INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR AHU

HORIZONTAL, MODULAR, VERTICAL AND ROOFTOP UNITS

SIZES FROM 600 CFM TO 9,000 CFM

SIZES FROM 600 TO 4,000 CFM

SIZES FROM 600 CFM TO 9,000 CFM

COMMERCIAL AIRE PRODUCTS 501 Terminal Road, Fort Worth TX 76106 Tel: 817-624-0820

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INTRODUCTION

READ THE ENTIRE INSTALLATION, OPERATION AND MAINTENANCE MANUAL. OTHER IMPORTANT SAFETY PRECAUTIONS ARE PROVIDED THROUGHOUT THIS MANUAL.

The following information is to be used by the installer as a guide. Since each installation is unique, only general topics are covered. To order in which topics are presented may not be those required by the actual installation.
This guide does not supersede or circumvent any applicable national, state or local code.
The installer must read the entire contents of this guide and develop a thorough understanding before beginning installation.
Note: Due to continued product research and development, Commercial Aire Products reserves the right to discontinue or change without notice, any or all specifications or designs without incurring obligations.

INSPECTION

Receiving Unit

When received, the unit should be checked for damage that might have occurred in transit. If damage is found it should be noted on the carrier's Freight Bill. A request for inspection by carrier's agent should be made in writing at once. All our sales are FOB our warehouse in Fort Worth Texas and any in transit damage is carrier responsibility.
Nameplate should be checked to ensure the correct model sizes and voltages have been received to match the job requirements.
If repairs must be made to damaged goods, then the factory should be notified before any repair action is taken in order to protect the warranty. Certain equipment alteration, repair, and manipulation of equipment without the manufacturer's consent may void the product warranty. Contact the MORTEX MANUFACTURING Warranty Department for assistance with handling damaged goods, repairs, and freight claims: (817) 624-0820 ext 225.
Note: Upon receipt check shipment for items that ship loose such as filters and remote sensors. Consult order and shipment documentation to identify potential loose-shipped items. Loose-shipped items may have been placed inside unit cabinet for security. Installers and owners should secure all doors with locks or nuts and bolts to prevent unauthorized access
Thoroughly inspect all packages upon receipt of product. Ensure pallet(s) have not been dropped, crushed or punctured. Inspect all contents for damage. If damage is found, immediately file a claim with the delivering freight carrier

Storage

This equipment is not suitable for outdoor storage. If installation will not occur immediately following delivery, store equipment in a dry protected area away from construction traffic and in the proper orientation as marked on the packaging with all internal packaging in place. Secure all loose-shipped items.

CAP DESCRIPTION MODEL NUMBER NOMENCLATURE - PAGE #1

H	W	E	D	A	0	3	0	3	2	2	5	1	.	2	5	2	4	2	A	R	H	6
MODEL				CM	SIZE			CFM				ESP				COIL ROWS			RF	CN	MOTOR	

UNIT CONFIGURATION
- H HORIZONTAL
- V VERTICAL
- M MODULAR
- R ROOFTOP

COOLING OPTIONS
- W CHILLED WATER
- X DIRECT EXPANSION
- 0 NO COOLING

HEATING OPTIONS
- H HOT WATER
- S STEAM
- E ELECTRIC
- 0 NO HEAT

UNIT INSULATION
- S SINGLE WALL 1/2" FOIL FACE FIBERGLASS
- T SINGLE WALL 1" FOIL FACE FIBERGLASS
- U SINGLE WAL 7/8" CLOSED CELL
- D DOUBLE WALL
- X SPECIAL

CABINET MATERIAL
- A GALVANIZED STEEL
- B PRE-PAINTED STEEL
- C POWDER PAINTED

UNIT SIZE
- 024 24000
- 036 36000
- 048 48000
- 060 60000
- 090 90000
- 120 120000
- 180 180000
- 240 240000

PRE-HEAT
- 0 NO PH
- 1 1- ROW
- 2 2-ROW

COOLING
- 0 NO COOLING
- 2 2-ROWS
- 4 4-ROWS
- 6 6-ROWS
- 8 8-ROWS

RE-HEAT
- 0 NO RH
- 1 1- ROW
- 2 2-ROW

REFRIGERANT
- A R-410A
- B R-22
- C R-NU22
- D R-134A
- 0 NONE

PIPING CONNECTIONS
- R RIGHT HAND
- L LEFT HAND

ALL CONNECTIONS ARE SET
LOOKING THE UNIT IN THE AIR FLOW DIRECTION

MOTOR SIZE AND VOLTAGE OPTIONS

1ST DIGIT		2ND DIGIT	
A	0.25 HP	1	115/208/230/1 ODP
B	0.33 HP	2	115/230/1 ODP, HE
C	0.50 HP	3	115/1 ODP, 2 SPD
D	0.75 HP	4	230/1 ODP, 2 SPD
E	1.00 HP	5	277/1 ODP
F	1.50 HP	6	208/230/460/3/50/60hz ODP
G	2.00 HP	7	208/230/460/3/50/60hz ODP, HE
H	3.00 HP	8	208/230/460/3/50/60 ODP, 2 SPD
I	5.00 HP	9	575 V 3 Ph 60Hz
J	7.50 HP		
K	10.0 HP		

CAP DESCRIPTION MODEL NUMBER NOMENCLATURE - PAGE #2

B	B	C	0	E	1	0	0	.	0	C	0	0	C	F	0	1	1
OAC	UNIT ACCS			V	EH KW					HTR ACCS			V	VFD ACC		REV	REV

OUTSIDE AIR OPTIONS

0	NONE
A	MIXING BOX W/ PLEATED FILTER 2"
B	MB W/ 3 POSITION CONTROL PACKAGE
C	MB W/MODULATING CONTROL PACKAGE
E	FACE & BYPASS DAMPER W/FILTER SEC.
X	SPECIAL

UNIT ACCESSORIES

0	NONE
A	PLEATED FILTER 2"
B	DISCHARGE GRILL PLENUM
C	RETURN GRILL AIR PLENUM
E	MOTOR START STOP STATION
X	SPECIAL

HEATER VOLTAGE

0	NO HEATERS
A	115/1
B	208/1
C	230/1
E	277/1
F	208/3
G	230/3
H	460/3
J	575/3

HEATER CAPACITY

	1.0 to 100.0 KW IN .1 Kw increments
0	NO HEATERS

HEATER ACCESSORIES

0	NO ACCESSORIES
A	Single point line Conn.
B	SCR Controls
C	Start Stop Control St
D	None

FACTORY USE

VFD ACCESORIESS

0	NO ACCESSORIES
A	REM MTG KIT
B	LCP11 CONT PANEL
C	LCP12 CONT PANEL
D	NEMA TYPE 1 KIT FOR M1 FR
E	NEMA TYPE 1 KIT FOR M2 FR
F	NEMA TYPE 1 KIT FOR M3 FR
G	DECOUPLING PLT KIT FOR M1&M2 FRAME
H	DECOUPLING PLT KIT FOR M3 FRAME
I	IP21 FOR M1 FRAME
J	IP21 FOR M2 FRAME
K	IP21 FOR M3 FRAME
L	DIN RAIL MTG KIT

VFD SIZE

0	NO VFD
A	0.25 HP 230/1
B	0.50 HP 230/1
C	1.00 HP 230/1
D	2.00 HP 230/1
E	3.00 HP 230/1
F	0.33 HP 230/3
G	0.50 HP230/3
H	1.00 HP 230/3
I	2.00 HP 230/3
J	3.00 HP 230/3
K	5.00 HP 230/3
L	0.50 HP 460/3
M	1.00 HP 460/3
N	2.00 HP 460/3
P	3.00 HP 460/3
Q	5.00 HP 460/3
R	7.50 HP 460/3
S	10.0 HP 460/3

NOTE: MOST ACCESSORIES ARE NOT FACTORY INSTALLED, CONTACT FACTORY REP. FOR DETAILS

SAFETY

The installation and/or servicing of comfort conditioning equipment can be hazardous due to system pressures and electrical devices.

ONLY TRAINED/QUALIFIED PERSONNEL SHOULD PERFORM SERVICE AND/OR INSTALLATION
OBSERVE ALL PRECAUTIONS AND WARNINGS IN PRODUCT DATA OR INSTRUCTIONS ON UNIT.
FOLLOW ALL SAFETY CODES.
Wear eye protection and gloves. Have a fire extinguisher readily available.
DISCONNECT ALL POWER SUPPLIES BEFORE REMOVING ANY PANELS.
DISCONNECTING MORE THAN ONE POWER SUPPLY MAY BE REQUIRED FOR SOME EQUIPMENT.

Locating the Unit

Placement of the unit relative to ductwork, electrical and plumbing must be carefully considered. Return air plenum or duct can be mounted directly to the return air flanges. Use flexible gasket material to seal the duct to the unit.

Verify floor, foundation or suspension support can support the total unit weight, including accessory weights. Unit must be level in both horizontal axes to support the unit and reduce noise and vibration from the unit.

Allow adequate service clearances as shown on the unit nameplate and unit drawing. Consult your local building codes for additional service clearance requirements.

Allow adequate space for piping access and panel removal. Condenser water piping and condensate drain connections are located on either side of the unit.

Suspended Units

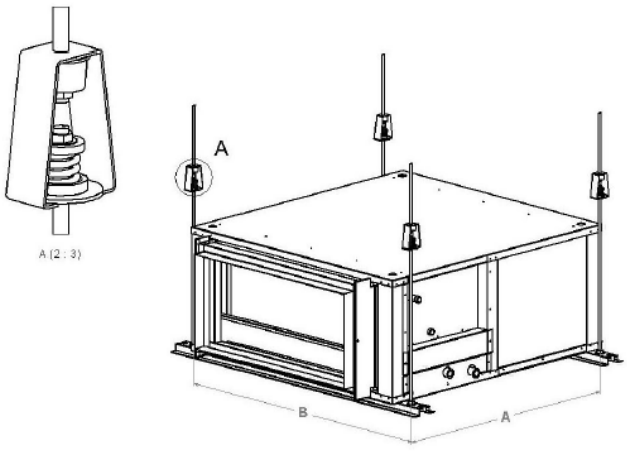
Horizontal air handling units are equipped for suspended installations. The unit should be lifted into position by supporting the unit with the skid used for shipping. The air handling unit must be installed level and care should be taken to prevent damage to the cabinet. Other installation provisions may be necessary according to job specifications.

LIFTING AND HANDLIND THE UNIT

Horizontal, Vertical and Modular Units have channels underneath the base which provide lifting access to the underside of the unit and allow moving without physical damage.

Before lifting the unit, be sure that all the shipping materials has been removed.

Incorrect lifting can cause damage to the unit, injury or death. Lifting equipment capacity should exceed unit weight by an adequate safety factor. Always test lift unit not more than 24 inches to verify the proper center of gravity lift point.



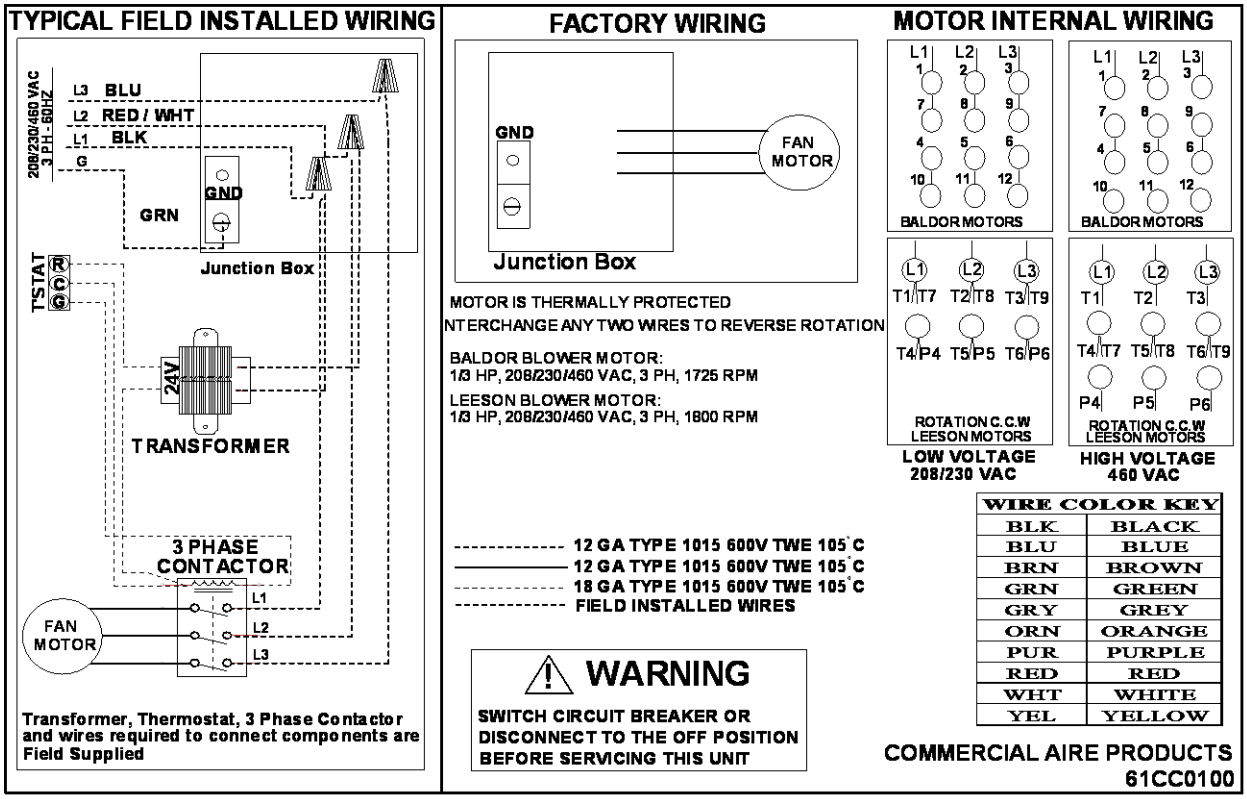
Floor Mounted Units

Make sure the unit is level and mounted on a field supplied platform with a minimum height to allow for proper depth of the condensate line p-trap. Other installation provisions may be necessary according to job specifications. Vertical air handling units are designed for upflow applications only.

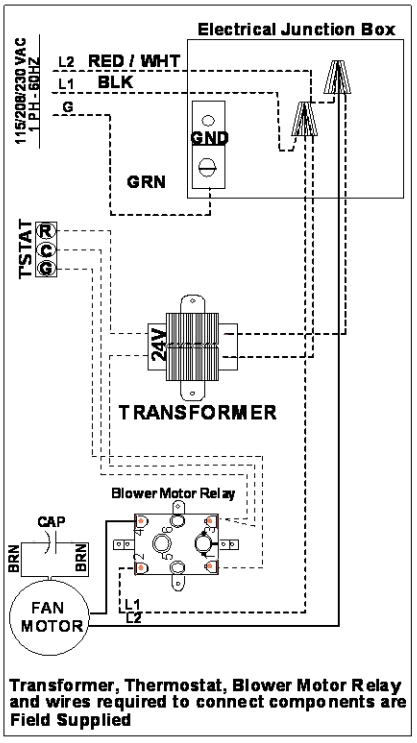
ELECTRICAL

Verify the unit nameplate agrees with the power supply. The wiring diagram is located inside the unit. Route the power and control wiring separately, through the utility entry in the unit. DO NOT RUN POWER AND CONTROL WIRES IN THE SAME CONDUIT.

ELECTRIC SHOCK HAZARD. Before attempting to perform any installation, service, or maintenance, shut of all electrical power to the unit at the disconnect switches. Unit may have multiple power supplies. Failure to disconnect power could result in dangerous operation, serious injury, and death or property damage.

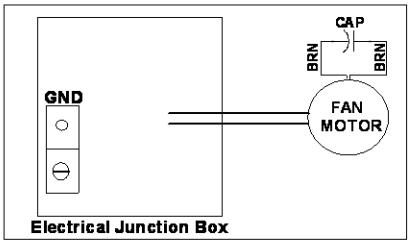


TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, Blower Motor Relay and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED
INTERCHANGE LEADS 5 AND 8 TO REVERSE ROTATION

BALDOR BLOWER MOTORS:
1/4 HP, 115/230 VAC, 1 PH, 1725 RPM
1/3 HP, 115/230 VAC, 1 PH, 1725 RPM
1/2 HP, 115/230 VAC, 1 PH, 1725 RPM
3/4 HP, 115/230 VAC, 1 PH, 1725 RPM
1 HP, 115/230 VAC, 1 PH, 1725 RPM

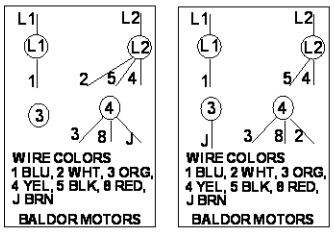
LEESON BLOWER MOTORS:
1/4 HP, 115/208/230 VAC, 1 PH, 1800 RPM
1/3 HP, 115/208/230 VAC, 1 PH, 1800 RPM
1/2 HP, 115/208/230 VAC, 1 PH, 1800 RPM
3/4 HP, 115/208/230 VAC, 1 PH, 1800 RPM
1 HP, 115/208/230 VAC, 1 PH, 1800 RPM

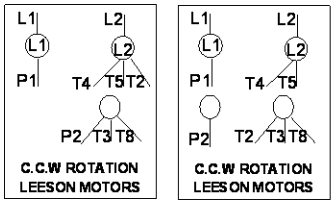
---------- 12 GA TYPE 1015 600V TWE 105 C
———— 12 GA TYPE 1015 600V TWE 105 C
---------- 18 GA TYPE 1015 600V TWE 105 C
---------- FIELD INSTALLED WIRES

⚠ WARNING

SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

MOTOR INTERNAL WIRING





LOW VOLTAGE 115 VAC | **HIGH VOLTAGE 230 VAC**

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

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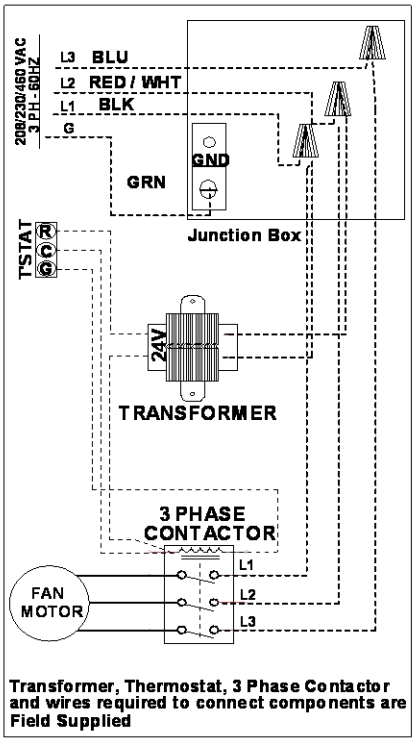
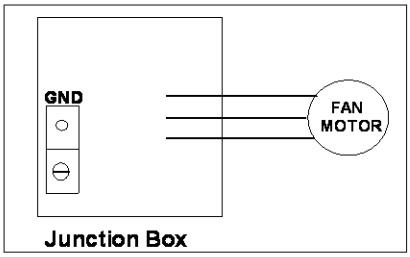
61CC0101

TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, 3 Phase Contactor and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED
INTERCHANGE ANY TWO WIRES TO REVERSE ROTATION

BALDOR BLOWER MOTOR:
3.0 HP, 230/460 VAC, 3 PH, 1765 RPM
5.0 HP, 208/230/460 VAC, 3 PH, 1750 RPM
7.5 HP, 208/230/460 VAC, 3 PH, 1770 RPM
10 HP, 230/460 VAC, 3 PH, 1770 RPM

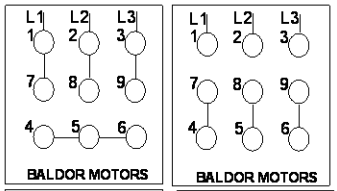
LEESON BLOWER MOTOR:
3.0 HP, 208/230/460 VAC, 3 PH, 1800 RPM
5.0 HP, 208/230/460 VAC, 3 PH, 1800 RPM
7.5 HP, 208/230/460 VAC, 3 PH, 1800 RPM
10 HP, 208/230/460 VAC, 3 PH, 1800 RPM

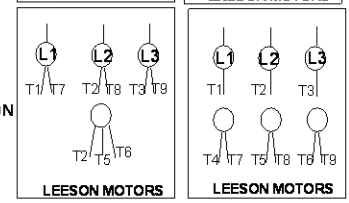
---------- 12 GA TYPE 1015 600V TWE 105°C
———— 12 GA TYPE 1015 600V TWE 105°C
---------- 18 GA TYPE 1015 600V TWE 105°C
---------- FIELD INSTALLED WIRES

⚠ WARNING

SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

MOTOR INTERNAL WIRING



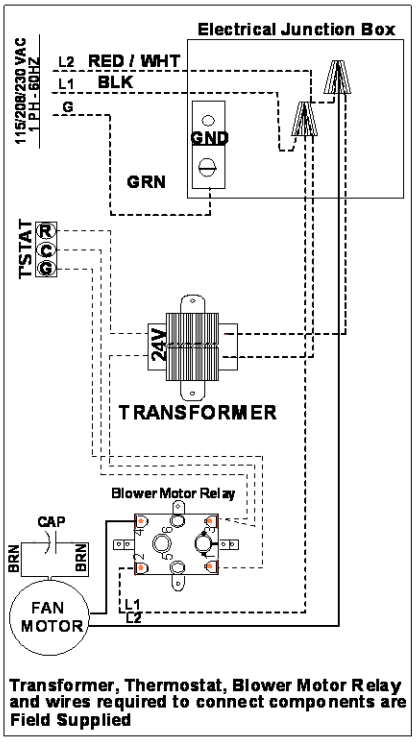


LOW VOLTAGE 208/230 VAC | **HIGH VOLTAGE 460 VAC**

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

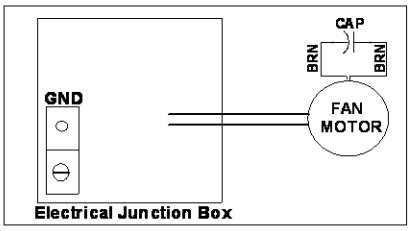
COMMERCIAL AIRE PRODUCTS
61CC0102

TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, Blower Motor Relay and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED

INTERCHANGE LEADS 5 AND 8 TO REVERSE ROTATION

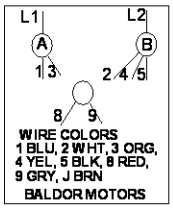
BALDOR BLOWER MOTOR:
2.0 HP, 115/208/230 VAC, 1 PH, 1725 RPM
3.0 HP, 115/230 VAC, 1 PH, 1725 RPM

LEESON BLOWER MOTOR:
2.0 HP, 115/208/230 VAC, 1 PH, 1800 RPM
3.0 HP, 115/230 VAC, 1 PH, 1740 RPM

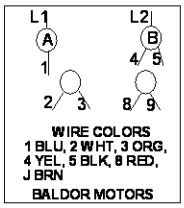
---------- 12 GA TYPE 1015 600V TWE 105 C
———— 12 GA TYPE 1015 600V TWE 105 C
---------- 18 GA TYPE 1015 600V TWE 105 C
---------- FIELD INSTALLED WIRES

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

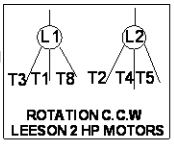
MOTOR INTERNAL WIRING



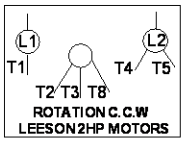
WIRE COLORS
1 BLU, 2 WHT, 3 ORG, 4 YEL, 5 BLK, 8 RED, 9 GRY, J BRN
BALDOR MOTORS



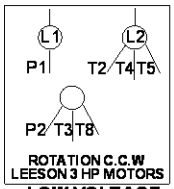
WIRE COLORS
1 BLU, 2 WHT, 3 ORG, 4 YEL, 5 BLK, 8 RED, J BRN
BALDOR MOTORS



ROTATION C.C.W
LEESON 2 HP MOTORS

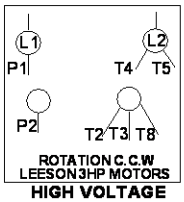


ROTATION C.C.W
LEESON 2HP MOTORS



ROTATION C.C.W
LEESON 3 HP MOTORS

LOW VOLTAGE
115 VAC



ROTATION C.C.W
LEESON 3HP MOTORS

HIGH VOLTAGE
208/230 VAC

⚠ WARNING

SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

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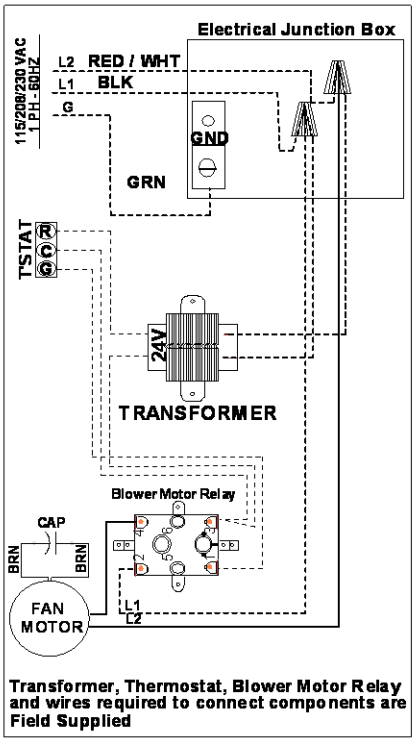
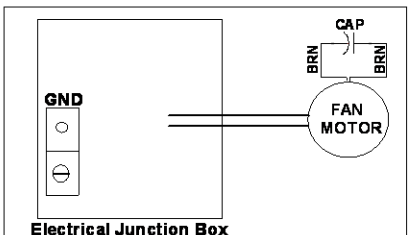
61CC0103

TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, Blower Motor Relay and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED

INTERCHANGE LEADS 5 AND 8 TO REVERSE MOTOR ROTATION

BALDOR BLOWER MOTOR:
1.5 HP, 115/230 VAC, 1 PH, 1725 RPM

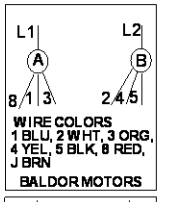
LEESON BLOWER MOTOR:
1.5 HP, 115/208/230 VAC, 1 PH, 1800 RPM

---------- 12 GA TYPE 1015 600V TWE 105 C
———— 12 GA TYPE 1015 600V TWE 105 C
---------- 18 GA TYPE 1015 600V TWE 105 C
---------- FIELD INSTALLED WIRES

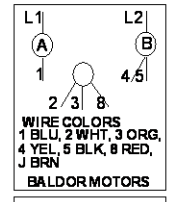
⚠ WARNING

SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

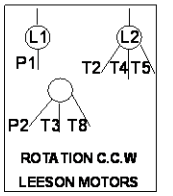
MOTOR INTERNAL WIRING



WIRE COLORS
1 BLU, 2 WHT, 3 ORG, 4 YEL, 5 BLK, 8 RED, J BRN
BALDOR MOTORS

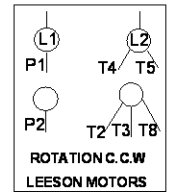


WIRE COLORS
1 BLU, 2 WHT, 3 ORG, 4 YEL, 5 BLK, 8 RED, J BRN
BALDOR MOTORS



ROTATION C.C.W
LEESON MOTORS

LOW VOLTAGE
115 VAC



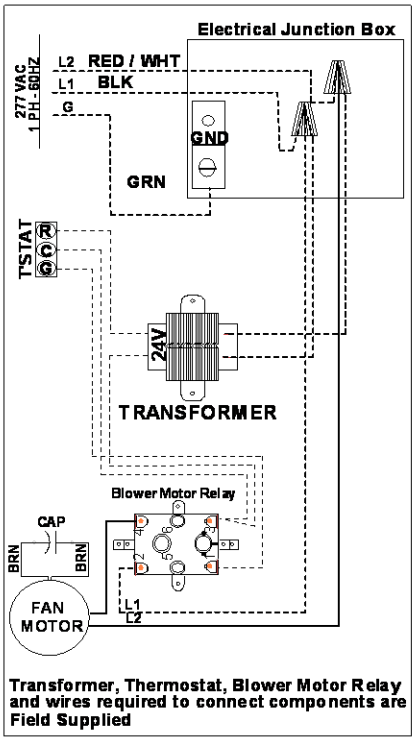
ROTATION C.C.W
LEESON MOTORS

HIGH VOLTAGE
208/230 VAC

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

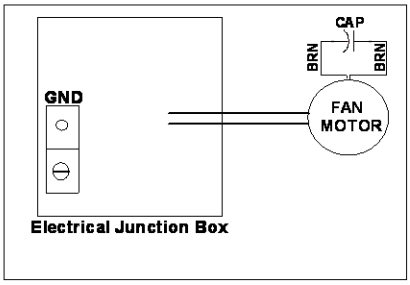
COMMERCIAL AIRE PRODUCTS
61CC0104

TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, Blower Motor Relay and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED

INTERCHANGE LEADS 5 AND 8 TO REVERSE MOTOR ROTATION

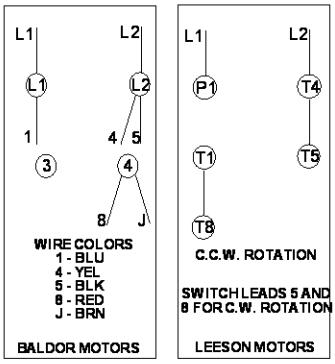
BLOWER MOTOR:
1/3 HP, 277 VAC, 1 PH, 1725 RPM
1/2 HP, 277 VAC, 1 PH, 1725 RPM
3/4 HP, 277 VAC, 1 PH, 1725 RPM
1.0 HP, 277 VAC, 1 PH, 1725 RPM
1.5 HP, 277 VAC, 1 PH, 1725 RPM

---------- 12 GA TYPE 1015 600V TWE 105°C
———— 12 GA TYPE 1015 600V TWE 105°C
---------- 18 GA TYPE 1015 600V TWE 105°C
---------- FIELD INSTALLED WIRES

⚠ WARNING

SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

MOTOR INTERNAL WIRING

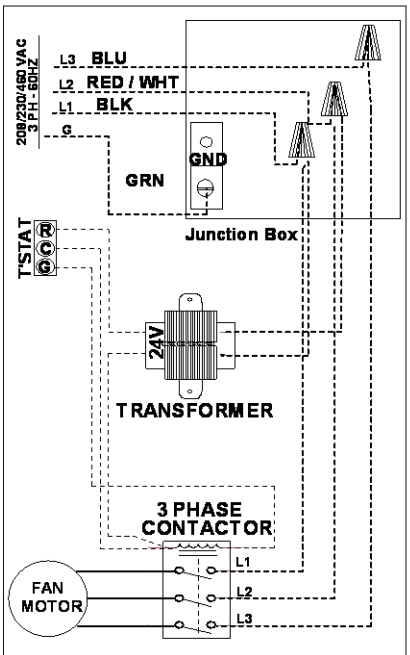


VOLTAGE 277 VAC | VOLTAGE 277 VAC

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

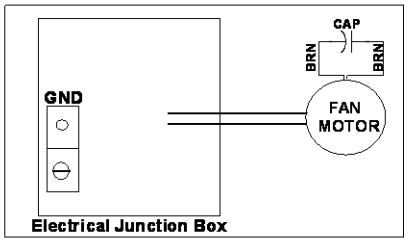
COMMERCIAL AIRE PRODUCTS
61CC0105

TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, 3 Phase Contactor and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED
INTERCHANGE LEADS 5 AND 8 TO REVERSE ROTATION

BALDOR BLOWER MOTOR:
1/2 HP, 208/230/460 VAC, 3 PH, 1800 RPM
3/4 HP, 208/230/460 VAC, 3 PH, 1725 RPM
1.0 HP, 208/230/460 VAC, 3 PH, 1725 RPM
1.5 HP, 208/230/460 VAC, 3 PH, 1725 RPM
2.0 HP, 208/230/460 VAC, 3 PH, 1725 RPM

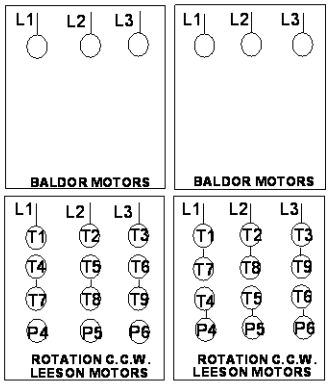
LEESON BLOWER MOTOR:
1/2 HP, 208/230/460 VAC, 3 PH, 1800 RPM
3/4 HP, 208/230/460 VAC, 3 PH, 1800 RPM
1.0 HP, 208/230/460 VAC, 3 PH, 1800 RPM
1.5 HP, 208/230/460 VAC, 3 PH, 1800 RPM
2.0 HP, 208/230/460 VAC, 3 PH, 1800 RPM

---------- 12 GA TYPE 1015 600V TWE 105 C
———— 12 GA TYPE 1015 600V TWE 105 C
---------- 18 GA TYPE 1015 600V TWE 105 C
---------- FIELD INSTALLED WIRES

⚠ WARNING

SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

MOTOR INTERNAL WIRING

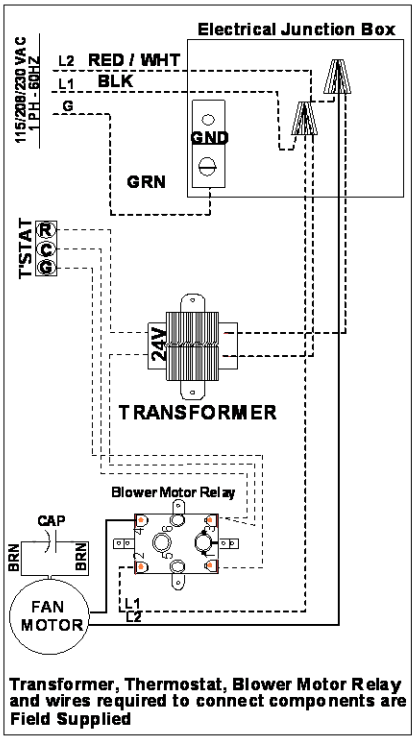


LOW VOLTAGE 208/230 VAC | HIGH VOLTAGE 460 VAC

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

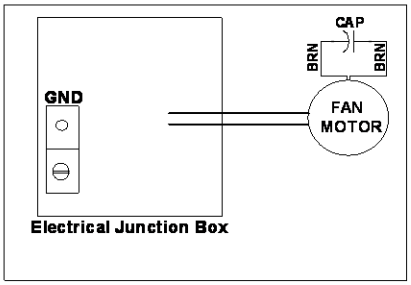
COMMERCIAL AIRE PRODUCTS
61CC0106

TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, Blower Motor Relay and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED

INTERCHANGE LEADS 5 AND 8 TO REVERSE MOTOR ROTATION

LEESON BLOWER MOTOR:

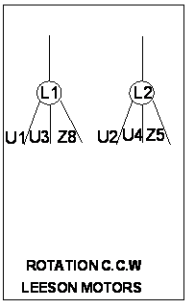
1/3 HP, 110/220 VAC, 1 PH, 50 HZ, 1500 RPM
1/2 HP, 110/220 VAC, 1 PH, 50 HZ, 1500 RPM
3/4 HP, 110/220 VAC, 1 PH, 50 HZ, 1500 RPM
1.0 HP, 110/220 VAC, 1 PH, 50 HZ, 1500 RPM
1.5 HP, 110/220 VAC, 1 PH, 50 HZ, 1500 RPM

---------- 12 GA TYPE 1015 600V TWE 105 C
———— 12 GA TYPE 1015 600V TWE 105 C
- - - - - - - - - - 18 GA TYPE 1015 600V TWE 105 C
---------- FIELD INSTALLED WIRES

⚠ WARNING

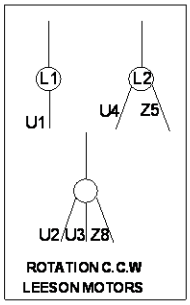
SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

MOTOR INTERNAL WIRING



ROTATION C.C.W
LEESON MOTORS

HIGH VOLTAGE
110 VAC



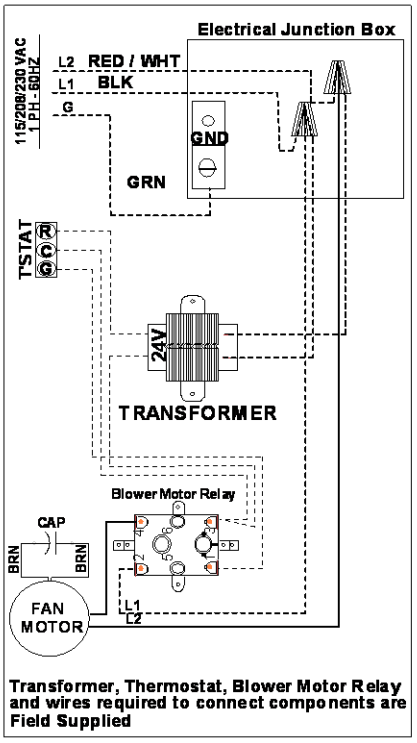
ROTATION C.C.W
LEESON MOTORS

HIGH VOLTAGE
220 VAC

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

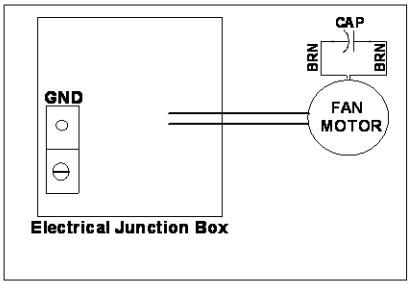
COMMERCIAL AIRE PRODUCTS
61CC0107

TYPICAL FIELD INSTALLED WIRING



Transformer, Thermostat, Blower Motor Relay and wires required to connect components are Field Supplied

FACTORY WIRING



MOTOR IS THERMALLY PROTECTED

INTERCHANGE LEADS 5 AND 8 TO REVERSE MOTOR ROTATION

LEESON BLOWER MOTOR:

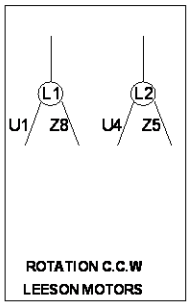
2.0 HP, 220 VAC, 1 PH, 50 HZ, 1500 RPM, FR182T
3.0 HP, 220 VAC, 1 PH, 50 HZ, 1500 RPM, FR184T
5.0 HP, 220 VAC, 1 PH, 50 HZ, 1500 RPM, FR184T

---------- 12 GA TYPE 1015 600V TWE 105 C
———— 12 GA TYPE 1015 600V TWE 105 C
- - - - - - - - - - 18 GA TYPE 1015 600V TWE 105 C
---------- FIELD INSTALLED WIRES

⚠ WARNING

SWITCH CIRCUIT BREAKER OR DISCONNECT TO THE OFF POSITION BEFORE SERVICING THIS UNIT

MOTOR INTERNAL WIRING

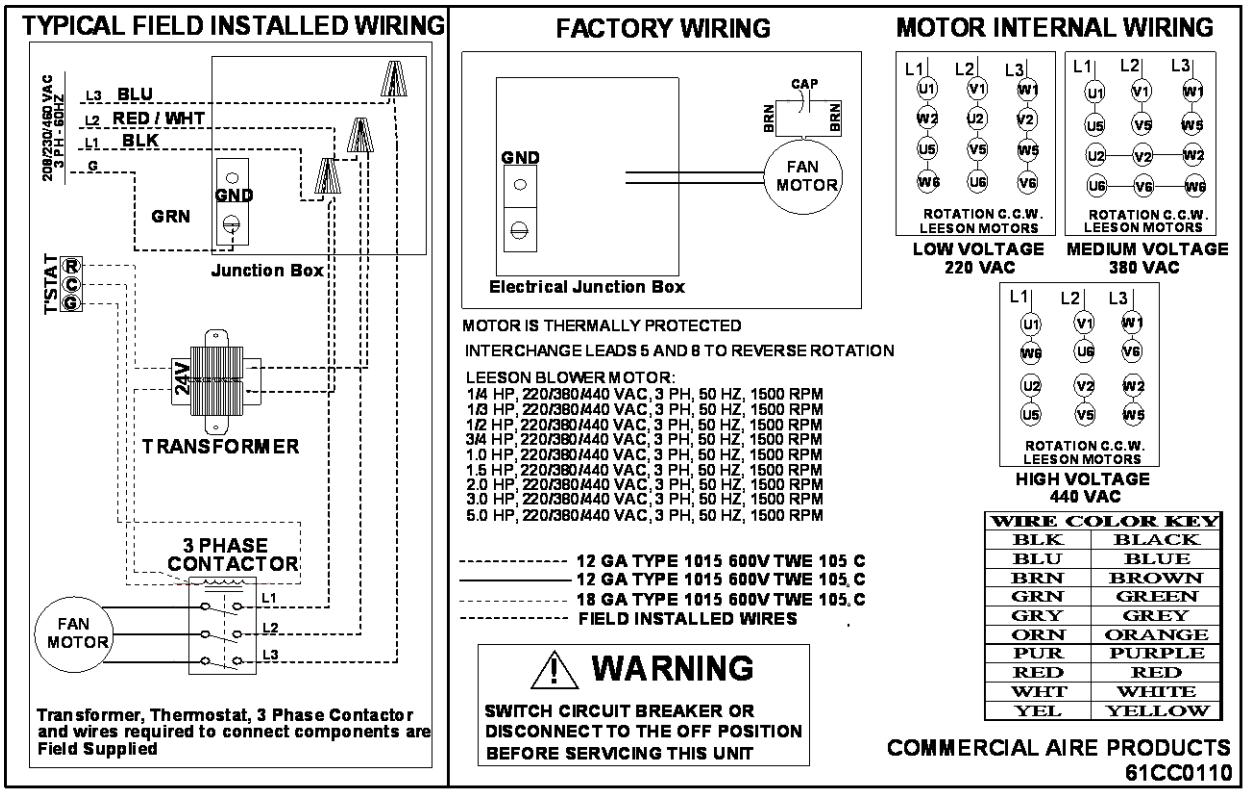


ROTATION C.C.W
LEESON MOTORS

VOLTAGE
220 VAC

WIRE COLOR KEY	
BLK	BLACK
BLU	BLUE
BRN	BROWN
GRN	GREEN
GRY	GREY
ORN	ORANGE
PUR	PURPLE
RED	RED
WHT	WHITE
YEL	YELLOW

COMMERCIAL AIRE PRODUCTS
61CC0108



All units require field supply electrical over-current and short circuit protection. Device must be sized larger than Maximum over-current Protection (MOP).
Codes may require a disconnect switch be within sight of the unit. It is recommended that over-current protection and disconnect switch not be installed in the unit.
Locations for field cut electrical entries are marked on the unit. Field openings must be at least 6" away from any component to prevent damage during the cutting procedure.
To pass wires through the wall or roof of the unit, a hole should be cut and a conduit should be passed through it using the following procedure.

CUTTING ELECTRICAL OPENINGS

1- Locate the placement of the hole. Be sure that the hole will not interfere with any component operation or prevent access to any part of the unit.
2- Drill a pilot hole all the way through the panel, insulation and interior panel.
3- Using a hole saw cut the hole through the outside metal, insulation and inside metal
4- Install the conduit through the panel and caulk the entire perimeter of the conduit in both sides with and industrial grade caulking or duct seal compound.

Size supply conductors according to the Minimum Circuit Ampacity (MCA) rating. Supply conductors must be rated a minimum of 75ºC. Protect each branch circuit according with the codes and requirements. All the units must be electrically grounded in accordance with local codes or, in absence of local codes, as per the current National Electric Code.
Supply voltage must be within the minimum/maximum range shown on the unit nameplate, available short circuit current should not exceed the short circuit current rating (SCCR) shown in the unit nameplate.

Installing contractor must check for proper motor rotation and verify the bower motor amps are not exceeding the name plate.
Control wiring must be wired in separate conduit from the power to avoid inductance problems and must follow the local codes for low voltage wiring. The following table is a guide for control wiring size and allowable distance:

20 AWG	200 FT
18 AWG	350 FT
16 AWG	500 FT
14 AWG	750 FT
12 AWG	1250 FT

Duct Heaters Installation

Our duct heaters may be used with heat pumps, cooling units or force air systems. They are suitable for zero clearance installations in vertical or horizontal duct systems.

Duct Heaters Installation Guidelines:

1- Install it at least 4 Ft. Downstream from air source or elbow. If closer than 4 Ft. may require turning vanes, baffles or other devices to assure an even distribution of air over the heater.
2- Install at least 2 Ft. before an elbow or may require devices as #1
3- Transitions to and from a duct heater should be limited to 20% of the duct area per linear foot.
4- Always mount in the side of a vertical or horizontal duct. **NEVER MOUNT FROM TOP OR BOTTOM OF A HORIZONTAL DUCT.**
5- All duct materials must be suitable for 250 º F operation.
6- The air duct should be installed in accordance with the standards of the NFPA for installation of air conditioning and ventilating systems pamphlet No. 90A and 90B.
7- Locate the heater so that it is completely accessible and normal ventilation is assured.
8- The amount of air curtain between the heater elements and limit switches must not be reduced by internal duct liner within 1 ft before or after the heater. In fiber glass duct systems, a metal sleeve inside the duct to support the heater must be used. If the base of the heater is not flush with the air stream, nuisance cycling may result.
9- Field connected wires entering the heater controls compartment must be copper suitable for 75 º C (167 º F) Field wire the supply and control circuits in accord with the National and Local Codes and use the wiring diagram supply with each heater as a guide. The heater must not operate unless the fan is on. Never use a fan delay with these heaters.

START UP LIST FOR DUCT HEATERS

1.) Electric duct heater must be installed according to manufacturer's installation instruction manual and must be in compliance with all NEC, local and state codes.
Failure to observe all of the installation guide lines will void the warranty and listing of the product.
2.) Review heater data information label found on outside of heater panel cover.
3.) Voltage, phase and frequency of heater must match heater data label. If field voltage and/or phase does not match heater data label, do not operate heater.
4.) The proper field wire size to heater must be used, copper conductors only. See wire size data label adjacent to heater terminal block or disconnect switch in heater. Heater must be properly ground to accommodate NEC guide lines. Failure to do so may result in shock or death.
5.) Ensure all electrical connections are tight before energizing heater circuit. #10-14

AWG should be 35 inch/pound and 8 AWG should be 40 inch / pound wiring in heater.
6.) Review the proper size disconnect means and / or fusing has been applied to heater power supply circuit Only qualified individuals experienced in proper installation of heating and cooling should perform any start-up operations of HVAC systems.
Turn disconnect switch (s) to the on position. Energize heater circuit with thermostat to 100% rating of heater KW rating. First start-up of heating element will burn off any element manufacturing oil that may cause some smoke in the air system.
7.) Using proper measuring devices to measure voltage to heater, line voltage should be plus or minus 5% of heater rated voltage. Never operate 208V rated heater on 240V line voltage. Measure line 1 to line 2 on single phase heaters and line 1 to neutral on 120V and 277V heaters.
On three phase heaters measure line 1 to line 3, line 2 to line 3 and line 1 to line 2 for proper line voltage. Measure amp draw on supply conductors to heater disconnect switch or terminal block, for proper amp draw with proper instruments. Amp draw must match heater data label with 100% heater is energized; reading should be plus or minus 3%.
8.) Air flow over heating elements must be even across the face of the heater. Duct system must have .08 minimum static pressure duct system 2
9.) Automatic reset will de-energize heater if heater is not installed to manufacturers duct installation manual or low air flow/uneven air across face of element.
Correction must be made to operate heater. Manual reset will also de-energized heater if there is low or uneven air flow over the heating elements. Air flow volume and / or reinstallation of heater must be done before energizing heater.
10.) If heater has a control transformer it may have a breaker in the circuit. If transformer is shorted, breaker will open the circuit. You must reset and find the cause of the short. If transformer has no breaker, it may have an inline fuse. A short circuit will open the transformer. Transformer must be replaced with an identical transformer.
11.) Air flow switch only proves that air flow exists, not that the minimum proper air flow does exist; standard air pressure switch set-up is for positive air pressure system.
Heaters in negative air system must have air tubing to air pressure switch relocated to the open port of the switch.
12.) After heater installation and operation has meet standards and heater data label, closed heater panel door and energized heater circuit.

Minimum Air Flow Requirements Across the heaters

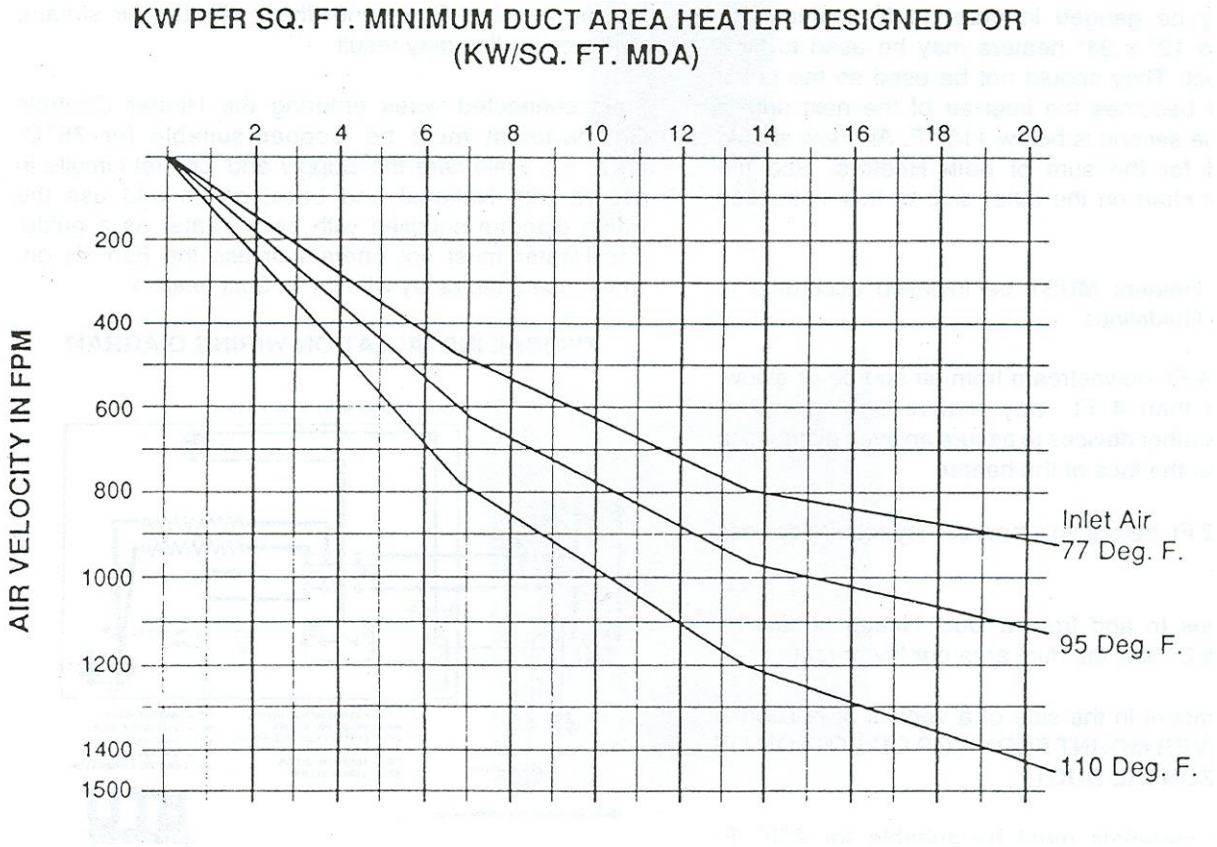
Each KW produces 3413 BTUH. Divide the total BTUH needed by 3413 to find the KW needed. Use the chart below to find the minimum air flow required. You will need to know the maximum inlet temperature of the heater. The outlet air from a Heat pump (sometimes 110 º F) would be the inlet air to an auxiliary heater. You must also know the Kw per Sq. Ft. of the Minimum Duct Area (Kw/Sq. Ft. MDA) for the heater. An example is worked out below:

EXAMPLE: Using 12 KW Heater designed for minimum duct size 8” x 16” and being the only heat in an area. You expect inlet air to the heater will be 77 º F Maximum.

8” x 16” divided by the .888 Sq. Ft. = 13.5 which is the Kw/Sq. Ft. MDA
Locate the 13.5 along the top side of the chart and from there draw a vertical line downward until the 77 º F inlet air line is intersected. From point of intersection draw a horizontal line to the left side of the chart to the answer of 800 FPM (Velocity) of air minimum required over the heater.

To convert to CFM multiply the answer by the Sq. Ft. of the heater minimum duct area design. In the example 800 multiply by .888 would be 710 CFM.

These minimum air flow requirements should be met at any point over the face of the heater. If heaters are used in ducts larger than the heater minimum duct design, reliable means should be used to assure the proper air flow through the heater.



ELECTRIC DUCT HEATER MAINTENANCE GUIDE LINES

In most cases electric duct heaters require very little maintenance or service during the life of the product. The duct heater must be installed according to our installation instruction manual and NEC / SMACNA guide lines.

1) Disconnect ALL power circuit(s) to heater before any service is to be performed, there may be more than one disconnect switch that needs to be in the off position.

2) All electrical connections to the heater power & control circuits should be tight. Inspect all electrical connections in heater, as they may become loose during operation. All wiring must be done in accordance with the National Electrical Codes and any applicable state & local codes.

3) All air filters in duct or unit system should be checked to ensure clean air is present with no restriction of air flow to heating elements. Always replace the filter with the same type as originally furnished.

4) Check the field voltage and phase rating is the same as the heater information data. Check full line amp draw of heater against rated heater data plate/label. Correct field wire size and grade must be used to heater power circuit(s). Heater must have proper grounded wire to heater.

5) Heater should be free and clean of dust /dirt and moisture in heater control panel.

6) Heater construction or wiring must not be modified or any alterations are preformed to change the heater construction. This would void the listing and warranty of the heater.

7) Replacing unauthorized components must be approved from the factory first, if not of the same part number and style. Safety automatic and manual resets MUST be of the same temperature, part number and vendor for proper heater operation. When higher rated temperature automatic/ manual resets are replaced in the heater circuit, this will void the listing and warranty and could cause damage or result in a fire.
8) Heater panel cover should not be removed or open during heater operation. Optimal operation of heater requires cleanliness.
9) Check operation of heater circuits with thermostat/ controller to ensure proper cycling of heater relays(s) and to the controller or thermostat set point.
10) If dust or other material is collecting on the heating elements, check filter(s) for replacement. The heater may have to be removed from duct section for cleaning. Use low pressure air to remove dust from heating element surfaces. Always wear eye protection and nose protection during this operation.
11) Do not try to repair any of the heater components, as they need to be replaced with original part number from vendor for safe operation of the heater. Do not file down the relay(s) contacts to stop relay chatter or to extend the life of the relay. Element male /female chassis insulators that are cracked or broken should be replaced with the same style and size.
Insulators in the element support frame that are missing or broken must be replaced or replacement frame assembly should be ordered. Broken heating elements must replace with the same element gauge, ohms and outside diameter (O.D.) size.
12) Inspect all internal wiring in heater control panel for burned or broken wires. Replacement wiring must be rated for 105 C grades and of the same gauge for proper operation of heater.
13) Preventative maintenance to achieve maximum performance and service life of heater, a formal schedule of regular maintenance should be established and maintained.

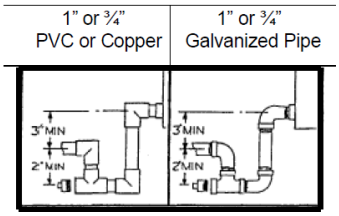
DUCT CONNECTIONS

Check existing duct insulation and vapor barriers. Previously installed heating supply ductwork may already have adequate insulation against excessive heat loss. This insulation may be satisfactory for protection against heat gain from summer cooling. Depending on application, it may require additional insulation.
External insulated duct systems must have adequate vapor seal for summer operation, particularly where duct is exposed to high humidity conditions such as in attic, vented crawl space, unconditioned basement or utility room**.**
Remove any shipping material from the unit before installing the duct. Be sure that there are no material inside the unit that can damage the blower wheel when start running. Attach the duct to the flanges provided on the unit. The installer is responsible for sealing the ducts to the flanges to prevent any leak or contamination.
Ductwork should be sized according with the existing standards and installed following all the local and national codes. When attaching the duct to the unit, use a flexible connection to avoid vibrations on the duct. A three inches flexible connection is recommended.

CONDENSATE DRAIN PIPING

Our units are equipped with more than one drain connection. A p-trap and drain line must be installed one the drain connections of the unit with a p-trap not to exceed 6” from the drain connection. The lines should be the same size or larger than the drain connection, include a p-trap, and pitch downward toward drain. An air break should be used with long runs of condensate lines. Units include an overflow drain pan to catch any overflowing condensation from the primary. This pan requires a separate ¾” or 1” condensate drains installation. Draw-through units will have a negative static pressure in the drain pan area; this will cause an un-trapped drain to back-up due to air being pulled up through the

condensate drain piping. Condensate drain trapping piping must conform to all applicable governing codes



HEATING COILS

One or two row hot water or steam preheating, heating or reheating coils can be factory installing in our units, all valves and controls are field supplied and field installed. All precautions to prevent freezing should be taken by consulting engineers or contractors during the installation.

CHILLED WATER COILS

Water piping

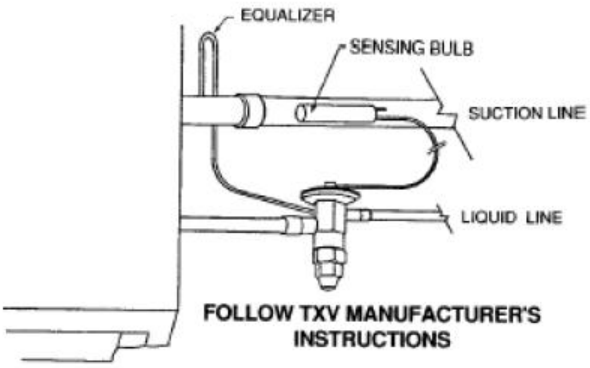
All piping must be supported independent of coils to prevent vibration and stress on coil headers. Swing joints or flexible fittings must be provided to absorb expansion and contraction strains. Rigid piping reduces the effectiveness of vibration isolators.

Water piping should always be connected so that the entering water is on the leaving air side of the coil. Coils must be adequately vented in order to prevent air binding. Units are provided with manual air vents mounted through manifold panel.

Our units can have from two to 8 rows chilled water coils or any combination with pre heat and or reheat coils up to 10 rows factory mounted. All control valves flow measuring devices and freeze controls are field supply and field installed. All piping shall be in accordance with national and local codes. Pressure limiting devices, backflow preventers, flow meters and all safety requirements are the sole responsibility of consulting engineers and installing contractors.

REFRIGERANT PIPING

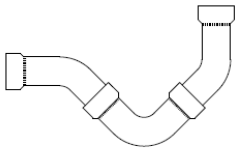
Always use the condensing unit manufacturer's recommended line sizes. The suction line must be insulated for satisfactory operation. Observe all condensing unit manufacturer's installation requirements. Use refrigerant grade copper only. If unit is to be used when installed as the indoor coil of a heat pump, a bypass check valve must be used unless unit is equipped with a TXV which includes bypass and check valve operations.



Typical TXV installation

NOTE:

An oil trap must be installed in all vertical suction risers. An additional oil trap must be installed every 15' for risers over 15' high. If the condensing unit is located above the evaporator, an inverted oil trap must be installed at the top of the vertical riser.



TYPICAL OIL TRAP

Piping from the condensing unit to the air handling unit is responsibility of the installing contractor. The piping sizes must be selected to meet the codes and the actual installation conditions and not based on connection sizes of the evaporator and/or condensing unit. Improper installation, adjustment, alteration, service or maintenance, can cause property damage, personal injury or loss of life. Installation and service must be performed by a trained and qualified technician.

Only clean ACR tubing should be used. Piping should conform to all the generally accepted practices and codes. The AHU coils are shipped pressurized with nitrogen the copper caps must be punctured to allow the gradual relief of the pressure prior to un-sweating the caps. Immediately couple the tubing to the indoor unit to avoid exposing the coils to moisture. When making solder connections, make sure to have dry nitrogen flowing through the lines to prevent copper oxidation inside the pipes.

Minimizing the refrigerant line size is favorable from an economic perspective, reducing installation costs, and reducing the potential for leakage. However, as pipe diameters narrow, pressure-reducing frictional forces increase.

Excessive suction line pressure drop causes loss of compressor capacity and increased power usage resulting in reduced system efficiency. Excessive pressure drops in the liquid line can cause the liquid refrigerant to flash, resulting in faulty TXV operation and improper system performance. In order to operate efficiently and cost effectively, while avoiding malfunction, refrigeration systems must be designed to minimize both cost and pressure loss.

Equivalent Line Length

All line lengths discussed in this manual, unless specifically stated otherwise, are Equivalent Line Lengths. The frictional pressure drop through valves, fittings, and accessories is determined by establishing the equivalent length of straight pipe of the same diameter. **Always use equivalent line lengths when calculating pressure drop**. Special piping provisions must be taken when lines are run underground, up vertical risers, or in excessively long line runs.

Liquid Line Sizing

When sizing the liquid line, it is important to minimize the refrigerant charge to reduce installation costs and improve system reliability. This can be achieved by minimizing the liquid line diameter. However, reducing the pipe diameter will increase the velocity of the liquid refrigerant which increases the frictional pressure drop in the liquid line, and causes other undesirable effects such as noise.
Maintaining the pressure in the liquid line is critical to ensuring sufficient saturation temperature, avoiding flashing upstream of the TXV, and maintaining system efficiency. Pressure losses through the liquid line due to frictional contact, installed accessories, and vertical risers are inevitable. Maintaining adequate sub-cooling at the condenser to overcome these losses is the only method to ensure that liquid refrigerant reaches the TXV.
Liquid refrigerant traveling upwards in a riser loses head pressure. If the evaporator is below the condenser, and the liquid line does not include risers, the gravitational force will increase the pressure of the liquid refrigerant. This will allow the refrigerant to withstand greater frictional losses without the occurrence of flashing prior to the TXV.
A moisture-indicating sight glass may be field installed in the liquid line to indicate the occurrence of premature flashing or moisture in the line. The sight glass should not be used to determine if the system is properly charged. **Use temperature and pressure measurements to determine liquid sub-cooling, not the sight glass.**

Liquid Line Routing

Care should be taken with vertical risers. When the system is shut down, gravity will pull liquid down the vertical column, and back to the condenser when it is below the evaporator. This could potentially result in compressor flooding. A check valve can be installed in the liquid line where the liquid column rises above the condenser to prevent this. The liquid line is typically pitched along with the suction line, or hot gas line, to minimize the complexity of the configuration.
Liquid Line Insulation

When the liquid line is routed through regions where temperature losses are expected, no insulation is required, as this may provide additional sub-cooling to the refrigerant. When routing the liquid line through high temperature areas, insulation of the line is appropriate to avoid loss of sub-cooling through heat gain.

Liquid Line Guidelines

In order to ensure liquid at the TXV, frictional losses must not exceed available sub-cooling. A commonly used guideline to consider is a system design with pressure losses due to friction through the line not to exceed a corresponding 1-2°F change in saturation temperature.
If the velocity of refrigerant in the liquid line is too great, it could cause excessive noise or piping erosion. The recommended maximum velocities for liquid lines are 100 fpm from the condenser to a receiver tank to discourage fluid backup, and 300 fpm from receiver tank to the evaporator to minimize valve induced liquid hammer.

Liquid Line Accessories

Liquid line shut off valves and filter driers are factory provided. Filter driers must be field installed on 2-6 ton units. The total length equivalent of pressure losses through valves, elbows and fittings must be considered when adding additional components in the field. It is a good practice to utilize the fewest elbows that will allow the mating units to be successfully joined.

Suction Line Sizing

The suction line is more critical than the liquid line from a design and construction standpoint. More care must be taken to ensure that adequate velocity is achieved to return oil to the compressor at minimum loading conditions. However, reducing the piping diameter to increase the velocity at minimal load can result in excessive pressure losses, capacity reduction, and noise at full load.

Suction Line Routing

Pitch the suction line in the direction of flow (about 1 foot per 120 feet of length) to maintain oil flow towards the compressor, and keep it from flooding back into the evaporator. Crankcase heaters are provided to keep any condensed refrigerant that collects in the compressor from causing damage or wear. Make sure to provide support to maintain suction line positioning, and insulate completely between the evaporator and condensing unit.

It is important to consider part load operation when sizing suction lines. At minimum capacity, refrigerant velocity may not be adequate to return oil up the vertical riser. Decreasing the diameter of the vertical riser will increase the velocity, but also the frictional loss.

A double suction riser can be applied to the situation of part load operation with a suction riser. A double suction riser is designed to return oil at minimum load while not incurring excessive frictional losses at full load. A double suction riser consists of a small diameter riser in parallel with a larger diameter riser, and a trap at the base of the large riser. At minimum capacity, refrigerant velocity is not sufficient to carry oil up both risers, and it collects in the trap, effectively closing off the larger diameter riser, and diverting refrigerant up the small riser where velocity of the refrigerant is sufficient to maintain oil flow.

At full load, the mass flow clears the trap of oil, and refrigerant is carried through both risers. The smaller diameter pipe should be sized to return oil at minimum load, while the larger diameter pipe should be sized so that flow through both pipes provides acceptable pressure drop at full load.

Suction Line Insulation

The entire suction line should be insulated. This prevents condensation from forming on the line, and reduces any potential loss in capacity associated with heat gain.

Suction Line Guidelines

For proper performance, suction line velocities less than a 4,000 fpm maximum are recommended. The minimum velocity required to return oil is dependent on the pipe diameter, however, a general guideline of 1,000 fpm minimum may be applied.

In a fashion similar to the liquid line, a common guideline to consider is a system design with pressure losses due to friction through the line not to exceed a corresponding 1-2°F change in saturation temperature.

At points where small pipe size can be used to provide sufficient velocity to return oil in vertical risers at part loads, greater pressure losses are incurred at full loads. This can be compensated for by over sizing the horizontal runs and vertical drop sections. This will however require additional refrigerant charge. Circuits with variable capacity scroll compressors require suction riser traps every 15 feet.

Suction Line Accessories

If the job requirements specify suction accumulators, they must be separately purchased and field installed.

Hot Gas Bypass Line

Hot Gas Bypass is available for use with DX systems that may experience low suction pressure during the operating cycle. This may be due to varying load conditions associated with VAV applications or units supplying a large percentage of outside air. The system is designed to divert refrigerant from the compressor discharge to the low pressure side of the system in order to keep the evaporator from freezing and to maintain adequate refrigerant velocity for oil return at minimum load.

Hot discharge gas is redirected to the evaporator inlet via an auxiliary side connector (ASC) to false load the evaporator when reduced suction pressure is sensed. **Field piping between the condensing unit and the evaporator is required.**

Hot Gas Bypass Piping Considerations for Evaporator above Condensing Unit

Pitch the hot gas bypass (HGB) line downward in the direction of refrigerant flow, toward the evaporator.

When installing hot gas bypass risers, a drain leg must be provided at the lowest point in the system. The drain leg must be vertical, its diameter should be the same as the diameter of the riser, and it should be 1 foot long. Install a sight glass in the drain leg for observation. Run an oil return line, using 1/8 inch capillary tube, 10 feet in length, from the drain leg to the suction line. Connect the oil return line below the sight glass and 1 inch above the bottom of the drain leg.

HGB valves are adjustable. Factory HGB valve settings will be sufficient for most applications, but may require slight adjustments for some applications, including some make up air applications.

R-410A REFRIGERANT TEMPERATURE-PRESSURE CHART									
º F	**PSIG**	**º F**	**PSIG**	**º F**	**PSIG**	**º F**	**PSIG**	**º F**	**PSIG**
20	78.3	**46**	132.2	**72**	207.0	**98**	307.5	**124**	439.6
21	80.0	**47**	134.7	**73**	210.3	**99**	311.9	**125**	445.4
22	81.8	**48**	137.2	**74**	213.7	**100**	316.4	**126**	451.3
23	83.6	**49**	139.7	**75**	217.1	**101**	321.0	**127**	457.3
24	85.4	**50**	142.2	**76**	220.6	**102**	325.6	**128**	463.2
25	87.2	**51**	144.8	**77**	224.1	**103**	330.2	**129**	469.3
26	89.1	**52**	147.4	**78**	227.7	**104**	334.4	**130**	475.4
27	91.0	**53**	150.1	**79**	231.3	**105**	339.3	**131**	481.6
28	92.9	**54**	152.8	**80**	234.9	**106**	344.4	**132**	487.8
29	94.9	**55**	155.5	**81**	238.6	**107**	349.3	**133**	494.1
30	96.8	**56**	158.2	**82**	242.3	**108**	354.2	**134**	500.5
31	98.8	**57**	161.0	**83**	246.0	**109**	359.1	**135**	506.9
32	100.9	**58**	163.8	**84**	249.8	**110**	364.1	**136**	513.4
33	102.9	**59**	166.7	**85**	253.7	**111**	369.1	**137**	520.0
34	105.0	**60**	169.6	**86**	257.5	**112**	374.2	**138**	526.6
34	107.1	**61**	172.5	**87**	261.4	**113**	379.4	**139**	533.3
36	109.2	**62**	175.4	**88**	265.4	**114**	384.6	**140**	540.1

37	111.4	**63**	178.4	**89**	269.4	**115**	389.9	**141**	547.0
38	113.6	**64**	181.5	**90**	273.5	**116**	395.2	**142**	553.9
39	115.8	**65**	184.5	**91**	277.6	**117**	400.5	**143**	560.9
40	118.1	**66**	187.6	**92**	281.7	**118**	405.9	**144**	567.9
41	120.3	**67**	190.7	**93**	285.9	**119**	411.4	**145**	575.1
42	122.7	**68**	193.9	**94**	290.1	**120**	416.9	**146**	582.3
43	125.0	**69**	197.1	**95**	294.4	**121**	422.5	**147**	589.6
44	127.4	**70**	200.4	**96**	298.7	**122**	428.2	**148**	596.9
45	129.8	**71**	203.6	**97**	303.0	**123**	433.9	**149**	604.4

PRIOR TO START-UP

Insure all shipping bolts, screws, and brackets are removed. Inspect all mounting bolts/screws on blowers, motor, coils and mounting brackets.
Check sheave and pulley to ensure alignment, check belt tension, and tighten all set screws.
Check for proper rotation of the blower pulley.
Exchanging two of the three leads at the motor can reverse three phase motor rotation. Note that not all installations will use starters.
Exchanging leads inside the motor junction box can reverse single phase motor rotation.(refer to motor data plate).
Ensure all filters are properly installed and free from construction debris.
Replace all doors, panels etc and check amperage draw of the motor. The amperage draw should not exceed the nameplate amps shown on the motor data plate.

OPERATION AND MAINTENANCE

WARNING

Disconnect electrical power to all circuits before servicing unit. Failure to do so may result in personal injury or death from electrical shock or moving parts.

RETURN AIR FILTERS – Filter access is from either side of unit. Inspect on a regular basis (at least monthly) and clean or replace.

CAUTION

Never operate unit without a filter or with filter access door removed. Damage to blower motor may result.

WATER PIPING

To check or clean, remove unit access panel, filter access door and filters. Use accepted industry methods for cleaning.
Remove all foreign matter from pan and condensate drain line. Check for rust or holes and repair as needed.

BELT AND PULLEY –

Proper pulley alignment and belt tension must be maintained at all times. Speed is reduced by adjusting pulley faces so they are farther apart; speed is increased with faces closer together. Check pulley setscrews and bolts.

Changing Fan Speed With An Adjustable Sheave

Adjustable sheaves are commonly used to change fan speed in light commercial air balancing applications. But how is it done? That is what this section is about. This section will also try and explain how to change the dimensions of a sheave. If you can follow along and become a pro, you can figure out ahead of time what the change in fan speed will be.

Keep in mind that this article appears somewhere else, need to give the proper credit. Here is the link to the original article on how to use an adjustable sheave to change fan speed.

Adjustable sheaves are more expensive than fixed ones, and motor sheaves are smaller than fan sheaves, adjustable sheaves are generally used on the motor shaft and not on the fan shaft.

How They Work

The two halves of an adjustable sheave

As the two sections of an adjustable sheave are turned closer to each other, the belt is forced to the outside of the sheave. This requires the belt to have to travel a greater distance around the sheave.

This increases the speed of the fan, and then the opposite would be true too yeah? If we unscrewed the sheave sections, the belt would need to travel less around the groove…

Sheave Measurement

In order to measure the pitch diameter, where exactly the belt rides on a sheave, you may or may not have to remove the sheave from the shaft. Using calipers, measure the outside diameter of the belt, while it's ***wrapped around*** the sheave. The diameter of the sheave is the actual outside dimension of the sheave. These are usually two different diameters or values.

Screw in or out the sheave in order to increase or decrease the diameter to the calculated size. Now install the belt around the sheave again. Measure the diameter to verify that the right pitch has been dialed in.

After you've measured and adjusted the diameter to the required size, re-install the sheave onto the shaft. You can use an air flow hood to verify that the air flow you expected is being achieved.

Fan Laws

Fan laws are equations or formulas that allow you to calculate belt and sheave changes prior to making them. This saves you time and the hassle of having to make a minor adjustment and measuring again. If you are able to do the math right halve.

Using the first fan law, you are able to calculate the change in sheave diameter you would need in order to increase or decrease fan speed to make the fan deliver your desired, or required, air flow.

1) Start by measuring the air flow at the fan.

- Fan air flow can also be plotted by measuring the fan speed in RPM and the fan operating total external static pressure, and by then plotting the fan air flow in the manufacturer's fan performance tables.

The two pieces of an adjustable sheave side by side.

2) Measure the outside diameter of the belt riding on the sheave.

- Also measure the physical outside diameter of the sheave just to be sure it is large enough to adjust to the required diameter.

Let's use this example.

You have a 3" adjustable motor sheave and the fan delivers 2300 cfm on a system that demands 3000 cfm. Here is the formula with our data:

First, divide 3000 cfm (desired) by 2300 cfm (current) to find the ratio of air flow increase.

3000/2300 = 1.3

This shows us that we are 30% "off" when comparing our required air flow vs. what the fan is actually delivering. So, the air flow needs to increase by 30% for the fan to deliver the required air flow.

Now we multiply the original sheave belt diameter of 3" times 1.3 to find our new sheave belt diameter of 3.9".

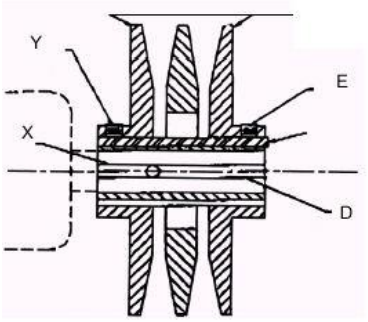
Now you can adjust the motor sheave pitch to 3.9" to raise the air flow to out desired set point of 3000 cfm. This fan law will only work if the sheave diameter is at least 3.9" or so.

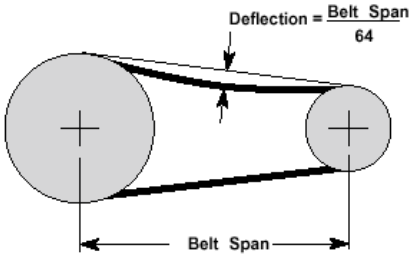
Keep in mind that you can't just go around your building or property and starting increasing the air flow. In our example, we would want to make certain that both the fan and motor have the capacity or rating to now handle 3000 cfm.

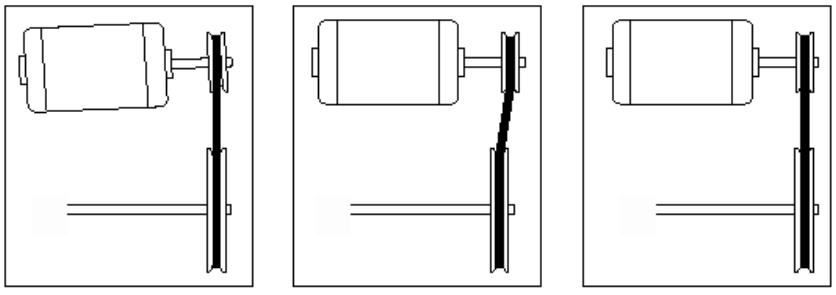
Look at how our fan air flow increased by 30% and sheave size also increased by 30%.

Single Groove Variable Pitch Key Type Sheaves

a) Loosen setscrews “Y” and “C” in moving parts of sheave and pull out external key “E”. (This key projects a small amount to provide a grip for removing.
b) Adjust sheave pitch diameter for desired speed by opening moving parts by half or full turns from closed position. Do not open more than five full turns for “A” belts or six full turns for “B” belts.
c) Replace external key “E” and tighten set screw “Y” over key and set screw “C” into keyway in fixed half of the sheave. Wrench torque 110 in. lbs. min 130 in. lbs. max.
d) Verify sheave alignment, install belts and adjust belt tension. (Do not force belts over grooves.)
e) Future adjustments should be made by loosening the belt tension and increasing or decreasing the pitch diameter of the sheave by half or full turns as required. Readjust belt tension before starting drive.
f) Be sure that all keys are in place and that all set screws are torqued properly before starting drive. Check set screws and belt tension after 24 hours of service

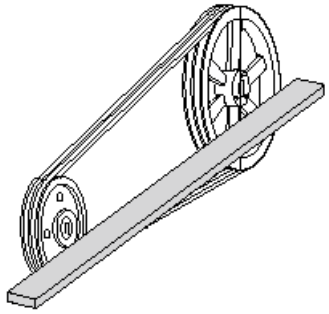






Improper Sheave Alignment

Proper Sheave Alignment



Aligning Sheaves with a Straight Edge

BLOWER RPM

All our AHU are factory set to run at the specified cfm and static pressure, **we are not responsible for the design or field given conditions.** Contractor is responsible for the final balance and verification of the final installation conditions. Failure to do that, can cause blow off water from the coils and damage to the equipment and system due to excessive face velocity over the cooling coils.
The motor sheave is adjustable to allow some RPM field change; if major variation is needed, consult factory for the proper sheave pulley combination.

MOTOR –
Tighten motor mount bracket and base bolts as required.

BLOWER –
Check bearings for wear. Replace as required. Check wheel for accumulation of dirt and clean as required.

LIMITED WARRANTY

Commercial Aire (CAP) warrants this product to be free from defects in factory workmanship and material for a term of ONE YEAR under normal use and service. CAP will, at its option, repair or replace any parts that prove to have such defects according to the terms outlined below. This warranty covers only the equipment described by the product Model and Serial Number listed below.

For your benefit and protection, fax this completed sheet to CAP at (817) 624-8581 promptly after installation. This will initiate the warranty period. In the absence of recorded warranty coverage, the warranty period will begin upon date of manufacture based upon the serial number provided. The warranty period for repair or replacement parts shall not exceed 2 years from date of manufacture.

This warranty extends only to the original consumer purchaser and is non-transferable. For this warranty to apply the product must be installed according to CAP recommendations and specifications, and in accordance with all local, state, and national codes; and the product must not be removed from its place of original installation.

CAP strongly recommends regular periodic preventative maintenance on this equipment. A licensed contractor can ensure your maintenance program meets the conditions of the warranty, maximize the efficiency of the equipment, and service your unit within the mandated guidelines with regard to unlawful discharge of refrigerants into the atmosphere.

This warranty applies only to products installed in the United States and Canada.

For Owner's Information:

PRODUCT MODEL. NO. _____ INSTALLATION DATE_____

UNIT SERIAL NO. _____INSTALLED BY: _____

CONTRACTOR PHONE # _____ CONTRACTOR LICENSE #_____

EXCLUSIONS

This warranty does not cover any:

1. Shipping, labor, or material charges (including Refrigerant).

2. Damages resulting from transportation, installation, or servicing.

3. Damages resulting from: use of the product in a corrosive atmosphere; accident; abuse; fire; flood; alteration; or acts of God. Tampering, altering, defacing or removing the product serial number will void this warranty.

4. Damages resulting from inadequacy or interruption of electrical service or fuel supply, improper voltage conditions, Blown fuses, or other like damages.

5. Cleaning or replacement of filters.

6. Damages resulting from failure to properly and regularly clean air and/or water side of condenser and evaporator.

7. Damages resulting from: (**a**) freezing of condenser water or condensate; (**b**) inadequate or interrupted water supply; (**c**) Use of corrosive water; (**d**) fouling or restriction of the water circuit by foreign material or like causes.

8. Damages resulting from operation with inadequate supply of air or water.

9. Damages resulting from use of components or accessories not manufactured or approved by Commercial Aire.

10. Increase in fuel or electric cost.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Some states do not allow the disclaimer of implied warranty, so the preceding disclaimer may not apply. In states allowing only a partial limitation on implied warranties, the duration of implied warranties is expressly limited to the duration of the express warranty on the face hereof. In no event, whether as a result of breach of warranty or contract, tort (including negligence) strict liability or otherwise, shall CAP be liable of special, incidental, or consequential damages, including (but not limited to) loss of use of equipment or associated equipment, lost revenues, lost profits, cost of substitute equipment or cost of fuel or electricity.

The above limitations shall inure to the benefit of CAP suppliers and sub-contractors. The above limitation on consequential damage shall not apply to injuries to persons in the case of consumer goods. Some states do not allow the exclusion or limitation of liability for consequential, or incidental damages, or for strict liability in tort, so the above exclusions and limitations may not apply.

CAP does not assume or authorize any person to assume for CAP any other liability for the sale of CAP product. This warranty gives you specific legal rights. You may also have other rights, which vary from state to state.

The above warranty applies with respect to parts only and not labor. Accordingly, subject to the conditions and limitations set forth herein, the above warrant entitles the Customer only to receive a repaired or replacement part and not to the installation thereof. However, for the first one (1) year only of the above warranty period, CAP will provide labor services to repair a Product or install repaired or replacement parts at its designated repair facilities, or at its option**, compensate its authorized dealers and authorized contractors at CAP's standard fixed rates then in effect (irrespective of charges actually imposed and time actually expended) to provide such services**

The above warranty is for repair or replacement only. Except to that limited extent, CAP will not under any circumstances be liable for any loss, cost, damage, or expense of any kind arising out of a breach of this warranty or otherwise. Without intending to limit the foregoing sentence, it is specifically provided as follows: CAP SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, EXEMPLARY, SPECIAL, OR PUNITIVE DAMAGES, OR FOR ANY LOSS OF REVENUE, PROFIT OR USE, ARISING OUT OF A BREACH OF THIS WARRANTY (INCLUDING BUT NOT LIMITED TO DAMAGE RESULTING FROM CONDENSATE LEAKAGE) OR IN CONNECTION WITH THE SALE, MAINTENANCE, USE, OPERATION OR REPAIR OF ANY CAP PRODUCT. IN NO EVENT WILL CAP BE LIABLE FOR ANY AMOUNT GREATER THAN THE PURCHASE PRICE OF A DEFECTIVE PRODUCT.

Warranty 07/21/11

COMMERCIAL AIRE PRODUCTS 501 Terminal Road, Fort Worth TX 76106 Tel: 817-624-0820

INSTALLATION CHECK LIST

Job Name:_____ Date:_____

Address:_____

Model:_____

Serial:_____Tag:_____

Contractor:_____

INITIAL CHECKLIST

INSTALLING CONTRACTOR MUST VERIFY THE FOLLOWING ITEMS

1- Did you check the unit for any visible shipping damage?	**YES?___**	**NO?___**
2- Is the unit installed properly level?	**YES?___**	**NO?___**
3- Are the clearances adequate for operation and service?	**YES?___**	**NO?___**
4- Can you open the access doors and removable panels?	**YES?___**	**NO?___**
5- Have all the shipping braces and protections been removed?	**YES?___**	**NO?___**
6- Did you check the incoming voltage against the name plate?	**YES?___**	**NO?___**
7- Have all electrical connections been tested?	**YES?___**	**NO?___**
8- Has over current protection been installed matching the requirements?	**YES?___**	**NO?___**
9- Do the fan rotate freely?	**YES?___**	**NO?___**
10- Is copper tubing isolated from any metal parts?	**YES?___**	**NO?___**
11- Are the filters clean and installed with the proper orientation?	**YES?___**	**NO?___**
12- Have the drain and p-trap checked and properly connected?	**YES?___**	**NO?___**

Ambient Dry Bulb Temperature_____ Ambient Wet Bulb Temperature_____

Supply Fan Details

Alignment Checked?	**YES?___**	**NO?___**
Rotation Checked?	**YES?___**	**NO?___**

Band Size_____

Nameplate Amps_____ Actual Amps_____

Motor RPM_____ Blower RPM_____

Design CFM_____ Actual CFM_____

Design ESP_____ Actual ESP_____

COMMERCIAL AIRE PRODUCTS 501 Terminal Road, Fort Worth TX 76106 Tel: 817-624-0820

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. CAP Warranty Department is available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper start-up, maintenance and servicing of the equipment falls to the owner and qualified licensed technician

ACTION DATE	ACTION TAKEN	NAME/TELEPHONE