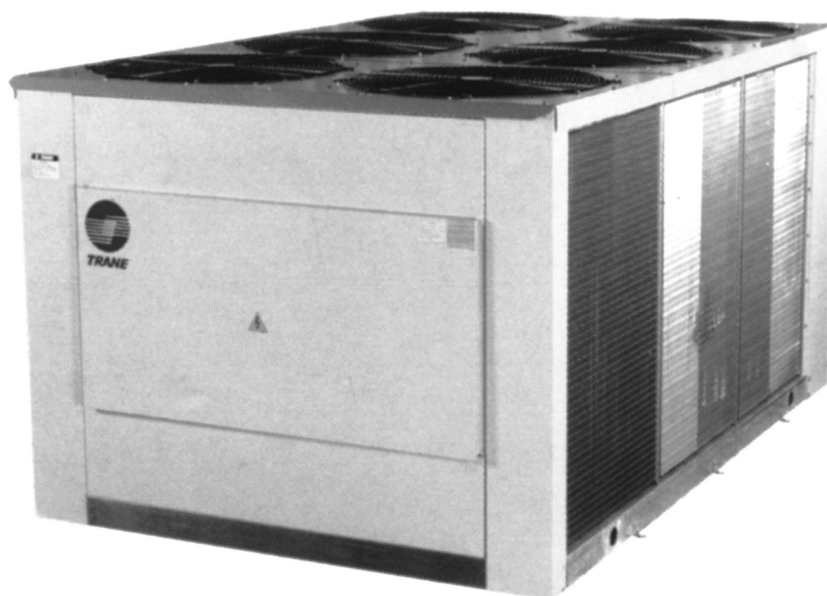




Installation Operation Maintenance

Split System
Condensing Units
20-55 Tons



Models

RAUP 200, RAUP 250, RAUP 300,
RAUP 400, RAUP 500, RAUP 600

MUL-SVN05A-E4



Performance Data

Foreword

These installation operation and maintenance instructions are given as a guide to good practice in the installation, putting, into service, operation and periodic maintenance by the Trane Product user. They do not contain the full service procedures necessary

for the continued successful operation of this equipment. The services of a qualified service technician should be employed through the medium of a maintenance contract with a reputable service company.

Warranty

Warranty is based on the general terms and conditions of The Trane Company. The warranty is void if the equipment is repaired or modified without the written approval of Trane, if the operating

limits are exceeded or if the control system or the electrical wiring is modified. Damage due to misuse, lack of maintenance or failure to comply with the manufacturer's instructions or recommendations is not covered by the warranty obligation.

Receiving/Handling

On arrival, inspect the unit before signing the delivery note. Specify any damage on the delivery note, and send a registered letter of protest to the last carrier of the goods within 72 hours of delivery. Notify the local Trane Sales Office at the same time. The unit should be totally inspected within 15 days of delivery.

If any concealed damage is discovered, stop unpacking the shipment. Take photos of the damaged material if possible. Notify the Carrier immediately by phone and registered mail. Notify the local Trane Sales office. Concealed damage must be reported within 15 days of delivery.

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MODEL NOMENCLATURE

MALAYSIA	MODEL NOMENCLATURE
	EG: R A U P 2 0 0 D O H O A 1 2 3 4 5 6 7 8 9 10 11 12
<u>Digit</u>	<u>Description</u>
R	Remote Condensing Unit
A	Air Cooled
U	Unit Airflow-Upflow
P	Development Sequence
200	Nominal Gross Capacity (MBH) 200 = 200 MbH 400 = 400 MbH 250 = 250 MbH 500 = 500 MbH 300 = 300 MbH 600 = 600 MbH
D	Electrical Rating / Utilization Range D = 380-415V / 3Ph / 50Hz
0	Motor / Compressor Controls 0 = None (Termination Only) 1 = DOL (3 wire) Starter
H	Minor Design Sequence
0	Factory Installed / Shipped Options 0 = None 1 = Corrosion Resistant Coated Fin 2 = Suction / Liquid Line Service Valves 3 = Crankcase Heater 4 = 1 and 2 (Corrosion Resistant Coated Fin & Service Valves) 5 = 1,2 and 3 (Corrosion Resistant Coated Fin / Service Valves & Crankcase Heater) 6 = 1 and 3 (Corrosion Resistant Coated Fin & Crankcase Heater) 7 = 2 and 3 (Service Valves & Crankcase Heater)
A	Service Indicator Specials : 1. Low Ambient Kit 2. Copper Fin



General Data 20-55 Ton Condensing Unit

Table 1

		RAUP 200	RAUP 250	RAUP 300	RAUP 400	RAUP 500	RAUP 600
Performances (1)							
Gross Cooling Capacity (1)	(kW)/(MBH)	60.5/207	73.9/253	90.3/308	113.9/389	147.9/505	180.5/617
Unit Capacity Steps (%)		100-50	100-50	100-50	100-75-50-25	100-75-50-25	100-75-50-25
Total Compressor Power Input (1)	(kW)	18.1	25.2	26.8	36.2	50.4	53.6
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Utilization Range		400V +,-10%					
Sound Power Level	(dB(A))	86	87	89	89	90	92
Compressor							
Number		2	2	2	4	4	4
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		2 x 10T	2x13 T	2 x 15T	2x(10T+10T)	2x(13T+13T)	2x(15T+15T)
Speeds Number		1	1	1	1	1	1
Motors Number		1	1	1	1	1	1
Unit MCA Amps (4)	(A)	50	55	108	93	104	107
RLA / LRA (1)	(A)	20.7/130	22.9/135	24.2/175	20.7/130	22.9/135	24.2/175
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900
Sump Heater (Optional) per compressor	(W)	100W-240V	2x80W-240V	2x80W-240V	100W-240V	2x80W-240V	2x80W-240V
Liquid and Suction connection							
Suction Connection	brazed	1 5/8"	2 1/8"	2 1/8"	1 5/8"	2 1/8"	2 1/8"
Liquid Connection	brazed	7/8"	7/8"	7/8"	7/8"	7/8"	7/8"
Coil							
Type		Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin	Plate Fin
Tube Size	(mm)	9.52	9.52	9.52	9.52	9.52	9.52
Tube Type		Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
Height	(mm)	1346	1600	1600	1168	1473	1270
Length	(mm)	1803	1803	2032	1803	1803	2444
Quantity		1	1	1	2	2	2
Face Area	(m2)	2.43	2.88	3.25	4.21	5.31	6.21
Rows		3	3	3	3	3	3
Fins Per Inch (fpi)		144	144	144	144	144	144
Fan							
Type		Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
Number		2	2	3	3	4	6
Diameter	(mm)/(in)	711/28	711/28	711/28	711/28	7 11/28	711/28
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct
Speeds Number		1	1	1	1	1	1
Air Flow	(m3/h)/(cfm)	18009/10600	19539/11500	25485/15000	29053/17100	37853/22280	49950/29400
Motors Quantity		2	2	3	3	4	6
Motors kW(2)	kw/hp	0.55/0.75	0.55/0.75	0.55/0.75	0.55/0.75	0.55/0.75	0.55/0.75
FLA/LRA (2)	(A)	1.56/5.7	1.56/5.7	1.56/5.7	1.56/5.7	1.56/5.7	1.56/5.7
Motor RPM	(rpm)	915	915	915	915	915	915
Dimensions							
Height	(mm)	1312	1465	1465	1414	1718	1515
Width	(mm)	1022	1222	1222	1920	1920	1920
Length	(mm)	2229	2294	2952	2557	2557	2957
Weight Uncrated	(kg)	499	624	740	1001	1246	1210
Weight Crated	(kg)	519	644	760	1036	1281	1245
System Data							
Refrigerant Circuit		1	1	1	2	2	2
Refrigerant Charge (3)							
Approximate per circuit	(kg)	19.5	20	27.5	19.5	20.0	27.5
RAUP Only							
Minimum Outdoor Air Temperature for Mechanical Cooling							
Standard Ambient Operating Range	(F)	59-133 F	59-133 F	59-133 F	59-113 F	59-113 F	59-113 F
	(C)	15-45 C	15-45 C	15-45 C	15-45 C	15-45 C	15-45 C
Low Ambient Option		Below 15 C Ambient					
High Pressure [cut out - cut in]	(psig)	390+/-15 psig, 260+/-20 psig					
Low Pressure [cut out - cut in]	(psig)	35+/-5 psig, 60+/-7 psig					

Notes

- [1] at 7 deg C SST and 35 deg C Ambient, 400V, Subcooling 8.3K, Superheat 11.1K
 [2] Per Motor @400V
 [3] Per Circuit. RAUPs have a dry Nitrogen holding charge.

[4]

Minimum Circuit Ampacity (MCA) is 125% of the largest compressor RLA plus 100% of the other compressor RLA plus the sum of the condenser fan FLA.

Installation

General Information

This manual cover the installation of the RAUP 200, RAUP 250 & RAUP 300(single circuit), and RAUP 400, RAUP 500 & RAUP 600(dual circuits)air cooled condensing units. Installation procedures should be performed in the sequence that they appear in this manual. Do not destroy or remove the manual from the unit. The manual should remain weather-protected with the unit until all installation procedures are complete.

Note: It is not the intention of this manual to cover all possible variations in the systems that may occur or to provide comprehensive information concerning every possible contingency that may be encountered during an installation. If additional information is required or if specific problems arise that are not fully discussed in this manual, contact your local sales office.

Note: "Warnings" and "Cautions" appear at appropriate places in this manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The Company assumes on liability for installations or servicing performed by unqualified personnel.

Unit nameplate

The unit nameplate gives the full model reference. The power supply of the unit is specified and must not vary by more that 5% of the specified voltage.

Machine room installation requirements

Foundation

A special base or foundation is not required when the floor is level and of sufficient strength to support the unit's weight.

Lifting of the unit

Four lifting lugs are provided at the base of each unit for crane lift. Attach cable slings to each lug (refer to Figure1) and install a spreader bar between the cable to protect the unit. Make sure that the lifting equipment is capable of handling the weight of the unit.(Table 1)

Clearances

Provide sufficient clearance around the unit for performance of service and maintenance. Caution unit operation is a function of the air temperature. Any recycling of the air fed out by the fans will increase the air intake temperature over the condense fins and result in a high temperature out. Make sure nothing prevents air flow to run through the unit coils. Refer to dimensional drawing recommended for detailed clearances, under "Dimensional Data" section.

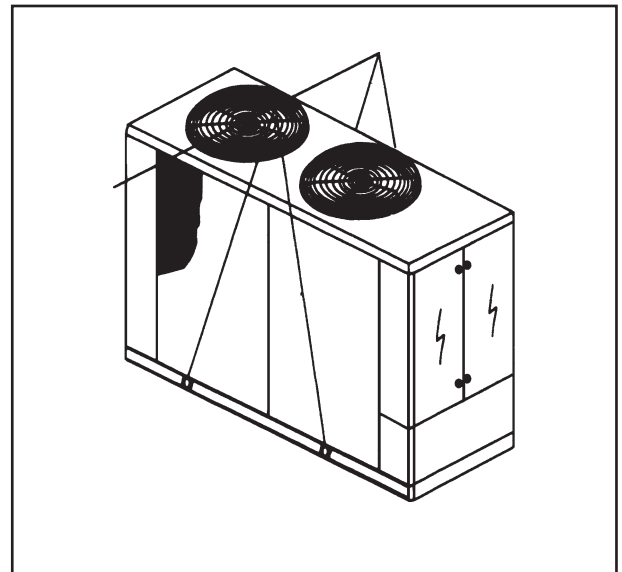
Special lifting and moving instruction

A specific lifting method is recommended as follows:

1. Four lifting points are built into the unit
2. Slings and spreader bar to be provided by rigger and attached to the four lifting points.
3. Minimum rated lifting capacity (vertical) of each sling and spreader bar shall be no less than the tabulated unit shipping weight.
4. Caution :The unit must be lifted with the utmost care Avoid shock load by lifting slowly and evenly.

Figure 1

Lifting of the unit



Vibration Isolators (option)

Vibration isolators (rubber pads) are recommended and are to be placed under the unit feet. The unit is levelled by placing the

Installation

Refrigerant circuit

One circuit on sizes 200, 250 and 300, and two circuits on sizes 400, 500 and 600. Single circuit units will have two compressors manifolded. Both circuits of the four compressor units are manifolded. Refrigerant connections not connected are sealed and plugged.

Refrigerant pipe connections

Determination of the size of the pipe connections.

Liquid line

Size the liquid line on the basis of:

1. Full load operating conditions.
2. A pressure drop of 100 kPa maximum.
3. A liquid velocity not exceeding 3 m/s (to avoid hammer).

Suction line

Design the suction line to provide sufficient gas velocity in both horizontal and vertical runs to carry the compressor oil and ensure a uniform rate of return to the compressor. Size the hot gas line on the basis of:

1. Producing gas velocity in horizontal runs at least 2.5 m/s at minimum operating conditions.
2. Producing gas velocity in vertical risers at least 5 m/s at minimum operating conditions.
3. Gas velocity should not exceed 20 m/s under maximum load conditions.
4. Maximum pressure drop in suction line should not exceed 20 kPa.

Pitch the horizontal run of suction line toward the evaporator.

Refrigerant line isolation

Isolate the refrigerant lines from the building to prevent normal vibration in the lines from the building structure. Also avoid bypassing the isolation system on the unit by attaching the refrigerant piping or electric conduit too rigidly.

Any unit vibration can travel along rigid pipes or conduits to the building.

Pressure and leak testing

When pressure and leak testing, these safety precautions must be adhered to:

1. Do not work in a closed area where refrigerant may be leaking- a sufficient quantity of vapors may be present to cause personal injury. Provide adequate ventilation.
2. Do not use oxygen or acetylene in place of refrigerant and dry nitrogen for leak testing- a violent explosion may result.
3. Always use a pressure regulator, valves and gauges to control drum and line pressures when pressure testing the system. Excessive pressures may cause line ruptures, equipment damage or an explosion resulting in personal injury.

Pressure test the liquid line, and suction line at pressures dictated by local codes.

Caution: Do not exceed the high pressure control setting plus 0.7 bar. Test pressures on liquid line and on suction line must comply with local and national codes.

Charge enough refrigerant into the system to raise the pressure to 1 bar. Using oil-pumped dry nitrogen, build the system pressure to 7 bar.

Check the piping and the evaporator unit for leaks with a leak detector. Be very thorough in this test, checking every possible point of leakage. If leaks are found during the testing, release the test pressure, break the connection and make a new joint. Retest to make sure the connection is solid.

Field evacuation

For field evacuation, use a rotary-style vacuum pump. Determine the pump size required for proper unit evacuation.

Table 1A Electrical data

Model	Unit wiring				Motor data						R22/ckt. Approx. charge (kg)
	Voltage	Voltage Range	MCA	Max. Fuse Size	Compressor (ea.)			Condenser fan (ea.)			
					Qty	RLA	LRA	Qty	Hp	FLA	
RAUP 200	415/50/3	360-440	50	70.4	2	20.7 X 2	130	2	3/4	1.56	19.5
RAUP 250	415/50/3	360-440	55	77.5	2	22.9 X 2	135	2	3/4	1.56	20
RAUP 300	415/50/3	360-440	108	83.3	2	24.2 X 2	175	3	3/4	1.56	27.5
RAUP 400	415/50/3	360-440	93	113.4	4	20.7 X 4	130	3	3/4	1.56	19.5
RAUP 500	415/50/3	360-440	104	126.5	4	22.9 X 4	135	4	3/4	1.56	20
RAUP 600	415/50/3	360-440	107	136.4	4	24.2 X 4	175	6	3/4	1.56	27.5

MODEL	COMPRESSOR				(RLA)		LRA	FAN			MCA@380V
	VOLT	HZ	PH	TON	415V	380V	@380V	Qty	Hp	FLA	
RAUP 200	380	50	3	2 (10T)	20.7 X 2	22.6 X 2	142	2	3/4	1.70	54.3
RAUP 250	380	50	3	2 (13T)	22.9 X 2	25.0 X 2	147	2	3/4	1.70	59.7
RAUP 300	380	50	3	2 (15T)	24.2 X 2	26.4 X 2	191	3	3/4	1.70	64.5
RAUP 400	380	50	3	4 (10T)	20.7 X 4	22.6 X 4	142	3	3/4	1.70	101.2
RAUP 500	380	50	3	4 (13T)	22.9 X 4	25.0 X 4	147	4	3/4	1.70	113.1
RAUP 600	380	50	3	4 (15T)	24.2 X 4	26.4 X 4	191	6	3/4	1.70	122.4

Installation

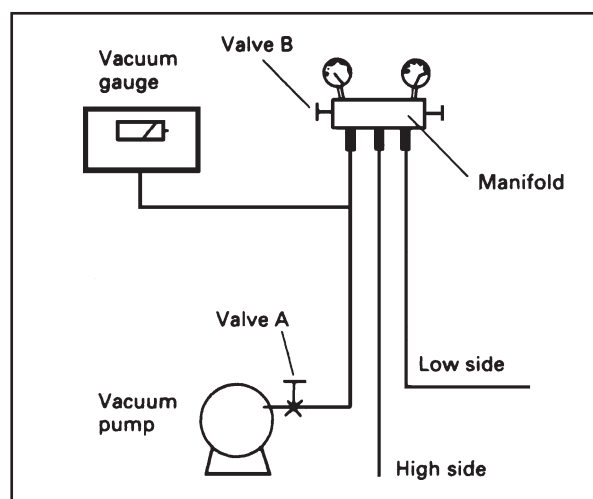
When hooking a vacuum pump to a refrigeration system, it is important to connect the pump to both the high and low side of the system.

Follow the pump manufacturer's directions as to the proper methods of using the vacuum pump. The lines used to connect the pump to the system should be copper and of the largest diameter that can practically be used. Using larger line sizes with minimum flow resistance can significantly reduce evacuation time. Rubber or synthetic hoses are not acceptable for unit evacuation because they have moisture absorbing characteristics which result in excessive rates of outgassing and pressure rise during standing vacuum test. This makes it impossible to determine if the unit has a leak.

An electronic thermopile vacuum gauge should be installed in the common line ahead of the vacuum pump shutoff valve as shown in Figure 2. Close Valve B and open Valve A. After several minutes, the gauge reading will indicate the minimum blank-off pressure the pump is capable of pulling. Rotary pump should produce vacuum of less than 100 microns.

Open Valve B and evacuate the system to a pressure of 500 microns or less. Valve A must be closed when taking this reading. Once 500 microns or less is obtained, with Valve A closed, a time versus pressure rise should be performed. The maximum allowable rise over a 15 minute period is 200 microns. If pressure rise is greater than 200 microns but levels off to a constant value, excessive moisture is present. If the pressure steadily continues to rise, a leak is indicated.

Figure 2
Vacuum pump connection.



Electrical Connections

Wiring diagrams are furnished with the units, but extra copies may be obtained from the local Trane sales office. The installing contractor is to provide and install fused disconnect switches and the wiring up to the unit control panel. Check all wiring connections and trace the circuits to make sure that they agree with the wiring diagrams.

Caution :

1. All wiring should comply with local and national codes. Type and location of disconnect switches should comply with local and national codes. Install disconnect switch near unit, within sight, for safety.
2. Use copper conductors only for installation wiring. Unit terminals are not designed to accept other type of wiring. The use of aluminium wire may cause galvanic corrosion and/or overheating at the connection points with resultant equipment failure.

Unit Start-Up

Preparation for start-up

Before starting the unit, use the following procedures to ensure that the unit is completely and properly installed and ready for start-up.

The installer must make sure that the following points are checked before the initial start-up.

1. Inspect all wiring connections. Connections should be clean and tight. Trace circuits to ensure that wiring agrees with wiring diagrams provided with the unit. Information in the title block of the wiring diagram should match the data that appears on the unit nameplate.
2. Close the unit power fused disconnect switch and the manual disconnect switch.
3. Check the unit supply voltage to ensure that the voltage is within the utilization range.
4. Check the compressor oil level.
5. Check with a phase-meter the direction of rotation of scroll Trane compressors or check the good operation of the discharge and suction pressures.
6. As the various motors of the system are started, check the direction of rotation and make sure that the driven equipment is operating satisfactorily.
7. Ensure sufficient cooling load available at day of start-up (minimum of 50% of design load).

Preparation

Before putting the system into operation, perform these service and check-out procedures :

1. Before making any electrical power connections make sure that the insulation resistance of all power terminal to earth is in accordance with the international electrical codes. Measure the insulation of all electrical motors using a 500 V DC tester and refer to the manufacturer's specifications.

Warning :

No motor should be started if the insulation resistance is less than 2 mega ohms. Under no circumstances should any voltage be applied to a motor while it is under vacuum.

2. Check the unit supply voltage to ensure that the voltage is within the utilization range.

Caution :

Phase unbalance must not exceed 2% . Supply for all motors is to be within plus or minus 5% of the voltages specified on the compressor nameplate.

3. Place all refrigerant circuit valves in operating position.

Installation

4. Reset all controls equipped with a manual reset function.

Refrigerant charging

After the refrigeration pipework system has been pressure tested and evacuated, and meets the vacuum pressure requirements of paragraph <<Field evacuation>>, the refrigerant may be charged as follows. Be sure to follow the start-up procedure at the same as charging the refrigerant.

1. Loosely connect a cylinder of refrigerant to the 1/4" OD Charging Valve Located on the liquid line.
2. Open and close the valve on the refrigerant cylinder to purge the connection. Tighten the coupling nut.
3. Invert the refrigerant cylinder so that only liquid will enter the system
4. Allow the compressor to continue running throughout the remainder of the charging operation. Do not allow the pressure to fall below 0.15 bar.

Caution:

Do not attempt to start the compressor by blocking the safety controls. Allow the condensing unit to function in a normal manner.

5. Allow the system to continue functioning for approximately 30 minutes. If during this period bubbles appear in the liquid line sight glass, add refrigerant.
6. Leak-test the refrigerant circuit.

Start-up procedure

1. Start the unit by switching to <<On>>
2. After the unit has started, allow it to operate for at least 15 minutes to stabilise operating pressures. Then check :
 - compressor oil level.
 - compressor and fan motor power consumption.
 - suction pressure.
 - discharge pressure.
 - liquid line sight glass.
 - superheat.
 - subcooling.

All readings and measurement should be logged. Procedures are given below.

CAUTION

PHASE ROTATION IS CRITICAL

IF SUCTION PRESSURE DOES NOT FALL TO EXPECTED OPERATING LEVEL WITHIN THIRTY (30) SECONDS AFTER COMPRESSOR IS STARTED, COMPRESSOR ROTATION MAY BE REVERSED.

TO REVERSE ROTATION, DISCONNECT ALL UNIT POWER AND REVERSE ANY TWO (2) INCOMING POWER LEAD WIRES AT THE UNIT HIGH VOLTAGE TERMINAL BLOCK. RECONNECT ALL UNIT POWER, RESTART UNIT, AND RE-CHECK SUCTION PRESSURE.

Oil level

Oil should be visible in the compressor, under full load, in the compressor oil level sight glass. The unit was charged with the proper amount of oil before shipping. Under normal operation, compressor oil is always expected to return to compressor oil sump, and no additional oil should be added. For oil level indication, refer to compressor oil sight glass, as per Figure 3. If oil is within sight glass visibility, oil quantity should be sufficient.

Refrigerant pressures

Observe operating pressures. If pressures are above or below normal see <<Trouble Analysis>> section. Normal operating pressures are in Table 2. A High & Low pressure settings are found in Table 1

Liquid line sight glass (Optional)

The flow of refrigerant through the sight glass should be smooth and without bubbles. Bubbles indicate a refrigerant shortage and probably a leak, or a restriction in the liquid line.

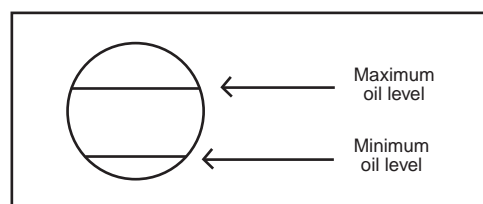
Superheat

Normal Superheat is 6 to 8 deg C. Overfeeding of the evaporator results in high suction pressure, low superheat and possible liquid carryover. Inadequate or too high a superheat is remedied by adjusting stem on the thermostatic expansion valve (TEV). If this fails to correct the condition, then the valve cage or power element of the TEV may be defective and should be replaced.

Caution:

1. Excessive foaming indicates the presence of refrigerant in the oil and will result in insufficient compressor lubrication. Turn off the motor and investigate the cause.
2. An excess of the oil in the compressor can cause problems in the same way as a lack of oil. Before topping up, contact a qualified service technician. Use only Trane recommended oils.

Figure 3 - Compressor oil level



WARNING

1. Do NOT run the compressor on reverse rotation
2. Do NOT perform any pump down cycle with Scroll compressor
3. Do Not run the compressor below the setting of low pressure switch
4. Do NOT bypass any safety devices when operating the system.

Failure to observe any of the above will cause severe damage to the Scroll compressors.

Operation / Maintenance

Figure 3A
PIPING DETAILS OF REFRIGERANT COILS

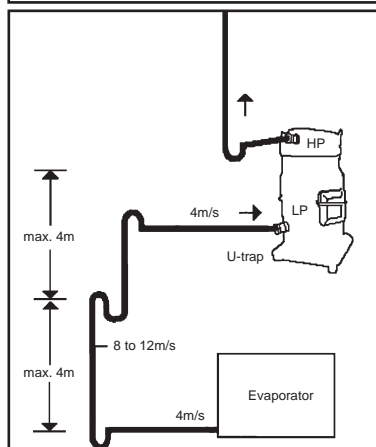
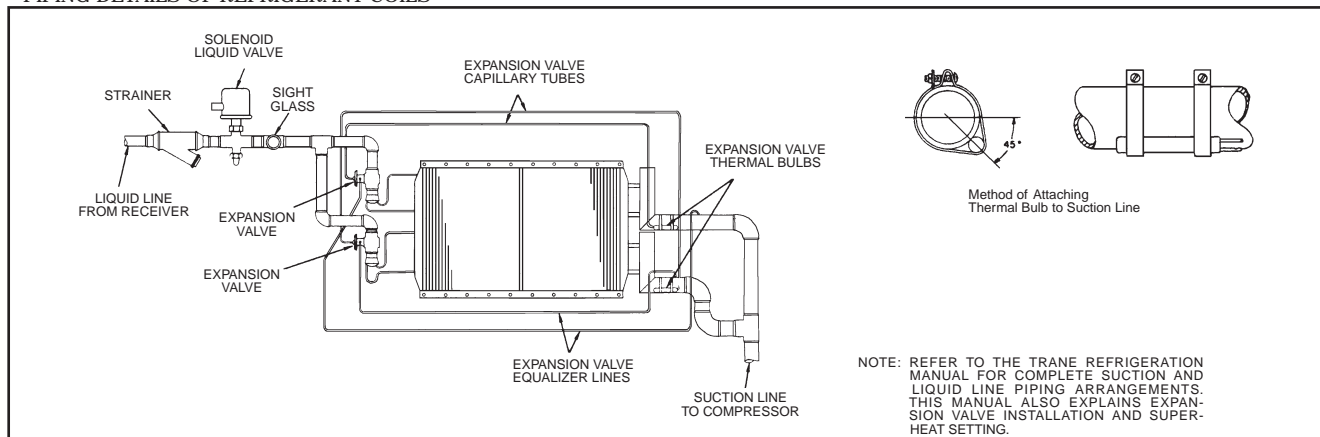


Figure 3B

Table 2 - Normal operating conditions

Ambient	Temperature (C)		
	25	30	40
Discharge pressure (bar)	14-17	17-19	22-25
Suction pressure (bar)	4-6	4-6	4-6

Final checkout

Run the unit sequentially through its stages of cooling. Once proper unit operation is confirmed, perform these final steps:

1. Inspect the unit for debris and/or misplaced tools and hardware.
2. If the unit is operated immediately, be sure all valves are in operating position.
3. Secure all panels including control panel in place.

Operation

Operating the unit

Unit operation unit initialized by turning the control circuit switch in the control panel.

Seasonal start-up procedure

1. Perform the applicable procedures outline under << Annual Maintenance >> in the Maintenance Section
2. Test the entire refrigerant system for leaks.
3. Close the system master disconnect switch
4. Start the system
5. Check the operation of all interlocked equipment.
6. Check oil level and operating pressures after the system has been in operation for 15 to 20 minutes.
7. Check discharge pressure against <<Normal operating conditions>>. If the pressure is above or below the normal level, stop the unit and correct the cause.
8. On Scrolls, compressor sightglass oil levels may be anywhere within the sightglass. Also 2 scrolls manifolded together will have different levels.

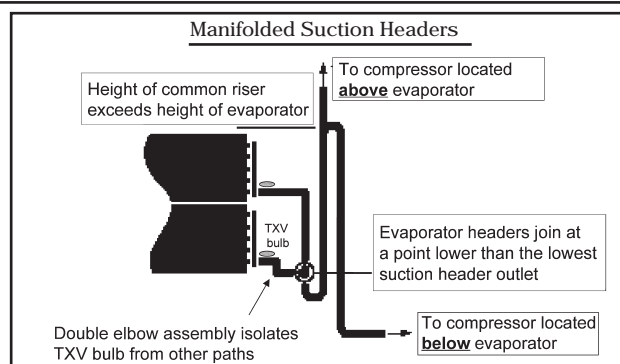


Figure 3C

Maintenance

The following maintenance are given as an essential part of the required maintenance of this equipment. However the services of a qualified services technician are required to perform the periodic maintenance procedures as part of a regular maintenance contact. Perform all maintenance procedures at the scheduled intervals. This will prolong the life of the unit and reduce the possibility of costly equipment failure. Use an <<operator's log>> to record a weekly <<operator condition history>> for this machine. The operating log for this unit can be a valuable diagnostic tool for service personnel also, the operator, by noticing trends in the operating conditions can often foresee and prevent problem situations before they become serious. It may be required for inspection in the event of warranty claim.

Weekly maintenance

1. Check the compressor oil level. The oil should cover 1/2 of the sight glass when running at full load. Before oil is added allow the compressor to run continuously for 3-4 hours. Check the oil level every 30 minutes. If the level does not return to cover 1/2 of the sight glass contact a qualified service technician.
2. Trane approved compressor oil:
Trane oil 015E.(R22 refrigerant)

Note:

The lubricating oils recognised by Trane have been subjected to extensive testing in out laboratories and have been found to give the required satisfactory results for use with Trane compressors. The use of any oil not conforming to Trane required standard is at the sole responsibility of the user and could result in warranty cancellation.

Maintenance

Caution:

1. Excessive foaming indicates the presence of refrigeration in the oil and will result in insufficient compressor lubrication. Turn off the motor and investigate the cause.
2. An excess of oil in the compressor can cause problems in the same way as a lack of oil. Before topping up, contact a qualified service technician. Use only Trane recommended oil.
3. The flow of refrigerant through the sight glass should be smooth and without bubbles. Bubbles indicate a refrigerant shortage and probably a leak, or a restriction in the liquid line. Contact a qualified service technician. Each sight glass is equipped with a moisture indicator. The colour of the indicator element changes with the amount of moisture in the refrigerant, but also as a function of temperature. It should indicate <<dry>> refrigerant if it indicates <<wet>> run the unit for a minimum of 12 hours and check again. If it remains consistently in <<caution>> or <<wet>> zones, contact a qualified service technician.
4. Run the compressor(s) for a minimum of two (2) hours before taking the initial moisture level readings after a start-up. The moisture indicator element is moisture and temperature sensitive, so the system must be at normal operating temperatures to obtain correct moisture level readings.

3. Observe operating pressures. If pressures are above or below normal, see <<Trouble Analysis>> section. Normal operating pressures are in Table 2.
4. Inspect entire system for any unusual conditions such as noisy compressor, loose access panels, leaky pipes of chattering contactors.
5. Note temperatures, pressures, date and time as well as any observation in a machine log book.

Annual maintenance

1. Remove corrosion from any surface and repaint. Check the condition of the gasket around the control panel door.
2. Perform all weekly maintenance procedures.

Maintenance inspections

If the unit does not perform properly during these inspections, consult the <<Trouble Analysis>> section for possible cause and recommended procedures. The following procedures should be carried out by a qualified service technician as part of a maintenance contract.

The first and last visit will include the seasonal shut down and start-up procedures, when applicable as detailed on the section on <<operation>>. The visits should include the following procedures :

- Inspect contacts of motor contactors.
- Check setting and function of each system control.
- Perform an oil analysis to determine the acidity of the compressor oil and record the results.

Warning / Caution :

The oil analysis procedure must be performed by a qualified service technician. Incorrect interpretation of analysis results can cause damage to the unit. The use of improper analysis procedures can cause hazardous condition that may result in injury to service personnel.

- Refrigerant leak test.
- Check motor winding insulation (once per year).

Other procedures may be necessary, depending on the age and usage of the equipment.

Note :

It is important that the equipment is regularly serviced by a qualified service technician, at least once per year /1000 hours of operation , minimum frequency. Failure to respect this requirement may result in cancellation of Trane warranty and liability.

A maintenance visit by a qualified service technician is also recommended after the first 500 hours of operation after commissioning.

Table 2A

General interconnecting line sizes.

CONDENSING UNIT	LENGTH OF INTERCONNECTING LINES(FT)**																					
	0-20		21-40		41-60		61-80		81-100		101-120		121-140		141-160		161- 180		181-200			
	LINE SIZE - O.D.(IN.)																					
	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT	LIQ	SUCT		
RAUP 200,400	5/8	1 5/8	7/8	1 5/8	7/8	1 5/8	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8		
RAUP 250,500	7/8	1 5/8	7/8	1 5/8	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8	1 1/8	2 1/8	1 1/8	2 1/8	1 1/8	2 1/8	1 1/8	2 1/8	—	—		
RAUP 300.600	7/8	1 5/8	7/8	2 5/8	7/8	2 1/8	7/8	2 1/8	1 1/8	2 1/8	1 1/8	2 1/8	1 1/8	2 1/8	—	—	—	—	—	—		

** In shaded region, use 2 1/8 for all horizontal runs, and 1 5/8 for all vertical risers.

However, for correct and proper pipe sizing, it is recommended to size piping based on Trane recommended piping guide or use computer aided software where applicable

Compressor

Compressor Motor Winding Thermostat

Each motor winding thermostat is a pilot duty control designed to stop compressor operation if the motor windings become hot due to rapid cycling, loss of charge, abnormally low suction temperatures, or the compressor running backwards.

Compressor Manifold Piping

The compressor refrigerant piping manifold system was purposely designed to provide proper oil return to both compressors; therefore, the original refrigerant manifold system should not be modified in any way!

If a compressor replacement is required, do not alter the compressor manifold piping; improper oil return and compressor failure could result. If a suction filter is required, install it a minimum of 18" upstream of the compressor manifold piping.

See Figure 4

Caution : Altering the original manifold piping may cause oil compressor failure.

The scroll compressors in the RAUP units do not unload. Instead, they are staged on and off for various steps of loading. This sequence is critical and must not be changed! Altering this sequence in any way could cause compressor failure.

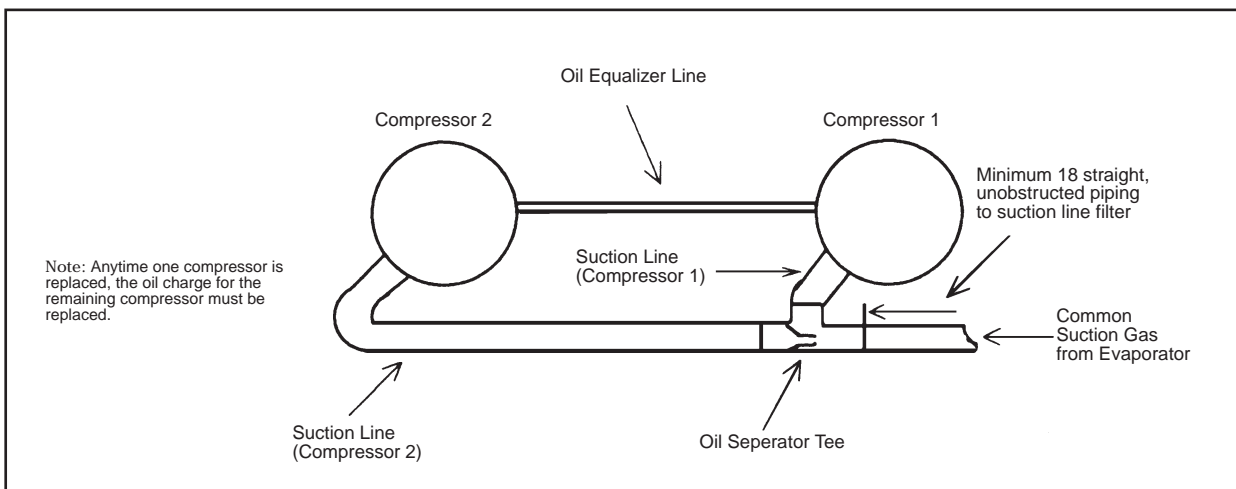
This sequence is of most importance because it maximizes lubrication and ensure proper oil return. Secondly, the design of the oil return with equalizer is critical. The lead compressor must always be in the lead in the sequence. Should it fail, it locks out the circuit immediately, saving the other compressor.

Table 2B
Compressor Sequencing

Unit Size	Control Step	Circuit Comp.1		Circuit Comp.2	
200					-
250	1	1	(50%)		-
300	2	1,2	(100%)		-
400	1	1	(50%)		-
500	2	1	(50%)	3	(50%)
600	3	1	(50%)	3,4	(100%)
	4	1,2	(100%)	3,4	(100%)

Note: 1, 2, 3 and 4 indicate which compressor in the unit is operating. (%) indicates the amount of the circuit in the operation during a given step. Refer to dimensional data for the location of the compressors 1, 2, 3 and 4 in the RAUP unit.

Figure 4 :
Location Requirements for Suction Line Filter Installation after Motor Burnout



Trouble Analysis

A. Compressor fails to start

Problems and symptoms	Probable cause	Recommended action.
Full voltage at motor terminal but motor will not run.	Burned-out motor.	Repair or replace.
Inoperative motor starter.	Burned-out holding coil or broken contacts.	Repair or replace.
Open contacts of safety control of thermal overload.	Safety control of thermal overload relays has cut outs.	Call Trane Service.
Electric circuit test shows no current on line side of motor starter.	a) Power failure.	Check for blown line fuse or broken leak.
	b) Disconnect switch open.	Determine why switch was opened.
Electric circuit test show current on line but not on motor side or fuse.	Fuse down. Replace fuse	Check load on motor.
Voltmeter does not read proper voltage.	Low voltage	Call power company.
Motor starter holding coil is not energized.	Open control circuit.	Locate open control and determine cause. See individual control.
Compressor will not operate.	Frozen compressor due to locked or damaged mechanism	Replace Compressor.
Open contact on high pressure switch.	Discharge pressure above cut-in setting of high pressure cut-out switch	See Complaint<<Discharge pressure too high.>>
Discharge pressure above cut-in setting.		

B. Compressor stops

Problems and symptoms	Probable Cause	Recommended action
High pressure control has cut out.	See H.	See H.
Thermal overload relay has cut out.	a)voltage too low	a) contact power company.
	b) cooling load or condensing temperature too high	b) see discharge pressure too high.
Winding thermostat has cut out.	Refrigerant shortage	Repair leak, add refrigerant.



Trouble Analysis

C. Compressor shortcycles

Problems and symptoms	Probable cause	Recommended action
Suction pressure too low and frosting at driver.	Restricted liquid liner driver.	Replace driver core.
Motor starts and stops frequently	Faulty motor.	Replace compressor.

D. Compressor runs Continuously

Problems and symptoms	Probable cause	Recommended action
High temperature in conditioned space	Excessively high cooling load	Check infiltration and insulation of conditioned space.
Bubbles in sight glass	a) Lack of refrigerant. b) Filter driver obstructed	a) Repair leak, add refrigerant. b) Replace driver core.

E. Compressor loses oil

Problems and symptoms	Probable cause	Recommended action
Oil level too low (sight glass).	Insufficient oil charge.	All oil.
Gradual drop of oil level.	Clogged filter drier	Replace.
Excessively cold suction. Noisy compressor	Liquid flooding back to compressor	Readjust superheat setting and verify correct bulb mounting.

F. Compressor is noisy

Problems and symptoms	Probable cause	Recommended action
Abnormally cold suction line: compressor knocks. Valve bulb attachment.	a) Liquid flood-back b) Expansion Valve stuck in open position	a) Check superheat and expansion. b) Repair or replace
Compressor noisy	Incorrect direction of rotation	Inverse the direction of rotation

G. System short of capacity

Problems and symptoms.	Probable cause.	Recommended action
Expansion valve hissed.	Lack of refrigerant.	Add refrigerant.
High pressure drop across filter-drier.	Clogged filter-driver.	Clean or replace.
Superheat too high.	Superheat set too high.	Check superheat and adjust expansion valve
Superheat too high.	Excessive pressure drop in the thermal expansion valve.	Check superheat and reset thermal expansion valve

Trouble Analysis

H. Discharge pressure too high

Problems and symptoms	Probable cause	Recommended action
Too little or too warm condenser air. Restricted air flow.	Excessively warm air leaving condenser. Cuts out on high pressure control.	Clean coil, check fan and motor for proper operation.
Excessive discharge pressure.	Air or noncondensable gas in system.	Remove air or non condensibles.

J. Discharge pressure too high

Problems and symptoms	Probable cause	Recommended action
Bubbles in sight glass.	Lack of refrigerant.	Repair leak and charge.

K. Discharge pressure too high

Problems and symptoms	Probable cause	Recommended action
Compressor runs continuously.	Excessive load on evaporator	Check system.
Abnormally cold suction line; liquid flood-back to compressor.	a) Expansion valve opens too far. b) Expansion valve stuck in open position.	a) Adjust superheat and check bulb attachment. b) Repair or replace.

L. Discharge pressure too high

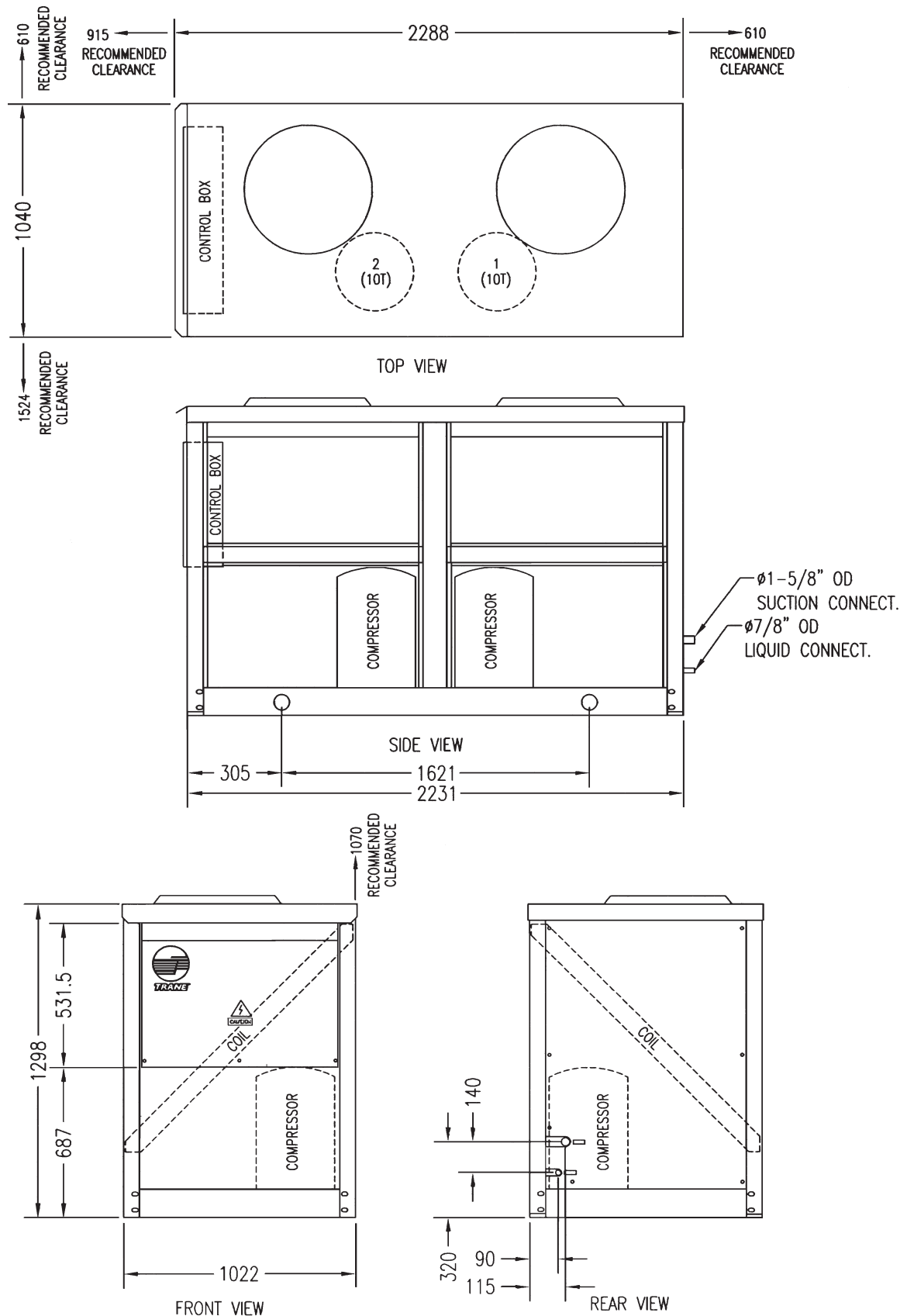
Problems and symptoms	Probable cause	Recommended action
Bubbles in sight glass.	Lack of refrigerant.	Repair leak, add refrigerant.
High pressure drop across filter-drier.	Clogged filter drier.	Replace.
No refrigerant flow through expansion valve.	Expansion valve power element has lost charge.	Replace valve power element.
Loss of capacity.	Obstructed expansion valve.	Clean or replace.
Superheat too high.	Too much pressure drop in evaporator.	Check external equaliser of expansion valve.

This is by no means a complete analysis of the scroll refrigeration system. Instead, its intention is to familiarize the operator with the operation of the scroll unit and

provide the background necessary for him to recognize and accurately correct or report any developing problem.

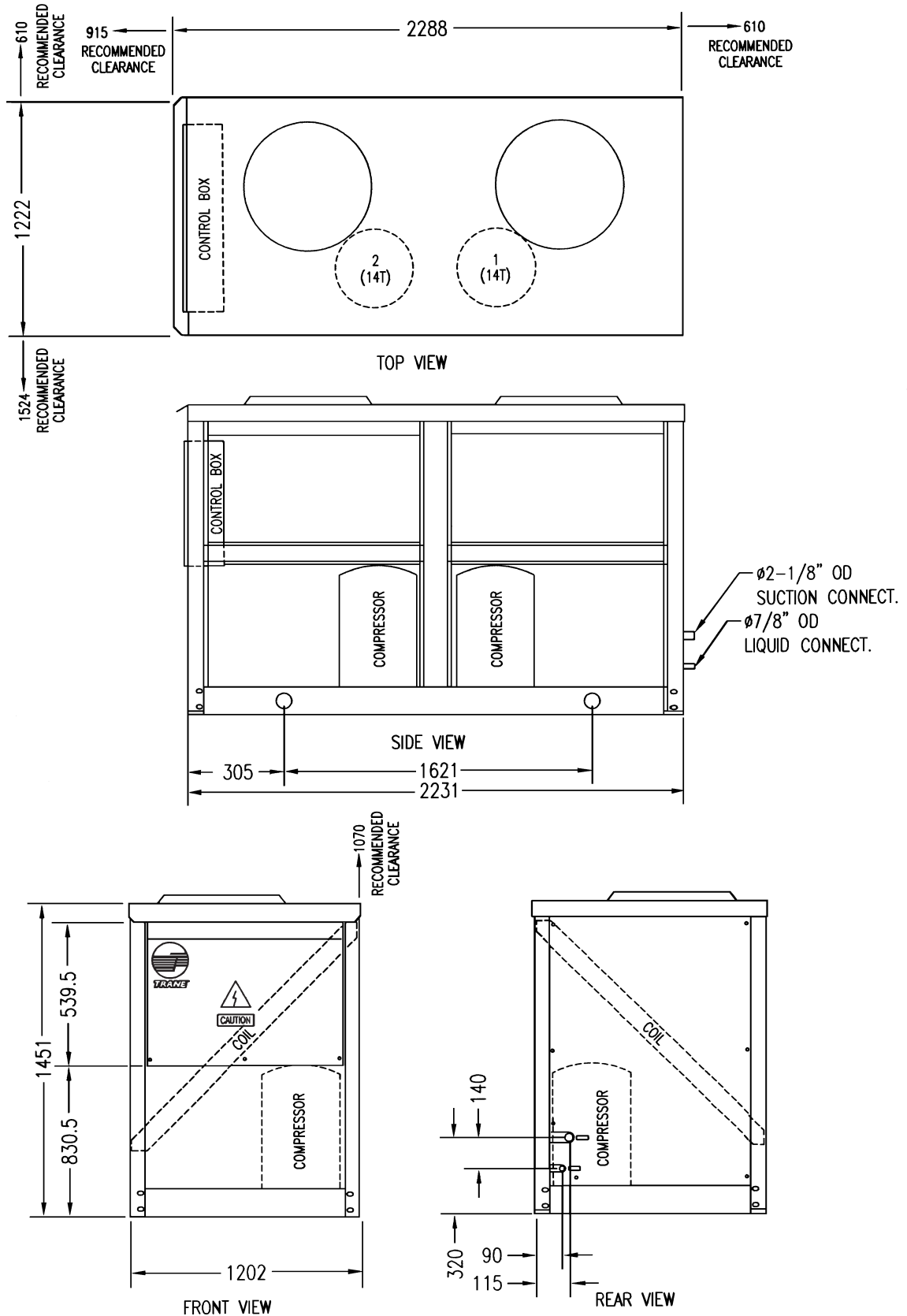
Dimensional Data Condensing Unit

RAUP 200



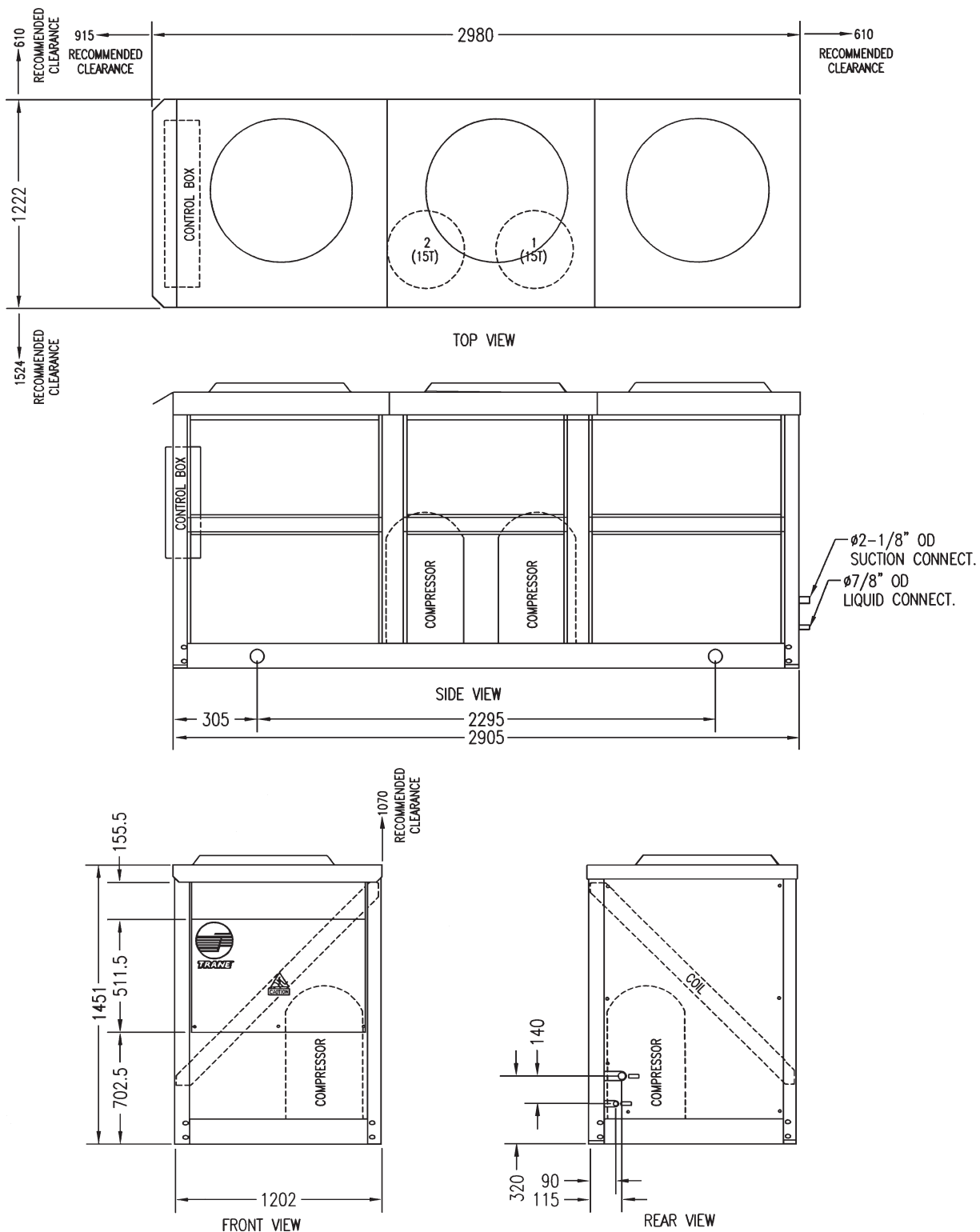
Dimensional Data Condensing Unit

RAUP 250



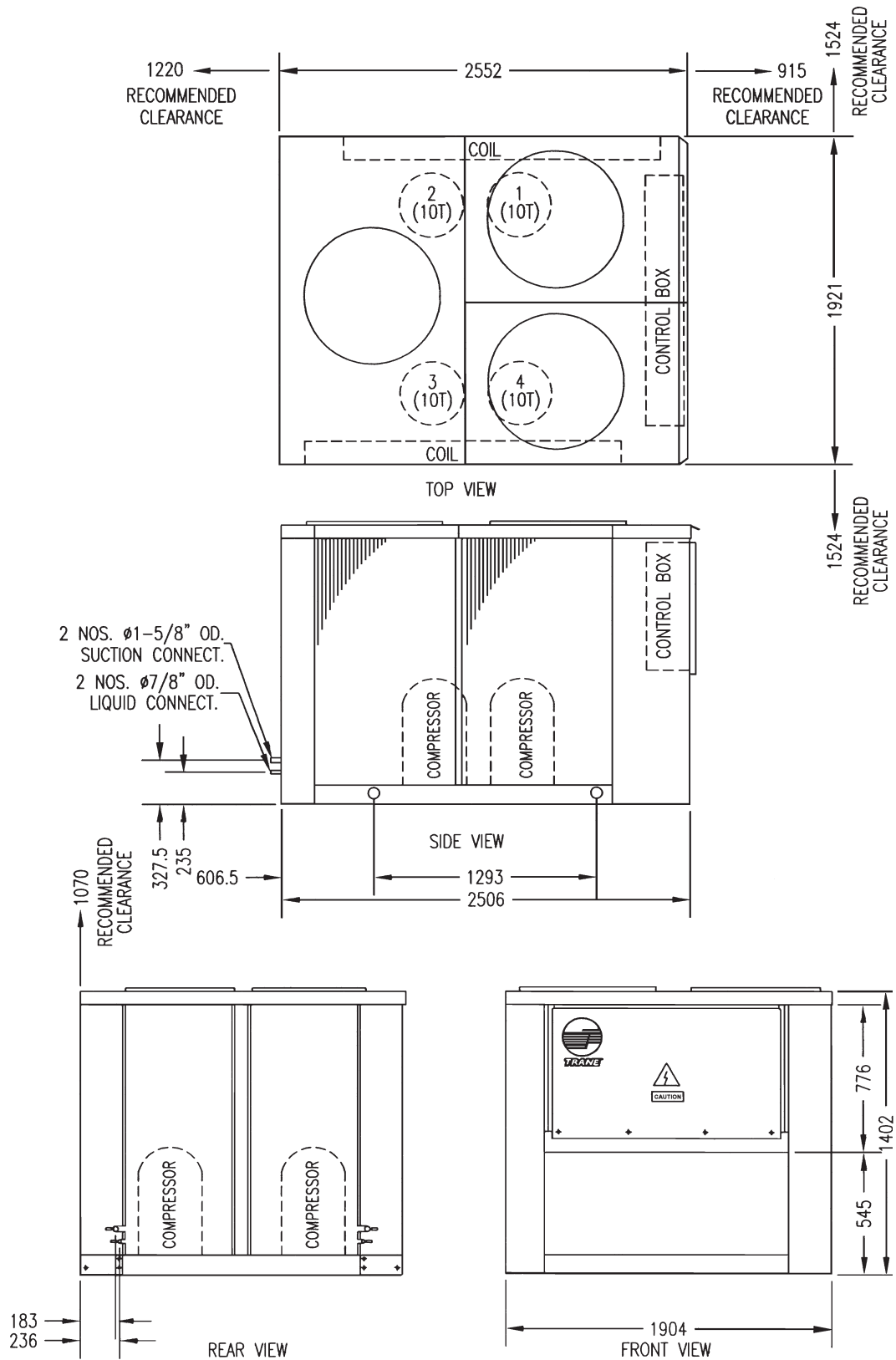
Dimensional Data Condensing Unit

RAUP 300



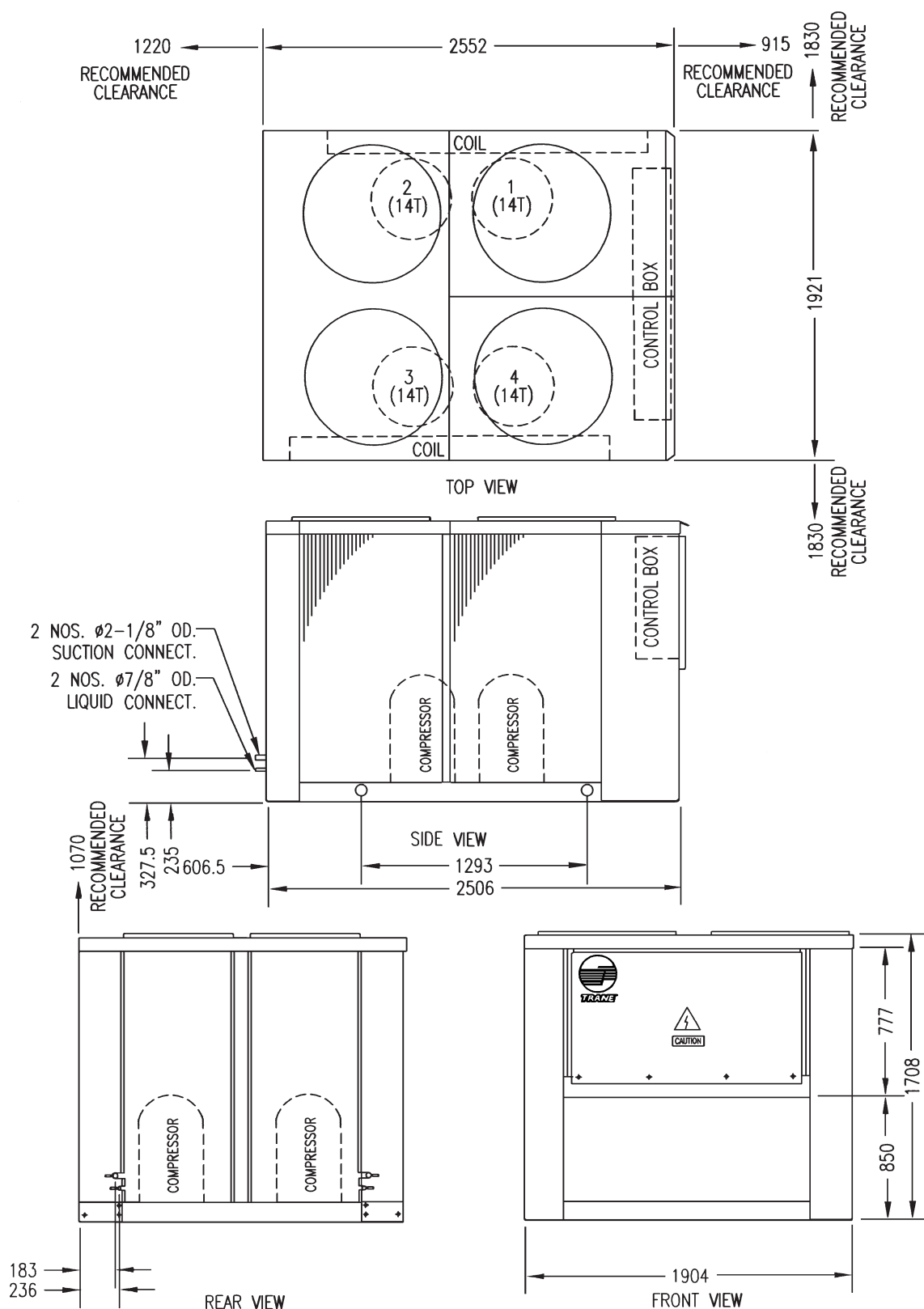
Dimensional Data Condensing Unit

RAUP 400



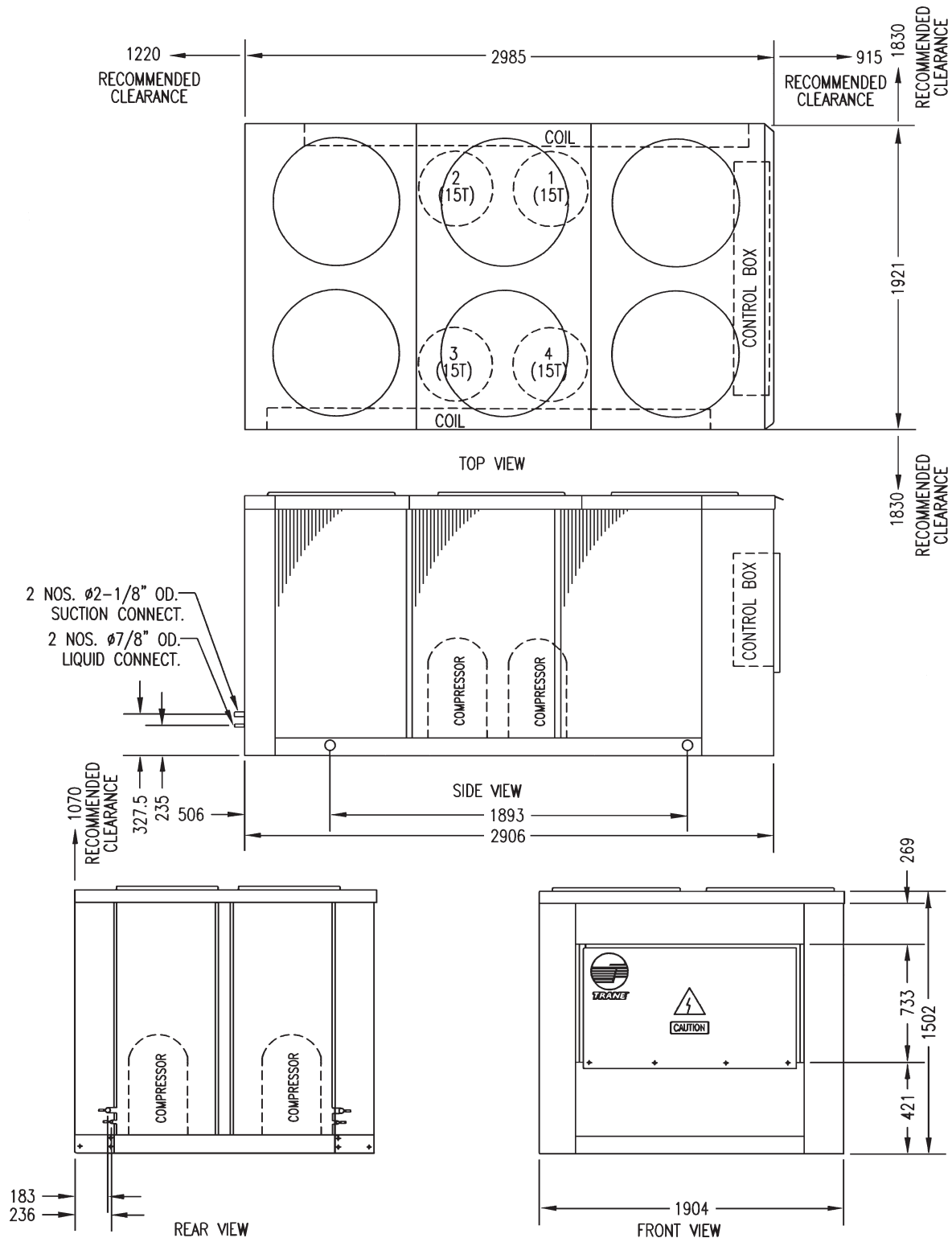
Dimensional Data Condensing Unit

RAUP 500



Dimensional Data Condensing Unit

RAUP 600



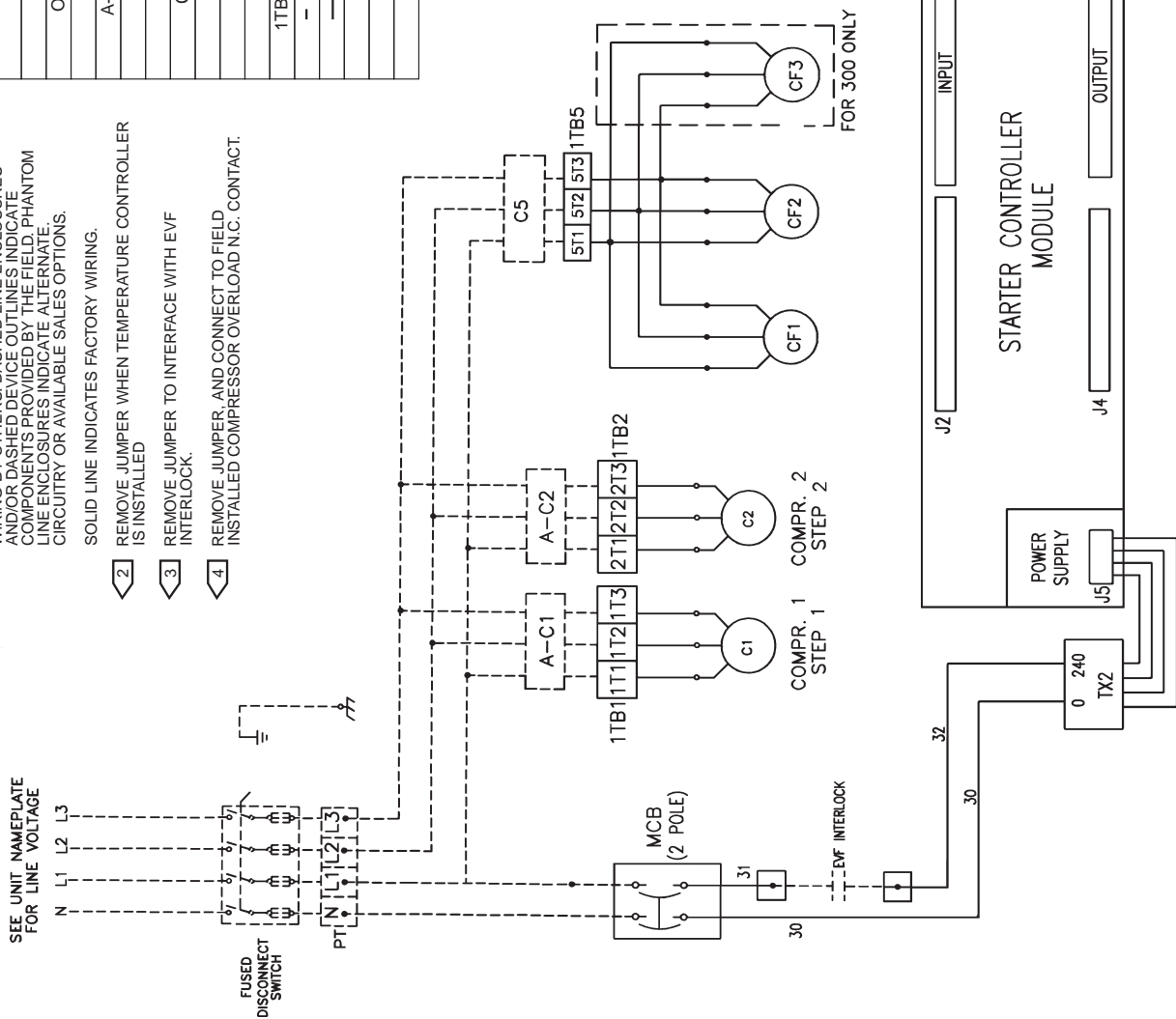
Schematic & Termination Diagram

RAUP 200 / 250/ 300
(Without Starter)

DEVICE	LEGEND
DESIGNATION	DESCRIPTION
LPCO	LOW PRESSURE CUT-OUT
HPCO	HIGH PRESSURE CUT-OUT
HMWT	HIGH MOTOR WINDING T-STAT
OL 1,2,3,4	OVER LOAD, COMPRESSOR
CF/OL	INTERNAL PROTECTOR, FAN MOTOR
A-C1, A-C2	STARTER, COMPRESSOR
EVF	EVAPORATOR FAN
S1	SYSTEM SWITCH
CF 1,2,3	FAN, CONDENSOR
MCB	CIRCUIT BREAKER
C5	STARTER, CONDENSOR FAN
PT	POWER TERMINALS
1TB1, 2, 3, 4, 5	BLOCK, TERMINATION
---	SUPPLIED & INSTALLED BY CUSTOMER
---	FACTORY INSTALLED
□	TERMINATION BLOCK, CONTROL
TX2	TRANSFORMER 240V : 24V
C1, C2	COMPRESSOR

NOTE :-
COMPRESSOR (SM 120/161) AND FAN MOTOR ARE INTERNALLY PROTECTED.

- NOTES:
- 1 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINE ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS. SOLID LINE INDICATES FACTORY WIRING.
 - 2 REMOVE JUMPER WHEN TEMPERATURE CONTROLLER IS INSTALLED
 - 3 REMOVE JUMPER TO INTERFACE WITH EVF INTERLOCK.
 - 4 REMOVE JUMPER, AND CONNECT TO FIELD INSTALLED COMPRESSOR OVERLOAD N.C. CONTACT.





(Without Starter)





TRANE

Schematic & Termination Diagram

RAUP 400 / 500/ 600
(Without Starter)

DEVICE	LEGEND
DESIGNATION	DESCRIPTION
LPCO	LOW PRESSURE CUT-OUT
HPCO	HIGH PRESSURE CUT-OUT
HMWT	HIGH MOTOR WINDING T-STAT
OL 1,2,3,4	OVER LOAD, COMPRESSOR
CF/OL	INTERNAL PROTECTOR, FAN MOTOR
A-C1, A-C2, B-C3, B-C4	STARTER, COMPRESSOR
EVF	EVAPORATOR FAN
S1	SYSTEM SWITCH
CF 1,2,3,4,5,6	FAN, CONDENSOR
MCB	CIRCUIT BREAKER
C5	STARTER, CONDENSOR FAN
PT	POWER TERMINALS
1TB1, 2, 3, 4, 5	BLOCK, TERMINATION
---	SUPPLIED & INSTALLED BY CUSTOMER
---	FACTORY INSTALLED
TX2	TERMINATION BLOCK, CONTROL
	TRANSFORMER 240V : 24V
C1, C2, C3, C4	COMPRESSOR

NOTE : - COMPRESSOR (SM 120/161) AND FAN MOTOR ARE INTERNALLY PROTECTED.

NOTES:

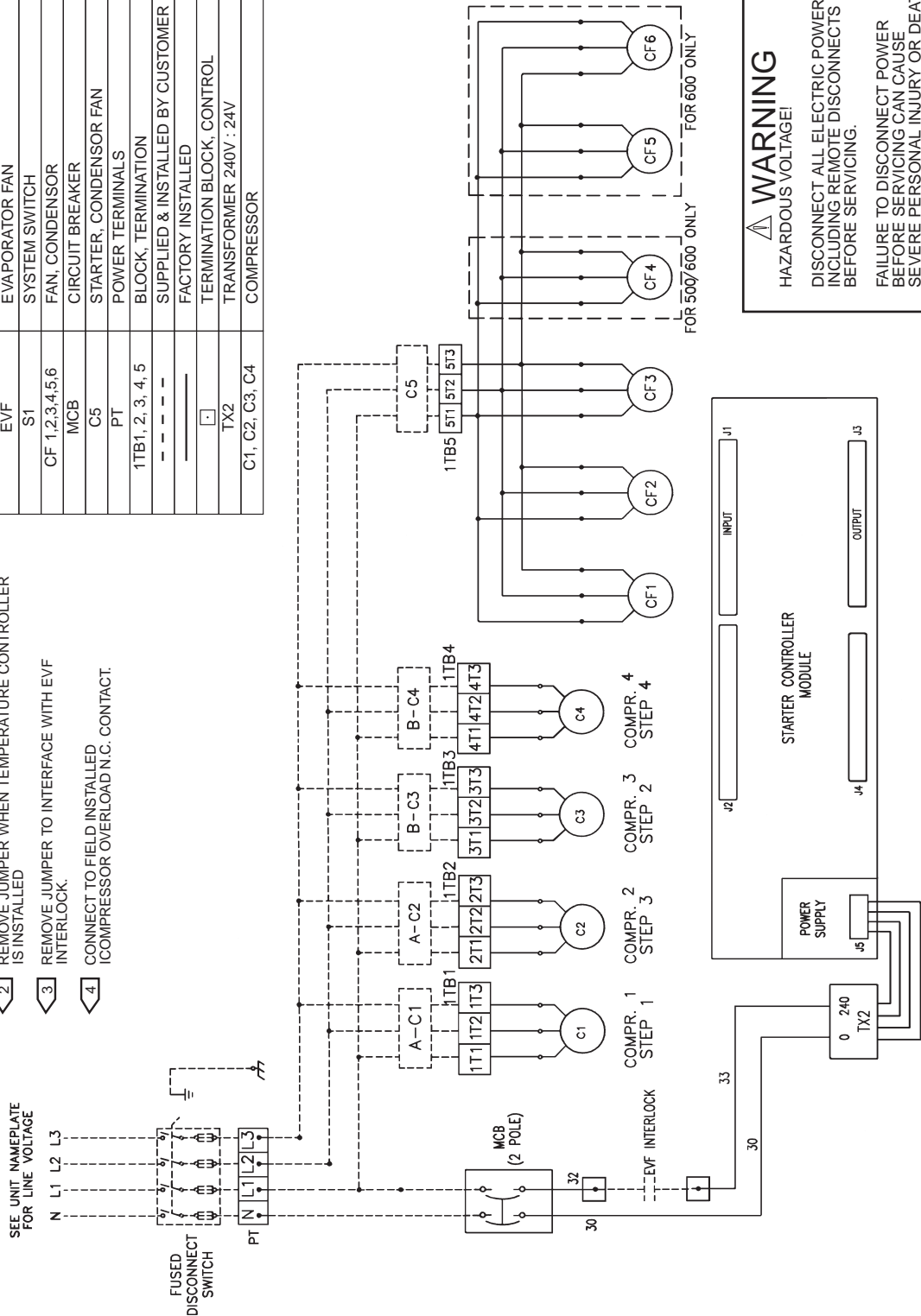
1 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINE ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS.

SOLID LINE INDICATES FACTORY WIRING.

2 REMOVE JUMPER WHEN TEMPERATURE CONTROLLER IS INSTALLED

3 REMOVE JUMPER TO INTERFACE WITH EVF INTERLOCK.

4 CONNECT TO FIELD INSTALLED ICOMPRESSOR OVERLOAD N.C. CONTACT.



WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

IMPORTANT

USE COPPER CONDUCTORS ONLY TO PREVENT EQUIPMENT DAMAGE. UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT ANY OTHER WIRING.



(Without Starter)

TERMINATION - (CONTROL)

TYPICAL WIRING FOR RAUP 400/500/600

INPUT J1

LPCO 1	COM 0	HPCO 1	OL 1	COM 0	OL 2	HMT 1	COM 0	HMT 2	PUMP/FAN-AUX	COM 0	S1	COM 0	S2
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OUTPUT J3

A-C1	COM 1	A-C2	COM 2	B-C3	COM 3	B-C4	COM 4	C5	COM 5
------	-------	------	-------	------	-------	------	-------	----	-------

WARNING :- CONTACT INPUTS ONLY
- NO AC SIGNAL AT INPUTS

LED ERROR CODE

E0	E1	E2	E3	Error Description
0	0	0	0	NORMAL
1	0	0	0	LPCO 1 Error
0	1	0	0	HPCO 1 Error
1	1	0	0	OL 1 Error
0	0	1	0	OL 2 Error
1	0	1	0	HMT 1 Error
0	1	1	0	HMT 2 Error
1	1	1	0	PUMP/FAN-Aux NOT ON
0	0	0	1	LPCO 2 Error
1	0	0	1	HPCO 2 Error
0	1	0	1	OL 3 Error
1	1	0	1	OL 4 Error
0	0	1	1	HMT 3 Error
1	0	1	1	HMT 4 Error
0	1	1	1	Either S1 or S3 condition NOT ON
1	1	1	1	Either S2 or S4 condition NOT ON

ERROR CODE TABLE

LED ERROR CODE

E0	E1	E2	E3	Error Description
0	0	0	0	NORMAL
1	0	0	0	LPCO 1 Error
0	1	0	0	HPCO 1 Error
1	1	0	0	OL 1 Error
0	0	1	0	OL 2 Error
1	0	1	0	HMT 1 Error
0	1	1	0	HMT 2 Error
1	1	1	0	PUMP/FAN-Aux NOT ON
0	0	0	1	LPCO 2 Error
1	0	0	1	HPCO 2 Error
0	1	0	1	OL 3 Error
1	1	0	1	OL 4 Error
0	0	1	1	HMT 3 Error
1	0	1	1	HMT 4 Error
0	1	1	1	Either S1 or S3 condition NOT ON
1	1	1	1	Either S2 or S4 condition NOT ON

INPUT J1

LPCO 1	COM 0	HPCO 1	OL 1	COM 0	OL 2	HMT 1	COM 0	HMT 2	PUMP/FAN-AUX	COM 0	S1	COM 0	S2
--------	-------	--------	------	-------	------	-------	-------	-------	--------------	-------	----	-------	----

OUTPUT J3

A-C1	COM 1	A-C2	COM 2	B-C3	COM 3	B-C4	COM 4	C5	COM 5
------	-------	------	-------	------	-------	------	-------	----	-------

WARNING :- CONTACT INPUTS ONLY
- NO AC SIGNAL AT INPUTS

LED ERROR CODE

E0	E1	E2	E3	Error Description
0	0	0	0	NORMAL
1	0	0	0	LPCO 1 Error
0	1	0	0	HPCO 1 Error
1	1	0	0	OL 1 Error
0	0	1	0	OL 2 Error
1	0	1	0	HMT 1 Error
0	1	1	0	HMT 2 Error
1	1	1	0	PUMP/FAN-Aux NOT ON
0	0	0	1	LPCO 2 Error
1	0	0	1	HPCO 2 Error
0	1	0	1	OL 3 Error
1	1	0	1	OL 4 Error
0	0	1	1	HMT 3 Error
1	0	1	1	HMT 4 Error
0	1	1	1	Either S1 or S3 condition NOT ON
1	1	1	1	Either S2 or S4 condition NOT ON

ERROR CODE TABLE

LED ERROR CODE

E0	E1	E2	E3	Error Description
0	0	0	0	NORMAL
1	0	0	0	LPCO 1 Error
0	1	0	0	HPCO 1 Error
1	1	0	0	OL 1 Error
0	0	1	0	OL 2 Error
1	0	1	0	HMT 1 Error
0	1	1	0	HMT 2 Error
1	1	1	0	PUMP/FAN-Aux NOT ON
0	0	0	1	LPCO 2 Error
1	0	0	1	HPCO 2 Error
0	1	0	1	OL 3 Error
1	1	0	1	OL 4 Error
0	0	1	1	HMT 3 Error
1	0	1	1	HMT 4 Error
0	1	1	1	Either S1 or S3 condition NOT ON
1	1	1	1	Either S2 or S4 condition NOT ON

INPUT J1

LPCO 1	COM 0	HPCO 1	OL 1	COM 0	OL 2	HMT 1	COM 0	HMT 2	PUMP/FAN-AUX	COM 0	S1	COM 0	S2
--------	-------	--------	------	-------	------	-------	-------	-------	--------------	-------	----	-------	----

OUTPUT J3

A-C1	COM 1	A-C2	COM 2	B-C3	COM 3	B-C4	COM 4	C5	COM 5
------	-------	------	-------	------	-------	------	-------	----	-------

WARNING :- CONTACT INPUTS ONLY
- NO AC SIGNAL AT INPUTS

LED ERROR CODE

E0	E1	E2	E3	Error Description
0	0	0	0	NORMAL
1	0	0	0	LPCO 1 Error
0	1	0	0	HPCO 1 Error
1	1	0	0	OL 1 Error
0	0	1	0	OL 2 Error
1	0	1	0	HMT 1 Error
0	1	1	0	HMT 2 Error
1	1	1	0	PUMP/FAN-Aux NOT ON
0	0	0	1	LPCO 2 Error</

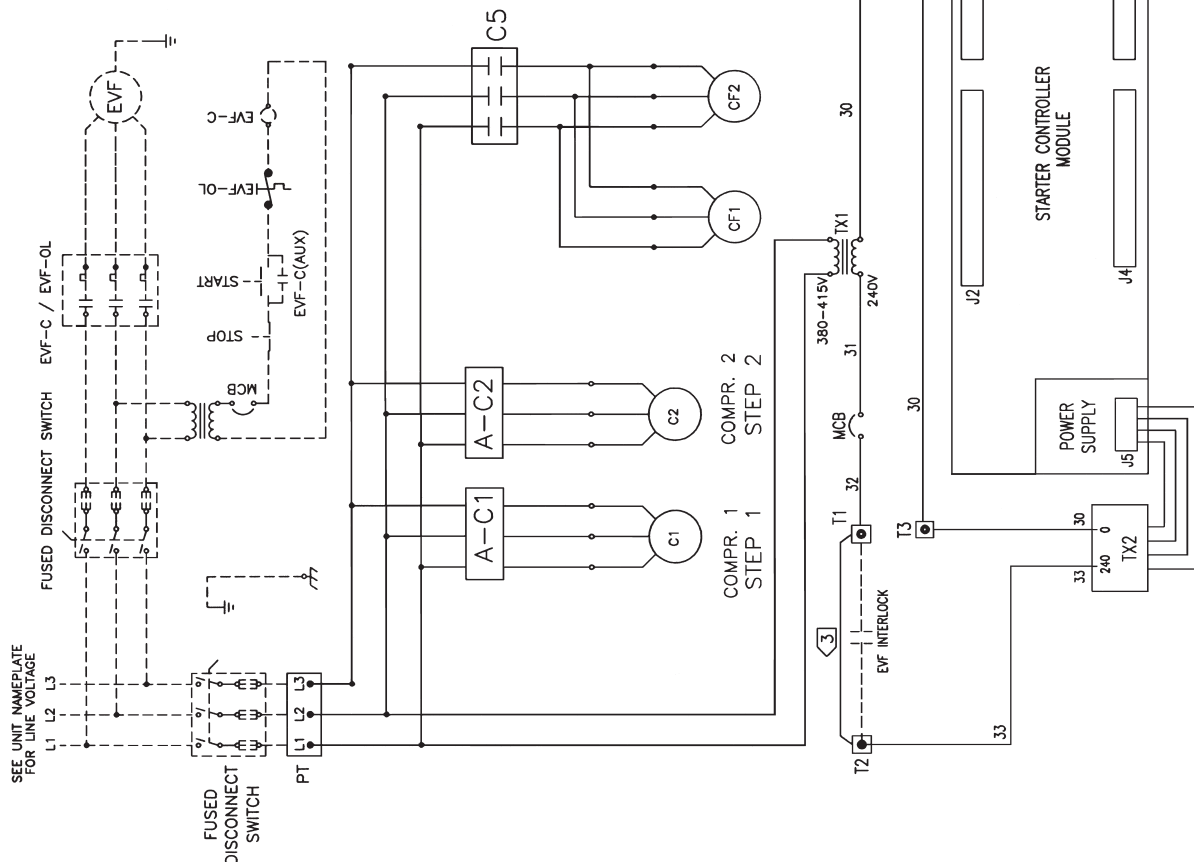


TRANE®

Schematic & DOL STARTER - 3 WIRE

RAUP 200 / 250
FOR SM 120 / 161

LEGEND	
DEVICE DESIGNATION	DESCRIPTION
LPCO	LOW PRESSURE CUT-OUT
HPCO	HIGH PRESSURE CUT-OUT
HMWT	HIGH MOTOR WINDING T-STAT
OL 1,2,3,4	OVER LOAD, COMPRESSOR
CF/OL	INTERNAL PROTECTOR, FAN MOTOR
A-C1, A-C2	STARTER, COMPRESSOR
EVF	EVAPORATOR FAN
S1	SYSTEM SWITCH
CF 1,2,3	FAN, CONDENSOR
MCB	CIRCUIT BREAKER
C5	STARTER, CONDENSOR FAN
PT	POWER TERMINALS
TB	BLOCK, TERMINATION
---	SUPPLIED & INSTALLED BY CUSTOMER
---	FACTORY INSTALLED
□	TERMINATION BLOCK, CONTROL
TX1	TRANSFORMER 380V/415V : 240V
TX2	TRANSFORMER 240V : 24V
C1, C2, C3, C4	COMPRESSOR



NOTE :-
COMPRESSOR AND FAN MOTOR ARE INTERNALLY PROTECTED.

NOTES:

1 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINE ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS.

SOLID LINE INDICATES FACTORY WIRING.

2 REMOVE JUMPER WHEN TEMPERATURE CONTROLLER IS INSTALLED

3 REMOVE JUMPER TO INTERFACE WITH EVF INTERLOCK.

WARNING

HAZARDOUS VOLTAGE!

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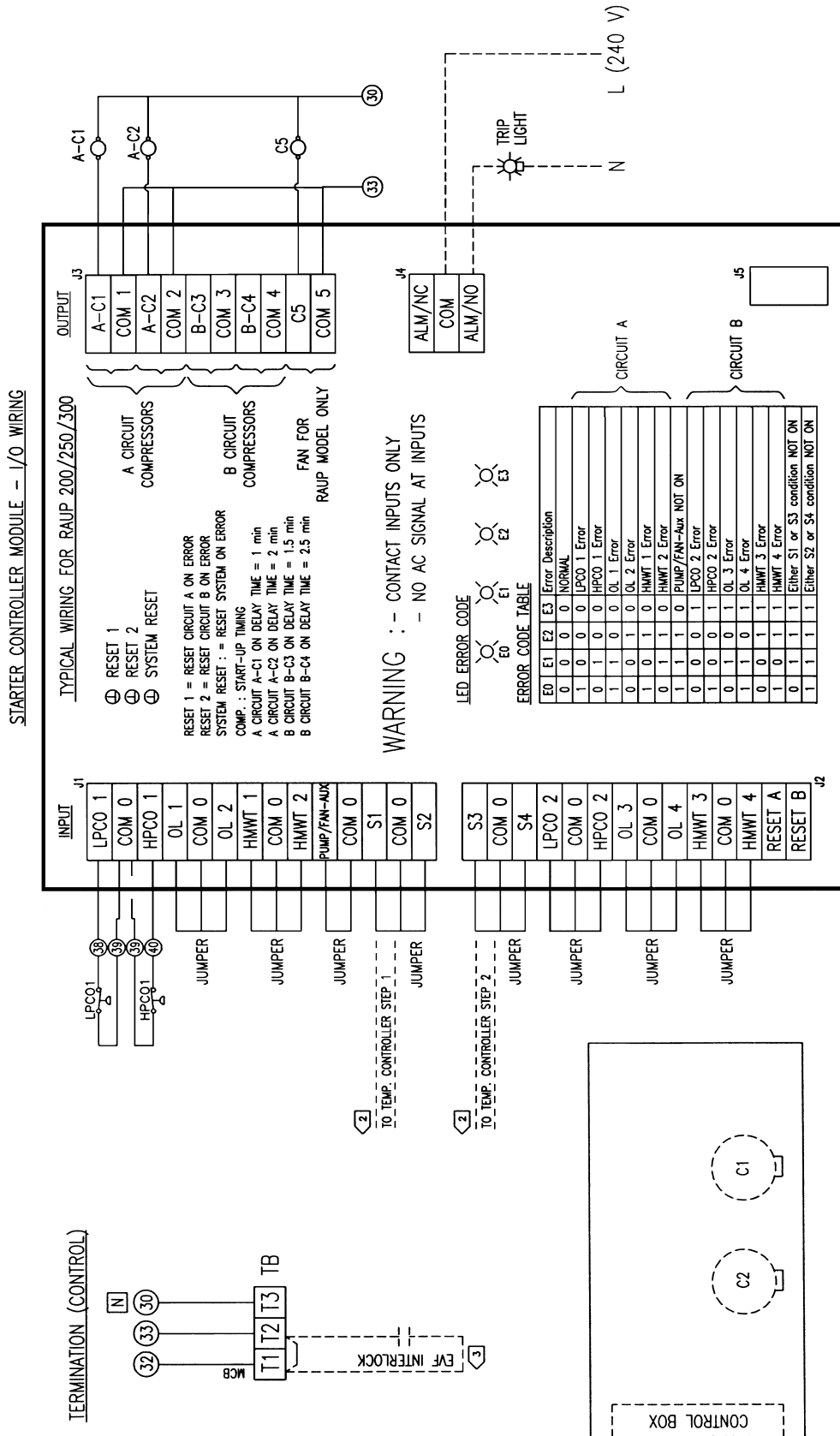
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

IMPORTANT

USE COPPER CONDUCTORS ONLY TO PREVENT EQUIPMENT DAMAGE. UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT ANY OTHER WIRING.

Schematic & DOL STARTER - 3 WIRE

RAUP 200 / 250
FOR SM 120 / 161



Schematic & DOL STARTER - 3 WIRE

RAUP 300
FOR SM 185

DEVICE DESIGNATION	LEGEND DESCRIPTION
LPCO	LOW PRESSURE CUT-OUT
HPCO	HIGH PRESSURE CUT-OUT
HMWT	HIGH MOTOR WINDING T-STAT
OL 1,2,3,4	OVER LOAD, COMPRESSOR
CF/OL	INTERNAL PROTECTOR, FAN MOTOR
A-C1, A-C2	STARTER, COMPRESSOR
EVF	EVAPORATOR FAN
S1	SYSTEM SWITCH
CF 1,2,3	FAN, CONDENSOR
MCB	CIRCUIT BREAKER
C5	STARTER, CONDENSOR FAN
PT	POWER TERMINALS
TB	BLOCK, TERMINATION
---	SUPPLIED & INSTALLED BY CUSTOMER
---	FACTORY INSTALLED
□	TERMINATION BLOCK, CONTROL
TX1	TRANSFORMER 380V/415V : 240V
TX2	TRANSFORMER 240V : 24V
C1, C2	COMPRESSOR

NOTE :-
COMPRESSOR AND FAN MOTOR ARE INTERNALLY PROTECTED.

- NOTES:
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 - 3 REMOVE JUMPER TO INTERFACE WITH EVF INTERLOCK.

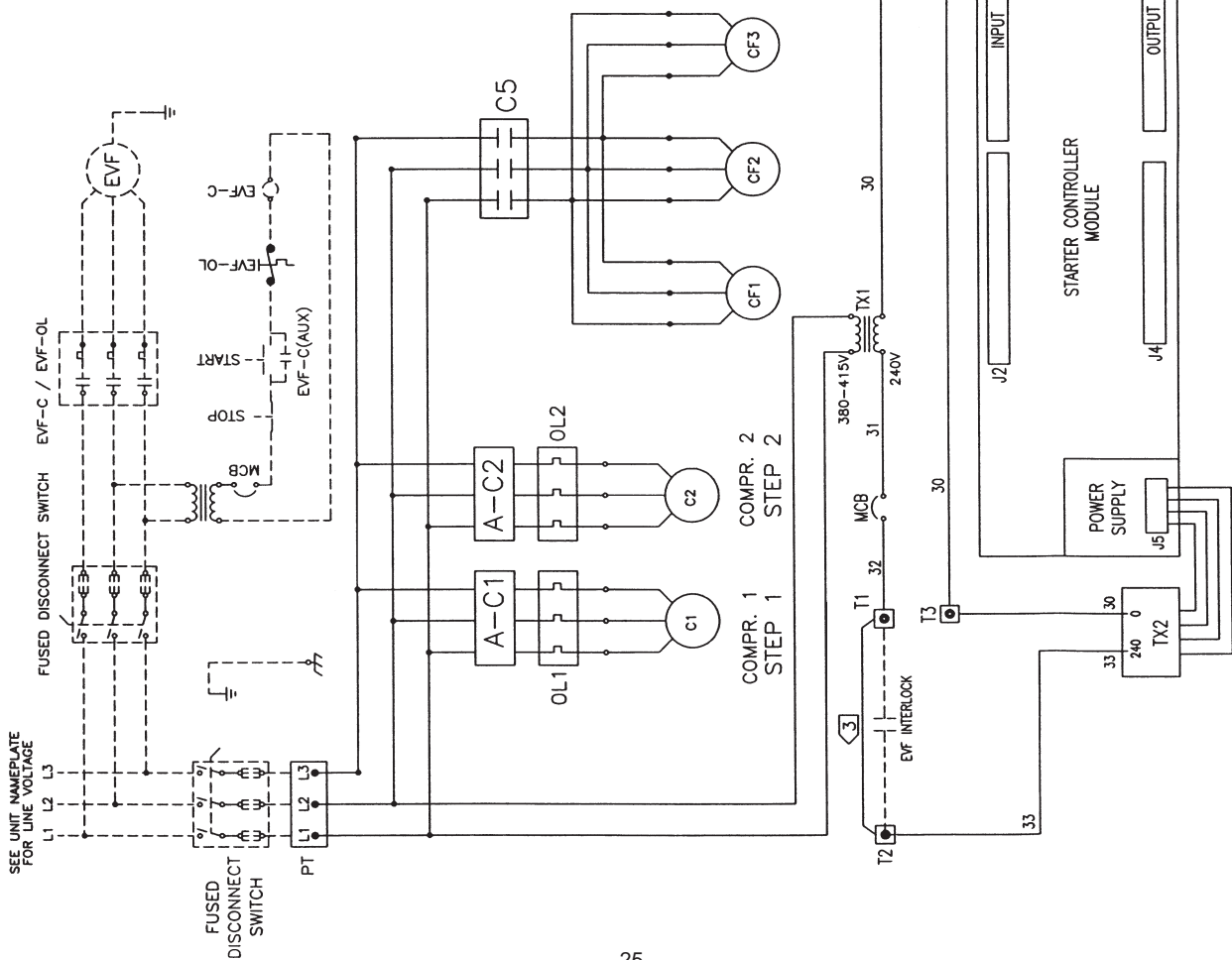
⚠ WARNING
HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

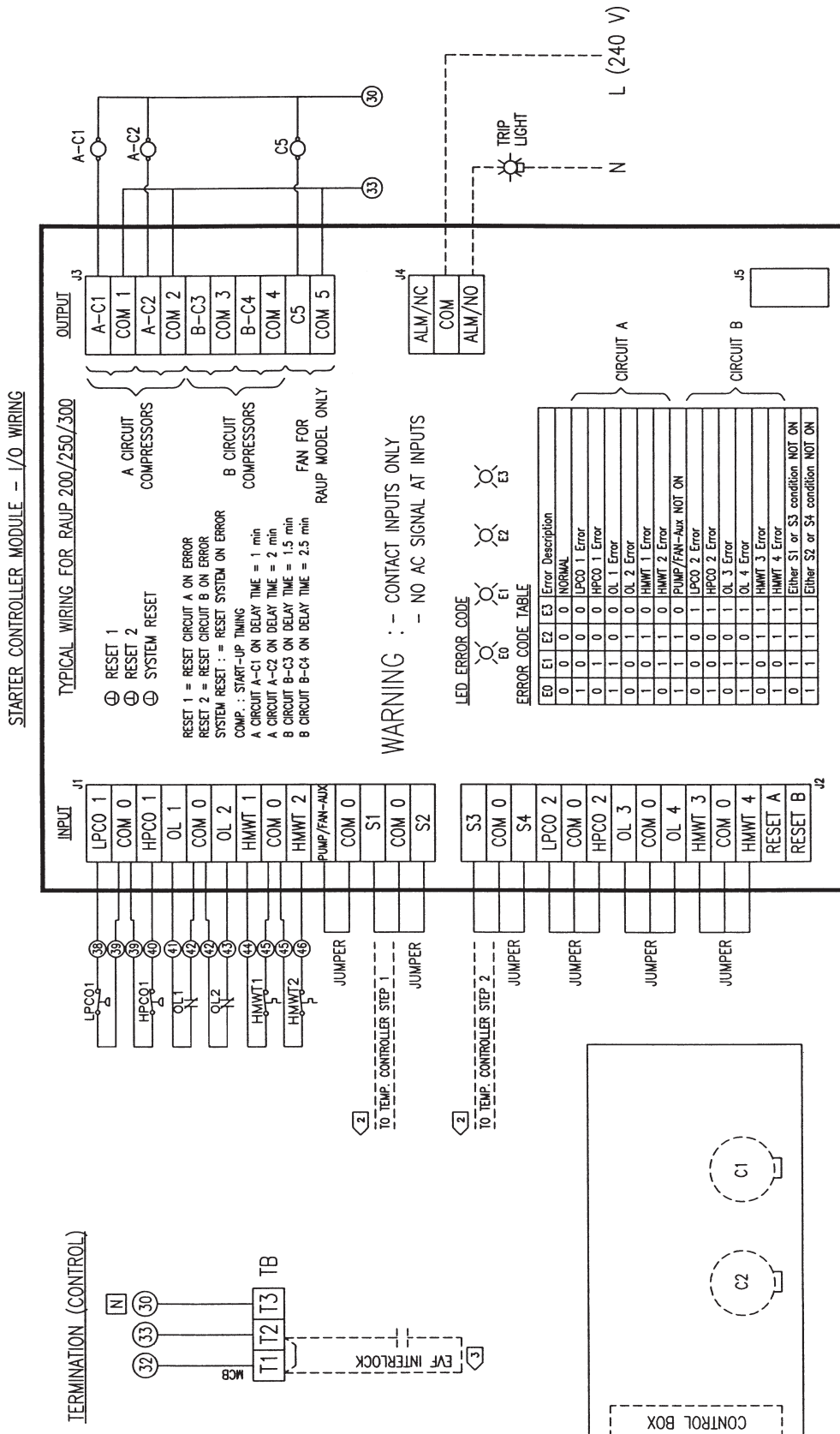
IMPORTANT

USE COPPER CONDUCTORS ONLY TO PREVENT EQUIPMENT DAMAGE. UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT ANY OTHER WIRING.



Schematic & DOL STARTER - 3 WIRE

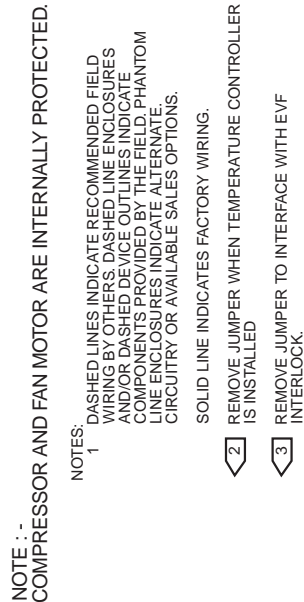
RAUP 300
FOR SM 185





RAUP 400 / 500
FOR SM 120 / 161

<p>⚠ WARNING</p> <p>HAZARDOUS VOLTAGE!</p>	<p>DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.</p> <p>FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.</p>
<p>IMPORTANT</p>	<p>USE COPPER CONDUCTORS ONLY TO PREVENT EQUIPMENT DAMAGE. UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT ANY OTHER WIRING.</p>





STARTER CONTROLLER MODULE - I/O WIRING





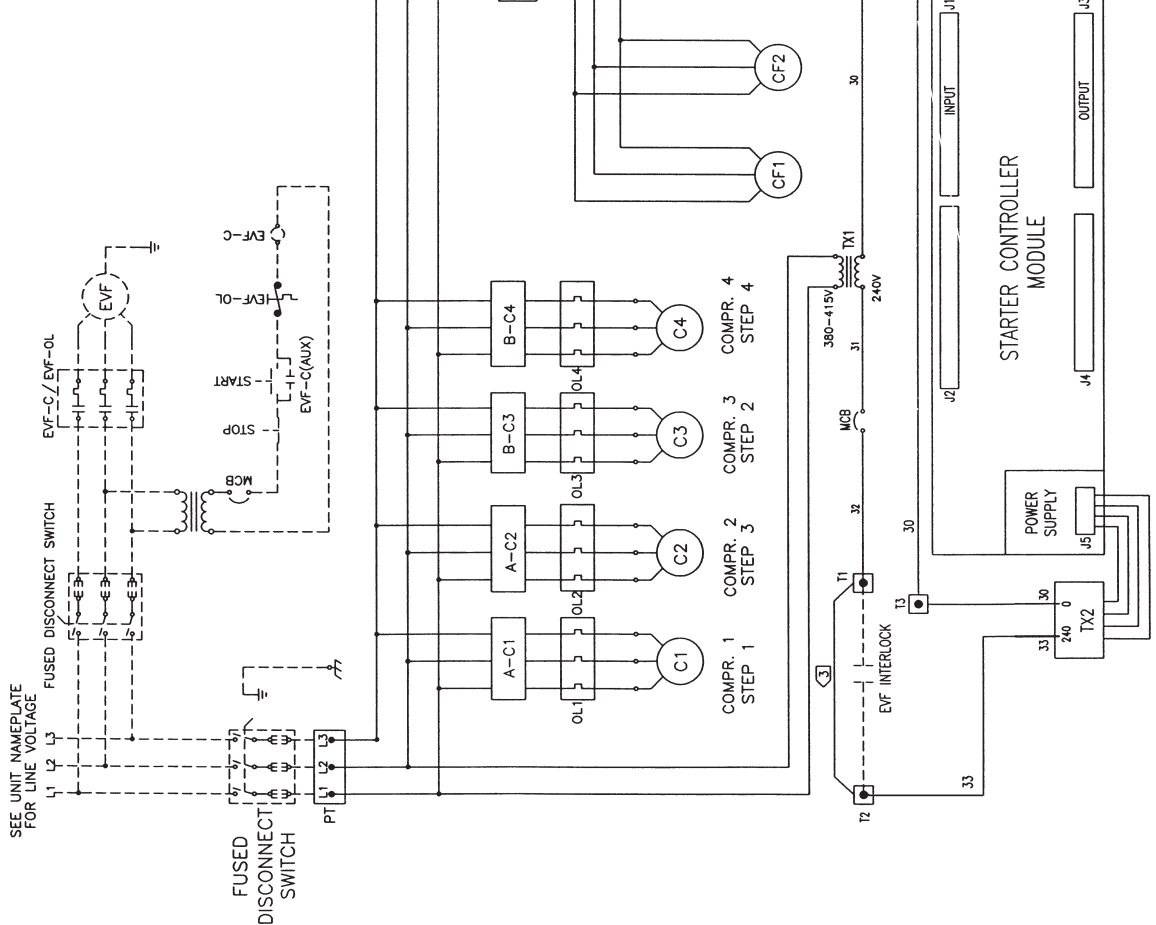
TRANE®

Schematic & DOL STARTER - 3 WIRE

RAUP 600
FOR SM 185

LEGEND	
DEVICE	DESCRIPTION
LPCO	LOW PRESSURE CUT-OUT
HPCO	HIGH PRESSURE CUT-OUT
HMWT	HIGH MOTOR WINDING T-STAT
OL 1,2,3,4	OVER LOAD, COMPRESSOR
CF/OL	INTERNAL PROTECTOR, FAN MOTOR
A-C1, A-C2,B-C3, B-C4	STARTER, COMPRESSOR
EVF	EVAPORATOR FAN
S1	SYSTEM SWITCH
CF 1,2,3,4,5,6	FAN, CONDENSOR
MCB	CIRCUIT BREAKER
C5	STARTER, CONDENSOR FAN
PT	POWER TERMINALS
TB	BLOCK, TERMINATION
---	SUPPLIED & INSTALLED BY CUSTOMER
---	FACTORY INSTALLED
□	TERMINATION BLOCK, CONTROL
TX1	TRANSFORMER 380V/415V : 240V
TX2	TRANSFORMER 240V : 24V
C1, C2, C3, C4	COMPRESSOR

- NOTES:
- 1 DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS COVERED BY INTERLOCK PHANTOM LINE ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS. SOLID LINE INDICATES FACTORY WIRING.
- 2 REMOVE JUMPER WHEN TEMPERATURE CONTROLLER IS INSTALLED
- 3 REMOVE JUMPER TO INTERFACE WITH EVF INTERLOCK.



NOTE :-
FAN MOTOR ARE INTERNALLY PROTECTED.

⚠ WARNING
HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

IMPORTANT

USE COPPER CONDUCTORS ONLY TO PREVENT EQUIPMENT DAMAGE. UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT ANY OTHER WIRING.

Thermostat Operation

FACTORY SETTINGS FOR THERMOSTATS & STAGE MODULE

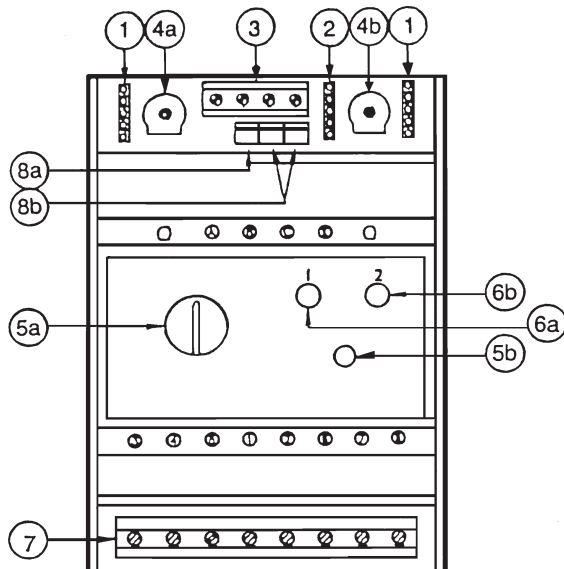


FIG. 1: THERMOSTAT

THERMOSTAT SECTION

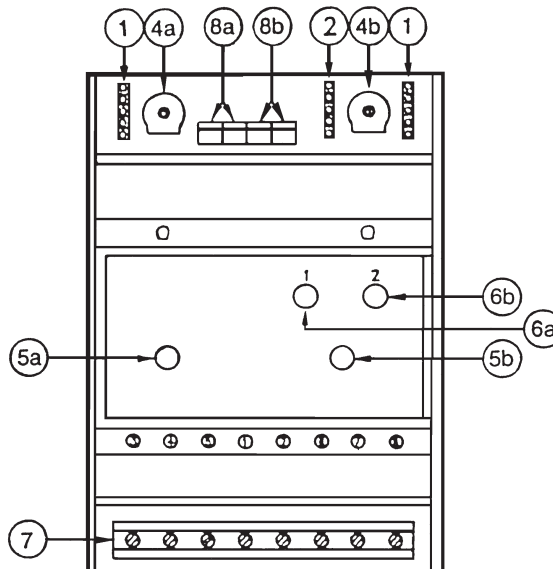


FIG. 2: STAGE MODULE (FOR DUAL CIRCUITS)

STAGE MODULE SECTION

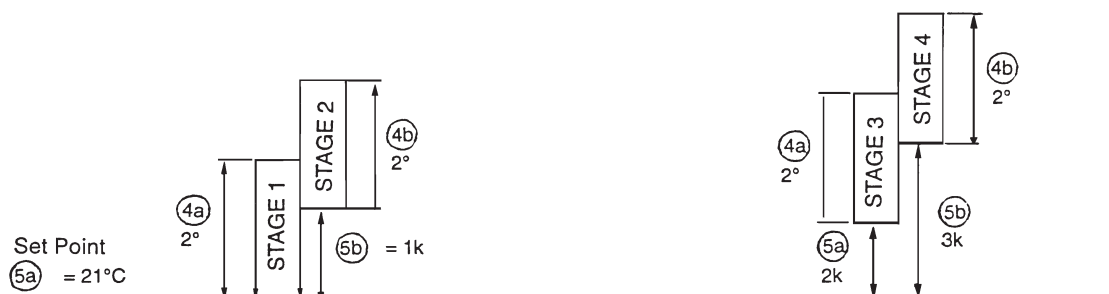


FIG. 3: THERMOSTAT & STAGE MODULE SETTING

Fig. 1 Front layout of thermostats A27A

- 1 Quick connector for use in combination with other System 27 Nova modules.
- 2 Connections for logic outputs and setpoint shift.
- 3 Input terminal block
 - A sensor common
 - B sensor input
 - C voltage supply-to humidity or pressure sensor
 - S setpoint read-out.
- 4a Differential adjustment stage 1
- 4b Differential adjustment stage 2
- 5a Setpoint adjustment
- 5b ΔSetpoint adjustment
- 6a LED " relay on " indication stage 1
- 6b LED " relay on " indication stage 2
- 7 Output terminal block
 - 1/2 Power supply
 - 3 Normally closed contact stage 1
 - 4 Normally open contact stage 1
 - 5 Common stage 1
 - 6 Normally closed contact stage 2
 - 7 Normally open contact stage 2
 - 8 Common stage 2

- 8a Selector set high / set low mode stage 1
- 8b Selector set high / set low mode stage 2
 - ☐ set High
 - ☐ set Low (cooling)

Fig. 2 Front layout of stage module S27A2

- 1 Quick connector for use in other System 27 Nova Controls.
- 2 Connections for logic outputs.
- 4 Differential adjustment stage 3
- 4b Differential adjustment stage 4
- 5a Δ Setpoint adjustment stage 3
- 5b Δ Setpoint adjustment stage 4
- 6a LED " relay on " indication stage 3
- 6b LED " relay on " indication stage 4
- 7 Output terminal block
 - 1/2 Power supply
 - 3 Normally closed contact stage 3
 - 4 Normally open contact stage 3
 - 5 Common stage 3
 - 6 Normally closed contact stage 4
 - 7 Normally open contact stage 4
 - 8 Common stage 4

- 8a Selector set high / set low mode stage 3
- 8b Selector set high / set low mode stage 4
 - ☐ set High
 - ☐ set Low (cooling)

Fig. 3 Factory settings

The above factory setting can be changed by adjusting the indicated dials to suit your applications

Installation Checklist

RAUP Trane Air Cooled Condensing Unit

This list must be checked off by the installer to ensure correct installation before the unit starts up.

Unit acceptance

- ☐ Check for damage, if any, on transportation
- ☐ Check for equipment shipped against delivery slip
- ☐ Check lifting system

Unit positioning

- ☐ Remove packaging
- ☐ Check position of unit
- ☐ Check unit is level
- ☐ Check clearance around condenser
- ☐ Check clearance required for maintenance access
- ☐ Check position of rubber pads

Refrigerant circuit

- ☐ Check filter dryer and sight glass presence
- ☐ Check oil traps presence on discharge line (if there vertical risers > 3m)
- ☐ Check pitch for horizontal lines (1cm/m)
- ☐ Check refrigerant presence

Electrical equipment

- ☐ Check direction of rotation of compressors and fan motors
- ☐ Check installation and rating of mains power switch/fuse
- ☐ Check that electrical connections comply with specification
- ☐ Check that electrical connections match information on manufacturer's identification plate
- ☐ Check electrical connections and connections to mains power switch

General

- ☐ Check available cooling charge (50% of rated installation load)
- ☐ Check with other handling installation works

Comments:.....

Signature: Name

Order No.

Work site:

Please return to your Trane Service Agency



Commissioning Log Sheet

START-UP ENGINEER/TECHNICIAN NAME: _____

PROJECT NAME : _____

DEALER/CONTRACTOR : _____

SALES OFFICE LOCATION : _____

DATE COMMISSIONED : _____

1. Nameplate information

Model No. _____ Serial No. _____

Voltage _____ RLA _____

2. Compressor (S)

A. Voltage at Compressor Terminals

Comp. No. 1: T1 _____ T2 _____ T3 _____

Comp. No. 2: T1 _____ T2 _____ T3 _____

Comp. No. 3: T1 _____ T2 _____ T3 _____

Comp. No. 4: T1 _____ T2 _____ T3 _____

Voltage Imbalance : Comp. "1" _____ Comp. "2" _____

Comp. "3" _____ Comp. "4" _____

B. Amp Draw

Comp. No. 1: T1 _____ T2 _____ T3 _____

Comp. No. 2: T1 _____ T2 _____ T3 _____

Comp. No. 3: T1 _____ T2 _____ T3 _____

Comp. No. 4: T1 _____ T2 _____ T3 _____

3. Operating Conditions

A. Circuit "A"

Discharge Pressure. _____ Suction Pressure _____

Liquid Line Pressure. _____ Suction Line Temp. _____

Liquid Line Temp. _____ SuperHeat _____

Subcooling. _____ Evap. Entering Air Temp. (DB/WB) _____

Ambient Temp. _____ Evap. Discharge Air Temp. (DB/WB) _____

B. Circuit "B"

Discharge Pressure. _____ Suction Pressure _____

Liquid Line Pressure. _____ Suction Line Temp. _____

Liquid Line Temp. _____ SuperHeat _____

Subcooling. _____ Evap. Entering Air Temp. (DB/WB) _____

Ambient Temp. _____ Evap. Discharge Air Temp. (DB/WB) _____

4. Controls

A. All Fans Operating [] Yes _____
Properly? [] No _____ Fan Inoperative

5. Refrigerant Piping

Evacuation Level _____ System Charge _____

Evaporator Piping Recommendation

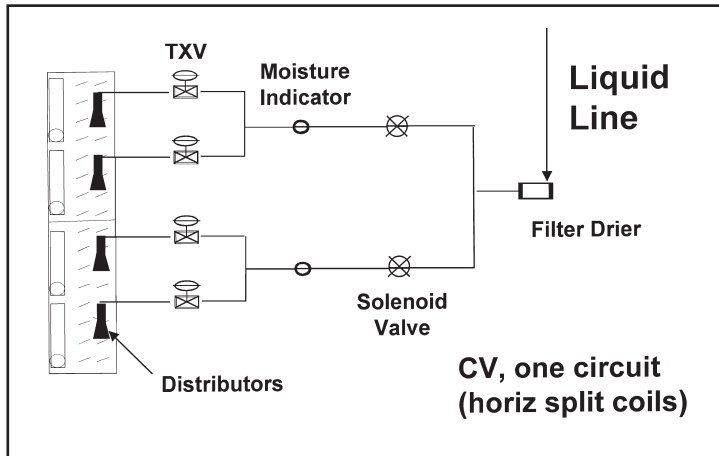


Figure 5A

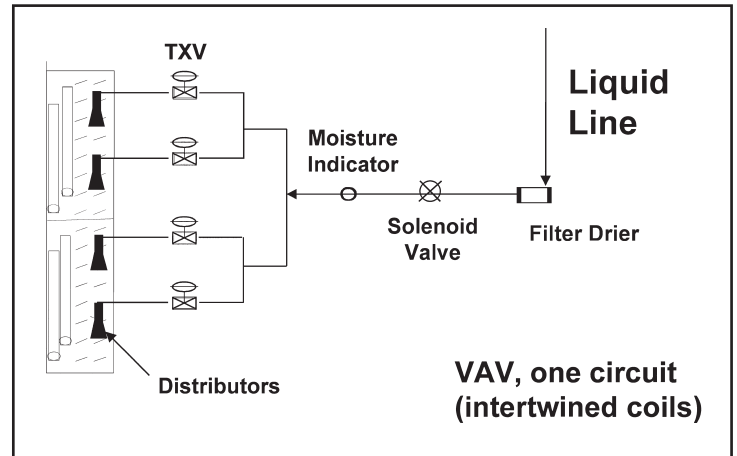


Figure 5B

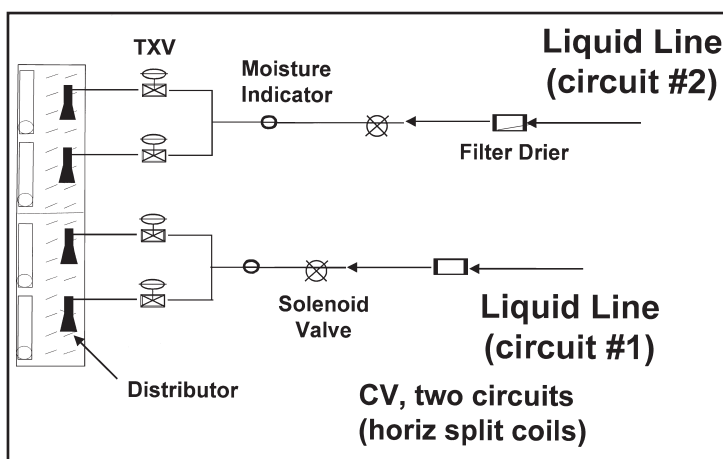


Figure 5C

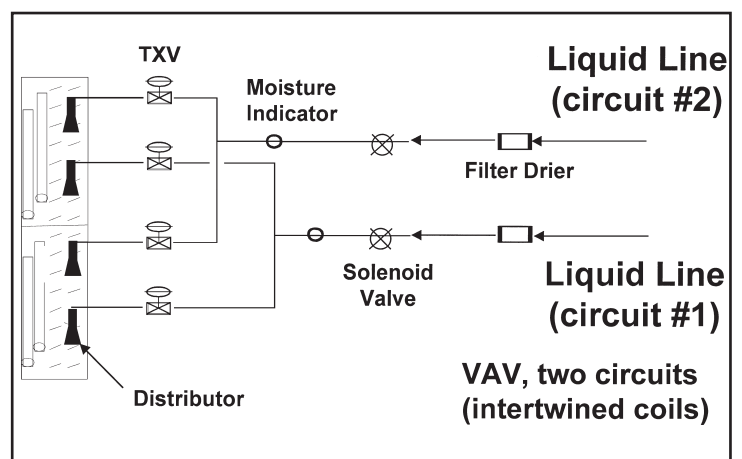


Figure 5D



TRANE®

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An American standard Company

Literature Order Number	MUL-SVNO54-E4
Date:	September 2002
Supersedes	MUL-SVN03A-E4
Stocking Location	Malaysia

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change design and specifications without notice.