

INSTALLATION INSTRUCTIONS

FAS/FHS Series, Package Air Handling Units

6 to 25 Ton Air Conditioners
6 to 20 Ton Heat Pump

These instructions must be read and understood completely before attempting installation

Safety Labeling and Signal Words

DANGER, WARNING, CAUTION, and NOTE

The signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTE** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING**, **CAUTION**, and **NOTE** will be used on product labels and throughout this manual and other manual that may apply to the product.

DANGER – Immediate hazards which will result in severe personal injury or death.

WARNING – Hazards or unsafe practices which could result in severe personal injury or death.

CAUTION – Hazards or unsafe practices which may result in minor personal injury or product or property damage.

NOTE – Used to highlight suggestions which will result in enhanced installation, reliability, or operation.

Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

 **WARNING**

The signal word **CAUTION** is used throughout this manual in the following manner:

 **CAUTION**

Signal Words on Product Labeling

Signal words are used in combination with colors and/or pictures or product labels.

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 **WARNING**

PERSONAL INJURY, AND/OR PROPERTY DAMAGE HAZARD

Failure to carefully read and follow this warning could result in equipment malfunction, property damage, personal injury and/or death.

Installation or repairs made by unqualified persons could result in equipment malfunction, property damage, personal injury and/or death.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with proper tools and test instruments.


Installation must conform with local building codes and with the national Electrical Code NFPA70 current edition or Canadian Electrical Code part 1 CSA C.22.1.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes, the current editions of the National Electrical Code (NEC) NFPA 70.

In Canada refer to the current editions of the Canadian Electrical Code CSA C22.1 Recognize safety information. Recognize safety information. This is the safety-alert

symbol  When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety-alert symbol. **DANGER** identifies the most serious hazards which **will** result in severe personal injury or death. **WARNING** signifies hazards which **could** result in personal injury or death. **CAUTION** is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before performing service or maintenance operations on unit, always turn off main power switch to unit and install lockout tag. Unit may have more than one power switch.



WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

R-410A systems operate at higher pressures than R-22 systems. When working with R-410A systems, use only service equipment and replacement components specifically rated or approved for R-410A service.



WARNING

PERSONAL INJURY AND ENVIRONMENTAL HAZARD

Failure to follow this warning could cause personal injury or death.

Relieve pressure and recover all refrigerant before system repair or final unit disposal.

Wear safety glasses and gloves when handling refrigerants.

Keep torches and other ignition sources away from refrigerants and oils.



CAUTION

CUT HAZARD

Failure to follow this caution may result in personal injury.

Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing units.



CAUTION

CUT HAZARD

Failure to follow this caution may cause equipment damage.

Ensure voltage listed on unit data plate agrees with electrical supply provided for the unit.

TABLE 1

Physical Data, English

6 to 15 Ton Cooling Units

UNIT FAS	072	091	120	150	180
NOMINAL CAPACITY (Tons)	6	7 ¹ / ₂	10	12 ¹ / ₂	15
OPERATING WEIGHT (lb)					
Base Unit with TXV	381	385	405	670	685
Plenum	175	175	175	225	225
FANS					
Qty...Diam. (in.)	1...15	1...15	1...15	2...15	2...15
Nominal Airflow (cfm)	2400	3000	4000	5000	6000
Airflow Range (cfm)	1800–3000	2250–3750	3000–5000	3750–6250	4500–7500
Nominal Motor Hp (Standard Motor)					
208/230–1–60	1.3	2.4	—	—	—
208/230–3–60 and 460–3–60	2.4	2.4	2.4	2.9	3.7
575–3–60	1.0	2.0	2.0	3.0	3.0
Motor Speed (rpm)					
208/230–1–60	1725	1725	—	—	—
208/230–3–60 and 460–3–60	1725	1725	1725	1725	1725
575–3–60	1725	1725	1725	1725	1725
REFRIGERANT	R-410A				
Operating charge (lb) (approx per circuit) [†]	3.0	3.0	1.5/1.5	2.0/2.0	2.5/2.5
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins				
Max Working Pressure (psig)	450				
Face Area (sq ft)	6.67	8.33	10.0	13.25	17.67
No. of Splits	1	1	2	2	2
No. of Circuits per Split	12	15	9	12	16
Split Type...Percentage	—	—		Face...50/50	
Fins/in.	15	15	15	15	15
PIPING CONNECTIONS,					
Quantity...Size (in.)					
DX Coil — Suction (ODF)	1...1 ¹ / ₈	1...1 ¹ / ₈	2...1 ¹ / ₈	2...1 ¹ / ₈	2...1 ¹ / ₈
DX Coil — Liquid Refrigerant (ODF)		1...5 ⁵ / ₈		2...5 ⁵ / ₈	
Steam Coil, In (MPT)		1...2 ¹ / ₂		1...2 ¹ / ₂	
Steam Coil, Out (MPT)		1...1 ¹ / ₂		1...1 ¹ / ₂	
Hot Water Coil, In (MPT)		1...1 ¹ / ₂			1...2
Hot Water Coil, Out (MPT)		1...1 ¹ / ₂			1...2
Condensate (PVC)	1...1 ¹ / ₄ ODM/1 IDF				
FILTERS	Throwaway — Factory Supplied				
Quantity...Size (in.)	4...16 x 24 x 2			4...16 x 20 x 2 4...16 x 24 x 2	
Access Location	Either Side				
STEAM COIL[‡]					
Max Working Pressure (psig at 260°F)	20				
Total Face Area (sq ft)	6.67	6.67	6.67	13.33	13.33
Rows...Fins/in.	1...9	1...9	1...9	1...10	1...10
HOT WATER COIL[‡]					
Max Working Pressure (psig)	150				
Total Face Area (sq ft)	6.67	6.67	6.67	13.33	13.33
Rows...Fins/in.	2...8.5	2...8.5	2...8.5	2...8.5	2...8.5
Water Volume					
(gal)		8.3		13.9	
(ft ³)		1.1		1.85	
LEGEND					
DX —Direct Expansion					
TXV —Thermostatic Expansion Valve					
[†] Units are shipped without refrigerant charge.					
[‡] Field installed accessory only.					

TABLE 1 (Cont.) Physical Data, English 20 and 25 Ton Cooling Units

UNIT FAS	240	300
NOMINAL CAPACITY (Tons)	20	25
OPERATING WEIGHT (lb)		
Base Unit with TXV	730	1050
Plenum	225	325
FANS		
Qty...Diam. (in.)	2...15	2...18
Nominal Airflow (cfm)	8000	10000
Airflow Range (cfm)	6000 – 10000	7500 – 12500
Nominal Motor Hp (Standard Motor)		
208/230-3-60 and 460-3-60	5.0	7.5
575-3-60	5.0	7.5
Motor Speed (rpm)		
208/230-3-60 and 460-3-60	1745	1745
575-3-60	1745	1755
REFRIGERANT	R-410A	
Operating charge (lb) (approx per circuit) [†]	3.5	4.5
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins	
Max Working Pressure (psig)	450	
Face Area (sq ft)	19.88	24.86
No. of Splits	2	2
No. of Circuits per Split	18	20
Split Type...Percentage	Face...50/50	
Fins/in.	17	15
PIPING CONNECTIONS, Quantity...Size (in.)		
DX Coil — Suction (ODF)	2...1 ¹ / ₈	2...1 ³ / ₈
DX Coil — Liquid Refrigerant (ODF)	2... ⁵ / ₈	
Steam Coil, In (MPT)	1...2 ¹ / ₂	
Steam Coil, Out (MPT)	1... ¹ / ₂	
Hot Water Coil, In (MPT)	1...2	
Hot Water Coil, Out (MPT)	1...2	
Condensate (PVC)	1...1 ¹ / ₄ ODM/1 IDF	
FILTERS	Throwaway — Factory Supplied	
Quantity...Size (in.)	4...16 x 20 x 2	4...20 x 24 x 2
Access Location	4...16 x 24 x 2	4...20 x 25 x 2
	Either Side	
STEAM COIL[‡]		
Max Working Pressure (psig at 260°F)	20	
Total Face Area (sq ft)	13.33	15.0
Rows...Fins/in.	1...10	1...10
HOT WATER COIL[‡]		
Max Working Pressure (psig)	150	
Total Face Area (sq ft)	13.33	15.0
Rows...Fins/in.	2...8.5	2...12.5
Water Volume		
(gal)	13.9	14.3
(ft ³)		1.90
LEGEND		
DX — Direct Expansion		
TXV — Thermostatic Expansion Valve		
[†] Units are shipped without refrigerant charge.		
[‡] Field installed accessory only.		

TABLE 1 (Cont.)

Physical Data, SI

6 to 15 Ton Cooling Units

UNIT FAS	072	091	120	150	180
NOMINAL CAPACITY (kW)	21	26	35	43	52
OPERATING WEIGHT (kg)					
Base Unit with TXV	173	175	184	304	311
Plenum	80	80	80	102	102
FANS					
Qty...Diam. (mm)	1...381	1...381	1...381	2...381	2...381
Nominal Airflow (L/s)	1133	1604	1888	2360	2831
Airflow Range (L/s)	850–1416	1203–2006	1416–2360	1770–2949	2124–3539
Nominal Motor kW (Standard Motor)					
208/230–1–60	0.97	1.79	—	—	—
208/230–3–60 and 460–3–60	1.79	1.79	1.79	2.16	2.16
575–3–60	0.75	1.49	1.49	2.24	2.24
Motor Speed (r/s)					
208/230–1–60	28.8	28.8	—	—	—
208/230–3–60 and 460–3–60	28.8	28.8	28.8	28.8	28.8
575–3–60	28.8	28.8	28.8	28.8	28.8
REFRIGERANT	R-410A				
Operating charge (kg) (approx per circuit) [†]	1.36	1.36	0.68/0.68	0.90/0.90	1.13/1.13
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins				
Max Working Pressure (kPag)	3102				
Face Area (sq m)	0.62	0.77	0.93	0.93	1.64
No. of Splits	1	1	2	2	2
No. of Circuits per Split	12	15	9	12	16
Split Type...Percentage	—	—	—	Face...50/50	—
Fins/m	591	591	670	591	591
PIPING CONNECTIONS,					
Quantity...Size (in.)					
DX Coil — Suction (ODF)	1...1 ¹ / ₈	1...1 ¹ / ₈	2...1 ¹ / ₈	2...1 ¹ / ₈	2...1 ¹ / ₈
DX Coil — Liquid Refrigerant (ODF)	1...5 ⁵ / ₈	—	—	2...5 ⁵ / ₈	—
Steam Coil, In (MPT)	1...2 ¹ / ₂	—	—	1...2 ¹ / ₂	—
Steam Coil, Out (MPT)	1...1 ¹ / ₂	—	—	1...1 ¹ / ₂	—
Hot Water Coil, In (MPT)	—	1...1 ¹ / ₂	—	—	1...2
Hot Water Coil, Out (MPT)	—	1...1 ¹ / ₂	—	—	1...2
Condensate (PVC)	1...1 ¹ / ₄ ODM/1 IDF				
FILTERS	Throwaway — Factory Supplied				
Quantity...Size (mm)	4...406 x 610 x 51			4...406 x 508 x 51 4...406 x 610 x 51	
Access Location	Either Side				
STEAM COIL[‡]					
Max Working Pressure (kPag at 126°C)	138				
Total Face Area (sq m)	0.62	0.62	0.62	1.24	1.24
Rows...Fins/m	1...355	1...355	1...355	1...394	1...394
HOT WATER COIL[‡]					
Max Working Pressure (kPag)	1034				
Total Face Area (sq m)	0.62	0.62	0.62	1.24	1.24
Rows...Fins/m	2...335	2...335	2...335	2...335	2...335
Water Volume					
(L)	31.4			52.6	
(m ³)	0.031			0.052	
LEGEND					
DX — Direct Expansion					
TXV — Thermostatic Expansion Valve					
[†] Units are shipped without refrigerant charge.					
[‡] Field installed accessory only.					

TABLE 1 (Cont.)

Physical Data, SI

20 and 25 Ton Cooling Units

UNIT FAS	240	300
NOMINAL CAPACITY (kW)	70	87
OPERATING WEIGHT (kg)		
Base Unit with TXV	331	477
Plenum	102	148
FANS		
Qty...Diam. (mm)	2...381	2...457
Nominal Airflow (L/s)	3775	4119
Airflow Range (L/s)	2831 – 4719	3539 – 5899
Nominal Motor kW (Standard Motor)		
208/230–3–60 and 460–3–60	3.73	5.60
575–3–60	3.73	5.60
Motor Speed (r/s)		
208/230–3–60 and 460–3–60	29.1	29.1
575–3–60	29.1	29.3
REFRIGERANT	R-410A	
Operating charge (kg) (approx per circuit) [†]	1.59	2.04
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins	
Max Working Pressure (kPag)	3102	
Face Area (sq m)	1.85	2.30
No. of Splits	2	2
No. of Circuits per Split	18	20
Split Type...Percentage	Face...50/50	
Fins/m	670	591
PIPING CONNECTIONS, Quantity...Size (in.)		
DX Coil — Suction (ODF)	2...1 ¹ / ₈	2...1 ³ / ₈
DX Coil — Liquid Refrigerant (ODF)	2... ⁵ / ₈	
Steam Coil, In (MPT)	1...2 ¹ / ₂	
Steam Coil, Out (MPT)	1... ¹ / ₂	
Hot Water Coil, In (MPT)	1...2	
Hot Water Coil, Out (MPT)	1...2	
Condensate (PVC)	1...1 ¹ / ₄ ODM/1 IDF	
FILTERS	Throwaway — Factory Supplied	
Quantity...Size (mm.)	4...406 x 508 x 51	4...508 x 610 x 51
	4...406 x 610 x 51	4...508 x 635 x 51
Access Location	Either Side	
STEAM COIL[‡]		
Max Working Pressure (kPag at 126°C)	138	
Total Face Area (sq m)	1.24	1.39
Rows...Fins/m	1...394	1...394
HOT WATER COIL[‡]		
Max Working Pressure (kPag)	1034	
Total Face Area (sq m)	1.24	1.39
Rows...Fins/m	2...335	2...335
Water Volume		
(L)	52.6	54.1
(m ³)	0.052	0.054
LEGEND		
DX — Direct Expansion		
TXV — Thermostatic Expansion Valve		
[†] Units are shipped without refrigerant charge.		
[‡] Field installed accessory only.		

TABLE 1 (Cont.)

Physical Data, English

6 to 15 Ton Heat Pump Units

UNIT FHS	072	091	120	180
NOMINAL CAPACITY (Tons)	6	7½	10	15
OPERATING WEIGHT (lb)				
Base Unit with TXV	385	385	427	713
Plenum	175	175	175	225
FANS				
Qty...Diam. (in.)	1...15	1...15	1...15	2...15
Nominal Airflow (cfm)	2400	3000	4000	6000
Airflow Range (cfm)	1800–3000	2250–3750	3000–5000	4500–7500
Nominal Motor Hp (Standard Motor)				
208/230–1–60	1.3	2.4	—	—
208/230–3–60 and 460–3–60	2.4	2.4	2.4	3.7
575–3–60	1.0	2.0	2.0	3.0
Motor Speed (rpm)				
208/230–1–60	1725	1725	—	—
208/230–3–60 and 460–3–60	1725	1725	1725	1725
575–3–60	1725	1725	1725	1725
REFRIGERANT	R-410A			
Operating charge (lb) (approx per circuit) [†]	3.0	3.0	2.0/2.0	3.0/3.0
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins			
Max Working Pressure (psig)	650			
Face Area (sq ft)	8.33	8.33	10.0	16.56
No. of Splits	1	1	2	2
No. of Circuits per Split	15	12	9	10
Split Type...Percentage	—	—	Face...50/50	Face...50/50
Rows...Fins/in.	3...15	4...15	4...15	4...15
PIPING CONNECTIONS,				
Quantity...Size (in.)				
DX Coil — Suction (ODF)	1...1⅛	1...1⅛	2...1⅛	2...1⅛
DX Coil — Liquid Refrigerant (ODF)	1...5/8	1...5/8	2...5/8	2...5/8
Steam Coil, In (MPT)	1...2½	1...2½	1...2½	1...2½
Steam Coil, Out (MPT)	1...1½	1...1½	1...1½	1...1½
Hot Water Coil, In (MPT)	1...1½	1...1½	1...1½	1...2
Hot Water Coil, Out (MPT)	1...1½	1...1½	1...1½	1...2
Condensate (PVC)	1...1¼ ODM/1 IDF			
FILTERS	Throwaway — Factory Supplied			
Quantity...Size (in.)	4...16 x 24 x 2			4...16 x 20 x 2 4...16 x 24 x 2
Access Location	Either Side			
STEAM COIL[‡]				
Max Working Pressure (psig at 260°F)	20			
Total Face Area (sq ft)	6.67	6.67	6.67	13.33
Rows...Fins/in.	1...9	1...9	1...9	1...10
HOT WATER COIL[‡]				
Max Working Pressure (psig)	150			
Total Face Area (sq ft)	6.67	6.67	6.67	13.33
Rows...Fins/in.	2...8.5	2...8.5	2...8.5	2...8.5
Water Volume				
(gal)		8.3		13.9
(ft ³)		1.1		1.85
LEGEND				
DX — Direct Expansion				
TXV — Thermostatic Expansion Valve				
[†] Units are shipped without refrigerant charge.				
[‡] Field installed accessory only.				

TABLE 1 (Cont.) Physical Data, English 20 Ton Heat Pump Units

UNIT FHS	240
NOMINAL CAPACITY (Tons)	20
OPERATING WEIGHT (lb)	
Base Unit with TXV	720
Plenum	140
FANS	
Qty...Diam. (in.)	2...15
Nominal Airflow (cfm)	8000
Airflow Range (cfm)	6000–10000
Nominal Motor Hp (Standard Motor)	
208/230–3–60 and 460–3–60	5.0
575–3–60	5.0
Motor Speed (rpm)	
208/230–3–60 and 460–3–60	1745
575–3–60	1745
REFRIGERANT	R-410A
Operating charge (lb) (approx per circuit)[†]	3.5/3.5
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins
Max Working Pressure (psig)	650
Face Area (sq ft)	19.9
No. of Splits	2
No. of Circuits per Split	2
Split Type...Percentage	Face...50/50
Rows...Fins/in.	4...15
PIPING CONNECTIONS,	
Quantity...Size (in.)	
DX Coil — Suction (ODF)	2...1 ¹ / ₈
DX Coil — Liquid Refrigerant (ODF)	2...5 ⁵ / ₈
Steam Coil, In (MPT)	1...2 ¹ / ₂
Steam Coil, Out (MPT)	1...1 ¹ / ₂
Hot Water Coil, In (MPT)	1...2
Hot Water Coil, Out (MPT)	1...2
Condensate (PVC)	1...1 ¹ / ₄ ODM/1 IDF
FILTERS	Throwaway — Factory Supplied
Quantity...Size (in.)	4...16 x 20 x 2 4...16 x 24 x 2
Access Location	Right or Left Side
STEAM COIL[‡]	
Max Working Pressure (psig at 260°F)	20
Total Face Area (sq ft)	13.33
Rows...Fins/in.	1...10
HOT WATER COIL[‡]	
Max Working Pressure (psig)	150
Total Face Area (sq ft)	13.33
Rows...Fins/in.	2...8.5
Water Volume	
(gal)	13.9
(ft ³)	1.85
LEGEND	
DX —Direct Expansion	
TXV —Thermostatic Expansion Valve	
[†] Units are shipped without refrigerant charge.	
[‡] Field installed accessory only.	

TABLE 1 (Cont.)

Physical Data, SI

6 to 15 Ton Heat Pump Units

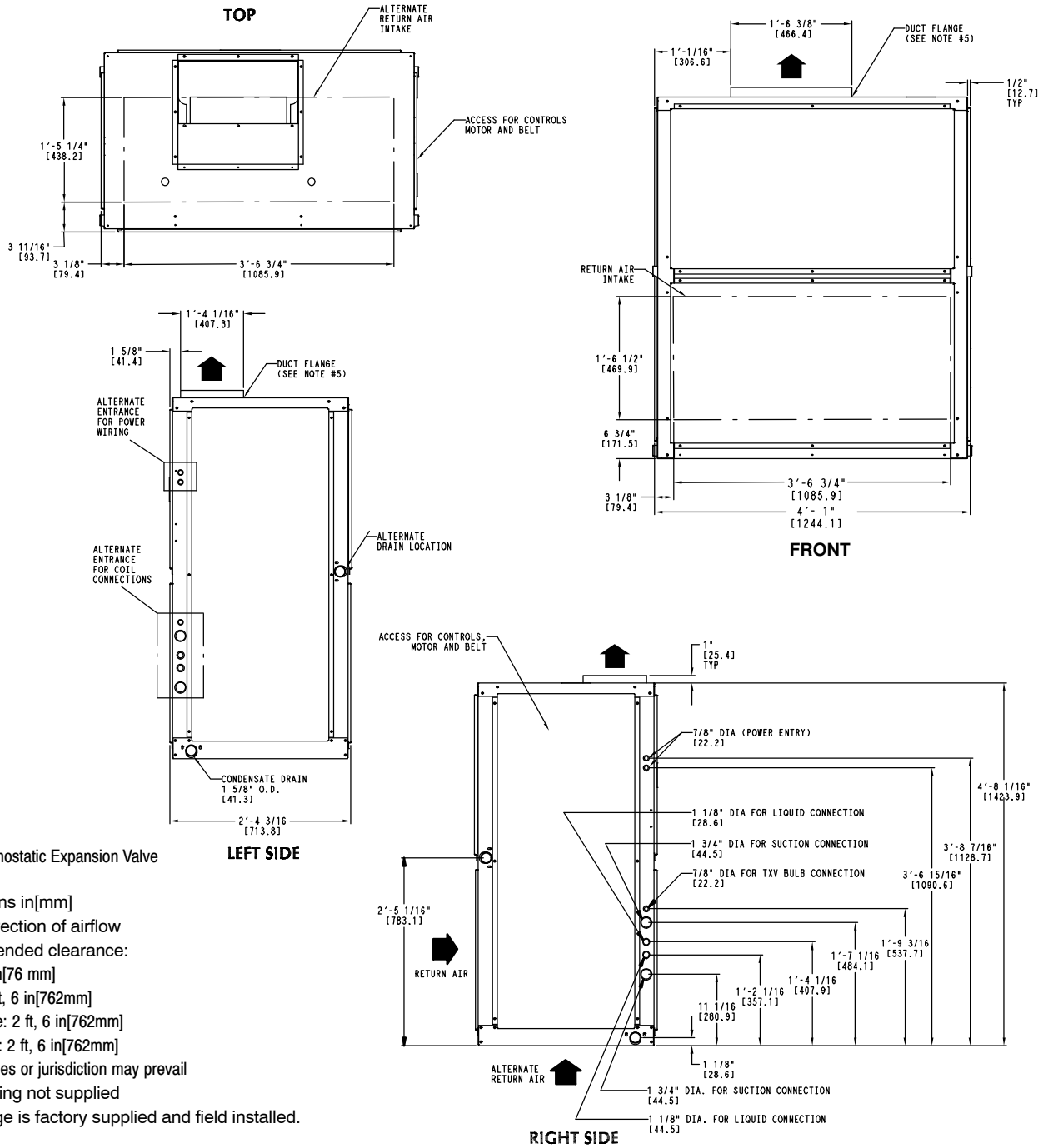
UNIT FHS	072	091	120	180
NOMINAL CAPACITY (kW)	21	26	35	52
OPERATING WEIGHT (kg)				
Base Unit with TXV	175	175	194	323
Plenum	80	80	80	102
FANS				
Qty...Diam. (mm)	1...381	1...381	1...381	2...381
Nominal Airflow (L/s)	1133	1604	1888	2831
Airflow Range (L/s)	850–1416	1203–2006	1416–2360	2124–3539
Nominal Motor kW (Standard Motor)				
208/230–1–60	0.97	1.79	—	—
208/230–3–60 and 460–3–60	1.79	1.79	1.79	2.76
575–3–60	0.75	1.49	1.49	2.24
Motor Speed (r/s)				
208/230–1–60	28.8	28.8	—	—
208/230–3–60 and 460–3–60	28.8	28.8	28.8	28.8
575–3–60	28.8	28.8	28.8	28.8
REFRIGERANT	R-410A			
Operating charge (kg) (approx per circuit) [†]	1.36	1.36	0.91/0.91	1.36/1.36
DIRECT-EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine-Wave Fins			
Max Working Pressure (kPag)	4482			
Face Area (sq m)	0.77	0.77	0.93	1.54
No. of Splits	1	1	2	2
No. of Circuits per Split	12	12	9	10
Split Type...Percentage	—	—	Face...50/50	Face...50/50
Rows...Fins/m	3...591	3...591	3...591	4...591
PIPING CONNECTIONS,				
Quantity...Size (in.)				
DX Coil — Suction (ODF)	1...1 ¹ / ₈	1...1 ¹ / ₈	2...1 ¹ / ₈	2...1 ¹ / ₈
DX Coil — Liquid Refrigerant (ODF)	1... ⁵ / ₈	1... ⁵ / ₈	2... ⁵ / ₈	2... ⁵ / ₈
Steam Coil, In (MPT)	1...2 ¹ / ₂	1...2 ¹ / ₂	1...2 ¹ / ₂	1...2 ¹ / ₂
Steam Coil, Out (MPT)	1...1 ¹ / ₂	1...1 ¹ / ₂	1...1 ¹ / ₂	1...1 ¹ / ₂
Hot Water Coil, In (MPT)	1...1 ¹ / ₂	1...1 ¹ / ₂	1...1 ¹ / ₂	1...2
Hot Water Coil, Out (MPT)	1...1 ¹ / ₂	1...1 ¹ / ₂	1...1 ¹ / ₂	1...2
Condensate (PVC)	1...1 ¹ / ₄ ODM/1 IDF			
FILTERS	Throwaway — Factory Supplied			
Quantity...Size (mm)	4...406 x 610 x 51			4...406 x 508 x 51 4...406 x 610 x 51
Access Location	Either Side			
STEAM COIL[‡]				
Max Working Pressure (kPag at 126°C)	138			
Total Face Area (sq m)	0.62	0.62	0.62	1.24
Rows...Fins/m	1...355	1...355	1...355	1...394
HOT WATER COIL[‡]				
Max Working Pressure (kPag)	1034			
Total Face Area (sq m)	0.62	0.62	0.62	1.24
Rows...Fins/m	2...335	2...335	2...335	2...335
Water Volume				
(L)				52.6
(m ³)	31.4 0.031			0.052
LEGEND				
DX — Direct Expansion				
TXV — Thermostatic Expansion Valve				
[†] Units are shipped without refrigerant charge.				
[‡] Field installed accessory only.				

TABLE 1 (Cont.) Physical Data, SI 20 Ton Heat Pump Units

UNIT FHS	240
NOMINAL CAPACITY (kW)	70
OPERATING WEIGHT (kg)	
Base Unit with TXV	326
Plenum	44
FANS	
Qty...Diam. (mm)	2...381
Nominal Airflow (L/s)	3775
Airflow Range (L/s)	2831–4719
Nominal Motor kW (Standard Motor)	
208/230–3–60 and 460–3–60	3.73
575–3–60	3.73
Motor Speed (r/s)	
208/230–3–60 and 460–3–60	29.1
575–3–60	29.1
REFRIGERANT	R–410A
Operating charge (kg) (approx per circuit) [†]	1.59/1.59
DIRECT–EXPANSION COIL	Enhanced Copper Tubes, Aluminum Sine–Wave Fins
Max Working Pressure (kPag)	4482
Face Area (sq m)	1.85
No. of Splits	2
No. of Circuits per Split	2
Split Type...Percentage	Face...50/50
Fins/m	591
PIPING CONNECTIONS,	
Quantity...Size (in.)	
DX Coil — Suction (ODF)	2...1 ¹ / ₈
DX Coil — Liquid Refrigerant (ODF)	2... ⁵ / ₈
Steam Coil, In (MPT)	1...2 ¹ / ₂
Steam Coil, Out (MPT)	1...1 ¹ / ₂
Hot Water Coil, In (MPT)	1...2
Hot Water Coil, Out (MPT)	1...2
Condensate (PVC)	1...1 ¹ / ₄ ODM/1 IDF
FILTERS	Throwaway — Factory Supplied
Quantity...Size (mm)	4...406 x 610 x 51 4...406 x 508 x 51
Access Location	Right or Left Side
STEAM COIL[‡]	
Max Working Pressure (kPag at 126° C)	138
Total Face Area (sq m)	1.24
Rows...Fins/m	1...394
HOT WATER COIL[‡]	
Max Working Pressure (kPag)	1034
Total Face Area (sq m)	1.24
Rows...Fins/m	2...335
Water Volume	
(L)	52.6
(m ³)	0.052
LEGEND	
DX — Direct Expansion	
TXV — Thermostatic Expansion Valve	
[†] Units are shipped without refrigerant charge.	
[‡] Field installed accessory only.	

Figure 1A

Dimensions – Sizes 6 – 10 Ton



LEGEND

TXV - Thermostatic Expansion Valve

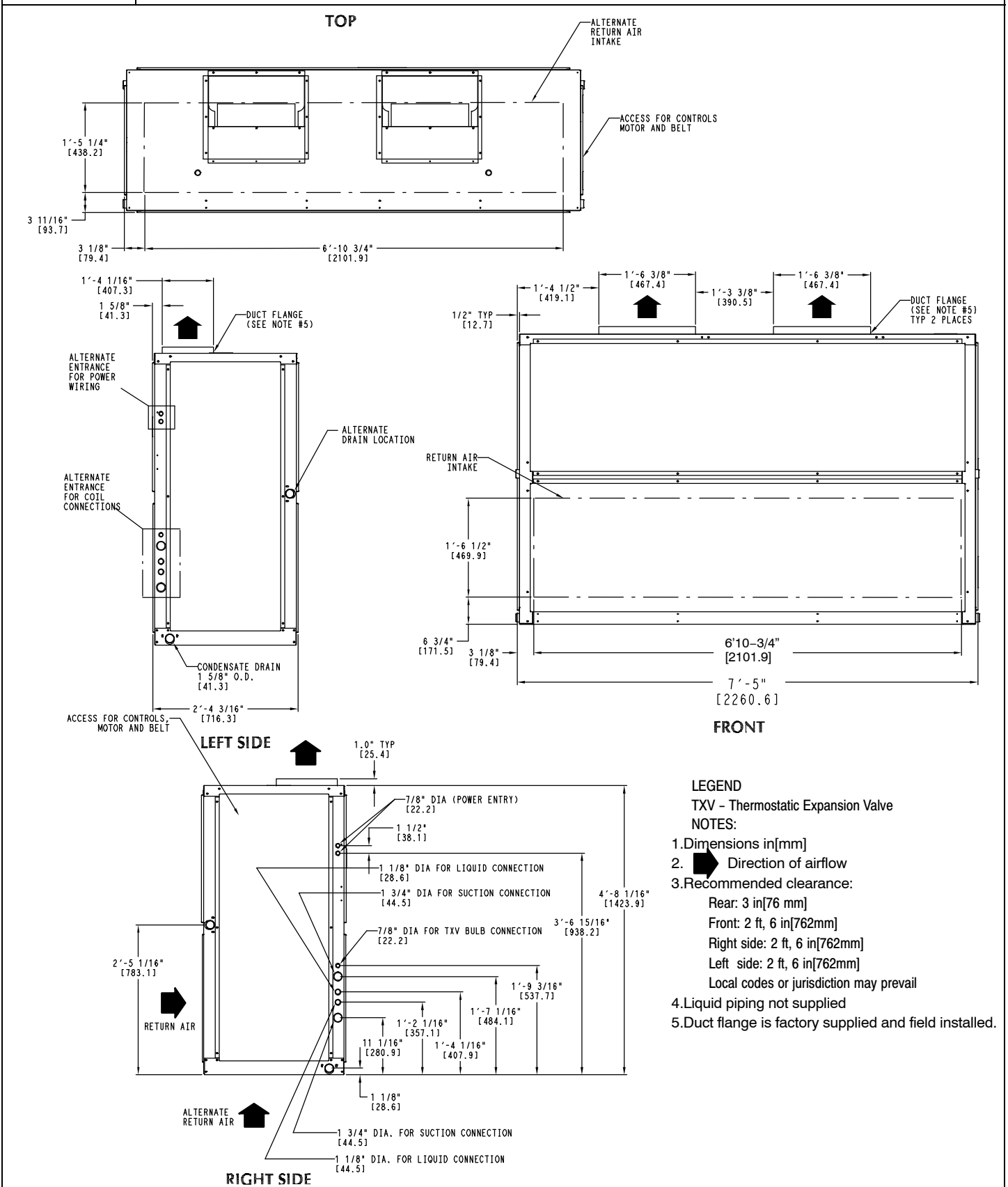
NOTES:

1. Dimensions in [mm]
2. Direction of airflow
3. Recommended clearance:
 - Rear: 3 in [76 mm]
 - Front: 2 ft, 6 in [762mm]
 - Right side: 2 ft, 6 in [762mm]
 - Left side: 2 ft, 6 in [762mm]
 Local codes or jurisdiction may prevail
4. Liquid piping not supplied
5. Duct flange is factory supplied and field installed.

COOLING UNIT	UNIT WEIGHT lb(kg)
FAS072	381 (173)
FAS091	385 (175)
FAS120	405 (184)

HEAT PUMP UNIT	UNIT WEIGHT lb(kg)
FHS072	385 (175)
FHS091	385 (175)
FHS120	427 (194)

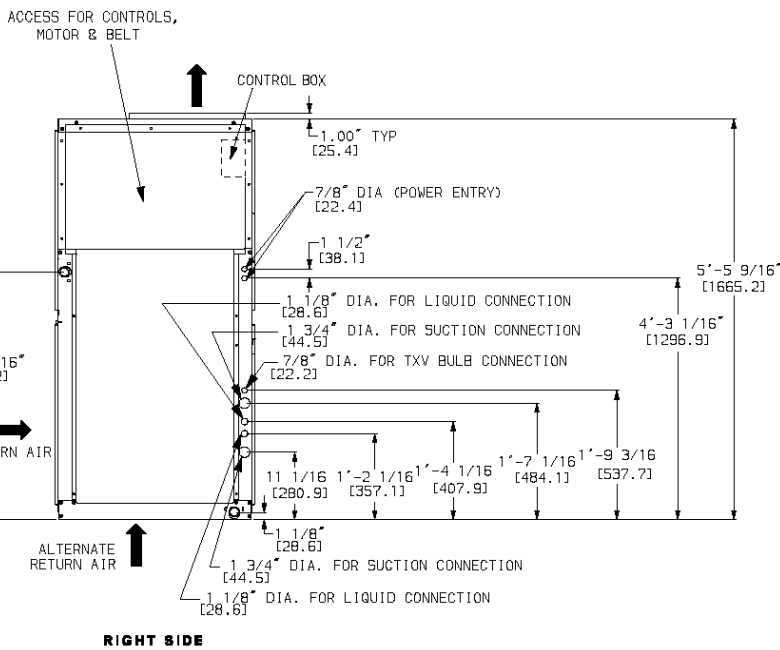
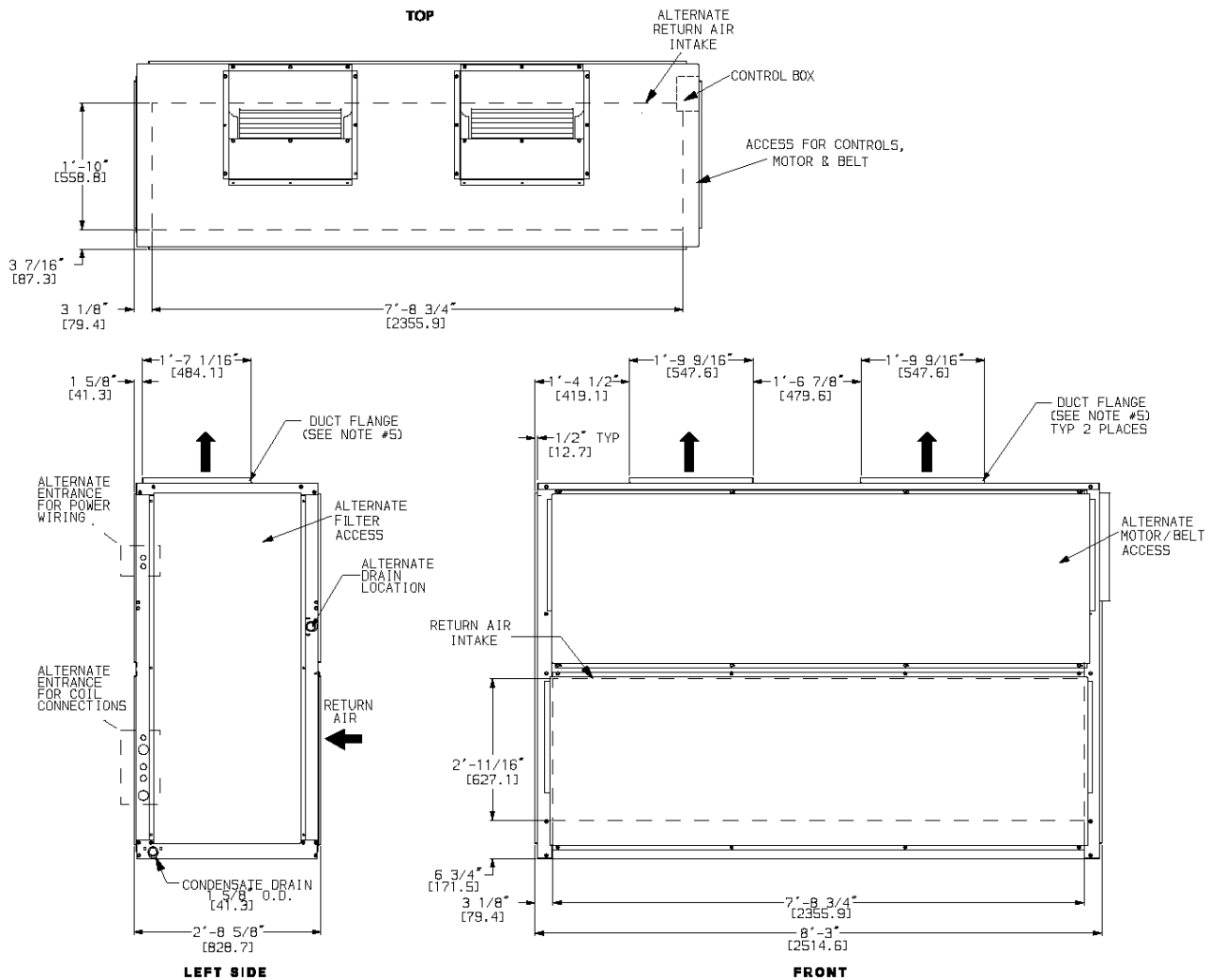
Figure 1B Dimensions – Size 12.5 – 20 Ton



UNIT	WEIGHT lb(kg)	UNIT	WEIGHT lb(kg)
FAS150	670 (304)	FHS180	713 (323)
FAS180	685 (311)	FHS240	720 (326)
FAS240	730 (331)		

Figure 1C

Dimensions – Size 25 Ton



LEGEND

TXV — Thermostatic Expansion Valve

NOTES:

- Dimensions in [] are in millimeters.
- Direction of airflow.
- Recommended clearance:
 - Rear: 3 in. [914 mm] (2 ft, 6 in. [762 mm] with electric heat accessory)
 - Front: 2 ft, 6 in. [762 mm]
 - Right Side: 2 ft, 6 in. [762 mm]
 - Left Side: 2 ft, 6 in. [762 mm]
 - Local codes or jurisdiction may prevail.
- Liquid piping not supplied by Carrier.
- Duct flange is factory supplied and field installed.
- FAS may require alternate or additional field fabricated piping access holes

UNIT	WEIGHT lb(kg)
FAS300	1050 (477)

PRE-INSTALLATION

1. The power supply (v, ph, and Hz) must correspond to that specified on unit rating plate.
2. The electrical supply provided by the utility must be sufficient to handle load imposed by this unit.
3. Refer to Installation, General section and Figure 1A and Figure 1B for locations of electrical inlets, condensate drain, duct connections, and required clearances before setting unit in place.
4. This installation must conform with local building codes and with the NEC (National Electrical Code) or ANSI (American National Standards Institute)/NFPA (National Fire Protection Association) latest revision. Refer to provincial and local plumbing or wastewater codes and other applicable local codes.

Moving and Storage — To transfer unit from truck to storage site, use a fork truck. Do not stack units more than two high during storage. If unit is to be stored for more than two weeks before installation, choose a level, dry storage site free from vibration. Do not remove plastic wrap or skid from unit until final installation.

Rigging — All units can be rigged by using the shipping skid. Units are shipped fully assembled. Do not remove shipping skids or protective covering until unit is ready for final placement; damage to bottom panels can result. Use slings and spreader bars as applicable to lift unit.

INSTALLATION

General – Allow the following clearances for service access and airflow:

- Rear: 3 ft (914 mm) [2¹/₂ ft (762 mm) with electric heat accessory]
- Front: 2¹/₂ ft (762 mm)
- Right Side: 3¹/₂ ft (1067 mm)
- Left Side: 2¹/₂ ft (762 mm)

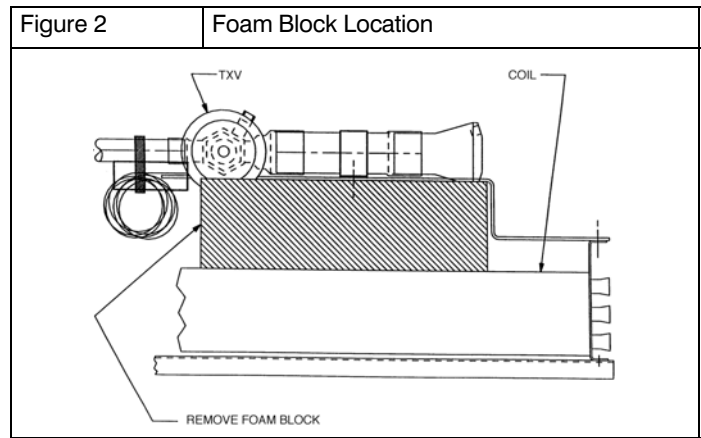
For units equipped with an economizer, refer to the accessory installation instructions for additional clearance requirements. Be sure floor, wall, or ceiling can support unit weight (Figures 1A – 1C). See Fig. 1A – 1C for dimensions.

Uncrating — Move unit as near as possible to final location before removing shipping skid. Remove metal banding, top skid, and plastic wrap. Examine unit for shipping damage. If shipping damage is evident, file claim with transportation agency. Remove base skid just prior to actual installation.

Check nameplate information against available power supply and model number description in Model Nomenclature.

NOTE: Be sure to remove the styrofoam shipping pad from the thermostatic expansion valve (TXV). Verify that it has been removed. See Figure 2.

Accessories — Refer to instructions shipped with each accessory for specific information.



Unit Positioning – The unit can be mounted on the floor for vertical application with return air entering the face of the unit and supply air discharging vertically through the top of the unit. The unit can also be applied in a horizontal arrangement with return air entering horizontally and the supply air discharging horizontally. When applying the unit in a horizontal arrangement, ensure the condensate drain pan is located at the bottom center of the unit for adequate condensate disposal. See Figure 3 for condensate connections for each unit position.

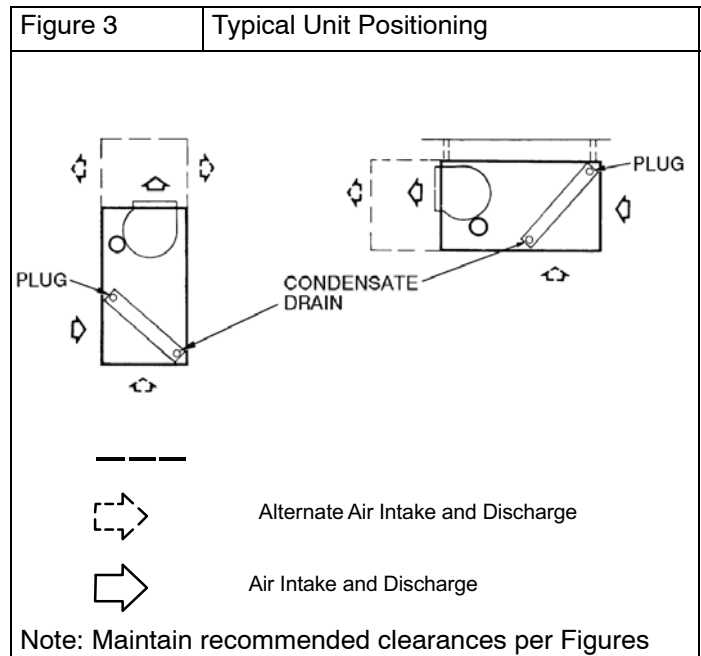


CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in unit damage or improper operation.

Do not attempt to install unit with return air entering top panel of unit. Condensate will not drain from unit.



Typical positioning and alternate return air locations are shown in Figure 3. Alternate return air locations can be used by moving the unit panel from the alternate return air location to the standard return air location. Refer to overhead suspension accessory drawing (Figure 4) for preferred suspension technique. The unit needs support underneath to prevent sagging.

Unit Isolation – Where extremely quiet operation is essential, install isolators between floor and base of unit, or between ceiling and top section of unit.

Be sure that unit is level and adequately supported. Use channels at front and sides of unit for reference points when leveling.

Refrigerant Piping Access – The units come with standard knockouts for refrigerant piping. These knockouts are located on both sides of the unit for installation flexibility. The standard knockouts provide sufficient access to the unit's coils for all units. See Figure 5 for the positions. Recommended access hole use is also listed for all units. Note that Figure 5 shows the access holes on the control-box side of the unit; this is the side of the unit with the coil headers, so it is used most often for piping access.



CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in improper operation.

Do not bury refrigerant piping underground.

Refrigerant Piping – See Table 1 for refrigerant pipe connection sizes. For ease in brazing, it is recommended that all internal solder joints be made before unit is placed in final position.

The direct-expansion units have internal factory-installed thermostatic expansion valves (TXVs), distributors, and nozzles for use with R-410A. Knockouts are provided in the unit corner posts for refrigerant piping. See Figure 5, which also lists recommended knockouts and access holes to use for each FAS/FHS unit size. Recommended fittings are listed in Table 3.

The sensor bulb capillary tubes must be routed from the TXVs inside the unit through one of the piping access holes. Clamp the TXV sensor bulb on a vertical portion of the suction line, outside the unit. See Figure 6.

NOTE: Be sure to remove the styrofoam shipping pad from the TXV. Verify that it has been removed. See Figure 2.

NOTE: Do not attach the sensor to the suction manifold. do NOT mount the sensor on a trapped portion of the suction line.

The evaporator coils have a face-split design. Ensure that lower circuit of coil is first on/last off when connected to the condensing unit and/or system controls. See Figure 7.

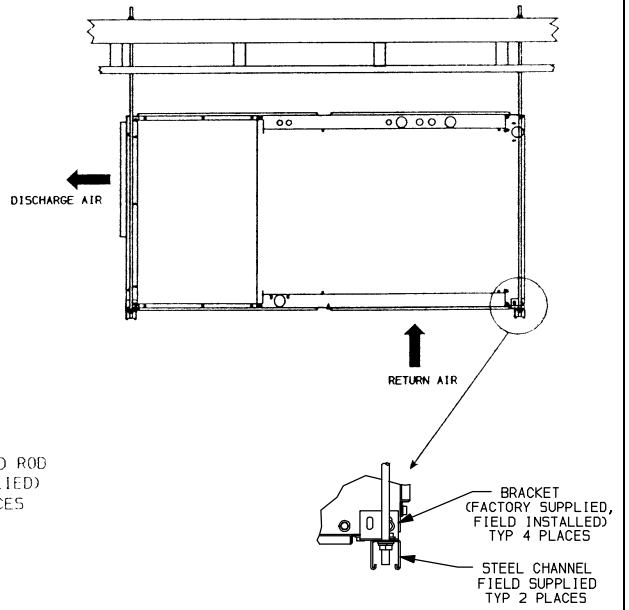
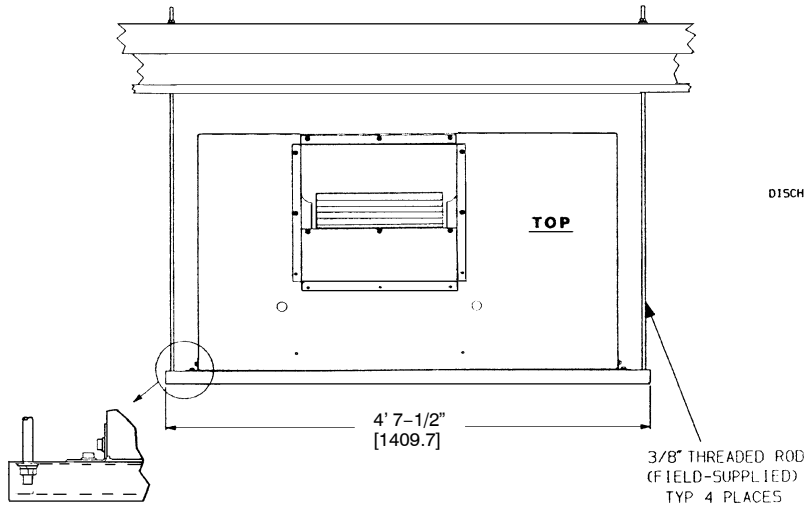
External TXV equalizer connections are provided and factory-brazed into the coil suction manifolds.

If suction line must be horizontal, clamp bulb to suction line at least 45 degrees above bottom, at approximately the 4 o'clock or 8 o'clock position. See Figure 8.

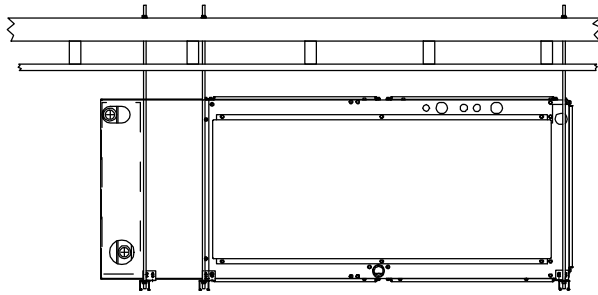
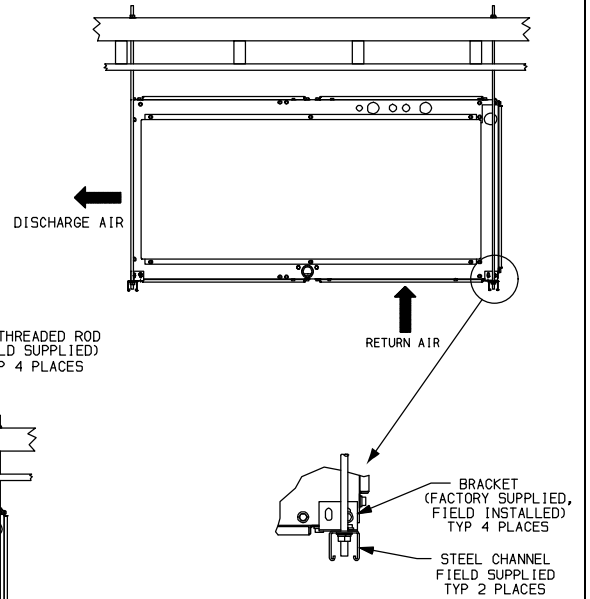
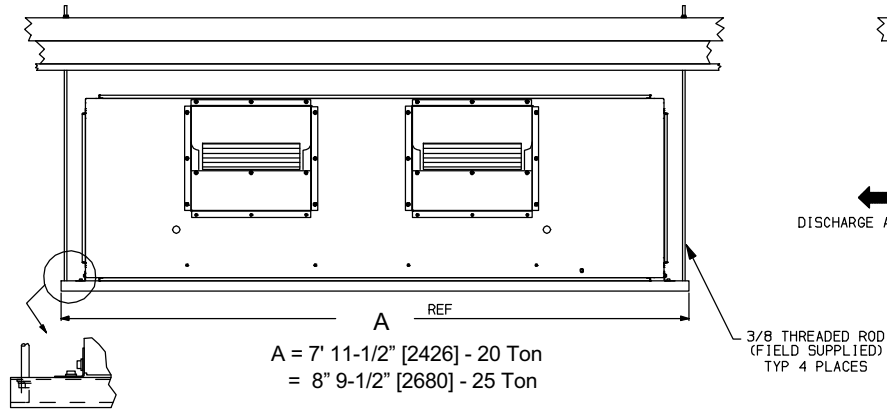
Figure 4

Preferred Suspension Technique – Overhead Suspension Accessory

UNIT SIZES 6 - 10 TON

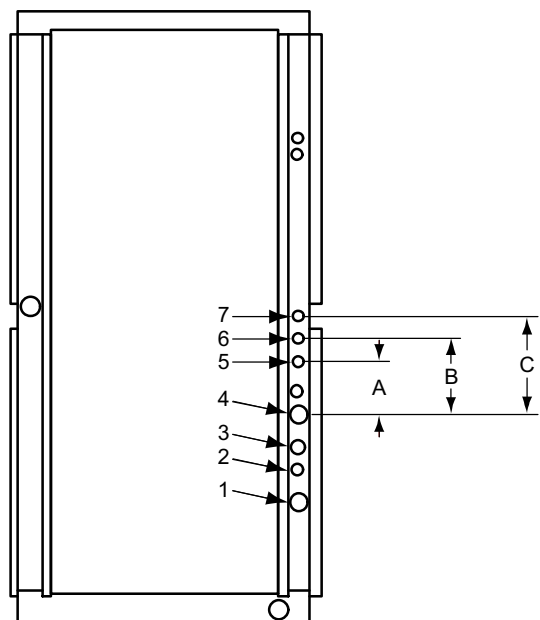


UNIT SIZES 12.5 - 25 TON



OVERHEAD SUSPENSION ACCESSORY WITH HOT WATER COIL

Figure 5 Refrigerant Piping Access Holes

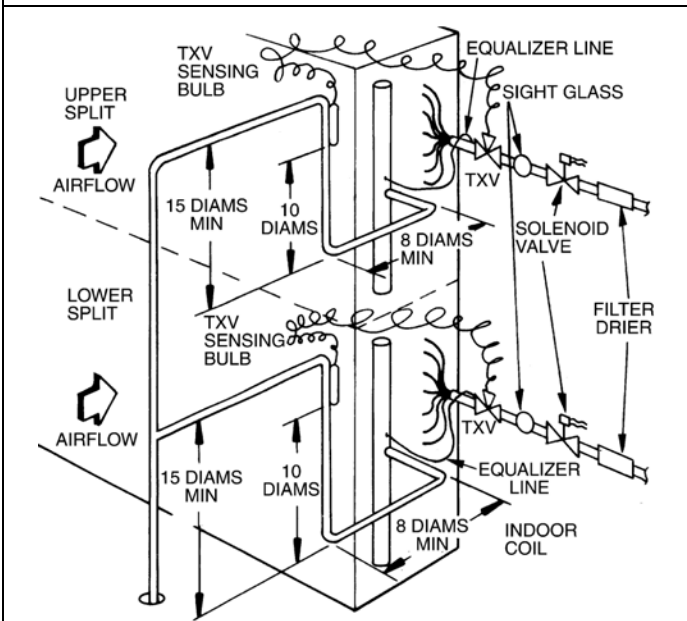


UNIT	USE HOLE NUMBERS	FIELD-FABRICATED HOLE DIAMETERS in. (mm)			FIELD-FABRICATED HOLE POSITION DIMENSIONS in. (mm)		
		No. 5	No. 6	No. 7	A	B	C
FAS072, 091 FHS072, 091	1, 3	—	—	—	—	—	—
FAS120, 150, 180 FHS120	1, 2, 3, 4	—	—	—	—	—	—
FHS180	3 ^ø , 5, 6, 7	1 ¹ / ₈ (28.6)	1 ¹ / ₈ (28.6)	1 ³ / ₄ (44.5)	3.25 (82.6)	6.125 (155.6)	10.38 (263.7)
FAS240, 300	1, 2, 3, 4	—	—	—	—	—	—
FHS240	3*, 5, 6, 7	1 ¹ / ₈ (28.6)	1 ¹ / ₈ (28.6)	1 ³ / ₄ (44.5)	3.25 (82.6)	6.125 (155.6)	10.38 (263.7)

*Must be enlarged from 1¹/₈ in. (28.6mm) to 1³/₄ in. (44.5mm)
 NOTE: Access hole knockouts 1–4 are factory-supplied.

Figure 6 Face-Split Coil Suction and Liquid Line Piping (Typical)

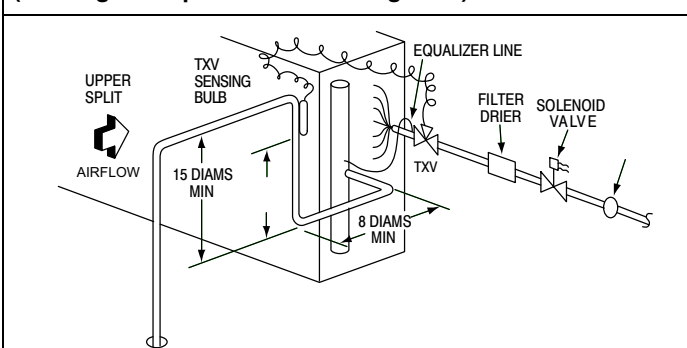
Dual Circuit Coil Piping Configuration FAS120-300, FHS120-240 (For single compressor condensing units)



TXV - Thermostatic Expansion Valve

NOTE - Component location arrangement shown for field installation of sight glasses, solenoid valves, filter driers, and TXV sensing bulbs. The TXV's and equalizer lines are factory installed.

Single Circuit Coil Piping Configurations- FAS/FHS072/091 (For single compressor condensing units)



TXV - Thermostatic Expansion Valve

Figure 7 Typical Evaporator Coil Connections

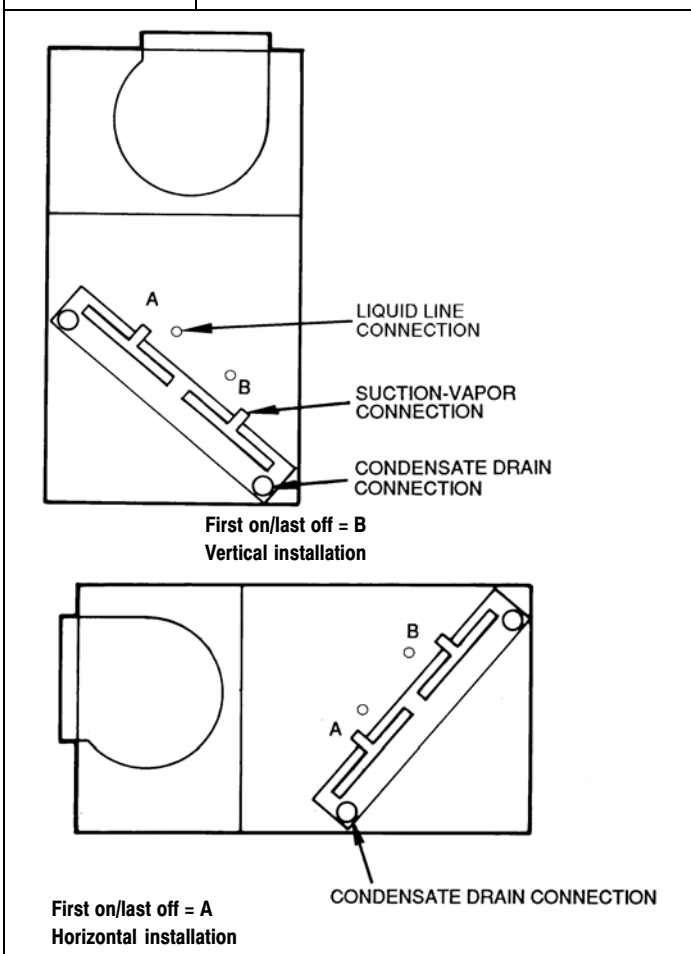
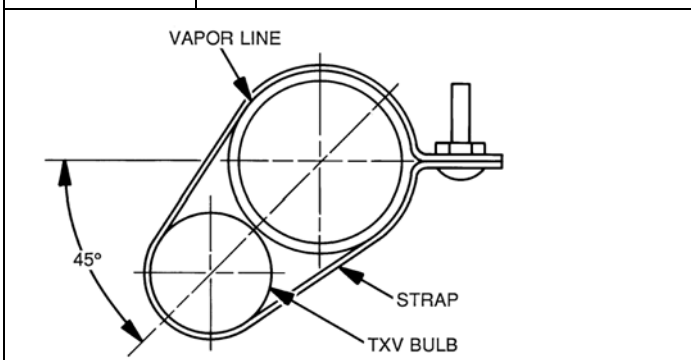


Figure 8 TXV Sensing Bulb Location



TXV - Thermostatic Expansion Valve

NOTE - The 8 o'clock position is shown above

TABLE 2

Factory Installed Nozzle and Distributor Data

6 to 25 Ton

UNIT	COIL TYPE STD	TXV Qty...Part No.	DISTRIBUTOR Qty...Part No.	FEEDER TUBES PER DISTRIBUTOR [‡] Qty...Size (in.)	NOZZLE Qty...Part No.
FAS072	4 Row	2...1178405	1...1178408	12... ¹ / ₄	1...1178410
FHS072	3 Row	2...1178405	1...1178412	15... ¹ / ₄	1...1178411
FAS091	4 Row	1...1178406	1...1178412	15... ¹ / ₄	1...1178411
FHS091	4 Row	1...1183553	1...1178407	12... ³ / ₁₆	1...1178411
FAS120	4 Row	2...1178404	2...1178408	9... ¹ / ₄	2...1178409
FHS120	4 Row	2...1178405	2...1178407	9... ³ / ₁₆	2...1178409
FHS180	4 Row	2...1183553	2...1178407	10... ³ / ₁₆	2...1178411
FAS150	4 Row	2...1178405	2...1178407	12... ³ / ₁₆	2...1178409
FAS180	4 Row	2...1178406	2...1178412	16... ³ / ₁₆	2...1178410
FAS240	4 Row	2...1183553	2...1175454	18... ³ / ₁₆	2...1179769
FAS300	4 Row	2...1183751	2...1173485	20... ³ / ₁₆	2...1179803
FHS240	4 Row	2...1183750	2...1175455	2-12... ³ / ₁₆	2...1171352

[‡] Feeder tube size is ¹/₄ in. (6.35 mm).
 NOTE: Hot gas bypass applications require field-supplied auxiliary side connector.

TABLE 3

FITTING REQUIREMENTS

6 to 25 Ton

UNIT	ACCESS HOLE NO [‡]	CONNECTION TYPE	CIRCUIT	FITTINGS REQUIRED [†] (in.)
FAS072 FHS072	1	Suction	—	1 ¹ / ₈ Street Elbow
				1 ¹ / ₈ Nipple, 10 ⁵ / ₈ L
				1 ¹ / ₈ Long Radius Elbow
FAS091 FHS091	3	Liquid	—	5 ⁵ / ₈ Street Elbow
				5 ⁵ / ₈ Nipple, 8 ⁵ / ₈ L
				5 ⁵ / ₈ Long Radius Elbow
FAS120	1	Suction	—	1 ¹ / ₈ Street Elbow
				1 ¹ / ₈ Nipple, 8 ⁵ / ₈ L
				1 ¹ / ₈ Long Radius Elbow
FAS120	2	Liquid	Lower	5 ⁵ / ₈ Street Elbow
				5 ⁵ / ₈ Nipple, 8 ¹ / ₂ L
				5 ⁵ / ₈ Long Radius Elbow
FAS120	3	Liquid	Upper	5 ⁵ / ₈ Street Elbow
				5 ⁵ / ₈ Nipple, 13 ¹ / ₂ L
				5 ⁵ / ₈ Long Radius Elbow
FAS120	4	Suction	Upper	1 ¹ / ₈ Nipple, 5 ³ / ₄ L
				1 ¹ / ₈ Long Radius Elbow
				1 ¹ / ₈ Nipple, 12 L
				1 ¹ / ₈ Long Radius Elbow

[‡] See Fig. 8 for access hole location by number.
[†] Fittings are listed in order from header or tee stub connection out to access hole in corner support post.

TABLE 3 (Cont.)

FITTING REQUIREMENTS

6 to 25 Ton

UNIT	ACCESS HOLE NO.†	CONNECTION TYPE	CIRCUIT	FITTINGS REQUIRED† (in.)
FHS120	1	Suction	Lower	(2) 1 ¹ / ₈ Street Elbow
				5/8 Street Elbow
	2	Liquid	Lower	5/8 Nipple, 5 ¹ / ₂ L
				5/8 Long Radius Elbow
	3	Liquid	Upper	5/8 Street Elbow
				5/8 Nipple, 10 ¹ / ₂ L
				5/8 Long Radius Elbow
	4	Suction	Upper	1 ¹ / ₈ Nipple, 5 ³ / ₄ L
				1 ¹ / ₈ Long Radius Elbow
				1 ¹ / ₈ Nipple, 12 L
				1 ¹ / ₈ Long Radius Elbow
	FAS150	1	Suction	Lower
1 ¹ / ₈ Nipple, 7 ⁵ / ₈ L				
1 ¹ / ₈ Long Radius Elbow				
2		Liquid	Lower	5/8 Street Elbow
				5/8 Nipple, 1 ⁷ / ₁₆ L
				5/8 Long Radius Elbow
3		Liquid	Upper	5/8 Street Elbow
				5/8 Nipple, 11 ¹ / ₂ L
4		Suction	Upper	5/8 Long Radius Elbow
				1 ¹ / ₈ Nipple, 5 ⁵ / ₈ L
				1 ¹ / ₈ Long Radius Elbow
				1 ¹ / ₈ Nipple, 13 L
FAS180	1	Suction	Lower	1 ¹ / ₈ Street Elbow
				1 ¹ / ₈ Nipple, 7 ⁵ / ₈ L
				1 ¹ / ₈ Long Radius Elbow
	2	Liquid	Lower	5/8 Street Elbow
				5/8 Nipple, 1 ³ / ₈ L
				5/8 Long Radius Elbow
	3	Liquid	Upper	5/8 Street Elbow
				5/8 Nipple, 11 ¹ / ₂ L
	4	Suction	Upper	5/8 Long Radius Elbow
				1 ¹ / ₈ Nipple, 5 ⁵ / ₈ L
				1 ¹ / ₈ Long Radius Elbow
				1 ¹ / ₈ Nipple, 13 L
FHS180	3	Suction	Lower	1 ¹ / ₈ Nipple, 3 L
				1 ¹ / ₈ Long Radius Elbow
	5	Suction	Lower	5/8 Nipple, 2 ⁷ / ₈ L
				5/8 45° Elbow
				5/8 Nipple, 1 ⁵ / ₈ L
	6	Liquid	Upper	5/8 Long Radius Elbow
				5/8 Nipple, 2 ⁷ / ₈ L
				5/8 45° Elbow
	7	Suction	Upper	5/8 Nipple, 4 ¹ / ₄ L
				5/8 Long Radius Elbow
				1 ¹ / ₈ Nipple, 5 L
				1 ¹ / ₈ 45° Elbow
				1 ¹ / ₈ Nipple, 8 ³ / ₄ L
				1 ¹ / ₈ Long Radius Elbow

* See Fig. 8 for access hole location by number.

† Fittings are listed in order from header or tee stub connection out to access hole in corner support post.

TABLE 3 (Cont.)

FITTING REQUIREMENTS

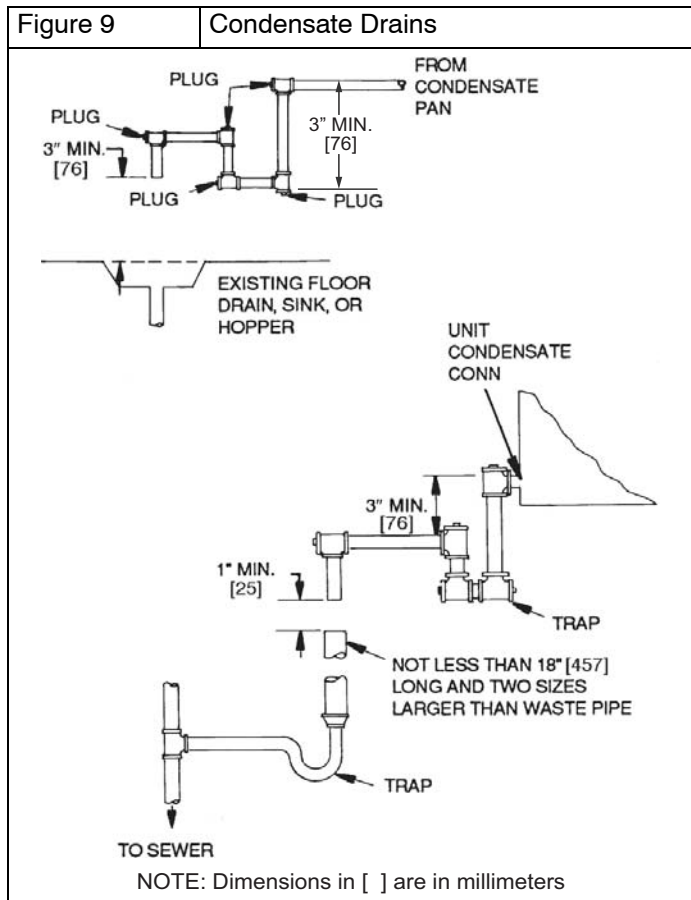
6 to 25 Ton

UNIT	ACCESS HOLE NO [‡]	CONNECTION TYPE	CIRCUIT	FITTINGS REQUIRED† (in.)
FAS240	1	Suction	Lower	1 ¹ / ₈ Street Elbow
				1 ¹ / ₈ Nipple, 7 ⁵ / ₈ L
				1 ¹ / ₈ Long Radius Elbow
	2	Liquid	Lower	5 ⁵ / ₈ Street Elbow
				5 ⁵ / ₈ Nipple, 6 ¹ / ₂ L
				5 ⁵ / ₈ Long Radius Elbow
	3	Liquid	Upper	5 ⁵ / ₈ Street Elbow
				5 ⁵ / ₈ Nipple, 9 ¹ / ₂ L
				5 ⁵ / ₈ Long Radius Elbow
	4	Suction	Upper	1 ¹ / ₈ Nipple, 5 ⁵ / ₈ L
				1 ¹ / ₈ Long Radius Elbow
				1 ¹ / ₈ Nipple, 11 L
1 ¹ / ₈ Long Radius Elbow				
FHS240	3	Suction	Lower	1 ¹ / ₈ Nipple, 3 L
				1 ¹ / ₈ Long Radius Elbow
	5	Suction	Lower	5 ⁵ / ₈ Nipple, 2 ⁷ / ₈ L
				5 ⁵ / ₈ 45° Elbow
6	Liquid	Upper	5 ⁵ / ₈ Nipple, 1 ⁵ / ₈ L	
			5 ⁵ / ₈ Long Radius Elbow	
7	Suction	Upper	5 ⁵ / ₈ Nipple, 2 ⁷ / ₈ L	
			5 ⁵ / ₈ 45° Elbow	
FAS300	1	Suction	Lower	1 ³ / ₈ Street Elbow
				1 ³ / ₈ Nipple, 11 L
				1 ³ / ₈ Long Radius Elbow
	2	Liquid	Lower	5 ⁵ / ₈ Street Elbow
5 ⁵ / ₈ Nipple, 11 ¹ / ₂ L				
3	Liquid	Upper	5 ⁵ / ₈ Long Radius Elbow	
			5 ⁵ / ₈ Street Elbow	
4	Suction	Upper	5 ⁵ / ₈ Nipple, 19 ¹ / ₂ L	
			5 ⁵ / ₈ Long Radius Elbow	
			1 ³ / ₈ Nipple, 4 ³ / ₁₆ L	
				1 ³ / ₈ Long Radius Elbow
				1 ³ / ₈ Nipple, 23 ¹ / ₄ L
				1 ³ / ₈ Long Radius Elbow

* See Fig. 8 for access hole location by number.

† Fittings are listed in order from header or tee stub connection out to access hole in corner support post.

Condensate Drain – Install a trapped condensate drain line to unit connection as shown in Figure 9. The unit drain connection is a PVC stub. See Figure 10. Some areas may require an adapter to connect to either galvanized steel or copper pipe. For these applications, install a field-supplied threaded PVC adapter.



NOTE: A trap must be installed in the condensate drain line to ensure that the static pressure of fans is balanced with the water column in the drain line and that condensate can drain completely from pan. Without a trap, air can be drawn up drain line until water level in condensate pan becomes equal to static pressure created by fans, preventing complete drainage. Conditions will worsen as filters become dirty.

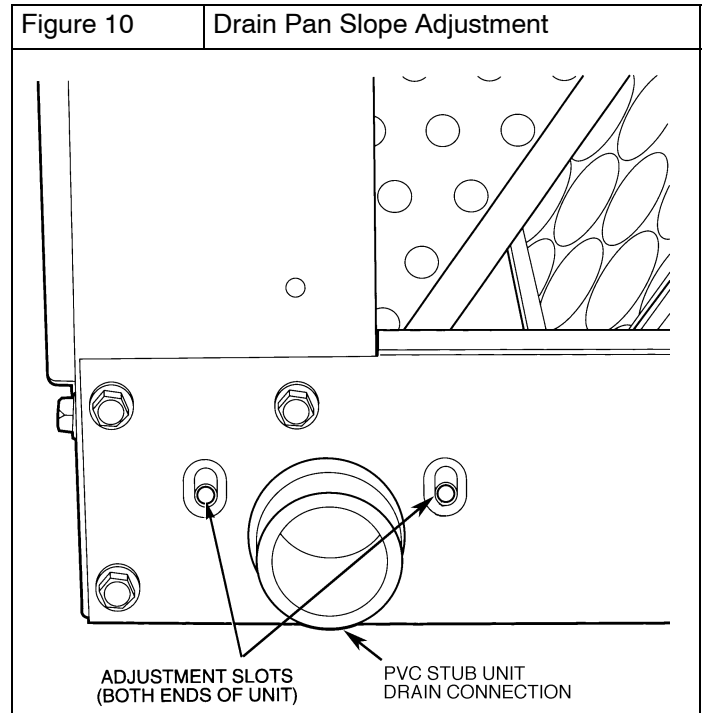
Install clean-out plugs in trap. Pitch drain line downward to an open floor drain or sump. Provide service clearance around drain line to permit removal of unit panels. Observe all local sanitary codes.

As shipped, the unit's condensate drain pan is NOT sloped towards the drain connection. The pan slope must be changed to pitch towards the side of the unit with the drain connection. See Figure 10. Loosen the two (2) screws next to the drain outlet at both ends of the unit, push drain pan down in the slots near the drain connection, and up in the slots on the opposite end. Retighten screws. The pan should have a pitch of at least 1/4-in. (6.4mm) over its length toward the drain connection.

Fan Motors and Drives – Motor and drive packages are factory installed in all units. The standard motor and drive packages consist of the following items:

- 1 – fan motor
- 1 – adjustable motor pulley
- 1 – fan pulley
- 1 – fan belt (FAS072 – 120 & FHS072 – 120 units)
- 2 – matched fan belts (FAS150 – 300 & FHS18 units)

For instructions on changing fan rotation, changing drive speeds and adjusting drives, see Pulley and Drive Adjustment in the Service section.



Power Supply and Wiring – Check the unit data plate to ensure that available power supply matches electrical characteristics of the unit. Provide a disconnect switch of size required to provide adequate fan motor starting current.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Do not use gas piping as an electrical ground. Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code); ANSI/NFPA 70, latest edition (in Canada, Canadian Electrical Code CSA [Canadian Standards Association] C22.1), and local electrical codes.



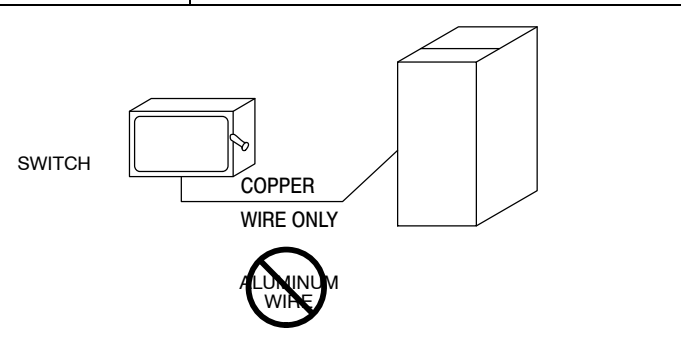
WARNING

FIRE HAZARD

Failure to follow this caution may result in unit damage or improper operation.

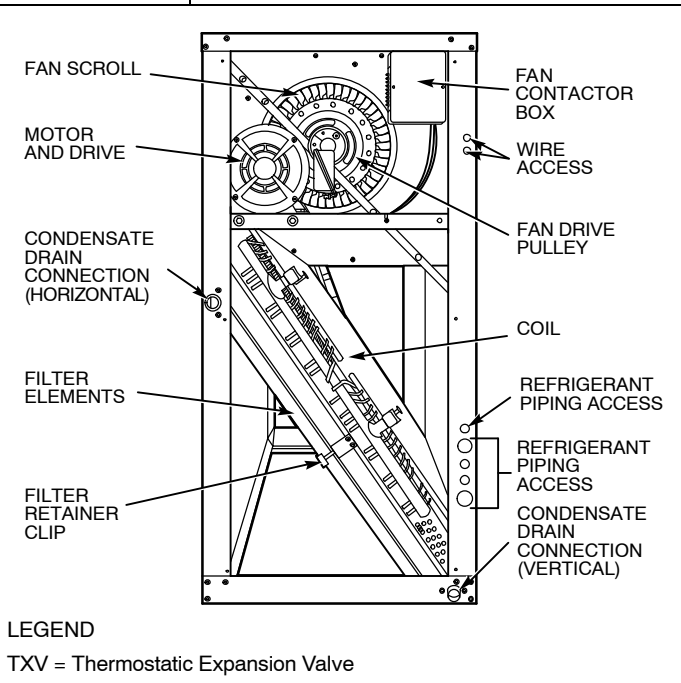
Do not connect aluminum wire between disconnect switch and condensing unit. Use only copper wire, Figure 11.

Figure 11 Disconnect Switch and Unit



Install disconnect switch and power wiring in accordance with all applicable local codes. See Figure 11, Figure 12, & Figure 13 and the unit label diagram. For units with motor sizes less than 5 Hp (3.7 kW), connect power wiring to unit with no. 10 ring terminal. For units with motor sizes of 5 Hp (3.7 kW) or more, connect power wiring with 1/4-in. ring terminal.

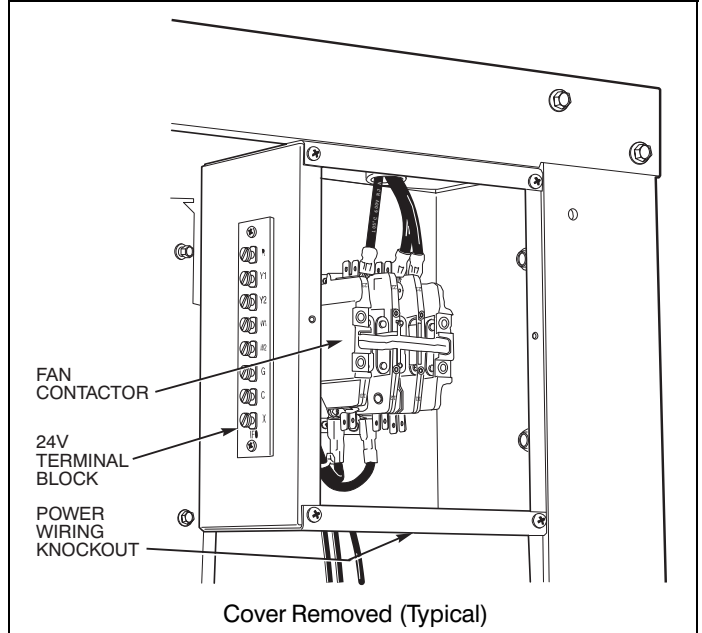
Figure 12 Wiring and Service Access (Side Panel Removed)



replacing the 460-v sticker information on the units' corner post.

Fan motors are factory installed on all units. Indoor-fan contactors are located in the fan contactor box behind the side access panel (see Figure 12 and Figure 13). Wire the thermostat to the 24-v control circuit terminal block located in the side of the fan contactor control box, according to Figure 14 or the unit label diagram. If the air handler is part of a split system, complete the wiring from the condensing unit to the thermostat shown in Figure 14.

Figure 13 Fan Contactor Box and Terminal Block



The FAS/FHS 6 to 15 ton units that have motors wired for 460-v, 3-ph, 60 Hz operation can be field-converted to 208/230-v, 3-ph, 60 Hz operation. Rewire the motor according to the diagram plate on the motor. After reconfiguring the motor, mark the motor specifying 208-v or 230-v operation

TABLE 4

ELECTRICAL DATA, STANDARD MOTORS

6 to 25 Ton

UNIT	V-PH-Hz†	VOLTAGE LIMITS	FAN MOTOR		POWER SUPPLY	
			Hp (kW)	FLA	Minimum Circuit Amps	MOCP
FAS072 FHS072	208/230-1-60	187-253	1.3 (0.97)	7.6	9.5	15
	208/230-3-60	187-253	2.4 (1.79)	5.8	7.3	15
	460-3-60	414-506	2.4 (1.79)	2.6	3.3	15
	575-3-60	518-632	1.0 (0.75)	1.4	1.7	15
FAS091 FHS091	208/230-1-60	187-253	2.4 (1.79)	11.0	13.8	20
	208/230-3-60	187-253	2.4 (1.79)	5.8	7.3	15
	460-3-60	414-506	2.4 (1.79)	2.6	3.3	15
	575-3-60	518-632	2.0 (1.49)	2.4	8.0	15
FAS120 FHS120	208/230-3-60	187-253	2.4 (1.79)	5.8	7.5	15
	460-3-60	414-506	2.4 (1.79)	2.6	3.3	15
	575-3-60	518-632	2.0 (1.49)	2.4	3.0	15
FAS150	208/230-3-60	187-253	2.4 (1.79)	5.8	7.5	15
	460-3-60	414-506	2.4 (1.79)	2.6	3.3	15
	575-3-60	518-632	3.0 (2.24)	3.8	4.8	15
FAS180 FHS180	208/230-3-60	187-253	3.7 (2.76)	10.6	13.3	20
	460-3-60	414-506	3.7 (2.76)	4.6	6.0	15
	575-3-60	518-632	3.0 (2.24)	3.8	4.8	15
FAS240 FHS240	208/230-3-60	187-253	5.0 (3.73)	14.7/13.6	18.4/17.0	30/25
	460-3-60	414-506	5.0 (3.73)	6.8	8.5	15
	575-3-60	518-632	5.0 (3.73)	5.1	6.4	15
FAS300	208/230-3-60	187-253	7.5 (5.59)	21.4/19.4	26.9/24.3	45/40
	460-3-60	414-506	7.5 (5.59)	9.7	12.1	20
	575-3-60	518-632	7.5 (5.59)	7.8	9.8	15

See Legend and Notes on next page.

TABLE 4 (Cont.)

ELECTRICAL DATA, ALTERNATE MOTORS

6 to 25 Ton

UNIT	V-PH-Hz†	VOLTAGE LIMITS	FAN MOTOR		POWER SUPPLY	
			Hp (kW)	FLA	Minimum Circuit Amps	MOCP
FAS072 FHS072	208/230-1-60	187-253	2.4 (1.79)	11.0/11.0	13.8/13.8	20
	208/230-3-60	187-253	2.9 (2.16)	7.5	9.4	15
	460-3-60	414-506	2.9 (2.16)	3.4	4.3	15
	575-3-60	518-632	2.0 (1.49)	2.4	3.0	15
FAS091 FHS091	208/230-1-60	187-253	2.4 (1.79)	11.0	13.8	15
	208/230-3-60	187-253	2.9 (2.16)	7.5/7.5	9.4/9.4	15
	460-3-60	414-506	2.9 (2.16)	3.4	4.3	15
	575-3-60	518-632	3.0 (2.24)	3.8	4.8	15
FAS120 FHS120	208/230-3-60	187-253	3.7 (2.76)	10.5/10.5	13.3/13.3	20
	460-3-60	414-506	3.7 (2.76)	4.8	6.0	15
	575-3-60	518-632	3.0 (2.24)	3.8	4.8	15
FAS150	208/230-3-60	187-253	3.7 (2.76)	10.2	12.7	20
	460-3-60	414-506	3.7 (2.76)	4.8	6.0	15
	575-3-60	518-632	5.0 (3.73)	5.1	6.4	15
FAS180 FHS180	208/230-3-60	187-253	5.0 (3.73)	14.6/12.8	18.3/16.0	30/25
	460-3-60	414-506	5.0 (3.73)	6.4	8.0	15
	575-3-60	518-632	5.0 (3.73)	5.1	6.4	15
FAS240 FHS240	208/230-3-60	187-253	7.5 (5.59)	21.4/19.4	26.9/24.3	45/40
	460-3-60	414-506	7.5 (5.59)	9.7	12.1	20
	575-3-60	518-632	7.5 (5.59)	7.8	9.8	15
FAS300	208/230-3-60	187-253	10.0 (7.46)	28.0/25.2	35.0/31.5	60/50
	460-3-60	414-506	10.0 (7.46)	12.6	15.8	25
	575-3-60	518-632	10.0 (7.46)	10.3	12.9	20

See Legend and Notes below.

Legend and Notes for TABLES 4 & 5

LEGEND

FLA — Full Load Amps

MOCP — Maximum Overcurrent Protection

† Motors are designed for satisfactory operation within 10% of nominal voltages shown. Voltages should not exceed the limits shown in the Voltage Limits column.

NOTES:

1. Minimum circuit amps (MCA) and MOCP values are calculated in accordance with NEC (National Electrical Code) (U.S.A. standard), Article 440.
2. Motor FLA values are established in accordance with UL (Underwriters' Laboratories) Standard 1995 (U.S.A. standard).
3. Indoor fan motors 5 hp and larger meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT) effective October 24, 1997.
4. Unbalanced 3-Phase Supply Voltage
Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percentage of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 230-3-60



AB = 224 v
BC = 231 v
AC = 226 v

$$\text{Average Voltage} = \frac{(224 + 231 + 226)}{3} = \frac{681}{3} = 227$$

Determine maximum deviation from average voltage.

(AB) 227 - 224 = 3 v

(BC) 231 - 227 = 4 v

(AC) 227 - 226 = 1 v

Maximum deviation is 4 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{227} = 1.76\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

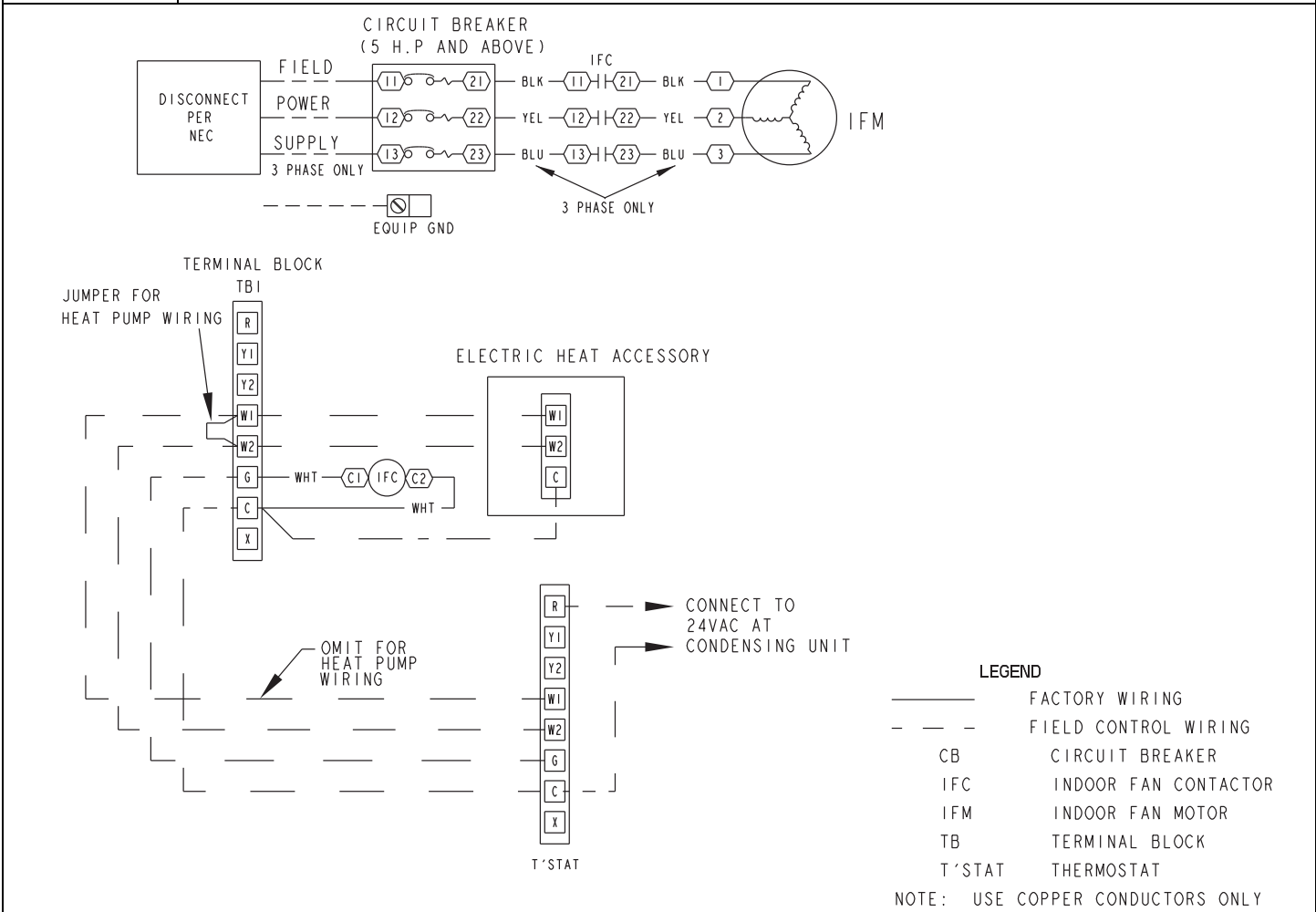
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Table 5 Fan Contactor Coil Data

UNIT	VOLTAGE (vac)	MAXIMUM HOLDING VA
ALL	24	10

Figure 14

Unit Wiring



Connecting Ductwork – Figure 15 shows recommended duct connection to units with two fans.

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in unit damage or improper operation.

Do not operate unit without ductwork or discharge plenum unless fan speed has been adjusted for external static pressure of zero in wc. Failure to do so may result in motor overload.

Discharge Connections – Duct flanges are factory supplied; they are shipped inside the unit attached to the hairpin end of the coil tube sheet for field installation. Using the existing screws, install the duct flanges on the unit's fan deck. Each fan discharge requires two (2) flanges; each flange must be bent

in the middle to conform to the discharge opening. See Figure 16. After flanges are installed, connect them to the supply duct using a canvas connection to prevent vibration. It is important that this connection be properly fabricated to prevent high air friction losses and air noise.

Return Connection – When using return-air ductwork, route return-air duct to the unit's return air inlet near the filter rack, using a canvas connection to prevent transmission of unit vibration. If the duct blocks off the unit's access panel, provide a slip joint in the ductwork to permit removal for servicing.

Outdoor-air inlet Connection – Connect outdoor-air inlet to field-installed accessory economizer. Refer to economizer Installation Instructions.

Return Air Filters – Air filters are factory-supplied shown in Table 1 and installed. In all units with two fans, a filter replacement tool (hook) is shipped inside the unit for field use when replacing filters. See the Service section for instructions on filter element replacement.

Figure 15 Typical Fan Discharge Connections for Multiple Fan Units

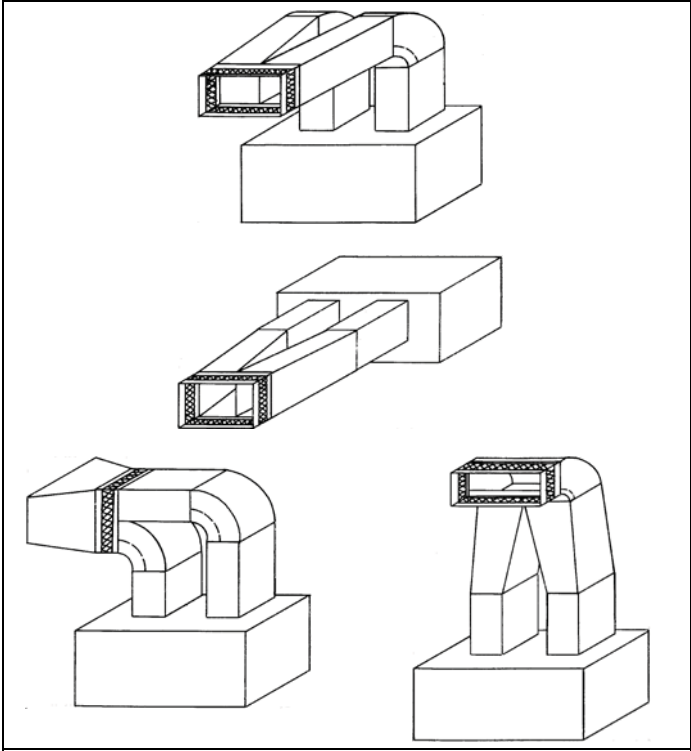
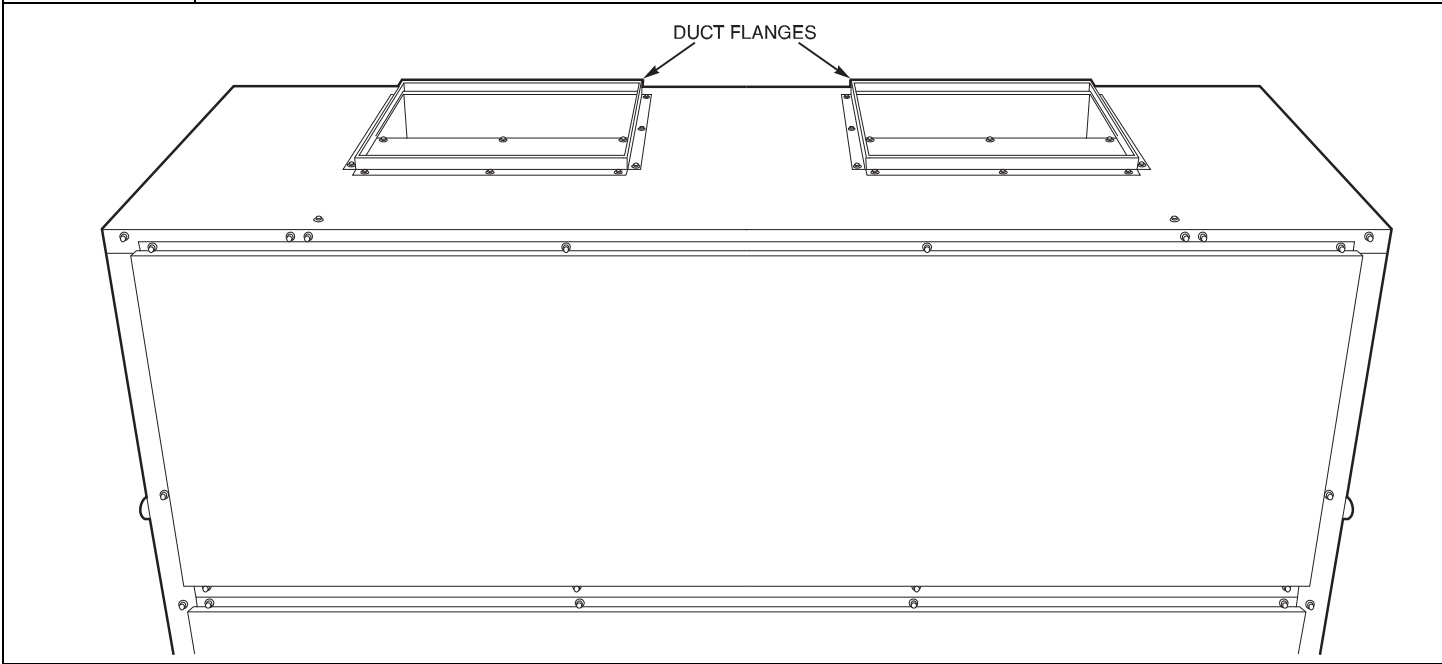


Figure 16 Duct Flange Installation



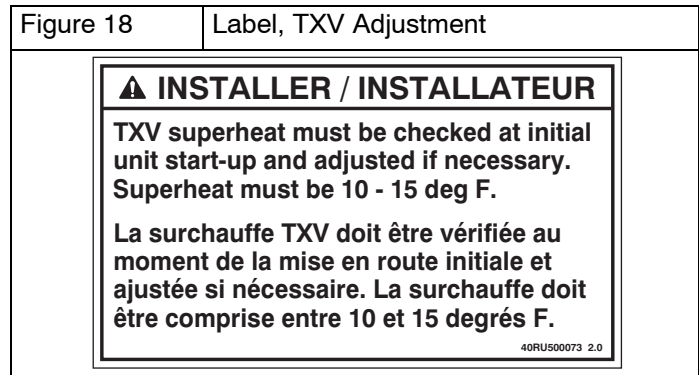
START-UP

Before starting unit, check the following and correct as necessary:

- Is unit solidly supported?
- Is fan adjusted for speed and pulley alignment?
- Are pulleys, motor, and bearings securely mounted?
- Are there any loose parts that will rattle or vibrate?
- Is condensate drain pan pitched for correct drainage?
- Are coil baffle plates tight against coil to prevent air bypass?
- Are all panels securely fastened?
- Are all electrical connections correct and tight?
- Is TXV bulb located on suction tube per Fig. 17?
- Is the capillary tube to the bulb free of kinks and not subject to pinching?
- Is the bulb well secured to the suction tube with strap?

Also refer to condensing unit instructions before starting a split system. A split system start-up checklist is provided in the back of these instructions.

2. To increase superheat, turn the stem clockwise. To decrease the superheat, turn the stem counterclockwise. Do not turn the stem more than one full turn.
3. Wait until suction pressure and superheat stabilize. This may take more than 30 minutes.
4. Continue adjustment until superheat reaches 10°F to 15°F (5.5°C to 8.3°C).
5. Replace the seal cap; tighten.



SERVICE

Inspection and maintenance should be performed at regular intervals and should include the following:

Complete cleaning of cabinet, fan wheel, cooling coil, condensate pan and drain, heating coils, and return-air grille (if present).

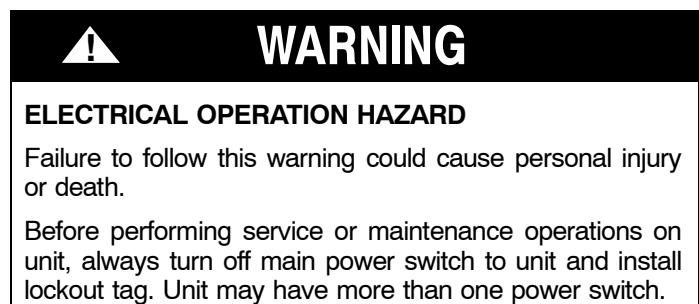
Inspection of panels and sealing of unit against air leakage.

Adjustment of fan motor, belt, bearings, and wheels.

Cleaning or replacement of filters.

Testing for cooling/heating system leaks.

Checking of all electrical connections.

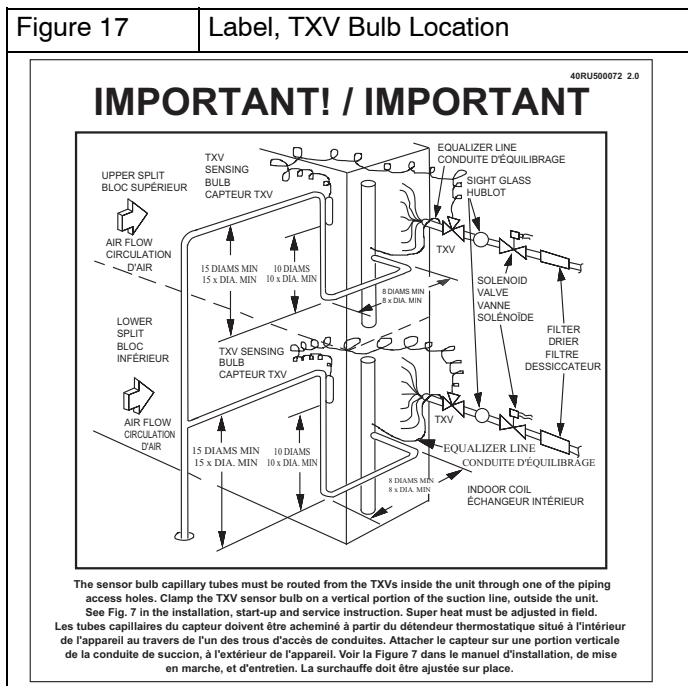


Most unit service can be performed by removing one or both of the unit's side panels. Coil cleaning or removal or insulation cleaning may require removal of a rear, top, or bottom panel, depending on the unit's orientation. When service is completed, replace unit panels.

Panels – Panels are fastened to unit frame with sheet metal screws. Fan and coil compartment must be sealed tightly after service to prevent air from bypassing the cooling coil.

Fan Motor Lubrication – Fan motor supplied with unit is permanently lubricated and requires no further lubrication.

Fan Shaft Bearings – Bearings on Size 072, 091, 120 units are sealed, permanently lubricated bearings that require no further lubrication. Size 150, 180 & 240 units have pillow-block bearings (Figure 19) that must be lubricated with suitable bearing grease approximately every three months. See Table 6 for suitable lubricants.



Adjusting TXV for Superheat —

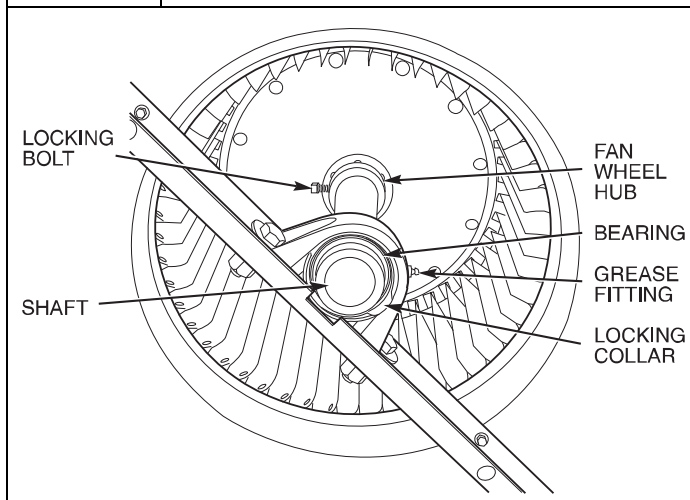
The unit-mounted thermostatic expansion valve(s) is/are factory set to provided superheat at the bulb location in 10°F to 15°F (5.5°C to 8.3°C) range. Actual system load conditions may require adjustment of the factory setting. To adjust the TXV superheat setting:

1. Remove the seal cap from the bottom of the TXV body.

Table 6	Lubricant Data
MANUFACTURER	LUBRICANT
Mobil	Mobilplex EP No. 2
Sunoco	Prestige 42
Texaco	Multifak 2
Texaco	Regal AFB-2*

*Preferred lubricant because it contains rust and oxidation inhibitors.

Figure 19 Fan Shaft, Bearings, and Fan Wheel

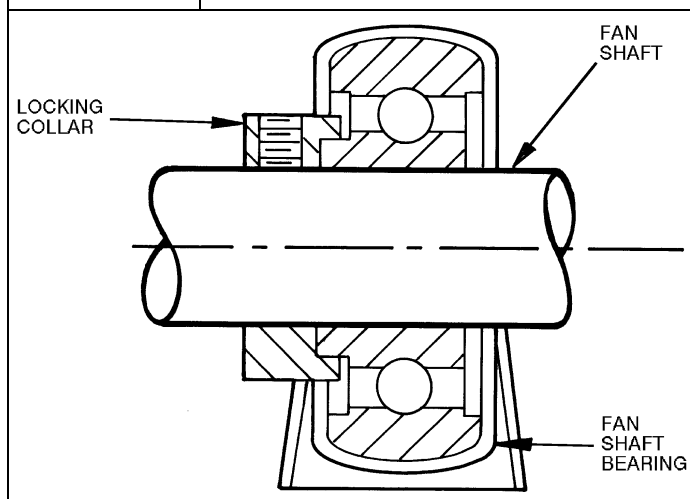


Centering Fan Wheel – If fan and fan shaft assembly are not properly centered, blades may scrape against scroll or may create an objectionable whistling noise. It may be necessary to adjust individual fan wheels or move entire fan shaft. See the following two sections.

Fan Shaft Position Adjustment – Loosen setscrew or locking collar of each fan shaft bearing. Slide shaft into correct position and replace locking collar (Figure 20). To replace locking collar, push collar up against inner face of bearing. Turn collar in direction of fan rotation until tight, and tighten setscrew. Tightening locking collar in direction of fan rotation results in further tightening of collar should setscrew work itself loose.

Individual Fan Wheel Adjustment – Loosen the two (2) locking bolts holding fan wheel hub to shaft. See Figure 19. Position fan wheel in center of the fan housing and tighten locking bolts. Clearance between wheel and housing should be the same on both sides.

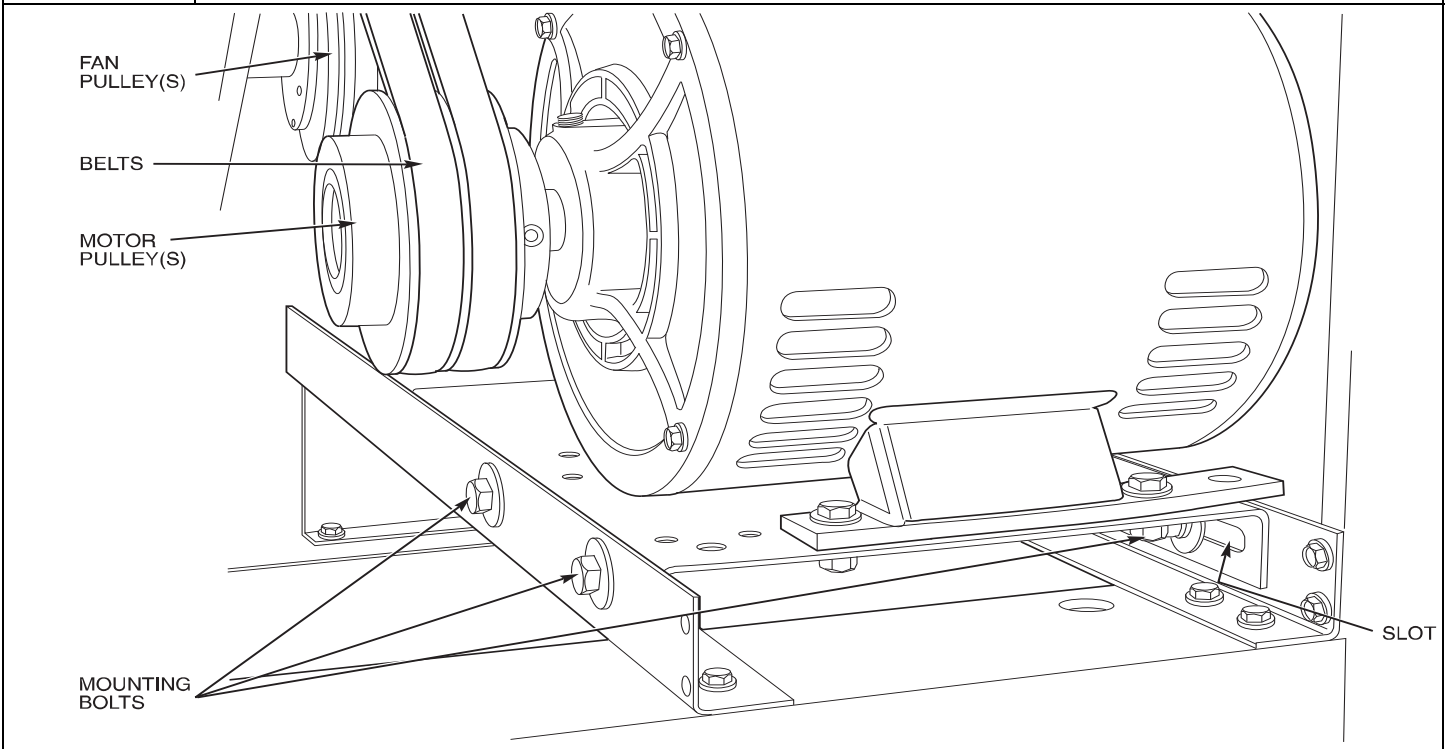
Figure 20 Fan Shaft Bearing



Fan Belts – Motor mounting plate and motor support angles are slotted to permit both vertical and horizontal adjustment. Adjust belt(s) for correct deflection by loosening motor plate mounting bolts, moving motor/plate assembly forward or back, and retightening bolts. Press down on belt with one finger midway between fan and motor pulleys to check deflection. For units with motor sizes up to and including 3.7 Hp (2.76 kW), correct deflection is $\frac{3}{16}$ -in. (4.8 mm) For larger motor sizes, correct deflection is $\frac{1}{8}$ -in. (3.2 mm), see Figure 21.

If complete belt replacement is required during servicing, loosen the motor plate mounting bolts (Figure 21), move motor/plate assembly towards fan pulley, and pull belt(s) off pulleys. Reverse the procedure with new bolts and readjust deflection.

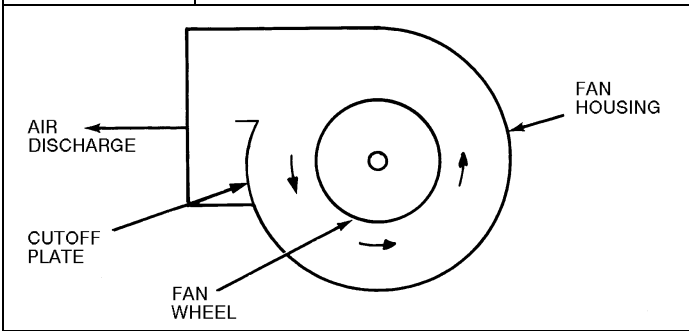
Figure 21 Fan Motor Mounting



Fan Rotation – Correct fan rotation with respect to fan outlet is shown in Figure 22.

To reverse the direction of rotation of a 3-phase fan motor, reverse any two of the power leads. Refer to the connection diagram on the inside of motor terminal box cover for proper reversing procedure of single-phase motor.

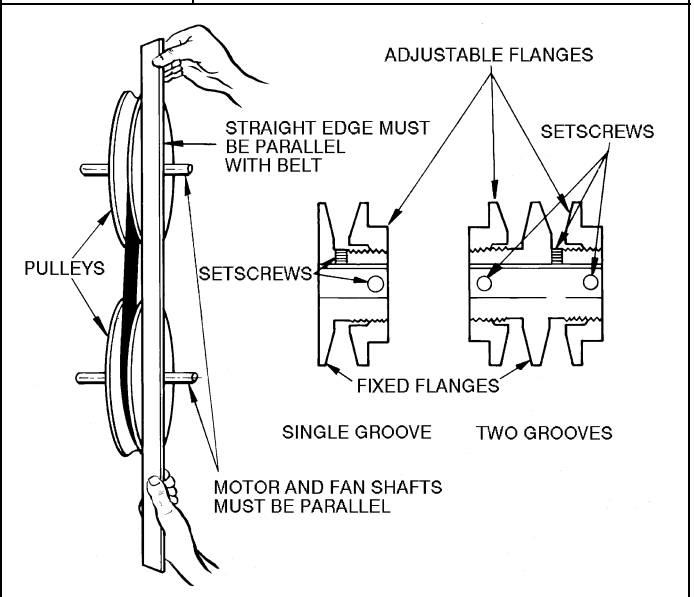
Figure 22 Fan Rotation



Fan Pulley Alignment – Align as follows:

1. Loosen setscrews on pulleys.
2. Align pulleys visually and tighten setscrews on fan pulley to lock it in place.
3. Use the methods shown in Figure 23 to check proper pulley alignment.
4. If pulleys are not in correct alignment, loosen the motor holddown bolts and slide the motor axially until the pulleys are aligned.
5. Tighten motor holddown bolts.

Figure 23 Fan Pulley Adjustments



Pulley and Drive Adjustment – To obtain desired fan speed, refer to the fan motor and drive data in Tables 7a to 12F and adjust fan motor pulley as follows:

1. Remove belt from fan motor pulley after loosening motor from motor base.
2. Loosen setscrew in moveable flange of pulley. Screw moveable flange toward fixed flange to increase the fan speed and away from fixed flange to reduce speed. Before tightening setscrew, make certain that setscrew is over nearest flat surface of pulley hub (Figure 23).



CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in improper operation or equipment damage.

Increasing fan speed produces a greater load on motor. Do not exceed rated capacity of motor.

Condensate Drains – Keep condensate drains free of dirt and foreign matter.

Return-Air Filters – Refer to Replacing Filters section for filter accessibility and removal. Replace with clean filters.

Coil Removal – Remove unit panels and corner posts as required. Disconnect coil connections and remove fastening screws. Remove coil through end or side sections of unit.

Cleaning Cooling Coil – Remove return-air filters. Remove any heavy dirt that may have accumulated on underside of coil. Coil can be cleaned more easily with a stiff brush, vacuum cleaner, or compressed air when coil is dry. If coil is wet or if water is to be used for cleaning, guard against splashing water on electrical components or damaging surrounding area. Clean coil baffles as applicable and check for tight fit to be sure air does not bypass coil.

Cleaning Insulation – The insulation contains an immobilized antimicrobial agent that helps prevent the growth of bacteria and fungi. Clean the inner surface of the insulation according to the maintenance instructions in this manual.

Replacing Filters – Filters can be removed and installed from either side of the unit. Install new filters in units that have one fan as follows:

1. Remove the side access panel (retain screws).
2. Remove the filter retainer clip (see Figure 24).
3. Remove old filters by lifting and tilting them out of the filter track (see Figure 25).
4. Reverse the procedure to install new filters.

To install new filters in larger units that have two fans, follow the preceding steps, but use the factory-supplied filter hook to slide filters within reach for removal. The filter hook is shipped inside the unit in the filter track.



CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in improper operation.

Do not operate unit without air filters.

Figure 24

Remove Filter Retainer Clip

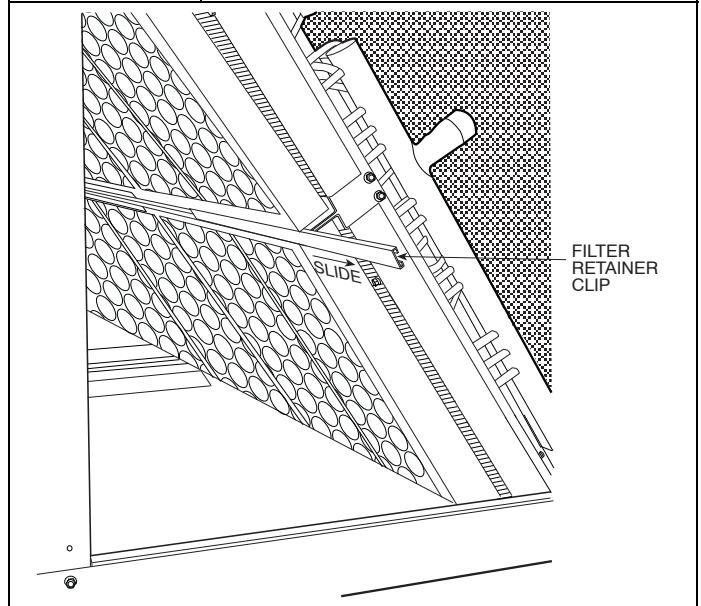


Figure 25

Filter Remove/Replacement

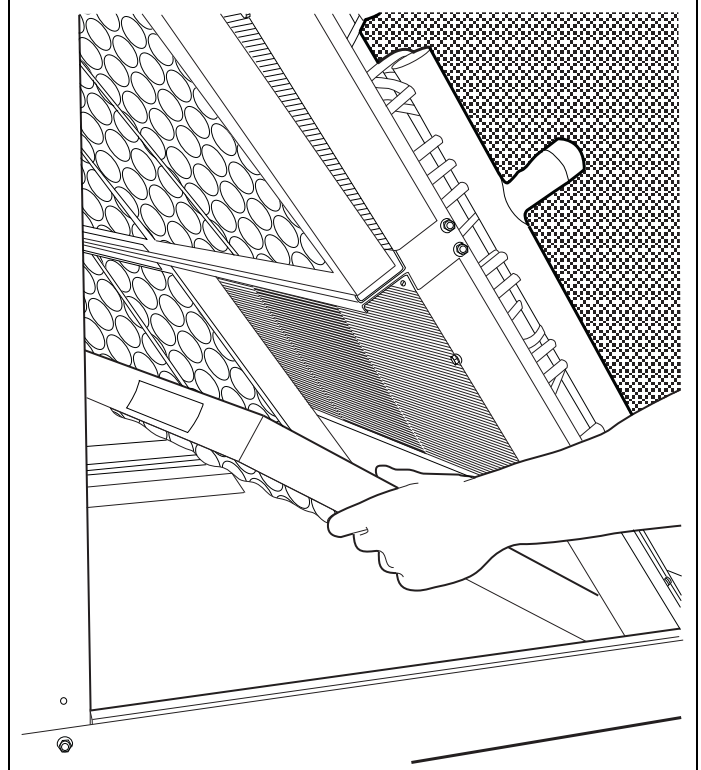


TABLE 7A

FAN MOTOR DATA, STANDARD MOTORS – ENGLISH

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
208/230-1-60					
Speed (rpm)	1725	1725	—	—	—
Hp	1.3	2.4	—	—	—
Frame (NEMA)	56Y	56Y	—	—	—
Shaft Dia (in.)	$\frac{5}{8}$	$\frac{5}{8}$	—	—	—
208/230-3-60 and 460-3-60					
Speed (rpm)	1725	1725	1725	1725	1725
Hp	2.4	2.4	2.4	2.9	3.7
Frame (NEMA)	56Y	56Y	56Y	56Y	56Y
Shaft Dia (in.)	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
575-3-60					
Speed (rpm)	1725	1725	1725	1725	1725
Hp	1.0	2.0	2.0	3.0	3.0
Frame (NEMA)	56	56HZ	56HZ	56HZ	56HZ
Shaft Dia (in.)	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
LEGEND NEMA — National Electrical Manufacturers Association					

TABLE 7B

FAN MOTOR DATA, ALTERNATE MOTORS – ENGLISH

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
208/230-1-60					
Speed (rpm)	1725	1725	—	—	—
Hp	2.4	2.4	—	—	—
Frame (NEMA)	56Y	56Y	—	—	—
Shaft Dia (in.)	$\frac{5}{8}$	$\frac{5}{8}$	—	—	—
208/230-3-60 and 460-3-60					
Speed (rpm)	1725	1725	1725	1725	1725
Hp	2.9	2.9	3.7	3.7	5.0
Frame (NEMA)	56Y	56Y	Y56Y	Y56Y	S184T
Shaft Dia (in.)	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$1\frac{1}{8}$
575-3-60					
Speed (rpm)	1725	1725	1725	1745	1745
Hp	2.0	3.0	3.0	5.0	5.0
Frame (NEMA)	56HZ	56HZ	56HZ	184T	184T
Shaft Dia (in.)	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$
LEGEND NEMA — National Electrical Manufacturers Association					

TABLE 8A

FAN MOTOR DATA, STANDARD MOTORS – SI

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
208/230–1–60					
Speed (r/s)	28.75	28.75	—	—	—
Shaft kW	0.97	1.79	—	—	—
Frame (NEMA)	56Y	56Y	—	—	—
Shaft Dia (mm)	15.9	15.9	—	—	—
208/230–3–60 and 460–3–60					
Speed (r/s)	28.75	28.75	28.75	28.75	28.75
Shaft kW	1.79	1.79	1.79	2.16	2.76
Frame (NEMA)	56Y	56Y	56Y	56Y	56Y
Shaft Dia (mm)	15.9	15.9	15.9	22.2	22.2
575–3–60					
Speed (r/s)	28.75	28.75	28.75	28.75	28.75
Shaft kW	0.746	1.49	1.49	2.24	2.24
Frame (NEMA)	56	56HZ	56HZ	56HZ	56HZ
Shaft Dia (mm)	15.9	22.2	22.2	22.2	22.2
LEGEND NEMA — National Electrical Manufacturers Association					

TABLE 8B

FAN MOTOR DATA, ALTERNATE MOTORS – SI

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
208/230–1–60					
Speed (r/s)	28.75	28.75	—	—	—
Shaft kW	1.79	1.79	—	—	—
Frame (NEMA)	56Y	56Y	—	—	—
Shaft Dia (mm)	15.9	15.9	—	—	—
208/230–3–60 and 460–3–60					
Speed (r/s)	28.75	28.75	28.75	28.75	29.08
Shaft kW	2.16	2.16	2.76	2.76	3.73
Frame (NEMA)	56Y	56Y	Y56Y	Y56Y	S184T
Shaft Dia (mm)	22.2	22.2	22.2	22.2	28.6
575–3–60					
Speed (r/s)	28.75	28.75	28.75	29.08	29.08
Shaft kW	1.49	2.24	2.24	3.73	3.73
Frame (NEMA)	56HZ	56HZ	56HZ	184T	184T
Shaft Dia (mm)	22.2	22.2	22.2	28.6	28.6
LEGEND NEMA — National Electrical Manufacturers Association					

TABLE 9A

Standard Drive Data, 60 Hz – ENGLISH

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
MOTOR DRIVE					
Motor Pulley Pitch Diameter (in.)	2.4–3.4	2.8–3.8	3.4–4.4	2.8–3.8	2.8–3.8
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	2.5
FAN DRIVE					
Pulley Pitch Dia (in.)	8.8	8.8	8.8	9.0	9.0
Pulley Bore (in.)	1	1	1	1 ⁷ / ₁₆	1 ⁷ / ₁₆
Belt No. — Section	1—A	1—A	1—A	1—A	1—A
Belt Pitch (in.)	40.3	41.3	42.3	42.3	42.3
FAN SPEEDS (rpm)					
Factory Setting	568	647	764	632	632
Range	470–666	549–745	666–863	537–728	537–728
Max Allowable Speed (rpm)	1200	1200	1200	1200	1200
Change per 1/2 Turn of Moveable Motor Pulley Flange	19.6	19.6	19.7	19.1	19.1
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	5
SHAFTS CENTER DISTANCE (in.)	10.44–12.32	10.44–12.32	10.44–12.32	10.44–12.32	10.44–12.32

TABLE 9B

Medium Static Drive Data, 60 Hz – ENGLISH

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
MOTOR DRIVE					
Motor Pulley Pitch Diameter (in.)	3.4–4.4	3.4–4.4	3.4–4.4	3.4–4.4	3.7–4.7
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	3.0
FAN DRIVE					
Pulley Pitch Dia (in.)	8.8	8.0	8.0	8.2	8.6
Pulley Bore (in.)	1	1	1	1 ⁷ / ₁₆	1 ⁷ / ₁₆
Belt No. — Section	1—A	1—A	1—A	1—A	1—B
Belt Pitch (in.)	42.3	40.3	40.3	41.3	41.8
FAN SPEEDS (rpm)					
Factory Setting	764	841	841	820	842
Range	666–863	733–949	733–949	715–926	742–943
Max Allowable Speed (rpm)	1200	1200	1200	1200	1200
Change per 1/2 Turn of Moveable Motor Pulley Flange	19.7	21.6	21.6	21.1	16.7
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	6
SHAFTS CENTER DISTANCE (in.)	10.44–12.32	10.44–12.32	10.44–12.32	10.44–12.32	10.44–12.32

TABLE 9C

High Static Drive Data, 60 Hz – ENGLISH

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
MOTOR DRIVE					
Motor Pulley Pitch Diameter (in.)	3.4–4.4	3.4–4.4	3.4–4.4	3.7–4.7	4.3–5.3
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	3.0	3.0
FAN DRIVE					
Pulley Pitch Dia (in.)	7.0	6.0*	6.0	7.4	7.9
Pulley Bore (in.)	1	1	1	1 ⁷ / ₁₆	1 ⁷ / ₁₆
Belt No. — Section	1—A	1—A	1—A	1—B	1—B
Belt Pitch (in.)	41.3	37.3	37.3	39.8	39.8
FAN SPEEDS (rpm)					
Factory Setting	961	1121	1121	979	1060
Range	838–1084	978–1200*†	978–1200†	873–1096	950–1171
Max Allowable Speed (rpm)	1200	1200	1200	1200	1200
Change per 1/2 Turn of Moveable Motor Pulley Flange	24.6	28.7	28.7	19.4	18.4
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	6	6
SHAFTS CENTER DISTANCE (in.)	10.44–12.32	10.44–12.32	10.44–12.32	10.44–12.32**	9.16–10.99
<p>* Values for 3-phase motor shown. For single-phase motor, pulley pitch diameter is 7 in. And resulting fan speed is 837–1096 rpm.</p> <p>† It is possible to adjust drive so that fan speed exceeds maximum allowable. DO NOT exceed 1200 rpm.</p> <p>** 575-v unit has a center distance of 9.16–10.99.</p>					

TABLE 9D

Standard Drive Data, 60 Hz – SI

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
MOTOR DRIVE					
Motor Pulley Pitch Diameter (mm)	61.0–86.4	71.1–96.5	86.4–111.8	71.1–96.5	71.1–96.5
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	2.5
FAN DRIVE					
Pulley Pitch Dia (mm)	224	224	224	229	229
Pulley Bore (mm)	25.4	25.4	25.4	36.5	36.5
Belt No. — Section	1—A	1—A	1—A	1—A	1—A
Belt Pitch (mm)	1024	1049	1074	1074	1074
FAN SPEEDS (r/s)					
Factory Setting	9.5	10.8	12.7	10.5	10.5
Range	7.8–11.1	9.2–12.4	11.1–14.4	9.0–12.1	9.0–12.1
Max Allowable Speed (r/s)	20.0	20.0	20.0	20.0	20.0
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.327	0.327	0.328	0.318	0.318
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	5
SHAFTS CENTER DISTANCE (mm)	265–313	265–313	265–313	265–313	265–313

TABLE 9E

Medium Static Drive Data, 60 Hz – SI

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
MOTOR DRIVE					
Motor Pulley Pitch Diameter (mm)	86.4– 111.8	86.4– 111.8	86.4– 111.8	86.4– 111.8	94.0– 119.4
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	2.5	3.0
FAN DRIVE					
Pulley Pitch Dia (mm)	224	203	203	208	218
Pulley Bore (mm)	25.4	25.4	25.4	36.5	36.5
Belt No. — Section	1—A	1—A	1—A	1—A	1—B
Belt Pitch (mm)	1074	1024	1024	1049	1062
FAN SPEEDS (r/s)					
Factory Setting	12.7	14.0	14.0	13.7	14.0
Range	11.1–14.4	12.2–15.8	12.2–15.8	11.9–15.4	12.4–15.7
Max Allowable Speed (r/s)	20.0	20.0	20.0	20.0	20.0
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.328	0.360	0.360	0.352	0.278
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	5	6
SHAFTS CENTER DISTANCE (mm)	265–313	265–313	265–313	265–313	265–313

TABLE 9F

High Static Drive Data, 60 Hz – SI

6 to 15 Ton

UNIT	FAS072 FHS072	FAS091 FHS091	FAS120 FHS120	FAS150	FAS180 FHS180
MOTOR DRIVE					
Motor Pulley Pitch Diameter (mm)	86.4–111.8	86.4–111.8	86.4–111.8	94.0–119.4	109.2–134.6
Pulley Factory Setting Full Turns Open	2.5	2.5	2.5	3.0	3.0
FAN DRIVE					
Pulley Pitch Dia (mm)	178	152*	152	188	201
Pulley Bore (mm)	25.4	25.4	25.4	36.5	36.5
Belt No. — Section	1—A	1—A	1—A	1—B	1—B
Belt Pitch (mm)	1049	947	947	1011	1011
FAN SPEEDS (r/s)					
Factory Setting	16.0	18.7	18.7	16.3	17.7
Range	14.0–18.1	16.3–20.0*†	16.3–20.0†	14.4–18.3	15.8–19.5
Max Allowable Speed (r/s)	20.0	20.0	20.0	20.0	20.0
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.410	0.478	0.478	0.323	0.307
MAX FULL TURNS FROM CLOSED POSITION	5	5	5	6	6
SHAFTS CENTER DISTANCE (mm)	265–313	265–313	265–313	265–313**	232–279

* Values for 3-phase motor shown. For single-phase motor, pulley pitch diameter is 178 mm and resulting fan speed is 14.0–18.3 r/s.

† It is possible to adjust drive so that fan speed exceeds maximum allowable. DO NOT exceed 20 r/s.

** 575-v unit has a center distance of 233–279.

TABLE 10A

FAN MOTOR DATA, STANDARD MOTORS – ENGLISH

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
208/230–3–60 and 460–3–60		
Speed (rpm)	1745	1745
Hp	5.0	7.5
Frame (NEMA)	S184T	S213T
Shaft Dia (in.)	1 ¹ / ₈	1 ³ / ₈
575–3–60		
Speed (rpm)	1745	1755
Hp	5.0	7.5
Frame (NEMA)	184T	S213T
Shaft Dia (in.)	1 ¹ / ₈	1 ³ / ₈
LEGEND NEMA — National Electrical Manufacturers Association		

TABLE 10B

FAN MOTOR DATA, ALTERNATE MOTORS – ENGLISH

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
208/230–3–60 and 460–3–60		
Speed (rpm)	1745	1745
Hp	7.5	10.0
Frame (NEMA)	S213T	S215T
Shaft Dia (in.)	1 ³ / ₈	1 ³ / ₈
575–3–60		
Speed (rpm)	1755	1750
Hp	7.5	10.0
Frame (NEMA)	S213T	D215T
Shaft Dia (in.)	1 ³ / ₈	1 ³ / ₈
LEGEND NEMA — National Electrical Manufacturers Association		

TABLE 11A

FAN MOTOR DATA, STANDARD MOTORS – SI

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
208/230–3–60 and 460–3–60		
Speed (r/s)	29.08	29.08
Shaft kW	3.73	5.60
Frame (NEMA)	S184T	S213T
Shaft Dia (mm)	28.6	34.9
575–3–60		
Speed (r/s)	29.08	29.25
Shaft kW	3.73	5.60
Frame (NEMA)	184T	S213T
Shaft Dia (mm)	28.6	34.9
LEGEND NEMA — National Electrical Manufacturers Association		

TABLE 11B

FAN MOTOR DATA, ALTERNATE MOTORS – SI

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
208/230–3–60 and 460–3–60		
Speed (r/s)	29.08	29.17
Shaft kW	5.60	7.46
Frame (NEMA)	S213T	S215T
Shaft Dia (mm)	34.9	34.9
575–3–60		
Speed (r/s)	29.25	29.17
Shaft kW	5.60	7.46
Frame (NEMA)	S213T	D215T
Shaft Dia (mm)	34.9	34.9
LEGEND NEMA — National Electrical Manufacturers Association		

TABLE 12A

Standard Drive Data, 60 Hz – ENGLISH

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
MOTOR DRIVE		
Motor Pulley Pitch Diameter (in.)	3.7–4.7	4.3–5.3
Pulley Factory Setting Full Turns Open	3.0	3.0
FAN DRIVE		
Pulley Pitch Dia (in.)	9.4	11.0
Pulley Bore (in.)	1 ⁷ / ₁₆	1 ¹⁵ / ₁₆
Belt No. — Section	2—B	2—B†
Belt Pitch (in.)	41.8	(2) 42.8 (2) 43.8
FAN SPEEDS (rpm)		
Factory Setting	771	752
Range	679–863	682–841
Max Allowable Speed (rpm)	1200	1100
Change per 1/2 Turn of Moveable Motor Pulley Flange	15.3	13.1
MAX FULL TURNS FROM CLOSED POSITION	6	6
SHAFTS CENTER DISTANCE (in.)	9.12–10.99	6.67–9.43
† Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.		

TABLE 12B

Medium Static Drive Data, 60 Hz – ENGLISH

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
MOTOR DRIVE		
Motor Pulley Pitch Diameter (in.)	4.3–5.3	4.3–5.3
Pulley Factory Setting Full Turns Open	3.0	3.0
FAN DRIVE		
Pulley Pitch Dia (in.)	9.4	9.4
Pulley Bore (in.)	1 ⁷ / ₁₆	1 ¹⁵ / ₁₆
Belt No. — Section	1—B	2—B†
Belt Pitch (in.)	41.8	(2) 38.8 (2) 39.8
FAN SPEEDS (rpm)		
Factory Setting	881	881
Range	798–984	798–984
Max Allowable Speed (rpm)	1200	1100
Change per 1/2 Turn of Moveable Motor Pulley Flange	15.3	15.3
MAX FULL TURNS FROM CLOSED POSITION	6	6
SHAFTS CENTER DISTANCE (in.)	9.16–10.99	6.67–9.43
† Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.		

TABLE 12C

High Static Drive Data, 60 Hz – ENGLISH

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
MOTOR DRIVE		
Motor Pulley Pitch Diameter (in.)	4.3–5.3	4.3–5.3
Pulley Factory Setting Full Turns Open	3.0	3.0
FAN DRIVE		
Pulley Pitch Dia (in.)	7.4	8.6
Pulley Bore (in.)	1 ⁷ / ₁₆	1 ¹⁵ / ₁₆
Belt No. — Section	2—B	2—B
Belt Pitch (in.)	36.8	37.8
FAN SPEEDS (rpm)		
Factory Setting	1118	1024
Range	1014–1200†	873–1075
Max Allowable Speed (rpm)	1200	1100
Change per 1/2 Turn of Moveable Motor Pulley Flange	19.4	16.7
MAX FULL TURNS FROM CLOSED POSITION	6	6
SHAFTS CENTER DISTANCE (in.)	8.16–10.02	6.67–9.43

† It is possible to adjust drive so that fan speed exceeds maximum allowable. DO NOT exceed 1200 rpm.

TABLE 12D

Standard Drive Data, 60 Hz – SI

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
MOTOR DRIVE		
Motor Pulley Pitch Diameter (mm)	94.0–119.4	109.2–134.6
Pulley Factory Setting Full Turns Open	3.0	3.0
FAN DRIVE		
Pulley Pitch Dia (mm)	239	279
Pulley Bore (mm)	36.5	49.2
Belt No. — Section	2—B	2—B†
Belt Pitch (mm)	1062	(2) 1987 (2) 1113
FAN SPEEDS (r/s)		
Factory Setting	12.9	12.5
Range	11.3–14.4	11.4–14.0
Max Allowable Speed (r/s)	20.0	18.3
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.255	0.218
MAX FULL TURNS FROM CLOSED POSITION	6	6
SHAFTS CENTER DISTANCE (mm)	232–279	169–240

† Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.

TABLE 12E

Medium Static Drive Data, 60 Hz – SI

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
MOTOR DRIVE		
Motor Pulley Pitch Diameter (mm)	109.2–134.6	109.2–134.6
Pulley Factory Setting Full Turns Open	3.0	3.0
FAN DRIVE		
Pulley Pitch Dia (mm)	239	239
Pulley Bore (mm)	36.5	49.2
Belt No. — Section	1—B	2—B†
Belt Pitch (mm)	1062	(2) 986 (2) 1011
FAN SPEEDS (r/s)		
Factory Setting	14.7	14.7
Range	13.3–16.4	13.3–16.4
Max Allowable Speed (r/s)	20.0	18.3
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.255	0.255
MAX FULL TURNS FROM CLOSED POSITION	6	6
SHAFTS CENTER DISTANCE (mm)	232–279	169–240
† Four belts shipped with unit. Use correct set of 2 belts sized according to the pulley setting.		

TABLE 12F

High Static Drive Data, 60 Hz – SI

20 & 25 Ton

UNIT	FAS240 FHS240	FAS300
MOTOR DRIVE		
Motor Pulley Pitch Diameter (mm)	109.2–134.6	109.2–134.6
Pulley Factory Setting Full Turns Open	3.0	3.0
FAN DRIVE		
Pulley Pitch Dia (mm)	188	203 Ⓜ †
Pulley Bore (mm)	36.5	49.2
Belt No. — Section	2—B	2—B
Belt Pitch (mm)	935	935
FAN SPEEDS (r/s)		
Factory Setting	18.6	17.1
Range	16.9–20.0†	14.6–17.9
Max Allowable Speed (r/s)	20.0	18.3
Change per 1/2 Turn of Moveable Motor Pulley Flange	0.323	0.278
MAX FULL TURNS FROM CLOSED POSITION	6	6
SHAFTS CENTER DISTANCE (mm)	207–255	169–240
† It is possible to adjust drive so that fan speed exceeds maximum allowable. DO NOT exceed 20 r/s		

TABLE 13

Standard Fan Performance Data — 0.0–2.4 in. wg External Static Pressure — English 6 to 15 Ton

UNIT	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
		0.0		0.2		0.4		0.6		0.8		1.0		1.2	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
FAS072 FHS072	1,800	399	0.19	454	0.24	548	0.35	634	0.47	713	0.60	785	0.74	850	0.89
	2,100	446	0.28	497	0.34	583	0.46	660	0.59	733	0.73	802	0.88	867	1.05
	2,400	498	0.40	541	0.47	622	0.60	693	0.74	760	0.89	824	1.05	885	1.22
	2,700	544	0.55	588	0.63	663	0.78	730	0.93	792	1.09	851	1.26	909	1.44
	3,000	594	0.73	635	0.82	707	0.99	770	1.15	828	1.32	883	1.50	937	1.69
FAS091 FHS091	2,250	273	0.08	493	0.37	580	0.49	656	0.62	727	0.76	794	0.92	858	1.08
	2,600	322	0.15	540	0.52	622	0.66	693	0.81	757	0.96	819	1.12	878	1.29
	3,000	552	0.65	595	0.73	673	0.91	740	1.07	800	1.24	856	1.41	910	1.60
	3,400	615	0.91	653	1.01	726	1.21	789	1.40	846	1.59	899	1.78	950	1.97
	3,750	671	1.20	706	1.31	773	1.53	834	1.74	889	1.95	940	2.16	988	2.37
FAS120 FHS120	3,000	399	0.29	573	0.69	654	0.86	722	1.03	784	1.19	841	1.37	896	1.55
	3,500	604	0.92	641	1.02	714	1.22	780	1.42	838	1.61	892	1.81	942	2.01
	4,000	680	1.33	713	1.45	778	1.68	839	1.91	896	2.14	947	2.36	995	2.58
	4,500	756	1.86	787	1.99	845	2.26	901	2.52	955	2.78	1005	3.03	1051	3.28
	5,000	834	2.51	861	2.67	914	2.96	966	3.25	1016	3.54	1064	3.82	1109	4.11
FAS150	3,750	394	0.40	453	0.52	558	0.80	643	1.10	717	1.39	785	1.71	848	2.04
	4,300	436	0.57	487	0.70	586	1.00	670	1.34	742	1.67	806	2.01	867	2.36
	5,000	492	0.86	535	0.99	623	1.31	704	1.69	775	2.08	838	2.47	896	2.86
	5,700	550	1.23	587	1.37	664	1.71	740	2.11	809	2.55	872	2.99	929	3.43
	6,250	596	1.59	630	1.74	700	2.09	770	2.51	837	2.97	899	3.45	955	3.94
FAS180 FHS180	4,500	428	0.59	475	0.70	570	0.99	656	1.33	730	1.68	796	2.02	856	2.38
	5,300	488	0.92	528	1.04	609	1.34	689	1.71	762	2.11	827	2.51	886	2.92
	6,000	542	1.29	578	1.43	649	1.74	721	2.11	791	2.55	855	3.00	914	3.46
	6,800	604	1.83	637	1.99	700	2.32	763	2.70	826	3.15	888	3.64	946	4.15
	7,500	660	2.42	690	2.59	747	2.95	804	3.34	861	3.79	919	4.29	975	4.83

TABLE 13 (Cont.)

Standard Fan Performance Data — 0.0–2.4 in. wg External Static Pressure — English 6 to 15 Ton

UNIT	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
		1.4		1.6		1.8		2.0		2.2		2.4	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
FAS072 FHS072	1,800	910	1.04	965	1.20	1016	1.36	1065	1.52	1111	1.69	1155	1.86
	2,100	927	1.21	983	1.38	1035	1.56	1084	1.74	1131	1.92	1175	2.11
	2,400	944	1.41	999	1.59	1052	1.78	1101	1.98	1149	2.18	1193	2.38
	2,700	964	1.63	1018	1.82	1069	2.03	1118	2.24	1165	2.45	—	—
	3,000	989	1.89	1039	2.10	1089	2.31	1136	2.53	1183	2.76	—	—
FAS091 FHS091	2,250	918	1.26	975	1.43	1029	1.62	1079	1.80	1126	1.99	1172	2.18
	2,600	936	1.48	991	1.67	1044	1.87	1094	2.07	1142	2.28	1188	2.49
	3,000	963	1.79	1014	1.99	1064	2.20	1113	2.42	1159	2.64	—	—
	3,400	998	2.18	1045	2.39	1092	2.61	1137	2.83	1182	3.07	—	—
	3,750	1034	2.58	1078	2.80	1122	3.03	1164	3.27	—	—	—	—
FAS120 FHS120	3,000	949	1.74	1000	1.93	1050	2.14	1099	2.36	1147	2.58	1192	2.81
	3,500	990	2.21	1037	2.42	1083	2.64	1128	2.86	1172	3.10	—	—
	4,000	1040	2.80	1084	3.03	1126	3.26	1167	3.50	—	—	—	—
	4,500	1094	3.53	1136	3.78	1176	4.03	—	—	—	—	—	—
	5,000	1151	4.39	1191	4.66	—	—	—	—	—	—	—	—
FAS150	3,750	909	2.37	968	2.74	1026	3.12	1080	3.51	1131	3.92	1181	4.32
	4,300	925	2.73	980	3.11	1034	3.52	1084	3.92	1135	4.35	1184	4.78
	5,000	950	3.26	1002	3.67	1052	4.09	1101	4.53	1148	4.98	1190	5.44
	5,700	981	3.88	1031	4.33	1079	4.79	1125	5.25	1169	5.73	—	—
	6,250	1007	4.42	1057	4.91	1103	5.40	1148	5.90	1191	6.40	—	—
FAS180 FHS180	4,500	912	2.75	967	3.13	1019	3.52	1070	3.92	1120	4.35	1168	4.79
	5,300	940	3.33	992	3.75	1041	4.18	1088	4.61	1134	5.06	1179	5.52
	6,000	968	3.92	1018	4.38	1066	4.85	1112	5.32	1156	5.80	1198	6.29
	6,800	1000	4.67	1050	5.19	1097	5.71	1142	6.23	1185	6.76	—	—
	7,500	1028	5.39	1078	5.97	1125	6.54	1170	7.11	—	—	—	—

See Legend and Notes on page 51.

TABLE 17

Standard Fan Performance Data — 0.0–2.4 in. wg External Static Pressure — English 20 & 25 Ton

UNIT	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
		0.0		0.2		0.4		0.6		0.8		1.0		1.2	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
FAS240 FHS240	6,000	532	1.25	569	1.39	639	1.69	711	2.06	781	2.48	846	2.93	905	3.60
	7,000	608	1.93	641	2.09	702	2.42	763	2.08	824	3.23	885	3.71	943	4.23
	8,000	686	2.83	716	3.01	770	3.38	823	3.77	876	4.21	930	4.70	983	5.24
	9,000	764	3.97	791	4.18	841	4.59	888	5.02	935	5.47	982	5.96	1030	6.51
	10,000	843	5.38	868	5.62	914	6.09	957	6.55	1000	7.02	1042	7.53	1084	8.08
FAS300	7,500	456	1.29	490	1.47	556	1.85	621	2.25	678	2.64	729	3.06	778	3.60
	8,750	521	1.98	551	2.18	608	2.61	664	3.07	720	3.53	770	3.99	816	4.45
	10,000	587	2.88	614	3.11	664	3.59	714	4.09	763	4.62	812	5.15	857	5.68
	11,250	653	4.03	678	4.29	724	4.82	768	5.37	812	5.95	856	6.54	899	7.14
	12,500	720	5.46	743	5.75	785	6.33	825	6.93	865	7.55	904	8.20	944	8.86
	15,000	829	8.84	850	9.19	888	9.88	924	10.57	958	11.27	991	11.99	1024	12.73

TABLE 17 (Cont.)

Standard Fan Performance Data — 0.0–2.4 in. wg External Static Pressure — English 20 & 25 Ton

UNIT	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
		1.4		1.6		1.8		2.0		2.2		2.4	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
FAS240 FHS240	6,000	954	3.83	1005	4.27	1052	4.72	1098	5.22	1142	5.67	—	—
	7,000	990	4.74	1040	5.24	1090	5.80	1135	6.30	1176	6.84	—	—
	8,000	1028	5.79	1078	6.38	1130	7.00	1173	7.60	—	—	—	—
	9,000	1073	7.11	1120	7.72	1169	8.37	—	—	—	—	—	—
	10,000	1126	8.75	1166	9.37	—	—	—	—	—	—	—	—
FAS300	7,500	831	4.41	870	5.10	913	5.90	950	6.88	985	7.70	—	—
	8,750	859	4.97	901	5.59	944	6.42	980	7.20	1020	8.10	—	—
	10,000	900	6.20	939	6.74	976	7.33	1013	8.00	1050	8.82	—	—
	11,250	941	7.73	980	8.32	1017	8.90	1052	9.51	1088	10.16	—	—
	12,500	984	9.53	1022	10.19	1058	10.84	1093	11.49	—	—	—	—
	15,000	1057	13.49	1090	14.28	—	—	—	—	—	—	—	—

See Legend and Notes on page 52.

TABLE 18

Standard Fan Performance Data — 0–600 kPa External Static Pressure — SI

20 & 25 Ton

UNIT	AIRFLOW (L/s)	EXTERNAL STATIC PRESSURE (kPa)													
		0		50		100		150		200		250		300	
		r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW
FAS240 FHS240	2830	8.86	0.94	9.48	1.04	10.65	1.26	11.84	1.53	13.01	1.85	14.10	2.19	15.08	2.53
	3300	10.14	1.44	10.69	1.56	11.70	1.81	12.71	2.08	13.73	2.41	14.74	2.77	15.71	3.15
	3780	11.43	2.11	11.93	2.25	12.84	2.52	13.71	2.81	14.60	3.14	15.49	3.51	16.39	3.91
	4250	12.74	2.96	13.19	3.12	14.02	3.43	14.81	3.74	15.59	4.08	16.37	4.45	17.17	4.85
	4720	14.05	4.01	14.47	4.19	15.23	4.54	15.96	4.88	16.66	5.24	17.36	5.62	18.07	6.03
FAS300	3540	7.60	0.96	8.16	1.09	9.27	1.38	10.34	1.68	11.30	1.97	12.15	2.28	12.97	2.68
	4130	8.68	1.47	9.18	1.62	10.13	1.94	11.07	2.29	11.99	2.63	12.84	2.97	13.60	3.32
	4720	9.78	2.15	10.23	2.32	11.07	2.67	11.89	3.05	12.72	3.45	13.53	3.84	14.29	4.23
	5310	10.89	3.01	11.30	3.20	12.06	3.59	12.80	4.00	13.53	4.43	14.27	4.88	14.99	5.33
	5900	12.00	4.07	12.38	4.29	13.09	4.72	13.75	5.17	14.41	5.63	15.07	6.11	15.74	6.61

TABLE 18 (Cont.)

Standard Fan Performance Data — 0–600 kPa External Static Pressure — SI

20 & 25 Ton

UNIT	AIRFLOW (L/s)	EXTERNAL STATIC PRESSURE (kPa)											
		350		400		450		500		550		600	
		r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW
FAS240 FHS240	2830	15.90	2.86	16.75	3.18	17.53	3.52	18.30	3.89	19.03	4.23	—	—
	3300	16.50	3.53	17.33	3.91	18.17	4.32	18.92	4.70	19.60	5.10	—	—
	3780	17.13	4.32	17.97	4.76	18.83	5.22	19.55	5.67	—	—	—	—
	4250	17.88	5.30	18.67	5.76	19.48	6.24	—	—	—	—	—	—
	4720	18.77	6.52	19.43	6.99	—	—	—	—	—	—	—	—
FAS300	3540	13.85	3.29	14.50	3.80	15.22	4.40	15.83	5.13	16.42	5.74	—	—
	4130	14.31	3.71	15.01	4.17	15.74	4.79	16.33	5.37	17.00	6.04	—	—
	4720	14.99	4.62	15.65	5.02	16.27	5.46	16.88	5.97	17.50	6.57	—	—
	5310	15.68	5.77	16.34	6.20	16.95	6.64	17.53	7.09	18.09	7.58	—	—
	5900	16.39	7.10	17.03	7.60	17.64	8.08	18.22	8.57	—	—	—	—

See Legend and Notes on page 52.

TABLE 19 High Capacity Fan Performance Data — 0.0–2.4 in. wg External Static Pressure — English 20 & 25 Ton

UNIT	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)													
		0.0		0.2		0.4		0.6		0.8		1.0		1.2	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
FAS240 FHS240	6,000	542	1.29	577	1042	646	1.72	716	2.09	785	2.51	849	2.95	907	3.40
	7,000	620	1.99	652	2.15	711	2.48	771	2.85	831	3.28	890	3.76	947	4.27
	8,000	700	2.92	728	3.10	781	3.46	833	3.85	885	4.29	938	4.78	990	5.32
	9,000	781	4.10	806	4.30	854	4.71	900	5.13	946	5.58	993	6.08	1039	6.62
	10,000	862	5.56	885	5.79	929	6.24	971	6.70	1012	7.18	1054	7.69	1096	8.24
FAS300	7,500	476	1.39	510	1.58	579	1.99	644	2.40	701	2.81	752	3.29	804	3.96
	8,750	545	2.14	574	2.35	633	2.81	691	3.29	747	3.77	797	4.25	842	4.76
	10,000	615	3.12	641	3.36	692	3.87	743	4.41	794	4.96	843	5.51	888	6.05
	11,250	685	4.37	709	4.64	754	5.20	800	5.79	845	6.40	891	7.02	935	7.64
	12,500	756	5.92	778	6.22	819	6.83	860	7.47	901	8.14	942	8.83	983	9.52

TABLE 19 (Cont.) High Capacity Fan Performance Data — 0.0–2.4 in. wg External Static Pressure — English 20 & 25 Ton

UNIT	AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)											
		1.4		1.6		1.8		2.0		2.2		2.4	
		Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
FAS240 FHS240	6,000	961	3.86	1011	4.31	1058	4.77	1104	5.24	1147	5.71	—	—
	7,000	1000	4.79	1050	5.32	1097	5.85	1142	6.38	1184	6.91	—	—
	8,000	1041	5.88	1090	6.47	1137	7.07	1181	7.67	—	—	—	—
	9,000	1086	7.21	1133	7.82	1178	8.47	—	—	—	—	—	—
	10,000	1138	8.83	1180	9.46	—	—	—	—	—	—	—	—
FAS300	7,500	874	5.33	897	5.91	940	6.80	990	7.50	—	—	—	—
	8,750	886	5.36	930	6.13	982	7.32	1020	8.10	—	—	—	—
	10,000	930	6.60	969	7.20	1007	7.89	1045	8.71	—	—	—	—
	11,250	976	8.25	1014	8.86	1051	9.49	1086	10.17	—	—	—	—
	12,500	1023	10.20	1061	10.88	1097	11.56	—	—	—	—	—	—

See Legend and Notes on page 52.

TABLE 20

High Capacity Fan Performance Data — 0–600 kPa External Static Pressure — SI

20 & 25 Ton

UNIT	AIRFLOW (L/s)	EXTERNAL STATIC PRESSURE (kPa)													
		0		50		100		150		200		250		300	
		r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW
FAS240 FHS240	2830	9.03	0.96	9.62	1.06	10.77	1.29	11.94	1.56	13.08	1.087	14.15	2.20	15.12	2.54
	3330	10.34	1.48	10.86	1.60	11.85	1.85	12.84	2.12	13.85	2.45	14.84	2.80	15.78	3.18
	3780	11.67	2.17	12.14	2.31	13.02	2.58	13.88	2.87	14.75	3.20	15.63	3.56	16.50	3.96
	4250	13.01	3.05	13.44	3.21	14.23	3.51	15.00	3.82	15.77	4.16	16.54	4.53	17.32	4.94
	4720	14.36	4.15	14.75	4.32	15.48	4.66	16.18	4.99	16.87	5.35	17.56	5.73	18.26	6.14
FAS300	3540	7.94	1.04	8.51	1.18	9.65	1.48	10.73	1.79	11.68	2.10	12.53	2.46	13.40	2.95
	4130	9.08	1.59	9.57	1.75	10.55	2.10	11.52	2.46	12.45	2.81	13.28	3.17	14.04	3.55
	4720	10.24	2.33	10.68	2.51	11.53	2.88	12.39	3.29	13.24	3.70	14.05	4.11	14.80	4.51
	5310	11.42	3.26	11.81	3.46	12.57	3.88	13.33	4.32	14.09	4.77	14.85	5.24	15.58	5.70
	5900	12.60	4.42	12.96	4.64	13.65	5.09	14.33	5.57	15.01	6.07	15.40	6.58	16.38	7.10

TABLE 20 (Cont.)

High Capacity Fan Performance Data — 0–600 kPa External Static Pressure — SI

20 & 25 Ton

UNIT	AIRFLOW (L/s)	EXTERNAL STATIC PRESSURE (kPa)											
		350		400		450		500		550		600	
		r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW	r/s	kW
FAS240 FHS240	2830	16.01	2.88	16.85	3.22	17.64	3.56	18.39	3.91	19.12	4.26	—	—
	3300	16.67	3.57	17.50	3.96	18.28	4.36	19.03	4.75	19.73	5.15	—	—
	3780	17.35	4.39	18.17	4.82	18.95	5.27	19.68	5.72	—	—	—	—
	4250	18.11	5.37	18.88	5.83	19.63	6.31	—	—	—	—	—	—
	4720	18.96	6.58	19.67	7.05	—	—	—	—	—	—	—	—
FAS300	3540	14.57	3.97	14.95	4.41	15.67	5.07	16.50	5.59	—	—	—	—
	4130	14.76	3.99	15.51	4.57	16.36	5.46	17.00	6.04	—	—	—	—
	4720	15.49	4.92	16.15	5.37	16.78	5.88	17.42	6.50	—	—	—	—
	5310	16.26	6.15	16.91	6.61	17.51	7.08	18.10	7.58	—	—	—	—
	5900	17.04	7.61	17.68	8.11	18.28	8.62	—	—	—	—	—	—

See Legend and Notes on page 52.

Legends and Notes for Tables 13 to 16, English – 6 to 15 Ton

LEGEND

- Bhp** — Brake Horsepower Input to Fan
ESP — External Static Pressure

NOTES:

1. Maximum allowable fan speed is 1200 rpm for all sizes.
2. Fan performance is based on deductions for wet coil, clean 2-in. filters, and unit casing. See table at right for factory-supplied filter pressure drop.
3. Refer to fan motor and drive tables for additional data.

FACTORY-SUPPLIED PRESSURE DROP — ENGLISH

UNIT	AIRFLOW (Cfm)	PRESSURE DROP (in. wg)
FAS072 FHS072	850	0.05
	1150	0.08
	1450	0.11
FAS091 FHS091	2,250	0.07
	3,000	0.11
	3,750	0.15
FAS120 FHS120	3,000	0.11
	4,000	0.17
	5,000	0.23
FAS150	3,750	0.06
	5,000	0.10
	6,250	0.13
FAS180 FHS180	4,500	0.08
	6,000	0.12
	7,500	0.17

Legends and Notes for Tables 13 to 16, SI – 6 to 15 Ton

LEGEND

- ESP** — External Static Pressure

NOTES:

1. Maximum allowable fan speed is 20 r/s for all sizes.
2. Fan performance is based on deductions for wet coil, clean 51-mm filters, and unit casing. See table at right for factory-supplied filter pressure drop.
3. Refer to fan motor and drive tables for additional data.

FACTORY-SUPPLIED PRESSURE DROP — SI

UNIT	AIRFLOW (L/s)	PRESSURE DROP (Pa)
FAS072 FHS072	850	13
	1150	20
	1450	28
FAS091 FHS091	1000	17
	1400	27
	1800	38
FAS120 FHS120	1450	28
	1900	42
	2350	56
FAS150	1750	15
	2350	24
	2950	33
FAS180 FHS180	2100	20
	2800	30
	3500	42

Legends and Notes for Tables 17 to 20, English – 20 & 25 Ton

LEGEND

Bhp – Brake Horsepower Input to Fan
ESP – External Static Pressure

NOTES:

1. Maximum allowable fan speed for size 240 units is 1200 rpm .
 Maximum allowable fan speed for size 300 units is 1100 rpm.
2. Fan performance is based on deductions for wet coil, clean 2-in. filters, and unit casing. See table at right for factory-supplied filter pressure drop.
3. Refer to fan motor and drive tables for additional data.

FACTORY-SUPPLIED PRESSURE DROP — ENGLISH

UNIT	AIRFLOW (Cfm)	PRESSURE DROP (in. wg)
FAS240 FHS240	6,000	0.12
	8,000	0.19
	10,000	0.26
FAS300	7,500	0.15
	10,000	0.22
	12,500	0.30

Legends and Notes for Tables 17 to 20, SI – 20 & 25 Ton

LEGEND

ESP – External Static Pressure

NOTES:

1. Maximum allowable fan speed for size 240 units is 20 r/s. Maximum allowable fan speed for size 300 units is 18.3 r/s.
2. Fan performance is based on deductions for wet coil, clean 51–mm filters, and unit casing. See table at right for factory-supplied filter pressure drop.
3. Refer to fan motor and drive tables for additional data.

FACTORY-SUPPLIED PRESSURE DROP — SI

UNIT	AIRFLOW (L/s)	PRESSURE DROP (Pa)
FAS240 FHS240	2900	32
	3800	47
	4700	64
FAS300	3500	36
	4700	55
	5900	76

START-UP CHECKLIST
(SPLIT SYSTEMS WITH FAS/FHS UNITS)

I. PRELIMINARY INFORMATION

OUTDOOR: MODEL NO. _____ INDOOR: MODEL NO. _____
SERIAL NO. _____ SERIAL NO. _____
ADDITIONAL ACCESSORIES _____

II. PRE-START-UP
OUTDOOR UNIT

IS THERE ANY SHIPPING DAMAGE? _____ (Y/N) _____
IF SO, WHERE: _____

WILL THIS DAMAGE PREVENT UNIT START-UP? (Y/N) _____
CHECK POWER SUPPLY. DOES IT AGREE WITH UNIT? (Y/N) _____
HAS THE GROUND WIRE BEEN CONNECTED? (Y/N) _____
HAS THE CIRCUIT PROTECTION BEEN SIZED AND INSTALLED PROPERLY? (Y/N) _____
ARE THE POWER WIRES TO THE UNIT SIZED AND INSTALLED PROPERLY? (Y/N) _____
HAVE COMPRESSOR HOLDDOWN BOLTS BEEN LOOSENED? (Y/N) _____

CONTROLS

ARE THERMOSTAT(S) AND INDOOR FAN CONTROL WIRING CONNECTIONS MADE AND CHECKED? (Y/N) _____
ARE ALL WIRING TERMINALS (including main power supply) TIGHT? (Y/N) _____
HAVE OUTDOOR UNIT CRANKCASE HEATERS BEEN ENERGIZED FOR 24 HOURS? (Y/N) _____

INDOOR UNIT

HAS WATER BEEN PLACED IN DRAIN PAN TO CONFIRM PROPER DRAINAGE? (Y/N) _____
ARE PROPER AIR FILTERS IN PLACE? (Y/N) _____
HAVE FAN AND MOTOR PULLEYS BEEN CHECKED FOR PROPER ALIGNMENT? (Y/N) _____
DO THE FAN BELTS HAVE PROPER TENSION? (Y/N) _____

PIPING

HAS FOAM SHIPPING BLOCK BEEN REMOVED FROM THE TXV (Thermostatic Expansion Valve)? (Y/N) _____
ARE LIQUID LINE SOLENOID VALVES LOCATED AT THE INDOOR UNIT (FAS) OR OUTDOOR UNIT (FHS) COILS AS REQUIRED? (Y/N) _____
HAVE LEAK CHECKS BEEN MADE AT COMPRESSORS, CONDENSERS, INDOOR COILS, TXVs (Thermostatic Expansion Valves) SOLENOID VALVES, FILTER DRIERS, AND FUSIBLE PLUGS WITH A LEAK DETECTOR? (Y/N) _____
LOCATE, REPAIR, AND REPORT ANY LEAKS. _____
HAVE ALL COMPRESSOR SERVICE VALVES BEEN FULLY OPENED (BACKSEATED) (Y/N) _____
ARE THE COMPRESSOR OIL SIGHT GLASSES SHOWING CORRECT LEVELS? (Y/N) _____

CHECK VOLTAGE IMBALANCE

LINE-TO-LINE VOLTS: AB _____ V AC _____ V BC _____ V

(AB + AC + BC)/3 = AVERAGE VOLTAGE = _____ V

MAXIMUM DEVIATION FROM AVERAGE VOLTAGE = _____ V

VOLTAGE IMBALANCE = 100 X (MAX DEVIATION)/(AVERAGE VOLTAGE) = _____ %

IF OVER 2% VOLTAGE IMBALANCE, DO NOT ATTEMPT TO START SYSTEM!
CALL LOCAL POWER COMPANY FOR ASSISTANCE.

III. START-UP

CHECK INDOOR FAN MOTOR SPEED AND RECORD.

AFTER AT LEAST 10 MINUTES RUNNING TIME, RECORD THE FOLLOWING MEASUREMENTS:

	COMP A1	COMP B1
OIL PRESSURE	_____	_____
SUCTION PRESSURE	_____	_____
SUCTION LINE TEMP	_____	_____
DISCHARGE PRESSURE	_____	_____
DISCHARGE LINE TEMP	_____	_____
ENTERING OUTDOOR UNIT AIR TEMP	_____	_____
LEAVING OUTDOOR UNIT AIR TEMP	_____	_____
INDOOR UNIT ENTERING AIR DB TEMP	_____	_____
INDOOR UNIT ENTERING AIR WB TEMP	_____	_____
INDOOR UNIT LEAVING AIR DB TEMP	_____	_____
INDOOR UNIT LEAVING AIR WB TEMP	_____	_____

COMPRESSOR AMPS (L1/L2/L3) ____/____/____ ____/____/____

CHECK THE COMPRESSOR OIL LEVEL SIGHT GLASSES, ARE THE SIGHT GLASSES SHOWING OIL LEVEL AT 1/8 to 1/3 FULL? (Y/N) _____

NOTES:
