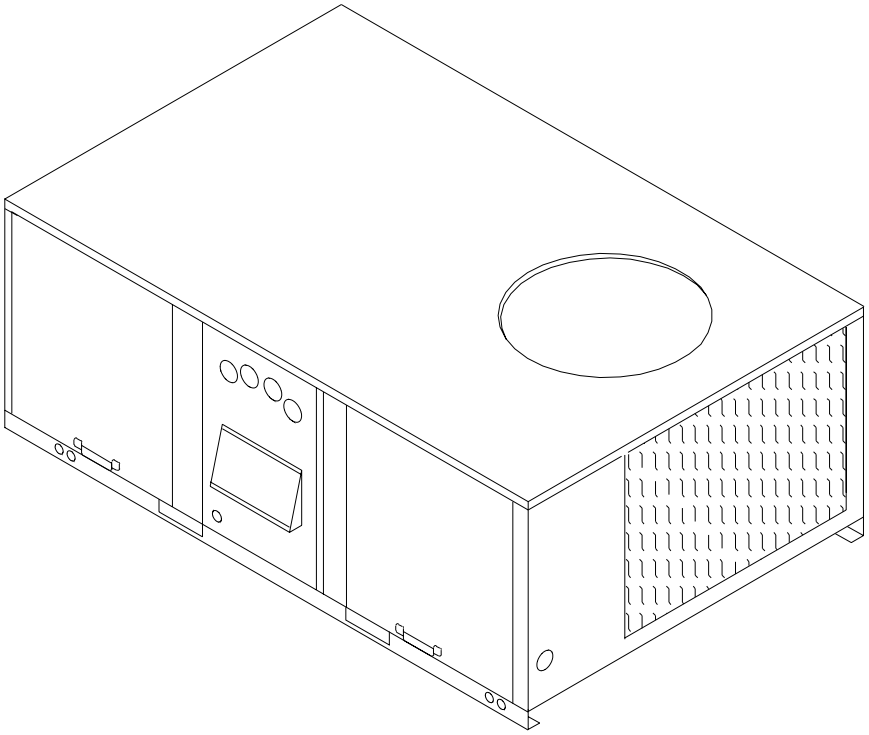
INSTALLATION OPERATION MAINTENANCE

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

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

Models: (50 Hz)
YK(D,H)063C
YK(D,H)073C
YK(D,H)089C

Packaged Gas/Electric
YK*063 - YK*089



IMPORTANT NOTE: All phases of this installation must comply with the **NATIONAL & LOCAL CODES.** *These units are equipped with an electronic unit 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

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.

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

IMPORTANT: This unit, as shipped from the factory, is designed to use natural gas only. Do not connect gas piping to the unit until a line pressure test has been completed. Pressure in excess of 34.8 mbar (14 inches water column (1/2 PSIG)) will damage to the gas valve resulting in an unsafe condition.

⚠WARNING: *All power legs to the electrical components may not be broken by contactors. See the wiring diagram on the unit control box cover.*
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.

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 unit nameplate to determine if unit is correct for application intended. Power supply must be adequate for the unit and all accessories.

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.

MODULE NAMES

UCP - Unitary Control Processor (standard component) This is the heart of the system. The computer and program reside in this module. The minimum configuration will include the **UCP** and one of the zone sensor modules.

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. This interface module is required to connect the system to an ICS BUILDING MANAGEMENT SYSTEM. i.e. - Tracer or Tracker.

CTI - Conventional Thermostat Interface (BAYCTHI001 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

. **Lead-Lag**
Is a selectable configuration within the UCP which alternates the starting of the compressors between the two refrigeration circuits. To enable the Lead/Lag function, cut wire 52F (PR) which is connected to terminal J1-7 at the UCP. Refer to the unit wiring diargam.) Each time the request for cooling is satisfied, the designated lead compressor switches. Upon Power-up Initialization, the control will default to the number one compressor. When a Conventional Thermostat Inteface (CTI) is used, Lead/Lag is functional except during the test mode.

. **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 Indicator Lights (Optional)**
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 when limit **TCO1** and/or **TCO2** has tripped.
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.

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.

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

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.

— 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.

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	Heat 1	On	Min	Off	Off	On	Off	Off	Off	Off
6 *	Heat 2	On	Min	Off	Off	Off	On	Off	Off	Off
7 *	Heat 3	Not Applicable on Gas/Electric Units.								
8 **	Defrost	Not Applicable on Gas/Electric Units.								
9 **	Em Heat	Not Applicable on Gas/Electric Units.								

* With Optional Accessory **With Heat Pump

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

Resistance Values Chart

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 the Gas/Electric units.

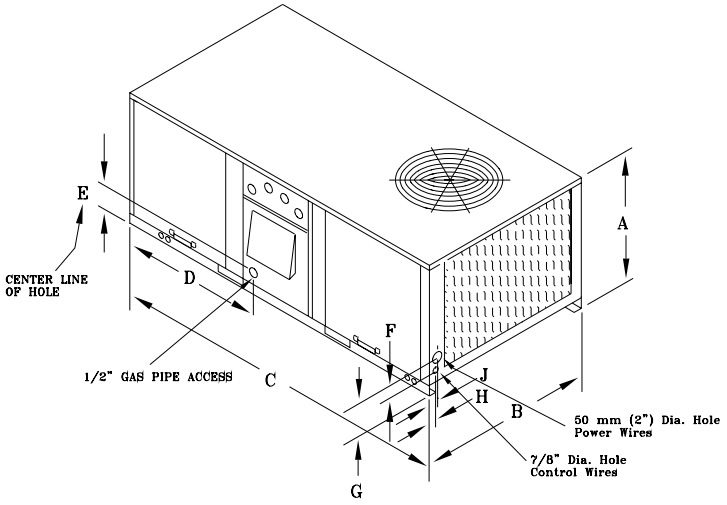
DIMENSIONAL DATA

Unit Dimensions - SI (mm)

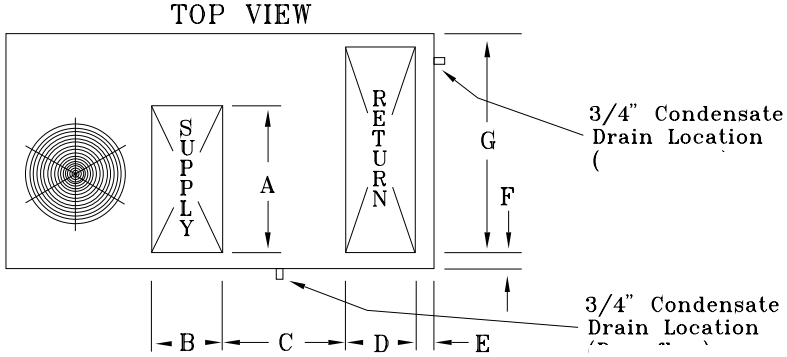
UNITS	A	B	C	D	E	F	G	H	J
YK*063-089	889	1259	2211	1062	151	155	211	60	48

* Downflow and/or Horizontal

Figure 1



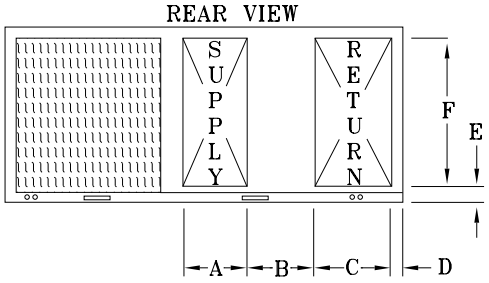
063 - 089 Ton Downflow



DOWNFLOW UNIT - SI (mm)
TOP VIEW SHOWING DUCT OPENINGS IN THE BASE

UNITS (mm)	A	B	C	D	E	F	G
YK*063 - 089	895	386	572	329	83	86	1013

063 - 089Ton Horizontal



HORIZONTAL UNIT - SI (mm)
REAR VIEW SHOWING DUCT OPENINGS UNITS

UNITS (mm)	A	B	C	D	E	F
YK*063 - 089	406	408	511	60	137	686

Curb Dimensions - SI (mm)

UNIT	A	B	C	D	D*	E	E*	F	G	H	J	K	L	M
YK*063 - 089	2064	1170	356	365	556	438	551	464	1076	25	46	919	2073	1178

* Dimensions when round ductwork is used.

Figure 2

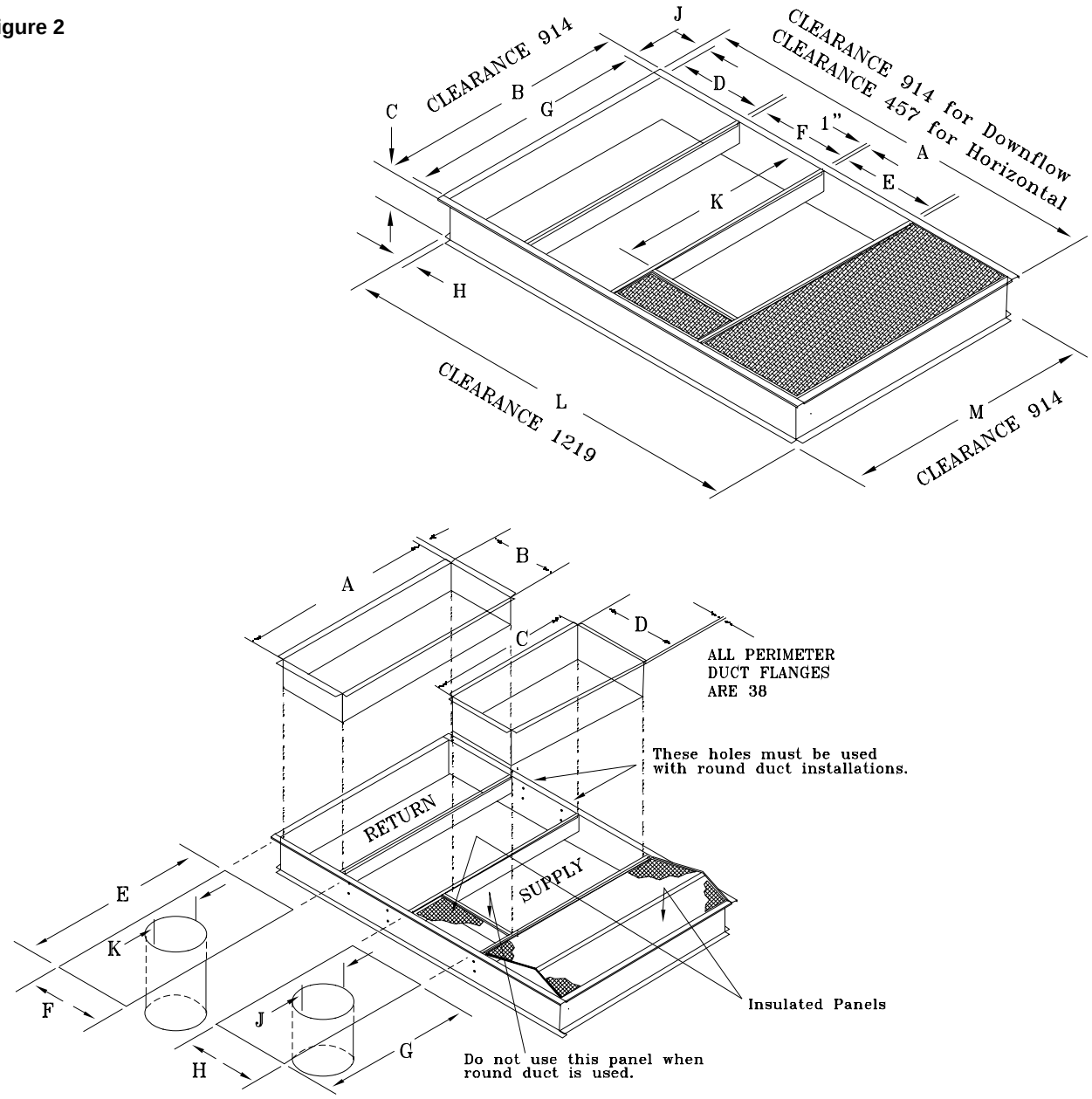


Table 3 Field Fabricated Duct Dimensions - SI (mm)

UNIT	A	B	C	D	E	F	G	H	J	K
YK*063 - 089	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. Check unit nameplate for supply voltage required. Determine if adequate electrical power is available. Refer to specification sheet. Furnace may be installed on Class A, B or C roofing material.

Location and Clearances

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

Model YK 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, in accordance with local and national codes. Since these units are designed exclusively for outdoor operation, additional flue venting systems are not required. Each unit contains an operating charge of Refrigerant as shipped.

Select a location that will permit unobstructed airflow into the condenser coil and away from the fan discharge and permit unobstructed combustion airflow into the burner 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 1.8 m 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.*

Unit Mounting
Mounting on Roof

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

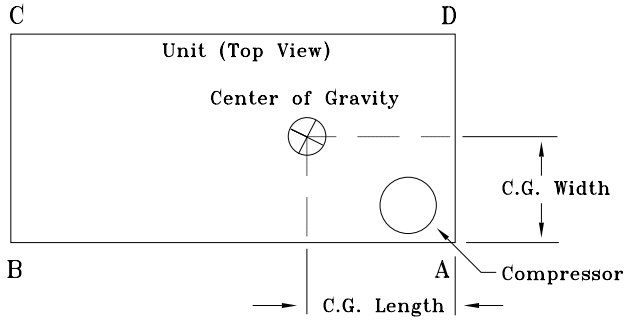
"For ground level installation, the unit base should be adequately supported and hold the unit near level. The installation must meet the guidelines set forth in local codes."

Table 1
Corner weights & Center of Gravity

	Total Unit, Net	Corner Weights (note 1) (kg)				Center of Gravity (mm)	
Unit	Weight	A	B	C	D	Length	Width
YK*063C	341	108	87	65	80	991	533
YK*073C	360	119	92	69	80	991	533
YK*089C	360	119	92	69	80	991	533

* Downflow or Horizontal

Note 1 - *Corner weights are given for information only. Unit is to be supported continuously by a curb or equivalent frame support.*



Ductwork

Attaching Downflow Ductwork to 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.

Guidelines for ductwork construction:

— 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 Unit

— All conditioned air ductwork should be insulated to minimize heating and cooling duct losses. Use minimum of 50mm of insulation with a vapor barrier. The outside ductwork must be weather proofed between the unit and the building.

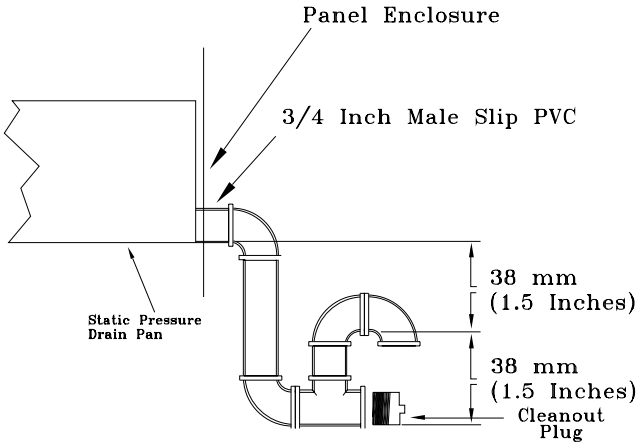
— When attaching ductwork to a horizontal unit, provide a flexible water tight connection to prevent noise transmission from the unit to the ducts. The flexible connection **must** be indoors and molded out of heavy canvas.

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 as 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.

Figure 4



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

— Made of 3/4" pipe size.
— Pitched 2.1 mm per meter (1/4" per foot) to provide free drainage to convenient drain system.
— Trapped
— Must not be connected to closed drain system.

Gas Pipework Installation
The installation must conform to all standards and regulations. The gas supply pipework and gas stop valve to be installed near the unit must be dimensioned so as to assure the gas pressure is sufficient at the unit inlet when operating at full load.

The pipework must be self supporting and the final connection to the burner must be made by flexible pipe. Provide a dust protection (filter) upstream of the unit connection. Look for gas pipe leaks using "Typo", "1000 bulles" or a similar product. Soapy water must not be used.

Caution: Never use an open flame to check for gas leaks. Required gas pressure at the unit inlet connection are given in Table 4.

Caution: The gas pipework must not exert any stress on the burner gas connection.

The heating system must be isolated by a gas stop valve from the gas supply pipe during the pressure test as soon as it is higher than 0.035 bar. Applying a pressure higher than 0.035 bar at the unit valve gas could damage it.

Operating Principles of the Gas Heating Module
The heating function of the YK* units is controlled by the heating module ignition burner. The burner, of the forced air type, has two capacity stages controlled by the UCP electronic controller which optimizes the air conditioner operation.

A normal call for heat is initiated by the UCP, using the temperature detected at the zone sensor. The UCP module internal relays K5 and K6 energize, which in turn energize the heat relay (H), the combustion fan motor (CFM), and the ignition control module (IGN).

The relay K5 switches CFM into high speed. After approximately 1 minute K5 switches back and the CFM changes into low speed. If the low pressure fan switch (LPGS), and the high limit cutout (TC01) are closed, ignition is allowed. The ignition control module pre-heats the ignition probe (IP) during approximately 36 seconds. After this pre-heating stage the gas valve is energized for approximately 8 seconds to ignite the burner. If the burner fails to ignite, the control module tries again twice before self-locking out. When the gas ignites successfully, the IP probe is de-energized and maintains a flame detection function.

If the zone temperature remains below the first stage heating setpoint for 90 seconds after the heating cycle has started, the UCP energizes again the K5 relay. The burner fan then switches into high speed and the heating capacity is raised to maximum.

When the temperature of the zone has reached the setpoint, the UCP de-engerizes the relays K5, K6, H and IGN; the burner then stops.

If the indoor fan is set to auto operation, it will stop 90 seconds after the burner has stopped in order to recover as much heat as possible from the exchanger.

To reset the ignition controller which has tripped on safety, it is necessary to cycle power to the unit.

Note: The supply static pressure should be checked and should be no less than 200 Pa.

In addition to the safety features of the ignition controller, the burner includes the following safeties:

- detection of a gas supply minimal pressure by the automatic reset pressure switch LPGS.

- detection of an abnormal temperature of the supply air (Thermostat TC01).

- detection of an overheating problem due to a lack of air circulation through the heat exchanger (Thermostat TC02).

Table 2 - State of LEDs on Gas-Fired Heating Module

Diagnostics	Green LED	Red LED
1. Powered without heating demand	Off	Off
2. Heating demand without fault	Flashing	Off
3.No flame detection on ignition or signal detected and then lost	Off	Flashing
4. Gas unit incorrectly wired or flame signal detected on a heating demand	On	Flashing
5. Internal fault	Off	On

Putting the Gas-Fired Heating Module into Operation (Reserved for the qualified gas technician)

CAUTION: ***This type of burner can only be put into operation by an approved techician who has read the following procedure beforehand, or preferably has undergone the training course on Trane gas burners.***

Before performing ignition tests it is first necessary to perform the following operations:

- Check a gate valve is present
- Check an expansion valve is present. This valve must be adapted to the type of gas used:
* G 20 : 20 mb
* G 25 : 25 mb
* G 31 : 37 or 50 mb

Note: To operate with propane gas, the burner is fitted with a limiter (supplied by Trane).

- Vent the gas line

- Check the gas pipe is leak-tight upstream of the gas unit (see drawing). Use Typol or a foaming product ("1000 bulles" aerosol or similar). Do not use soapy water.

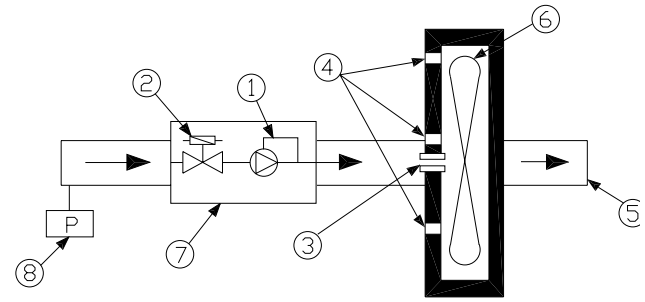
- Check the pressure upstream of the gas unit (the pressure connection is located on the minimum gas pressure cut-out). This cut-out must be set to 15 mbar. This operation must be carried out while the burner is not operating.

- Check the power supply voltage is present at the T2-2 transformer output.

- 115 volts for power supply of the IGN module (L1 - L2 and S1 - S2).

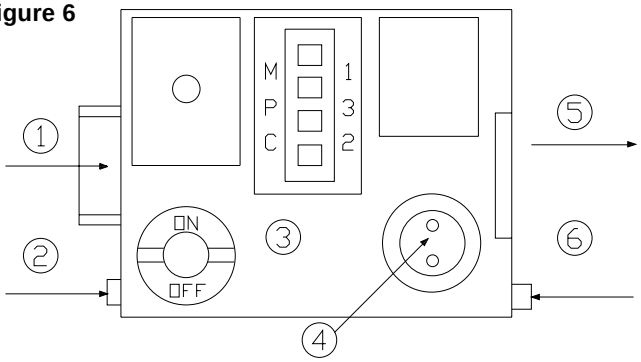
* 230 volts for power supply of the burner fan motor.

Figure 5



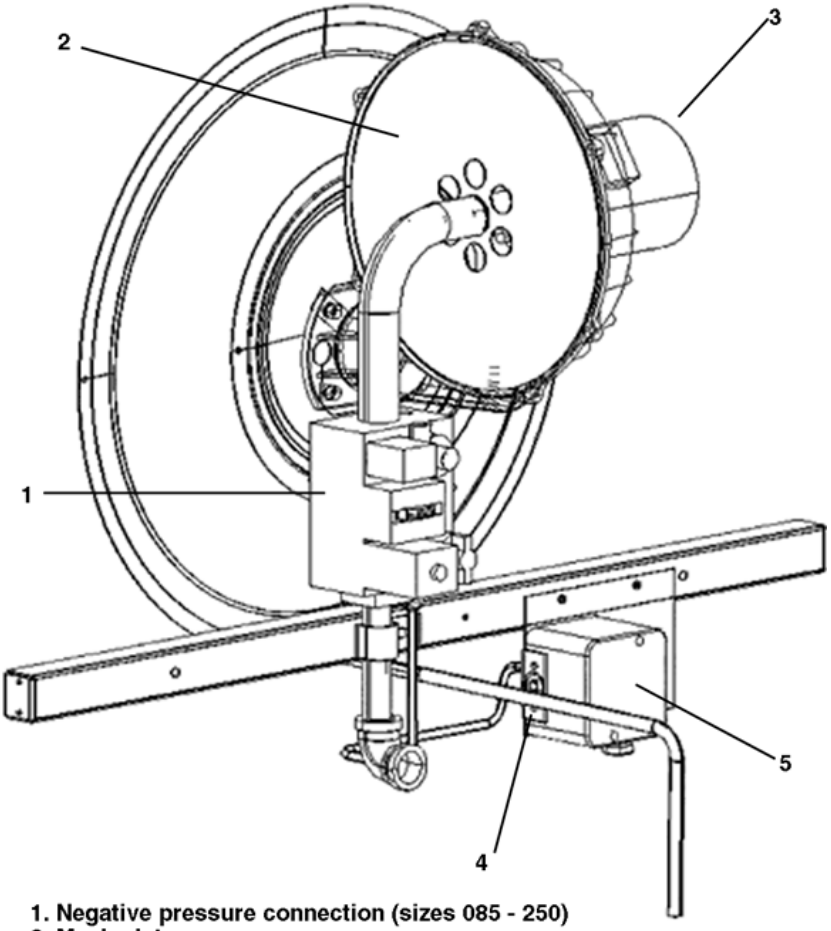
① Negative pressure control
② Safety solenoid
③ Gas injector
④ Air inlets
⑤ To the burner
⑥ Fan
⑦ Gas unit
⑧ Min. gas pressure cut-out

Figure 6



① Gas inlet
② Pressure connection
③ Gas unit
④ Brass screw
⑤ Gas outlet
⑥ Downstream pressure connection

Detail of the Gas Section



1. Negative pressure connection (sizes 085 - 250)
2. Mesh plate
3. Fan motor unit
4. Gas pressure connection
5. Min. gas pressure cut-out

- Measure the negative pressure downstream of the gas unit. Connect a flexible hose to the gas unit branch connection (for sizes 063 and 073 the connection is located on the gas pipe) and connect as electronic pressure gauge, or failing this a U tube.

- Start the burner by modifying the thermostat's set point or by using the "test mode" terninals on hte machines terminal strip.

- Measure the downstream partial vaccum. It must be between - (minus) 5 mm and - (minus) 9 mm of water head.

- Check the supply pressure upstream of the gas unit once more when it is operating to ensure the pressure has not dropped.

Important note: In the event this measurement is correct, do not adjust the gas unit setting. It has been set in the factory.

When the measured partial vaccum is positive (above atmospheric pressure) or zero
- Remove the paint mark on hte brass threaded plug with two holes drilled in it, located on the gas unit, and unscrew it (See Figure 6).

- To increase the partial vaccum turn the screw anti-clockwise.

- Measure the partial vaccum again while the burner is operating.

- When the adjustment is finished, seal the brass threaded plug with paint.

It is highly recommended to check the combustion gases with a flue gas analyser. The measured valves must be within the following ranges:
-Carbon monoxide (CO) less than 50 PPM
-Oxygen (O2) greater than 1.5%
-Carbon dioxide (CO2) less than 11%

Note: If the correct setting cannot be obtained, contact the Trane technicians.

Checking the correct operation of the burner
After having iginited the burner a few times, it is necessary to check the proper operation of the burner safeties by following the following procedure:

1. Close the main gas valve, and then simulate a demand for heating. The burner must start, and then stop when the quantity of gas contained in the pipe between the main valve and the built-in gas unit has run out. To ensure this takes place, following the drop in supply pressure, the LPGS cut-out must open and stop all the gas supply chain components (fans, gas valve, ignition controller). Any attempt to ignite the system again must fail.

2. Open the main gas valve. The pressure switch LPGS should automatically reset. The burner can now be put back into operation.

3. Ignite the burner. Once it is burning, simulate a flame failure by disconnecting a wire of the flame detection sensor (quick connect). The ignition controller should immediately stop the burner and close the gas valve.

4. Reconnect the sensor and re-ignite the burner. Once the burner is ignited, simulate a high temperature failure by disconnecting a wire from the sensor TC01. The gas valve should close and stop the flaem, re-connect TC01. The ignition sequence will be initiated. The burner should re-light after about 45 seconds.

5. Once the burner is ignited, simulate overheating by disconnecting a wire from the sensor TC02. This stops all the burner's elements (fan and gas valve should no longer be energized). Reconnect the TC02 wire.

Adaption to available gases (See Table 3)
The gas-fired heating modules built into YK* units are available in different categories. The units are supplied ready to operate using natural gases G20 (20 mbar) and G25 (25 mbar) or using gas G31 (37 mbar).

The transition from G20 gas to G25 gas does not require any action. The available power in G25 gas supply is reduced.

The transition from G20 to G31 gas requires the following modifications.
- Change of the gas intake orifice in the burner's fan.
- Implementation of pressure limiter.

⚠ WARNING: The orfice and the limiter for supply with gas G31 must be manufactured by Trane.

Start up
Operating check list before the start-up
-Unit is level, with sufficient clearance all round.
-Duct network is correctly dimensioned according to the unit configuration, insulated and water tight.
-Condensate drainage line is correctly dimensioned, equipped with trap and sloped.
-Filters are in position: correct size and quantity , clean.
-Wiring is correctly sized, and connected in accordance with wiring diagrams.
- Power supply lines are protected by recommended fuses and correctly earthed.
-Thermostat is correctly wired and positioned Unit is checked for refrigerant charge and leaks.
-Indoor and outdoor fans rotate freely and are fixed on shafts.
-Indoor fan rotation speed is set.
-Access panels and doors are replaced to prevent air entering and risks of injury.
-Checking of the gas heating section, in accordance with above precedure.

⚠ WARNING: If any operating checks must be performed with the unit operating, it is the technicians responsibility to recognize any possible hazards and proceed in a safe manner. Failure to do so could result in severe personal injury or death due to electrical shock or contact with moving parts.

Table 3 - Units Equipped with Gas Heating Modules, CE Marked

Sales Reference	G205	G250	G350	G400
Rooftop Air Conditioner	Gas Module Heating Capacity kW PCI (Output %)			
50 Hz EEC Voyager				
G20	41,4 (92%)	49,1 (91%)	70,6 (90%)	77,4 (91%)
G25	35,0 (92%)	38,3 (89%)	59,4 (88%)	60,3 (90%)
G31	37,7 (92%)	48,6 (90%)	57,3 (88%)	78,2 (92%)
YK*063CD	X			
YK*073CD	X			
YK*073DD	X			
YK*085CD	X			
YK*089CD	X			
YK*100CD	X			
YK*100BD		X		
YK*125CD		X		
YK*155BD			X	
YK*175CD			X	
YK*200BD				X
YK*250BD				X

Table 4 - Characteristics of G20, G25 and G31 Gases used by Gas-Fired Heating Modules fitted to YK*Roof Top Air Conditioners

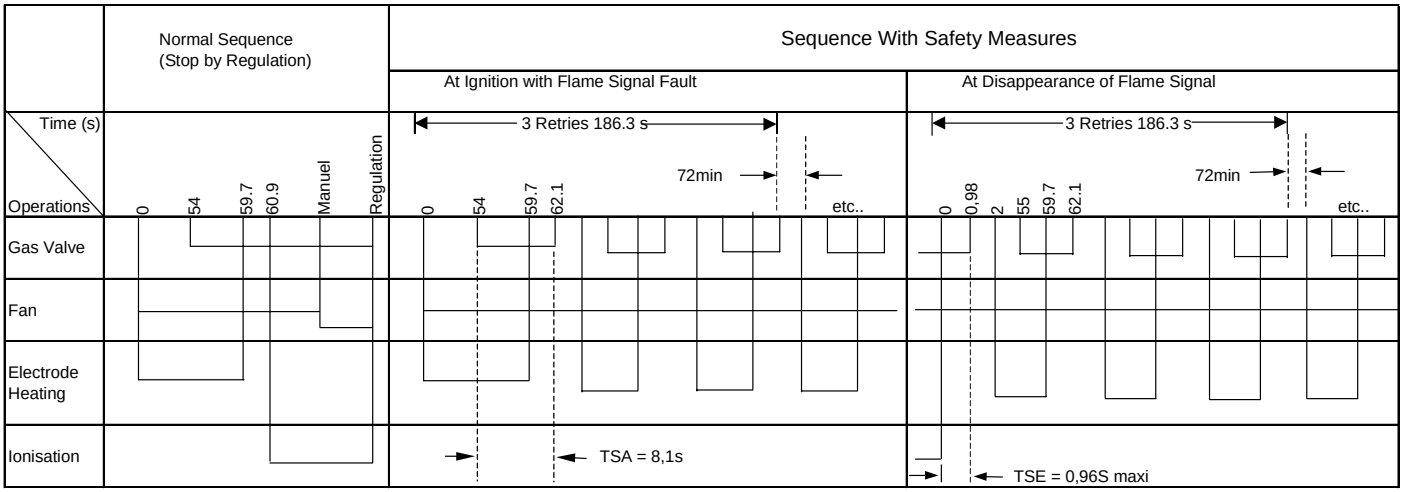
Module de chauffage		**G205**	**G250**	**G350**	**G400**
Natural Gas G20 (20mbar)					
34.02 MJ/m3 (15 C-1013)					
Injector diameter	(mm)	6,05	7,67	8,20	10,69
Heating Capacity	(kW)	77,4	41,4	49,1	70,6
Minimum Gas Pressure (Trip-out)	(mbar)	15,0	15,0	15,0	15,0
Normal Rate					
Gas Flow (15 C-1013 mbar)	(m3/h)	3,1	4,8	5,7	8,3
Heat Rate	(kW)	45,0	54,0	78,7	85,0
Reduce Rate					
Gas Flow (15 C-1013 mbar)	(m3/h)	4,6	5,1	8,1	8,5
Heat Rate	(kW)	43,5	48,0	76,8	80,0
Natural Gas G25 (20 ou 25 mbar)					
29.30 MJ/m3 (15 C-1013)					
Injector diameter	(mm)	7,67	8,20	9,80	10,69
Heating Capacity	(kW)	35,0	38,3	59,4	60,3
Minimum Gas Pressure (Trip-out)	(mbar)	15,0	15,0	15,0	15,0
Normal Rate					
Gas Flow (15 C-1013 mbar)	(m3/h)	4,7	5,3	8,3	8,2
Heat Rate	(kW)	38,0	43,0	67,4	67,0
Reduce Rate					
Gas Flow (15 C-1013 mbar)	(m3/h)	4,5	4,9	7,8	7,9
Heat Rate	(kW)	36,5	40,0	63,4	64,0
Natural Gas G31 (30, 37ou 50 mbar)					
88.00 MJ/m3 (15 C-1013)					
Injector diameter	(mm)	5,40	6,67	7,37	8,50
Heating Capacity	(kW)	37,7	48,6	57,3	78,2
Minimum Gas Pressure (Trip-out)	(mbar)	20,0	20,0	20,0	20,0
Normal Rate					
Gas Flow (15 C-1013 mbar)	(m3/h)	1,7	2,2	2,7	3,5
	(kg/h	3,2	4,2	5,1	6,6
Heat Rate	(kW)	41,0	54,0	65,3	85,0
Reduce Rate					
Gas Flow (15 C-1013 mbar)	(m3/h)	1,6	2,2	2,6	3,2
	(kg/h)	3,0	4,1	4,9	6,1
Heat Rate	(kW)	38,5	53,0	62,6	78,0
Combustion Air Flow (Avec E=25%)	(m3/h)	60,0	72,0	98,0	113,0

NOTE: GAS FLOW MAY VARY BY AS MUCH AS ± 10%

CE MARKING CATEGORY OF THE GAS SECTION IN THE DIFFERENT COUNTRIES

NL	FR	BE	GB/ES	IT	DE
Netherlands	France	Belgium	United Kingdom	Italy	Germany
II2L3P	II2E +3P	I2E + I 3P	II2H3P	I2H + (Natural Gas Only)	I 2E I 3P
G20 - 20 mbar					
G31 30 mbar	G31 37 mbar				G37 50 mbar

Figure 7 - Trane Gas Heating Module Ignition Controler Start and Safety Sequence



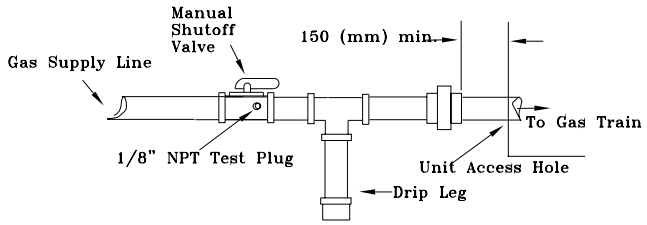
Use the following steps to complete the installation of the unit gas piping. See Figure 8.

1. Install a tapped, style A (1/8 inch NPT tap) shut-off gas cock at the end of the gas supply line near the unit. Be sure the tapped gas cock is downstream of the pressure regulator, if used.

Note: *The shut-off gas cock must be installed outside the unit, and should meet the specifications of all applicable National and Local Codes.*

2. Install a ground union joint downstream of the shut-off cock. This joint must be installed outside of the unit.
3. Install a drip leg (at least 150mm (six inches) in depth) next to the union as shown in Figure 6. This drip leg is required to collect any sediment that may be deposited in the line.
4. Before connecting the piping circuit to the unit, bleed the air from the supply line. Then cap or plug the line and test the pressure at the tapped shut-off cock. The pressure reading should not exceed 34.8 mbar (14 inches) water column.
5. Connect the gas piping to the unit. Check the completed piping for leaks using a soap and water solution, or equivalent.

Figure 8 - Schematic Diagram of Gas piping to unit



FILTER INSTALLATION

Filters

Access to the filters is made by removing the evaporator fan access panel. Each downflow unit ships with one-inch filters, as determined by unit size. To modify the unit filter racks to accept 50 mm (two-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 Note: *Do not operate unit without filters in place.*

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 (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.

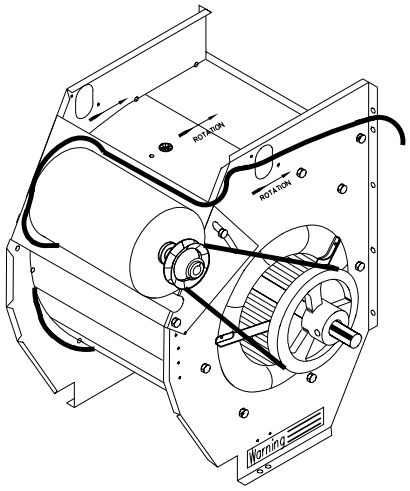
2. Use the table(s) in the Service Facts to find the external static pressure (in inches water column) that most closely approximates total system external static pressure. Then locate the appropriate airflow rate (in cfm) for your unit. The value obtained represents the brake horsepower for the evaporator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

For 063C and 073C models, the Indoor Fan speed is field adjustable by changing the adjustable motor sheave. See Figure 9.

Note : *Do not exceed F.L. Amps listed in the Product Specifications Table of Service Facts.*

Figure 9
Typical fan, motor, and sheave assembly for 063 & 073

TO INCREASE m^3/h (CFM)	TO DECREASE m^3/h (CFM)
Loosen pulley adjustment set screw and turn sheave clockwise	Loosen pulley adjustment set screw and turn sheave counter-clockwise



TO ADJUST BELT TENSION
Loosen adjustment bolt - Pull motor mounting plate back until belt is tight - Tighten adjustment bolt after belt has correct tension.

Electrical Connections

— Electrical wiring and grounding must be installed in accordance with local 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 weather-proof 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 weather-tight conduit to the disconnect, and into the bottom of the unit control box. Provide strain relief for all conduit with suitable connectors.

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

— Insure all connections are made tight. See Figure10.

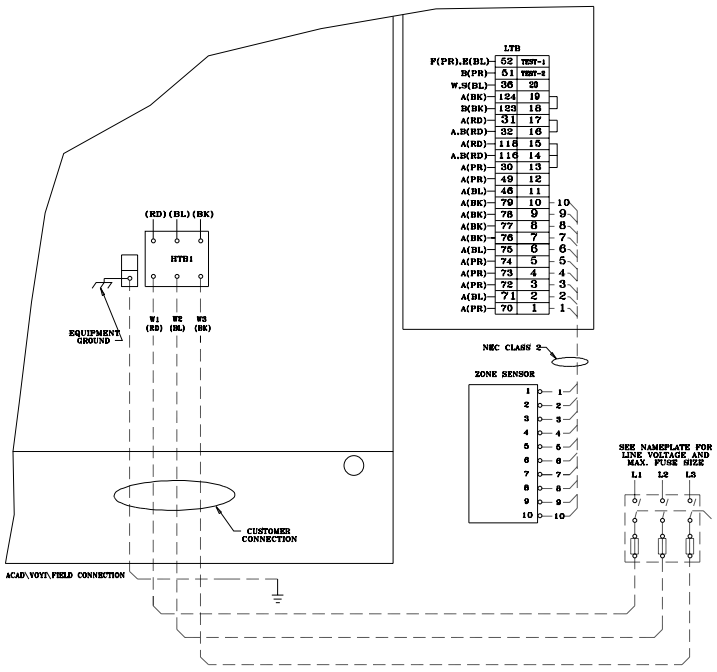
Note: *For branch circuit wiring (main power supply to unit disconnect), Wire size for the length of run should be determined using the circuit ampacity found on the unit nameplate.*

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

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

Note: *Unit must be grounded for igniter to operate properly. Gas pipe to unit is not an adequate ground. Ground the unit internally as provided. See wiring diagram for location.*

Figure 10 Typical Field Wiring Diagram



Control Wiring

Note: Some models have a 24 volt 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 switch before continuing installation. Failure to do so could result in severe personal injury or death due to electrical shock or contact with moving parts.

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

— Low voltage control wiring **must not** be run in conduit with power wiring. Route low voltage (class II) colored wire from zone sensor terminals through 7/8 inch bushing in the unit. See Figure 1 for control entry location. Make connections as shown by the appropriate low voltage wiring diagrams in Figure 11.

— 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) Communications Interface .

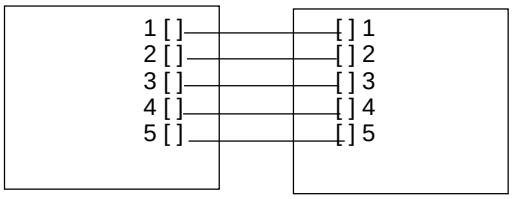
— Recommended wire sizes and lengths for installing the zone sensor are provided in Table 5. The total resistance of these low voltage wires must not exceed 2.5 ohms per conductor. Any resistance in excess of 2.5 ohms may cause problems with the accuracy of the zone sensor setpoint.

TABLE 5

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. See example below.

Zone Sensor Module **(ZSM)** — Low Voltage Terminal Strip **(LTB)**

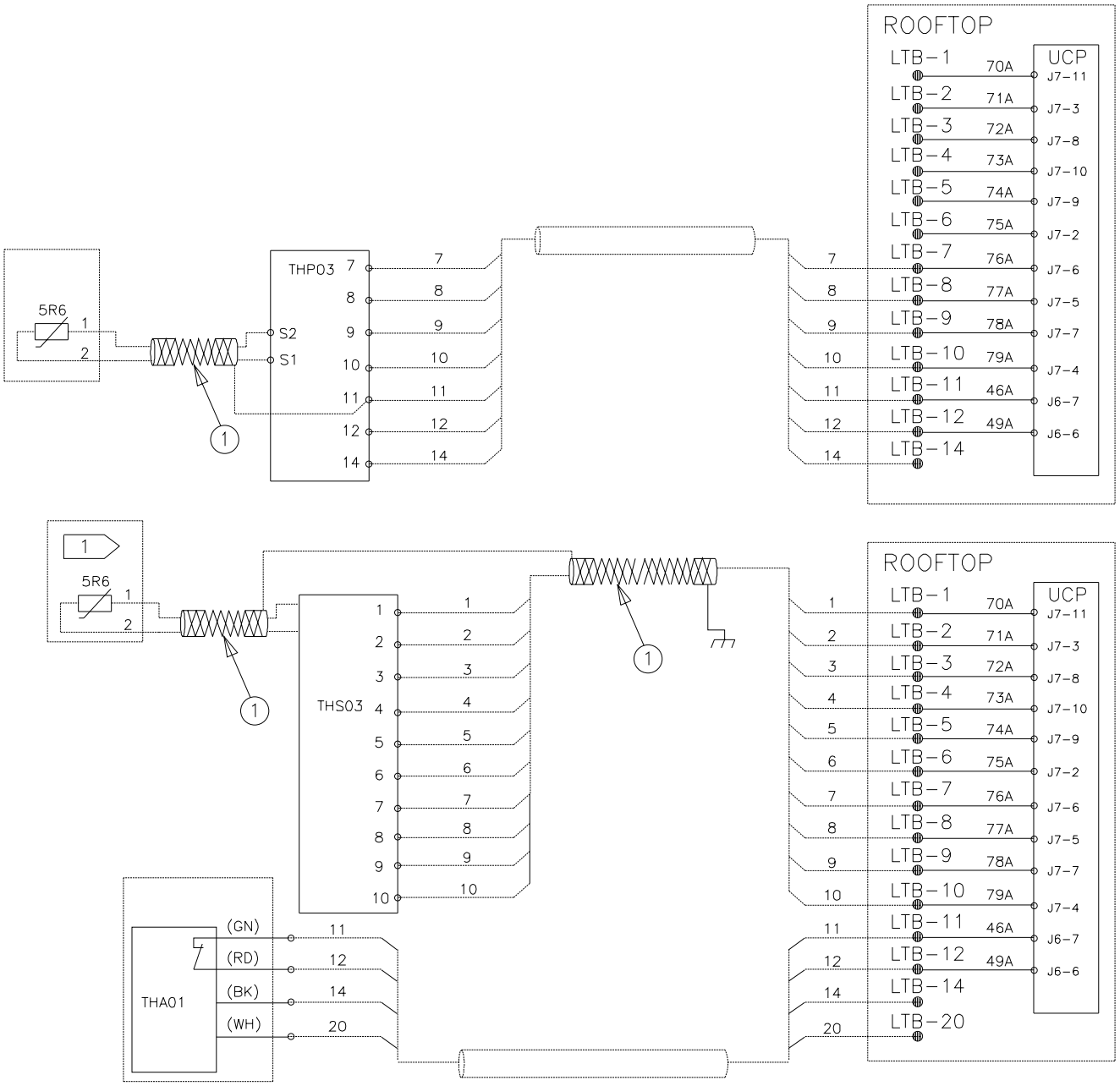


Zone Sensor Module Terminal Identification

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

Figure 11A - Zone Sensor Interconnecting Diagram



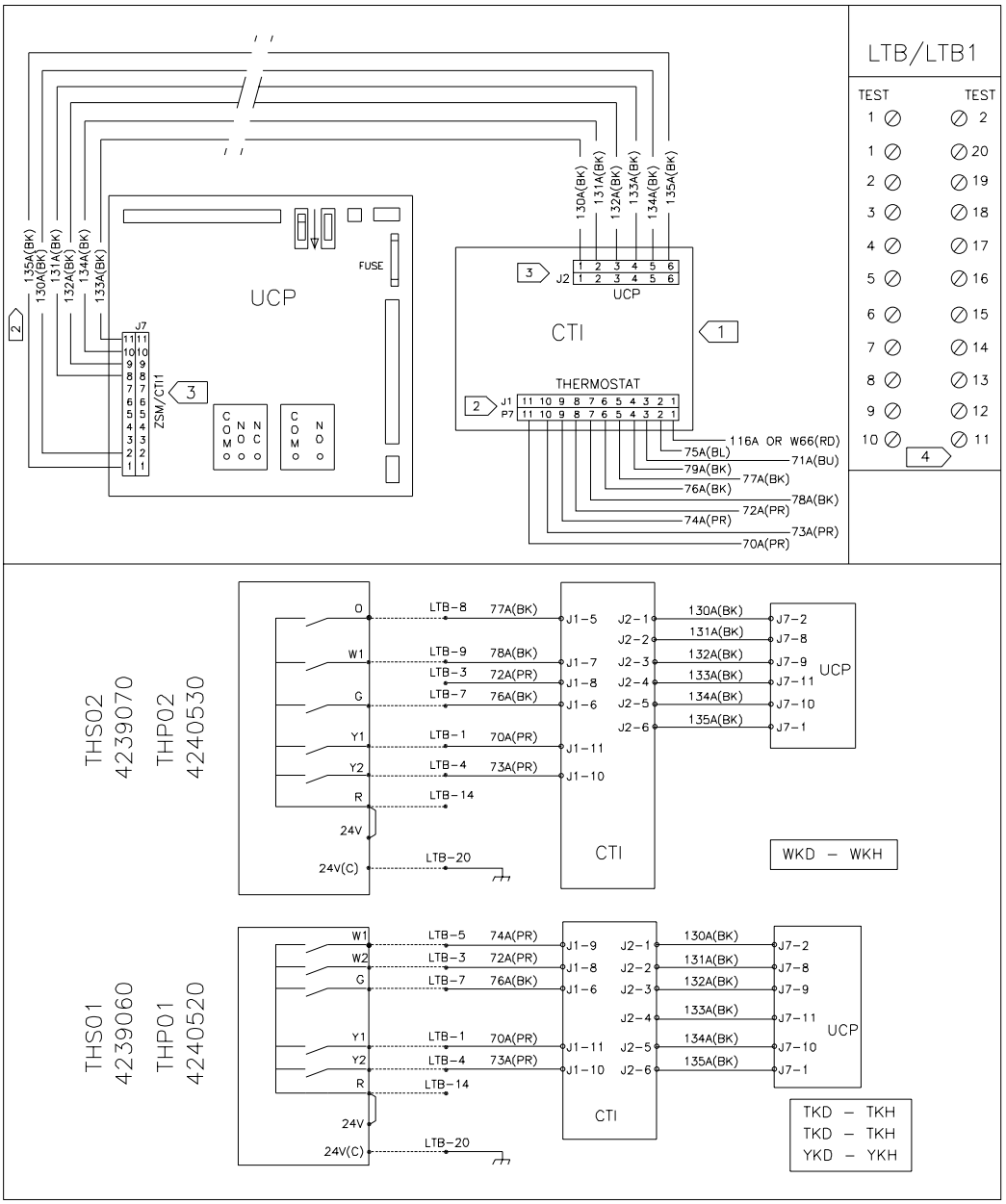
———	TRANE WIRING
·····	CUSTOMER WIRING

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 11B - 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

START-UP

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.

Pre-Start Quick Check List

[ ] Is unit properly located and level 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 the gas piping correctly sized, run, trapped and purged of air? (See gas piping)

[ ] 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?

[ ] Is the indoor fan 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.

Starting the Unit in the Heating Mode

The following warning complies with State of California law, Proposition 65.

⚠ WARNING: **Hazardous Gasses!**
Exposure to fuel substances or by-products of incomplete fuel combustion is believed by the state of California to cause cancer, birth defects, or other product reproductive harm.

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

1. Check to ensure all grilles and registers are open and all unit access doors are closed before start-up.
2. Purge the gas supply line of air by opening the union ahead of the unit. When the odor of gas is detected, re-tighten union and wait 5 minutes before proceeding.
3. Place the zone sensor system switch in the heat position.
4. Position the heating setpoint approximately 10 degrees above room temperature and place the fan switch in "Auto" or "On" position.
5. Open the main gas valve(s) and 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 page 3 and 4 of this manual.*

1. The combustion blower motor and ignitor should energize. The main burners should light within one minute from the time the combustion blower starts. Initial start may be delayed somewhat if unit is not purged and air is trapped in gas line.
2. If burners fail to ignite after 3 tries the ignition system will lockout. Reset by disconnecting and re-applying unit power.
3. Unit will start in the high fire mode. After a short run cycle it will switch to low fire.

Note: *Blue smoke produced by the heat exchanger during the initial burner firing is caused by a thin film of oil on the surface of the heat exchanger. This oil will burn off quickly.*

Check control operation and burner operating conditions through the sight glass in burner assembly cover.

Manifold Pressure

Connect a manometer to the pressure tap at the outlet side of the unit gas valve. Read the manifold pressure with the main burners firing. The manifold pressure reading indicated should be a (negative) -50 Pa (-0.2 inch water column).

⚠WARNING: Open and lock unit disconnect switch before continuing installation. Failure to do so could result in severe personal injury or death due to electrical shock or contact with moving parts.

Adjust the evaporator fan rpm (at the motor sheave) to a speed which most closely approximates the rpm value found in the motor sheave/fan speed (rpm) table in the Service Facts. To insure proper unit operation, the resulting airflow must be within + or - 20 percent of the nominal airflow rate.

After adjusting the evaporator fan, check heat exchanger temperature rise during furnace operation to insure that it falls within the range specified on the unit nameplate.

If the temperature rise noted is outside of the specified limits, adjust the fan motor rpm to cause the temperature rise of the heat exchanger to fall within the required range.

⚠WARNING: Do not operate the unit without the evaporator fan access panel in place. Reinstall the access panel after performing any maintenance procedures on the fan. Operating the unit without the access panel properly installed may result in severe personal injury or death.

Heating Shut-down

To exit the test mode, disconnect unit power for 3-5 seconds and re-apply. When running the unit using the zone sensor as the control, position the selector switch at “Off”. There will be a delay of 0 - 90 seconds before unit shuts down in this setting.

Set the zone sensor to the desired set-point.

Start-Up

Starting The Unit In The Cooling Mode.

IMPORTANT NOTE: *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 the 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 3 and 4 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 technicians'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 re-apply. 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 air conditioning 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.

Final Installation Checklist

[ ] 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?

[ ] Is the compressor 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 furnace manifold pressure been checked ?

[ ] Has the heating air temperature rise been checked?

[ ] 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 re-installing them in the unit (or duct system).

Note: *Replace permanent filters annually if washing fails to clean, or they show signs of deterioration. Be sure to use the same type and size as was originally installed.*

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 injury or possible injury,death and equipment damage from an explosion, do not store combustible materials, gasoline or other flammable vapors and liquids near the unit.

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

[ ] Visually inspect the flue stack to ensure the exhaust path is clear and free of obstructions.

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

[ ] Check the operation of the gas ignition system: To do this, turn off the gas supply with the unit operating to verify that the gas valve closes, and that a re-ignition cycle is initiated by the unit.

[ ] Visually inspect all of the unit's flue product passageways for excessive deposit buildup and corrosion. If buildup or corrosion is apparent, a qualified serviceman should perform the necessary repairs.