Installation, Operation, and Maintenance

Series R
Helical Rotary Liquid Chillers
With heat recovery option

Models: RTHD
175-450 ton units (60 Hz)
125-410 ton units (50 Hz)

J99000002020

⚠ 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.

Feb. 2018

RTHD-SVX02H-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 procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- **Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.**
- **If there is a risk of arc or flash, technicians MUST put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, PRIOR to servicing the unit.**

Failure to follow recommendations could result in death or serious injury.

⚠ 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.

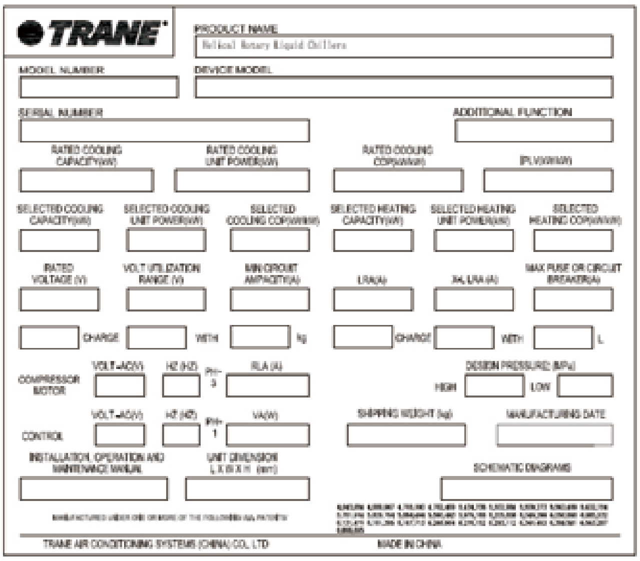
Contents

General Information

Unit Identification - Nameplates

When the unit arrives, compare all nameplate data with ordering, submittal, and shipping information. A typical unit nameplate is shown in Figure 1.

Figure 1. Typical Unit Nameplate



Unit Nameplates

The RTHD "unit" nameplate is applied to the exterior surface of the starter/ control panel. The "compressor" nameplate is applied to the compressor. The starter/control panel nameplate is located inside the panel.

The unit nameplate provides the following information:

- Unit model
- Unit Serial Number
- Unit device number.
  - » Identifies unit electrical requirements
  - » Lists correct operating charges of HFC-134a and refrigerant oil
  - » Lists unit test pressures and maximum working pressures.

The starter/control panel nameplate provides the following information:

- Panel model number
- Rated load amps
- Voltage
- Electrical characteristics - starter type, wiring
- Options included.

The compressor nameplate provides the following information:

- Compressor model descriptor
- Compressor serial number
- Compressor device number
- Motor serial number
- Compressor electrical characteristics
- Refrigerant.

Unit Inspection

When the unit is delivered, verify that it is the correct unit and that it is properly equipped. Inspect all exterior components for visible damage. Report any apparent damage or material shortage to the carrier and make a "unit damage" notation on the carrier's delivery receipt. Specify the extent and type of damage found and notify the appropriate Trane Sales Office.

Do not proceed with installation of a damaged unit without sales office approval.

Inspection Checklist

To protect against loss due to damage incurred in transit, complete the following checklist upon receipt of the unit.

- Inspect the individual pieces of the shipment before accepting the unit. Check for obvious damage to the unit or packing material.
- Inspect the unit for concealed damage as soon as possible after delivery and before it is stored. Concealed damage must be reported within 10 days after receipt.
- If concealed damage is discovered, stop unpacking the shipment. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
- Notify the Trane sales representative and arrange for repair. Do not repair the unit, however, until damage is inspected by the transportation representative.

Loose Parts Inventory

Check all items against the shipping list. Water vessel drain plugs, isolation pads, rigging and electrical diagrams, service literature and the starter/control panel wire pullbox (required on some starters) are shipped unassembled in the starter control panel.

Unit Description

The RTHD units are single compressor, helical-rotary type, water-cooled liquid chillers designed for installation indoors. Each unit is a completely assembled, hermetic package that is factory-piped, wired, leak-tested, dehydrated, charged (optional), and tested for proper control operation before shipment.

Figure 2 and Figure 3 show a typical RTHD unit and its components. Figure 4 and Figure 5 show a typical RTHD total recovery unit and its components. Figure 6 and Figure 7 show a typical RTHD partial heat recovery unit and its components. Water inlet and outlet openings are covered before shipment. The oil tank is factory charged with the proper amount of refrigeration oil. The unit can be factory charged with refrigerant.

Model Number Coding System

The model numbers for the unit and the compressor are composed of numbers and letters that represent features of the equipment. Shown in the three tables following are samples of typical unit, compressor, and panel model numbers, followed by the coding system for each.

Each position, or group of positions, in the model number is used to represent a feature. For example, in the first table, position 08 of the unit model number, Unit Voltage, contains the letter "F". An F in this position means that the unit voltage is 460/60/3.

Unit Model Number

Table 1. Model Number

Name	Code	M/N Digit	M/N Code	Description
MODL		**1-4**		**Basic product line**
	RTHD		RTHD	Water-Cooled Series R - Dev Sequence D
DCTL		**5**		**Manufacturing Plant**
	WCBU		U	Water Chiller Business Unit, Pueblo CO USA
	EPL		E	Epinal Business Unit, Charmes FR
	CHIN		C	China Business Unit
COMP		**6-7**		**Compressor**
	B1		B1	B1 compressor
	B2		B2	B2 compressor
	C1		C1	C1 compressor
	C2		C2	C2 compressor
	D1		D1	D1 compressor
	D2		D2	D2 compressor
	D3		D3	D3 compressor (50 Hz only)
	E3		E3	E3 compressor (50 Hz only)
VOLT		**8**		**Unit power supply**
	200A		A	200V/60Hz/3Ph power
	230A		C	230V/60Hz/3Ph power
	380A		D	380V/60Hz/3Ph power
	380B		R	380V/50Hz/3Ph power
	400B		T	400V/50Hz/3Ph power
	415B		U	415V/50Hz/3Ph power
	460A		F	460V/60Hz/3Ph power
	575A		H	575V/60Hz/3Ph power
SPEC		**9**		**Design Specials**
	NONE		X	None
	ELSE		C	Specials denoted elsewhere
	NOT		S	Specials not denoted elsewhere
DSEQ		**10-11**		**Design sequence**
	A0		A0	Factory/ABU assigned, start with A0
AGLT		**12**		**Agency listing**
	NONE		X	No agency listing
	CUL		U	C/UL listing
	CCC		3	CCC- Chinese Compulsory Code
CODE		**13**		**Pressure vessel code**
	ASME		A	ASME pressure vessel code
	CAN		C	Canadian code
	SQLO		L	Chinese code
	SPL		S	Special

Table 1. Model Number

Name	Code	M/N Digit	M/N Code	Description
EVAP		**14-15**		**Evaporator**
	B1		B1	B1 evaporator
	B2		B2	B2 evaporator
	C1		C1	C1 evaporator
	C2		C2	C2 evaporator
	D1		D1	D1 evaporator
	D2		D2	D2 evaporator
	D3		D3	D3 evaporator
	D4		D4	D4 evaporator
	D5		D5	D5 evaporator
	D6		D6	D5 evaporator
	E1		E1	E1 evaporator
	F1		F1	F1 evaporator
	F2		F2	F2 evaporator
	G1		G1	G1 evaporator
	G2		G2	G2 evaporator
	G3		G3	G3 evaporator
EVTM		**16**		**Evap Tube type**
	STD		A	Standard
EVWP		**17**		**Evaporator passes**
	2		2	2 Pass evaporator
	3		3	3 Pass evaporator
	4		4	4 Pass evaporator
EVWC		**18**		**Evaporator water connection**
	LH		L	Left hand evaporator connection
	RH		R	Right hand evaporator connection
EVCT		**19**		**Evaporator connection type**
	STD		A	Standard grooved pipe
	SPEC		S	Special
EVPR		**20**		**Evaporator water side pressure**
	LOW		L	150 PSI / 10.5 Bar evaporator water pressure
	HIGH		H	300 PSI / 21 Bar evaporator water pressure
COND		**21-22**		**Condenser**
	B1		B1	B1 condenser
	B2		B2	B2 condenser
	D1		D1	D1 condenser
	D2		D2	D2 condenser
	E1		E1	E1 condenser
	E2		E2	E2 condenser
	E3		E3	E3 condenser
	E4		E4	E4 condenser
	E5		E5	E5 condenser
	F1		F1	F1 condenser
	F2		F2	F2 condenser
	F3		F3	F3 condenser
	G1		G1	G1 condenser
	G2		G2	G2 condenser
	G3		G3	G3 condenser
	H1		H1	H1 condenser (totalheat recovery)
	H2		H2	H2 condenser (totalheat recovery)
	J1		J1	J1 condenser (totalheat recovery)
	J2		J2	J2 condenser (totalheat recovery)
	J3		J3	J3 condenser (totalheat recovery)
	K1		K1	K1 condenser (totalheat recovery)
	L1		L1	L1 condenser (partialheat recovery)
	L2		L2	L2 condenser (partialheat recovery)
	M1		M1	M1 condenser (partialheat recovery)
	M2		M2	M2 condenser (partialheat recovery)
	M3		M3	M3 condenser (partialheat recovery)
	N1		N1	N1 condenser (partialheat recovery)

Table 1. Model Number

Name	Code	M/N Digit	M/N Code	Description
CDTM		**23**		**Condenser tube type**
	CUFN		A	Enhanced fin - copper
	SMBR		B	Smooth bore - copper
	SBCN		C	Smooth bore - 90/10 Cu/Ni
CDWP		**24**		**Condenser passes**
	2		2	2 Pass
CDWC		**25**		**Condenser water connection**
	LH		L	Left hand condenser connection
	RH		R	Right hand condenser connection
CDCT		**26**		**Condenser connection type**
	STD		A	Standard grooved pipe
	MAR		C	Marine
	SPEC		S	Special
CDPR		**27**		**Condenser water side pressure**
	150		L	150 PSI / 10.5 Bar condenser water pressure
	300		H	300 PSI / 21 Bar condenser water pressure
CDLW		**28**		**Condenser Leaving Water Temp**
	STD		A	Standard (<45 deg C)
VLVS		**29**		**Refrigerant specialties**
	NONE		X	No refrigerant isolation valves
	VLV		V	Refrigerant isolation valves
OILC		**30**		**Oil Cooler**
	NONE		X	without oil cooler
	OIL		C	with oil cooler
INSL		**31**		**Thermal Insulation**
	NONE		X	No insulation
	INSC		Q	Factory insulation cold parts
	INSLS		S	Double insulation
SNDA		**32**		**Sound Attenuator**
	NONE		X	No insulation
	INSC		A	Standard attenuator
LANG		**33**		**Control,Label, and Literature Language**
	ENG		E	English
	CHN		C	Chinese
SFTY		**34**		**Safety Devices**
	STD		X	Standard
CHRG		**35**		**Shipping Charge**
	FACT		A	Full Factory Charge
	N2		B	Nitrogen
	FACP		C	Refrigerant charged less than 12kg(R134a)
PCKG		**36**		**Shipping Package**
	NONE		X	No shipping requirment
	SKID		Z	Shipment package+Unit bottom frame
FLOW		**37**		**Flow Switch**
	NONE		X	Without
	EVNM		A	Evap NEMA-1
	ECNM		B	Evap & Cond NEMA-1
	EWP		C	Evap Vapor
	ECVP		D	Evap & Cond Vapor
	ERNM		E	Evap & Cond & HR Cond NEMA-1
TEST		**38**		**Factory Performance Test**
	NONE		X	Without
	WIT		C	Witness test
	REP		D	Performance test w/report
	SPEC		S	Special
SRTY		**39**		**Starter Type**
	YDEL		Y	Wye-delta closed transition starter
	SSST		A	Solid State starter
MRLA		**40-42**		**Starter Type**
	MRLA		***	Slection RLA

Table 1. Model Number

Name	Code	M/N Digit	M/N Code	Description
PCON		**43**		**Power line connection type**
	TERM		A	Terminal block connection for incoming line(s)
	DISC		B	Mech disconnect switch
	CB		D	Circuit breaker
	CBHI		F	High interrupt circuit breaker
	GFCB		H	Ground fault circuit breaker
	GFHI		J	Ground fault high interrupt circuit breaker
ENC		**44**		**Enclosure type**
	NEMA		A	NEMA 1
WVUO		**45**		**Under/over voltage protection**
	NIST		X	No under/over voltage protection
	INST		U	Under/over voltage protection
OPIN		**46**		**Unit operator interface**
	DVA		A	Dyna-View operator interface-Pueblo
	DVD		D	Dyna-View/Spanish
	DVG		G	Dyna-View/Trad.Chinese
	DVH		H	Dyna-View/Simp.Chinese
	DVJ		J	Dyna-View/Japanese
	DVK		K	Dyna-View/Portugese(Brazil)
	DVL		L	Dyna-View/Korean
	DVM		M	Dyna-View/Thai
COMM		**47**		**Remote Interfaces (digital comm)**
	NIST		X	No remote digital comm
	TRM4		4	Tracer Comm 4 Interface
	TRM5		5	Tracer Comm 5 LCI-C (LonTalk)
SETP		**48**		**External Chilled Water & Current Limit Setpoint**
	NIST		X	None
	INST		4	4-20 ma input
	INSA		2	2-10 Vdc input
BSLD		**49**		**External Base Loading**
	NIST		X	None
	INST		4	4-20 ma input
	INSA		2	2-10 Vdc input
ICEB		**50**		**Icemaking**
	NIST		X	None
	INST		A	Icemaking with relay
	INSA		B	Icemaking without relay
STAT		**51**		**Programmable Relays**
	NIST		X	None
	INST		R	Programmable Relay
OATS		**52**		**Chilled water reset -outdoor air temp**
	NIST		X	No Sensor (return water CHW reset standard)
	INST		T	Chilled water reset - outdoor air temp
RPOT		**53**		**Reg. Valve & RLA**
	NIST		X	None
	WREG		V	Condenser reg. Valve out & % RLA out
	HPC		P	Condenser Pressure (%HPC) & % RLA out
	DELP		D	Chiller Delta P & %RLA out
RMTP		**54**		**Refrigerant Monitor Input**
	NIST		X	None
	INST		A	100 ppm / 4-20 ma
	INSA		B	1000 ppm / 4-20 ma
	INSB		C	100 ppm / 2-10 Vdc
	INSC		D	1000 ppm / 2-10 Vdc
HWCT		**55**		**Hot water Control**
	NIST		X	None
	INST		H	with hot water control
IACC		**56**		**Installation Accessories**
	NONE		X	NONE
	NISO		A	Elastomeric Isolators

Table 1. Model Number

Name	Code	M/N Digit	M/N Code	Description
HR		**57**		**Heat Recovery**
	NONE		X	NONE
	1		1	Partial Heat recovery
	2		2	Total Heat recovery

Model Number (located on compressor nameplate)

Table 2. Compressor Model Number

Selection Category	M/N Digit	M/N Code	Description of Selection
Compressor Series	1-4	CHHC	Semi-Hermetic Heli-Rotor Compressor
Design Control	5	1	Pueblo
Compressor Frame	6	B	B Frame
		C	C Frame
		D	D Frame
		E	E Frame
Compressor Capacity	7	1	Smaller capacity (minor)
		2	Larger capacity (major)
		3	Special 50 Hz capacity
Motor	8	A	200V/60Hz/3
		C	230V/60Hz/3
		D	380V/60Hz/3
		F	460V/60Hz/3 or 400V/50Hz/3
		H	575V/60Hz/3
Specials	9	O	No Specials
		C	Specials Denoted Elsewhere
		S	Uncategorized Special not denoted elsewhere
Design Sequence	10-11	AO	1st Design (Factory Input)

Figure 2. Component Location for Typical RTHD Unit

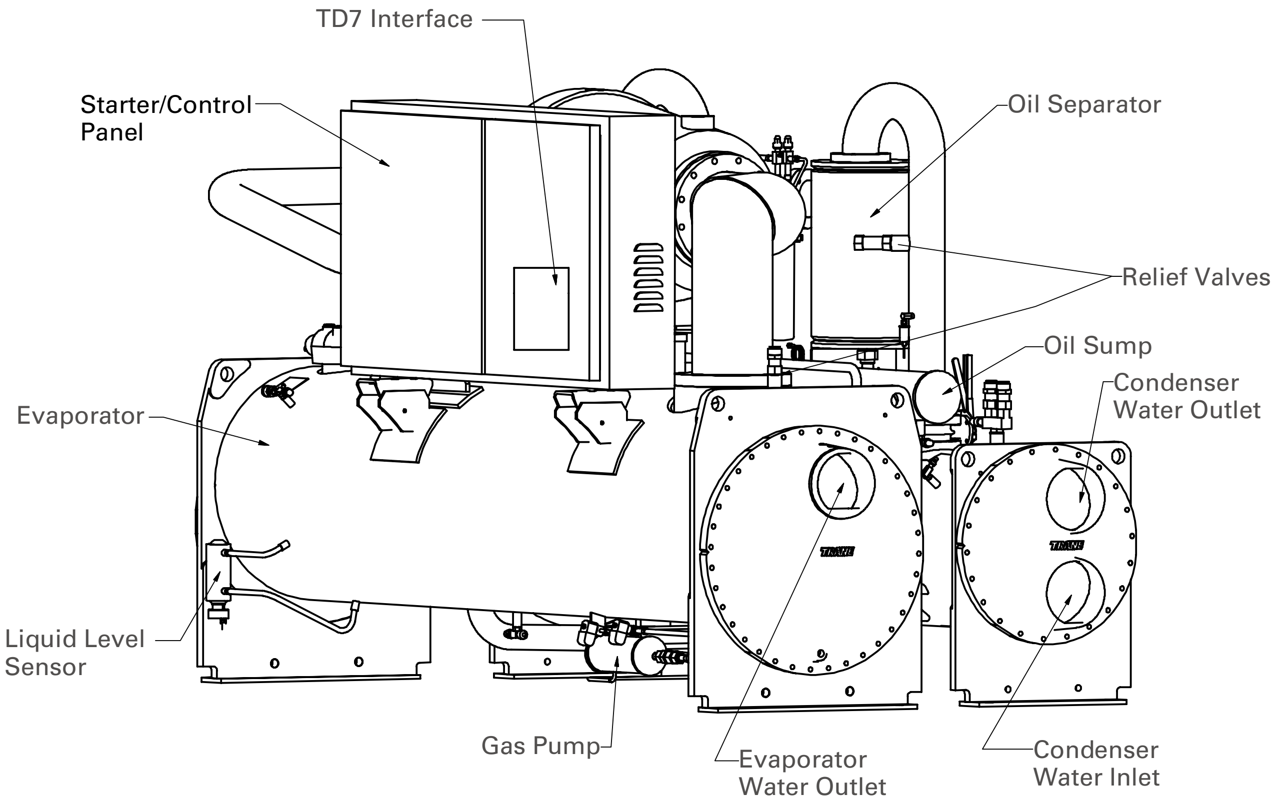


Figure 3. Component Location for Typical RTHD Unit (Back View)

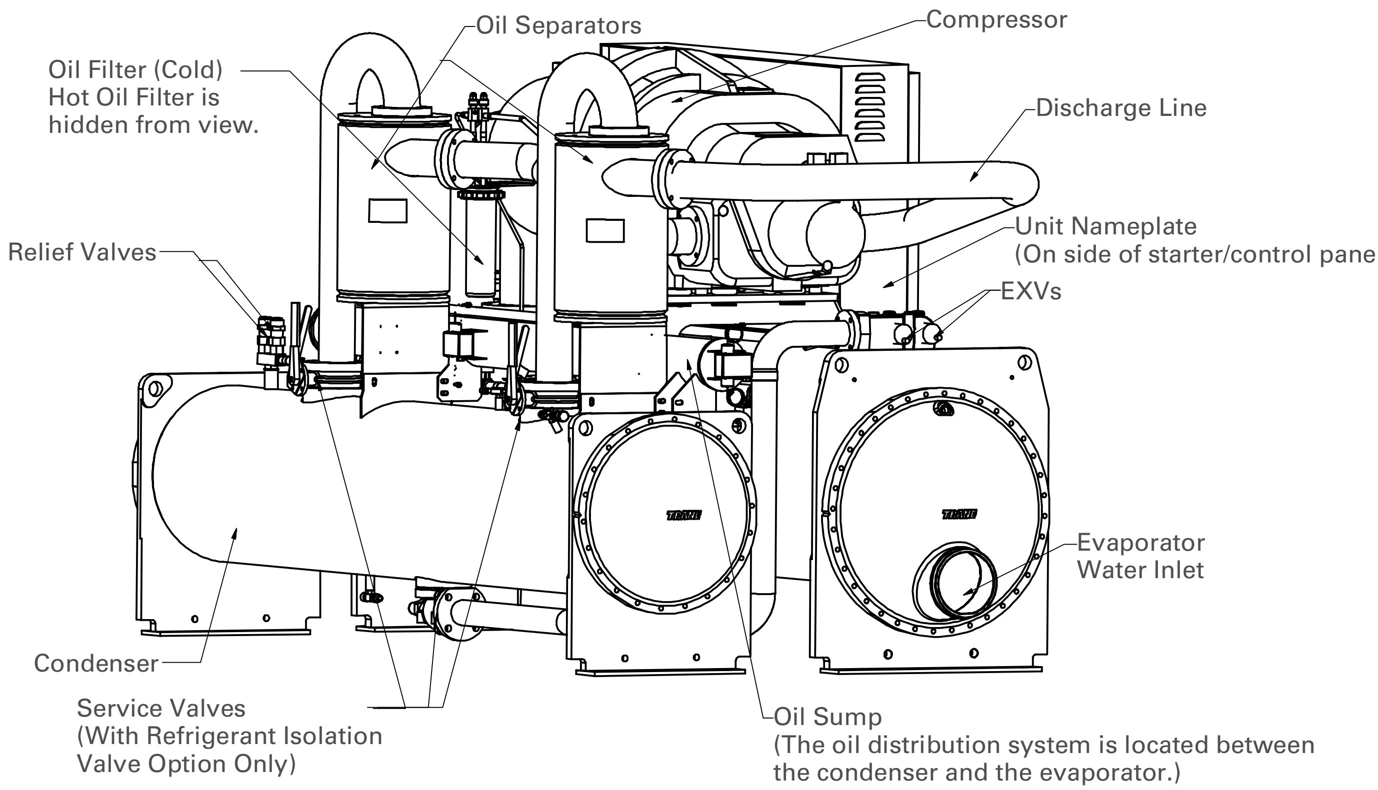


Figure 4. Component Location for Typical RTHD Total Heat Reclaim Unit

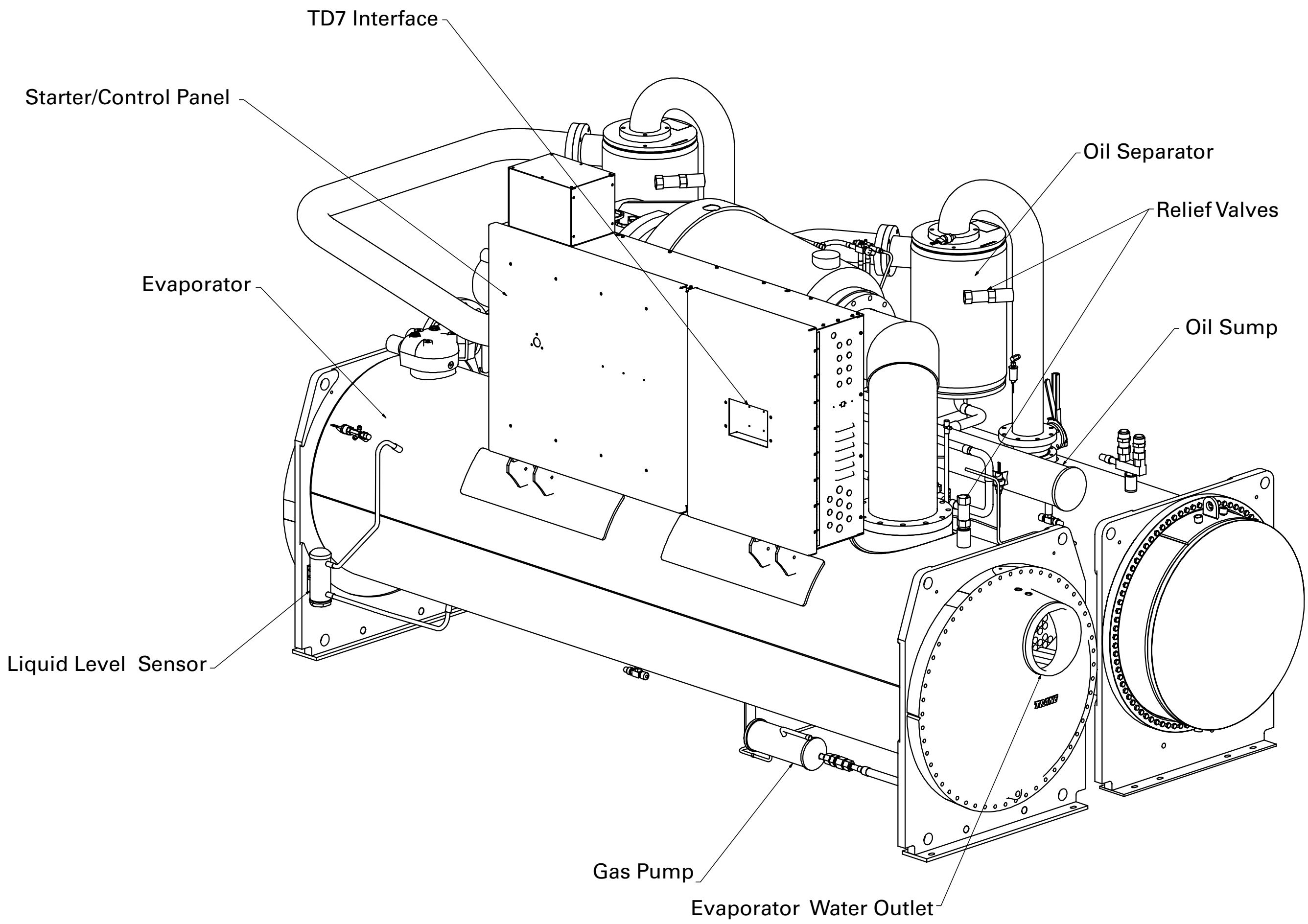


Figure 5. Component Location for Typical RTHD Total Heat Reclaim Unit (Back View)

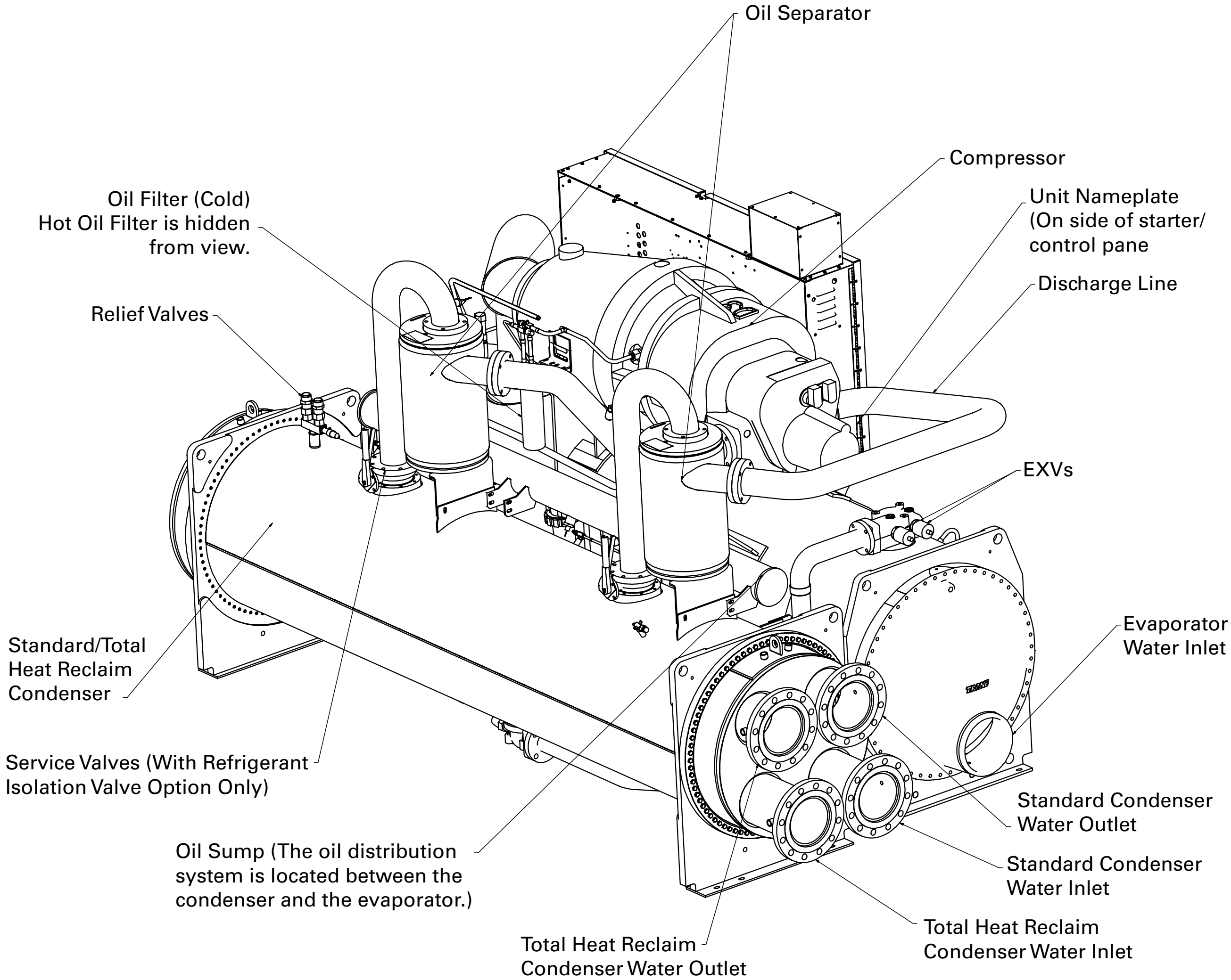


Figure 6. Component Location for Typical RTHD Partial Heat Reclaim Unit

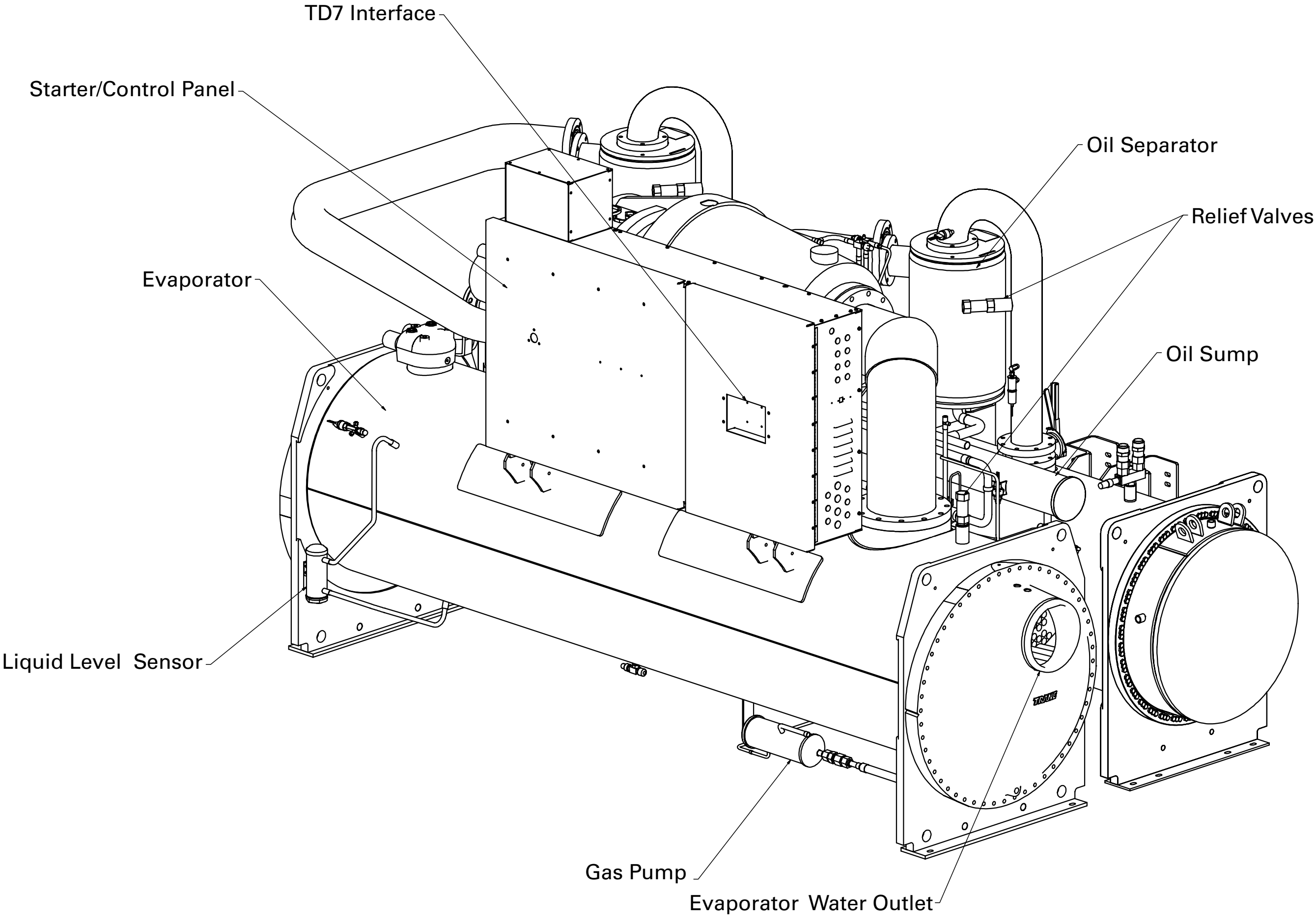
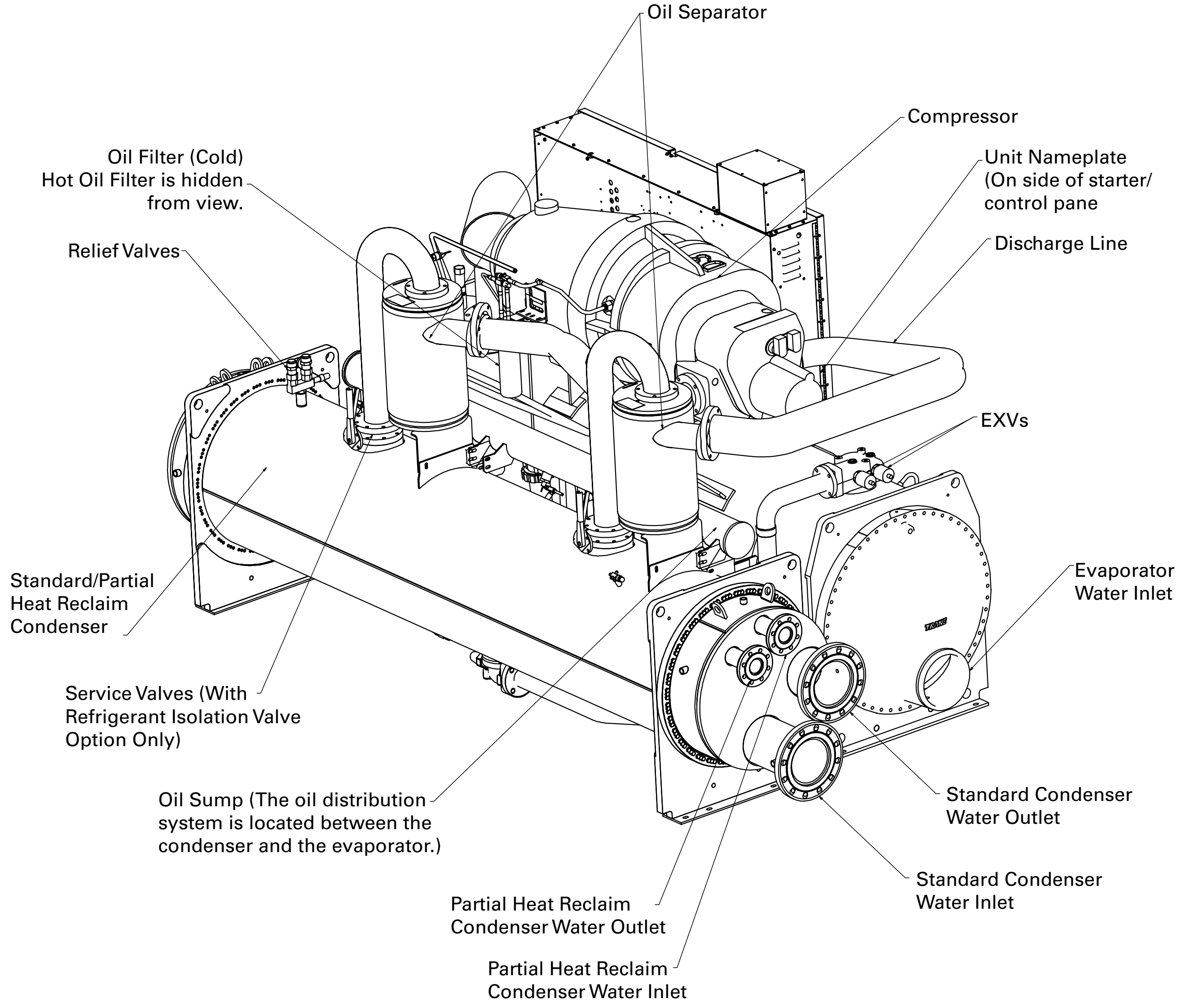


Figure 7. Component Location for Typical RTHD Partial Heat Reclaim Unit (Back View)



Installation Overview

For convenience, Table 3 summarizes responsibilities that are typically associated with the RTHD chiller installation process.

Table 3. Installation Responsibility Chart for RTHD Units

Requirement	Trane-supplied, Trane-installed	Trane-supplied, Field-installed	Field-supplied, Field-installed
• Rigging			• Safety chains • Clevis connectors - Lifting beam
• Isolation		• Isolation pads • Elastomeric Isolators (option)	• Isolation pads • Elastomeric Isolators (option)
• Electrical	• Circuit breakers or non-fused disconnects (optional) • Unit-mounted starter	• Circuit breaker or non-fused disconnect handle • Temperature sensor (optional outdoor air) • Flow switches (may be fieldsupplied) • Condenser water regulating valve controller (optional: may be fiel-supplied)	• Circuit breakers or fusible disconnects (optional) • Terminal lugs • Ground connection(s) • Jumper bars • BAS wiring (optional) • IPC wiring • Control voltage wiring • High condenser pressure interlock wiring • Chilled water pump contactor and wiring • Condenser water pump contactor and wiring • Optional relays and wiring
• Water piping		• Flow switches (may be fieldsupplied) • Condenser water regulating valve controller (optional: may be field-supplied)	• Thermometers • Water flow pressure gauges • Isolation and balancing valves water piping • Vents and drain valves • Pressure relief valves (for water boxes as required)
• Pressure Relief	• Relief valves		• Vent line and flexible connector
• Insulation	• Insulation (optional)		• Insulation

Refer to the Installation Mechanical and Installation Electrical sections of this manual for detailed installation instructions.

- Locate and maintain the loose parts, e.g. isolators, temperature sensors, flow sensors or other factory-ordered, field-installed options, for installation, as required. Loose parts are located in the starter/control panel.
- Install the unit on a foundation with flat support surfaces, level within 1/4” (6.35 mm) and of sufficient strength to support concentrated loading. Place the manufacturer-supplied isolation pad assemblies under the unit.
- Install the unit per the instructions outlined in the Mechanical Installation section.
- Complete all water piping and electrical connections.

Note: *Field piping must be arranged and supported to avoid stress on the equipment. It is strongly recommended that the piping contractor provide at least 3 feet (914 mm) of clearance between the pre-installation piping and the planned location of the unit. This will allow for proper fit-up upon arrival of the unit at the installation site. All necessary piping adjustments can be made at that time. Refer to the current engineering bulletin for further details on installation.*

- Where specified, supply and install valves in the water piping upstream and downstream of the evaporator and condenser water boxes, to isolate the shells for maintenance and to balance/trim the system.
- Supply and install condenser water control valve(s) per Trane Engineering Bulletin -Water Cooled Series R® Condenser Water Contol.
- Supply and install flow switches or equivalent devices in both the chilled water and condenser water piping. Interlock each switch with the proper pump starter and UC800, to ensure that the unit can only operate when water flow is established.
- Supply and install taps for thermometers and pressure gauges in the water piping, adjacent to the inlet and outlet connections of both the evaporator and the condenser.
- Supply and install drain valves on each water box.
- Supply and install vent cocks on each water box.
- Where specified, supply and install strainers ahead of all pumps and automatic modulating valves.
- Supply and install refrigerant pressure relief piping from the pressure relief to the atmosphere.
- If necessary, supply enough HCFC-134 refrigerant and dry nitrogen (75 psig) for pressure testing.
- Start the unit under supervision of a qualified service

technician.

- Where specified, supply and insulate the evaporator and any other portion of the unit, as required, to prevent sweating under normal operating conditions.
- For unit-mounted starters, cutouts are provided at the top of the panel for line-side wiring.
- Supply and install the wire terminal lugs to the starter.
- Supply and install field wiring to the line-side lugs of the starter.

Table 4. General Data

	Unit Designator (corresponds to digits 6, 7, 14, 15, 21, 22 of unit model number)						
	D1D1E1	**D1F1F2**	**D1G1G1**	**D1G2G2**	**D2D2E2**	**D2F2F3**	**D2G3G3 / D3G3G3**
General							
Refrigerant Type	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb (kg))	473 (215)	623 (283)	700 (318)	700 (318)	473 (215)	623 (283)	700 (318)
Oil Charge (gal(l))	6 (23)	10 (38)	11 (42)	11 (42)	6 (23)	10 (38)	11 (42)
Operating Weight (lb(kg))	15385 (6978)	17537 (7955)	20500 (9299)	21065 (9555)	15570 (7063)	18220 (8265)	21641 (9816)
Shipping Weight (lb(kg))	14443 (6551)	16187 (7342)	18600 (8437)	19107 (8667)	14562 (6605)	16820 (7630)	19508 (8849)
Overall Dimensions							
Length (in(mm))	130 (3313)	147 (3736)	149 (3774)	149 (3774)	130 (3313)	147 (3736)	149 (3774)
Width (in(mm))	68 (1717)	68 (1717)	70 (1771)	70 (1771)	68 (1717)	68 (1717)	70 (1771)
Height (in(mm))	76 (1937)	76 (1937)	80 (2033)	80 (2033)	76 (1937)	76 (1937)	80 (2033)
Evaporator							
Water Storage (gal (l))	69 (261)	102 (386)	136 (515)	144 (545)	74 (280)	107 (405)	159 (602)
Minimum Flow (gpm (l/s)) Water	415 (26) for 2-pass	563 (36) 2-pass	505 (35) 3 pass	505 (35) for 3-pass	450 (28) for 2-pass	604 (38) for 2-pass	622 (39) for 3-pass
	275 (17) for 3-pass	376 (24) 3-pass	379 (24) 4 pass	411 (26) for 4-pass	300 (20) for 3-pass	404 (25) for 3-pass	466 (29) for 4-pass
Minimum Flow (gpm (l/s))Brine	498 (31) for 2-pass	676 (43) 2-pass	606 (38) 3 pass	660 (42) for 3-pass	541 (34) for 2-pass	725 (46) for 2-pass	747 (47) for 3-pass
	330 (21) for 3-pass	454 (29) 3-pass	454 (29) 4 pass	492 (31) for 4-pass	357 (23) for 3-pass	487 (31) for 3-pass	557 (35) for 4-pass
Maximum Flow (gpm (l/s))	1812 (114) for 2-pass	2478 (156) for 2-pass	2218 (139) 3 pass	2413 (152) for 3-pass	1980 (125) for 2-pass	2667 (168) for 2-pass	2732 (172) for 3-pass
	1206 (76) for 3-pass	1655 (104) for 3-pass	1666 (104) 4 pass	1807 (114) for 4-pass	1320 (83) for 3-pass	1780 (112) for 3-pass	2050 (129) for 4-pass
Condenser (all are 2-pass)							
Water Storage (gal (l))	44 (166)	57 (216)	79 (299)	91 (344)	47 (178)	61 (231)	97 (367)
Minimum Flow (gpm (l/s))Water	291 (18)	355 (22)	444 (28)	535 (34)	316 (20)	385 (24)	589 (37)
Minimum Flow (gpm (l/s))Brine	350 (22)	430 (27)	530 (33)	650 (41)	380 (24)	460 (29)	710 (45)
Max Flow (gpm (l/s))	1280 (81)	1560 (98)	1960 (124)	2360 (149)	1390 (88)	1700 (107)	2600 (164)

All weights ±3%, include standard 150 psig water boxes.
Operating weights include refrigerant, oil, and water charges.
If oil cooler is installed, add 1/4 gal (1 liter) to the oil charge value given for B family units; add 1.0 gal (4 liters) for all other units.
Overall dimensions are based on 3-pass evap/2 configurations pass cond and LH/RH water connections. Refer to TOPSS for exact job configurations.

Table 5. General Data

	Unit Designator (corresponds to digits 6, 7, 14, 15, 21, 22 of unit model number)						
	D2G2G1	**D3D2E2**	**D3F2F3**	**D3G2G1**	**E3D2E2**	**E3F2F3**	**E3G2G1**
General							
Refrigerant Type	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb (kg))	700 (318)	473 (215)	623 (283)	700 (318)	473 (215)	623 (283)	700 (318)
Oil Charge (gal(l))	11 (42)	6 (23)	10 (38)	11 (42)	11 (42)	6 (23)	10 (38)
Operating Weight (lb(kg))	20700 (9389)	15570 (7063)	18220 (8265)	20700 (9389)	15728 (7134)	18356 (8326)	20800 (9435)
Shipping Weight (lb(kg))	18700 (8482)	14562 (6605)	16820 (7630)	18700 (8482)	14720 (6677)	16956 (7695)	18800 (8552)
Overall Dimensions							
Length (in(mm))	149 (3774)	130 (3313)	147 (3736)	149 (3774)	130 (3313)	147 (3736)	149 (3774)
Width (in(mm))	70 (1771)	68 (1717)	68 (1717)	70 (1771)	68 (1717)	68 (1717)	70 (1771)
Height (in(mm))	80 (2033)	76 (1937)	76 (1937)	80 (2033)	76 (1937)	76 (1937)	80 (2033)
Evaporator							
Water Storage (gal (l))	144 (545)	74 (280)	107 (405)	144 (545)	74 (280)	107 (405)	144 (545)
Minimum Flow (gpm (l/s)) Water	550 (35) 3-pass	405 (28) for 2-pass	604 (38) 2-pass	550 (35) 3-pass	405 (28) 2-pass	604 (38) 2-pass	550 (35) 3-pass
	411 (26) 4-pass	300 (19) for 3-pass	404 (25) 3-pass	411 (26) 4-pass	300 (19) 3-pass	404 (25) 3-pass	411 (26) 4-pass
Minimum Flow (gpm (l/s))Brine	660 (42) 3-pass	541 (34) for 2-pass	725 (46) 2-pass	660 (42) 3-pass	541 (34) 2-pass	725 (46) 2-pass	660 (42) 3-pass
	492 (31) 4-pass	357 (23) for 3-pass	487 (31) 3-pass	492 (31) 4-pass	357 (23) 3-pass	487 (31) 3-pass	492 (31) 4-pass
Maximum Flow (gpm (l/s))	2413 (152) for 3-pass	1980 (125) for 2-pass	2667 (168) for 2-pass	2413 (152) for 3-pass	1980 (125) 2-pass	2667 (168) for 2-pass	2413 (152) for 3-pass
	1807 (114) for 4-pass	1320 (83) for 3-pass	1780 (112) for 3-pass	1807 (114) for 4-pass	1320 (83) for 3-pass	1780 (112) for 3-pass	1807 (114) for 4-pass
Condenser (all are 2-pass)							
Water Storage (gal (l))	79 (299)	47 (178)	61 (231)	79 (299)	47 (178)	61 (231)	79 (299)
Minimum Flow (gpm (l/s))Water	444 (28)	316 (20)	355 (22)	444 (28)	316 (20)	355 (22)	444 (28)
Minimum Flow (gpm (l/s))Brine	530 (33)	380 (24)	460 (29)	530 (33)	380 (24)	460 (29)	530 (33)
Max Flow (gpm (l/s))	1960 (124)	1390 (88)	1700 (107)	1960 (124)	1390 (88)	1700 (107)	1960 (124)

All weights ±3%, include standard 150 psig water boxes.
Operating weights include refrigerant, oil, and water charges.
If oil cooler is installed, add 1/4 gal (1 liter) to the oil charge value given for B family units; add 1.0 gal (4 liters) for all other units.
Overall dimensions are based on 3-pass evap/2 pass cond and LH/RH water connections. Refer to TOPSS for exact job configurations.

Table 6. General Data

	Unit Designator (corresponds to digits 6, 7, 14, 15, 21, 22 of unit model number)						
	C1C2D2	**C1D6E5**	**C1D5E4**	**C1D3E3**	**C1E1F1**	**C2D4E4**	**C2D3E3**
General							
Refrigerant Type	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb (kg))	490 (222)	490 (222)	490 (222)	490 (222)	525 (238)	490 (222)	490 (222)
Oil Charge (gal(l))	6 (23)	6 (23)	6 (23)	6 (23)	10 (38)	6 (23)	6 (23)
Operating Weight (lb(kg))	12460 (5652)	13397 (6077)	13673 (6202)	15044 (6824)	15818 (7175)	13672 (6202)	15044 (6824)
Shipping Weight (lb(kg))	11735 (5334)	12780 (5797)	12973 (5885)	14002 (6351)	14718 (6675)	12972 (5884)	14002 (6351)
Overall Dimensions							
Length (in(mm))	145 (3674)	130 (3313)	130 (3313)	130 (3313)	146 (3712)	130 (3313)	130 (3313)
Width (in(mm))	67 (1695)	68 (1717)	68 (1717)	68 (1717)	68 (1717)	68 (1717)	68 (1717)
Height (in(mm))	74 (1870)	76 (1937)	76 (1937)	76 (1937)	76 (1937)	76 (1937)	76 (1937)
Evaporator							
Water Storage (gal (l))	58 (220)	45 (170)	52 (197)	78 (295)	82 (311)	52 (197)	78 (295)
Minimum Flow (gpm (l/s)) Water	347 (22) for 2-pass	293 (18) for 2-pass	351 (21) for 2-pass	465 (31) for 2-pass	450 (28) for 2-pass	351 (21) for 2-pass	465 (31) for 2-pass
	232 (15) for 3-pass	196 (12) for 3-pass	234 (15) or 3-pass	324 (20) or 3-pass	300 (19) for 3-pass	234 (15) or 3-pass	324 (20) for 3-pass
Minimum Flow (gpm (l/s))Brine	375 (24) for 2-pass	352 (22) for 2-pass	422 (27) for 2-pass	584 (37) for 2-pass	487 (31) for 2-pass	422 (27) for 2-pass	584 (37) for 2-pass
	276 (17) for 3-pass	233 (15) for 3-pass	281 (18) or 3-pass	389 (25) or 3-pass	357 (23) for 3-pass	281 (18) for 3-pass	389 (25) for 3-pass
Maximum Flow (gpm (l/s))	1531 (97) for 2-pass	1287 (81) for 2-pass	1542 (97)or 2-pass	2131 (134)or 2-pass	1980 (125) for 2-pass	1542 (97) for 2-pass	2131 (134) for 2-pass
	1022 (150) for 3-pass	860 (54) for 3-pass	1028 (65) or 3-pass	1417 (89) or 3-pass	1320 (83) for 3-pass	1028 (65) for 3-pass	1417 (89) for 3-pass
Condenser (all are 2-pass)							
Water Storage (gal (l))	34 (129)	29 (110)	32 (121)	47 (178)	60 (226)	32 (121)	47 (178)
Minimum Flow (gpm (l/s))Water	212 (13)	206 (13)	245 (15)	325 (21)	375 (24)	245 (15)	325 (21)
Minimum Flow (gpm (l/s))Brine	255 (16)	250 (16)	295 (19)	390 (25)	450 (28)	295 (19)	390 (25)
Max Flow (gpm (l/s))	935 (59)	910 (57)	1080 (68)	1420 (90)	1650 (104)	1080 (68)	1420 (90)

All weights ±3%, include standard 150 psig water boxes.
Operating weights include refrigerant, oil, and water charges.
If oil cooler is installed, add 1/4 gal (1 liter) to the oil charge value given for B family units; add 1.0 gal (4 liters) for all other units.
Overall dimensions are based on 3-pass evap/2 configurations pass cond and LH/RH water connections. Refer to TOPSS for exact job configurations.

General Information

Table 7. General Data

	Unit Designator (corresponds to digits 6, 7, 14, 15, 21, 22 of unit model number)					
	C2E1F1	**C2F2F3**	**B1B1B1**	**B1C1D1**	**B2B2B2**	**B2C2D2**
General						
Refrigerant Type	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb (kg))	525 (238)	700 (318)	410 (186)	490 (222)	410 (186)	490 (222)
Oil Charge (gal(l))	10 (38)	11 (42)	4.5 (17.0)	4.5 (17.0)	4.5 (17.0)	4.5 (17.0)
Operating Weight (lb(kg))	15818 (7175)	17560 (7965)	9867 (4476)	10554 (4787)	10019 (4544)	10653 (4832)
Shipping Weight (lb(kg))	14718 (6675)	16168 (7334)	9292 (4215)	9837 (4462)	9402 (4265)	9953 (4515)
Overall Dimensions						
Length (in(mm))	146 (3712)	147 (3736)	126 (3210)	145 (3674)	126 (3210)	145 (3674)
Width (in(mm))	68 (1717)	68 (1717)	64 (1634)	64 (1634)	64 (1634)	64 (1634)
Height (in(mm))	76 (1937)	76 (1937)	73 (1849)	73 (1849)	73 (1849)	73 (1849)
Evaporator						
Water Storage (gal (l))	82 (311)	107 (405)	41 (155)	55 (208)	45 (170)	58 (220)
Minimum Flow (gpm (l/s)) Water	450 (28) for 2-pass	604 (38) for 2-pass	253 (16) for 2-pass	320 (18) for 2-pass	288 (22) for 2-pass	347 (22) for 2-pass
	300 (19) for 3-pass	404 (25) for 3-pass	168 (11) for 3-pass	213 (12) for 3-pass	192 (15) for 3-pass	232 (15) for 3-pass
Minimum Flow (gpm (l/s))Brine	487 (31) for 2-pass	725 (46) for 2-pass	303 (19) for 2-pass	346 (22) for 2-pass	346 (22) for 2-pass	375 (24) for 2-pass
	357 (23) for 3-pass	487 (31) for 3-pass	200 (13) for 3-pass	254 (16) for 3-pass	233 (15) for 3-pass	276 (17) for 3-pass
Maximum Flow (gpm (l/s))	1980 (152) for 2-pass	2667 (168) for 2-pass	1104 (70) for 2-pass	1412 (89) for 2-pass	1266 (80) for 2-pass	1531 (97) for 2-pass
	1320 (83) for 3-pass	1780 (112) for 3-pass	736 (46) for 3-pass	941 (59) for 3-pass	844 (53) for 3-pass	1022 (65) for 3-pass
Condenser (all are 2-pass)						
Water Storage (gal (l))	60 (226)	61 (231)	28 (106)	31 (117)	29 (110)	34 (129)
Minimum Flow (gpm (l/s))Water	357 (24)	355 (22)	193 (12)	193 (12)	212 (13)	212 (13)
Minimum Flow (gpm (l/s))Brine	450 (28)	460 (29)	230 (15)	230 (15)	255 (16)	255 (16)
Max Flow (gpm (l/s))	1650 (104)	1700 (107)	850 (54)	850 (54)	935 (59)	935 (59)

All weights ±3%, include standard 150 psig water boxes.
Operating weights include refrigerant, oil, and water charges.
If oil cooler is installed, add 1/4 gal (1 liter) to the oil charge value given for B family units; add 1.0 gal (4 liters) for all other units.
Overall dimensions are based on 3-pass evap/2 pass cond and LH/RH water connections. Refer to TOPSS for exact job configurations.

Table 8. General Data

	Unit Designator (corresponds to digits 6, 7, 14, 15, 21, 22 of unit model number)							
	B1C1H1	**B2C2H2**	**C1E1J1**	**C2F2J3**	**D1F1J2**	**D2G2K1**	**D3G2K1**	**E3G2K1**
General								
Refrigerant Type	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb (kg))	567 (257)	567 (257)	646 (293)	746 (338.5)	745 (338)	789 (358)	789 (358)	789 (358)
Oil Charge (gal(l))	7.5 (28.0)	7.5 (28.0)	11 (42)	12 (45)	11 (42)	13.5 (51)	13.5 (51)	13.5 (51)
Operating Weight (lb(kg))	12413 (5626)	12570 (5697)	19322 (8757)	21014 (9524)	21046 (9538)	24188 (10962)	24188 (10962)	24290 (11008)
Shipping Weight (lb(kg))	11180 (5067)	11363 (5150)	17365 (7870)	18830 (8534)	18792 (8517)	21363 (9682)	21363 (9682)	21465 (9728)
Overall Dimensions								
Length (in(mm))	157 (3995)	157 (3995)	157 (3996)	158 (4007)	158 (4007)	160 (4062)	160 (4062)	160 (4062)
Width (in(mm))	72 (1830)	72 (1830)	77 (1953)	77 (1953)	77 (1953)	77 (1960)	77 (1960)	77 (1960)
Height (in(mm))	76 (1919)	76 (1919)	82 (2078)	82 (2078)	82 (2078)	81 (2061)	81 (2061)	81 (2061)
Evaporator								
Water Storage (gal (l))	55 (208)	58 (220)	82 (311)	107 (405)	102 (386)	144 (545)	144 (545)	144 (545)
Minimum Flow (gpm (l/s)) Water	320(18) 2 -pass	347(22) 2 -pass	450(28) 2 -pass	604(38) 2 -pass	563(36) 2 -pass	550(35) 3 -pass	550(35) 3 -pass	550(35) 3 -pass
	213(12) 3 -pass	232(15) 3 -pass	300(19) 3 -pass	404(25) 3 -pass	376(24) 3 -pass	411(26) 4 -pass	411(26) 4 -pass	411(26) 4 -pass
Minimum Flow (gpm (l/s))Brine	346(22) 2 -pass	375(24) 2 -pass	487(31) 2 -pass	725(46) 2 -pass	676(43) 2 -pass	660(42) 3 -pass	660(42) 3 -pass	660(42) 3 -pass
	254(16) 3 -pass	276(17) 3 -pass	357(23) 3 -pass	487(31) 3 -pass	454(29) 3 -pass	492(31) 4 -pass	492(31) 4 -pass	492(31) 4 -pass
Maximum Flow (gpm (l/s))	1412(89) 2 -pass	1531(97) 2 -pass	1980(152) 2 -pass	2667(168) 2 -pass	2478(156) 2 -pass	2413(152) 3 -pass	2413(152) 3 -pass	2413(152) 3 -pass
	941(59) 3 -pass	1022(65) 3 -pass	1320(83) 3 -pass	1780(112) 3 -pass	1655(104) 3 -pass	1807(114) 4 -pass	1807(114) 4 -pass	1807(114) 4 -pass
Condenser (Main condensation side waterway)								
Water Storage (gal (l))	42 (158)	43 (162)	74 (279)	71 (267)	75 (285)	84 (316)	84 (316)	84 (316)
Minimum Flow (gpm (l/s))Water	190 (12)	206 (13)	380 (24)	349 (22)	349 (22)	444 (28)	444 (28)	444 (28)
Minimum Flow (gpm (l/s))Brine	238 (15)	254 (16)	444 (28)	460 (29)	428 (27)	523 (33)	523 (33)	523 (33)
Max Flow (gpm (l/s))	856 (54)	935 (59)	1649 (104)	1696 (107)	1554 (98)	1966 (124)	1966 (124)	1966 (124)
Condenser (Full heat recovery side channel)								
Water Storage (gal (l))	42 (158)	43 (162)	74 (279)	71 (267)	75 (285)	84 (316)	84 (316)	84 (316)
Minimum Flow (gpm (l/s))Water	190 (12)	206 (13)	380 (24)	349 (22)	349 (22)	444 (28)	444 (28)	444 (28)
Minimum Flow (gpm (l/s))Brine	238 (15)	254 (16)	444 (28)	460 (29)	428 (27)	523 (33)	523 (33)	523 (33)
Max Flow (gpm (l/s))	856 (54)	935 (59)	1649 (104)	1696 (107)	1554 (98)	1966 (124)	1966 (124)	1966 (124)

All weights ±3%, include standard 150 psig water boxes.
Operating weights include refrigerant, oil, and water charges.
If oil cooler is installed, add 1/4 gal (1 liter) to the oil charge value given for B family units; add 1.0 gal (4 liters) for all other units.
Overall dimensions are based on 3-pass evap/2 pass cond and LH/RH water connections. Refer to TOPSS for exact job configurations.

Table 9. General Data

	Unit Designator (corresponds to digits 6, 7, 14, 15, 21, 22 of unit model number)							
	B1C1L1	**B2C2L2**	**C1E1M1**	**C2F2M3**	**D1F1M2**	**D2G2N1**	**D3G2N1**	**E3G2N1**
General								
Refrigerant Type	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb (kg))	490 (222)	490 (222)	545 (247)	645 (292.5)	644 (292)	725 (329)	725 (329)	725 (329)
Oil Charge (gal(l))	7.5 (28.0)	7.5 (28.0)	11 (42)	12 (45)	11 (42)	13.5 (51)	13.5 (51)	13.5 (51)
Operating Weight (lb(kg))	11259 (5102)	11360 (5148)	17040 (7723)	18737 (8492)	18790 (8516)	22597 (10241)	22597 (10241)	22698 (10287)
Shipping Weight (lb(kg))	10298 (4667)	10426 (4725)	15556 (7050)	17010 (7709)	17017 (7712)	20205 (9157)	20205 (9157)	20306 (9203)
Overall Dimensions								
Length (in(mm))	150 (3815)	150 (3815)	149 (3780)	149 (3780)	149 (3780)	161 (4085)	161 (4085)	161 (4085)
Width (in(mm))	67 (1701)	67 (1701)	71 (1814)	72 (1821)	72 (1821)	76 (1925)	76 (1925)	76 (1925)
Height (in(mm))	75 (1892)	75 (1892)	77 (1949)	77 (1949)	77 (1949)	79 (2002)	79 (2002)	79 (2002)
Evaporator								
Water Storage (gal (l))	55 (208)	58 (220)	82 (311)	107 (405)	102 (386)	144 (545)	144 (545)	144 (545)
Minimum Flow (gpm (l/s)) Water	320(18) 2 -pass	347(22) 2 -pass	450(28) 2 -pass	604(38) 2 -pass	563(36) 2 -pass	550(35) 3 -pass	550(35) 3 -pass	550(35) 3 -pass
	213(12) 3 -pass	232(15) 3 -pass	300(19) 3 -pass	404(25) 3 -pass	376(24) 3 -pass	411(26) 4 -pass	411(26) 4 -pass	411(26) 4 -pass
Minimum Flow (gpm (l/s))Brine	346(22) 2 -pass	375(24) 2 -pass	487(31) 2 -pass	725(46) 2 -pass	676(43) 2 -pass	660(42) 3 -pass	660(42) 3 -pass	660(42) 3 -pass
	254(16) 3 -pass	276(17) 3 -pass	357(23) 3 -pass	487(31) 3 -pass	454(29) 3 -pass	492(31) 4 -pass	492(31) 4 -pass	492(31) 4 -pass
Maximum Flow (gpm (l/s))	1412(89) 2 -pass	1531(97) 2 -pass	1980(152) 2 -pass	2667(168) 2 -pass	2478(156) 2 -pass	2413(152) 3 -pass	2413(152) 3 -pass	2413(152) 3 -pass
	941(59) 3 -pass	1022(65) 3 -pass	1320(83) 3 -pass	1780(112) 3 -pass	1655(104) 3 -pass	1807(114) 4 -pass	1807(114) 4 -pass	1807(114) 4 -pass
Condenser (Main condensation side waterway)								
Water Storage (gal (l))	41 (156)	42 (160)	72 (274)	69 (262)	74 (279)	90 (340)	90 (340)	90 (340)
Minimum Flow (gpm (l/s))Water	190 (12)	206 (13)	380 (24)	349 (22)	349 (22)	444 (28)	444 (28)	444 (28)
Minimum Flow (gpm (l/s))Brine	238 (15)	254 (16)	444 (28)	460 (29)	428 (27)	523 (33)	523 (33)	523 (33)
Max Flow (gpm (l/s))	856 (54)	935 (59)	1649 (104)	1696 (107)	1554 (98)	1966 (124)	1966 (124)	1966 (124)
Condenser (Full heat recovery side channel)								
Water Storage (gal (l))	19 (71)	20 (75)	31 (116)	30 (112)	31 (119)	33 (125)	33 (125)	33 (125)
Minimum Flow (gpm (l/s))Water	79 (5)	72 (5)	133 (8)	123 (8)	124 (8)	158 (10)	158 (10)	158 (10)
Minimum Flow (gpm (l/s))Brine	85 (5)	89 (6)	155 (10)	162 (10)	152 (10)	187 (12)	187 (12)	187 (12)
Max Flow (gpm (l/s))	304 (19)	304 (19)	476 (30)	491 (31)	476 (30)	491 (31)	491 (31)	491 (31)

All weights ±3%, include standard 150 psig water boxes.
Operating weights include refrigerant, oil, and water charges.
If oil cooler is installed, add 1/4 gal (1 liter) to the oil charge value given for B family units; add 1.0 gal (4 liters) for all other units.
Overall dimensions are based on 3-pass evap/2 pass cond and LH/RH water connections. Refer to TOPSS for exact job configurations.

Installation Mechanical

Storage

If the chiller is to be stored more than one month prior to installation, observe the following precautions:

- Do not remove the protective coverings from the electrical panel.
- Store the chiller in a dry, vibration-free, secure area.
- At least every three months, attach a gauge and manually check the pressure in the refrigerant circuit. If the refrigerant pressure is below 71 psig at 70oF (or 46 psig at 50oF), call a qualified service organization and the appropriate Trane sales office.

Note: *Pressure will be approximately 20 psig if shipped with the optional nitrogen charge.*

Location Requirements

Noise Considerations

- Refer to Trane Engineering Bulletin -Series R® Chiller Sound Ratings and Installation Guide.

for sound consideration applications.

- Locate the unit away from sound-sensitive areas.
- Install the isolation pads under the unit. Refer to "Unit Isolation."
- Install rubber vibration isolators in all water piping.
- Use flexible electrical conduit for final connection to the UC800.

• Seal all wall penetrations.

Note: *Consult an acoustical engineer for critical applications.*

Foundation

Provide rigid, non-warping mounting pads or a concrete foundation of sufficient strength and mass to support the chiller operating weight (including completed piping and full operating charges of refrigerant, oil and water).

Refer to Table 10 for unit operating weights.

Once in place, level the chiller within 1/4" (6.35 mm) over its length and width.

The Trane Company is not responsible for equipment problems resulting from an improperly designed or constructed foundation.

Vibration Eliminators

- Provide rubber boot type isolators for all water piping at the unit.
- Provide flexible conduit for electrical connections to the unit.
- Isolate all pipe hangers and be sure they are not supported by main structure beams that could introduce vibration into occupied spaces.
- Make sure that the piping does not put additional stress on the unit.

Note: *Do not use metal braided type eliminators on the water piping. Metal braided eliminators are not effective at the frequencies at which the unit will operate.*

Clearances

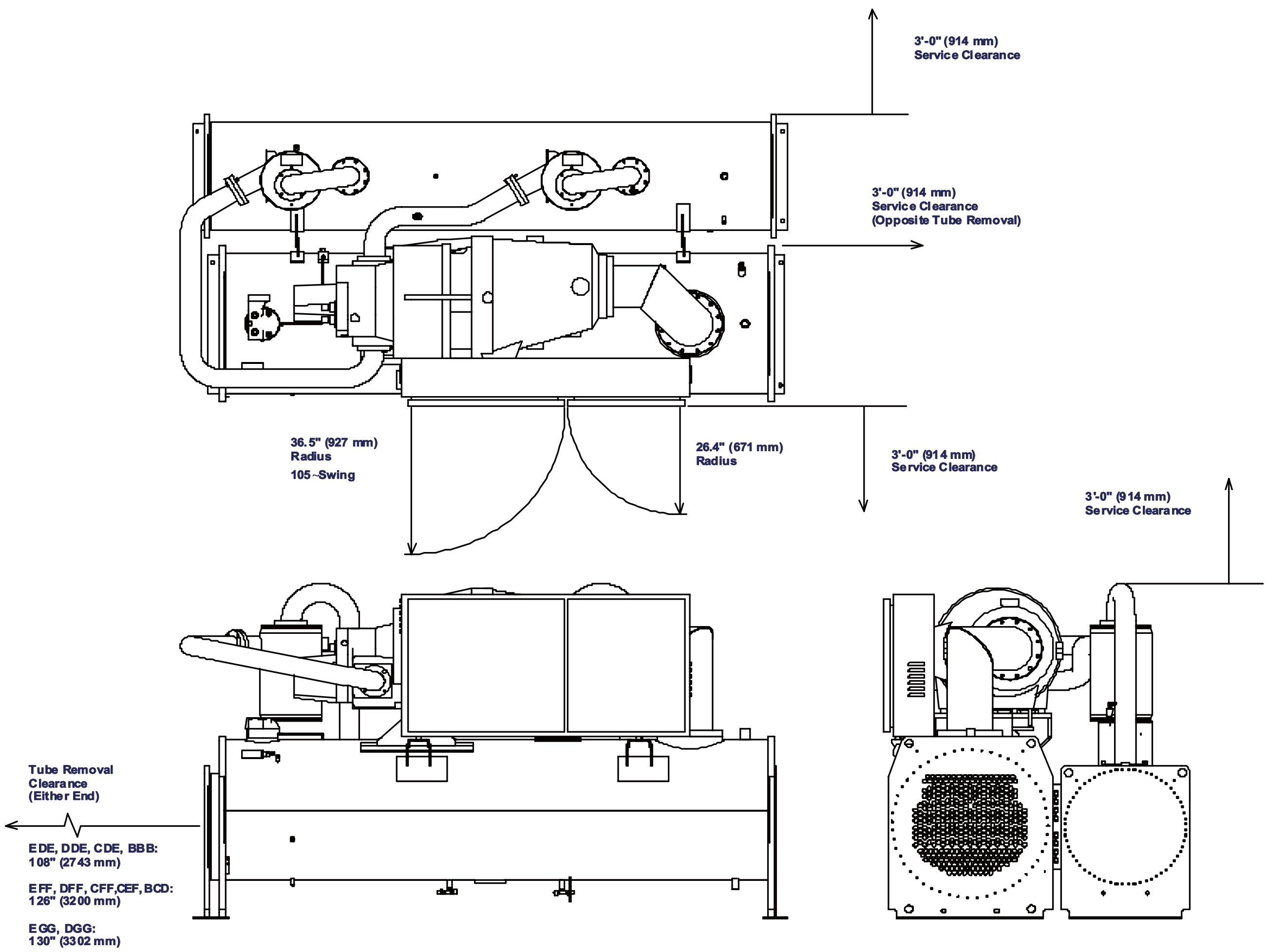
Provide enough space around the unit to allow the installation and maintenance personnel unrestricted access to all service points. Refer to submittal drawings for the unit dimensions.

Allow adequate clearance for condenser and compressor servicing. A minimum of three feet is recommended for compressor service and to provide sufficient clearance for the opening of control panel doors. Refer to Figure 8 for minimum clearances required for condenser tube service. In all cases, local codes will take precedence over these recommendations.

Note: *Required vertical clearance above the unit is 36" (914.4 mm). There should be no piping or conduit located over the compressor motor.*

If the room configuration requires a variance to the clearance dimensions, contact your Trane sales office representative.

Figure 8. Recommended Operating and Service Clearances



Note: *Maximum clearances are given. Depending on the unit configuration, some units may require less clearance than others in the same category.*

Ventilation

The unit produces heat even though the compressor is cooled by the refrigerant. Make provisions to remove heat generated by unit operation from the equipment room. Ventilation must be adequate to maintain an ambient temperature lower than 122°F (50°C).

Vent the evaporator, condenser and compressor pressure relief valves in accordance with all local and national codes. Refer to Table 12.

Make provisions in the equipment room to keep the chiller from being exposed to freezing temperatures (32°F/0°C).

Water Drainage

Locate the unit near a large capacity drain for water vessel drain-down during shutdown or repair. Condensers and evaporators are provided with drain connections. Refer to "Water Piping." All local and national codes apply.

Access Restrictions

Door clearances for the RTHD units are given in Figure 9 . Refer to the unit submittals for specific "per unit" dimensional information.

Moving and Rigging

The Model RTHD chiller should be moved by lifting at designated lift points only. Refer to Figure 10 and Table 10 for typical unit lifting and operating weights. Refer to the rigging diagram that ships with each unit for specific "per unit" weight data.

⚠ WARNING

Heavy Equipment!

Always use lifting equipment with a capacity exceeding unit lifting weight by an adequate safety factor. (+10%). Follow the procedures and diagrams in this manual and in the submittal. Failure to do so can result in death or serious injury.

Figure 9. Unit Weights and Dimensions for Rigging

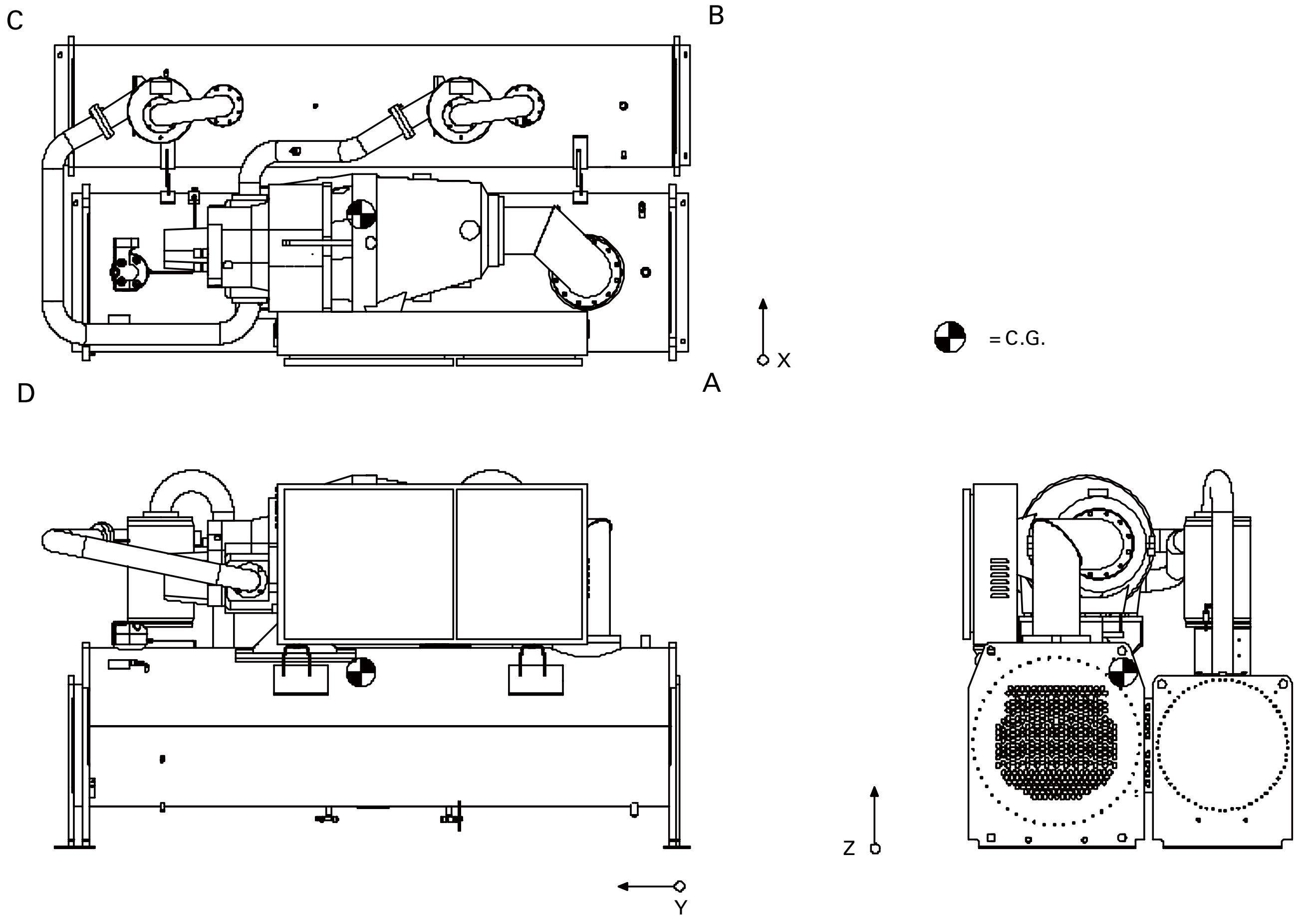


Table 10. Unit Weight (lb(kg))

	Location (points)			
Unit Designator*	**A**	**B**	**C**	**D**
E3G2G1	5158 (2340)	4304 (1952)	4226 (1917)	5300 (2404)
E3F2F3	4781 (2169)	3582 (1625)	3750 (1701)	4851 (2200)
E3D2E2	3796 (1722)	2834 (1285)	3300 (1497)	4789 (2172)
D3G3G3	5320 (2413)	4451 (2019)	4327 (1963)	5140 (2331)
D3G2G1	5085 (2307)	4255 (1930)	4136 (1876)	5171 (2346)
D3F2F3	4737 (2149)	3563 (1616)	3722 (1688)	4797 (2176)
D3D2E2	3754 (1703)	2818 (1278)	3269 (1483)	4720 (2141)
D2G3G3	5320 (2413)	4451 (2019)	4327 (1963)	5140 (2331)
D2G2G1	5085 (2307)	4255 (1930)	4136 (1876)	5171 (2346)
D2F2F3	4737 (2149)	3563 (1616)	3722 (2176)	4797 (2176)
D2D2E2	3754 (1703)	2818 (1278)	3269 (1483)	4720 (2141)
D1G1G1	4981 (2259)	4148 (1882)	4041 (1833)	5076 (2302)
D1G2G2	5216 (2366)	4344 (1970)	4231 (1919)	5316 (2411)
D1F1F2	4526 (2053)	3452 (1566)	3615 (1640)	4594 (2084)
D1D1E1	3728 (1691)	2758 (1251)	3236 (1468)	4694 (2129)
C2F2F3	4649 2109	3496 1586	4707 2135	4707 2135
C2E1F1	4205 (1907)	3046 (1382)	3196 (1450)	4271 (1937)
C2D3E3	3612 (1638)	2738 (1242)	3148 (1428)	4503 (2043)
C2D4E4	3374 (1530)	2479 (1124)	2876 (1305)	4243 (1925)
C1E1F1	4205 (1907)	3046 (1382)	3196 (1450)	4271 (1937)
C1D3E3	3612 (1638)	2738 (1242)	3148 (1428)	4503 (2043)
C1D5E4	3375 (1531)	2479 (1124)	2876 (1305)	4243 (1925)
C1D6E5	3330 (1510)	2430 (1102)	2825 (1281)	4195 (1903)
C1C2D2	3946 (1790)	2606 (1182)	2055 (932)	3322 (1507)
B2C2D2	3162 (1510)	2297 (1042)	1767 (802)	2726 (1237)
B2B2B2	2522 (1144)	1996 (905)	1926 (874)	2958 (1342)
B1C1D1	3136 (1422)	2264 (1027)	1739 (789)	2698 (1224)
B1B1B1	2495 (1132)	1969 (893)	1901 (862)	2928 (1328)

* Unit Designator (corresponds to digits 6,7,14,15,21,22 of unit model number)

	Location (points)			
Unit Designator*	**A**	**B**	**C**	**D**
Total Heat Reclaim				
B1C1H1	3430 (1556)	2429 (1102)	2255 (1023)	3062 (1389)
B2C2H2	3463 (1571)	2485 (1127)	2315 (1050)	3102 (1407)
C1E1J1	4819 (2186)	3721 (1688)	3858 (1750)	4965 (2252)
C2F2J3	5165 (2343)	4087 (1854)	4246 (1926)	5333 (2419)
D1F1J2	5161 (2341)	4068 (1845)	4228 (1918)	5335 (2420)
D2G2K1	5432 (2464)	4515 (2048)	5258 (2385)	6155 (2792)
D3G2K1	5432 (2464)	4515 (2048)	5258 (2385)	6155 (2792)
E3G2K1	5798 (2630)	4932 (2237)	4934 (2238)	5800 (2631)
Partial Heat Reclaim				
B1C1L1	3183 (1444)	2222 (1008)	2017 (915)	2875 (1304)
B2C2L2	3210 (1456)	2255 (1023)	2053 (931)	2910 (1320)
C1E1M1	4385 (1989)	3223 (1462)	3389 (1537)	4561 (2069)
C2F2M3	4700 (2132)	3567 (1618)	3796 (1722)	4945 (2243)
D1F1M2	4709 (2136)	3565 (1617)	3794 (1721)	4952 (2246)
D2G2N1	5240 (2377)	4171 (1892)	4870 (2209)	5922 (2686)
D3G2N1	5240 (2377)	4171 (1892)	4870 (2209)	5922 (2686)
E3G2N1	5604 (2542)	4592 (2083)	4548 (2063)	5562 (2523)

* Unit Designator (corresponds to digits 6,7,14,15,21,22 of unit model number)

Table 11. Center of Gravity(in(mm))

Unit Designator*	X	Y	Z
E3G3G3	30.8 (782.32)	63.81 (1621)	37.62 (956)
E3G2G1	30.8 (782.32)	63.55 (1614)	38.70 (983)
E3F2F3	27.64 (702.06)	63.46 (1612)	38.33 (974)
E3D2E2	25.9 (658)	60.05 (1525)	40.5 (1029)
D3G3G3	30.85 (784)	63.48 (1612)	37.44 (951)
D3G2G1	30.58 (777)	68.56 (1741)	37.79 (960)
D3F2F3	27.7 (704)	63.4 (1610)	38.14 (969)
D3D2E2	25.97 (660)	59.95 (1523)	40.31 (1024)
D2G3G3	30.85 (784)	63.48 (1612)	37.44 (951)
D2G2G1	30.58 (777)	68.56 (1741)	37.79 (960)
D2F2F3	27.7 (704)	63.4 (1610)	38.14 (969)
D2D2E2	25.97 (660)	59.95 (1523)	40.31 (1024)
D1G1G1	30.58 (777)	68.56 1741)	37.79 (960)
D1G2G2	30.77 (782)	63.55 (1614)	37.72 (958)
D1F1F2	27.92 (709)	63.47 (1612)	38.7 (9833)
D1D1E1	25.91 (658)	60 (1524)	40.47 (1028)
C2F2F3	27.92 (709)	63.47 (1612)	38.7 (9833)
C2E1F1	26.36 (670)	63.49 (1613)	40.95 (1040)
C2D3E3	26.13 (664)	59.74 (1517)	40.08 (1018)
C2D4E4	26.13 (664)	59.74 (1517)	40.08 (1018)
C1E1F1	26.36 (670)	63.49 (1613)	40.95 (1040)
C1D3E3	26.13 (664)	59.74 (1517)	40.08 (1018)
C1D5E4	26.13 (664)	59.74 (1517)	40.08 (1018)
C1D6E5	26.13 (664)	59.74 (1517)	40.08 (1018)
B2C2D2	22.4 (569)	58.29 (1481)	33.51 (851)
B2B2B2	22.88 (581)	58.11 (1476)	35.43 (900)
B1C1D1	22.32 (567)	58.23 (1479)	33.65 (855)
B1B1B1	22.84 (580)	58.13 (1477)	35.59 (904)

* Designator correponds to digits 6,7,14,15,21,22 of model number

Unit Designator*	X	Y	Z
Total Heat Reclaim			
B1C1H1	26 (666)	58 (1481)	32 (824)
B2C2H2	26 (671)	58 (1483)	32 (819)
C1E1J1	31 (794)	62 (1582)	39 (999)
C2F2J3	32 (824)	62 (1583)	38 (953)
D1F1J2	32 (822)	62 (1584)	38 (954)
D2G2K1	35 (883)	68 (1732)	36 (927)
D3G2K1	35 (883)	68 (1732)	36 (927)
E3G2K1	35 (887)	64 (1621)	37 (947)
Partial Heat Reclaim			
B1C1L1	24 (601)	58 (1480)	33 (837)
B2C2L2	24 (603)	58 (1482)	33 (833)
C1E1M1	28 (714)	63 (1592)	40 (1027)
C2F2M3	29 (749)	63 (1593)	38 (974)
D1F1M2	29 (748)	63 (1593)	38 (974)
D2G2N1	33 (848)	68 (1737)	37 (939)
D3G2N1	33 (848)	68 (1737)	37 (939)
E3G2N1	34 (853)	64 (1619)	38 (961)

* Designator correponds to digits 6,7,14,15,21,22 of model number

Lifting Procedure

⚠ CAUTION

Equipment Damage!

Never use a forklift to move the unit. The skid is not designed to support the unit at any one point and using a forklift to move the equipment may cause unit damage. Always position the lifting beam so that cables do not contact the unit. Failure to do so may result in unit damage.

Note: *If absolutely necessary, the chiller can be pushed or pulled across a smooth surface if it is bolted to wood shipping mounts.*

⚠ WARNING

Shipping Mounts!

Do not use the threaded holes in the compressor to lift or assist in lifting the unit. They are not intended for that purpose and could create a dangerous situation. Do not remove the wood mounts until the unit is in its final location. Removal of wood shipping mounts prior to unit final locating could result in death or serious injury or equipment damage.

1. When the unit is at its final location, remove the shipping bolts that secure the unit to the wood base mounts.
2. Rig the unit properly and lift from above or jack the unit (alternate moving method). Use the points shown on the rigging diagram that ships with the unit as shown in Figure 10. Remove the base mounts.
3. Install clevis connectors in lifting holes provided on the unit. Attach lifting chains or cables to clevis connectors as shown in Figure 10. Each cable alone must be strong enough to lift the chiller.

Table 12. Rigging

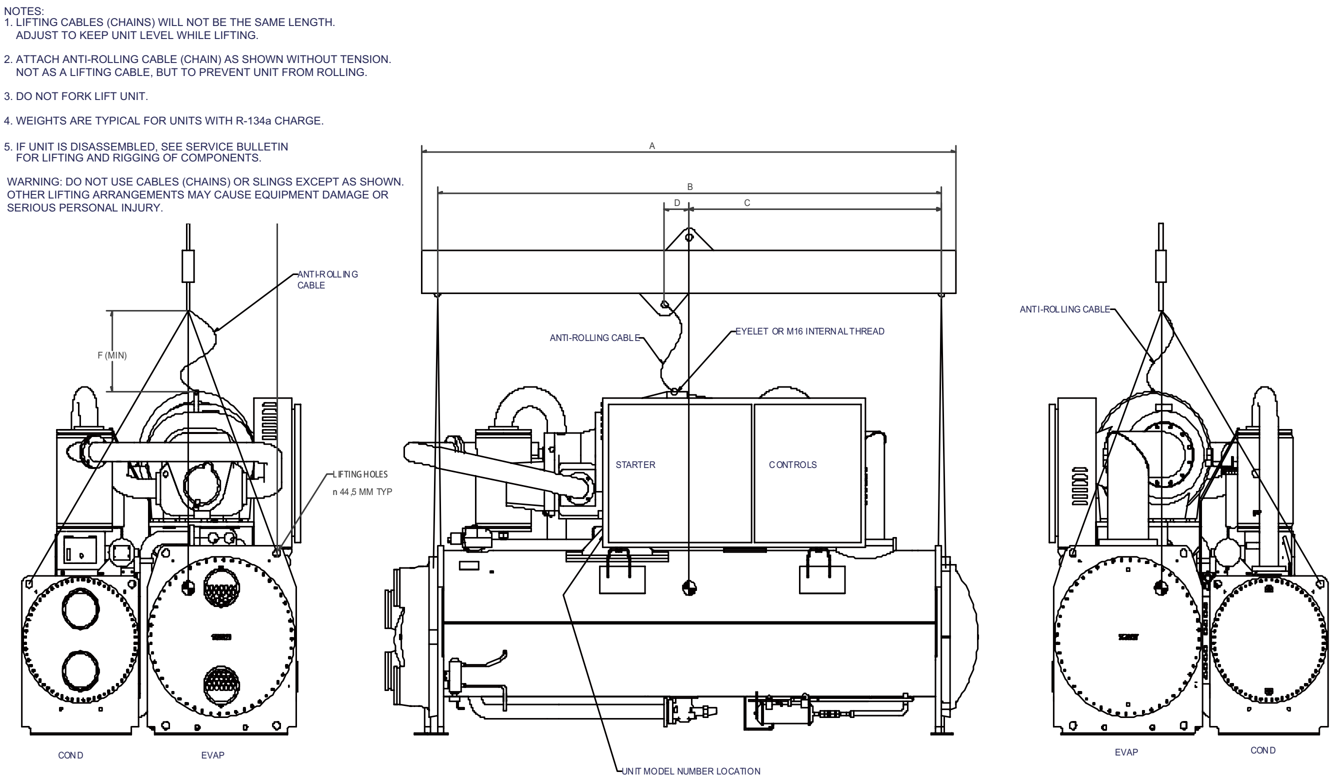
Unit Designator*	Dimension (mm (in))					
	A	B	C	D	E	F
E3G2G1	3658 (144.02)	3353 (132.01)	1621 (63.82)	20 (0.79)	661 (26.02)	610 (24.02)
E3F2F3	3658 (144.02)	3353 (132.01)	1612 (63.46)	29 (1.14)	615 (24.21)	610 (24.02)
E3D2E2	3048 (120.00)	2743 (107.99)	1525 (60.04)	116 (4.57)	612 (24.09)	610 (24.02)
D3G2G1	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	654 (25.75)	610 (24.02)
D3F2F3	3658 (144.02)	3353 (132.01)	1610 (63.39)	101 (3.98)	617 (24.29)	610 (24.02)
D3D2E2	3048 (120.00)	2743 (107.99)	1523 (59.96)	188 (7.40)	614 (24.17)	610 (24.02)
D2G3G3 / D3G3G3	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	654 (25.75)	610 (24.02)
D2G2G1	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	654 (25.75)	610 (24.02)
D2F2F3	3658 (144.02)	3353 (132.01)	1610 (63.39)	101 (3.98)	617 (24.29)	610 (24.02)
D2D2E2	3048 (120.00)	2743 (107.99)	1523 (59.96)	188 (7.40)	614 (24.17)	610 (24.02)
D1G1G1	3658 (144.02)	3353 (132.01)	1614 (63.54)	97 (3.82)	661 (26.02)	610 (24.02)
D1G2G2	3658 (144.02)	3353 (132.01)	1614 (63.54)	97 (3.82)	661 (26.02)	610 (24.02)
D1F1F2	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	622 (24.49)	610 (24.02)
D1D1E1	3048 (120.00)	2743 (107.99)	1524 60.00)	187 (7.36)	612 (24.09)	610 (24.02)
C2F2F3	3658 (144.02)	3353 (132.01)	1610 63.39)	101 (3.98)	617 (24.29)	610 (24.02)

* Designator corresponds to digits 6, 7, 14, 15, 21, 22 of model number

Unit Designator*	Dimension (mm (in))					
	A	B	C	D	E	F
C2E1F1	3658 (144.02)	3353 (132.01)	1613 (63.50)	129 (5.08)	624 (24.57)	610 (24.02)
C2D3E3	3048 (120.00)	2743 (107.99)	1517 (59.72)	225 (8.86)	618 (24.33)	610 (24.02)
C2D4E4	3048 (120.00)	2743 (107.99)	1523 (59.96)	219 (8.62)	584 (22.99)	610 (24.02)
C1E1F1	3658 (144.02)	3353 (132.01)	1613 (63.50)	129 (5.08)	624 (24.57)	610 (24.02)
C1D3E3	3048 (120.00)	2743 (107.99)	1517 (59.72)	225 (8.86)	618 (24.33)	610 (24.02)
C1D5E4	3048 (120.00)	2743 (107.99)	1523 (59.96)	219 (8.62)	584 (22.99)	610 (24.02)
C1D6E5	3048 (120.00)	2743 (107.99)	1524 (60.00)	218 (8.58)	582 (22.91)	610 (24.02)
C1C2D2	3658 (144.02)	3353 (132.01)	1459 (57.44)	93 (3.66)	523 (20.59)	610 (24.02)
B2C2D2	3658 (144.02)	3353 (132.01)	1481 (58.31)	93 (3.66)	523 (20.59)	610 (24.02)
B2B2B2	3048 (120.00)	2743 (107.99)	1476 (58.11)	98 (3.86)	535 (21.06)	610 (24.02)
B1C1D1	3658 (144.02)	3353 (132.01)	1479 (58.23)	95 (3.74)	521 (20.51)	610 (24.02)
B1B1B1	3048 (120.00)	2743 (107.99)	1447 (56.97)	97 (3.82)	534 (21.02)	610 (24.02)
Total Heat Reclaim						
B1C1H1	3658 (144.02)	3353 (132.01)	1479 (58.23)	95 (3.74)	620 (24.41)	610 (24.02)
B2C2H2	3658 (144.02)	3353 (132.01)	1481 (58.31)	93 (3.66)	625 (24.61)	610 (24.02)
C1E1J1	3658 (144.02)	3353 (132.01)	1613 (63.50)	129 (5.08)	748 (29.45)	610 (24.02)
C2F2J3	3658 (144.02)	3353 (132.01)	1610 (63.39)	101 (3.98)	781 (30.75)	610 (24.02)
D1F1J2	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	779 (30.67)	610 (24.02)
D2G2K1	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	763 (30.04)	610 (24.02)
D3G2K1	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	763 (30.04)	610 (24.02)
E3G2K1	3658 (144.02)	3353 (132.01)	1621 (63.82)	20 (0.79)	767 (30.20)	610 (24.02)
Partial Heat Reclaim						
B1C1L1	3658 (144.02)	3353 (132.01)	1479 (58.23)	95 (3.74)	555 (21.85)	610 (24.02)
B2C2L2	3658 (144.02)	3353 (132.01)	1481 (58.31)	93 (3.66)	557 (21.93)	610 (24.02)
C1E1M1	3658 (144.02)	3353 (132.01)	1613 (63.50)	129 (5.08)	668 (26.30)	610 (24.02)
C2F2M3	3658 (144.02)	3353 (132.01)	1610 (63.39)	101 (3.98)	706 (27.80)	610 (24.02)
D1F1M2	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	705 (27.76)	610 (24.02)
D2G2N1	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	728 (28.66)	610 (24.02)
D3G2N1	3658 (144.02)	3353 (132.01)	1612 (63.46)	99 (3.90)	728 (28.66)	610 (24.02)
E3G2N1	3658 (144.02)	3353 (132.01)	1621 (63.82)	20 (0.79)	733 (28.86)	610 (24.02)

* Designator corresponds to digits 6, 7, 14, 15, 21, 22 of model number

Figure 10. Lifting the Unit



4. Attach cables to lifting beam. Total lifting weight, lifting weight distribution and required lifting beam dimensions are shown in the rigging diagram shipped with each unit and in Figure 10. The lifting beam crossbar must be positioned so the lifting cables do not contact unit piping or electrical panel enclosure.

⚠ WARNING

Anti- rotation Strap!

Connect an anti-rotation strap between the lifting beam and compressor before lifting unit. Failure to do so may result in death or serious injury should a lifting cable fail.

5. Connect an anti-rotation strap or cable loosely between the lifting beam and the threaded coupling or eyelet provided at the top of the compressor. Use an eyebolt or clevis to secure the strap at the coupling or eyelet.

Note: *The anti-rotation strap is not a lifting chain, but a safety device to ensure that the unit cannot tilt during lifting.*

Alternate Moving Method

6. If it is not possible to rig from above as shown in the figures, the unit may also be moved by jacking each end high enough to move an equipment dolly under each tube sheet support. Once securely mounted on the dollies, the unit may be rolled into position.

Isolation Pads

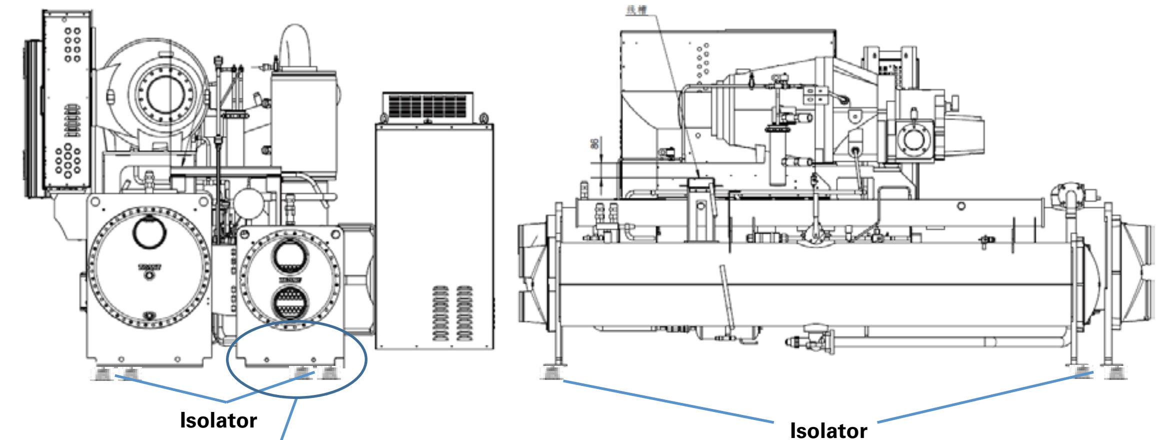
The elastomeric pads shipped (as standard) are adequate for most installations. For additional details on isolation practices, refer to Trane Engineering Bulletin -Series R® Chiller Sound Ratings and Installation Guide., or consult an acoustical engineer for sound-sensitive installations.

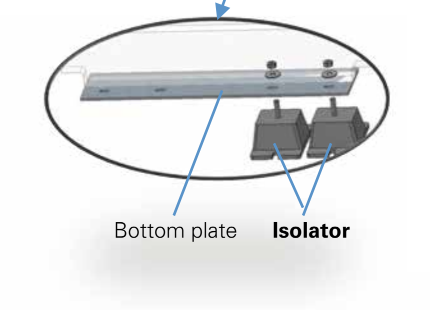
7. During final positioning of the unit, place the isolation pads under the evaporator and condenser tube sheet supports. Level the unit.

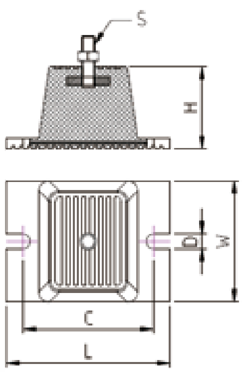
Placement Neoprene Isolator Installation (optional)

8. Install the optional neoprene isolators at each mounting location.
   8.1. Secure the isolators to the mounting surface, using the mounting slots in the isolator base plate, as shown as below. Do not fully tighten the isolator mounting bolts at this time.
   8.2. Align the mounting holes in the base of the unit, with the threaded positioning pins on the top of the isolators.
   8.3. Lower the unit on to the isolators and secure the isolator to the unit with a nut. Maximum isolator deflection should be approximately 1/4".
   8.4. Level the unit carefully. Refer to "Leveling". Fully tighten the isolator mounting bolts.
   8.5. Two Isolators for each foot, refer to Figure 11 , total 8 isolators installed for one chiller.

Figure 11. Isolator Pad Placement







Technical data of rubber AVM

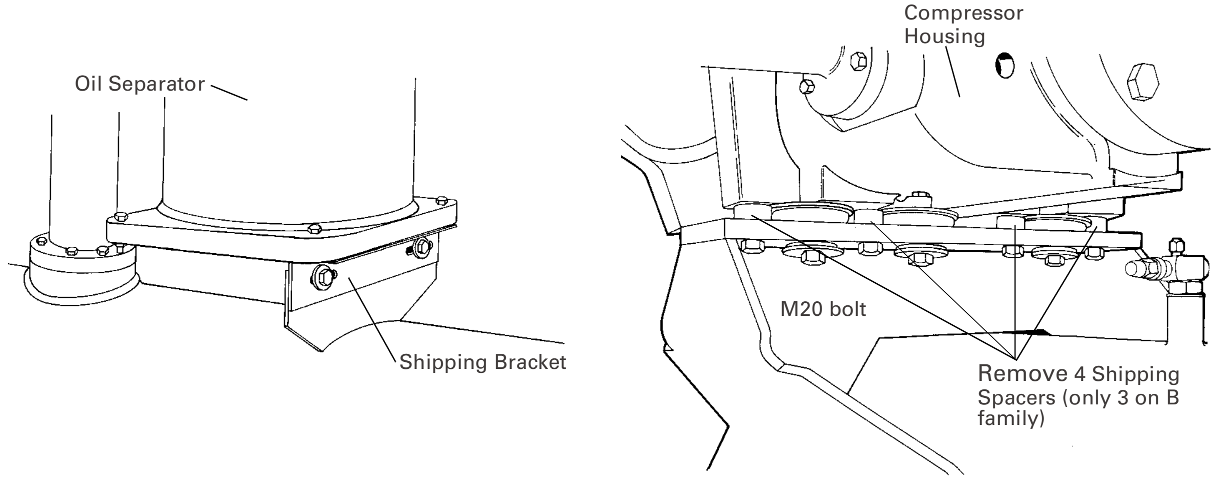
Model	Load (kg)	Load (Lbs)	Deflection (±3mm)	Vertical Rigidity (kg/mm)	Outer Size(±2mm)					
					L	W	H	C	ØD	S
HA-700	700	1543	12	58.33	159	118	70	127	14	M12
HA-1000	1000	2205		83.33						
HA-1400	1400	3086		116.67						
HA-1800	1800	3968		150.00						

9. The unit is shipped with four spacers (only three on B family) on the compressor mount that protect the compressor isolation pads during shipping and in handling. Remove these spacers (Figure 12) before the unit is operated.

10. Remove the shipping brackets from the bottom sides of the oil separator(s) (see Figure 12).

Note: *Once shipping bracket(s) is removed, the oil separator is only supported by the discharge line.*

Figure 12. Oil Separator with Shipping Bracket and Compressor Shipping Spacer



Unit Leveling

Note: *The electrical panel side of the unit is designated as the "front" of the unit.*

1. Check unit level end-to-end by placing a level on the top surface of the evaporator shell.
2. If there is insufficient surface available on the top of the evaporator shell, attach a magnetic level to the bottom of the shell to level the unit. The unit should be level to within 1/4" (6.35 mm) over its length.
3. Place the level on the evaporator shell tube sheet support to check sideto- side (front-to-back) level. Adjust to within 1/4" (6.35 mm) of level frontto- back.

Note: *The evaporator MUST be level for optimum heat transfer and unit performance.*

4. Use full-length shims to level the unit.

Water Piping

Piping Connections

⚠ CAUTION

Equipment Damage!

To prevent equipment damage, bypass the unit if using an acidic flushing agent.

Make water piping connections to the evaporator and condenser. Isolate and support piping to prevent stress on the unit. Construct piping according to local and national codes. Insulate and flush piping before connecting to unit.

Use grooved pipe connectors for all water piping connections. Evaporator and condenser water inlet and outlet sizes and locations are shown by the unit submittals and in Figure 13 through Figure 18. The designation in the tables corresponds to the compressor frame code followed by the evaporator shell code followed by the condenser shell code as given in the unit model number, digits 6, 7, 14, 15, 21 and 22. Table 13 gives additional water connection information.

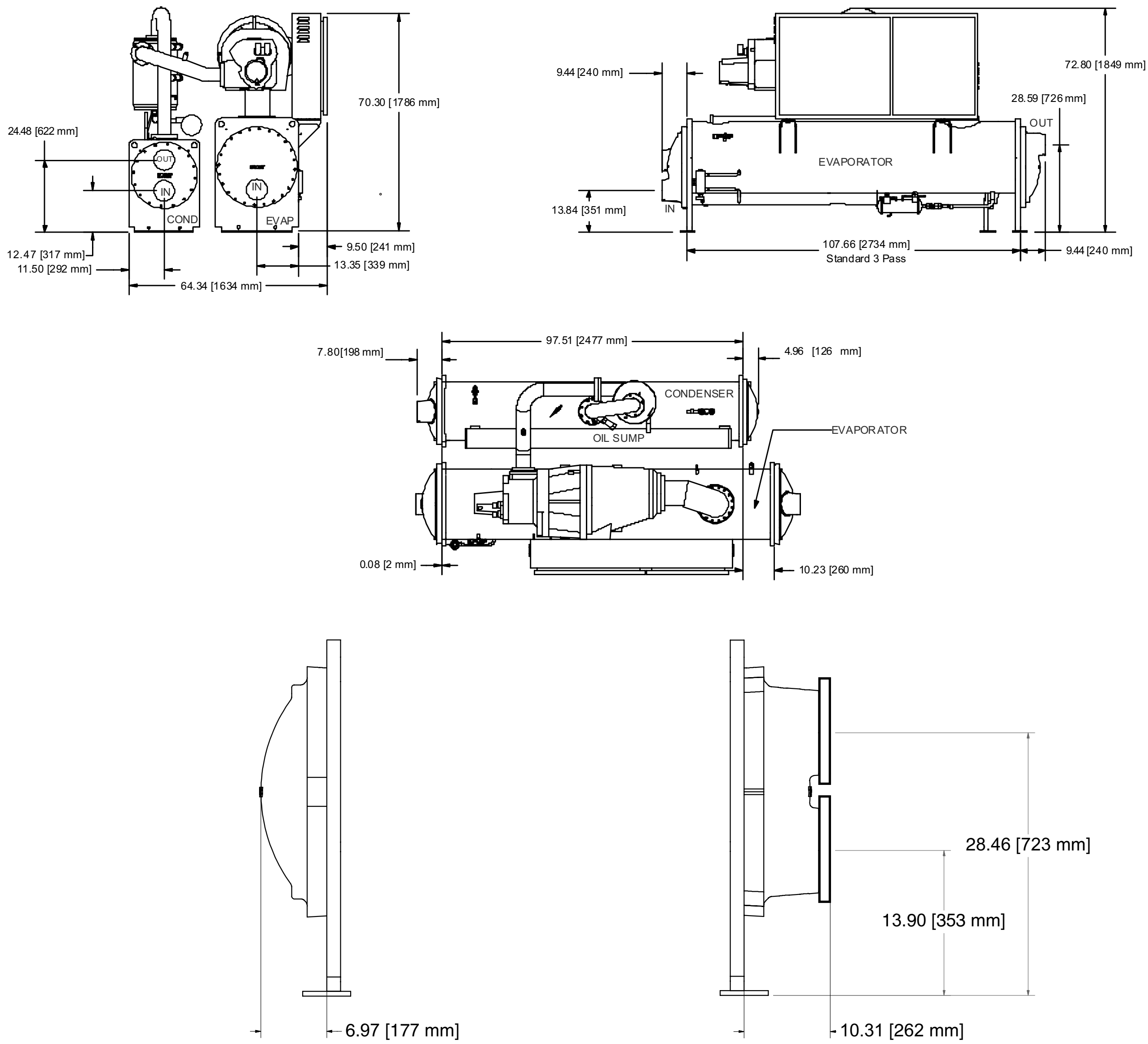
Reversing Water Boxes

All water boxes may be reversed end-for-end. Do not rotate water boxes. Remove the sensors from the wells before removing the water box. Complete the water box switch and replace the sensors. See Figure 13 through Figure 18 for correct orientation of the water inlet and outlet.

If the water boxes are reversed, be sure to properly rewire the water temperature sensors in the control panel.

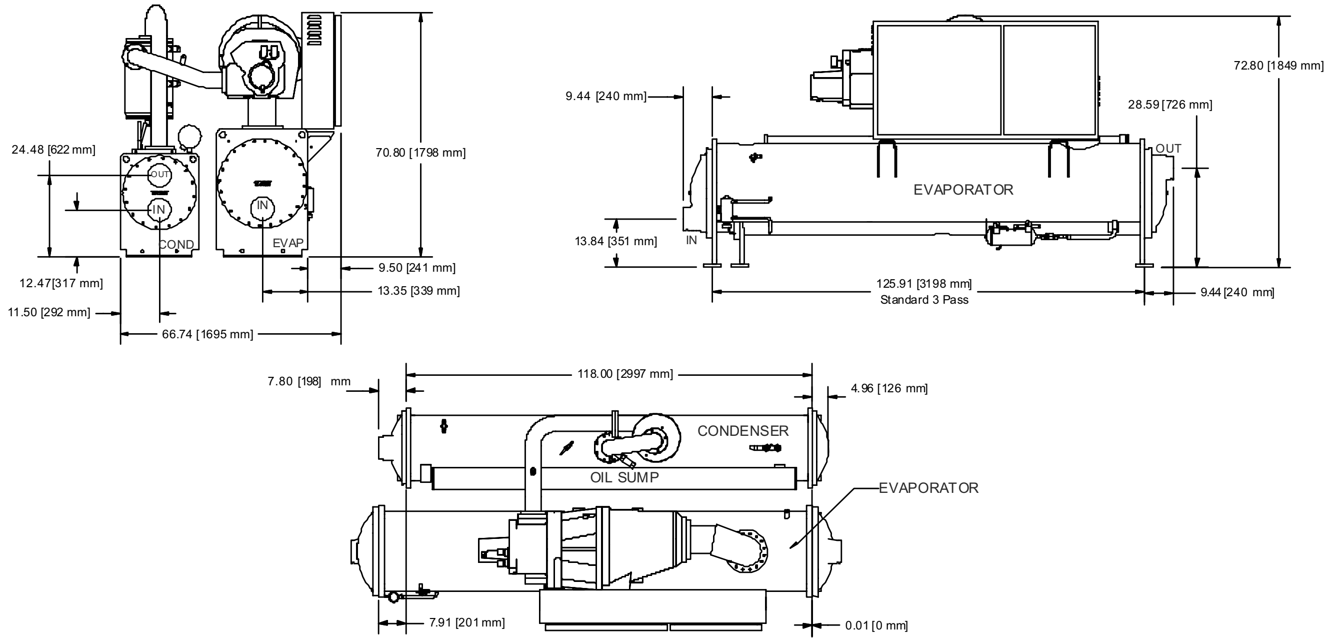
Note: *Be certain to replace water boxes right-side-up to maintain proper baffle orientation. Use new o-rings.*

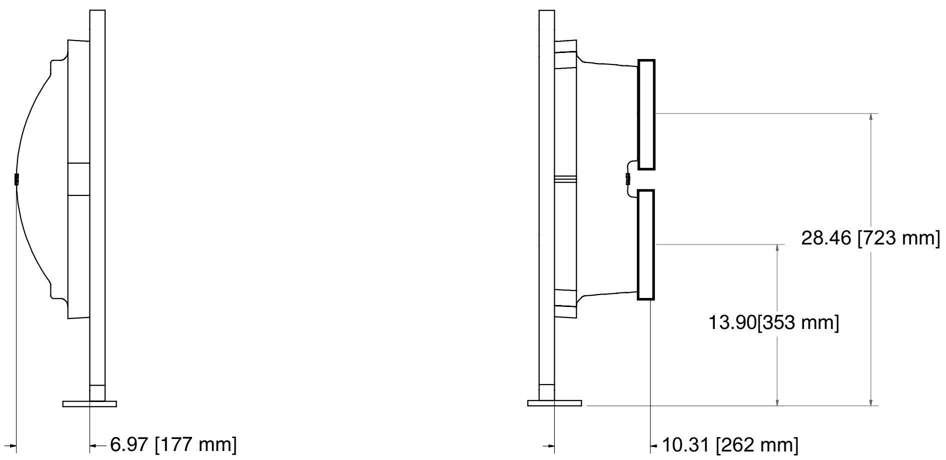
Figure 13. Condenser and Evaporator Water Connections -BBB



2 Pass Evaporator
Connection Configuration (left or right hand)
Depends on Water Inlet

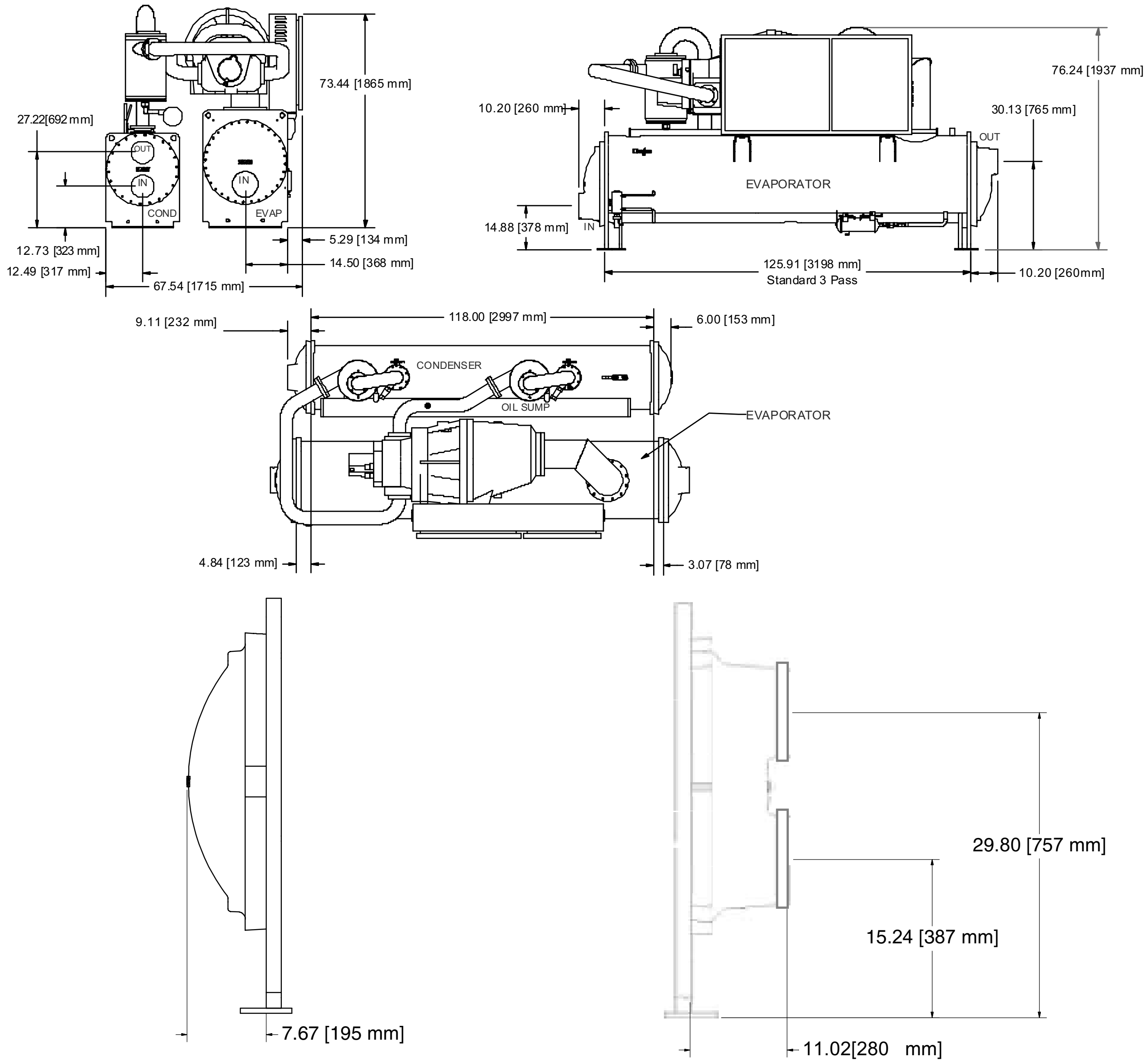
Figure 14. Condenser and Evaporator Water Connections -BCD/CCD





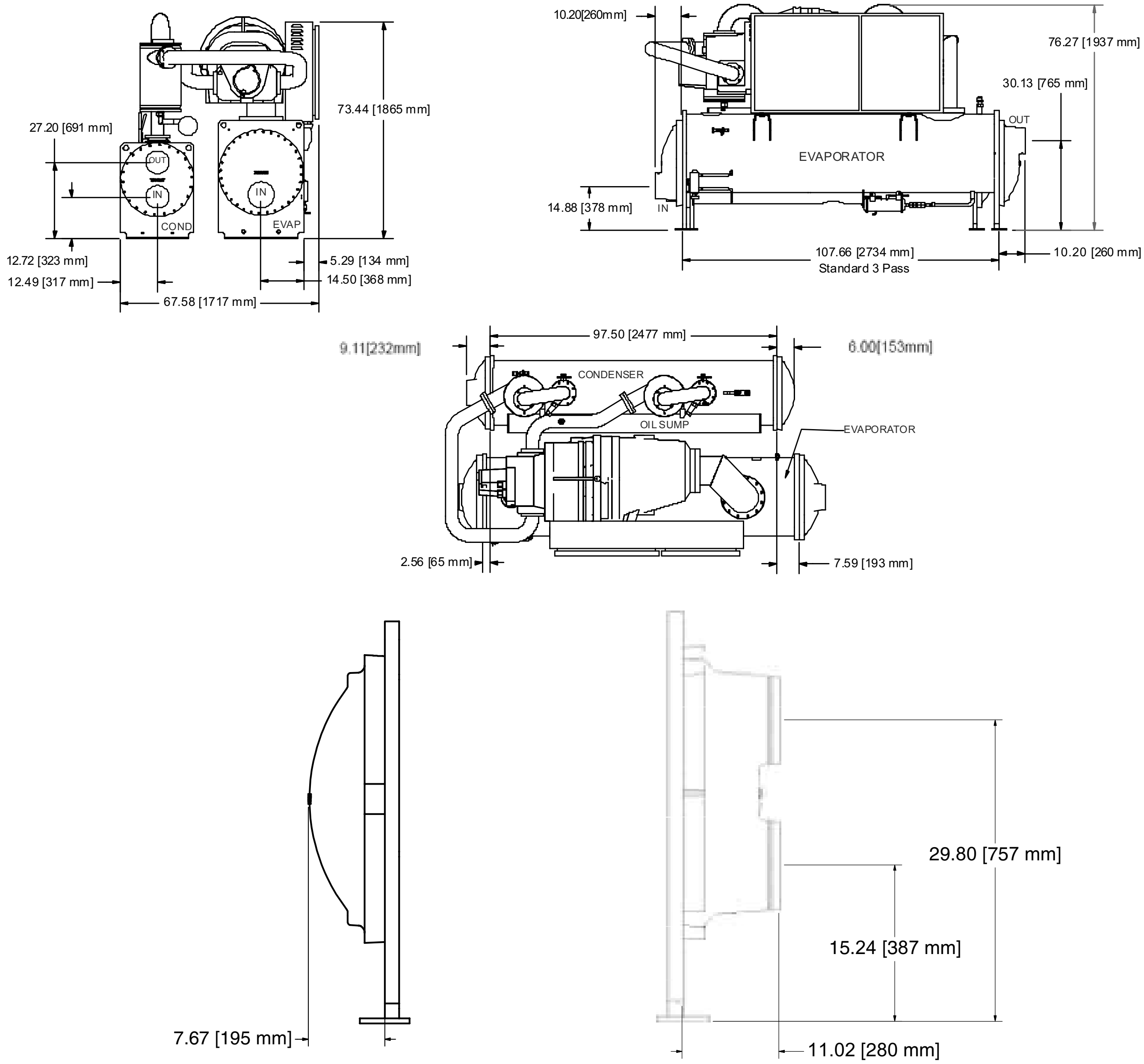
2 Pass Evaporator
Connection Configuration (left or right hand)
Depends on Water Inlet

Figure 15. Condenser and Evaporator Water Connections - CEF



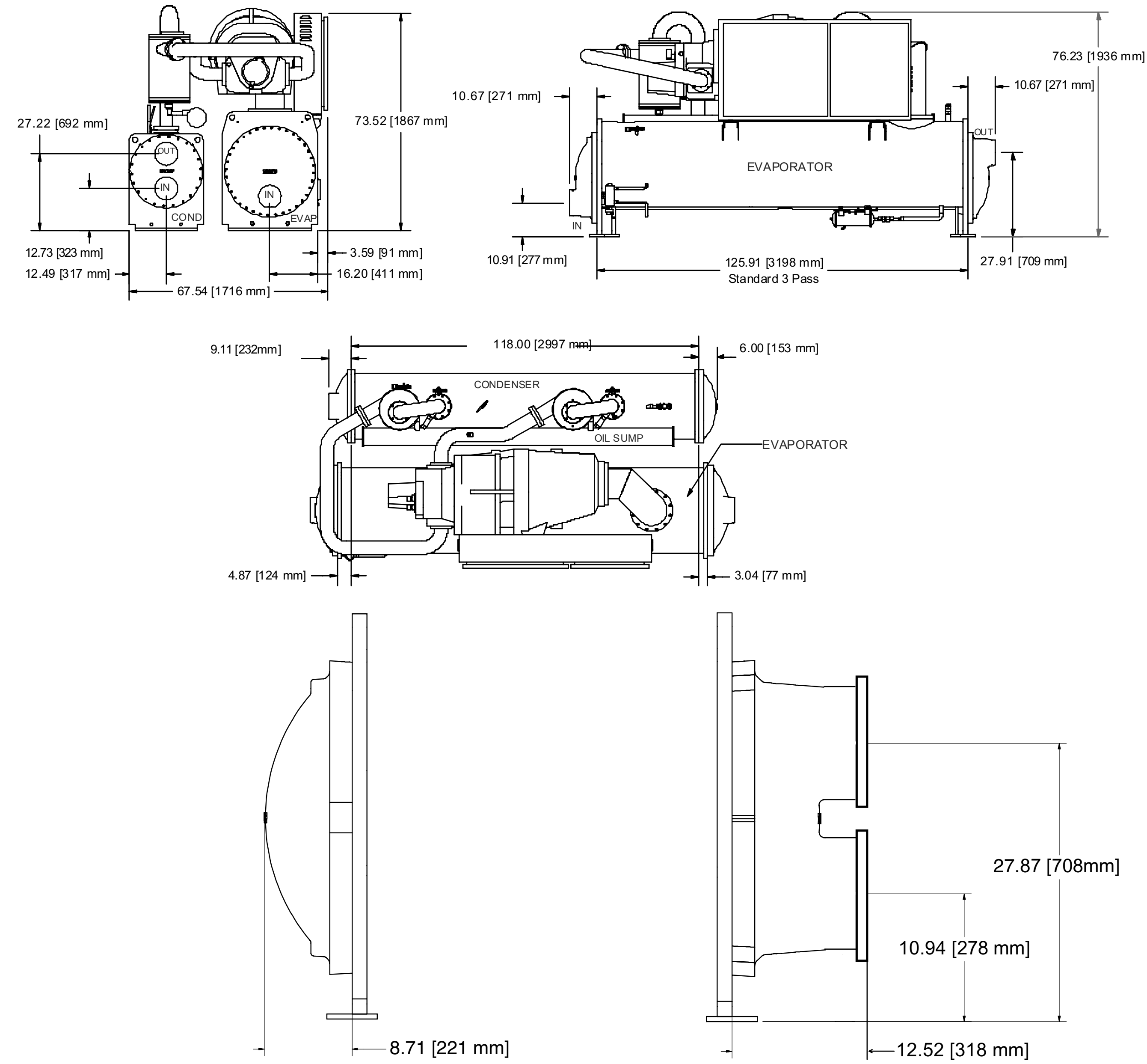
2 Pass Evaporator
Connection Configuration (left or right hand)
Depends on Water Inlet

Figure 16. Condenser and Evaporator Water Connections - CDE/DDE/EDE



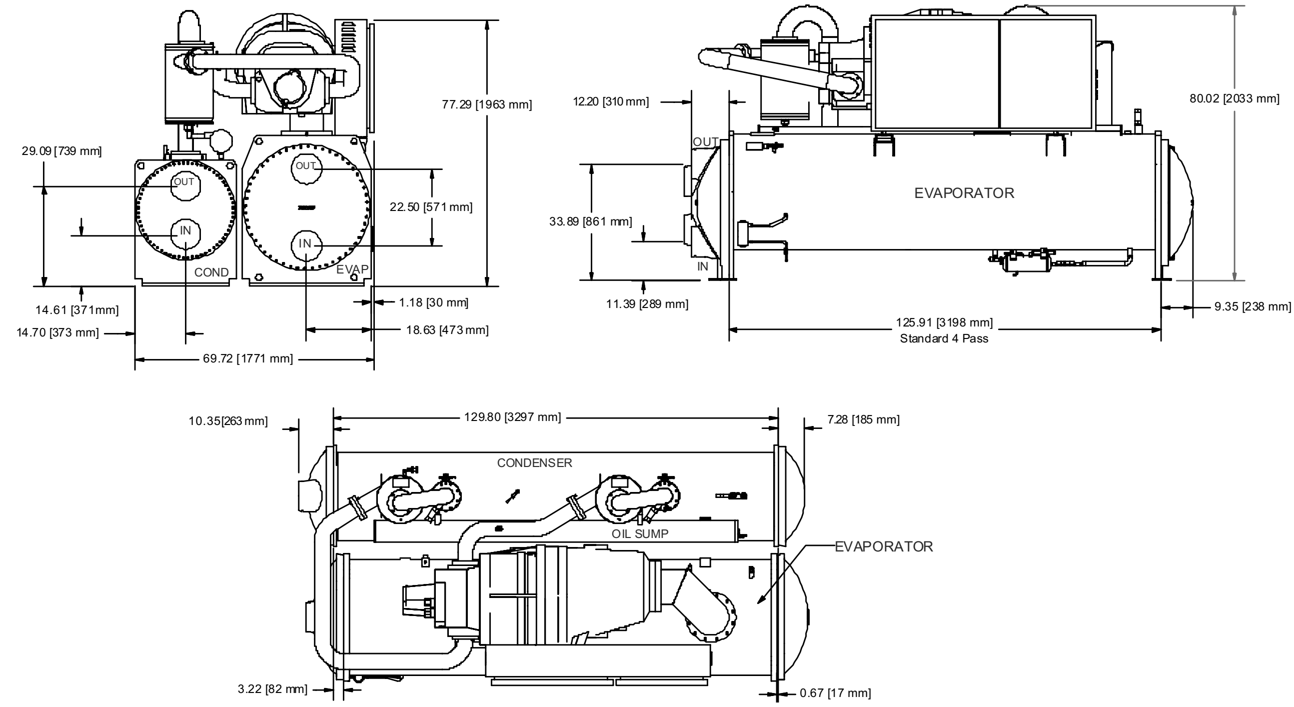
2 Pass Evaporator
Connection Configuration (left or right hand)
Depends on Water Inlet

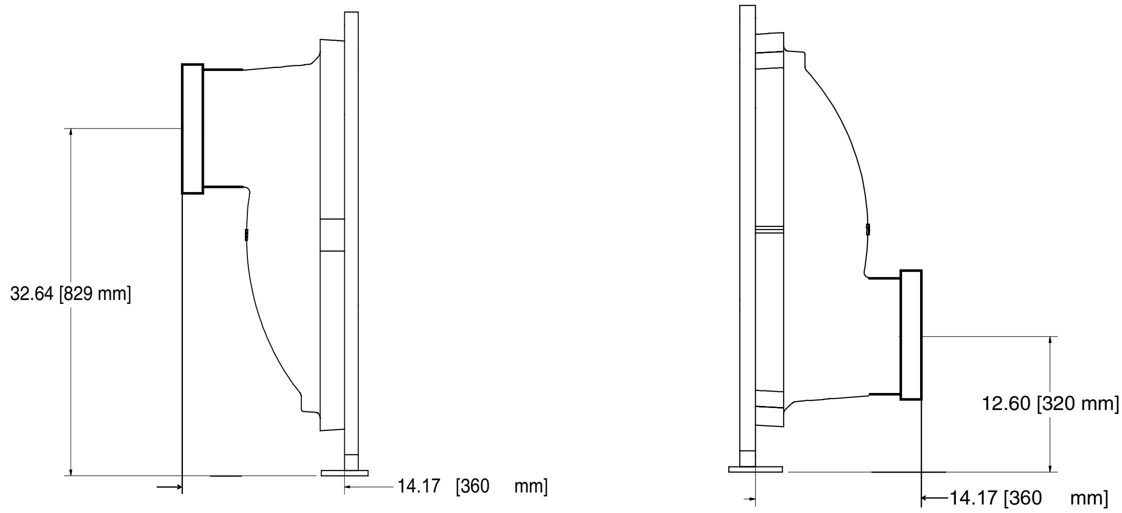
Figure 17. Condenser and Evaporator Water Connections – CFF/DFF/EFF



2 Pass Evaporator
Connection Configuration (left or right hand)
Depends on Water Inlet

Figure 18. Condenser and Evaporator Water Connections - CGG/DGG/EGG





3 Pass Evaporator
Connection Configuration (left or right hand)
Depends on Water Inlet

Figure 19. Condenser and Evaporator Water Connections - BCH

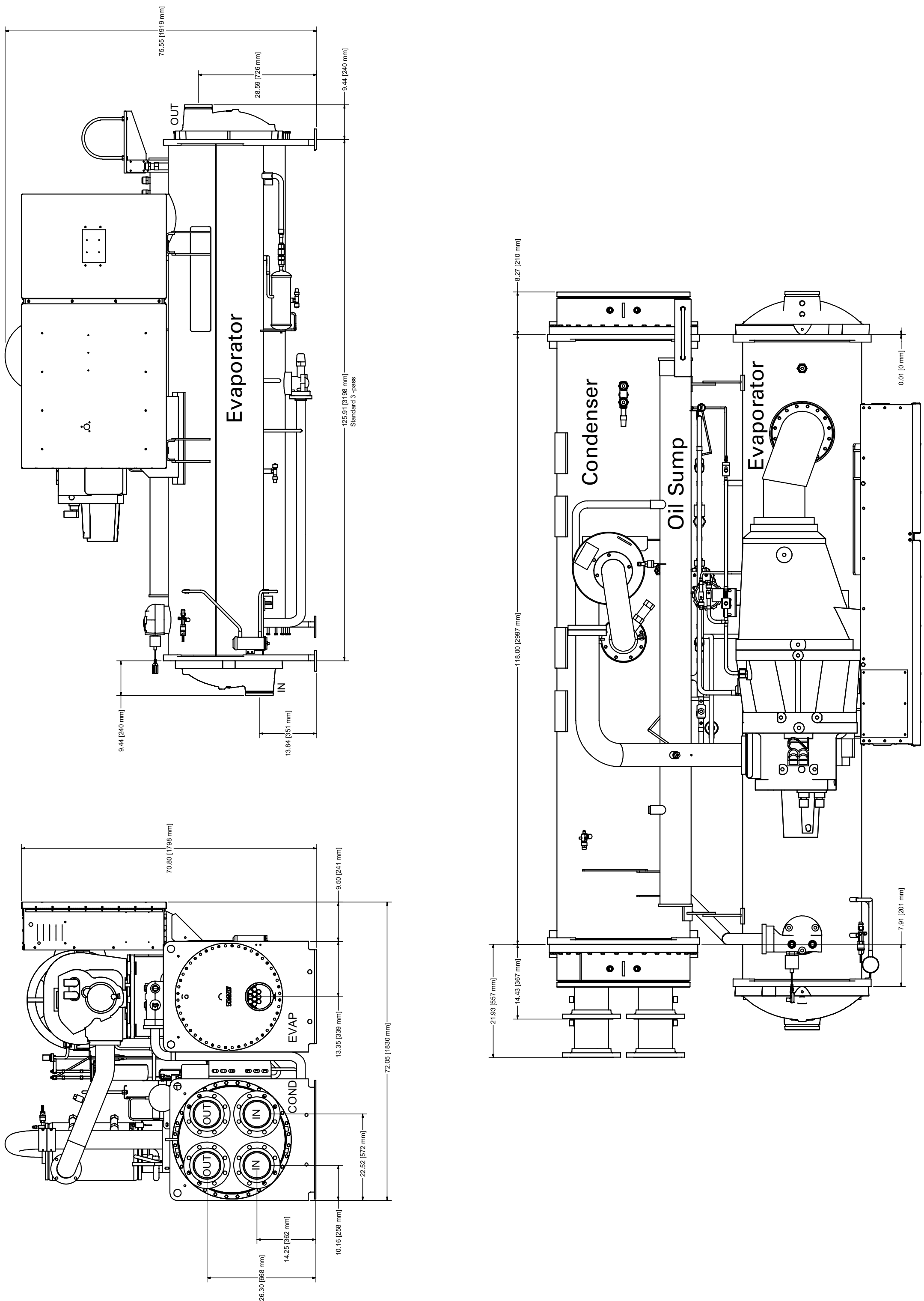


Figure 20. Condenser and Evaporator Water Connections - CEJ

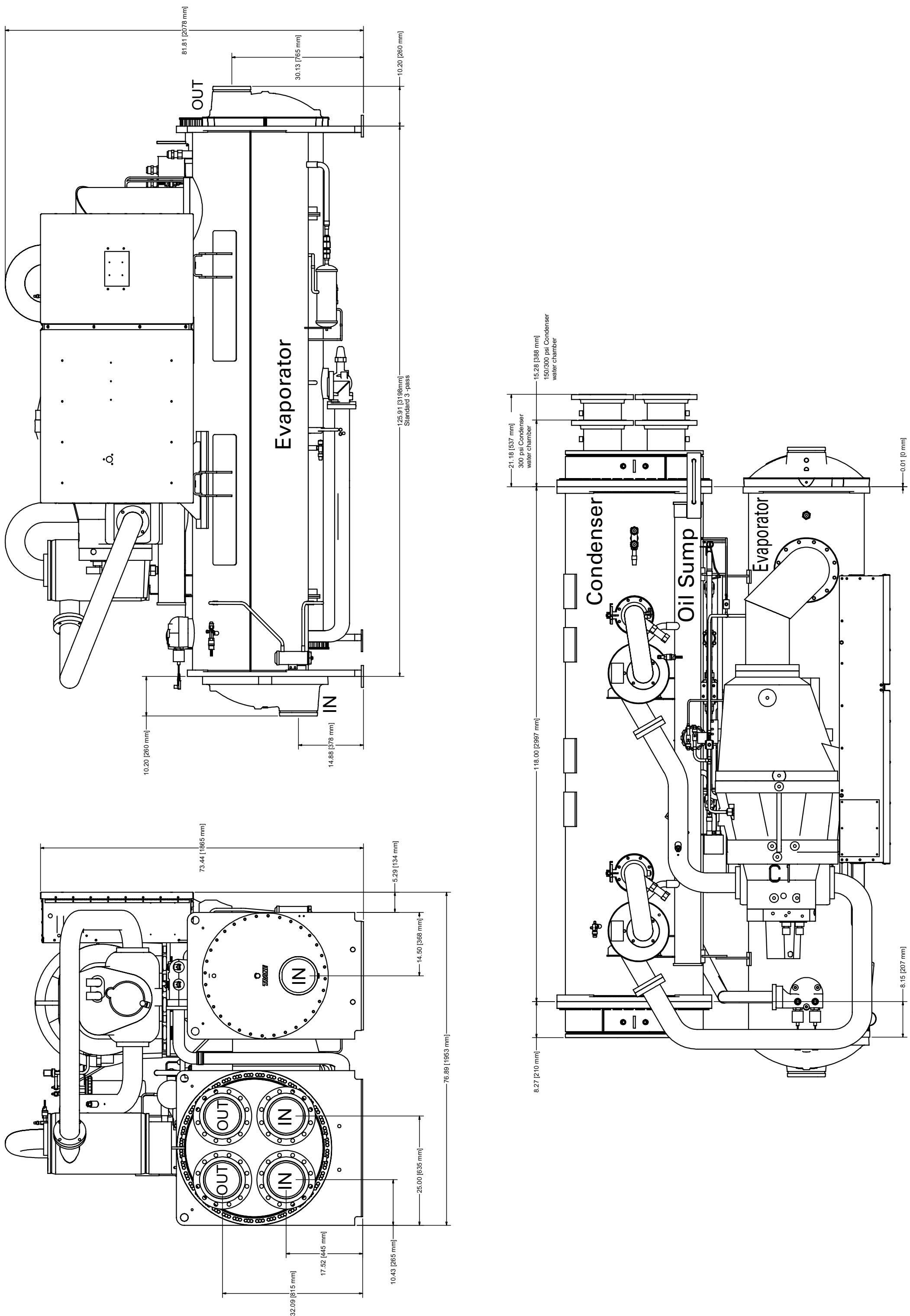


Figure 21. Condenser and Evaporator Water Connections - CFJ/DFJ

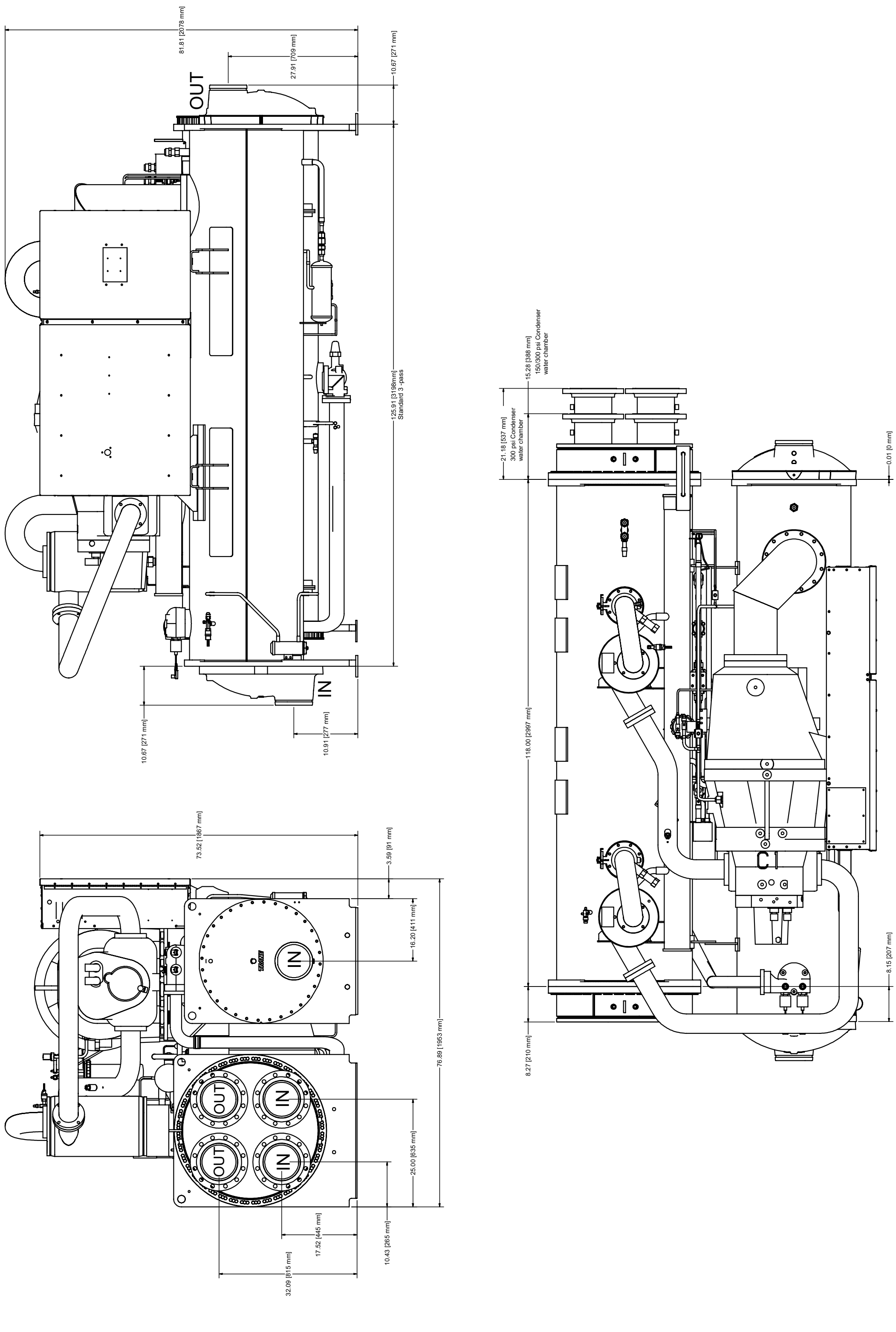


Figure 22. Condenser and Evaporator Water Connections - DGK/EGK

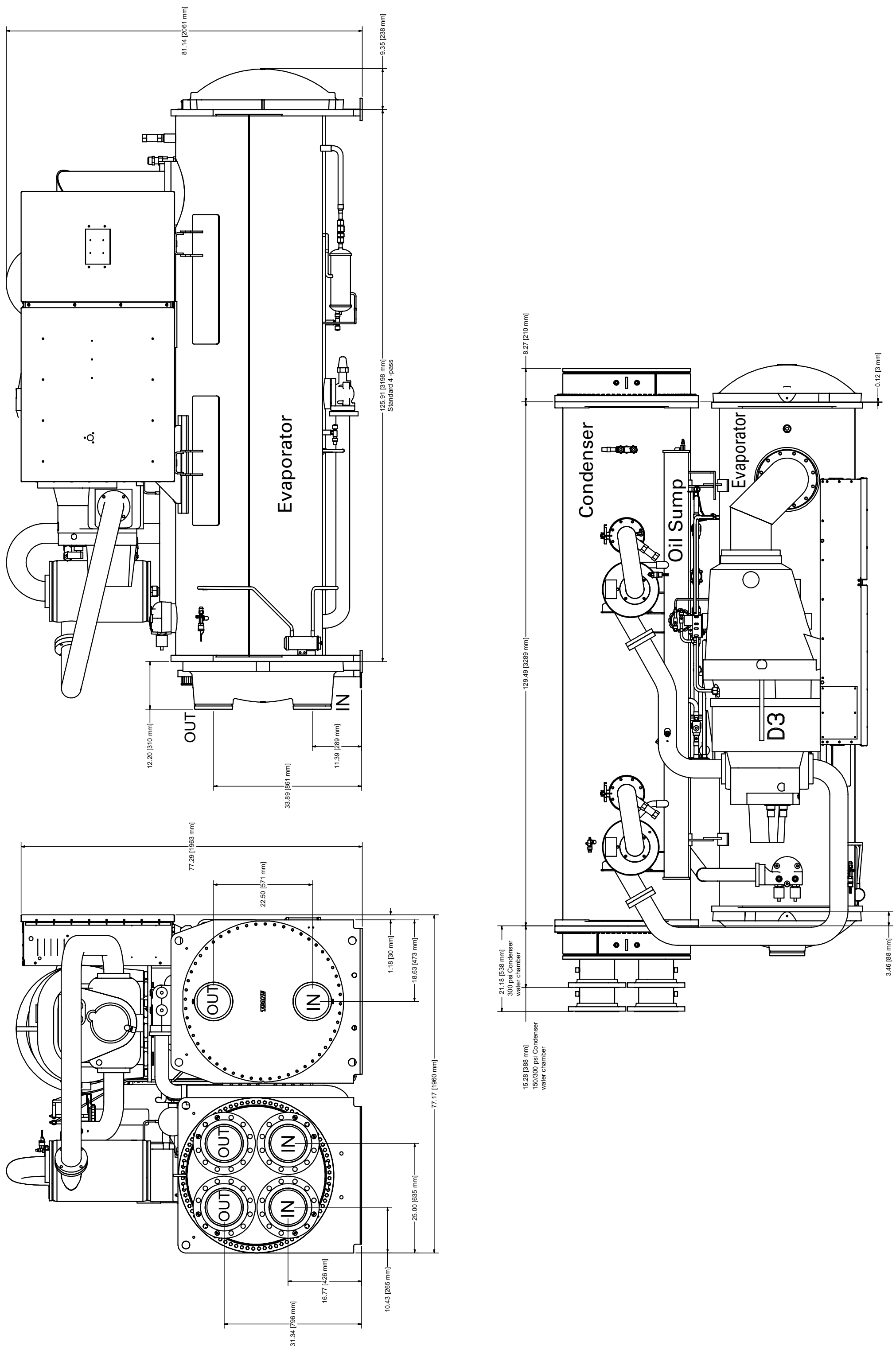


Figure 23. Condenser and Evaporator Water Connections - BCL

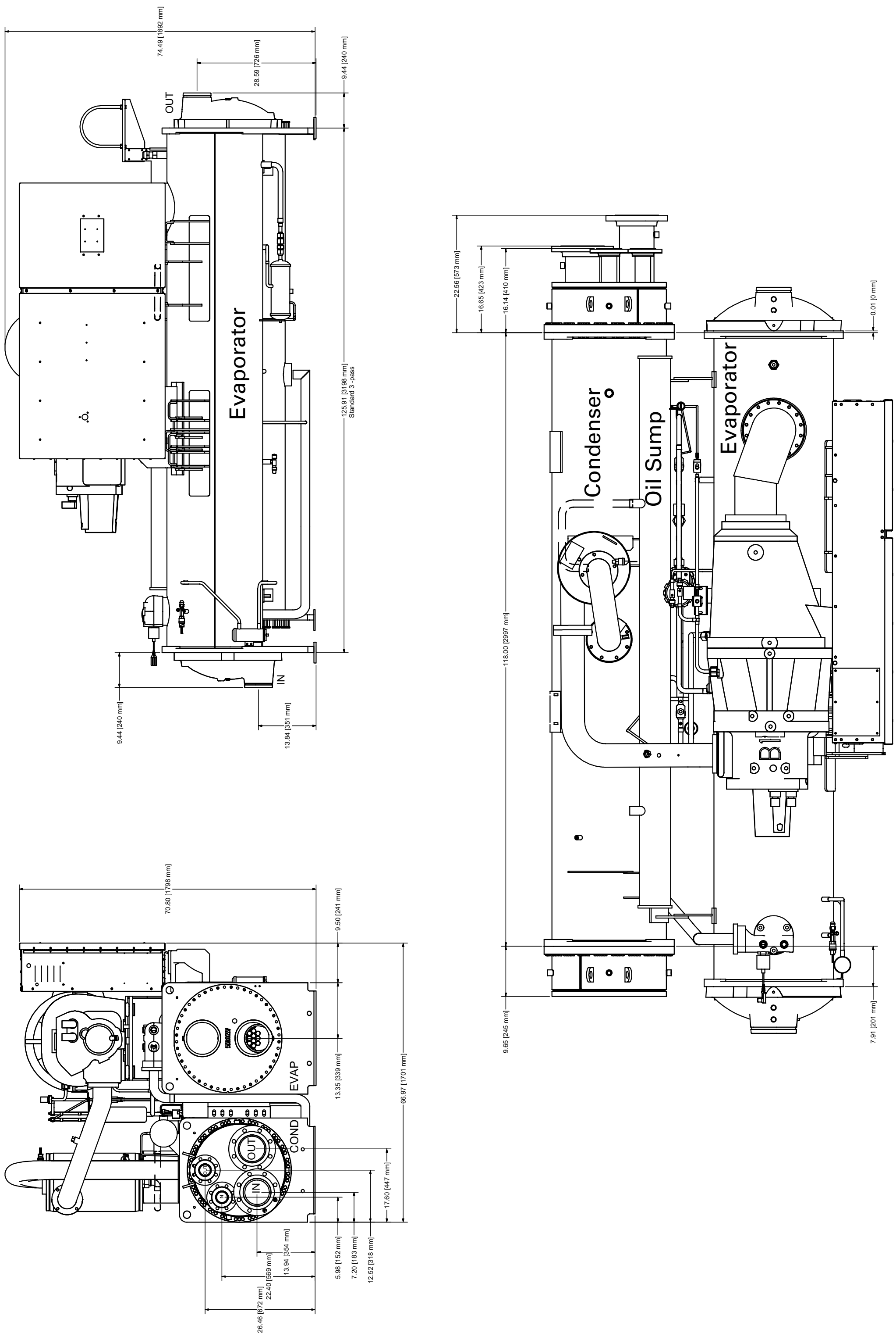


Figure 24. Condenser and Evaporator Water Connections - CEM

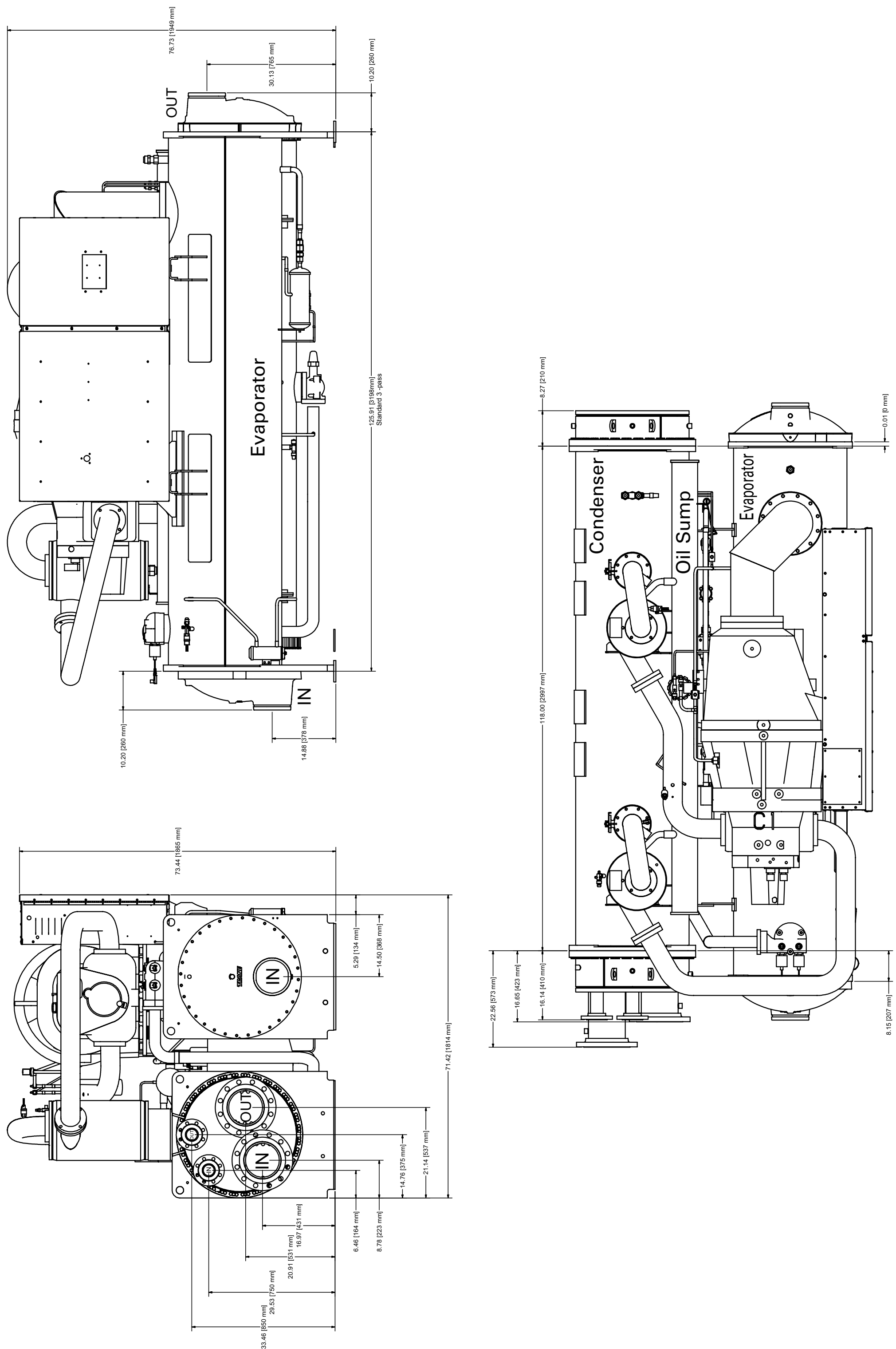


Figure 25. Condenser and Evaporator Water Connections - CFM/DFM

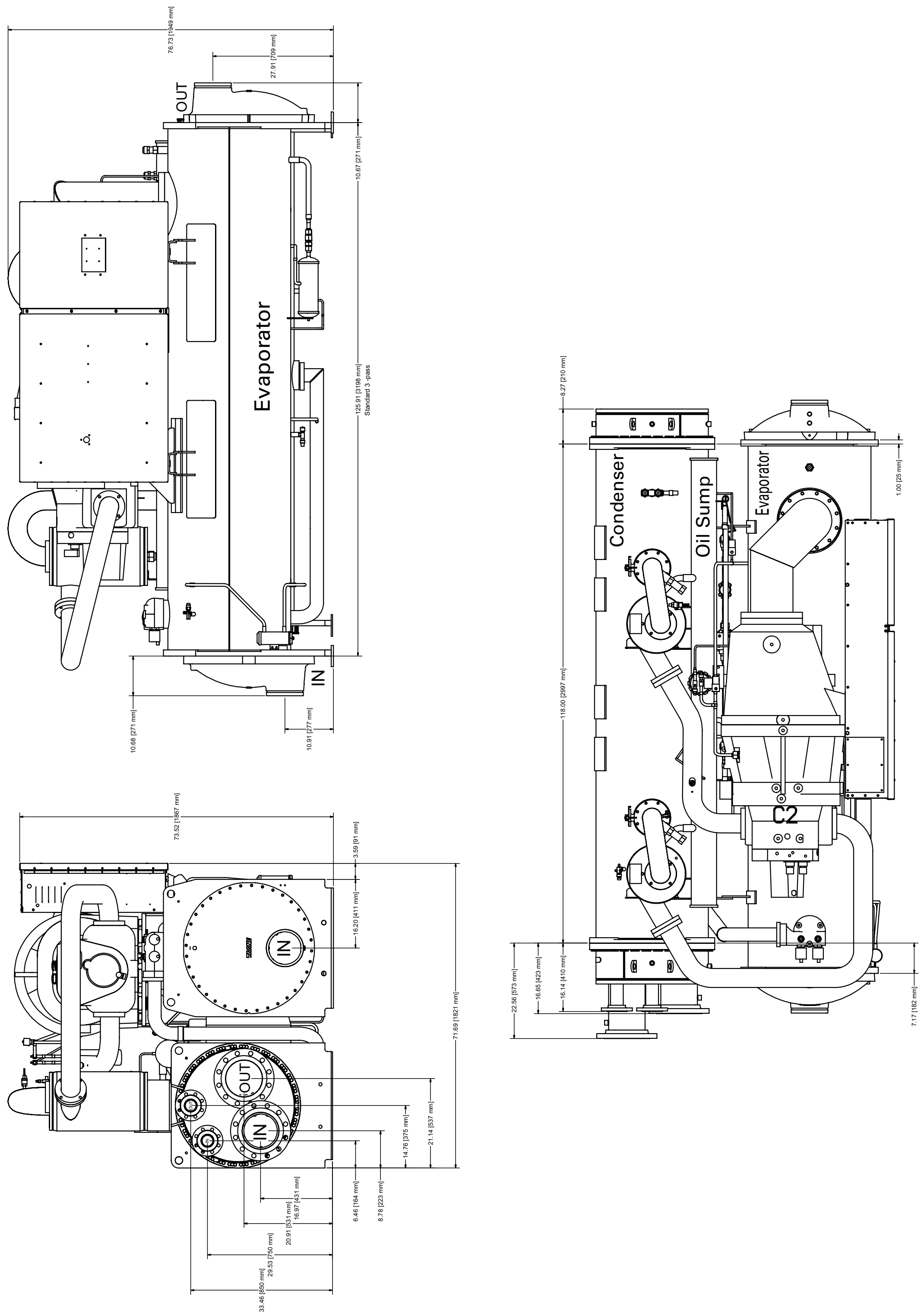


Figure 26. Condenser and Evaporator Water Connections - DGN/EGN

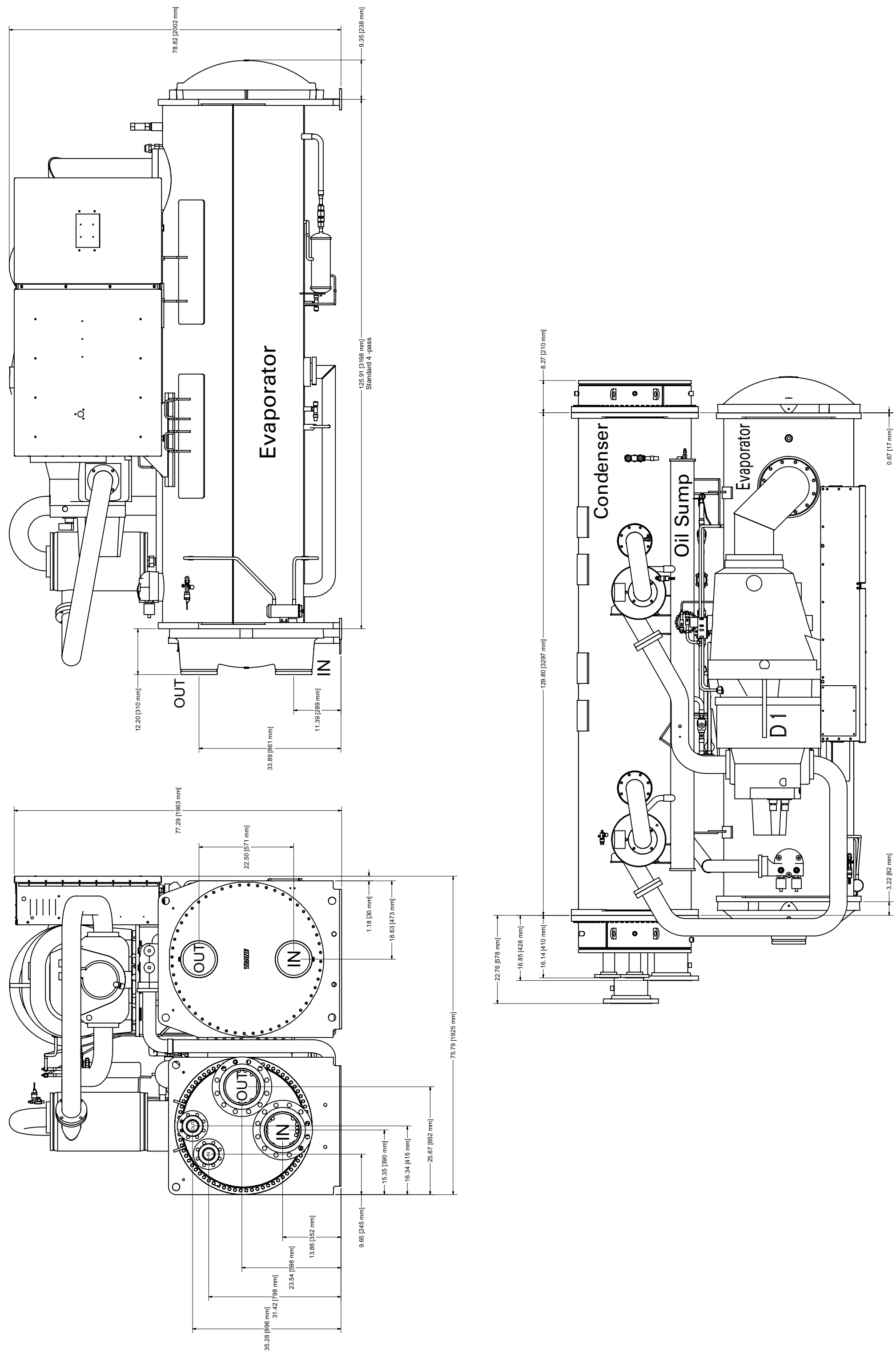
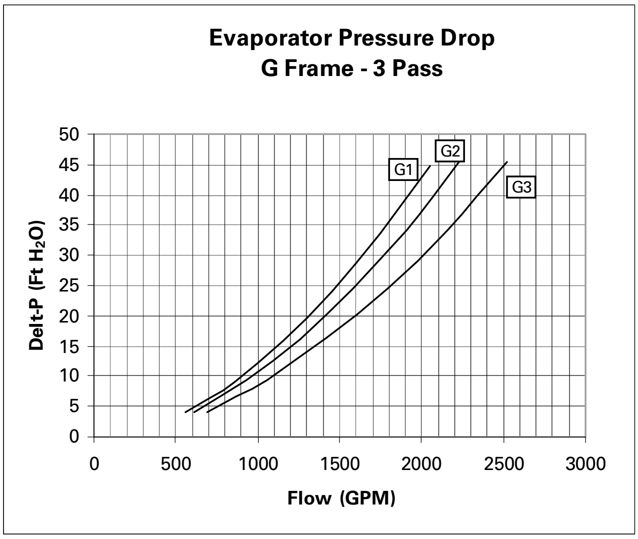


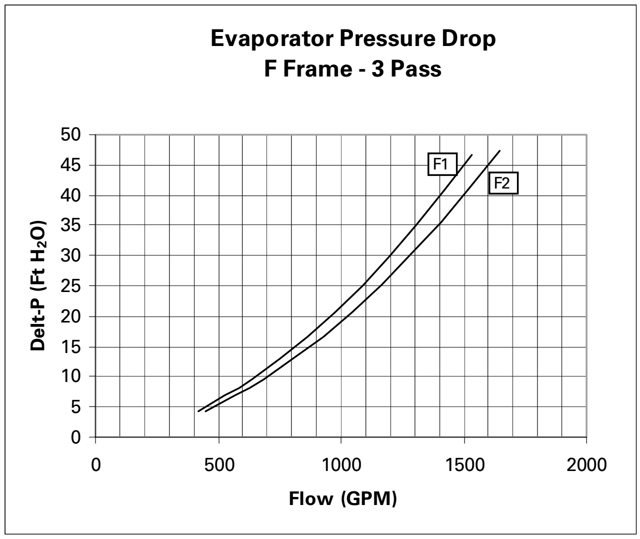
Table 13. Evaporator and Condenser Data

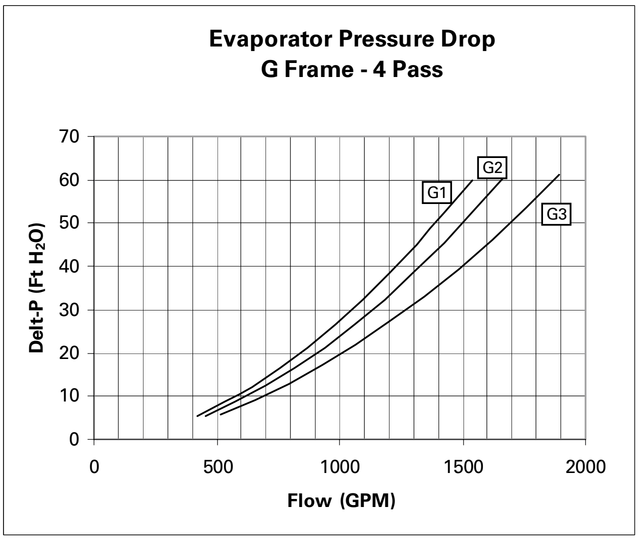
Compressor Frame Code (Digit 6,7 of Model No.)	Evap Shell Code (Digits 14, 15 of Model No.)	Evap. Shell Diameter (in)	Nominal Connector size (NPS)*			Cond Shell Code (Digits 21,22 of Model No.)	Cond. Shell Diameter (in)	Nom. Conn. Size (NPS)*	
			2-Pass	3-Pass	4-Pass			Standard Condenser 2-Pass	Heat Reclaim 2-Pass
E3	D2	26.5	8	8	6	E2	22.0	8	-
	F2	29.0	8	8	-	E2	22.0	8	-
	G2	33.5	-	10	8	G1	25.75	8	-
D3	D2	26.5	8	8	6	E2	22.0	8	-
	F2	29.0	10	8	-	F3	22.0	8	-
	G2	33.5	-	10	8	G1	25.75	8	-
	G3	33.5	-	10	8	G3	25.75	8	-
D2	G3	33.5	-	10	8	G3	25.75	8	-
	D2	26.5	8	8	6	E2	22.0	8	-
	F2	29.0	10	8	-	F3	22.0	8	-
	G2	33.5	-	10	8	G1	25.75	8	-
D1	D1	26.5	8	8	6	E1	22.0	8	-
	F1	29.0	10	8	-	F2	22.0	8	-
	G1	33.5	-	10	8	G1	25.75	8	-
C2	D3	26.5	8	8	6	E3	22.0	8	-
	D4	26.5	8	8	6	E4	22.0	8	-
	E1	26.5	8	8	6	F1	22.0	8	-
	F2	29.0	10	8	-	F3	22.0	8	-
C1	D6	26.5	8	8	6	E5	22.0	8	-
	D5	26.5	8	8	6	E4	22.0	8	-
	D3	26.5	8	8	6	E3	22.0	8	-
	E1	26.5	8	8	6	F1	22.0	8	-
	C2	23.0	-	6	-	D2	18.75	6	-
B2	C2	23.0	-	6	-	D2	18.75	6	-
	B2	23.0	-	6	-	B2	18.75	6	-
B1	C1	23.0	-	6	-	D1	18.75	6	-
	B1	23.0	-	6	-	B1	18.75	6	-
B1	C1	23.0	-	6	-	H1	25.75	6	6
B2	C2	23.0	-	6	-	H2	25.75	6	6
C1	E1	26.5	8	8	-	J1	31.5	8	8
C2	F2	29.0	10	8	-	J3	31.5	8	8
D1	F1	29.0	10	8	-	J2	31.5	8	8
D2	G2	33.5	-	10	8	K1	31.5	8	8
D3	G2	33.5	-	10	8	K1	31.5	8	8
E3	G2	33.5	-	10	8	K1	31.5	8	8
B1	C1	23.0	-	6	-	L1	22.0	6	3
B2	C2	23.0	-	6	-	L2	22.0	6	3
C1	E1	26.5	8	8	-	M1	26.5	8	4
C2	F2	29.0	10	8	-	M3	26.5	8	4
D1	F1	29.0	10	8	-	M2	26.5	8	4
D2	G2	33.5	-	10	8	N1	29.0	8	4
D3	G2	33.5	-	10	8	N1	29.0	8	4
E3	G2	33.5	-	10	8	N1	29.0	8	4

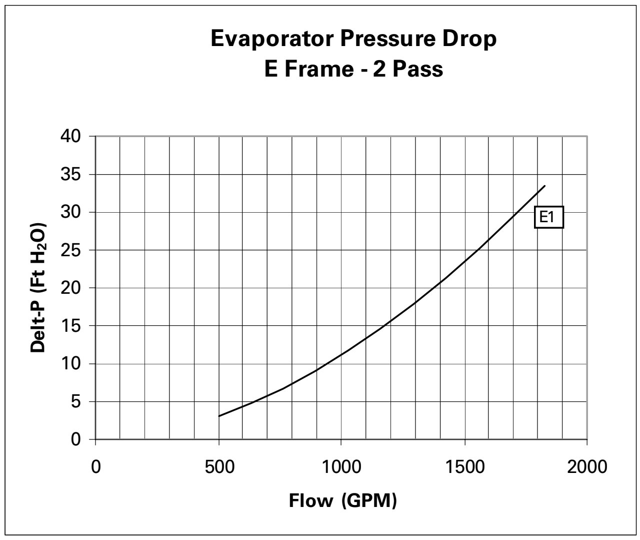
Metric Conversion is:
6 NPS = 150 mm nominal
8 NPS = 200 mm nominal
10 NPS = 250 mm nominal

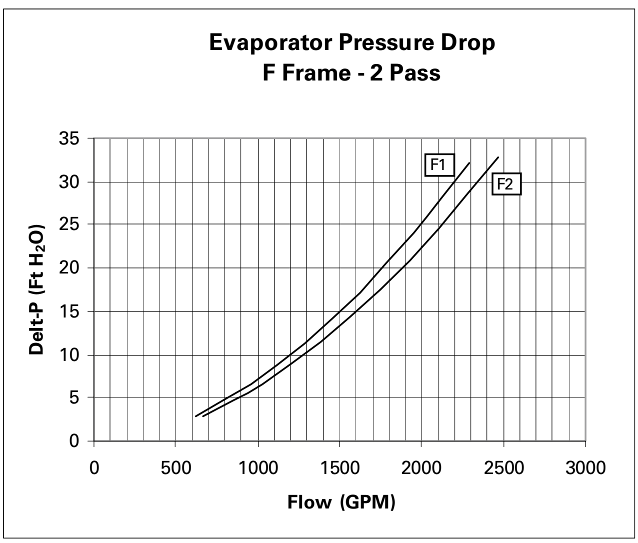
Water Pressure Drop Data

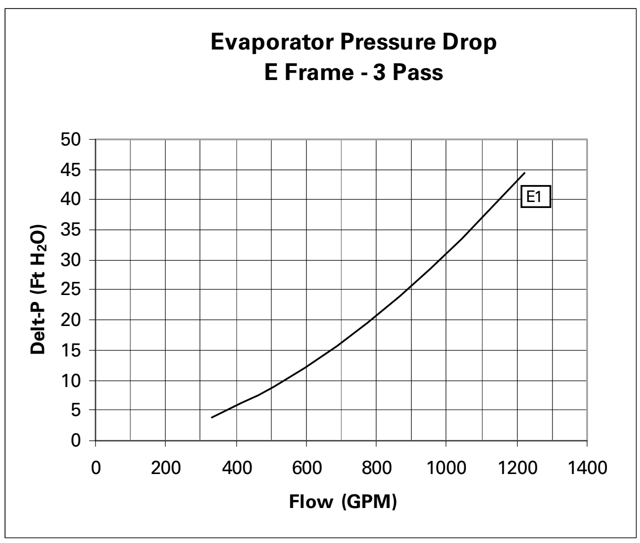


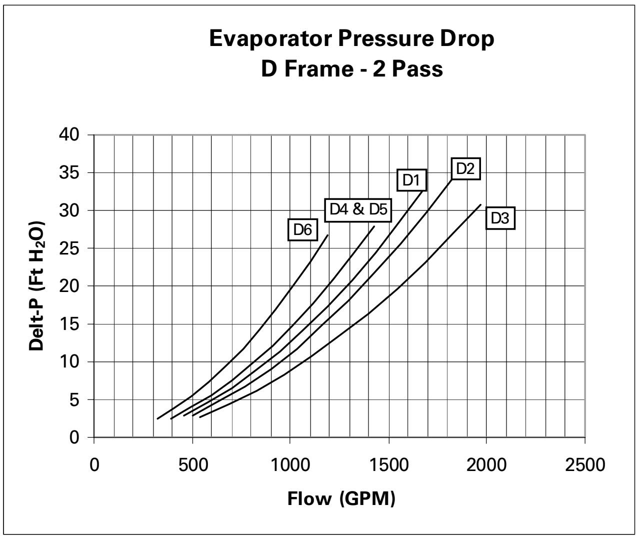


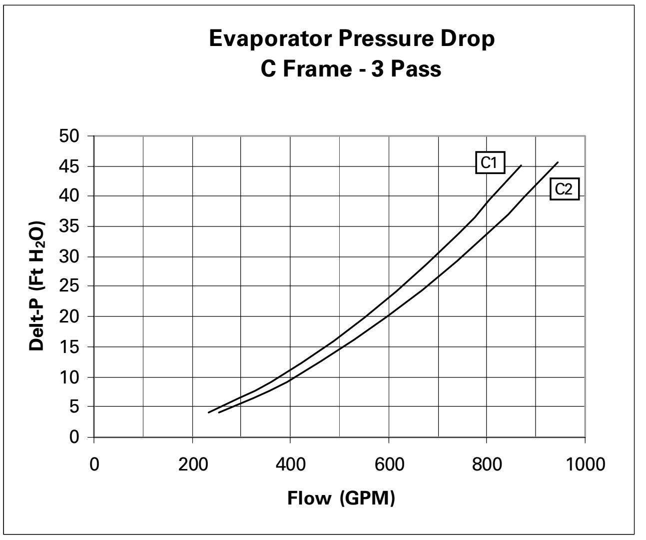


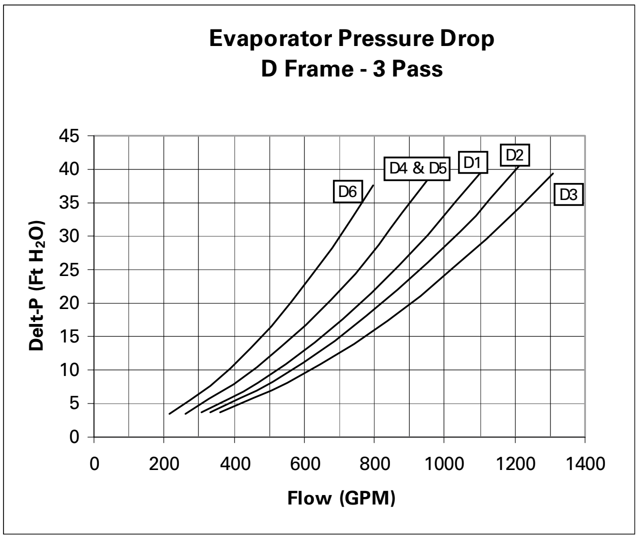


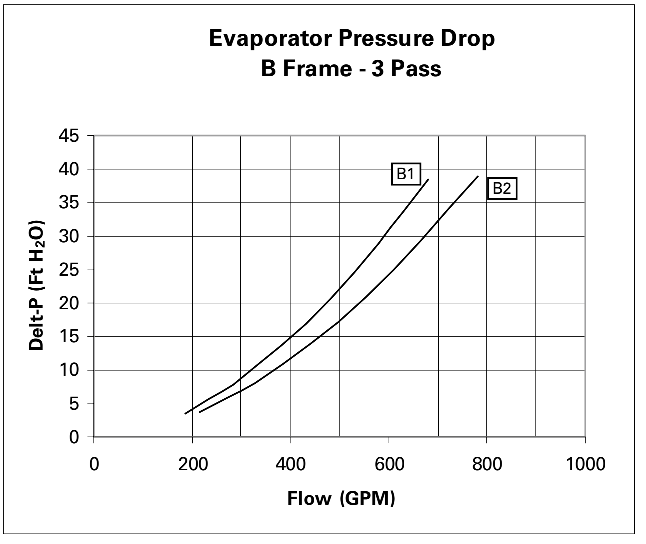


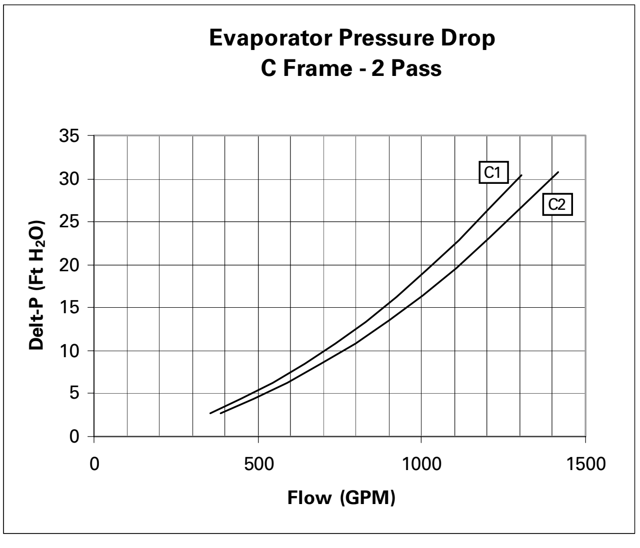


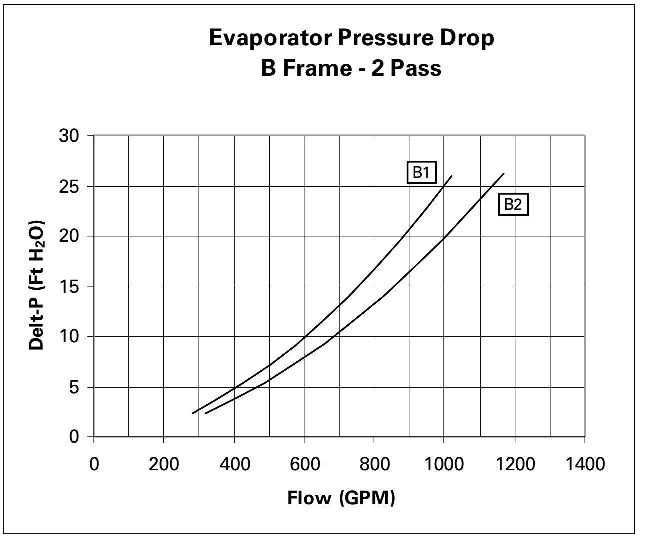

Evaporator Pressure Drop
D Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
0
500
1000
1500
2000
2500
0
5
10
15
20
25
30
35
40
D6
D4 & D5
D1
D2
D3

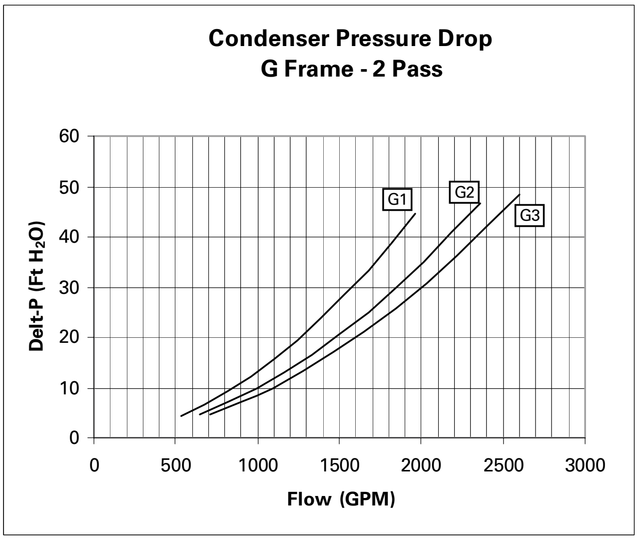

Evaporator Pressure Drop
C Frame - 3 Pass
Delt-P (Ft H_2O)
Flow (GPM)
0
200
400
600
800
1000
0
5
10
15
20
25
30
35
40
45
50
C1
C2

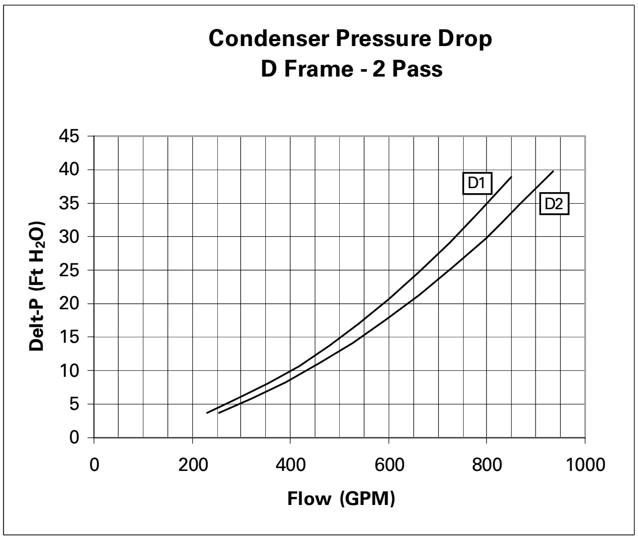

Evaporator Pressure Drop
D Frame - 3 Pass
Delt-P (Ft H_2O)
Flow (GPM)
0
200
400
600
800
1000
1200
1400
0
5
10
15
20
25
30
35
40
45
D6
D4 & D5
D1
D2
D3

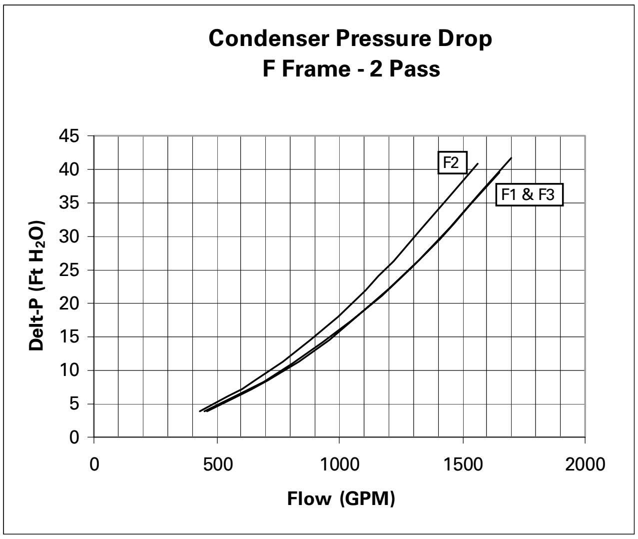

Evaporator Pressure Drop
B Frame - 3 Pass
Delt-P (Ft H_2O)
Flow (GPM)
0
200
400
600
800
1000
0
5
10
15
20
25
30
35
40
45
B1
B2

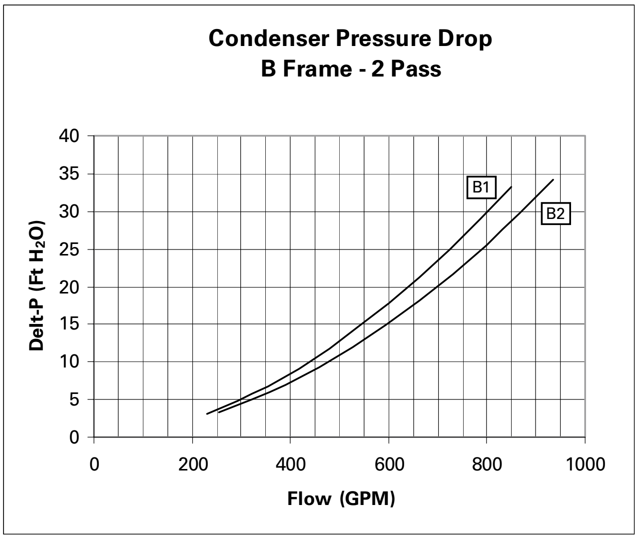

Evaporator Pressure Drop
C Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
0
500
1000
1500
0
5
10
15
20
25
30
35
C1
C2

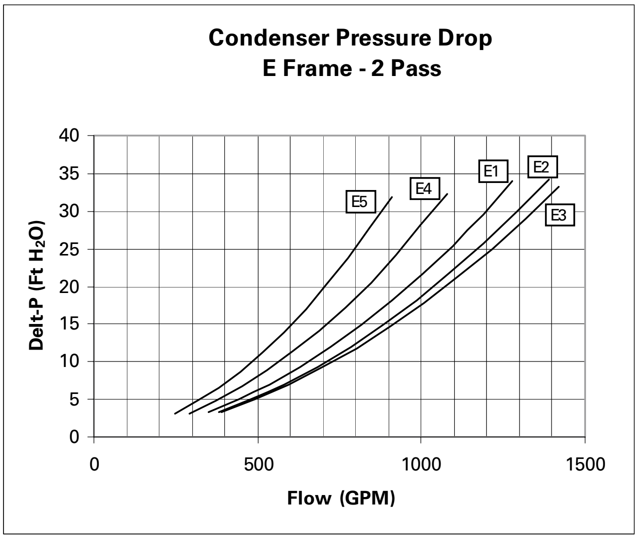

Evaporator Pressure Drop
B Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
0
200
400
600
800
1000
1200
1400
0
5
10
15
20
25
30
B1
B2

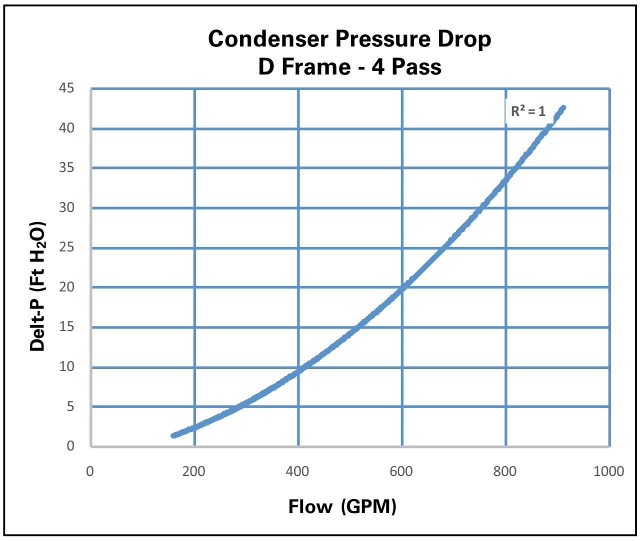

Condenser Pressure Drop
G Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
G1
G2
G3
0 10 20 30 40 50 60
0 500 1000 1500 2000 2500 3000

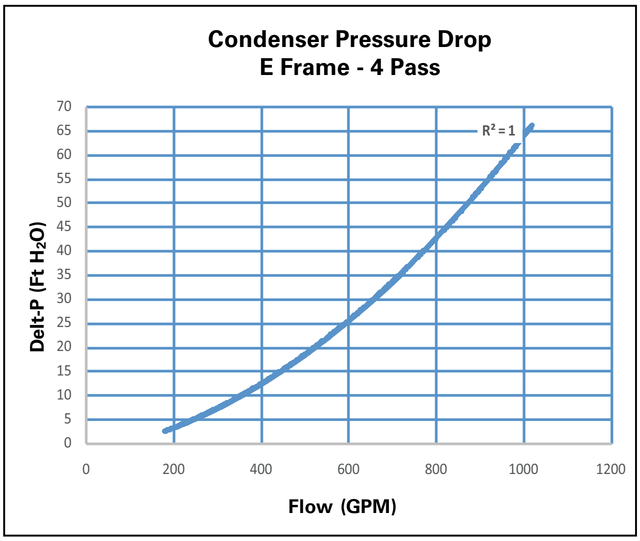

Condenser Pressure Drop
D Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
D1
D2
0 5 10 15 20 25 30 35 40 45
0 200 400 600 800 1000

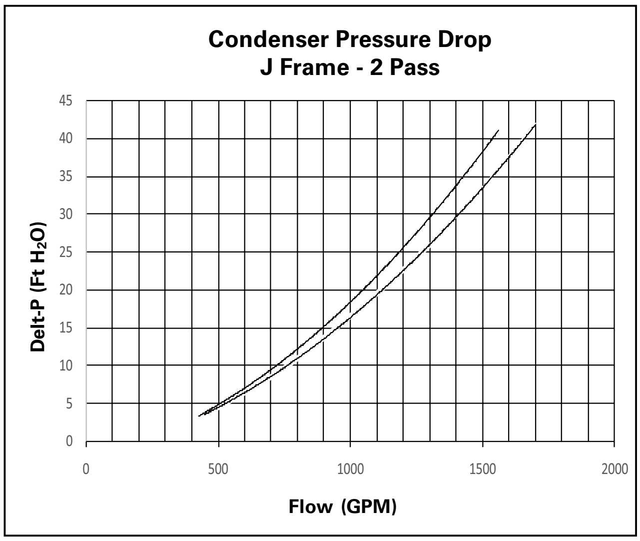

Condenser Pressure Drop
F Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
F2
F1 & F3
0 5 10 15 20 25 30 35 40 45
0 500 1000 1500 2000

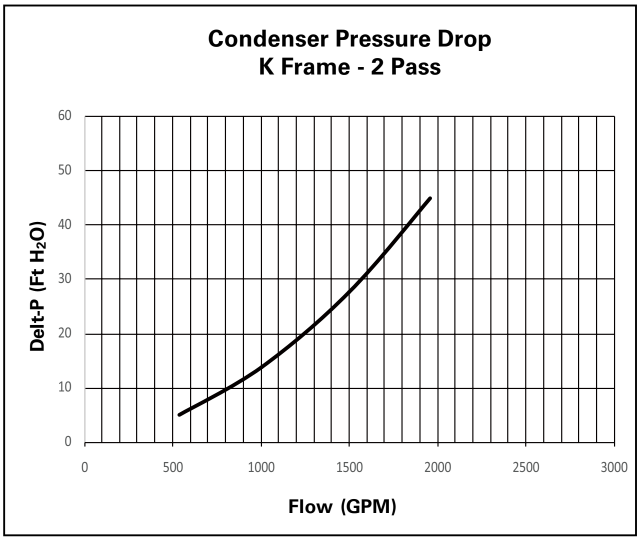

Condenser Pressure Drop
B Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
B1
B2
0 5 10 15 20 25 30 35 40
0 200 400 600 800 1000

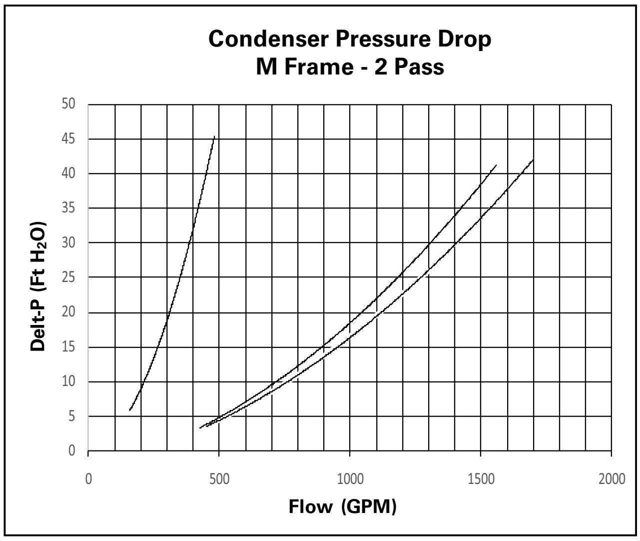

Condenser Pressure Drop
E Frame - 2 Pass
Delt-P (Ft H_2O)
Flow (GPM)
E5
E4
E1
E2
E3
0 5 10 15 20 25 30 35 40
0 500 1000 1500

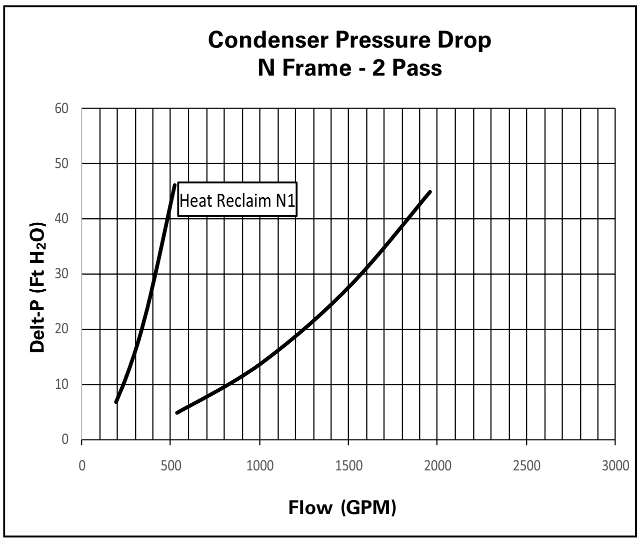

Condenser Pressure Drop
D Frame - 4 Pass
Delt-P (Ft H_2O)
Flow (GPM)
$R^2 = 1$
0 5 10 15 20 25 30 35 40 45
0 200 400 600 800 1000

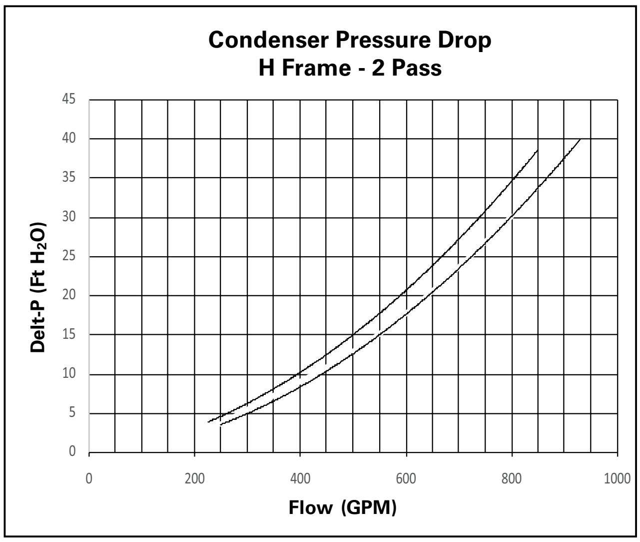

Condenser Pressure Drop
E Frame - 4 Pass
Delt-P (Ft H2O)
Flow (GPM)
$R^2 = 1$
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
200
400
600
800
1000
1200

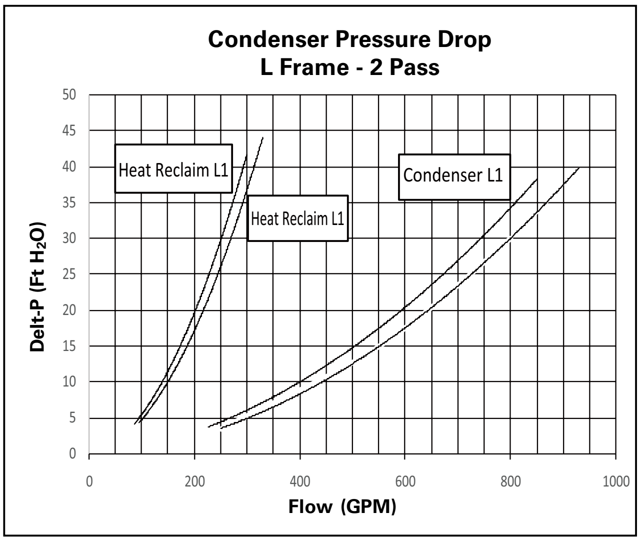

Condenser Pressure Drop
J Frame - 2 Pass
Delt-P (Ft H2O)
Flow (GPM)
0
5
10
15
20
25
30
35
40
45
500
1000
1500
2000


Condenser Pressure Drop
K Frame - 2 Pass
Delt-P (Ft H2O)
Flow (GPM)
0
10
20
30
40
50
60
500
1000
1500
2000
2500
3000


Condenser Pressure Drop
M Frame - 2 Pass
Delt-P (Ft H2O)
Flow (GPM)
0
5
10
15
20
25
30
35
40
45
50
500
1000
1500
2000


Condenser Pressure Drop
N Frame - 2 Pass
Delt-P (Ft H2O)
Flow (GPM)
Heat Reclaim N1
0
10
20
30
40
50
60
500
1000
1500
2000
2500
3000


Condenser Pressure Drop
H Frame - 2 Pass
Delt-P (Ft H2O)
Flow (GPM)
0
5
10
15
20
25
30
35
40
45
200
400
600
800
1000



Making Grooved Pipe Connections

⚠ CAUTION

Equipment Damage!

To prevent damage to water piping, do not overtighten connections. To prevent equipment damage, bypass the unit if using an acidic flushing agent.

Note: *Make sure that all piping is flushed and cleaned prior to starting the unit.*

Vents and Drains

Install pipe plugs in evaporator and condenser water box drain and vent connections before filling the water systems.

To drain water, remove vent and drain plugs, install a NPT connector in the drain connection with a shutoff valve and connect a hose to it.

Evaporator Piping Components

Note: *Make sure all piping components are between the shutoff valves, so that isolation can be accomplished on both the condenser and the evaporator.*

"Piping components" include all devices and controls used to provide proper water system operation and unit operating safety. These components and their general locations are given below.

Entering Chilled Water Piping

- Air vents (to bleed air from system)
- Water pressure gauges with shutoff valves
- Pipe unions
- Vibration eliminators (rubber boots)
- Shutoff (isolation) valves
- Thermometers
- Cleanout tees
- Pipe strainer

Leaving Chilled Water Piping

- Air vents (to bleed air from system)
- Water pressure gauges with shutoff valves
- Pipe unions
- Vibration eliminators (rubber boots)
- Shutoff (isolation) valves
- Thermometers
- Cleanout tees
- Balancing valve
- Pressure relief valve
- Flow switch

⚠ CAUTION

Evaporator Damage!

To prevent evaporator damage, do not exceed 150 psig (10.3 bar) evaporator water pressure for standard water boxes. Maximum pressure for high pressure water boxes is 300 psig (20.7 bar). Refer to digit 14 of the Model No. To prevent tube damage, install a strainer in the evaporator water inlet piping. To prevent tube corrosion, ensure that the initial water fill has a balanced pH.

Condenser Piping Components

"Piping components" include all devices and controls used to provide proper water system operation and unit operating safety. These components and their general locations are given below.

Entering condenser water piping

- Air vents (to bleed air from system)
- Water pressure gauges with shutoff valves
- Pipe unions
- Vibration eliminators (rubber boots)
- Shutoff (isolation) valves. One per each pass
- Thermometers
- Cleanout tees
- Pipe strainer

Leaving condenser water piping

- Air vents (to bleed air from system)
- Water pressure gauges with shutoff valves
- Pipe unions
- Vibration eliminators (rubber boots)
- Shutoff (isolation) valve - one per each pass

- Thermometers
- Cleanout tees
- Balancing valve
- Pressure relief valve.
- Flow switch

⚠ CAUTION

Condenser Damage!

To prevent condenser damage, do not exceed 150 psig (10.3 bar) water pressure for standard water boxes. Maximum pressure for high pressure water boxes is 300 psig (20.7 bar). Refer to digit 18 of the Model No. To prevent tube damage, install a strainer in condenser water inlet piping. To prevent tube corrosion, ensure that the initial water fill has a balanced pH.

Condenser Water Regulating Valve

The Condenser Head Pressure Control Option provides for a 0-10VDC (maximum range - a smaller range is adjustable) output interface to the customer's condenser water flow device. The condenser water flow device is typically a large butterfly type (6" or 8") automatic valve for 200 to 400 Ton chillers.

The following guidelines must be met in order to ensure adequate oil circulation throughout the system.

- The RTHD must maintain a 23 psid system pressure differential at all load conditions in order to ensure adequate oil circulation.
- The entering condenser water temperature must be above 55°F (12.8°C) or between 45°F (7.2°C) and 55°F (12.8°C) with a 1°F temperature rise per minute to 55°F (12.8°C).
- Condenser leaving water temperature must be 17°F degrees higher than evaporator leaving water temperature within 2 minutes of startup. A 25°F diferential must be maintained thereafter.

If the above guidelines cannot be met, then some form of tower water control must be used.

Condenser Water Regulating Valve Adjustment

A separate TechView Settings Menu tab entitled "Condenser Head Pressure Control - Setup" that is only visible if the configuration is selected, contain the following settings and manual overrides for user adjustments and commissioning all under one tab:

- "Off State" Output Command (0-10 Vdc 0.1 volt increments, Default 2.0 Vdc)
- Output Voltage @ Desired Minimum Flow (Adj: 0 to 10.0 in 0.1 volt increments, Default 2.0 Vdc)
- Desired Minimum Flow (Adj: 0- 100% of full flow in 1% intervals, Default 20%)
- Output Voltage @ Desired Maximum Flow (Adj: 0 to 10.0 in .1 volt increments (or finer), Default 10 Vdc)
- Actuator Stroke Time (Min to Max Range Time) (Adj: 1 to 1000 seconds, in 1 second increments, Default 30s)
- Damping Coefficient (adj: 0.1 to 1.8 , in .1 increments, Default .5)
- Head Pressure Control Override (enumeration of: disabled (auto), "off" state, minimum, maximum (100%),) default :disabled (auto). When this setting is in "disabled (auto)"
- Condenser Water Pump Prerun Time

Partial Heat Recovery Condenser Tube Parts

Partial heat recovery condenser should be installed with a pressure reducing valve to reduce the inlet water pressure. This requirement is only for the design pressure that the water pressure exceeds the container nameplate. This is necessary to prevent the valve disc and valve seat from being damaged by excessive pressure drop. In addition, it is necessary to limit the water side pressure of partial heat recovery condenser. Some heat recovery condenser water side design pressure shown in the container nameplate.

⚠ WARNING

May Damage The Condenser and Compressor!

In order to avoid damaging the partial heat recovery condenser or water flow regulating valve, the inlet pressure should not exceed the design pressure shown in the container nameplate.

Full Heat Recovery Condenser Tube Parts

The full heat recovery condenser should be installed with a pressure reducing valve to reduce the inlet water pressure. This requirement is only for the design pressure that the water pressure exceeds the container nameplate. This is necessary to prevent the valve disc and valve seat from being damaged by excessive pressure drop. In addition, it is necessary to limit the water side pressure of the total heat recovery condenser. The total heat recovery condenser water side design pressure shown in the container nameplate.

⚠ WARNING

May Damage The Condenser and Compressor!

In order to avoid damaging the total heat recovery condenser or water flow regulating valve, the inlet pressure should not exceed the design pressure shown in the container nameplate.

Full Heat Recovery Condenser Water Temperature Requirements and Control

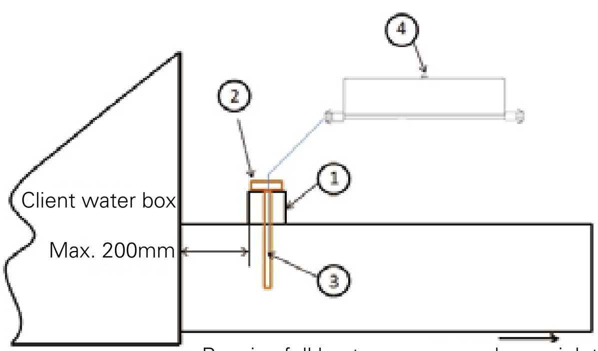
⚠ WARNING

The following application conditions must be satisfied, otherwise the unit will be damaged easily!

1. **Operation control of the pump: the operation of the pump must correspond with the pump start-stop signal of the UC800 controller of the unit.**
2. **Setting of water flow switch: the flow switch node of the unit is not allowed to be short-connected, and it should be connected with the water system flow switch, and the flow rate is not less than 60% of the rated flow when the water flow switch is closed.**
3. **Establishment time of flow: Time between flow switch close and water pump runs should not exceed 5 minutes.**
4. **In addition to the mode switching process, the two water pumps of the full heat recovery unit are not allowed to run simultaneously.**

Installation Of Water Tank Temperature Sensor

The RTHD full heat recovery unit needs to collect the temperature of the client's water tank at run time for load control, and the installation of the temperature sensor of the tank can be referenced below.
Part 1 is provided by the customer. The internal thread specification of the joint and temperature sensor temperature package is 1/2-14NPT. Parts 2, 3, 4 are provided by Trane. In order to avoid affecting the measurement accuracy, the distance between the insertion position of the temperature sensor and the water tank must not exceed 200mm. The temperature sensor is connected to the temperature acquisition module by 20 meters long connecting line, and the temperature of the water tank is transmitted to the unit control cabinet.



1. Temperature sensor temperature well connector.
2. Temperature sensor temperature well.
3. Temperature sensor
4. 20 meters long connecting line.

Water Treatment

⚠ CAUTION

Proper Water Treatment!

The use of untreated or improperly treated water in a RTHD may result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. The Trane Company assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

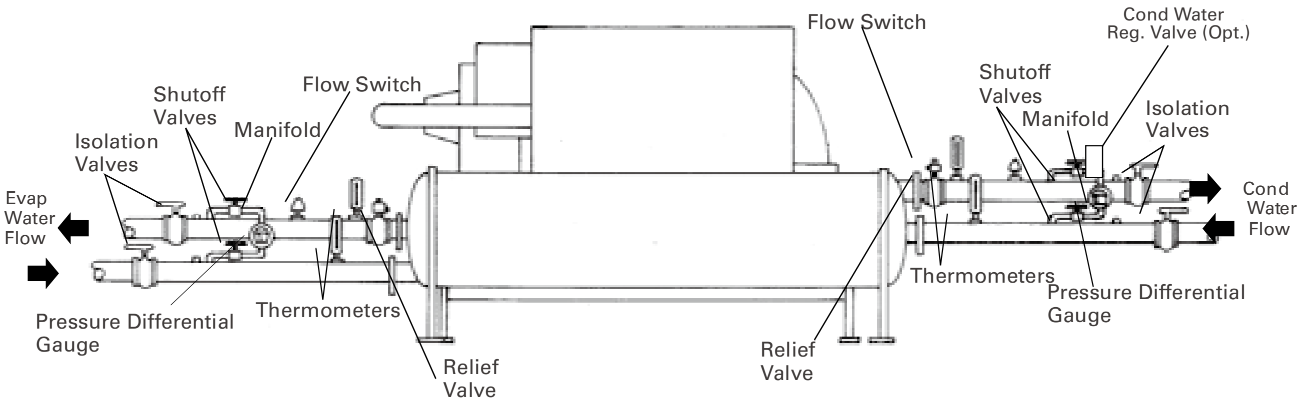
Using untreated or improperly treated water in these units may result in inefficient operation and possible tube damage. Consult a qualified water treatment specialist to determine whether treatment is needed.

Water Pressure Gauges and Thermometers

Install field-supplied thermometers and pressure gauges (with manifolds, whenever practical) as shown in Figure 27. Locate pressure gauges or taps in a straight run of pipe; avoid placement near elbows, etc. Be sure to install the gauges at the same elevation on each shell if the shells have opposite-end water connections.

To read manifolded water pressure gauges, open one valve and close the other (depending upon the reading desired). This eliminates errors resulting from differently calibrated gauges installed at unmatched elevations.

Figure 27. Typical Thermometer, Valving, and Manifold Pressure Gauge Set-up



Refer to *Trane Engineering Bulletin - Series R® Chillers Sound Ratings and Installation Guide* for sound-sensitive applications.

Water Pressure Relief Valves

⚠ CAUTION

Shell Damage!

Install a pressure relief valve in both evaporator and condenser water systems. Failure to do so may result in shell damage.

Install a water pressure relief valve in one of the condenser and one of the evaporator water box drain connections or on the shell side of any shutoff valve. Water vessels with close-coupled shutoff valves have a high potential for hydrostatic pressure buildup on a water temperature increase. Refer to applicable codes for relief valve installation guidelines.

Flow Sensing Devices

The installer must provide flow switches or differential pressure switches with pump interlocks to sense system water flow. Flow switch locations are schematically shown in Figure 27.

To provide chiller protection, install and wire flow switches in series with the water pump interlocks, for both chilled water and condenser water circuits (refer to the Installation Electrical section). Specific connections and schematic wiring diagrams are shipped with the unit.

Flow switches must stop or prevent compressor operation if either system water flow drops off below the required minimum shown on the pressure drop curves. Follow the manufacturer's recommendations for selection and installation procedures. General guidelines for flow switch installation are outlined below.

- Mount the switch upright, with a minimum of 5 pipe diameters straight, horizontal run on each side.
- Do not install close to elbows, orifices or valves.

Note: *The arrow on the switch must point in the direction of the water flow.*

- To prevent switch fluttering, remove all air from the water system.

Note: *The UC800 provides a 6-second time delay on the flow switch input* before shutting down the unit on a loss-of-flow diagnostic. Contact a qualified service organization if nuisance machine shutdowns persist.

- Adjust the switch to open when water flow falls below nominal. Refer to the General Data table in Section 1 for minimum flow recommendations for specific water pass arrangements. Flow switch contacts are closed on proof of water flow.

Refrigerant Pressure Relief Valve Venting

⚠ WARNING

Hazardous Gases!

Consult local regulations for any special relief line requirements. Refrigerant vented into a confined equipment room could displace available oxygen to breathe, causing possible asphyxiation or other serious health risks. Failure to follow these recommendations could result in death or serious injury.

Note: *Vent pipe size must conform to the ANSI/ASHRAE Standard 15 for vent pipe sizing. All federal, state, and local codes take precedence over any suggestions stated in this manual.*

All relief valve venting is the responsibility of the installing contractor.

All RTHD units use evaporator, compressor, and condenser pressure relief valves (Figure 28) that must be vented to the outside of the building.

Relief valve connection sizes and locations are shown in the unit submittals. Refer to local codes for relief valve vent line sizing information.

⚠ CAUTION

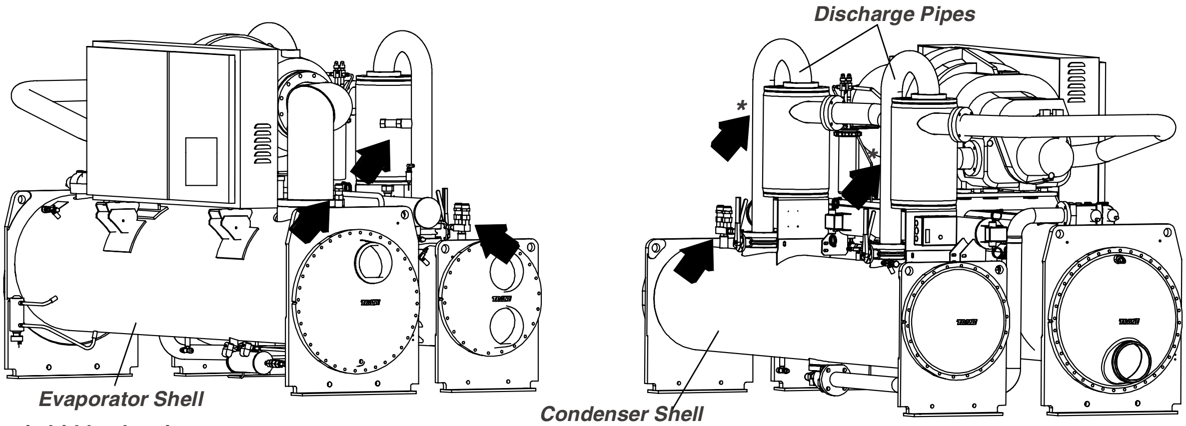
Equipment Damage!

Do not exceed vent piping code specifications. Failure to comply with specifications may result in capacity reduction, unit damage and/or relief valve damage.

Relief valve discharge setpoints and capacities rates are given in Table 14. Once the relief valve has opened, it will reclose when pressure is reduced to a safe level.

Note: *Once opened, relief valves may have tendency to leak and must be replaced.*

Figure 28. Relief Valve Location



** Valve is hidden by pipe*

Pressure relief valve discharge capacities will vary with shell diameter and length and also compressor displacement. Discharge venting capacity should be calculated as required by ASHRAE Standard 15-94. Do not adjust relief valve setting in the field.

Table 14. Pressure Relief Valve Data

Valve Location	Discharge Setpoint (psi)	Number of Valves	Rated Capacity per Relief Valve (lba/min.)	Field Connection Pipe Size (in NPT)	Factory Shell Side Connection(in)
Evap - B1	200	2	48.0	1	1-5/16-12
Evap - B2	200	2	48.0	1	1-5/16-12
Evap - C1	200	2	48.0	1	1-5/16-12
Evap - C2	200	2	48.0	1	1-5/16-12
Evap - D1	200	2	48.0	1	1-5/16-12
Evap - D2	200	2	48.0	1	1-5/16-12
Evap - D3	200	2	48.0	1	1-5/16-12
Evap - D4	200	2	48.0	1	1-5/16-12
Evap - D5	200	2	48.0	1	1-5/16-12
Evap - D6	200	2	48.0	1	1-5/16-12
Evap - E1	200	2	48.0	1	1-5/16-12
Evap - F1	200	2	48.0	1	1-5/16-12
Evap - F2	200	2	48.0	1	1-5/16-12
Evap - G1	200	2	48.0	1	1-5/16-12
Evap - G2	200	2	48.0	1	1-5/16-12
Evap - G3	200	2	48.0	1	1-5/16-12
Cond - B1	200	2	48.0	1	1-5/16-12
Cond - B2	200	2	48.0	1	1-5/16-12
Cond - D1	200	2	48.0	1	1-5/16-12
Cond - D2	200	2	48.0	1	1-5/16-12
Cond - E1	200	2	48.0	1	1-5/16-12
Cond - E2	200	2	48.0	1	1-5/16-12
Cond - E3	200	2	48.0	1	1-5/16-12
Cond - E4	200	2	48.0	1	1-5/16-12
Cond - E4	200	2	48.0	1	1-5/16-12
Cond - E5	200	2	48.0	1	1-5/16-12
Cond - F1	200	2	48.0	1	1-5/16-12
Cond - F2	200	2	48.0	1	1-5/16-12
Cond - F3	200	2	48.0	1	1-5/16-12
Cond - G1	200	2	48.0	1	1-5/16-12
Cond - G1	200	2	48.0	1	1-5/16-12
Cond - G3	200	2	48.0	1	1-5/16-12
Cond - H1	200	2	48.0	1	1-5/16-12
Cond - H2	200	2	48.0	1	1-5/16-12
Cond - J1	200	2	48.0	1	1-5/16-12
Cond - J2	200	2	48.0	1	1-5/16-12
Cond - J3	200	2	48.0	1	1-5/16-12
Cond - K1	200	2	48.0	1	1-5/16-12
Cond - L1	200	2	48.0	1	1-5/16-12
Cond - L2	200	2	48.0	1	1-5/16-12
Cond - M1	200	2	48.0	1	1-5/16-12
Cond - M2	200	2	48.0	1	1-5/16-12
Cond - M3	200	2	48.0	1	1-5/16-12
Cond - N1	200	2	48.0	1	1-5/16-12
Comp - B1/B2*	200	2	78.8	1-1/4	1-5/8-12
Comp - C1/C2*	200	3	78.8	1-1/4	1-5/8-12
Comp - D1/D2/D3*	200	3	78.8	1-1/4	1-5/8-12
Comp -E3*	200	3	78.8	1-1/4	1-5/8-12

* Only used with isolation valve option

Thermal Insulation

All RTHD units are available with optional factory installed thermal insulation. If the unit is not factory insulated, install insulation over the areas shaded in Figure 29. Refer to Table 15 for types and quantities of insulation required.

Insulation thickness is determined at normal design conditions which are:

- Standrad comfort-cooling leaving chilled water temperature
- 85°F Dry bulb ambient temperature
- 75% Relative humidity

Operation outside of normal design conditions as defined above may require additional insulation; contact Trane for further review.

Note: *Liquid line filter, refrigerant charging valves, water temperature sensors, drain and vent connections when insulated must remain accessible for service.*

Note: *Use only water-base latex paint on factory-applied insulation. Failure to do so may result in insulation shrinkage.*

Note: *Units in environments with higher humidity or very low leaving water temperature may require thicker insulation*

Figure 29. Typical RTHD Insulation Requirements

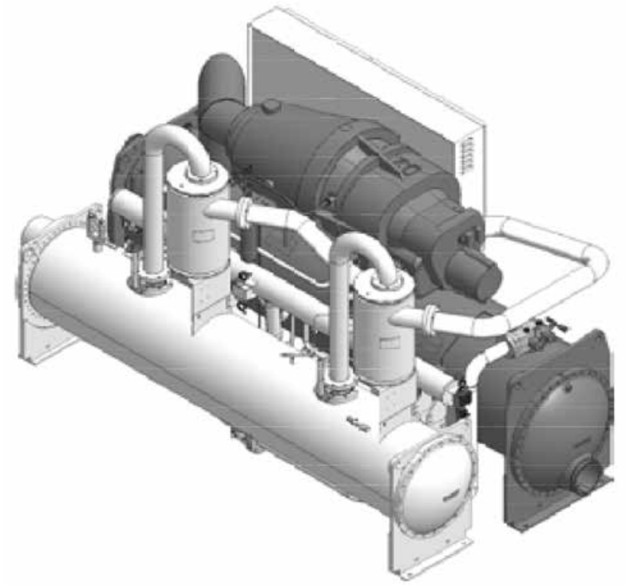


Table 15. Recommended Insulation Types

Location	Type	Sq. Feet
Evaporator	3/4" wall	90
Compressor	3/4" wall	25
All components and piping on low side of system (gas pump, return oil line, filter from pump)	3/4" wall	160

Waterbox Removal and Installation

Introduction

The purpose of this bulletin is to communicate waterbox weights, recommended connection devices, and connection and lifting arrangements for RTHD water cooled chillers.

Important

Only qualified technicians should perform the installation and servicing of equipment referred to this bulletin.

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

Discussion

This bulletin will discuss recommended hoist ring/clevises and lifting. Proper lifting technique will vary based on mechanical room layout.

- It is the responsibility of the person(s) performing the work to be properly trained in the safe practice of rigging, lifting, securing, and fastening the of water box.
- It is the responsibility of the person(s) providing and using the rigging and lifting devices to inspect these devices to insure they are free from defect and are rated to meet or exceed the published weight of the waterbox.
- Always use rigging and lifting devices in accordance with the applicable instructions for such device.

Procedure

⚠ WARNING

Heavy Objects!

Each of the individual cables (chains or slings) used to lift the waterbox must be capable of supporting the entire weight of the waterbox. The cables (chains or slings) must be rated for overhead lifting applications with an acceptable working load limit. Failure to properly lift waterbox could result in death or serious injury.

⚠ WARNING

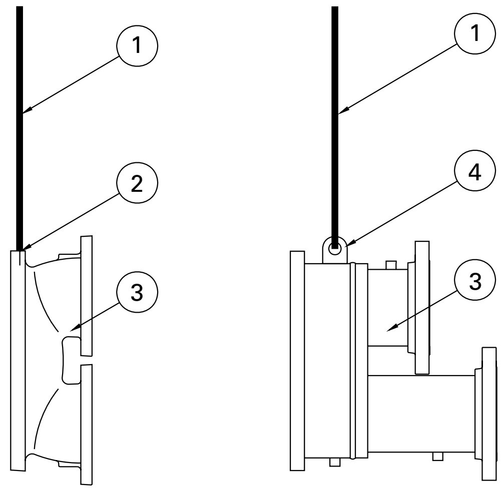
Eyebolts!

The proper use and ratings for eyebolts can be found in ANSI/ASME standard B18.15 Maximum load rating for eyebolts are based on a straight vertical lift in a gradually increasing manner. Angular lifts will significantly lower maximum loads and should be avoided whenever possible. Loads should always be applied to eyebolts in the plane of the eye, not at some angle to this plane. Failure to properly lift waterbox could result in death or serious injury.

Review mechanical room limitations and determine the safest method or methods of rigging and lifting the waterboxes.

1. Determine the type and size of chiller being serviced. Refer to Trane Nameplate located on chiller control panel.
   Important: This bulletin contains rigging and lifting information for Trane RTHD water cooled chillers built in Taicang China only. For Trane chillers built outside China, refer to literature provided by the applicable manufacturing location.
2. Select the proper lift connection device from Table 17. The rated lifting capacity of the selected lift connection device must meet or exceed the published weight of the waterbox.
3. Insure the lift connection device has the correct connection for the waterbox. Example: thread type (coarse/fine, English/metric). Bolt diameter (English/metric).
4. Properly connect the lift connection device to the waterbox. Refer to Figure 30. Insure lift connection device is securely fastened Install hoist ring on to the lifting connection on the waterbox. Torque to 37Nm (28 ft-lbs) for M12 x1.75 (mm) threaded connection.
5. Disconnect water pipes, if connected.
6. Remove waterbox bolts.
7. Lift the waterbox away from the shell.

Figure 30. Water Box Rigging and Lifting – Vertical Lift Only



1 = Cables, chains or slings

2 = Eyebolt connection (See figure 2)

3 = Waterbox

4 = Factory welded connection device

⚠ WARNING

OVERHEAD HAZARD!

Never stand below or in close proximately to heavy objects while they are suspended from, or being lifted by, a lifting device. Failure to follow these instructions could result in death or serious injuries.

8. Store waterbox in a safe and secure location and position.
   Do not leave waterbox suspended from lifting device.

Reassembly

Once service is complete the waterbox should be reinstalled on the shell following all previous procedures in reverse. Use new o-rings or gaskets on all joints after thoroughly cleaning each joint.

1. Torque waterbox bolts.
   Torque bolts in a star pattern. Refer to Table 16 for torque values.

Table 16. RTHD Torque

Unit	Bolt Size (mm)	Evaporator	Condenser
RTHD	M12x1.75	88 Nm (65 ft-lbs)	88 Nm (65 ft-lbs)

Parts Ordering Information

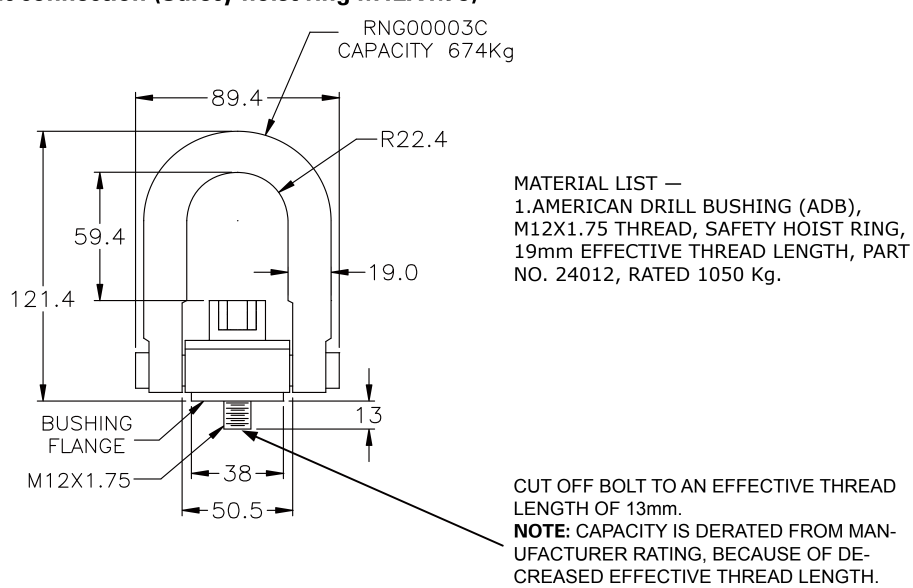
This Bulletin is informational only and does not authorize any parts or labor.

Use the Table 17 for part ordering information.

Table 17. Connection Devices

Unit	Product	Rated Capacity	Part Number
RTHD	Safety Hoist Ring M12X1.75	674 Kg	RNG00003C (See Figure 31)

Figure 31. Eyebolt connection (Safety hoist ring M12X1.75)



⚠ WARNING

Safety Hoist Ring Modification!

The modification shown in Figure 31 must be complete prior to using the hoist ring to lift the waterbox. Failure to make these modification could result in death or serious injuries.

The length of the standard hoist ring bolt must be shortened (modified) prior to use for lifting waterboxes. Shorting of the bolt as instructed will help insure the base of the hoist right is flat against the waterbox when properly seated. If bases of hoist is not properly seated against waterbox side loading on the bolt may occur which could lead to bolt failure.

Questions

Contact the Product Technical Service department in Taicang, China with questions regarding this Service Bulletin. They can be reached at baojjw@trane.com.

Installation Electrical

General Recommendations

For proper electrical component operation, do not locate the unit in areas exposed to dust, dirt, corrosive fumes, or excessive humidity. If any of these conditions exist, corrective action must be taken.

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. 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.

All wiring must comply with local and National Electric Codes. Minimum circuit ampacities and other unit electrical data is on the unit nameplate. See the unit order specifications for actual electrical data. Specific electrical schematics and connection diagrams are shipped with the unit.

Typical wiring diagrams are in the back of this manual.

⚠ 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.

Do not allow conduit to interfere with other components, structural members or equipment. All conduit must be long enough to allow compressor and starter removal.

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

Power Supply Wiring

Model RTHD are designed according to NEC Article 310-15; therefore, all power supply wiring must be sized and selected accordingly by the project engineer.

For a complete discussion on the use of conductors, see Trane Engineering Bulletin EB-MSCR-40.

Refer to Trane Engineering Bulletin CTV-EB-93 for power wire sizing.

Water Pump Power Supply

Provide power supply wiring with fused disconnect for both the chilled water and condenser water pumps.

Electrical Panel Power Supply

Power supply wiring instructions for the starter/control panel are:

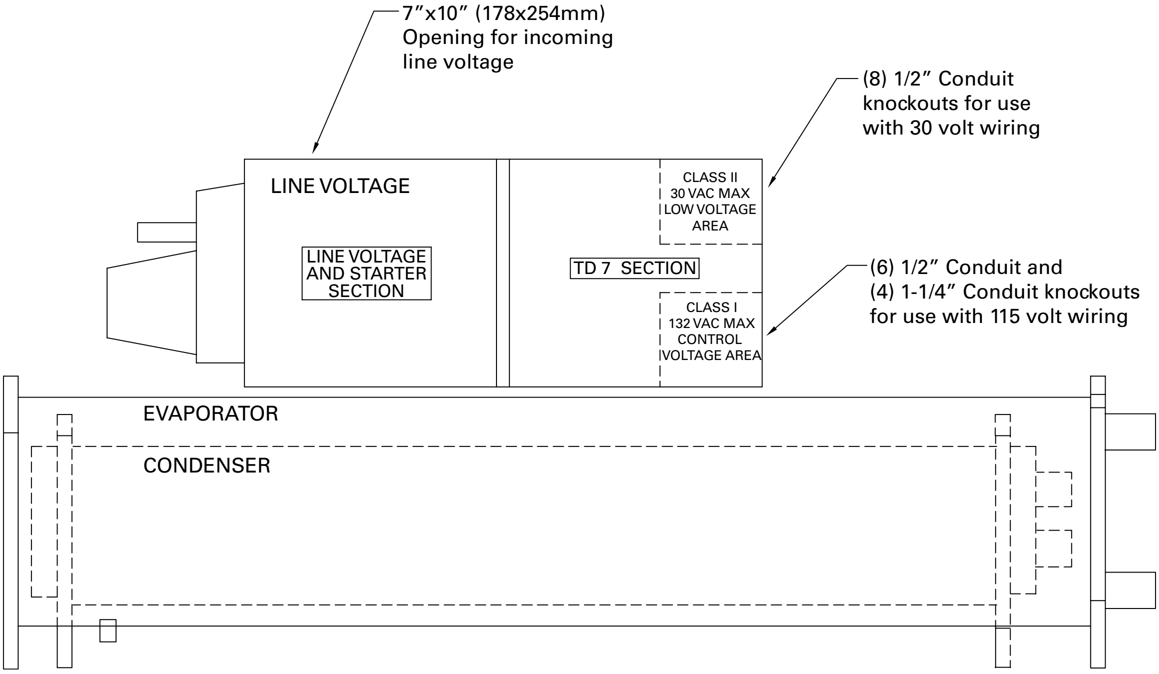
1. Run line voltage wiring in conduit to access opening(s) on starter/control panel or pull-box. See CTV-EB-93 for wire sizing and selection information and refer to Table 18 that show typical electrical connection sizes and locations. Always refer to submittal information for your actual unit specifications.

Table 18. Wire Selection Chart for Starter Panels

Min. Wire Size Copper (75°C)	Supply Leads for All Starters (0 - 2000 Volts)						
	1 Conduit 3 Wire	1 Conduit 6 Wire	1 Conduit 9 Wire	2 Conduit 6 Wire	2 Conduit 12 Wire	3 Conduit 9 Wire	4 Conduit 12 Wire
8	40	*	*	*	*	*	*
6	52	*	*	*	*	*	*
4	68	*	*	*	*	*	*
3	60	*	*	*	*	*	*
2	92	*	*	*	*	*	*
1	104	*	*	*	*	*	*
0	120	192	252	360	384	360	480
00	140	224	294	420	448	420	560
000	160	256	336	480	512	480	640
0000	184	294	386	552	589	552	736
250	204	326	428	612	653	612	816
300	228	356	479	684	730	684	912
350	248	397	521	744	794	744	992
400	268	429	563	804	858	804	1072
500	304	486	638	912	973	912	1216

Conductors to the starter and motor connected in parallel (electrically joined at both ends to form a single conductor) must be sized 0 (1/0) or larger per NEC 310-4. Each phase must be equally represented in each conduit.

Figure 32. Electrical Installation



⚠ WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Compressor Motor Phase Sequencing

Always verify that proper rotation of the Series R compressor is established before the machine 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 incoming power supply phased A, B, C.

To confirm the correct phase sequence (ABC), use a Model 45 Associated Research Phase indicator or equivalent.

Basically, voltages generated in each phase of a polyphase alternator or circuit are called phase voltages. In a three-phase circuit, three sine wave voltages are generated, differing in phase by 120 electrical degrees. The order in which the three voltages of a three-phase system succeed one another is called phase sequence or phase rotation. This is determined by the direction of rotation of the alternator. When rotation is clockwise, phase sequence is usually called “ABC,” when counterclockwise, “CBA.”

This direction may be reversed outside the alternator 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.

Correcting Improper Electrical Phase Sequence

Proper compressor motor electrical phasing can be quickly determined and corrected before starting the unit. If using an Associated Research Model 45 Phase Sequence Indicator, follow this procedure:

1. Press the STOP button to insure the unit will not attempt to start the compressor.
2. Open the electrical disconnect or circuit protection switch that provides line power to the line power terminal block in the control panel (or to the unit-mounted disconnect).
3. 3. Connect the phase sequence indicator leads to the line power terminal block (or the unit mounted disconnect) as follows:

Phase Seq. Lead	1TB1 Terminal
Black (Phase A)	L1
Red (Phase B)	L2
Yellow (Phase C)	L3

4. Turn power on by closing the unit supply power disconnect switch.
5. Read the phase sequence on the indicator. The “ABC” indicator on the face of the phase indicator will glow if phase is “ABC”.

> **⚠ WARNING**
>
> **Hazardous Voltage!**
>
> **Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. 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.**

6. If the “CBA” indicator glows instead, open the unit main power disconnect and switch two line leads on the line power terminal block (or the unit mounted disconnect). Reclose the main power disconnect and recheck phasing.
7. Reopen the unit disconnect and disconnect the phase indicator.

Terminal Lugs

Proper starter/control panel line-side lug sizes are specified on the starter submittals. These lug sizes must be compatible with conductor sizes specified by the electrical engineer or contractor. Appropriate lug sizes are provided.

Circuit Breakers and Non-Fused Disconnect Switches (factory installed Option)

Units that are ordered with factory installed Circuit Breakers or Non-Fused Disconnect Switches ship with the handle in the control panel. The handle must be installed prior to starting the unit.

The operating mechanism is already pre installed on the Disconnect/ Circuit Breaker frame.

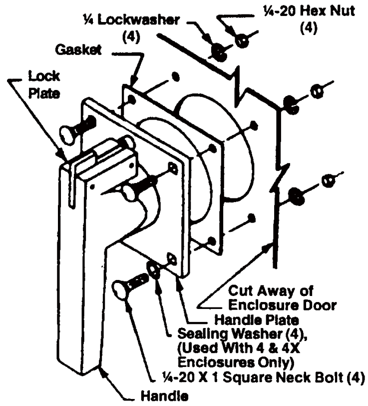
The hole locations and shafts lengths have already been cut. And the shaft already installed.

> **⚠ WARNING**
>
> **Hazardous Voltage!**
>
> **Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. 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.**

1. Attach the handel and gasket to the enclosure door and secure with the four bolts, lock washers and nut as shown in Figure 33. Tighten to 75 in-Lbs.

Note: *There is an additional lexan spacer on the handel not shown in the Figure 33, do not remove.*

Figure 33. Handle on Door



2. Check that when the enclosure door is closed, the handle interlocks with the shaft in all handel positions except RESET/OPEN. To open the enclosure door when the breaker is in the ON position, rotate the screw slot on the handle plate counter -clockwise. Verify operation.

Table 19. Lug Sizes

RLA	Circuit Breaker	Non-fused Disconnect Switch
1-185	(2) 2/0 - 250 MCM or (1)2/0 - 500	(1) #4 - 350 MCM
186-296	(2) 2/0 - 250 MCM or 2/0 - 500	
297-444	(2) 3/0 - 350 MCM	
445-592	(2) 1 - 500 MCM	
593-888	(4) 4/0 - 500 MCM	
RLA	**Main Lugs Only**	
1-623	(2) #4-500 MCM	
624-888	(4) #4/0-500 MCM	

Fused Disconnect Switches

Size fused disconnects in accordance with NEC Article 440-22(a).

Rated Load Amperage (RLA)

The compressor motor RLA for a particular chiller is determined by the field selection program and indicated on the compressor nameplate.

Minimum Circuit Ampacity (MCA)

The MCA is equal to 1.25 x the compressor RLA (on nameplate).

Maximum Fuse/Circuit Breaker Size

The maximum fuse/circuit breaker size is equal to 2.25 x the compressor RLA in accordance with UL 1995, para. 36.15.See also NEC 440-22.

The recommended dual element (RDE) fuse size is equal to 1.75 x RLA in accordance with NEC Table 430-152.

For recommended field connection lug sizes (RTHD starters) see Table 19.

⚠ WARNING

Electrical Shock!

Contacting any of the motor terminals, even with the motor off can cause a severe, potentially fatal, shock. 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.

IMPORTANT!

WHEN EVACUATING THE CHILLER'S REFRIGERANT SYSTEM, ALWAYS HAVE THE MAIN POWER DISCONNECT/ CIRCUIT BREAKER OPENED.

Even when the compressor is not running, voltage is present at the compressor motor terminals, providing the potential for current to flow through a low impedance path.
When removing refrigerant for the chiller both the condenser and chilled water pump must be operating to avoid freeze up.

As the chiller is evacuated below atmospheric pressure, the dielectric strength (resistance to arcing) of the gaseous atmosphere is significantly reduced. Because the SCRs are connected "inside the delta," three of the motor terminals are connected directly to the line voltage. An "arc over" can occur between motor terminals under conditions seen in the evacuation process.

If this occurs the circuit breaker (or other external protective devices) will trip in response to high fault currents, and motor damage may also occur.

This can be avoided through being certain that the chiller is ***fully disconnected from all power sources before beginning pumpdown or evacuation procedures***, as well as guaranteeing that the disconnect cannot be accidentally closed while the chiller is in a vacuum.

Figure 34. Y-D Starter Panel Power Wire Routing

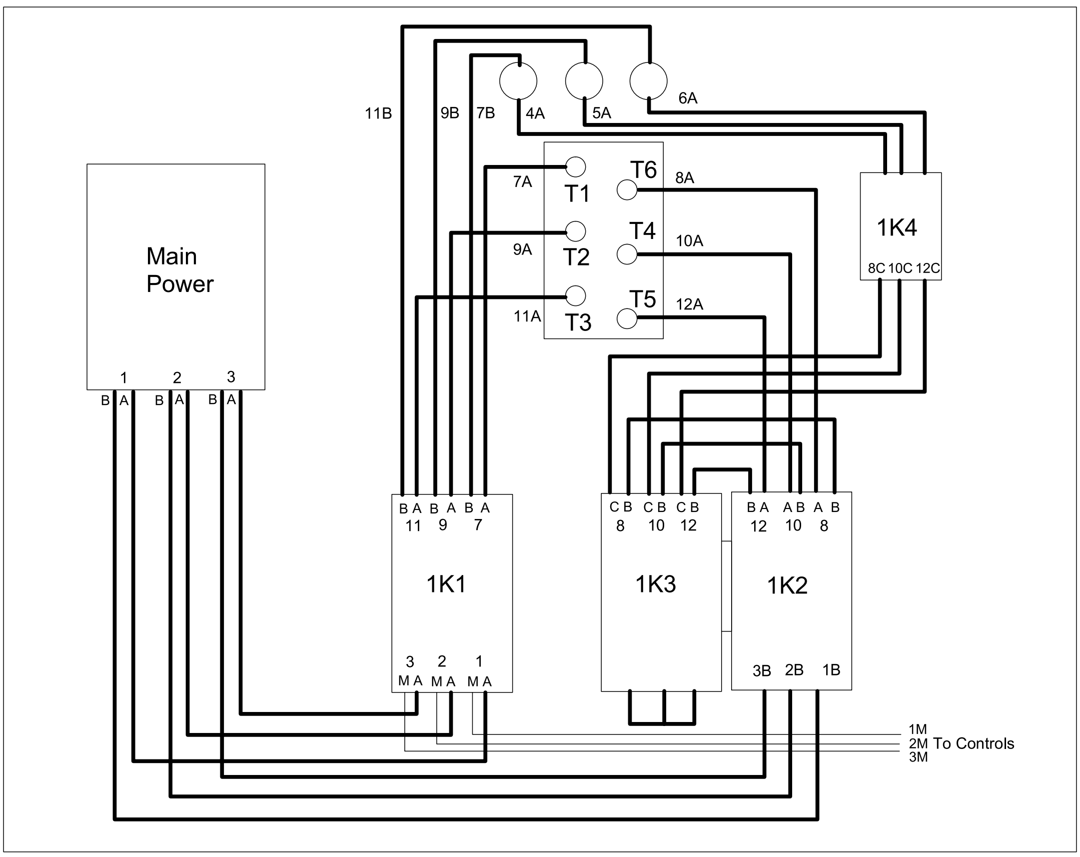
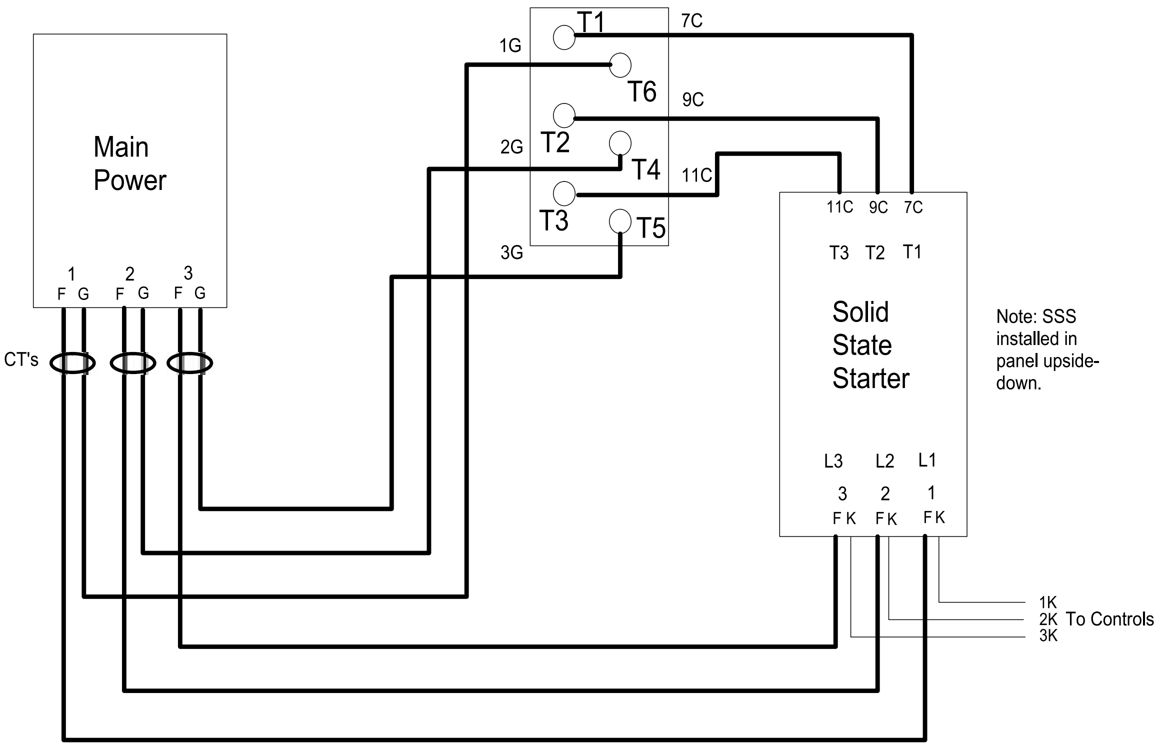


Figure 35. Solid State Starter Panel Power Wire Routing



Module Connections for Interconnecting Wiring

All connectors can be unplugged or the wires can be removed from the screw assembly. If an entire plug is removed, make sure the plug and the associated jack are marked for proper location identification during reinstallation.

⚠ CAUTION

Equipment Damage!

Plugs and jacks must be clearly marked before disconnecting, because specific plugs will fit into other jacks. Possible damage to equipment may occur if the plugs are reversed with the jacks.

Interconnecting Wiring (Field Wiring Required)

Important: Do not turn chiller on or off using the chilled water pump interlocks.

When making field connections, refer to the appropriate field layout, wiring, schematics and controls diagrams that ship with the unit. The diagrams in this manual are typical only and may not match the unit.

Whenever a contact closure (binary output) is referenced, the electrical rating is:

At 120 VAC	7.2 amp resistive
	2.88 amp pilot duty
	1/3 hp, 7.2 FLA, 43.2 LRA
At 240 VAC	5.0 amp resistive
	2.0 amp pilot duty
	1/3 hp, 3.6 FLA, 21.6 LRA

Whenever a dry contact input (binary input) is referenced, the electrical rating is 24VDC, 12 mA.

Whenever a control voltage contact input (binary input) is referenced, the electrical rating is 120 VAC, 5mA.

Note: *Asterisked connections require the user to provide an external source of power. The 115V control power transformer is not sized for additional load.*

Chilled Water Pump Control

UC800 has a evaporator water pump output relay that 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. To protect against the build-up of pump heat for those diagnostics that do not stop and/or start the pump and to protect against the condition of a bad flow switch, the pump shall always be stopped when the evaporator pressure is seen to be close to the Low Side Evaporator Pressure relief valve setting.

Chilled Water Flow Interlock

UC800 has an input that will accept a contact closure from a proof-of-flow device such as a flow switch. The flow switch is to be wired in series with the chilled water pump starter's auxiliary contacts. When this input does not prove flow within 20 minutes relative to transition from Stop to Auto modes of the chiller, or if the flow is lost while the chiller is in the Auto mode of operation, the chiller will be inhibited from running by a non-latching diagnostic. The flow switch input shall be filtered to allow for momentary openings and closings of the switch due to turbulent water flow. This is accomplished with a 6 seconds filtering time. The sensing voltage for the condenser water flow switch is 115/240 VAC.

IMPORTANT! DO NOT cycle the chiller through starting and stopping the chilled water pump. This could cause the compressor to shut down fully loaded. Use the external stop/start input to cycle the chiller.

Condenser Water Pump Control

UC800 provides a contact closure output to start and stop the condenser water pump. If condenser pumps are arranged in a bank with a common header, the output can be used to control an isolation valve and/or signal another device that an additional pump is required.

Condenser Water Pump Prestart time has been added to help with cold condenser water problems. In very cold outdoor ambients, the cooling towers sump cold water would reach the chiller some time after the low system differential pressure protection had run through its ignore time, and result in an immediate shutdown and latching diagnostic. By simply starting the pump earlier, and allowing mixing of the warmer indoor loop with the cooling tower's sump, this problem can be avoided.

Condenser Water Flow Interlock

The UC800 shall accept an isolated contact closure input from a customer installed proof-of-flow device such as a flow switch and customer provided pump starter auxiliary contact for interlocking with condenser water flow. The input shall be filtered to allow momentary openings and closings of the switch due to turbulent water flow, etc. This shall be accomplished with a 6 seconds filtering time. The sensing voltage for the condenser water flow switch is 115/240 VAC.

On a call for cooling after the restart inhibit timer has timed out, the UC800 shall energize the condenser water pump relay and then check the condenser water flow switch and pump starter interlock input for flow confirmation. Startup of the compressor will not be allowed until flow has proven.

If flow is not initially established within 1200 seconds (20 minutes) of the condenser pump relay energizing, an automatically resetting diagnostic "Condenser Water

Flow Overdue" shall be generated which terminates the prestart mode and de-energizes the condenser water pump relay This diagnostic is automatically reset if flow is established at any later time.

Note: *This diagnostic would never automatically reset if UC800 was in control of the condenser pump through its condenser pump relay since it is commanded off at the time of the diagnostic. It could however reset and allow normal chiller operation if the pump was controlled from some external source.*

Heat Recovery Pump Control

UC800 provides a closed contact output for starting and closing the heat recovery pump.

Heat Recovery Water Flow Interlock

UC800 on one input port, receives the user installation flow test device, such as flow switch contact signal and provide pump starter auxiliary contact signal, to interlock cooling water flow. This input must be filtered to prevent the instantaneous disconnection and closure caused by eddy current. The filtering time constant is 6 seconds. The heat recovery flow switch sensor voltage is 115/240vac.

When heat recovery is required, the UC800 unit will energize the heat recovery pump relay, and then check the heat recovery flow switch and pump starter input to confirm the flow. The compressor must not be started before confirming the flow.

If heat recovery water pump relay live within 1200 seconds (20 minutes) after flow can't established, will appear automatically restore the diagnosis of fault - "delay" heat recovery water information, thus to suspend the pre startup mode and disconnect heat recovery pump relay. The fault will be automatically reset after the flow is established in the following time.

Note: *if UC800 is used to control the heat recovery pump through a heat recovery pump relay, the diagnostic failure will not be automatically reset because it is set to be closed in case of a diagnosis. If the pump is controlled by external source, the fault can be automatically reset and the chiller can be started normally.*

Chilled Water Reset (CWR)

The MP will reset the chilled water temperature setpoint based on either return water temperature, or outdoor air temperature. The Return Reset option is standard, Outdoor Reset is optional.

The following is selectable:

- RESET TYPE Setpoint.
  This can be set to: NO CWR, OUTDOOR AIR TEMPERATURE RESET, RETURN WATER TEMPERATURE RESET, or CONSTANT RETURN WATER TEMPERATURE RESET. The MP shall not permit more than one type of reset to be selected.
- RESET RATIO Setpoints.
  For outdoor air temp. reset, both positive and negative reset ratios will be allowed.
- START RESET Setpoints.
- MAXIMUM RESET Setpoints.
  The maximum resets shall be with respect to the chilled water setpoint.

When the chiller is running, if any type of CWR is enabled, the MP will step the CWS toward the desired CWS' (based on the below equations and setup parameters) at a rate of 1 degree F every 5 minutes until the Active CWS equals the desired CWS'. When the chiller is not running the CWS will be fully reset immediately (within one minute). The chiller will then start at the Differential to Start value above a fully reset CWS or CWS' for Outdoor, Return, and Constant Return Reset.

Equations for calculating CWR

Equation used to get Degrees of Reset:

Outdoor Air:

Degrees of Reset = Reset Ratio * (Start Reset - TOD)

Return Reset:

Degrees of Reset = Reset Ratio * (Start Reset - (TWE - TWL))

Constant Return:

Degrees of Reset = 100% * (Design Delta Temp - (TWE - TWL))

To obtain Active CWS from Degrees of Reset:

Active CWS = Degrees of Reset + Previous CWS

Note: *Previous CWS can either be Front Panel, BAS, or External*

Reset Ratio calculation:

The Reset Ratio on the User Interface is displayed as a percentage. To use it in the above equation it must be converted to its decimal form.

Reset Ratio percent / 100 = Reset Ratio decimal

Example of converting Reset Ratio:

If the Reset Ratio displayed on the User Interface is 50% then use (50/100) = .5 in the equation

TOD = Outdoor Air Temp

TWE = Evap Entering Water Temp

TWL = Evap Leaving Water Temp

Programmable Relays (Alarm and Status) - Optional

UC800 provides a flexible alarm or chiller status indication to a remote location through a hard wired interface to a dry contact closure. Four relays are available for this function, and they are provided (generally with a Quad Relay Output LLID) as part of the Alarm Relay Output Option.

The events/states that can be assigned to the programmable relays are listed in the following table.

Table 20. Chiller Events/Status Descriptions

Event/State	Description
Alarm - Latching	This output is true whenever there is any active diagnostic that requires a manual reset to clear, that effects the Chiller, the Circuit, or any of the Compressors on a 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 effects the Chiller, the Circuit, or any of the Compressors on a circuit. This classification does not include informational diagnostics. If all of the auto resetting diagnostics were to clear, this output would return to a false condition.
Alarm	This output is true whenever there is any diagnostic effecting any component, whether latching or automatically clearing. This classification does not include informational diagnostics.
Warning	This output is true whenever there is any informational diagnostic effecting any component, whether latching or automatically clearing.
Chiller Limit Mode	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. A given limit or overlapping of different limits must be in effect continuously for 20 minutes prior to the output becoming true. It will become false, if no Unload limits are present for 1 minute. The filter prevents short duration or transient repetitive limits from indicating. The chiller is considered to be in a limit mode for the purposes of front panel display and annunciation, only if it is fully inhibiting loading by virtue of being in either the "hold" or "forced unload" regions of the limit control, excluding the "limited loading region". (In previous designs, the "limit load" region of the limit control was included in the criteria for the limit mode call out on the front panel and annunciation outputs)
Compressor Running	The output is true whenever any compressors are started or running on the chiller and false when no compressors are either starting or running on the chiller. This status may or may not reflect the true status of the compressor in Service Pumpdown if such a mode exists for a particular chiller.
Chiller Head Pressure Relief Request Relay	This relay output is energized anytime the chiller is running in one of the following modes; Ice Making Mode or Condenser Pressure Limit Control Mode continuously for the duration specified by the Chiller Head Relief Relay Filter Time. The Chiller Head Relief Relay Filter Time is a service setpoint. The relay output is de-energized anytime the chiller exits all above modes continuously for the duration specified by the same Chiller Head Relief Relay Filter Time.

The UC800 Service Tool (Tracer TU) is used to install and assign any of the above listed events or status to each of the four relays provided with this option.

The default assignments for the four available relays are listed below.

Table 21. Programable Relays

LLID Name	LLID Software Relay Designation	Output Name	Default
Operating Status Programmable Relays	Relay 0	Status Relay 4, J2-1,2,3	Head Pressure Relief Request
	Relay 1	Status Relay 3, J2-4,5,6	Chiller Limit Mode Relay
	Relay 2	Status Relay 2, J2-7,8,9	Chiller Alarm Relay (latching or nonlatching)
	Relay 3	Status Relay 1, J2-10,11,12	Compressor Running Relay

Emergency Stop

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

External Auto/Stop

If the unit requires the external Auto/Stop function, the installer must provide leads from the remote contacts to the proper terminals of the LLID on the control panel.

The chiller will run normally when the contacts are closed. When the contact opens, the compressor(s), if operating, will go to the RUN:UNLOAD operating mode and cycle off. Unit operation will be inhibited. Re-closure of the contacts will permit the unit to automatically return to normal operation.

Note: *A "panic" stop (similar to "emergency" stop) can be manually commanded by pressing the STOP button twice in a row, the chiller will immediately shut down, but without creating a latching diagnostic.*

Soft Loading

Soft loading will prevent the chiller from going to full capacity during the pulldown period.

The UC800 control system has two soft loading algorithms running all of the time. They are capacity control soft loading and current limit soft loading. These algorithms introduce the use of a Filtered Chilled Water Setpoint and a Filtered Current Limit Setpoint. After the compressor has been started, the starting point of the filtered chilled water setpoint is initialized to the value of the Evap Leaving Water Temperature. The filtered current limit setpoint is initialized to the value of the Current Limit Softload Starting Percent. These filtered setpoints allow for a stable pull-down that is user adjustable in duration.

They also eliminate sudden transients due to setpoint changes during normal chiller operation.

Three settings are used to describe the behavior of soft loading. The setup for softloading can be done using TU.

- Capacity Control Softload Time: This setting controls the time constant of the Filtered Chilled Water Setpoint. It is settable between 0 and 120 min.
- Current Limit Control Softload Time: This Setting controls the time constant of the Filtered Current Limit Setpoint. It is settable between 0 and 120 minutes.
- Current Limit Softload Starting Percent: This setting controls the starting point of the Filtered Current Limit Setpoint. It is adjustable from 40 to 100 percent RLA.

External Base Loading - Optional

Primarily for process control requirements, base loading provides for immediate start and loading of a chiller up to an externally or remotely adjustable current limit setpoint without regard to differential to start or stop, or to leaving water temperature control. This allows the flexibility to prestart or preload a chiller in anticipation of a large load application. It also allows you to keep a chiller on line between processes when leaving water temperature control would normally cycle the unit.

When the base loading option is installed through Tracer TU it will be controllable through TD7/TU, External Hardware Interface or Tracer (if Tracer is installed). Order for precedence for all setpoints, TD7/TU then External then Tracer from lowest to highest priority. If one of the higher priority setpoints drops out due to a bad sensor or communication loss then base loading shall go to the next lowest priority of command and setpoint. The command settings and control setpoints associated with base loading are explained below.

Base Loading Control setpoint

This setpoint has three possible sources, an External Analog Input, TD7/TU or Tracer.

- TD7/TU Base Loading Control Setpoint
  The range is 40 - 100 % Compressor Load (Max %RLA). The default is 50%.
- Tracer Base Loading Control Setpoint
  The range is 40 - 100 % Compressor Load (Max %RLA). The default is 50%.
- External Base Loading Setpoint
  This is an Analog Input that sets the base loading setpoint. This signal can be controlled by either a 2-10Vdc or 4-20ma Signal based on configuration information. The equations show the relationship between input and percent compressor load:
  If the input is configured as a 4 - 20 mA:
  % Load = 3.75 * (mA Input) + 25
  If the input is configured as a 2 - 10 Vdc:
  % Load = 7.5 * (Vdc Input) + 25

Summit Interface - Optional

UC800 provides an optional interface between the chiller and a Trane Summit BAS. A Communications interface LLID shall be used to provide “gateway” functionality between the Chiller and Summit.

LonTalk Communication Interface - Optional

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 the LonTalk protocol and the Chiller.

External Chilled Water Setpoint - Optional

UC800 will accept either a 2-10 VDC or a 4-20 mA input (J9-4, J9-5) signal, to adjust the chilled water setpoint from a remote location.

External Current Limit Setpoint - Optional

UC800 will accept either a 2-10VDC or a 4-20mA input (J7-11, J7-12) signal to adjust the current limit setpoint from a remote location.

Percent Condenser Pressure Output - Optional

UC800 provides a 2-10 VDC analog output to indicate percent High Pressure Cutout (HPC) condenser pressure.

Percent HPC = (Condenser Pressure/High Pressure Cutout Setpoint)*100

Compressor Percent RLA Output - Optional

UC800 provides a 0-10 Vdc analog output to indicate % RLA of compressor starter average phase current. 2 to 10 Vdc corresponds to 0 to 120% RLA.

Operating Principles Mechanical

This section contains an overview of the operation and maintenance of Series R chillers equipped with microcomputer-based control systems. It describes the overall operating principles of the RTHD water chiller.

Following the section is information regarding specific operating instructions, detailed descriptions of the unit controls and options (Operator Interface - Control Systems), and maintenance procedures that must be performed regularly to keep the unit in top condition (Periodic Maintenance and Maintenance Procedures). Diagnostic information (Diagnostics) is provided to allow the operator to identify system malfunctions.

Note: *To ensure proper diagnosis and repair, contact a qualified service organization if a problem should occur.*

General

The Model RTHD units are single-compressor water-cooled liquid chillers. These units are equipped with unit-mounted starter/control panels.

The basic components of an RTHD unit are:

- Unit-mounted panel containing UC800 controller and Input/Output LLIDS
- Helical-rotary compressor
- Evaporator
- Electronic expansion valve
- Water-cooled condenser with integral subcooler
- Oil supply system
- Oil cooler (application dependent)
- Related interconnecting piping.

Refrigeration (Cooling) Cycle

The refrigeration cycle of the Series R chiller is conceptually similar to that of other Trane chiller products. It makes use of a shell-and-tube evaporator design with refrigerant evaporating on the shell side and water flowing inside tubes having enhanced surfaces.

The compressor is a twin-rotor helical rotary type. It uses a suction gascooled motor that operates at lower motor temperatures under continuous full and part load operating conditions. An oil management system provides an almost oil-free refrigerant to the shells to maximize heat transfer performance, while providing lubrication and rotor sealing to the compressor. The lubrication system ensures long compressor life and contributes to quiet operation.

Condensing is accomplished in a shell-and-tube heat exchanger where refrigerant is condensed on the shell side and water flows internally in the tubes.

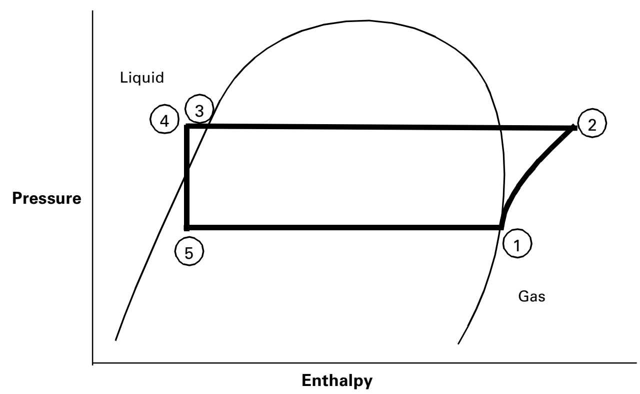
Refrigerant is metered through the flow system using an electronic expansion valve, that maximizes chiller efficiency at part load.

A unit-mounted starter and control panel is provided on every chiller. Microprocessor- based unit control modules (UC800) provide for accurate chilled water control as well as monitoring, protection and adaptive limit functions. The "adaptive" nature of the controls intelligently prevents the chiller from operating outside of its limits, or compensates for unusual operating conditions, while keeping the chiller running rather than simply tripping due to a safety concern. When problems do occur, diagnostic messages assist the operator in troubleshooting.

Cycle Description

The refrigeration cycle for the RTHD chiller can be described using the pressure- enthalpy diagram shown in Figure 36 Key State Points are indicated on the figure and are referenced in the discussion following. A schematic of the system showing the refrigerant flow loop as well as the lubricant flow loop is shown in Figure 37.

Figure 36. Pressure /Enthalpy Curve



Evaporation of refrigerant occurs in the evaporator. A metered amount of refrigerant liquid enters a distribution system in the evaporator shell and is then distributed to the tubes in the evaporator tube bundle. The refrigerant vaporizes as it cools the water flowing through the evaporator tubes. Refrigerant vapor leaves the evaporator as saturated vapor (State Pt. 1).

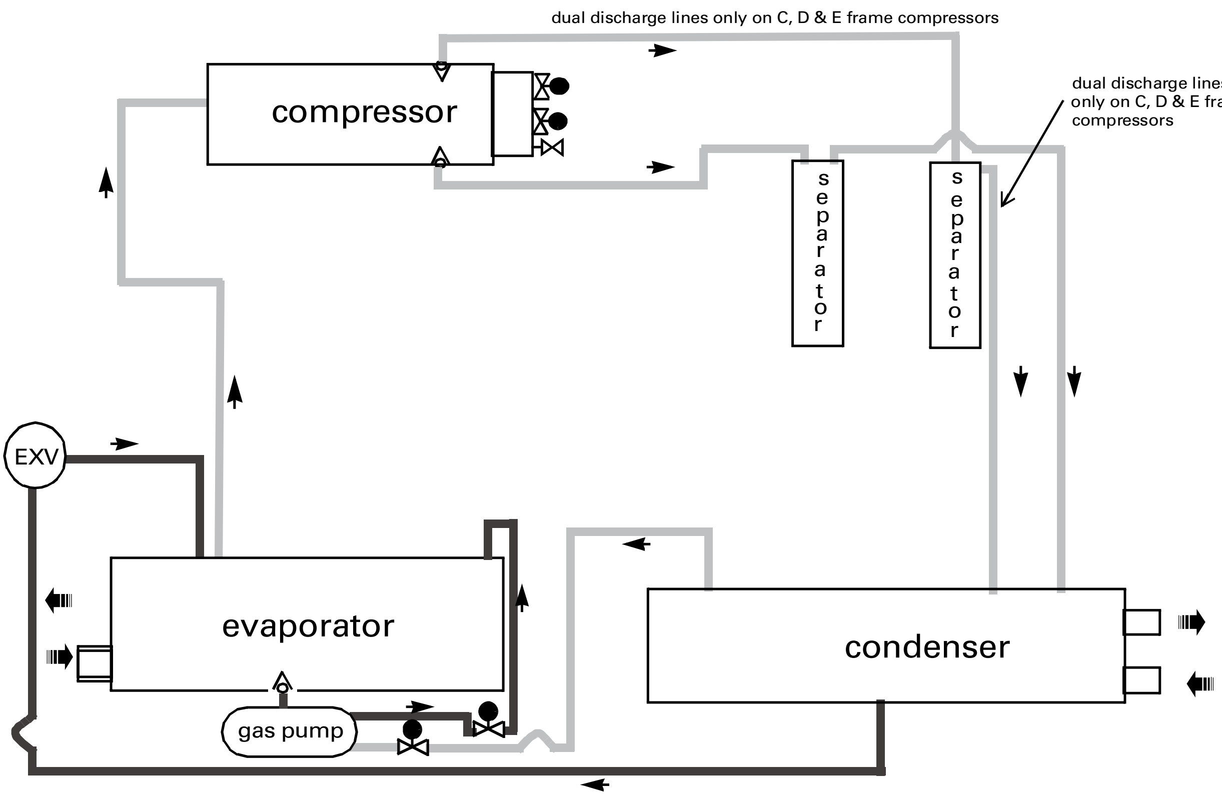
The refrigerant vapor generated in the evaporator flows to the suction end of the compressor where it enters the motor compartment of the suction-gascooled motor. The refrigerant flows across the motor, providing the necessary cooling, then enters the compression chamber. Refrigerant is compressed in the compressor to discharge pressure conditions. Simultaneously, lubricant is injected into the compressor for two purposes: (1) to lubricate the rolling element bearings, and (2) to seal the very small clearances between the compressor's twin rotors. Immediately following the compression process the lubricant and refrigerant are effectively divided using an oil separator. The oil-free refrigerant vapor enters the condenser at State Pt. 2. The lubrication and oil management issues are discussed in more detail in the compressor description and oil management sections that follow.

Baffles within the condenser shell distribute the compressed refrigerant vapor evenly across the condenser tube bundle. Cooling tower water, circulating through the condenser tubes, absorbs heat from this refrigerant and condenses it.

As the refrigerant leaves the bottom of the condenser (State Pt. 3), it enters an integral subcooler where it is subcooled before traveling to the electronic expansion valve (State Pt. 4). The pressure drop created by the expansion process vaporizes a portion of the liquid refrigerant. The resulting mixture of liquid and gaseous refrigerant then enters the Evaporator Distribution system (State Pt. 5). The flash gas from the expansion process is internally routed to compressor suction, and while the liquid refrigerant is distributed over the tube bundle in the evaporator.

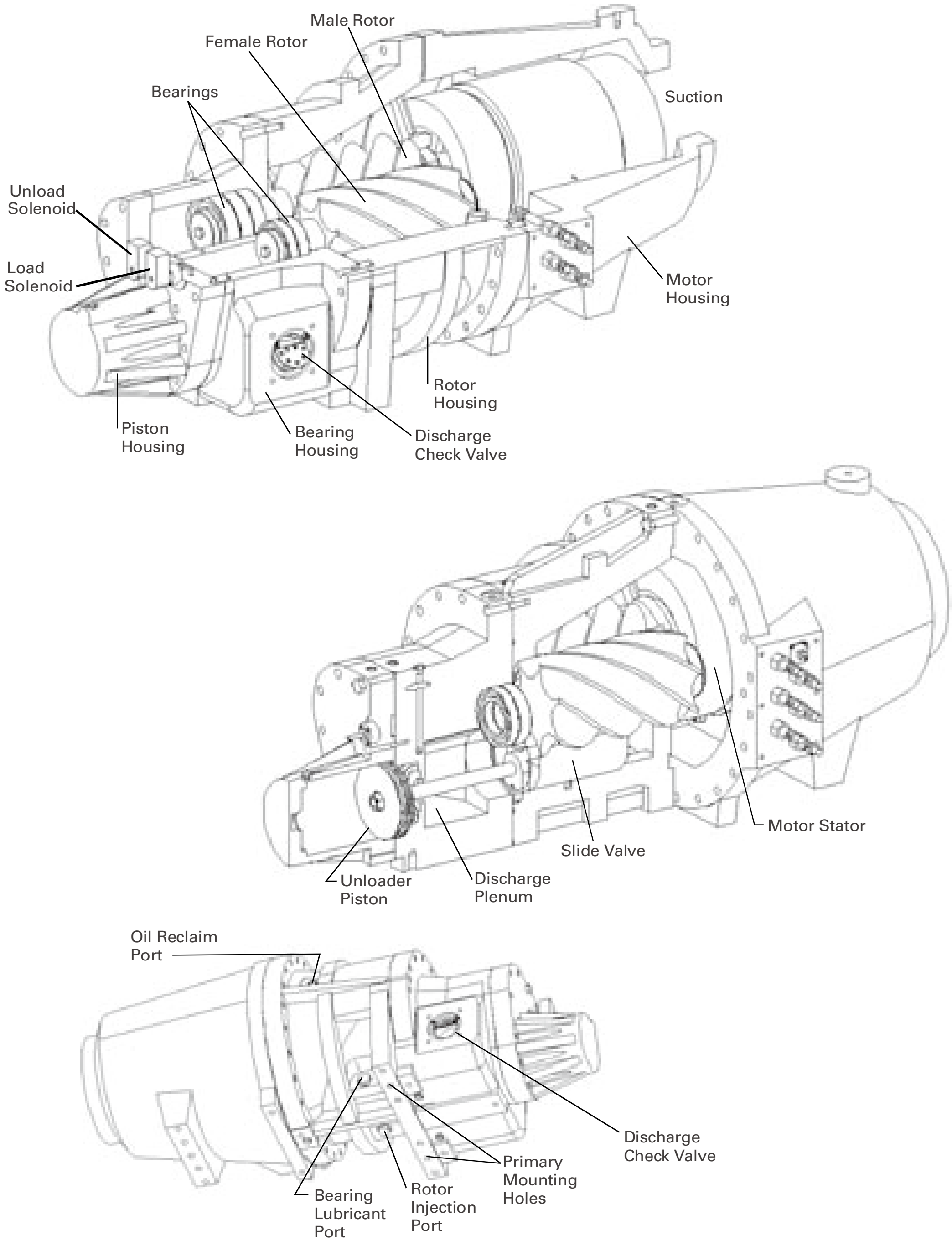
The RTHD chiller maximizes the evaporator heat transfer performance while minimizing refrigerant charge requirements. This is accomplished by metering the liquid refrigerant flow to the evaporator's distribution system using the electronic expansion valve. A relatively low liquid level is maintained in the evaporator shell, which contains a bit of surplus refrigerant liquid and accumulated lubricant. A liquid level measurement device monitors this level and provides feedback information to the UC800 unit controller, which commands the electronic expansion valve to reposition when necessary. If the level rises, the expansion valve is closed slightly, and if the level is dropping, the valve is opened slightly such that a steady level is maintained.

Figure 37. Refrigerant Flow Diagram



Compressor Description

Figure 38. Compressor Description



The compressor used by the Series R chiller consists of three distinct sections: the motor, the rotors and the bearing housing. Refer to Figure 38.

Compressor Motor

A two-pole, hermetic, squirrel-cage induction motor directly drives the compressor rotors. The motor is cooled by suction vapor drawn from the evaporator and entering the end of the motor housing (Figure 38) .

Compressor Rotors

Each Series R chiller uses a semi-hermetic, direct-drive helical rotary type compressor. Excluding the bearings, each compressor has only 3 moving parts: 2 rotors - “male” and “female” - provide compression, and a slide valve that controls capacity. See Figure 38. The male rotor is attached to, and driven by the motor, and the female rotor is, in turn, driven by the male rotor. Separately housed bearing sets are provided at each end of both rotors on the RTHD units. The slide valve is located below (and moves along) the rotors.

The helical rotary compressor is a positive displacement device. Refrigerant from the evaporator is drawn into the suction opening at the end of the motor section. The gas is drawn across the motor, cooling it, and then into the rotor section. It is then compressed and released directly into the discharge plenum.

There is no physical contact between the rotors and compressor housing. Oil is injected into the bottom of the compressor rotor section, coating both 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.

Capacity control is accomplished by means of a slide valve assembly located in the rotor/bearing housing sections of the compressor. Positioned along the bottom of the rotors, the slide valve is driven by a piston/cylinder along an axis that parallels those of the rotors (Figure 38).

Compressor load condition is dictated by the coverage of the rotors by the slide valve. When the slide valve fully covers the rotors, the compressor is fully loaded. Unloading occurs as the slide valve moves away from the suction end of the rotors. Slide valve unloading lowers refrigeration capacity by reducing the compression surface of the rotors.

Slide Valve Movement

Movement of the slide valve piston (Figure 38) determines slide valve position which, in turn, regulates compressor capacity. Compressed vapor flowing in to and out of the cylinder governs piston movement, and is controlled by the load and unload solenoid valves.

The solenoid valves (both normally closed) receive “load” and “unload” signals from the UC800, based on system cooling requirements. To load the compressor, the UC800 opens the load solenoid valve. The pressurized vapor flow then enters the cylinder and, with the help of the lower suction pressure acting on the face of the unloader valve, moves the slide valve over the rotors toward the suction end of the compressor.

The compressor is unloaded when the unload solenoid valve is open. Vapor “trapped” within the cylinder is drawn out into the lower-pressure suction area of the compressor. As the pressurized vapor leaves the cylinder, the slide valve slowly moves away from the rotors toward the discharge end of the rotors.

When both solenoid valves are closed, the present level of compressor loading is maintained.

On compressor shutdown, the unload solenoid valve is energized. Springs assist in moving the slide valve to the fully-unloaded position, so the unit always starts fully unloaded.

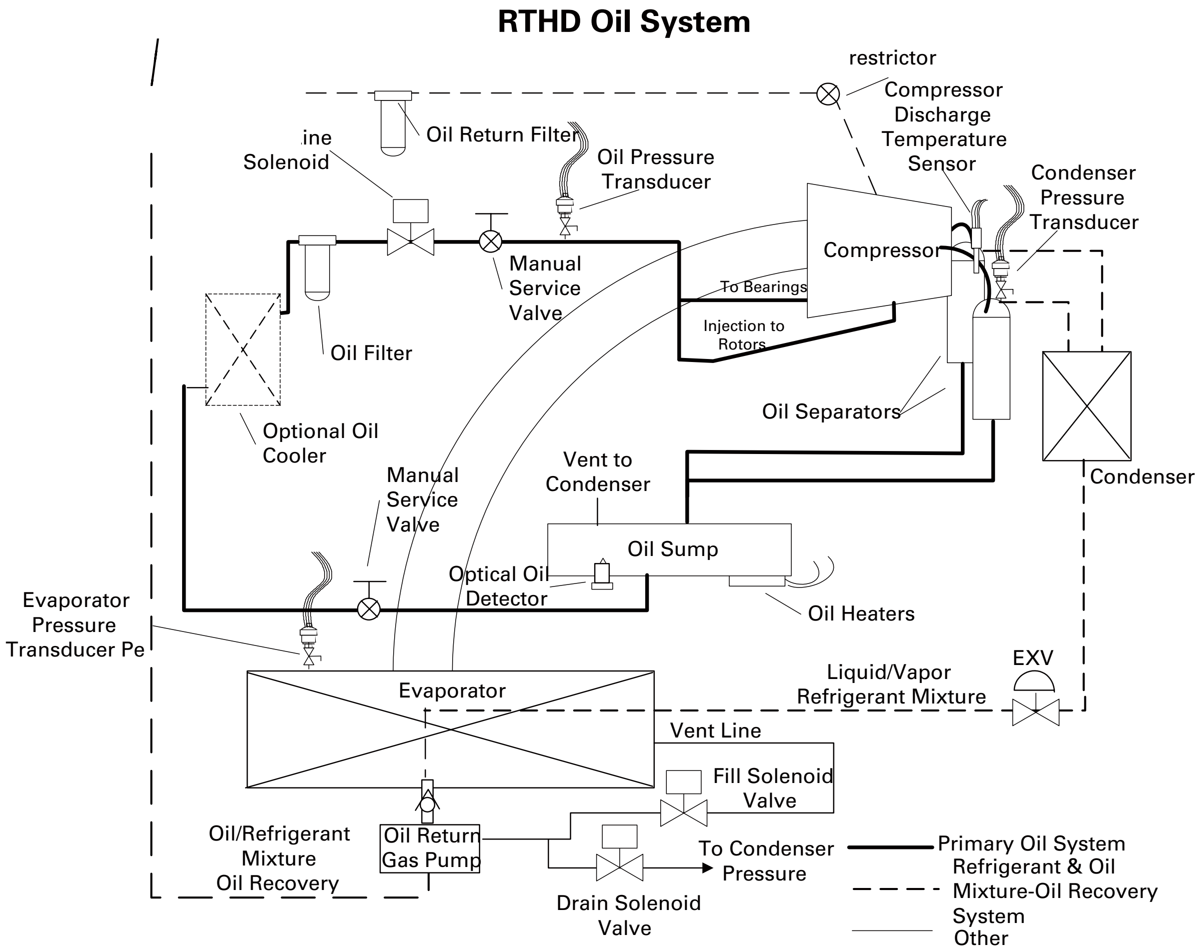
Oil Management System

Oil Separator

The oil separator consists of a vertical cylinder surrounding an exit passageway. Once oil is injected into the compressor rotors, it mixes with compressed refrigerant vapor and is discharged directly into the oil separator. As the refrigerant-and-oil mixture is discharged into the oil separator, the oil is forced outward by centrifugal force, collects on the walls of the cylinder and drains to the bottom of the oil separator cylinder. The accumulated oil then drains out of the cylinder and collects in the oil sump located near the top and in-between the evaporator and condenser shells.

Oil that collects in the oil tank sump is at condensing pressure during compressor operation; therefore, oil is constantly moving to lower pressure areas.

Figure 39. Oil Flow Diagram



Oil Flow Protection

Oil flowing through the lubrication circuit flows from the oil sump to the compressor (see Figure 39). As the oil leaves the sump, it passes through a service valve, an oil cooler (if used), oil filter, master solenoid valve, and another service valve. Oil flow then splits into two distinct paths, each performing a separate function: (1) bearing lubrication and cooling, and (2) compressor oil injection.

Oil flow and quality is proven through a combination of a number of sensors, most notably a pressure transducer and the optical oil level sensor.

If for any reason oil flow is obstructed because of a plugged oil filter, closed service valve, faulty master solenoid, or other source, the oil pressure transducer will read an excessively high pressure drop in the oil system (relative to the total system pressure) and shut down the chiller.

Likewise, the optical oil level sensor can detect the lack of oil in the primary oil system (which could result from improper oil charging after servicing, or oil logging in other parts of the system). The sensor will prevent the compressor from starting or running unless an adequate volume of oil is present. The combination of these two devices, as well as diagnostics associated with extended low system differential pressure and low superheat conditions, can protect the compressor from damage due to severe conditions, component failures, or improper operation.

If the compressor stops for any reason, the master solenoid valve closes; this isolates the oil charge in the sump during "off" periods. With the oil efficiently contained in the sump, oil is immediately available to the compressor at startup. Such flows would otherwise purge oil from the lines and the oil sump, which is an undesirable effect.

To ensure the required system differential pressure is adequate to move oil to the compressor, the UC800 attempts to both control a minimum system differential pressure as well as monitor it. Based on readings from pressure transducers in both the evaporator and condenser , the EXV is modulated to maintain evaporator pressure at a minimum of 25 psid below the condenser pressure. Once the minimum is met, the EXV will return to normal liquid level control (see the paragraph on "Cycle Description". If the differential is significantly lower than required, the unit will trip and initiate a appropriate diagnostics and would enforce a compressor “cool down” period.

To ensure proper lubrication and minimize refrigerant condensation in the oil sump, heaters are mounted on the bottom of the oil sump. An auxilliary contact of the compressor starter, energizes these heaters during the compressor off cycle to maintain a proper elevation of the oil temperature. The heater element is continuously energized while the compressor is off and does not cycle on temperature.

Oil Filter

All Series R chillers are equipped with replaceable-element oil filters. Each removes any impurities that could foul the compressor internal oil supply galleries. This also prevents excessive wear of compressor rotor and bearing surfaces and promotes long bearing life. Refer to the Section 9 for recommended filter element replacement intervals.

Compressor Bearing Oil Supply

Oil is injected into the rotor housing where it is routed to the bearing groups located in the motor and bearing housing sections. Each bearing housing is vented to compressor suction so oil leaving the bearings returns through the compressor rotors to the oil separator.

Compressor Rotor Oil Supply

Oil flowing through this circuit enters the bottom of the compressor rotor housing. From there it is injected along the rotors to seal clearance spaces around the rotors and lubricate the contact line between the male and female rotors.

Lubricant Recovery

Despite the high efficiency of the oil separators, a small percentage of oil will get past them, move through the condenser, and eventually end up in the evaporator. This oil must be recovered and returned to the oil sump. The function of active oil return is accomplished by a pressure-actuated pump referred to as the “gas pump.”

The gas pump, mounted just beneath the evaporator, is a cylinder with four ports controlled by two solenoids. The pump serves to return accumulating oil in the evaporator to the compressor at regular time intervals. As the refrigerant- oil mixture enters the gas pump from the bottom of the evaporator, a fill solenoid opens to allow refrigerant vapor to be vented into the top of the evaporator, and is then closed. A second solenoid then opens to allow refrigerant at condenser pressure to enter the gas pump. Simultaneously, a check valve prevents reverse flow back into the evaporator. A liquid refrigerant and oil mixture is displaced from the gas pump cylinder and is directed through a filter to the compressor. The oil then combines with oil injected into the compressor and returns to the oil sump via the oil separators.

Oil Cooler

The oil cooler is a brazed plate heat exchanger located near the oil filter. It is designed to transfer approximately one ton of heat from the oil to the suction side of the system. Subcooled liquid is the cooling source.

The oil cooler is required on units running at high condensing or low suction temperatures. The high discharge temperatures in these applications increase oil temperatures above the recommended limits for adequate lubrication and reduce the viscosity of the oil.

Operator Interface Controls

UC800 Overview

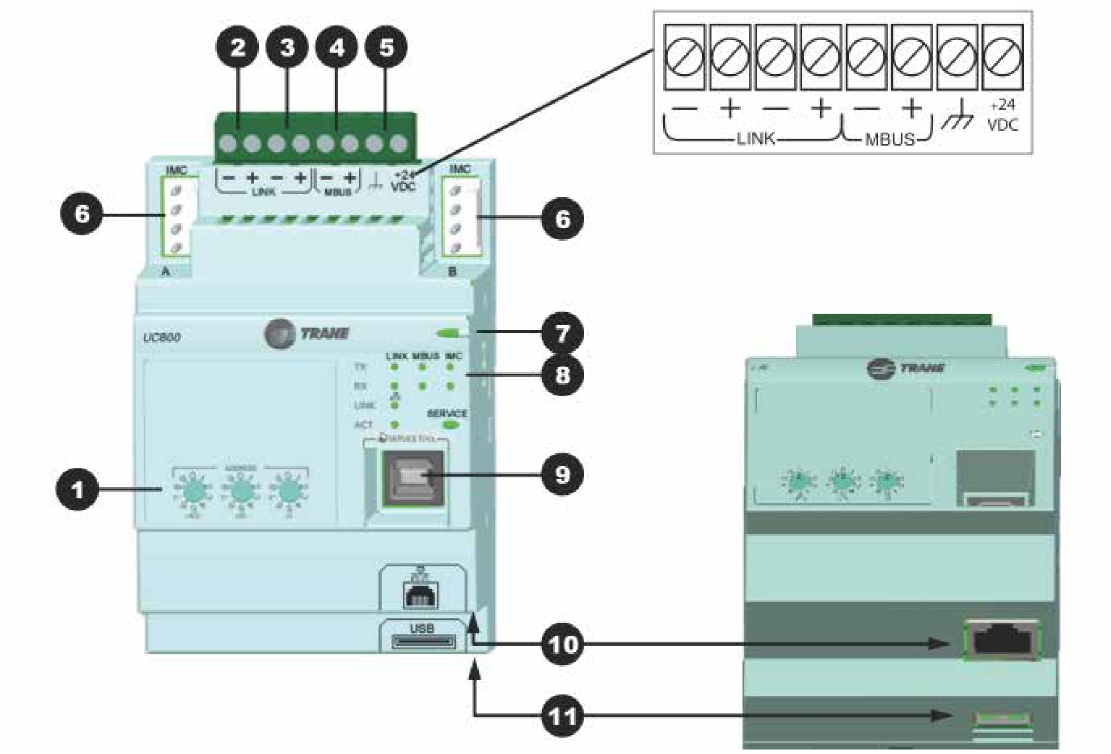
Power Supply

The UC800 (1A22) receives 24 Vac (210 mA) power from the 1A2 power supply located in the chiller control panel.

Wiring and Port Descriptions

Figure 40 illustrates the UC800 controller ports, LEDs, rotary switches, and wiring terminals.The numbered list following Figure 40 corresponds to the numbered call-outs in the illustration.

Figure 40. Wiring locations and connection ports



Front view **Bottom View**

1. Rotary Switches for setting BACnet®MAC address or MODBUS ID.
2. LINK for BACnet MS/TP, or MODBUS Slave (two terminals, ±). Field wired if used.
3. LINK for BACnet MS/TP, or MODBUS Slave (two terminals, ±). Field wired if used.
4. Machine bus for existing machine LLIDs (IPC3Tracer bus 19.200 baud). IPC3 Bus: used for Comm4 usingTCI or LonTalk®using LCI-C.
5. Power (210 mA at 24 Vdc) and ground terminations (same bus as item 4). Factory wired.
6. Not used.
7. Marquee LED power and UC800 Status indicator (Table 22).
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 theTracerAdaptiView display.
11. USB Host (not used).

Communication Interfaces

There are four connections on the UC800 that support the communication interfaces listed. Refer to Figure 40, for the locations of each of these ports.

- BACnet MS/TP
- MODBUS Slave
- LonTalk using LCI-C (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 41 shows the locations of each LED and Table 22, describes their behavior in specific instances.

Figure 41. LED Locations

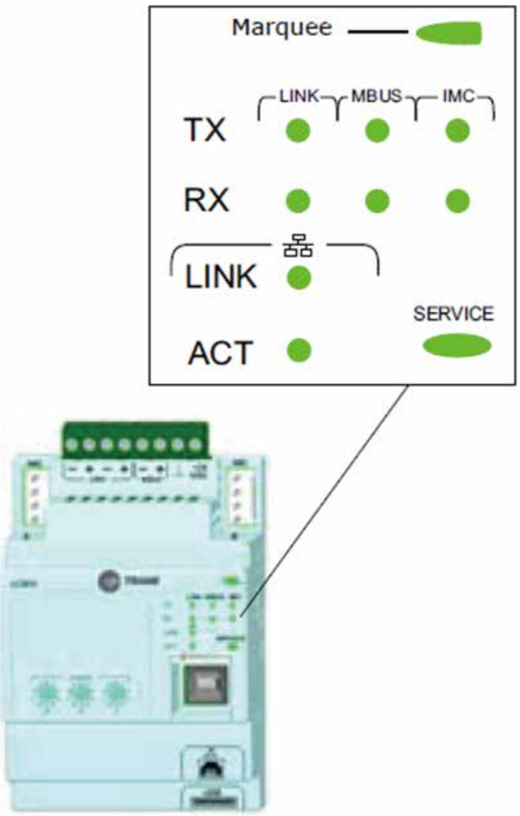


Table 22. LED Behavior

LED	UC800 Status
Powered. If the Marquee LED is green solid, the UC800 is powered and no problems exist. Marquee LEDLow 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, IMCThe 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 LinkThe 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.	
ServiceThe Service LED is solid green when pressed. For qualified service technicians only. Do not use.	

NOTICE:

Electrical Noise! 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.

Controls Interface

TD7 Display

Each chiller is equipped with the TD7 interface. TD7 has the capability to display additional information to the advanced operator including the ability to adjust settings. Multiple screens are available and text is presented in multiple languages as factory-ordered or can be easily downloaded online.

Tracer TU

Tracer TU can be connected to the UC800 and provides further data, adjustment capabilities, diagnostics information, downloadable software.

Tracer AdaptiView™ TD7

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.

Figure 42. TD7

Main Display Area/Home Screen

All screens appear within the main display area (shown as location in Figure 43).

Home screen: Chiller status information

The home screen (Figure 43) 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 43. Main Screen

Table 23. Main Screen Items

Description	Resolution	Units
Active Chilled Water Setpoint	X.X	°F / °C
Active Current Limit Setpoint	X.X	%RLA
Average Motor Current %RLA	X.X	%RLA
Evap Entering/Leaving Water Temp	X.X	°F / °C
Cond Entering/Leaving Water Temp	X.X	°F / °C
Frequency Command	X.X	Hz
Evaporator Water Flow Status	X.X	
Condenser Water Flow Status		

Viewing Chiller Operating Modes

On the Reports screen, touch Chiller 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 44. Chiller Operating Modes screen

Table 24. Operating Modes

Chiller Modes	Description
MP Resetting	
Stopped	**The chiller is not running 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 button twice in succession) – previous shutdown was manually commanded to shutdown immediately without a run-unload or pumpdown cycle - cannot be remotely overridden.
Diagnostic Shutdown – Manual Reset	The chiller is stopped by a diagnostic that requires manual intervention to reset.
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 sub-mode:**
Diagnostic Shutdown – Auto Reset	The entire chiller is stopped by a diagnostic that may automatically clear.
Starting is Inhibited by External Source	The chiller is inhibited from starting (and running) by the "external stop" hardwired input.
Start Inhibited by BAS	The chiller is inhibited from starting (and running) by command from a Building Automation System via the digital communication link (com 4 or com 5).
Waiting for BAS Communications	This is a transient mode - 15-min. max, and is only possible if the chiller is in the Auto - Remote command mode. After a power up reset, it is necessary to wait for valid communication from a Building Automation System (Tracer) to know whether to run or stay inhibited. Either valid communication will be received from the Building Automation System (e.g. Tracer), or a communication diagnostic ultimately will result. In the latter case the chiller will revert to Local control.
Power Up Delay Inhibit min:sec	The compressor is currently being inhibited from starting as part of the power up start delay (or staggered start) feature. This feature is intended to prevent multiple chillers from all starting simultaneously if power is restored to all chillers simultaneously.
Low Differential Refrigerant Pressure Cool-Down Timemin:sec	See Oil Flow Protection (Spec Page 78)
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 sub-mode:**
Waiting For Evap 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 the Differential to Start.
Waiting to Start	**The chiller is not currently running and there is a call for cooling but start is delayed by certain interlocks or proofs. Further information is provided by the sub-mode:**
Waiting For Cond Water Flow	The chiller will wait up to 20 minutes in this mode for condenser water flow to be established per the flow switch hardwired input.
Start Inhibited Waiting for Oil	The chiller will wait up to 2 minutes in this mode for oil level to appear in the oil tank.
Condenser Water Pump Pre-Run Timemin:sec	The chiller will wait up to 30 minutes (user adjustable) in this mode for to allow the condenser water loop to equalize in temperature
Restart Inhibit min:sec	The compressor is currently unable to start due to its restart inhibit timer. A given compressor is not allowed to start until 5 minutes (adj) has expired since its last start, once a number of "free starts" have been used up.
Waiting For EXV Preposition	The Chiller 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)
Minimum Condenser Watermin:sec	Only possible when Condenser Head Pressure Control option is enabled, this wait may be necessary due to the Head Pressure control device's stroke time.
Condenser Water Regulating Control min:sec	Only possible when Condenser Head Pressure Control option is enabled, this wait may be necessary due to the Head Pressure control device's stroke time
Running	**The chiller, circuit, and compressor are currently running. Further information is provided by the sub-mode:**
High Discharge Temp Limit	The compressor is running 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.
Base Loaded	Chiller is running in "Base Load" operation where the capacity of the chiller is controlled to maintain a given current per an adjustable set point. The chiller is forced to run without regard to the chilled water temperatures and the differential to start and stop
Capacity Control Softloading	The chiller is running, but loading is influenced by a gradual 'pulldown" filter on the chilled water temperature setpoint The settling time of this filter is user adjustable as part of the softload control feature.
Current Control Softloading	The chiller is running, but loading is influenced by a gradual filter on the current limit setpoint The starting current and the settling time of this filter is user adjustable as part of the softload control feature.
Waiting For Heat Recovery Water Flow	In this mode, the unit will wait for the establishment of heat recovery flow and the input of the hardware interface of the flow switch.

Table 24. Operating Modes

Chiller Modes	Description
Heat Recovery Water Pump PreRun Time 2 min:sec	In this mode, the chiller will wait for a period of time (the user can adjust) to meet the temperature requirements of the heat recovery water circuit.
Heat Recovery Active	The heat recovery is running.
Normal To Heat Recovery Transition	The unit is in the conversion process of refrigeration mode to heat recovery mode.
Heat Recovery To Normal Transition	The unit is in the conversion process of heat recovery mode to refrigeration mode.
EXV Controlling Differential Pressure	Liquid level control of the Electronic Expansion Valve has temporarily been suspended. The EXV is being modulated to control for a minimum differential pressure. This control implies low liquid levels and higher approach temperatures, but is necessary to provide minimum oil flow for the compressor until the condenser water loop can warm up to approx 50F.
Chilled Water Control	Unit is running in the Cooling Mode of operation and is attempting to control to the active Chilled Water Setpoint. (Note this mode was not necessary prior to the introduction of Hot Water Control)
Running – Limited	**The chiller, 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.*
Low Evaporator Refrigerant Temperature Inhibit	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. *
Capacity Limited by Low Liquid Level	The circuit is experiencing low refrigerant liquid levels and the EXV is at or near full open. The compressors on the circuit will be unloaded to prevent tripping.*
Current Limit	The compressor is running and its capacity is being limited by high currents. The current limit setting is 100% 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.*
Phase Unbalance Limit	The compressor is running and its capacity is being limited by excessive phase current unbalance.*
Low Discharge Superheat Limit	This is limit control that acts to prevent chiller shutdown when the discharge superheat approaches the limit setpoint by reducing the liquid level and unloading the slide valve.
Oil Loss Avoidance	This is limit control that acts to prevent chiller shutdown when the estimated refrigerant flow approaches the calculated minimum flow by increasing the slide valve capacity and/or VFD frequency
Note: Other normal running modes (see above) may also appear under this top level mode	
Shutting Down	**The chiller is still running but shutdown is imminent. The chiller is going through a compressor run-unload. sequence. Shutdown is necessary due to one (or more) of the following sub-modes:**
Local Stop	Chiller is in the process of being stopped by TD7 Stop button command
immediate Stop	Chiller is in the process of being stopped by TD7 Panic Stop command
Diagnostic Shutdown – Manual Reset	Chiller is in the process of being stopped by a Latching Diagnostic shutdown – Manual Reset is required to clear
Diagnostic Shutdown – Auto Reset	Chiller is in the process of being stopped by a Diagnostic shutdown – Automatic clearing of the diagnostic is possible if condition clears.
Compressor Unloading min:sec	The compressor is in its "run – unload" state in which it is being continuously unloaded for 40 sec prior to shutdown.
Starting is Inhibited by External Source	Chiller is in the process of being stopped by the External Stop hardwired input
Start Inhibited by BAS	The Chiller is in the process of shutdown due to a command from the Building Automation System (e.g. Tracer)
Evaporator Water Pump Off Delay min:sec	
Service Override	**The Chiller is in a Service Override mode**
Service Pumpdown	The chiller, circuit, and compressor is running via a manual command to perform a Service Pumpdown. Both evap and condenser water pumps are commanded to be running. The EXV is being held wide open, but the manual liquid line service valve should be closed.

For heat recovery unit, may have below operation modes:

1. Cooling
2. Cooling + Heat recovery
3. Heating

Conditions for entering heat recovery(below conditions should both meet):

1. Chiller is at cooling mode
2. Heat recovery option enabled
3. Chiller is running
4. Customer water tank temperature <set point-margin
5. Heat recovery water flow detected
6. No diagnostic
7. Heat recovery ignore time expired

Condition for exiting heat recovery(below condition just need meet any one):

1. Customer water tank temp>=set point + margin
2. Condenser pressure >170psig
3. Heat recovery option disabled
4. Chiller stop
5. Chiller has diagnostic

Alarms

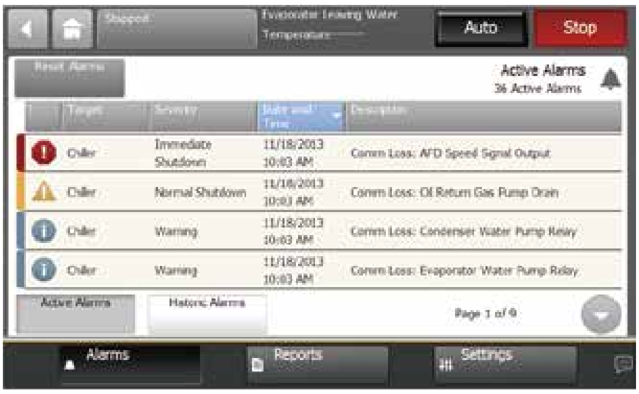
You can use the display to view alarms and to reset them. Alarms are communicated to the display immediately upon detection.

Viewing the Alarms Screen

Touch the Alarms button in the main menu area (Figure 43) 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 45. This example shows the default view, which appears each time you return to the screen.

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 45. 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.

If a informational warning is present, the “Alarms” key will be present but not flashing. If a Alarm shutdown (normal or immediate)has occurred, the “Alarm” key will display that is flashing. If no Alarms exist, the “Alarm” key will not be present.

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 4) 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 46. 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 re-order data as follows:

6. On the Custom Report screen, touch Edit. The Edit Custom Report screen appears.
7. Add, remove, or re-order as follows:

- To add an item to the custom report, touch it. It responds by changing to blue. You an 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. To add all of the remaining items in the left box to the custom report, touch Add All.
- 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.
- 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.

8. To save and view your edited custom report, touch

Save.

Figure 47. Edit Custom Report screen

Figure 48. Report Evaporator Screen

Table 25. Report Evaporator Screen Items

Description	Resolution	Units
Active Chilled Water Setpoint	X.X	°F / °C
Evaporator Entering Water Temperature	X.X	°F / °C
Evaporator Leaving Water Temperature	X.X	°F / °C
Evaporator Water Flow Status	Flow, No Flow	Text
Evaporator Water Pump Override	Auto, On	Text
Evaporator Approach Temperature	X.X	°F / °C
EXV Position Percent	X.X	%
Evaporator Refrigerant Pressure	XXX.X	PSIA/ kPaA
Evaporator Saturated Rfgt Temp	X.X	°F / °C
Evaporator Refrigerant Liquid Level	X.XX	in/mm

Figure 49. Report Condenser Screen

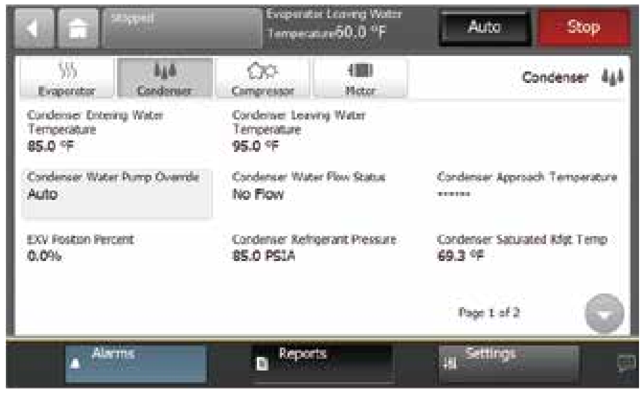


Table 26. Report Condenser Screen Items

Description	Resolution	Units
Condenser Entering Water Temperature	X.X	°F / °C
Condenser Leaving Water Temperature	X.X	°F / °C
Condenser Water Flow Status	Flow, No Flow	Text
Condenser Water Pump Override	Auto, On	Text
Condenser Approach Temperature	X.X	°F / °C
EXV Position Percent	X.X	%
CondenserRefrigerant Pressure	XXX.X	PSIA/kPaA
Condenser Saturated Rfgt Temp	X.X	°F / °C
Differential Refrigerant Pressure	XXX.X	PSIA/kPaA
Outdoor Air Temperature	X.X	°F / °C
Recovery Active Active	Active/InActive	Text
Active Heat Recovery Setpoint	X.X	°F / °C
Heat Recovery Tank Water Temp	X.X	°F / °C
Heat Recovery Water Flow Switch	Flow/No Flow	Text
Heat Recovery Entering Water Temp	X.X	°F / °C
Heat Recovery Leaving Water Temp	X.X	°F / °C

Figure 50. Report Compressor Screen

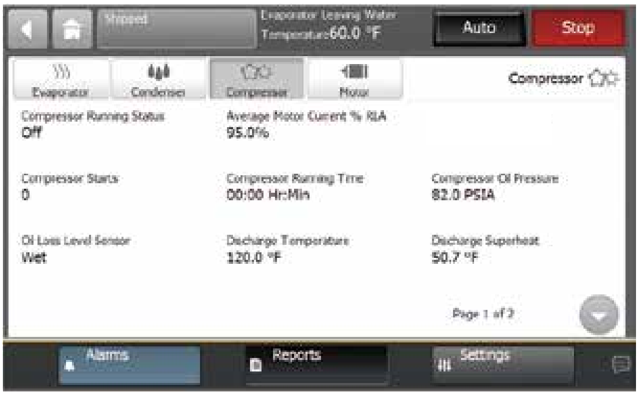


Table 27. Report Compressor Screen Items

Description	Resolution	Units
Compressor Running Status	On,Off	Text
Average Motor Current %RLA	XX.X%	%RLA
Compressor Starts	XX	Text
Compressor Running Time	XX:XX	Hr:Min
Oil Loss Level Sensor	Wet, Dry	Text
Discharge Temperature	X.X	°F / °C
Discharge Temperature	X.X	°F / °C
Compressor Oil Pressure	XXX.X	PSIA/kPaA
Evaporator Refrigerant Pressure	XXX.X	PSIA/kPaA
Condenser Refrigerant Pressure	XXX.X	PSIA/kPaA
Differential Refrigerant Pressure	XXX.X	PSIA/kPaA

Figure 51. Report Motor Screen

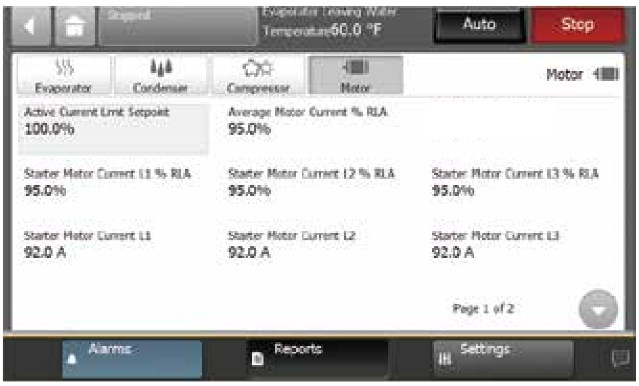


Table 28. Report Motor Screen Items

Description	Resolution	Units
Active Current Limit Setpoint	X.X	%RLA
Average Motor Current %RLA	X.X	%RLA
Starter Motor Current L1 %RLA	X.X	%RLA
Starter Motor Current L2 %RLA	X.X	%RLA
Starter Motor Current L3 %RLA	X.X	%RLA
Starter Motor Current L1	X.X	A
Starter Motor Current L1	X.X	A
Starter Motor Current L1	X.X	A
Starter Input Voltage AB	XXX.X	V
Starter Input Voltage BC	XXX.X	V
Starter Input Voltage CA	XXX.X	V
Average Motor Current	X.X	A
Average Phase Voltage	XXX.X	V

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 (see Figure 43) to view the Settings screen. Equipment Settings identifies a column of buttons located on the screen (see the outlined column in Figure 52). The buttons are:

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

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

Figure 52. 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 53). Touch any button to view a screen where you can change the setting for the featureshown 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 53*

Figure 53. Example equipment settings screen (Chiller Settings shown)

To change an equipment setting, follow this procedure:

1. Touch one of the button 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:

- For screens with button selections (Figure 54), touch the button that represents the setting you want. The button becomes shaded, and a Save button appears at the bottom of thescreen.
- For screens with numerical keypads (Figure 55), 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 thescreen, demonstrating that the change has been communicated to the Tracer UC800 controller. The screen you were previously viewing appears.

Figure 54. Chilled Water Setpoint Screen

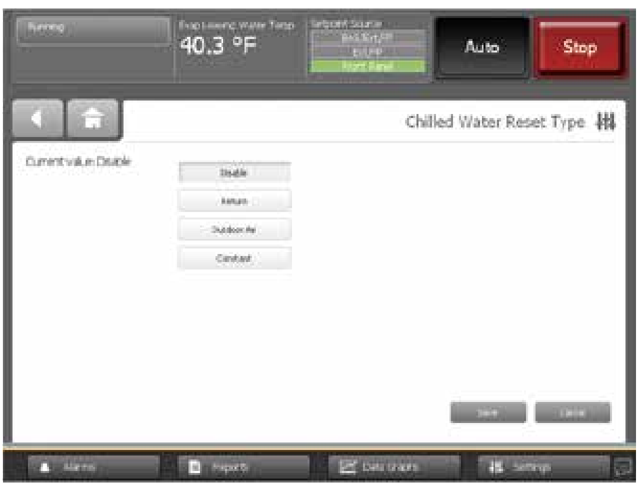


Figure 55. Changed Chilled Water Setpoint Screen

Figure 56. Heat Reclaim 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.

Table 29. Settings Screen Items

Description	Resolution	Units
Chiller Settings		
Active Chilled Water Setpoint	± XXX.X	°F / °C
Active Current Limit Setpoint	XXX %	%RLA
Active Panel Base Load Cmd	On/Auto	Text
Active Base Loading Setpoint	XXX	%
Active Base Loading Command	On/Auto	Text
Differential to Start	XXX.X	°F / °C
Differential to Stop	XXX.X	°F / °C
Setpoint Source (BAS/Ext/FP, Ext/ Front Panel, Front Panel),BAS/ Ext/FP		Text
Evaporator Water Pump Off Delay	XX	Min
Condenser Pump Prestart Time	XX	Min
High Evap Water Temp Cutout	XXX.X	°F / °C
Evaporator Leaving Water Temp Cutout	XX.X	°F / °C
Low Refrigerant Temperature Cutout	XX.X	°F / °C
Current Limit Softload Start Point	XXX.X	%
Current Limit Control Softload Time	XXXX	Sec
Capacity Control Softload Time	XXXX	Sec
Local Atmospheric Pressure	XXX.X	psi/kPa
Power Up Start Delay	XXX	Min
Feature Settings		
External Chilled/Hot Water SetpointEnable/Disable		Text
External Current Limit SetpointEnableEnable/Disable		Text
LCI-C Diagnostic EncodingEnable/Disable		Text
Chilled Water Reset(Constant, Outdoor, Return, Disable), Disable		Text
Return Reset Ratio	XXX	%
Return Start Reset	XXX.X	°F / °C
Return Maximum Reset	XXX.X	°F / °C
Outdoor Reset Ratio	XXX	%
Outdoor Start Reset	XXX.X	°F / °C
Outdoor Maximum Reset	XXX.X	°F / °C
Mode Overrides		
Evap Water Pump (Auto, On), Auto		Text
Cond Water Pump (Auto, On), Auto		Text
Display Reference		
Date Format ("mmm dd, yyy", "dd-mmm-yyyy"),	mmm dd, yyy	Text
Data Separator		Text
Time Format (12-hour, 24-hour), 12-hour		Text
Unit System (SI, English) English		Text
Pressure Units (Absolute, Gauge), Absolute		Text
Number Format		Text

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.

Viewing the Settings Screen

Touch the Settings button in the main menu area (Figure 43) to view the Settings screen. Display Settings identifies a column of buttons located on the screen (see Figure 57). The buttons are:

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

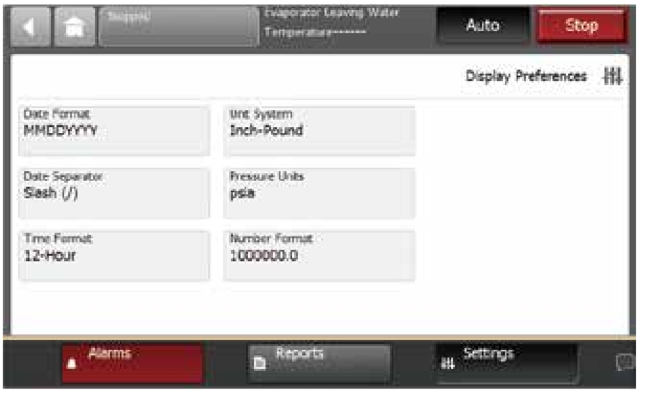
Each button provide access to a screen that is related to the button name.

Viewing and Changing Display Preferences

On the Settings screen, touch Display Preferences to view a screen containing these buttons (see Figure 58):

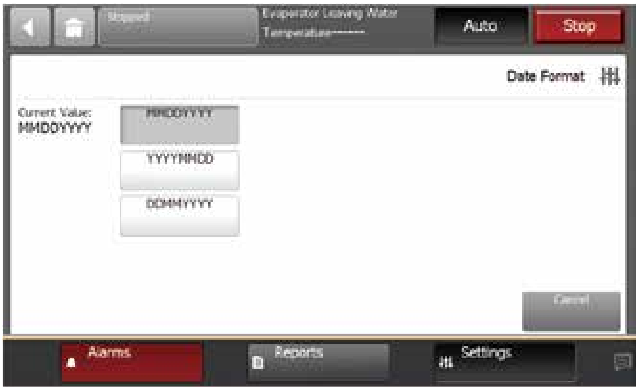
- Date Format
- Date Separator
- Time Format
- Unit System
- Pressure Units
- Number Format

Figure 57. Display ReferenceScreen



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 58. Data 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

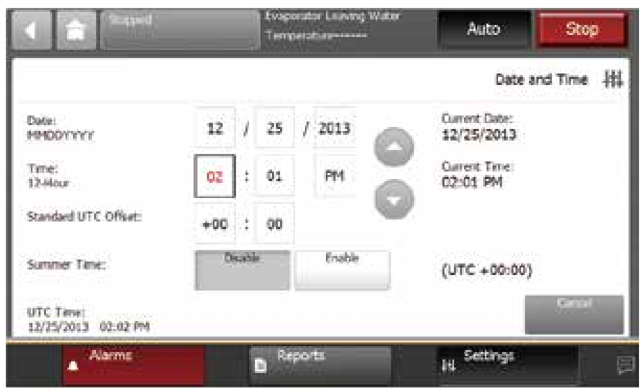
Figure 59. Language Page

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” buttonin Figure 59 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 60. 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.

Cleaning the Display

On the Settings screen, touch Clean Display to disable the Tracer AdaptiView display screen for 15seconds so that you can clean the screen without it responding to touch. During this time, thescreen is black with a number in the center that counts down the seconds. After 15 seconds, theSettings screen re-appears.

Figure 61. Countdown screen

Security Settings

If security if enabled, the Tracer AdaptiView display requires that you log in with a four-digit security PIN to make settting 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 62).

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/Logoutbutton is gone.

To enable security:

1. From the Settings screen, touch the Security button. The Security screen appears (Figure 62).
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 62. Security screen

Figure 63. Security 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 63).
2. Use the keypad to enter your PIN.

- The PIN is a four-digit number, which was configured for your system with the Tracer TU service tool.
- 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.

- 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.
- 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 64. Log In Screen

Logging Out

To log out:

1. Touch the Log out button. A confirmation screen appears (Figure 65).
2. Touch Yes to confirm that you want to log out. The Settings screen appears with a Log in button on it.

Figure 65. Log out confirmation screen

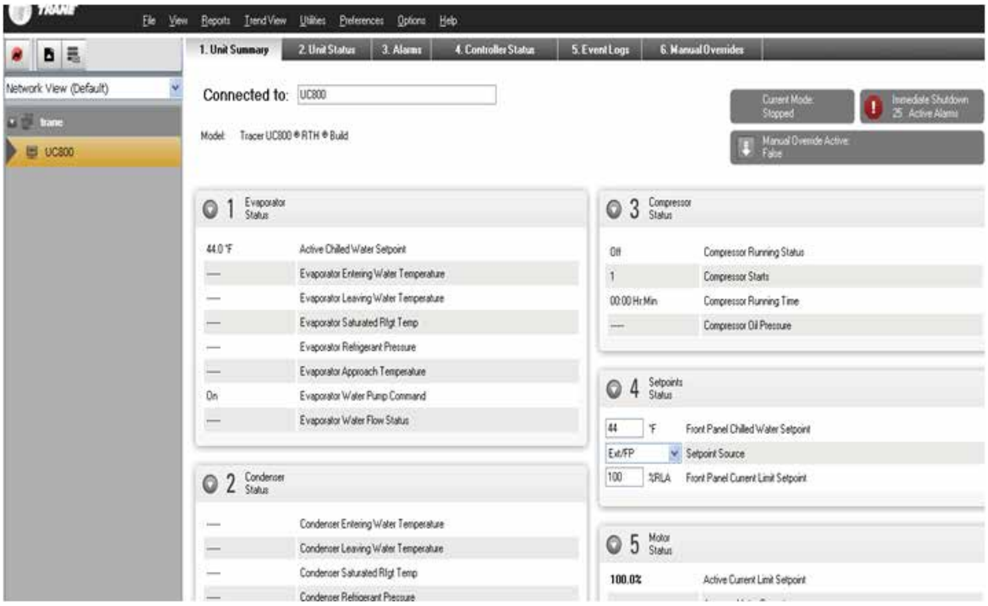
TracerTU

TracerTU (non-Trane personnel, contact your localTrane office for software) adds a level of sophistication that improves service technician effectiveness and minimizes chiller downtime.TheTracer AdaptiView control's operator interface is intended to serve only typical daily tasks. The portable PC-based service-tool software,Tracer TU, supports service and maintenance tasks. TracerTU serves as a common interface to allTrane® chillers,andwill customize itself basedonthe 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 respectiveTracerTU indicators visually confirm the availability of each connected sensor, relay, and actuator. TracerTU is designed to run on a customer's laptop, connected to theTracer 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
- CD-ROM drive
- Ethernet 10/100 LAN card
- An available USB 2.0 port
- Microsoft® Windows® XP Professional operation system with Service Pack 3 (SP3) or Windows 7 Enterprise or Professional operating system (32-bit or 64-bit4.0 or later.

Note: *TracerTU is designed and validated for this minimum laptop configuration.Any variation from this configuration may have different results. Therefore, support forTracerTU is limited to only those laptops with the configuration previously specified.*

Figure 66.



Unit Start-up

Power Up

The Power up chart shows the respective TD7 screens during a power up of the main processor. This process takes from 30 to 50 seconds depending on the number of installed Options. On all power ups, the software model will always 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.

Figure 67. Sequence of operation: power up diagram

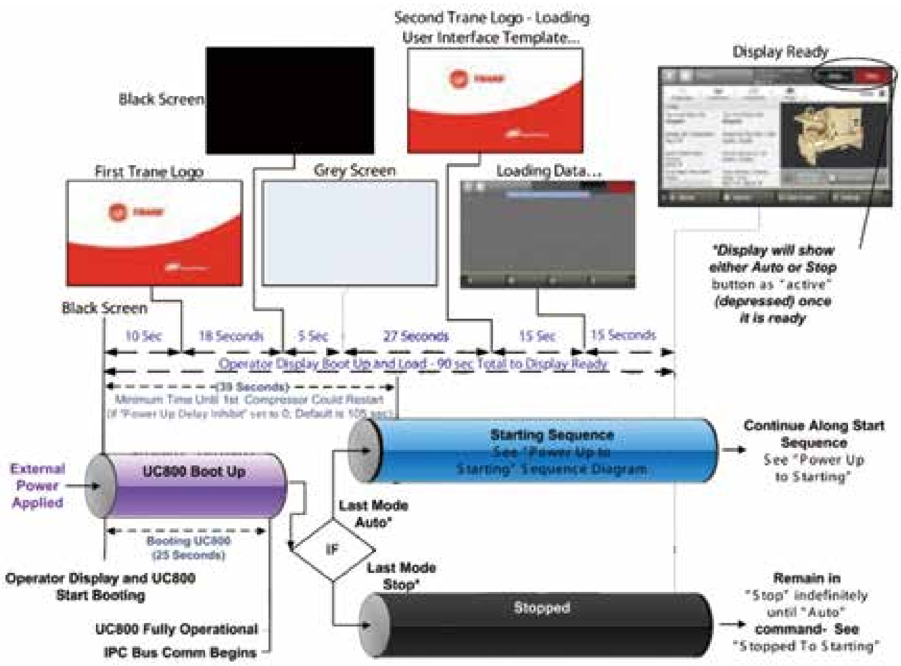


Figure 68. TD-7 screen displays

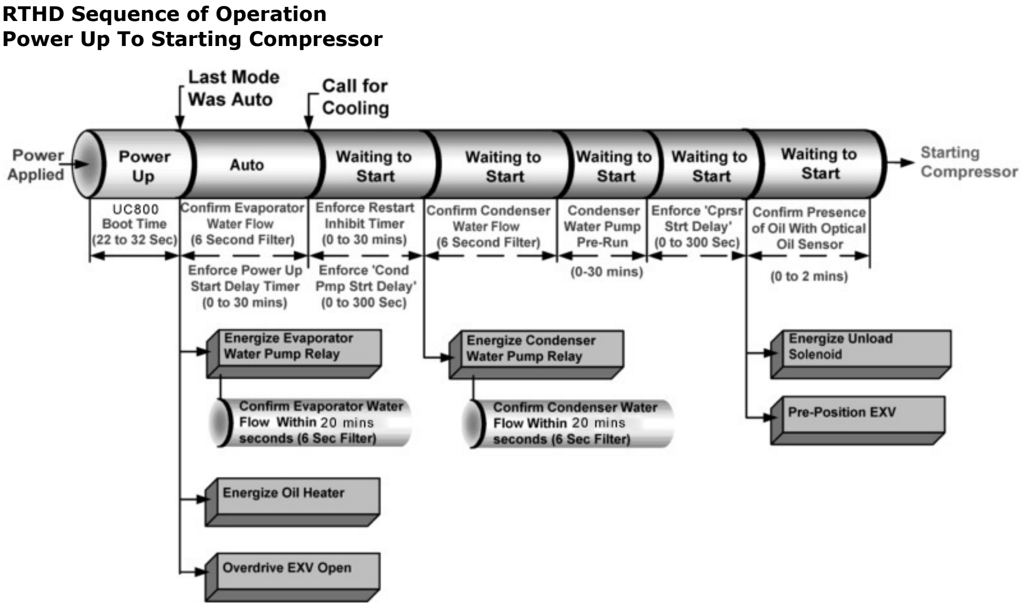
Power Up to Starting

The Power up to starting diagram shows the timing from a power up event to energizing the compressor. The shortest allowable time would be under the following conditions:

1. No motor restart inhibit
2. Evaporator and Condenser Water flowing
3. Power up Start Delay setpoint set to 0 minutes
4. Adjustable Stop to Start Timer set to 5 seconds
5. Need to cool

The above conditions would allow for a minimum power up to starting compressor time of 95 seconds.

Figure 69. Power Up to Starting



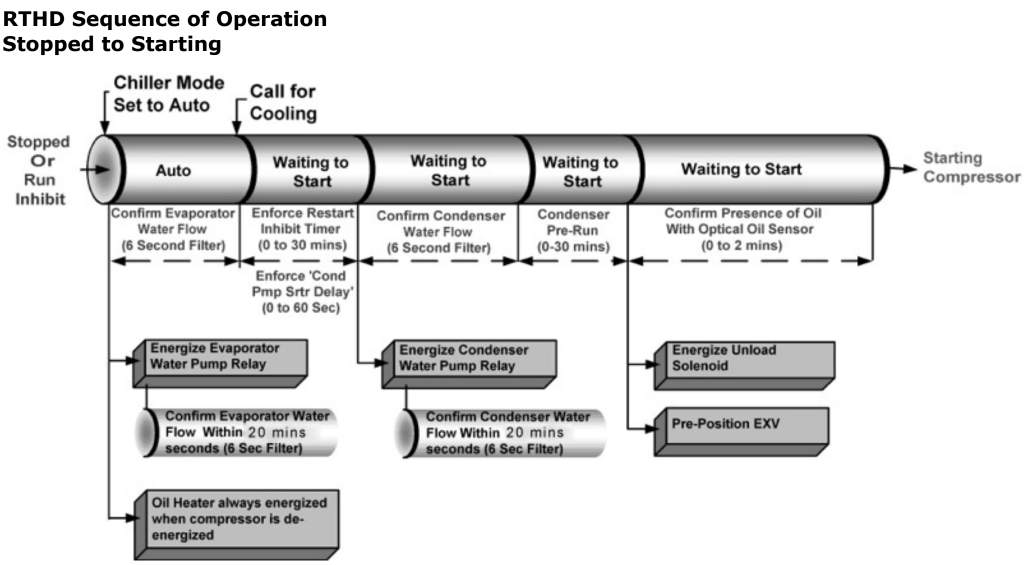
Stopped to Starting

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

1. No motor restart inhibit
2. Evaporator and Condenser Water flowing
3. Power up Start Delay Timer has expired
4. Adjustable Stop to Start Timer has expired
5. Need to cool

The above conditions would allow the compressor to start in 60 seconds

Figure 70. Stopped to Starting



Limit Conditions

UC800 will automatically limit certain operating parameters during startup and run modes to maintain optimum chiller performance and prevent nuisance diagnostic trips. These limit conditions are noted in Table 30.

Table 30. Limit Conditions

Running - Limited	**The chiller, 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.**
Condenser Pressure Limit	The circuit is experiencing condenser pressures at or near the condenser limit setting. The compressor will be unloaded to prevent exceeding the limits.
Low Evaporator Refrigerant Temperature Inhibit	The circuit is experiencing saturated evaporator temperatures at or near the Low Refrigerant Temperature Cutout setting. The compressors will be unloaded to prevent tripping.
Capacity Limited by Low Liquid Level	The circuit is experiencing low refrigerant liquid levels and the EXV is at or near full open. The compressor will be unloaded to prevent tripping.
Current Limit	The compressor is running and its capacity is being limited by high currents. The current limit setting is 100% RLA (to avoid overcurrent trips).
Phase Unbalance Limit	The compressor is running and its capacity is being limited by excessive phase current unbalance.

Seasonal Unit Start-Up Procedure

1. Close all valves and re-install the drain plugs in the evaporator and condenser heads.
2. Service the auxiliary equipment according to the start-up/maintenance instructions provided by the respective equipment manufacturers.
3. Vent and fill the cooling tower, if used, as well as the condenser and piping. At this point, all air must be removed from the system (including each pass). Close the vents in the evaporator chilled water circuits.
4. Open all the valves in the evaporator chilled water circuits.
5. 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.

⚠ CAUTION

Equipment Damage!

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

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 startup for the remainder of the seasonal startup.
9. For the heat recovery unit, if chiller can’t start up by low system differential pressure at low condenser inlet water temperature. you cna increase the parameter in TU: Unit start time (max to 60 seconds).

Series R Start-up Test Log	
Job Name	Job Location
Model #	Serial # start date:
Sales Order # ship date:	Job elevation (ft. above sea level)
STARTER DATA:	**START-UP ONLY**
Manufacturer	Chiller appearance at arrival:
Type:	Compressor shipping bolts removed? Y N
Vendor ID #/Model #:	Oil separator shipping bolts removed? Y N
Volts Amps Hz	Machine Gauge Pressure: psig/ kPag
COMPRESSOR DATA:	Machine UC800 Pressure: psig/ kPag
Model #:	Complete if pressure test is required
Serial #:	Vacuum after leak test= mm
NAMEPLATE DATA:	Standing vacuum test = mm rise in hrs
RLA KW Volts	**UNIT CHARGES**
50 60 Hz	Unit refrigerant charge: lbs/ Kg
DESIGN DATA:	Unit Oil Charge: gal/ L
RLA KW Volts	
CURRENT TRANSFORMER	**SUMMARY OF UNIT OPTIONS INSTALLED**
Part Number ("X" code and 2-digit extension)	Y N Tracer Communications Interface
Primary CT's	Y N Options Module
X -	Y N Outdoor Air Sensor
X -	Y N Ice Making Control
X -	Y N Other

DESIGN CONDITIONS				
Evap Desig	________ GPM L/S	________ PSID kPad	Ent. Water F/C ____________	Leaving Water F/C ____________
Evap Actual	________ GPM L/S	________ PSID kPad	Ent. Water F/C ____________	Leaving Water F/C ____________
Cond Design	________ GPM L/S	________ PSID kPad	Ent. Water F/C ____________	Leaving Water F/C ____________
Cond Actual	________ GPM L/S	________ PSID kPad	Ent. Water F/C ____________	Leaving Water F/C ____________

Owner Witness Signature: ______________________________

Installation Checklist for Model RTHD Series R	
To: ______________________ Trane Service Company	
S.O. No.: ______________________ Serial No: ______________	
Job/Project Name: ______________________	
RECEIVING	
	Verify that the unit nameplate data corresponds to the ordering information.
	Inspect the unit for shipping damage and any shortages of materials. Report any damage or shortage to the carrier.
UNIT LOCATION AND MOUNTING	
	Inspect the location desired for installation and verify adequate service access clearances.
	Provide drainage for evaporator and condenser water.
	Remove and discard all shipping materials (cartons, etc.)
	Install optional spring or neoprene isolators, if required. Refer to IOM for details.
	Level unit and secure it to the mounting surface.
UNIT PIPING	
Caution:	If using an acidic commercial flushing solution, construct a temporary bypass around the unit to prevent damage to the internal components of the condenser and evaporator. To avoid possible equipment damage, do not use untreated or improperly treated system water.
	Flush all unit water piping before making final connections to unit.
	Connect water piping to the evaporator and condenser.
	Install pressure gauges and shutoff valves on the water inlet and outlet to the evap. and cond.
	Install water strainers in the entering chilled water and condenser water lines.
	Install balancing valves (discretionary) and flow switches in the leaving chilled and condenser water lines.
	Install drains with shutoff valves or drain plugs on the evaporator and condenser.
	Vent the chilled water and condenser water systems at the high points of the system piping.
	Pipe relief valves outdoors in accordance to ASHRAE 15, the IOM and local code.
ELECTRICAL WIRING	
	WARNING: To prevent injury or death, disconnect electrical power source before completing wiring connections on the unit.
	Check for tight connections for the unit power supply wiring with the fused disconnect Unit-mounted circuit breaker (or unit-mounted disconnect) in the power section of the control panel.
	Check for tight 115 volt control wiring connections to the chilled water pump and condenser water pump
	Check Interlock Wiring, including chilled water pump control, chilled water flow interlock, condenser water pump, condenser water flow interlock, external auto stop. For further details refer to the IOM or the unit wiring.
Caution:	Information on Interconnecting Wiring: Chilled Water Pump Interlock and External Auto/Stop must be adhered to or equipment damage may occur.
	If remote Alarm contacts, Limit Warning Contact, Outdoor Air Temperature Sensor, Emergency Stop, Head Relief Request Contact, Ice Making, External Chilled Water Setpoint, External Current Limit Setpoint, Percent Condenser Pressure output are used refer to the IOM and the unit wiring for further details.
	Control power wiring isolated in control panel/starter panel enclosure.
	Is chilled water pump control by UCP2, CH530, UC800 or Others (circle one)

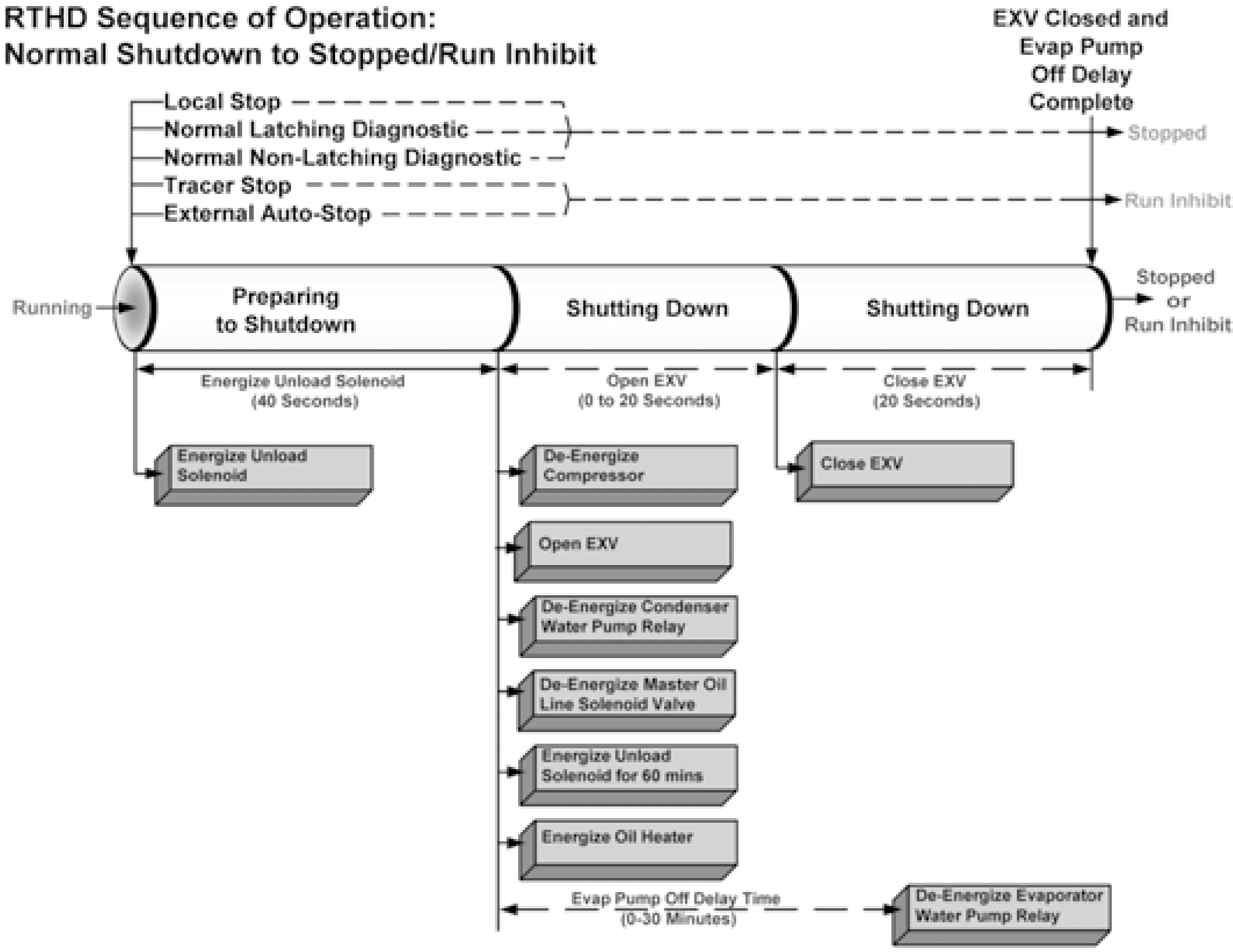
Installation Checklist for Model RTHD Series R	
PRE-START CHECK-OUT	
	Inspect all other wiring connection. Connections should be clean and tight.
	Energize crankcase heaters. Heaters need to be energized 24 hours before start-up.
	Confirm that all service and isolation valves are open. Refer to RTHD-SVX02A-EN for RTHD units, RTHC-SB-1B for RTHC units and RTHB-IOM-1 for the RTHB units.
	Remove the four (3 on B Frame Compressors) compressor shipping stops (snubbers) from under the compressor. (RTHD and RTHC only)
	Remove shipping bolts from under the two oil separators (RTHD and RTHC only)
	Confirm phase-sequencing "A-B-C". Refer to the IOM for further details.
	Check all water temperature sensors for proper installation and use of heat transfer paste.
	Fill the chilled water circuit. Type of glycol ___________________ Percent of glycol _______________ byweight
Caution:	To prevent equipment damage, do not use untreated or improperly treated water in the system.
	Fill the condensing water circuit.
	Close the fused disconnect switch to supply power to the chilled water pump and condenser water pump starter.
	Start the water pumps. With water pumps running, inspect all piping connections for leakage. Make any necessary repairs.
	With water pumps running, adjust water flows and check water pressure drops through the evaporator and condenser.
	Adjust the flow switches for proper operation.
	Return pumps to the automatic mode.
	Disable machine start circuit until start-up mechanic arrives (use either the external stop or emergency stop circuit)

Unit Shutdown

Normal Shutdown to Stopped

The Normal Shutdown diagram 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 71. Normal Shutdown



Seasonal Unit Shutdown

1. Perform the normal unit stop sequence using the <Stop> key.

Note: *Do not open the starter disconnect switch. This must remain closed to provide control power from the control power transformer to the oil sump heater.*

2. Verify that the chilled water and condenser water pumps are cycled off. If desired, open the disconnect switches to the pumps.
3. Drain the condenser piping and cooling tower, if desired.
4. Remove the drain and vent plugs from the condenser headers to drain the condenser.
5. Verify that the Crank Case heater is working.
6. Once the unit is secured, perform the maintenance identified in the following sections.

Periodic Maintenance

Overview

This section describes preventative maintenance procedures and intervals for the Series R unit. Use a periodic maintenance program to ensure optimal performance and efficiency of the Series R units.

An important aspect of the chiller maintenance program is the regular completion of the "Series R Operating Log"; an example of this log is provided in this manual. When filled out properly the completed logs can be reviewed to identify any developing trends in the chiller's operating conditions.

For example, if the machine operator notices a gradual increase in condensing pressure during a month's time, he can systematically check for and then correct, the possible cause(s) of this condition (e.g., fouled condenser tubes, non-condensables in the system).

Weekly Maintenance and Checks

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

- Log the chiller.
- Check evaporator and condenser pressures with gauges and compare to the reading on the Clear Language Display. Pressure readings should fall within the following ranges specified in the Operating Conditions.

Note: *Optimum condenser pressure is dependent on condenser water temperature, and should equal the saturation pressure of the refrigerant at a temperature 2 to 5°F above that of leaving condenser water at full load.*

Monthly Maintenance and Checks

- Review operating log.
- Clean all water strainers in both the chilled and condensing water piping systems.
- Measure the oil filter pressure drop. Replace oil filter if required. Refer to "Service Procedures".
- Measure and log the subcooling and superheat.
- If operating conditions indicate a refrigerant shortage, leak check the unitan confirm using soap bubbles.
- Repair all leaks.
- Trim refrigerant charge until the unit operates in the conditions listed in the note below.

Note: *ARI conditions are: condenser water: 85°F and 3 GPM per ton and evaporator water: 54-44°F.*

Table 31. Operating Conditions at Full Load

Description	Condition
Evaporator pressure	40-55 psig
Condensing pressure	85-120 psig
Discharge superheat	17°F
Subcooling	5-10°F
EXV percent open	40-50% open in Auto mode

All conditions stated above are based on the unit running fully loaded, running at ARI conditions.

- If full load conditions can not be met. Refer to note below to trim the refrigerant charge.

Note: *Conditions at minimum must be: entering condenser water: 85°F and entering evaporator water: 55°F.*

Table 32. Operating Conditions at Minimum Load

Description	Condition
Evaporator approach	*less than 7°F (non-glycol applications)
Condensing approach	*less than 7°F
Subcooling	2-3°F
EXV percent open	10-20 % open

*≈1.0°F for new unit.

Annual Maintenance

Shut down the chiller once each year to check the following:

⚠ 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.

- Perform all weekly and monthly maintenance procedures.
- Check the refrigerant charge and oil level. Refer to "Maintenance Procedures". Routine oil changing is not necessary on a hermetic system.
- Have a qualified laboratory perform an oil analysis to determine system moisture content and acid level.

Note: ***IMPORTANT:*** *Due to the hygroscopic properties of the POE oil, all oil must be stored in metal containers. The oil will absorb water if stored in a plastic container*

- Check the pressure drop across the oil filter. Refer to "Maintenance Procedures".
- Contact a qualified service organization to leak check the chiller, to inspect safety controls, and inspect electrical components for deficiencies.
- Inspect all piping components for leakage and/or

damage. Clean out any inline strainers.

- Clean and repaint any areas that show signs of corrosion.
- Test vent piping of all relief valves for presence of refrigerant to detect improperly sealed relief valves. Replace any leaking relief valve.
- Inspect the condenser tubes for fouling; clean if necessary. Refer to "Maintenance Procedures".
- Check to make sure that the crank case heater is working.

Scheduling Other Maintenance

- Use a nondestructive tube test to inspect the condenser and evaporator tubes at 3-year intervals.

Note: *It may be desirable to perform tube tests on these components at more frequent intervals, depending upon chiller application. This is especially true of critical process equipment.*

- Depending on chiller duty, contact a qualified service organization to determine when to conduct a complete examination of the unit to determine the condition of the compressor and internal components.

Operating Log

A sample of several operating logs and checklists have been included.

Chiller Log			
Main Tab	**Run Time**		
	15 min	**30 min**	**1 hr**
Chiller Mode			
Evap Ent/Lvg Water Temp			
Cond Ent/Lvg Water Temp			
Active Chilled Water Setpoint (F)			
Average Line Current (%RLA)			
Active Current Limit Setpoint (%RLA)			
Software Type			
Software Version			
Reports Tab			
Evaporator			
Evap Entering Water Temperature (F)			
Evap Leaving Water Temperature (F)			
Evap Sat Rfgt Temp (F)			
Evap Rfgt Pressure (psia)			
Evap Approach Temp (F)			
Evap Water Flow Switch Status			
Expansion Valve Position (%)			
Expansion Valve Position Steps			
Evap Rfgt Liquid Level (in)			
Condenser			
Cond Entering Water Temperature (F)			
Cond Leaving Water Temperature (F)			
Cond Sat Rfgt Temp (F)			
Cond Rfgt Pressure (psia)			
Cond Approach Temp (F)			
Cond Water Flow Switch Status			
Cond Head Pressure Ctrl Command (%)			
Compressor			
Compressor Starts			
Compressor Run Time			
System Rfgt Diff Pressure (psid)			
Oil Pressure (psia)			
Compressor rfgt Discharge Temp (F)			
Discharge Superheat (F)			
% RLA L1 L2 L3 (%)			
Amps L1 L2 L3 (Amps)			
Volts AB BC CA			

Settings	
Settings Tab	
Chiller	
Front Panel Chilled Water Setpt (F)	
Front Panel Current Limit Setpt (RLA)	
Differential to Start (F)	
Differential to Stop (F)	
Setpoint Source	
Feature Settings	
Chilled Water Reset	
Return Reset Ratio	
Return Start Reset	
Return Maximum Reset	
Outdoor Reset Ratio	
Outdoor Start Reset	
Outdoor Maximum Reset	
Mode Overrides	
Evap Water Pump	
Cond Water Pump	
Expansion Valve Control	
Slide Valve Control	
Service Pumpdown	
Display Settings	
Date Format	
Date	
Time Format	
Time of Day	
Keypad/Display Lockout	
Display Units	
Pressure Units	
Language Selection	

Maintenance Procedures

Cleaning the Condenser

⚠ CAUTION

Proper Water Treatment!

The use of untreated or improperly treated water in a RTHD may result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. The Trane Company assumes no responsibility for equipment failures which result from untreated or improperly treated water, saline or brackish water.

Condenser tube fouling is suspect when the "approach" temperature (i.e., the difference between the refrigerant condensing temperature and the leaving condenser water temperature) is higher than predicted.

Standard water applications will operate with less than a 10°F approach. If the approach exceeds 10°F cleaning the condenser tubes is recommended.

Note: *Glycol in the water system typically doubles the standard approach.*

If the annual condenser tube inspection indicates that the tubes are fouled, 2 cleaning methods can be used to rid the tubes of contaminants.The methods are:

Mechanical Cleaning Procedure

Mechanical tube cleaning this method is used to remove sludge and loose material from smooth-bore condenser tubes.

1. Remove the retaining bolts from the water boxes at each end of the condenser. Use a hoist to lift the water boxes.
2. Work a round nylon or brass bristled brush (attached to a rod) in and out of each of the condenser water tubes to loosen the sludge.
3. Thoroughly flush the condenser water tubes with clean water.

(To clean internally enhanced tubes, use a bi-directional brush or consult a qualified service organization for recommendations.)

Chemical Cleaning Procedure

- Scale deposits are best removed by chemical means. Consult a qualified water treatment specialist (i.e., one that knows the local water supply chemical/mineral content) for a recommended cleaning solution suitable for the job. (A standard condenser water circuit is composed solely of copper, cast iron and steel.) Improper chemical cleaning can damage tube walls.

All of the materials used in the external circulation system, the quantity of the solution, the duration of the cleaning period, and any required safety precautions should be approved by the company furnishing the materials or performing the cleaning.

Note: *Chemical tube cleaning should always be followed by mechanical tube cleaning.*

Cleaning the Evaporator

Since the evaporator is typically part of a closed circuit, it does not accumulate appreciable amounts of scale or sludge. However, if cleaning is deemed necessary, use the same cleaning methods described for the condenser tubes.

Compressor Oil

⚠ CAUTION

Equipment Damage!

To prevent oil sump heater burnout, open the unit main power disconnect switch before removing oil from the compressor.

Trane Polyolester Oil is the approved oil for the RTHD units. Polyolester oil is extremely hygroscopic meaning it readily attracts moisture.The oil can not be stored in plastic containers due to the hygroscopic properties. As with mineral oil, if water is in the system it will react with the oil to form acids. Use Table 33 to determine the acceptability of the oil.

Table 33. POE Oil Properties

Description	Acceptable Levels
Moisture content	less than 300 ppm
Acid Level	less than 0.3 TAN (mg KOH/g)

Note: *Use an oil transfer pump to change the oil regardless of chiller pressure.*

Oil Sump Level Check

The oil level in the oil sump can be measured to give an indication of the system oil charge. Follow the procedures below to measure the level.

1. Run the unit fully loaded for approximately 20 minutes (Keep leaving evaporator water temperature lower than 48ºF, entering condenser water temperature higher than 75ºF) .

Note: *Operating the unit at minimum load tends to lower oil sump levels to as low as 2", well below the normal 4.5" to 6.0" levels. This is because the evaporator tends to hold more oil at minimum load conditions. Before adding any oil, obtain an oil level reading near a full load operating condition.*

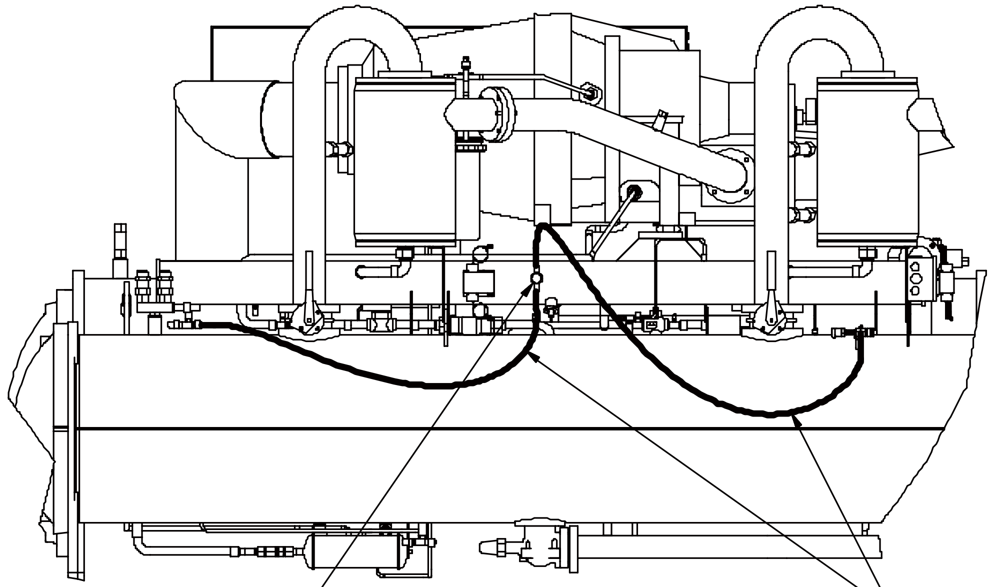
2. Cycle the compressor off line.

⚠ CAUTION

Oil Loss!

Never operate the compressor with the sightglass service valves opened. Severe oil loss will occur. Close the valves after checking the oil level. The sump is above the condenser and it is possible to drain the oil.

Figure 72. Determining Oil Level in Sump



3. Attach a 3/8″ or 1/2″ hose with a sightglass in the middle to the oil sump drain valve and the condenser service valve at the top of the condenser.
   Using high pressure rated clear hose with appropriate fittings can help speed up the process.
4. After the unit is off line for 10 minutes, move the sightglass along the side of the oil sump.
5. The level should be between 2″ and 5″ from the bottom of the oil sump. If the level appears to be above 8″, the oil sump is completely full. Most likely more oil resides in the rest of the system and some oil needs to be removed until the level falls between 2″ and 5″ in the oil sump.
6. If the level is below 2″, there is not enough oil in the sump. This can occur from not enough oil in the system or more likely, oil migration to the evaporator. Oil migration can occur from a low refrigerant charge, gas pump malfunction, etc.

Note: *If the oil is logged in the evaporator confirm the operation of the gas pump. If the gas pump is not functioning properly all oil will be logged in the evaporator.*

7. After the level is determined, close the service valves and remove the hose/sightglass assembly.

Removing Compressor Oil

The oil in the compressor oil sump is under a constant positive pressure at ambient temperature. To remove oil, open the service valve located on the bottom of the oil sump and drain the oil into a suitable container using the procedure outlined below:

⚠ CAUTION

POE Oil!

Due to the hygroscopic properties of the POE oil, all oil must be stored in metal containers. The oil will absorb water if stored in a plastic container.

Oil should not be removed until the refrigerant is isolated or removed.

8. Connect a line to the oil sump drain valve.
9. Open the valve and allow the desired amount of oil to flow into the container and close the charging valve.
10. Measure the exact amount of oil removed from the unit.

Oil Charging Procedure

It is critical to fill the oil lines feeding the compressor when charging a system with oil. The diagnostic "Loss of oil at the compressor stopped" will be generated if the oil lines are not full on start-up.

To properly charge the system with oil, follow the steps below:

1. Locate the 1/4" schrader valve between the ball valve and oil filter (or the ball valve and oil cooler, if so equipped).
2. Loosely connect oil pump to schrader valve called out in step 1.
3. Operate oil charging pump until oil appears at the charging valve connection; then tighten the connection.

Note: *To keep air from entering the oil, the charging valve connection must be air- tight.*

4. Close the ball valve just upstream of the schrader valve connected to the oil pump. This will allow the oil to travel through the oil lines to the compressor first rather than directly to the oil sump.
5. Energize the master oil solenoid.
6. This will allow the oil to travel from the schrader to the compressor. It takes approximately 2 gallons of oil to fill the lines.
7. After charging the first 2 gallons, de-energize the master solenoid.
8. Open the ball valve just upstream of the schrader connected to the oil pump. This will allow the remainder of the charge to flow to the oil sump.
9. Monitor the "Oil Loss Level Sensor Status in TechView under the Status view. This display shows whether the optical sensor is seeing oil (wet) or if it is not (dry).

Note: *The remainder of the oil charge can be charged into the 1/4" service valve located at the bottom of the sump if a larger connection is preferred.*

Replacing the Main Oil Filter (Hot Filter)

The filter element should be changed if the oil flow is sufficiently obstructed. Two things can happen: first, the chiller may shut down on a "Low Oil Flow" diagnostic, or secondly, the compressor may shut down on a "Loss of Oil at Compressor (Running) diagnostic. If either of these diagnostics occurs, it is possible the oil filter needs replacement. The oil filter is not usually the cause of a Loss of oil at Compressor diagnostic.

Specifically, the filter must be changed if the pressure drop between the two service valves in the lubrication circuit exceeds the maximum level as given in Figure 73. This chart shows the relationship between the pressure drop measured in the lubrication circuit as compared with operating pressure differential of the chiller (as measured by pressures in the condenser and evaporator).

Normal pressure drops between the service valves of the lubrication circuit are shown by the lower curve. The upper curve represents the maximum allowable pressure drop and indicates when the oil filter must be changed. Pressure drops that lie between the lower and upper curves are considered acceptable.

For a chiller equipped with an oil cooler, add 5 psid to the values shown in Figure 73. For example, if the system pressure differential was 80 psid, then the clean filter pressure drop would be approximately 15 psid (up from 10 psid). For a chiller with an oil cooler and operating with a dirty oil filter, the maximum allowable pressure drop would be 28 psid (up from 23 psid).

Under normal operating conditions the element should be replaced after the first year of operation and then as needed thereafter.

Refer to Table 4 - Table 7 and Unit nameplate for Oil charge information.

1. Isolate the oil filter by closing the two ball valves located before and after the filter.
2. Relieve the pressure from the hydraulic line through the 1/4" schrader valve located between the ball valve and the oil filter (or the ball valve and oil cooler, if so equipped).
3. Use a strap wrench to break loose the nut that secures the oil filter element to the filter manifold.
4. Turn the nut clockwise until the filter element detaches from the manifold.
5. Remove the filter element and measure the exact amount of oil contained in the filter bowl and element.
6. Place the cartridge in the nut after filling the bowl with the proper amount of refrigerant oil (see Step 5). Turn the new nut assembly counterclockwise and tighten securely.
7. Connect manifold gauge set at oil charging valve and evacuate the filter to 500 microns.
8. Charge the oil line back with the amount of oil removed. Open the isolation valves to the oil supply system.

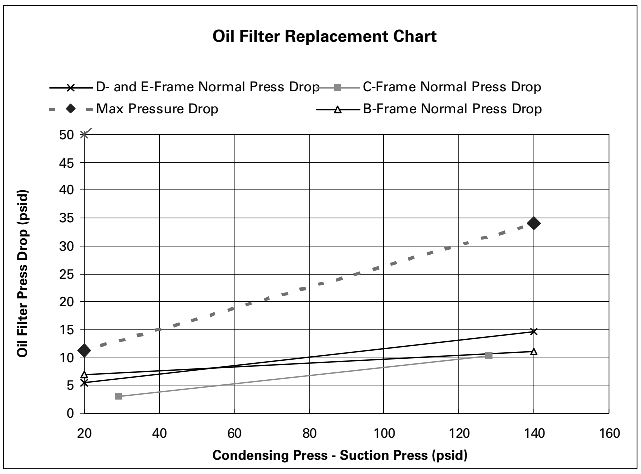
Replacing the Gas Pump Oil Filter

The filter element in the gas pump circuit may need to be changed if the gas pump is unable to return the oil to the compressor.

An evaporator logged with oil will have a high liquid level when referring to the liquid level sensor, low suction pressures, and higher than normal approach on the evaporator.

Refer to Figure 73 to determine if the pressure drop across the filter is above the normal range at full load conditions. Once the oil is logged in the evaporator, it may be necessary to manually move the oil from the evaporator to the oil sump to avoid losses in the main oil lines.

Figure 73. Oil Filter Replacement Chart (E,D, C and B Frame Compressors)



Refrigerant Charge

If a low refrigerant charge is suspected, first determine the cause of lost refrigerant. Once the problem is repaired follow the procedures below for evacuating and charging the unit.

Evacuation and Dehydration

1. Disconnect ALL power before/during evacuation.
2. Connect the vacuum pump to the 5/8” flare connection on the bottom of the evaporator and/or condenser.
3. To remove all of the moisture from the system and to insure a leak free unit, pull the system down below 500 microns.
4. After the unit is evacuated, perform a standing rise test for at least an hour. The pressure should not rise more than 150 microns. If the pressures rises more than 150 microns, either a leak is present or moisture is still in the system.

Note: *If oil is in the system, this test is more difficult. The oil is aromatic and will give off vapors that will raise the pressure of the system.*

Refrigerant Charging

Once the system is deemed leak and moisture free, use the 5/8” flare connections at the bottom of the evaporator and condenser to add refrigerant charge.

Refer to Table 4 - Table 7 and Unit nameplate for Refrigerant charge information.

Freeze Protection

For unit operation in a low temperature environment, adequate protection measures must be taken against freezing. Adjusted settings and recommended ethylene glycol solution strengths are contained in Table 31 as follows:

Table 34. Low Refrigerant Temperature, Ethylene Glycol, and Freeze Protection Settings

		DDE, EDE, CBC*			DFF, EFF, CDE, BCD, BBB, CFF*			DGG, EGG, CEF*		
Chilled Water Setpt (°F)	Leaving Wtr Temp Cutout (°F)	Low Rfgt Temp Cutout (°F)	Rec % Ethylene Glycol	Solution Freeze Point (°F)	Low Rfgt Temp Cutout (°F)	Rec % Ethylene Glycol	Solution Freeze Point (°F)	Low Rfgt Temp Cutout (°F)	Rec % Ethylene Glycol	Solution Freeze Point (°F)
40	34	28.6	0	32.0	28.6	0	32.0	28.6	0	32.0
39	33	27.2	2	30.6	27.6	1	31.3	27.9	0	32.0
38	32	25.7	4	29.1	26.5	3	30.1	27.2	2	31.1
37	31	24.2	6	27.6	25.4	5	28.9	26.5	3	30.2
36	30	22.7	8	26.1	24.2	6	27.7	25.7	4	29.3
35	29	21.1	11	24.5	23.0	8	26.4	24.9	6	28.3
34	28	20.2	12	23.6	22.1	10	25.5	24.0	7	27.4
33	27	19.2	13	22.6	21.1	11	24.5	23.0	8	26.4
32	26	18.1	15	21.5	20.1	12	23.5	22.0	10	25.4
31	25	17.0	16	20.4	18.8	14	22.2	20.6	12	24.0
30	24	15.9	17	19.3	17.6	15	21.0	19.3	13	22.7
29	23	14.8	18	18.2	16.6	16	20.0	18.4	14	21.8
28	22	13.6	20	17.0	15.5	17	18.9	17.4	15	20.8
27	21	12.4	21	15.8	14.4	18	17.8	16.4	16	19.8
26	20	11.2	22	14.6	13.3	20	16.7	15.4	17	18.8
25	19	9.9	23	13.3	12.1	21	15.5	14.3	19	17.7
24	18	8.6	24	12.0	10.9	22	14.3	13.2	20	16.6
23	17	7.3	25	10.7	9.7	23	13.1	12.1	21	15.5
22	16	5.9	26	9.3	8.4	24	11.8	10.9	22	14.3
21	15	4.5	27	7.9	7.1	25	10.5	9.7	23	13.1

Table 34. Low Refrigerant Temperature, Ethylene Glycol, and Freeze Protection Settings

		DDE, EDE, CBC*			DFF, EFF, CDE, BCD, BBB, CFF*			DGG, EGG, CEF*		
Chilled Water Setpt (°F)	Leaving Wtr Temp Cutout (°F)	Low Rfgt Temp Cutout (°F)	Rec % Ethylene Glycol	Solution Freeze Point (°F)	Low Rfgt Temp Cutout (°F)	Rec % Ethylene Glycol	Solution Freeze Point (°F)	Low Rfgt Temp Cutout (°F)	Rec % Ethylene Glycol	Solution Freeze Point (°F)
20	14	3.1	28	6.5	5.8	26	9.2	8.5	24	11.9
19	13	1.6	30	5.0	4.4	27	7.8	7.3	25	10.7
18	12	0.1	31	3.5	3.1	29	6.5	6.0	27	9.4
17	11	-1.4	32	2.0	1.6	30	5.0	4.7	28	8.1
16	10	-2.9	33	0.5	0.2	31	3.6	3.3	29	6.7
15	9	-4.5	33	-1.1	-1.3	32	2.1	2.0	30	5.4
14	8	N/A	34	-2.8	-2.8	33	0.6	0.6	31	4.0
13	7	N/A	35	-4.4	-4.3	34	-0.9	-0.8	32	2.6
12	6	N/A	36	-6.1	N/A	34	-2.5	-2.3	33	1.1
11	5	N/A	37	-7.8	N/A	35	-4.1	-3.8	34	-0.4
10	4	N/A	38	-9.6	N/A	36	-5.7	-5.3	34	-1.9

Notes: * Refer to unit Model No. digits 6, 14, 21
N/A means chiller is not to be applied at leaving evaporator water temperatures, which result in the LRTC setting below those shown in the table.

NOTE: ***When setting up an ice-making system, the ice termination setpoint is the entering water. Subtract 6°F from the setpoint to use Table 31 (Chilled Water Setpoint (ice-making only) = (Ice Termination Setpoint - 6°F).***

Diagnostics

The following diagnostic Table contains all the diagnostics possible. Not all data is available unless Trace TU is installed.

Hex Code: 3 digit hexadecimal code used on all past products to uniquely identify diagnostics.

Diagnostic Name and Source: Name of diagnostic and its source. Note that this is the exact text used in the User Interface and/or Service Tool displays.

Severity: Defines the severity of the above effect. Immediate means immediate shutdown of the effected portion, Normal means normal or friendly shutdown of the effected portion, Special Mode means a special mode of operation (limp along) is invoked, but without shutdown, and Info means an Informational Note or Warning is generated.

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

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 diagnostic reset command which can clear the diagnostic. The manual diagnostic reset levels in order of

Priority are: Local and Remote. A diagnostic that has a reset level of Local, can only be reset by a local diagnostic reset command, but not by the lower priority remote Reset command whereas a diagnostic listed as Remote reset can be reset by either.

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
3D8	At Speed Input Opened	Immediate	Latch	The "At Speed" input was found to be opened with the compressor motor running after successfully obtaining an at speed and bypassed condition. This is active for solid state starters only	Local
3D6	At Speed Input Shorted	Immediate	Latch	The "At Speed" input is shorted before the compressor was started. This is active for only solid state starters.	Local
398	BAS Communication Lost	Special	NonLatch	The BAS was setup as "installed" at the MP and the Comm 3 llid 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 effected by the comm loss. The chiller follows the value of the Tracer Default Run Command which can be previously written by Tracer and stored nonvolatilely by the MP (either use local or shutdown).	Remote
390	BAS Failed to Establish Communication	Special	NonLatch	The BAS was setup as "installed" and the BAS did not communicate with the MP within 15 minutes after power-up. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be effected. Note: The original requirement for this was 2 minutes, but was implemented at 15 minutes for RTAC.	Remote
2E6	Check Clock	Info	Latch	The real time clock had detected loss of its oscillator at some time in the past. Check / replace battery? This diagnostic can be effectively cleared only by writing a new value to the chiller's time clock using the TechView or DynaView's "set chiller time" functions.	Remote
8A	Evap Water Flow (Entering Water Temp)	Info	NonLatch	The entering evaporator water temp fell below the leaving evaporator water temp. by more than 2°F for 100 °F-sec. For falling film evaporators this diagnostic cannot reliably indicate loss of flow, but can warn of improper flow direction through the evaporator, misbound temperature sensors, or other system problems	Remote
5F8	Comm Loss: Evaporator Water Pump Relay	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5EF	Comm Loss: Evaporator Water Flow Switch	Immediate	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: Compressor % RLA Output	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: Cond Head Press Cntrl Output	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: Condenser Entering Water Temperature	Info and Special Action	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. If chiller running, and condenser water regulating valve option installed, force valve to 100% flow.	Remote

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
6B6	Comm Loss: Condenser Leaving Water Temperature	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5F2	Comm Loss: Condenser Rfgt Pressure	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: Condenser Rfgt Pressure Output	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5F9	Comm Loss: Condenser Water Pump Starter	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
694	Comm Loss: Electronic Expansion Valve 1	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
695	Comm Loss: Electronic Expansion Valve 2	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5DE	Comm Loss: Emergency Stop	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5E4	Comm Loss: Evap Entering Water Temp	Info and Special Action	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall remove any Return or Constant Return Chilled Water Reset, if it was in effect. Apply slew rates per Chilled Water Reset spec.	Remote
5E3	Comm Loss: Evap Leaving Water Temp	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
688	Comm Loss:Evaporator Rfgt Liquid Level	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5F0	Comm Loss:Evaporator Rfgt Pressure	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5E1	Comm Loss: Ext Ice Building Control Input	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state.	Remote
5DD	Comm Loss:External Auto/Stop	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: External Base Load Enable	Info and Special Action	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. The external base load input is removed from the arbitration to enable Base Loading.	Remote
6B6	Comm Loss: External Base Load Setpoint Input	Info and Special Action	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. The external base load setpoint input is removed from the arbitration to establish the Base LoadingSetpoint.	Remote
5E9	Comm Loss: External Chilled Water Setpoint	Info and Special Action	NonLatch	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
5EA	Comm Loss: External Current Limit Setpoint	Info and Special Action	NonLatch	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 Current limit setpoint and revert to the next higher priority for Current Limit setpoint arbitration	Remote
5EB	Comm Loss: High Pressure Cutout Switch	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5FA	Comm Loss: Ice-Making Status	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state.	Remote
69D	Comm Loss: Local BAS Interface	Info and Special Action	NonLatch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Use the last values sent from BAS	Remote
6B6	Comm Loss: Master Oil Line Solenoid Valve	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: Oil Loss Level Input	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5F4	Comm Loss: Oil Pressure	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
6B6	Comm Loss: Oil Return Gas Pump Drain	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: Oil Return Gas Pump Fill	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6A0	Comm Loss: Op Status Programmable Relays	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5E2	Comm Loss: Outdoor Air Temperature	Info and Special Action	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note that if this diagnostic occurs, Chiller shall remove any OA Chilled Water Reset, if it was in effect and if Tracer OA was unavailable. Apply slew rates per Chilled Water Reset spec	Remote
6B6	Comm Loss: Refrigerant Monitor Input	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5D2	Comm Loss: Slide Valve Load	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
5D1	Comm Loss: Slide Valve Unload	Normal	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6B6	Comm Loss: Solid State Starter Fault Input	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
690	Comm Loss: Starter	Immediate	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
1F5	Compressor Did Not Accelerate Fully	Immediate	Latch	The starter module did not receive an "Up to Speed" or "End of Ramp" signal from the SSS within 2.5 seconds after commanding a bypass, or after the maximum acceleration time had expired, whichever is longer. This diagnostic only applies to SSS.	Local
EE	Compressor Did Not Accelerate: Shutdown	Immediate	Latch	The compressor did not come up to speed (get to <85%RLA) in the allotted time defined by the Maximum Acceleration Timer and and the start was aborted per the starter configuration selected.	Remote
1FA	Compressor Did Not Accelerate: Transition	Info	Latch	The compressor did not come up to speed (get to <85%RLA) in the allotted time defined by the Maximum Acceleration Timer and a transition was forced (motor put across the line) at that time. This applies to all starter types. Note: Since RTHD SSS has no forced transition capability, this info warning can be followed with a "Compressor did not accelerate fully " diagnostic above and an aborted start.	Remote
284	Compressor Discharge Temperature Sensor	Immediate	Latch	Bad Sensor or LLID	Remote
9A	Condenser Entering Water Temperature Sensor	Info and Special Action	Latch	Bad Sensor or LLID. If chiller running, and condenser water regulating valve option installed, force valve to 100% flow.	Remote
9B	Condenser Leaving Water Temperature Sensor	Info	Latch	Bad Sensor or LLID	Remote
5B8	Condenser Refrigerant Pressure Transducer	Normal	Latch	Bad Sensor or LLID	Remote
F7	Condenser Water Flow Lost	Immediate	NonLatch	The condenser water flow proof input was open for more than 6 contiguous seconds after flow had been proven. This diagnostic is automatically cleared once the compressor is stopped by a fixed time out of 7 sec. The Cond Pump shall be commanded off but the Evap pump command will not be effected.	Remote
DC	Condenser Water Flow Overdue	Normal	NonLatch	Condenser water flow was not proven within 20 minutes of the condenser pump relay being energized. The Cond Pump shall be commanded off. Diagnostic is reset with return of flow (although only possible with external control of pump)	Remote
EC or EC	Current Overload TripMotor Current Overload	Immediate	Latch	Compressor current exceeded overload time vs. trip characteristic. For A/C products Must trip = 140% RLA, Must hold=125%, nominal trip 132.5% in 30 seconds	Local
FD	Emergency Stop	Immediate	Latch	a. EMERGENCY STOP 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
8E	Evaporator Entering Water Temperature Sensor	Info	Latch	Bad Sensor or LLID Normal operation unless CHW Reset is enabled. If CHW Reset is enabled and either Return or Constant Return Chilled Water Reset is selected, its effect will be removed but slew rates on the change will be limited per the Chilled Water Reset spec.	Remote

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
AB	Evaporator Leaving Water Temperature Sensor	Normal	Latch	Bad Sensor or LLID	Remote
27D	Evaporator Liquid Level Sensor	Normal	Latch	Bad Sensor or LLID	Remote
5BA	Evaporator Refriger-ant Pressure Transducer	Normal	Latch	Bad Sensor or LLID	Remote
ED	Evaporator Water Flow Lost	Immediate	NonLatch	The chilled water flow proof input was open for more than 6-10 contiguous seconds after flow had been proven. The pump command status will not be effected. 6-10 seconds of contiguous flow shall clear this diagnostic. Even though the pump may be commanded to run in the STOP modes (pump off delay time), this diagnostic shall not be called out in the STOP modes.	Remote
384	Evaporator Water Flow Overdue	Normal	NonLatch	Evaporator water flow was not proven within 20 minutes of the Chilled water pump relay being energized. The Evap pump command status will not be effected.	Remote
5C4	Excessive Loss of Comm	Immediate	Latch	Loss of comm with 20% or more of the llids configured for the system has been detected. This diagnostic will suppress the callout of all subsequent comm loss diagnostics. Check power supply(s) and power disconnects - troubleshoot LLIDS buss using TechView	Remote
4C4	External Base Loading Setpoint	Info and Special Action	NonLatch	a. Not "Enabled": no diagnostics. b. "Enabled ": Out- Of-Range Low or Hi or bad LLID, set diagnostic, default BLS to next level of priority (e.g. Front Panel SetPoint. This Info diagnostic will automatically reset if the input returns to the normal range.	Remote
87	External Chilled Water Setpoint	Info	NonLatch	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). This Info diagnostic will automatically reset if the input returns to the normal range.	Remote
89	External Current Limit Setpoint	Info	NonLatch	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. This Info diagnostic will automatically reset if the input returns to the normal range.	Remote
1C2	High Compressor Discharge Temperature	Immediate	Latch	The compressor discharge temperature exceeded 190°F. This diagnostic will be suppressed if it occurs during the compressor run-unload period or after the compressor has stopped, but a run unload will be terminated early as a result. 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 nears this trip-point.	Remote
1C6	High Differential Refrigerant Pressure	Normal	Latch	a. The system differential pressure was above 160 Psid- trip immediately (normal shutdown) B The diff pressure was above 152 Psid - trip in 1 hour	Remote
584	High Evaporator Liquid Level	Normal	Latch	The liquid level sensor is seen to be at or near its high end of range for 80 contiguous minutes while the compressor is running. (The diagnostic timer will hold, but not clear when the circuit is off). Design: 80% or more of bit count corresponding to +21.2 mm or more liquid level for 80 minutes)	Remote
6B8	High Evaporator Refrigerant Pressure	Immediate and Special Action	NonLatch	The evaporator refrigerant pressure 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 the evaporator pressures falls below 185 psig. This diagnostic must shutdown the chiller if it is running.	Local
F5	High Pressure Cutout	Immediate	Latch	A high pressure cutout was detected; C.O. on rise @ 180 psig, reset @ 135 psig (+/-5 psi on switching tolerance) Note: Pressure relief valve is 200 Psig +- 2% trip at 315 ± 5 psi. Note: Other diagnostics that may occur as an expected consequence of the HPC trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input Open.	Local
1C6	High Refrigerant Pressure Ratio	Immediate	Latch	The system pressure ratio exceeded 5.61 for 1 contiguous minute. This pressure ratio is a fundamental limitation of the compressor. The pressure ratio is defined as Pcond (abs)/Pevap(abs).	Remote
59C	Loss of Oil at Compressor (Running)	Immediate	Latch	In running modes , Oil Loss Level Sensor detects lack of oil in the oil tank feeding the compressor (distinguishing a liquid flow from a vapor flow)	Local

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
59D	Loss of Oil at Compressor (Stopped)	Immediate and Special Action	Latch	Oil Loss Level Sensor detects a lack of oil in the oil tank feeding the compressor for 90 seconds after EXV preposition is completed. Note: Compressor start is delayed while waiting for oil to be detected.	Local
C5	Low Chilled Water Temp: Unit Off	Info and Special Action	NonLatch	The leaving chilled 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 Evap Water pump Relay until diagnostic auto resets, then return to normal evap pump control. Automatic reset occurs when the temp rises 2°F (1.1°C) above the cutout setting for 30 minutes.	Remote
C6	Low Chilled Water Temp: Unit On	Immediate and Special Action	NonLatch	The chilled water temp. fell below the cutout setpoint for 30 degree F Seconds while the compressor was running. Automatic reset occurs when 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
1AE	Low Differential Refrigerant Pressure	Immediate	Latch	The system differential pressure was either below 15 Psid for more than 164 Psid-sec, or below 23.0 Psid for 3000 Psid-sec. The latter integral’s value is not cleared for any reason including diagnostic trip, manual reset, or power up reset (ie. Integral is saved nonvolatily on power down). The integral will decay while circuit is running at a max rate of -10 PSID, and while stopped at a rate of -0.4 PSID. This same integral is associated with the operating mode “Compressor Cool Down”. Also see diagnostic below	Remote
18E	Low Discharge Superheat	Normal	Latch	While Running Normally, the Discharge Superheat was less than 12 degrees F +- 1F for more than 6500 degree F seconds.. At startup the UCM shall ignore the Discharge Superheat for 5.	Remote
583	Low Evaporator Liquid Level	Info	NonLatch	The liquid level sensor is seen to be at or near its low end of range for 80 contiguous minutes while the compressor is running. Design: 20% or less of bit count corresponding to -21.2 mm or less liquid level for 80 minutes)	Remote
B5	Low Evaporator Refrigerant Pressure	Immediate	Latch	The Evaporator Refrigerant Pressure dropped below 10 psia just prior to compressor start. The pressure fell below 10 psia while running but before the 1 minute ignore time had expired or fell below 16 Psia after the 1 minute ignore time had expired.	Local
FB	Low Evaporator Refrigerant Temperature	Immediate	Latch	a. The inferred Saturated Evap Refrigerant Temperature (calculated from suction pressure transducer(s)) dropped below the Low Refrigerant Temperature Cutout Setpoint for 450°F-sec (10°F-sec max rate) while the circuit was running after the ignore period had expired. The integral is held at zero for the 1 minute ignore time following the circuit startup and the integral will be limited to never trip in less than 45 seconds, i.e. the error term shall be clamped to 10°F. The minimum LRTC setpoint is -5°F (18.7 Psia) the point at which oil separates from the refrigerant. b. During the timeout of the trip integral, the unload solenoid(s) of the running compressors on the circuit, shall be energized continuously and the load solenoid shall be off. Normal load/unload operation will be resumed if the trip integral is reset by return to temps above the cutout setpoint.	Remote
6B3	Low Evaporator Temp: Unit Off	Info and Special Action	NonLatch	The evap sat temp fell below the water temp cutout setting while the respective evap liquid level was greater than -21.2mm for 30 degree F seconds while Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Evap Water pump Relay until diagnostic auto resets, then return to normal evap pump control. Automatic reset occurs when either the evap temp rises 2°F (1.1°C) above the cutout setting or the liquid level falls below - 21.2mm for 30 minutes	Remote
198	Low Oil Flow	Immediate	Latch	The oil pressure was out of the acceptable pressure range for 15 seconds, while the Delta Pressure was greater than 23.8 Psid.: Acceptable range is 0.50 > (PC-Po) / (PC-PE) for the first 2.5 minutes of operation, and 0.40 > (PC-Po) / (PC-PE) thereafter,	Local
E2	Momentary Power Loss	Immediate	Nonlatch	Momentary Power Loss option disabled: No effect. Momentary Power Loss option enabled: A loss of power on three line cycles or more was detected. Diagnostic is reset in 30 seconds. See Momentary Power Loss Protection specification for additional information.	Remote

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
1AD	MP Application Memory CRC Error	Immediate	Latch	App software inside the MP failed its own checksum test. Possible causes: application software in the MP is not complete - software download to the MP was not completed successfully - or MP hardware problem. Note: User should attempt to reprogram the MP if this diagnostic occurs.	Remote
6A1	MP: Could not Store Starts and Hours	Info	Latch	MP has determined there was an error with the previous power down store. Starts and Hours may have been lost for the last 24 hours.	Remote
5FF	MP: Invalid Configuration	Immediate	Latch	MP has an invalid configuration based on the current software installed	Remote
6A2	MP: Non-Volatile Block Test Error	Info	Latch	MP has determined there was an error with a block in the Non-Volatile memory. Check settings.	Remote
69C	MP: Non-Volatile Memory Reformat	Info	Latch	MP has determined there was an error in a sector of the Non-Volatile memory and it was reformatted. Check settings.	Remote
D9	MP: Reset Has Occurred	Info	NonLatch	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 TechView	Remote
297	No Differential Refrigerant Pressure	Immediate	Latch	The system differential pressure was below 7.7 Psid. The occurrence of this diagnostic will saturate the above "Low Diff Rfgt Press" Integral and invoke the same "Compressor Cool Down" op mode.	Remote
1E1	Oil Flow Protection Fault	Immediate	Latch	The Oil Pressure Transducer for this Chiller is reading a pressure either above its Condenser Pressure by 15 Psia or more, or below its Evaporator Pressure 10 Psia or more for 30 seconds continuously.	Local
5BE	Oil Pressure Transducer	Normal	Latch	Bad Sensor or LLID	Remote
A1	Outdoor Air Temperature Sensor	Info and Special Action	Latch	Bad Sensor or LLID. This diagnostic will only occur if OA sensor is configured.OA Chilled water reset will be suspended if selected and Tracer OA unavailable.	Remote
D7	Over Voltage	Normal	NonLatch	a. Average of all monitored Line voltages above + 10% of nominal. [Must hold = + 10 % of nominal. Must trip = + 15 % of nominal. Reset differential = min. of 2% and max. of 4%. Time to trip = minimum of 1 min. and maximum of 5 min.) Design: Nom. trip: 60 seconds at greater than 112.5%, + or - 2.5%, Auto Reset at 109% or less.	Remote
E4	Phase Loss	Immediate	Latch	a) No current was sensed on one or two of the current transformer inputs while running or starting (See Nonlatching 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 trippoint 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 xformer inputs. Logic will detect and trip in a maximum of 0.3 second from compressor start.	Local
E5 or E5	Phase Reversal	Immediate	Latch	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 0.3 second from compressor start.	Local
E3	Phase Unbalance Severe Current Imbalance	Normal	Latch	A 30% Phase cCurrent Unbalance imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
1A0	Power Loss	Immediate	NonLatch	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 will auto reset in 10 seconds from its occurrence, and is not active during the start mode before the transition complete input is proven. This prevents the chiller from cycling due to some internal starter problem, as the starter would latch out on either a "Starter Fault Type 3" or a "Starter Did Not Transition" latching diagnostic. However true power loss occurring during a start would result in a misdiagnosis and the chiller would not automatically recover.	Remote
2F2	Refrigerant Monitor Sensor	Info	NonLatch	Open or Shorted input and the Rfgt Monitor is setup as installed	Remote
28C	Restart Inhibit Warning	Info	NonLatch	The Restart Inhibit was invoked on a compressor. This indicates excessive chiller cycling which should be corrected.	Remote
189	Solid State Starter Fault	Immediate	Latch	The Solid State Starter Fault Relay is open	Local
188	Starter Dry Run Test	Immediate	Latch	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
5CD	Starter Comm Loss with MP	Immediate	Latch	Starter has had a loss of communication with the MP for a 15 second period.	Local
CA	Starter Contactor Interrupt Failure	Immediateand Special Mode-Actio n	Latch	Detected compressor currents greater than 10% RLA on any or all phases when the compressor was commanded off. Detection time shall be 5 seconds 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 and Cond Pump Outputs, continue to command the affected compressor off, fully unload the effected compressor. For as long as current continues, perform liquid level and oil return gas pump control	Local
F0	Starter Did Not Transition	Immediate	Latch	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
6A3	Starter Failed to Arm/Start	Info	Latch	Starter failed to arm or start within the allotted time (15 seconds).	Remote
1E9	Starter Fault Type I	Immediate	Latch	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
1ED	Starter Fault Type II	Immediate	Latch	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
1F1	Starter Fault Type III	Immediate	Latch	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
5C5	Starter Module Memory Error Type 1	Info	Latch	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
5C9	Starter Module Memory Error Type 2 -	Immediate	Latch	Checksum on EEPROM copy of the Starter LLID configuration failed. Factor default values used.	Local

Table 35. Diagnostics Table

Hex Code	Diagnostic Name and Source	Severity	Persistence	Criteria	Reset Level
3D7	Transition Complete Input Opened	Immediate	Latch	The Transition Complete input is open with the compressor motor running after a successful completion of transition. This is active only for all electromechanical starters	Local
3D5	Transition Complete Input Shorted	Immediate	Latch	The Transition Complete input is shorted before the compressor was started. This is active for all electromechanical starters.	Local
D8	Under Voltage	Normal	Non Latch	a. Average of all monitored Line voltages below - 10% of nominal or the Under/Overvoltage transformer(s) are not connected. [Must hold = - 10 % of nominal. Must trip = - 15 % of nominal. Reset differential = min. of 2% and max. of 4%. Time to trip = min. of 1 min. and max. of 5 min.) Design: Nom. trip: 60 seconds at less than 87.5%, + or - 2.8% at 200V or + or - 1.8% at 575V, Auto Reset at 90% or greater.	Remote
6B6	Heat recovery tank temperature sensor	Alarm	Latch	Bad Sensor or LLID	Remote
6B6	Heat recovery outlet temperature sensor	Warning	Latch	Bad Sensor or LLID	Remote
6B6	Heat recovery water inlet temperature sensor	Warning	Latch	Bad Sensor or LLID	Remote
6B6	External heat recovery temperature setting input	Warning	Non Latch	Bad Sensor or LLID	Remote
6B6	Heat recovery flow delay	Alarm	Non Latch	The water in the heat recovery pipeline cannot be proved to be flowing in 20 minutes after the heat recovery pump relay is added. The heat recovery pump will be ordered to stop when the heat recovery line detects the flow of water and the alarm is cleared.	Remote
6B6	The heat recovery flow is short	Immediate	Non Latch	The input disconnection of the flow of the heat recovery pipeline is more than 6 seconds after confirming the flow. The compressor is automatically cleared after 7 seconds.	Remote
6B6	Undesired flow - main condenser	Warning	Non Latch	When the main condenser is ordered to shut down, it will continue to monitor the presence of water. Once the water flow is detected, the alarm will be automatically cleared.	Remote
6B6	Undesired flow - heat recovery condenser	Warning	Non Latch	When the heat recovery condenser is ordered to be shut down for 180 days, it will continue to monitor the presence of water. Once the water flow is detected, the alarm will be automatically cleared.	Remote
6B6	No communication: heat recovery tank temperature	Alarm	Latch	Continuous communication between M P and functional ID was interrupted for 35 to 40 seconds.	Remote
6B6	No communication: heat recovery outlet temperature	Warning	Latch	Continuous communication between M P and functional ID was interrupted for 35 to 40 seconds.	Remote
6B6	No communication: heat recovery water inlet temperature	Warning	Latch	Continuous communication between M P and functional ID was interrupted for 35 to 40 seconds.	Remote
6B6	No communication: heat recovery flow switch	Alarm	Latch	Continuous communication between M P and functional ID was interrupted for 35 to 40 seconds.	Remote
6B6	No communication: heat back pump	Warning	Latch	Continuous communication between M P and functional ID was interrupted for 35 to 40 seconds.	Remote
6B6	No communication: external heat recovery Settings	Warning	Latch	Continuous communication between M P and functional ID was interrupted for 35 to 40 seconds.	Remote
6B6	No communication: external heat recovery command	Warning	Latch	Continuous communication between M P and functional ID was interrupted for 35 to 40 seconds.	Remote

Wiring Schematics

Typical field connection diagrams, electrical schematics and connections diagramsfor the RTHD are shown in this section.

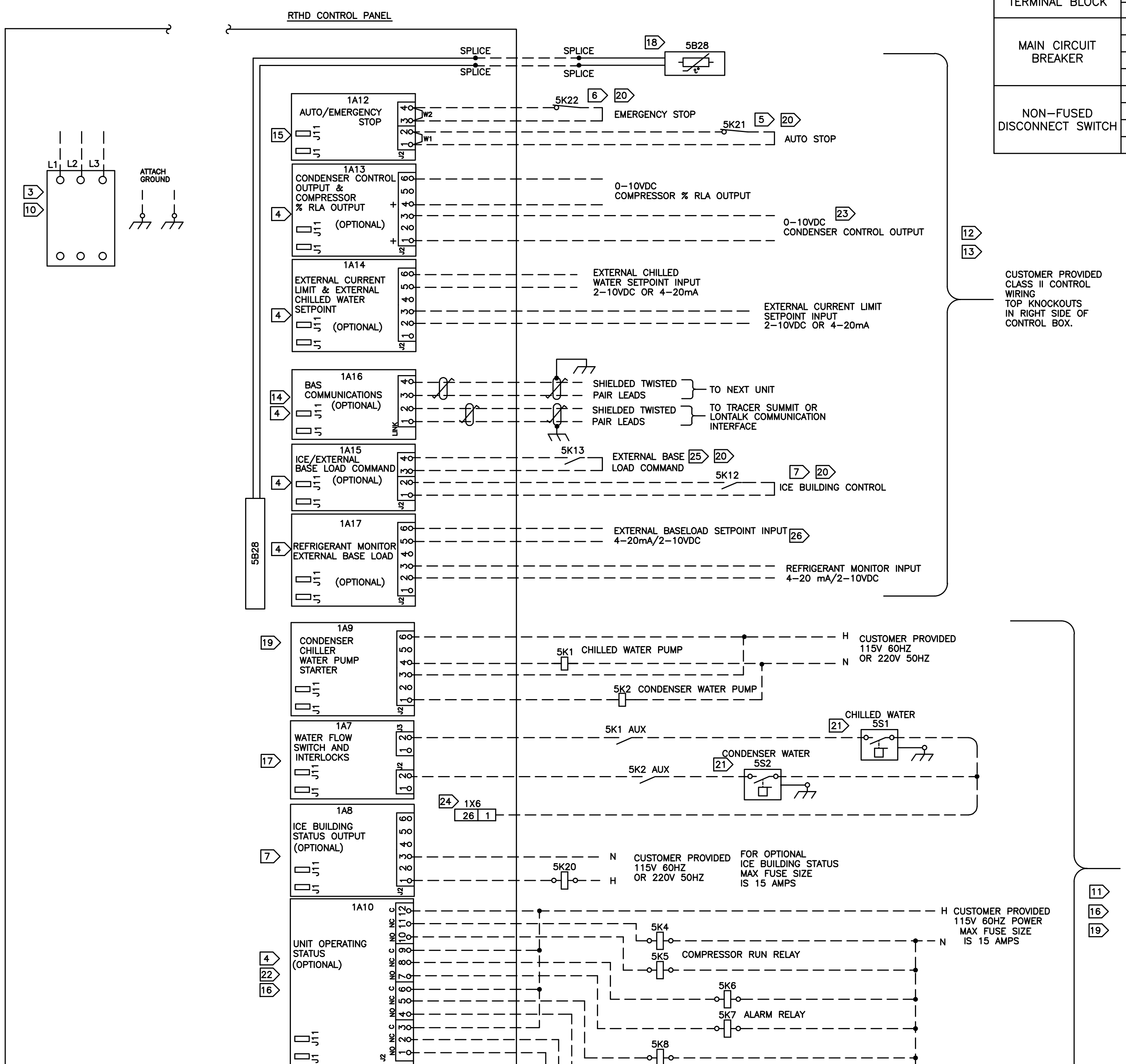
Note: *The drawings in this section are provided for reference only. Thesediagrams may not reflect the actual wiring of your unit. For specific electrical-connection and schematic information, always refer to the wiring diagramsthat were shipped with the unit.*

Unit Electrical Data

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

Drawing	Description	IOM Page
C2309-4870	field wiring	120
C2309-7552	schematic, page1 Wye-Delta starter	122
C2309-7553	schematic, page2 Wye-Delta starter	124
C2309-7554	schematic, page3 Wye-Delta starter	126
C2309-7555	schematic, page4 Wye-Delta starter	128
5721-9857	schematic, Solid State starter	132
C2309-7564	component location	142
C2309-7565	component location-Solid State starter	146

TABLE 1		
POWER CONNECTION	SELECTION RLA	LUG SIZE (PER PHASE)
TERMINAL BLOCK	0 – 598	(2) #4 – 500 MCM
	599 – 779	NA
MAIN CIRCUIT BREAKER	0 – 200	(1) 3/0 – 350 MCM
	201 – 476	(2) 2/0 – 500 MCM
	477 – 640	(3) 3/0 – 500 MCM
	641 – 779	(4) 3/0 – 500 MCM
NON–FUSED DISCONNECT SWITCH	0 – 277	(1) #1 – 600 MCM
	278 – 397	(2) 2/0 – 500 MCM
	398 – 598	(3) 3/0 – 500 MCM
	599 – 779	(4) 3/0 – 500 MCM



⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.

FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ AVERTISSEMENT

TENSION DANGEREUSE!

COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.

NE PAS RESPECTER CES MESURES DE PRÉCAUTION PEUT ENTRAÎNER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

⚠ ADVERTENCIA

¡VOLTAJE PELIGROSO!

DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUSO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA LAS UNIDADES CON EJE DE DIRECCIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR.

EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

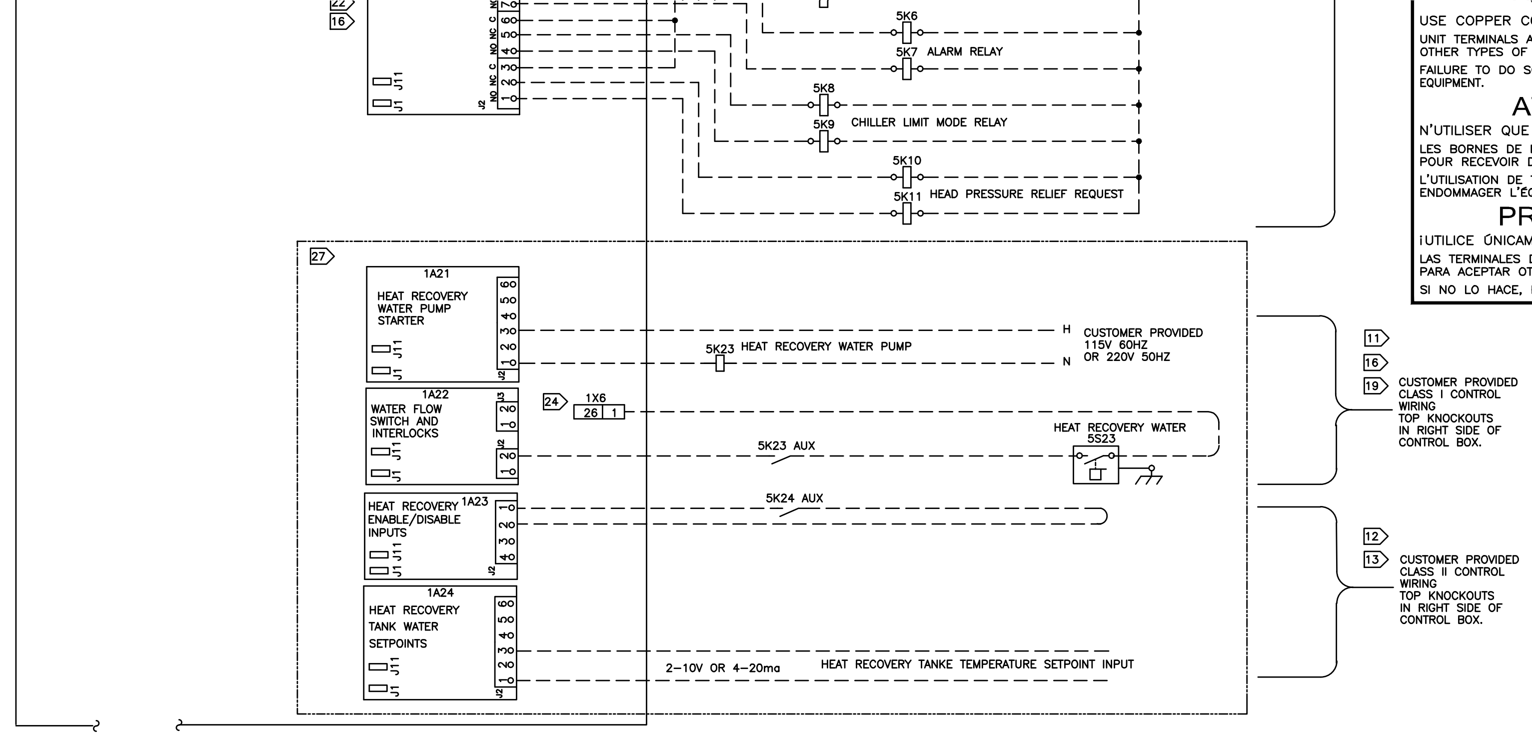
CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

ATTENTION



CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

ATTENTION

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!

LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.

L'UTILISATION DE TOUT AUTRE CONDUCTEUR PEUT ENDOMMAGER L'ÉQUIPEMENT.

PRECAUCIÓN

¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!

LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.

SI NO LO HACE, PUEDE OCASIONAR DAÑO AL EQUIPO.

GENERAL NOTES:

1. CAUTION–DO NOT ENERGIZE THE UNIT UNTIL CHECK OUT AND STARTUP PROCEDURES HAVE BEEN COMPLETED.
2. COMPRESSOR MOTOR IS PROTECTED FROM PRIMARY SINGLE PHASE FAILURE.
3. ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM TEMPERATURE INSULATION RATING OF 75 DEGREE C (MRLA = 0–598) OR 90 DEGREE C (MRLA = 779). SEE UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM FUSE SIZE REQUIREMENTS. USE 600 VOLT COPPER CONDUCTORS ONLY. 200 TO 600 VOLT CIRCUIT, PROVIDE AN EQUIPMENT GROUND IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES.
4. THESE FEATURES ARE OPTIONAL AND MAY OR MAY NOT BE PROVIDED. CUSTOMER PROVIDED WIRING FOR ALL STANDARD FEATURES AND OPTIONS IS SHOWN ON THIS DIAGRAM. OPTIONAL FEATURES ARE SO NOTED.
5. OPENING THE EXTERNAL AUTO–STOP CONTACT WILL INITATE A SHUT DOWN SEQUENCE OF THE CHILLER. CLOSURE OF THE CONTACT WILL ALLOW THE CHILLER TO RETURN TO NORMAL AUTOMATIC OPERATION.
6. AN OPENING OF THE EMERGENCY STOP CONTACT WILL SHUT THE CHILLER DOWN IMMEDIATELY AND TRIGGER AN EMERGENCY STOP INPUT DIAGNOSTIC. CLOSURE OF THE CONTACT AND A MANUAL RESET OF THE UNIT CONTROL DIAGNOSTIC WILL ALLOW THE CHILLER TO RETURN TO NORMAL OPERATION.
7. ICE BUILDING CONTROL 1A8 MODULE IS OPTIONAL.

WIRING REQUIREMENTS

8. RECOMMENDED FIELD WIRING CONNECTIONS ARE SHOWN BY DASHED LINES
9. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND STATE AND LOCAL REQUIREMENTS. EXPORT UNIT WIRING MUST COMPLY WITH LOCAL APPLICABLE CODES.
10. LINE VOLTAGE OPTIONS: UNIT MOUNTED TERMINAL BLOCK, DISCONNECT OR HACR CIRCUIT BREAKER. THE POWER WIRING LUG SIZE PROVIDED ON THE VARIOUS UNITS IS SHOWN IN TABLE 1.
11. CLASS I WIRING ,14 AWG, 600 VOLT CONDUCTORS. 115 VOLT CIRCUIT
12. 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.
13. DO NOT RUN LOW VOLTAGE CONTROL WIRING (30 VOLTS OR LESS) IN CONDUIT WITH 110 VOLT OR HIGHER WIRING. DO NOT EXCEED THE FOLLOWING MAXIMUM RUN LENGTHS FOR A GIVEN SIZE: 14 AWG, 5000 FT; 16 AWG, 2000 FT; 18 AWG, 1000 FT.
14. TRANE TRACER SUMMIT RECOMMENDED WIRE:
TRANE ICS SHIELDED TWISTED PAIR COMMUNICATION CABLE 14–18 AWG. 600V CABLE, 30 VOLT CIRCUIT. THE SUM TOTAL LENGTH OF ALL INTERCONNECTED CABLE SEGMENTS NOT TO EXCEED 5000 FEET. GROUND THE SHIELD AT THE TRACER END ONLY. REFER TO THE IOM FOR COMPLETE CABLE AND INSTALLATION REQUIREMENTS. TRANE TRACER SUMMIT MAY ALSO USE LCI WIRING RECOMMENDED BELOW.
LONTALK COMMUNICATION INTERFACE (LCI) RECOMMENDED WIRE:
22 AWG LEVEL 4 UNSHIELDED COMMUNICATION WIRE RECOMMENDED. THE SUM TOTAL LENGTH OF ALL INTERCONNECTED CABLE SEGMENTS NOT TO EXCEED 4500 FEET. CONNECTION TOPOLOGY SHOULD BE DAISY CHAIN. REFER TO BUILDING AUTOMATION SYSTEM (BAS) COMMUNICATION INSTALLATION LITERATURE FOR END OF LINE TERMINATION RESISTOR REQUIREMENTS.
15. THE CONTACTS FOR THESE FEATURES ARE JUMPERED AT THE FACTORY BY JUMPERS W1 & W2 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED REMOVE THE JUMPERS AND CONNECT TO THE DESIRED CONTROL CIRCUIT.
16. FIELD PROVIDED 115 VOLT 60HZ OR 220 VOLT 50HZ CONTROL POWER SUPPLIES ARE REQUIRED. THE MAX FUSE SIZE FOR ALL FIELD PROVIDED WIRING IS 15 AMPS. GROUND ALL CUSTOMER PROVIDED POWER SUPPLIES AS REQUIRED BY CODE. GREEN GROUND SCREWS ARE PROVIDED IN UNIT CONTROL PANEL.
17. CHILLED/CONDENSER WATER PUMP STARTER AUXILIARY CONTACTS TO BE WIRED IN SERIES WITH FLOW SWITCHES.
18. WHEN ORDERED THE OUTDOOR AIR TEMP SENSOR ELECTRONICS IS FACTORY MOUNTED INSIDE THE CONTROL PANEL AND THE IPC BUS IS FACTORY WIRED. THE SENSOR IS TO BE FIELD WIRED EXTERNALLY WITH THE SENSOR LEADS EXTENDED BACK TO THE CONTROL PANEL. THESE WIRES CAN BE SPLICED WITH TWO 14–18 AWG 600V WIRES, WITH A MAXIMUM LENGTH OF 1000 FEET (305 METERS), SPLICE AT SENSOR END MUST BE WATER TIGHT. REFER TO UNIT IOM FOR DETAILS.

CONTACT RATINGS AND REQUIREMENTS

19. UNIT PROVIDED DRY CONTACTS FOR THE CONDENSER/CHILLED WATER PUMP CONTROL. THE UNIT OPERATING STATUS RELAYS AND ICE MAKING STATUS RELAY ARE RATED FOR 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, OR 1/3 HP, 7.2 FLA AT 120 VOLTS 60 HZ, CONTACTS ARE RATED FOR 5 AMPS GENERAL PURPOSE DUTY AT 240 VOLTS.
20. CUSTOMER SUPPLIED CONTACTS FOR ALL LOW VOLTAGE CONNECTIONS MUST BE COMPATABLE WITH DRY CIRCUIT 24 VOLTS DC FOR A 12 MA RESISTIVE LOAD. SILVER OR GOLD PLATED CONTACTS ARE RECOMMENDED.
21. FLOW SWITCH AND INTERLOCK CONTACTS MUST BE ACCEPTABLE FOR USE IN A 120 VOLT 1mA CIRCUIT. OR A 220 VOLT 2mA CIRCUIT.
22. THE FIELD PROVIDED INDICATORS MAY BE RELAYS, LIGHTS OR AUDIBLE DEVICES. EACH FUNCTION IS ASSOCIATED WITH A SPDT RELAY. THE INDICATORS FUNCTIONS MAY BE CONNECTED TO EITHER OR BOTH OF THE NORMALLY OPEN OR NORMALLY CLOSED RELAY CONTACTS OF EACH OF THE 4 SPDT RELAYS ON THE OPTIONAL UNIT OPERATING STATUS MODULE.
THE FUNCTIONS OF THE OPERATING STATUS MODULE RELAYS ARE PROGRAMABLE. SEE IOM FOR DETAILS. DEFAULT FUNCTIONS ARE SHOWN.
THE NORMALLY OPEN CONTACTS ON EACH RELAY OPERATE AS FOLLOWS:
COMPRESSOR RUNNING — THE NO CONTACTS CLOSE WHEN COMPRESSOR STATUS FROM STARTER MODULE IS EITHER STARTING OR RUNNING.
ALARM RELAY — THE NO CONTACTS CLOSE WHEN THERE IS AN DIAGNOSTIC THAT HAS CAUSED A CHILLER SHUTDOWN WITH EITHER A MANUAL RESET REQUIRED OR AN AUTOMATIC RESET POTENTIAL.
CHILLER LIMIT MODE RELAY — THE NO CONTACTS CLOSE 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.
HEAD PRESSURE RELIEF REQUEST — THE NO CONTACTS CLOSE ANYTIME THE CHILLER IS RUNNING IN ONE OF THE FOLLOWING MODES: ICE MAKING MODE OR CONDENSER PRESSURE LIMIT CONTROL MODE CONTINUOUSLY FOR THE DURATION SPECIFIED BY THE CHILLER HEAD RELIEF RELAY FILTER TIME.
23. FIELD SELECTABLE AS: CONDENSER PRESSURE, DELTA PRESSURE OR CONTROL OUTPUT SIGNAL FOR CONDENSER HEAD PRESSURE CONTROL.
24. THE FIELD WIRING FOR THE 115V HOT LEG IS TERMINATED TO 1X6 TERMINAL BLOCK. SEE INSTRUCTION LABEL IN CONTROL PANEL FOR WIRE INSERTION INSTRUCTIONS. SPLICE FIELD WIRES TOGETHER AND WIRE TO 1X6.
25. CLOSED CONTACT COMMANDS BASE LOADING OPERATION.
26. ACTUAL BASE LOADING SETPOINT USED IS SETABLE AT FRONT PANEL. REFER TO IOM FOR DETAILS.
27. OPTIONAL MODULES. ONLY PRESENT WHEN HEAT RECOVERY IS REQUIRED.

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES. TOLERANCE:
.X = ±
.XX = ±
.XXX = ±
ANGLES = ± HOLE DIA = + -
FINISH ✓
CONFORMS TO ASME Y14.5M - 1994

TRANE
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DRAWN BY: PBL
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THIRD ANGLE PROJECTION

23094870 SHEET 1 OF 1 REV H
FIELD WIRING
RTHD

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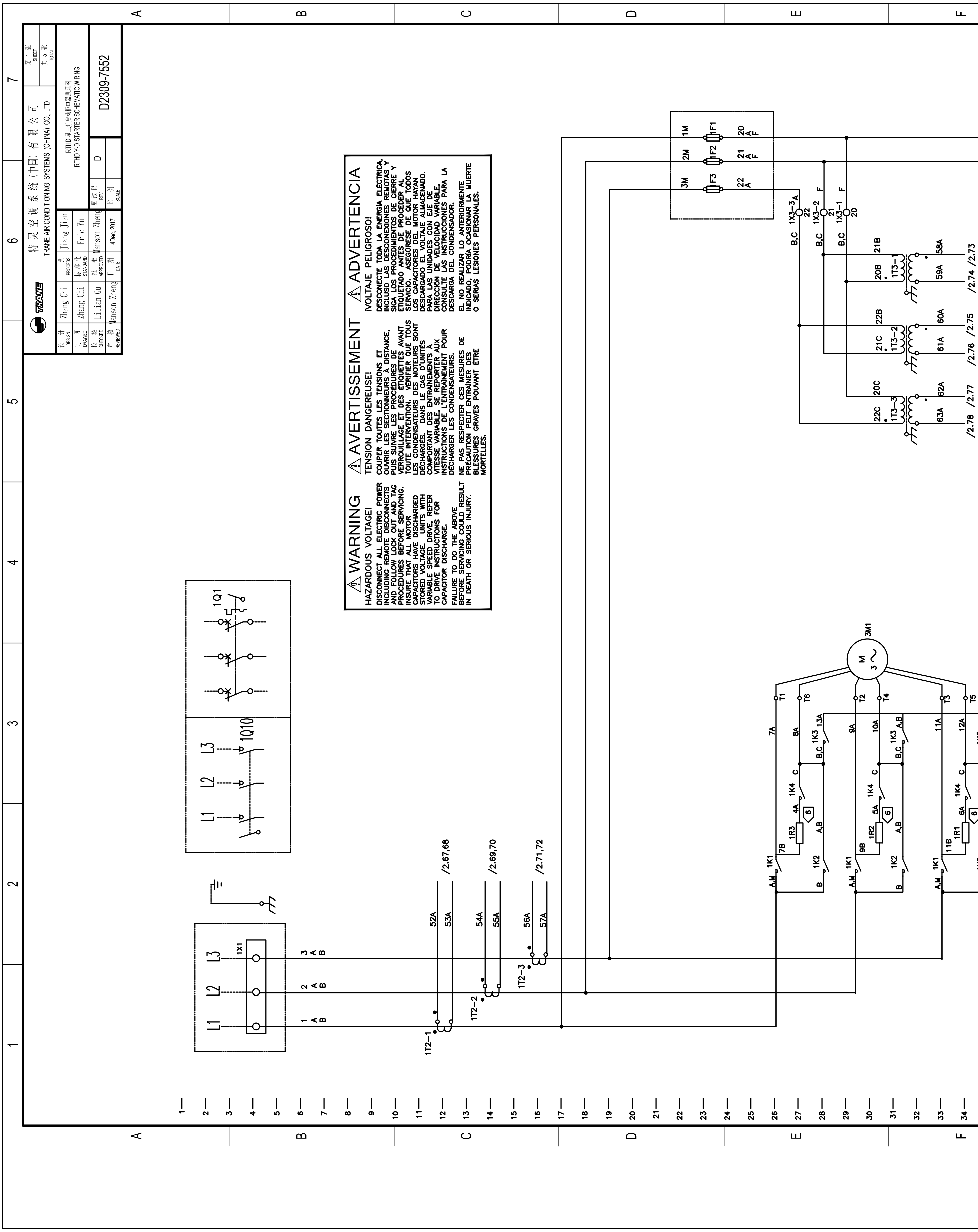
特灵空调系统（中国）有限公司
TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD
RTHD Y-D STARTER SCHEMATIC WIRING
D2309-7552
Zhang Chi
Jiang Jian
Eric Yu
Lilian Gu
Manson Zheng
4Dec. 2017
D
WARNING
HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.
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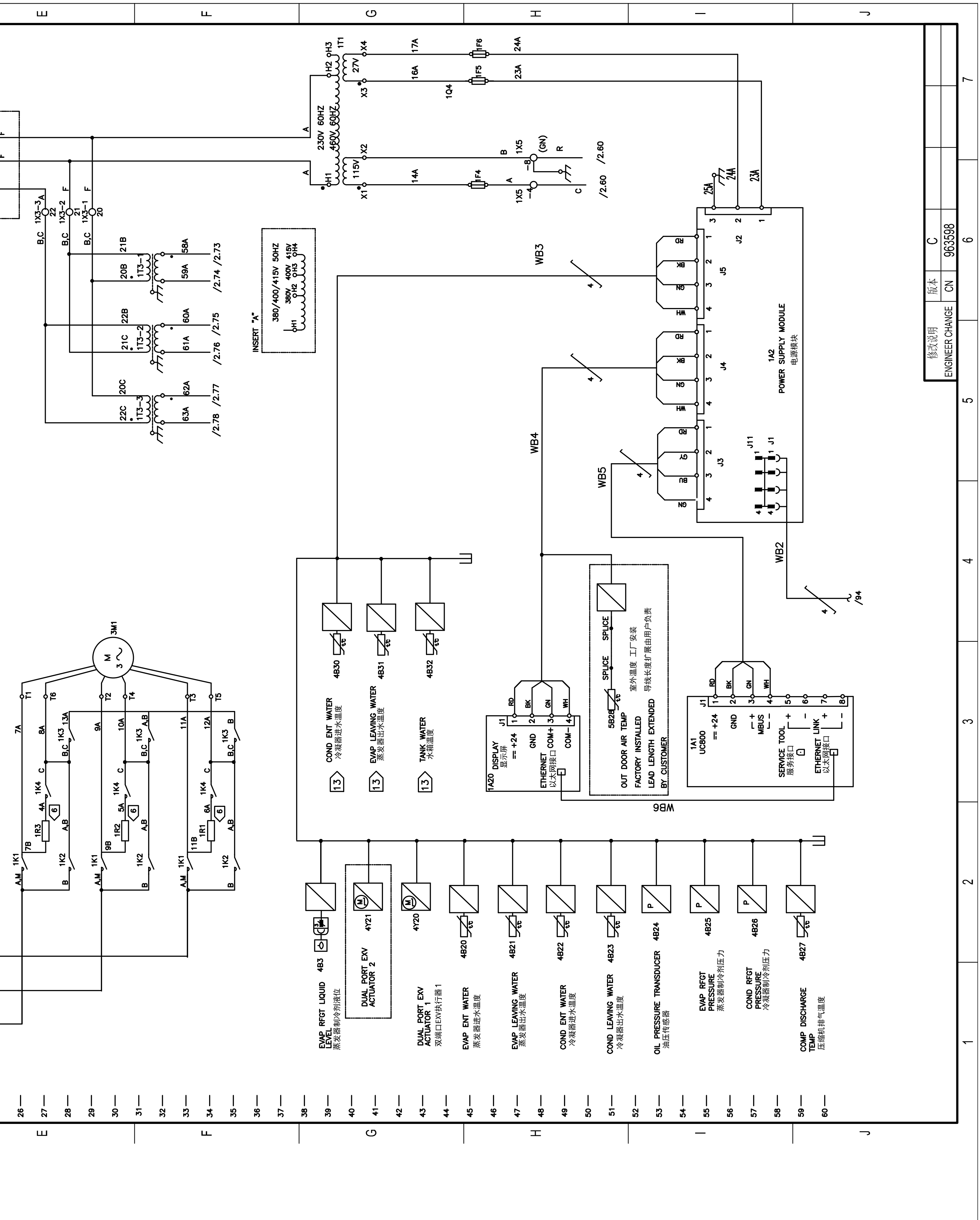
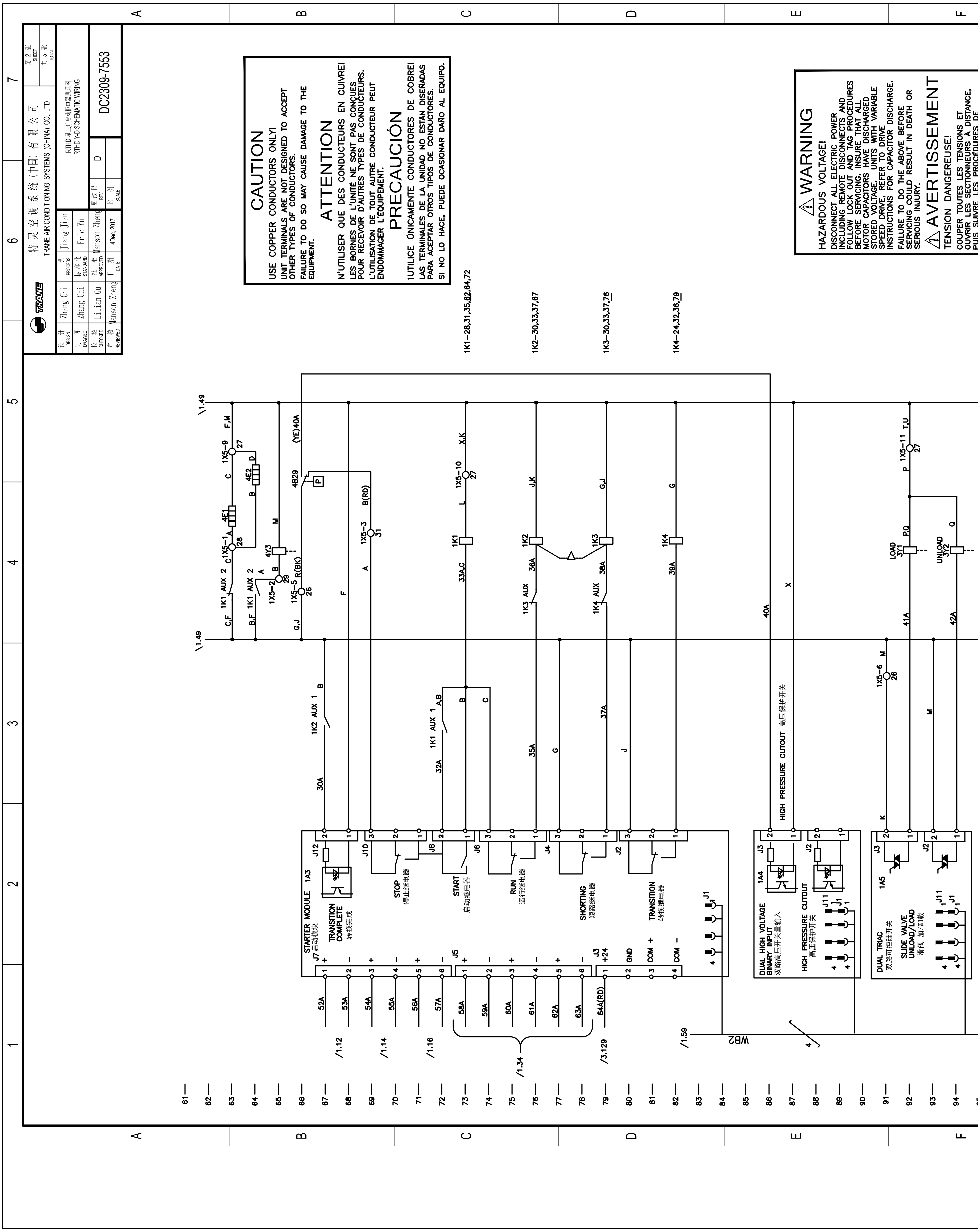
AVERTISSEMENT
TENSION DANGEREUSE!
ADVERTENCIA
¡VOLTAJE PELIGROSO!
1Q1
1Q10
1X1
L1
L2
L3
1T2-1
1T2-2
1T2-3
1T3-1
1T3-2
1T3-3
F1
F2
F3
3M1
1K1
1K2
1K3
1K4
1R1
1R2
1R3



230V 60HZ
460V 60HZ
115V
27V
1T1
1F4
1F5
1F6
1Q4
1X5
INSERT "A"
380/400/415V 50HZ
1T3-1
1T3-2
1T3-3
WB2
WB3
WB4
WB5
WB6
1A2
POWER SUPPLY MODULE
电源模块
J2
J3
J4
J5
J11
3M1
1K1
1K2
1K3
1K4
1R1
1R2
1R3
COND ENT WATER
冷凝器进水温度
EVAP LEAVING WATER
蒸发器出水温度
TANK WATER
水箱温度
4B30
4B31
4B32
1A20 DISPLAY
显示屏
ETHERNET
以太网接口
5B28
SPLICE
OUT DOOR AIR TEMP
室外温度
FACTORY INSTALLED
工厂安装
LEAD LENGTH EXTENDED BY CUSTOMER
导线长度扩展由用户负责
1A1
UC800
MBUS
SERVICE TOOL
服务接口
ETHERNET LINK
以太网接口
EVAP RFGT LIQUID LEVEL
蒸发器制冷剂液位
4B3
DUAL PORT EXV ACTUATOR 2
4Y21
DUAL PORT EXV ACTUATOR 1
双端口EXV执行器1
4Y20
EVAP ENT WATER
蒸发器进水温度
4B20
EVAP LEAVING WATER
蒸发器出水温度
4B21
COND ENT WATER
冷凝器进水温度
4B22
COND LEAVING WATER
冷凝器出水温度
4B23
OIL PRESSURE TRANSDUCER
油压传感器
4B24
EVAP RFGT PRESSURE
蒸发器制冷剂压力
4B25
COND RFGT PRESSURE
冷凝器制冷剂压力
4B26
COMP DISCHARGE TEMP
压缩机排气温度
4B27
修改说明
ENGINEER CHANGE
版本
CN
C
963598


特灵空调系统（中国）有限公司
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RTHD 星三角启动柜电器原理图
RTHD Y-D SCHEMATIC WIRING
DC2309-7553
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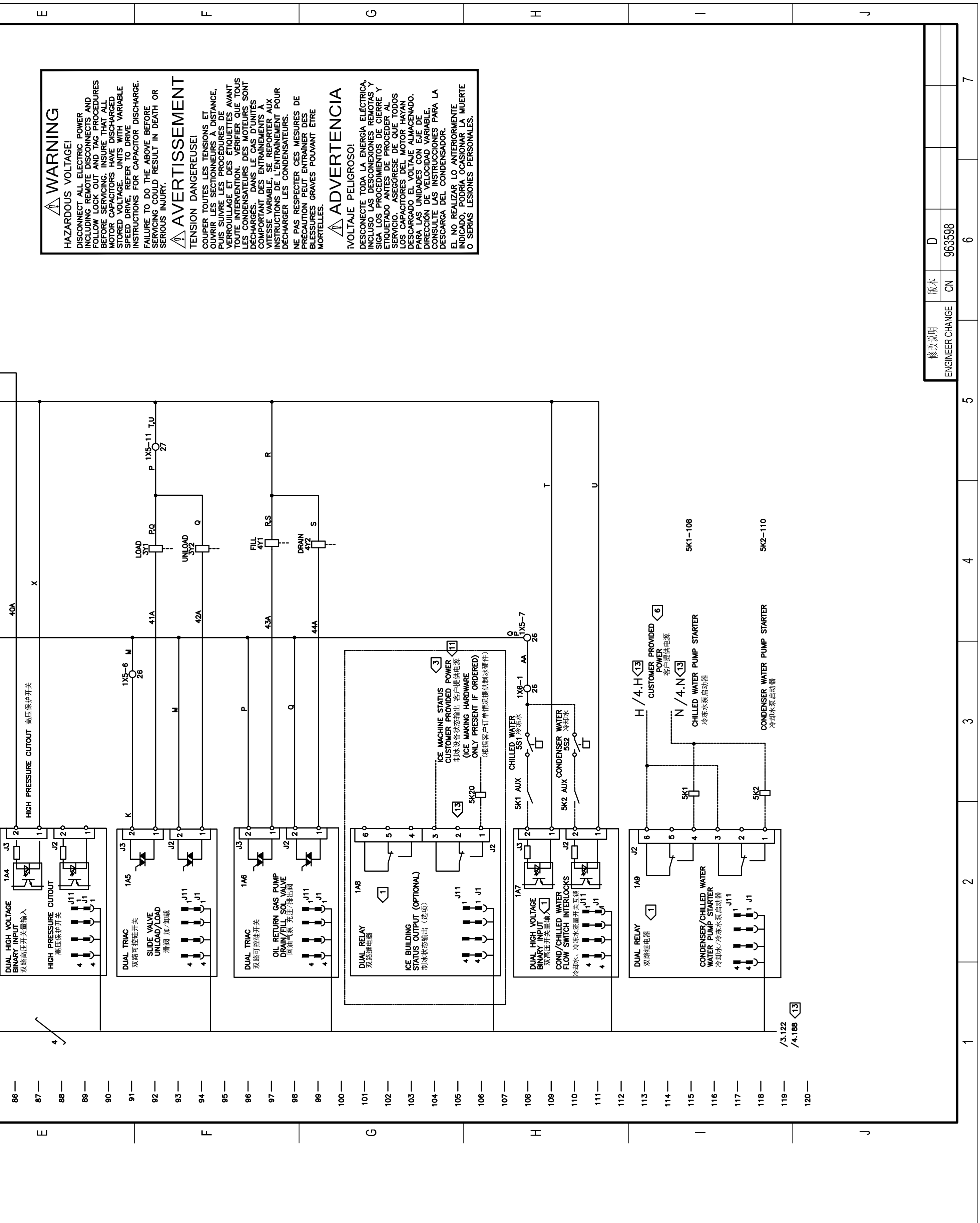
HAZARDOUS VOLTAGE!
AVERTISSEMENT
TENSION DANGEREUSE!
STARTER MODULE 1A3
HIGH PRESSURE CUTOUT 高压保护开关
DUAL HIGH VOLTAGE BINARY INPUT
DUAL TRIAC
SLIDE VALVE UNLOAD/LOAD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修改说明 ENGINEER CHANGE
版本 CN
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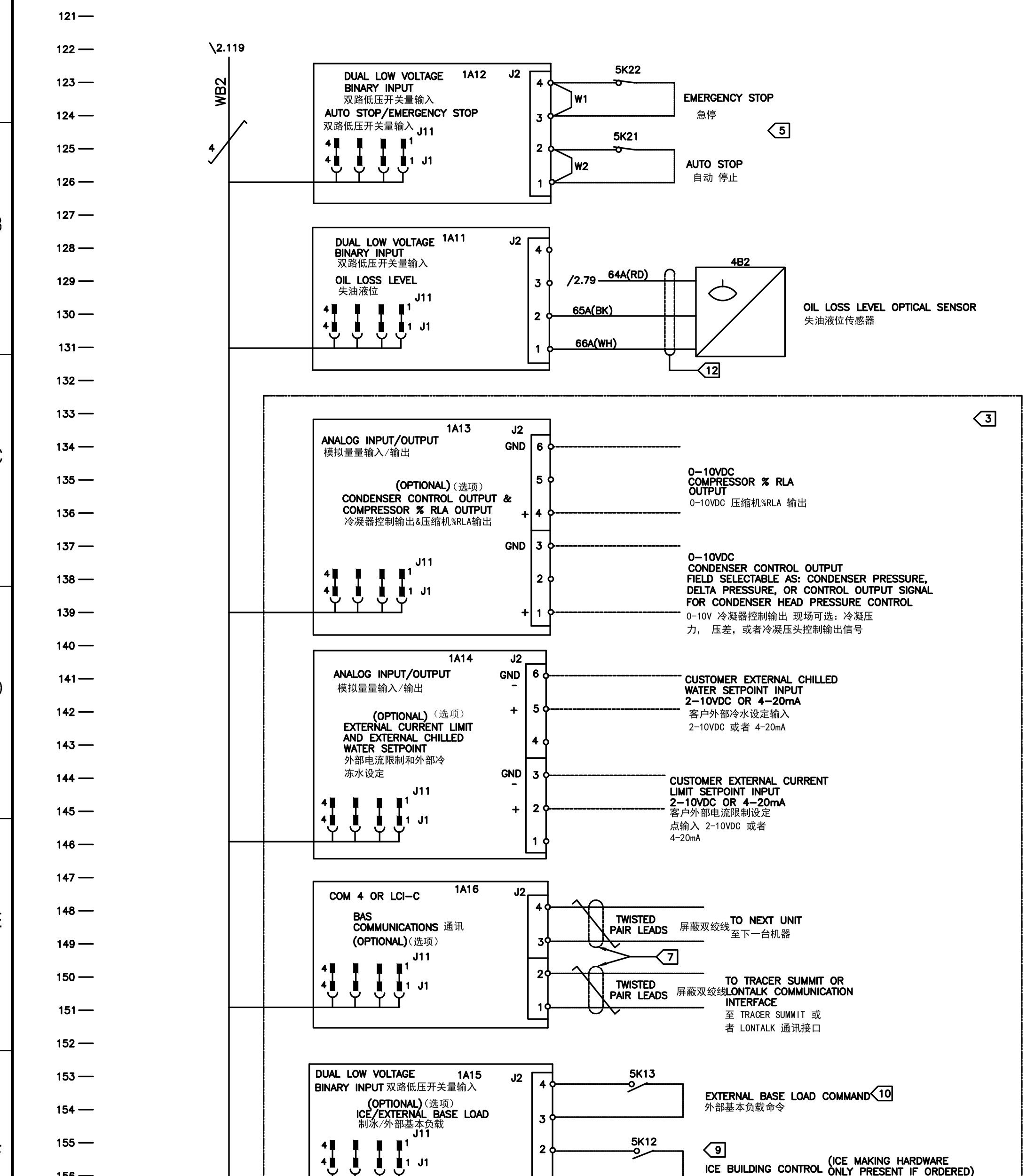
963598
DUAL HIGH VOLTAGE BINARY INPUT 双路高压开关量输入
HIGH PRESSURE CUTOUT 高压保护开关
DUAL TRIAC 双路可控硅开关
SLIDE VALVE UNLOAD/LOAD 滑阀 加/卸载
OIL RETURN GAS PUMP DRAIN/FILL SOL VALVE 回油气泵 充注/排出阀
DUAL RELAY 双路继电器
ICE BUILDING STATUS OUTPUT (OPTIONAL) 制冰状态输出（选项）
ICE MACHINE STATUS CUSTOMER PROVIDED POWER 制冰设备状态输出 客户提供电源
(ICE MAKING HARDWARE ONLY PRESENT IF ORDERED)（根据客户订单情况提供制冰硬件）
COND/CHILLED WATER FLOW SWITCH INTERLOCKS 冷却水、冷冻水流量开关互锁
CHILLED WATER 5S1 冷冻水
CONDENSER WATER 5S2 冷却水
CUSTOMER PROVIDED POWER 客户提供电源
CHILLED WATER PUMP STARTER 冷冻水泵启动器
CONDENSER WATER PUMP STARTER 冷却水泵启动器
CONDENSER/CHILLED WATER WATER PUMP STARTER 冷却水/冷冻水泵启动器
LOAD 3Y1
UNLOAD 3Y2
FILL 4Y1
DRAIN 4Y2
5K1-108
5K2-110
/3.122
/4.188

TRANE	特灵空调系统(中国)有限公司 TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD						第 3 张 SHEET / 共 5 张 TOTAL
设计 DESIGN	Zhang Chi	工艺 PROCESS	Jiang Jian	RTHD 星三角启动柜电器原理图 RTHD Y-D STARTER SCHEMATIC WIRING			
制图 DRAWED	Zhang Chi	标准化 STANDARD	Eric Yu				
校核 CHECKED	Lilian Gu	批准 APPROVED	Manson Zheng	更改码 REV.	D	D2309-7554	
审核 REVIEWED	Manson Zheng	日期 DATE	4Dec, 2017	比例 SCALE			



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L'UTILISATION DE TOUT AUTRE CONDUCTEUR PEUT ENDOMMAGER L'ÉQUIPEMENT.

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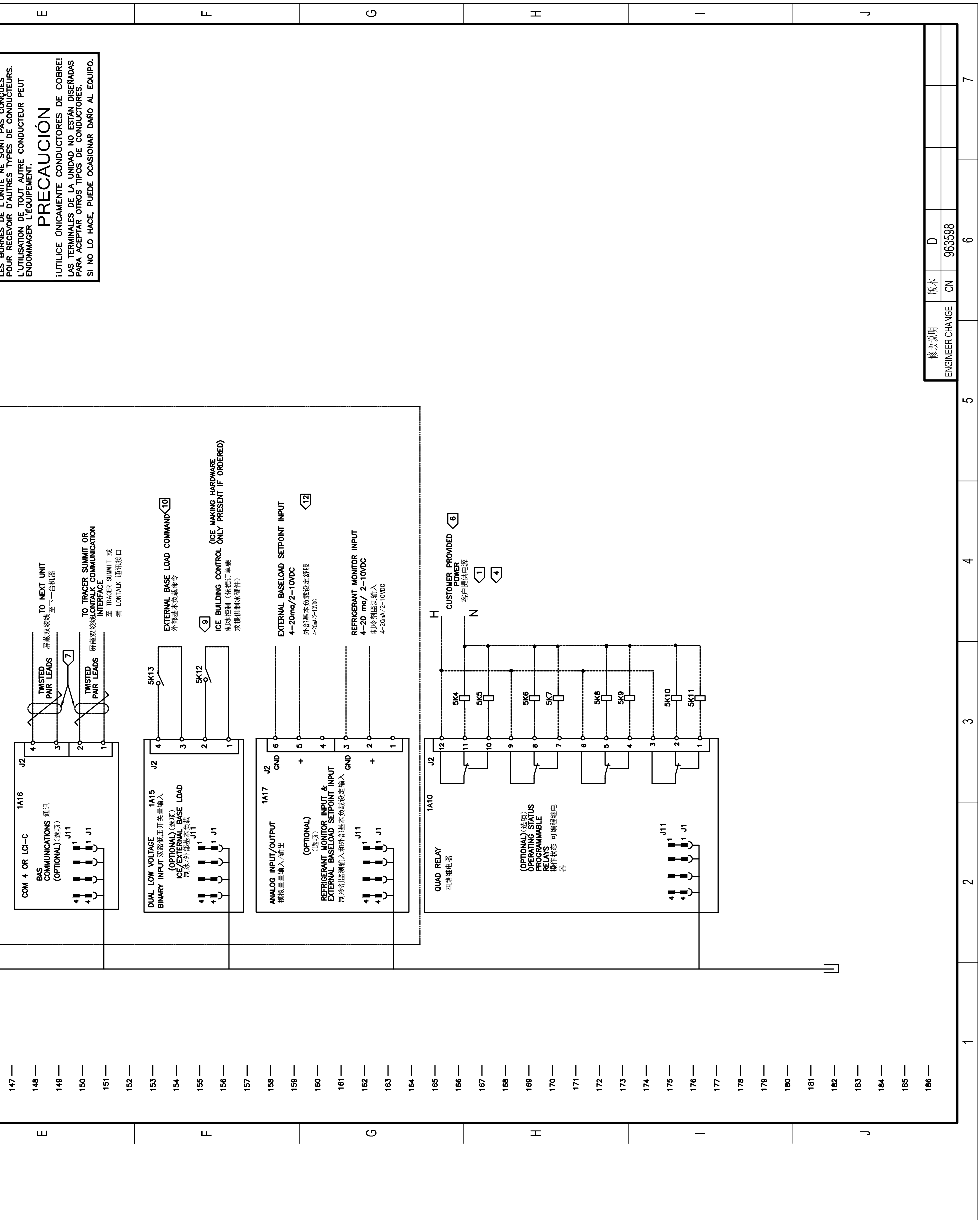
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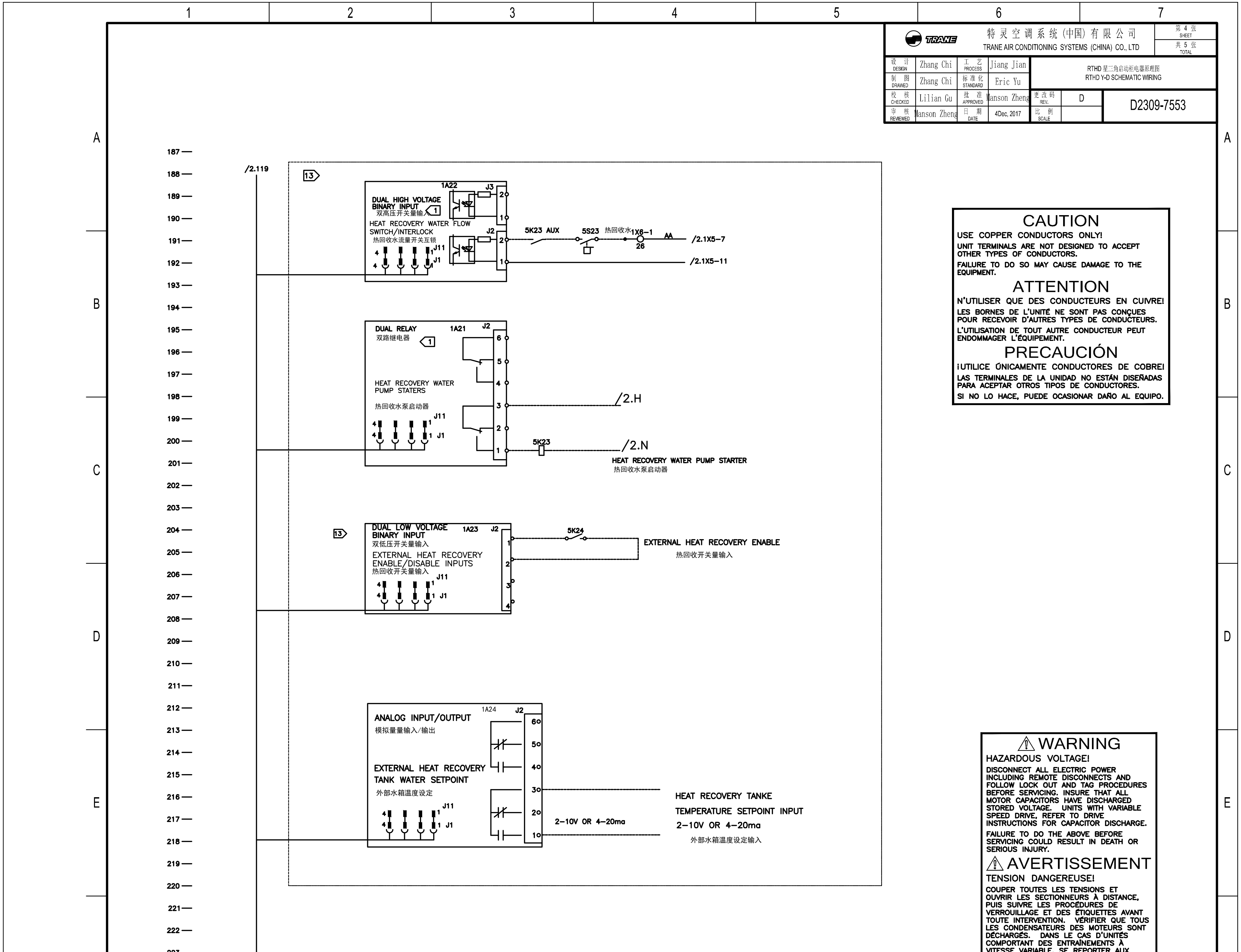
ENGINEER CHANGE
修改说明
版本
CN
D
963598
COM 4 OR LCI-C
BAS COMMUNICATIONS 通讯 (OPTIONAL)(选项)
1A16
TWISTED PAIR LEADS
TO NEXT UNIT
至下一台机器
TO TRACER SUMMIT OR LONTALK COMMUNICATION INTERFACE
DUAL LOW VOLTAGE BINARY INPUT 双路低压开关量输入
(OPTIONAL)(选项)
ICE/EXTERNAL BASE LOAD
1A15
5K13
5K12
EXTERNAL BASE LOAD COMMAND
外部基本负载命令
ICE BUILDING CONTROL
(ICE MAKING HARDWARE ONLY PRESENT IF ORDERED)
ANALOG INPUT/OUTPUT
模拟量输入/输出
(OPTIONAL)
(选项)
REFRIGERANT MONITOR INPUT & EXTERNAL BASELOAD SETPOINT INPUT
1A17
EXTERNAL BASELOAD SETPOINT INPUT
4-20mA/2-10VDC
REFRIGERANT MONITOR INPUT
4-20 mA/ 2-10VDC
QUAD RELAY
四路继电器
1A10
(OPTIONAL)(选项)
OPERATING STATUS PROGRAMMABLE RELAYS
5K4
5K5
5K6
5K7
5K8
5K9
5K10
5K11
CUSTOMER PROVIDED POWER
客户提供电源
H
N
J11
J1
J2
GND



TRANE
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TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD
第 4 张 SHEET
共 5 张 TOTAL
设计 DESIGN Zhang Chi
制图 DRAWED Zhang Chi
校核 CHECKED Lilian Gu
审核 REVIEWED Manson Zheng
工艺 PROCESS Jiang Jian
标准化 STANDARD Eric Yu
批准 APPROVED Manson Zheng
日期 DATE 4Dec, 2017
RTHD 星三角启动柜电器原理图
RTHD Y-D SCHEMATIC WIRING
更改码 REV. D
比例 SCALE
D2309-7553
/2.119
13
1A22
J3
DUAL HIGH VOLTAGE BINARY INPUT
双高压开关量输入
1
HEAT RECOVERY WATER FLOW SWITCH/INTERLOCK
热回收水流量开关互锁
J2
J11
J1
5K23 AUX
5S23 热回收水
1X6-1
26
AA
/2.1X5-7
/2.1X5-11
DUAL RELAY
双路继电器
1A21
J2
HEAT RECOVERY WATER PUMP STATERS
热回收水泵启动器
/2.H
5K23
/2.N
HEAT RECOVERY WATER PUMP STARTER
热回收水泵启动器
DUAL LOW VOLTAGE BINARY INPUT
双低压开关量输入
1A23
EXTERNAL HEAT RECOVERY ENABLE/DISABLE INPUTS
热回收开关量输入
5K24
EXTERNAL HEAT RECOVERY ENABLE
热回收开关量输入
ANALOG INPUT/OUTPUT
模拟量量输入/输出
1A24
EXTERNAL HEAT RECOVERY TANK WATER SETPOINT
外部水箱温度设定
2-10V OR 4-20ma
HEAT RECOVERY TANKE TEMPERATURE SETPOINT INPUT
2-10V OR 4-20ma
外部水箱温度设定输入
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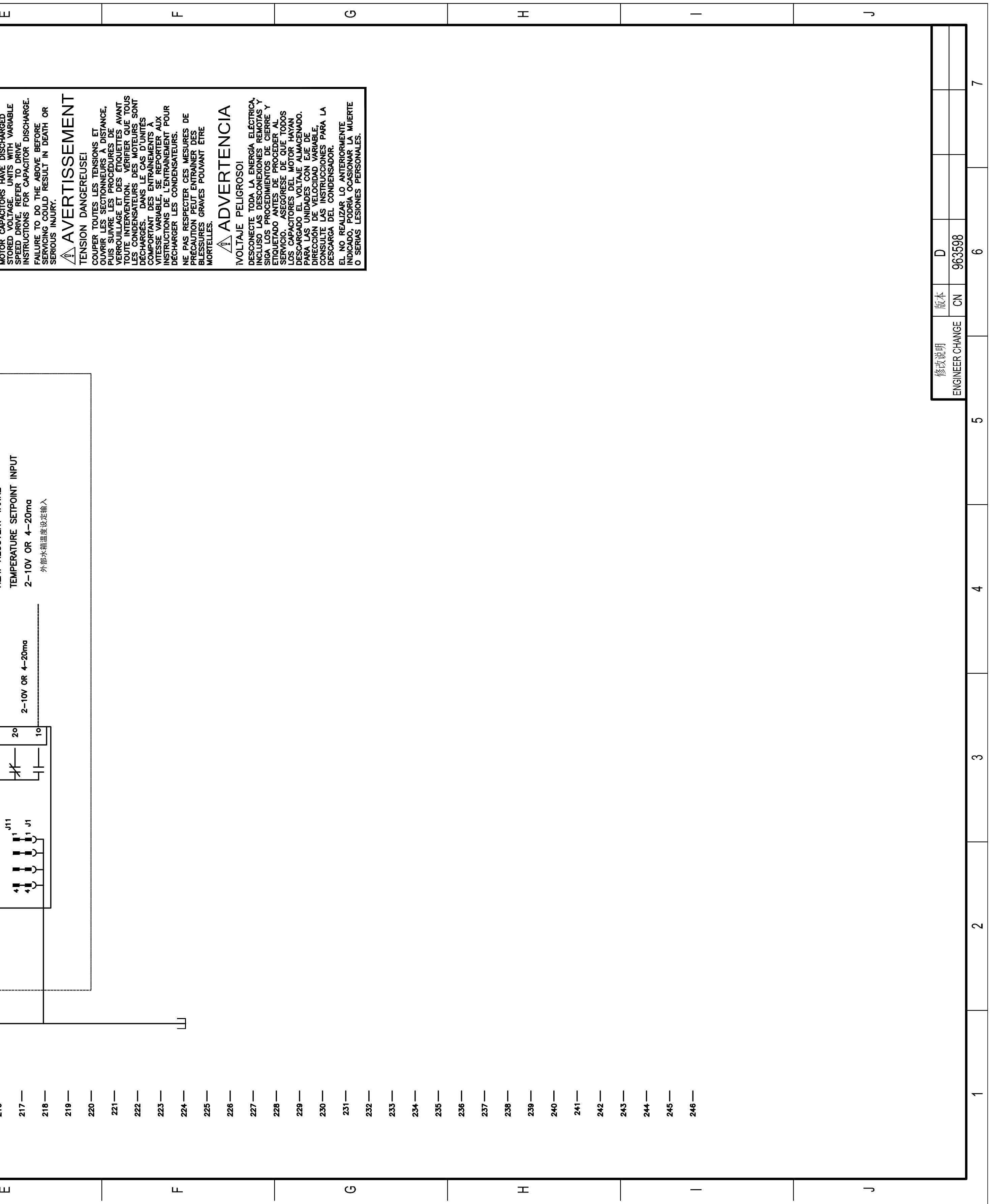
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DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUSO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA LAS UNIDADES CON EJE DE DIRECCIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR.
EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.
TEMPERATURE SETPOINT INPUT
2–10V OR 4–20ma
外部水箱温度设定输入
2–10V OR 4–20ma
J11
J1
修改说明
ENGINEER CHANGE
版本
CN
D
963598

COLOR CODE		
BK	BLACK	黑色
BN	BROWN	褐色
BU	BLUE	蓝色
GY	GRAY	紫色
RD	RED	红色
WH	WHITE	白色
GN	GREEN	绿色
OG	ORANGE	橙色
YE	YELLOW	黄色

1K20
IDENTIFICATION 标示符号
CLASSIFICATION 分类符号
LOCATION CODE 位置代码

LOCATION 位置

1	CONTROL PANEL	控制柜
2	NOT USED	未使用
3	COMPRESSOR	压缩机
4	UNIT MTD	机组安装
5	CUSTOMER PROVIDED	用户自备

————	TRANE WIRING	特灵接线
- - - - -	CUSTOMER WIRING	客户接线
— — —	OPTIONS	选项

特灵空调系统(中国)有限公司 TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD				第 4 张 SHEET / 共 5 张 TOTAL
设计 DESIGN	Zhang Chi	工艺 PROCESS	Jiang Jian	RTHD 星三角启动柜电器原理图 RTHD Y-D SCHEMATIC WIRING
制图 DRAWED	Zhang Chi	标准化 STANDARD	Eric Yu	
校核 CHECKED	Lilian Gu	批准 APPROVED	Manson Zheng	更改码 REV. D / D2309-7553
审核 REVIEWED	Manson Zheng	日期 DATE	4Dec, 2017	比例 SCALE

LINE #	ITEM	DESCRIPTION	名 称
54	1A1	UC800 CONTROLLER	UC800 控制器
55	1A2	POWER SUPPLY MODULE	电源模块
66	1A3	STARTER MODULE	启动模块
86	1A4	HIGH PRESSURE CUTOUT SWITCH	高压切断开关
91	1A5	SLIDE VALVE UNLOAD AND LOAD CONTROL SOLENOID VALVE	滑阀加载/卸载 电磁阀
96	1A6	OIL RETURN GAS PUMP DRAIN AND FILL SOLENOID VALVE	回油气泵排出和充注电磁阀
108	1A7	CONDENSER AND CHILLED WATER FLOW SWITCH INTERLOCKS	冷却水和冷冻水流量开关互锁
101	1A8	ICE BUILDING STATUS OUTPUT AND MASTER OIL LINE SOLENOID VALVE	制冰状态输出和主油路电磁阀
113	1A9	CONDENSER AND CHILLED WATER PUMP STARTER	冷却水泵和冷冻水泵启动器
164	1A10	OPERATING STATUS PROGRAMMABLE RELAYS	操作状态可编程继电器
128	1A11	OIL LOSS LEVEL SENSOR AND UNUSED INPUTS	失油液位传感器
123	1A12	EXTERNAL AUTO/STOP AND EMERGENCY STOP INPUT	外部自动/停止和急停输入
134	1A13	CONDENSER CONTROL AND % RLA OUTPUT	冷凝压力控制及%RLA输出
141	1A14	EXTERNAL CURRENT LIMIT AND CHILLED WATER	外部电流限定设定/冷水设定点输入
152	1A15	ICE BUILDING CONTROL AND EXTERNAL BASE LOADING COMMAND	制冰控制及外部基本负载输入
147	1A16	COMM 4 OR LCI–C (COMM 5)	COMM 4 OR LCI–C (COMM 5)
157	1A17	REFRIGERANT MONITOR INPUT AND EXTERNAL BASE LOADING SETPOINT	制冷剂监视输入/外部基本负载设定
46	1A20	TD 7 DISPLAY	TD 7 显示屏
73	1K1	START CONTACTOR	启动接触器
76	1K2	RUN CONTACTOR	运行接触器
79	1K3	SHORTING CONTACTOR	断路接触器
82	1K4	TRANSITION CONTACTOR	转换接触器
4	1Q1	MAIN CIRCUIT BREAKER	主回路断路器
23	1F1, 1F2, 1F3	PRIMARY FUSES – CPT, UOVM	主回路保险丝
44	1F4	SECONDARY FUSE 115V	次级保险丝 115V
44	1F5, 1F6	SECONDARY FUSES 27V	次级保险丝 27V
4	1Q10	DISCONNECT SWITCH	分断开关
29,33,36	1R1–3	TRANSITION RESISTOR	转换电阻
39	1T1	TRANSFORMER	变压器
12,14,16	1T2–1,2,3	CURRENT TRANSFORMERS	电流互感器
32	1T3–1,2,3	UNDER OVER VOLTAGE TRANSFORMERS	欠过电压互感器
28,77	1U1		
4	1X1	TERMINAL BLOCK	接线端子
27,28,29	1X3	UNDER OVER VOLTAGE TERMINAL BLOCK	过欠电压接线端子
	1X5	CONTROL TERMINAL BLOCK 115V	控制接线端子 115V
108	1X6	FIELD FLOW SWITCH TERMINAL BLOCK	现场流量开关接线端子
92	3Y1	LOAD SOLENOID VALVE	加载电磁阀
94	3Y2	UNLOAD SOLENOID VALVE	卸载电磁阀
32	3M1	COMPRESSOR MOTOR	压缩机电机
63,64	4E1–2	OIL SUMP HEATERS	邮箱加热器
97	4Y1	FILL SOLENOID VALVE	注油电磁阀
99	4Y2	DRAIN SOLENOID VALVE	排油电磁阀
65	4Y3	MASTER OIL LINE SOLENOID	主油路电磁阀
129	4B2	OIL LOSS LEVEL SWITCH	失油液位传感器
40	4B3	EVAPORATOR REFRIGERANT LIQUID LEVEL SENSOR	蒸发器制冷剂液位传感器
46	4B20	EVAPORATOR ENTERING WATER TEMP. SENSOR	蒸发器进水温度传感器
48	4B21	EVAPORATOR LEAVING WATER TEMP. SENSOR	蒸发器出水温度传感器
50	4B22	CONDENSER ENTERING WATER TEMP. SENSOR	冷凝器进水温度传感器

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.

FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ AVERTISSEMENT

TENSION DANGEREUSE!

COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.

NE PAS RESPECTER CES MESURES DE PRÉCAUTION PEUT ENTRAÎNER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

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CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

ATTENTION

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!

LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.

92	3Y1	LOAD SOLENOID VALVE	加载电磁阀
94	3Y2	UNLOAD SOLENOID VALVE	卸载电磁阀
32	3M1	COMPRESSOR MOTOR	压缩机电机
63,64	4E1-2	OIL SUMP HEATERS	邮箱加热器
97	4Y1	FILL SOLENOID VALVE	注油电磁阀
99	4Y2	DRAIN SOLENOID VALVE	排油电磁阀
65	4Y3	MASTER OIL LINE SOLENOID	主油路电磁阀
129	4B2	OIL LOSS LEVEL SWITCH	失油液位传感器
40	4B3	EVAPORATOR REFRIGERANT LIQUID LEVEL SENSOR	蒸发器制冷剂液位传感器
46	4B20	EVAPORATOR ENTERING WATER TEMP. SENSOR	蒸发器进水温度传感器
48	4B21	EVAPORATOR LEAVING WATER TEMP. SENSOR	蒸发器出水温度传感器
50	4B22	CONDENSER ENTERING WATER TEMP. SENSOR	冷凝器进水温度传感器
52	4B23	CONDENSER LEAVING WATER TEMP. SENSOR	冷凝器出水温度传感器
54	4B24	OIL PRESSURE TRANSDUCER	油压传感器
40	4B25	EVAPORATOR REFIGERANT PRESSURE TRANSDUCER	蒸发器制冷器压力传感器
42	4B26	CONDENSER REFRIGERANT PRESSURE TRANSDUCER	冷凝器制冷器压力传感器
44	4B27	COMPRESSOR DISCHARGE TEMP. SENSOR	压缩机排气温度传感器
66	4B29	HIGH PRESSURE CUTOUT SWITCH	高压切断开关
44,42	4Y20-21	DUAL PORT EXV ACTUATOR	双端口电子膨胀阀执行器
52	5B28	OUTDOOR AIR TEMP. SENSOR	室外温度传感器
115	5K1	CHILLED WATER PUMP STARTER	冷冻水泵启动
118	5K2	CONDENSER WATER PUMP STARTER	冷却水泵启动
166-176	5K4-11	UNIT STATUS RELAYS	机组状态继电器
155	5K12	ICE BUILDING CONTROL	制冰控制
153	5K13	EXTERNAL BASE LOAD ENABLE	外部基本负载使能
106	5K20	ICE BUILDING STATUS	制冰状态
123	5K22	EXTERNAL EMERGENCY STOP	外部急停
125	5K21	EXTERNAL AUTO STOP	外部自动停机
108	5S1	CHILLED WATER FLOW SWITCH	冷冻水流量开关
110	5S2	CONDENSER WAQTER FLOW SWITCH	冷却水流量开关
39	4B30	CONDENSER ENTERING WATER TEM. SENSOR	冷凝器进水温度传感器
41	4B31	CONDENSER LEAVING WATER TEMP. SENSOR	冷凝器出水温度传感器
43	4B32	TANK WATER TEMP. SENSOR	水箱温度传感器
195	1A21	HEAT RECOVERY WATER PUMP STATERS	热回收水泵启动器
189	1A22	HEAT RECOVERY WATER FLOW SWITCH/INTERLOCK	热回收水流量开关互锁
204	1A23	EXTERNAL HEAT RECOVERY ENABLE/DISABLE INPUTS	热回收开关量输入
212	1A24	EXTERNAL HEAT RECOVERY TANK WATER SETPOINT	热回收水箱温度设定
191,200	5K23	HEAT RECOVERY WATER PUMP STATERS	热回收水流量开关
204	5K24	EXTERNAL HEAT RECOVERY ENABLE/DISABLE INPUTS	热回收水箱温度设定
191	5S23	HEAT RECOVERY WATER PUMP STATERS	热回收水流量开关

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ATTENTION

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!

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L'UTILISATION DE TOUT AUTRE CONDUCTEUR PEUT ENDOMMAGER L'ÉQUIPEMENT.

PRECAUCIÓN

¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!

LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.

SI NO LO HACE, PUEDE OCASIONAR DAÑO AL EQUIPO.

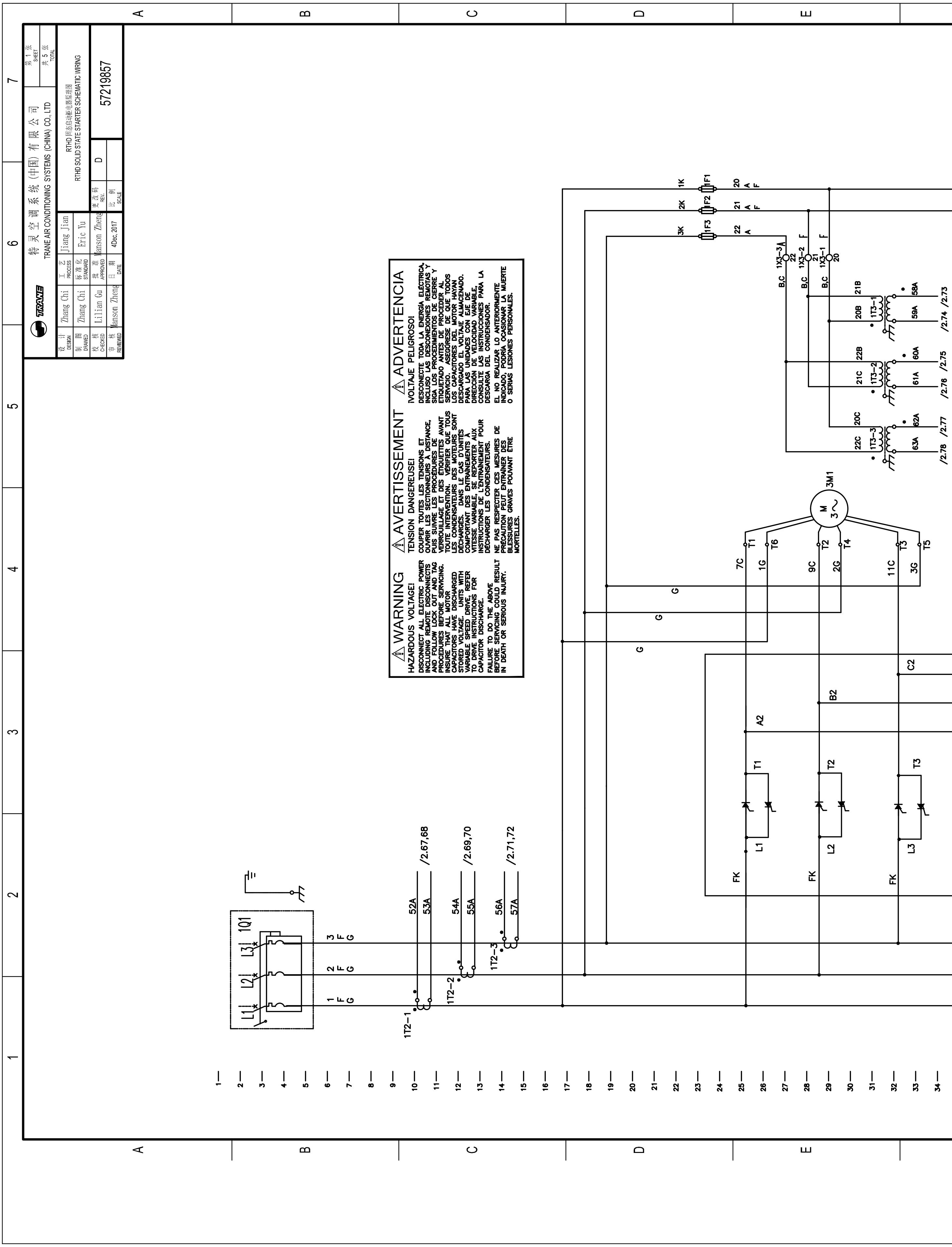
NOTES:

1. CLASS 1 FIELD WIRED MODULE
2. 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.
3. OPTIONAL MODULES. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
4. FIELD ASSIGNED PROGRAMMABLE RELAYS.
5. AUTO/STOP, EMERGENCY STOP THE CONTACTS ARE JUMPED AT THE FACTORY BY JUMPERS W1 & W2 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED REMOVE THE JUMPERS AND CONNECT TO THE DESIRED CONTROL CIRCUIT.
6. RELAY AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, 1/3 HP, 7.2 FLA AT 240VAC: 5 AMPS GENERAL PURPOSE.
7. IF SHIELD IS PRESENT, DO NOT WIRE SHIELD TO GROUND IN CONTROL PANEL. IF USED, SHIELD IS TO BE GROUNDED EXTERNALLY TO CONTROL PANEL. REFERENCE FIELD WIRING DIAGRAM FOR RECOMMENDED WIRE TYPE.
8. RELAY ENERGIZED WHILE MAKING ICE.
9. CONTACT CLOSURE ENABLES ICE MAKING.
10. CLOSED CONTACT COMMANDS BASE LOADING OPERATION.
11. ACTUAL BASE LOADING SETPOINT USED IS SETABLE AT FRONT PANEL. REFER TO IOM FOR DETAILS.
12. OPTIONAL MODULES. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
13. ONLY PRESENT WHEN HEAT RECOVERY IS REQUIRED

标记说明：

1. CLASS1 现场接线模式
2. CLASS1 现场接线绝缘等级应当相当或高于设备供应电压等级，CLASSII现场接线绝缘等级最小为300V
3. 选项模块的推荐接线请查看现场接线图
4. 现场赋值可编程继电器
5. 在出厂前，为确保正常操作， 自动/停止，急停的触点W1和W2已短接， 若进行远程控制， 应移去短接线，并将其接至相应的控制回路。
6. 继电器120VAC:7.2AMPS 阻性负载， 2.88AMP带载，1/3HP，7.2FLA，240VAC,5AMPS
7. 若存在屏蔽， 不用将屏蔽线接至控制柜内的接地处，若使用， 屏蔽层需接至控制柜外部，用线规格参考现场接线图。
8. 当执行制冰命令时，继电器被激活。
9. 触点闭合允许制冰。
10. 触点闭合执行基本负载操作。
11. 在操作面板上， 可进行实际负载设定， 细节参阅IOM.
12. 选项模块的推荐接线请查看现场接线图
13. 全热回收选项时安装

修改说明	版本	D
ENGINEER CHANGE	CN	963598


特灵空调系统（中国）有限公司
TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD
第 1 张 SHEET
共 5 张 TOTAL
RTHD 固态启动柜电器原理图
RTHD SOLID STATE STARTER SCHEMATIC WIRING
57219857
设计 DESIGN Zhang Chi
制图 DRAWED Zhang Chi
校核 CHECKED Lilian Gu
审核 REVIEWED Manson Zheng
工艺 PROCESS Jiang Jian
标准化 STANDARD Eric Yu
批准 APPROVED Manson Zheng
日期 DATE 4Dec, 2017
更改码 REV. D
比例 SCALE
WARNING
HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.
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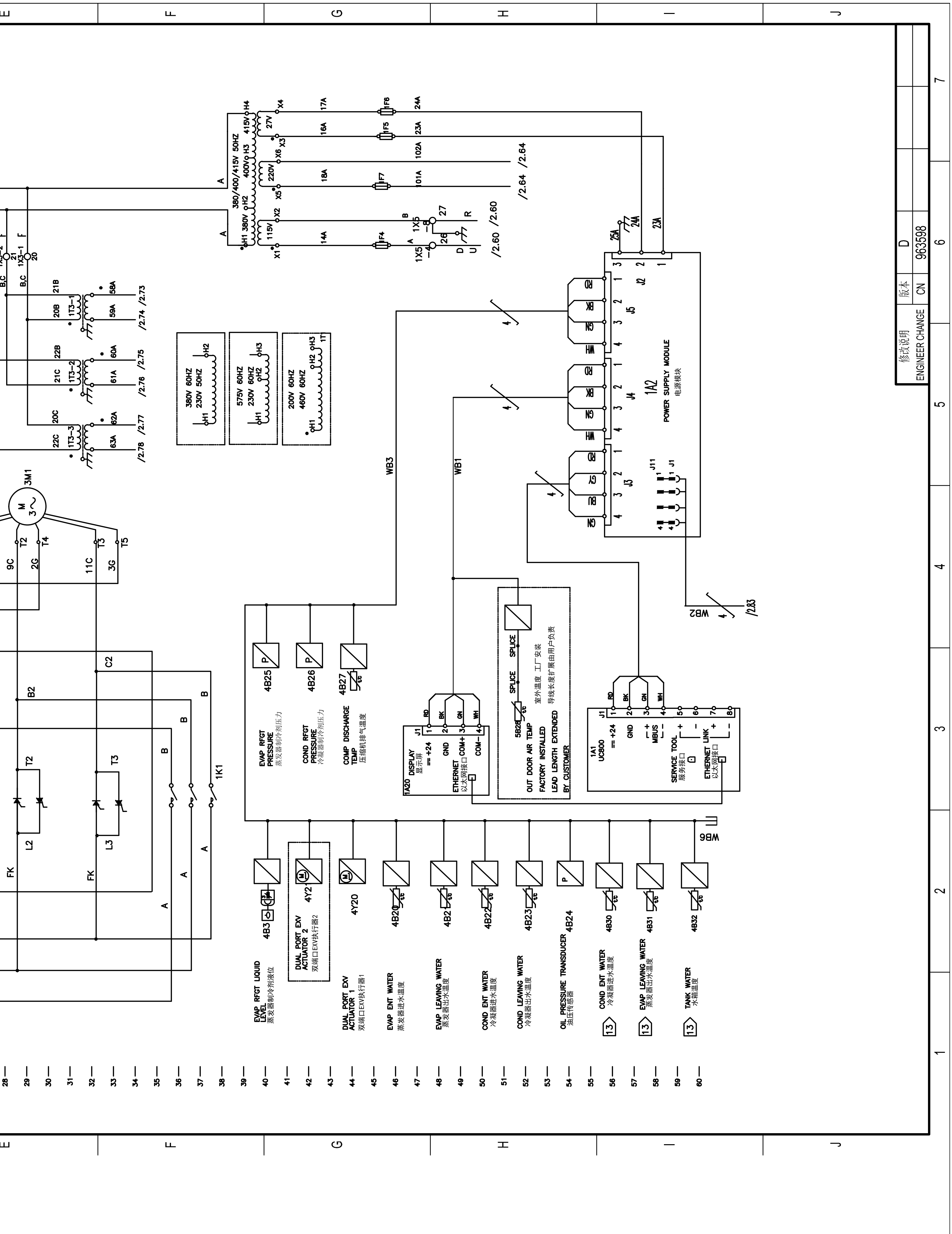
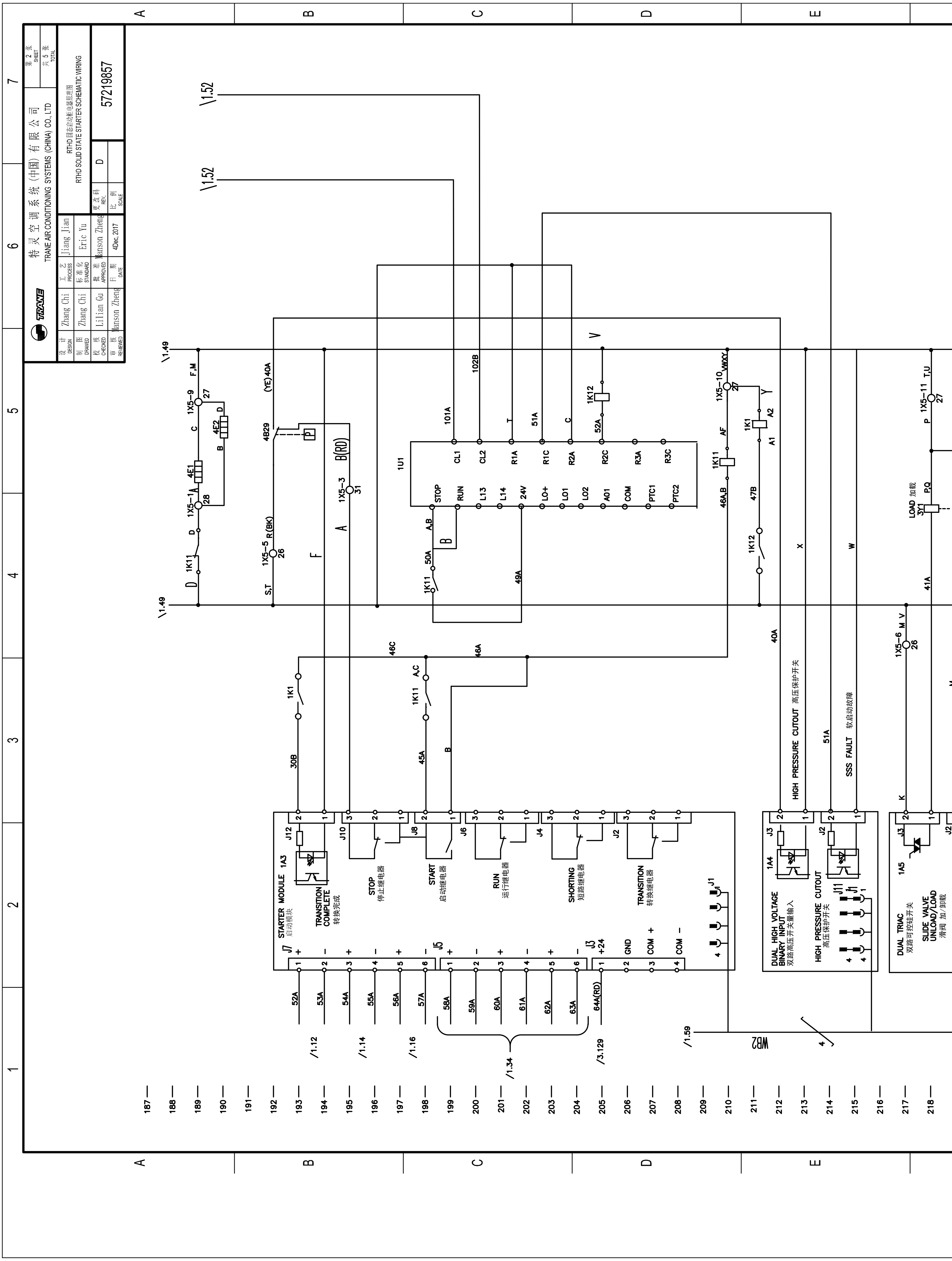
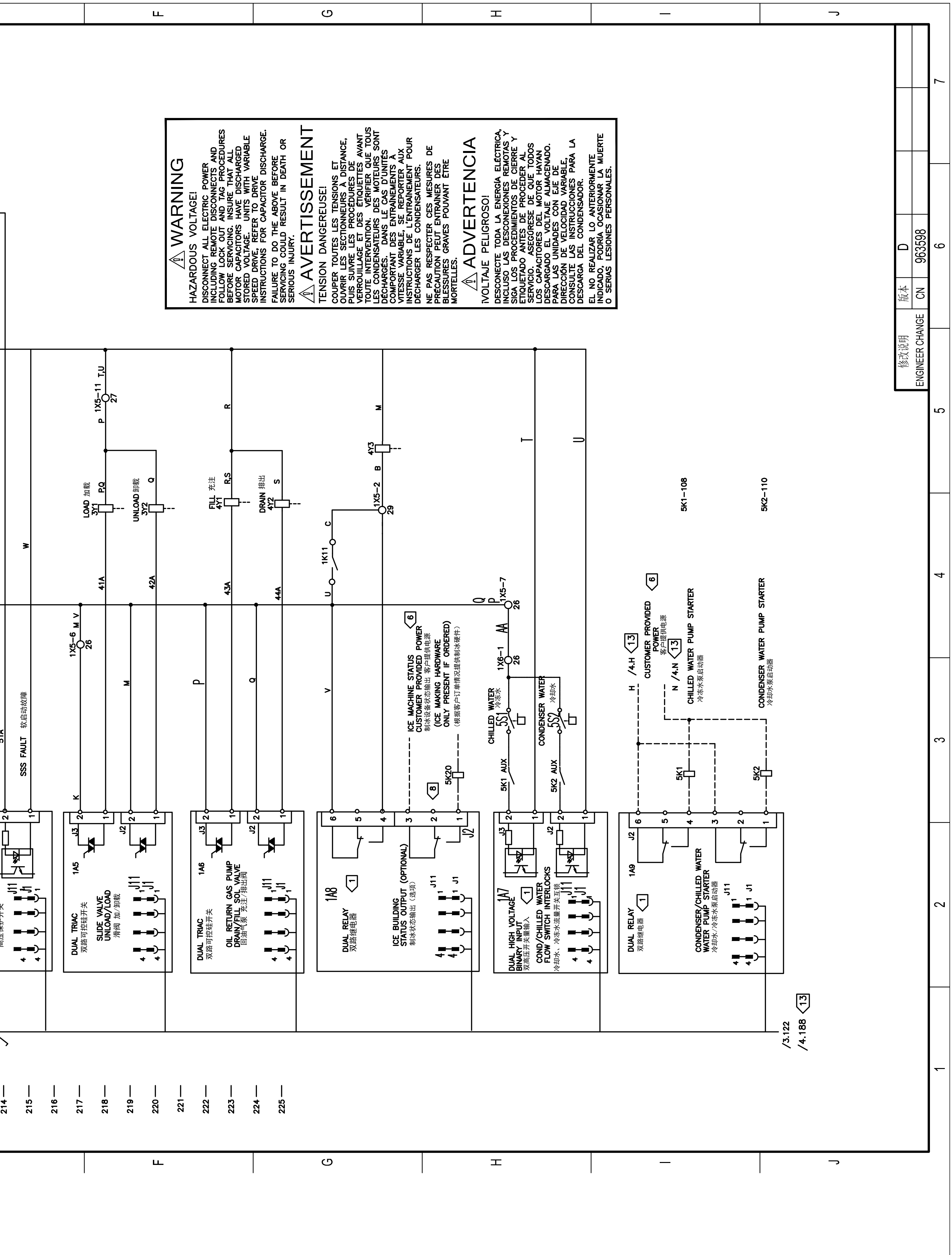


POWER SUPPLY MODULE
电源模块
1A2
1A1 UC800
1A20 DISPLAY 显示屏
ETHERNET 以太网接口
SERVICE TOOL 服务接口
ETHERNET LINK 以太网接口
EVAP RFGT PRESSURE 蒸发器制冷剂压力
COND RFGT PRESSURE 冷凝器制冷剂压力
COMP DISCHARGE TEMP 压缩机排气温度
OUT DOOR AIR TEMP 室外温度
FACTORY INSTALLED 工厂安装
LEAD LENGTH EXTENDED BY CUSTOMER 导线长度扩展由用户负责
EVAP RFGT LIQUID LEVEL 蒸发器制冷剂液位
DUAL PORT EXV ACTUATOR 2 双端口EXV执行器2
DUAL PORT EXV ACTUATOR 1 双端口EXV执行器1
EVAP ENT WATER 蒸发器进水温度
EVAP LEAVING WATER 蒸发器出水温度
COND ENT WATER 冷凝器进水温度
COND LEAVING WATER 冷凝器出水温度
OIL PRESSURE TRANSDUCER 油压传感器
TANK WATER 水箱温度
380V 60HZ 230V 50HZ
575V 60HZ 230V 60HZ
200V 60HZ 460V 60HZ
380/400/415V 50HZ
ENGINEER CHANGE 修改说明
CN 版本
D
963598


特灵空调系统（中国）有限公司
TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD
RTHD SOLID STATE STARTER SCHEMATIC WIRING
57219857
STARTER MODULE 1A3
TRANSITION COMPLETE
STOP
START
RUN
SHORTING
TRANSITION
HIGH PRESSURE CUTOUT
SSS FAULT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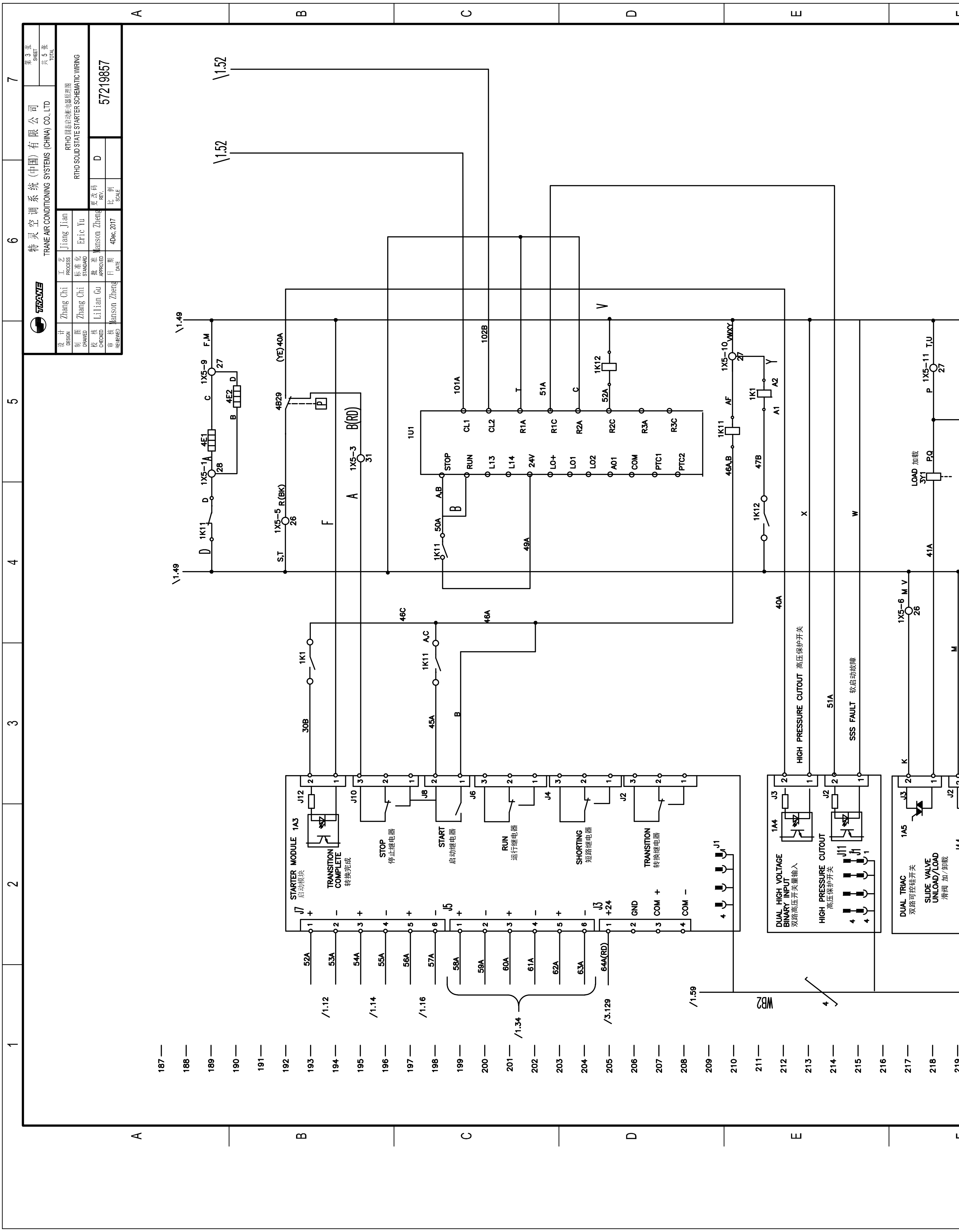
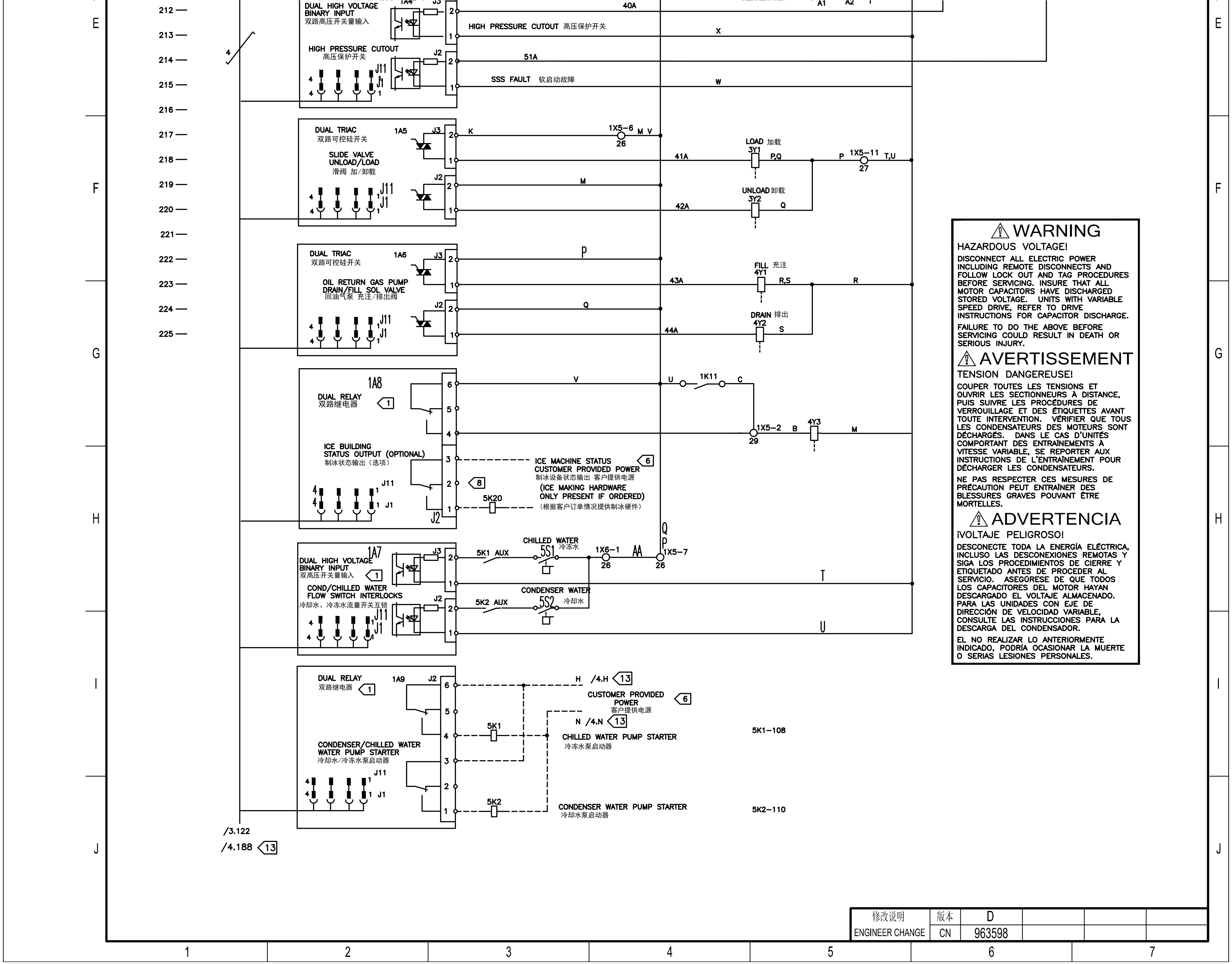
SSS FAULT 软启动故障
DUAL TRIAC 双路可控硅开关
1A5
SLIDE VALVE UNLOAD/LOAD 滑阀 加/卸载
LOAD 加载 3Y1
UNLOAD 卸载 3Y2
DUAL TRIAC 双路可控硅开关
1A6
OIL RETURN GAS PUMP DRAIN/FILL SOL VALVE 回油气泵 充注/排出阀
FILL 充注 4Y1
DRAIN 排出 4Y2
1A8
DUAL RELAY 双路继电器
ICE BUILDING STATUS OUTPUT (OPTIONAL) 制冰状态输出（选项）
ICE MACHINE STATUS CUSTOMER PROVIDED POWER 制冰设备状态输出 客户提供电源
(ICE MAKING HARDWARE ONLY PRESENT IF ORDERED)
（根据客户订单情况提供制冰硬件）
5K20
1K11
4Y3
1A7
DUAL HIGH VOLTAGE BINARY INPUT 双高压开关量输入
COND/CHILLED WATER FLOW SWITCH INTERLOCKS 冷却水、冷冻水流量开关互锁
5K1 AUX
CHILLED WATER 冷冻水 5S1
5K2 AUX
CONDENSER WATER 冷却水 5S2
DUAL RELAY 双路继电器
1A9
CONDENSER/CHILLED WATER WATER PUMP STARTER 冷却水/冷冻水泵启动器
5K1
5K2
CUSTOMER PROVIDED POWER 客户提供电源
CHILLED WATER PUMP STARTER 冷冻水泵启动器
CONDENSER WATER PUMP STARTER 冷却水泵启动器
5K1–108
5K2–110
/3.122
/4.188
修改说明 ENGINEER CHANGE
版本 CN
D
963598


特灵空调系统(中国)有限公司
TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD
RTHD固态启动柜电器原理图
RTHD SOLID STATE STARTER SCHEMATIC WIRING
57219857
Zhang Chi
Jiang Jian
Eric Yu
Lillian Gu
Manson Zheng
4Dec, 2017
STARTER MODULE 1A3 启动模块
TRANSITION COMPLETE 转换完成
STOP 停止继电器
START 启动继电器
RUN 运行继电器
SHORTING 短路继电器
TRANSITION 转换继电器
DUAL HIGH VOLTAGE BINARY INPUT 双路高压开关量输入
HIGH PRESSURE CUTOUT 高压保护开关
SSS FAULT 软启动故障
DUAL TRIAC 双路可控硅开关
SLIDE VALVE UNLOAD/LOAD 滑阀 加/卸载
LOAD 加载


DUAL HIGH VOLTAGE BINARY INPUT
双路高压开关量输入
HIGH PRESSURE CUTOUT
高压保护开关
HIGH PRESSURE CUTOUT 高压保护开关
SSS FAULT 软启动故障
DUAL TRIAC
双路可控硅开关
SLIDE VALVE UNLOAD/LOAD
滑阀 加/卸载
LOAD 加载
UNLOAD 卸载
DUAL TRIAC
双路可控硅开关
OIL RETURN GAS PUMP DRAIN/FILL SOL VALVE
回油气泵 充注/排出阀
FILL 充注
DRAIN 排出
1A8
DUAL RELAY
双路继电器
ICE BUILDING STATUS OUTPUT (OPTIONAL)
制冰状态输出（选项）
ICE MACHINE STATUS CUSTOMER PROVIDED POWER
制冰设备状态输出 客户提供电源
(ICE MAKING HARDWARE ONLY PRESENT IF ORDERED)
（根据客户订单情况提供制冰硬件）
1A7
DUAL HIGH VOLTAGE BINARY INPUT
双高压开关量输入
COND/CHILLED WATER FLOW SWITCH INTERLOCKS
冷却水、冷冻水流量开关互锁
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冷却水泵启动器
5K1-108
5K2-110
/3.122
/4.188
WARNING
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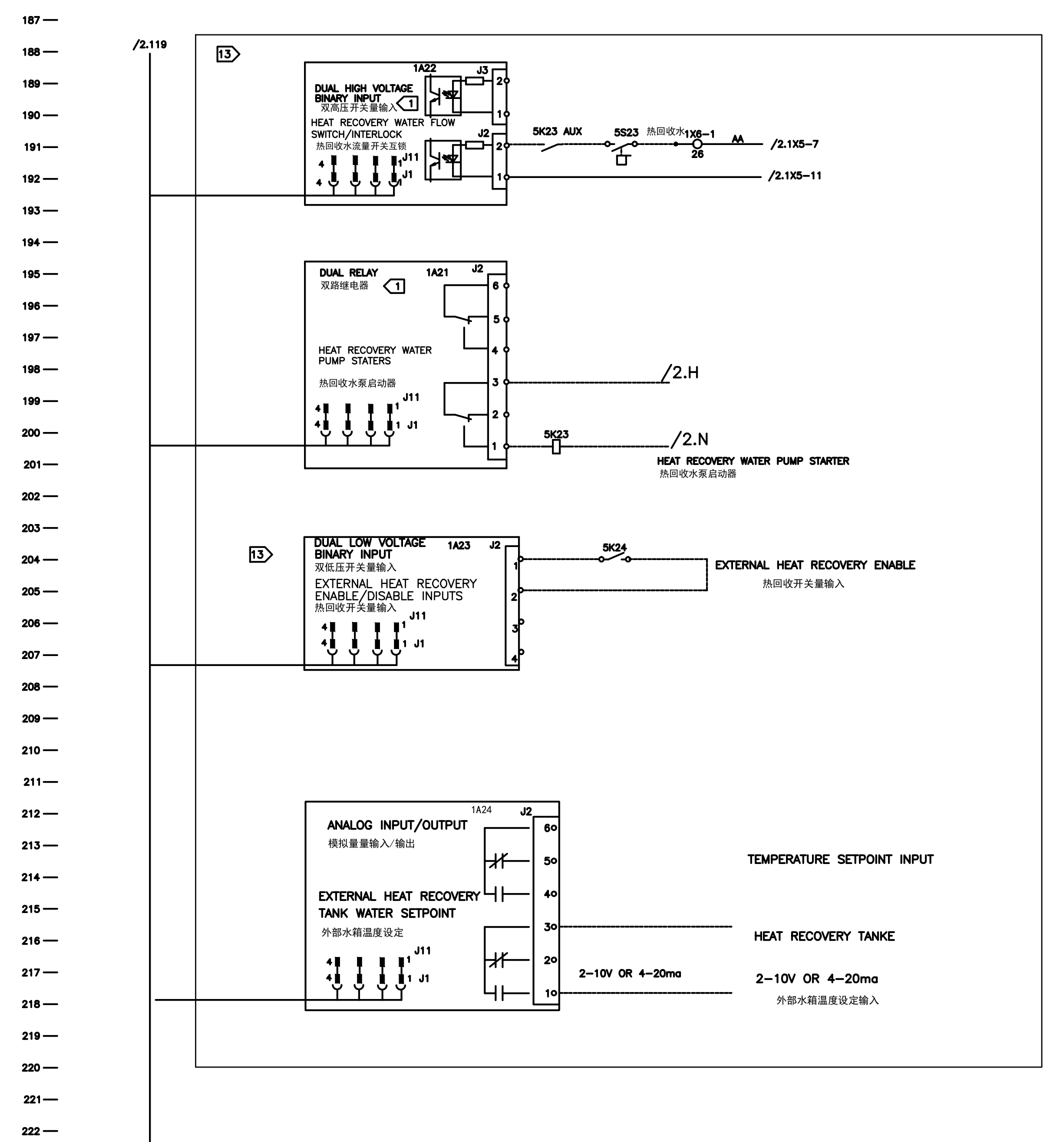
修改说明 版本 D
ENGINEER CHANGE CN 963598

TRANE	特灵空调系统(中国)有限公司 TRANE AIR CONDITIONING SYSTEMS (CHINA) CO., LTD				第 4 张 SHEET / 共 5 张 TOTAL
设计 DESIGN	Zhang Chi	工艺 PROCESS	Jiang Jian	RTHD 固态启动柜电器原理图 RTHD SOLID STATE STARTER SCHEMATIC WIRING	
制图 DRAWED	Zhang Chi	标准化 STANDARD	Eric Yu		
校核 CHECKED	Lilian Gu	批准 APPROVED	Manson Zheng	更改码 REV. D	57219857
审核 REVIEWED	Manson Zheng	日期 DATE	4Dec, 2017	比例 SCALE	



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EXTERNAL HEAT RECOVERY
TANK WATER SETPOINT
外部水箱温度设定
J11
J1
2-10V OR 4-20ma
HEAT RECOVERY TANKE
2-10V OR 4-20ma
外部水箱温度设定输入
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设计 DESIGN	Zhang Chi	工艺 PROCESS	Jiang Jian	RTHD固态启动柜电器原理图 RTHD SOLID STATE STARTER SCHEMATIC WIRING	
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校核 CHECKED	Lilian Gu	批准 APPROVED	Manson Zheng	更改码 REV. D	57219857
审核 REVIEWED	Manson Zheng	日期 DATE	4Dec, 2017	比例 SCALE	

COLOR CODE	
BK	BLACK 黑色
BN	BROWN 褐色
BU	BLUE 蓝色
GY	GRAY 紫色
RD	RED 红色
WH	WHITE 白色
GN	GREEN 绿色
OG	ORANGE 橙色
YE	YELLOW 黄色

1K20
- IDENTIFICATION 标示符号
- CLASSIFICATION 分类符号
- LOCATION CODE 位置代码

LOCATION 位置

1	CONTROL PANEL	控制柜
2	NOT USED	未使用
3	COMPRESSOR	压缩机
4	UNIT MTD	机组安装
5	CUSTOMER PROVIDED	用户自备

————	TRANE WIRING	特灵接线
- - - - -	CUSTOMER WIRING	客户接线
—— — —	OPTIONS	选项

LINE #	ITEM	DESCRIPTION	名 称
54	1A1	UC800 CONTROLLER	UC800 控制器
55	1A2	POWER SUPPLY MODULE	电源模块
66	1A3	STARTER MODULE	启动模块
86	1A4	HIGH PRESSURE CUTOUT SWITCH	高压切断开关
91	1A5	SLIDE VALVE UNLOAD AND LOAD CONTROL SOLENOID VALVE	滑阀加载/卸载 电磁阀
96	1A6	OIL RETURN GAS PUMP DRAIN AND FILL SOLENOID VALVE	回油气泵排出和充注电磁阀
108	1A7	CONDENSER AND CHILLED WATER FLOW SWITCH INTERLOCKS	冷却水和冷冻水流量开关互锁
101	1A8	ICE BUILDING STATUS OUTPUT AND MASTER OIL LINE SOLENOID VALVE	制冰状态输出和主油路电磁阀
113	1A9	CONDENSER AND CHILLED WATER PUMP STARTER	冷却水泵和冷冻水泵启动器
164	1A10	OPERATING STATUS PROGRAMMABLE RELAYS	操作状态可编程继电器
128	1A11	OIL LOSS LEVEL SENSOR AND UNUSED INPUTS	失油液位传感器
123	1A12	EXTERNAL AUTO/STOP AND EMERGENCY STOP INPUT	外部自动/停止和急停输入
134	1A13	CONDENSER CONTROL AND % RLA OUTPUT	冷凝压力控制及%RLA输出
141	1A14	EXTERNAL CURRENT LIMIT AND CHILLED WATER	外部电流限定设定/冷水设定点输入
152	1A15	ICE BUILDING CONTROL AND EXTERNAL BASE LOADING COMMAND	制冰控制及外部基本负载输入
147	1A16	COMM 4 OR LCI–C (COMM 5)	COMM 4 OR LCI–C (COMM 5)
157	1A17	REFRIGERANT MONITOR INPUT AND EXTERNAL BASE LOADING SETPOINT	制冷剂监视输入/外部基本负载设定
46	1A20	TD 7 DISPLAY	TD 7 显示屏
84	1K11	RELAY	控制中间继电器
77	1K12	RELAY	控制中间继电器
4	1Q1	MAIN CIRCUIT BREAKER	主回路断路器
23	1F1,1F2,1F3	PRIMARY FUSES – CPT, UOVM	主回路保险丝
44	1F4	SECONDARY FUSE 115V	次级保险丝 115V
44	1F5, 1F6	SECONDARY FUSES 27V	次级保险丝 27V
44	1F7	SECONDARY FUSES 220V	次级保险丝 27V
29,33,36	1R1–3	TRANSITION RESISTOR	转换电阻
39	1T1	TRANSFORMER	变压器
12,14,16	1T2–1,2,3	CURRENT TRANSFORMERS	电流互感器
32	1T3–1,2,3	UNDER OVER VOLTAGE TRANSFORMERS	欠过电压互感器
28,77	1U1		
4	1X1	TERMINAL BLOCK	接线端子
27,28,29	1X3	UNDER OVER VOLTAGE TERMINAL BLOCK	过欠电压接线端子
	1X5	CONTROL TERMINAL BLOCK 115V	控制接线端子 115V
108	1X6	FIELD FLOW SWITCH TERMINAL BLOCK	现场流量开关接线端子
92	3Y1	LOAD SOLENOID VALVE	加载电磁阀
94	3Y2	UNLOAD SOLENOID VALVE	卸载电磁阀
32	3M1	COMPRESSOR MOTOR	压缩机电机
63,64	4E1–2	OIL SUMP HEATERS	邮箱加热器
97	4Y1	FILL SOLENOID VALVE	注油电磁阀
99	4Y2	DRAIN SOLENOID VALVE	排油电磁阀
65	4Y3	MASTER OIL LINE SOLENOID	主油路电磁阀
129	4B2	OIL LOSS LEVEL SWITCH	失油液位传感器
40	4B3	EVAPORATOR REFRIGERANT LIQUID LEVEL SENSOR	蒸发器制冷剂液位传感器
46	4B20	EVAPORATOR ENTERING WATER TEMP. SENSOR	蒸发器进水温度传感器
48	4B21	EVAPORATOR LEAVING WATER TEMP. SENSOR	蒸发器出水温度传感器
50	4B22	CONDENSER ENTERING WATER TEMP. SENSOR	冷凝器进水温度传感器
52	4B23	CONDENSER LEAVING WATER TEMP. SENSOR	冷凝器出水温度传感器
54	4B24	OIL PRESSURE TRANSDUCER	油压传感器
40	4B25	EVAPORATOR REFRIGERANT PRESSURE TRANSDUCER	蒸发器制冷器压力传感器

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108	1X6	FIELD FLOW SWITCH TERMINAL BLOCK	现场流量开关接线端子
92	3Y1	LOAD SOLENOID VALVE	加载电磁阀
94	3Y2	UNLOAD SOLENOID VALVE	卸载电磁阀
32	3M1	COMPRESSOR MOTOR	压缩机电机
63,64	4E1–2	OIL SUMP HEATERS	邮箱加热器
97	4Y1	FILL SOLENOID VALVE	注油电磁阀
99	4Y2	DRAIN SOLENOID VALVE	排油电磁阀
65	4Y3	MASTER OIL LINE SOLENOID	主油路电磁阀
129	4B2	OIL LOSS LEVEL SWITCH	失油液位传感器
40	4B3	EVAPORATOR REFRIGERANT LIQUID LEVEL SENSOR	蒸发器制冷剂液位传感器
46	4B20	EVAPORATOR ENTERING WATER TEMP. SENSOR	蒸发器进水温度传感器
48	4B21	EVAPORATOR LEAVING WATER TEMP. SENSOR	蒸发器出水温度传感器
50	4B22	CONDENSER ENTERING WATER TEMP. SENSOR	冷凝器进水温度传感器
52	4B23	CONDENSER LEAVING WATER TEMP. SENSOR	冷凝器出水温度传感器
54	4B24	OIL PRESSURE TRANSDUCER	油压传感器
40	4B25	EVAPORATOR REFIGERANT PRESSURE TRANSDUCER	蒸发器制冷器压力传感器
42	4B26	CONDENSER REFRIGERANT PRESSURE TRANSDUCER	冷凝器制冷器压力传感器
44	4B27	COMPRESSOR DISCHARGE TEMP. SENSOR	压缩机排气温度传感器
66	4B29	HIGH PRESSURE CUTOUT SWITCH	高压切断开关
44,42	4Y20–21	DUAL PORT EXV ACTUATOR	双端口电子膨胀阀执行器
52	5B28	OUTDOOR AIR TEMP. SENSOR	室外温度传感器
115	5K1	CHILLED WATER PUMP STARTER	冷冻水泵启动
118	5K2	CONDENSER WATER PUMP STARTER	冷却水泵启动
166–176	5K4–11	UNIT STATUS RELAYS	机组状态继电器
155	5K12	ICE BUILDING CONTROL	制冰控制
153	5K13	EXTERNAL BASE LOAD ENABLE	外部基本负载使能
106	5K20	ICE BUILDING STATUS	制冰状态
123	5K22	EXTERNAL EMERGENCY STOP	外部急停
125	5K21	EXTERNAL AUTO STOP	外部自动停机
108	5S1	CHILLED WATER FLOW SWITCH	冷冻水流量开关
110	5S2	CONDENSER WAQTER FLOW SWITCH	冷却水流量开关
56	4B30	CONDENSER ENTERING WATER TEM. SENSOR	冷凝器进水温度传感器
58	4B31	CONDENSER LEAVING WATER TEMP. SENSOR	冷凝器出水温度传感器
60	4B32	TANK WATER TEMP. SENSOR	水箱温度传感器
195	1A21	HEAT RECOVERY WATER PUMP STATERS	热回收水泵启动器
189	1A22	HEAT RECOVERY WATER FLOW SWITCH/INTERLOCK	热回收水流量开关互锁
204	1A23	EXTERNAL HEAT RECOVERY ENABLE/DISABLE INPUTS	热回收开关量输入
212	1A24	EXTERNAL HEAT RECOVERY TANK WATER SETPOINT	热回收水箱温度设定
191,200	5K23	HEAT RECOVERY WATER PUMP STATERS	热回收水流量开关
204	5K24	EXTERNAL HEAT RECOVERY ENABLE/DISABLE INPUTS	热回收水箱温度设定
191	5S23	HEAT RECOVERY WATER PUMP STATERS	热回收水流量开关

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NOTES:

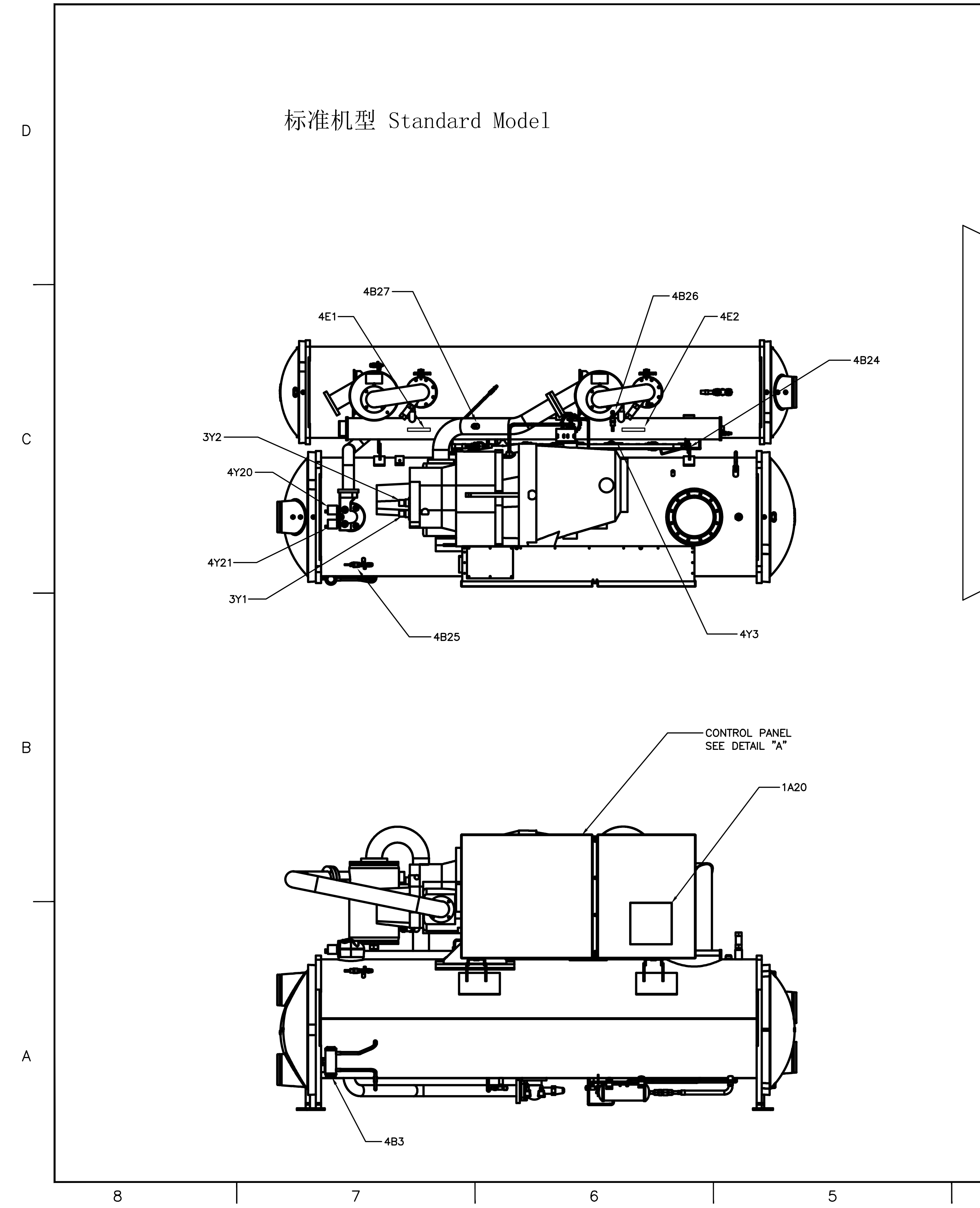
1. CLASS 1 FIELD WIRED MODULE
2. CLASS 1 FIELD WIRING INSULATION RATING IS REQUIRED TO BE EQUAL TO OR GREATER THAN THE EQUIPMENT SUPPLY VOLTAGE RATING. CLASS 2 FIELD WIRE INSULATION TO BE RATED AT 300V MINIMUM.
3. OPTIONAL MODULES. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
4. FIELD ASSIGNED PROGRAMMABLE RELAYS.
5. AUTO/STOP, EMERGENCY STOP THE CONTACTS ARE JUMPED AT THE FACTORY BY JUMPERS W1 & W2 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED REMOVE THE JUMPERS AND CONNECT TO THE DESIRED CONTROL CIRCUIT.
6. RELAY AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, 1/3 HP, 7.2 FLA AT 240VAC: 5 AMPS GENERAL PURPOSE.
7. IF SHIELD IS PRESENT, DO NOT WIRE SHIELD TO GROUND IN CONTROL PANEL. IF USED, SHIELD IS TO BE GROUNDED EXTERNALLY TO CONTROL PANEL. REFERENCE FIELD WIRING DIAGRAM FOR RECOMMENDED WIRE TYPE.
8. RELAY ENERGIZED WHILE MAKING ICE.
9. CONTACT CLOSURE ENABLES ICE MAKING.
10. CLOSED CONTACT COMMANDS BASE LOADING OPERATION.
11. ACTUAL BASE LOADING SETPOINT USED IS SETABLE AT FRONT PANEL. REFER TO IOM FOR DETAILS.
12. OPTIONAL MODULES. REFER TO FIELD WIRING DIAGRAM FOR SUGGESTED WIRING.
13. OPTIONAL MODULES. ONLY PRESENT WHEN HEAT RECOVERY IS REQUIRED

标记说明:

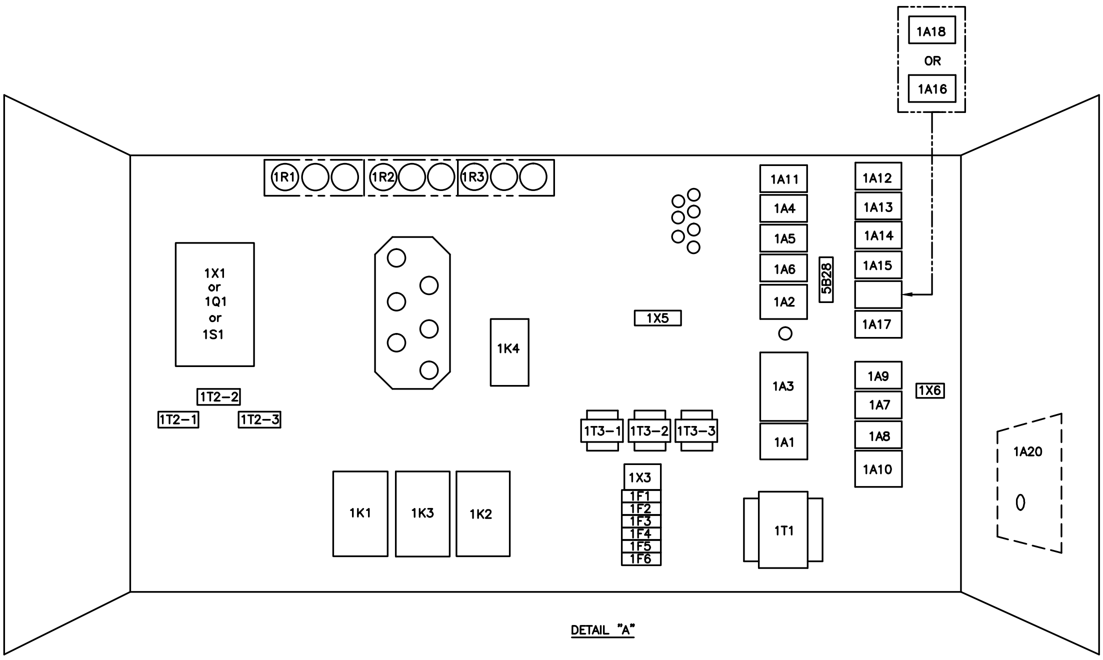
1. CLASS1 现场接线模式
2. CLASS1 现场接线绝缘等级应当相当或高于设备供应电压等级，CLASSII现场接线绝缘等级最小为300V
3. 选项模块的推荐接线请查看现场接线图
4. 现场赋值可编程继电器
5. 在出厂前，为确保正常操作， 自动/停止，急停的触点W1和W2已短接， 若进行远程控制， 应移去短接线，并将其接至相应的控制回路。
6. 继电器120VAC:7.2AMPS 阻性负载， 2.88AMP带载，1/3HP, 7.2FLA, 240VAC,5AMPS
7. 若存在屏蔽， 不用将屏蔽线接至控制柜内的接地处，若使用， 屏蔽层需接至控制柜外部，用线规格参考现场接线图。
8. 当执行制冰命令时，继电器被激活。
9. 触点闭合允许制冰。
10. 触点闭合执行基本负载操作。
11. 在操作面板上， 可进行实际负载设定， 细节参阅IOM.
12. 选项模块的推荐接线请查看现场接线图
13. 全热回收选项时安装

修改说明	版本	D
ENGINEER CHANGE	CN	963598

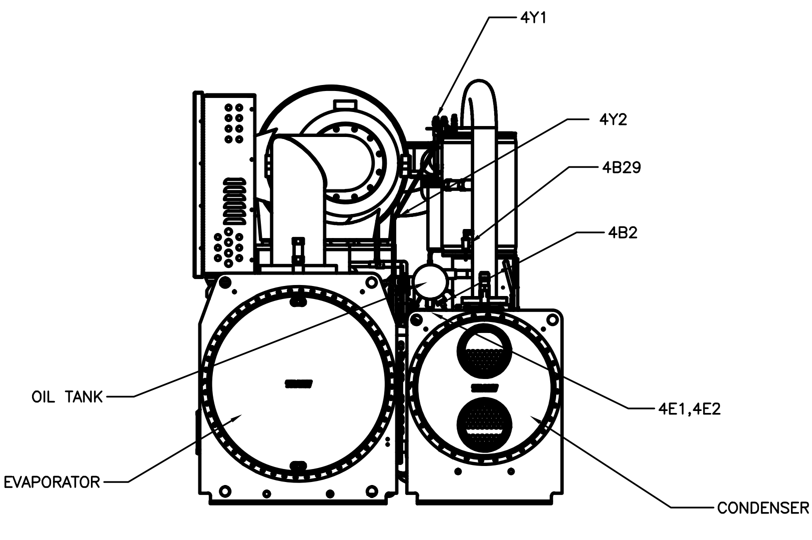
标准机型 Standard Model



UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES. TOLERANCE: .X = ± .XX = ± FINISH ✓ .XXX = ± ANGLES = ± HOLE DIA = + - CONFORMS TO ASME Y14.5M - 1994	**TRANE** THIS DRAWING IS PROPRIETARY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF TRANE DRAWN BY: PBL ©TRANE DATE: 03-MAR-2003 DO NOT SCALE PRINT THIRD ANGLE PROJECTION	23097564 SHEET 1 OF 1 REV G COMPONENT LOCATION RTHD WYE-DELTA START



DETAIL "A"



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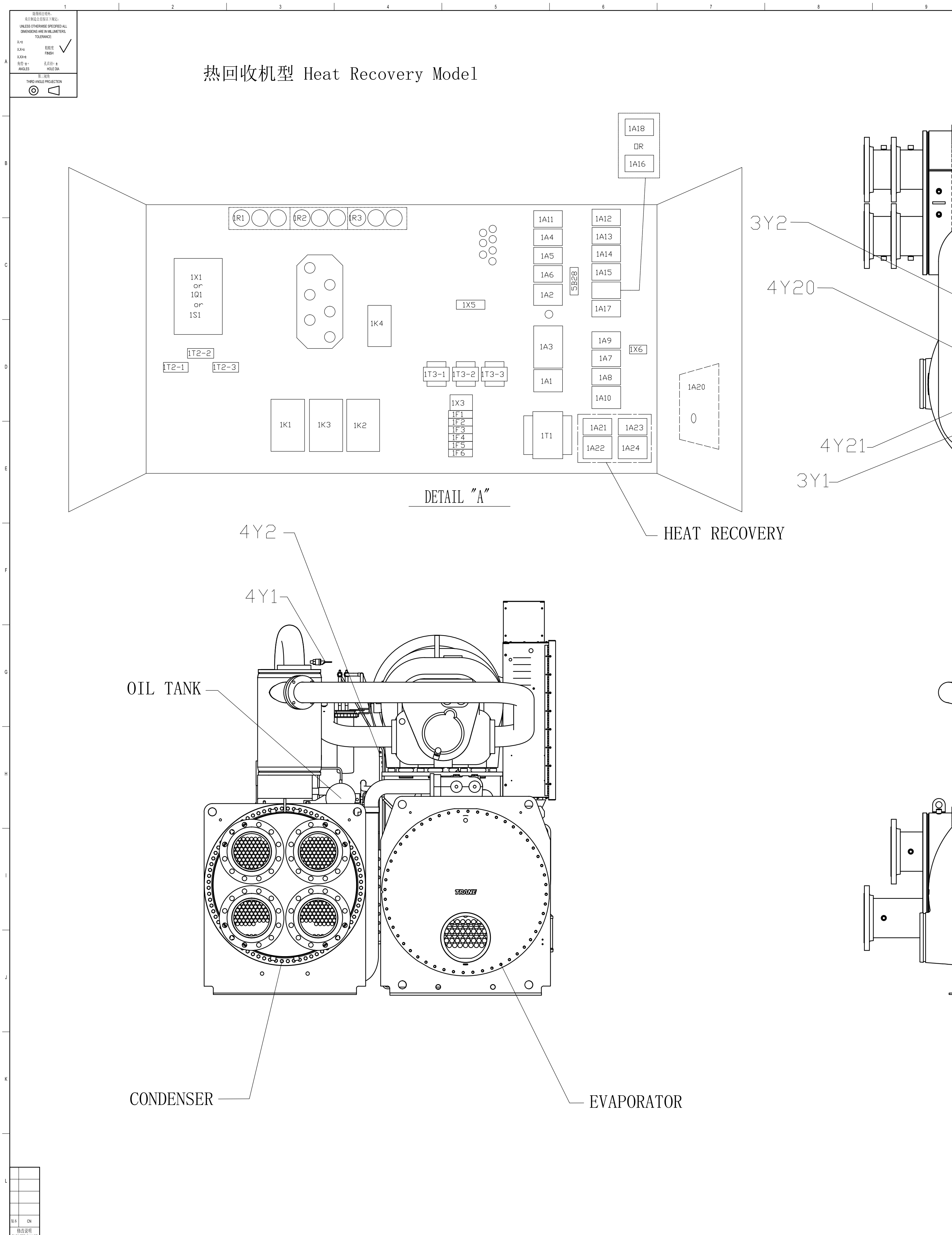
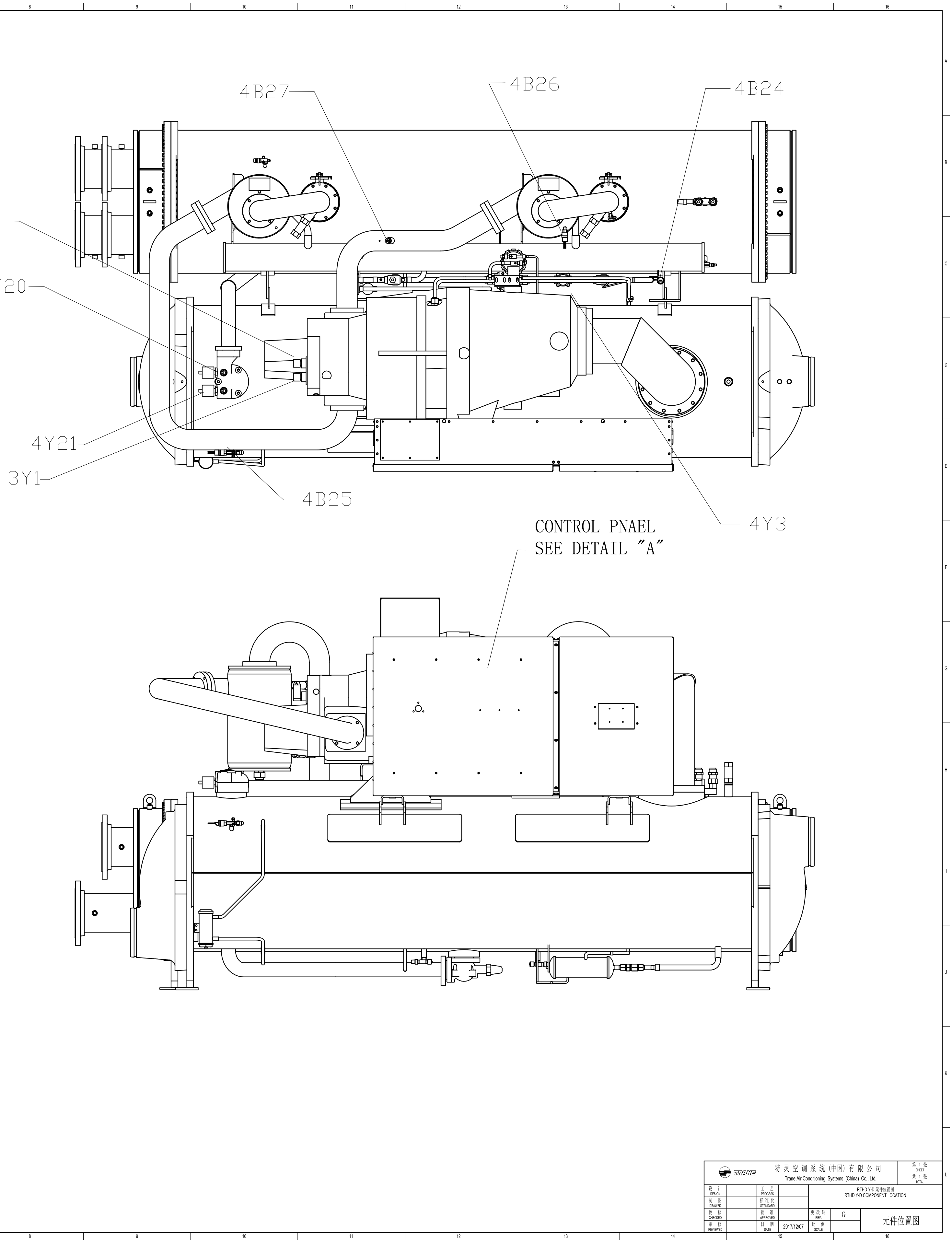
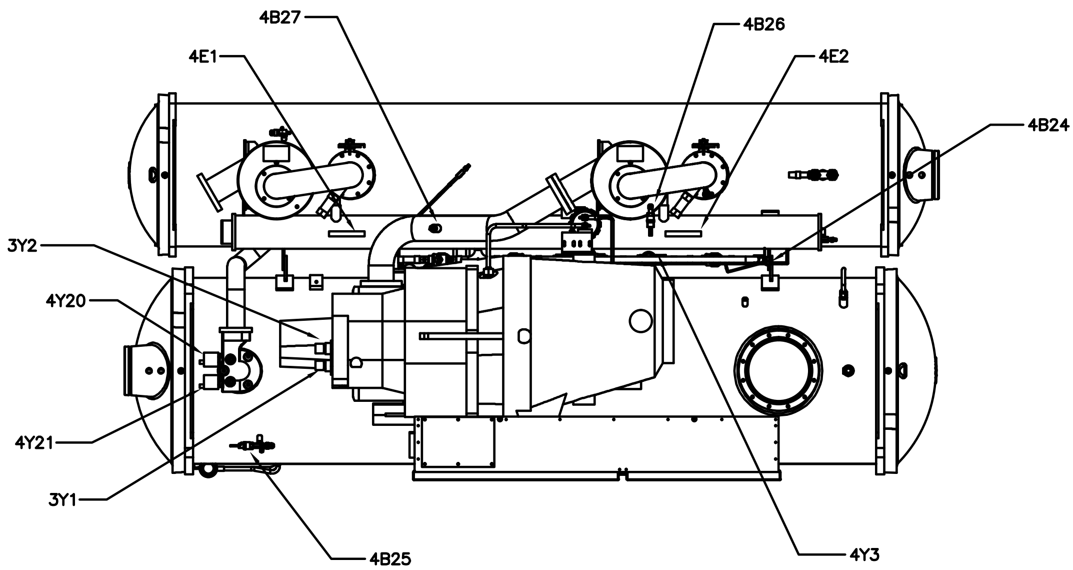
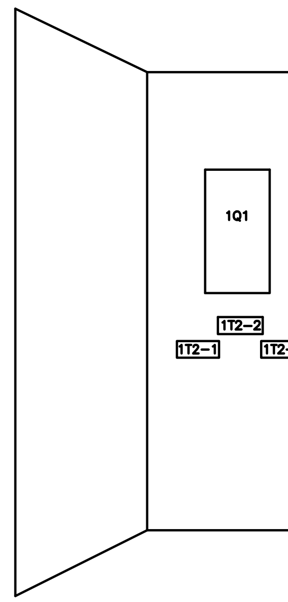
热回收机型 Heat Recovery Model

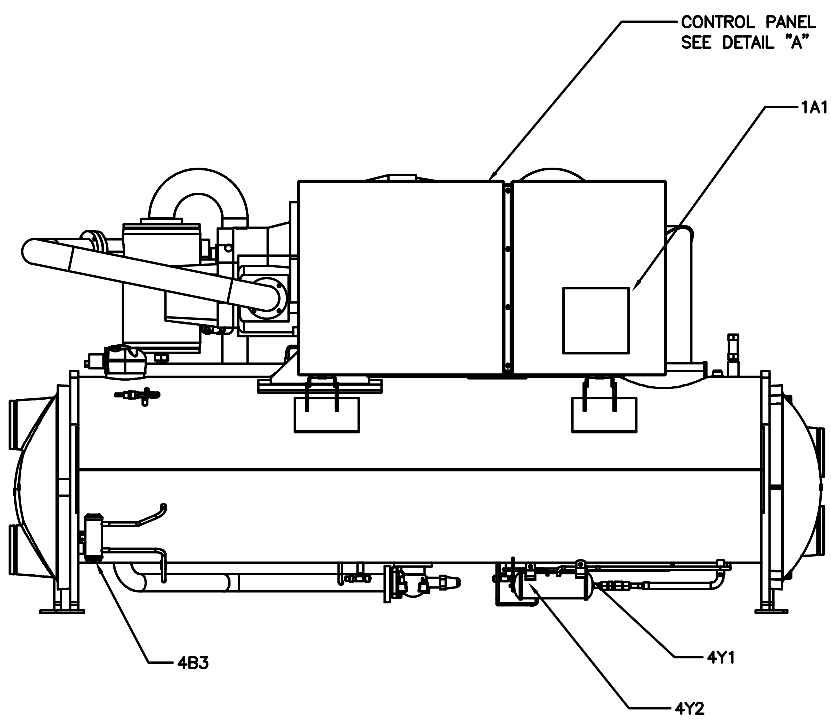


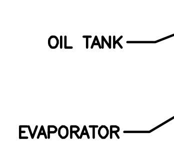

4B27
4B26
4B24
20
4Y21
3Y1
4B25
4Y3
CONTROL PNAEL
SEE DETAIL "A"
特灵空调系统(中国)有限公司
Trane Air Conditioning Systems (China) Co., Ltd.
第 1 张 SHEET
共 1 张 TOTAL
设计 DESIGN
工艺 PROCESS
制图 DRAWED
标准化 STANDARD
校核 CHECKED
批准 APPROVED
审核 REVIEWED
日期 DATE
2017/12/07
RTHD Y-D 元件位置图
RTHD Y-D COMPONENT LOCATION
更改码 REV.
G
比例 SCALE
元件位置图

标准机型 Standard Mode

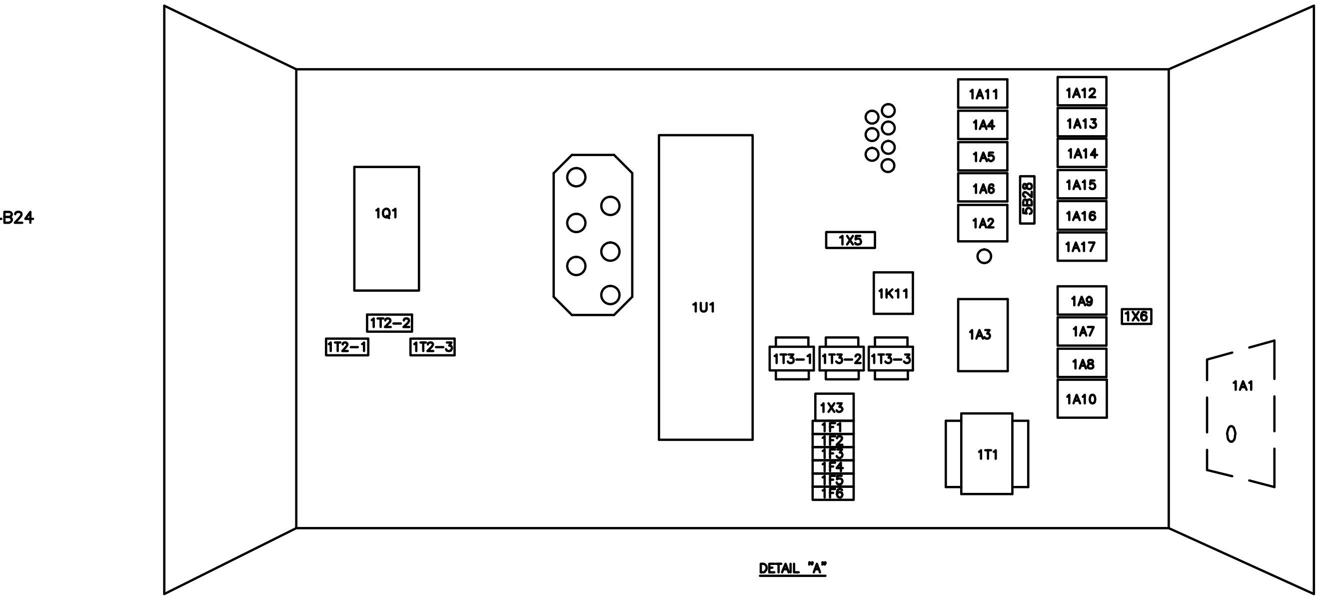








TRANE A DIVISION OF AMERICAN STANDARD INC. ALL RIGHTS RESERVED	2309–7565 SHEET REV C
DRAWN BY: PBL DATE: 3–13–03	COMPONENT LOCATION RTHD
REPLACES:	
REVISION DATE: 6–26–03	
SIMILIAR TO:	
SOLID STATE STARTER	



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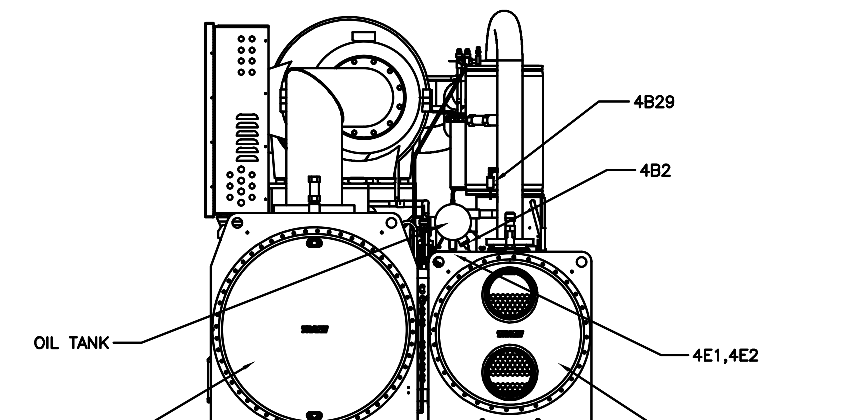
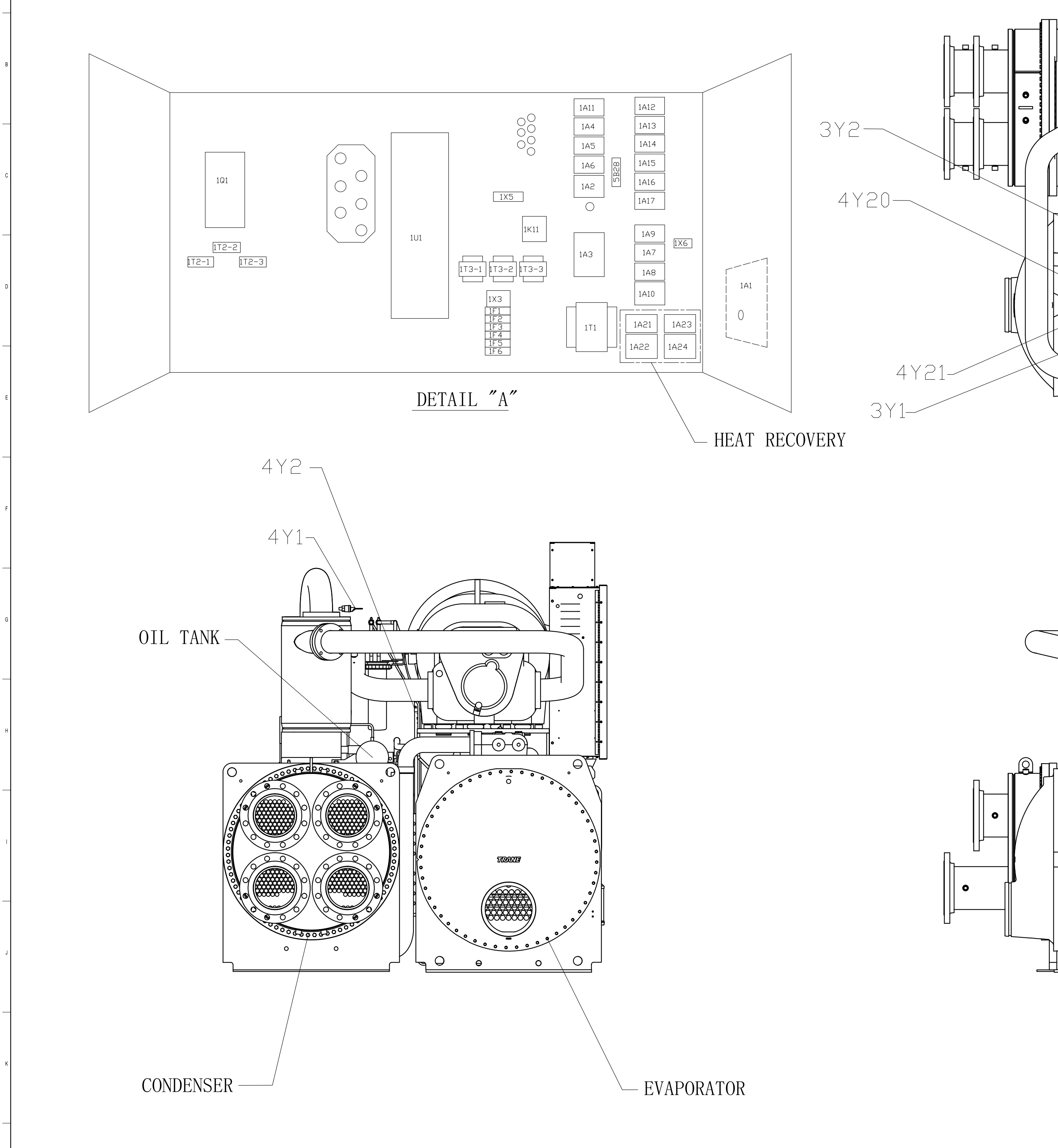
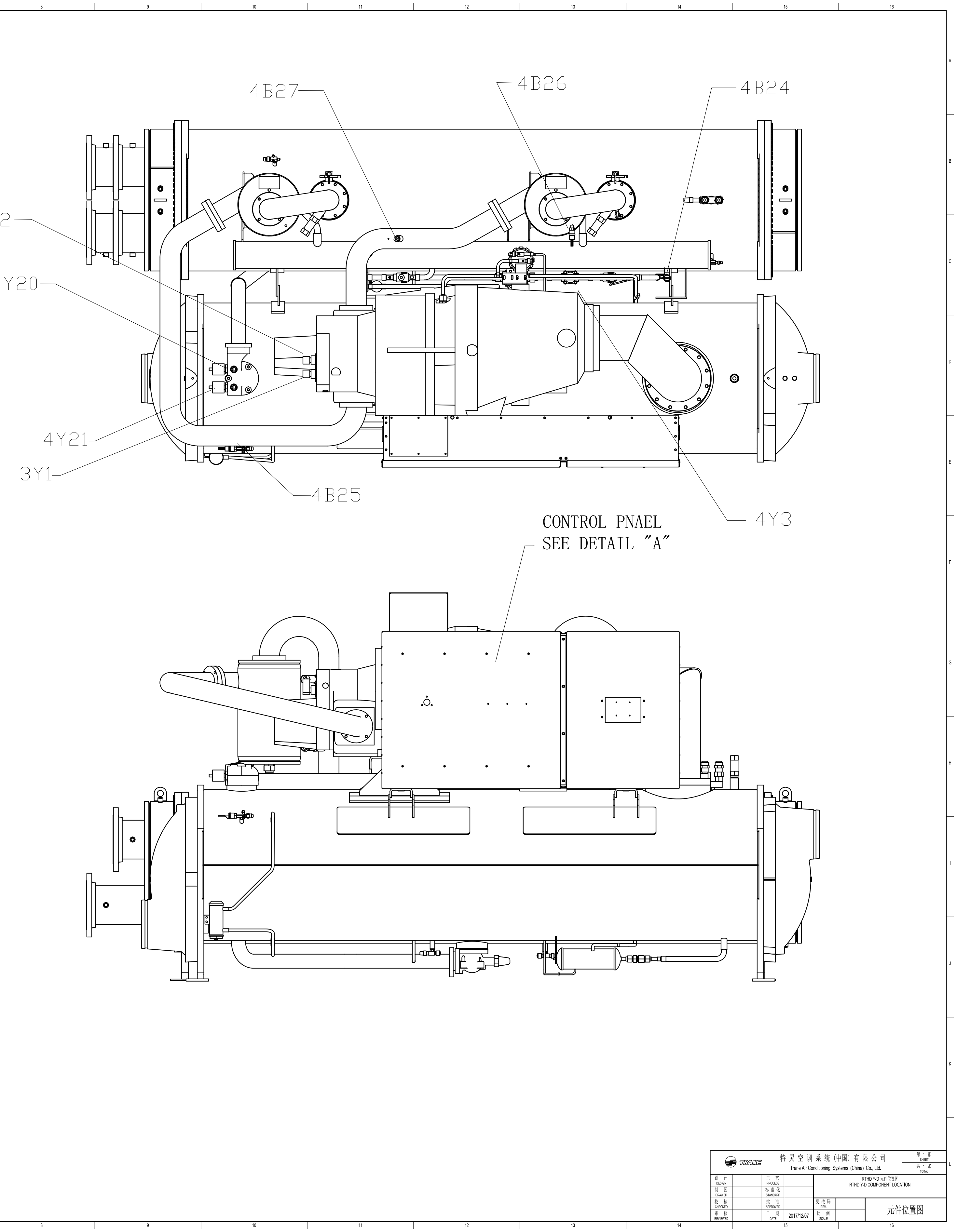


热回收机型 Heat Recovery Model




4B27
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比例 SCALE

Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services, and parts. For more information, visit www.Trane.com.

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RTHD-SVX02H-EN Feb. 2018
Supersedes RTHD-SVX02G-EN Sep. 2017

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