Date
03/28/2024
Project Name
30 Bldg
Project Number
Client / Purchaser

FRASER-JOHNSTON
Heating ▪ Air Conditioning

Submittal Summary Page

Qty	Tag #	Model # / Material #	Description
1	CU-5	THE48B41S	Fraser-Johnston Brand, 4 Ton, Heat Pump, R-410A Refrigerant, 14 SEER / 1-Stage, 460-3-60
1	Furn-5	JHETC48GBCS2N1	Fraser-Johnston Branded, Single Piece, Standard ECM, Two Stage Capable, 21 inch width, 4 ton, 3R-28-12, BC Factory TXV, Standard (Conventional), 208/230-1-60
1	Furn-5	S1-1BR01121	Filter Rack
2	CU-7, 8	THE2B24T21S	Fraser Johnston Brand, Heat Pump, R410a Refrigerant, 14.3 SEER2 Series, 2 Ton, Two Stage, 208/230-1-60, Standard Controls
2	Furn-7, 8	JHETB24CBAS2N1	Fraser-Johnston Branded, Single Piece, Standard ECM, Two Stage Capable, 17.5 inch width, 2 ton, 2R-20-18, BA Factory TXV, Standard (Conventional), 208/230-1-60
2	Furn-7, 8	S1-1BR01117	Filter Rack
1	CU-6	THE36B42S	Fraser-Johnston Brand, 3 Ton, Heat Pump, R-410A Refrigerant, 14 SEER / 1-Stage, 460-3-60
1	FURN-6	JHETC36DBCS2N1	Fraser-Johnston Branded, Single Piece, Standard ECM, Two Stage Capable, 21 inch width, 3 ton, 3R-20-14, BC Factory TXV, Standard (Conventional), 208/230-1-60
1	FURN-6	S1-1BR01121	Filter Rack

Equipment start-up and commissioning by a factory trained technician is recommended.
Contact your supplying distributor or sales representative for additional information & guidance.


WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

FRASER-JOHNSTON
Heating ▪ Air Conditioning

Residential Split

Split-System Outdoor

Project Name: **30 Bldg**

Unit Model #: **THE48B41S**

Quantity: **1** Tag #: **CU-5**

System: **THE48B41S,JHETC48GBCS2N1**

Cooling Performance		
Total net capacity	47.8	MBH
Sensible net capacity	36.2	MBH
Seasonal Efficiency (at ARI)	14.50	SEER
Efficiency (at ARI)	12.00	EER
Ambient DB temp.	95.0	°F
Leaving air temp dew point	57.00	°F
Power input	4.11	kW

Refrigerant	
Refrigerant type	R-410A

Heat Pump Performance		
Heating output capacity	51.7	MBH
Ambient DB temp.	47	°F
Entering DB temp.	60	°F
Leaving DB temp.	86.6	°F
Air temp. rise	26.6	°F
Power Input	3.5	kW
Cop	4.3	COP
HSPF	9	

Electrical Data		
Power supply	460-3-60	
Unit min circuit ampacity	8.66	A
Unit max over-current protection	15	A

Outdoor Unit Shipping Dimensions & Weight					
Hgt	43 in	Len	37 in	Wth	34 in
Weight with factory installed options					251 lb

Matchup Information		
AHRI Reference Number	210380248	
AHRI Rated Capacity	47.8	MBH

Note: Please refer to the tech guide for actual unit dimensions

Note: Please refer to the tech guide for listed maximum static pressures

4 Ton

Product Features

- The THE three phase models are the newest offering in our successful LX Series split system heat pump lineup. These outdoor units are optimized for the new 14 SEER / 8.2 HSPF Minimum Efficiency in all US Regions, and are specifically designed to be matched with Fraser-Johnston indoor coils, furnaces, and air handlers to provide a complete system solution.

Unit Features

- 14 SEER / 1-Stage
- Environmentally Friendly - CFC-free R-410A refrigerant delivers environmentally friendly performance with zero ozone depletion.
- Durable Finish – The coated steel wire fan guard, coated external fasteners, and pre-treated G90-equivalent galvanized steel chassis components resist corrosion and rust creep. Champagne colored powdercoat paint further protects external panels.
- Fully Exposed Refrigerant Connections and a Single Panel Covering the Electrical Controls Make for Easy Servicing of the Unit
- Scroll Compressor
- Protected Compressor - Compressors are protected internally by a high pressure relief valve and a temperature sensor, and externally by the system high and low pressure switches. The liquid line filter-drier is factory installed to protect the compressor against moisture and debris
- Rugged Coil Protection - Coils are protected from mechanical damage by a proven stamped steel coil guard design.

Warranty

- Standard One (1)-Year Limited Parts
- Standard Five (5)-Years Limited Compressor
- Extended Ten (10) Year Limited Parts Warranty when Product is Registered Online Within 90 Days of Purchase for Replacement or Closing for New Home Construction

Project Name: **30 Bldg** Unit Model #: **THE48B41S**

Quantity: **1** Tag #: **CU-5** System: **THE48B41S,JHETC48GBCS2N1**

Factory Installed Options

THE48B41S

Equipment Options		Option(s) Selected
Product Category:	**T**	Fraser-Johnston Brand
Type:	**H**	Heat Pump
Nominal Series Efficiency & Staging:	**E**	14 SEER / 1-Stage
Nominal Cooling Capacity:	**48**	4 Ton
Refrigerant:	**B**	R-410A Refrigerant
Voltage:	**4**	460-3-60
Product Generation:	**1**	
Factory-Installed Options:	**S**	

Field Installed Accessories

- ○ S1-01007646000 - Compressor Sound Blanket - Large Scroll (2.0 lbs)
- ○ S1-02549810000 - Compressor Crankcase Heater - Bellyband - Scroll 240V (1.0 lbs)
- ○ S1-1HK0601 - Hurricane Kit (LX Series) (1.4 lbs)
- ○ S1-2LA04701024 - Advanced Low Ambient Control Kit (1.8 lbs)
- ○ S1-2LA06700424 - Standard Low Ambient Control Kit (0.8 lbs)
- ○ S1-2PS06700524 - Low Pressure Switch Kit (R-410A) (0.2 lbs)
- ○ S1-3024-6881/D - Single Outdoor Thermostat (1.0 lbs)
- ○ S1-51301536000 - Touch-up Paint: Titanium (1.1 lbs)
- ○ S1-ADDWIRE - Add-a-Wire allows 5-wire thermostats to use only 4 wires. (0.3 lbs)
- ○ S1-CHGTENT01 - Cold Weather Charging Tent (20.0 lbs)
- ○ S1-CTSDTS - CTS Wired Temperature Sensor for thermostat | Duct *Also works for LX Series (0.3 lbs)
- ○ S1-CTSHTS - CTS Hardwired Temperature Sensor for CTS Thermostats *Works with LX series as well (0.2 lbs)
- ○ S1-CTSPLATE - Wall Plate for CTS Thermostats *Also works for new platform LX series models below (0.0 lbs)
- ○ S1-CTSWFTS - CTS Temperature Sensor with WiFi for CTS Thermostats *Also works with LX Series (0.1 lbs)
- ○ S1-FHM3204HT - High Ambient Condenser Fan Motor (1/4 HP) (13.6 lbs)
- ○ S1-LXLOCK - Locking Ring For LX-Series Thermostats (0.4 lbs)
- ○ S1-LXPLATE - Wall Plate For LX-Series Thermostats (0.0 lbs)
- ○ S1-LXWFM - For LX Series Thermostats - WiFi Communication (0.1 lbs)
- ○ S1-THELOCK - Locking Ring For THE Series Thermostats (0.4 lbs)
- ○ S1-THEPLATE - Wall Plate for THE Thermostats (0.1 lbs)
- ○ S1-THPU432-S - SOURCE 1 CTS SERIRES | 3/4 Stage Heating | 2 Stage Cooling | 7-day/5+2 Programmable | WiFi | Dual Fuel (0.7 lbs)
- ○ S1-THPU433-S - Source 1 Branded CTS Series | 3/4 Stage Heating | 2 Stage Cooling | 7-Day/5+2 Programmable | WiFi | Dual Fuel (0.7 lbs)
- ○ S1-THSU231-S - Source 1 Branded LX Series | 2.3" Display | 2 Stage Heating | 2 Stage Cooling | 7-day Programmable | WiFi On-Board (0.2 lbs)
- ○ S1-THSU301-S - Source 1 Branded LX Series | 3" Display | 2 Stage Heating | 1 Stage Cooling | (5+2) 7-day Programmable (1.0 lbs)
- ○ S1-THSU302-S - Source 1 Branded LX Series | 3" Display | 3/4 Stage Heating | 2 Stage Cooling | (5+2) 7-day Programmable (1.0 lbs)
- ○ S1-THSU303-S - Source 1 Branded LX Series | 3" Display | 3/4 Stage Heating | 2 Stage Cooling | (5+2) 7-day Programmable | Humidity On-Board (1.0 lbs)
- ○ S1-THXU430W - Wi-Fi Communicating Touchscreen Thermostat with Proprietary Hexagon Interface (White), with 4.3” display screen (0.9 lbs)

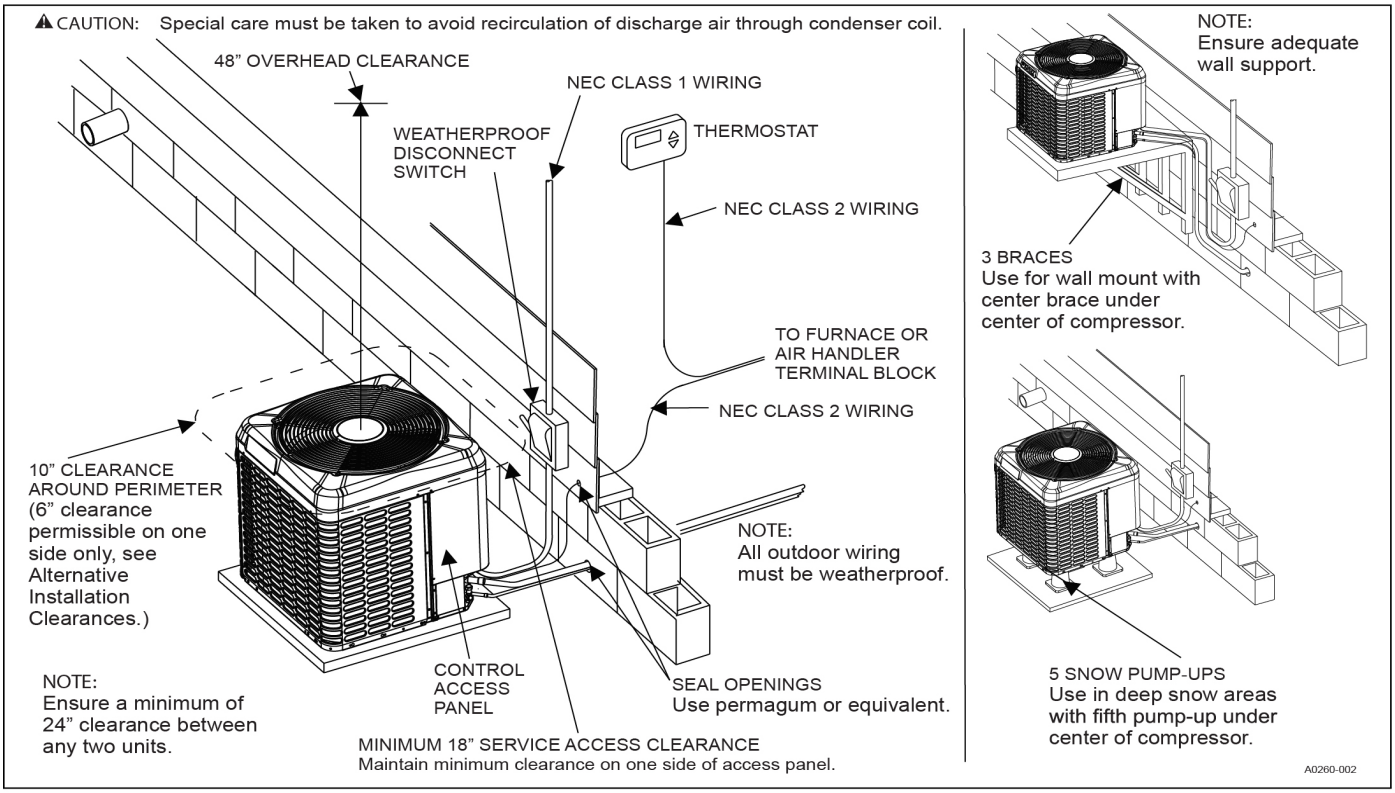
Project Name:

Unit Model #: **THE48B41S**

Quantity: **1** Tag #: **CU-5**

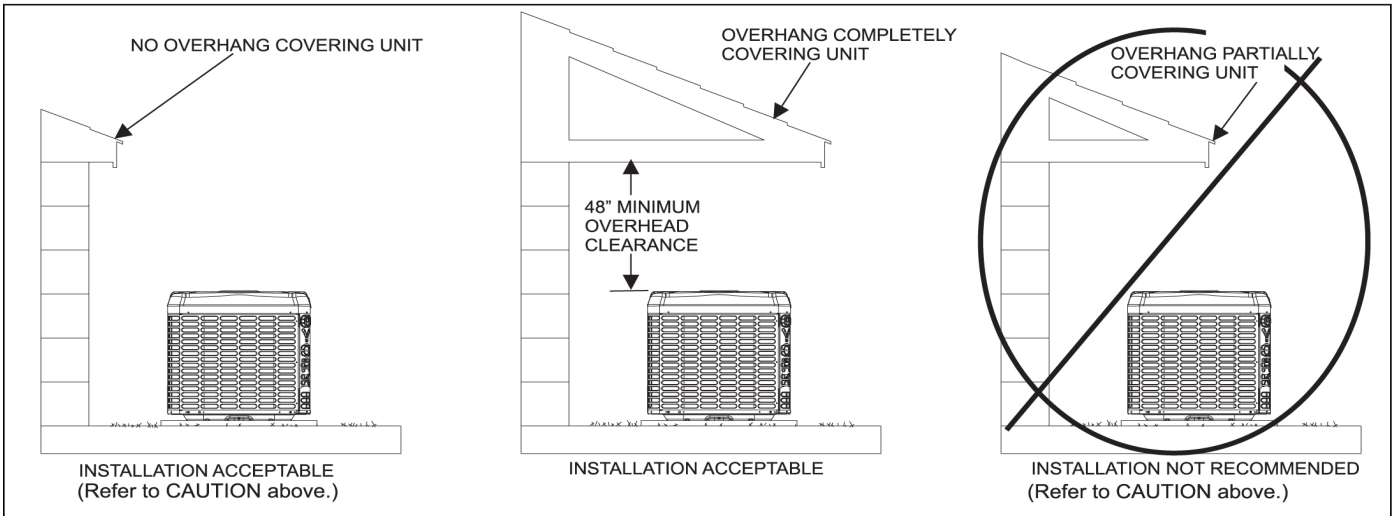
THE Typical Installation

TYPICAL INSTALLATION



⚠ CAUTION

Care must be taken to prevent ice from damaging the unit. Damage may occur from ice falling onto unit from a sloped roof or from a vertical drip line due to a partial overhang.



NOTE:
The unit must be installed on a solid base above the grade. The base must not be able to settle or shift causing strain on refrigerant lines and possible leaks.

NOTE:
Install unit on flat surface. If installation surface is sloped, ensure that unit slopes away from house structure at 1/4" per foot.

⚠ **CAUTION:** Special care must be taken to avoid recirculation of discharge air through condenser coil.

A0291-001

Project Name: Unit Model #: **THE48B41S**

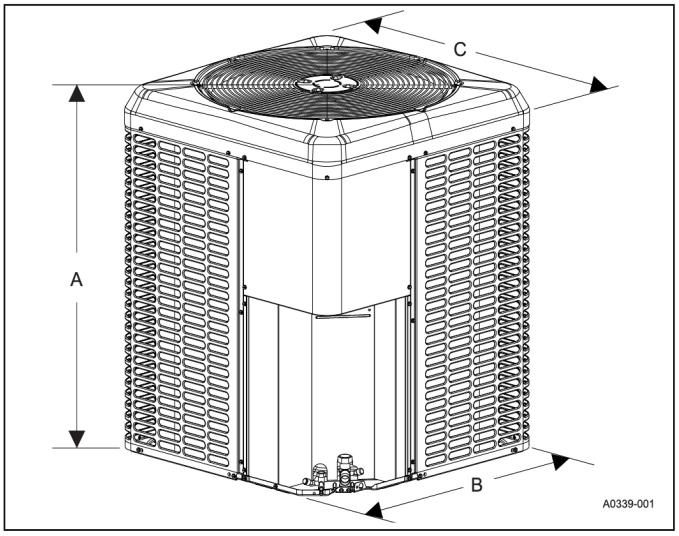
Quantity: **1** Tag #: **CU-5**

THE Unit Dimensions

PHYSICAL AND ELECTRICAL DATA

MODEL		THE30 B31S	THE36 B31S	THE42 B31S	THE48 B31S	THE60 B31S	THE30 B41S	THE36 B41S	THE42 B41S	THE48 B41S	THE60 B41S
Unit Supply Voltage		208-230V, 3Ø, 60Hz					460V, 3Ø, 60Hz				
Normal Voltage Range [1]		187 to 252					432 to 504				
Minimum Circuit Ampacity		12.42	12.58	16.10	18.42	21.22	5.93	7.05	7.25	8.66	10.33
Max. Overcurrent Device Amps [2]		20	20	25	30	35	15	15	15	15	15
Min. Overcurrent Device Amps [3]		15	15	15	15	20	15	15	15	15	15
Compressor Type		Scroll	Recip	Recip	Scroll	Scroll	Scroll	Recip	Recip	Scroll	Scroll
Compressor Amps	Rated Load	9.9	7.6	10.2	15.3	17.8	4.7	3.8	5.1	6.9	8.6
	Locked Rotor	58.0	68.0	88.0	83.1	110.0	38.0	34.0	44.0	41.0	52.0
Crankcase Heater		No	Yes	Yes	No	No	No	Yes	Yes	No	No
Factory External Discharge Muffler		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fan Diameter Inches		24	24	24	26	26	24	24	24	26	26
Fan Motor	Rated HP	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	Rated Load Amps	1.30	1.30	1.30	1.30	1.30	0.65	0.65	0.65	0.60	0.60
	Nominal RPM	850	850	850	850	850	850	850	850	850	850
	Nominal CFM	2995	3715	3715	4100	4100	2995	3715	3715	4100	4100
Coil	Face Area Sq. Ft.	23.82	23.82	23.82	26.40	28.80	23.82	23.82	23.82	26.40	28.80
	Rows Deep	1	2	2	2	2	1	2	2	2	2
	Fins / Inch	22	18	18	18	18	22	18	18	18	18
Liquid Line Set OD (Field Installed)		3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Vapor Line Set OD (Field Installed)[4]		3/4	3/4	7/8	7/8	1-1/8‡	3/4	3/4	7/8	7/8	1-1/8‡
Unit Charge (Lbs. - Oz.) [5]		7 - 15	12 - 4	12 - 7	15 - 4	14 - 10	7 - 15	12 - 4	12 - 7	15 - 4	14 - 10
Charge Per Foot, Oz.		0.62	0.62	0.67	0.67	0.75	0.62	0.62	0.67	0.67	0.75
Operating Weight Lbs.		176	230	230	235	256	176	230	230	235	256

1. Rated in accordance with AHRI Standard 110-2012, utilization range “A”.
2. Dual element fuses or HACR circuit breaker. Maximum allowable overcurrent protection.
3. Dual element fuses or HACR circuit breaker. Minimum recommended overcurrent protection.
4. For applications with non-standard vapor line sizes, see the "Applications & Accessories" section of this Technical Guide.
5. The Unit Charge is correct for the outdoor unit, smallest matched indoor unit, and 15 feet of refrigerant tubing. For tubing lengths other than 15 feet, add or subtract the amount of refrigerant, using the difference in actual lineset length (not the equivalent length) multiplied by the per foot value.



DIMENSIONS

Unit Model	Dimensions (Inches)			Refrigerant Connection Service Valve Size	
	A	B	C	Liquid	Vapor
THE30B(3,4)1S	39-1/2	35-1/4	31-3/4	3/8	3/4
THE36B(3,4)1S	39-1/2	35-1/4	31-3/4		
THE42B(3,4)1S	39-1/2	35-1/4	31-3/4		7/8
THE48B(3,4)1S	39-1/2	38	34-1/4		
THE60B(3,4)1S	42-1/2	38	34-1/4		7/8‡

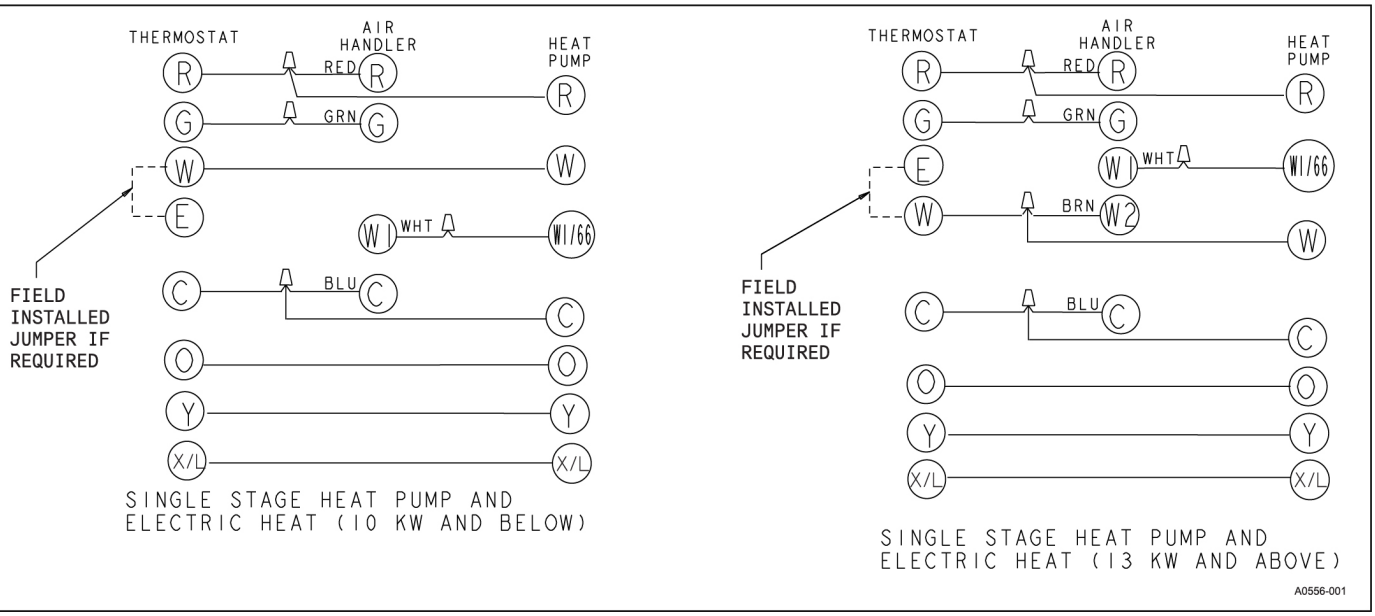
‡ Adapter fitting must be field installed for the required 1-1/8” line set.
All dimensions are in inches and are subject to change without notice.
Overall height is from bottom of base pan to top of fan guard.
Overall length and width include screw heads.

Project Name: Unit Model #: **THE48B41S**

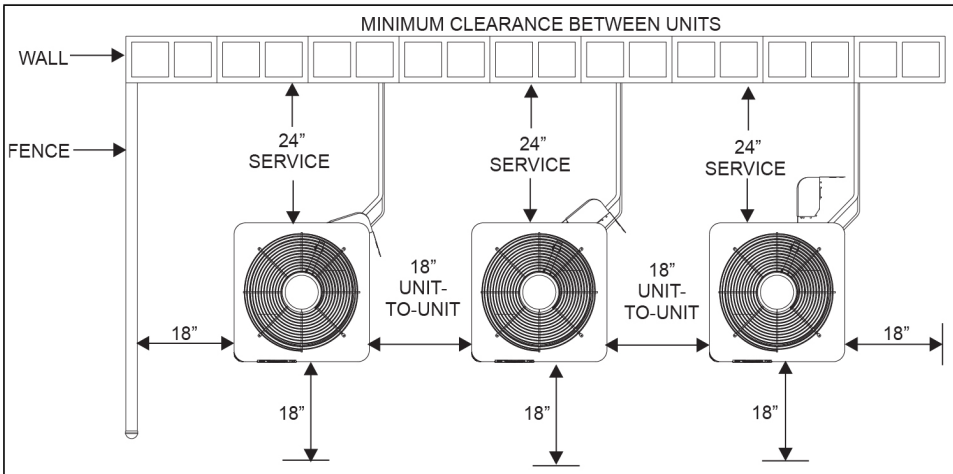
Quantity: **1** Tag #: **CU-5**

THE Typical Wiring

TYPICAL FIELD WIRING

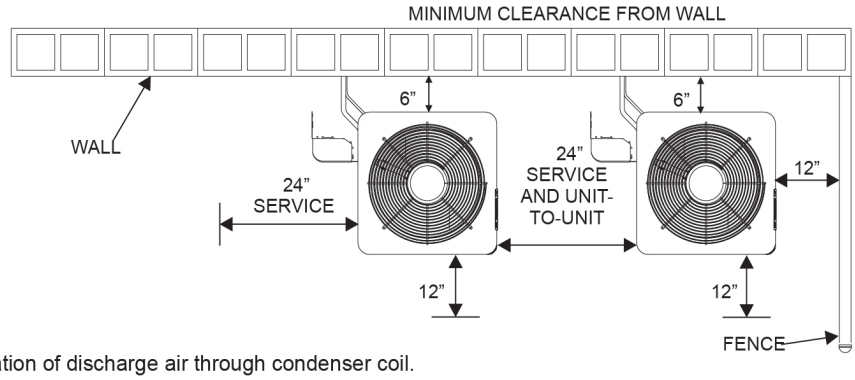


ALTERNATIVE INSTALLATION CLEARANCES



NOTE:
Clearance between two units may be reduced to 18" minimum provided the service access clearance is increased to 24" minimum, and the clearance on each remaining side is maintained at 18" minimum.

NOTE:
Clearance to one side of the unit may be reduced to 6" provided the clearance to each remaining side is increased to 12" minimum, the service access is increased to 24" minimum, and the clearances between any two units is maintained at 24" minimum.



CAUTION:
Special care must be taken to avoid recirculation of discharge air through condenser coil.

A0287-001

Project Name:

Unit Model #: **JHETC48GBCS2N1**

Quantity: **1** Tag #: **Furn-5**

System: **THE48B41S,JHETC48GBCS2N1**

Cooling Performance		
Total net capacity	47.8	MBH
Sensible net capacity	36.2	MBH
Entering DB temp.	80.0	°F
Entering WB temp.	67.0	°F
Unit Leaving DB temp.	61.4	°F
Unit Leaving WB temp.	58.7	°F

Supply Air Blower Performance		
Supply air	1800	cfm
Ext. static pressure	0.5	IWG
Blower speed description	HIGH (5)	
Motor rating	0.75	HP
Elevation	0	ft
Drive type	DIRECT	

Indoor Electrical Data		
Power supply	208-1-60	
Unit min circuit ampacity	6.80	A
Unit max over-current protection	15	A

Indoor Unit Shipping Dimensions & Weight					
Hgt	68 in	Len	26 in	Wth	22 in
Weight with factory installed options					129 lb

Matchup Information		
AHRI Reference Number	210380248	
AHRI Rated Capacity	47.8	MBH

Note: Please refer to the tech guide for actual unit dimensions

Note: Please refer to the tech guide for listed maximum static pressures

Product Features

- This fan coil line offers the ultimate in application flexibility. This unit may be used for upflow, downflow, horizontal right, or horizontal left applications. All Johnson Controls air handlers and coils can use a TXV to provide our customers with the optimum performance and refrigerant control. Single piece air handlers are available as Flex-coils (without a factory-installed metering device). For added flexibility, an R-22 or R-410A TXV or piston must be field-installed to meet the requirement of the chosen refrigerant.

Unit Features

- MaxAlloyTM coil - long-life aluminum coils built to deliver lasting performance, efficiency, and reliability
- Next generation even-flow distributor - designed for balanced refrigerant flow and even coil circuit performance
- Next generation high-efficiency blower - delivers increased airflow and reduced blower watts by 10%, using a standard ECM motor
- Two-stage operation - provides flexibility in application with single and two-stage outdoor equipment
- Next generation insulation and gasket design - reduces thermal transmission paths and reduces sweating
- Tool-less filter access - sliding latch design provides quick and easy access
- Designed for easy installation and service - casing size of 20.5 in., smooth sides, and rigid construction provide ease of attic access and tight applications. Front facing components, slide out blower, laser cut knock outs and integrated duct flanges shorten install time
- Cabinet air leakage - less than 2% at 1 in. W.C. external static pressure when tested in accordance with ASHRAE Standard 193
- Long lasting quality - structural components made of postpowder painted aluminum or galvanized steel to prevent corrosion
- Thermoset drain pan - positive slope for drainage to reduce cause for potential mold or contaminants

Warranty

- Standard 5-year limited parts warranty.
- Extended 10-year limited parts warranty when product is registered online within 90 days of purchase for replacement or closing for new home construction.

Project Name: Unit Model #: **JHETC48GBCS2N1**

Quantity: **1** Tag #: **Furn-5** System: **THE48B41S,JHETC48GBCS2N1**

Factory Installed Options

JHETC48GBCS2N1

Equipment Options		Option(s) Selected
Brand:	**J**	Fraser-Johnston Branded
Product Type:	**H**	Single Piece
Motor Control Options:	**E**	Standard ECM
Stage:	**T**	Two Stage Capable
Cabinet Width:	**C**	21 inch width
Capacity:	**48**	4 ton
Slab Size:	**G**	3R-28-12
Refrigerant / TXV:	**BC**	BC Factory TXV
Controls:	**S**	Standard (Conventional)
Voltage:	**2**	208/230-1-60
Factory-Installed Options:	**N**	
Product Generation:	**1**	

Field Installed Accessories

- ○ S1-02435672000 - Service Disconnect Opening Seal Cover (0.2 lbs)
- ● S1-1BR01121 - Filter Rack (8.2 lbs)
- ○ S1-1FB1921 - Combustible Floor Base For Downflow W /Electric Heat (8.2 lbs)
- ○ S1-1PF0602BK - Permanent Filter (¾ X 20 X 20) (Contains 10) (5.0 lbs)
- ○ S1-8HK06500206 - 2.5 kW 208/230-1-60 Electric Heat without Circuit Breaker (1.0 lbs)
- ○ S1-8HK06500506 - 5 kW 208/230-1-60 Electric Heat without Circuit Breaker (8.4 lbs)
- ○ S1-8HK06500806 - 7.5 kW 208/230-1-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501006 - 10 kW 208/230-1-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501025 - 10 kW 208/230-3-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501525 - 15 kW 208/230-3-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK16500206 - 2.5 kW 208/230-1-60 Electric Heat with Circuit Breaker (1.0 lbs)
- ○ S1-8HK16500506 - 5 kW 208/230-1-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK16500806 - 7.5 kW 208/230-1-60 Electric Heat with Circuit Breaker (6.0 lbs)
- ○ S1-8HK16501006 - 10 kW 208/230-1-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK16501506 - 15 kW 208/230-1-60 Electric Heat with Circuit Breaker (8.0 lbs)
- ○ S1-8HK16502006 - 20 kW 208/230-1-60 Electric Heat with Circuit Breaker (9.0 lbs)
- ○ S1-8HK16502025 - 20 kW 208/230-3-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK26501506 - 15 kW 208/230-1-60 Electric Heat Kit w/ Circuit Breaker and Jumper Bar (5.0 lbs)
- ○ S1-8HK26502006 - 20 kW 208/230-1-60 Electric Heat Kit w/ Circuit Breaker and Jumper Bar (5.0 lbs)
- ○ S1-JM11AH2020A - Color matched filter box and merv 11 filter. Accepts 4" and 1" filters (16.0 lbs)

Project Name: Unit Model #: **JHETC48GBCS2N1**

Quantity: **1** Tag #: **Furn-5**

Unit Dimensions

Dimensions and duct connections

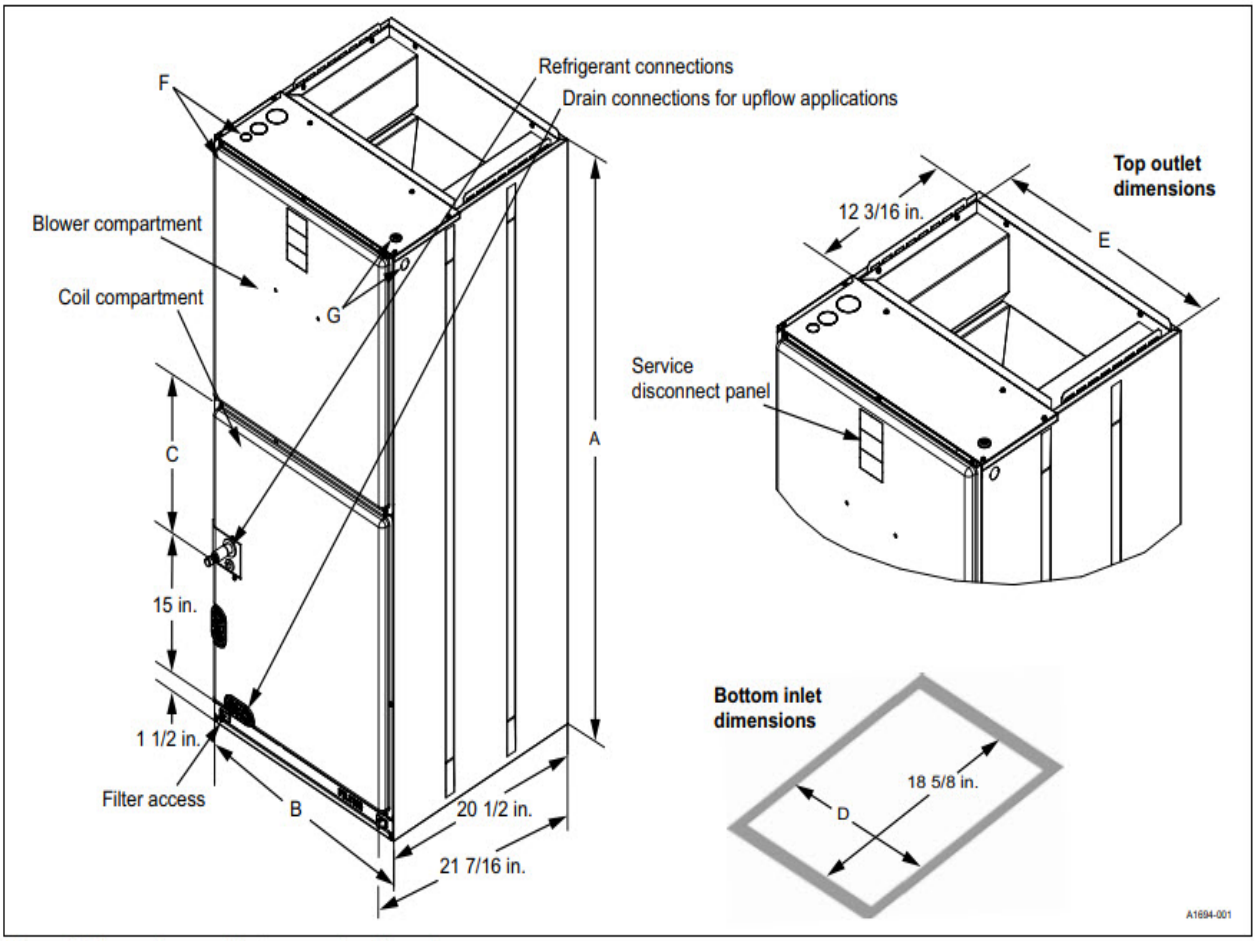


Figure 1: Dimensions and duct connection dimensions

Table 1: Dimensions[1]

Models	Dimensions					Wiring knockouts[2]		Refrigerant connections line size	
	A	B	C	D	E	F	G		
	Height (in.)	Width (in.)	Opening widths (in.)			Power (in.)	Control (in.)	Liquid (in.)	Vapor (in.)
JHET**B18B**	47	17 1/2	7 1/2	16 1/2	16 1/2	7/8 (1/2) 1 3/8 (1) 1 23/32 (1 1/4)	7/8 (1/2)	3/8	3/4
JHET**B24C**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**B30D**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**B36D**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**C36D**	51	21	11 1/2	20	20				
JHET**C42F**	57	21	17 1/2	20	20				7/8
JHET**C48G**	61 1/4	21	21 3/4	20	20				
JHET**D48G**	61 1/4	24 1/2	21 3/4	23 1/2	23 1/2				
JHET**C60H**	63	21	23 1/2	20	20				
JHET**D60H**	63	24 1/2	23 1/2	23 1/2	23 1/2				
JHET**D60J**	61 1/4	24 1/2	21 3/4	23 1/2	23 1/2				

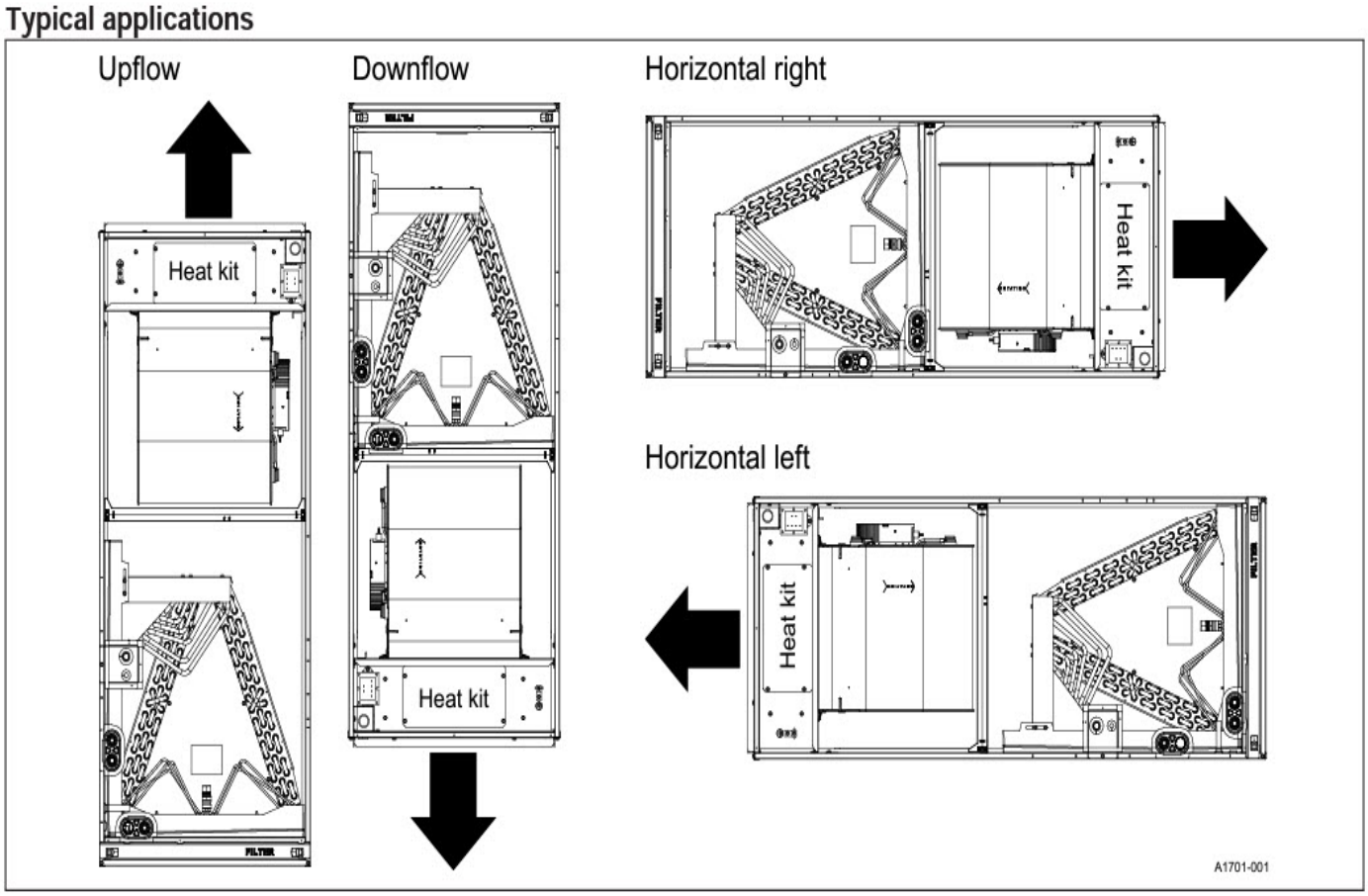
1. All dimensions are in inches.
2. Actual size (conduit size).

Project Name:

Unit Model #: **JHETC48GBCS2N1**

Quantity: **1** Tag #: **Furn-5**

Typical Application



Project Name:

Unit Model #: **JHETC48GBCS2N1**

Quantity: **1** Tag #: **Furn-5**

JHET Physical and Electrical

Table 4: Physical and electrical data - cooling only

Models		B18B	B24C	B30D	B36D	C36D	C42F
Blower - diameter x width (in.)		11 x 8	11 x 8	11 x 8	11 x 8	11 x 10	11 x 10
Motor	HP	1/3 HP	1/3 HP	1/2 HP	1/2 HP	1/2 HP	1/2 HP
	Nominal RPM	1050	1050	1050	1050	1050	1050
Voltage (V)		208/230	208/230	208/230	208/230	208/230	208/230
Full load amps at 230 V (A)		2.6	2.6	3.8	3.8	3.8	3.8
Filter[1]	Type	Disposable or cleanable					
	Size	16 x 20 x 1	16 x 20 x 1	16 x 20 x 1	20 x 20 x 1	20 x 20 x 1	20 x 20 x 1
Shipping/operating weight (lb)		101/93	107/99	108/100	108/100	124/114	135/125

Models		C48G	D48G	C60H	D60H	D60J	
Blower - diameter x width (in.)		11 x 10	11 x 11	11 x 10	11 x 11	11 x 11	
Motor	HP	3/4 HP	3/4 HP	3/4 HP	3/4 HP	3/4 HP	
	Nominal RPM	1050	1050	1050	1050	1050	
Voltage (V)		208/230	208/230	208/230	208/230	208/230	
Full load amps at 230 V (A)		5.4	5.4	5.4	5.4	5.4	
Filter[1]	Type	Disposable or cleanable					
	Size	20 x 20 x 1	23 x 20 x 1	20 x 20 x 1	23 x 20 x 1	23 x 20 x 1	
Shipping/operating weight (lb)		140/129	152/140	153/141	158/146	162/150	

1. Field supplied.

Table 5: Electrical data - cooling only

Models	Motor FLA[1]	Minimum Circuit Ampacity (A)	MOP[2]
B18B/B24C	2.6	3.3	15
B30D/B36D/C36D/C42F	3.8	4.8	15
C48G/D48G/C60H/D60H/D60J	5.4	6.8	15

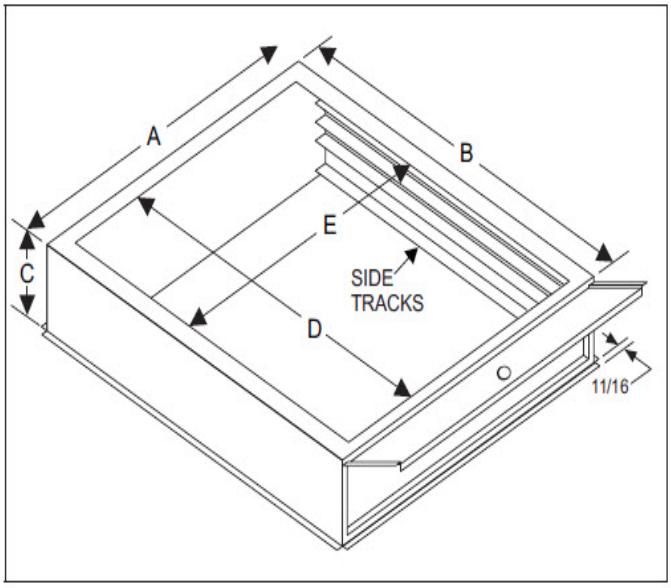
1. FLA = Full Load Amps
2. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

Project Name: Unit Model #: **JHETC48GBCS2N1**

Quantity: **1** Tag #: **Furn-5**

Filter Rack Accessory

Filter rack dimensions



Galvanized models	A	B	C	D	E	Filter size
1BR01117	17.50	21.56	4.00	18.63	14.25	16 x 20 x 1 or 2
1BR01121	21.00	21.56	4.00	18.63	17.75	20 x 20 x 1 or 2
1BR01124	24.50	21.56	4.00	18.63	21.25	20 x 24 x 1 or 2

Project Name: Unit Model #: **THE2B24T21S**

Quantity: **2** Tag #: **CU-7, 8** System: **THE2B24T21S,JHETB24CBAS2N1**

Cooling Performance		
Total net capacity	24.4	MBH
Sensible net capacity	18.6	MBH
Seasonal Efficiency (at ARI)	14.30	SEER2
Efficiency (at ARI)	11.00	EER2
Ambient DB temp.	95.0	°F
Leaving air temp dew point	56.70	°F
Power input	2.10	kW

Hangtag Ratings		
Hangtag Cooling	14.30	SEER2
Hangtag Heating	7.50	HSPF2

Refrigerant		
Refrigerant type	R-410A	
Data plate charge with 15' lineset	5 lb	6 oz

Heat Pump Performance		
Heating output capacity	23.9	MBH
Ambient DB temp.	47	°F
Entering DB temp.	60	°F
Leaving DB temp.	86.8	°F
Air temp. rise	26.8	°F
Power Input	1.8	kW
Cop	4	COP
HSPF2	7.5	

Electrical Data		
Power supply	208/230-1-60	
Unit min circuit ampacity	13.4	A
Unit max over-current protection	20	A

Outdoor Unit Shipping Dimensions & Weight					
Hgt	40 in	Len	26 in	Wth	26 in
Weight with factory installed options					140 lb

Matchup Information		
AHRI Reference Number	209452458	
AHRI Rated Capacity	24.4	MBH
AHRI Rated Efficiency	14.3	SEER2

Note: Please refer to the tech guide for actual unit dimensions

Note: Please refer to the tech guide for listed maximum static pressures

2 Ton

Unit Features

- Two Stage
- 14.3 SEER2 / 7.5 HSPF2 Series / R410A Refrigerant
- Scroll Compressor -Protected internally by a high-pressure relief valve and a temperature sensor, and externally by the system high-pressure switch.
- Small footprint - Minimum footprint for easier handling, transportation, and installation.
- Easier installation - Independent panels provide quick access for unit setup. Installation time is reduced by easy power and control wiring access.
- Accessible information - QR code on unit provides quick access to technical documents and warranty information.
- Durable finish - The coated steel wire fan guard, coated external fasteners, and pretreated G90-equivalent galvanized steel chassis
- Quality Coils - Enhanced aluminum fins are mechanically bonded to copper tubing.
- Low operating sound levels - Developed using CFD and FEA tools, the sturdy cabinet and top design provides sound performance of 76 dBA or lower.
- Reliable Operation - Ball bearing fan motors provide superior performance in extreme temperatures. Factory installed accumulator ensures proper functioning across a wide range of conditions.
- Better Service Access - Diagonal base valves with open access for low-loss fittings, single panel access to the electrical controls, full corner access, and removable fan guard allow easy access for unit maintenance.

Warranty

- Five (5) Year Limited Parts Warranty
- Ten (10) Year Limited Compressor Warranty
- Extended Ten (10) Year Limited Parts Warranty when Product is Registered Online Within 90 Days of Purchase for Replacement or Closing for New Home Construction

Project Name: Unit Model #: **THE2B24T21S**

Quantity: **2** Tag #: **CU-7, 8** System: **THE2B24T21S,JHETB24CBAS2N1**

Factory Installed Options

THE2B24T21S

Equipment Options		Option(s) Selected
Brand:	**T**	Fraser Johnston Brand
Unit Type:	**H**	Heat Pump
Efficiency:	**E2**	14.3 SEER2 Series
Refrigerant:	**B**	R410a Refrigerant
Nominal Cooling Capacity:	**24**	2 Ton
Stage:	**T**	Two Stage
Voltage:	**2**	208/230-1-60
Product Generation:	**1**	
Controls:	**S**	Standard Controls

Field Installed Accessories

- ○ S1-01007645000 - Compressor Sound Blanket - Small Scroll (1.6 lbs)
- ○ S1-02549809000 - Compressor Crankcase Heater - Bellyband - Scroll 240V (1.0 lbs)
- ○ S1-1HK0601 - Anchor Bracket Kit (1.4 lbs)
- ○ S1-1TVMBA1 - (2.0 lbs)
- ○ S1-2LA04701024 - Advanced Low Ambient Control Kit (1.8 lbs)
- ○ S1-2LA06700424 - Standard Low Ambient Control Kit (0.8 lbs)
- ○ S1-2LT06700224 - Low Temperature Cutout (1.0 lbs)
- ○ S1-2SA06710106 - Compressor Start Assist Kit (1.3 lbs)
- ○ S1-33102952111 - Outdoor Communicating Board Kit (1.2 lbs)
- ○ S1-51301535000 - Touch-up Paint: Champagne (1.1 lbs)
- ○ S1-51301537000 - Touch-up Paint: Black (1.1 lbs)
- ○ S1-ACB-30 - Wall Mount Kit - 30" (11.3 lbs)
- ○ S1-ADDWIRE - Add-a-Wire allows 5-wire thermostats to use only 4 wires. (0.3 lbs)
- ○ S1-CE-9722F - High Ambient Condenser Fan Motor (1/12 - 1/8 HP)
- ○ S1-CHGTENT01 - Cold Weather Charging Tent (20.0 lbs)
- ○ S1-CTSDTS - CTS Wired Temperature Sensor for thermostat | Duct *Also works for LX Series (0.3 lbs)
- ○ S1-CTSHTS - CTS Hardwired Temperature Sensor for CTS Thermostats *Works with LX series as well (0.2 lbs)
- ○ S1-CTSPLATE - Wall Plate for CTS Thermostats *Also works for new platform LX series models below (0.0 lbs)
- ○ S1-CTSWFTS - CTS Temperature Sensor with WiFi for CTS Thermostats *Also works with LX Series (0.1 lbs)
- ○ S1-HPRKIT-12 - Support Feet (Snow Feet) Kit - 12" (6.0 lbs)
- ○ S1-HPRKIT-3 - Support Feet (Snow Feet) Kit - 3" (2.5 lbs)
- ○ S1-HPRKIT-6 - Support Feet (Snow Feet) Kit - 6" (3.5 lbs)
- ○ S1-LXLOCK - Locking Ring For LX-Series Thermostats (0.4 lbs)
- ○ S1-LXPLATE - Wall Plate For LX-Series Thermostats (0.0 lbs)
- ○ S1-LXWFM - For LX Series Thermostats - WiFi Communication (0.1 lbs)
- ○ S1-THEC11NS - Source 1 Branded THE Value Series | 2.3" Display | 1 Stage Heating | 1 Stage Cooling | Non-Programmable | Hardwire/Battery Powered (0.6 lbs)
- ○ S1-THEC11P5S - Source 1 Branded THE Value Series | 2.3" Display | 1 Stage Heating | 1 Stage Cooling | 7-Day (5+2) Programmable | Hardwire/Battery Powered (1.0 lbs)
- ○ S1-THELOCK - Locking Ring For THE Series Thermostats (0.4 lbs)
- ○ S1-THEPLATE - Wall Plate for THE Thermostats (0.1 lbs)
- ○ S1-THPU432-S - SOURCE 1 CTS SERIRES | 3/4 Stage Heating | 2 Stage Cooling | 7-day/5+2 Programmable | WiFi | Dual Fuel (0.7 lbs)
- ○ S1-THPU433-S - Source 1 Branded CTS Series | 3/4 Stage Heating | 2 Stage Cooling | 7-Day/5+2 Programmable | WiFi | Dual Fuel (0.7 lbs)
- ○ S1-THSU231-S - Source 1 Branded LX Series | 2.3" Display | 2 Stage Heating | 2 Stage Cooling | 7-day Programmable | WiFi On-Board (0.2 lbs)

Project Name: Unit Model #: **THE2B24T21S**

Quantity: **2** Tag #: **CU-7, 8** System: **THE2B24T21S,JHETB24CBAS2N1**

- ○ S1-THSU301-S - Source 1 Branded LX Series | 3" Display | 2 Stage Heating | 1 Stage Cooling | (5+2) 7-day Programmable (1.0 lbs)
- ○ S1-THSU302-S - Source 1 Branded LX Series | 3" Display | 3/4 Stage Heating | 2 Stage Cooling | (5+2) 7-day Programmable (1.0 lbs)
- ○ S1-THSU303-S - Source 1 Branded LX Series | 3" Display | 3/4 Stage Heating | 2 Stage Cooling | (5+2) 7-day Programmable | Humidity On-Board (1.0 lbs)
- ○ S1-THXU430W - Wi-Fi Communicating Touchscreen Thermostat with Proprietary Hexagon Interface (White), with 4.3” display screen (0.9 lbs)

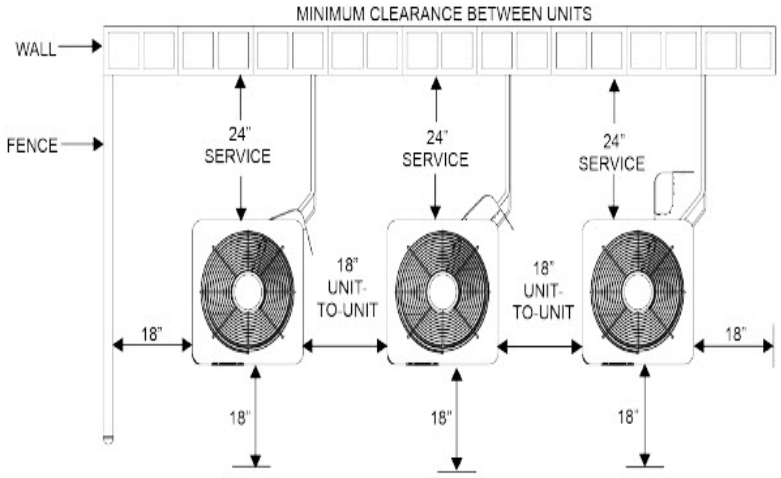
Project Name: Unit Model #: **THE2B24T21S**

Quantity: **2** Tag #: **CU-7, 8**

Alternate Clearances

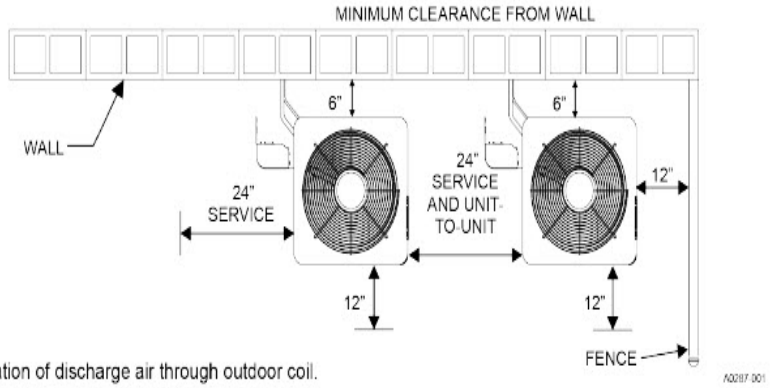
Alternative installation clearances

Figure 6: Alternative installation clearances



NOTE:
Clearance between two units may be reduced to 18" minimum provided the service access clearance is increased to 24" minimum, and the clearance on each remaining side is maintained at 18" minimum.

NOTE:
Clearance to one side of the unit may be reduced to 6" provided the clearance to each remaining side is increased to 12" minimum, the service access is increased to 24" minimum, and the clearances between any two units is maintained at 24" minimum.



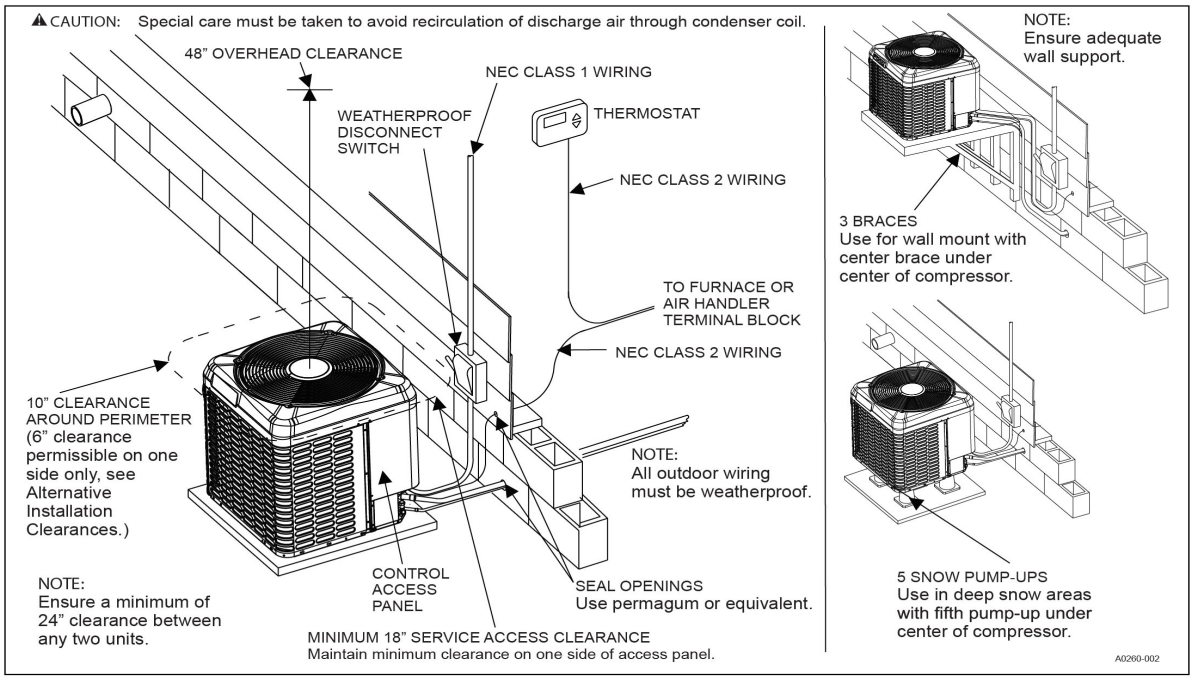
CAUTION:
Special care must be taken to avoid recirculation of discharge air through outdoor coil.

Project Name: Unit Model #: **THE2B24T21S**

Quantity: **2** Tag #: **CU-7, 8**

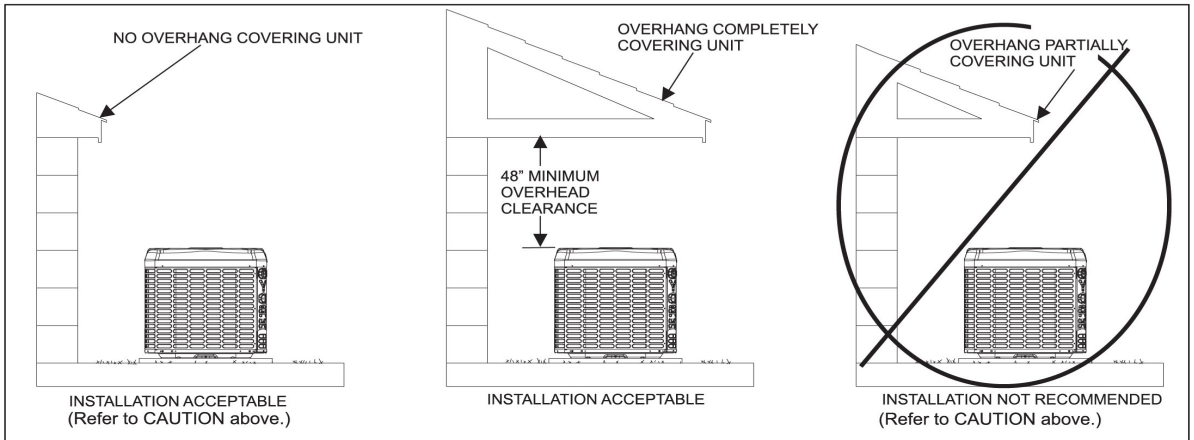
Typical Installation

TYPICAL INSTALLATION



⚠ CAUTION

Care must be taken to prevent ice from damaging the unit. Damage may occur from ice falling onto unit from a sloped roof or from a vertical drip line due to a partial overhang.



NOTE:
The unit must be installed on a solid base above the grade. The base must not be able to settle or shift causing strain on refrigerant lines and possible leaks.

NOTE:
Install unit on flat surface. If installation surface is sloped, ensure that unit slopes away from house structure at 1/4" per foot.

⚠ **CAUTION:** Special care must be taken to avoid recirculation of discharge air through condenser coil.

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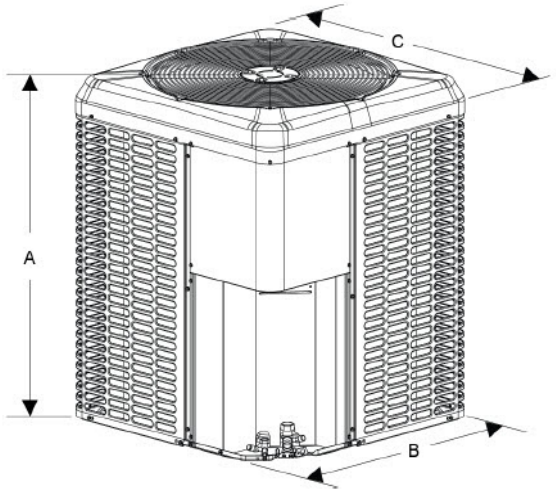
Project Name: Unit Model #: **THE2B24T21S**

Quantity: **2** Tag #: **CU-7, 8**

Unit Dimensions

Unit dimensions



Dimensions

Unit model	Dimensions (in.)			Refrigerant connection service valve size (in.)	
	A	B	C	Liquid	Vapor
THE2B18S21S	33 1/4	24	24	3/8	3/4
THE2B24T21S	36 1/4	24	24		
THE2B30T21S	30	29 1/4	29 1/4		
THE2B36T21S	33 1/4	35 1/4	31 3/4		
THE2B42T21S	39 1/2	35 1/4	31 3/4		7/8
THE2B48T21S	39 1/2	35 1/4	31 3/4		
THE2B60T21S	46	38	34 1/4		

Notes:

All dimensions are in inches and are subject to change without notice.
Overall height is from the bottom of the base pan to the top of the fan guard.
Overall length and width include screw heads.

Project Name: Unit Model #: **THE2B24T21S**

Quantity: **2** Tag #: **CU-7, 8**

Sound Performance

Sound power ratings - cooling

Table 12: Sound power ratings - high cooling

Cooling	Octave band sound power level (db re. 1-pW)									
Model number	63	125	250	500	1000	2000	4000	8000	dBA	SQI
THE2B18S21S	72.9	68.7	63.1	68.4	63.6	68.7	60.4	57.7	72	19.0
THE2B24T21S	73.3	68.2	61.8	68.2	63.7	59.3	56.4	56.2	69	19.2
THE2B30T21S	67.6	70.8	66.6	70.8	69.1	64.5	62.9	59.7	73	19.0
THE2B36T21S	69.8	72.3	69.1	70.6	71.3	69.1	65.6	61.7	76	19.0
THE2B42T21S	69.1	69.4	69.5	71.4	70.1	64.4	64.3	62.4	74	19.0
THE2B48T21S	67.4	68.8	67.8	69.4	69.8	66.3	64.6	61.6	74	19.0
THE2B60T21S	68.4	71.6	69.8	71.1	71.8	66.6	63.6	62.1	75	19.1

Table 13: Sound power ratings - low cooling

Cooling	Octave band sound power level (db re. 1-pW)									
Model number	63	125	250	500	1000	2000	4000	8000	dBA	SQI
THE2B18S21S	—	—	—	—	—	—	—	—	—	—
THE2B24T21S	73.5	68.2	62.3	69.5	66.7	60.0	58.4	58.0	70	19.2
THE2B30T21S	67.3	70.3	67.5	70.3	68.8	63.9	61.7	58.0	73	19.1
THE2B36T21S	70.0	72.4	69.2	71.1	70.7	66.5	63.4	59.8	75	19.0
THE2B42T21S	69.0	71.1	69.8	72.6	70.8	67.3	65.4	62.2	75	19.1
THE2B48T21S	67.8	68.9	67.9	69.3	68.9	65.3	64.4	64.2	74	19.1
THE2B60T21S	69.1	71.5	68.9	71.1	70.0	65.2	64.3	61.9	74	19.0

ⓘ **Note:** Rated in accordance with AHRI Standard 270.

Sound power ratings - heating

Table 14: Sound power ratings - high heating

Heating	Octave band sound power level (db re. 1-pW)									
Model number	63	125	250	500	1000	2000	4000	8000	dBA	SQI
THE2B18S21S	73.4	65.4	61.1	64.4	63.6	62.2	55.8	51.0	68	19.0
THE2B24T21S	74.7	65.4	61.6	68.0	64.7	59.3	56.8	55.8	69	19.1
THE2B30T21S	67.9	72.4	67.1	69.6	67.2	62.8	61.3	57.1	72	19.0
THE2B36T21S	71.9	75.8	70.2	72.3	71.1	68.8	65.2	63.0	76	19.0
THE2B42T21S	69.3	80.5	70.8	72.5	71.0	65.7	65.4	63.8	76	19.0
THE2B48T21S	71.3	73.8	70.8	72.5	71.4	67.9	66.0	67.7	76	19.1
THE2B60T21S	69.2	72.2	71.9	73.0	71.9	66.9	64.4	62.6	76	19.1

Project Name:

Unit Model #: **JHETB24CBAS2N1**

Quantity: **2** Tag #: **Furn-7, 8**

System: **THE2B24T21S,JHETB24CBAS2N1**

Cooling Performance		
Total net capacity	24.4	MBH
Sensible net capacity	18.6	MBH
Entering DB temp.	80.0	°F
Entering WB temp.	67.0	°F
Unit Leaving DB temp.	59.1	°F
Unit Leaving WB temp.	57.6	°F
Supply Air Blower Performance		
Supply air	825	cfm
Ext. static pressure	0.5	IWG
Blower speed description	MEDIUM/HIGH (4)	
Motor rating	0.33	HP
Elevation	0	ft
Drive type	DIRECT	
Indoor Electrical Data		
Power supply	230-1-60	
Unit min circuit ampacity	3.30	A
Unit max over-current protection	15	A
Indoor Unit Shipping Dimensions & Weight		
Hgt 56 in Len 26 in Wth 15 in		
Weight with factory installed options	99	lb
Matchup Information		
AHRI Reference Number	209452458	
AHRI Rated Capacity	24.4	MBH
AHRI Rated Efficiency	14.3	SEER2

Note: Please refer to the tech guide for actual unit dimensions

Note: Please refer to the tech guide for listed maximum static pressures

Product Features

- This fan coil line offers the ultimate in application flexibility. This unit may be used for upflow, downflow, horizontal right, or horizontal left applications. All Johnson Controls air handlers and coils can use a TXV to provide our customers with the optimum performance and refrigerant control. Single piece air handlers are available as Flex-coils (without a factory-installed metering device). For added flexibility, an R-22 or R-410A TXV or piston must be field-installed to meet the requirement of the chosen refrigerant.

Unit Features

- MaxAlloyTM coil - long-life aluminum coils built to deliver lasting performance, efficiency, and reliability
- Next generation even-flow distributor - designed for balanced refrigerant flow and even coil circuit performance
- Next generation high-efficiency blower - delivers increased airflow and reduced blower watts by 10%, using a standard ECM motor
- Two-stage operation - provides flexibility in application with single and two-stage outdoor equipment
- Next generation insulation and gasket design - reduces thermal transmission paths and reduces sweating
- Tool-less filter access - sliding latch design provides quick and easy access
- Designed for easy installation and service - casing size of 20.5 in., smooth sides, and rigid construction provide ease of attic access and tight applications. Front facing components, slide out blower, laser cut knock outs and integrated duct flanges shorten install time
- Cabinet air leakage - less than 2% at 1 in. W.C. external static pressure when tested in accordance with ASHRAE Standard 193
- Long lasting quality - structural components made of postpowder painted aluminum or galvanized steel to prevent corrosion
- Thermoset drain pan - positive slope for drainage to reduce cause for potential mold or contaminants

Warranty

- Standard 5-year limited parts warranty.
- Extended 10-year limited parts warranty when product is registered online within 90 days of purchase for replacement or closing for new home construction.

Project Name: Unit Model #: **JHETB24CBAS2N1**

Quantity: **2** Tag #: **Furn-7, 8** System: **THE2B24T21S,JHETB24CBAS2N1**

Factory Installed Options

JHETB24CBAS2N1

Equipment Options		Option(s) Selected
Brand:	**J**	Fraser-Johnston Branded
Product Type:	**H**	Single Piece
Motor Control Options:	**E**	Standard ECM
Stage:	**T**	Two Stage Capable
Cabinet Width:	**B**	17.5 inch width
Capacity:	**24**	2 ton
Slab Size:	**C**	2R-20-18
Refrigerant / TXV:	**BA**	BA Factory TXV
Controls:	**S**	Standard (Conventional)
Voltage:	**2**	208/230-1-60
Factory-Installed Options:	**N**	
Product Generation:	**1**	

Field Installed Accessories

- ○ S1-02435672000 - Service Disconnect Opening Seal Cover (0.2 lbs)
- ● S1-1BR01117 - Filter Rack (7.6 lbs)
- ○ S1-1FB1917 - Combustible Floor Base For Downflow W /Electric Heat (7.5 lbs)
- ○ S1-1PF0601 - Permanent Filter (¾ X 16 X 20) (Contains 10) (0.5 lbs)
- ○ S1-8HK06500206 - 2.5 kW 208/230-1-60 Electric Heat without Circuit Breaker (1.0 lbs)
- ○ S1-8HK06500506 - 5 kW 208/230-1-60 Electric Heat without Circuit Breaker (8.4 lbs)
- ○ S1-8HK06500806 - 7.5 kW 208/230-1-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501006 - 10 kW 208/230-1-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501025 - 10 kW 208/230-3-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501525 - 15 kW 208/230-3-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK16500206 - 2.5 kW 208/230-1-60 Electric Heat with Circuit Breaker (1.0 lbs)
- ○ S1-8HK16500506 - 5 kW 208/230-1-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK16500806 - 7.5 kW 208/230-1-60 Electric Heat with Circuit Breaker (6.0 lbs)
- ○ S1-8HK16501006 - 10 kW 208/230-1-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK16501506 - 15 kW 208/230-1-60 Electric Heat with Circuit Breaker (8.0 lbs)
- ○ S1-8HK26501506 - 15 kW 208/230-1-60 Electric Heat Kit w/ Circuit Breaker and Jumper Bar (5.0 lbs)
- ○ S1-JM11AH1620A - Color matched filter box and merv 11 filter. Accepts 4" and 1" filters (18.0 lbs)

Project Name: Unit Model #: **JHETB24CBAS2N1**

Quantity: **2** Tag #: **Furn-7, 8**

Unit Dimensions

Dimensions and duct connections

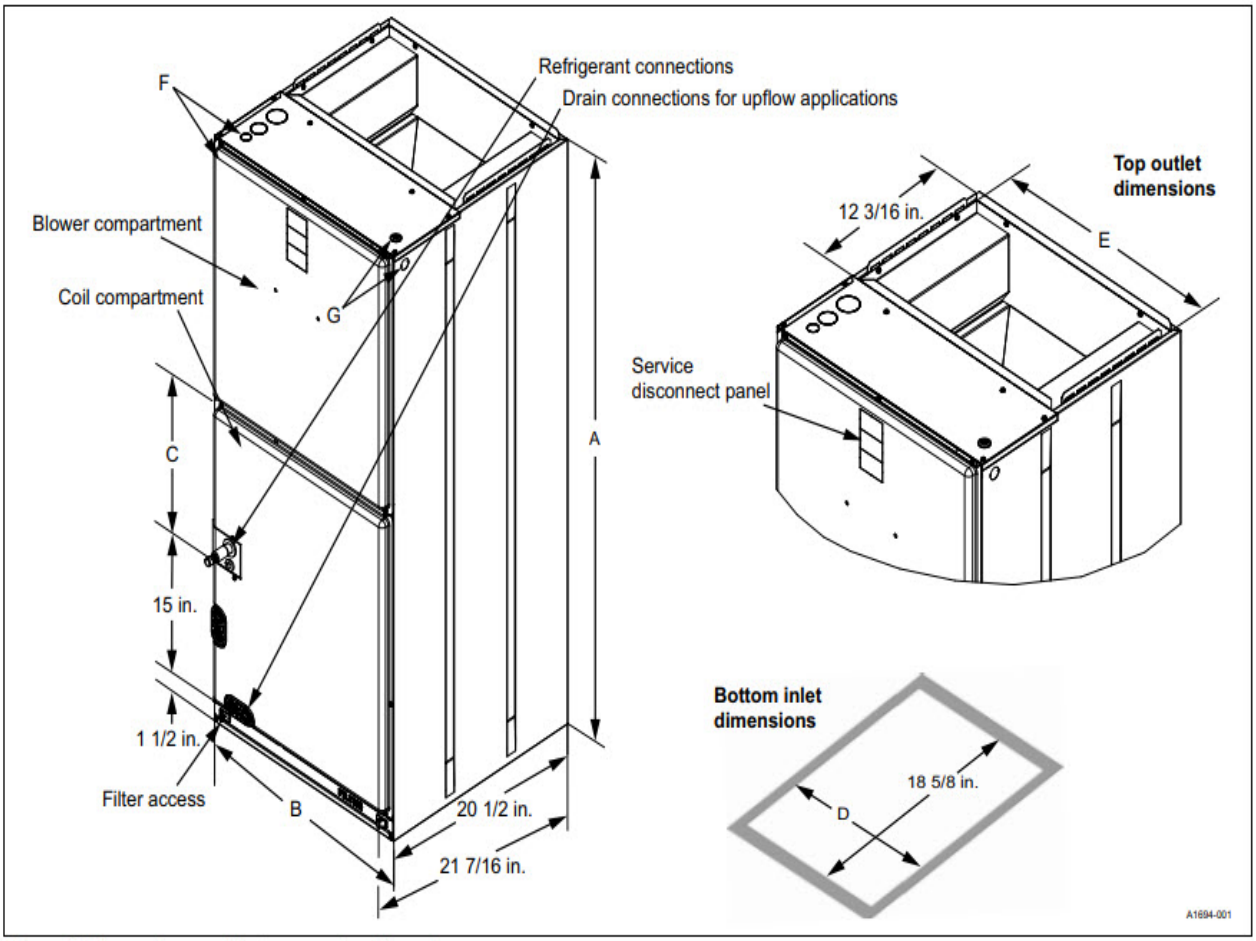


Figure 1: Dimensions and duct connection dimensions

Table 1: Dimensions[1]

Models	Dimensions					Wiring knockouts[2]		Refrigerant connections line size	
	A	B	C	D	E	F	G		
	Height (in.)	Width (in.)	Opening widths (in.)			Power (in.)	Control (in.)	Liquid (in.)	Vapor (in.)
JHET**B18B**	47	17 1/2	7 1/2	16 1/2	16 1/2	7/8 (1/2) 1 3/8 (1) 1 23/32 (1 1/4)	7/8 (1/2)	3/8	3/4
JHET**B24C**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**B30D**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**B36D**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**C36D**	51	21	11 1/2	20	20				
JHET**C42F**	57	21	17 1/2	20	20				7/8
JHET**C48G**	61 1/4	21	21 3/4	20	20				
JHET**D48G**	61 1/4	24 1/2	21 3/4	23 1/2	23 1/2				
JHET**C60H**	63	21	23 1/2	20	20				
JHET**D60H**	63	24 1/2	23 1/2	23 1/2	23 1/2				
JHET**D60J**	61 1/4	24 1/2	21 3/4	23 1/2	23 1/2				

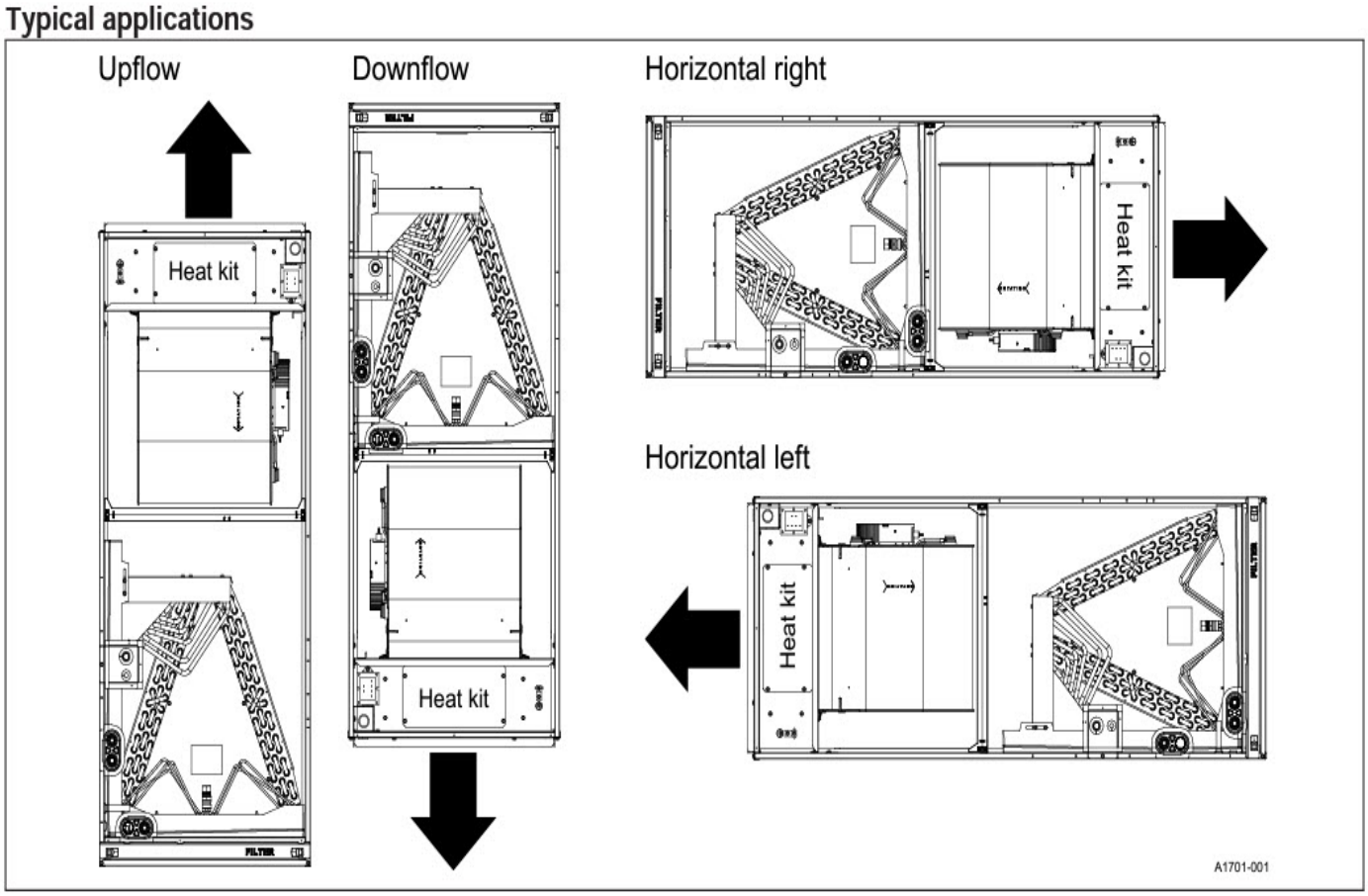
1. All dimensions are in inches.
2. Actual size (conduit size).

Project Name:

Unit Model #: **JHETB24CBAS2N1**

Quantity: **2** Tag #: **Furn-7, 8**

Typical Application



Project Name: Unit Model #: **JHETB24CBAS2N1**

Quantity: **2** Tag #: **Furn-7, 8**

JHET Physical and Electrical

Table 4: Physical and electrical data - cooling only

Models		B18B	B24C	B30D	B36D	C36D	C42F
Blower - diameter x width (in.)		11 x 8	11 x 8	11 x 8	11 x 8	11 x 10	11 x 10
Motor	HP	1/3 HP	1/3 HP	1/2 HP	1/2 HP	1/2 HP	1/2 HP
	Nominal RPM	1050	1050	1050	1050	1050	1050
Voltage (V)		208/230	208/230	208/230	208/230	208/230	208/230
Full load amps at 230 V (A)		2.6	2.6	3.8	3.8	3.8	3.8
Filter[1]	Type	Disposable or cleanable					
	Size	16 x 20 x 1	16 x 20 x 1	16 x 20 x 1	20 x 20 x 1	20 x 20 x 1	20 x 20 x 1
Shipping/operating weight (lb)		101/93	107/99	108/100	108/100	124/114	135/125

Models		C48G	D48G	C60H	D60H	D60J	
Blower - diameter x width (in.)		11 x 10	11 x 11	11 x 10	11 x 11	11 x 11	
Motor	HP	3/4 HP	3/4 HP	3/4 HP	3/4 HP	3/4 HP	
	Nominal RPM	1050	1050	1050	1050	1050	
Voltage (V)		208/230	208/230	208/230	208/230	208/230	
Full load amps at 230 V (A)		5.4	5.4	5.4	5.4	5.4	
Filter[1]	Type	Disposable or cleanable					
	Size	20 x 20 x 1	23 x 20 x 1	20 x 20 x 1	23 x 20 x 1	23 x 20 x 1	
Shipping/operating weight (lb)		140/129	152/140	153/141	158/146	162/150	

1. Field supplied.

Table 5: Electrical data - cooling only

Models	Motor FLA[1]	Minimum Circuit Ampacity (A)	MOP[2]
B18B/B24C	2.6	3.3	15
B30D/B36D/C36D/C42F	3.8	4.8	15
C48G/D48G/C60H/D60H/D60J	5.4	6.8	15

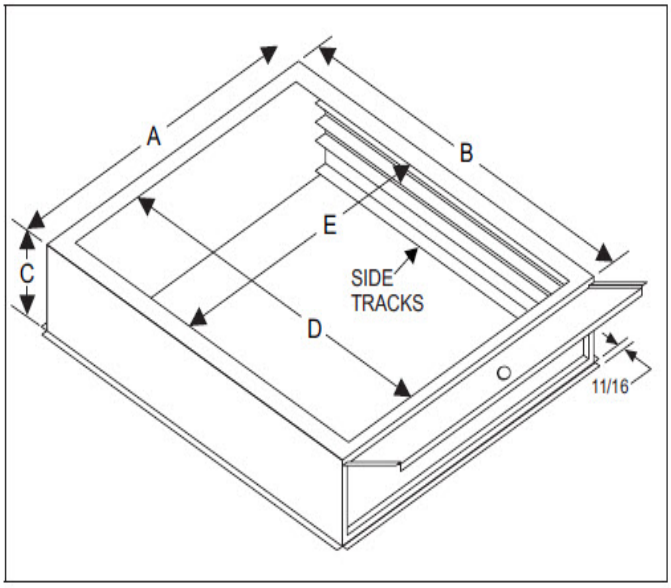
1. FLA = Full Load Amps
2. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

Project Name: Unit Model #: **JHETB24CBAS2N1**

Quantity: **2** Tag #: **Furn-7, 8**

Filter Rack Accessory

Filter rack dimensions



Galvanized models	A	B	C	D	E	Filter size
1BR01117	17.50	21.56	4.00	18.63	14.25	16 x 20 x 1 or 2
1BR01121	21.00	21.56	4.00	18.63	17.75	20 x 20 x 1 or 2
1BR01124	24.50	21.56	4.00	18.63	21.25	20 x 24 x 1 or 2

Project Name: Unit Model #: **THE36B42S**

Quantity: **1** Tag #: **CU-6** System: **THE36B42S,JHETC36DBCS2N1**

Cooling Performance		
Total net capacity	37.6	MBH
Sensible net capacity	26.5	MBH
Seasonal Efficiency (at ARI)	15.00	SEER
Efficiency (at ARI)	12.50	EER
Ambient DB temp.	95.0	°F
Leaving air temp dew point	55.60	°F
Power input	3.05	kW

Refrigerant		
Refrigerant type	R-410A	

Heat Pump Performance		
Heating output capacity	36	MBH
Ambient DB temp.	47	°F
Entering DB temp.	60	°F
Leaving DB temp.	87.2	°F
Air temp. rise	27.2	°F
Power Input	2.7	kW
Cop	3.9	COP
HSPF	8.55	

Electrical Data		
Power supply	460-3-60	
Unit min circuit ampacity	8.8	A
Unit max over-current protection	15	A

Outdoor Unit Shipping Dimensions & Weight					
Hgt	43 in	Len	40 in	Wth	36 in
Weight with factory installed options					200 lb

Matchup Information		
AHRI Reference Number	210380340	
AHRI Rated Capacity	37.6	MBH

Note: Please refer to the tech guide for actual unit dimensions

Note: Please refer to the tech guide for listed maximum static pressures

3 Ton

Product Features

- The THE three phase models are the newest offering in our successful LX Series split system heat pump lineup. These outdoor units are optimized for the new 14 SEER / 8.2 HSPF Minimum Efficiency in all US Regions, and are specifically designed to be matched with Fraser-Johnston indoor coils, furnaces, and air handlers to provide a complete system solution.

Unit Features

- 14 SEER / 1-Stage
- Environmentally Friendly - CFC-free R-410A refrigerant delivers environmentally friendly performance with zero ozone depletion.
- Durable Finish – The coated steel wire fan guard, coated external fasteners, and pre-treated G90-equivalent galvanized steel chassis components resist corrosion and rust creep. Champagne colored powdercoat paint further protects external panels.
- Fully Exposed Refrigerant Connections and a Single Panel Covering the Electrical Controls Make for Easy Servicing of the Unit
- Scroll Compressor
- Protected Compressor - Compressors are protected internally by a high pressure relief valve and a temperature sensor, and externally by the system high and low pressure switches. The liquid line filter-drier is factory installed to protect the compressor against moisture and debris
- Rugged Coil Protection - Coils are protected from mechanical damage by a proven stamped steel coil guard design.

Warranty

- Standard One (1)-Year Limited Parts
- Standard Five (5)-Years Limited Compressor
- Extended Ten (10) Year Limited Parts Warranty when Product is Registered Online Within 90 Days of Purchase for Replacement or Closing for New Home Construction

Project Name: Unit Model #: **THE36B42S**

Quantity: **1** Tag #: **CU-6** System: **THE36B42S,JHETC36DBCS2N1**

Factory Installed Options

THE36B42S

Equipment Options		Option(s) Selected
Product Category:	**T**	Fraser-Johnston Brand
Type:	**H**	Heat Pump
Nominal Series Efficiency & Staging:	**E**	14 SEER / 1-Stage
Nominal Cooling Capacity:	**36**	3 Ton
Refrigerant:	**B**	R-410A Refrigerant
Voltage:	**4**	460-3-60
Product Generation:	**2**	
Factory-Installed Options:	**S**	

Field Installed Accessories

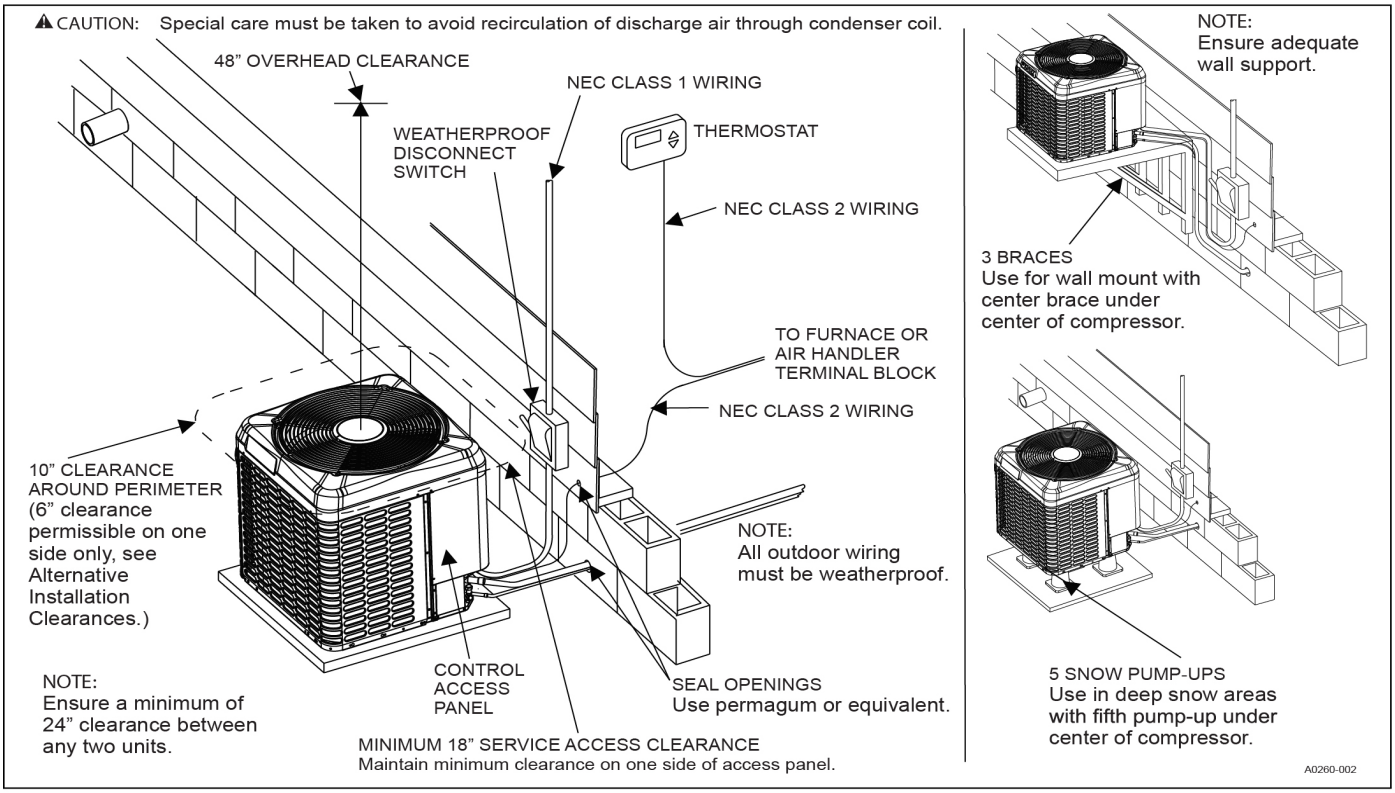
- ○ S1-01007647000 - Compressor Sound Blanket - Small Recip (5.0 lbs)
- ○ S1-02549809000 - Compressor Crankcase Heater - Bellyband - Scroll 240V (1.0 lbs)
- ○ S1-1HK0601 - Hurricane Kit (LX Series) (1.4 lbs)
- ○ S1-2LA04701024 - Advanced Low Ambient Control Kit (1.8 lbs)
- ○ S1-2LA06700424 - Standard Low Ambient Control Kit (0.8 lbs)
- ○ S1-2PS06700524 - Low Pressure Switch Kit (R-410A) (0.2 lbs)
- ○ S1-3024-6881/D - Single Outdoor Thermostat (1.0 lbs)
- ○ S1-37327982001 - Outdoor Thermostat for Electric Heat Staging (1.0 lbs)
- ○ S1-51301536000 - Touch-up Paint: Titanium (1.1 lbs)
- ○ S1-ADDWIRE - Add-a-Wire allows 5-wire thermostats to use only 4 wires. (0.3 lbs)
- ○ S1-CHGTENT01 - Cold Weather Charging Tent (20.0 lbs)
- ○ S1-CTSDTS - CTS Wired Temperature Sensor for thermostat | Duct *Also works for LX Series (0.3 lbs)
- ○ S1-CTSHTS - CTS Hardwired Temperature Sensor for CTS Thermostats *Works with LX series as well (0.2 lbs)
- ○ S1-CTSPLATE - Wall Plate for CTS Thermostats *Also works for new platform LX series models below (0.0 lbs)
- ○ S1-CTSWFTS - CTS Temperature Sensor with WiFi for CTS Thermostats *Also works with LX Series (0.1 lbs)
- ○ S1-FHM3204HT - High Ambient Condenser Fan Motor (1/4 HP) (13.6 lbs)
- ○ S1-LXLOCK - Locking Ring For LX-Series Thermostats (0.4 lbs)
- ○ S1-LXPLATE - Wall Plate For LX-Series Thermostats (0.0 lbs)
- ○ S1-LXWFM - For LX Series Thermostats - WiFi Communication (0.1 lbs)
- ○ S1-THELOCK - Locking Ring For THE Series Thermostats (0.4 lbs)
- ○ S1-THEPLATE - Wall Plate for THE Thermostats (0.1 lbs)
- ○ S1-THPU432-S - SOURCE 1 CTS SERIRES | 3/4 Stage Heating | 2 Stage Cooling | 7-day/5+2 Programmable | WiFi | Dual Fuel (0.7 lbs)
- ○ S1-THPU433-S - Source 1 Branded CTS Series | 3/4 Stage Heating | 2 Stage Cooling | 7-Day/5+2 Programmable | WiFi | Dual Fuel (0.7 lbs)
- ○ S1-THSU231-S - Source 1 Branded LX Series | 2.3" Display | 2 Stage Heating | 2 Stage Cooling | 7-day Programmable | WiFi On-Board (0.2 lbs)
- ○ S1-THSU301-S - Source 1 Branded LX Series | 3" Display | 2 Stage Heating | 1 Stage Cooling | (5+2) 7-day Programmable (1.0 lbs)
- ○ S1-THSU302-S - Source 1 Branded LX Series | 3" Display | 3/4 Stage Heating | 2 Stage Cooling | (5+2) 7-day Programmable (1.0 lbs)
- ○ S1-THSU303-S - Source 1 Branded LX Series | 3" Display | 3/4 Stage Heating | 2 Stage Cooling | (5+2) 7-day Programmable | Humidity On-Board (1.0 lbs)
- ○ S1-THXU430W - Wi-Fi Communicating Touchscreen Thermostat with Proprietary Hexagon Interface (White), with 4.3” display screen (0.9 lbs)

Project Name: Unit Model #: **THE36B42S**

Quantity: **1** Tag #: **CU-6**

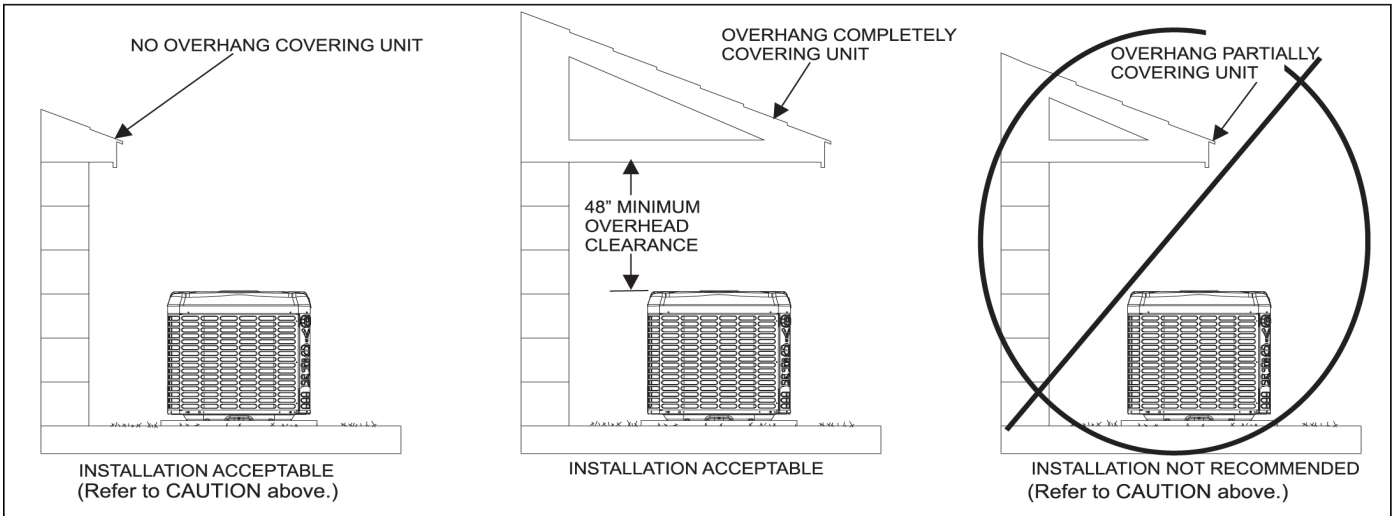
THE Typical Installation

TYPICAL INSTALLATION



⚠ CAUTION

Care must be taken to prevent ice from damaging the unit. Damage may occur from ice falling onto unit from a sloped roof or from a vertical drip line due to a partial overhang.



NOTE:
The unit must be installed on a solid base above the grade. The base must not be able to settle or shift causing strain on refrigerant lines and possible leaks.

NOTE:
Install unit on flat surface. If installation surface is sloped, ensure that unit slopes away from house structure at 1/4" per foot.

⚠ **CAUTION:** Special care must be taken to avoid recirculation of discharge air through condenser coil.

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Project Name: Unit Model #: **THE36B42S**

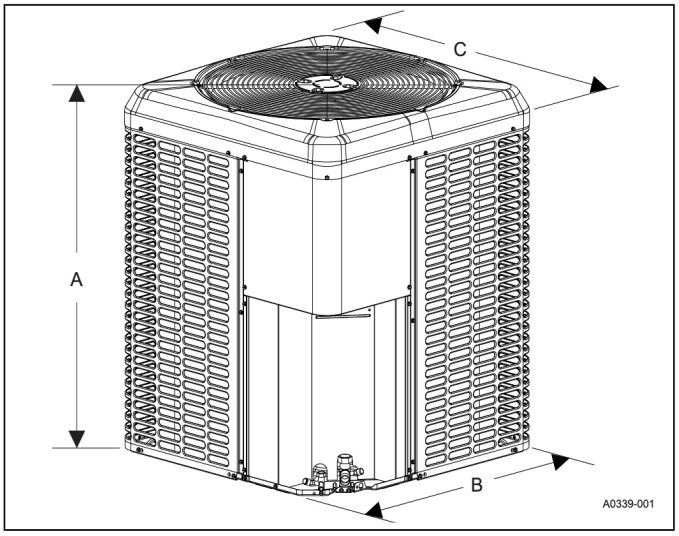
Quantity: **1** Tag #: **CU-6**

THE Unit Dimensions

PHYSICAL AND ELECTRICAL DATA

MODEL		THE30 B31S	THE36 B31S	THE42 B31S	THE48 B31S	THE60 B31S	THE30 B41S	THE36 B41S	THE42 B41S	THE48 B41S	THE60 B41S
Unit Supply Voltage		208-230V, 3Ø, 60Hz					460V, 3Ø, 60Hz				
Normal Voltage Range [1]		187 to 252					432 to 504				
Minimum Circuit Ampacity		12.42	12.58	16.10	18.42	21.22	5.93	7.05	7.25	8.66	10.33
Max. Overcurrent Device Amps [2]		20	20	25	30	35	15	15	15	15	15
Min. Overcurrent Device Amps [3]		15	15	15	15	20	15	15	15	15	15
Compressor Type		Scroll	Recip	Recip	Scroll	Scroll	Scroll	Recip	Recip	Scroll	Scroll
Compressor Amps	Rated Load	9.9	7.6	10.2	15.3	17.8	4.7	3.8	5.1	6.9	8.6
	Locked Rotor	58.0	68.0	88.0	83.1	110.0	38.0	34.0	44.0	41.0	52.0
Crankcase Heater		No	Yes	Yes	No	No	No	Yes	Yes	No	No
Factory External Discharge Muffler		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fan Diameter Inches		24	24	24	26	26	24	24	24	26	26
Fan Motor	Rated HP	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
	Rated Load Amps	1.30	1.30	1.30	1.30	1.30	0.65	0.65	0.65	0.60	0.60
	Nominal RPM	850	850	850	850	850	850	850	850	850	850
	Nominal CFM	2995	3715	3715	4100	4100	2995	3715	3715	4100	4100
Coil	Face Area Sq. Ft.	23.82	23.82	23.82	26.40	28.80	23.82	23.82	23.82	26.40	28.80
	Rows Deep	1	2	2	2	2	1	2	2	2	2
	Fins / Inch	22	18	18	18	18	22	18	18	18	18
Liquid Line Set OD (Field Installed)		3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Vapor Line Set OD (Field Installed)[4]		3/4	3/4	7/8	7/8	1-1/8‡	3/4	3/4	7/8	7/8	1-1/8‡
Unit Charge (Lbs. - Oz.) [5]		7 - 15	12 - 4	12 - 7	15 - 4	14 - 10	7 - 15	12 - 4	12 - 7	15 - 4	14 - 10
Charge Per Foot, Oz.		0.62	0.62	0.67	0.67	0.75	0.62	0.62	0.67	0.67	0.75
Operating Weight Lbs.		176	230	230	235	256	176	230	230	235	256

1. Rated in accordance with AHRI Standard 110-2012, utilization range “A”.
2. Dual element fuses or HACR circuit breaker. Maximum allowable overcurrent protection.
3. Dual element fuses or HACR circuit breaker. Minimum recommended overcurrent protection.
4. For applications with non-standard vapor line sizes, see the "Applications & Accessories" section of this Technical Guide.
5. The Unit Charge is correct for the outdoor unit, smallest matched indoor unit, and 15 feet of refrigerant tubing. For tubing lengths other than 15 feet, add or subtract the amount of refrigerant, using the difference in actual lineset length (not the equivalent length) multiplied by the per foot value.



DIMENSIONS

Unit Model	Dimensions (Inches)			Refrigerant Connection Service Valve Size	
	A	B	C	Liquid	Vapor
THE30B(3,4)1S	39-1/2	35-1/4	31-3/4	3/8	3/4
THE36B(3,4)1S	39-1/2	35-1/4	31-3/4		
THE42B(3,4)1S	39-1/2	35-1/4	31-3/4		7/8
THE48B(3,4)1S	39-1/2	38	34-1/4		
THE60B(3,4)1S	42-1/2	38	34-1/4		7/8‡

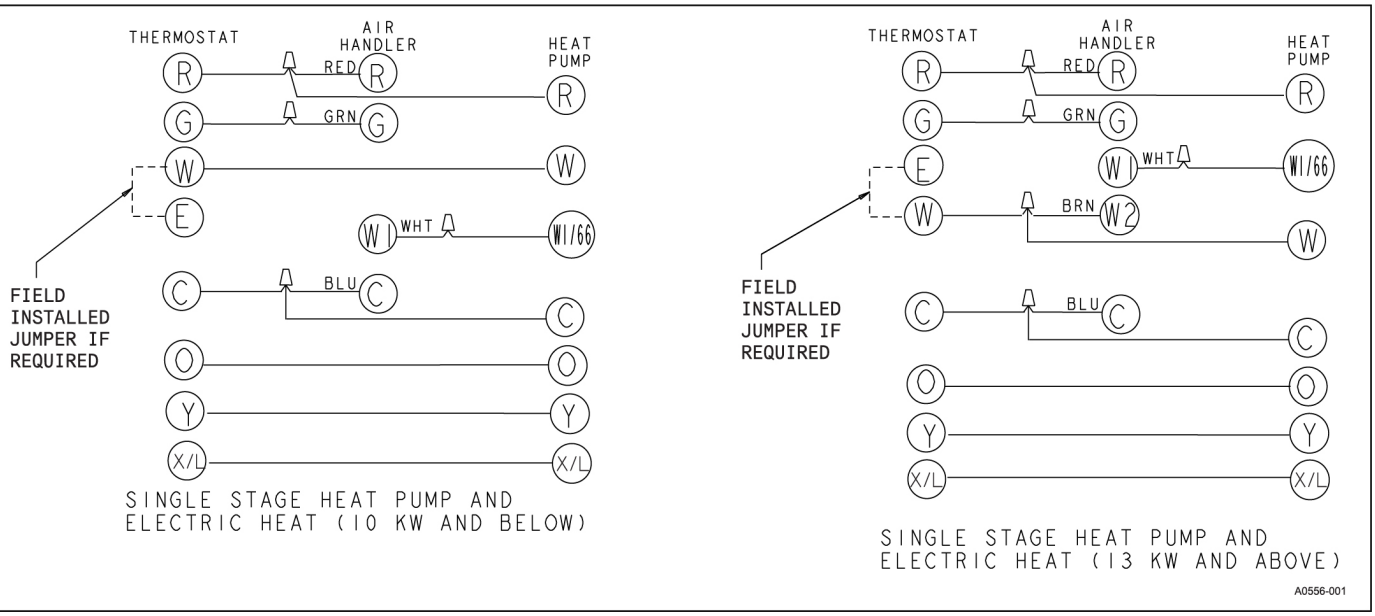
‡ Adapter fitting must be field installed for the required 1-1/8” line set.
All dimensions are in inches and are subject to change without notice.
Overall height is from bottom of base pan to top of fan guard.
Overall length and width include screw heads.

Project Name: Unit Model #: **THE36B42S**

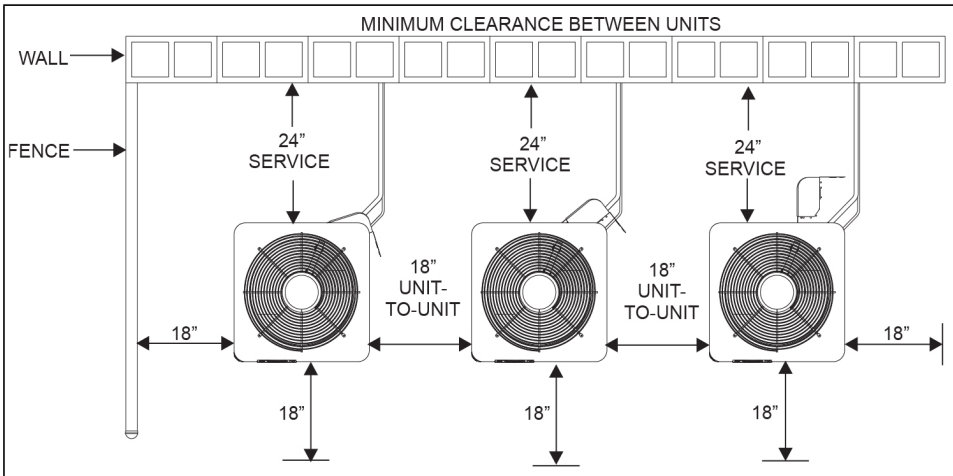
Quantity: **1** Tag #: **CU-6**

THE Typical Wiring

TYPICAL FIELD WIRING

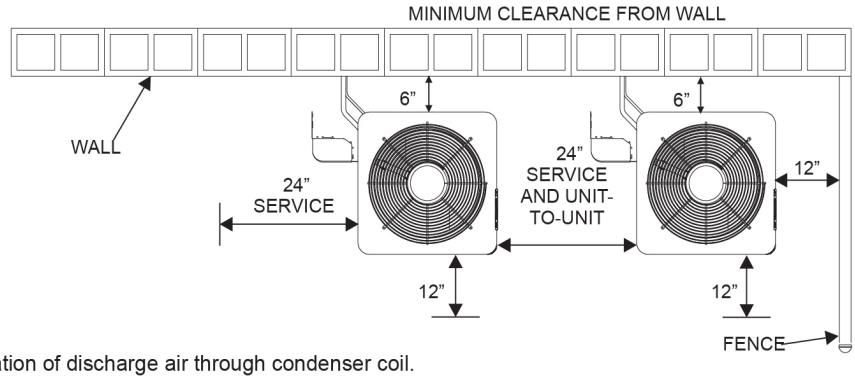


ALTERNATIVE INSTALLATION CLEARANCES



NOTE:
Clearance between two units may be reduced to 18" minimum provided the service access clearance is increased to 24" minimum, and the clearance on each remaining side is maintained at 18" minimum.

NOTE:
Clearance to one side of the unit may be reduced to 6" provided the clearance to each remaining side is increased to 12" minimum, the service access is increased to 24" minimum, and the clearances between any two units is maintained at 24" minimum.



CAUTION:
Special care must be taken to avoid recirculation of discharge air through condenser coil.

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Project Name:

Unit Model #: **JHETC36DBCS2N1**

Quantity: **1** Tag #: **FURN-6**

System: **THE36B42S,JHETC36DBCS2N1**

Cooling Performance		
Total net capacity	37.6	MBH
Sensible net capacity	26.5	MBH
Entering DB temp.	80.0	°F
Entering WB temp.	67.0	°F
Unit Leaving DB temp.	60.0	°F
Unit Leaving WB temp.	57.3	°F

Supply Air Blower Performance		
Supply air	1225	cfm
Ext. static pressure	0.5	IWG
Blower speed description	MEDIUM/HIGH (4)	
Motor rating	0.50	HP
Elevation	0	ft
Drive type	DIRECT	

Indoor Electrical Data		
Power supply	230-1-60	
Unit min circuit ampacity	4.80	A
Unit max over-current protection	15	A

Indoor Unit Shipping Dimensions & Weight						
Hgt	57 in	Len	26 in	Wth	22	in
Weight with factory installed options					114	lb

Matchup Information		
AHRI Reference Number	210380340	
AHRI Rated Capacity	37.6	MBH

Note: Please refer to the tech guide for actual unit dimensions

Note: Please refer to the tech guide for listed maximum static pressures

Product Features

- This fan coil line offers the ultimate in application flexibility. This unit may be used for upflow, downflow, horizontal right, or horizontal left applications. All Johnson Controls air handlers and coils can use a TXV to provide our customers with the optimum performance and refrigerant control. Single piece air handlers are available as Flex-coils (without a factory-installed metering device). For added flexibility, an R-22 or R-410A TXV or piston must be field-installed to meet the requirement of the chosen refrigerant.

Unit Features

- MaxAlloyTM coil - long-life aluminum coils built to deliver lasting performance, efficiency, and reliability
- Next generation even-flow distributor - designed for balanced refrigerant flow and even coil circuit performance
- Next generation high-efficiency blower - delivers increased airflow and reduced blower watts by 10%, using a standard ECM motor
- Two-stage operation - provides flexibility in application with single and two-stage outdoor equipment
- Next generation insulation and gasket design - reduces thermal transmission paths and reduces sweating
- Tool-less filter access - sliding latch design provides quick and easy access
- Designed for easy installation and service - casing size of 20.5 in., smooth sides, and rigid construction provide ease of attic access and tight applications. Front facing components, slide out blower, laser cut knock outs and integrated duct flanges shorten install time
- Cabinet air leakage - less than 2% at 1 in. W.C. external static pressure when tested in accordance with ASHRAE Standard 193
- Long lasting quality - structural components made of postpowder painted aluminum or galvanized steel to prevent corrosion
- Thermoset drain pan - positive slope for drainage to reduce cause for potential mold or contaminants

Warranty

- Standard 5-year limited parts warranty.
- Extended 10-year limited parts warranty when product is registered online within 90 days of purchase for replacement or closing for new home construction.

Project Name: Unit Model #: **JHETC36DBCS2N1**

Quantity: **1** Tag #: **FURN-6** System: **THE36B42S,JHETC36DBCS2N1**

Factory Installed Options

JHETC36DBCS2N1

Equipment Options		Option(s) Selected
Brand:	**J**	Fraser-Johnston Branded
Product Type:	**H**	Single Piece
Motor Control Options:	**E**	Standard ECM
Stage:	**T**	Two Stage Capable
Cabinet Width:	**C**	21 inch width
Capacity:	**36**	3 ton
Slab Size:	**D**	3R-20-14
Refrigerant / TXV:	**BC**	BC Factory TXV
Controls:	**S**	Standard (Conventional)
Voltage:	**2**	208/230-1-60
Factory-Installed Options:	**N**	
Product Generation:	**1**	

Field Installed Accessories

- ○ S1-02435672000 - Service Disconnect Opening Seal Cover (0.2 lbs)
- ● S1-1BR01121 - Filter Rack (8.2 lbs)
- ○ S1-1FB1921 - Combustible Floor Base For Downflow W /Electric Heat (8.2 lbs)
- ○ S1-1PF0602BK - Permanent Filter (¾ X 20 X 20) (Contains 10) (5.0 lbs)
- ○ S1-8HK06500206 - 2.5 kW 208/230-1-60 Electric Heat without Circuit Breaker (1.0 lbs)
- ○ S1-8HK06500506 - 5 kW 208/230-1-60 Electric Heat without Circuit Breaker (8.4 lbs)
- ○ S1-8HK06500806 - 7.5 kW 208/230-1-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501006 - 10 kW 208/230-1-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501025 - 10 kW 208/230-3-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK06501525 - 15 kW 208/230-3-60 Electric Heat without Circuit Breaker (5.0 lbs)
- ○ S1-8HK16500206 - 2.5 kW 208/230-1-60 Electric Heat with Circuit Breaker (1.0 lbs)
- ○ S1-8HK16500506 - 5 kW 208/230-1-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK16500806 - 7.5 kW 208/230-1-60 Electric Heat with Circuit Breaker (6.0 lbs)
- ○ S1-8HK16501006 - 10 kW 208/230-1-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK16501506 - 15 kW 208/230-1-60 Electric Heat with Circuit Breaker (8.0 lbs)
- ○ S1-8HK16502006 - 20 kW 208/230-1-60 Electric Heat with Circuit Breaker (9.0 lbs)
- ○ S1-8HK16502025 - 20 kW 208/230-3-60 Electric Heat with Circuit Breaker (5.0 lbs)
- ○ S1-8HK26501506 - 15 kW 208/230-1-60 Electric Heat Kit w/ Circuit Breaker and Jumper Bar (5.0 lbs)
- ○ S1-8HK26502006 - 20 kW 208/230-1-60 Electric Heat Kit w/ Circuit Breaker and Jumper Bar (5.0 lbs)
- ○ S1-JM11AH2020A - Color matched filter box and merv 11 filter. Accepts 4" and 1" filters (16.0 lbs)

Project Name: Unit Model #: **JHETC36DBCS2N1**

Quantity: **1** Tag #: **FURN-6**

Unit Dimensions

Dimensions and duct connections

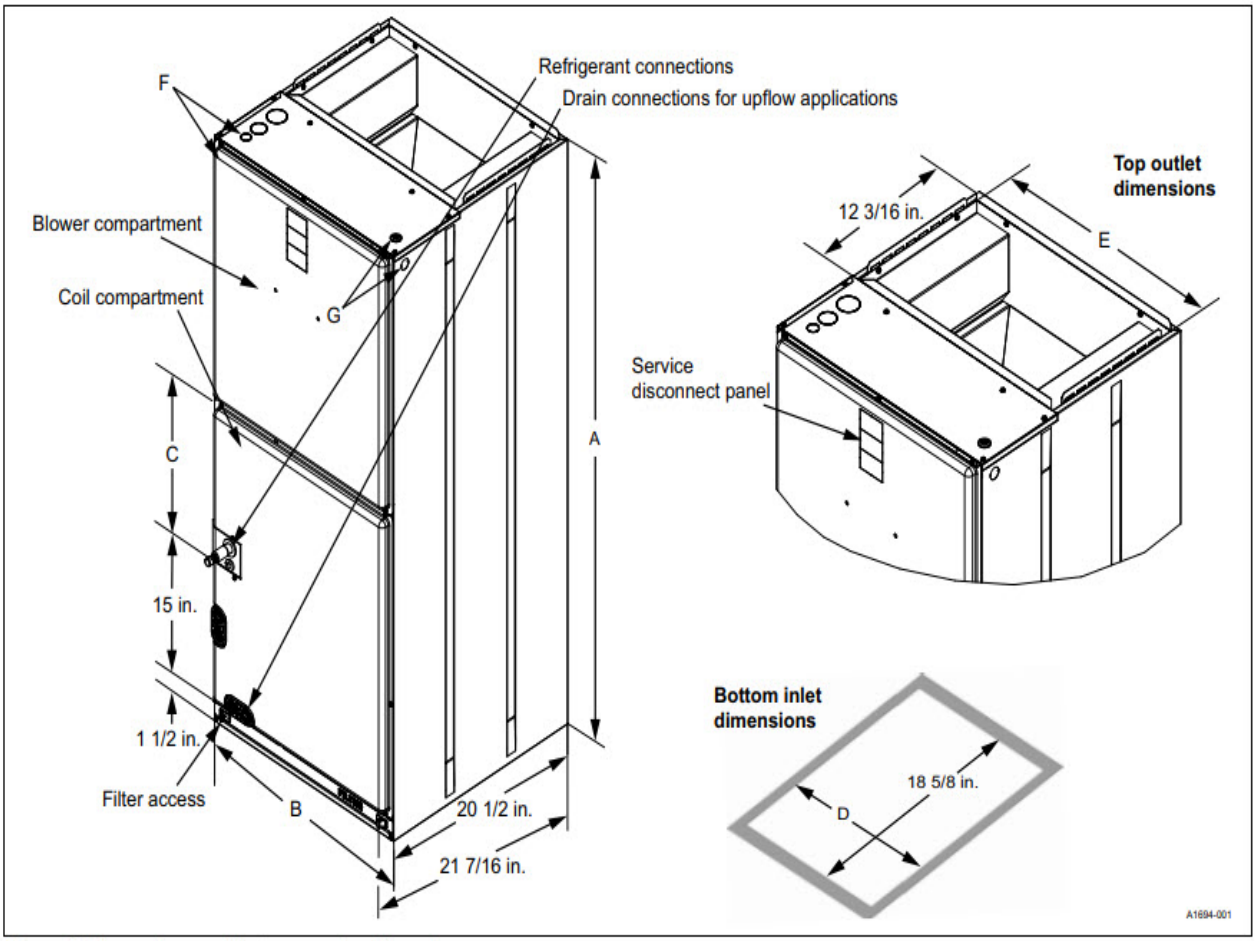


Figure 1: Dimensions and duct connection dimensions

Table 1: Dimensions[1]

Models	Dimensions					Wiring knockouts[2]		Refrigerant connections line size	
	A	B	C	D	E	F	G		
	Height (in.)	Width (in.)	Opening widths (in.)			Power (in.)	Control (in.)	Liquid (in.)	Vapor (in.)
JHET**B18B**	47	17 1/2	7 1/2	16 1/2	16 1/2	7/8 (1/2) 1 3/8 (1) 1 23/32 (1 1/4)	7/8 (1/2)	3/8	3/4
JHET**B24C**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**B30D**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**B36D**	49 5/8	17 1/2	10	16 1/2	16 1/2				
JHET**C36D**	51	21	11 1/2	20	20				
JHET**C42F**	57	21	17 1/2	20	20				7/8
JHET**C48G**	61 1/4	21	21 3/4	20	20				
JHET**D48G**	61 1/4	24 1/2	21 3/4	23 1/2	23 1/2				
JHET**C60H**	63	21	23 1/2	20	20				
JHET**D60H**	63	24 1/2	23 1/2	23 1/2	23 1/2				
JHET**D60J**	61 1/4	24 1/2	21 3/4	23 1/2	23 1/2				

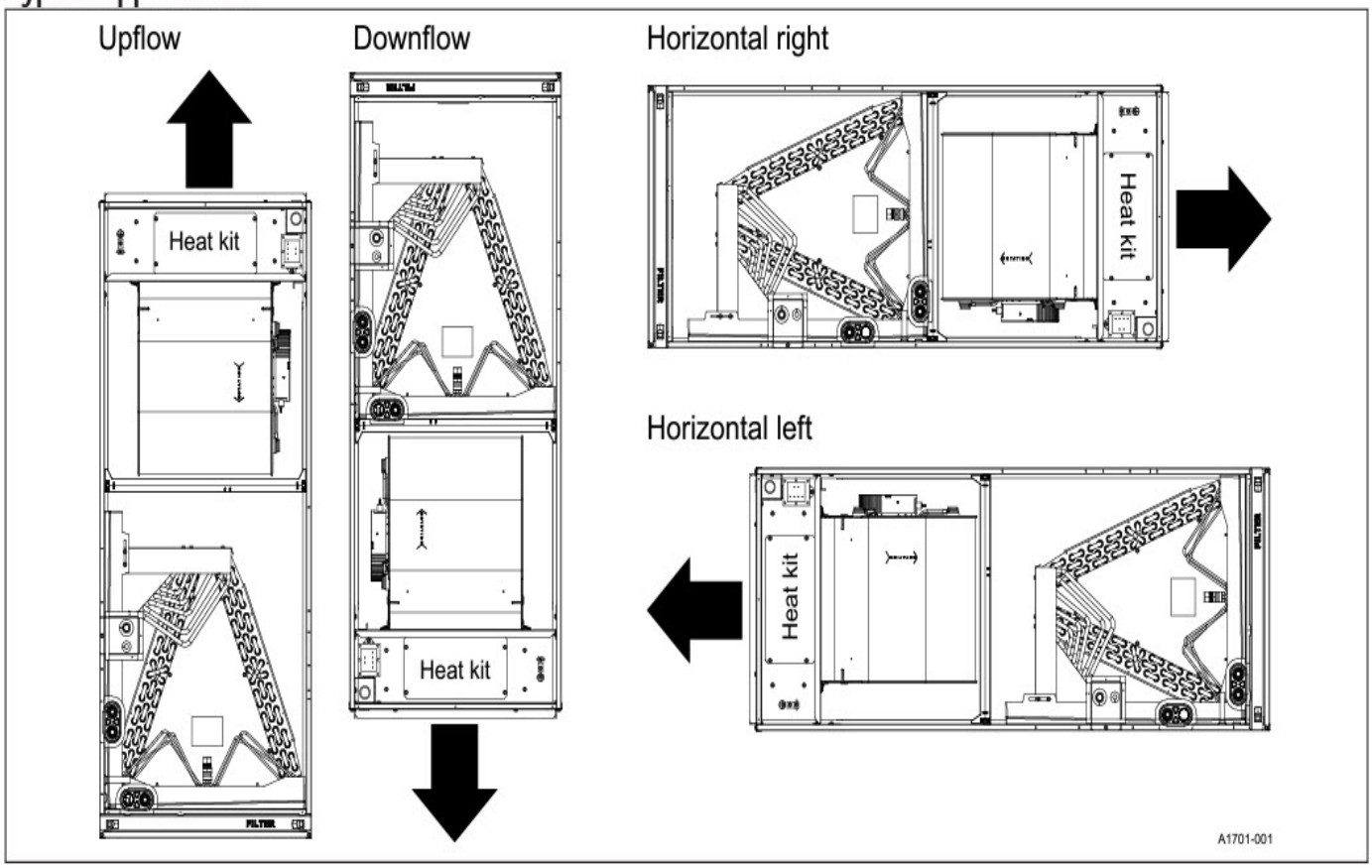
1. All dimensions are in inches.
2. Actual size (conduit size).

Project Name: Unit Model #: **JHETC36DBCS2N1**

Quantity: **1** Tag #: **FURN-6**

Typical Application

Typical applications



Project Name:

Unit Model #: **JHETC36DBCS2N1**

Quantity: **1** Tag #: **FURN-6**

JHET Physical and Electrical

Table 4: Physical and electrical data - cooling only

Models		B18B	B24C	B30D	B36D	C36D	C42F
Blower - diameter x width (in.)		11 x 8	11 x 8	11 x 8	11 x 8	11 x 10	11 x 10
Motor	HP	1/3 HP	1/3 HP	1/2 HP	1/2 HP	1/2 HP	1/2 HP
	Nominal RPM	1050	1050	1050	1050	1050	1050
Voltage (V)		208/230	208/230	208/230	208/230	208/230	208/230
Full load amps at 230 V (A)		2.6	2.6	3.8	3.8	3.8	3.8
Filter[1]	Type	Disposable or cleanable					
	Size	16 x 20 x 1	16 x 20 x 1	16 x 20 x 1	20 x 20 x 1	20 x 20 x 1	20 x 20 x 1
Shipping/operating weight (lb)		101/93	107/99	108/100	108/100	124/114	135/125

Models		C48G	D48G	C60H	D60H	D60J	
Blower - diameter x width (in.)		11 x 10	11 x 11	11 x 10	11 x 11	11 x 11	
Motor	HP	3/4 HP	3/4 HP	3/4 HP	3/4 HP	3/4 HP	
	Nominal RPM	1050	1050	1050	1050	1050	
Voltage (V)		208/230	208/230	208/230	208/230	208/230	
Full load amps at 230 V (A)		5.4	5.4	5.4	5.4	5.4	
Filter[1]	Type	Disposable or cleanable					
	Size	20 x 20 x 1	23 x 20 x 1	20 x 20 x 1	23 x 20 x 1	23 x 20 x 1	
Shipping/operating weight (lb)		140/129	152/140	153/141	158/146	162/150	

1. Field supplied.

Table 5: Electrical data - cooling only

Models	Motor FLA[1]	Minimum Circuit Ampacity (A)	MOP[2]
B18B/B24C	2.6	3.3	15
B30D/B36D/C36D/C42F	3.8	4.8	15
C48G/D48G/C60H/D60H/D60J	5.4	6.8	15

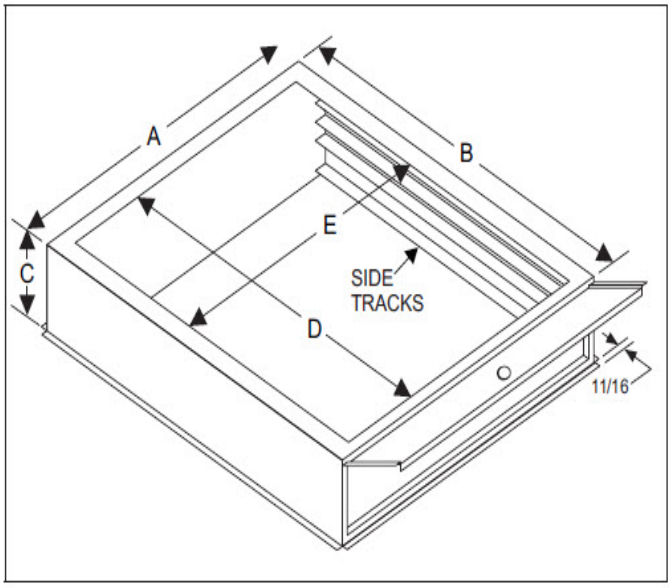
1. FLA = Full Load Amps
2. MOP = Maximum Overcurrent Protection device; must be HACR type circuit breaker or time delay fuse. Refer to the latest edition of the National Electric Code or in Canada the Canadian electrical Code and local codes to determine correct wire sizing.

Project Name | Unit Model #: **JHETC36DBCS2N1**

Quantity: **1** Tag #: **FURN-6**

Filter Rack Accessory

Filter rack dimensions



Galvanized models	A	B	C	D	E	Filter size
1BR01117	17.50	21.56	4.00	18.63	14.25	16 x 20 x 1 or 2
1BR01121	21.00	21.56	4.00	18.63	17.75	20 x 20 x 1 or 2
1BR01124	24.50	21.56	4.00	18.63	21.25	20 x 24 x 1 or 2

APPLICATION DATA SHEET

General Piping Recommendations and Refrigerant Line Length for Split-System Air Conditioners and Heat Pumps

⚠ CAUTION

This Split-System (Air Conditioning Condensing/Heat Pump) unit is one component of an entire system. As such it requires specific application considerations with regard to the rest of the system (air handling unit, duct design, refrigerant piping and control scheme).

Failure to properly apply this equipment with the rest of the system may result in premature failure and/or reduced performance/increased costs. Warranty coverage specifically excludes failures due to improper application and UP specifically disclaims any liability resulting from improper application.

Please refer to the equipment Technical Guide, Installation Manual and the following publication for further information.

INTRODUCTION

Installation of residential and commercial split-systems should be performed by qualified service technicians with proper training in the installation, service and repair of these units.

This document should serve as a guideline for proper split-system piping installation. Read these instructions along with the unit installation instructions carefully and adhere to all cautions, warnings and general practice guidelines. Consult local building codes for special requirements.

The tables and application data in this publication will help you to better apply split-system cooling and heat pump systems to achieve maximum efficiency and performance, improved reliability, and greater customer satisfaction. This guideline includes information for:

- General Guidelines
- Indoor Unit Above the Outdoor Unit
- Outdoor Unit Above the Indoor Unit
- Total line length
- Line Sizing
- Additional Refrigerant
- Refrigerant Oil Management
- Accumulator Use and Misuse
- Recommended Orifice Sizing Chart
- Long Line Set Applications

GENERAL GUIDELINES

The following guidelines apply to the application on either factory line sets or field fabricated tubing for cooling only and heat pump systems:

- Many service problems can be avoided by taking adequate precautions to provide an internally clean and dry system and by using procedures and materials that conform with established standards.
- The lines should be installed so that they will not obstruct service access to the indoor coil, air handling system or filter. Install the lines with as few bends as possible. Care must be taken not to damage the couplings or kink the tubing. Care must also be used to isolate the refrigerant lines to minimize noise transmission from the equipment to the structure.
- Never solder vapor and liquid lines together. They can be taped together for convenience and support purposes, but they must be completely insulated from each other.
- Support all refrigerant lines at minimum intervals with suitable hangers and brackets. Tape and suspend the refrigerant lines as shown in Figure 1. **DO NOT ALLOW METAL-TO-METAL CONTACT**.

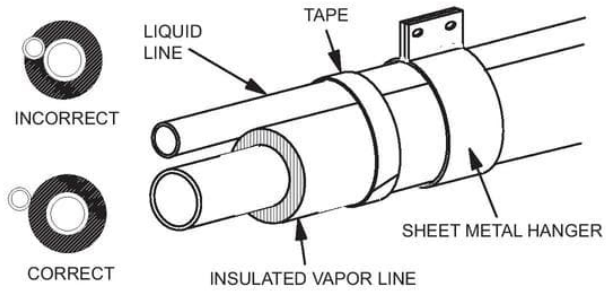


FIGURE 1: Refrigerant Line Support

- Slope horizontal suction lines on cooling only systems approximately 1 inch every 20 feet toward the outdoor unit to facilitate proper oil return. Since the flow of refrigerant is bi-directional on heat pumps, all horizontal vapor lines should be level. Pre-charged lines with excess tubing should be coiled horizontally in an inconspicuous location to avoid oil trapping. Never coil excess tubing vertically.
- Use long radius elbows wherever possible.
- Use PVC piping as a conduit for all underground installations. See Figure 2. Buried lines must be kept as short as possible to minimize the build up of liquid refrigerant in the vapor line during long periods of shutdown.

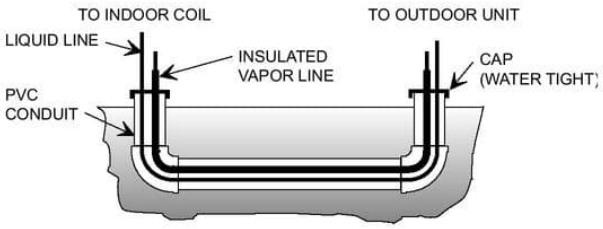


FIGURE 2: Underground Application

- Pack fiberglass insulation and a sealing material such as permagum around refrigerant lines where they penetrate a wall to reduce vibration and to retain some flexibility. If multiple line sets are routed through a common conduit, then all lines must be insulated.
- Insulate all vapor lines with a minimum of 1/2 inch of foam rubber. Liquid lines that will be exposed to direct sunlight or high ambient temperatures such as an attic must also be insulated.

The following additional guidelines apply to field fabricated piping:

- Use hard drawn refrigeration type copper tubing where no appreciable amount of bending around pipes or obstructions is necessary. If soft copper must be used, care should be taken to avoid sharp bends which may cause a restriction.
- Braze all copper to copper joints with Silfos-5 or equivalent brazing material. **DO NOT USE SOFT SOLDER**.
- During brazing operations, flow an inert gas such as nitrogen through the system to prevent internal scaling and contamination.

TRAPS

Traps are not required if the piping is properly sized. Traps will only add pressure drop to the system, further reducing capacity.

INDOOR UNIT ABOVE OUTDOOR UNIT

With this configuration, a common problem with the cooling cycle (air conditioning or heat pump) is that the amount of liquid sub-cooling varies as operating conditions change (such as outdoor ambient). Under some conditions, it is possible that flashing will actually occur in the liquid riser. As long as only liquid is present in the liquid riser, the liquid static pressure loss can be calculated at 1/2 psi per foot of rise. However, as soon as flashing starts, the rate of pressure loss increases and continues to increase as the amount of gas increases. For this reason, the restrictions on elevation differences for this configuration must be based on the entire range of operating conditions.

When the indoor unit is above the outdoor unit, the pressure loss in the liquid line during the cooling cycle will limit the amount of elevation difference allowed. Since both friction and static head contribute to pressure loss, it can be stated that the elevation difference allowed decreases as the total equivalent line length (horizontal plus vertical) increases.

OUTDOOR UNIT ABOVE INDOOR UNIT

COOLING CYCLE

When the outdoor unit is above the indoor unit, the static pressure gain in the liquid line vertical drop (1/2 psi per foot) may overcome the frictional pressure loss resulting in a total pressure gain. A pressure gain in the liquid line is not detrimental to the performance of the system.

On cooling only systems where the outdoor unit is located high above the indoor coil, it may even be possible to reduce the size of the liquid line. The static gain in the vertical drop will offset the increased friction loss caused by smaller tubing. In addition, the reduction in the total system charge due to the smaller liquid line will enhance the reliability of the system.

With this configuration, gas velocity in the vapor riser must be kept above 1000 feet per minute for proper oil return and below 3000 feet per minute to avoid noise and vibration problems.

HEATING CYCLE (Heat Pumps Only)

In the heating mode, liquid will travel from the indoor unit up the liquid riser to the outdoor unit. This will result in a liquid line pressure drop and a starved outdoor coil. Since heat pumps have a defrost cycle, coil freeze-up is not a problem. However, the resulting lower suction pressure will decrease the capacity and efficiency of the system.

TOTAL LINE LENGTH

The total length of interconnecting tubing is the sum of all horizontal and vertical runs from the indoor unit to the outdoor unit. Total measured line lengths are limited to:

- The limiting factor on heat pumps is the storage capacity of the accumulator. The limiting factor on cooling units is oil sump capacity in the compressor.
- Total equivalent line lengths must only be used when calculating pressure drop. Therefore use Table 1 to calculate equivalent lengths for elbows.

TABLE 1: EQUIVALENT LENGTHS OF ELBOWS IN FEET

LINE SIZE INCHES (O.D.)	90° SHORT RADIUS ELBOW (FT.)*	90° LONG RADIUS ELBOW (FT.)
1/4	0.7	0.6
5/16	0.8	0.7
3/8	0.9	0.8
1/2	1.2	1.0
5/8	1.5	1.3
3/4	1.6	1.4
7/8	1.8	1.6
1-1/8	2.4	2.0
1-3/8	3.2	2.2
1-5/8	3.8	2.6
2-1/8	5.2	3.4
2-5/8	6.5	4.2

*. **Two 45° radius ells equals one 90° radius ell.**

LINE SIZING

Every split-system unit is shipped with a factory-mounted sweat fitting.

For split systems, interconnecting refrigerant lines should be sized to match the factory supplied fittings unless the application dictates different line sizes due to pressure drop, refrigerant velocity constraints and/or line set lengths.

For cooling systems where the indoor and outdoor sections are installed at the same elevation, refrigerant line sizes can usually be matched with the factory supplied fittings. There are exceptions for total line lengths exceeding 75 feet where pressure drop limitations are exceeded. Refer to Long Line Set section.

In some applications, especially where elevation differences exist between the indoor and outdoor sections, suction and liquid line sizes can be increased (or decreased) to minimize pressure loss (or gain) and improve oil return to the compressor. When sizing refrigerant lines for split-system cooling units, the following factors must be considered:

1. Suction line pressure loss due to friction.
2. Suction line velocity for oil return.
3. Liquid line pressure loss due to friction.
4. Liquid line pressure loss (or gain) due to static head.

The effect that each of these factors have on a cooling system depends on the orientation of the indoor and outdoor sections; e.g., indoor unit above the outdoor unit. Before we discuss the various orientations, it is important to understand a few things about suction and liquid lines.

First, lets consider suction lines. Suction pressure loss reduces system capacity by 1% for R-22 and 0.6% for R-410A per psi. This can be a serious problem if suction lines are not sized properly and pressure loss is 8 or 9 psi. Therefore, in order to minimize capacity loss and maximize efficiency, suction pressure loss must be minimized. This is achieved by increasing the size of the suction line. As a good achievable guideline, suction pressure loss should not be allowed to exceed 3 psi (5 psi for R-410A).

Another important consideration when sizing suction lines is refrigerant gas velocity in a suction riser. Velocity of at least 1000 feet per minute is required to carry oil up a suction riser. Of course, this is only a factor when the outdoor unit is above the indoor unit and the oil must overcome the pull of gravity to return to the compressor. Greater refrigerant velocities are obtained by decreasing the size of the suction line. In applications where smaller tubing is required for a suction riser and larger tubing is needed to minimize pressure drop, the riser must be sized to achieve a velocity of at least 1000 feet per minute while the horizontal runs can be sized larger to minimize pressure drop.

NOTE: Must maintain 800 fpm minimum velocity on all horizontal pipe runs.

Liquid lines must also be sized to minimize pressure change. The total pressure change in a liquid line is the sum of the loss due to friction and the loss (or gain) due to static head in the vertical line. Liquid pressure loss reduces the amount of liquid sub-cooling at a rate of 1 degree for every 3 psi for R-22 and 5 psi for R-410A. Sufficient sub-cooling must be maintained at the expansion valve to provide proper operation. If the liquid pressure drop is high enough to deplete all of the liquid sub-cooling in the system, liquid will begin to flash reducing the refrigerant flow through the indoor coil expansion valve. However, as soon as flashing begins, the rate of pressure loss increases and continues to increase as the amount of gas increases. Careful consideration must be given to liquid line sizing to minimize pressure drop and system charge. Liquid lines should be sized as small as possible without exceeding the **recommended maximum pressure drop**. The maximum recommended liquid line velocity is 400 fpm. Velocities exceeding 400 fpm can result in higher than acceptable noise levels.

ADDITIONAL REFRIGERANT

In many applications, additional refrigerant will have to be added to the system. The actual amount of charge that must be added is determined by adding the following:

1. The indoor coil charge adjustment from the Installation Manual.
2. The additional charge required for the interconnecting piping and the size of the vapor and liquid lines.

Example: For a system using a 3/8 liquid line and a 3/4 suction line with a total measured length of 50 feet,

Liquid line	50 - 15 feet x 0.62 oz./foot	= 21.7 oz.
Suction line	50 - 15 feet x 0.06 oz./foot	= 2.1 oz.
Charge add for interconnecting tubing		= 23.8 oz.

NOTE: On residential equipment 15 feet of line is included on nameplate charge.

TABLE 2: LINE CHARGE

R-22 LINE CHARGE*			
SUCTION	OZ./FT.	LIQUID	OZ./FT.
1/2	0.02	1/4	0.23
5/8	0.04	5/16	0.40
3/4	0.06	3/8	0.62
7/8	0.08	1/2	1.12
1-1/8	0.14	5/8	1.81
1-3/8	0.21	7/8	3.78
1-5/8	0.30	7/8	3.78
2-1/8	0.53	1-1/8	6.46
2-5/8	0.81	1-1/8	6.46

R-410A LINE CHARGE*			
SUCTION	OZ./FT.	LIQUID	OZ./FT.
1/2	0.04	1/4	0.19
5/8	0.06	5/16	0.33
3/4	0.09	3/8	0.51
7/8	0.12	1/2	1.01
1-1/8	0.20	5/8	1.64
1-3/8	0.31	3/4	2.46
1-5/8	0.43	7/8	3.27
2-1/8	0.76	1-1/8	5.58
2-5/8	1.17		

*. Charges are based upon 40°F suction temperature and 105°F liquid temperature.

REFRIGERANT OIL MANAGEMENT

Inherent to all refrigeration systems is the presence of refrigerant oil required for proper and continuous lubrication of the compressor(s) bearings. All refrigeration systems, whether they are packaged or split-systems circulate oil throughout the system due to the miscibility of refrigerant oil. Split-systems, due to their propensity for long piping lengths, can circulate more refrigerant oil than packaged units, which can become a problem if not recognized and managed. It is not unusual for a given system to circulate as much as 15% of the original compressor oil charge. Yet another side-effect of long piping runs on split-systems is the aspect of system oil logging which can occur even in the best of installations. Even the best piping practices can inadvertently create oil traps in the system especially when elevation differences between the indoor and outdoor units occur. Refer to the section on **Long Line Set Applications** for determining if refrigerant oil should be added to the system.

ACCUMULATOR USE AND MISUSE

Ordinarily, suction line accumulators are not necessary on AC units if the system is piped correctly and all of the precautionary guidelines are followed. Refrigerant suction line accumulators should only be installed on systems where liquid flood back to the compressor(s) is highly likely. Accumulators are a standard item on all heat pumps to avoid liquid flood back to the compressor when switching from heat to cooling, reversal before and after defrost and during low ambient heating operation. If applied incorrectly suction line accumulators can log oil or not provide the necessary liquid protection especially when under sized.

The compressor suction line size should never be used as a guideline for sizing the suction line accumulator. Matching the accumulator piping size to the suction line size can often times result in an undersized accumulator. Normally the accumulator is sized for not less than 50% of the total system capacity.

Careful consideration must be given when attempting to apply an accumulator to a split-system. On any given unit approximately 80% of the system charge can be found between the compressor and the expansion device during operation. When the system shuts down the refrigerant is trapped between the compressor check valve and the non-bleed expansion device used on all York split-systems. During long periods of shut down the refrigerant will migrate to the low side of the system possibly accumulating in the evaporator coil and horizontal suction lines.

If it has been determined that an accumulator must be installed in the system proper positioning with respect to the compressor suction line level is shown in Figure 3. It may become necessary in many cases to elevate the outdoor unit to accommodate proper piping and drainage back to the accumulator during the off cycle. Multiple accumulators whether piped in series or parallel are not recommended.

If an accumulator has been installed into a system and the compressor experiences a burn out the accumulator must be replaced. The debris from the burn out will clog the orifice in the accumulator resulting in oil return starvation to the replacement compressor.

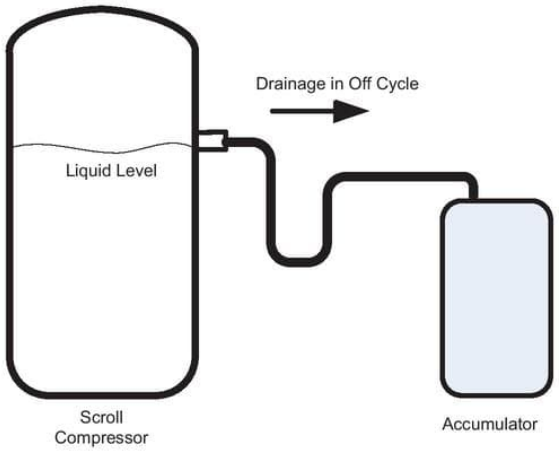


FIGURE 3: Accumulator Field Piping

RECOMMENDED ORIFICE SIZE

ORIFICE SIZING

Use the York® Comfort Cooling Piping software to determine liquid line pressure drop to select proper orifice sizing.

TABLE 3: RECOMMENDED ORIFICE SIZE

LIQUID LINE PRESSURE GAINS (PSI)					STANDARD ORIFICE SIZE	LIQUID LINE PRESSURE LOSSES (PSI)	
51	41	31	21	11		11	21
Thru	Thru	Thru	Thru	Thru		Thru	Thru
60	50	40	30	20		20	30
CORRECTED ORIFICE SIZE						CORRECT ORIFICE SIZE	
-	-	-	-	39	41	43	45
-	-	-	39	41	43	45	47
41	43	45	47	49	51	53	55
43	45	47	49	51	53	55	57
45	47	49	51	53	55	57	59
47	49	51	53	55	57	59	61
49	51	53	55	57	59	61	63
51	53	55	57	59	61	63	65
53	55	57	59	61	63	65	67
55	57	59	61	63	65	67	69
57	59	61	63	65	67	69	71
59	61	63	65	67	69	71	73
61	63	65	67	69	71	73	75
63	65	67	69	71	73	75	78
65	67	69	71	73	75	78	81
69	71	73	75	75	78	81	84
71	73	75	78	78	81	84	87
75	75	78	81	81	84	87	90
78	78	81	84	84	87	90	93
81	81	84	87	87	90	93	96
84	84	87	90	90	93	96	99
87	87	90	93	93	96	99	102
90	90	93	96	96	99	102	105
93	93	96	99	99	102	105	105

LONG LINE SET APPLICATIONS

This section is intended for long line applications that exceed 75'. When sizing line sets under 75', always use factory supplied connections. If your application is outside of the selection charts, your application must be approved through the Application Engineering group.

LIQUID LINE SIZING CRITERIA

The following considerations have already been accounted for when relating to the selection charts.

- R-22 Maximum Pressure Drop is 35 psig
- R-410A Maximum Pressure Drop is 60 psig
- Increased charge levels
- Maximum recommended velocity of 400 fpm
- Minimum velocity of 100 fpm

Liquid Line Selection Chart: The charts below show the line sizes that can be selected for each tonnage of unit and the maximum equivalent length and maximum rise of the line. ***The maximum actual line length is 200 feet. Equivalent line lengths would include elbows and other components that would increase the equivalent length***.

TABLE 4: R22 LIQUID LINE, MAXIMUM RISE CHART

Tons	Line Size	Maximum Total Equivalent Length								Velocity
		75	100	125	150	175	200	225	250	FPM
1.5	5/16	60	55	50	50	45	40	35	30	186
	3/8	65	65	65	60	60	60	55	55	115
2.0	5/16	50	45	35	30	25	20	15	5	248
	3/8	60	60	60	55	55	50	45	45	154
2.5	3/8	60	55	55	50	45	40	35	35	192
	1/2	65	65	65	65	65	60	60	60	103
3.0	3/8	55	50	45	40	35	30	25	20	231
	1/2	65	65	65	65	60	60	60	55	124
3.5	3/8	50	45	35	30	25	20	10	5	269
	1/2	65	65	60	60	60	55	55	55	145
4.0	3/8	45	35	30	20	15	10	-	-	308
	1/2	65	60	60	60	55	55	50	50	165
5.0	3/8	30	20	10	-	-	-	-	-	385
	1/2	60	60	55	50	50	45	45	40	207
7.5	1/2	50	45	40	35	30	25	15	10	310
	5/8	65	60	60	60	55	55	55	50	193
10	5/8	60	55	55	50	50	45	40	40	257
	3/4	65	65	65	60	60	60	55	55	175
12.5	5/8	55	50	45	40	35	30	25	25	322
	3/4	65	60	60	55	55	55	50	50	219
15	3/4	60	60	55	55	50	50	45	45	263
	7/8	65	65	65	60	60	60	60	55	186
20	3/4	55	50	45	45	40	35	30	25	351
	7/8	65	60	60	55	55	55	50	50	248
25	7/8	60	55	55	50	50	45	40	40	310
	1-1/8	65	65	65	65	65	60	60	60	182

Shaded area indicates system needs oil added (Refer to Oil Addition section on page 7).

TABLE 5: R-410A LIQUID LINE, MAXIMUM RISE CHART

Tons	Line Size	Maximum Total Equivalent Length								Velocity
		75	100	125	150	175	200	225	250	FPM
1.5	5/16	75	90	85	85	80	75	75	70	223
	3/8	75	100	95	95	95	95	90	90	138
2.0	5/16	75	80	75	70	65	60	55	50	297
	3/8	75	95	90	90	85	85	85	80	184
2.5	3/8	75	90	85	85	80	80	75	70	230
	1/2	75	100	100	100	100	95	95	95	123
3.0	3/8	75	85	85	80	75	70	65	60	276
	1/2	75	100	100	95	95	95	90	90	148
3.5	3/8	75	80	75	70	65	60	55	50	322
	1/2	75	95	95	95	95	90	90	90	173
4.0	3/8	75	75	70	60	55	45	40	35	368
	1/2	75	95	95	95	90	90	90	85	198
5.0	3/8	70	60	50	40	30	20	10	0	*460
	1/2	75	95	90	90	85	85	80	80	247
7.5	1/2	75	80	80	75	70	65	60	55	370
	5/8	75	95	95	95	90	90	90	85	231
10	5/8	75	90	90	85	85	80	80	75	307
	3/4	75	100	95	95	95	95	90	90	210
12.5	5/8	75	85	85	80	75	70	65	65	384
	3/4	75	95	95	90	90	90	90	85	262
15	3/4	75	95	90	90	85	85	85	80	315
	7/8	75	100	95	95	95	95	95	90	222
20	3/4	75	85	85	80	75	70	70	65	419
	7/8	75	95	95	90	90	90	85	85	296
25	7/8	75	95	90	90	85	85	80	75	371
	1-1/8	75	100	100	100	95	95	95	95	217

***Note**: Exceeds recommended maximum velocity of 400 fpm, consider noise when selecting this pipe size.

Example: 3 Ton cooling unit with 175' of equivalent length, condensing unit is below the evaporator with 80' of vertical rise to the evaporator.

Answer: You should have selected 1/2". Why did you select this size? Because at 175' equivalent length with a 3 ton system, the maximum rise is 75' for 3/8" and 95' for 1/2".

Multi Stage Refrigeration Systems: When sizing the liquid line for a system with either a 2 stage scroll compressor (residential) or when a **single** refrigeration system utilizes compressor staging for capacity reduction (commercial). **ALWAYS** calculate the liquid line size with the **maximum** tonnage rating of the unit.

SUCTION LINE SIZING CRITERIA

The following considerations have already been accounted for when relating to the selection charts.

- Minimum velocity of 1000 fpm for vertical lines and 800 fpm for horizontal lines guarantee proper oil return
- Minimal pressure drop to minimize capacity loss

Suction Line Selection Chart: The charts below show the line sizes that can be selected for each tonnage of unit and the percent of capacity reduction the system will have because of the long line set application. ***The maximum actual line length is 200 feet, equivalent line lengths would include elbows and other components that would increase the equivalent length***.

TABLE 6: R22 SUCTION LINE, CAPACITY REDUCTION CHART (%)

Tons	Line Size	Total Equivalent Length								Velocity
		75	100	125	150	175	200	225	250	FPM
1.5	5/8	5	7	9	12	-	-	-	-	1682
	3/4	4	5	6	7	9	11	12	13	1147
2.0	3/4	3	4	6	8	9	11	-	-	1529
	7/8	3	4	5	6	7	8	9	10	1081
2.5	3/4	3	5	7	-	-	-	-	-	1911
	7/8	2	3	4	5	7	8	9	10	1351
3.0	3/4	5	7	8	-	-	-	-	-	2294
	7/8	2	3	5	6	8	9	10	11	1621
3.5	7/8	2	4	6	7	-	-	-	-	1892
	1-1/8	2	3	4	4	5	5	6	7	1109
4.0	7/8	3	5	7	-	-	-	-	-	2162
	1-1/8	2	2	3	4	4	5	6	7	1268
5.0	7/8	5	-	-	-	-	-	-	-	2703
	1-1/8	1	2	3	4	5	6	6	7	1585
	1-3/8	1	2	3	3	4	4	5	6	1048
7.5	1-3/8	1	2	2	2	3	4	5	5	1561
	1-5/8	1	2	2	2	3	3	4	4	1103
10	1-3/8	1	1	2	3	4	5	6	-	2082
	1-5/8	1	1	2	2	2	3	3	3	1471
12.5	1-5/8	1	1	1	2	2	3	3	4	1839
	2-1/8	1	1	1	1	2	2	3	3	1057
15	1-5/8	1	1	2	3	3	4	4	5	2207
	2-1/8	1	1	1	2	2	2	2	3	1268
20	2-1/8	1	1	1	1	2	2	2	2	1691
	2-5/8	1	1	1	1	1	2	2	2	1096
25	2-1/8	1	1	1	1	1	2	2	3	2114
	2-5/8	1	1	1	1	1	2	2	2	1370

Note: (-) Indicates unacceptable pressure drop in suction line

TABLE 7: R-410A SUCTION LINE, CAPACITY REDUCTION CHART (%)

Tons	Line Size	Total Equivalent Length								Velocity
		75	100	125	150	175	200	225	250	FPM
1.5	5/8	3	4	5	7	8	10	12	13	1185
	3/4	3	4	5	6	8	10	11	12	808*
2.0	5/8	2	4	6	7	-	-	-	-	1582
	3/4	3	4	4	5	6	7	8	10	1078
2.5	3/4	2	3	4	5	6	7	8	10	1346
	7/8	2	3	4	5	6	6	7	8	952*
3.0	3/4	2	2	4	5	6	8	-	-	1616
	7/8	2	3	3	4	5	5	6	7	1143
3.5	3/4	2	3	4	6	-	-	-	-	1887
	7/8	2	2	3	3	4	5	6	7	1333
4.0	3/4	2	4	5	-	-	-	-	-	2155
	7/8	1	2	2	3	5	6	7	8	1523
5.0	7/8	1	2	3	5	6	-	-	-	1905
	1-1/8	1	2	2	3	3	4	4	5	1117
7.5	1-1/8	1	1	2	2	3	4	5	5	1676
	1-3/8	1	1	2	2	3	3	3	4	1100
10	1-3/8	1	1	1	2	2	2	3	3	1467
	1-5/8	1	1	1	2	2	2	3	3	1036
12.5	1-3/8	1	1	1	1	2	2	3	4	1834
	1-5/8	1	1	1	1	2	2	2	3	1295
15	1-3/8	1	1	1	2	3	4	5	-	2200
	1-5/8	1	1	1	1	1	2	2	2	1554
20	1-5/8	1	1	1	1	1	2	3	3	2073
	2-1/8	1	1	1	1	1	1	2	2	1191
25	1-5/8	1	1	1	2	3	4	-	-	2591
	2-1/8	1	1	1	1	1	1	1	2	1489

*Velocity is below 1000 fpm, should only be used on horizontal line.

Multi Stage Refrigeration Systems: When sizing the suction line for a system with either a 2 stage scroll compressor (residential) or when a **single** refrigeration system utilizes compressor staging for capacity reduction (commercial). **ALWAYS** select the largest available pipe size from the minimum tonnage of capacity reduction.

Example: 10 ton R-22 2 pipe system that reduces capacity to 5 tons. Select 1-3/8" suction line, this is the largest available suction line size for a 5 ton suction line.

Note: 2 stage scroll compressors operate at 67% of full load capacity.

LONG LINE SET ACCESSORIES

All long line set applications must have the following accessories installed if they are not already installed from the factory.

- **Crankcase Heater** - A crankcase heater will warm the compressor sump and prevent the refrigerant from migrating to the compressor in the off cycle.
- **Non Bleed TXV's on all ID Coils** - Prevents refrigerant from bleeding into the low side of the system through the evaporator in the off cycle.
- **Hard Start Kit** - A hard start kit is necessary to increase the compressor starting torque anytime a TXV is used in a system. This is necessary to overcome the pressure difference across the compressor.
- **Cooling Only Units** - Require **liquid line check valve** placed in the liquid line near the condensing unit. This is used to lock the refrigerant in the liquid line between the TXV and the condensing unit to reduce off cycle migration.
- **Heat Pumps with Orifice in OD Coil** - Require **check valve and solenoid valve** placed in liquid line to prevent off cycle migration, refer to Figure 4 for proper placement.
- **Heat Pumps with TXV's on both Coils** - Do not require additional check valves and solenoid valves.
- **Pump Out Accessory** - This is required on commercial applications where available.

OIL ADDITION

If the line set you selected is in the shaded area of Table 4, (R22 Liquid Line, Maximum Rise Chart) oil needs to be added to the compressors. The formula below determines the amount of oil to add to the compressors.

(TSC x .03 x 16) - (SOC x .1) = AOR

- TSC = Total System Charge in pounds
- SOC = System Oil Charge in ounces
- AOR = Additional Oil Required in ounces

ROTARY COMPRESSOR

If you are selecting a unit with a rotary compressor, the maximum actual line set is 100 ft.

⚠ CAUTION

Any application that falls outside standard limits should be referred to Unitary Products application Engineering @ 1-877-UPG-SERV.

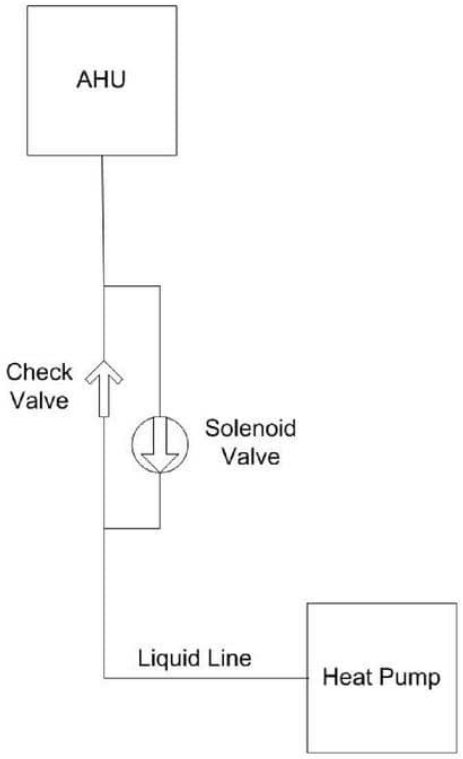


FIGURE 4: Heat Pump Solenoid/Check Valve Installation Arrangement

TABLE 8: CRANKCASE HEATERS FOR SPLIT UNITS

Model	Part #	Voltage	Watts	Min. Circum	Max. Circum
Danfoss Scrolls (All)	S1-02541100000	240	70	19.625	27.125
	S1-02541101000	460	70	19.625	27.125
	S1-02541102000	575	70	19.625	27.125
Copeland Scrolls (Residential)	S1-02531959000	240	80	22	26
	S1-02531960000	460	80	22	26
	S1-02531958000	575	80	22	26
Copeland Scrolls (Commercial)	S1-02533474240	240	90	28.75	35.75
Bristol H23A	S1-02533474460	460	90	28.75	35.75
	S1-02533474575	575	90	28.75	35.75
Bristol Recips (Remainder)	S1-02537399240	240	70	21.81	29
	S1-02537399480	460	70	21.81	29
	S1-02537399575	575	70	21.81	29

TABLE 9: HP SOLENOID VALVE

Model	Part#	Voltage
3/8" Liquid Line Solenoid Valve	S1-02541203000	24V

TABLE 10: MAGNETIC CHECK VALVES

Pipe Diameter	Part #
3/8"	S1-02222498000
1/2"	S1-02211519000
5/8"	S1-02209099000
3/4"	S1-02211520000
7/8"	S1-02211481000
1-1/8"	S1-02211521000

⚠ CAUTION

Any application that falls outside standard limits should be referred to Unitary Products application Engineering @ 1-877-UPG-SERV.

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