TRANE®

Installation Operation Maintenance

Self Contained Water Cooled Air Conditioners

Models

WCVS 270, WCVS 330, WCVS 400, WCVS 470, WCVS 530, WCVS 600, WCVS 660, WCVS 730, WCVS 800, WCVS 900, WCVS 12H.

WCVS-SVX01A-EN
(Aug 2012)

Performance Data

Foreword

These instructions do not attempt to cover all variations in system, nor to provide for every possible contingency to be met in connection with installation. Should further information be desired or should particular problems arise which are not sufficiently covered for the purchaser's purpose, the matter should be referred to the manufacturer.

Warranty

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

Reception

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 damage 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.

Check the unit nameplate to confirm that the proper unit was shipped. Available power supply must be compatible with electrical characteristics specified on component nameplates.

General Information

This manual covers the installation, operation and maintenance of the Trane WCVS.

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 manufacturer assumes no liability for installations or servicing performed by unqualified personnel.

Handling

The unit will be supplied with a shipping base and protective packaging over the unit casing. The packaging should be kept on the unit during handling or storage on site.

If it is necessary to remove the packaging for inspection prior to completion of on site handling, retain packaging parts and reapply them by tapping in position to prevent damage to the casing. The unit as supplied has a shipping base which is suitable for handling by a fork lift truck. If it is necessary to sling the unit, use spreader bars under the shipping base. Ensure that ropes do not cause abrasion to the surface of the unit.

TRANE®

Contents

WCVS Model Nomenclature

W	C	V	S	2	7	0	D	1	C	X	I	A	0	D
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

DIGIT 1,2,3 [W][C][V] Water Cooled / Self contained / Vertical

DIGIT 4 [S] Development Sequence

DIGIT 5,6,7 [2][7][0] Unit Size

270	600
330	660
400	730
470	800
530	900
	12H

DIGIT 8 [D] Electrical Rating / Utilization Range
D = 380 - 415V / 3 Phase / 50 Hz

DIGIT 9 [1] Factory Mounted Control
1 = DOL(4w) STR with Unitary Controller, UC2c / UC4C.
2 = Soft Starter with Unitary Controller, UC2c / UC4c. (Consult Factory)

DIGIT 10 [C] Minor Design Sequence
C = Double Wall PU Panels - Standard on all models & Introduction of FUJI Starter

DIGIT 11 [X] Factory Installed Options
X = None

DIGIT 12 [I] Installed Motor kW

WCVS Models	STD.MTR, Kw	O/Size MTR, Kw
WCVS 270	I = 3.7	K = 5.5
WCVS 330	I = 3.7	L = 7.5
WCVS 400 / 470 / 530	K = 5.5	M = 11
WCVS 600 / 660	L = 7.5	N = 15
WCVS 730 / 800	M = 11	N = 15
WCVS 900	N = 15	O = 18.5
WVCS 12H	P = 22	NA

DIGIT 13 [A] Refrigerent Type
A = R22
B = R407c

DIGIT 14 [0] Future Use

DIGIT 15 [D] Service Indicator
D = Introduction of Externally Manifolded Condenser on WCVS 600-800.

TRANE®

General Specification
WCVS 270-12H

Table 1 - General Data Trane Water Cooled Self Contained Units.

GENERAL SPECIFICATIONS WCVS 270-12H

		WCVS 270	WCVS 330	WCVS 400	WCVS 470
Performances (1)					
Unit Capacity Steps (%)		50-50	50-50	50-50	27-63-100
Total Compressor Power Input	(kW)	13.2	18.3	22.3	25.5
Main Power Supply					
Utilization Range					
Sound Power Level (at 1kHz]	(dBA)	70	68	73	72
Compressor Data					
Number		2	2	2	3
Type		Scroll	Scroll	Scroll	Scroll
Model		2x10T	2x13T	2x15T	(1x10T) + (2x13T)
Speeds Number					
Unit MCA Amps (2) (4)	(A)				
RLA / LRA (2) (4)	(A)				
Condenser Data					
Condenser Type		SIMPLEX - Shell & Tube Condenser (25RT)			DUPLEX - Shel & Tube
Water Connection Size	in, BSPT (Int Thd.)	2.5" BSPT			2.5
Max. Flow Rate	gpm/Lpm	60/228	73/276	89/335	102/386
Min Flow Rate	gpm/Lpm	26/98	33/145	40/150	46/174
Max. Water Side Pressure	psig/Kpa	300/2068	300/2068	300/2068	300/2068
Evaporator Coil Data					
Configuration	Rows/FPI	3/12	3/12	3/12	3/12
Face Area	Sq. ft/m2	13.4/1.25	16.7/1.55	19.2/1.78	26.2/2.44
Tube Material		Copper	Copper	Copper	Copper
Tube Type					
Tube Size (OD)	in/mm	3/8 / 9.5	3/8 / 9.5	3/8 / 9.5	3/8 / 9.5
No. Of Circuits (Coil)		1	1	1	2
Refrigerant Flow Control					
Drain Connection Size	in, BSPT	1-1/4"	1-1/4"	1-1/4"	1-1/4"
Evaporator Fan/Motor Data					
Drive Type					
FLA/LRA (each) (2)					
No of Motors	Std. HP/kW	5/3.7	5/3.7	7.5/5.5	7.5/5.5
	Hi Static HP/kW	7.5/5.5	10/7.5	15/11	15/11
Diameter of Fan	in/mm	15.4/390	15.7/400	15.7/400	15.4/390
No of Fans		1	1	1	2
Indoor Fan Type		←			
Air Qty. - Max	cfm	7600	9500	11300	14600
- Min	cfm	4800	6200	7400	9600
Fan Motor Type					
Std. Fan Speed (Std. Factory Set)		900	850	900	900
@ ESP including filters in /[Nominal CFM]		1.1"[6190]	1.1"[7760]	1"[9240]	1.0"[10750]
Max. Allowable Fan RPM		1100	1100	1100	1200
Filters (3)					
Size	(Qty) in	(2) 15x20x2	(4) 20x20x2	(4) 20x25x2	(6) 15x25x2
		(1) 15x25x2	(2) 20x25x2	(2) 25x25x2	(3) 25x25x2
		(2) 20x20x2			
		(1) 20x25x2			
Refrigerant Charge					
Circuit 1	(kg)	14.6	16.8	16.8	16.8
Circuit 2	(kg)	-	-	-	7.3
Circuit 3	(kg)				
Circuit 4	(kg)				
Dimensions [uncrated]					
Height	(mm)	1428	1898	1898	2040
Width	(mm)	1989	1989	1989	2263
Depth	(mm)	874	1061	1061	1061
Appx. Operating Weight	(kg)	567	927	980	1226

Notes:

1 Gross Cooling Capacity based on 85/95 deg F [29.5-35C] , EWT-LWT and 80/67 deg F[27/19C] on coil conditions & Nominal airflows.

2 RLA/LRA, FLA, MCA Rated at 400V

3 2 inch Washable Filter is STANDARD on all Models

4 RLA rated at ARI 360 Conditions

WCVS 530	WCVS 600	WCVS 660	WCVS 730	WCVS 800	WCVS 900	WCVS 12H
25-62-100	21-50-70-100	25-50-75-100	23-50-73-100	25-50-75-100	35-66-100	25-50-75-100
29.2	32.1	33.9	41.2	45.2	57.0	77.0
	400/3/50					
	400V+,- 10%					
72	72	71	73	76	76	76
3	4	4	4	4	3	4
Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
(1x10T) + (2x15T)	(2x10T) + (2x13T)	2 x (2x13T)	(2x13T) + (2x15T)	2 x (15T+15T)	3x25T	4x25T
	Single Speed, 2900RPM @ 50Hz					
	Refer to Electrical Data Table					
	Refer to Electrical Data Table					
Condenser, 35RT	Manifolded Shell & Tube Condenser, 50RT				MANIFOLDED - Tube in Tube Cds.	
2.5	2.5	2.5	2.5	2.5	4	4
116/438	132/500	144/546	161/609	172/648	265/1003	338/1279
53/198	58/219	66/252	72/273	79/300	165/625	178/674
300/2068	300/2068	300/2068	300/2068	300/2068	300/2068	300/2068
3/12	4/12	4/12	4/12	4/12	4/12	4/12
26.2/2.44	34.8/3.24	34.8/3.24	38/3.53	38/3.53	50/4.65	66/6.13
Copper	Copper	Copper	Copper	Copper	Copper	Copper
	Smooth Bore					
3/8 / 9.5	0.5 / 12.7	0.5 / 12.7	0.5 / 12.7	0.5 / 12.7	0.5 / 12.7	0.5 / 12.7
2	2	2	2	2	3	4
	TXV					
1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"
	Belt					
	Refer to Electrical Data Table					
7.5/5.5	10/7.5	10/7.5	15/11	15/11	20/15	30/22
15/11	20/15	20/15	20/15	20/15	25/18.5	-
15.4/390	17.7/450	17.7/450	17.7/450	17.7/450	19.7/500	22/560
2	2	2	2	2	2	2
←	Centrifugal FC	→				
14600	18300	18300	21900	21900	28000	38000
9600	12000	12000	14400	14400	21000	28000
	TEFC 400V+,-10%/3Ph/50Hz					
900	760	760	760	760	786	698
0.9"[12120]	1.4"[13800]	1.5"[15130]	1.3"[16880]	1.1"[18080]	1.2"[24750]	1.2"[33000]
1200	1000	1000	1000	1000	1000	1000
	2" WASHABLE					
(6) 15x25x2	(9) 20x25x2	(9) 20x25x2	(3) 25x25x2	(3) 25x25x2	(10) 25x20x2	(5) 16x25x2
(3) 25x25x2	(3) 20x20x2	(3) 20x20x2	(4) 20x25x2	(4) 20x25x2	(2) 16x25x2	(5) 22x25x2
			(1) 20x20x2	(1) 20x20x2	(5) 20x20x2	(10) 25x25x2
			(3) 25x26x2	(3) 25x26x2	(1) 16x20x2	
			(1) 20x26x2	(1) 20x26x2		
16.8	16.8	16.8	16.8	16.8	27.0	27.0
7.3	16.8	16.8	16.8	16.8	27.0	27.0
					27.0	27.0
						27.0
2040	2040	2040	2040	2040	2260	2519
2263	2769	2769	2769	2769	3232	3577
1061	1275	1275	1275	1275	1345	1500
1199	1585	1594	1722	1730	1779	2046

General Information

General information

The multiple-compressor WCVS units consist of compressors, water-cooled condensers, an evaporator coil, and FC fan. Each unit is shipped with refrigerant and oil charge with complete refrigerant piping. Each refrigerant circuit includes a brazed filter-drier, condenser pressure relief valve, sightglass, high and low pressure access ports, thermal expansion valve with external equalizer, lock-out safety and thermal overloads for each compressor, time delay safety and high-low pressure cut-out switches.

The evaporator fan is of double-width double inlet forward curved fan.

Rigging

WARNING: To prevent injury or death and unit damage, observe handling cautions and procedures given in Figure 1 when lifting the unit. Always test-lift the unit to determine actual centre of gravity.

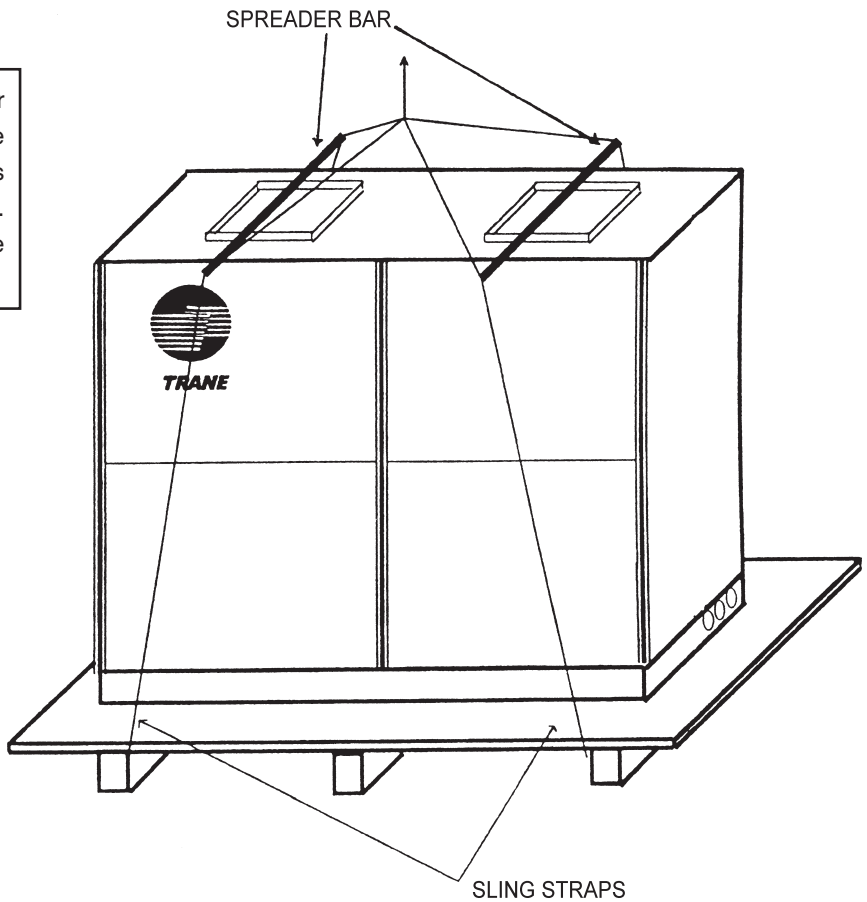
Before preparing the unit or component for lifting, estimate the approximate centre of gravity for lifting safety. Due to the placement of internal components, the unit weights may be unevenly distributed. Unit weights are provided in the general specification.

Special Note on Refrigeration Emissions

World environmental scientists have concluded, based on the best currently available evidence, that ozone in our upper atmosphere is being reduced due to release of CFC fully halogenated compounds.

Trane-Ingersoll Rand urges all HVAC servicers working on Trane equipment, or any manufacturer's products, make every effort to **eliminate**, if possible, or **vigorously reduce** the emission of **CFC**, **HCFC**, and **HFC refrigerants** to the atmosphere resulting from installation, operation, routine maintenance, or major service on this equipment. Always act in a responsible manner to conserve refrigerants for continued use even when acceptable alternatives are available.

Figure 1 - Recommended rigging method for WCVS



Installation

Installation

For proper installation, consider the following:

Unit nameplate

The unit nameplate gives the full model reference. The operating voltage must be as specified and must not vary by more than 6%.

Foundation

Ensure the floor to foundation of the unit is level, solid and of sufficient strength to support the unit weight. Level the floor if necessary before placing the unit. Please refer to (General Specification) for information on weights.

Clearances

Provide sufficient clearance around the unit. Please refer to the section on dimensions for recommended service are required. **The service envelope shown is the minimum required for general maintenance of fans and refrigerant components. The minimum room required to remove fans, fan motor, compressors and condensers was considered.** However, the service envelopes provided do not include space required for change of shaft or removal of coils or local electrical codes.

Piping

The installer must furnish and install a condenser main and standby water pump, cooling tower, pressure gauges, strainers and all components for waterside piping. All field installed piping must conform to applicable local codes. Recommended piping components is provided in figure 2, to ensure proper, clean and serviceable supply.

Air Filters

Please refer to unit dimension al data for information on filter layout.

Condensate drain connections

Connect drain piping to a 1-1/4 inch fitting. Piping should be no smaller than 7/8 inch-OD copper or ¾ inch iron pipe. Pitch the line away from the drain pan and install a P-trap.

Note: Unit has no floor drainpan. (Secondary drainpan)

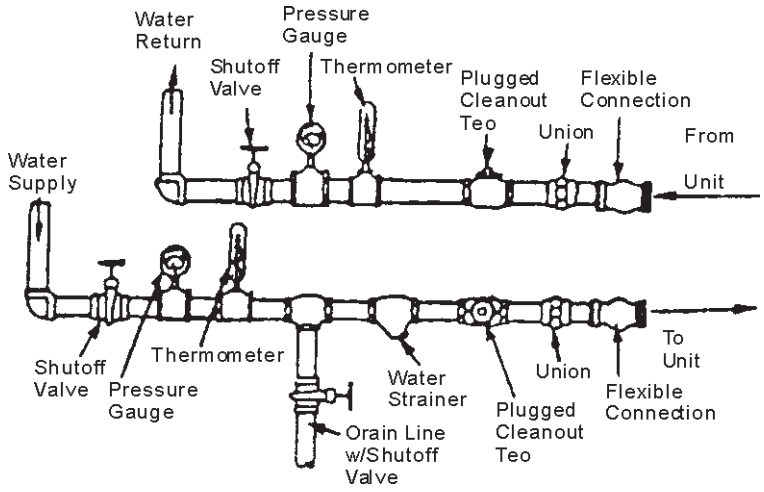
Vibration Isolation

All units will be shipped with rubber-in-shear isolators at the base which holds the compressors. For further vibration and acoustic isolation, it is recommended to install neoprene rubber padding along the perimeter of the unit base.

Refrigerant Circuit

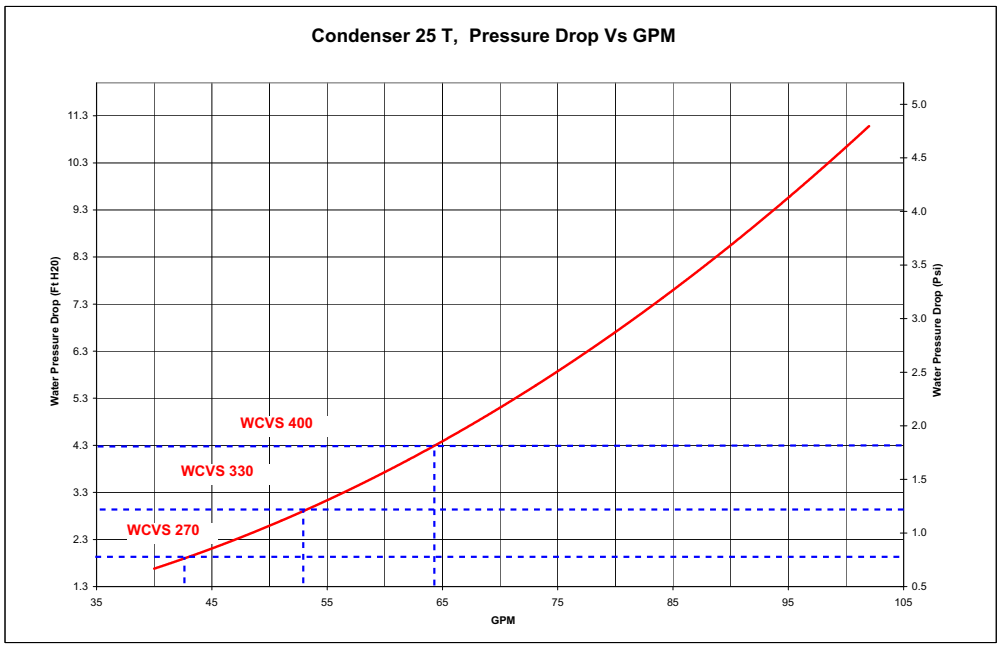
Single manifolded circuit on WCVS 270,WCVS 330 and WCVS 400.
Two manifolded circuits on WCVS 470-800.
Manifolded circuits will have two compressors manifolded.
Figure 3 shows a typical manifolded circuit for WCVS.

Figure 2-Condenser Water Piping Components for Cooling Tower System.

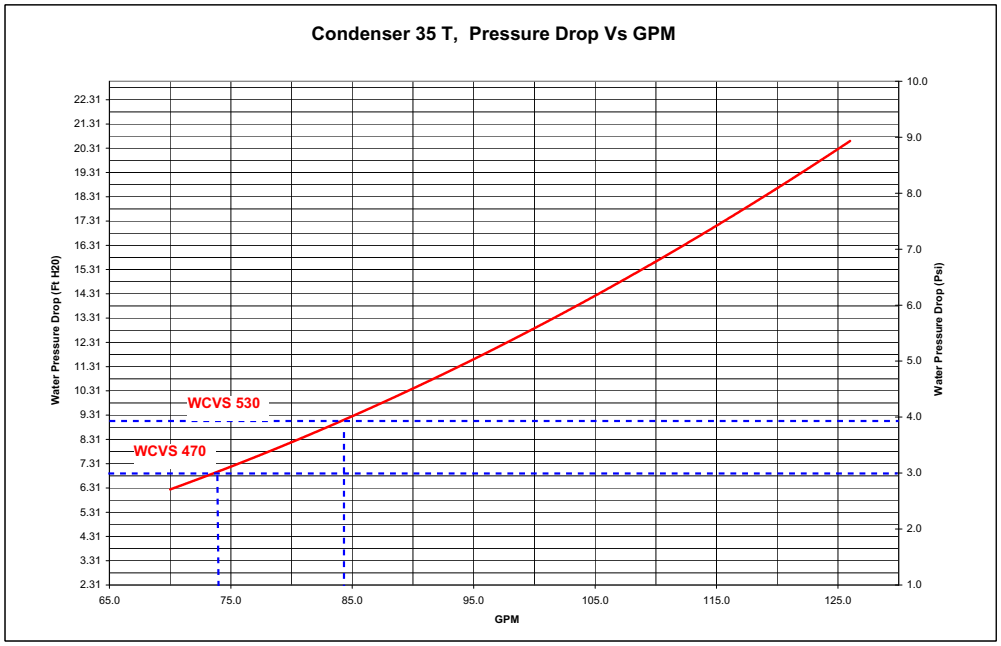


Installation - Condenser Water Pressure Drop Data

WCVS 270 / 330 / 400

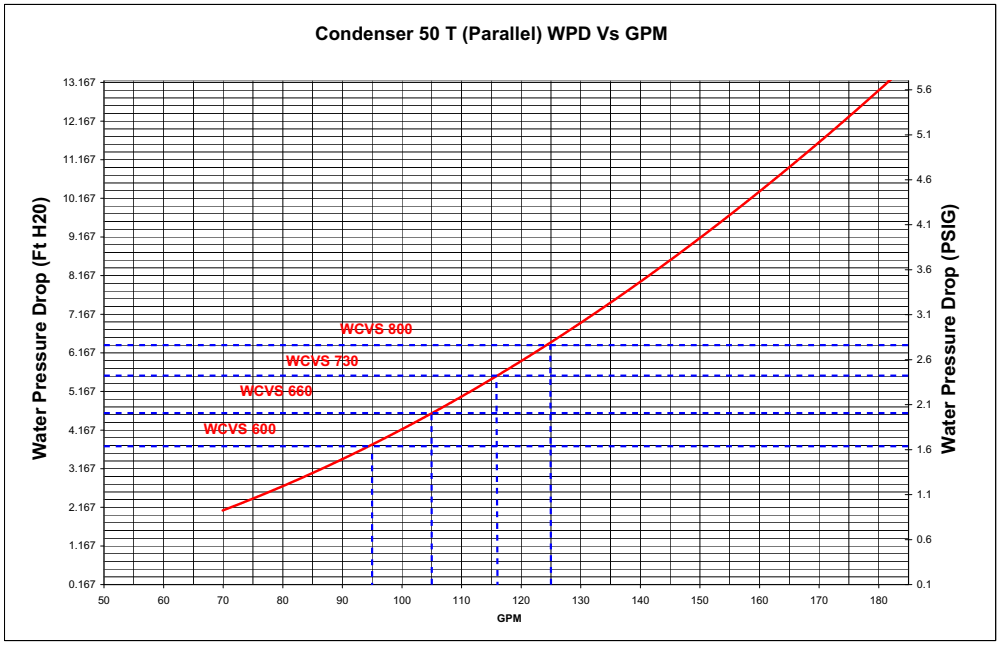


WCVS 470 / 530

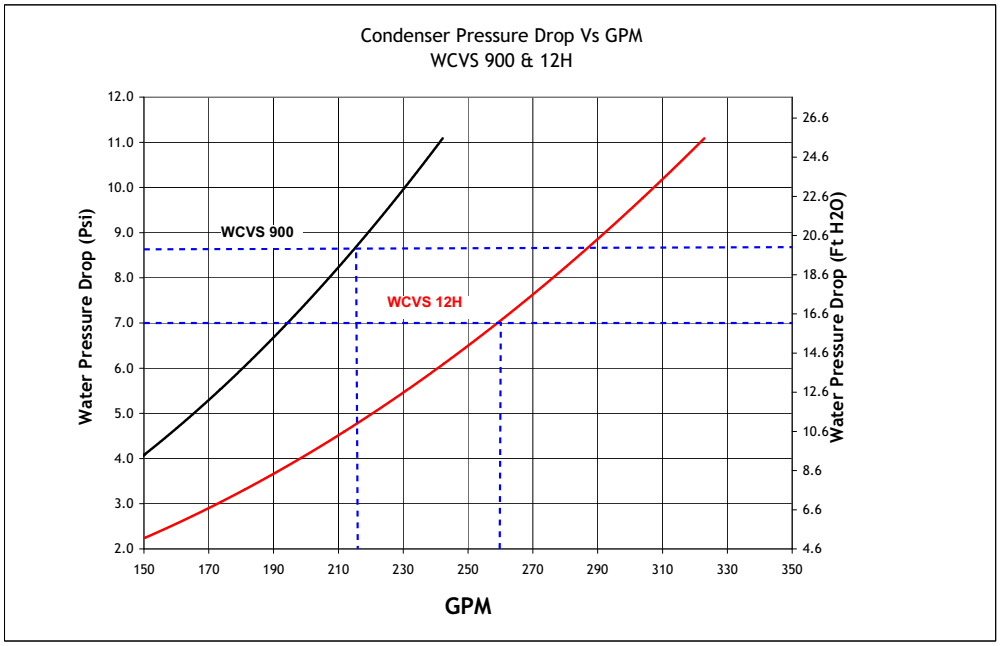


Installation - Condenser Water Pressure Drop Data

WCVS 600 / 660 / 730 / 800



WCVS 900 / 12H



Operation / Start-Up

Start-up

Before Start-up, confirm the following:

1. Isolator spacers at compressor base if any, had been removed.
2. Ensure sufficient cooling load is available at the day of start-up (Min 50% design load).
3. Check if duct is firmly connected to the fan discharge with a flexible duct. The flexible duct must be loose.
4. Check and ensure that the balancing dampers are opened.
5. Water piping system must be properly installed and filled with clean water.
6. Check the condition and tension of the fan belts.
7. Compressor oil should be visible in the sight glass.
8. Check voltage at all compressor terminals.
9. Check voltage imbalance. Maximum allowable voltage imbalance, phase to phase is 2%.
10. Check phase rotation with a phase meter. The phase rotation for all multiple scroll compressors are the same (clockwise direction L1-L2-L3). Please refer figure 6 for details.

WARNING: Do not jumper low-pressure cut-out during start-up. Failure in observing this warning may result in compressor failure due to starting at low suction pressure.

Note: All units do not have liquid solenoid valves. Liquid solenoid valves are not required nor recommended.

To Start Unit

1. Turn on the unit power switch.
2. Turn on the condenser water supply.
3. Check the fan for direction of rotation.
4. Turn the Zone Sensor Thumbwheel to desired temperature setting.

Operation

Unit start/stop controls are provided on the facia of the unit-mounted control box.

Unit is operated by, pressing the "START" botton while the 'H-O-A' selector switch in H (Hand / Manual) mode. Please ensure there are at least 50% design load.

To interrupt unit operation, press the "STOP" button.

Seasonal Start-up Procedure.

1. Perform the applicable procedures outlined under "Annual maintenance" in the Maintenance section.
2. Test the entire refrigerant system for leaks.
3. Start the system.
4. Check the operation of all interlocked equipments.
5. Check the compressor oil level and system operating pressures after the system has stabilized (About 15 to 20 minutes).
6. Observe the flow of refrigerant through sight-glass. If bubbles appear, re-check the system for leaks.
7. Check for adequate subcooling.

Note: Normal oil level on the manifolded compressors could be any where from low to 3/4th. of the oil sight glass. Add oil only if oil level is not visible in the sight glass.

Maintenance

The following maintenance procedures are given as an essential part of the required maintenance of this equipment. However, the services of a qualified service technician are required to perform the periodic maintenance procedures as a part of a regular maintenance contract.

WARNING: Disconnect power source and allow all rotating equipment to stop completely before servicing or inspecting the unit. Failure to do so many result in injury or death.

Operation / Start-Up

Weekly maintenance

- ☐ Check the liquid line sight-glass. Presence of bubbles indicates possible shortage of refrigerant or dirty liquid line filter driers.
- ☐ A noticable temperature drop across the filter driers (more than 5 deg. ^{0}F) indicates dirt or obstruction in the filter driers. Replace filter drier if necessary.

Monthly maintenance

- ☐ Inspect unit air filter. Clean or replace if filters are dirty and blocking airflow.
- ☐ Inspect coils for excess moisture or icing. Icing may be due to restricted air flow or shortage of refrigerant flow across the coil.
- ☐ Check condensate flow though drainpipe. Remove any obstructions or algae if found.
- ☐ Check tension and condition of fan belts.

Note: Belt tensions should be checked and adjusted at least twice during the first few days of new belt operation.

Six month interval

- ☐ Inspect fan motor for proper lubrication.
- ☐ With power disconnected, manually rotate the fan wheel to check for obstructions in the housing.
- ☐ Check alignment of fan assembly sheaves. Tighten setscrews for their proper torques.

Annual maintenance

- ☐ Check and tighten all setscrews, bolts, locking collars and sheaves.
- ☐ Inspect, clean and tighten all electrical connections.
- ☐ Inspect the TXV sensing bulbs for cleanliness, good contact with suction line and insulated from ambient.
- ☐ Check superheat setting of TXV. It should be 11^{0}F to 14^{0}F.(6-8^{0}C)
- ☐ Drain the condenser water system and throughly inspect for fouling. Clean the condensers.

Required Unit Service Envelope

The following summarizes the envelope around each unit size which is required for proper service access. The assumption in establishing these service envelopes are listed below:

1. Service envelopes shown are assumed to be the absolute minimum space required to service a unit. It is suggested that unit-to-wall clearance on all sides be 900mm, except where more room is already specified; this will allow easier access to all components for general unit servicing.
2. Room for general maintenance of fans and refrigerant components was considered. Also the minimum room required to remove fans, fan motors and compressor servicing is considered. Cleaning of the condenser waterside tubes must be accomplished by the use of a flexible type brush cleaning machine.

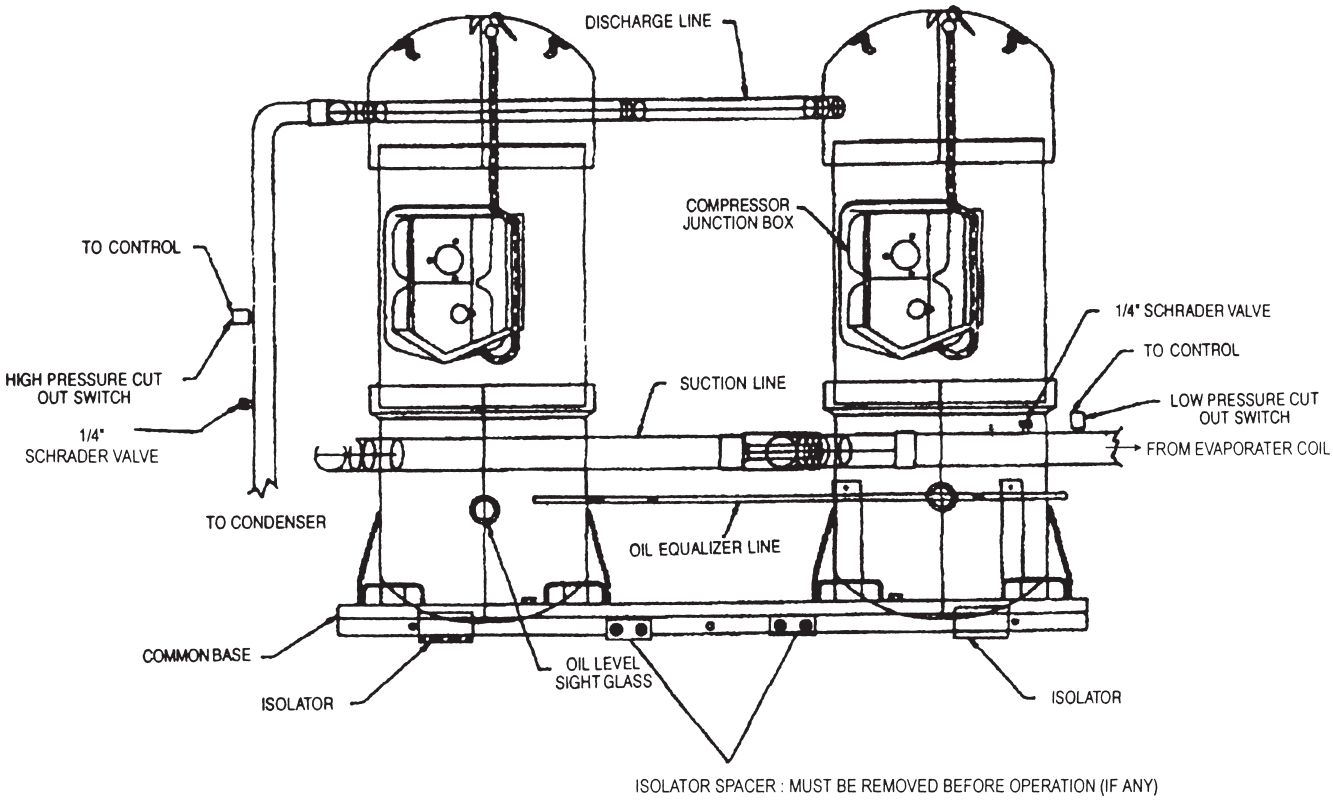
Adequate service clearance has NOT been left for the following: (It is unlikely these service procedures will be needed).

* Condenser cleaning using the brush with a straight rod.
* Relining condensers.
* Relining evaporator coils.
* Replacing evaporator coils.
* Shaft removal.

3. The clearance specified on the unit control panel side is the clearance which is required for general unit servicing and not that which is required by local electrical codes. The required control panel clearance must be determined by the applicable codes in that region.
4. Refer to the unit dimension al data for recommended clearance.

Operation / Start-Up

Figure 3-Typical Manifolded Circuit



General Recommendations

Cooling Towers

Cooling tower controls affect the unit cycle rates; 10-15 degree^{0}F (5.5-8.5^{0}C) swings in condenser water temperature may cause excessive compressor, water valve and unit cycling. Be sure the tower controls are set to minimize compressor/ unit cycling.

Duct Connect

WARNING: Please ensure no electrical power is supplied to the fan motor when installing ductwork. Failure to do so may result in injury or death from entanglement in moving fan wheel or electrical shock.

Air duct shoud be installed in accordance with the standards of the National Fire Protection Association for the "Installation of Air Conditioning and Ventilating Systems other than Residence Type (NFPA 90A) and Residence Type Warm Air Heating and Air Conditioning Systems (NFPA 90B) or as perapplicable local codes.

Make duct connections to the unit with a flexible material such as heavy canvas. If a fire hazard exists, the recommended material is flexweave 1000, type FW-30 or equivalent.

Refer to Fan/ Duct layout (next page) for recommended correct ductwork installation.

Where proper duct turns are not possible consider discharge into a plenum with take-offs made from that plenum.

Operation / Start-Up

Figure 4

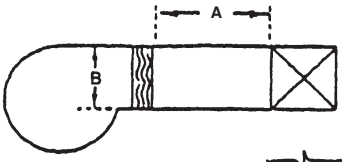
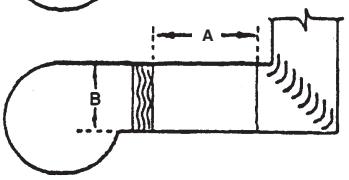
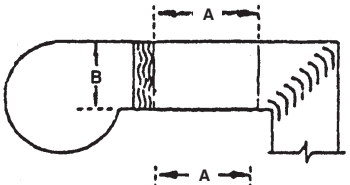
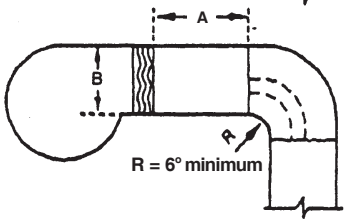
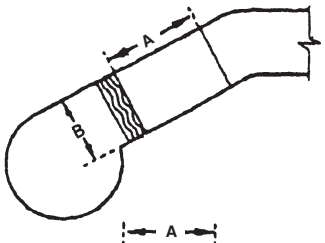
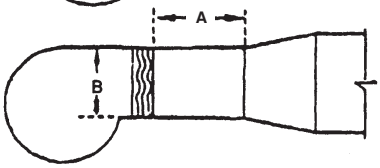
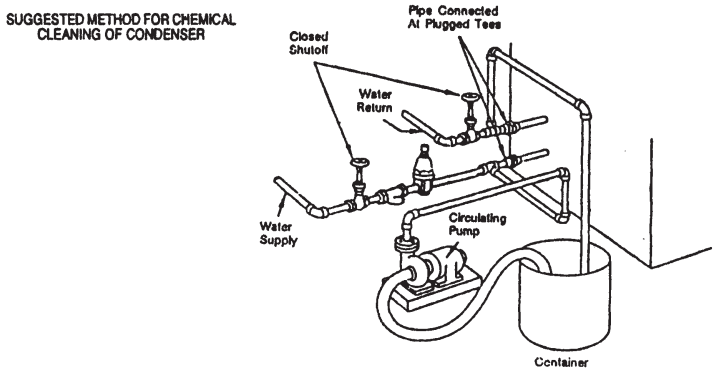
Fan / Duct Layout	Comment
	Bad if A < 3 B
	Bad if A < 3 B Very Bad if turning vanes are deleted
	Fair if A < 3 B Bad if A < 1.5 B
	Good if A > 3 B Fair if A > 1.5 B Bad if A < 1.5 B (Delete turning vanes if A < 1.5 B)
	Very good if A > 3 B Fair if A < 3 B
	Best if A > 1.5 B Transition wall slopes of 1:7 preferred. Slopes of 1:4 permitted if inlet velocity is less than 2000 FPM.

Figure 5



Coil / Condenser Cleaning

Coil Fins and External Surface Cleaning

Coils should be kept clean to maintain maximum performance. For operation at its highest efficiency, the refrigerant coil should be cleaned often during periods of high cooling demand or when dirty conditions prevail. A routine cleaning schedule (minimum of once per year) is recommended to prevent dirt buildup in the coil fins, where it may not be visible.

Remove large debris from the coils and straighten fins before cleaning. Remove filters before cleaning.

Clean refrigerant coils with cold water and detergent, or with one of the commercially available chemical coil cleaners. Rinse coils throughly after cleaning.

Caution: Do not clean the refrigerant coil with hot water or steam. The use of hot water or steam as a refrigerant coil cleaning agent will cause high pressure inside the coil tubing and subsequent damage to the coil.

Caution: Do not use acidic chemical coil cleaners. Do not use alkaline chemical coil cleaners that, after mixing have a pH value greater than 8.5, without also using an aluminium corrosion inhibitor in the cleaning solution. If these instructions are followed, the unit could be damaged.

WARNING: Some chemical coil-cleaning compounds are caustic or toxic. Use these substances only in accordance with the manufacturer's instructions Failure to do so may result in injury, death or equipment damage.

Caution: Failure to properly drain and vent coils when not in use during freezing temperatures may result in coil freeze-up damage.

Caution: Failure to provide adequate water treatment in condenser systems may result in fouling of the coil and condenser surfaces or undue metal damage.

Customer Note

The use of improperly treated or untreated water in this equipment may result in scaling, erosion, corrosion, algae or slime. The services of a qualified water treatment specialist should be engaged to determine what treatment, if any, is advisable. Trane-Ingersoll Rand warranty specifically excludes liability for corrosion, erosion or deterioration of Trane-Ingersoll Rand equipment. Trane assumes no responsibilities for the results of the use of untreated or improperly treated water, or saline or brackish water.

Condenser Cleaning

Condensing water contains minerals that collect on the condenser tube walls. Cooling towers also collect dust and foreign materials that deposit in the condenser tube. The formation of scale or sludge in the condenser is indicated by a decrease water flow, low temperature difference between inlet and outlet water, and abnormally high condensing temperatures. To maintain maximum condenser efficiency, the condenser must remain free of built-up scale and sludge, and may be cleaned either mechanically or chemically.

Mechanical Cleaning of Condenser

The mechanical method of cleaning the condenser is used for removing mud and other loose material from the condenser. Complete the following:

1. Turn off condenser supply water.
2. Remove condenser end plates by removing clamp bolts. This exposes the condenser tubes.
3. Rotate a round brush through the tubes to loosen contaminant.
4. Flush tubes with water which will flush the sludge out through the drain opening in the bottom of the supply header and the drain opening in the return pipe.
5. Replace condenser end-plates and clamps. The end-plates must be centered when the clamp is tightened.
6. Replace coil headers with gaskets and torque bolts to 50 ft-lbs.

Chemical Cleaning of Condenser

Chemical cleaning removes scale deposits built up by minerals in the water. For a suitable chemical solution, consult a water treatment specialist. The condenser water circuit is composed of copper, steel, and cast iron.

See Figure 5 for a typical piping arrangement for chemically cleaning the condenser. All materials used in the external circulating system, along with the quantity of cleaning material, duration of cleaning time and safety precautions necessary for handling the cleaning agent, should be provided or approved by the chemical supply house.

Trouble Analysis Guide

POSSIBLE SYMPTOMS / POSSIBLE CAUSES	Overcharge of refrigerant	Shortage of refrigerant	Water through condenser restricted	Water through condenser to cold	Water through condenser too hot	Water through condenser reversed	Low evap air flow	High evap air flow	Expansion valve power element lost its charge	Expansion valve feeler bulb improperly mounted	Expansion valve stem eroded or leaking	Expansion valve restricted	Restricted line on low side	Restricted drier or liquid line	Restricted hot gas line or condenser	Restricted equalizer line	Too much compressor oil in system	Compressor wiring incorrect	Incorrect condenser (If condenser in changed)	Air in system	Moisture in system	Bad compressor	Service valve closed (if any)
SOLUTION	Recover/Re-evacuate/Re-charge	Recover/Re-evacuate/Re-charge or add refring.	Remove restriction	Reduce flow (if possible)	Increase flow (if possible)	Correct	Check fan direction, voltage, drive, baffle	Check fan direction, voltage, drive, baffle	Replace power element	Re-locate/re-mount bulb. Verify circuit.	Inspect/replace stem & o-ring	Inspect stem, ports & o-ring	Remove restriction	Replace or remove restriction	Remove restriction	Remove restriction	Drain/Re-charge oil	Verify and correct if necessary	Verify cond. size and correct if necessary	Recover/Re-evacuate/Re-charge	Recover/Re-evacuate/Re-charge	Replace compressor	Correct
Hunting TXV		X		X			X			X	X				X	X						X	
Compr Amps HI/LO	H	L	H	L	H	H	L	H	L			L	L	L	H			L	H/L	H	L	H/L	H
High sub - cooling	X			X			X												X	X			
Low sub-cooling		X				X		X							X								
Moisture indication																				X	X		
HPCO Failure	X		X												X		X			X			X
LPCO Failure		X					X		X	X		X	X	X									X	X
Noisy compressor	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
Suction line frosting	X	X		X			X			X		X				X	X						
Bubbles in sight		X	X		X	X		X						X					X	X	X		X	X
Low Suction P		X		X					X	X		X	X	X	X		X				X		X	
High Suction P	X							X										X				X		
Low Discharge P		X		X														X	X			X		
High Discharge P	X		X		X	X									X		X		X	X				X
Low Superheat	X						X			X	X					X								
Hight Superheat		X						X	X	X		X	X	X	X						X			

Note: Always verify instrumentation prior to making any changes.

TRANE®

Electrical Data

Table 1 - WCVS-CA, Electrical Data (@ARI)

Model	Power Supply	Compr.1		Compr.2		Compr.3		Compr.4		Fan Motor @ 415V				UNIT MCA	Max Fuse Size & MCB
		RLA (ARI)	LRA	RLA (ARI)	LRA	RLA (ARI)	LRA	RLA (ARI)	LRA	kW	FLA	LRA	Qty		
WCVS 270	**380-415V/3Ph/50Hz**	14.4	130	14.4	130					3.7	7.32	52	1	**40**	**55**
	Over-Size Fan Mtr--->									5.5	11.1	75	1	**43**	**58**
WCVS 330	**380-415V/3Ph/50Hz**	17.8	135	17.8	135					3.7	7.32	52	1	**48**	**66**
	Over-Size Fan Mtr--->									7.5	13.9	100	1	**54**	**72**
WCVS 400	**380-415V/3Ph/50Hz**	21.3	175	21.3	175					5.5	11.1	75	1	**59**	**80**
	Over-Size Fan Mtr--->									11	19.7	155	1	**68**	**90**
WCVS 470	**380-415V/3Ph/50Hz**	17.8	135	17.8	135	14.4	130			5.5	11.1	75	1	**65**	**83**
	Over-Size Fan Mtr--->									11	19.7	155	1	**76**	**132**
WCVS 530	**380-415V/3Ph/50Hz**	21.3	175	21.3	175	14.4	130			5.5	11.1	75	1	**73**	**94**
	Over-Size Fan Mtr--->									11	19.7	155	1	**83**	**104**
WCVS 600	**380-415V/3Ph/50Hz**	17.8	135	17.8	135	14.4	130	14.4	130	7.5	13.9	101	1	**83**	**101**
	Over-Size Fan Mtr--->									15	27	188	1	**98**	**172**
WCVS 660	**380-415V/3Ph/50Hz**	17.8	135	17.8	135	17.8	135	17.8	135	7.5	13.9	101	1	**90**	**107**
	Over-Size Fan Mtr--->									15	27.0	188	1	**105**	**179**
WCVS 730	**380-415V/3Ph/50Hz**	21.3	175	21.3	175	17.8	135	17.8	135	11	19.7	140	1	**103**	**125**
	Over-Size Fan Mtr--->									15	27.0	188	1	**112**	**186**
WCVS 800	**380-415V/3Ph/50Hz**	21.3	175	21.3	175	21.3	175	21.3	175	11	19.7	140	1	**110**	**132**
	Over-Size Fan Mtr--->									15	27.0	188	1	**119**	**193**
WCVS 900	**380-415V/3Ph/50Hz**	35	270	35	270	35	270			15	27.0	188	1	**141**	**176**
										18.5	33.2	207	1	**147**	**182**
WCVS 12H	**380-415V/3Ph/50Hz**	35	270	35	270	35	270	35	270	22	40.5	260	1	**191**	**224**

Rating based on 85/95^{0}F (29.5/35^{0}C) EWT/LWT and 80/67^{0}F (27/19^{0}C) on coil conditions at nominal airflows.

Note: MCA - Minimum circuit capacity
Largest compressor RLA x 1.25 + sum of remaining compressors RLA and fan motor FLA.
(However, if fan motor FLA is largest, use 1.25 x FLA + remaining compressor RLAs)

Supply voltage must be within 6% of equipment rated voltage.

LRA - Lock rotor amp.
RLA - Rated load amp at 80 ºF / 67 ºC return air, 85 ºF EWT, 95 ºF LWT and rated airflow. (for compressors)
FLA - Full Load amp. (for Fan Motor)
Rated at 400V, 50 Hz

Table 2

High Pressure Switch	: cut-out / cut-in	310 / 240 psig
Low Pressure Switch	: cut-out / cut-in	27 /46 psig
Pressure relief valve	: pressure setting (SHELL & TUBE CDS ONLY)	350 psig

Electrical Wiring

Electrical wiring

General

All wiring should confirm to NEC or applicable codes as per requirements of local codes and regulations. Wiring diagrams are furnished with the units but extra copies can be obtained from Trane Sales Offices.

The installing contractor is to provide and install fused disconnect switches, wiring up to the unit (as indicated in the wiring diagrams), water circulating pumps and pump starting equipments, cooling tower controls and relays as indicated in the wiring diagrams. Electrical data on compressors and evaporator fan motors are available on Table 1.

Check the available power supply against the nameplate information. Voltage at the unit must be within ± 6% of the voltage indicated on the nameplate. Voltage within the phases must be balanced within 2%.

All factory supplied wiring are colored and numbered. Always check the numbers on the wiring to the unit terminal block against that in the wiring diagram. Should there be any inconsistency, please do not hesitate to contact the nearest Trane Sales & Service Office.

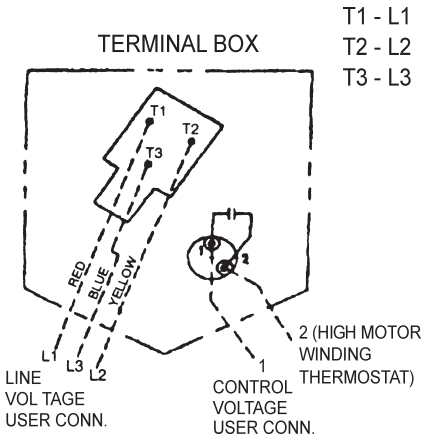
WARNING: The supply to the unit must be properly grounded. Disconnect electrical power source when power supply wirings are installed. Failure to do so may result in injury or death from electric shock.

Safety Controls

Safety controls for the WCVS water-cooled packaged units are indicated in Table 2. Please note that the high-low pressure cut-outs are non-adjustable, factory pre-set switches.

WARNING: PHASE ROTATION FOR SCROLL COMPRESSORS IS CRITICAL.
PLEASE ENSURE THAT WIRING TO THE COMPRESSOR TERMINALS ARE CONNECTED IN THE CORRECT PHASE SEQUENCES. PLEASE REFER DIAGRAM ON FIGURE 6.

Figure 6 -Scroll Compressors Terminal Wiring



LINE 1 & 2 TO BE CONNECTED IN SERIES WITH CONTROL.

- PHASING TO BE CONNECTED AS SHOWNTO PREVENT REVERSE ROTATION.

Phase Sequencing

The scroll compressor is an unidirectional compressor and to function properly it must be phase properly. The Compressor data sheets show the correct phasing for the compressor. The scroll compressor will run without damaging itself if the phasing is improper, but it will not pump refrigerant and will draw minimal current. if the compressor is incorrectly phased upon start up, it will eventually shutoff on the internal winding thermostat. Depending on the conditions it could take up to 30 minutes to trip the internal winding thermostats. The compressor will be noisy, vibrate excessively and the oil sump will become warm when running backwards.

It is important that the proper rotation of the scroll compressor be established before the compressor is started. Proper motor rotation requires confirmation of the electrical phase sequencing of the power supply. To confirm the correct phase sequence (ABC), use a device similar of the Model 45 Associated Research Phase indicator as shown in Figure 7.

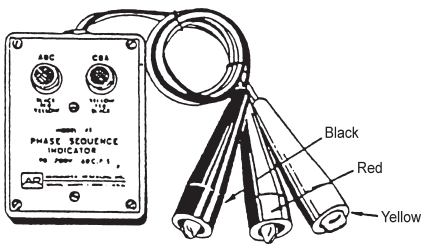
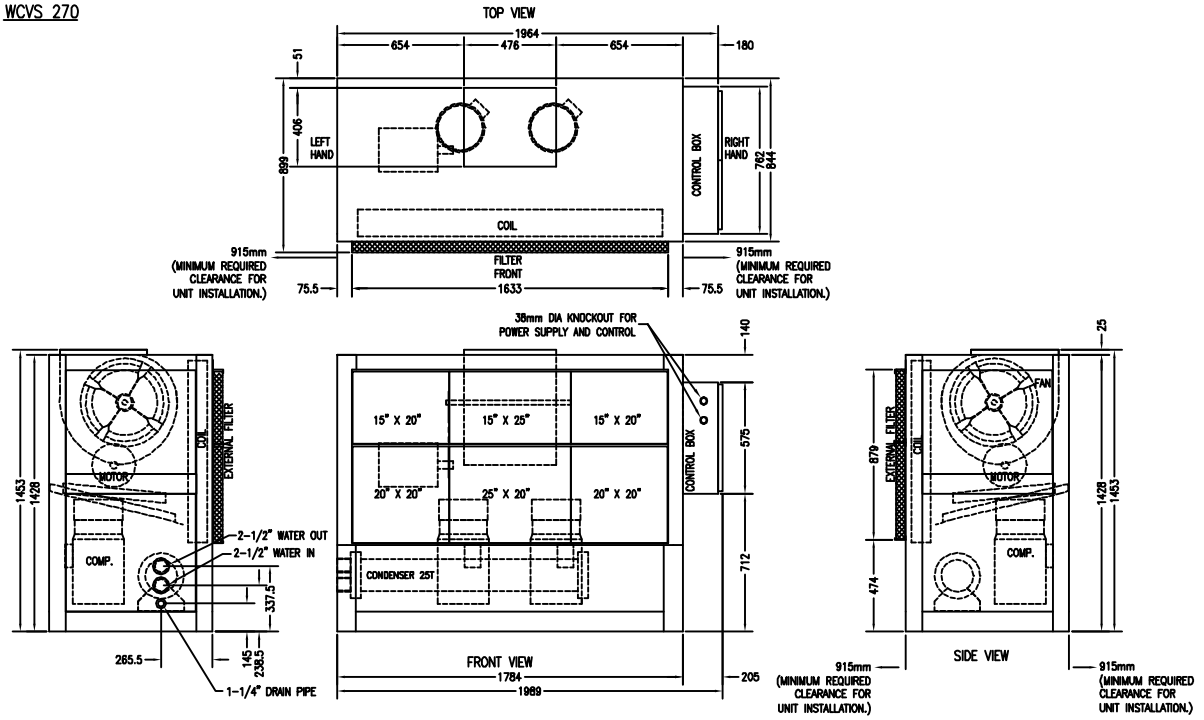


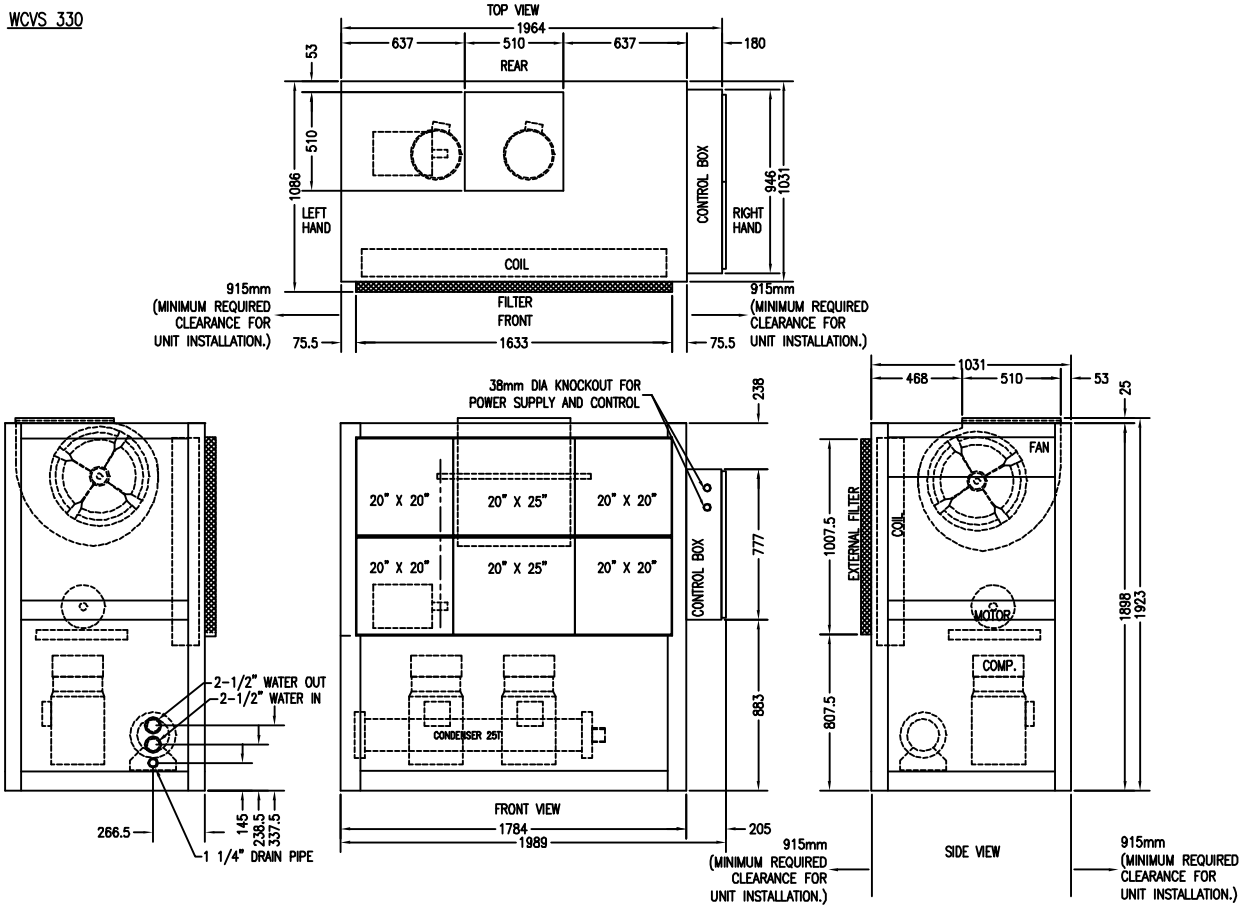
Figure 7- Model 45 Associated Research Phase Indicator

Unit Dimensions
Water-Cooled Vertical System WCVS 270/330

WCVS 270

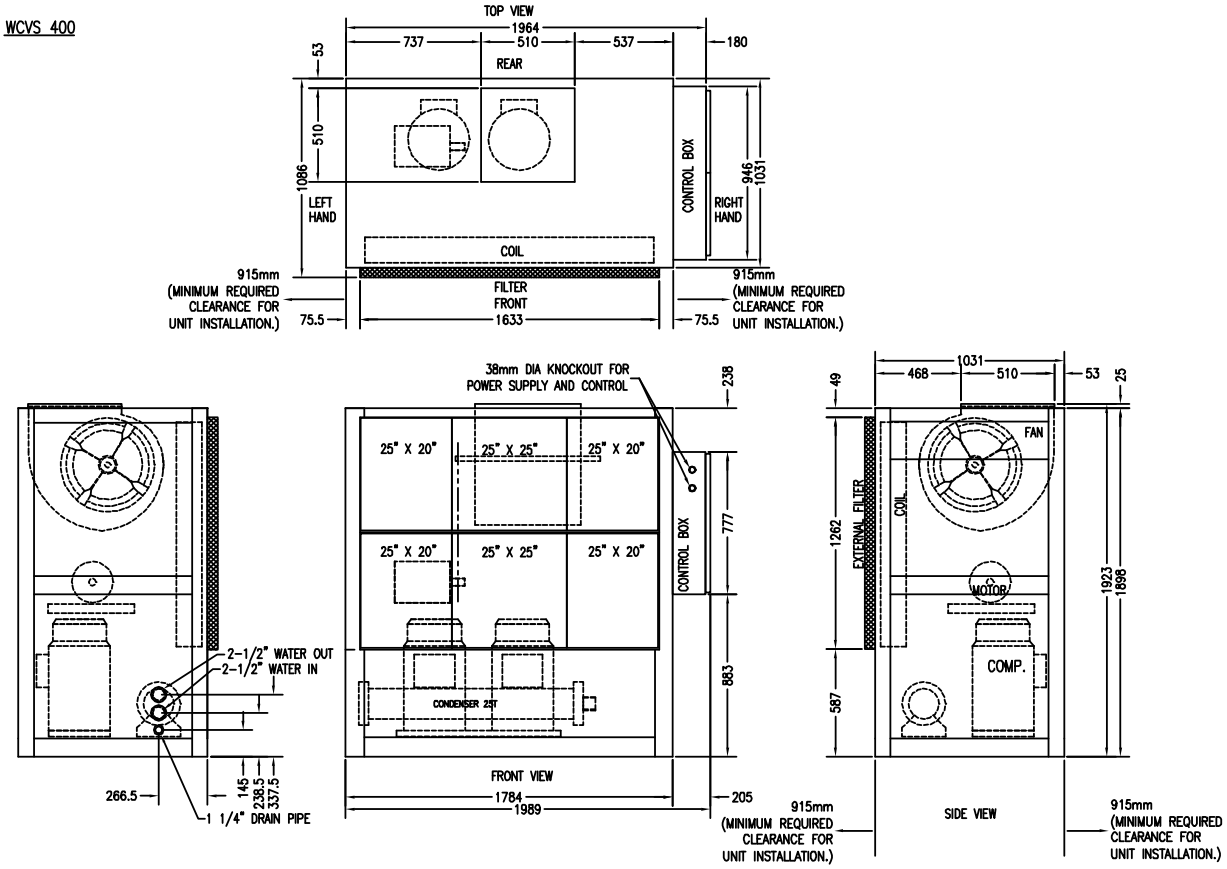


WCVS 330

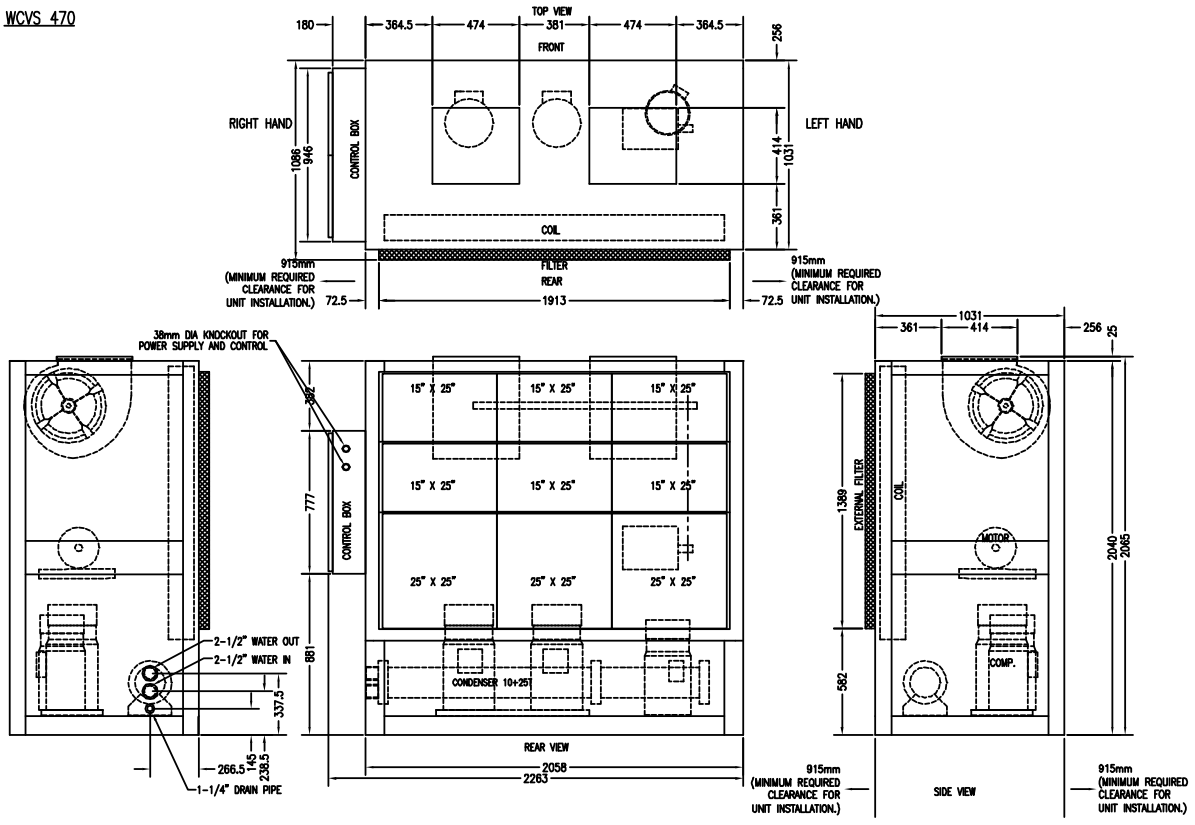


Unit Dimensions Water-Cooled Vertical System WCVS 400/470

WCVS 400

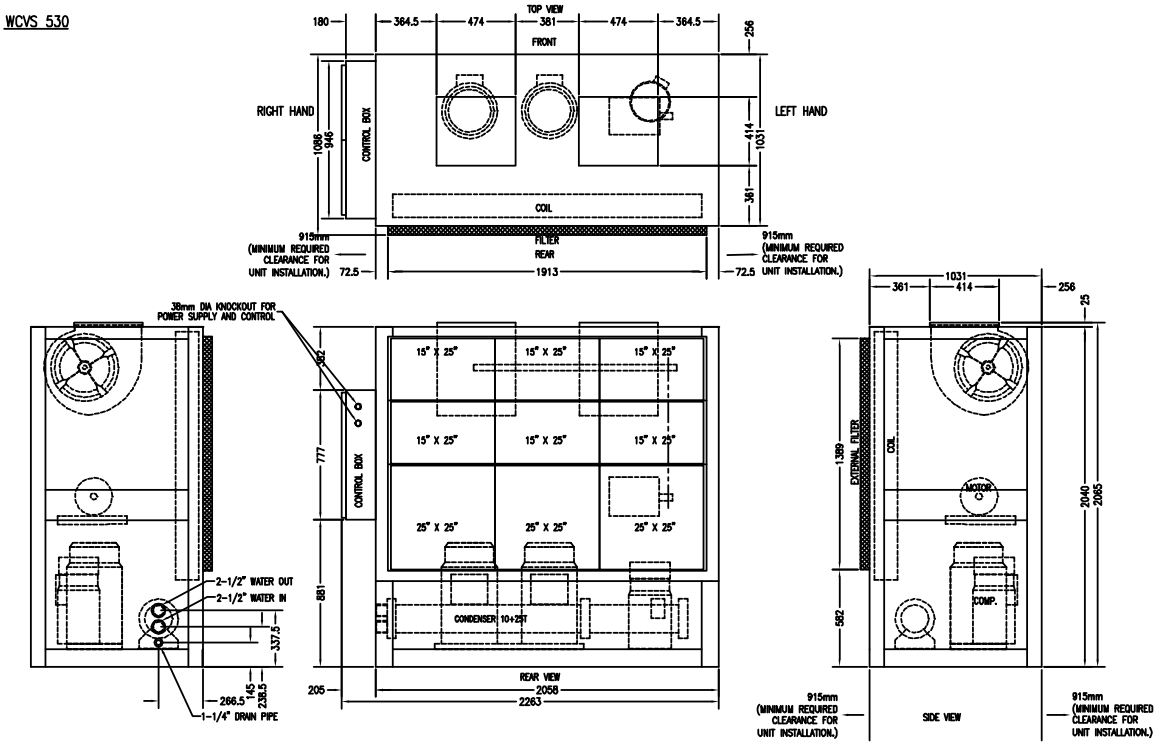


WCVS 470

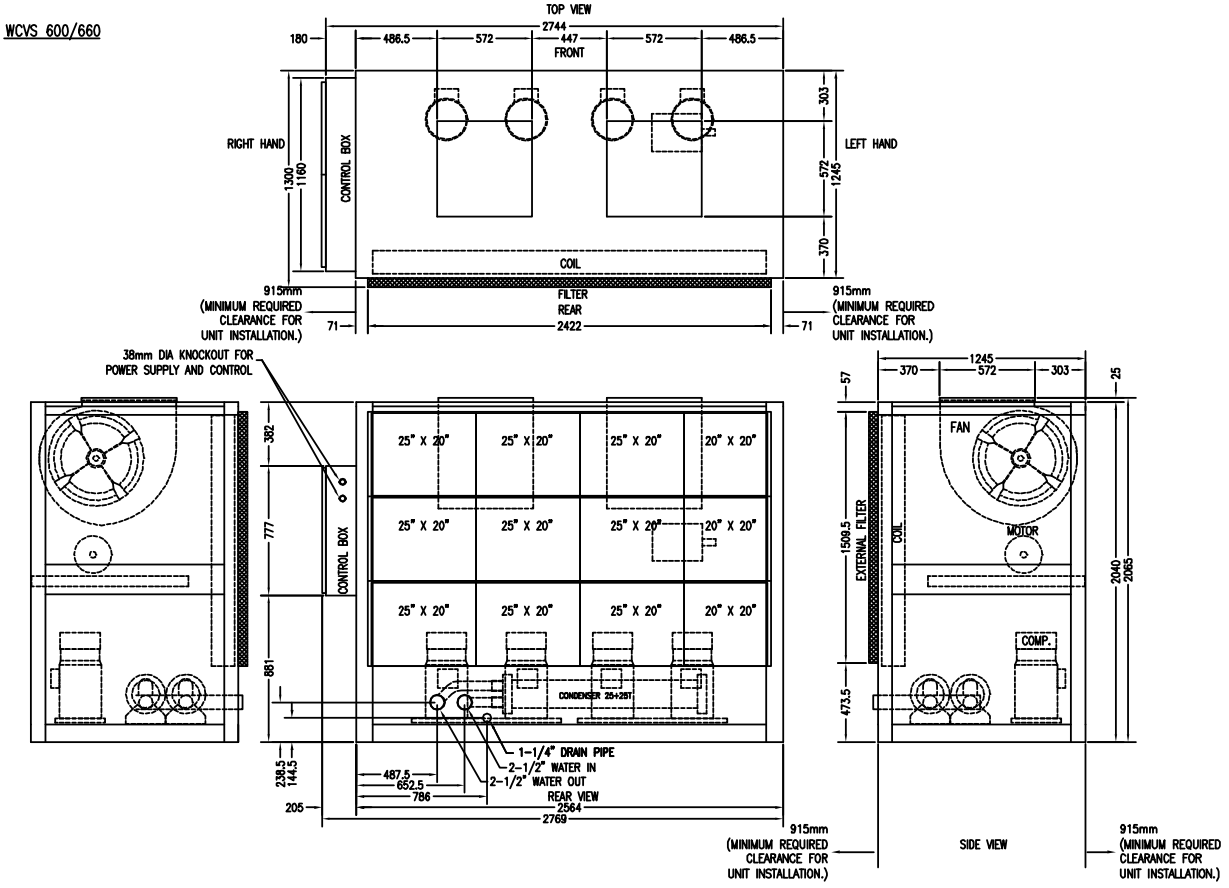


Unit Dimensions
Water-Cooled Vertical System WCVS 530/600/660

WCVS 530

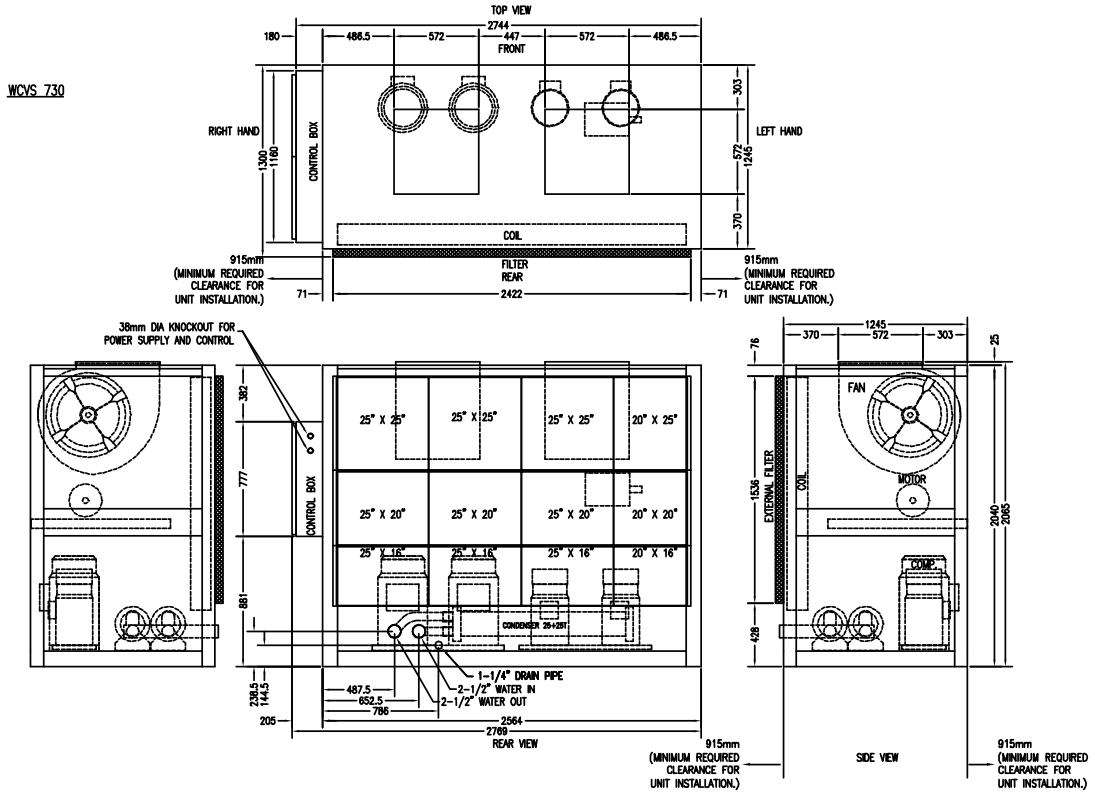


WCVS 600/660

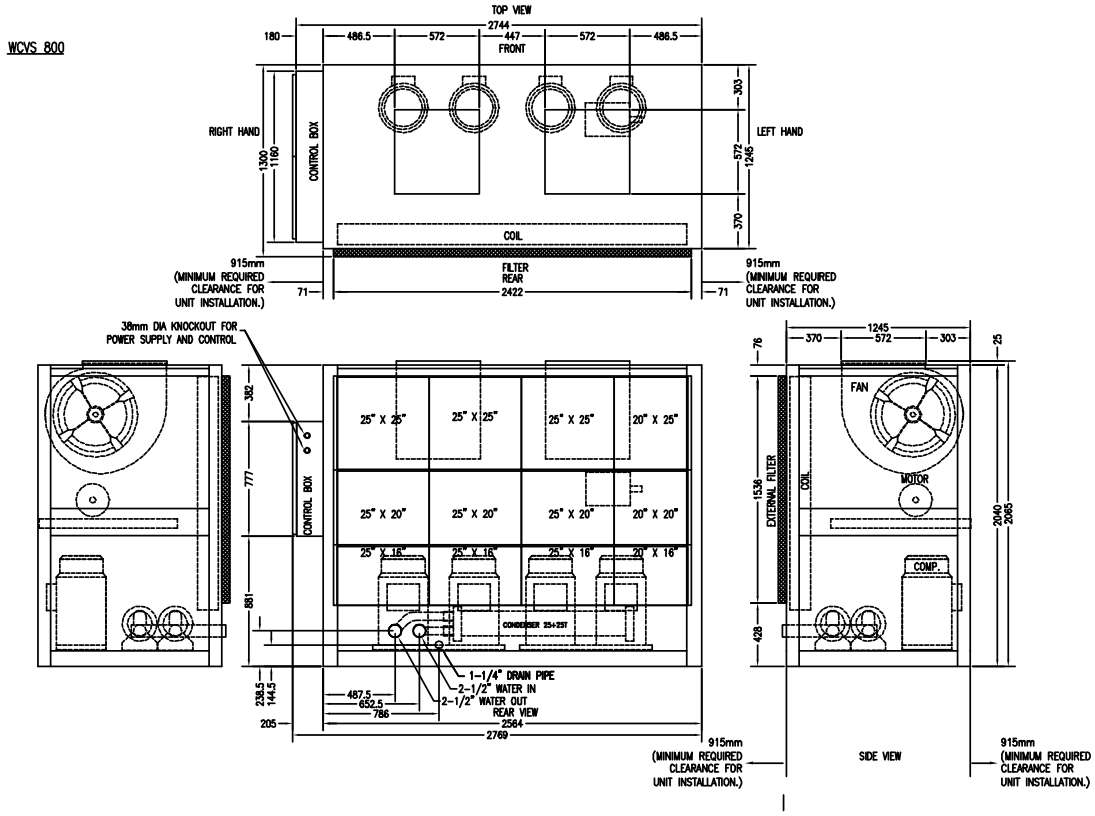


Unit Dimensions
Water-Cooled Vertical System WCVS 730/800

WCVS 730

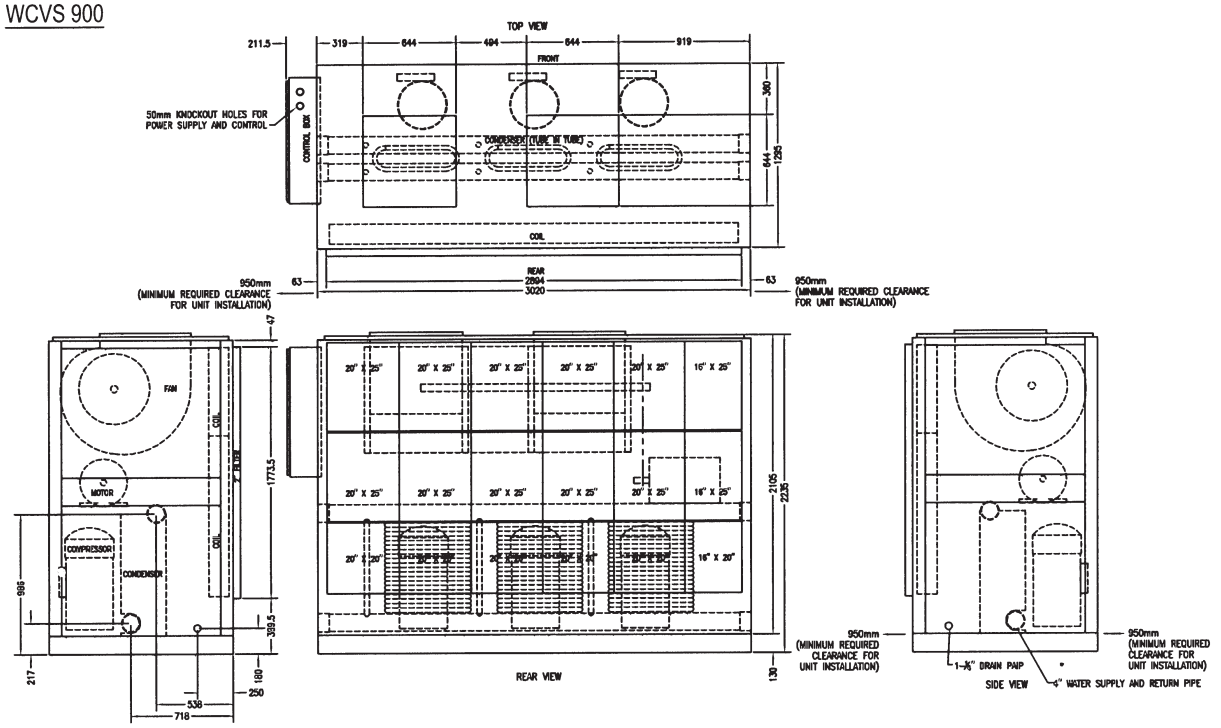


WCVS 800

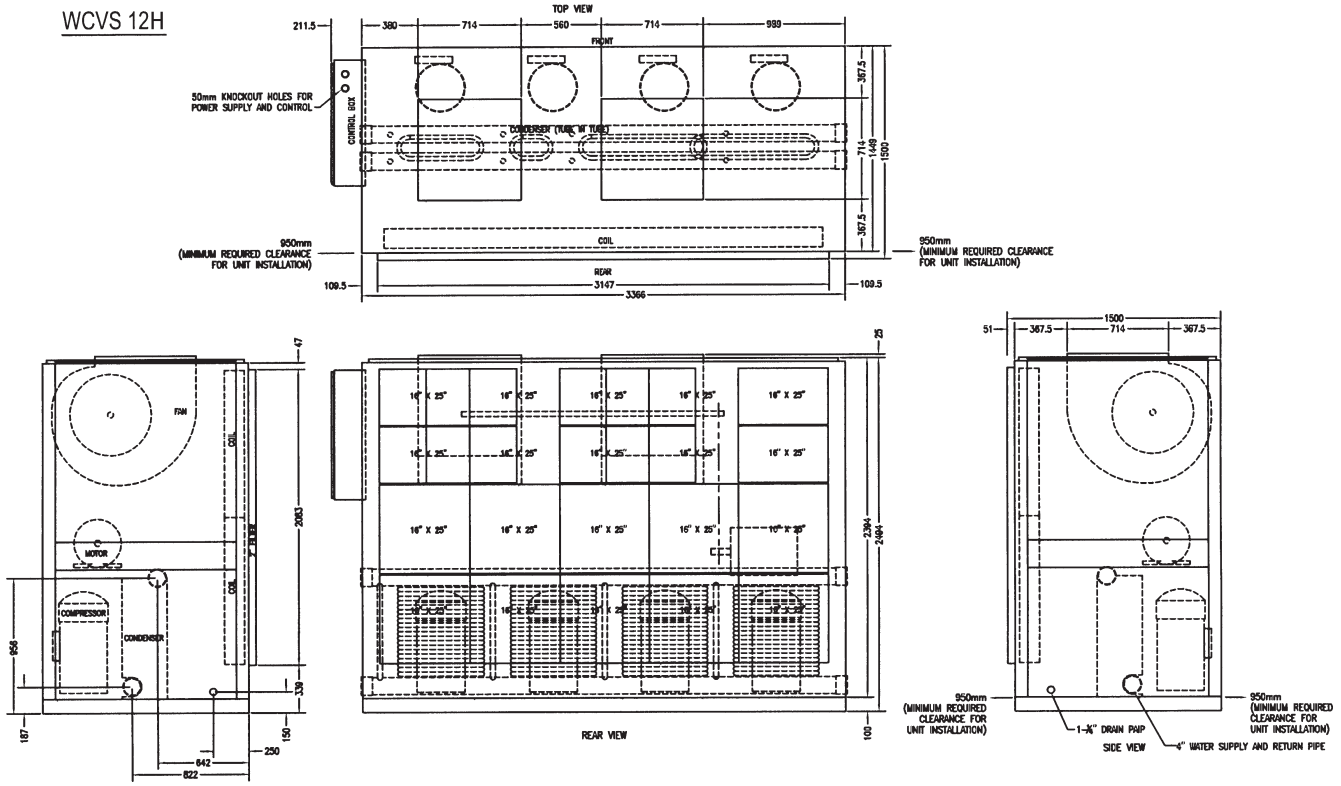


Unit Dimensions
Water-Cooled Vertical System WCVS 900-12H

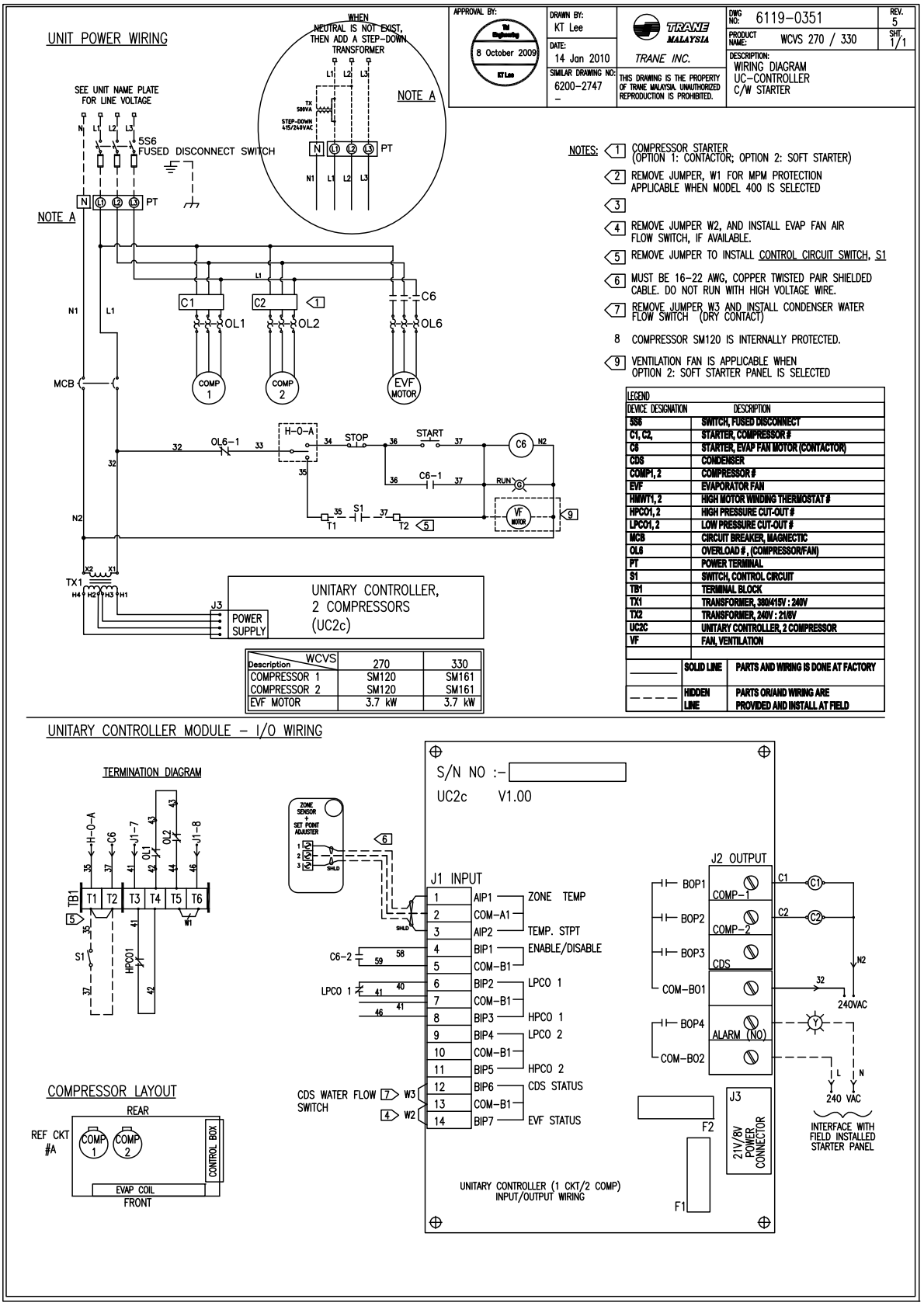
WCVS 900



WCVS 12H



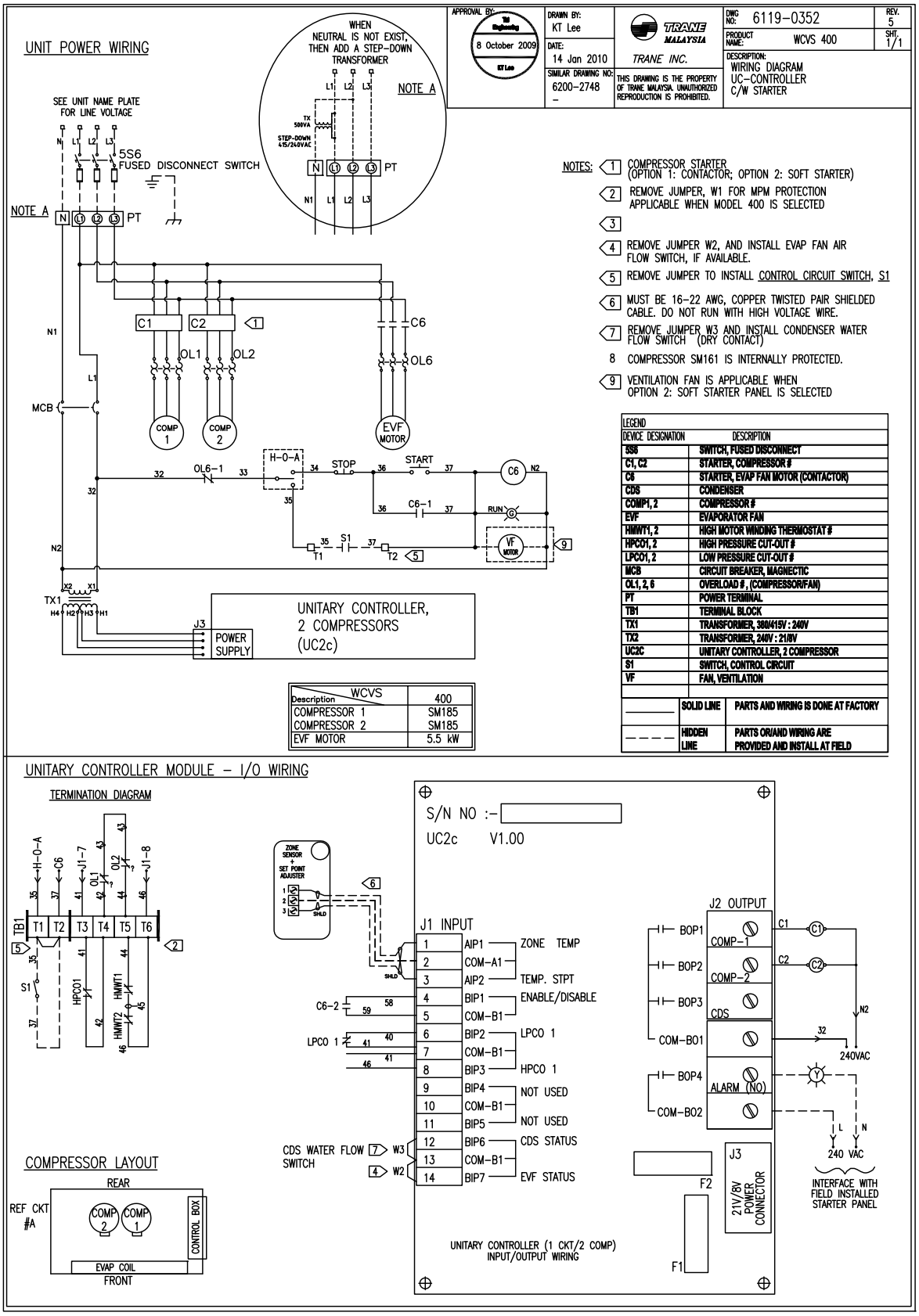
Wiring Diagram (With Starter) WCVS 270/330



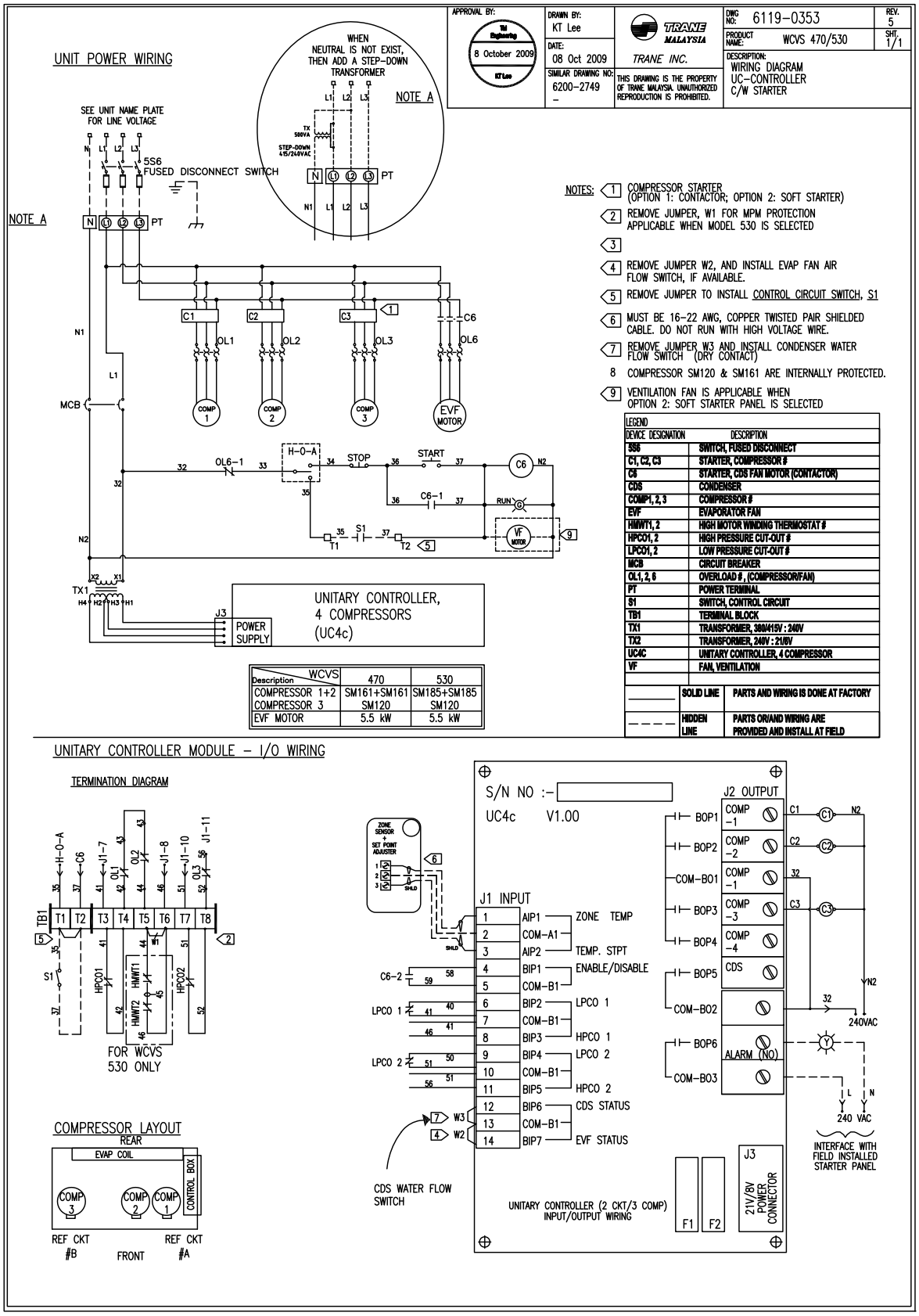
Description \ WCVS	270	330
COMPRESSOR 1	SM120	SM161
COMPRESSOR 2	SM120	SM161
EVF MOTOR	3.7 kW	3.7 kW

DEVICE DESIGNATION	DESCRIPTION
5S6	SWITCH, FUSED DISCONNECT
C1, C2,	STARTER, COMPRESSOR #
C6	STARTER, EVAP FAN MOTOR (CONTACTOR)
CDS	CONDENSER
COMP1, 2	COMPRESSOR #
EVF	EVAPORATOR FAN
HIWY1, 2	HIGH MOTOR WINDING THERMOSTAT #
HPCO1, 2	HIGH PRESSURE CUT-OUT #
LPCO1, 2	LOW PRESSURE CUT-OUT #
MCB	CIRCUIT BREAKER, MAGNECTIC
OL6	OVERLOAD # , (COMPRESSOR/FAN)
PT	POWER TERMINAL
S1	SWITCH, CONTROL CIRCUIT
TB1	TERMINAL BLOCK
TX1	TRANSFORMER, 380/415V : 240V
TX2	TRANSFORMER, 240V : 21/8V
UC2C	UNITARY CONTROLLER, 2 COMPRESSOR
VF	FAN, VENTILATION

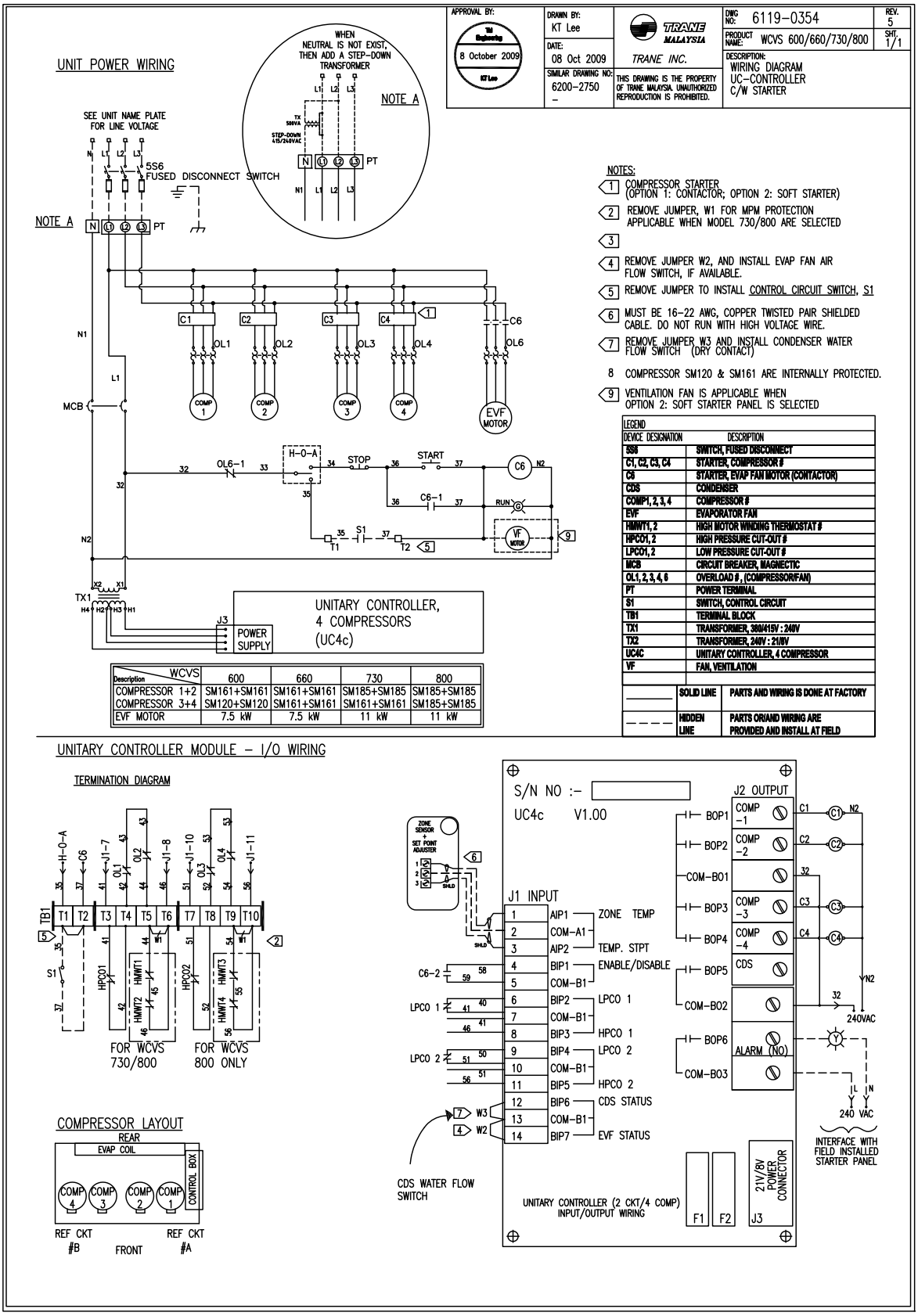
Schematic Wiring Diagram (With Starter) WCVS 400



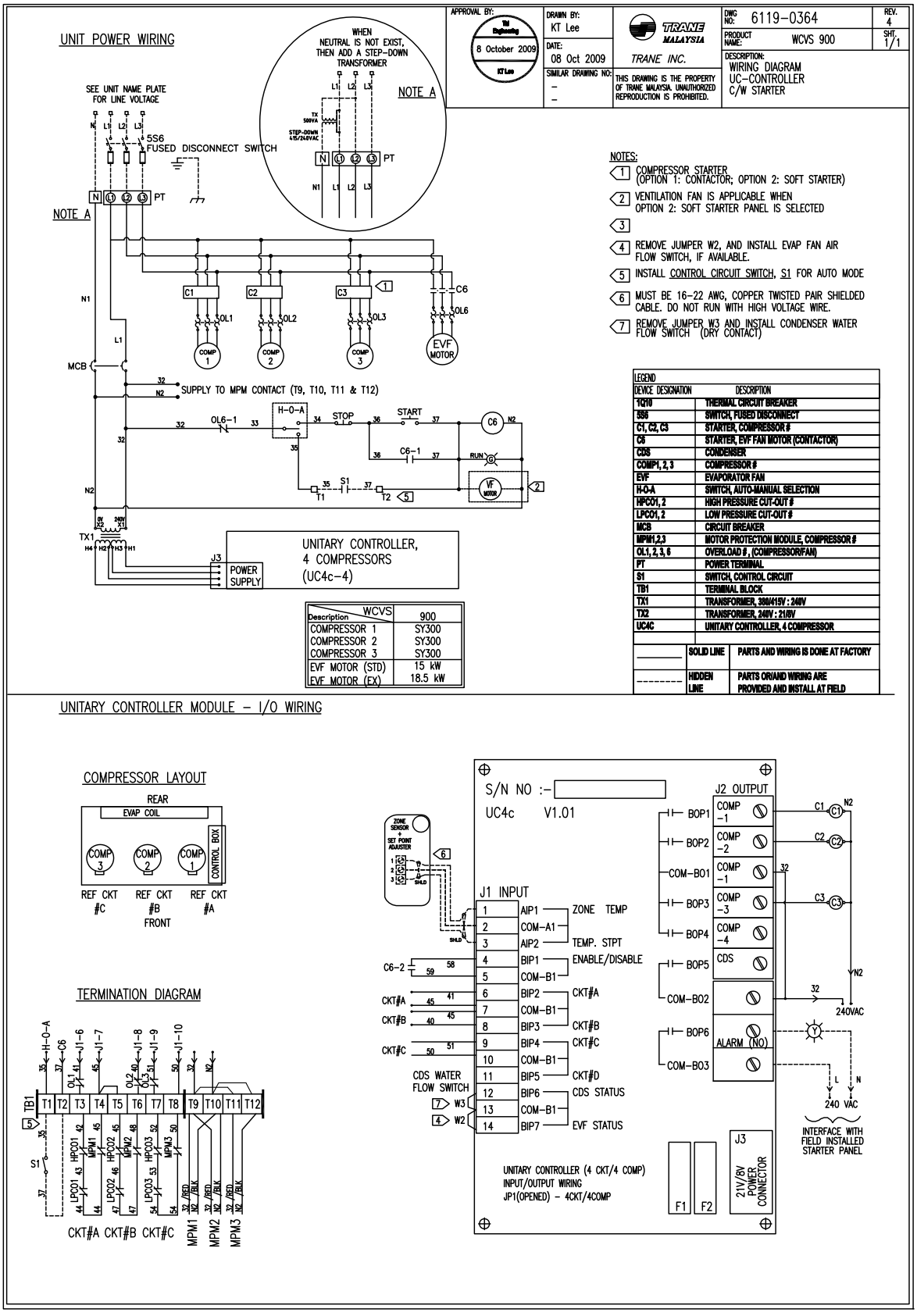
Schematic Wiring Diagram (With Starter) WCVS 470/530



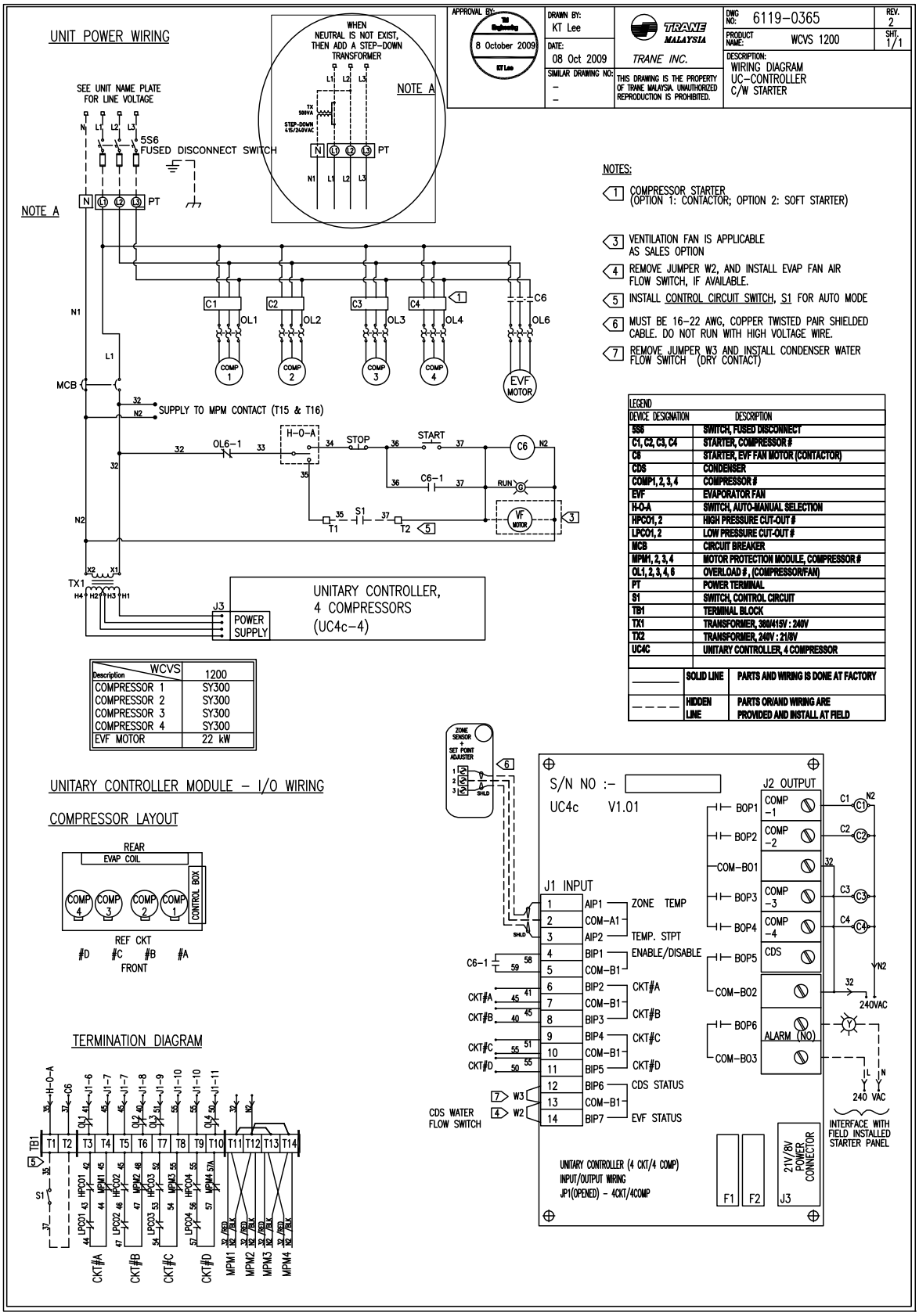
Schematic Wiring Diagram (With Starter) WCVS 600/660 730/800



Schematic Wiring Diagram (With Starter) WCVS 900



Schematic Wiring Diagram (With Starter) WCVS 12H



TRANE®

Trane
www.trane.com

For more information, contact your local district office

Literature Order Number WCVS-SVX01A-EN (August 2012)

File Number

Supersedes WCVS-SVX01A-EN (February 2009)

Stocking Location MALAYSIA