Application Guide
Trane Residential Communicating Systems

SSC-APG005-EN

Shutdown Device Wiring Diagrams
Unit Mounting
Minimum Clearances
Refrigerant Piping Limitations

Photo of Trane XL20i outdoor unit with Comfortlink™ II and Charge Assist™
The purpose of this bulletin is to provide application criteria as related to the Trane residential communicating systems with Comfortlink™ II with Charge Assist™ cooling units and heat pumps.

This bulletin discusses:
I. Auxiliary Shutdown Devices
II. Unit Mounting
III. Minimum Operating Clearances
IV. Clearance from Vents
V. Refrigerant Piping Limitations

POSITION STATEMENT:
Trane has always recommended installing Trane approved, matched indoor and outdoor systems. The benefits of installing approved matched systems are maximum efficiency, optimum performance, and best overall system reliability.

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

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

⚠️ CAUTION – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION – Indicates a situation that may result in equipment or property-damage-only accidents.

ISSUED BY:
Product Application Engineering Department
Trane
Tyler, Texas
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### Section I - Auxilliary Shutdown Devices and Methods

#### Low Ambient Cooling Control:

Communicating systems with Comfortlink™ II and Charge Assist™ 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. XL20i systems are approved to 55°F in the cooling mode. XL16i systems are approved to 30°F in the cooling mode. Please refer to figure 30 for windshield information.

#### Other Shutdown Devices:

Table 1 list devices that may be utilized as required by the specific application, local utility or local building departments..

#### Emergency System Shutdown

High voltage must be broken to the indoor unit in order to shut down the system to accomplish immediate blower shutdown.

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#### Table 1

<table>
<thead>
<tr>
<th>OD Unit</th>
<th>Indoor Unit Type</th>
<th>System Type</th>
<th>Application</th>
<th>Low Ambient</th>
<th>Load Shedding</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55°F</td>
<td>30°F</td>
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<tr>
<td>XL16i</td>
<td>C ommunicating furnace</td>
<td>Heat pump</td>
<td>As shipped</td>
<td>Not Approved</td>
<td>XS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cooling unit</td>
<td>As shipped</td>
<td>X</td>
<td>X</td>
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<tr>
<td></td>
<td>C ommunicating air handling unit</td>
<td>Heat pump</td>
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<td></td>
<td>Cooling unit</td>
<td>As shipped</td>
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<td>X</td>
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<tr>
<td></td>
<td>C ommunicating air handling unit</td>
<td>Heat pump</td>
<td>As shipped</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Cooling unit</td>
<td>As shipped</td>
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<tr>
<td></td>
<td>C ommunicating air handling unit</td>
<td>Heat pump</td>
<td>As shipped</td>
<td>Not approved</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cooling unit</td>
<td>As shipped</td>
<td>Not approved</td>
<td>X</td>
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#### Table 2

<table>
<thead>
<tr>
<th>Unit Model</th>
<th>Additional Accessory Requirements</th>
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<tr>
<td></td>
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</tr>
<tr>
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<td>X</td>
</tr>
<tr>
<td>4 T T X 6 0 2 4 C</td>
<td>X</td>
</tr>
<tr>
<td>4 T W X 6 0 3 6 C</td>
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<tr>
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<td>4 T T X 6 0 4 8 C</td>
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<tr>
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<td>X</td>
</tr>
<tr>
<td>4 T T X 6 0 6 0 C</td>
<td>X</td>
</tr>
</tbody>
</table>
Figure #1 indicates where the control is placed in the low voltage circuitry; however, the EDC control is mounted in the indoor unit’s coil and two wires must be ran from the indoor unit to the outdoor unit.

Note: The installation manual accompanying the AY28X079 only addresses standard 24 volt systems.

Figure #1

Field installed wiring from indoor unit!

24 volt common wires must be relocated from MS coil to the EDC as shown in this diagram.

Figure #2

Remove the three low voltage blue wires from the MS contactor and connect them to one side of the EDC contacts. Connect the other side of the EDC contacts to the MS contactor as shown in Figure 1.

HOW IT WORKS

The evaporator defrost control will allow the system to be operated below the minimum temperature of 55°F as indicated in the product data manual. This control will cycle the compressor and the outdoor fan off when the coil fin temperature falls below 25°F and will cycle them on when the coil fin temperature reaches 60°F. Communication failures should not result from breaking the common circuitry in the above manner.

⚠️ WARNING

Hazardous Voltage!
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.
24 Volt Harness

- Red
- Yellow
- Green
- White
- Blue

EDC

24 Volt Thermostat

R
Y1
Y2
O
B

(Y1) (not used)
(T) (not used)

*Reference 18-HH16D1-5 or latest version for low voltage harness installation to the condensing unit.

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XL16i Heat Pump Systems with AY28X084 Evaporator Defrost Control

Diagram shows only the affected common low voltage circuitry

The heat pump unit must be converted to 24 volt operation by installing the BAYACHP024A harness. **Three stage communicating furnaces may not be converted to 24 volt standard.** Therefore, if low ambient control is required for hybrid systems, an XC80 or 24 volt variable speed furnace must be utilized. Check [www.ahrinet.org](http://www.ahrinet.org) for system ratings prior to specifying or installing system.

**HOW IT WORKS**

The evaporator defrost control will allow the system to be operated below the minimum temperature of 55°F as indicated in the product data manual. This control will cycle the compressor and the outdoor fan off when the coil fin temperature falls below 25°F and will cycle them on when the coil fin temperature reaches 60°F. During defrost, the EDR coil is energized and the EDR-1 contacts are closed, thus bypassing the EDC switch. This will avoid the potential of the system shutting down during the defrost cycle.

*Reference 18-HH16D1-6 or latest version for low voltage harness installation to the condensing unit.

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See user interface 24 VAC mode setup menu for 1st stage airflow percentage options.
2 step (XL16i) = 65% - 80%
XL16i ComSys HP Unit / 24V AH Unit / BAYACHP024A / AY28X084 Evap. Defrost Control

Red
Yellow / Red
Yellow
Blue
Orange

Red
Yellow / Red
Yellow
Blue
Orange

XL16i ComSys HP Unit / 24V Gas Furnace / BAYACHP024A / AY28X084 Evap. Defrost Control

Red
Yellow / Red
Yellow
Blue
Orange

Red
Yellow / Red
Yellow
Blue
Orange

Figure #6

24 Volt Harness*

Figure #7

24 Volt Harness*

*Reference 18-HH16D1-6 or latest version for low voltage harness installation to the condensing unit.

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XL16i Typical wiring if load shedding is required as specified in Table 1.

Stage One and Stage Two Load Shedding
Diagram shows only the affected common low voltage circuitry

**Figure #8**

- **Field installed wiring**
- **Blue from Transformer**
- **Blue / White**
- **Blue**

24 volt common wires must be relocated from MS coil to the Load Shed relay contacts as shown in this diagram.

**Figure #9**

- **MS-L0**

**HOW IT WORKS**
The purpose of any load shedding device is to off load the local utility grid when demand exceeds power capability or a predetermined load by the local utility has been exceeded. This control will cycle both compressors and the outdoor fan off whenever the load shedding device energizes. Communication failures should not result from breaking the common circuitry in the above manner.

**WARNING**
Hazardous Voltage!
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

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Pg. 8
XL20i Typical wiring if load shedding is required as specified in Table 1.

Stage One and Stage Two Load Shedding
Diagram shows only the affected common low voltage circuitry

**How it Works**
The purpose of any load shedding device is to off load the local utility grid when demand exceeds power capability or a predetermined load by the local utility has been exceeded. This control will cycle both compressors and the outdoor fan off whenever the load shedding device energizes. Communication failures should not result from breaking the common circuitry in the above manner.

**Warning**
Hazardous Voltage!
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.
XL20i Typical wiring if partial load shedding is required as specified in Table 1.

Stage Two Load Shedding

Diagram shows only the affected common low voltage circuitry

Figure #12

24 volt common wires must be relocated from MS-Hi coil to the MS-LO relay coil shown in this diagram.

Figure #13

Remove the two wire spade connection and connect it to one side of the load shed relay contacts and connect the other side of the contacts to the MS-HI contactor coil as shown in figure 12.

HOW IT WORKS

The purpose of any load shedding device is to off load the local utility grid when demand exceeds power capability or a predetermined load by the local utility has been exceeded. This control will cycle the high speed compressor off whenever the load shedding device energizes. The indoor blower will run independently and may ramp to high speed. The homeowner must be made aware that higher than normal humidity could result during load shedding periods if this scheme is used. Communication failures should not result from breaking the common circuitry in the above manner.

WARNING

Hazardous Voltage!
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.
Delayed System Shut Down

The engineer, system designer, or local code may require alternative devices designed to shut the system down. Trane recognizes this potential, therefore, this page discusses how delayed system shutdown may be accomplished in applications where immediate shutdown is not required. There are a number of shutdown devices available, an example of this may be a float switch, provided a delayed shutdown is approved by the system designer.

A communicating system may be shut down by breaking the 24 volt hot wire to the comfort control.

*How it works:*

When “R” to the comfort control is broken, the system will develop a communication fault and the comfort control screen will become blank. The user interface displays SYSTEM COM ERROR in the alert history. Also, the Fault LED on the indoor and outdoor controls will show a communication fault. The outdoor unit will shut down within one minute after 24 volts is broken to the comfort control and the indoor unit will shut down after a period of three minutes. After 24 volt power is restored to the comfort control, the system will recover to the original set point pending expiration of any compressor delay. If the system has a TAM installed, the owner may experience nuisance calls unless the feature is deactivated.

**Communicating Comfort Control / Communicating AHU or Furnace / Communicating Outdoor**

![Diagram](image)

- **Black** - Data
- **Red** - 24 VAC Hot
- **Blue** - 24 VAC Common

If the system is using a non communicating 24 volt furnace, a field converted outdoor unit to 24 volt, and a 24 volt comfort control, the 24 volt hot circuit (R) may be broken. The system may experience blower off delays, however, the outdoor unit will shut down immediately.

**System Zoning**

In order to use any zone damper control strategy, the system must be converted to 24 volt. The Trane Integrated Zone System may be installed per the installation instructions. As with any zone system, care must be taken to size the ductwork correctly and the appropriate relief / bypass strategy be applied. Please reference Trane Publication APP-APB004-EN for general zoning application guidelines. A condensing communicating furnace cannot be installed with a zone damper control system.

**Home Automation Control Systems**

<table>
<thead>
<tr>
<th>Controller</th>
<th>Sensors</th>
<th>Optical Coupler</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZASSMAL010 / 12</td>
<td>ZUSTATALS51 / 52</td>
<td>ZUSTATALS51</td>
</tr>
<tr>
<td>ZSCNTRAL010 / 12</td>
<td>ZUSTATALS51 / 52</td>
<td></td>
</tr>
</tbody>
</table>

The system must be converted to 24 volt. In addition, Trane recommends using the Trane Integrated Zone System optically isolated from the home automation system. In lieu of the zone system, the system controller and a programmable or non-programmable sensor may be used to communicate with a home automation system. An XC95 condensing communicating furnace may not be installed with a home automation system.

*The home automation contractor should contact the controls vendor regarding system compatibility, hardware, and additional programming instructions.*

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Section II- Unit Mounting:
This section describes appropriate methods for mounting and securing the XLI. However, if these units are to be mounted in a region where high winds are an issue, please refer to the appropriate Trane BAYECMT*** extreme conditions mounting kit. In regions where seismic restraint is a requirement, a local PE’s approval may be required for the restraining method.

A. For mounting or securing the Trane condensing units and heat pumps please observe the following:
1. If the unit is to be supported from the edge, the supporting material must extend two inches minimum under the perimeter of the unit’s base.
2. The mounting hole locations are molded in the basepan, however, must be drilled through.
   a) Hole locations are identified in figure 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 size 3 and 4 pans have four mounting holes - see figure 23
6. For hurricane or high wind applications, the bolt hardness and diameter is specified in the BAYECMT*** installation guide.
   a) Bolt length is determined by the local code authority and / or local PE.
   b) Mounting surface composition and weight shall be determined by local code authority and / or local PE.
   c) For non-ground installations, refer to a local PE.
   d) Refer to the BAYECMT*** installation manual.

![Figure #15](image-url)

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 2” minimum under the base. Trane recommends supporting the middle of the base pan with a cross member.
Section III - Minimum Operating Clearances:
This section discusses installing the XLI condensing unit / heat pump in applications that exceed the intent installation manual. The intent of this section is to demonstrate how to make provisions for a conducive environment that will lead to effective cooling and heating operation without system failure due to restricted outdoor unit clearances.

A. 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 surrounding ground area where the units are positioned to prohibit debris from collecting on the panels, thus further providing un-obstructed airflow to the condensing unit.
   4. State, Local Codes, and National Codes shall prevail. Check with the local jurisdiction before installation to assure compliance.

B. Numerous projects require minimum 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.

C. The prime considerations involved in establishing minimum clearances are:
   1. Adequate airflow to the outdoor coil with minimum recirculation.
      a) In order to assure that adequate airflow reaches the XLI condensing unit, size free air passages at 300 Feet Per Minute velocity. See Condensing unit airflow performance in table 3 of this document.
   2. Service access to the equipment.
      b) 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.
   3. Compliance with the National Electric Code and other applicable codes.
      c) Knowledge of the National Electric Code and other applicable codes for the job sight location is a necessity in order to comply with local codes. These codes are in place for service as well as service personnel safety.
   4. Design temperature - Design temperatures greater than 105°F require special consideration.
      d) Be sure to read all provisions and footnotes contained in this document. When ambient temperatures exceed 105°F, more space may be required for minimum operating clearances.
A. Installation of single XLi unit under a deck.

1. Single XLi 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 24 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. (Figure’s 17 - 21 are for illustration purposes only)
   g) Consult with local building department to assure the installation will comply with local code
      before installing the equipment.

Figure #17

Illustrations provided to designate required clearances. Trane recommends mounting the unit on a pad or approved
mounting surface that is independent of the structure.
Illustrations provided to designate required clearances. Trane recommends mounting the unit on a pad or approved mounting surface that is independent of the structure.

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Illustrations provided to designate required clearances. Trane recommends mounting the unit on a pad or approved mounting surface that is independent of the structure.
2. **Single XLi condensing unit / heat pump in a corner with unrestricted top clearance**
   
   A) For locations where the design ambient temperature is below 105°F:
   1) 1.5 feet clearance from both walls.
   2) Other two sides left unrestricted
   
   B) For locations where the design ambient temperature exceeds 105°F:
   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.

   ![Figure #22](image1)
   ![Figure #23](image2)

3. **Installation of two or more XLi units where two adjacent walls form a corner.**
   
   A) For locations where the design ambient temperature is below 105°F:
   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 105°F:**
   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 National Electric Code for more
         information regarding minimum clearances for working spaces.

   ![Figure #24](image3)
4. **Single XLI condensing unit / heat pump in a fenced corner with unrestricted top clearance**
   
   A) For locations where the design ambient temperature is below 105°F:
   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 105°F:
   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.

   ![Figure #25](image1)
   ![Figure #26](image2)
   * If removable panels are used and acceptable to local inspection agency, the clearance to the removable panel may be reduced to 2.0 feet

   ![Figure #27](image3)

   **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 XLi units where two adjacent walls form a fenced corner

A) For locations where the design ambient temperature is below 105°F:
   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 300 FPM air velocity

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

\[\text{Figure #28}\]

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

\[\text{Figure #29}\]

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

Figure #30

NOTES:
National Electrical Code requires minimum three feet clearance from the service panel. Some local building departments will allow a removeable panel in front of the unit service access area. Otherwise the distance between the windshield and the unit’s service access is required to be a minimum of three feet. Reference page 24 of this document for National Electric Code information.
The example installations below require replacing the XLI Weatherguard™ Top with the appropriate BAYVDTA*** vertical air discharge accessory kit from Trane.

F. Installation of a single condensing unit / heat pump with one side facing wall, fence, or other obstruction with free air space on top using the BAYVDTA*** vertical air discharge kit.

1) For locations where the ASHRAE design ambient temperature is below 110°F:
   a) 6.0 inches clearance on 1 side. Three feet minimum clearance required from other three sides from any obstructions.
   b) Service access side requires 3 feet minimum clearance. Consult Local, State, and National Electric Codes for minimum service clearance.

2) For locations where the ASHRAE design ambient temperature exceeds 110°F:
   Do not restrict any one side less than 1.0 feet. Refer to the unit’s installation manual or the minimum clearance section of this document for more information regarding unit clearances.

G. Installation of a multiple condensing units / heat pump units with one side facing wall, fence, or other obstruction with free air space on top using the BAYVDTA*** vertical air discharge kit.

1) For locations where the ASHRAE design ambient temperature is below 110°F:
   a) 6.0 inches clearance on 1 side. Three feet minimum clearance required from other three sides from any obstructions.
   b) Service access side requires 3 feet minimum clearance. Consult Local, State, and National Electric Codes for minimum service clearance.

2) For locations where the ASHRAE design ambient temperature exceeds 110°F:
   Do not restrict any one side less than 1.0 feet. Refer to the unit’s installation manual or the minimum clearance section of this document for more information regarding unit clearances.
Section IV - Minimum Clearances From Vents:
This section deals specifically with installations in which a dryer vent, kitchen exhaust vent, or furnace vent is located near the condensing unit / heat pump unit.

A. Condensing units and heat pumps shall be located not less than five feet from clothes dryer vents.
   1. Do not locate the condensing unit / heat pump unit directly below a clothes dryer vent.

B. Condensing units and heat pumps units shall be located not less than three from any kitchen exhaust vent.
   1. Do not locate the condensing directly under a kitchen exhaust vent.

C. Condensing units and heat pump unit shall be located not less than three feet vertically from any natural gas appliance vent outlet or inlet in which the condensing unit / heat pump unit is within a 10 feet diameter of the appliance vent termination.

D. Code Compliance:
   1. Local, State and National codes shall be adhered to for all installations.

E. Manufacturers Instructions:
   1. Always consult the manufacturers instructional manuals. These manuals contain information specific to the device or appliance being installed.

F. Vents other than discussed in this document:
   1. The intent of this document is not to discuss every possible venting device nor all types of gasses, vapors, and spaces that are mechanically vented or naturally vented by draft. Please consult local, state and national codes. In the absence of codes, or if the installer is unfamiliar with local, state and national codes, a professional engineer or local building department should be utilized as a resource.
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 2005 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(A)(1) 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 2005:

<table>
<thead>
<tr>
<th>Nominal Voltage to Ground</th>
<th>Working Clearances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum Clear Distance</td>
</tr>
<tr>
<td>0-150</td>
<td>900 mm (3 FT)</td>
</tr>
<tr>
<td>151-600</td>
<td>900 mm (3FT)</td>
</tr>
</tbody>
</table>

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.

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**TABLE #4**

**ComSys Outdoor Unit Airflow Table**

<table>
<thead>
<tr>
<th>Cooling Units</th>
<th>Heat Pump Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit Model Number</strong></td>
<td>CFM</td>
</tr>
<tr>
<td>4TTZ0024A1000A</td>
<td>3390</td>
</tr>
<tr>
<td>4TTZ0036A1000A</td>
<td>4450</td>
</tr>
<tr>
<td>4TTZ0048A1000A</td>
<td>4300</td>
</tr>
<tr>
<td>4TTZ0060A1000A</td>
<td>4630</td>
</tr>
<tr>
<td>4TTX6024C1000A</td>
<td>2300</td>
</tr>
<tr>
<td>4TTX6036C1000A</td>
<td>4225</td>
</tr>
<tr>
<td>4TTX6048C1000A</td>
<td>4600</td>
</tr>
<tr>
<td>4TTX6060C1000A</td>
<td>4400</td>
</tr>
</tbody>
</table>

*Table produced November 2008.

**Required Opening = CFM / 300 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 4TTX6036C100A's -

**Required:**
- Determine free air opening space required in fence -

**Solution:**
- 4225CFM X Qty of 2 = 8450 CFM
- 8450 CFM / 300 FPM = 28.16 square feet
- 28.2 square feet of free air opening in the 2 fence sections surrounding the units is required.
**XLi Unit Dimensions**

*Figure #35*

<table>
<thead>
<tr>
<th>Unit Model</th>
<th>Base</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Unit Model</th>
<th>Base Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>4TTZ0024C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
<td>4TWZ0024C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
</tr>
<tr>
<td>4TTZ0036C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
<td>4TWZ0036C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
</tr>
<tr>
<td>4TTZ0048C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
<td>4TWZ0048C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
</tr>
<tr>
<td>4TTZ0060C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
<td>4TWZ0060C1000A</td>
<td>4</td>
<td>53 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
</tr>
<tr>
<td>4TTX6024C1000A</td>
<td>3</td>
<td>44&quot;</td>
<td>32 5/8&quot;</td>
<td>29 3/4&quot;</td>
<td>4TWX6024C1000A</td>
<td>3</td>
<td>44&quot;</td>
<td>32 5/8&quot;</td>
<td>29 3/4&quot;</td>
</tr>
<tr>
<td>4TTX6036C1000A</td>
<td>4</td>
<td>41 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
<td>4TWX6036C1000A</td>
<td>4</td>
<td>45 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
</tr>
<tr>
<td>4TTX6048C1000A</td>
<td>4</td>
<td>49 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
<td>4TWX6048C1000A</td>
<td>4</td>
<td>49 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
</tr>
<tr>
<td>4TTX6060C1000A</td>
<td>4</td>
<td>49 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
<td>4TWX6060C1000A</td>
<td>4</td>
<td>49 7/8&quot;</td>
<td>37 1/4&quot;</td>
<td>34 1/4&quot;</td>
</tr>
</tbody>
</table>
Section V - Refrigerant Piping

The XL20i contains two compressors that share the same refrigeration circuit, however, do not operate simultaneously. Therefore, it is crucial that refrigerant lines be properly sized and do not exceed the length set forth in this guide. The XL16i has a single unloading scroll compressor.

A. Purpose

1. Liquid line - The purpose of the this 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. Vapor line - The purpose of this line is to convey refrigerant in the vapor 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. Please note it is recommended to use the service valve connection size tubing.

B. Limitations:

1. Line length limits as shipped:
   A. Vapor 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.
2. No exceptions shall be allowed to these piping limitations for the XL20i.
3. Contact the local Trane representative to determine if an exception is allowed for XL16i applications.

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 second stage if the liquid line exceeds 80 feet.
3. Oil return may be sacrificed during first stage operation if the vapor line exceeds 80 feet.

Typical Piping Illustrations

Figure #36

Figure #37

Figure #38
Section V - Refrigerant Piping Continued

D. Variations

1. Rated line diameters, service valve connection sizes and line variances are listed in Table 6. Please note length limitations if listed.

<table>
<thead>
<tr>
<th>Unit Model</th>
<th>Rated Vapor Line OD</th>
<th>Vapor Service Valve OD</th>
<th>Minimum Alternative Vapor Line OD</th>
<th>Maximum Alternative Vapor Line OD</th>
<th>Rated Liquid Line OD</th>
<th>Liquid Service Valve OD</th>
<th>Minimum Alternative Liquid Line OD</th>
<th>Maximum Alternative Liquid Line OD</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL16i</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4TTX6024C</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>3/4&quot;</td>
<td>5/16&quot;</td>
<td>5/16&quot;</td>
<td>3/8&quot;</td>
<td></td>
</tr>
<tr>
<td>4TTX6060C</td>
<td>7/8&quot;</td>
<td>7/8&quot;</td>
<td>3/4&quot;</td>
<td>7/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td></td>
</tr>
<tr>
<td>4TWX6024C</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>3/4&quot;</td>
<td>5/16&quot;</td>
<td>5/16&quot;</td>
<td>3/8&quot;</td>
<td></td>
</tr>
<tr>
<td>4TWX6036C</td>
<td>3/4&quot;</td>
<td>3/4&quot;</td>
<td>5/8&quot;</td>
<td>7/8&quot;</td>
<td>3/8&quot;</td>
<td>5/16&quot;</td>
<td>3/8&quot;</td>
<td></td>
</tr>
<tr>
<td>4TWX6048C</td>
<td>7/8&quot;</td>
<td>7/8&quot;</td>
<td>3/4&quot;</td>
<td>7/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td></td>
</tr>
<tr>
<td>4TWX6060C</td>
<td>7/8&quot;</td>
<td>7/8&quot;</td>
<td>3/4&quot;</td>
<td>7/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td></td>
</tr>
<tr>
<td>XL20i</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4TWZ0024A</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>5/8&quot;</td>
<td>3/4&quot; - 50 feet max length</td>
<td>3/8&quot;</td>
<td>5/16&quot;</td>
<td>3/8&quot;</td>
<td></td>
</tr>
</tbody>
</table>

E. Pressure drops:

1. Vapor line pressure drop shall not exceed 10 PSI.
2. Liquid line pressure drop shall not exceed 50 PSI.
3. Pressure drop calculation information on the following page.
### Table 7 Liquid Line Selection Chart

<table>
<thead>
<tr>
<th>Rated BTUH</th>
<th>Tube OD</th>
<th>R410A Liquid Line Pressure Drop (PSI) For Total Equivalent Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>20 Feet</td>
</tr>
<tr>
<td>24000</td>
<td>1/4&quot;</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>5/16&quot;</td>
<td>1.0</td>
</tr>
<tr>
<td>36000</td>
<td>3/8&quot;</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>1/2&quot;</td>
<td>2.0</td>
</tr>
<tr>
<td>48000</td>
<td>3/4&quot;</td>
<td>3.4</td>
</tr>
<tr>
<td>60000</td>
<td>7/8&quot;</td>
<td>5.1</td>
</tr>
</tbody>
</table>

* Maximum Linear Length of tubing allowed.

**F. Liquid Line Selection:**

Refer to Table 6 for approved liquid line diameters.

Determine Total Equivalent Length

<table>
<thead>
<tr>
<th>Number of Elbows</th>
<th>Multiplier from Table 8</th>
<th>Total Lineal Length</th>
<th>Total Equivalent Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>X</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Determine hydrostatic loss / gain.

<table>
<thead>
<tr>
<th>Length of vertical change in Feet</th>
<th>Pressure Drop per 1 ft vertical</th>
<th>Hydrostatic loss / gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X 0.43</td>
<td></td>
</tr>
</tbody>
</table>

Determine Allowable Pressure Drop

<table>
<thead>
<tr>
<th>System Type</th>
<th>Orientation</th>
<th>Beginning Allowance</th>
<th>Hydrostatic</th>
<th>Allowable Pressure Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Pump</td>
<td></td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td>Below</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td>Above</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Determine if the line is suitable.

<table>
<thead>
<tr>
<th>Allowable Pressure Drop</th>
<th>Pressure drop from Table 7</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The calculated total equivalent length (TEL) will be used to determine the pressure drop.

**EXAMPLE:**

If the system is a heat pump with 36,000 BTUH capacity and the installed liquid line is 50 linear feet of 5/16" with 6 long radius elbows and 15 feet of vertical change:

TEL = 6 X 3.2 = 19.2 + 50

TEL = 69.2

Hydrostatic loss = 15 X 0.43 = 6.45

Allowable Pressure Drop = 50 - 6.45 = 43.55

Actual Pressure Drop

Since 69.2 is close to 70, add 17.3 + 23.1 from table 7 and divide by 2.

(17.3 + 23.1) / 2 = 20.2 PSI drop.

Subtract Actual Pressure drop from Allowable Pressure Drop

43.55 - 20.2 = 23.35

If the difference is less than the allowable pressure drop, the liquid line is acceptable for use.
### Table 9 Vapor Line Pressure Drop

<table>
<thead>
<tr>
<th>Rated BTUH</th>
<th>Tube OD</th>
<th>Pressure Drop per 100 feet</th>
<th>Pressure Drop (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24000</td>
<td>5/8˝</td>
<td>5.4</td>
<td>2.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>3/4˝</td>
<td>2.0</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>36000</td>
<td>5/8˝</td>
<td>11.7</td>
<td>4.68</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11.7</td>
</tr>
<tr>
<td></td>
<td>3/4˝</td>
<td>4.3</td>
<td>1.72</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>7/8˝</td>
<td>1.9</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td>48000</td>
<td>3/4˝</td>
<td>7.4</td>
<td>2.96</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>7/8˝</td>
<td>3.2</td>
<td>1.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.2</td>
</tr>
<tr>
<td>60000</td>
<td>3/4˝</td>
<td>11.5</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11.5</td>
</tr>
<tr>
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<td>4.9</td>
<td>1.96</td>
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<td></td>
<td>2.94</td>
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<td></td>
<td>3.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.9</td>
</tr>
</tbody>
</table>

*Maximum Linear Length of tubing allowed.

**G. Vapor Line Selection:**

1. Refer to table 6 for allowable vapor lines and limitations.
2. After verifying the vapor line is approved, calculate frictional loss associated with the vapor line and fittings by using table 8 and table 9. (fitting eq length + linear length = total eq. length)

   Acceptable frictional loss in an R410A vapor line ranges from 1 PSI to 10 PSI. It is desirable to maintain less than 5 PSI; however, if the proposed system capacity - vapor line capacity loss will satisfy the calculate load calculation, the lines should be ok provided the frictional loss does not exceed the maximum of 10 PSI.

**Example:**

Determine if the vapor line for a 3 ton XL 20i system with 50 linear feet of 5/8˝ tubing and 6 long radius elbows is acceptable.

**Step 1:** Table 6 indicates that 5/8˝ tubing is allowed.

**Step 2:** Determine pressure drop.

   Calculate equivalent length of fittings by multiplying the number of elbows by the equivalent length identified in Table 8.
   
   \[ 6 \times 3.9 = 23.4 \text{ equivalent feet of fittings}. \]

   Next add the calculated value of fittings to the actual linear length to determine total equivalent length.
   
   \[ 23.4 + 50 = 73.4 \text{ eq feet}. \]

   Determine frictional loss in the vapor line by using table 9.

   In this case 73.4 is greater than 70 but less than 80. If the pressure drop @ 80 feet is acceptable, and the system has enough capacity versus the load to handle the capacity loss due to the vapor line, then the vapor line is ok to use.
H: Items of importance

1. Approved matches:
   A) Only combine XL16i and XL20i outdoor units with AHRI rated indoor combinations.
   B) Air handling unit models 4TEE3F31 through 3F65 units utilize a TXV and coil assembly prior to the XL20i design. The valves will not modulate to the XL20i’s first stage capacity and the coil assembly in the approved air handlers and furnace coils have been optimized for the XL20i.

2. Refrigeration Piping
   A) 1 1/8” vapor lines are not approved for XL16i or XL20i condensing units or heat pumps.
   B) For XL20i applications, insulate the liquid line section that runs through an attic.

NOTES:
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