



Installation Manual

Split Water-Cooled Condensing Units 7,000 - 60,000 Btu/h WTK Series 50 Hz



50Hz Models Cooling Only

WTK507
WTK509
WTK512
WTK518
WTK524
WTK530
WTK536
WTK048
WTK060

April 2004

WTK-SVN001-EN



General Information

Introduction

This Installation Manual is given as a guide to good practice in the installation by the installer of mini-split system. Installation procedures should be performed in the sequence that they appear in this manual.

For installing the unit to operate properly and reliably, it must be installed in accordance with these instructions. Also, the services of a qualified service technician should be employed, through the maintenance contract with a reputable service company.

Read these Installation Manual completely before installing the condensing unit.

About the Unit

The units are assembled, pressure tested, dehydrated, charged and run tested before shipment. The information contained in this manual applies to units that are designed to operate in cooling mode only.

Important

This document is customer property and is to remain with unit. Please place in service information pack upon completion of work. These instructions do not cover all variations in systems, nor do they 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 covered sufficiently in this manual, the matter should be referred to your Trane sales representative.

Reception

On arrival, inspect the unit before signing the delivery note. Verify that the nameplate data matches the date on the sales order, submittal data and delivery note (including electrical data) to insure the proper unit was shipped. Specify any damage of the unit 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 dealer at the same time.

The unit should be totally inspected within 7 days of delivery. If any concealed damage is discovered, send a registered letter of protest to the carrier within 7 days of delivery and notify the dealer.

Warranty

Warranty is based on the general terms and conditions by country. The warranty is void if the equipment is modified or repaired without the written approval of The Trane Company, if the operating limits are exceeded or if the control system or the electrical wiring is modified. Damage due to inappropriate installation, lack of knowledge or failure to comply with the manufacturer's instructions, is not covered by the warranty obligation. If the installer does not conform to the rules described in Installation Manual, it may entail cancellation of warranty and liabilities by The Trane Company.

Storage

Take precautions to prevent condensate from forming inside the unit's electrical board and motors if the unit is stored before it is installed. The Trane Company will not assume any responsibility for unit damage resulting from condensate accumulation on the unit's electrical and/or mechanical components.

About this Manual

Cautions and warnings appear at appropriate places in this instruction manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The Trane Company assumes no liability for installations or servicing performed by unqualified personnel. All phases of the installation of this air conditioning system must conform to all national, provincial, state and local codes.

Warning

Warnings are provided at appropriate places in this manual to indicate to installers, operators and service personnel of potentially hazardous situations which, if not avoided, COULD result in death or serious injury.

Caution

Cautions are provided at appropriate places in this manual to indicate to installers, operators, and service personnel of potentially hazardous situations which, if not avoided, MAY result in minor or moderate injury or malfunction of the unit.

Contents

General Information	2
Model Nomenclature	4
Location and Preparation of Unit	5
Refrigerant Tube Size Selection	5
Connection of Refrigerant Tubing (Flaring and Brazing Procedure)	6
Water Pipe Connection	8
Gas Leakage Inspection	9
Air Evacuation and Refrigerant Charge	10
Wiring and System Inspection before Test Run	11
Condenser Cleaning	11
Wiring Diagram	12
Dimensional Data	14



Model Nomenclature

<u>W</u>	<u>T</u>	<u>K</u>	<u>5</u>	<u>0</u>	<u>7</u>	<u>A</u>	<u>B</u>	<u>0</u>	<u>0</u>	<u>B</u>	<u>A</u>
1	2	3	4	5	6	7	8	9	10	11	12

Digit No. 1 = Product Type

W = Split Water Cooled Condensing Unit

Digit No. 2

T = Cooling Only

W = Heat Pump

Digit No. 3 = Refrigerant Circuit(s)/Compressor(s)

K = Single Refrigerant Circuit/Compressor

D = Dual Refrigerant Circuits/Compressors

T = Triple Refrigerant Circuits/Compressors

(Others to be determined as needed.)

Digit No. 4 = Refrigerant Connection Type

0 = Sweat (Brazed)

5 = Flared (Tubing)

7 = Quick Connect

Digit No. 5 and No. 6 = Nominal Capacity

Btu/h X 1000

(Note: Exact system capacities/performance when matched with selected indoor unit are specified in Product Catalogs.)

Digit No. 7 = Major Development Sequence

Digit No. 8 = Electric Power Supply Characteristics

A = 220V/1ph/50Hz or 200-220V/1ph/50Hz

B = 240V/1ph/50Hz or 220-240V/1ph/50Hz

1 = 220V/1ph/60Hz or 200-240V/1ph/60Hz

3 = 200-240V/3ph/60Hz

D = 380-415V/3ph/50Hz

4 = 460V/3ph/60Hz

Digit No. 9 and 10 = Factory Installed Options

(Note: The Alphabetic Letter "O" is not used in digit 9 or 10, Only the Number "0" is used.)

00 = No option

0E = 3 minute time delay (for use w/ MCD)

0F = Hi/Lo Pressure Cut Off

0G = 3 minute time delay + Hi/Lo Pressure Cut Off

0S = Special request to be provided in wording and to be approved by factory i.e. service valve at the water side, insulation on suction line, emergency stop.

Digit No. 11 = Minor Design Sequence/Series - Design Change

Alphabetic Letter, "A" through "Z"

Digit No. 12 = Service Digit

Location and Preparation of Unit

Installation of Condensing Unit at the appropriate places

- The place where is not near the gas area of potentially hazardous situations.
- Isolated place to avoid noise and heat disturbing to neighbourhood
- Convenient places for inspection or reparation

Refrigerant Tube Size Selection

To select tube size is necessary to consider many factors such as: velocity of refrigerant, number of tube connector, bended joint and length of refrigerant tube. Therefore, for quick selection size of refrigerant tube, see the detail below:-

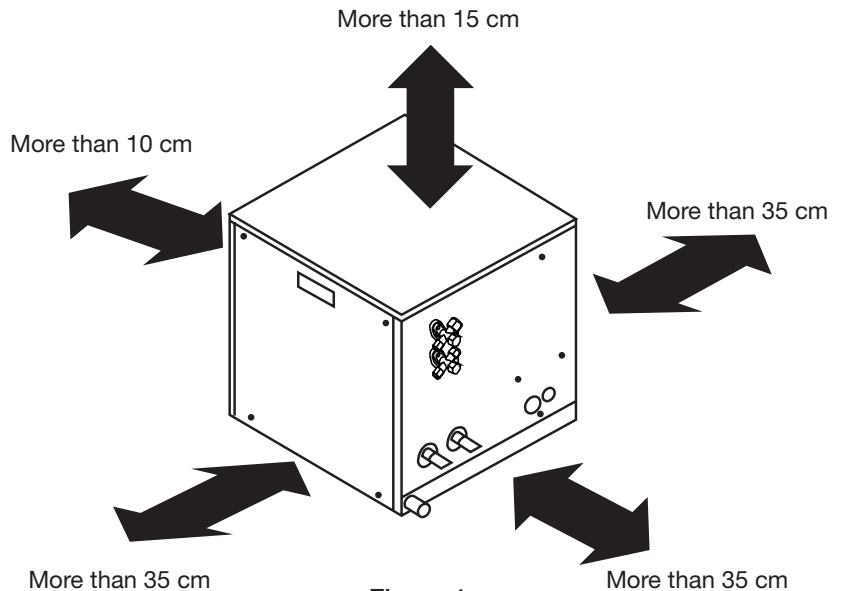


Figure 1

Refrigerant tube size for Trane Air-conditioning (size 7,000-60,000 Btu/h)

Domestic

Tubing Length (m) /Tubing size (inch)	Minimum 12 m		13 - 18 m		19 - 24 m		25 - 30 m		31 - 36 m	
	Liquid Line	Suction Line	Liquid Line	Suction Line	Liquid Line	Suction Line	Liquid Line	Suction Line	Liquid Line	Suction Line
WTK507	1/4	3/8	1/4	3/8	1/4	3/8	1/4	1/2	1/4	1/2
WTK509	1/4	3/8	1/4	3/8	1/4	3/8	1/4	1/2	1/4	1/2
WTK512	3/8	5/8	3/8	5/8	3/8	5/8	3/8	5/8	3/8	5/8
WTK518	3/8	5/8	3/8	5/8	3/8	5/8	3/8	5/8	3/8	5/8
WTK524	3/8	5/8	3/8	5/8	3/8	3/4	3/8	3/4	3/8	3/4
WTK530	3/8	5/8	3/8	5/8	3/8	3/4	3/8	3/4	3/8	3/4
WTK536	3/8	3/4	3/8	3/4	3/8	3/4	3/8	7/8	3/8	7/8
WTK048	1/2	7/8	1/2	7/8	1/2	7/8	1/2	7/8	1/2	1 1/8
WTK060	1/2	7/8	1/2	7/8	1/2	1 1/8	1/2	1 1/8	1/2	1 1/8

Export

Tubing Length (m) /Tubing size (inch)	Minimum 12 m		13 - 18 m		19 - 24 m		25 - 30 m		31 - 36 m	
	Liquid Line	Suction Line	Liquid Line	Suction Line	Liquid Line	Suction Line	Liquid Line	Suction Line	Liquid Line	Suction Line
WTK507	1/4	3/8	1/4	3/8	1/4	3/8	1/4	1/2	1/4	1/2
WTK509	1/4	3/8	1/4	3/8	1/4	3/8	1/4	1/2	1/4	1/2
WTK512	1/4	1/2	1/4	1/2	1/4	1/2	1/4	1/2	1/4	1/2
WTK518	1/4	1/2	3/8	5/8	3/8	5/8	3/8	5/8	3/8	5/8
WTK524	3/8	5/8	3/8	5/8	3/8	3/4	3/8	3/4	3/8	3/4
WTK530	3/8	5/8	3/8	5/8	3/8	3/4	3/8	3/4	3/8	3/4
WTK536	3/8	3/4	3/8	3/4	3/8	3/4	3/8	7/8	3/8	7/8
WTK048	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8
WTK060	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8	3/8	1 1/8

Connection of Refrigerant Tubing

Connection the Unit with Flaring Procedure

Flaring (If tubing is procured or cut at the site).

1. Cut the copper tube to the required length with a tube cutter. It is recommended to cut approx. 30 cm-50 cm (12" to 20") longer than the tubing length you estimate.
2. Hold each tube downward when cutting, remove burrs at the end of the copper tube with a tube reamer or file. This process is important and should be done carefully to make a good flare (Figure 2 and Figure 3).

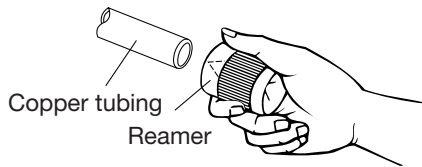


Figure 2

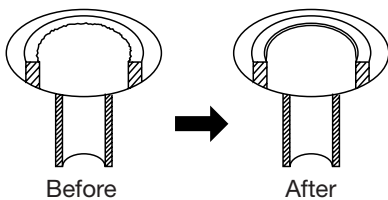


Figure 3

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube.

3. Remove the flare nut from the service valve and be sure to insert the flare nut onto tube.
4. Make a flare at the end of copper tube with a flare tool (Figure 4).

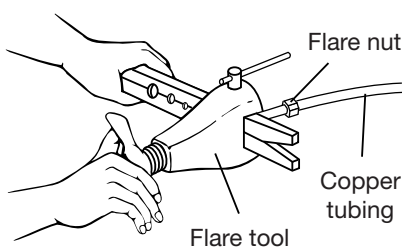


Figure 4

A good flare should have the following characteristics:

- Inside surface is glossy and smooth.
- Edge is smooth.
- Tapered sides are of uniform length.

Cautions Before Connecting Tubes Tightly

1. Be sure to apply a sealing cap or water-proof tape to prevent dust or water from getting into the tubes before they are used.
2. Be sure to apply refrigerant lubricant to the matching surfaces of the flare and union before connecting them together. This is effective for reducing gas leaks (Figure 5).

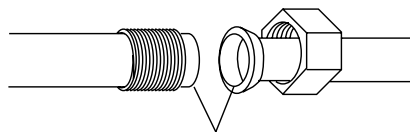


Figure 5

Connection

3. For proper connection, align the union tube and flare tube straight with each other, then screw in the flare nut lightly at first to obtain a smooth match (Figure 6).

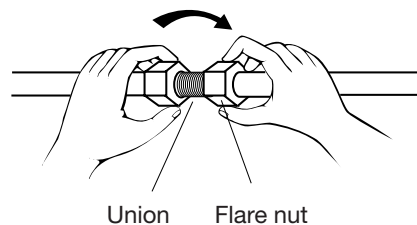


Figure 6

4. Tighten the flare nut to the specified tightening torque with torque wrench and adjustable wrench (Figure 7).
5. Repeat the process above for the remaining line.

Specified tightening torque

Tube diameter		Torque	
mm	inch	kg - cm	lb - in
6.35 mm	(1/4") dia.	150~200	130~170
9.53 mm	(3/8") dia.	350~400	300~340
12.7 mm	(1/2") dia.	500~550	430~470
15.88 mm	(5/8") dia.	600~650	520~570
19.05 mm	(3/4") dia.	700~750	610~650
22.23 mm	(7/8") dia.	800~850	700~740
28.58 mm	(1-1/8") dia.	900~950	800~825

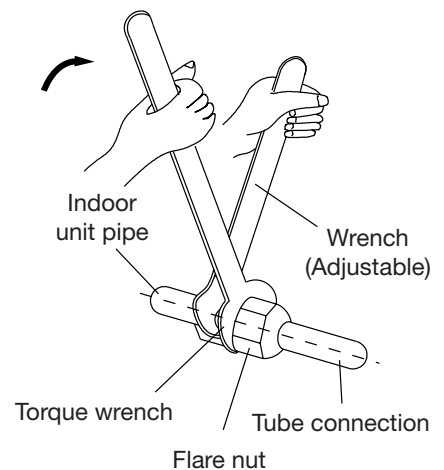


Figure 7

Connection Unit with Brazing Procedure

Connection Unit with Brazing Procedure

1. Cut the copper tube to the require length with the tube cutter. It is recommended to cut approximately 20-30 cm longer than the tube length you estimate and put in the straight line while cutting.
2. After cutting, remove burrs at the end of copper tube with a tube reamer. Hold the end downward and be sure that no copper scraps fall into the tube (Figure 2).
3. There are 2 methods to connect copper tube
 - Use tube connector between copper tube from fan-coil unit and copper tube from condensing unit (Figure 8).

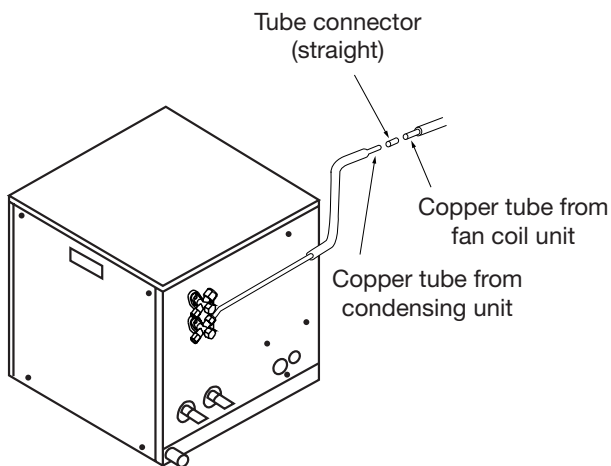


Figure 8

- Expand copper tube with the tube enlarging tool (Figure 9).

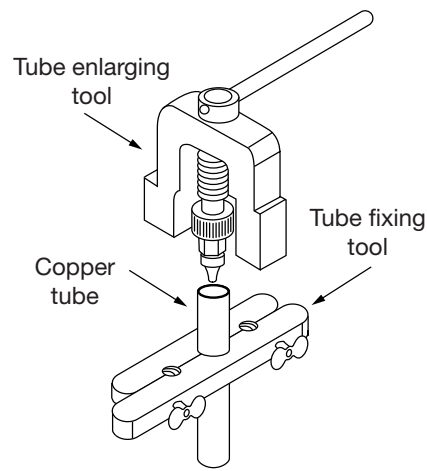


Figure 9

4. Clean copper tube surfaces both inside and outside before connection, expansion, or brazing.
5. Insulate the entire gas line.
6. Do not allow uninsulated liquid line to come in direct contact with bare gas line.
7. Precautions should be taken to avoid heat damage to the pressure tap valve core during brazing. It is recommended that a wet rag be wrapped around the valve body.
8. It is recommended to use braze shield, soak pad in water and place over suction and liquid lines to protect unit finish.
9. To braze the copper tube, before brazing a copper tube to a solder coupling or a copper tube to an expanded tube, do not forget to keep them tight as shown in figure 10.

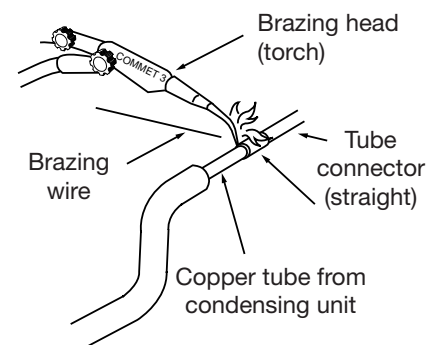


Figure 10

10. Use a dry nitrogen purge and brazing alloy without flux when brazing the field line to the copper factory connection. Flow dry nitrogen into either valve pressure tap port, through the tubing and out the other port while brazing.
11. Braze using accepted good brazing techniques.

Water Pipe Connection

Installers should prepare the following equipment:

Should have connected water pipe for heat exchange. Should have water pump, cooling tower, pressure gauge, and other equipments related to the water pipe connection. Please make sure that all equipments are according to the standard (see figure 11).

Water Return Pipe

Connect water return pipe with 3/4 inch pipe connector. Keep them far away from water tray and add trap (see figure 12).

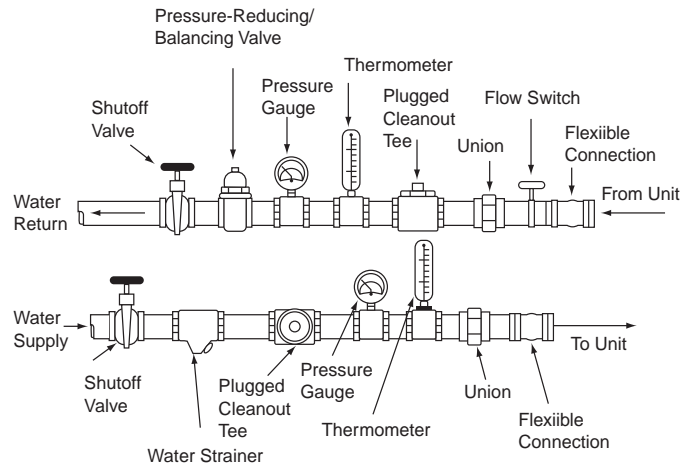
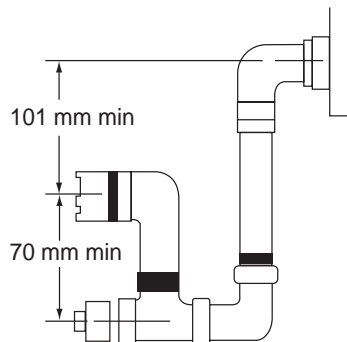


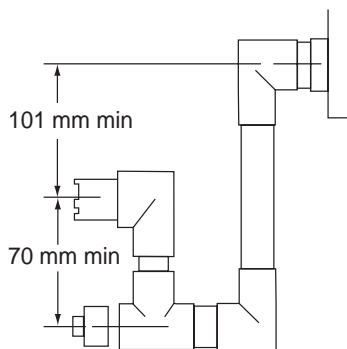
Figure 11

1 inch (25.4 mm) steel pipe and pipe connector



Equipment used	
1	Tee
2	Plug
3	Steel Elbow
4	140 mm Nipple

1 inch (25.4 mm) PVC pipe or copper pipe and pipe connector



Equipment used	
1	Tee
1	Plug
3	90° Elbow
1	152 mm Nipple
2	50 mm Nipple
1	1 NPT to PVC or copper adapter

Figure 12

Gas Leakage Inspection

Gas Leakage Inspection

After charging with refrigerant, it is necessary to check gas leakage. Inspecting gas leakage should be done with special precaution. If there is any leakage that we are unable to find, afterwards the system would be damaged. For example, if R22 refrigerant loses, cooling coil will be frozen. There are so many methods to inspect leakage, but the easiest and the most economical way is to use nitrogen gas detector and bubble of powder detergent per the following steps:-

- Prepare nitrogen tube with pressure regulator and pressure gauge or manifold gauge.
- Open service valve cover (at the suction side).
- Connect gauge line to the nitrogen tank, but do not open nitrogen valve at the nitrogen tank.
- Check out brazing track and all valves such as flare union.
- Connect the other tails of gauge line to the service valve (at the suction side).

- Slowly open nitrogen valve, let pressure gradually increase until 250 pound/square inches, then put bubble of powder detergent around all connected joints, notice any leakage. Fix the leakage, if any. If there is no leakage, leave 1-2 hours to check whether the pressure stays the same. If the pressure is still reducing, we need to check leakage again. Finally, release nitrogen gas in order to make refrigerant system to be under vacuum.

Caution

- Do not fully open nitrogen valve to 250 psig because valve may be damaged.
- Do not forget to check the leakage at the access valve both at the liquid line and at the suction line.

Air Evacuation and Refrigerant Charge

Evacuation

Air and humidity are the enemy of the air-conditioning system because humidity will react with R22 refrigerant and turns into acid, which will corrode the wire coil and reduce the compressor oil's efficiency. Evacuation is a must to prevent refrigerant system from air and humidity.

Evacuation Procedure

Connect the middle hose of service gauge to the vacuum pump, then connect the hose at the low side to "service valve" of air-conditioning at suction line. Connect the hose at the high side to "service valve" at liquid line (figure 13).

Fill up R22 refrigerant into the system

To fill up R22 refrigerant is the final step of installation. After leakage check and power wiring, fill up R22 refrigerant to the system.

How to fill up R22 refrigerant

Normally, this needs to be done immediately after air evacuation per the following steps (figure 13)

- Fill up the refrigerant via valve at liquid line until pressure of the liquid line is around 120-150 psig (Don't forget to evacuate air from liquid line before)
- Turn on evaporator and condensing unit.

- Fill up the refrigerant into suction line at the proper quantity while the unit is working.
- Let machine run for at least 20 minutes. Read pressure from pressure gauge "at both high and low side", and read current from amp-meter. Usually, suction line pressure should be around 65-70 psig, and liquid line pressure should be around 250-275 psig.

If the pressure readings of both liquid line and suction line are in the range stated above and electric current reading is at full load ampere of condensing unit, it indicates that refrigerant's volume is sufficient.

- But if suction pressure is lower than normal and electric current is far below full load ampere, it indicates that refrigerant is inadequate. You need to add more refrigerant.
- If suction pressure is higher than normal and electric current is over the full load ampere, and you notice some water spray holds on the compressor, it indicates over cooling system. You need to release some refrigerant.

Remark: When the interconnecting line is longer than 7.5 m, additional charging is necessary. For the additional amount, follow the table belows.

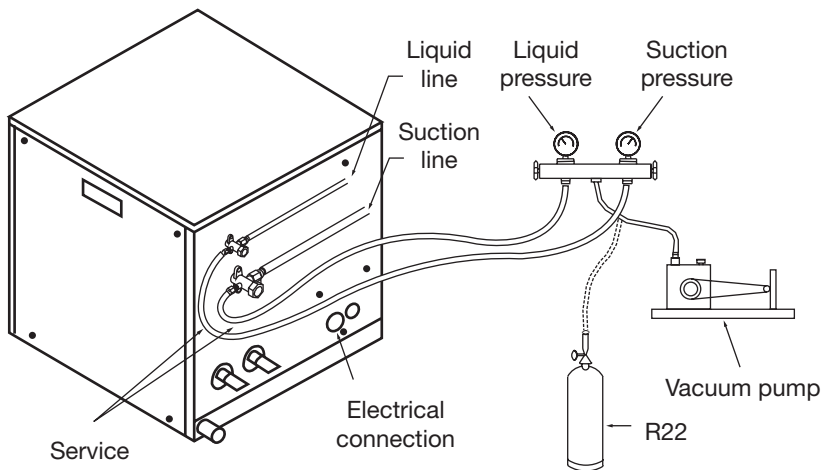


Figure 13

Piping size	Per each additional meter of interconnecting line grams/meter
Liquid-Suction	
1/4" - 3/8"	23 grams/meter
1/4" - 1/2"	26 grams/meter
3/8" - 5/8"	59 grams/meter
3/8" - 3/4"	60 grams/meter
3/8" - 1 1/8"	68 grams/meter
1/2" - 7/8"	117 grams/meter

Wiring and System Inspection before Test Run and Condenser Cleaning

Electric wire and ground wire must comply with each country's or regional's regulation.

1. Wiring

Importance

- Check the unit nameplate for electrical rating. Make sure that the wiring is according to local codes and wiring system diagram.
- A separate power supply disconnect and a circuit breaker for overcurrent protection should be provided in the external power supply line.
- Always connect ground wire to condensing unit every time to prevent an electric shock in case of an electric leakage.
- Electric wires shall not contact to refrigerant pipes, compressor, motor and the other moving parts.
- Manufacturer assumes no liability for the problems caused by unauthorized change in the internal wiring.
- Should tighten up wire connection.
- Electric conductor parts must be copper only.

2. Electric Wire Connection

- See wiring diagram on page 12
- Slipover electric wire at the end
- After connect electric wire, check whether all screws are firmly tightened

The electric wire connection between outdoor and indoor unit should be according to the wiring diagram.

To inspect system before test run.

After finished installing air-conditioning, all system shall be inspected before starting.

- Check that all brazings are correctly made.
- Check that units are correctly installed and there are no other tools near or on top of the unit.
- Check the tubing and connections for leak.
- Check that unit has a proper ground wiring.
- Check for proper voltage and fuse size.
- Check electrical wire size used is as specified.
- Check all field wiring for tight connection.
- Make sure that electrical wires inside the unit do not contact to refrigerant pipes.
- Turn on the unit, check the system carefully.

Condenser Cleaning

After air-conditioning works for a while, it may cause scales at the surface of pipe in the condensing unit, which may cause by cooling water or rust inside cooling tower. Installer can notice from the reduction of water velocity, or the reduction of difference of water temperature in and out, or condensing temperature is higher than normal.

Therefore, to maintain efficiency of condenser, installer must clean up the pipe's inside surface of condenser to prevent scales.

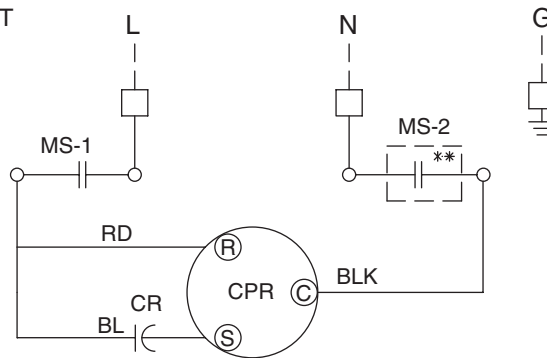
To clean up condenser with chemical

To clean up condenser with chemical is one of the methods to wipe out scales. To select proper chemical, installer need to consult the water treatment expert.

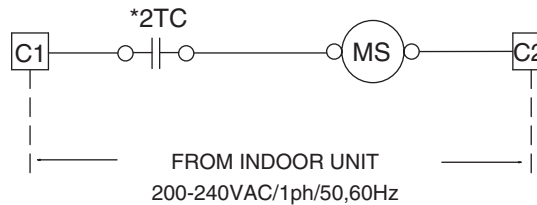
Wiring Diagram

POWER SUPPLY 220-240V/1ph/50Hz, 200-240V/1ph/60Hz

POWER CIRCUIT

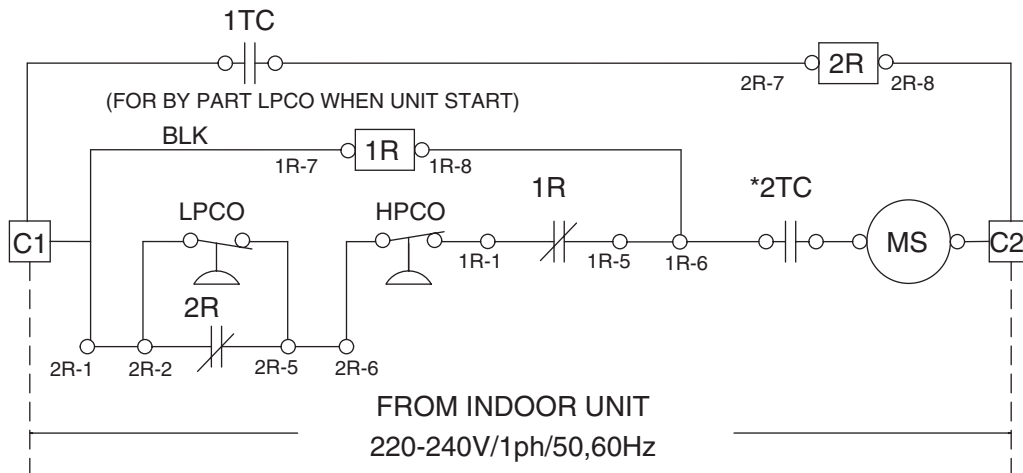


CONTROL CIRCUIT FOR MODEL WITHOUT HPCO AND LPCO



CONTROL CIRCUIT FOR MODEL WITH HPCO AND LPCO

BYPASS LPCO WHEN UNIT START, BYPASS TIME PERIOD CAN BE SETTING 0-4.5 MINS



COLOR CODE

BL BLUE
BLK BLACK
RD RED

- * 2TC AVAILABLE IN OPTIONAL MODEL
- ** APPLY FOR DOUBLE POLE CONTACTOR ONLY
(FOR SINGLE POLE CONTACTOR,CONNECT ELECTRIC LINE FROM COMPR-C DIRECT TO TERMINAL-N)

NOTES:

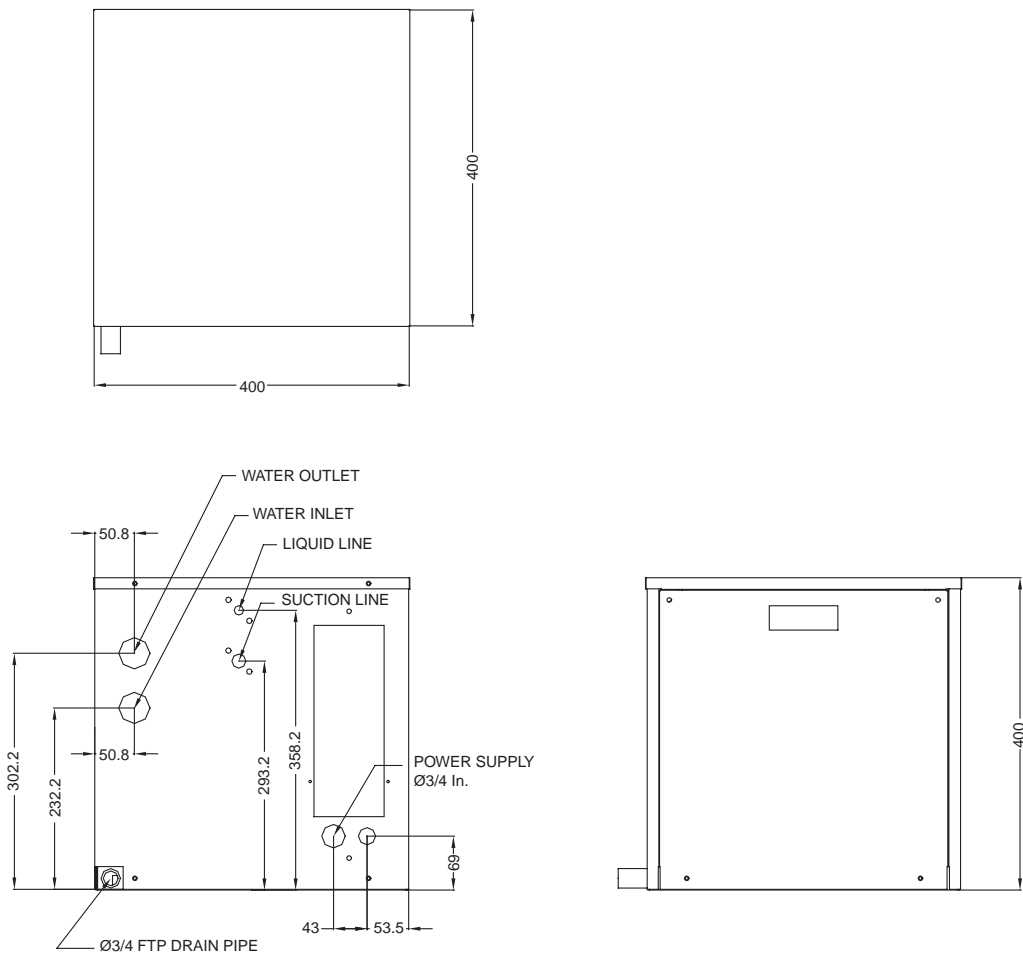
1. LOW VOLTAGE WIRING TO BE 18 AWG MINIMUM CONDUCTOR.
2. POWER WIRING AND GROUNDING OF EQUIPMENT MUST COMPLY WITH LOCAL CODES.
3. USE COPPER CONDUCTOR ONLY.

LEGEND

- CPR COMPRESSOR
- MS COMPRESSOR MOTOR CONTACTOR
- HPCO HIGH PRESSURE CUT-OUT
- LPCO LOW PRESSURE CUT-OUT
- TC TIME-DELAYED CONTACT 3 MINUTES
- TERMINAL
- COIL
- TERMINAL BOARD BY OTHER
- TERMINAL BOARD BY FACTORY
- - - - - FIELD WIRING
- ===== FACTORY WIRING
- ||| RELAY CONTACT NORMALLY OPEN
- ||| CAPACITOR
- ⊂ LOW PRESSURE SENSING SWITCH
- ⊂ HIGH PRESSURE SENSING SWITCH
- 1R LOCK OUT CIRCUIT RELAY
- 2R LOW PRESSURE SENSOR BYPASS RELAY

Dimensional Data

WTK507-518



DOMESTIC

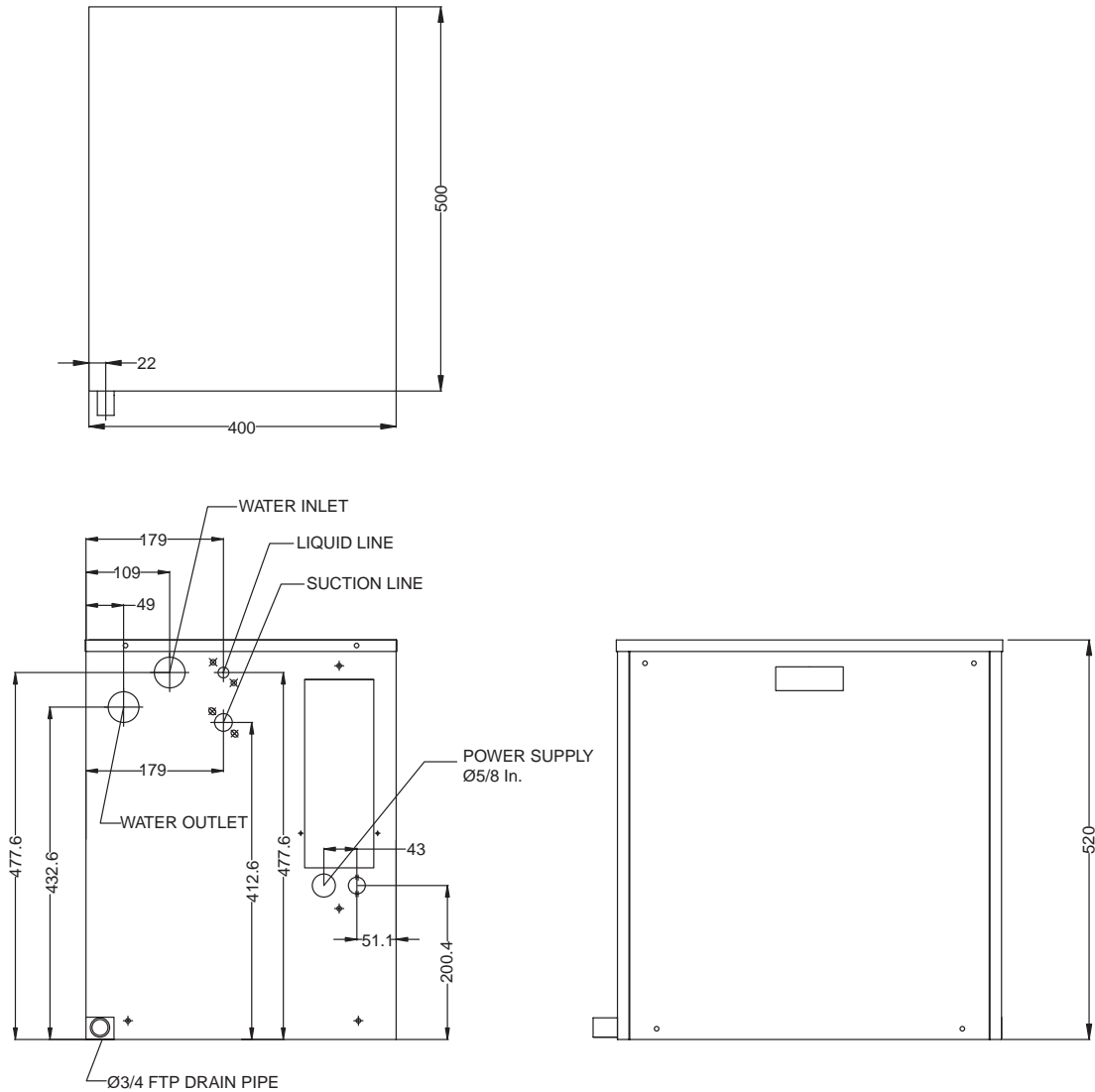
MODEL	REFRIGERANT CONNECTION SIZE (In.)		WATER CONNECTION SIZE (In.)
	LIQUID	SUCTION	
WTK507-509	1/4	3/8	3/4
WTK512-518	3/8	5/8	3/4

EXPORT

MODEL	REFRIGERANT CONNECTION SIZE (In.)		WATER CONNECTION SIZE (In.)
	LIQUID	SUCTION	
WTK507-509	1/4	3/8	3/4
WTK512-518	1/4	1/2	3/4

Dimensional Data

WTK524-060



DOMESTIC

MODEL	REFRIGERANT CONNECTION SIZE (In.)		WATER CONNECTION SIZE (In.)
	LIQUID	SUCTION	
WTK524-530	3/8	5/8	3/4
WTK536	3/8	3/4	3/4
WTK048-060	1/2	7/8	7/8

EXPORT

MODEL	REFRIGERANT CONNECTION SIZE (In.)		WATER CONNECTION SIZE (In.)
	LIQUID	SUCTION	
WTK524-530	3/8	5/8	3/4
WTK536	3/8	3/4	3/4
WTK048-060	3/8	1-1/8	7/8



TRANE®

Trane Thailand
7th Floor, Ploenchit Center Building
2 Sukhumvit Road, Klongtoey
Bangkok 10110

Amair Limited
35 Mu 8, Poochaosamingprai Road
Samrong Tai, Samutprakarn 10130
<http://www.trane.com>
An American Standard Company



Literature Order Number WTK-SVN001-EN0404

Supersedes WTK-SVN001-EN0303

Stocking Location Bangkok, Thailand

บริษัท แอมแอร์ จำกัด 35 หมู่ 8 ถ.ปู่เจ้าสมิงพราย ต.สำโรงใต้ อ.พระประแดง จ.สมุทรปราการ 10130

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