



Application Guide

XL16i-APG01-EN

Low Outdoor Operating Temperature
Unit Mounting
Minimum Clearances
Refrigerant Piping Limitations



Trane XL16i heat pumps and cooling units

The purpose of this bulletin is to provide cumulative application criteria as related to the Trane XL19i cooling units and heat pumps.

This bulletin discusses:

- I. Off Season Cooling Operation
- II. Unit Mounting
- III. Minimum Operating Clearances
- IV. Refrigerant Piping Limitations

ISSUED BY:
Product Training and Application Department
Trane
Tyler, Texas

Section I - Off Season Cooling Operation

The Trane XL16i may be operated in the cooling mode to 55°F as shipped from the factory. These units shall only be matched with variable speed air handling units and variable speed furnace / coil combinations. The coils have factory supplied non - bleed TXV's

Please refer to the accessory table below when determining if the XL16i will operate at the specified conditions as well as required accessories.

REQUIRED ACCESSORIES @ OD TEMPERATURE			
Model	55 °F	30 / 40 °F	0 °F
XL16i	As Shipped	Crankcase heater and Evaporator defrost control	Not Approved

Evaporator Defrost Control Kits (EDC)

AY28X079 - Cooling only

AY28X084 - Heat pumps

Compressor Crankcase Heater Kit - BAYCCHT

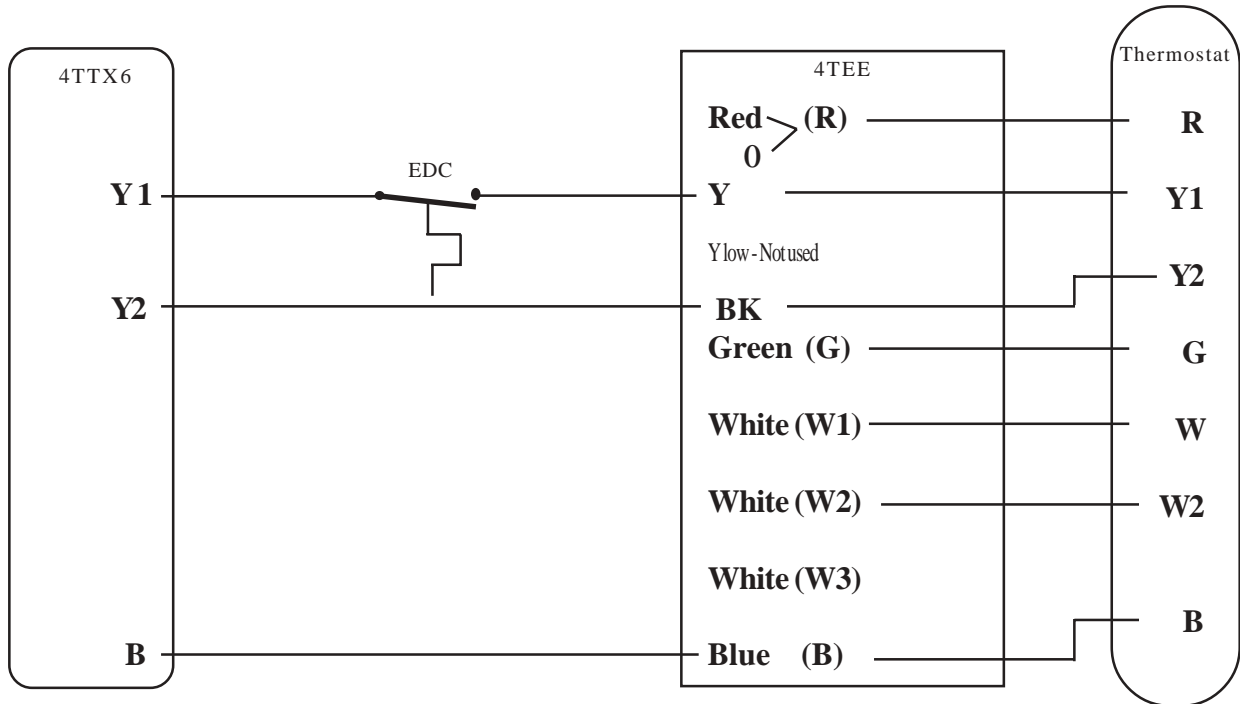
Compressor Hard Start Kits - BAYKSKT

Please refer to the matrix below for compressor crankcase heat and start kit information

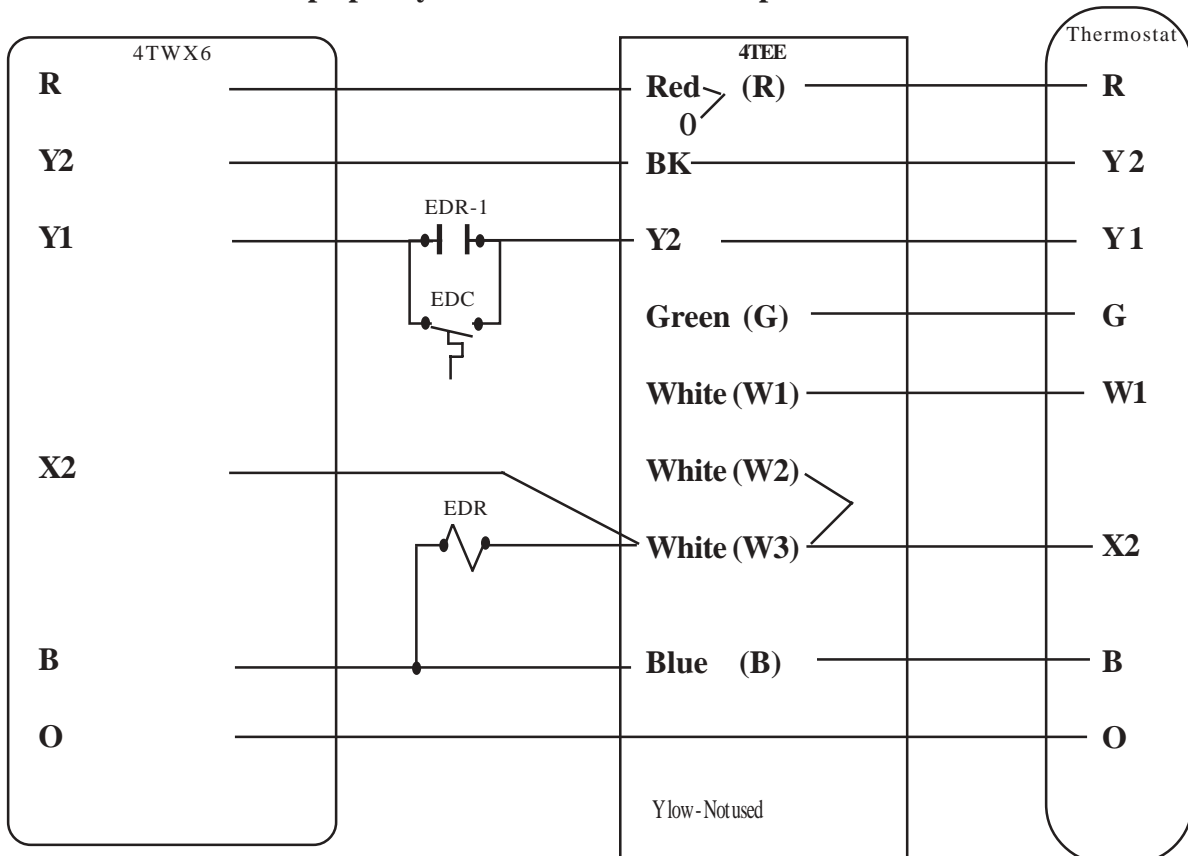
Unit Model	Required CCHT	Required Hard Start Kit	Unit Model	Required CCHT	Required Hard Start Kit
4TTX6024A1000A	BAYCCHT301	BAYKSKT260	4TWX6024A1000A	Factory Installed	BAYKST260
4TTR6036A1000A	BAYCCHT301	BAYKSKT260	4TWR6036A1000A	Factory Installed	BAYKSKT260
4TTR6048A1000A	BAYCCHT301	BAYKSKT260	4TWR6048A1000A	Factory Installed	BAYKSKT260
4TTR6060A1000A	Factory Installed	Factory Installed	4TWR6060A1000A	Factory Installed	Factory Installed

Typical wiring when using the evaporator defrost control (EDC) for operation as specified on page 3.

Cooling Split System and AY28X079 Evaporator Defrost Control



Heat Pump Split System and AY28X084 Evaporator Defrost Control



Note: Remove factory installed jumper between R and BK at the fan control board. Connect R to O on the terminal strip. These terminals on the AHU / Gas furnace must be jumpered together. Please refer to the equipment's installation manual for complete control wiring.

SECTION II - Unit Mounting:

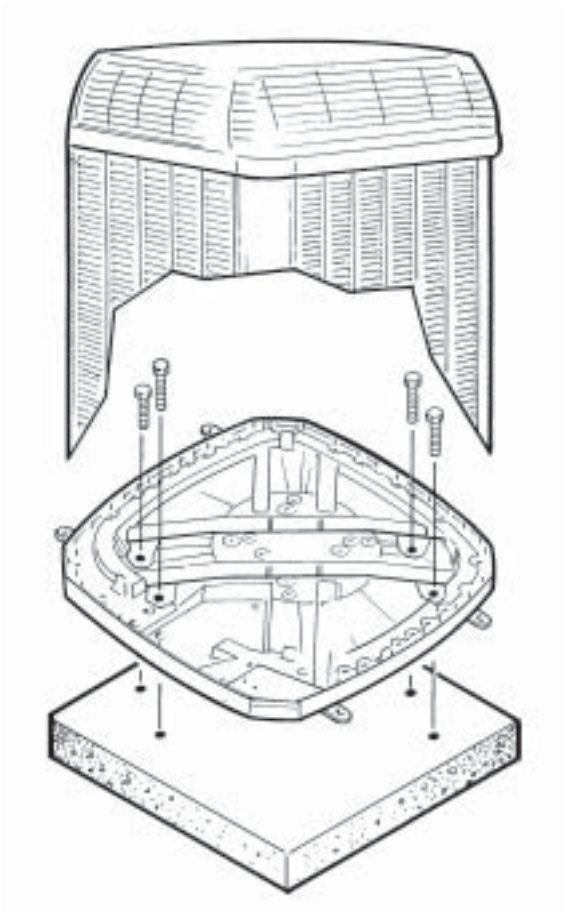
This section describes appropriate methods for mounting and securing the XL16i. However, if these units are to be mounted in a region where high winds are an issue, please refer to the Trane BAYECMT001 extreme conditions mounting kit. If installing in a region where seismic restraint is required, refer to local code authority for tie down requirement. This application may require a local P.E.'s approval and stamp.

When mounting or securing the Trane condensing units and heat pumps please observe the following.

1. Anytime the unit is to be supported from the edge, the supporting material shall extend minimum two inches under the perimeter of the unit's base.
2. The mounting hole locations are molded in the basepan, however, they must be drilled through.
 - a) Hole locations are identified on page 6.
 - b) Hole diameter is 5/16"
3. Washers should be placed in between the fastener head and the basepan.
4. Trane recommends supporting the center of the unit.
5. Base 3 and 4 pans have four mounting holes.

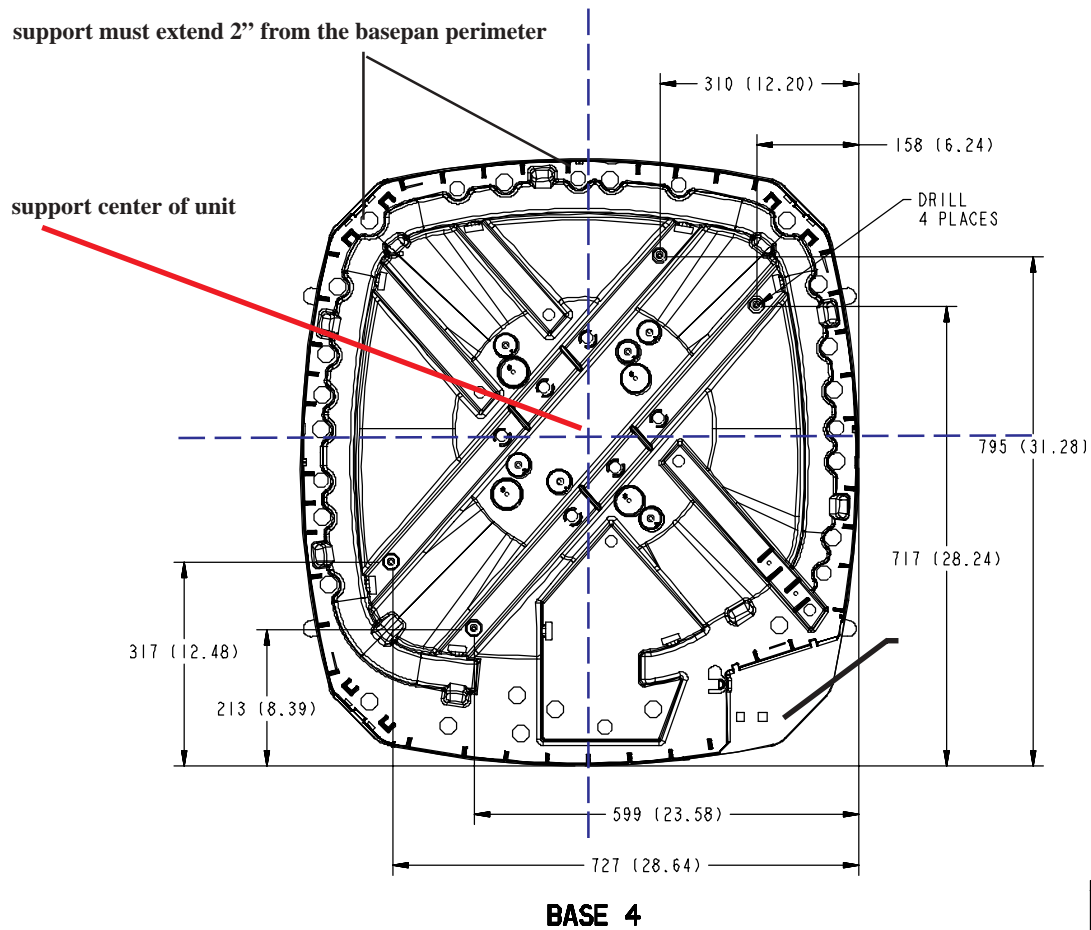
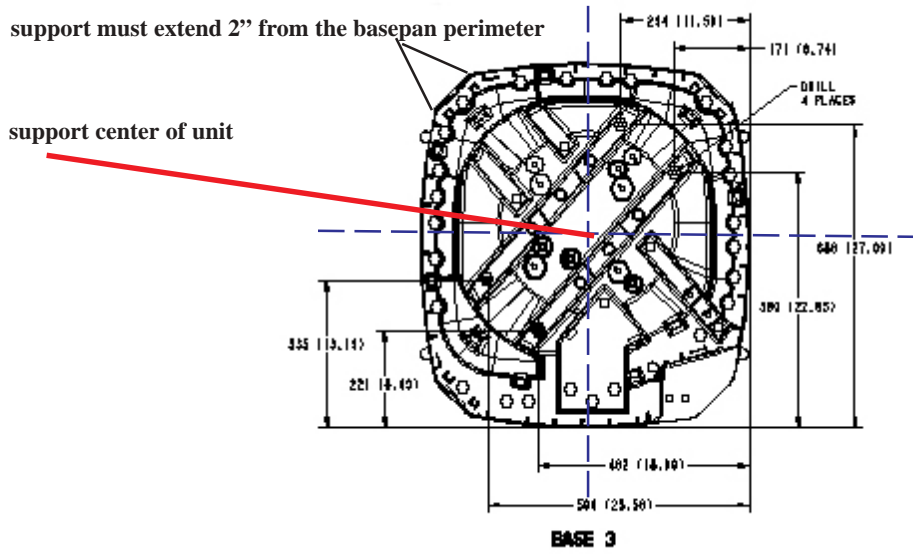
Refer to the dimension tables for actual unit size.

Please refer to the following illustrations for dimensions and general information.



Drawing for illustration purposes only.

BASE PAN MOUNTING HOLE LOCATIONS (location only, holes must be drilled)



If supporting the base pan from the perimeter, the support must extend under the base pan at least 2". Trane recommends supporting the middle of the base pan with a cross member.

Section III - Minimum Operating Clearances

This section discusses applying a condensing unit / heat pump in installations where there are space constraints.

These concerns must be addressed:

1. System Operation - Adequate airflow must be provided to the condensing unit / heat pump in order to enable appropriate heat transfer. If this is accomplished, head pressure will remain at an effective operating range.
2. System Servicability - Proper space must be allowed for HVAC service technician to properly maintain the condensing unit / heat pump. Furthermore, space must be allowed for major component change out in the event of a failure. Working space is determined by the National Electric Code
3. Space Maintenance - Appropriate area must be allowed in order maintain the ground area where the units are positioned to prohibit debris from collecting on the panels, thus further providing unobstructed airflow to the condensing unit.
4. State, Local Codes, and National Codes shall prevail. Check with the local jurisdiction before installation to assure compliance.

Numerous projects require reduced clearances between outdoor units and adjacent walls, fences and other units. The obstruction in question is usually one of the following:

1. Deck.
2. One or more walls of an adjacent building.
3. Fences or barriers provided to reduce sound transmission or visually screen the equipment.
4. Other outdoor units in a multi-unit installation.
5. A combination of the above.

The prime considerations involved in establishing minimum clearances are:

1. Adequate airflow to the outdoor coil with minimum recirculation.
2. Service access to the equipment.
3. Compliance with the National Electric Code and other applicable codes.
4. Design temperature - Design temperatures greater than 105F require additional consideration.

I. In order to assure that adequate airflow reaches the XL16i condensing unit, size free air passages at 300 feet per minute velocity (FPM). See condensing unit airflow performance on page 16 of this document; or, for the most current information, consult the unit's product data manual.

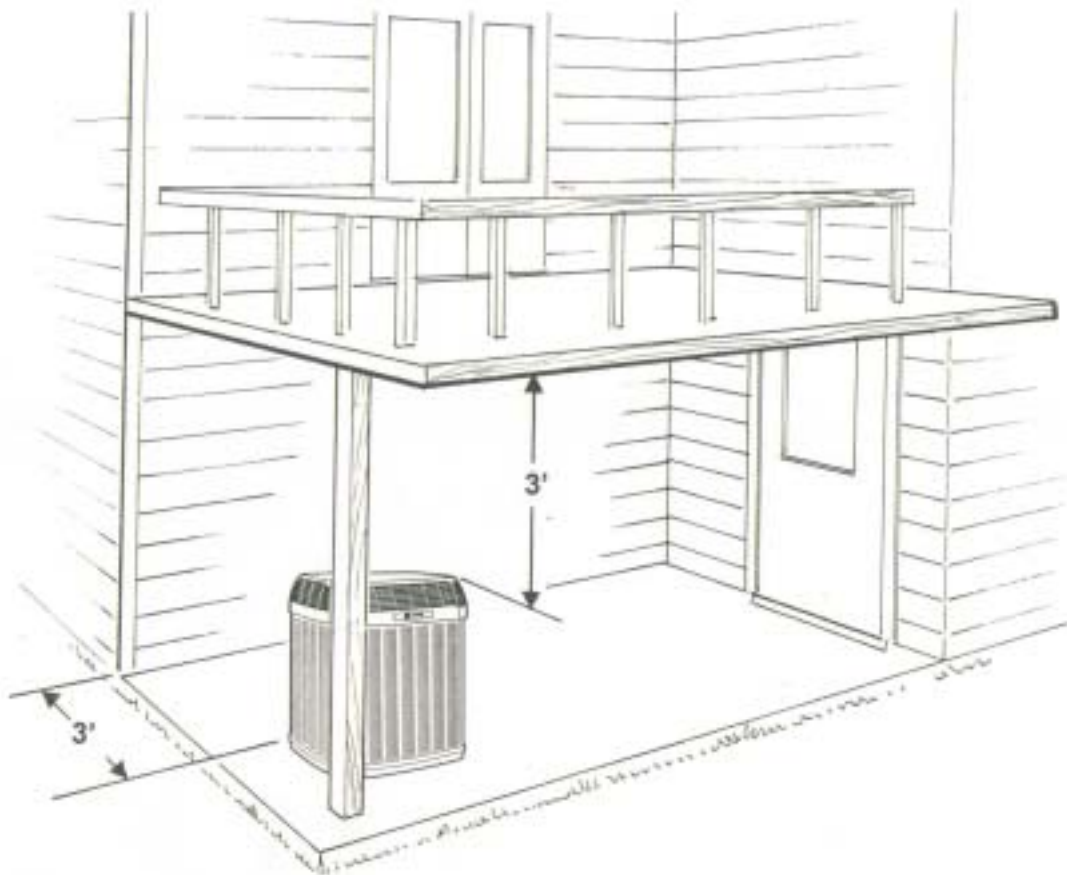
II. The importance of providing proper service access to equipment cannot be overemphasized. The HVAC service technician's job may be performed with greater ease if adequate service space is allowed.

III. Knowledge of the National Electric Code and other applicable codes for the job sight location is a necessity in order to satisfy local inspectors. These codes are in place for service as well as safety.

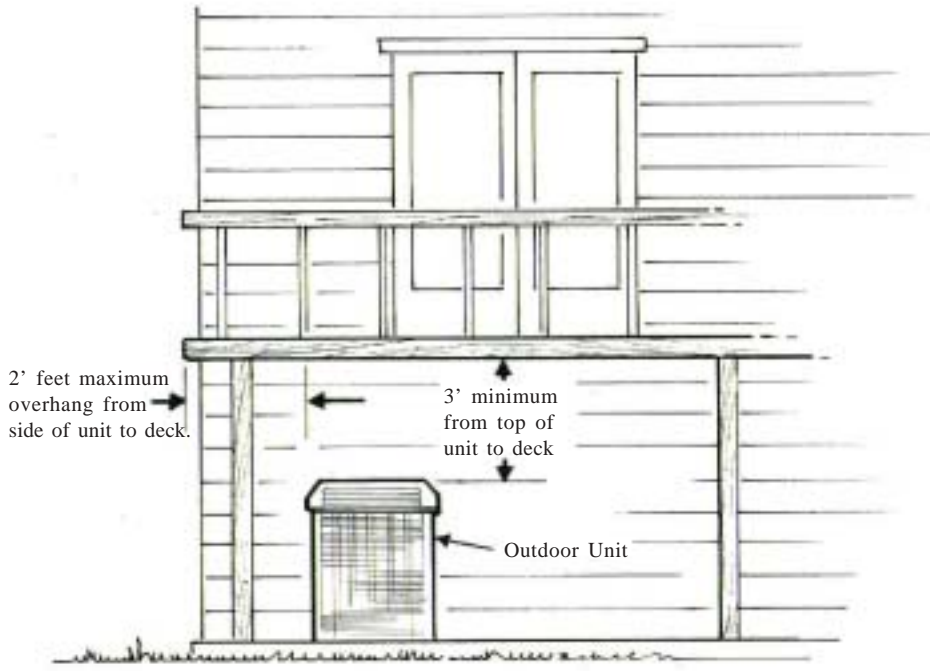
IV. Be sure to read all provisions and footnotes contained in this document. When ambient temperatures exceed 105F, more space may be required for minimum operating clearances.

A. Installation of single XL16i unit under a deck.

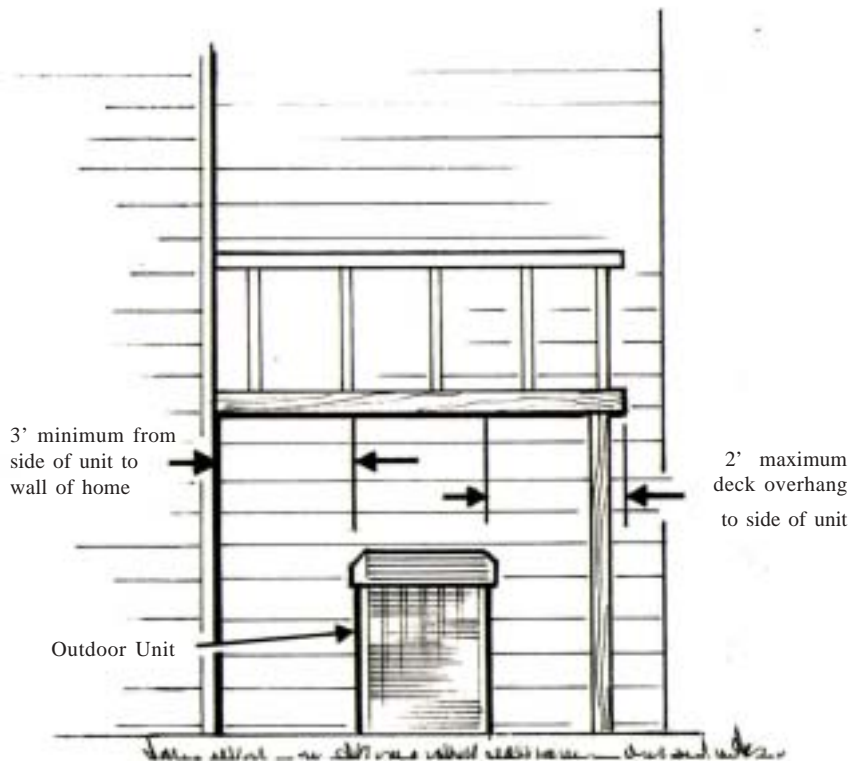
1. Single XL16i units may be installed under a deck providing the following criteria is met:
 - a) 3 feet minimum top clearance is provided.
 - b) 3 feet away from obstructions such as a wall, or shrubbery on two sides.
 - c) The other two sides left unobstructed.
 - d) Decking material overhanging the unit not to exceed two feet on two sides.
 - e) Servicability - Adequate space provided for annual service and maintenance. National Electric Code (NEC) requires minimum 3 feet service clearance for personnel safety. This distance may be increased under certain conditions. Please refer to the most current edition of the National Electric Code for more information. Page 15 of this document contains some NEC information.
 - f) Condensing unit shall be set on firm foundation independent from building structure, not directly on ground surface. (Photo below for illustration purposes only)
 - g) Consult with local building department to assure the installation will comply with local code before installing the equipment.



Illustrations provided to designate required clearances. Trane recommends mounting the unit on a pad that is independent of the structure. Reference section III.A.1.F on pg 8 of this document.

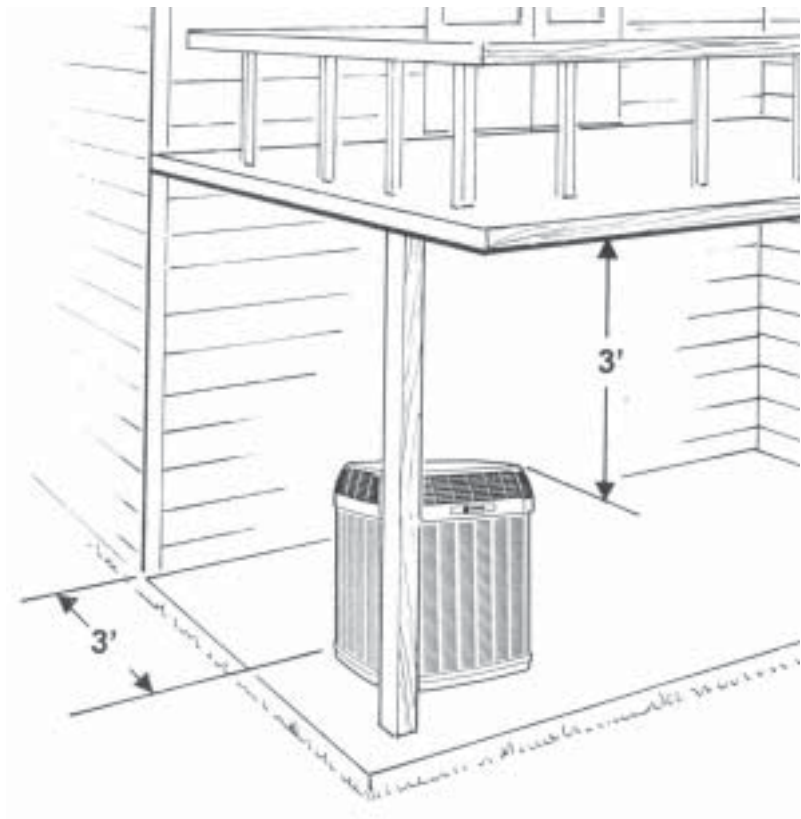
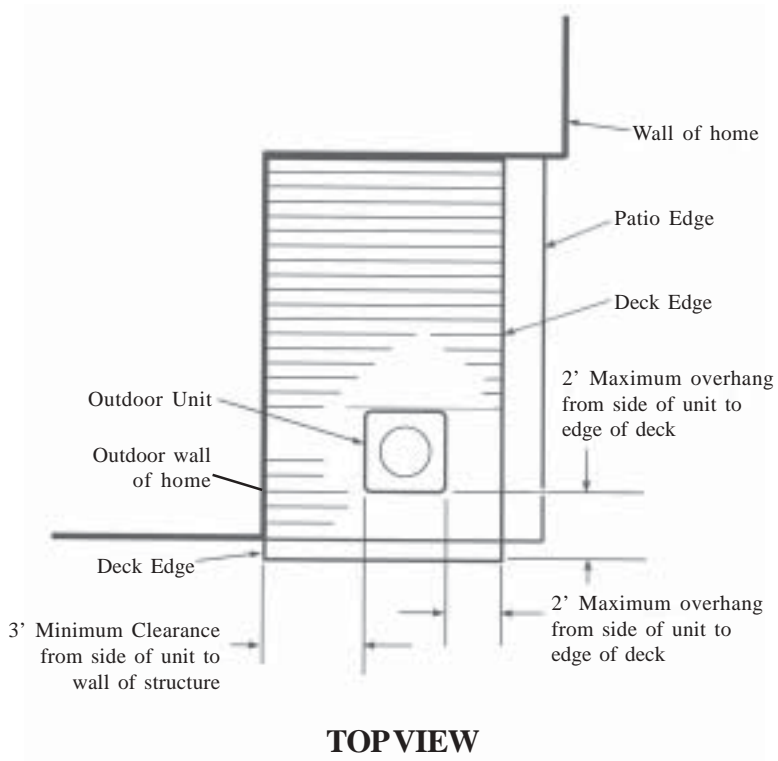


Front View



SIDE VIEW

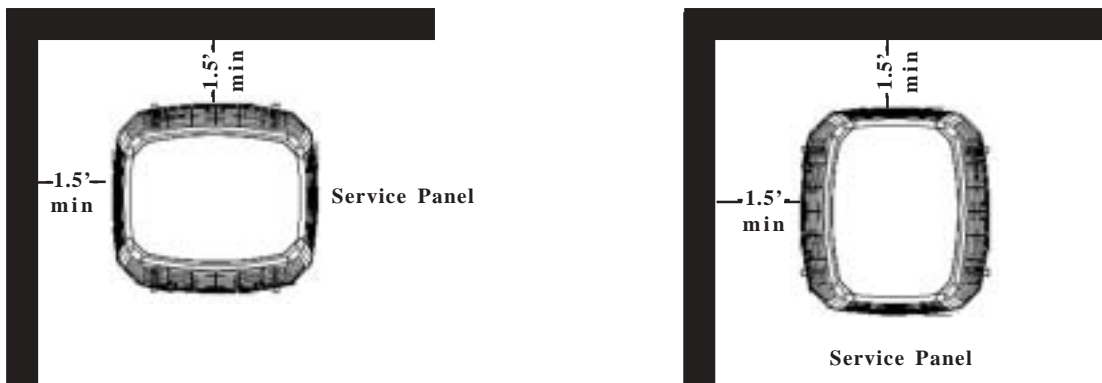
Illustrations provided to designate required clearances



Illustrations provided to designate required clearances. Trane recommends mounting the unit on a pad that is independent of the structure. Reference section III.A.1.F on Pg 8 of this document.

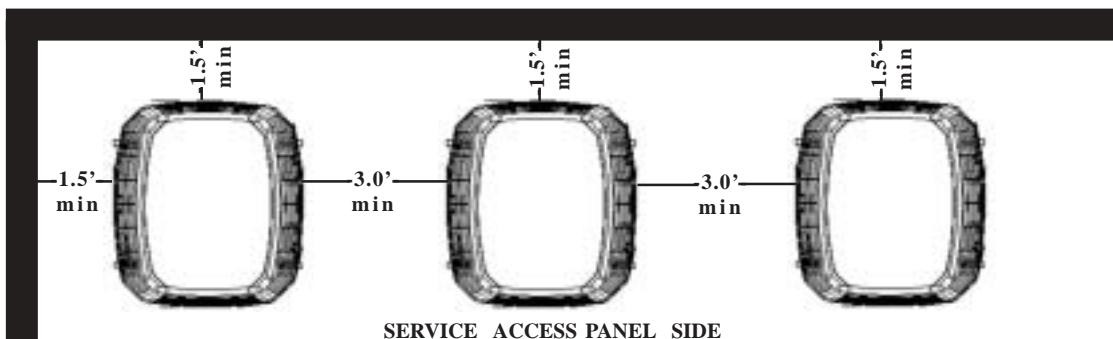
2. Single XL16i condensing unit / heat pump in a corner with unrestricted top clearance

- A) For locations where the design ambient temperature is below 105F:
 - 1) 1.5 feet clearance from both walls.
 - 2) Other two sides left unrestricted
- B) For locations where the design ambient temperature exceeds 105F:
 - 1) 2.0 feet clearance from both walls.
 - 2) Other two sides left unrestricted.
- C) If unit is located in such a way that service panel is facing the wall
 - 1) NEC requires minimum 3 feet between the unit and the wall
 - a) This space may be increased to 3 1/2 feet. Consult the National Electric Code for more information regarding minimum clearances for working spaces.



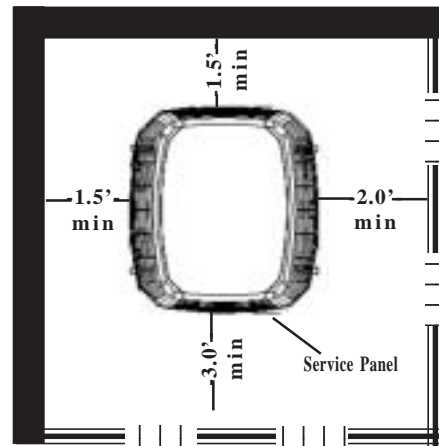
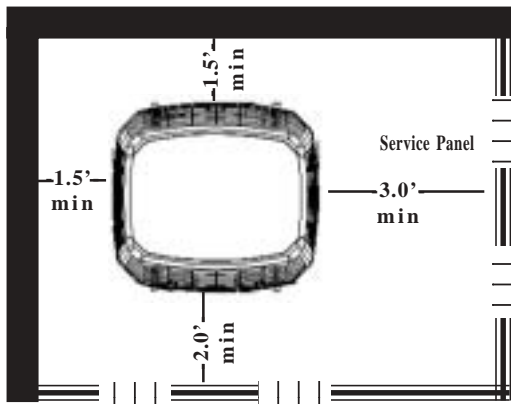
3. Installation of two or more XL16i units where two adjacent walls form a corner.

- A) For locations where the design ambient temperature is below 105F:
 - 1) Corner unit shall have 1.5 feet clearance from both walls.
 - 2) 3.0 feet clearance in between units. (if service panels face each other, this clearance may be increased to 4.0 feet per NEC)
 - 3) 2.0 feet clearance from other side to any obstruction
- B) **For locations where the design ambient temperature exceeds 105F:**
 - 1) 2.0 feet clearance from both walls.
 - 2) 3.0 feet clearance in between units. (if service panels face each other, this clearance may be increased to 4 feet per NEC)
 - 3) 2.0 feet clearance from other side to any obstruction.
- C) If unit's are located in such a way that the service panels are facing the wall
 - 1) NEC requires minimum 3.0 feet between the unit and the wall
 - a) This space may be increased to 3 1/2 feet. Consult the most current edition of the National Electric Code for more information regarding minimum clearances for working spaces.

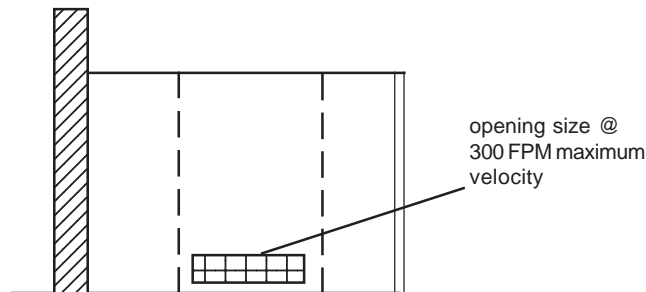


4. Single XL16i condensing unit / heat pump in a fenced corner with unrestricted top clearance

- A) For locations where the design ambient temperature is below 105F:
 - 1) 1.5 feet clearance from both walls.
 - 2) 2.0 feet fence clearance - openings shall be provided to allow free air passage to unit. (Free air passage shall be sized @ 300 FPM Velocity)
 - 3) Service access shall be 3.0 feet minimum
- B) For locations where the design ambient temperature exceeds 105F:
 - 1) 2.0 feet clearance from both walls.
 - 3) 3.0 feet clearance from fence. openings shall be provided to allow free air passage to unit. (Free air passage shall be sized @ 300 FPM Velocity)
 - 2) Service access shall be 3.0 feet minimum.
- C) If unit is located in such a way that service panel is facing the wall
 - 1) NEC requires minimum 3 feet between the unit and the wall
 - a) This space may be increased to 3 1/2 feet. Consult the National Electric Code for more information regarding minimum clearances for working spaces.



* If removable panels are used and acceptable to local inspection agency, the clearance to the removable panel may be reduced to 2.0 feet



Single Unit - Solid Fence

Solid Fence: Fence height not to exceed top of unit. Provide openings in fence that will allow maximum 300 FPM air velocity. These openings shall be located at the lower portion of the fence. If acceptable, the lower portion of the fence may be cut to provide open bottom clearance provided that debris, grass and vegetation will not obstruct air passageway.

5. Installation of two or more XL16i units where two adjacent walls form a fenced corner

A) For locations where the design ambient temperature is below 105F:

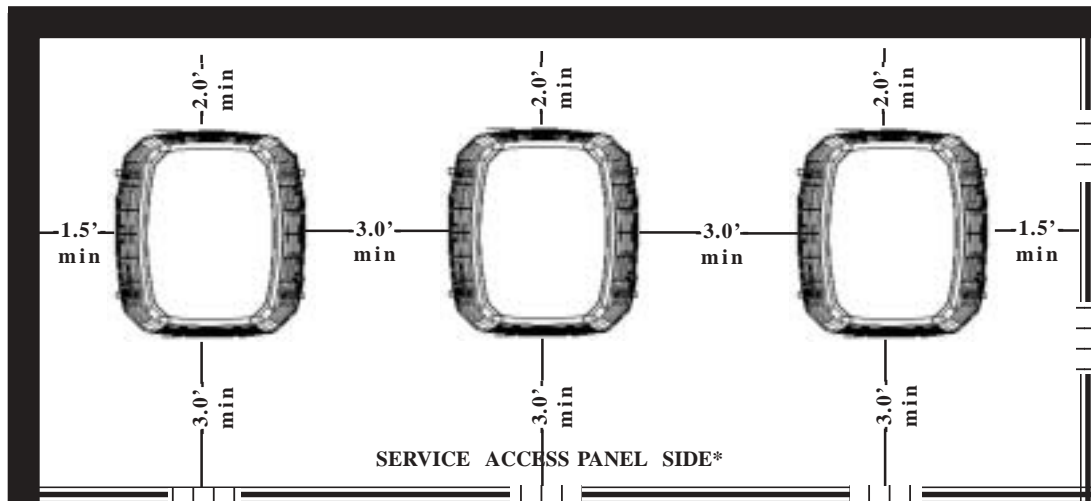
- 1) Corner unit shall have 1.5 feet clearance from one wall and 2.0 feet clearance from the other wall.
- 2) 3.0 feet clearance in between units.
- 3) NEC requires 3 feet clearance for service. This may be reduced to 2.0 feet if removable panels are used.
- 4) Free air passage shall be cut in order to allow maximum 200 FPM air velocity

B) For locations where the design ambient temperature exceeds 105F:

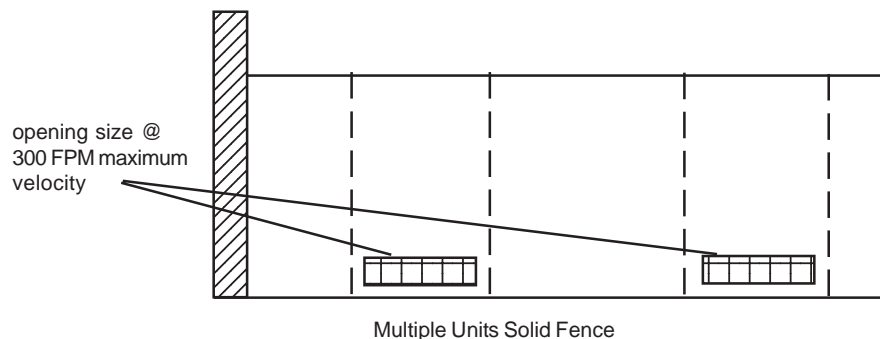
- 1) Corner unit shall have 2.0 feet clearance from one wall and 2.5 feet clearance from the other wall.
- 2) 3.5 feet clearance in between units.
- 3) NEC requires 3 feet clearance for service. This may be reduced to 2.5 feet if removable panels are used.

C) If unit's are located in such a way that the service panels are facing the wall

- 1) NEC requires minimum 3.0 feet between the unit and the wall
 - a) This space may be increased to 3 1/2 feet. Consult the most current edition of the National Electric Code for more information regarding minimum clearances for working spaces.



* If removable panels are used and acceptable to local inspection agency, the clearance to the removable panel may be reduced to 2.0 feet



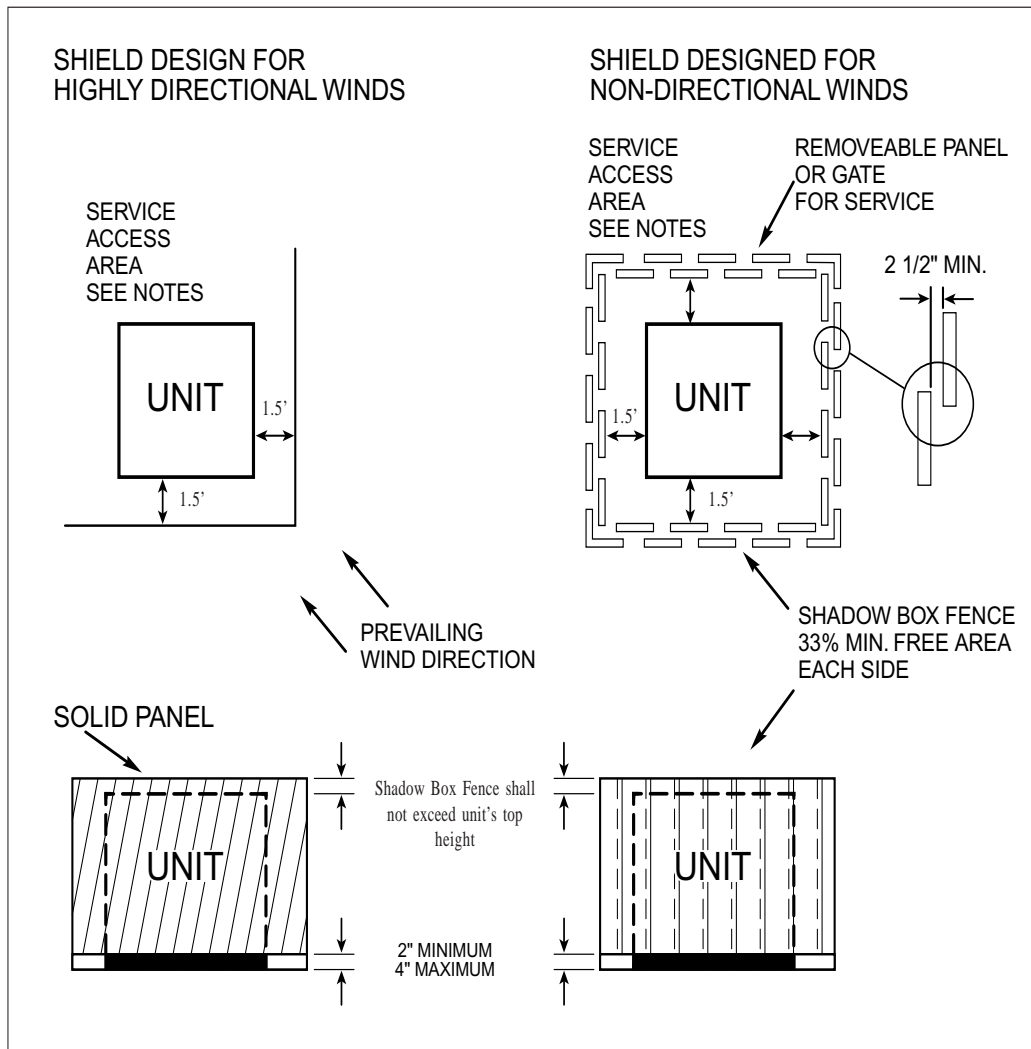
Solid Fence: Fence height not to exceed top of unit. Provide openings in fence that will allow maximum 300 FPM air velocity. These openings shall be located at the lower portion of the fence. If acceptable, the lower portion of the fence may be cut to provide open bottom clearance provided that debris, grass and vegetation will not obstruct air passageway.

D) Fence construction.

- 1) Height shall not exceed the top of the unit.
- 2) Free air passages shall be size at no greater than 300 FPM velocity.
- 3) Free air passages shall be cut at the lower portion of the fence.
- 4) Fence may also be undercut to allow free air passage provided grass, vegetation, or debris will not obstruct the free air passage.
- 5) Shrubbery shall not be planted within one foot of the fence.
- 6) If removable panel is utilized, the distance from the unit's service panel to the removable panel may be reduced to 2.0 feet. (3.0 feet if geographical location's design outdoor dry bulb is greater than 105° F.

E) Windshields:

If low ambient operation to 30F is required, windshields may be required to block prevailing winds from impacting system performance at low outdoor temperatures.



Note:

Minimum working clearance must be in compliance with the National Electric Code. Currently, the minimum clearance between a wood or suitable grounding material type fence requires minimum 3 feet. If other material is used to form the windshield, the minimum space may be increased to 3.5 feet. Please consult the 2002 or current Edition of the National Electric Code, Article 110 for the most up to date information

Electrical Code Information

Compliance with Local, State, and National Codes is a must on every HVAC Installation. This page discusses the criteria regarding minimum working spaces as defined in the 2002 National Electric Code. The main concern is the safety of the HVAC service / maintenance person. Minimum working clearances are specified in the National Electric Code (NEC) Article 110.26

For electrical equipment that from ground to power the voltage is 600 volts or less:

The National Electric Code specifically states that service area around electrical equipment shall provide sufficient access, and shall be properly maintained in order to permit safe operation and maintenance of the equipment. Table 110.26 as well as the figures beside the table describe the minimum clearance for proper service and access to electrical equipment.

Trane residential and light commercial condensing units ranging from 1 to 6 ton require access to the side service panel as indicated on the previous pages to gain access to the electrical controls.

The table and figure below are excerpts from the National Electric Code 2002:

Table 110.26(A)(1) Working Clearances

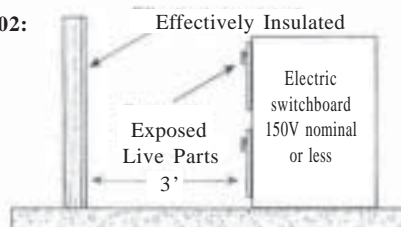
Nominal Voltage to Ground	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0-150	900 mm (3 FT)	900 mm (3 FT)	900 mm (3FT)
151-600	900 mm (3FT)	1 M (3.5FT)	1.2 m (4FT)

Note: Where the conditions are as follows

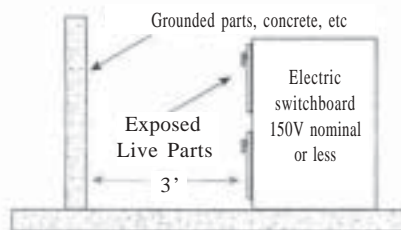
Condition 1 - Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be considered live parts

Condition 2 - Exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls shall be considered as grounded.

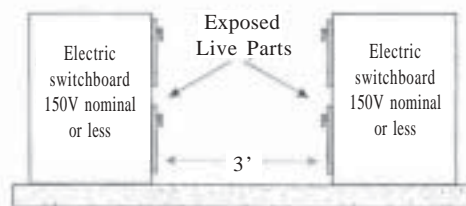
Condition 3 - Exposed live parts on both sides of the work space (not guarded as provided in Condition 1) with the operator between.



Condition 1
(3 ft min. for 151 - 600 V)



Condition 2
(Space would increase to 3 1/2 ft for 151 - 600 V)



Condition 3
(Space would increase to 4 ft for 151 - 600 V)

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XL16i Outdoor Unit Airflow Table			
Cooling Units		Heat Pump Units	
Unit Model Number	CFM	Unit Model Number	CFM
4TTX6024A1000A	2000	4TWX6024A1000A	2700
4TTX6036A1000A	3900	4TWX6036A1000A	3875
4TTX6048A1000A	4500	4TWX6048A1000A	4200
4TTX6060A1000A	4300	4TWX6060A1000A	4400

*Table produced Mar 2004. For the most current information, please refer to specific equipment Product Data.

$$\text{Required Opening} = \text{CFM} / 300 \text{ FPM}$$

Example:

Given:

Qty of 2 units in an area surrounded by a fence on two sides and solid walls on the other two sides. Units are 4TTX6048A100A's -

Required:

Determine free air opening space required in fence -

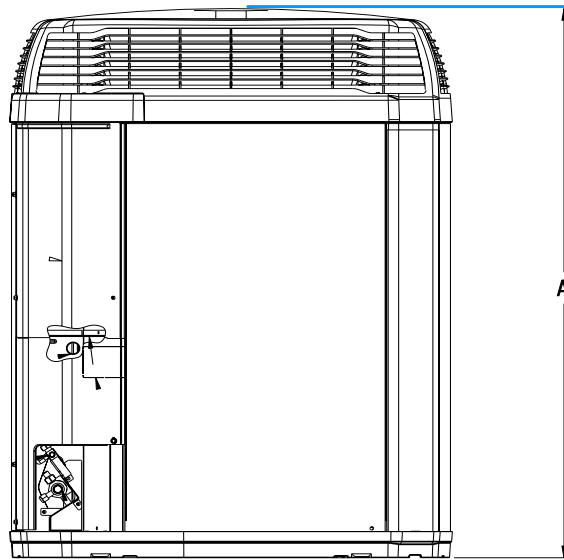
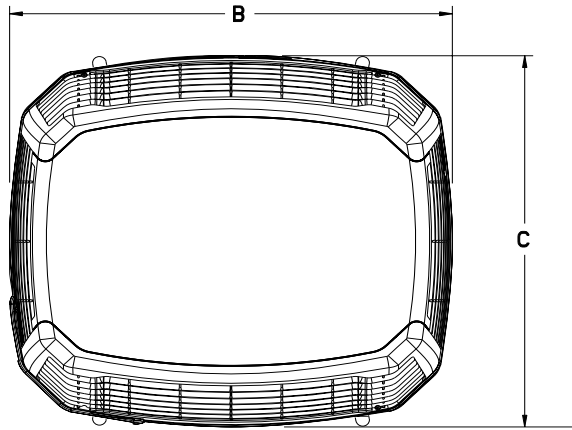
Solution:

4500 CFM X Qty of 2 = 9000 CFM

9000 CFM / 300 FPM = 30.0 square feet

These two systems require 30.0 square feet of free air opening in the 2 fence sections surrounding the units.

XL16i Unit Dimensions



Unit Model	Base Size	A	B	C	Unit Model	Base Size	A	B	C
4TTX6024A1000A	3	1118 (44)	756 (32 5/8)	756 (29 3/4)	4TWX6024A1000A	3	1118 (44)	756 (32 5/8)	756 (29 3/4)
4TTX6036A1000A	4	1064 (41 7/8)	946 (37 1/4)	870 (34 1/4)	4TWX6036A1000A	4	1165 (45 7/8)	946 (37 1/4)	870 (34 1/4)
4TTX6048A1000A	4	1267 (49 7/8)	946 (37 1/4)	870 (34 1/4)	4TWX6048A1000A	4	1267 (49 7/8)	946 (37 1/4)	870 (34 1/4)
4TTX6060A1000A	4	1267 (49 7/8)	946 (37 1/4)	870 (34 1/4)	4TWX6060A1000A	4	1267 (49 7/8)	946 (37 1/4)	870 (34 1/4)

Section IV - Refrigerant Piping

A. Purpose

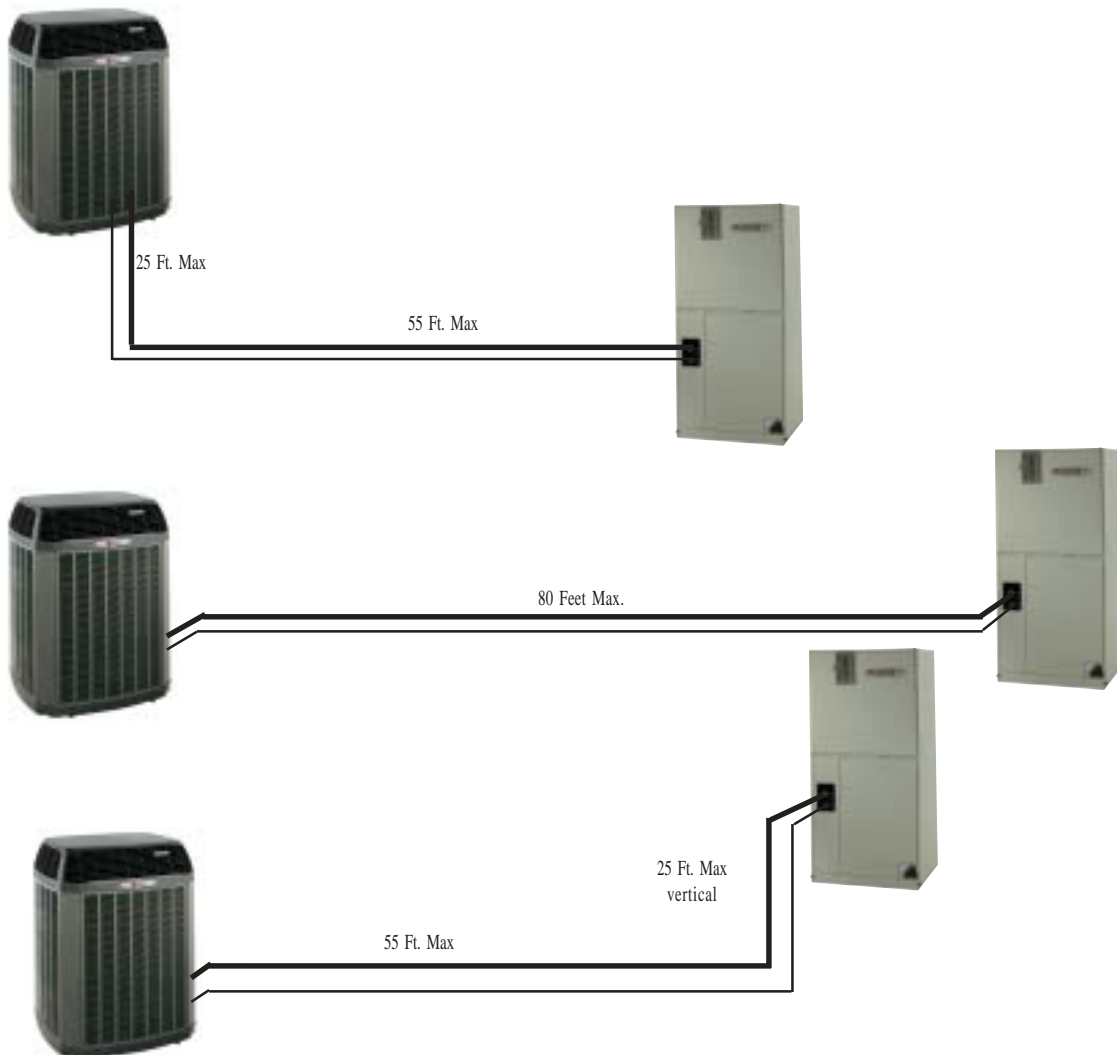
1. Liquid line - The purpose of the liquid refrigerant line is to convey refrigerant, in the liquid state, from the outdoor unit to the indoor unit in the cooling mode and from the indoor unit to the outdoor unit in the heating mode.
2. Gas line - The purpose of the gas line is to convey refrigerant in the gas state and oil from the indoor unit to the outdoor unit in the cooling mode and from the outdoor unit to the indoor unit in the heating mode.

B. Limitations:

1. The XL16i contains a single unloading compressor. Therefore, it is crucial that refrigerant lines are properly sized and do not exceed the length set forth in the unit's installation manual.
2. Line length limits:
 - A. Gas line = 80 feet linear length / of the linear length, 25 feet may be installed vertical.
 - B. Liquid line = 80 feet linear length / of the linear length, 25 feet may be installed vertical.
3. No exceptions shall be allowed to these piping limitations.

C. Explanation:

1. Refrigerant lines shall not exceed 80 feet total line length. / 25 feet of the 80 feet may be vertical. .
2. Liquid subcooling may not be achieved on first stage if the liquid line exceeds 80 feet.
3. Oil return may be sacrificed during first stage operation if the gas line exceeds 80 feet.



NOTES



It's Hard To Stop A Trane.®

Trane
6200 Troup Highway
Tyler, TX 75707
<http://www.trane.com>

Literature Order Number		
File Number	XL16i-APG01-EN	03/04
Supersedes	New	
Stocking Location		

Since Trane has a policy of continuous product improvement, it reserves the right to change design and specifications without notice