Application Guide

Tube Size and Component Selection

for Systems Comprised of BCHC and BCVC Blower Coils, Paired With R-410A Condensing Units and Heat Pump Units

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

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SS-APG010C-EN

Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in personal injury or death. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. 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, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE: Indicates a situation that could result in equipment or property-damage-only accidents.

Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

WARNING
Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- **Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.**

- **If there is a risk of arc or flash, technicians MUST put on all necessary Personal Protective Equipment (PPE) in accordance with NFPA70E for arc/flash protection PRIOR to servicing the unit.**

Failure to follow recommendations could result in death or serious injury.

⚠ WARNING
R-410A Refrigerant under Higher Pressure than R-22!

The unit described in this manual uses R-410A refrigerant which operates at higher pressures than R-22 refrigerant. Use ONLY R-410A rated service equipment or components with this unit. For specific handling concerns with R-410A, please contact your local Trane representative.

Failure to use R-410A rated service equipment or components could result in equipment or components exploding under R-410A high pressures which could result in death, serious injury, or equipment damage.

Introduction

This application guide provides refrigerant piping guidelines for Trane® split system outdoor unit models ranging in capacity from 1.5 to 10 tons when matched to Trane® indoor models BCHC and BCVC 024 through 090. Use the information presented here to properly select interconnecting piping and refrigerant components for these systems.

These systems are designed and intended for the use of R-410A and POE oil. All components of the system must also be designed and intended for R-410A and POE oil.

This publication also outlines an “envelope” of application that is based on the proximity of the refrigerant components. The guidelines presented pertain specifically to the operating envelope for standard air-conditioning applications that deliver either a constant or variable volume of airflow and that provide no more than 45 percent ventilation (outdoor) air.

Prospective applications outside this operating envelope—including low-ambient, process, and 100-percent outdoor-air applications—must be reviewed by Trane to help ensure proper performance.

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Overview

This guide should be used only for new systems design. It is not to aid with the remodel, retrofit, or partial replacement of older systems. Older blower coils and heat pump systems were not designed for the higher pressures of R-410A.

Trane's 4TTA3, 4TWA3, 4TTB3 and 4TWB3 sizes 1-1/2 through 5 ton and TTA073D and TWA120D sizes 5 through 10 ton cooling only and heat pump products have been matched to Trane® indoor unit models BCHC and BCVC 024 through 090. Beginning mid-2009, the TTA and TWA 6- through 20-ton product line has been designed for use only with R-410A and POE oil (check unit model number for specific refrigerant). R-410A is a high-pressure refrigerant that requires the other components of the system to be rated for R-410A. For compressor lubrication, the refrigerant requires POE oil.

Trane's BCHC and BCVC 024-090 blower coil air handler products have also been redesigned for use with the higher pressures of R-410A.

Traditionally, refrigerant piping practices were guided by four principles:

- Return the oil to the compressor.
- Maintain a column of liquid at the expansion valve.
- Minimize the loss of capacity.
- Minimize the refrigerant charge in the system.

These piping practices are similar for R-410A and POE oil. However, because of the different mass flows and pressures, the line diameter required to carry the oil and refrigerant may not be the same as a similar tonnage R-22 unit. Also, the allowable pressure drop may be greater for R-410A than R-22.

Evidence accumulated over years of observation demonstrates that the lower the refrigerant charge, the more reliably a split air-conditioning system performs. *Any* amount of refrigerant in excess of the minimum design charge becomes difficult to manage. The excess refrigerant tends to collect in areas that can interfere with proper operation and eventually shortens the service life of the system.

To successfully minimize the system refrigerant charge, the correct line size should be used and the line length must be kept to a minimum.

Resources

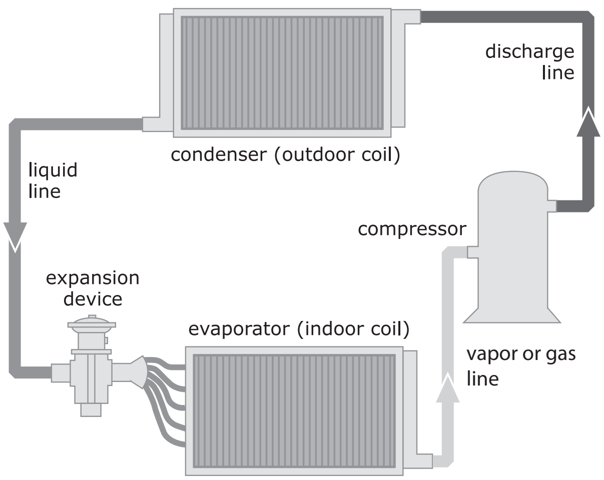
This purpose of this Application Guide is to aid the designer in applying the 4TWA, 4TTA, TTA, and TWA R-410A products with either BCHC or BCVC blower coils. For more information about the outdoor units, refer to the following application guides:

- *Refrigerant Piping Systems* [32-3009-03; SS-APG006-EN]
- *Tube Size and Component Selection for TTA and TWA Split Systems (6-20 Tons) Using Refrigerant 410A* [SS-APG008-EN]

Background

In a split air-conditioning system, the four major components of the refrigeration system are connected by field-assembled refrigerant piping (Figure 1). A vapor or gas line connects the evaporator to the compressor, the discharge line connects the compressor to the condenser, and the liquid line connects the condenser to the expansion device, which is located near the evaporator inlet. Operational problems can occur if these refrigerant lines are designed or installed improperly.

Figure 1. Interconnecting refrigerant lines in a typical split air-conditioning system



The origin of the requirements for equivalent line lengths of components, line pressure drop, and minimum and maximum refrigerant velocities is uncertain. It appears likely that at least some of the supporting data was derived from measurements and/or equations involving water. Some resource materials even *show* water components when illustrating refrigerant piping requirements.

Subsequent reviews of analytical and empirical data for refrigerant piping resulted in the publication of two research papers: *Pressure Losses in Tubing, Pipe, and Fittings* by R.J.S. Pigott and *Refrigerant Piping Systems — Refrigerants 12, 22, 500* by the American Society of Refrigeration Engineers (ASRE). In his paper, Pigott described his use of refrigerant as the fluid and his direct measurement of pressure drops. His findings indicated that the pressure drop of many line components is small and difficult to measure. For these components, he used experimental data to derive a formula relating the geometry of the component to its pressure drop. Overall, his calculated pressure loss of the components was less than originally determined.

The conclusion of the ASRE research paper stated that the minimum required velocity to maintain oil entrainment in vertical risers and horizontal lines will vary with the diameter of the tube *and with the saturation temperature of the suction gas*. In other words, the minimum required velocity for oil entrainment is not constant.

Updated Guidelines

Liquid Lines

Historically, liquid lines were sized to minimize the pressure losses within the piping circuit. Oil movement through the piping wasn't a concern (nor is it today) because oil is miscible in liquid refrigerant at normal liquid-line temperatures. The historic and traditional 6 psid liquid line pressure drop had the unintended consequence of requiring line sizes with large internal refrigerant volumes. Since our objective is also to minimize the refrigerant charge to make the most reliable systems, we increased the allowable liquid pressure drop to 35 psid (R-22), which allows for the selection of a smaller liquid line while still maintaining refrigeration operation.

With R-410A refrigerant and POE oil, this pressure drop can be as high as 50 psid. Within these guidelines, refrigeration operation is maintained while minimizing the refrigerant charge. It is still required to limit the liquid line velocity to 600 ft/min to help avoid issues with water hammer.

The liquid line sizes in the component section of this guide reflect these rules.

Suction Lines

R-410A is a high-pressure refrigerant and allows higher-pressure drops in the suction lines. With R-22, a 2°F loss in the suction line means a pressure drop of 3 psi. With R-410A refrigerant, that same 2°F loss is a 5 psi drop. Additional pressure drop may be tolerated in certain applications.

R-410A refrigerant suction lines must be sized to maintain oil-entrainment velocities in both the horizontal and vertical risers. Oil entrainment for R-410A is based on suction temperature as well as tube diameter. At the time of this writing, no known direct oil-entrainment tests have been conducted. Trane has used ASHRAE data to create equation-based formulas to predict the entrainment velocities of R-410A refrigerant and POE oil. These minimum velocities are reflected in the line sizes listed in the component selection summary (Table 3, p. 16).

Equipment Placement

Minimize Distance Between Components

For a split air conditioning system to perform as reliably and inexpensively as possible, the refrigerant charge must be kept to a minimum. To help accomplish this design goal:

- Site the outdoor unit (cooling-only condensing unit or heat pump) as close to the indoor unit as possible.
- Route each interconnecting refrigerant line by the shortest and most direct path so that line lengths and riser heights are no longer than absolutely necessary.
- Use only horizontal and vertical piping configurations.

Interconnecting lines of 150 lineal feet (45.7m) or less do not require Trane review, but be sure to limit the length in risers.

Be sure to review the required accessories for long lengths.

Allowable Elevation Difference

An acceptable riser height represents the summation of all individual risers and is a function of the total line length.

Outdoor unit *above* indoor unit. In this case, the velocity of the refrigerant must be sufficient to force oil up the gas riser in order to maintain proper oil movement during cooling operation. The gross height and line length for a heat pump in the heating mode must not cause a pressure drop sufficient to cause excess loss of subcooling. Figure 2 and Figure 3 show the allowable gross rise and run for TTA and TWA units, respectively. System designs outside the application envelopes defined in the charts require Trane review.

Outdoor unit *below* indoor unit. In this case, the pressure drop and accompanying loss of subcooling due to the total liquid-line length and lift limits the allowable gross lift. The velocity of the refrigerant gas for a heat pump in the heating mode must be sufficient to force oil up the hot gas riser in order to maintain proper oil movement. Figure 4 shows the allowable gross “rise and run” for TTA and TWA units. System designs outside the application envelope defined in the chart require Trane review.

Figure 2. Allowable elevation difference: R-410A cooling-only unit *above* indoor unit.

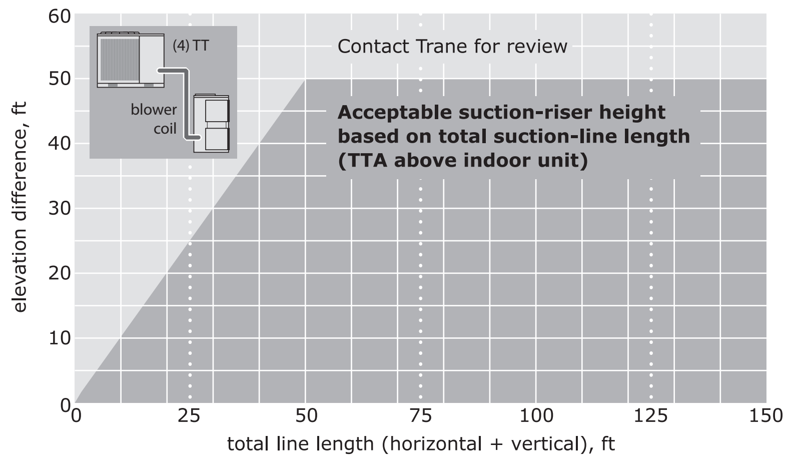


Figure 3. Allowable elevation difference: R-410A heat pump unit *above* indoor unit

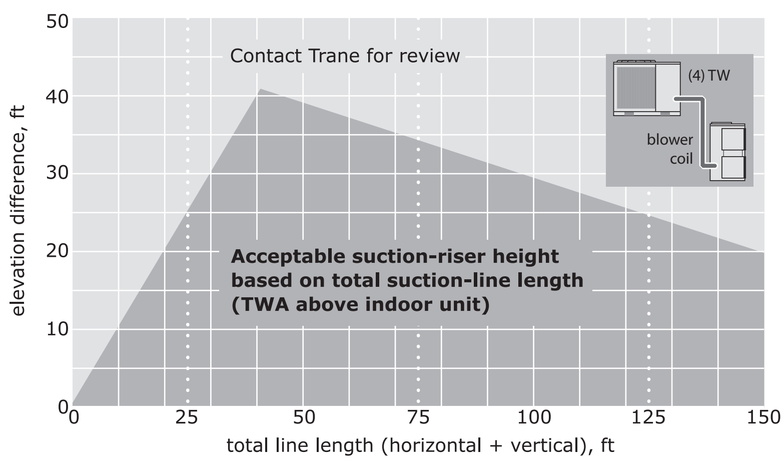
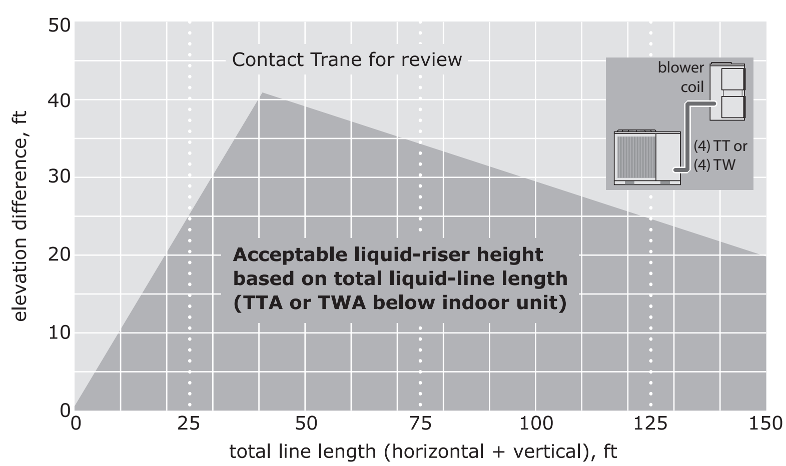


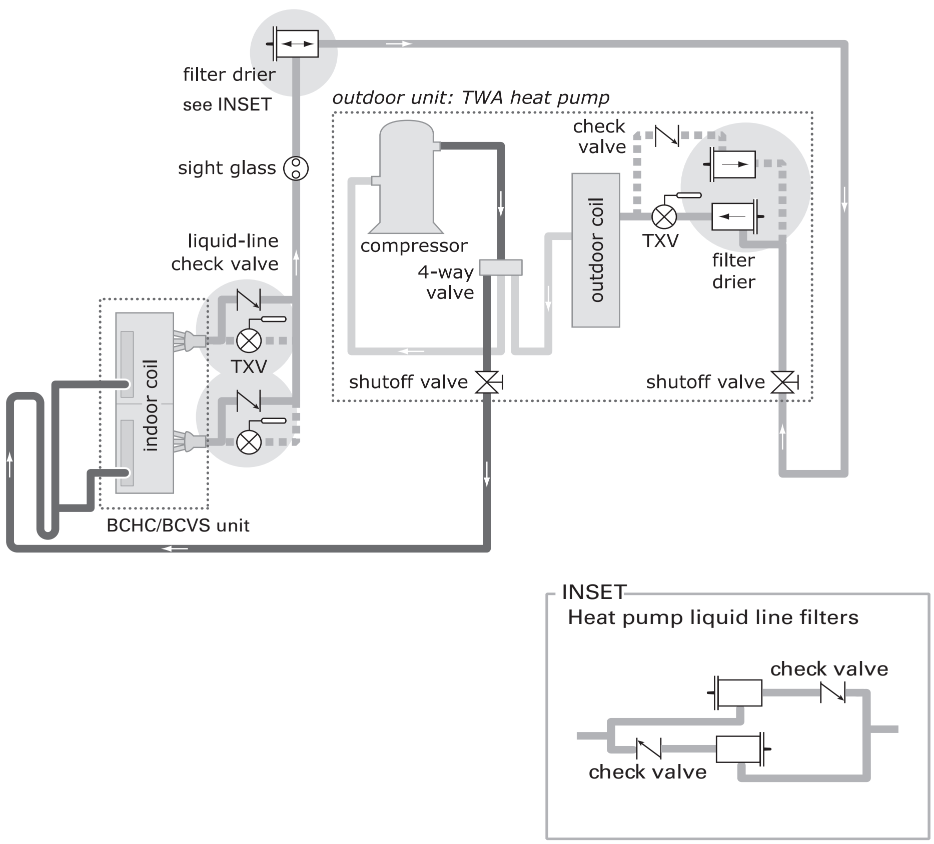
Figure 4. Allowable elevation difference: R-410A cooling only or heat pump unit *below* indoor unit



Line Sizing, Routing, and Component Selection

Figure 5 illustrates an example of a (4) TTA/TWA blower coil split system component arrangement. Use it to determine the proper, relative sequence of the components in the refrigerant lines that connect the (4) TTA/TWA outdoor unit to the blower coil. Refer to "Refrigerant Piping Examples," p. 12, for more detailed schematics of evaporator piping when a single-circuited blower coil is piped to a single-circuited outdoor unit; when a dual-circuited blower coil is piped to two outdoor units; or when a dual-circuited blower coil is piped to a single-circuited outdoor unit. All new (4) TTA/TWA units and BCHC/BCVC units are R-410A products, and all the selected components installed in the field must also be rated for use with R-410A.

Figure 5. Placement of liquid-line check valves in TWA heat-pump applications when paired with a BCHC/BCVC blower coil (single circuit shown in heating mode)



Liquid Lines

Line Sizing

Properly sizing the liquid line is critical to a reliable split system application. Table 3, p. 16, shows the recommended liquid-line sizing for each (4) TTA/TWA model based on its nominal capacity. Using the preselected tube diameter will maximize the operating envelope and is the line size around which the installation literature charging charts were generated. Increasing the line size will *not* increase the allowable line length.

Routing

Install the liquid line with a slight slope in the direction of flow so that it can be routed with the suction line.

A height limitation exists for liquid lines that include a liquid riser because of the loss of subcooling that accompanies the pressure loss in the height of the liquid column. Figure 2, Figure 3, and Figure 4, p. 4, depict the permissible rise in the liquid line (without excessive loss of subcooling). Again, system designs outside the application envelope of the TTA/TWA unit require Trane review.

Insulation

The liquid line is generally warmer than the surrounding air, so it does not require insulation. In fact, heat loss from the liquid line improves system capacity because it provides additional subcooling. If the liquid line is routed through a high temperature area, such as an attic or mechanical room, insulation would be required.

Components

Liquid-line refrigerant components necessary for a successful job may include a filter drier, access port, solenoid valve, moisture-indicating sight glass, expansion valve(s), and ball shutoff valves. Figure 5, p. 5, illustrates how to sequence the components properly in the liquid line. Position the components as close to the indoor unit as possible. Table 3, p. 16, identifies suitable components, by part number, for each outdoor unit.

Liquid Filter Drier

There is no substitute for cleanliness during system installation. The liquid filter drier prevents residual contaminants, introduced during installation, from entering the expansion valve and solenoid valve. All outdoor units have a filter drier pre-installed. However, on the 6-, 7-1/2-, and 10-ton TTA/TWA units, if the refrigerant line length exceeds 80 ft, this filter should be removed and a new one selected from Table 3, p. 16, and installed close to the indoor unit. Only units this size require the filter to be moved because of their larger line sizes and greater amount of introduced contaminants. If choosing a filter other than the one listed in Table 3, p. 16, make sure its volume, filtering, and moisture-absorbing characteristics are equivalent.

Note that TWA units will require two filters and two check valves due to the reverse flow nature of a heat pump.

Access Port

The access port located at the (4) TTA/TWA allows the unit to be charged with liquid refrigerant and is used to determine charge level. This port is usually a Schraeder valve with a core.

Solenoid Valve

In (4) TTA cooling-only split systems, solenoid valves may be used to isolate the refrigerant from the evaporator during the off cycles. This is only done when the indoor unit is well below the outdoor unit. The solenoid valve on the TTA unit is a drop solenoid—open when the compressor is on, and closed when the compressor is off. If used, the solenoid requires code compliant wiring to the (4) TTA condensing unit. (The solenoid is not shown on the unit wiring diagram.)

Note: Solenoids should not be used on heat pumps due to the reverse flow of the liquid.

Moisture-Indicating Sightglass

A moisture-indicating sightglass should be installed in the main liquid line at the blower coil.

Note: The sole value of the glass is its moisture-indicating ability. Use the Installation manual charging curves—not the sightglass—to determine proper charge levels.

Expansion Valve

The expansion valve is the throttling device that meters the refrigerant into the evaporator coil. Metering too much refrigerant floods the compressor; metering too little elevates the compressor temperature. Choosing the correct size and type of expansion valve is critical to ensure that it will correctly meter refrigerant into the evaporator coil throughout the entire operating envelope of the system. **Correct refrigerant distribution into the coil requires an expansion valve for each distributor.**

For improved modulation, choose expansion valves with balanced port construction and external equalization. Table 4, p. 17, identifies the part number of the valve recommended for (4) TTA/TWA systems.

The tonnage of the valve should represent the tonnage of the portion of coil that the TXV/distributor will feed.

The expansion valve is inclusive on the outdoor (4) TWA units for reverse flow heat pump operation.

Compressor Crankcase Heater

Smaller split systems may not ship with a compressor crankcase heater. For line lengths over 60 feet, compressor crankcase heaters are a requirement. Be sure to consult the product data catalogue to determine if the crankcase heater ships with the unit. If it does not, a Trane field-installed crankcase heater may be obtained from your local sales office.

Gas Line

Line Sizing

Proper line sizing is required to guarantee that the oil returns to the compressor throughout the system's operating envelope. At the same time, the line must be sized so that the pressure drop does not excessively affect capacity or efficiency.

Note: Preselected suction-line diameters shown in Table 3, p. 16, are independent of total line length for properly charged (4) TTA/TWA units in normal air-conditioning applications.

Routing

Route the line as straight (horizontally and vertically) as possible. Avoid unnecessary changes of direction. To prevent residual or condensed refrigerant from "free-flowing" toward the compressor, install the suction line so that it slopes by ¼ to 1 inch per 10 feet of run (1 cm per 3 m) toward the indoor coil.

Do not install riser traps. With two circuit blower coils and one circuit outdoor units, what appears to be a riser trap is located at the coil outlet; see Figure 8, p. 14 for an example. This piping arrangement, which isn't a riser trap, is the result of two requirements:

- Drain the coil to the low point
- Rise at least 1 ft (30 cm) from the common low point to prevent any off-cycle condensed refrigerant in the coil from attempting to flow to the compressor.

Double risers must not be installed. All (4) TTA and TWA units gas line size, preselected in Table 3, p. 16, provides sufficient velocity to push entrained oil up the permissible riser height.

Note: If a gas riser is properly sized, oil will return to the compressor regardless of whether a trap is present. If a gas riser is oversized, adding a trap will not restore proper oil entrainment.

Avoid Underground Refrigerant Lines

Refrigerant condensation during the off cycle, installation debris inside the line (including condensed ambient moisture), service access, and abrasion/corrosion can quickly impair reliability. R-410A is hygroscopic. Even small amounts of moisture in the system introduced during installation can harm the compressor.

If refrigeration lines must be installed below grade, consult your local sales engineer, territory manager, or field service representative.

Insulation

Any heat that transfers from the surrounding air to the cooler gas lines increases the load on the condenser (reducing the system's air-conditioning capacity) and promotes condensate formation. After operating the system and testing all fittings and joints to verify that the system is leak-free, insulate the gas lines to prevent heat gain and unwanted condensation.

Components

Adding a gas line filter is unnecessary—provided that good refrigeration practices (including nitrogen sweeping during brazing and proper system evacuation) are followed.

Access Port

Providing an access port in the gas line permits the servicer to check refrigerant pressure and determine superheat at the evaporator/indoor coil. Usually this port is a Schraeder valve with a core.

Expansion Valves

Expansion valves meter refrigerant into the evaporator under controlled conditions. If there is too much refrigerant, the refrigerant will not completely vaporize and the remaining liquid will slug the compressor. If there is too little refrigerant, there may not be enough cooling for the compressor.

Table 4, p. 17, lists expansion valves. Each evaporator distributor requires a dedicated expansion valve in order to maintain proper coil distribution. The expansion valve should be selected to match the capacity of the coil that the distributor feeds.

Example: 10-ton coil with two equal distributors

10 / 2 = 5

Each TXV should be selected for 5 tons.

The proper balance for feeding refrigerant for a (4) TTA/TWA system is to provide 18°F of superheat—the difference between the saturated and actual refrigerant temperature leaving the evaporator. Expansion valve superheat is preset from the factory, but it isn't set to 18°F. Use the turns listed in Table 1 to adjust them to the correct 18°F superheat.

Table 1. Expansion valves

Sporlan					
Standard off-the-shelf nominal valve settings (90 PSIG air test setting)					Field adjust for 18°F
Valve	Superheat, °F	CW turns available	CCW turns available	Superheat change per turn	
ERZE	12	4.5	4.5	2.4°F	2 1/2 CW

Controls

ReliaTel™ or thermostat control may be available on some model (4) TTA/TWA units. It is important to understand that if the staging of compressors is turned over to a third party, the compressor protection, provided through system stability, is also turned over to the third party. Simply stated, this means that when a compressor turns on, it shouldn't turn off until the expansion valve comes under control. And, once the compressor turns off, it should be allowed to stay off until the crankcase heater has warmed up, or if the system doesn't have a crankcase heater, until the compressor sump stabilizes.

System stability must be programmed in the third-party system control. To accomplish this, the system controls must incorporate a **5-minute-on**, a **5-minute-off**, and a **5-minute-interstage** differential on each compressor stage.

Hot Gas Bypass

Many years ago, hot gas bypass (HGBP) was successfully added to HVAC systems to correct a number of operational problems. Hoping to avoid such problems altogether, it eventually became common practice for designers to specify hot gas bypass in systems. Unfortunately, the practice often degraded rather than improved reliability.

Hot gas bypass increases the minimum refrigerant charge; it also inflates the first cost of the system. Besides adding more paths for potential refrigerant leaks, hot gas bypass increases the likelihood of refrigerant distribution problems. Finally, hot gas bypass uses excessive amounts of energy by preventing the compressors from cycling with fluctuating loads.

Trane now has several years of successful experience with Evaporator Defrost Control (EDC). Like hot gas bypass, the EDC system protects the coil from freezing, but it does so by turning off compressors when a sensor detects the formation of frost on the evaporator coil. The compressor is released to operate when the coil temperature rises a few degrees above the frost threshold. The EDC control strategy may reduce the overall energy consumption of the system while maintaining system control.

Systems should be designed to avoid HGBP whenever possible.

For more information, refer to the *Engineers Newsletter*, “Hot Gas Bypass – Blessing or a Curse?” (ADM-APM007-EN).

Refrigerant Piping Examples

Figure 6. Indoor coil (non-TWE) with one distributor (single-circuit TTA/TWA units)

1 Pitch the liquid line 1 inch per 10 feet (1 cm per 3 m) so that the liquid refrigerant drains toward the indoor coil. Use the liquid-line size recommended in Table 3, p. 16.

2 Provide one expansion valve (TXV) per distributor.

TWA heat pumps only: Provide one check valve for each expansion valve.

3 Pitch the gas line leaving the coil so that it slopes *away* from the coil by 1 inch per 10 feet (1 cm per 3 m).

4 For vertical risers, use the tube diameter recommended in Table 3, p. 16. Ensure that the top of the riser is at least 1 foot (30 cm) above the lowest point.

5 Pitch the gas line 1 inch per 10 feet (1 cm per 3 m) *toward* the indoor coil.

6 Insulate the gas line.

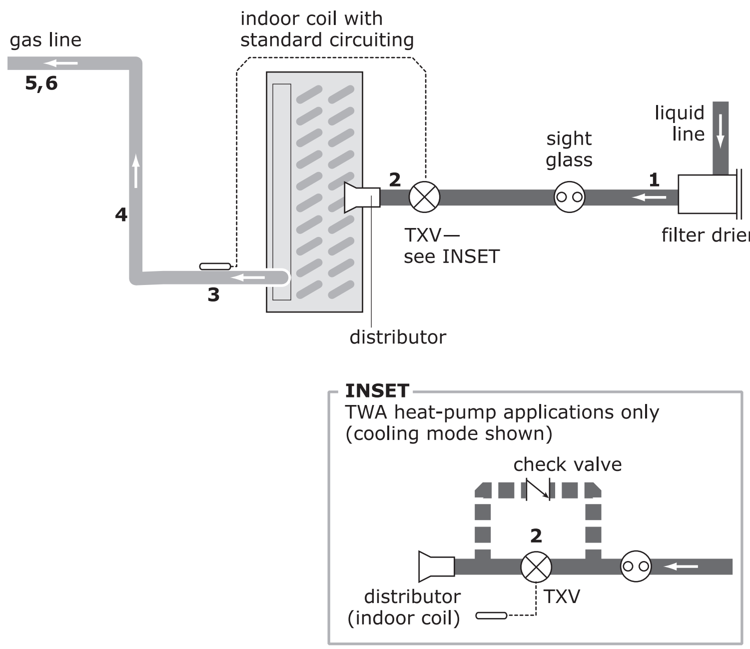


Figure 7. Indoor coil with two distributors (dual TTA/TWA units)

1 Pitch the liquid line 1 inch per 10 feet (1 cm per 3 m) so that the liquid refrigerant drains toward the indoor coil. Use the liquid-line size recommended in Table 3, p. 16.

2 Provide one expansion valve (TXV) per distributor.

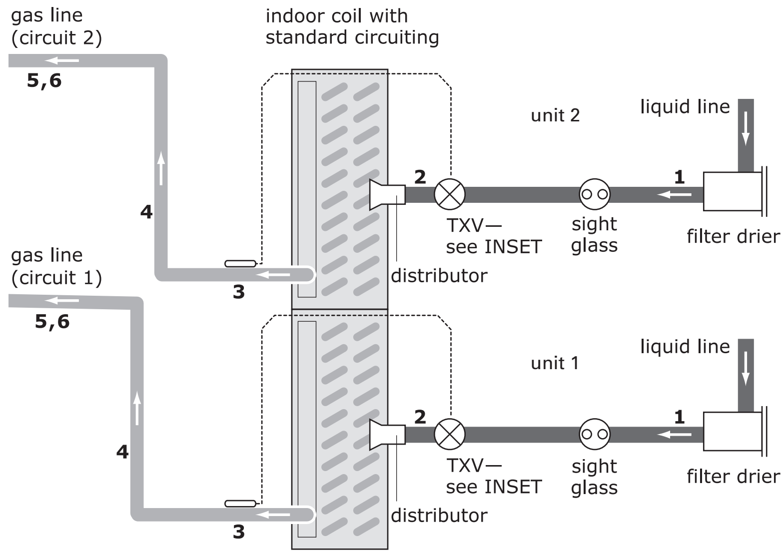
TWA heat pumps only: Provide one check valve for each expansion valve.

3 Pitch the gas line leaving the coil so that it slopes *away* from the coil by 1 inch per 10 feet (1 cm per 3 m).

4 For vertical risers, use the tube diameter recommended in Table 3, p. 16. Ensure that the top of the riser is at least 1 foot (30 cm) above the lowest point.

5 Pitch the gas line 1 inch per 10 feet (1 cm per 3 m) *toward* the indoor coil.

6 Insulate the gas line.



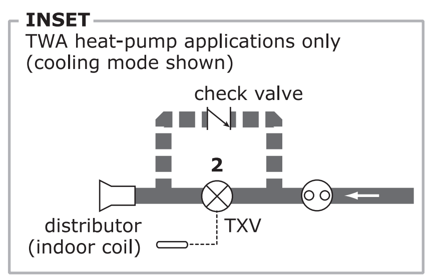


Figure 8. Indoor coil with two distributors (single-circuit TTA/TWA units)

1 Pitch the liquid line 1 inch per 10 feet (1 cm per 3 m) so that the liquid refrigerant drains toward the indoor coil. Use the liquid-line size recommended in Table 3, p. 16.

2 Provide one expansion valve (TXV) per distributor.

TWA heat pumps only: Provide one check valve for each expansion valve.

3 Pitch the gas line leaving the coil so that it slopes *away* from the coil by 1 inch per 10 feet (1 cm per 3 m).

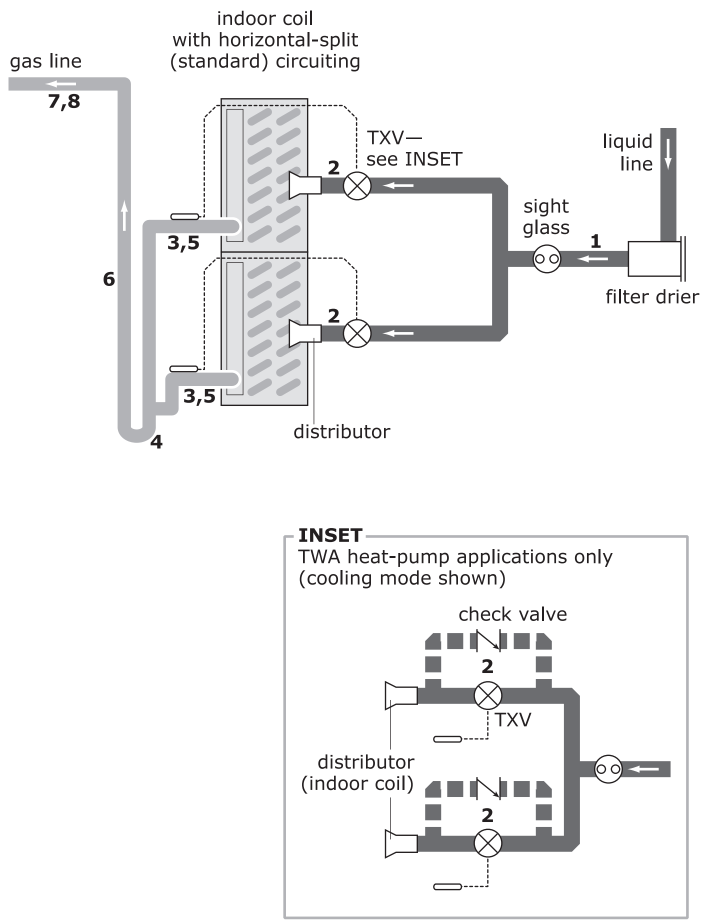
4 Arrange the gas line so that suction gas leaving the coil flows downward, *past the lowest gas-header outlet,* before turning upward. Use a double-elbow configuration on all lower branch circuits to isolate the TXV bulb from suction-header conditions. See "Gas Line: Routing," p. 7.

5 For all coil branch circuits in the gas line, use a tube diameter that is one size smaller than the gas-line size recommended in Table 3, p. 16.

6 For vertical risers, use the tube diameter recommended in Table 3, p. 16. Ensure that the top of the riser is at least 1 foot (30 cm) above the lowest point.

7 Pitch the gas line by 1 inch per 10 feet (1 cm per 3 m) *toward* the indoor coil.

8 Insulate the gas line.



Heat Pump and Blower Coil Matches

Table 2. Heat pump matches with 3/8-inch blower coils

UNIT*		BCHC012 BCVC012	BCHC18 BCVC18	BCHC24 BCVC24	BCHC36 BCVC36	BCHC54 BCVC54	BCHC72 BCVC72	BCHC90 BCVC90
	Adjustable cfm range	250-500	375-675	500-1000	750-1600	1125-2400	1500-3000	1875-4000
	Allowable ID cfm range							
4TWA3018A 4TWB3018A	525-675			6 row**				
4TWA3024A 4TWB3024A	750-900			6 row**	4 row**			
4TWA3030A 4TWB3030A	876-1125				4 row**			
4TWA3036A 4TWB3036A	1025-1350				6 row**	4 row**		
4TWA3042A 4TWB3042A	1225-1575				6 row**	4 row**		
4TWA3048A 4TWB3048A	1400-1800				6 row**	4 row**		(2) 4TWB3048 and (1) 6 row**
4TWA3060A 4TWB3060A	1750-2250					4 row**	4 row**	(2) 4TWB3060 and (1) 6 row**
TWA073DC	2100-2700						6 row**	
TWA090DC	2625-3375						6 row**	
TWA120D	3500-4500							6 row**

* These units must have 350-400 cfm/nominal ton and a minimum mixed air temp of 60°F in heating.
** Coils require 144 FPF fin spacing, which is standard on the BCHC/BCVC product.

Parts

Table 3. Component selection summary

UNIT	4TTA3018A 4TTB3018A 4TWA3018A 4TWB3018A	4TTA3024A 4TTB3024A 4TWA3024A 4TWB3024A	4TTA3030A 4TTB3030A 4TWA3030A 4TWB3030A	4TTA3036A 4TTB3036A 4TWA3036A 4TWB3036A	4TTA3042A 4TTB3042A 4TWA3042A 4TWB3042A	4TTA3048A 4TTB3048A 4TWA3048A 4TWB3048A	4TTA3060A 4TTB3060A 4TWA3060A 4TWB3060A	TTA073D TWA073D	TTA090D TWA090D	TTA120D TWA120D
Refrigerant ckts	1	1	1	1	1	1	1	1	1	1
Minimum step (tons)	1.5	2	2.5	3	3.5	4	5	6	7.5	10
GAS LINE	**GAS LINE**									
Tube diameter (in.)										
Horizontal (& drops)	**5/8**	**3/4**	**3/4**	**3/4**	**7/8**	**7/8**	**1 1/8**	**1 1/8**	**1 3/8**	**1 3/8**
Vertical (up)	**5/8**	**3/4**	**3/4**	**3/4**	**7/8**	**7/8**	**1 1/8**	**1 1/8**	**1 3/8**	**1 3/8**
LIQUID LINE	**LIQUID LINE**									
Tube diameter (in.)	**3/8**	**3/8**	**3/8**	**3/8**	**3/8**	**3/8**	**3/8**	**1/2**	**5/8**	**1/2**
Filter drier	Built-in up to max line length	Built-in up to max line length	Built-in up to max line length	Built-in up to max line length	Built-in up to max line length	Built-in up to max line length	Built-in up to max line length	TTA: DHY01123 TWA*: DHY01123 (QTY 2)	TTA: DHY01232 TWA*: DHY01232 (QTY 2)	TTA: DHY01123 TWA*: DHY01123 (QTY 2)
Sight glass 1/ckt	Not required	Not required	Not required	Not required	Not required	Not required	Not required	SA-14S	SA-15S	SA-14S
Access port 2/ckt								Schraeder valve w/core	Schraeder valve w/core	Schraeder valve w/core

* These heat pump products require two filters and two check valves: one set-oriented for liquid in the cooling direction, and one set-oriented for liquid in the heating direction (see Figure 5, p. 5).

Check valve selections

3/8 - VAL08459
1/2 - VAL08460
5/8 - VAL01722

More information can be found in the following literature:

1 1/2 to 5 ton	32-3009-03; SS-APG006-EN
6 to 10 ton	SS-APG008-EN

Table 4. Expansion valves

Refrigerant	Manufacturer	Tonnage Range	Model Number	Trane Part	Model Number w/Check Valve	Trane Part
R-410A	Sporlan	1 1/2 - 2 1/2	RCZE-2.0-ZGA	VAL08085	RCZE-2.0-ZGA	VAL08085
R-410A	Sporlan	2-3	ERZE-2-ZGA	VAL09476	RCZE-3.0-ZGA	VAL08086
R-410A	Sporlan	3-4	ERZE-3-ZGA	VAL09477	RCZE-4.0-ZGA	VAL08087
R-410A	Sporlan	4-5	ERZE-4-ZGA	VAL09478	RCZE-5.0-ZGA	VAL08088
R-410A	Sporlan	5-6	ERZE-5-ZGA	VAL09479	RCZE-6.0-ZGA	VAL08089
R-410A	Sporlan	6-8	ERZE-6-ZGA	VAL09480	----------------	----------------
R-410A	Sporlan	8-11	ERZE-8-ZGA	VAL09481	----------------	----------------

* See "Expansion Valves," p. 9.

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