

**Model KPH Ceiling
Mounted, Ducted
Condensing Units**

Supersedes: 145.28-IOM1 (708)

Form 145.28-IOM1 (908)

**KPH CEILING MOUNTED,
DUCTED CONDENSING UNITS
INSTALLATION AND OPERATION
INSTRUCTIONS**



IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including, but not limited to: refrigerants, oils, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in

which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to areas of potential hazard:



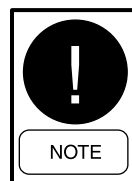
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



NOTE is used to highlight additional information which may be helpful to you.



All wiring must be in accordance with published specifications and must be performed **ONLY** by qualified service personnel. Johnson Controls will not be responsible for damages/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this will void the manufacturer's warranty and cause serious damage to property or injury to persons.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls policy for continuous product improvement, the information contained in this document is subject to change without notice. While Johnson Controls makes no commitment to update or provide current information automatically to the manual owner, that information, if applicable, can be obtained by contacting the nearest Johnson Controls service office.

It is the responsibility of operating/service personnel as to the applicability of these documents to the equipment in question. If there is any question in the mind of operating/service personnel as to the applicability of these documents, then, prior to working on the equipment, they should verify with the owner whether the equipment has been modified and if current literature is available.



Work on this equipment should only be done by properly trained personnel who are qualified to work on this type of equipment. Failure to comply with this requirement could expose the worker, the equipment and the building and its inhabitants to the risk of injury or property damage.

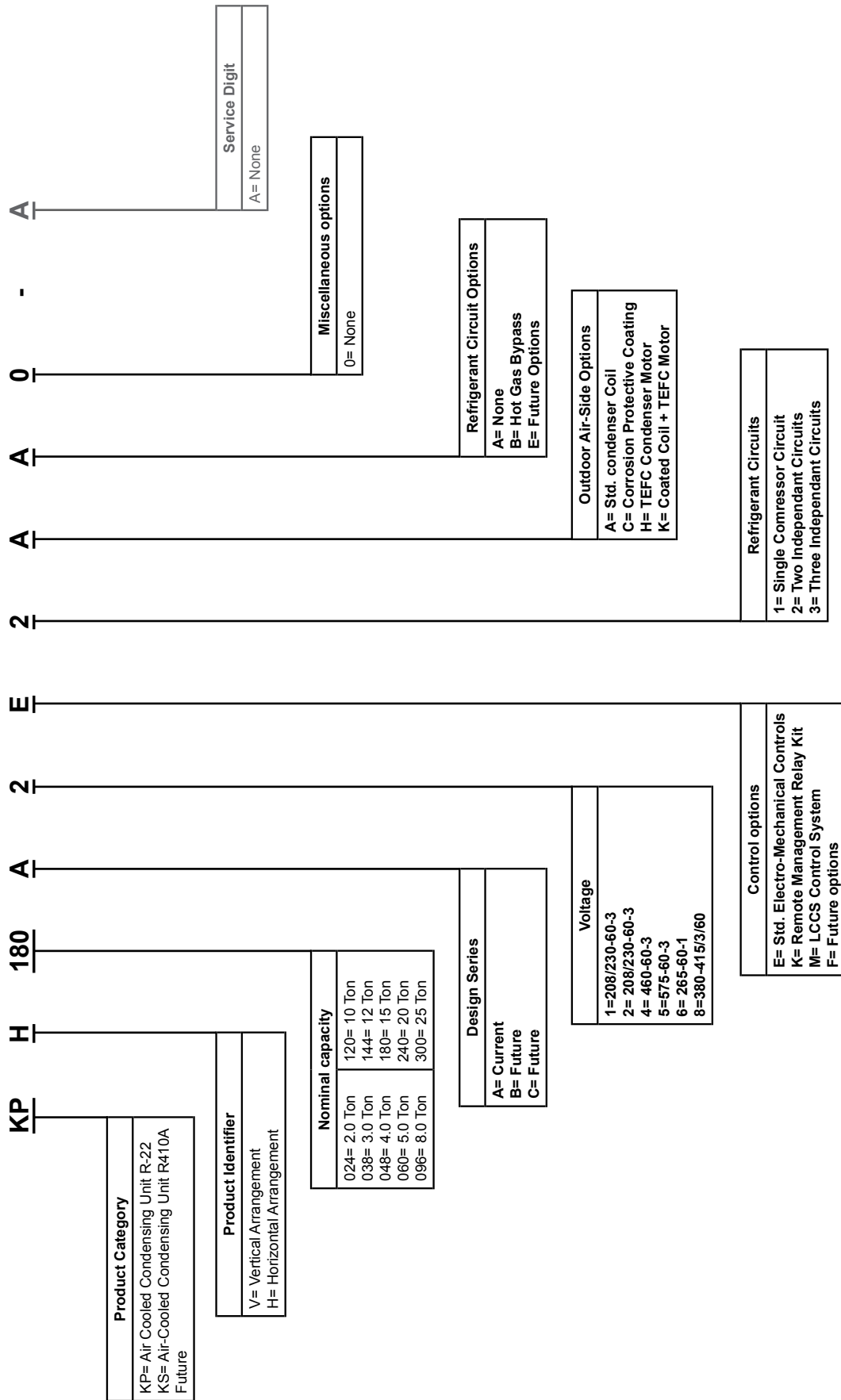
The instructions are written assuming the individual who will perform this work is a fully trained HVAC & R journeyman or equivalent, certified in refrigerant handling and recovery techniques, and knowledgeable with regard to electrical lock out/tag out procedures. The individual performing this work should be aware of and comply with all national, state and local safety and environmental regulations while carrying out this work. Before attempting to work on any equipment, the individual should be thoroughly familiar with the equipment by reading and understanding the associated service literature applicable to the equipment. If you do not have this literature, you may obtain it by contacting a Johnson Controls Service Office.

Should there be any question concerning any aspect of the tasks outlined in this instruction, please consult a Johnson Controls Service Office prior to attempting the work. Please be aware that this information may be time sensitive and that Johnson Controls reserves the right to revise this information at any time. Be certain you are working with the latest information.

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UNIT NOMENCLATURE



GENERAL INFORMATION

Our units are designed to meet the ever-changing (unique) installation requirements of today's market. The horizontal configuration can be used with a Johnson Controls EH evaporator or with other evaporator of equal capacity. Low profile design allows the unit to be installed on the floor or suspended from the ceiling. All unit components are securely mounted inside the heavy gauge "Galvalume" sheet metal cabinet. All units are lined with a 1/2 in. thick - 21b density acoustical insulation to ensure the quietest operation. All models are shipped with medium-efficiency 2-in. thick throwaway filters. Filter rack is internal to the cabinet.

Unit can be turned on its side for short periods of time, which allows passage through standard door sizes.

Horizontal units 2, 3, 4 & 5 ton models have a single refrigerant circuit configuration. The 8, 10, 12 & 15 ton models are configured with two independent refrigerant circuits. expansion valve (with external equalizer), one Each refrigerant circuit is equipped with a liquid line filter drier, sight glass/moisture indicator and easy access service gauge ports. All models are shipped with nitrogen holding charge only.

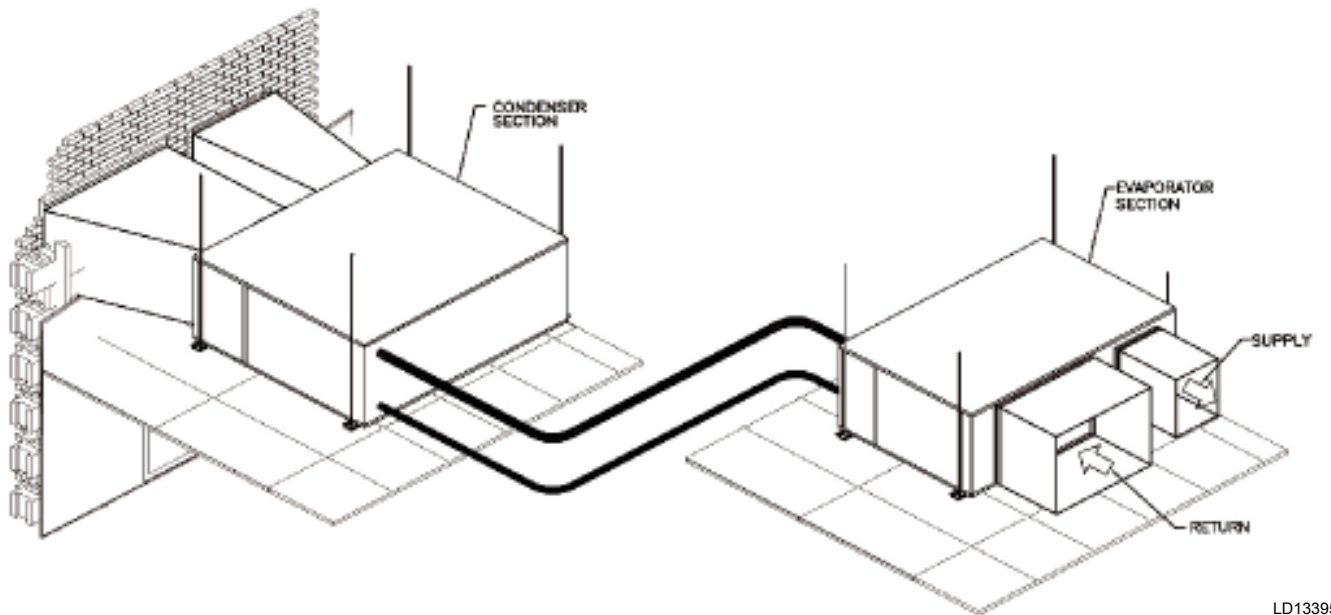
Installation time is minimized with all models. When planning an installation consider power supply, thermostat, condensate drain line, duct run, servicing allowances, and load points. Each refrigerant circuit is equipped with high pressure and low pressure switches. An electrically re-etttable lock-out relay will shut off the compressor in the event of a pressure switch trip during operation. Control circuit is 24-volt operation with oversized transformer. Optional anti-short circuit timers can be field/factory installed.

Service access doors are equipped with handles and are located on all sides of the unit to allow easy servicing of all components. Service access doors are factory shipped with knock-outs allowing gauge lines to be installed and pressure readings to be taken while the machine is operating. In addition there is a removable panel on the access door so visual observation of the sight glass is possible without removing the access door. All units are equipped with centrifugal blowers combined with variable pitch adjustable pulleys. Forward curved double width and inlet centrifugal blowers are used for condenser air movement. All models employ a draw-through air flow system. All blower wheels are galvanized steel, with solid steel shafts and are equipped with permanently lubricated ball bearings. V-belt driven blowers are used in all models; RPM can be adjusted through the variable pitch motor sheave.

High efficiency scroll compressors are used in all models, mounted on durable rubber isolator pads reducing vibration and noise while operating. Large condenser coil face areas reduce noise levels, and air pressure drops. All models are equipped with copper tube and rippled aluminum plate fin coils.

Units will operate reliably at an outdoor ambient down to 60 deg F. In applications requiring operation below this temperature, a low ambient damper accessory is available. Damper installs on condenser air intake, and allows operation to 0 deg F ambient.

HORIZONTAL Ductable Ceiling Air Conditioner Split Installation



LD13395

PRE-INSTALLATION INSPECTION OF EQUIPMENT

All units are factory tested to ensure safe operation and quality assembly. Units are packaged and sealed on shipping skids and shipped in first class condition. Torn and broken packaging, scratched or dented panels should be reported to carrier immediately. An internal inspection of each unit should be performed prior to installation. Remove all access doors and check for visual defects that can occur during transport. Any problems found internally should be reported to carrier and manufacturer immediately. Refrigerant circuit should be checked to ensure no leaks have occurred during shipment. Install gauge set on high and low pressure ports to confirm pressure has been maintained and no leaks have occurred during shipment. Repair any damage prior to installation to ensure safe operation.

NOTE: Record any unit damage on the Bill of Lading and report to carrier and factory immediately. Shipping and handling damages are not warranty items.

RIGGING

PRIOR TO MOUNTING UNIT, CHECK INDIVIDUAL UNIT WEIGHTS (PAGES 6-9) AND VERIFY LIFTING CAPACITY OF LIFTING EQUIPMENT EXCEEDS WEIGHT OF UNITS BY SAFE MARGINS. FAILURE TO DO SO MAY RESULT IN UNIT DAMAGE, PERSONAL INJURY OR EVEN DEATH.

To ensure safe installation of the unit when ceiling mount application is specified, estimate the approximate center of gravity of the unit. The configuration of internal components for each unit is different and weight is unevenly distributed.



DETERMINE THE ACTUAL CENTER OF GRAVITY OF THE UNIT BY PERFORMING A TEST LIFT. LIFTING AN UNBALANCED UNIT CAN CAUSE PERSONAL INJURY OR EVEN DEATH.

INSTALLATION

LOCK ALL ELECTRICAL POWER SUPPLY SWITCHES IN THE OFF POSITION BEFORE INSTALLING THE UNIT. FAILURE TO DISCONNECT POWER SUPPLY MAY RESULT IN ELECTRICAL SHOCK OR EVEN DEATH.

Location - To ensure unit operates at maximum efficiencies, choose a dry indoor area where the temperature is controlled between 50 deg F and 115 deg F. Consideration of surrounding areas should be taken when choosing a location to install the unit. Common vibration and sound levels associated with commercial equipment may be objectionable to people or equipment.



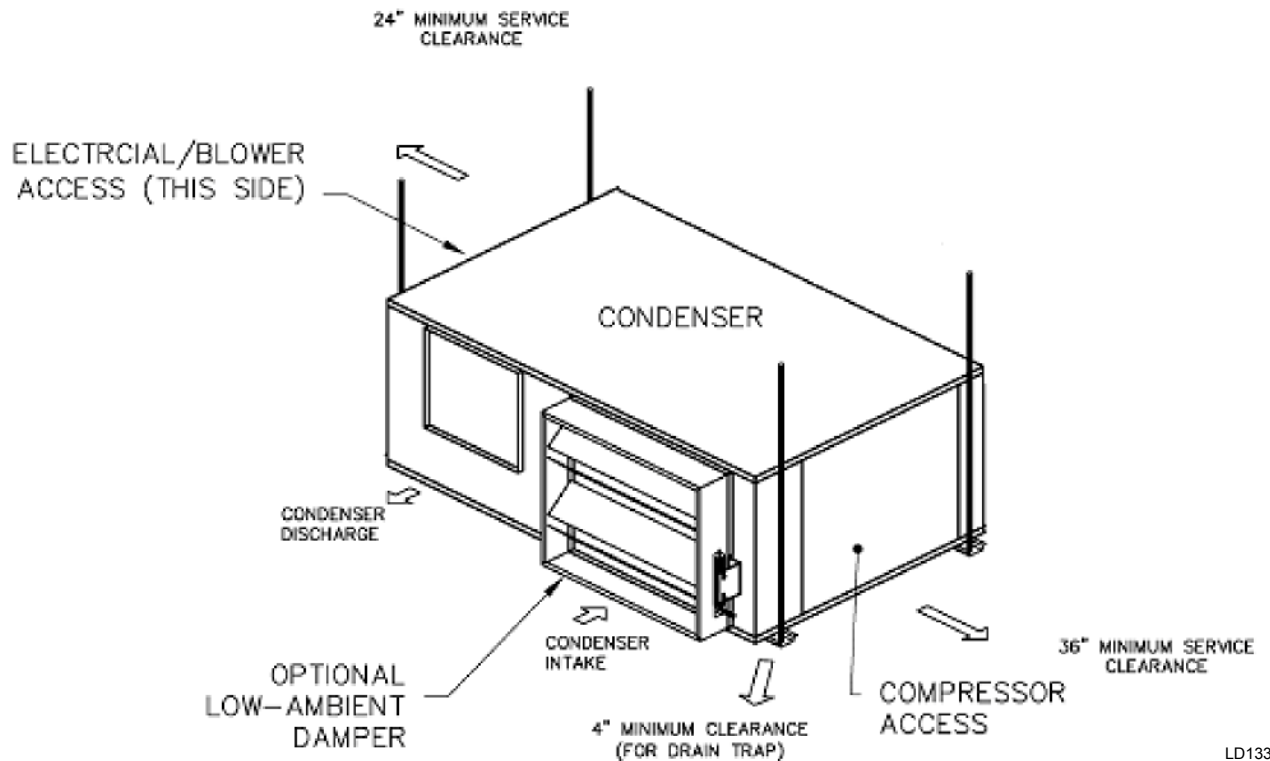
Failure to allow adequate space between units may result in poor unit performance and possible unit failure.

Refer to typical installation diagram (Page #3).

UNIT MOUNTING

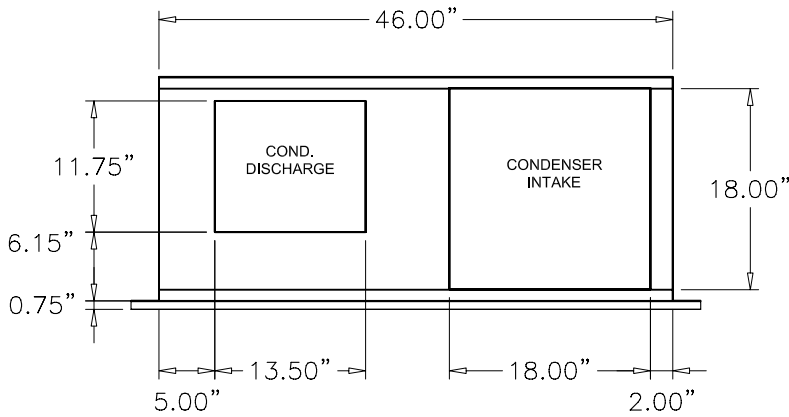
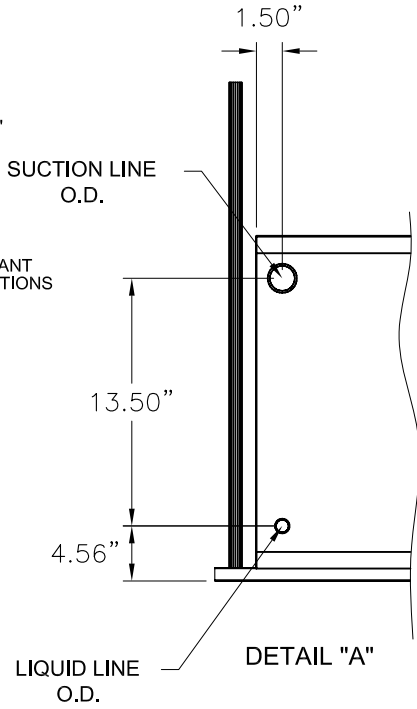
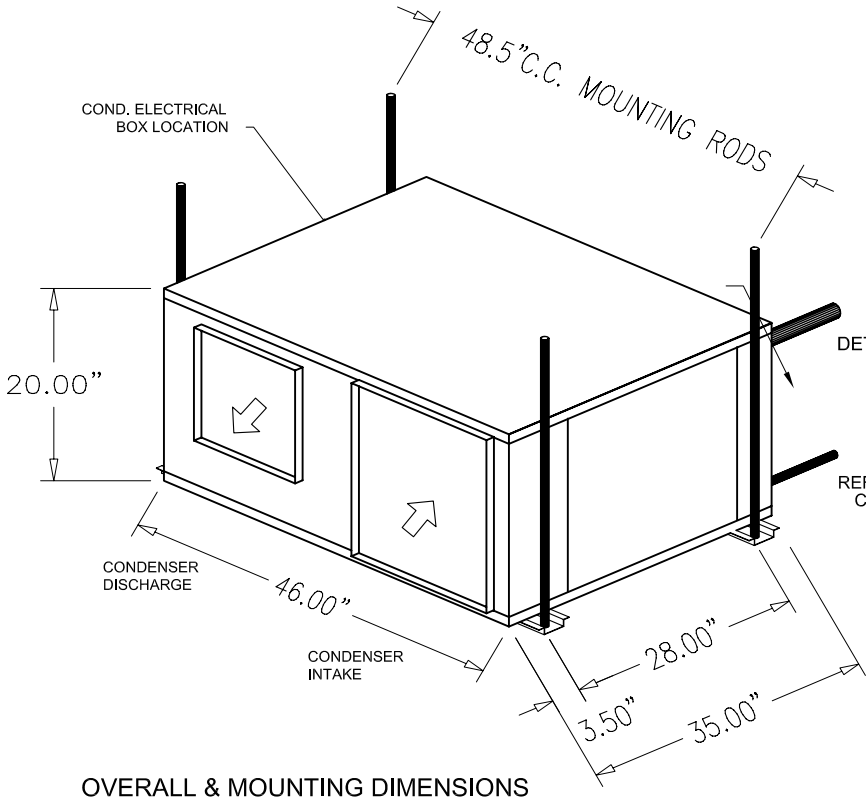
Units may be either hung, or floor mounted. If unit is to be hung, use all mounting points indicated - regardless if unit is installed as a package or split system (See unit dimension drawings). Use of 1/2in. dia hanger rods is recommended. Ensure the attachment point of the rods to the building structure is sufficient to support the unit weight. In order to ensure efficient condensate drainage, the unit may be pitched towards the evaporator end of the unit.

Floor mounted units should be secured on a solid, level pad. The use of isolating vibro-pads at several points under the bottom mounting channels is recommended. Ensure that provision is made for clearance to install a trap on the condensate drain outlet.



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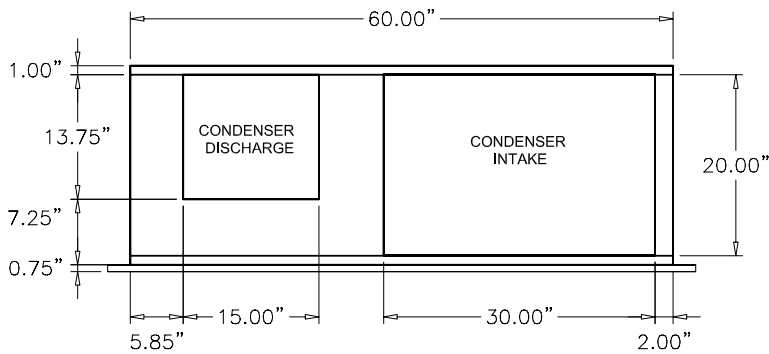
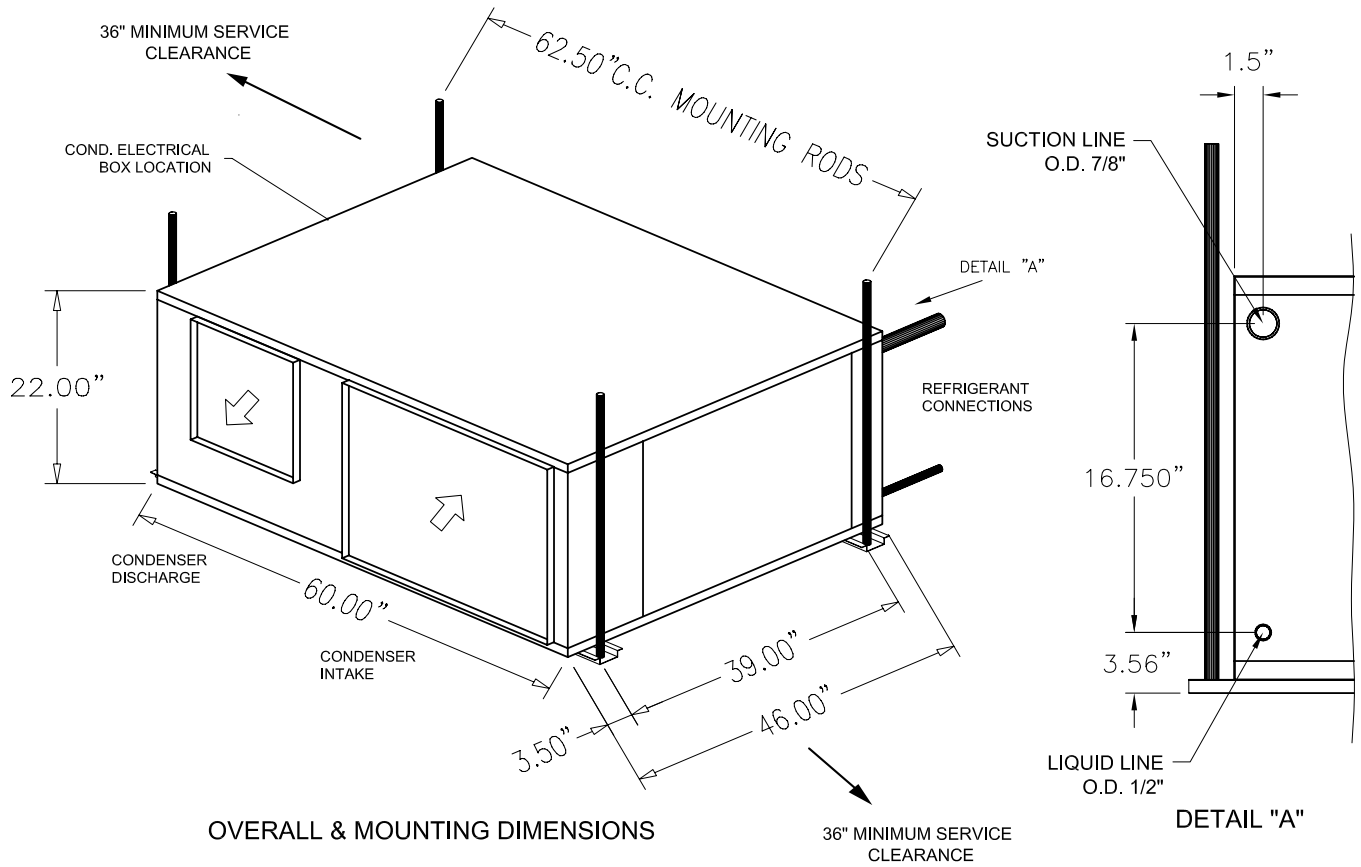
UNIT	SUCTION LINE O.D.	LIQUID LINE O.D.
2 TON	3/4"	3/8"
3 TON	7/8"	3/8"



CONDENSER OPENINGS

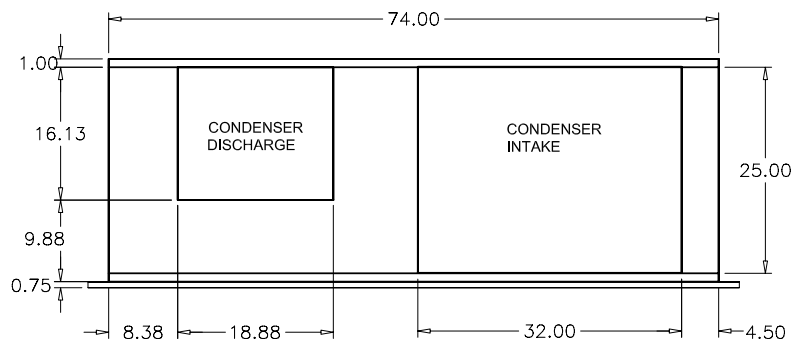
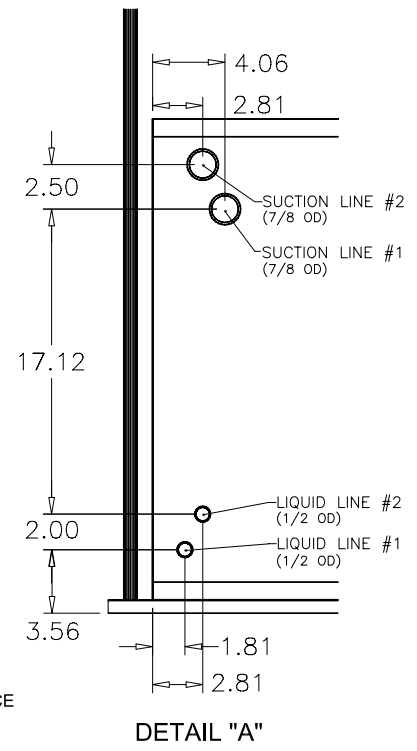
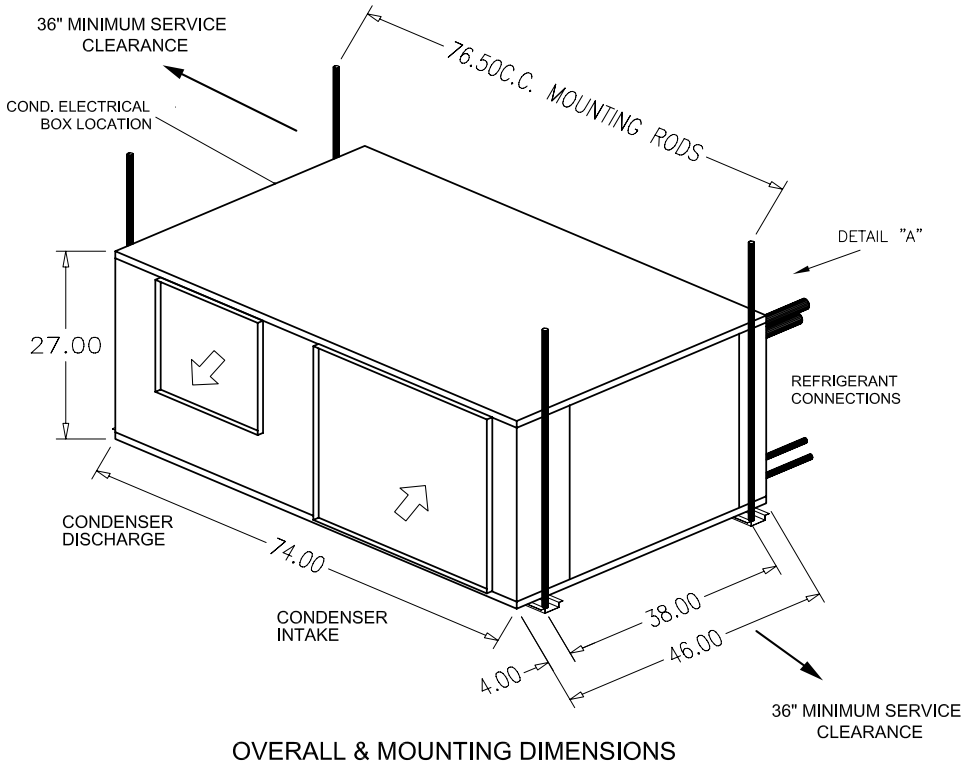
024F & 036F
 HORIZONTAL AIR-COOLED CONDENSING UNIT
 DIMENSIONAL DATA

LD13397



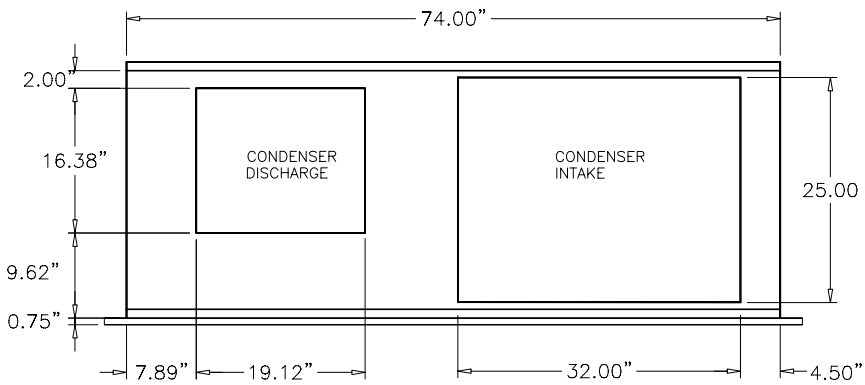
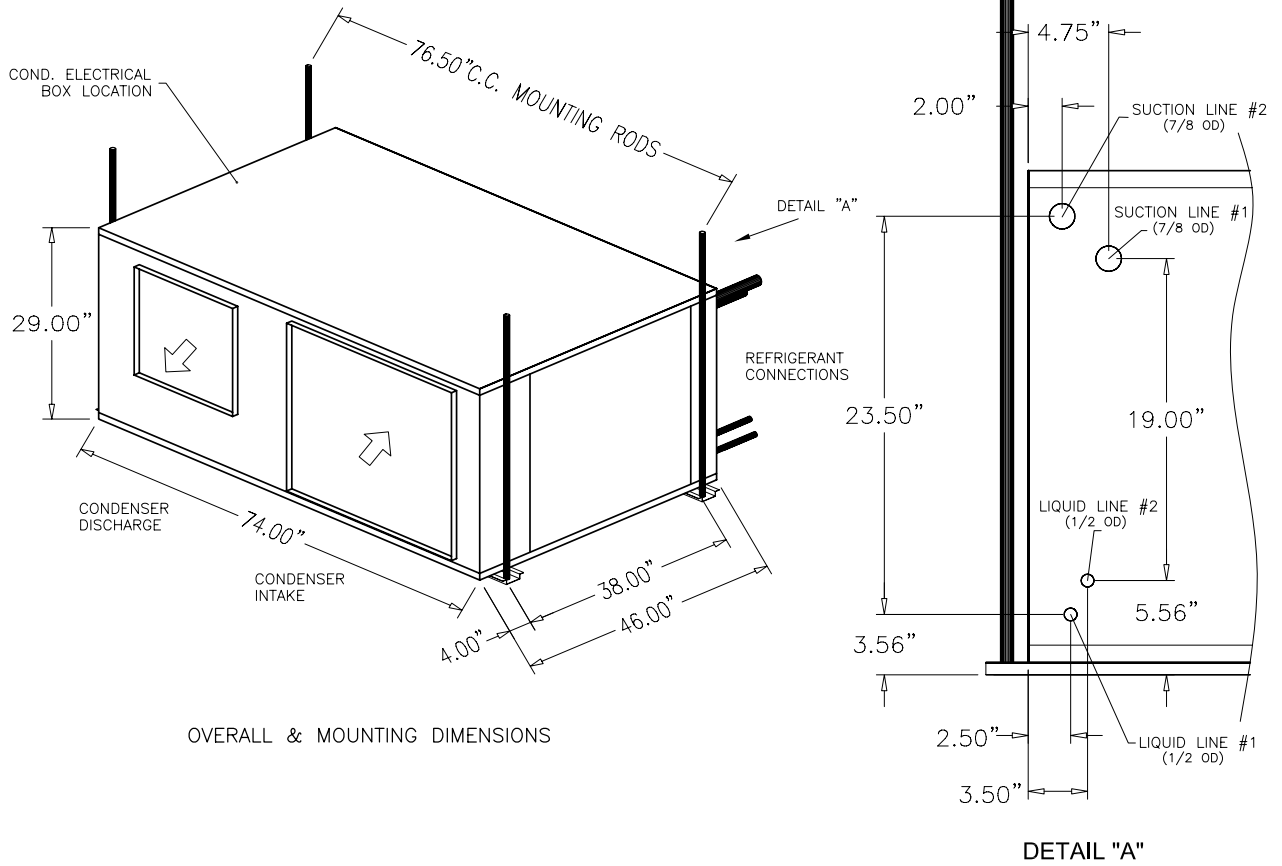
**048F & 060F
HORIZONTAL AIR-COOLED CONDENSING UNITS
DIMENSIONAL DATA**

LD13398



096F
 HORIZONTAL AIR-COOLED CONDENSING UNIT
 DIMENSIONAL DATA

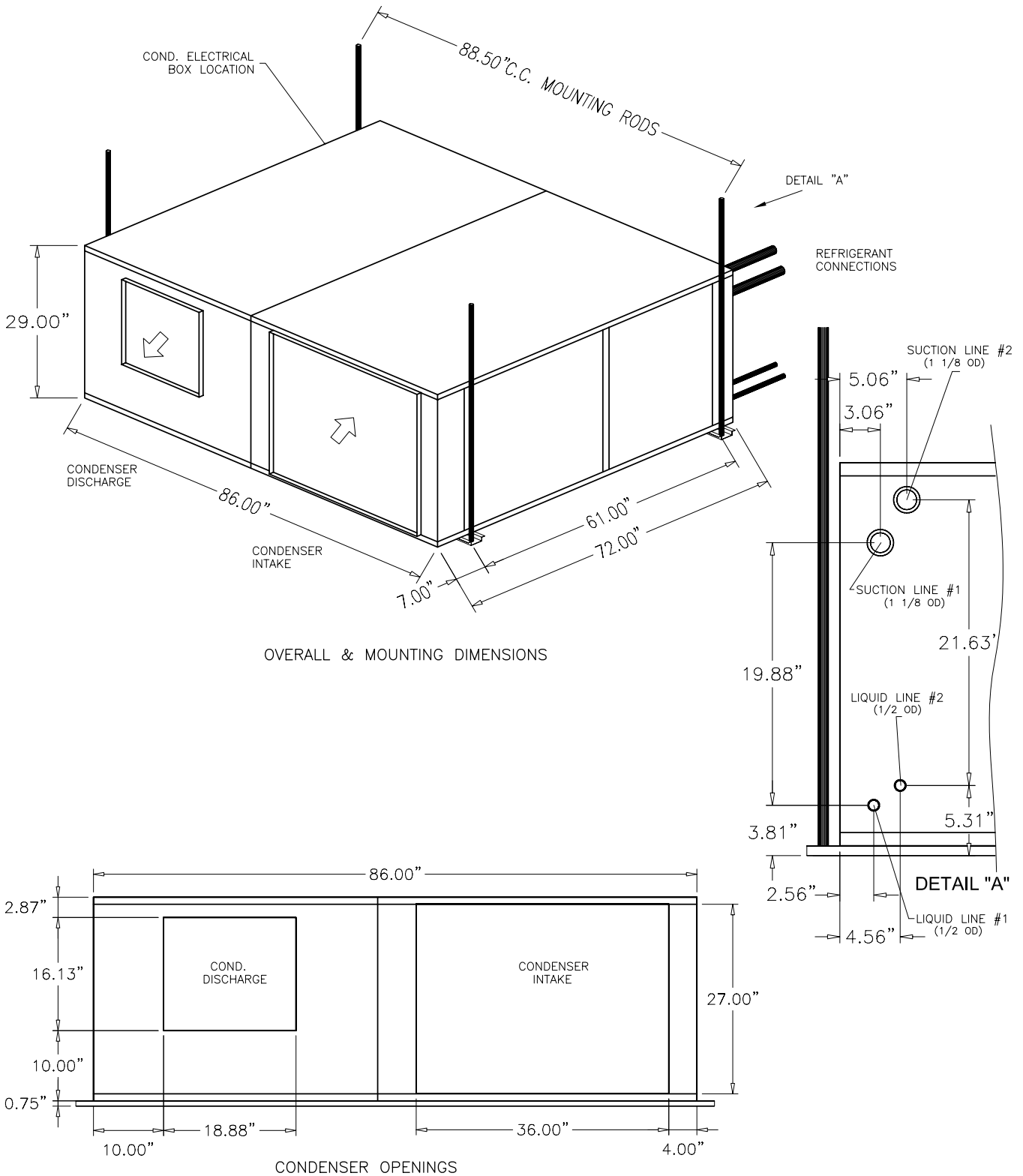
LD13399



CONDENSER OPENINGS

120F
HORIZONTAL AIR-COOLED CONDENSING UNIT
DIMENSIONAL DATA

LD13400



144F
HORIZONTAL AIR-COOLED CONDENSING UNIT
DIMENSIONAL DATA

LD13401

DUCTWORK

When installing ductwork, adhere to local Codes and sensible practice. Minimize duct runs and avoid abrupt changes in direction where possible. Allow ample access space for servicing of the coils and changing of filters. Perform regular maintenance on ducts to increase unit life, maintain efficient operation, and reduce accumulation of explosive dust. Refer to blower performance charts, and engineer duct runs and accessory pressure drop so as not to exceed maximum external static values.

Louver sizing guidelines

One of the key issues in obtaining optimum performance from indoor air-conditioners is the proper selection of the condenser intake and discharge louvers. Unlike outdoor air cooled units, which intake and discharge their cooling virtually unrestricted, indoor units must overcome the resistance of grilles or louvers at the outside wall - plus the restriction of any interconnecting ductwork.

Our indoor air cooled condensers are designed to accommodate the external static pressure loss associated with properly sized louvers of the "storm proof" type. This type of louver typically has a free area approximately 40-45% of the actual louver size. To determine the free area required for any given unit, adhere to the following guidelines:

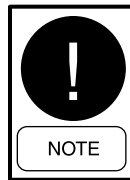
- Size condenser air intakes for 500-750 feet/minute nominal velocity
(Maximum recommended 800 feet/minute)
- Size condenser air discharge for 1,200-1,500 feet/minute nominal velocity
(Maximum recommended 1,700 feet/minute)

The use of louvers with higher velocities than above may be employed, at the discretion of the engineer/installer, provided that the total air pressure drop does not exceed the capability of the condenser fan and motor. The use of low restriction louvers with shallow blade angles can allow higher face velocities without excessive static pressure loss.

Exceeding the static pressure capability of the condenser fan will result in insufficient condenser air volume. This will cause a loss in system capacity, and may cause compressor shutdown during high ambient periods. (Installation of an oversize condenser motor/drive, where applicable, may be considered in such cases.)

(As a general rule, these velocities will require an intake louver sized approximately 1.25 to 1.5 times the dimensions of the duct connection on the unit, and a discharge louver sized approximately 1.5 to 2 times the duct connection dimensions.)

Use only louver sections that provide different deflection angles for air discharge and air intake, to ensure the unit air does not short circuit. Protect the unit from weather conditions (rain, snow) entering through the condenser air intake. All outdoor air ducts should pitch away from the unit, toward the outside wall. Connect all ducts to unit with canvas section duct connectors or choose another suitable noise and vibration absorbing device.



The Manufacturer will not accept any liability resulting from incorrect installation of this equipment. Follow installation instructions carefully.

INTERCONNECTING REFRIGERANT TUBING - SPLIT INSTALLATION

After the evaporator and condenser sections have been mounted, the interconnecting refrigerant tubing can be fabricated. Line sizing recommendations shown in the accompanying table are suitable for most applications. Consult sales office for applications outside the specified guidelines.

Route refrigerant tubing for minimum linear length, and minimum number of bends and fittings. Use long radius elbows for all 90-degree bends, except oil traps. Traps should be constructed from short radius street elbows, in order to keep the trap as small as possible. All brazing should be done using a 2 to 8 psig dry nitrogen purge flowing through the pipe being brazed.

Once the brazing operation of refrigeration lines is completed, the field-brazed connections must be checked for leaks. Pressurize the system to a minimum of 200 psig. Use soap bubbles or alternate methods of leak-checking all field brazed joints. After completion of the leak check, evacuate the interconnecting lines to hold a 350-micron vacuum. If gauge pressure rises above 500 microns in one minute, then evacuation is incomplete or the system has a leak.

Additional refrigerant (R-22) must be added to the system due to the extended refrigerant lines. Calculate the amount of additional refrigerant required as follows:

- 1) 5/16 in OD liquid line - add 0.40 oz per linear foot
- 2) 3/8 in OD liquid line - add 0.60 oz per linear foot
- 3) 1/2 in OD liquid line - add 1.20 oz per linear foot
- 4) 5/8 in OD liquid line - add 1.80 oz per linear foot

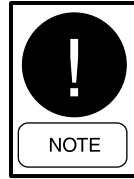
ELECTRICAL WIRING

Follow local electrical codes when making electrical connections. Units are completely factory wired for normal supply voltages (ie.208-230, 460, 575/3phase/60hz) Confirm unit specifications by checking unit data plate. The electrical control box is located behind the outer access panel.

Provide individual power disconnect for the condenser, or each section in the case of split applications. Install a secure ground to both evaporator and condenser. If canvas joiners are used on ductwork, install a ground wire to the ductwork as well. Unit requires installer to provide a 24volt thermostat with appropriate heating and cooling stages as needed. The condenser section electrical cover is installed with wiring diagrams on the inner access door, which must be opened to read the diagrams.



DISCONNECT AND LOCK OUT POWER WHEN SERVICING UNIT. UNIT MAY START AUTOMATICALLY IF POWER IS NOT DISCONNECTED. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH DUE TO ELECTRICAL SHOCK.



All wiring must comply with applicable local and national codes (NEC). Type and location of disconnect switches must comply with all applicable codes.

For low voltage wiring, 18 gauge wire may be used for up to 50 feet lengths. Low voltage runs up to 125 feet require 16-gauge wire.

ELECTRICAL DATA

MODEL #	VOLTAGE	COMPRESSOR			CONDENSER FAN		MIN. CCT.	"MOP" Max Overcurrent Prot.
		QTY	RLA	LRA	HP	FLA	AMPACITY	
024F	208-230/1/60	1	@ 13.6	61.0	0.50	4.4	21.40	35
	208-230/3/60	1	@ 8.6	55.0	0.50	2.1	12.85	20
036F	208-230/1/60	1	@ 17.9	88.0	1.00	7.4	29.78	45
	208-230/3/60	1	@ 11.4	77.0	1.00	3.7	17.95	25
	460/3/60	1	@ 5.7	39.0	1.00	1.7	8.83	15
	575/3/60	1	@ 4.7	31.0	1.00	1.3	7.18	15
048F	208-230/1/60	1	@ 20.4	109.0	1.00	7.4	32.90	50
	208-230/3/60	1	@ 13.9	88.0	1.00	3.1	20.48	30
	460/3/60	1	@ 7.1	44.0	1.00	1.4	10.33	15
	575/3/60	1	@ 5.4	34.0	1.00	1.1	7.79	15
060F	208-230/3/60	1	@ 19.3	123.0	2.00	5.9	30.03	45
	460/3/60	1	@ 7.5	49.5	2.00	2.8	12.18	15
	575/3/60	1	@ 6.4	40.0	2.00	2.2	10.20	15
096F	208-230/3/60	2	@ 13.9	88.0	3.00	8.7	39.98	50
	460/3/60	2	@ 7.1	44.0	3.00	4.0	20.07	25
	575/3/60	2	@ 5.4	34.0	3.00	3.2	15.24	20
120F	208-230/3/60	2	@ 19.3	123.0	3.00	8.7	52.13	70
	460/3/60	2	@ 7.5	49.5	3.00	4.0	20.88	25
	575/3/60	2	@ 6.4	40.0	3.00	3.2	17.60	20
144F	208-230/3/60	2	@ 20.7	156.0	5.00	13.7	60.28	80
	460/3/60	2	@ 10.0	75.0	5.00	6.6	29.10	35
	575/3/60	2	@ 8.2	54.0	5.00	5.3	23.75	30
180F	208-230/3/60	2	@ 28.6	196.0	5.00	13.7	78.05	100
	460/3/60	2	@ 14.2	100.0	5.00	6.6	38.55	50
	575/3/60	2	@ 9.7	90.0	5.00	5.3	27.13	35

Notes: Data shown for packaged unit installation, with single point power supply.

For split installation with separate evaporator motor power supply, calculate MCA and MFS as follows:

Min. Circuit Ampacity (MCA) = 1.25 X Largest motor amps (FLA or RLA) + sum of the remaining motor amps

Max Fuse / Cct. Bkr Size (MFS) = 2.25 X Largest motor amps + sum of the remaining motor amps

Select next smallest NEC listed fuse size from calculated value

FAN PERFORMANCE DATA

CONDENSER AIR BLOWER PERFORMANCE

MODEL	OUTDOOR CFM	EXTERNAL STATIC PRESSURE - Inches W.C.															
		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2 TON	1400	731	0.23	842	0.32	947	0.38	1043	0.43	1125	0.50	-	-	-	-	-	-
3 TON	1950	941	0.54	1024	0.63	1104	0.71	1183	0.80	1258	0.89	-	-	-	-	-	-
4 TON	2550	691	0.61	765	0.71	838	0.82	910	0.94	979	1.08	-	-	-	-	-	-
5 TON	3300	830	1.18	890	1.31	949	1.44	1007	1.58	1065	1.72	-	-	-	-	-	-
8 TON	4800	714	1.25	770	1.42	822	1.59	872	1.76	921	1.95	968	2.15	1014	2.37	1059	2.61
10 TON	5700	798	1.81	847	2.00	895	2.19	940	2.39	984	2.59	1027	2.80	1071	3.02	-	-
12 TON	6800	726	2.13	776	2.33	825	2.54	872	2.76	916	2.98	959	3.20	1000	3.43	1040	3.66
15 TON	8000	673	2.90	716	3.20	757	3.50	796	3.80	834	4.11	871	4.43	906	4.75	940	5.07

MOTOR AND PULLEY DATA

CONDENSER - STANDARD BLOWER MOTOR AND DRIVE DATA

Model	Drive Range (RPM)	Motor			Adjustable Motor Pulley		Fixed Blower Pulley		Belts	
		HP	Frame	Eff.(%)	Pitch Dia.(in)	Browning #	Pitch Dia.(in)	Browning#	Rating / Size	Qty
2 TON	805-1110	1/2	56	75.0	2.0-3.0	1VP34 X 5/8	4.7	AK49H	4L380	1
3 TON	950-1260	1	56	82.5	2.6-3.6	1VP40 X 5/8	4.9	AK51H	4L390	1
4 TON	710-985	1	143	82.5	2.6-3.6	1VP40 X 7/8	6.4	AK66H	4L500	1
5 TON	820-1095	2	145	84.0	3.0-4.0	1VP44 X 7/8	6.4	AK66H	4L500	1
8 TON	785-1045	3	182	86.5	3.0-4.0	1VP44 X 1-1/8	6.7	AK69H	A52	1
10 TON	820-1045	3	182	87.5	3.6-4.6	1VP50 X 1-1/8	7.7	AK79H	A55	1
12 TON	795-975	5	184	87.5	4.4-5.4	1VP56 X 1-1/8	9.7	BK105H	B62	1
15 TON	720-885	5	184	87.5	4.4-5.4	1VP56 X 1-1/8	10.7	BK110H	B64	1

BLOWER SPEED ADJUSTMENT

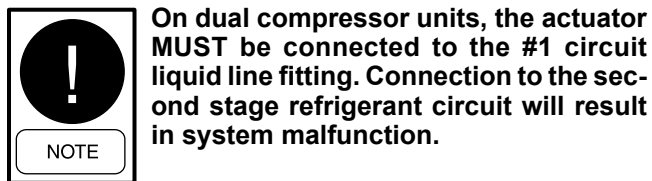
The RPM of the supply air and condenser air blowers will depend on the required CFM, and the static resistance of both the supply/discharge and the return/intake duct systems. With this information, the RPM for the blowers can be determined from the blower performance tables. Adjustment of blower speed is accomplished as follows:

- Loosen belt tension by moving motor towards the blower shaft via the adjustable mounting.
- Loosen the setscrew in the adjustable motor pulley flange. Remove external key on pulleys 4-in. dia and larger.
- Blower speed will increase when moveable flange is adjusted towards the fixed flange (closed). Blower speed will decrease when the moveable flange is adjusted away from the fixed flange (opened). Pulleys are adjustable only in half-turn increments. Do not open pulley more than five full turns for "4L" and "A" belts, or six full turns for "B" belts.
- Once the pulley has been opened/closed the appropriate number of turns, replace the external key and tighten the adjustment set screw. Proper torque is 110 - 130 in-lbs.
- Install drive belt and adjust motor mount to tension belt.

LOW AMBIENT DAMPER INSTALLATION

If unit operation is required at outdoor ambient below 60 F, the optional Low Ambient Damper kit should be installed to maintain acceptable condensing pressure.

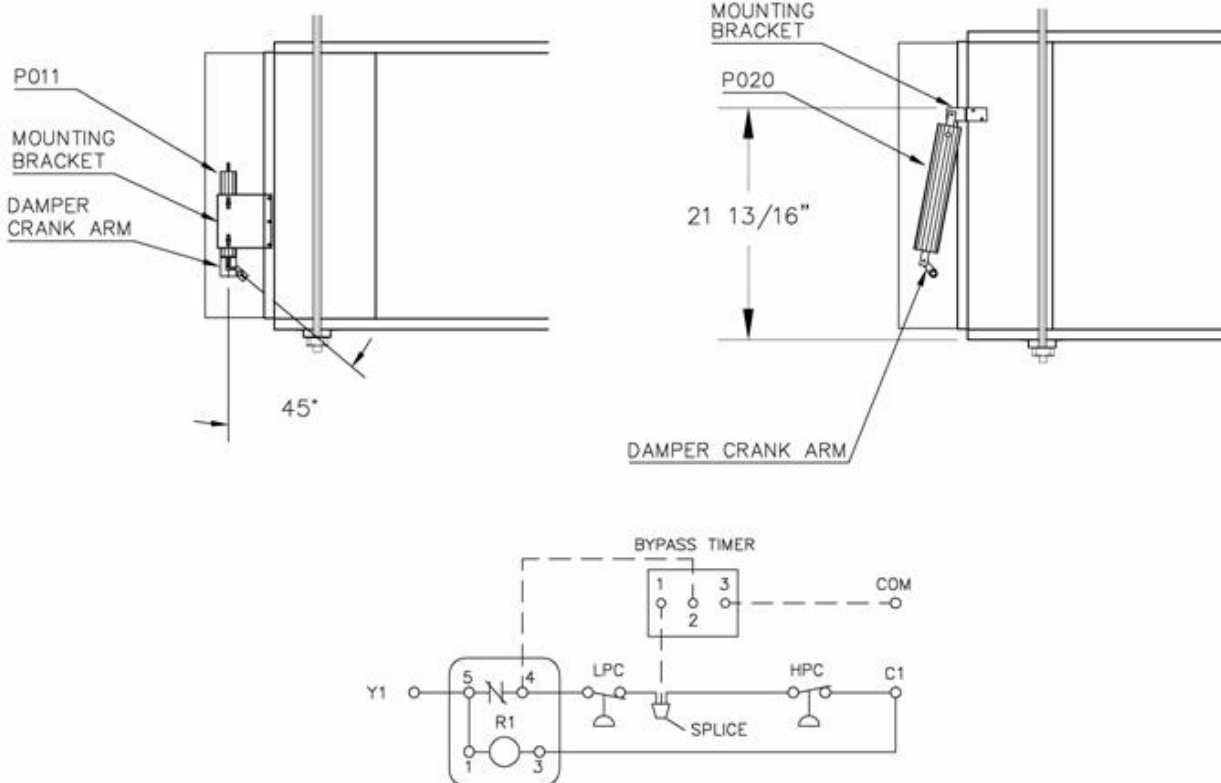
The damper is installed directly onto the intake duct connection as illustrated. The damper is controlled via a refrigerant pressure actuator. Two different mounting arrangements are used, depending on the size of the damper and actuator. Appropriate mounting hardware for the actuator is provided with each kit. The pressure actuator is connected to the liquid line access fitting through a 1/4 in copper tube. Attach the tubing using flare nuts at each end. A routing hole is provided in the condenser corner panel near the actuator mounting position. Purge the 1/4 in sensing line by loosening the flare nut at the actuator until liquid refrigerant is observed leaking from the fitting. Tighten the flare nuts securely.



A solid-state timer(s) is provided with the damper kit. The timer will bypass the low-pressure switch during compressor start-up. The time delay allows the condensing pressure to rise sufficiently for refrigerant flow through the evaporator to be established. The 8-15 ton units require a timer to be installed on both compressor circuits.

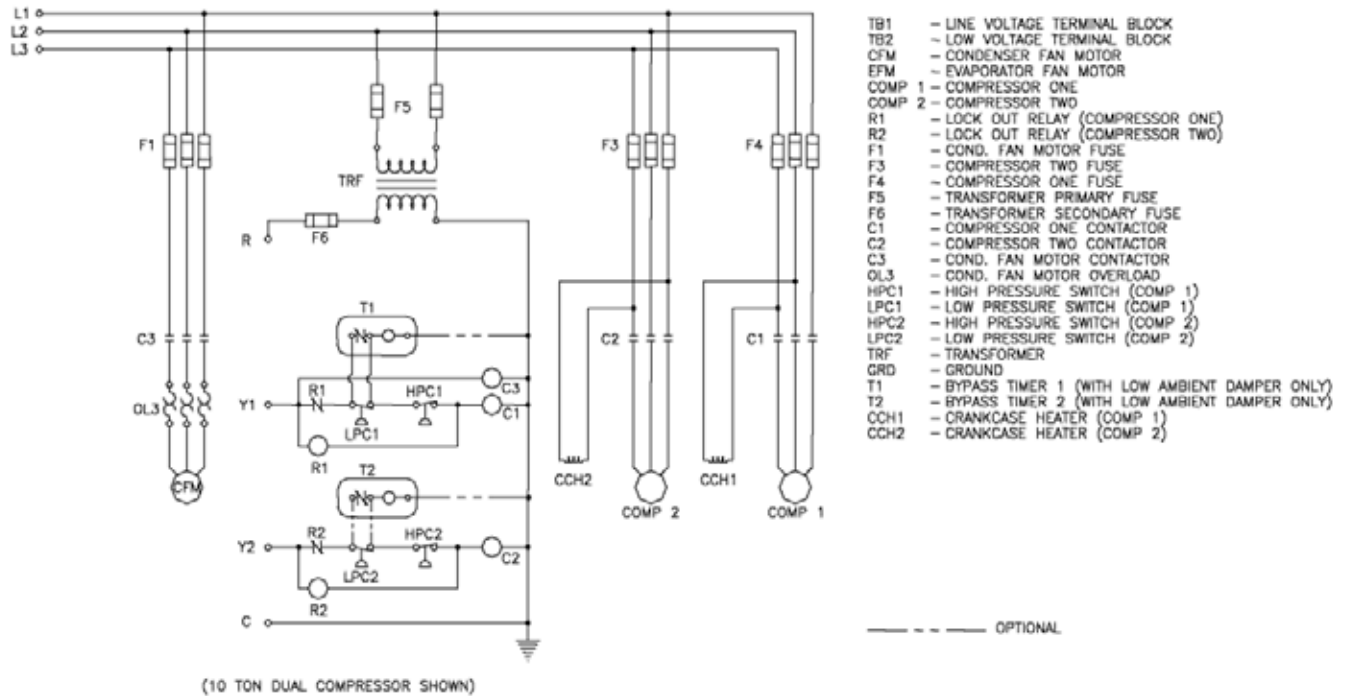
Mount the timer(s) in the condenser electrical panel. Mounting holes are provided near the lockout relays (R1, R2). Connect the timers into the compressor control circuit as shown. The wire splice between the LPC and HPC switches is accessible inside the electrical panel, in the low voltage section of the enclosure.

Test run the unit, and confirm proper operation. The damper should be fully closed when condensing pressure is below 165 psig, and should be fully open at condensing pressures of 250 psig and above.



LD13404

TYPICAL WIRING SCHEMATIC



RECOMMENDED REFRIGERANT LINE SIZES

UNIT SIZE	LESS THAN 60 LINEAR FEET		60-150 LINEAR FEET	
	LIQUID LINE	SUCTION LINE	LIQUID LINE	SUCTION LINE
2 TON	5/16	5/8	3/8	3/4
3 TON	3/8	3/4	3/8	7/8
4 TON	3/8	7/8	1/2	1-1/8
5 TON	3/8	1-1/8	1/2	1-1/8
8 TON	2 x 3/8	2 x 7/8	2 x 3/8	2 x 1-1/8
10 TON	2 x 3/8	2 x 1-1/8	2 x 1/2	2 x 1-1/8
12 TON	2 x 1/2	2 x 1-1/8	2 x 1/2	2 x 1-3/8
15 TON	2 x 1/2	2 x 1-1/8	2 x 5/8	2 x 1-3/8

- NOTES:**
- Maximum Suction Lift
 - Maximum Liquid Line Rise 40' (Measure from Condensing Unit Level)
 - Liquid Line Solenoid Valve required on Systems over 100 Linear Feet
 - Suction Accumulator (s) required on Systems over 125 Linear Feet

START-UP AND OPERATION

Prior to starting unit for the first time, turn the thermostat system switch to OFF - or raise the cooling setpoint to the highest temperature, to prevent the unit from starting. Close the electrical disconnect switch. This will energize the compressor crankcase heater(s). WAIT A MINIMUM OF FOUR HOURS BEFORE STARTING THE SYSTEM. This period will allow the crankcase heater to vaporize any liquid refrigerant in the compressor crankcase.

Start unit and check rotation of fans and compressors.

Scroll compressors will only compress in one rotational direction. Three phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, it is important to ensure proper rotation direction is achieved when the system is installed and operated.

Verification of proper direction is made by observing that suction pressure drops and discharge pressure rises when the compressor is energized. Reverse rotation also results in an elevated sound level as well as substantially reduced current draw.

There is no negative impacts on durability caused by operating three phase Scroll compressors in the reversed direction for a short period of time (less than one hour). However, after several minutes of operation the compressors internal protector will trip.

If opposite rotation is needed, disconnect and reverse any two leads of the three phase supply. Reconnect power and observe for correct rotation.

Observe unit operation and check for unusual noise or vibration.

PRESSURE SWITCH SETTINGS - ALL MODELS

	HIGH	LOW
Cut Out (PSIG)	400	25
Cut In (PSIG)	275	60

MAINTENANCE / SERVICE



DISCONNECT AND LOCK OUT POWER WHEN SERVICING UNIT. FAILURE TO DO SO MAY RESULT IN PERSONAL INJURY OR DEATH DUE TO ELECTRICAL SHOCK.



Exercise care when working around the sharp metal edges of door panels or door frames, etc. These edges can cause injury.

CONDENSER COILS -

Inspect the condenser coil at least semi-annually. A dirty condenser coil will result in elevated condensing pressures and poor unit performance. Extreme high pressure in the refrigeration system can lead to compressor failure. If the coils appear dirty, clean them using mild detergent or a commercial coil cleaning agent.

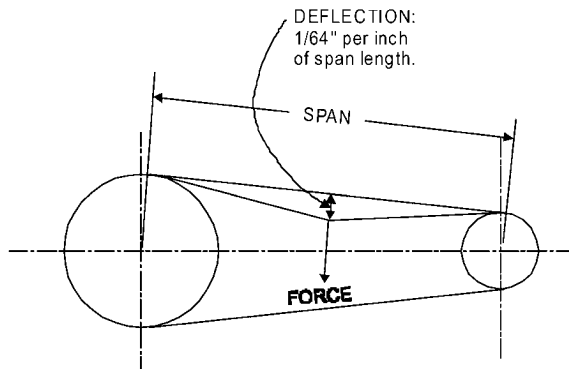
BLOWERS -

Inspect both the evaporator and condenser blowers at each regular service interval. Clean blower wheels as needed. Bearings are permanently sealed ball type, and do not require lubrication. Check bearings for any signs of wear (movement between inner and outer races). Ensure bearing locking collars are secure to the shaft, and that collar locking screw is properly set. Check that the blower wheel is tight on the shaft, and that the set-screws in the blower hub are properly torqued.

DRIVE BELTS -

Examine belts periodically for wear. Glazed areas on the drive surfaces indicate overheating due to belt slippage. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions. Over-tensioning shortens belt and bearing life.

The tension on the belt should be adjusted for a deflection of 1/64 of an inch per inch of belt span, with the appropriate force applied at the midpoint of the span. Tension "New" belts at the maximum value indicated. Used belts should be maintained at the minimum value.



<u>Belt Cross Section</u>	<u>POUNDS FORCE</u>	
	<u>Min.</u>	<u>Max.</u>
4L	1-1/2	2-1/2
A	3-1/2	6-1/2
B	5-1/2	8
BX	8	11

REFRIGERANT CIRCUIT(S) -

With the unit operating, check and record the compressor discharge and suction pressures. The compressor running current should also be recorded. A maintenance log of these readings can indicate if the unit is operating within its normal limits. Abnormal readings should be investigated, and the cause corrected.

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LIMITED WARRANTY

Johnson Controls warrants this product to be free from defects in workmanship or material for a period of one year from date of original installation or 18 months from date of shipment, whichever comes first.

Johnson Controls obligation under this Warranty is LIMITED to repairing or replacing at our sole option, at our factory, any part thereof which shall be returned to our factory, transportation charges prepaid and which on examination proves to have been thus defective under normal domestic use not exceeding the fuel rating. The defective part should be returned through a qualified servicing dealer. Upon warranty determination, the replacement part will be shipped freight collect and assumes the unexpired portion of this Limited Warranty.

When a defective part can be repaired or replaced, Johnson Controls shall not be obligated to repair the entire unit or any part thereof other than the defective part.

This warranty applies only to the original homeowner, and is subject to the terms and conditions hereof.

COMPRESSOR – FIVE YEAR LIMITED WARRANTY

In addition to the One Year Limited Warranty, Johnson Controls warrants the compressor to be free from defects in workmanship or material for a period of five (5) years from the date of original installation. If a compressor fails during this five year period, a new compressor will be supplied. The customer will be responsible for freight costs from our factory for delivery of the replacement compressor and also for the return of the defective compressor which may be required under the terms of the Warranty. Labor and any other expense involved in replacing the compressor is not covered by this Warranty.

LABOR AND COST NOT COVERED

This Warranty provides only replacement parts or credits, and does not provide for or cover any labor, shipping, handling or other costs for service travel, servicing, removing, or installing any parts.

EXCLUSIONS

This Warranty shall be void if:

1. The unit is not installed by a licensed or otherwise qualified or contractor and in compliance with the Installation Manual, applicable installation and good trade practices.
2. The defect or damage is caused by accident, abuse, negligence of any person or company, misuse, riot, flood, fire or Acts of God.
3. The unit is not operated and regularly serviced and maintained as called for in the Users' Manual.
4. Damages are caused by operating the unit in a commercial or corrosive atmosphere containing any damaging or dangerous chemicals.
5. The unit is modified or services in a manner not in accordance with the Installation Manual and Users' Manual.
6. Components, replacement parts, or other accessories not compatible with the unit or not approved by Johnson Controls have been used with or attached to the unit.
7. The defect or damage is not caused by Johnson Controls, or it arises from circumstances beyond the control of Johnson Controls.
8. The unit is installed outside the United States or Canada, or has been removed from the place where it was originally installed.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES, EXPRESSED OR IMPLIED BY EMPLOYEES OR REPRESENTATIVES OF JOHNSON CONTROLS. ALL STATUTORY, EXPRESSED OR IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY NEGATED AND EXCLUDED. ANY CLAIMS FOR INCIDENTAL AND CONSEQUENTIAL DAMAGES, OR ANY OTHER DAMAGES OR EXPENSES BEYOND THE TERMS OF THIS LIMITED WARRANTY ARE HEREBY EXPRESSLY NEGATED AND EXCLUDED.

