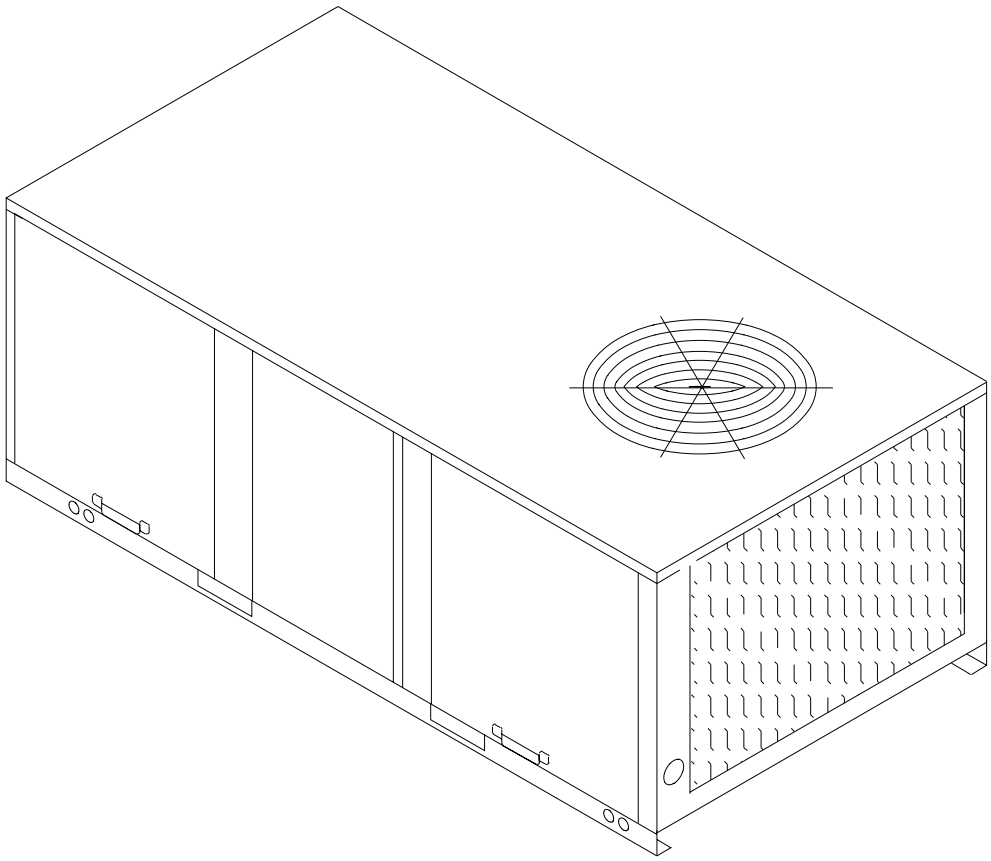
INSTALLATION OPERATION MAINTENANCE

<u>Customer Property</u> — Contains wiring, service, and operation information. Please retain.

Library	Service Literature
Product Section	Unitary
Product	Rooftop AC – Lt. Comm. SZ
Model	WK
Literature Type	Installation/ Oper/ Maint
Sequence	1
Date	November 2000
File No.	SV-UN-RT-WK-IOM-1 11/00
Supersedes	New

Models: (50 Hz)
WK(D,H)063C
WK(D,H)073C

Packaged Heat Pump
063C - 073C



IMPORTANT NOTE: All phases of this installation must comply with the **NATIONAL, STATE & LOCAL CODES.** These units are equipped with an electronic unitary control processor, (UCP) that provides service functions which are significantly different from conventional units. Refer to the TEST MODES and START-UP PROCEDURES before attempting to operate or perform maintenance on this unit.

Table of Contents

IMPORTANT: Read the entire manual before beginning installation procedures.

⚠ WARNING: ***Bodily injury can result from high voltage electrical components or fast moving fan drives. For protection from these inherent hazards during installation and servicing, the electrical supply must be disconnected. If operating checks must be performed with the unit operating, it is the technician's responsibility to recognize these hazards and proceed safely.***

IMPORTANT: **All power legs may not be broken by contactors. See wiring diagram on unit control box cover. Before starting the compressor, the crankcase heaters should be energized for eight hours.**

Read this manual carefully before attempting to install, operate or perform maintenance on this unit. Installation and maintenance must be performed by qualified service technicians except where noted.

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.

Model WK heating/cooling units are designed for outdoor mounting with a vertical condenser discharge. They can be located either at ground level or on a roof. Each unit contains an operating charge of refrigerant as shipped.

Inspection

1. Check for damage after unit is unloaded. Report promptly, to the carrier, any damage found to unit. Do not drop unit.

2. Check the unit nameplate to determine if the unit voltage is correct for the application. Determine if adequate electrical power is available. Refer to the application specifications.

3. Check to be sure the refrigerant charge has been retained during shipment. Access to 1/4" flare pressure taps may be gained by removing compressor compartment access panel.

Overall unit dimensional data for a cooling only unit is illustrated in Figure 1.

Module Names

UCP
Packaged Rooftop Units are controlled by a microelectronic control system that is referred to as "Unit Control Processor" (UCP). The acronym UCP is used extensively throughout this document when referring to the control system network. The "Unit Control Processor" (standard component) and one of the zone sensor modules makes up the minimum system configuration requirement.

ZSM
Zone Sensor Module (accessory component). Replaces thermostat, provides operator controls and the zone temperature sensor for the **UCP**. A complete line of **ZSMs** is available with various combinations of features. A zone sensor module, or a CTI is required for each system.

UEM
Unitary Economizer Module (standard component on economizer accessory). This module provides the hardware necessary to connect the economizer accessory to the **UCP**.

TCI
TCI Communications Interface (accessory component). This interface module is required to connect the system to an ICS BUILDING MANAGEMENT SYSTEM. i.e. - Tracer or Tracker.

CTI
Conventional Thermostat Interface (accessory component). This module can be used in special applications that require the installation of select electro-mechanical thermostats to interface with the **UCP**, instead of using a zone sensor module **(ZSM)**.

Unit Features

Self-test/Auto-configuration
At power-up, the system will perform a series of tests to verify correct operation and configure itself automatically, based on the unit wiring harness. This means there is no field configuration necessary when replacing the UCP, with exception of the zone comfort switch settings.

Cooling Minimum ON/OFF times
To enhance compressor reliability, a minimum of 3 minutes ON/OFF time has been implemented in the software. Any time power is applied or re-applied (e.g. after a power failure), the 3 minutes minimum OFF time is enforced to prevent short cycling a compressor.

Zone sensor operation
The zone sensors provide the user controls and zone temperature sensing function. The operator controls are as follows:

Unit Mode
Heat - Heat functions only enabled

Auto - Auto-changeover between cooling mode and heating mode as required by zone load. (On some models)

Off - No heating or cooling functions

Cool - Cooling functions only (including economizing) enabled

Fan Settings

Fan Auto - Fan runs only when heating or cooling functions are required

Fan On - Fan runs at all times. This is the setting used when minimum ventilation is required. When the fan is running, the economizer dampers will be open to at least minimum position.

Optional Remote Panel Zone Sensors Indicator Lights

SYS On
Indicates that power is applied to the unit and the UCP is functioning correctly. This indicator will flash at a 1 second rate to indicate operation in one of the test modes.

Heat
Indicates that at least one stage of heat is ON. This indicator will flash at a 1 second rate to indicate a heat failure

Cool
Indicates that cooling is active. This could be economizing and/or compressor cooling. This indicator will flash at a 1 second rate to indicate a cool failure. Sources of cool failure include high pressure controls if present and zone sensor failures.

Service
Indicates that a problem exists in the supply air stream. Could be dirty filters, broken drive belt or other functions depending on what sensors or switches are installed on the fan/filter status input.

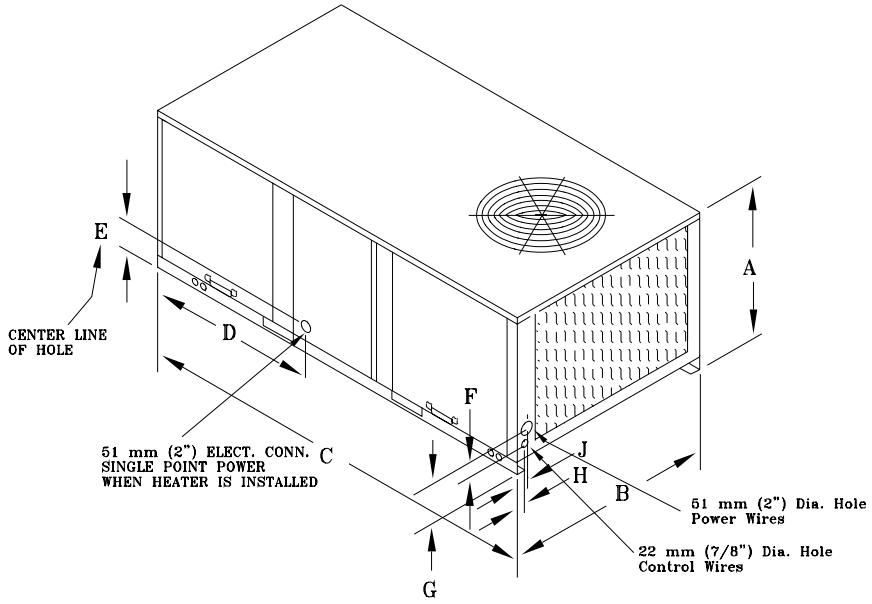
Dimensional Data

Figure 1

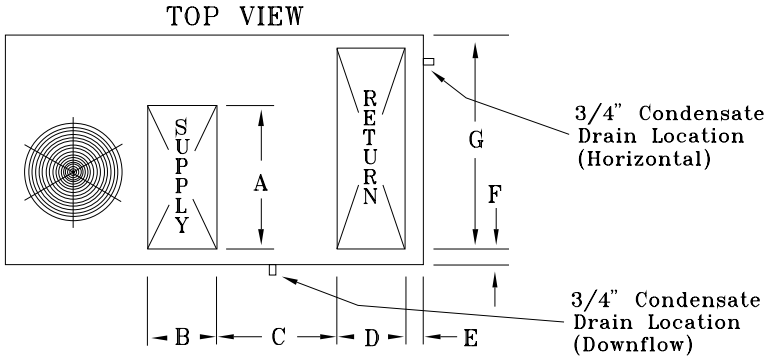
Unit Dimensions - mm

UNITS	A	B	C	D	E	F	G	H	J
WK*063 & 073	889	1259	2213	1064	152	156	213	98	60

* Downflow and/or Horizontal



Downflow Unit



Top View Showing Duct Openings in the Base - mm

UNITS	A	B	C	D	E	F	G
WK*063 - 073	895	386	572	329	83	86	1013

Figure 1 (Continued)
Horizontal Unit
Rear View Showing Duct Openings For Horizontal Air Flow - mm

UNITS	A	B	C	D	E	F
WK*063 - 073	406	408	511	60	137	686

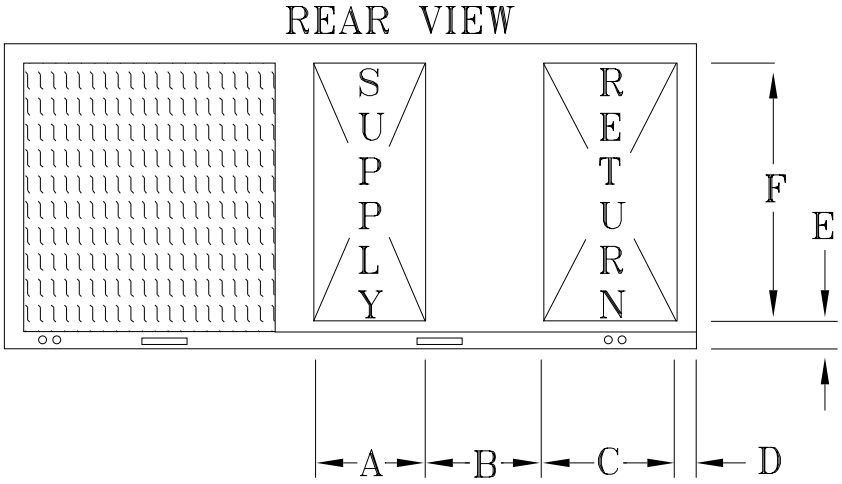


Figure 2
Curb Dimensions - mm

UNITS	A	B	C	D	D*	E	E*	F	G	H	J	K	L	M
WK*063 - 073	2064	1170	356	365	556	438	551	464	1076	25	46	919	2073	1178

* Dimensions when round ductwork is used.

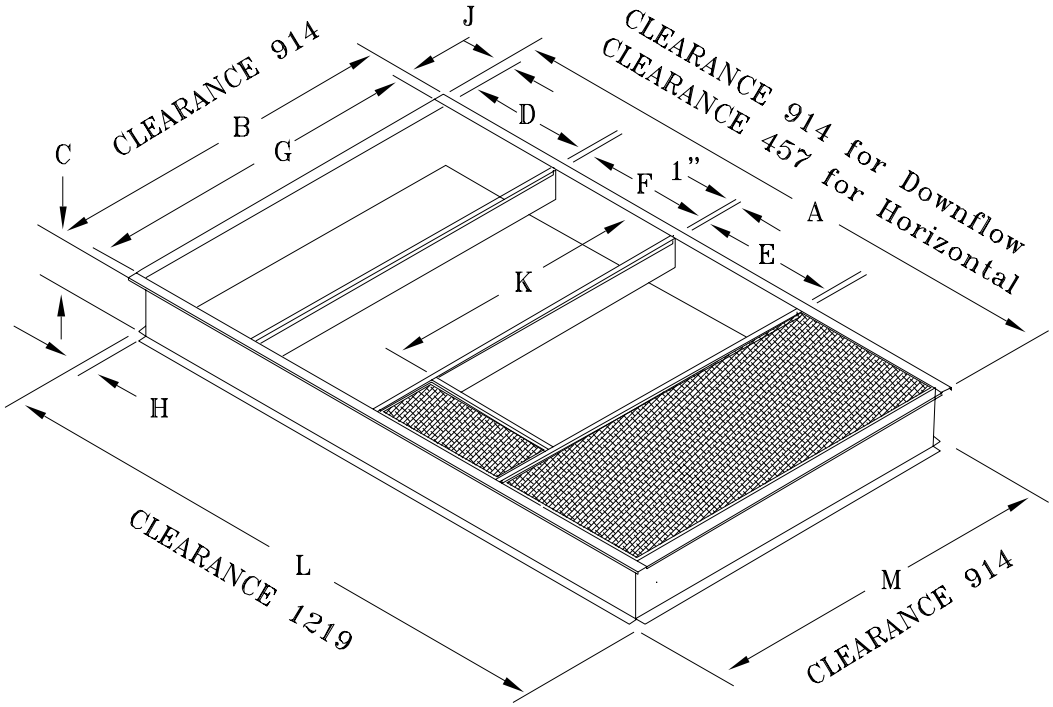
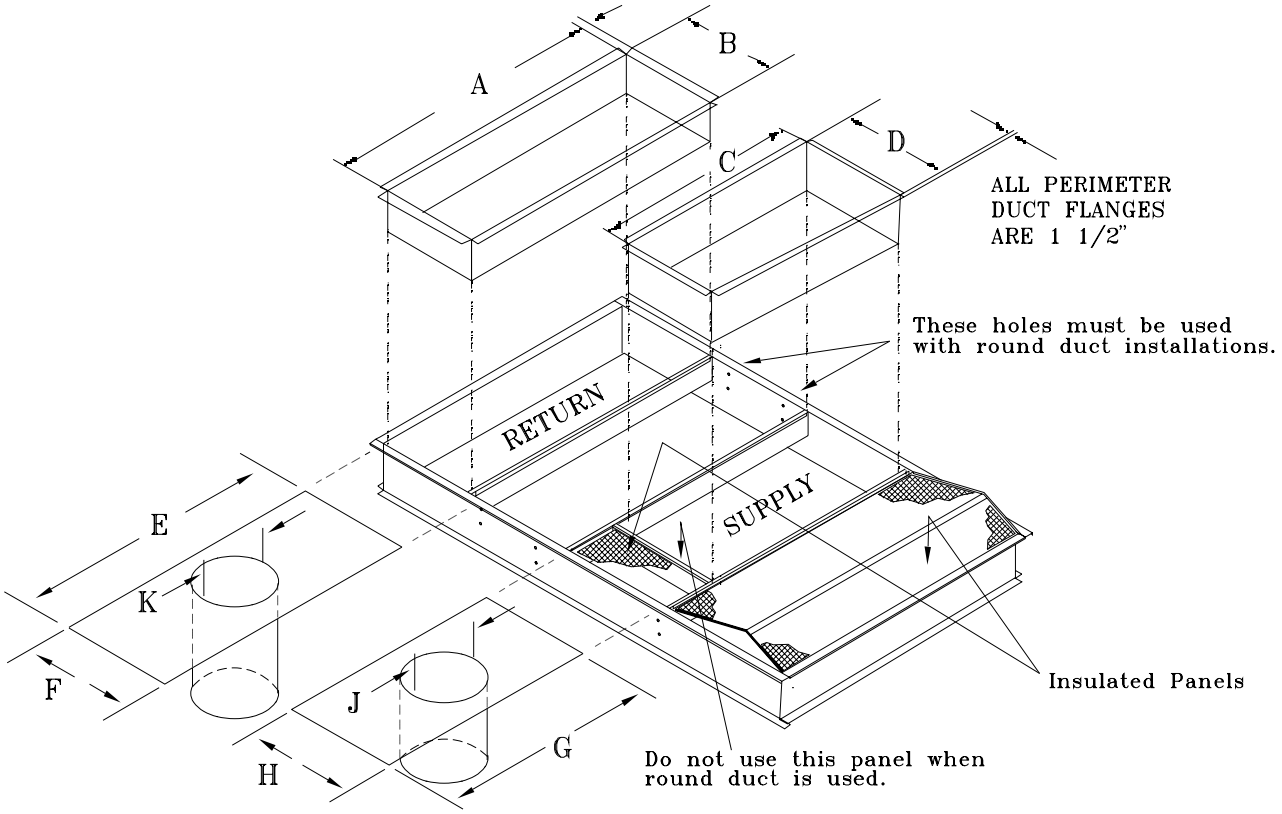


Figure 2 (Continued)

Field Fabricated Duct Dimensions - mm

UNITS	A	B	C	D	E	F	G	H	J	K
TK*063 - 073	1048	38	905	429	1124	575	1124	581	457	457



Installation

Location and Recommendations

Unit Support
If unit is to be roof mounted check building codes for weight distribution requirements. Refer to accessory roof curb mounting instructions.

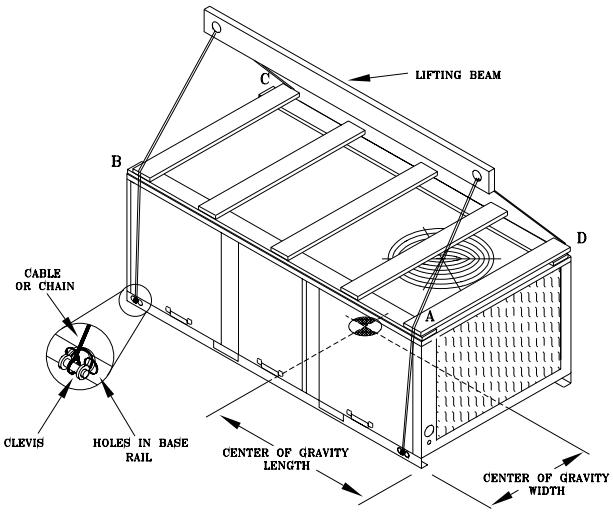
Location and Clearances
Installation of unit should conform to local and national building codes.

Select a location that will permit unobstructed airflow into the condenser coil and away from the fan discharge and permit unobstructed service access into the compressor compartment. Suggested airflow clearances and service clearances are given in Figure 2.

Placing and Rigging
Rig the unit using either belt or cable slings. The sling eyelet must be placed through the lifting holes in the base rail of the unit. The point where the slings meet the lifting eyelet should be at least 1.8mm (6 feet) above the unit. Use spreader bars to prevent excessive pressure on the top of the unit during lifting. Figure 3 shows the unit center of gravity and rigging recommendations.

IMPORTANT: **The use of "spreader bars" is required when hoisting the unit (prevents damage to sides and top). Top crating can be used as spreader bars.**

Figure 3



Roof Mounted Units
Downflow units should be mounted on a roof curb when possible. When installing the unit on the roof curb, follow the installation instructions accompanying the roof curb kit. On new roofs, the curb should be welded directly to the roof deck. For existing construction, nailers must be installed under the curb if welding is not possible. Be sure to attach the downflow ductwork to the curb before setting unit in place. See Figure 2.

When installing the unit, it must be level to insure proper condensate flow from the unit drain pan.

Slab Mount
"For ground level installation, the unit base should be adequately supported and hold the unit near level. The installation must meet the guidelines set forth in local codes."

Table 1

Corner Weights & Center of Gravity - mm

Unit Models	Net Weight	Length	Width	Corner Wts. (mm)			
				A	B	C	D
WK*063C	256	965	533	102	79	59	73
WK*073C	327	965	508	113	82	60	72

* Downflow or Horizontal

Note: Corner weights are given for information only. Unit is to be supported continuously by curb or equivalent frame support.

Ductwork

Attaching Downflow Ductwork to The Roof Curb

Supply and return air flanges are provided on the roof curb for easy duct installation. All duct work must be run and attached to the curb before the unit is set into place. See Figure 2 for duct connections.

Ductwork construction guidelines:
Connections to the unit should be made with three-inch canvas connectors to minimize noise and vibration transmission.

Elbows with turning vanes or splitters are recommended to minimize air noise and resistance.

The first elbow in the ductwork leaving the unit should be no closer than two feet from the unit, to minimize noise and resistance.

Attaching Horizontal Ductwork to The Unit
All conditioned air ductwork should be insulated to minimize heating and cooling duct losses. Use minimum of 50mm (2") of insulation with a vapor barrier. The outside ductwork must be weather proofed between the unit and the building.

When attaching ductwork to a horizontal unit, provide a flexible water tight connection to prevent noise transmission from the unit to the ducts. The flexible connection **must** be indoors and molded out of heavy canvas.

Note: **Do not draw the canvas taut between the solid ducts. See Figure 1 for duct connections.**

Condensate Drain Piping

A 3/4 inch male PVC condensate drain connection is provided on the opposite side of the unit from the evaporator section access panel on downflow units. On horizontal units, the condensate drain connection is located on the corner of the unit next to the evaporator section access panel. See Figure 1. A trap should be installed and filled with water before starting the unit to avoid air from being drawn through. Follow local codes and standard piping practices when running the drain line. Pitch the line downward, away from the unit, and avoid long horizontal runs. See Figure 4.

Do not use reducing fittings in the drain lines. The condensate drain must be:

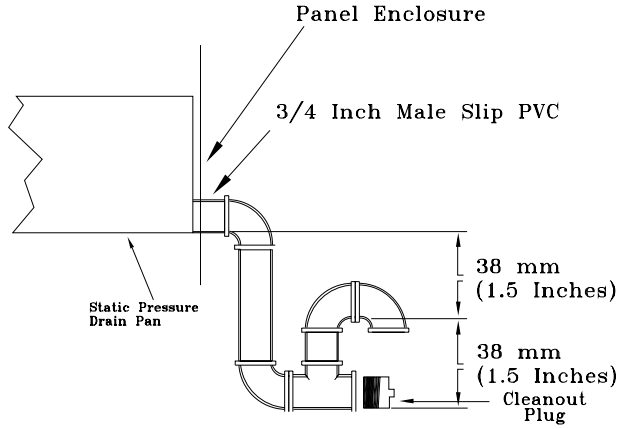
1. Made of 3/4" pipe size.

2. Pitched 2.1 mm per meter (1/4" per foot) to provide free drainage to convenient drain system.

3. Trapped

4. Must not be connected to closed drain system.

Figure 4



Filter Installation

Access to the filters is made by removing the evaporator fan access panel. Each downflow unit ships with 50mm (one-inch) filters, as determined by unit size. To modify the unit filter racks to accept two 50mm (one-inch) filters, the L-shaped angles (which are held in place with screws and formed tabs) on the racks must be rotated. Remove the screws, turn the angles 90 degrees, and reinstall the screws. Refer to the unit Service Facts for filter requirements.

Important: **Do not operate unit without filters in place.**

Electrical Connections

Check the unit nameplate for the required supply voltage. Determine if adequate electrical power is available. Refer to application specifications.

Electrical wiring and grounding must be installed in accordance with local and national codes.

Electrical Power
It is important that proper electrical power is available for the unit. Voltage variation should remain within the limits stamped on the nameplate.

Power Entry
Holes are provided for low-voltage and high-voltage wiring. It is not necessary to punch any new holes in either the interior or exterior unit panels. If new holes are punched, performance will be adversely affected unless they are resealed to be both air- and watertight.

Disconnect Switch
Provide an approved weatherproof disconnect either on the side of unit or within close proximity.

Over Current Protection
The branch circuit feeding the unit must be protected as shown on the unit rating plate.

Power Wiring
The power supply lines must be run in approved conduit to the disconnect, and in the bottom of the unit control box. Provide strain relief for all conduit with suitable connectors. (Wiring instructions change when electric heaters are used, See Figure 5 for power entry guide.

Figure 5
Power Entry Guide

Important: Holes are provided for low-voltage and high-voltage wiring. It is not necessary to punch any new holes in either the interior or exterior unit panels. If new holes are punched, performance will be adversely affected unless they are resealed to be both air- and watertight.

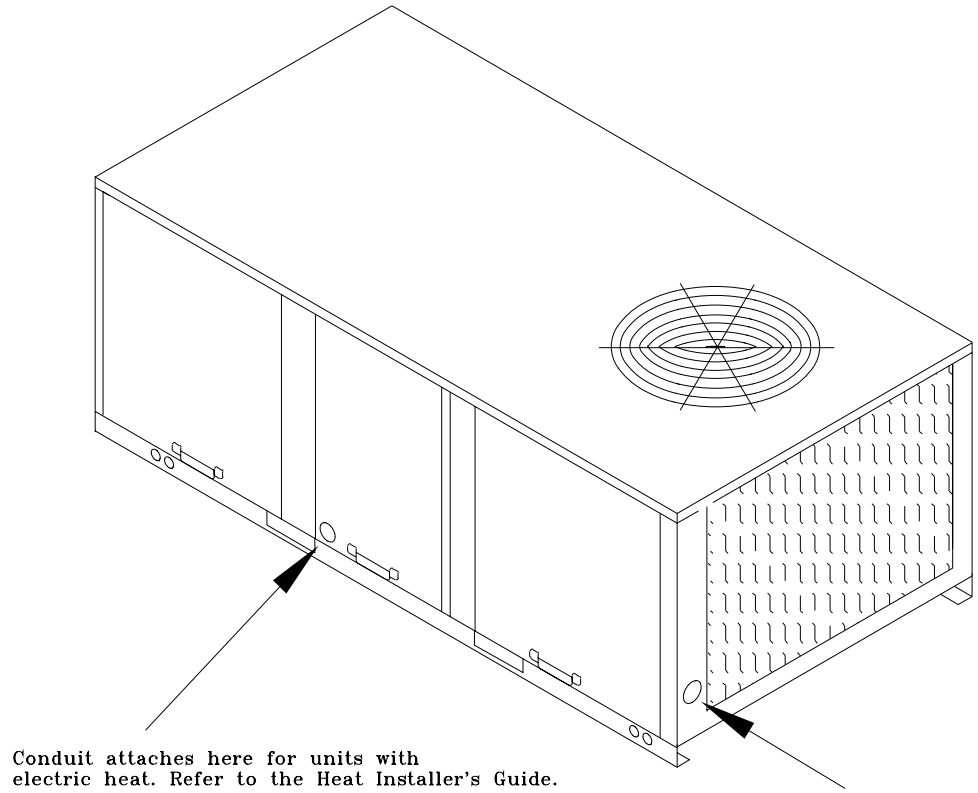
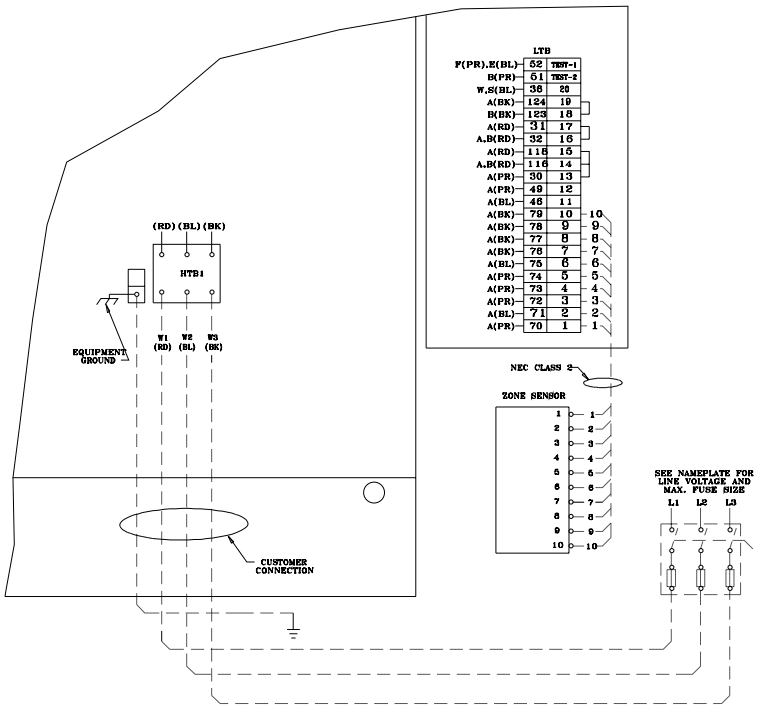


Figure 5A
Typical Field Wiring Diagram



Provide flexible conduit supports whenever vibration transmission may cause a noise problem within the building structure.

See Figure 5A for high voltage wiring connections. Insure all connections are made tight.

Note: **For branch circuit wiring (main power supply to unit disconnect), wire size for the length of run should be determined using the circuit ampacity found on the unit nameplate.**

For more than 3 conductors in a raceway or cable, see the N.E.C. for de-rating the ampacity of each conductor.

GROUNDING: THE UNIT MUST BE ELECTRICALLY GROUNDED IN ACCORDANCE WITH LOCAL AND NATIONAL CODES.

Control Wiring

Some models have a 24 voltage transformer with an integral circuit breaker. If the breaker trips, open unit disconnect before attempting to reset breaker. Models with a 50VA transformer do not have this circuit breaker.

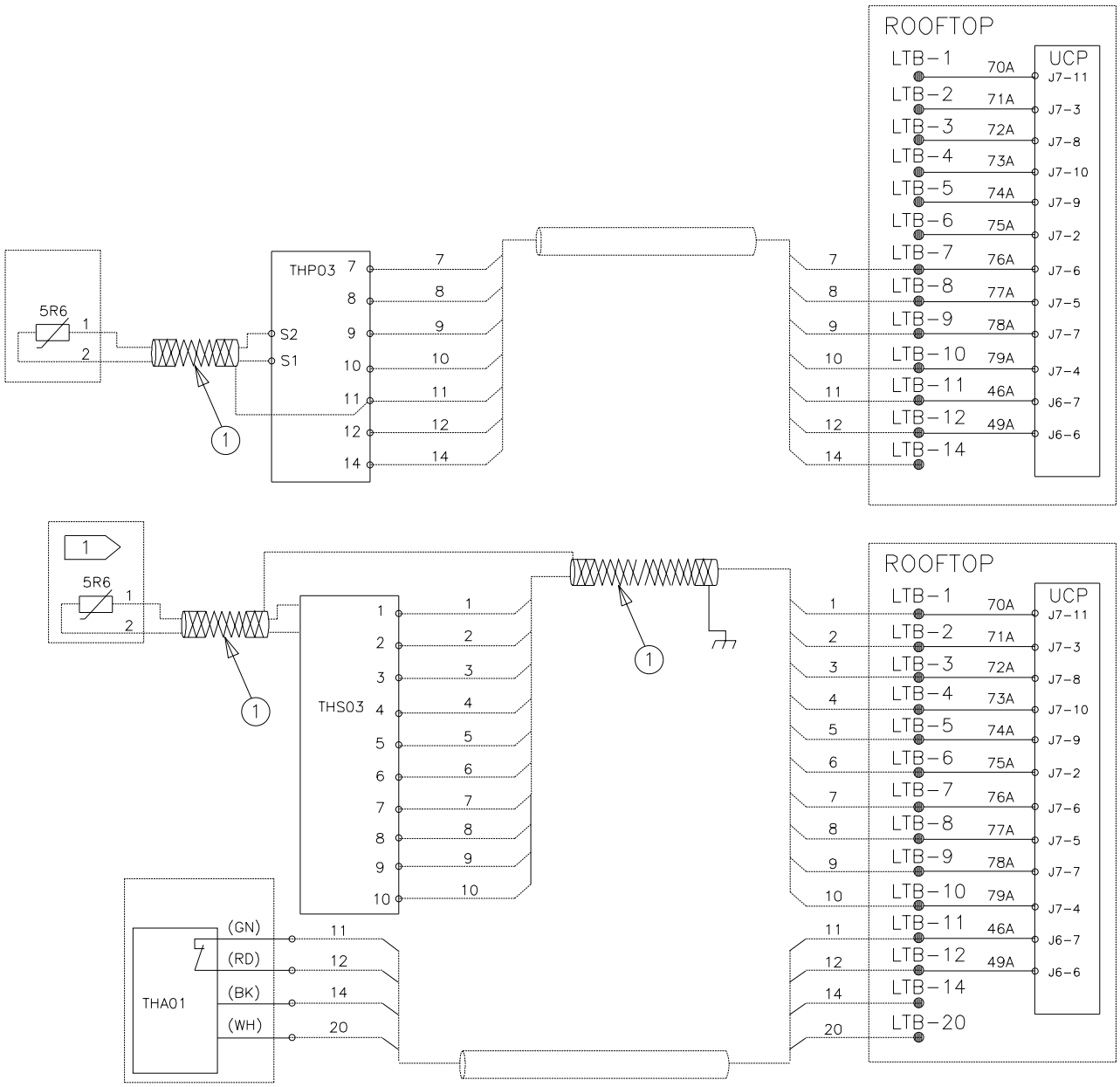
⚠WARNING: ***Open and lock unit disconnect. Failure to do so could result in severe personal injury or death due to electrical shock.***

Remove compressor access panel and control box panel to access transformer. Reset by pressing in on the black reset button located on the left side of the transformer.

Replace all panels before restoring power to the unit.

Important: The unit 24 volt transformer must not be used to power Field Installed Accessories (FIA), except for the ones that are factory supported.

Figure 6A
Zone Sensor Interconnecting Diagram



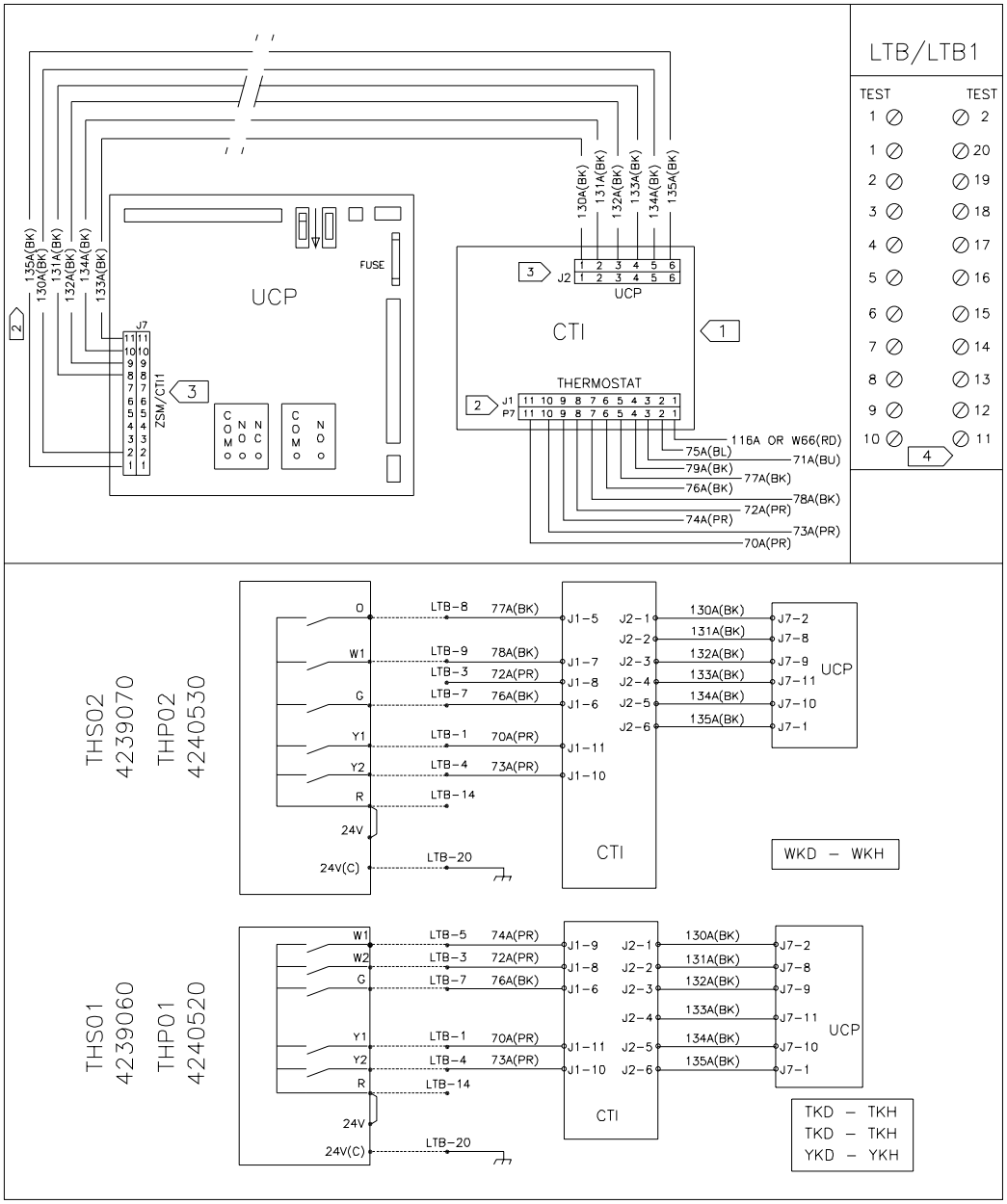
———	TRANE WIRING
·····	CUSTOMER WIRING

ITEM	DESCRIPTION
LTB-...	CONTROL TERMINAL BLOCK
THS03	STANDARD THERMOSTAT
THP03	PROGRAMMABLE THERMOSTAT
5R6	REMOTE SENSOR
GTC	BUILDING MANAGEMENT SYSTEM
TCI-3	TRANE COMMUNICATION INTERFACE
THA01	OCCUPANCY SENSOR
UCP	UNIT CONTROL MODULE

1 DISCONNECT THE THERMOSTAT'S THERMISTOR RTI WHEN REMOTE SENSOR OPTION IS USED.

(1) SHIELDED, TWISTED PAIR WIRE.

Figure 6B
Conventional Thermostat Interconnections



1 MOUNT CTI IN CONTROL BOX IN THE HOLES PROVIDED WITH 4 SCREWS INCLUDED.

2 REMOVE CONNECTOR P7 FROM J7 OF THE UCP AND INSTALL CONNECTOR ON J1 OF THE CTI.

3 UTILIZE CABLE INCLUDED WITH CTI TO CONNECT J2 OF THE CTI TO J7 OF THE UCP.

4 CONNECT ROOM THERMOSTAT TO TERMINAL BLOKC (X...LTB..) AS SHOWN FOR THE TYPE UNIT. PLACE WIRING DIAGRAM LABEL ON INSIDE OF ACCESS PANEL.

———	TRANE WIRING
- - - - - - - - - -	CUSTOMER WIRING

ITEM	DESCRIPTION
CTI	CONVENTIONAL THERMOSTAT INTERFACE
LTB	TERMINAL BLOCK
UCP	UNITARY CONTROL MODULE
24V(C)	0 VOLT STRIP
R – 24V	THERMOSTAT SUPPLY 24V
Y1 – Y2	COMPRESSOR CONTROL
G	SUPPLY FAN CONTROL
O	SWITCH OVER VALVE
W1	ELECTRIC HEATER CONTROL
THS	STANDARD CONTROL THERMOSTAT
THP	PROGRAMMABLE CONTROL THERMOSTAT
HTR	HEATING COIL

Zone sensor conductors are standard thermostat wire 22 to 14 ga. The only exceptions are Tracer/Tracker installations which utilize a serial communications link and require a shielded twisted pair of conductors between Tracer/ Tracker and the TCI Communication Interface.

Recommended wire sizes and lengths for installing the zone sensor are provided in Table 2. Resistance of 2 1/2 ohms per conductor can cause deviation in the accuracy of the control.

Field Installed DC Control Wiring

Before installing the connecting wiring between the components utilizing a DC analog output/input signal and the unit, refer to Table 2 for conductor sizing guidelines and;

a. Use standard copper conductor thermostat wire unless otherwise specified.

b. Ensure that the wiring between the controls and the unit's termination point does not exceed two and a half (2 1/2) ohms/conductor for the length of the run.

c. Refer to Figure 5 for the electrical access locations provided on the unit.

d. Do not run the electrical wires transporting Sensor DC signals in or around AC wires.

Units equipped with the Trane Communication Interface (TCI) option which utilizes a serial communication link;

a. Must be 18 AWG shielded twisted pair cable (Belden 8760 or equivalent).

b. Must not exceed 1525m (5,000 feet) maximum for each link.

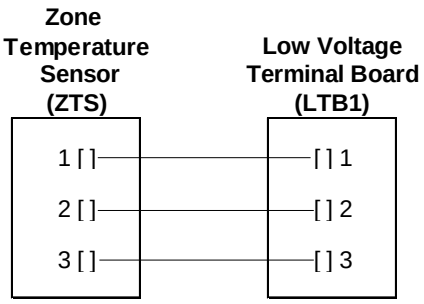
c. Must not pass between buildings.

NOTE: Resistance in excess of 2.5 ohms per conductor can cause deviations in the accuracy of the controls

Table 2
DC Conductors

Diameter (mm^2)	Maximum Length (m)
0.33	45
0.50	76
0.75	115
1.30	185
2.00	300

Zone sensor and low voltage terminal designations are no longer **R-W-Y-G-B** etc., they are now **1-2-3-4-5** etc. Connections should be made using 1 to 1, 2 to 2, 3 to 3, 4 to 4, and so on. Refer to the Zone Temperature Terminal Designation below.

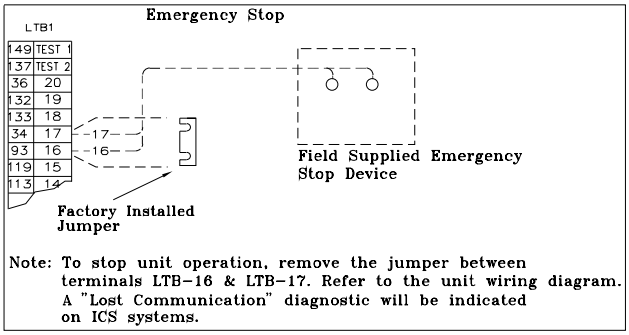


Zone Temperature Sensor Terminal Strip

Terminal #	Terminal I.D.
1	ZTEMP
2	SIGNAL COMMON
3	CSP
4	MODE
5	HSP
6	LED COMMON
7	HEAT LED
8	COOL LED
9	SYS ON LED
10	SERVICE LED

Make connections as shown in Figure 6 for the applicable Zone Sensor.

Emergency Shut Down
For Emergency Shut Down, remove the jumper between LTB-16 and LTB-17 and install normally closed contacts (Open at Fault Condition). Immediate shut down will occur and the UCP will be disabled.



Compressor Disable
To disable Compressor #1, remove the jumper between LTB-13 and LTB-14 and install normally closed contacts (open to disable).

To disable Compressor #2, (if applicable), remove the jumper between LTB-14 and LTB-15 and install normally closed contacts (open to disable).

Duct Mounted Supply Air Sensor (SAS)
To locate the Supply Air Sensor (SAS) in the ductwork, disconnect the unit mounted SAS and move it to the desired location, and; a. Connect wires 122A and 124A together. Remove the jumper between LTB-18 and LTB-19 and connect the field provided SAS to terminals LTB-18 and LTB-19.

IMPORTANT: **After completion of wiring, check all electrical connections, including factory wiring within the unit, and ensure all connections are tight. Replace and secure all electrical box covers and access doors before leaving unit or connecting power to circuit supplying unit.**

After all electrical wiring is complete, set the zone sensor switch to the off position and the fan switch to auto so compressor and fan will not run, and apply power by closing the system main disconnect switch. This will activate the compressor crankcase heaters. Do not change the zone sensor setting until power has been applied long enough to evaporate any liquid refrigerant in the compressor. It is recommended the crankcase heaters be energized for 8 hours prior to starting.

Start-Up

Pre-Start Quick Check List

[ ] Is unit level and located with proper clearances? See Figure 2.

[ ] Is the duct work correctly sized, run, taped, insulated and weather proofed with proper unit arrangement? (See duct work installation)

[ ] Is condensate line properly sized, run trapped and pitched?

[ ] Is the filter of the correct size and number, clean and in place?

[ ] Is the wiring properly sized and run in according to the unit wiring diagram?

[ ] Are all wiring connections tight including those in unit and compressor electrical boxes?

[ ] Has the unit been properly grounded and fused with the recommended fuse size? (See wiring data)

[ ] Is the zone sensor correctly wired and in a good location?

[ ] Have the air conditioning systems been checked at the service ports for charge and leak tested if necessary?

[ ] Does the condenser fan and indoor blower turn freely without rubbing and are they tight on the shafts?

[ ] Visually inspect the unit to ensure that the airflow required for the condenser coil is not obstructed from the unit.

[ ] Inspect the control panel wiring to verify that all electrical connections are tight, and that wire insulation is intact.

[ ] Is the indoor fan and rotation correct?

[ ] Has the indoor blower speed been determined and the proper speed been set? (See air flow performance data)

[ ] Has all work been done in accordance with applicable local and national codes?

[ ] Are all covers and access panels in place to prevent air loss and safety hazards?

⚠ WARNING: ***Bodily injury can result from high voltage electrical components. If operating checks must be performed with the unit operating, it is the technician's responsibility to recognize these hazards and proceed safely. Failure to do so could result in severe personal injury or death due to electrical shock or contact with moving parts.***

Power-up Initialization
The "initialization" by the Unitary Control Processor **(UCP)** occurs each time the system is powered-up. The **UCP** performs internal self-diagnostics checks, which include identifying the equipment components of its system, and the configuring of itself to that system. It also checks itself to be sure it is functioning correctly. On units with the optional economizer, the damper is driven open for 15-20 seconds and then fully closed. The **UCP** system indicator **LED** is turned to **"ON"** within one second of start-up if operation is correct.

Test Mode Procedure

Operating the unit from the roof using the test mode.

⚠ WARNING: ***When operating the unit in the test mode, the evaporator access panel and the control box cover,*** *must* ***be closed. Failure to ensure that the evaporator access panel and control box cover is in place could result in severe personal injury or death.***

The Unitary Control Processor **(UCP)** has a red indicator light in the lower left corner. When power is applied to the unit the light will glow if the **UCP** is functioning correctly. If the system is placed in the test mode the light will blink continuously.

Note: The control box cover has a small peep hole, located in the lower left hand corner. The red indicator light on the UCP can be seen through this peep hole. Do not remove the control box cover while the unit power is connected.

Step Test Mode

The step test mode is initiated by shorting across the "TEST" terminals, marked test 1 and test 2 on the unit's low voltage terminal strip **(LTB)**, for two (2) to three (3) seconds and then removing the short. When the test mode is initiated, the light on the **UCP** will blink and the system will begin the first test step, and turn on the indoor fan. (See test mode table)

To continue to the next step, reapply the short across the test terminals for 2 to 3 seconds.

The unit may be left in any test step for up to one hour. If allowed to remain in any test step for more than one hour, the test mode will terminate and control will revert to the zone sensor. As you continue to apply and remove the short across the test terminals, the unit will move through the steps according to the table below.

To terminate the test mode, cycle the unit power at the unit disconnect or continue stepping through the modes until the **UCP's** indicator light glows constantly.

Auto Test Mode

The auto test mode is initiated by installing a jumper between terminals marked TEST 1 and TEST 2 on the **LTB**. The unit will start in step 1 and cycle through the test steps one time, changing every 30 seconds.

When the test mode is initiated, the light on the **UCP** will blink and the system will begin the first test step, and turn on the indoor fan. (See test mode table)

At the end of the auto test mode, the indicator light will glow constantly and control will revert to the zone sensor.

The unit can be left in any one of the test steps, by removing the jumper. It will remain in this step for up to one hour. If allowed to remain in any test step for more than one hour, the test mode will terminate and control will revert to the zone sensor.

If the test mode is to be started again, cycle the unit power and reapply the jumper.

To terminate the test mode, cycle the unit power at the unit disconnect.

Note: Steps for optional accessories and modes not present in unit, will be skipped

Resistance Test Mode

The resistance test mode is Initiated by applying the appropriate resistance value across the "Test" terminals marked TEST 1 and TEST 2 on the **LTB**.

When the test mode is initiated, the light on the **UCP** will blink and the system will begin the test step selected by the resistance being applied across the test terminals. (See test mode table)

The resistance values are indicated in the Resistance Value Chart below.

After selecting the desired test step, and applying the appropriate resistance across the test terminals, the unit will start.

The unit can be left in this step for up to one hour. If allowed to remain in any test step for more than one hour, the test mode will terminate and control will revert to the zone sensor.
To terminate the test mode, remove the resistance, and cycle the unit power at the unit disconnect.

STEP	MODE	Ohms
1	FAN ON	2.2K
2*	ECONOMIZER	3.3K
3	COOL 1	4.7K
4	COOL 2	6.8K
5	HEAT 1	10K
6*	HEAT 2	15K
7*	HEAT 3	22K
8**	DEFROST	33K
9**	EM HEAT	47K

* With Optional Accessory
** With Heat Pumps
Note: Steps 7,8 & 9 are not applicable on Electric/Electric or Gas Units

Test Mode Table

Step	Mode	Fan	Econ	C1	C2	Heat 1	Heat 2	Heat 3	Defrost	Em Heat
1	Fan On	On	Min	Off	Off	Off	Off	Off	Off	Off
2*	Econ	On	Open	Off	Off	Off	Off	Off	Off	Off
3	Cool 1	On	Min	On	Off	Off	Off	Off	Off	Off
4	Cool 2	On	Min	On	On	Off	Off	Off	Off	Off
5	Heat1	On	Min	On	On	On	Off	Off	Off	Off
6*	Heat 2	On	Min	On	On	On	On	Off	Off	Off
7*	Heat 3	On	Min	On	On	On	On	On	Off	Off
8**	Defrost	On	Min	On	On	Off	On	On	On	Off
9**	Em Heat	On	Min	Off	Off	Off	On	On	Off	On

* With Optional Accessory ** With Heat Pump

Note: Steps for optional accessories and modes not present in unit, will be skipped.

Evaporator Fan Adjustment

Use the following procedure to determine the proper adjustment of the evaporator fan for a specific application.

1. Determine total system external static pressure Pa (in inches) water column) with accessories installed. To accomplish this:
   a. Obtain the design airflow rate and the design external static pressure drop through the distribution system. Your sales representative or the design engineer can provide you with these values.

   b. Using the table from unit Service Facts, add static pressure drop of the accessories installed on the unit.

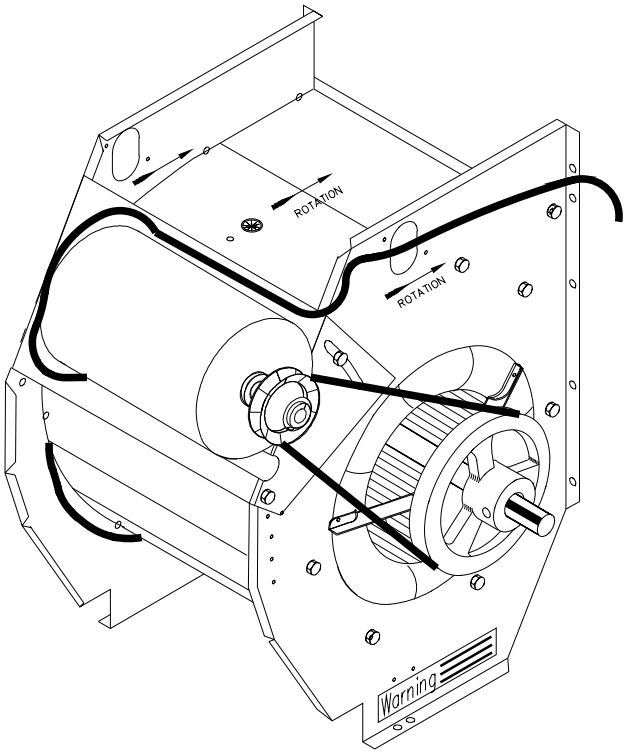
   c. Add the total accessory static pressure drop (from step 1b) to the design external static pressure. The sum of these two values is the total system external static pressure.

2. Use the table(s) in the Service Facts to find the external static pressure (in inches water column) that most closely approximates total system external static pressure. Then locate the appropriate airflow rate (in M^3/L (cfm) for your unit. The value obtained represents the Kw (brake horsepower) for the evaporator fan motor and the fan RPM.

Important: Fan Kw (Break Horsepower (BHP) listed in the Table is the precentage range of nameplate amperage the motors will safely work within, before an oversized motor is required.

On the WK(D,H) 063 - 073 models, the indoor fan speed is changed by opening or closing the adjustable motor sheave. See Figure 7.

Figure 7
Typical fan, motor, and sheave assembly for 063 - 073 models.



To Increase M^3/L (CFM)
Loosen the pulley adjustment set screw and turn sheave clockwise.

To Decrease M^3/L (CFM)
Loosen the pulley adjustment set screw and turn sheave counterclockwise.

To Increase Belt Tension
Loosen adjustment bolt. Pull motor mounting plate back until belt is tight. Tighten adjustment bolt after belt has correct tension.

Starting the Unit in the Heating Mode

(IMPORTANT: **Before starting the system in the cooling cycle, turn the zone sensor switch to "off" and close the unit disconnect switch. This procedure energizes the compressor crankcase heaters, vaporizing any liquid refrigerant in the crankcase. This is a precaution against foaming at start-up, which could damage the compressor bearings. Allow the heater to operate for a minimum of eight hours.**

Note: See "Sequence of operation" in the unit Service Facts for a complete description of heating operating sequence.

Check to ensure all grilles and registers are open and all unit access doors are closed before start-up.

Place the zone sensor system switch in the “Heat” position.

Position the heating setpoint approximately 10 degrees above room temperature and place the fan switch in “Auto” or “On” position.

Turn on unit main power supply.

Note: **To bypass time delays, and verify the operation of this unit from the roof, use the “Test mode procedure” on pages 3 and 4 of this manual.**

Heating Shut-down
To exit the test mode, disconnect unit power for 3-5 seconds and reapply. When running the unit using the zone sensor as the control, position the selector switch at “Off”.

Set the zone sensor to the desired set-point.

Starting The Unit In The Cooling Mode.

IMPORTANT: **Before starting the system in the cooling cycle, turn the zone sensor switch to “off” and close the unit disconnect switch. This procedure energizes the compressor crankcase heaters, vaporizing any liquid refrigerant in the crankcase. This is a precaution against foaming at start-up, which could damage the compressor bearings. Allow the heater to operate for a minimum of eight hours.**

Verify that the unit airflow rate is adjusted according to information provided in “Determining Evaporator Fan Adjustment” section of this manual.

Note: **See “Sequence of operation” in the unit Service Facts for a complete description of cooling operating sequence.**

To start the unit in the cooling mode, close unit disconnect switch and set the zone sensor system switch to COOL and move the cooling setpoint approximately 10 degrees below room temperature. The condenser fan motor, compressor and evaporator fan motor should operate automatically. There will be a delay of up to 5 minutes before the unit will start in the cooling mode.

Note: **To bypass time delays, and verify the operation of this unit from the roof, use the “Test mode procedure” on pages 13 and 14 of this manual.**

Operating Pressures
After the unit has operated in the cooling mode for a short period of time, install pressure gauges on the gauge ports of the discharge and suction line valves.

Note: **Always route refrigerant hoses through the port hole provided and have compressor access panel in place.**

Check the suction and discharge pressures and compare them to the normal operating pressures provided in the unit’s Service Facts.

Note: **Do not use pressures from Service Facts to determine the unit refrigerant charge. The correct charge is shown on the unit nameplate. To charge the system accurately, use superheat charging or weigh the charge.**

Voltage
With the compressor operating, check the line voltage at the unit. The voltage should be within the range shown on the unit nameplate. If low voltage is encountered, check the size and length of the supply line from the main disconnect to the unit. The line may be undersized for the length of the run.

⚠WARNING: ***Bodily injury can result from high voltage electrical components. If operating checks must be performed with the unit operating, it is the technician’s responsibility to recognize these hazards and proceed safely. Failure to do so could result in severe personal injury or death due to electrical shock or contact with moving parts.***

Cooling Shut Down
To exit the test mode, disconnect unit power for 3-5 seconds and reapply. When running the unit using the zone sensor as the control, position the selector switch at **“Off”**. There may be a delay of up to 3 minutes before compressors shut down and an additional 1 minute before the fan shuts down in this setting.

Do not de-energize main power disconnect except when unit is to be serviced. Power is required to keep compressor crankcase warm and boil off refrigerant in the oil.

(EDC) Evaporator Defrost Control
During low ambient operation below 13° C (55° F), compressor run time is accumulated by the UCP. When compressor run time reaches approximately 10 minutes, an evaporator defrost cycle is initiated. The defrost cycle lasts approximately 3 minutes.

During a defrost cycle, the compressor(s) are turned off and the indoor motor continues to run. After completing the defrost cycle the unit returns to normal operation, and the compressor run time counter is reset to zero.

Economizer operation is not affected by a defrost cycle.

Demand Defrost
These units are equipped with demand defrost. The logic used in this design permits operating characteristics to be stored in memory. The control is always comparing the most recent defrost performance to the characteristics from previous cycles and adjusting initation and termination values in order to improve overall system performances.

This control permits defrost whenever the icing condition begins to cause a significant capacity reduction.

Certain system faults detected by the UCP will cause the Heat and Cool lights on the Zone Sensor to flash indicating to the consumer that a fault exists. Under some fault conditions the control will revert to a 30 minute defrost cycle in an attempt to minimize excessive ice buildup until the needed service is performed.

If the heat pump is unable to normally terminate the defrost cycle, defrost will automatically terminate after 10 minutes. This prevents the system frm being locked into the defrost cycle.

When a defrost cycle is terminating, the outdoor motors are turned on for 5 seconds before de-energizing the switchover valves. This provides a smooth transition back to mechanical heating operating.

Final Installation Checklist & Maintenance

[ ] Does unit run and operate as described in the "Sequence of Operation" in the unit Service Facts?

[ ] Is the condenser fan and indoor blower operating correctly, with proper rotation and without undue noise?

[ ] Are the compressors operating correctly and has the system been checked with a charging chart?

[ ] Have voltage and running currents been checked to determine if it is within limits?

[ ] Have the air discharge grilles been adjusted to balance the system?

[ ] Has the ductwork been checked for air leaks and condensation?

[ ] Has the indoor airflow been checked and adjusted if necessary?

[ ] Has the unit been checked for tubing and sheet metal rattles and are there unusual noises to be checked?

[ ] Are all covers and panels in place and properly fastened?

[ ] Has the owner or maintenance personnel been given this manual, warranty, and been instructed on proper operation and maintenance?

Routine Maintenance By Owner

You can do some of the periodic maintenance functions for your unit yourself; this includes replacing (disposable) or cleaning (permanent) air filters, cleaning unit cabinet, clearing the condenser coil, and conducting a general unit inspection on a regular basis.

⚠WARNING: ***Before removing access panels to service unit, disconnect power supply. Failure to disconnect power before attempting any servicing can result in severe injury or death.***

Air Filters

It is very important to keep the central duct system air filters clean. Be sure to inspect them at least once each month when the system is in constant operation. (In new buildings, check the filters every week for the first 4 weeks.)

If you have disposable type filters, replace them with new ones of the same type and size.

Note: **Do not attempt to clean disposable filters.**

Permanent type filters can be cleaned by washing with a mild detergent and water. Ensure that the filters are thoroughly dry before reinstalling them in the unit (or duct system).

Condenser Coil

Unfiltered air circulates through the unit's condenser coil and can cause the coil's surface to become clogged with dust, dirt, etc. To clean the coil, vertically (i.e., with the fins) stroke the coil surface with a soft bristled brush.

Keep all vegetation away from the condenser coil area.

Maintenance Performed by Serviceman - Cooling Season

To keep your unit operating safely and efficiently, the manufacturer recommends that a qualified serviceman check the entire system at least once each year, or more frequently if conditions warrant. Your serviceman may examine these areas of your unit:

1. Filters (for cleaning or replacement)
2. Motors and drive system components
3. Economizer gaskets (for possible replacement)
4. Condenser coils (for cleaning)
5. Safety Controls (for mechanical cleaning)
6. Electrical components and wiring (for possible replacement or connection tightness)
7. Condensate drain (for cleaning)
8. Inspect the unit duct connections to ensure they are physically sound and sealed to the unit casing.
9. Inspect the unit mounting support to see that it is sound.
10. Inspect the unit to ensure there is no obvious deterioration.

Maintenance Performed By Serviceman - Heating Season

Complete the unit inspections and service routines described below at the beginning of each heating season.

⚠ WARNING: ***To prevent injury or death due to electrical shock of contact with moving parts, lock unit disconnect switch in open position before servicing unit.***

⚠ WARNING: ***To prevent an explosion and possible injury, death and equipment damage, do not store combustible materials, gasoline or other flammable vapors and liquids near the unit.***