Application Guide

FOR

Titus Vertical Stack Fan Coil Risers

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Introduction

The term riser is used to describe the piping used to supply or return water from the vertical stack fan coil (chilled or hot water) as well as the piping used to run off condensate water from the coil. Fan coils have three risers on a two-pipe system (one each supply, return and condensate) and five risers on a four-pipe system (chilled water supply, chilled water return, hot water supply, hot water return and condensate).

Risers are typically insulated with elastomeric, closed cell thermal insulation to minimize heat loss or gain from the water to the ambient space. The diameter of the riser will decrease or increase as the piping extends throughout the building, in order to equalize the pressure and velocity of water flow. This is not dissimilar to duct sizing in an air delivery system.

Pipe sizing and insulation are the domain of the consulting engineer for the project, their discussion in this guide serves to explain concepts used. The nature in which risers are supplied on a unit in order to meet the engineers design vary by manufacturer**.**

Riser Sizing

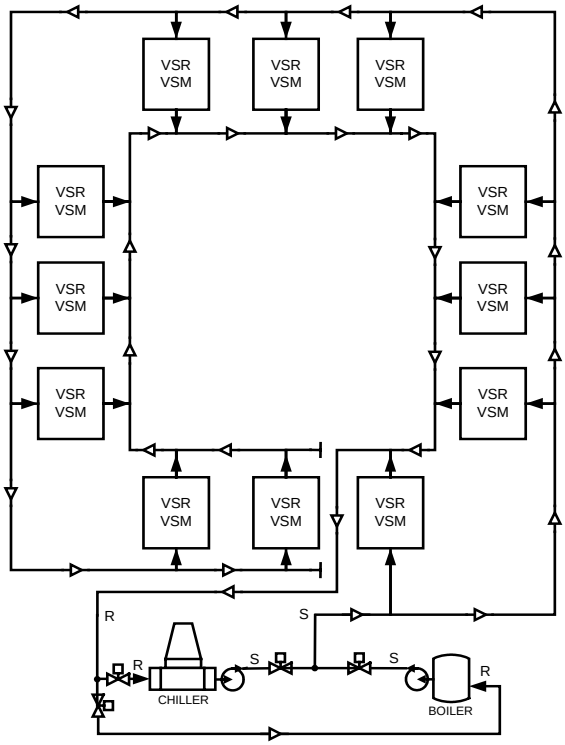
Design operating pressure differentials between the supply and return riser is typically 10 to 15 psi. Design velocities are typically between 1 and 4 feet/second. Typical riser pressure loss is designed for about 3 feet of head pressure loss per 100 feet of piping. As a rule of thumb, 10 feet of head pressure equates to about 5 psi.

Two types of systems are used in piping fan coils, 2 pipe and 4 pipe. A standard two-pipe system utilizes a supply riser, return riser and condensate riser. In a two-pipe system, hot water and chilled water share the same piping network, but the system can only be in the heating or cooling mode at any one time. A four-pipe system can operate simultaneously in the heating and cooling mode, and thus has separate supply and return risers for hot and chilled water. In both systems, the risers are sized for the amount of water they will carry at various points within the system.

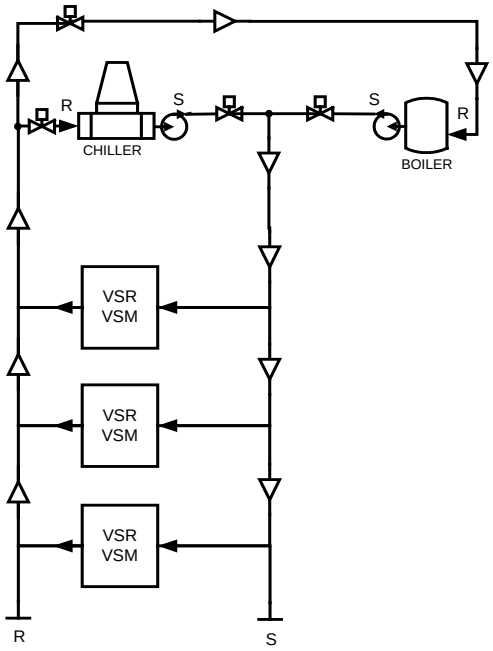
Two different configurations are available for return piping, standard return and reverse return. In the standard configuration, water flows from the first fan coil in the loop through the last, and returns from the last unit back through the first. In a reverse return system, both the supply and return flow run from the first unit in the system through the last and returns to the chiller through a separate riser.

Pictured below are horizontal and vertical layout configurations of standard return piping systems. Sample diagrams for reverse return piping systems are also featured.

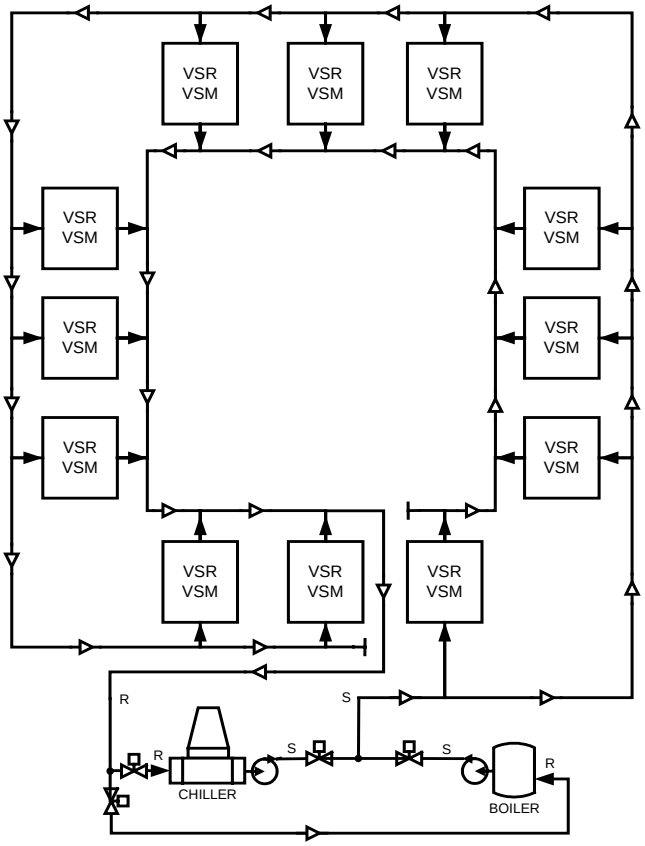
Horizontal Piping Layout For a 2 Pipe System with Standard Return Piping



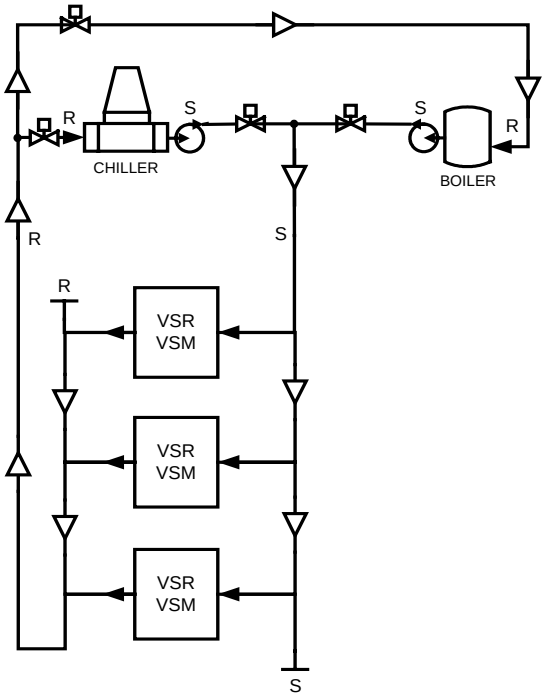
Vertical Piping Layout For a 2 Pipe System with Standard Return Piping



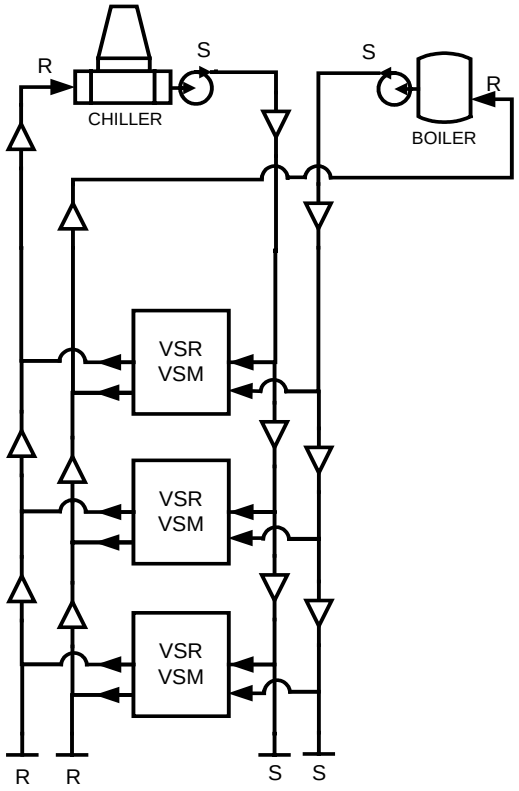
Horizontal Piping Layout For a 2 Pipe System with Reverse Return Piping



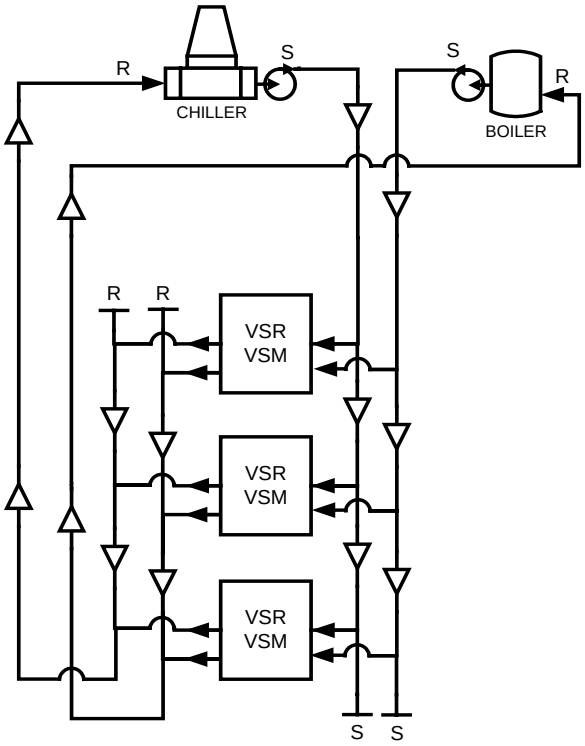
Vertical Piping Layout For a 2 Pipe System with Reverse Return Piping



Vertical Stack 4 Pipe System with Standard Return Piping



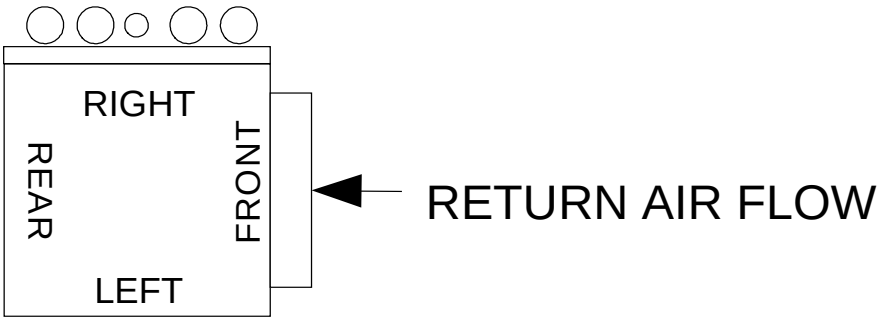
Vertical Stack 4 Pipe System with Reverse Return Piping



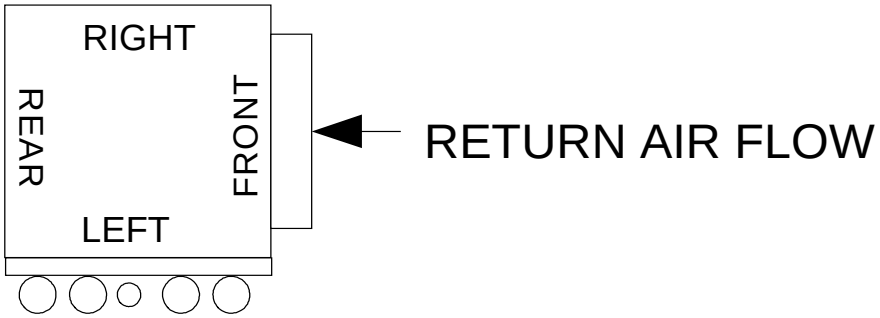
Riser Locations

The location of supply, return and condensate piping risers are flexible in order to meet construction constraints found on the job. Featured below are drawings, which show riser options, supply locations and typical configuration arrangements for vertical stack fan coils.

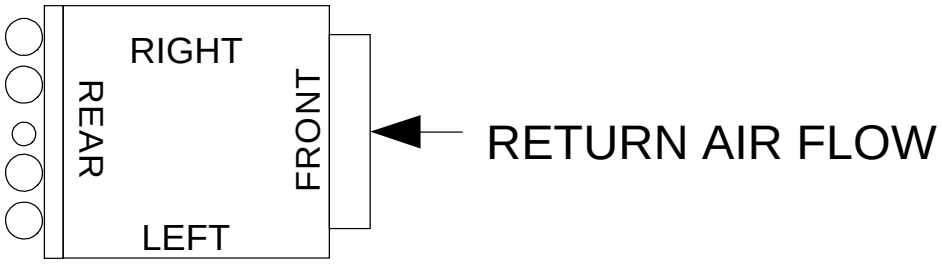
RIGHT HAND



LEFT HAND



REAR

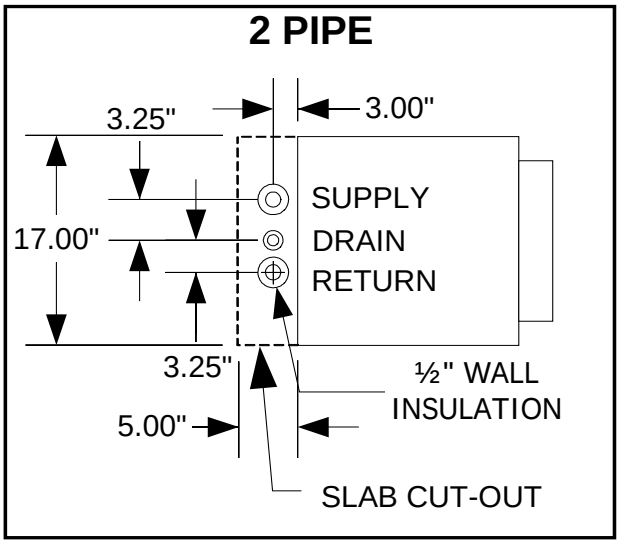


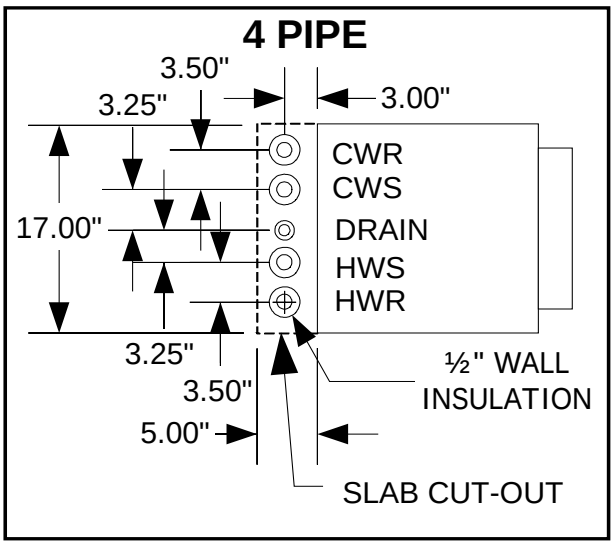
Riser Insulation and Spacing

The consulting engineer for the project specifies riser insulation thickness. Typically, elastomeric, closed cell thermal insulation is the material used for insulating risers and is normally ½ inch thick, providing for an R-value of approximately 2.5.

Some local codes have recently begun mandating increased R-values for thermal efficiency. The use of thicker insulation in these cases affects spacing of the risers, particularly in four pipe systems. Generally speaking, you do not want the total width of the riser package to exceed 17 inches. Pictured below is the standard riser spacing. In the event the cumulative dimensions of the riser diameter and insulation thickness exceeds 17 inches, contact Titus for a special riser design.

Standard Insulation Thickness and Riser Spacing





Riser Installation

The term riser refers to the supply/return/condensate piping attached to a vertical stack fan coil. The term riser extension refers to the piping, which connects risers associated with vertical stack fan coil units located on different floors, one above or below the other (see illustration on page 12 for riser extension length formula).

There are a number of general principles, which apply to any fan coil riser installation. Riser connections made by Titus at the factory are always brazed joints, while recommended field connections should be made with 95/5 solder. When making field connections of riser extensions, the correct method is to push the insulation down and clamp before soldering. In situations where the insulation cannot be pushed down far enough, the insulation should be neatly sliced vertically (parallel to the piping) and clamped before soldering. Once the joint has been connected, the insulation should be glued. Use of this methodology will not only provide for the best aesthetics, it will also maintain the integrity of the thermal protection provided by the insulation. The top of every riser should incorporate a female fitting while the bottom of every riser extension should be male. (See below) Also shown below are pictures detailing correct and incorrect methods of connecting riser extensions in the field. For fan coil specific installation information, refer to the IOM (Installation, Operation and Maintenance) guide.

Push insulation back before soldering

Cut insulation neatly in vertical manner

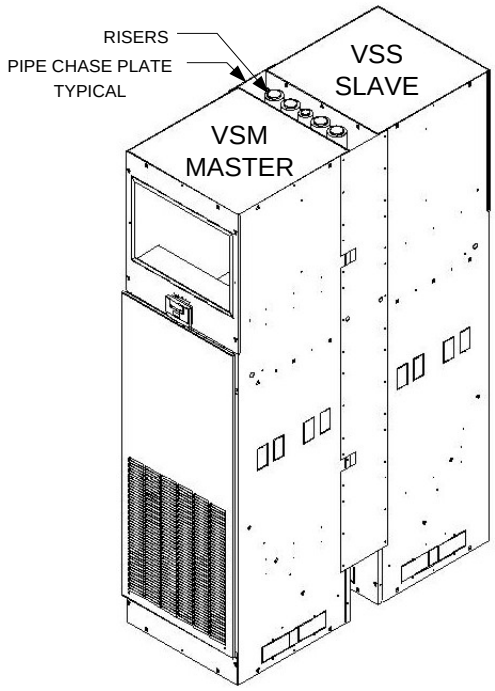
Top of riser incorporating female fitting

Correctly soldered extension joint

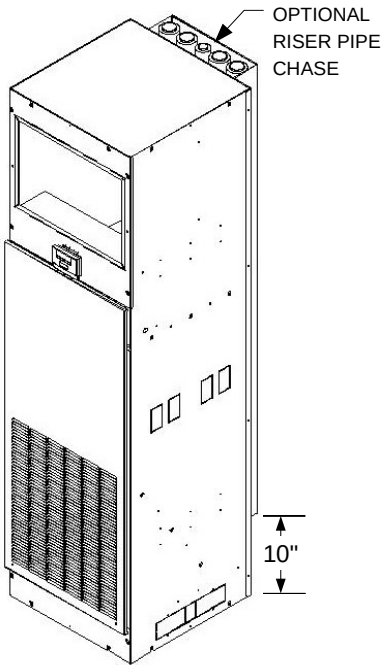
How to……and how <u>not</u> to field solder riser connections!

Care must be taken during shipment and installation not to damage risers. Titus provides an optional metal enclosure to encapsulate risers for extra protection. (See drawing below) Units should never be handled by the riser for transportation purposes, as they are not load bearing devices.

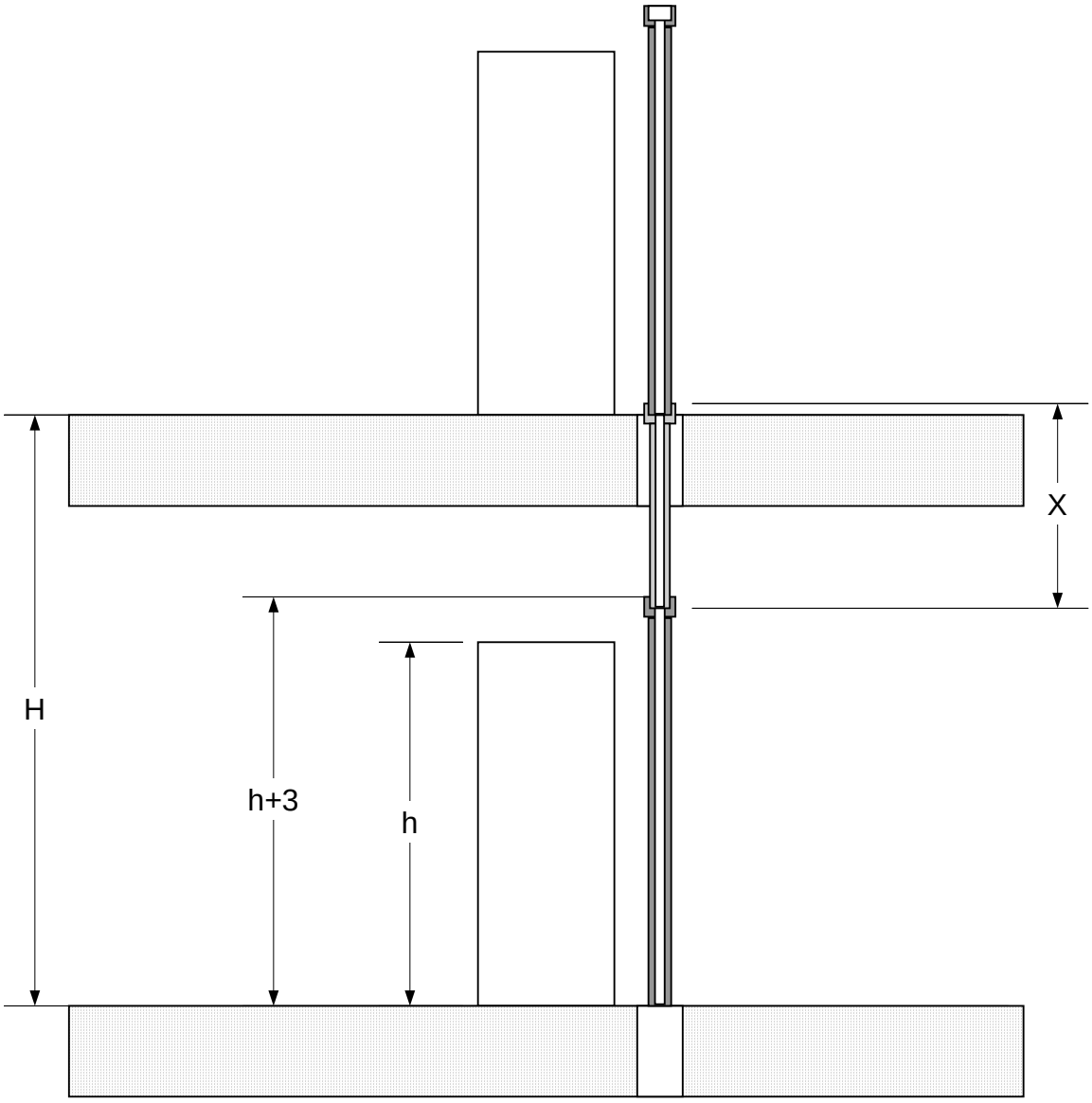
Master and Slave Configuration



VSR with Pipe Chase



Riser Extension Length Formula



Key:
h = Height of fan coil
h + 3 = Riser length
X = Extension length
H = Height between floors

(measurements in inches)

$$X = H - (h+3") + 4" \text{ overlap}$$