



OPTILINE™

VERTICAL STACKED FAN COILS

Model FSG

300 to 1,200 CFM



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Hazard Identification

DANGER
Danger indicates a hazardous situation, which will result in death or serious injury if not avoided.

WARNING
Warning indicates a potentially hazardous situations, which can result in property damage, personal injury, or death if not avoided.

CAUTION
Caution indicates a potentially hazardous situations, which can result in minor injury or equipment damage if not avoided.

NOTICE
Notice indicates practices not related to physical injury.

NOTE: Indicates important details or clarifying statements for information presented.

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Introduction

Daikin Applied OptiLine Fan Coil Units

The Daikin Applied OptiLine fan coil air conditioning units are designed for use in multiple floor apartments, office buildings, hotels and other similar applications and require a minimum amount of floor space. Just one OptiLine unit may do the job that formerly required more than one conventional unit.

The results of many years of experience in the development, design and manufacture of fan coil air conditioners have been incorporated in the Daikin Applied OptiLine units to provide highly efficient, quiet performance; individual thermostatic control; simple, low cost installation; application flexibility; and low maintenance and operating costs with no sacrifice in room comfort, design, or appearance.

For excellent design, performance, efficiency, flexibility of application, and ease of installation and maintenance, look to Daikin Applied OptiLine fan coils.

Application Flexibility

Designs are available with the flexibility necessary for any application requirement.

The 300 through 1200 CFM draw-through configuration units are designed to meet individual room control requirements, or multiple discharge arrangement to serve more than one room.

Both designs are available for two-pipe and four-pipe systems with single, double, triple and top discharge arrangements. Optional equipment is available to provide complete application flexibility.

Contact your Daikin Applied Representative for a copy of the Daikin Select Tools™ selection program to choose a unit meeting your needs.



Nomenclature

Daikin Applied Model Number

OptiLine Unit Code String ver.2023.1

NOTICE

Model number is first 11 code items. The following is a complete description of the vertical stack fan coil order item detail. Each digit has a corresponding code that identifies specific unit options.

Code Item 1 - Unit Type

Must always be "FS"

Code Item 2 - Cabinet Type

G - Concealed cabinet

Code Item 3 - Outside Air

F - None

Code Item 4 - Cabinet Footprint

04 - 15.75" W x 15.75" D

08 - 20" W x 18" D

12 - 24" W x 18" D

Code Item 5 - Cabinet Height

86 - 86"

Code Item 6 - M

Code Item 7 - K

Code Item 8 - Y

Code Item 9 - Primary Cooling

C - Chilled water (single purpose coil)

W - Chilled water (2-pipe changeover coil)

Y - No cooling coil

Code Item 10 - Primary Heating

H - Hot water (single purpose coil)

W - Hot water (2-pipe changeover coil)

E - Electric resistance

Y - No heating coil

Code Item 11 - Auxiliary Heat

E - Electric resistance (not available on 4 pipe system)

Y - None

Code Item 12 - Nominal CFM (L/s)

E - 300 (142)

G - 400 (188)

H - 575 (271), Free blow (250 mm fan in 08 cabinet)

K - 600 (283)

M - 800 (378)

P - 1000 (472)

R - 1200 (566)

Code Item 13 - Unit Connected Voltage

1 - 120/1/60 – Unfused disconnect

2 - 208/1/60 – Unfused disconnect

3 - 240/1/60 – Unfused disconnect

4 - 277/1/60 – Unfused disconnect

5 - 120/1/60 – Fused disconnect

6 - 208/1/60 – Fused disconnect

7 - 240/1/60 – Fused disconnect

8 - 277/1/60 – Fused disconnect

Code Item 14 - Motor Type

V - ECM variable speed

Code Item 15 - Water Coils

NOTE: X/Y format, where X = Number of Cooling rows and Y = Number of Heating rows. All coils have aluminum fins, copper tubes and galvanized casing.

Y - No water coil (electric heat only)

3 Row Coils

K - 3/0 (2-pipe), 12 FPI

L - 3/1 (4-pipe), 12 FPI

M - 3/2 (4-pipe), 12 FPI

N - 3/0 (2-pipe), 14 FPI

P - 3/1 (4-pipe), 14 FPI

Q - 3/2 (4-pipe), 14 FPI

4 Row Coils

U - 4/0 (2-pipe), 12 FPI

V - 4/1 (4-pipe), 12 FPI

W - 4/0 (2-pipe), 14 FPI

Z - 4/1 (4-pipe), 14 FPI

Code Item 16 - Chilled Water Piping Packages

NOTE: Manual air vent, flexible braided hoses and shutoff valves are standard features on all options except 'Y'. Control valves are mounted on coil return.

Y - No piping package (hose adapters are included for testing at factory)

A - 2-way control valve, shutoff valves on supply and return

B - 3-way control valve, shutoff valves on supply and return

C - 2-way control valve, shutoff valve on supply, manual balancing valve with shutoff on return

D - 3-way control valve, shutoff valve on supply, manual balancing valve with shutoff on return

E - 2-way control valve, combo strainer/shutoff valve on supply, manual balancing valve with shutoff on return

F - 3-way control valve, combo strainer/shutoff valve on supply, manual balancing valve with shutoff on return

G - 2-way control valve, combo strainer/shutoff valve on supply, automatic balancing valve with shutoff on return

H - 3-way control valve, combo strainer/shutoff valve on supply, automatic balancing valve with shutoff on return

Code Item 17 - Hot Water Piping Packages

NOTE: Manual air vent, flexible braided hoses and shutoff valves are standard features on all options except 'Y'. Control valves are mounted on coil return.

Y - No piping package (hose adapters are included for testing at factory)

A - 2-way control valve, shutoff valves on supply and return

B - 3-way control valve, shutoff valves on supply and return

C - 2-way control valve, shutoff valve on supply, manual balancing valve with shutoff on return

D - 3-way control valve, shutoff valve on supply, manual balancing valve with shutoff on return

E - 2-way control valve, combo strainer/shutoff valve on supply, manual balancing valve with shutoff on return

F - 3-way control valve, combo strainer/shutoff valve on supply, manual balancing valve with shutoff on return

G - 2-way control valve, combo strainer/shutoff valve on supply, automatic balancing valve with shutoff on return

H - 3-way control valve, combo strainer/shutoff valve on supply, automatic balancing valve with shutoff on return

Code Item 18 - Electric Heat

NOTE: Must operate at supply voltage, subject to cabinet size and airflow. SSR for modulating control is considered a special option. Contact Daikin Applied for pricing and lead time.

- Y - No electric heat
- A - 0.75 kW (Only available at 120V)
- B - 1.0 kW
- C - 1.5 kW
- D - 2.0 kW (maximum size 120V)
- E - 2.5 kW
- F - 3.0 kW
- G - 3.5 kW
- H - 4.0 kW
- J - 4.5 kW
- K - 5.0 kW
- L - 6.0 kW
- M - 7.0 kW
- N - 8.0 kW

Code Item 19 - Control Interface

NOTE: Auto changeover options listed. For manual changeover, please contact factory. If different features are wanted on any model listed below, please select that option and contact factory about these features.

- O - 0-10 vdc speed control, thermostat or controller by others
- K - 3 speed fan control, thermostat or controller by others
- C - Johnson Controls FCP-PA-701 – 3 speed fan control, auto changeover, programmable, NC 2-position valves
- E - Johnson Controls FCP-NA-701 – 3 speed fan control, auto changeover, non-programmable, NC 2-position valves
- J - Spartan TE226 (Daikin Applied Branded) – 4 pipe or 2 pipe w/electric heat fan coil option, 0-10 vdc speed control, digital programmable auto changeover, on/auto fan speed, energy savings input, NO or NC 2-position valve control
- Q - Spartan TE246 (Daikin Applied Branded) – 2 pipe w/out electric heat fan coil option, 0-10 vdc speed control, digital programmable auto changeover, on/auto fan speed, energy savings input, NO or NC 2-position valve control
- H - KMC MIT-FA-005 (Daikin Applied Branded) – 0-10 vdc speed control, digital programmable auto changeover, on/auto fan speed, NO or NC modulating or 2 position valve control and BACnet
- N - Viconics VT8350 – 0-10 vdc speed control, digital programmable auto changeover, on/auto fan speed, NO or NC modulating or 2 position or floating-point valve control, PIR sensor and BACnet (Programming on site is required, all software and instructions will be included.)
- R - MBTek Apollo – 0-10VDC fan control, manual changeover, programmable, NC 2-position valves, wi-fi control with user app
- S - Johnson Controls TEC 3000 – 0-10VDC or 3 speed fan control, auto changeover, programmable, 2-position or floating point or modulating valves
- Z - Special – Select for option not listed above. Digit 30 must also be 'S'. Daikin Applied must be consulted for any "Special" options before an order can be accepted.

Code Item 20 - Cooling & Heating Valve Control

NOTE: SR = spring return, FL = fail last. All valves are 24VAC.

- Y - None, installed by others
- C - 2-pipe, Contractor supplied, factory installed
- L - 4-pipe, Contractor supplied, factory installed
- A - 2-pipe, 2-position NO, SR
- B - 2-pipe, 2-position NC, SR
- D - 2-pipe, 3-wire floating, FL
- E - 2-pipe, 0-10 vdc NO, SR
- F - 2-pipe, 0-10 vdc NC, SR
- G - 4-pipe, 2 position CW NO, HW NC, SR
- H - 4 pipe, 2 position CW NC, HW NO, SR
- J - 4-pipe, 0-10 vdc CW NO, HW NC, SR
- K - 4-pipe, 0-10 vdc CW NC, HW NO, SR
- P - 4-pipe, 2-position NO, SR
- Q - 4-pipe, 2-position NC, SR
- R - 4-pipe, 3-wire floating, FL
- S - 4-pipe, 0-10 vdc NO, SR
- T - 4-pipe, 0-10 vdc NC, SR
- 9 - Special – Select for option not listed above. Digit 30 must also be 'S'. Daikin Applied must be consulted for any "Special" options before an order can be accepted.

Code Item 21 - Thermostat/Controller Mounting Location & Insulation

- A - Remote mounted thermostat/controller (1" fiberglass)
- B - Unit mounted thermostat/controller provided by factory (1" fiberglass)
- C - Remote mounted thermostat/controller (1/2" closed cell equivalent insulation)
- D - Unit mounted thermostat/controller provided by factory (1/2" closed cell equivalent insulation)
- E - Unit mounted thermostat/controller provided by others (1" fiberglass)
- F - Unit mounted thermostat/controller provided by others (1/2" closed cell equivalent insulation)

Code Item 22 - Drain Pan

NOTE: All drain pans are double sloped.

- Y - None (heating only)
- 1 - Acrylic coated galvanized (sizes 06-12)
- 2 - Acrylic coated galvanized with condensate switch (sizes 06-12)
- 3 - 304 SS (sizes 03-12)
- 4 - 304 SS with condensate switch
- 5 - Polymer (sizes 03-04)
- 6 - Polymer with condensate switch (sizes 03-04)

Code Item 23 - Design Sequence

- A - Current design
- S - Daikin Applied Special

Code Item 24 -**Digit 1: Top SA Opening**

- Y - None
- V - Top duct connection

Digit 2: SA Grille/Register Opening(s)

NOTE: Line of sight and sound baffle provided with front and back or two side grilles selected. See grille size chart.

- Y - None
- A - Single front
- B - Single back
- C - Single left
- D - Single right
- E - Front and left
- F - Front and right
- G - Front, right & left
- H - Front and back
- J - Left and right
- K - Back & left
- L - Back & right

Code Item 25 - Filters 1" MERV 10

- 1 - 1 set
- 2 - 2 sets

Code Item 26 - Riser Location

- 3 - Left
- 4 - Right
- 5 - Back
- 6 - Reverse left
- 7 - Reverse right
- 8 - Reverse back

Code Item 27 - Risers, Shipping Method

NOTE: See separate riser code string if supplied. Stub-out height is 36". Consult factory for specials.

- Y - No risers
- 1 - Attached to the unit
- 2 - Shipped loose

Code Item 28 - Raised Base

NOTE: If condensate pump is required, raised base with condensate pump must be factory installed.

- Y - None
- A - 4" raised base
- B - 8" raised base
- C - 8" raised base with access door
- D - 8" raised base with access door and 120 – 240v condensate pump
- E - 8" raised base with access door and 277v condensate pump
- F - 12" raised base
- G - 12" raised base with access door
- H - 12" raised base with access door and 120-240v condensate pump
- J - 12" raised base with access door and 277v condensate pump

Code Item 29 - External Static Pressure (in W.C.)

- F - Direct supply
- J - 0.2 (0.2 is max ESP for 300 or 400 nominal CFM units.)
- K - 0.4 (Contact Daikin Applied for nominal CFM.)

Code Item 30 - Riser Number

EXAMPLE: Riser 9 = 09

- YY - No riser number
- 0 - Spacer

Code Item 31 - Floor Number

EXAMPLE: 6th floor = 06, 35th floor = 35

- YY - No floor number

Code Item 32 - Room Number

EXAMPLE: Suite 10 = 0010; Suite 945 = 0945; Suite 1030 = 1030

- YYYY - No room number
- 0 - Spacer

Code Item 33 - Special

- Y - None

Code Item 34 - Factory Installed Risers

- Y - None
- L - Shipped loose, field installed
- R - Factory installed risers

Riser Package Code String ver.1.72**Code Item 1 - Riser Package**

Must always be "YRP"

Code Item 2 - Configuration

- A - 2-pipe system
- S - 4-pipe system

Code Item 3 - Riser Type

- S - Single
- M - Master

Code Item 4 - Copper Pipe Type

- 1 - All risers - type "M"
- 2 - All risers - type "L"
- 3 - Supply, Return - type "L", Condensate - type "M"
- 4 - Supply, Return - type "M", No Condensate
- 5 - Supply, Return - type "L", No Condensate

Code Item 5, 6, 7 - Riser Insulation Type

NOTE: For a 2-pipe system: First character: Use to describe the cooling supply and return (or heating supply and return). Second character: Enter "Y". Third character: use to describe condensate.

For a 4-pipe system: First character: Use to describe cooling supply and return. Second character: Use to describe heating supply and return. Third character: Use to describe condensate.

- Y - None
- 1 - Closed cell polyolefin
- 2 - Closed cell elastomeric
- 3 - Armaflex
- 4 - Fiberglass

Code Item 8 - Insulation length

- Y - Not insulated
- 1 - Insulated within cabinet height
- 2 - Insulated over full length

Code Item 9, 10, 11 - Riser Insulation Thickness (inches)

NOTE: In a 2-pipe system: The first character describes the supply and return, the second digit is a 0 and the 3rd is the condensate.

In a 4-pipe system: The 1st character describes the cooling supply and return, the 2nd the heating supply and return, the third the condensate.

Refer to the catalog for the riser layout as the risers become staggered when the diameter and/or insulation thickness increases.

Y - Insulation by others

2 - ½"

3 - ¾"

4 - 1"

X - Special

Riser Diameter (inches)**Code Item 12 - CW Supply****Code Item 13 - CW Return****Code Item 14 - HW Supply****Code Item 15 - HW Return****Code Item 16 -**

Y - None

A - ¾"

B - 1"

C - 1.25"

D - 1.5"

E - 2"

F - 2.5"

G - 3"

Code Item 17 - Riser Connection and shipping options

1 - Swaged at top

2 - Swaged with plugs

3 - Plain

4 - Plain with plugs

Code Item 18 - Cooling (2-Pipe) Supply Riser Increaser (inches)

A - No increase

B - No increase with top cap

C - No increase with bottom cap

D - Increase 1 size

E - Increase 1 size with bottom cap

F - Decrease 1 size

G - Decrease 1 size with bottom cap

H - Increase 2 sizes

J - Increase 2 sizes with top cap

K - Decrease 2 sizes

Code Item 19 - Cooling (2-Pipe) Return Riser Increaser (inches)

A - No increase

B - No increase with top cap

C - No increase with bottom cap

D - Increase 1 size

E - Increase 1 size with bottom cap

F - Decrease 1 size

G - Decrease 1 size with bottom cap

H - Increase 2 sizes

J - Increase 2 sizes with top cap

K - Decrease 2 sizes

Code Item 20 - Hot Water Supply Riser Increaser (inches)

A - No increase

B - No increase with top cap

C - No increase with bottom cap

D - Increase 1 size

E - Increase 1 size with bottom cap

F - Decrease 1 size

G - Decrease 1 size with bottom cap

H - Increase 2 sizes

J - Increase 2 sizes with top cap

K - Decrease 2 sizes

Code Item 21 - Hot Water Return Riser Increaser (inches)

A - No increase

B - No increase with top cap

C - No increase with bottom cap

D - Increase 1 size

E - Increase 1 size with bottom cap

F - Decrease 1 size

G - Decrease 1 size with bottom cap

H - Increase 2 sizes

J - Increase 2 sizes with top cap

K - Decrease 2 sizes

Code Item 22 - Condensate Riser Increaser

A - No increase

B - No increase with top cap

C - No increase with bottom cap

D - Increase 1 size

E - Increase 1 size with bottom cap

F - Decrease 1 size

G - Decrease 1 size with bottom cap

H - Increase 2 sizes

J - Increase 2 sizes with top cap

K - Decrease 2 sizes

Code Item 23 - Future

Must always be "Y"

Code Item 24 - Riser length (1/2" increments)

NOTE: Riser lengths between 92" and 120". First digit is "0" for lengths under 100".

EXAMPLE: 98" riser = 0980 112.5" riser = 1125

YYYY - No riser

Code Item 25 - Special

Y - No special

X - Special

Code Item 26 - Floor Number

EXAMPLE: 6th floor = 06, 35th floor = 35

Code Item 27 - Riser Number

EXAMPLE: Riser 9 = 09, Riser 32 = 32

Components and Technology

Component and Option Details



No.	Component	Description
1	Fan	OptiLine comes standard with a backward inclined, ECM driven, direct drive plenum fan. The fan motor combination can be controlled by a 0-10VDC control signal or optionally by 3 binary 24VAC discrete points. This promotes fantastic sound quality and is compatible with available field installed thermostat/control interface options.
2	Cabinet Construction	The small footprint of the OptiLine vertical stacked fan coil units is designed to maximize usable floor space. The outer skin is made of corrosion resistant galvanized steel. Nominal 300-1200 CFM units are available.
3	Insulation	1" fiberglass insulation is standard and optional 1/2" closed cell insulation is available.
4	Coils	OptiLine has multiple coil options intended to operate at different water temperatures and flow rates in different applications. 2-pipe (single coil) and 4-pipe (two coil) configurations are available. 3 and 4 row primary coils can optionally be matched with 1 or 2 row secondary coils. These coils can be selected at 12 and 14 fins per inch.
5	Electric Heat	Single point power is standard on all electric heat selections. Ranges from 0.75kW through 8.0kW are available with factory installed safeties.
6	Access Door	A visually appealing tool-less access door allows for easy access to components including filter, fan, and electrical box.
7	Filtration	OptiLine comes standard with a MERV10 filter for superior air filtration and particle arrestance. The filter is easily accessible behind the access door.
8	Valve Packages	Factory installed valve packages with different control options and valve types are available.
9	Thermostats	A factory-wired thermostat is optional. BACnet compatible control options are available where supported.
10	Discharge Options	Multiple discharge arrangements are available to serve multiple applications. For applications with front and back or two side discharge openings a line of sight baffle is included.
11	Condensate Pump	A factory installed and wired condensate overflow pump is optional for applications where condensate drains are not gravity fed.
12	Risers	Factory swaged risers (2-pipe and 4-pipe) are optional to reduce installation time. Risers can be factory mounted or shipped loose.
13	Drain Pan	Acrylic coated galvanized steel, stainless steel, and ABS plastic drain pans are available with and without condensate overflow protection switches.

Riser Systems

Insulated risers are available factory-installed or can be shipped with or prior to the units for field installation. Sweat ball valves are included with factory risers.

All copper risers are factory cut to a maximum 120" in length. Swaged connections for supply and return risers are standard. Insulation meets or exceeds current flammability classification UL94. Insulation to cover swaged couplings must be field provided. Supply and return risers are of type "L" copper in nominal 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2" & 3" diameters with 1/2" to 2" factory installed, closed cell flexible foam insulation

- Drain risers are type "L" copper (insulation included), in nominal 3/4" or 1 1/4" diameter.
- Optional M or K type copper is available with closed cell insulation.

NOTICE

Insulation thickness is limited on larger risers on the small cabinet due to physical space available.

The riser is a vertical pipe system, usually copper, that carries the supply, return (chilled and/or hot), and condensate water to and from a vertical stack fan coil unit.

Riser systems are installed in multi-story buildings where vertical stack hi-rise fan coil units are installed on top of each other, floor-by-floor. The risers interconnect the individual fan coil units as one moves from floor-to-floor, forming a "stack" as the risers ascend vertically through the building. Installation of the vertical stack fan coil unit is quick with no lateral runs of copper piping off the main riser lines.

Vertical stack fan coil units are available in both two-pipe and four-pipe systems. Two-pipe systems can provide chilled water only, or can be installed as a changeover system that switches seasonally from a chilled water system to a hot water system. Dedicated chilled water systems are common in warmer climates, but can be augmented with a dedicated electric heater. More temperate climates will use the changeover system when their cooler months will only require heating and their warmer months will only require cooling. Four-pipe systems provide both dedicated chilled water cooling and hot water heating. Both system types come equipped with an additional riser pipe to handle the condensate that is generated during cooling. A heating only two-pipe system can be selected without a condensate riser.

Riser Location

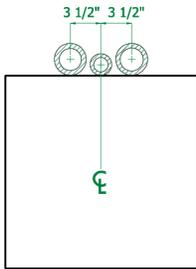
Risers can be installed on any of the three free sides of the fan coil unit cabinet. The front of the unit is always defined by the location of the return air/access panel. Left, right, and back are all determined as if you were standing in front of the unit looking at the return air/access panel. In addition to the three primary riser orientations, a "reverse" version of each is available to aid in the elimination of cross-over piping when the unit locations change on the floor plans as one moves up through the building.

Chilled water, hot water, and condensate risers are factory insulated to avoid condensation and/or heat loss. Factory insulation and installation of risers on the fan coil unit is standard and is recommended to minimize installation costs and to assure quality control of the insulation application. Insulation is available in a variety of materials (glass fiber, closed cell polyolefin foam, and closed cell elastomeric) and thicknesses (3/8" thru 1"), though not all material types are available in all sizes. Depending on region and climate, condensate riser insulation may or may not be necessary. Factory insulation is typically only fitted to the riser within the cabinet height as the ends of the riser should be accessible for connection to the units above/below. The exposed riser areas are then insulated in the field after installation and pressure testing.

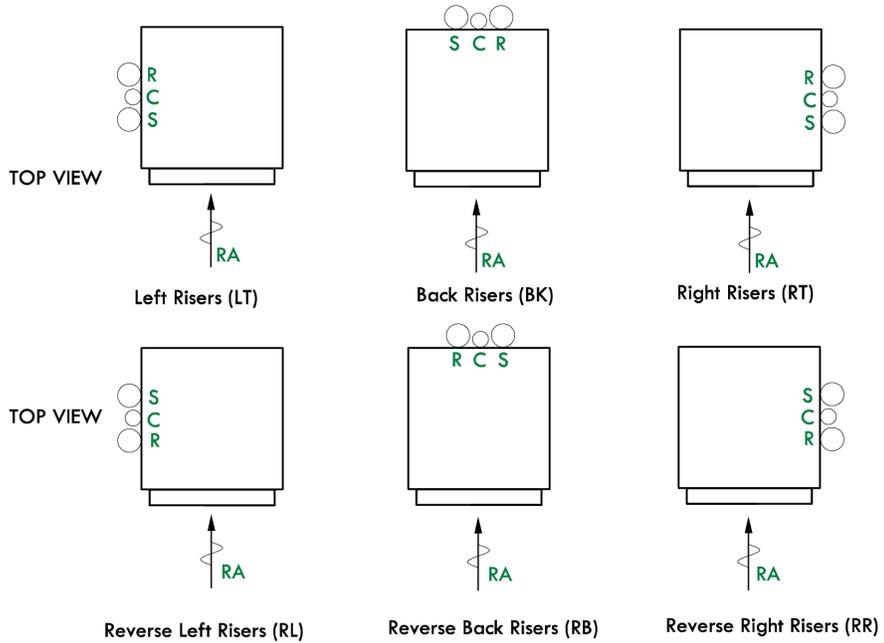
It is important to consider the centerlines of the riser pipes when selecting insulation thickness. Some compression of riser insulation can occur, but in the case of a direct return system with two 3" diameter risers side by side with 1" of insulation, a 5" spacing between center lines would be required, and not the 3 3/4" that they are designed for.

Figure 1: Riser Systems

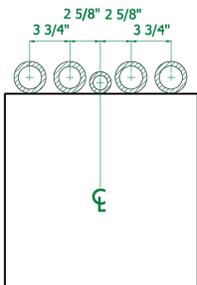
2 PIPE SYSTEMS



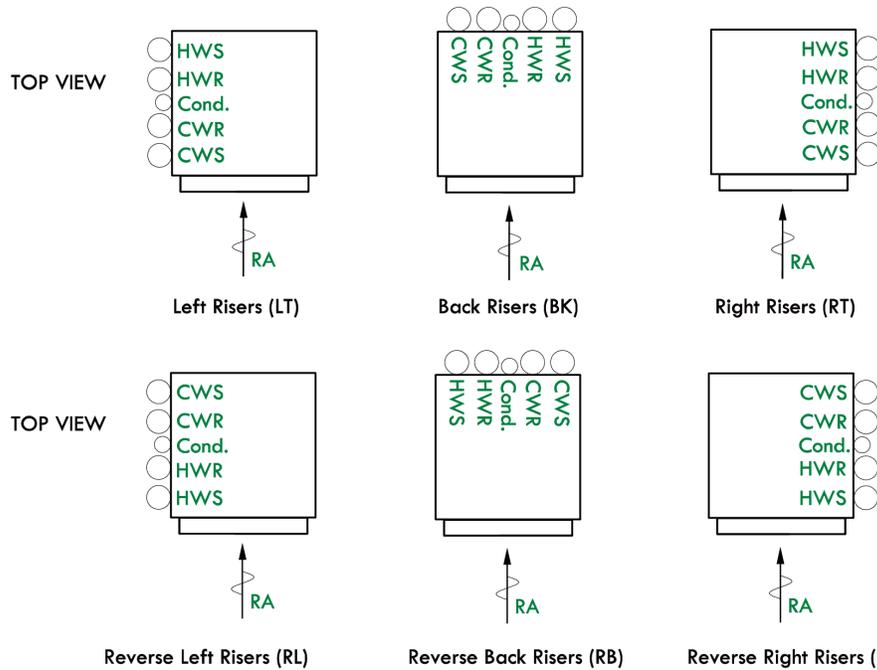
S = Supply Riser
R = Return Riser
C = Condensate Riser



4 PIPE SYSTEMS



HWS = Hot Water Supply Riser
HWR = Hot Water Return Riser
CWS = Chilled Water Supply Riser
CWR = Chilled Water Return Riser
Cond. = Condensate Riser



Reverse Riser orientations are used to aid in eliminating cross over piping when units on a riser stack change position from floor to floor or when two units share a common riser (Master/Secondary).



Direct & Reverse Return

There are two typical methods for designing and installing a riser stack; direct return and reverse return. Both offer their own advantages and disadvantages.

Direct Return

Advantages:

- Cost-effective and simple
- Straightforward installation
- Less confusion about properly sizing the risers

Disadvantages:

- The pressure drop is not equal at each unit on the stack. The total pressure drop on the path that the water takes to the top floor is much greater than the path to the unit on the lower floor(s) near the main/pump. A means of balancing the water flows at each floor must be provided. If a means for balancing is not provided, it is possible that there will be no water flow through the upper units on the stack due to height and friction loss. Balancing is most often achieved by including a balancing valve on the return side of the coil piping package, either a manual balancing valve or an auto-flow balancing valve that is paired with a strainer on the coil supply side. Either option adds cost to the piping package in the unit.

Reverse Return

Advantages:

- The system can be designed so that the total system pressure drop through each unit is automatically equalized.
- The overall pressure drop is lower – offering the potential for energy savings.
- Fewer components in the piping package.
- Easier to accommodate larger riser pipe sizes and insulation thicknesses.
- Can eliminate the need for balancing valves and strainers.

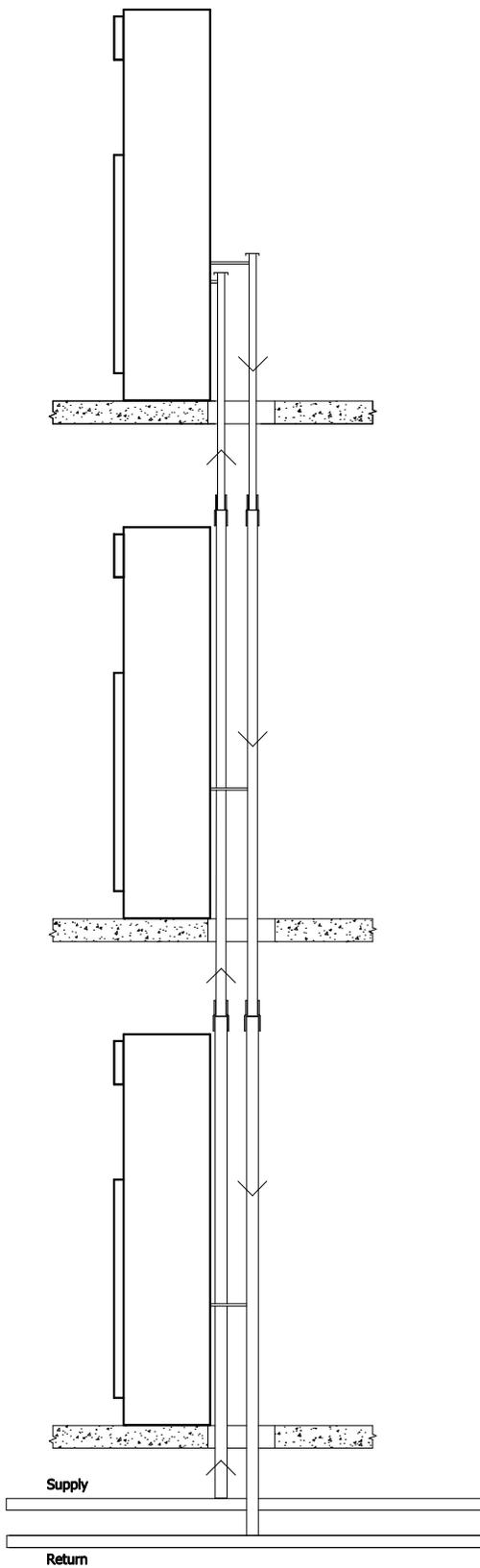
Disadvantages:

- At least one additional “express” return main/riser is required to collect all of the return water from all the stacks back to the boiler/chiller.
- The design of the system is more complex/less intuitive.
 - Supply side risers start at the main with the largest size and decrease in size as they reach the end of the stack.
 - Return side risers start at the smallest size and increase in size as they reach the end of the stack.
 - This can make the reverse return riser difficult to understand; however, if the stack is “balanced” with an equal number of pipes of each size on each side of the stack it begins to make sense.

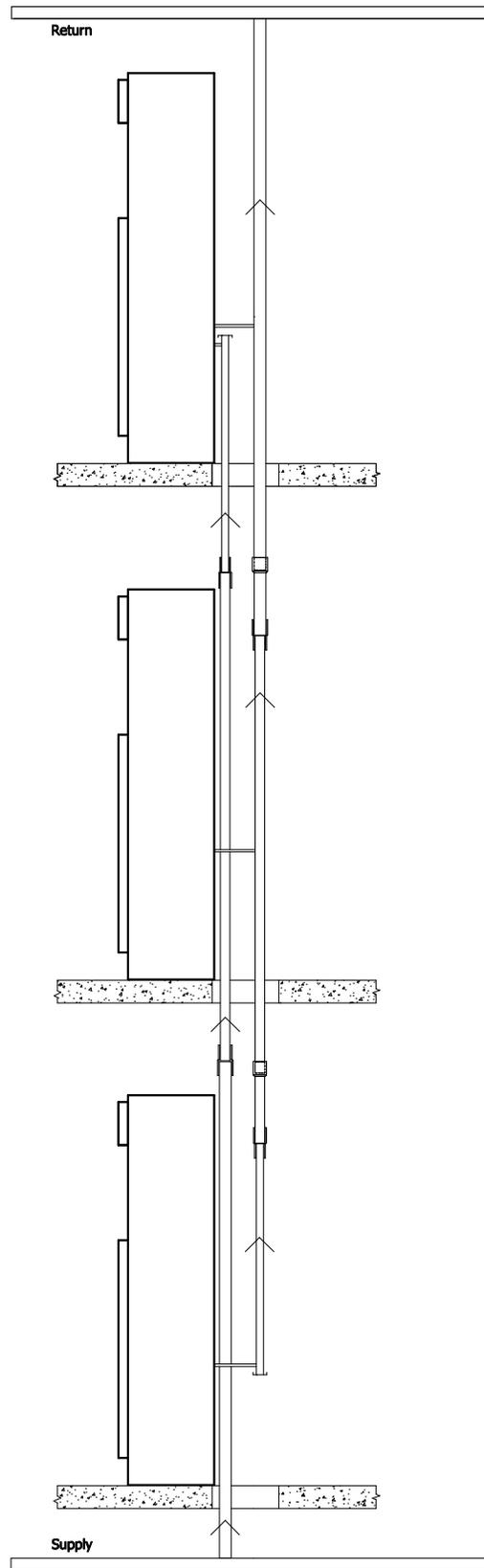
NOTICE

Some reverse return systems will employ an express return riser on each stack to take the return back to the mechanical room; however, this is very rare.

Figure 2: Direct Return Versus Reverse Return
Direct Return



Reverse Return



Riser Pipe Sizes

NOTICE

The design, selection of components, and specifications for a building's riser system are typically the responsibility of the mechanical engineering company retained on a given project. This guide is to be used solely as a guide document.

Copper pipe is used for risers. Job specifications will dictate the type of piping to be used. There are two types of copper available from Daikin Applied, type L and type M; the difference between the two being the wall thickness of the copper pipe. For most applications either type is adequate. Condensate risers do not need to be type L and will be assumed type M unless advised otherwise.

Sizing the risers can be determined by totaling the sum of the flow required for all the units on the stack. By tracking the flow required in the stack as one ascends the building, the riser sizes should increase or decrease to accommodate the flow. The risers closest to the supply and return mains will be carrying the greatest amount of water and will be the largest, the risers furthest from the mains will carry the least amount of water and will be the smallest. Risers are available from ¾" up to 3" in diameter.

The tables on the following pages are the general guidelines for the pipe sizes that Daikin Applied typically supplies for a riser system. There can be some variation of where the size transition should occur, +/- a few GPM. This is based on design criteria for frictional loss of 2 ft per 100 ft of pipe. Actual project velocity limits may be different than these based on the type of service, annual operating hours, or other guidelines as defined in the job specifications.

Direct Return

- Assuming the main is at the bottom of the stack, the largest risers will be located at the bottom of the stack. As the water diverts out of the supply riser and into the unit, it is subtracted from the supply side volume and the risers decrease in diameter as they get further from the main.
- Since the water is returning down after the water goes through the unit, it flows back out into the return riser. The return riser then carries all the water of the units above it, and so the risers also decrease in diameter as they get further from the main.

Reverse Return Risers

- Again assuming the main is at the bottom of the stack, the largest supply risers will be located at the bottom of the stack. As the water diverts out of the supply riser and into the unit, it is subtracted from the supply side, and the risers decrease in diameter as they get further from the main.
- Unlike the direct return, the return is being drawn up the stack, and therefore as the riser ascends the building it carries the water of all the units below, and it increases in diameter as they get further from the main.
- A reverse return riser system is "balanced" when the total number of pipes of a given size are the same on both the supply and return sides.

NOTICE

In both direct and reverse return risers, the whole system can be flipped with the mains located at the top.

Riser Capping

Risers are typically capped at the end of the riser stack. Either top capped (TC) at the top, or bottom capped (BC) at the bottom. Direct returns are typically top capped for both supply and return with the bottoms connected to the main. Reverse returns have their returns capped at the bottom, and supply risers are capped at the top. Unless the mains are located at the opposite end of the building, then as above, flip your capping locations.

Riser drain valves, riser air vents, and riser balancing valves, if required, are typically supplied and installed by the contractor.

Riser Pipe Sizing

Table 1: Dimensional Data of Type M & L Copper

Riser Size	Type M			Type L		
	OD	ID	Wall Thickness	OD	ID	Wall Thickness
3/4"	0.875	0.811	0.032	0.875	0.785	0.045
1"	1.125	1.055	0.035	1.125	1.025	0.05
1-1/4"	1.375	1.291	0.042	1.375	1.265	0.055
1-1/2"	1.625	1.527	0.049	1.625	1.505	0.06
2"	2.125	2.009	0.058	2.125	1.985	0.07
2-1/2"	2.625	2.495	0.065	2.625	2.465	0.08
3"	3.125	2.981	0.072	3.125	2.945	0.09

Table 2: Supply and Return Riser Pipe Sizing Guidelines (L & M* Copper)

Pipe Size	GPM
3/4"	< 4
1"	< 9
1-1/4"	< 14
1-1/2"	< 25
2"	< 50
2-1/2"	< 75
3"	< 120

*M copper is more typical for use in condensate risers.

Table 3: Condensate Pipe Sizing Guidelines

Location in Riser Stack	Pipe Size	Max Size Used
Top 4 Floors	3/4"	1 to 4 Story
Next Lower 10 Floors	1"	5 to 14 Story
Next Lower 12 Floors	1-1/4"	15 to 26 Story
Next Lower 12 Floors	1-1/2"	27 to 38 Story

Table 4: Typical 2-Pipe Direct Return Riser Schedule

Floor	CWS	CWR	Condenser	GPM in Supply	GPM in Return
First	2"	2"	1"	32.5	32.5
Second	2"	2"	1"	30	30
Third	2"	2"	1"	27.5	27.5
Fourth	2"	2"	1"	25	25
Fifth	2" > 1-1/2"	2" > 1-1/2"	1"	22.5	22.5
Sixth	1-1/2"	1-1/2"	1"	20	20
Seventh	1-1/2"	1-1/2"	1"	17.5	17.5
Eighth	1-1/2"	1-1/2"	1"	15	15
Ninth	1-1/2" > 1-1/4"	1-1/2" > 1-1/4"	1" > 3/4"	12.5	12.5
Tenth	1-1/4" > 1"	1-1/4" > 1"	3/4"	10	10
Eleventh	1"	1"	3/4"	7.5	7.5
Twelfth	1" > 3/4"	1" > 3/4"	3/4"	5	5
Thirteenth	3/4" TC	3/4" TC	3/4"	2.5	2.5

NOTE: TC = Top Capped Riser, BC = Bottom Capped Riser

Table 5: Typical 2-Pipe Reverse Return Riser Schedule

Floor	CWS	CWR	Condenser	GPM in Supply	GPM in Return
First	2"	3/4" < 1" BC	1"	32.5	5
Second	2"	1"	1"	30	7.5
Third	2"	1" < 1-1/4"	1"	27.5	10
Fourth	2"	1-1/4" < 1-1/2"	1"	25	12.5
Fifth	2" > 1-1/2"	1-1/2"	1"	22.5	15
Sixth	1-1/2"	1-1/2"	1"	20	17.5
Seventh	1-1/2"	1-1/2"	1"	17.5	20
Eighth	1-1/2"	1-1/2" < 2"	1"	15	22.5
Ninth	1-1/2" > 1-1/4"	2"	1" > 3/4"	12.5	25
Tenth	1-1/4" > 1"	2"	3/4"	10	27.5
Eleventh	1"	2"	3/4"	7.5	30
Twelfth	1" > 3/4"	2"	3/4"	5	32.5
Thirteenth	3/4" TC	2"	3/4"	2.5	35

NOTE: TC = Top Capped Riser, BC = Bottom Capped Riser

Riser Length

Risers are coupled together using a swaged connection. The swage is the expanded portion at the top of the riser that allows for the insertion of the riser from above of the same nominal pipe size. Once inserted into the swage, the risers are soldered together. Do not use brazing as this will cause the pipe to overheat and damage the pipe insulation. It is critical to ensure that the horizontal run-out from each riser to the coil is centered in the slot in the cabinet and that the run-out from the riser is at 90° as it enters the cabinet prior to soldering the risers. If the run-out is not centered in the opening it can be damaged when the risers expand/contract.

The length of the swage is approximately 3", this length allows for some tolerance in building floor-to-floor distances. Each riser joint must be aligned vertically, with a minimum of 1" penetration, though 2" is preferred.

This condition will be met if the floor-to-floor dimensions are as specified and each branch run-out is properly centered. Wide variations in the floor-to-floor dimension may necessitate field modifications to factory risers.

An alternate to swaged connections are compression coupling systems like ProPress®. If these fittings are to be used, the risers are supplied plain ended from the factory with no swaging.

Daikin Applied risers extend 6" above the 86" unit cabinet. From the top of the slab to the top of the riser is 92".

This height is to be maintained for all units on all floors to ensure that the run-out from the riser to the unit is centered in the opening, as noted above. The remaining riser length extends below the unit cabinet and through the floor slab (typical floor slab is 8").

The required riser length is determined by knowing the floor-to-floor height (top of slab to top of slab) and adding the additional length of pipe for insertion into the swaged end (typically 2").

The equation $L = F + 2"$ is used to determine the length of the riser. Where F is your floor-to floor height and the 2" is added for insertion into the swaged end of the riser below.

EXAMPLE: If $F = 110"$

$$L = 110" + 2" = 112"$$

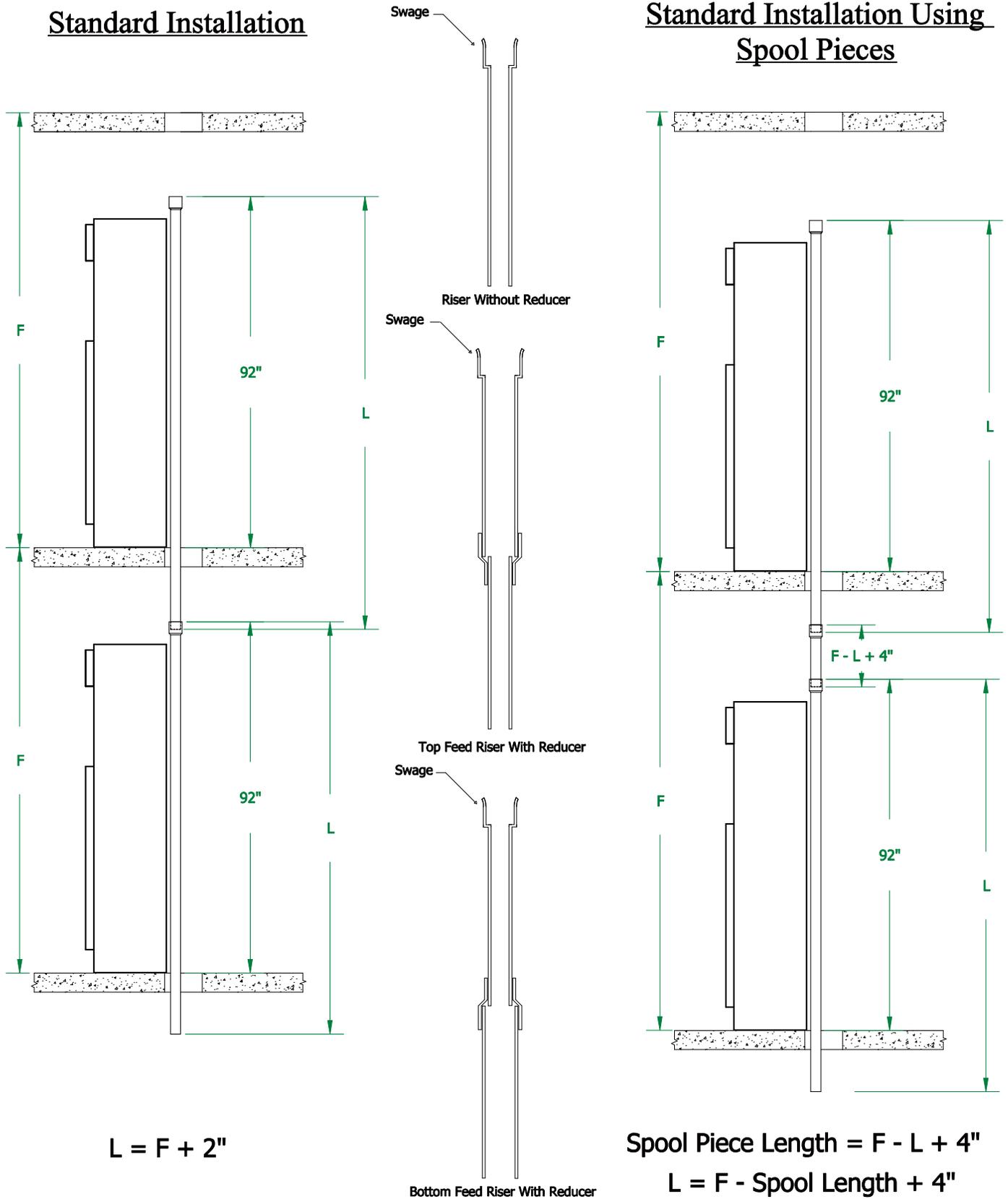
Daikin Applied risers can be supplied up to 120" in length. Though a 120" riser will extend 28" below the unit cabinet and can be difficult to maneuver through a floor slab on site. When the floor-to-floor height exceeds 118" or if 28" below the unit is deemed too long, spool pieces can be provided to fill in the gap.

When spool pieces are used, the riser length provided on the units is typically 108" but can be any dimension up to 120". The spool piece length is determined by the equation $Spool = F - L + 4"$ where the F still equals your floor-to-floor height, L equals the riser length provided on the unit, and the 4" allows for the insertion above and below on the spool piece.

EXAMPLE: If $F = 144"$ and $L = 108"$

$$Spool = 144" - 108" + 4" = 40"$$

Figure 3: Riser Lengths



Fan Coil Units Without Risers

WARNING

The insulation of the run-outs from the riser to the shut-off valve is the responsibility of the installing contractor.

When a fan coil unit is provided without risers it is called a secondary unit. Secondary units may be provided for a number of reasons, including:

- There are existing risers that this new unit will be connected to.
- The unit is part of a master/secondary pair where a single riser is used to feed a pair of fan coil units. The master unit ships with the riser attached and the secondary unit is connected to a run-out on the master unit by the contractor in the field (typical of hotel applications with mirrored room layouts).

The pipe connections are the same for a secondary unit as a unit with the risers attached. Only the riser is missing. A few simple steps are required to install a secondary unit to the field riser.

1. Remove the shut-off valve supplied in the unit by releasing the union on the coil side.

2. Solder the run-out end of the shut-off valve to the existing riser run-out.

NOTICE

Some field piping may be required to bridge the distance between the riser and the secondary unit.

3. Slide the secondary unit into position so that the shut-off valve passes through the 2" × 5" opening in the unit.
4. The shut-off valve should be inside the fan coil unit so that once the unit is furred-in the shut-off valve will be accessible and the handle fully operable through the return air access panel.
5. Re-attach the union side of the shut-off valve to the coil piping package inside the fan coil unit.
6. Connect the condensate run-out to the condensate riser.

As with risers attached to the fan coil unit, it is important to center the run-out from the riser to the unit in the opening on the cabinet to allow for the natural expansion and contraction in the riser system.

Control Packages

Table 6: Thermostats (24VAC)

Model	System Settings/ Changeover	Programmable	NO/NC	Valve Control	Available Fan Speeds	Description
 TE226	Auto	Yes	NO or NC	2-Position	On/Auto	0-10VDC Fan Control; 4 pipe or 2 pipe w/ electric heat fan coil option
 TE246	Auto	Yes	NO or NC	2-Position	On/Auto	0-10VDC Fan Control; 2 pipe w/out electric heat fan coil option
 MIT-FA-005	Auto	Yes	NO or NC	Modulating or 2-Position	On/Auto	0-10VDC fan control, BACnet compatible
 Johnson Controls TEC 3000	Auto	Yes	NO or NC	Modulating, 2-Position, or Floating Point	3	3 Spd Fan Control
 EVO	N/A	N/A	N/A	N/A	N/A	Converts conventional 3-Spd thermostat fan signal to 0-10VDC; allows max RPM adjustment for each speed

NOTE: EVO board is required with any thermostat that does not have a 0-10VDC fan speed output

Performance Data

Cooling Capacities

AHRI-Certified cooling performance is based on ANSI/AHRI Standard 440-2008: Performance Rating of Room Fan Coils: 80/67°F entering air temperature, 45°F entering chilled water temperature with a 10°F delta T. All performance measured on high speed tap using 120V AC motor, 0.05 inches ESP without filters or grilles.

Table 7: Cooling Capacities

Size	Coil	Airflow (cfm)	Total Capacity (MBh)	Sensible Capacity (MBh)	Water Flow (GPM)	WPD (ft H ₂ O)	Power Input (w)
300	3 Row of cooling/14 fpi	300	9.0	6.3	2.1	4.5	30
	4 Row of cooling/14 fpi	300	9.8	6.7	2.3	3.7	30
	3 Row of cooling/12 fpi	300	8.3	6.0	1.95	3.7	28
	4 Rows of cooling/12 fpi	300	9.1	6.5	2.14	3.4	29
400	3 Row of cooling/14 fpi	400	11.0	8.0	2.6	6.6	58
	4 Row of cooling/14 fpi	400	12.0	8.6	2.8	5.6	58
	3 Row of cooling/12 fpi	400	10.2	7.6	2.4	5.1	56
	4 Row of cooling/12fpi	400	11.2	8.2	2.63	4.9	57
600	3 Row of cooling/14 fpi	600	19.2	13.2	4.5	12.9	65
	4 Row of cooling/14 fpi	600	21.7	14.3	5.1	15.4	65
	3 Row of cooling/12 fpi	600	17.9	12.5	4.2	11.7	61
	4 Row of cooling/12 fpi	600	20.4	13.7	4.8	19.1	63
800	3 Row of cooling/14 fpi	800	23.7	17.3	5.6	19.7	141
	4 Row of cooling/14 fpi	800	27.1	19.0	6.4	22.9	141
	3 Row of cooling/12 fpi	800	21.7	16.3	5.1	16.4	137
	4 Row of cooling/12 fpi	800	25.2	18.1	5.9	17.9	139
1000	3 Row of cooling/14 fpi	1000	31.4	22.3	7.4	18.9	176
	4 Row of cooling/14 fpi	1000	36.0	24.6	8.5	16.5	176
	3 Row of cooling/12 fpi	1000	29.0	21.1	6.8	15.2	172
	4 Row of cooling/12 fpi	1000	33.7	23.5	7.9	16.5	174
1200	3 Row of cooling/14 fpi	1200	35.2	25.7	8.3	20.4	281
	4 Row of cooling/14 fpi	1200	40.8	28.5	9.6	18.9	281
	3 Row of cooling/12 fpi	1200	32.4	24.2	7.6	18.8	277
	4 Row of cooling/12 fpi	1200	38.2	27.2	9.0	19.9	279

Heating Capacities

Heating performance is based on 70°F entering air temperature, and listed entering water temperatures. All performance measured on high speed tap using 120V AC motor, 0.05 inches ESP without filters or grilles. 1-row and 2-row coils are in the preheat configuration as part of a 4-pipe system. 3-row and 4-row coils are only available as part of a 2-pipe system.

Table 8: Heating Capacities – Cabinet 300-400

Size		Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)	Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)	Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)
CFM	Rows Heating	1.0 GPM			2.0 GPM			3.0 GPM		
Entering Water Temp. 140°F										
300	1-Row Heating	9.4	0.8	119	10.7	2.6	128	11.2	5.4	132
300	2-Row Heating	12.5	0.2	113	14.9	0.8	124	15.7	1.6	129
400	1-Row Heating	10.7	0.8	117	12.5	2.6	127	13.3	5.4	131
400	2-Row Heating	14.2	0.2	110	17.7	0.8	121	19.0	1.6	126
Entering Water Temp. 160°F										
300	1-Row Heating	12.2	0.8	133	13.9	2.5	145	14.5	5.1	149
300	2-Row Heating	16.3	0.2	125	19.2	0.8	139	20.3	1.5	145
400	1-Row Heating	13.9	0.8	130	16.2	2.5	143	17.1	5.1	148
400	2-Row Heating	18.5	0.2	120	22.9	0.8	135	24.6	1.5	142
Entering Water Temp. 180°F										
300	1-Row Heating	15.0	0.7	147	17.0	2.4	161	17.6	4.8	166
300	2-Row Heating	20.2	0.2	136	23.7	0.7	154	25.0	1.5	162
400	1-Row Heating	17.1	0.7	143	19.9	2.4	158	21.1	4.9	165
400	2-Row Heating	23.0	0.2	130	28.8	0.7	149	30.3	1.5	158

Table 9: Heating Capacities – Cabinet 600-800

Size		Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)	Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)	Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)
CFM	Rows Heating	1.5 GPM			2.5 GPM			3.5 GPM		
Entering Water Temp. 140°F										
600	1-Row Heating	17.0	0.4	116	19.5	0.9	123	20.8	1.7	127
600	2-Row Heating	24.7	0.8	105	28.5	1.9	116	30.3	3.4	121
800	1-Row Heating	19.1	0.4	113	22.4	0.9	121	24.1	1.7	125
800	2-Row Heating	27.9	0.8	100	33.5	1.9	111	36.2	3.4	118
Entering Water Temp. 160°F										
600	1-Row Heating	22.2	0.4	128	25.2	0.9	138	26.7	1.6	143
600	2-Row Heating	32.1	0.8	114	36.9	1.8	130	39.2	3.3	136
800	1-Row Heating	25.0	0.4	124	29.1	0.9	135	31.3	1.6	141
800	2-Row Heating	36.3	0.8	108	43.3	1.8	123	46.8	3.3	131
Entering Water Temp. 180°F										
600	1-Row Heating	27.3	0.3	141	30.9	0.8	153	33.0	1.5	159
600	2-Row Heating	39.4	0.7	123	45.3	1.7	141	48.1	3.1	150
800	1-Row Heating	30.8	0.4	136	35.8	0.8	149	38.5	1.5	156
800	2-Row Heating	44.7	0.7	116	53.2	1.8	134	57.5	3.1	144

Table 10: Heating Capacities – Cabinet 1000-1200

Size		Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)	Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)	Total Capacity (MBh)	WPD (ft H ₂ O)	LWT (°F)
CFM	Rows Heating	2.5 GPM			3.5 GPM			4.5 GPM		
Entering Water Temp. 140°F										
1000	1-Row Heating	24.4	1.1	119	26.4	2.0	124	27.6	3.0	127
1000	2-Row Heating	36.8	2.3	108	40.2	4.0	115	42.2	6.2	119
1200	1-Row Heating	26.5	1.1	117	28.9	2.0	122	30.4	3.0	125
1200	2-Row Heating	39.9	2.3	105	44.2	4.1	112	46.8	6.3	117
Entering Water Temp. 160°F										
1000	1-Row Heating	31.9	1.0	133	34.1	1.9	139	35.5	2.9	143
1000	2-Row Heating	47.5	2.2	118	51.9	3.9	127	54.5	6.0	133
1200	1-Row Heating	34.4	1.1	129	37.4	1.9	136	39.3	2.9	141
1200	2-Row Heating	51.6	2.2	114	57.1	3.9	124	60.5	6.0	130
Entering Water Temp. 180°F										
1000	1-Row Heating	39.1	1.0	147	42.2	1.8	154	43.1	2.8	157
1000	2-Row Heating	58.3	2.1	128	63.7	3.7	139	65.3	5.7	145
1200	1-Row Heating	42.4	1.0	142	46.0	1.8	151	48.3	2.8	156
1200	2-Row Heating	63.4	2.1	123	70.1	3.7	135	74.2	5.7	143

AHRI-440 Rated Fan Curves

Figure 4: AHRI-440 Fan Curves: Sizes 03-04

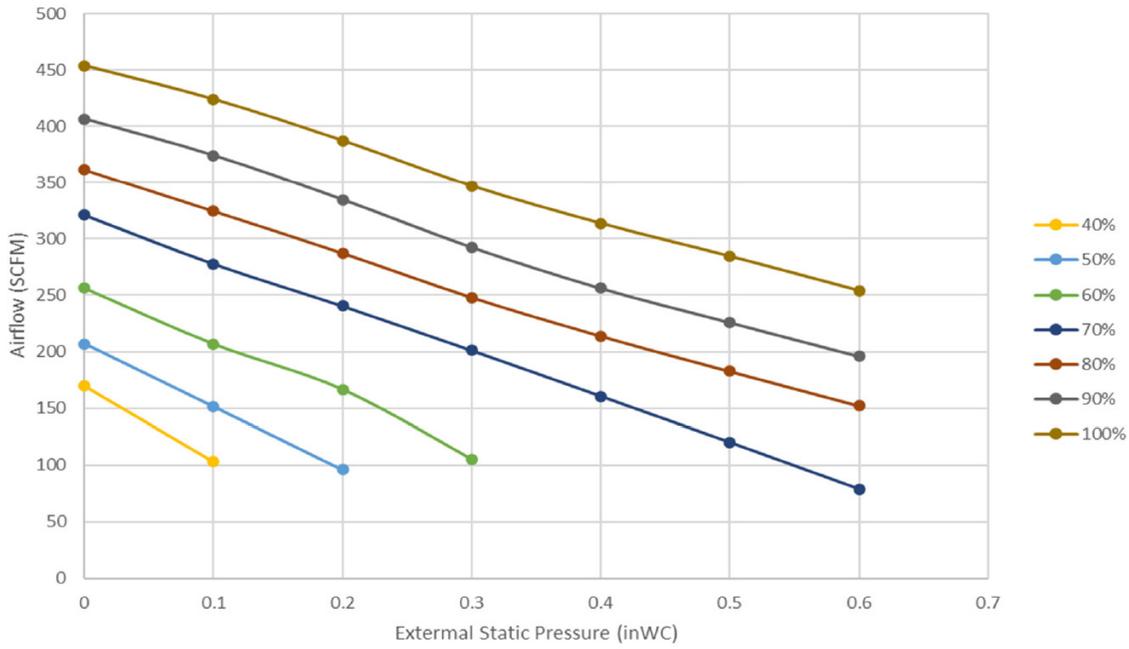


Figure 5: AHRI-440 Fan Curves: Sizes 06-08

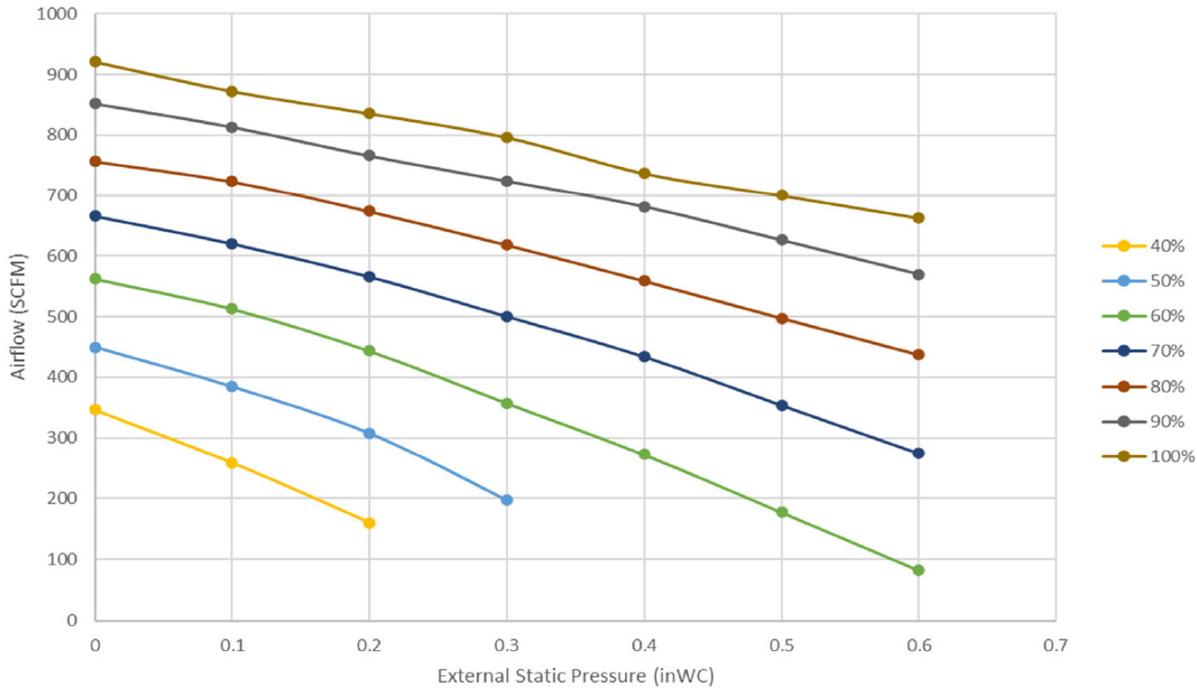


Figure 6: AHRI-440 Fan Curves: Sizes 10-12 at 100-130VAC

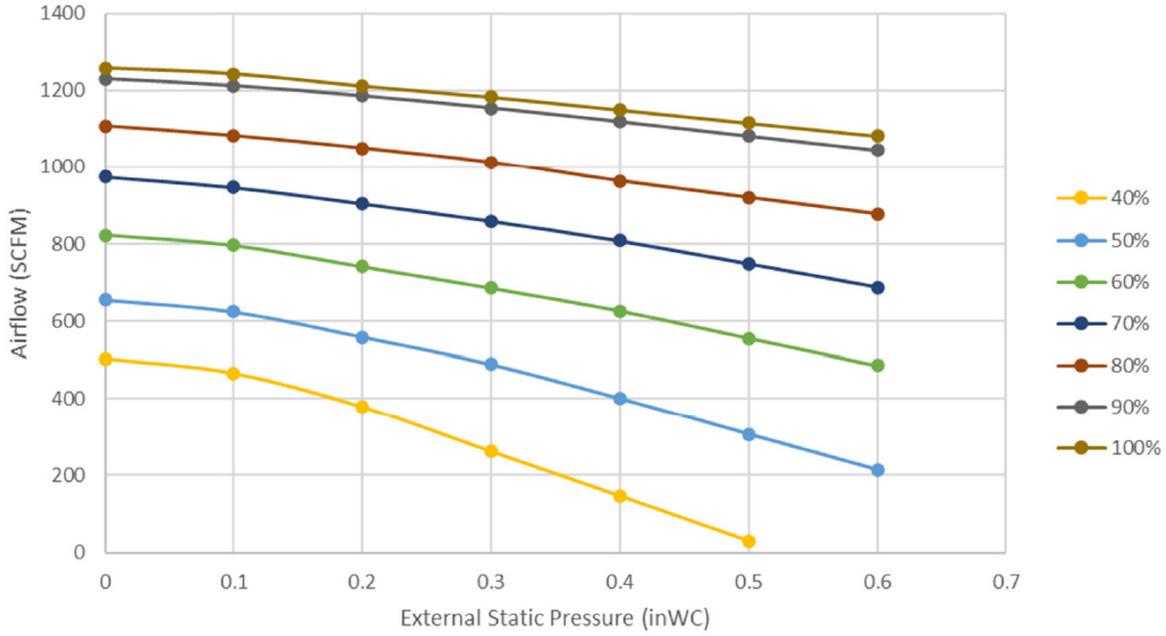
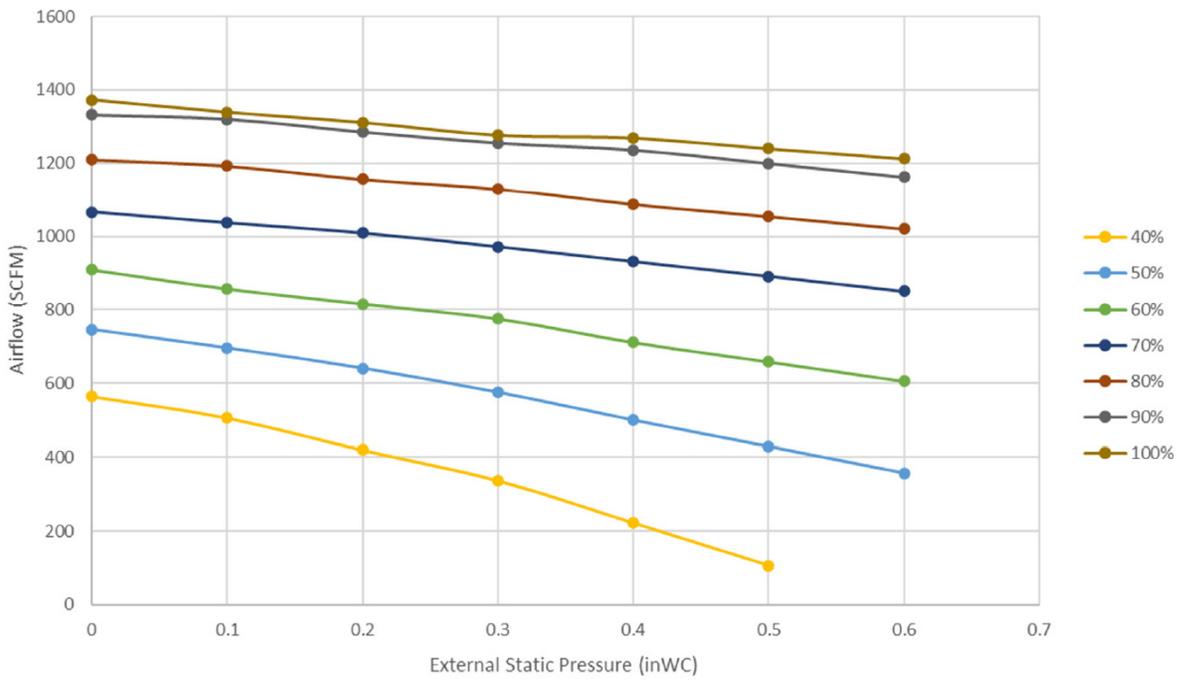


Figure 7: AHRI-440 Fan Curves: Sizes 10-12 at 200-277 VAC



Electric Heat

Table 11: Electric Heat Data

Model	kW Volts/ph/Hz	Heater Amps												
		0.75	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0
300/400	120V/1/60	6.3	8.3	12.5	16.7	—	—	—	—	—	—	—	—	—
	208V/1/60	—	4.8	7.2	9.6	12.0	14.4	16.8	—	—	—	—	—	
	240V/1/60	—	4.2	6.3	8.3	10.4	12.5	14.6	—	—	—	—	—	
	277V/1/60	—	3.6	5.4	7.2	9.0	10.8	12.6	—	—	—	—	—	
600/800	120V/1/60	6.3	8.3	12.5	16.7	—	—	—	—	—	—	—	—	
	208V/1/60	—	4.8	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24.0	28.8	—	
	240V/1/60	—	4.2	6.3	8.3	10.4	12.5	14.6	16.7	18.8	20.8	25.0	—	
	277V/1/60	—	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.1	21.7	—	
1000/1200	120V/1/60	6.3	8.3	12.5	16.7	—	—	—	—	—	—	—	—	
	208V/1/60	—	4.8	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24.0	28.8	33.7	
	240V/1/60	—	4.2	6.3	8.3	10.4	12.5	14.6	16.7	18.8	20.8	25.0	29.2	
	277V/1/60	—	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.1	21.7	25.3	

- Heaters are wired for single stage operation
- An Auto-reset high limit device is included
- Power connection is single point
- The heater is located in the reheat position relative to the cooling coil
- The fan coil unit does not include a fuse or fusible type disconnect. Motor sub-fusing as per electrical code.

$$\text{Amps} = \frac{\text{Watts}}{\text{Volts}}$$

$$\text{Air temp. rise (Delta T)} = \frac{\text{kW} \times 3160}{\text{CFM}} = \frac{\text{MBH} \times 925}{\text{CFM}}$$

S.A. = Supply Air

FLA = Full Load Amps
= S.A fan motor Amps + Electric Heater Amps

MCA = Minimum Circuit Ampacity
= FLA x 1.25

MOP = Rating of maximum overcurrent protection device
= (2.25 x S.A. fan motor Amps) + Electric Heater Amps

Requirements of Standards: UL 1995 and CSA C22.2 No.236

- If the value of the calculated rating does not equal standard current rating of overcurrent protective device, the marked maximum rating shall be the next lower standard rating.
- Exception No. 1: The marked maximum rating of the overcurrent protective device shall be the standard rating next higher than the computed value if the next lower standard ratings is less than 125 percent of the current rating of an electric heater load, when the unit includes an electric heater.
- Exception No. 2: If the computed value of the overcurrent protective device is less than the minimum ampacity of the supply circuit, the marked rating of the device shall be increased to the largest standard overcurrent protective device rating appropriate for the marked minimum circuit ampacity.
- Exception No. 3: If the marked minimum circuit ampacity does not correspond to a standard protective device rating, the next higher standard rating of the protective device may be marked.

Electrical Data

Motor Data

Table 12: Motor Data

Unit Size	Connection Voltage	ECM Nameplate Data		FLA	MOP
	Volts/ph/Hz	Wattage	Amps	Amps	Amps
03	120V/1/60	85	1.3	1.63	15
	208-240V/1/60	80	0.7	0.88	15
	277V/1/60	80	0.7	0.88	15
04	120V/1/60	85	1.3	1.63	15
	208-240V/1/60	80	0.7	0.88	15
	277V/1/60	80	0.7	0.88	15
06	120V/1/60	165	2.3	2.88	15
	208-240V/1/60	168	1.4	1.75	15
	277V/1/60	168	1.4	1.75	15
08	120V/1/60	165	2.3	2.88	15
	208-240V/1/60	168	1.4	1.75	15
	277V/1/60	168	1.4	1.75	15
10	120V/1/60	345	3.0	3.75	15
	200-277V/1/60	500	2.2	2.75	15
12	120V/1/60	345	3.0	3.75	15
	200-277V/1/60	500	2.5	3.125	15

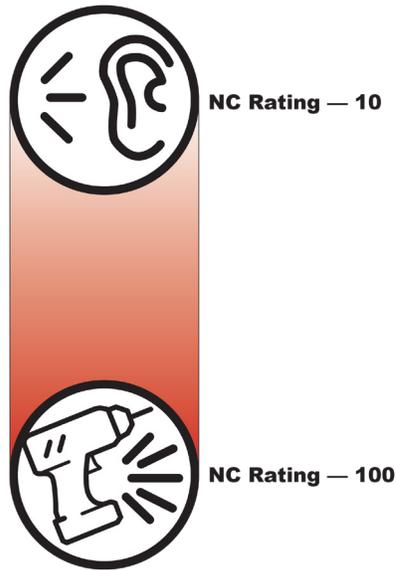
Unit Size	CFM*	Watts* (Open Discharge)
03	220	14
	272	21
	*300	29
04	328	32
	370	44
	*400	59
06	426	29
	563	50
	600	66
08	571	50
	658	74
	743	107
10	*800	142
	667	67
	776	88
	929	133
12	*1000	177
	768	97
	823	107
	1081	196
	*1200	282

*AHRI certified operating points. Other cfm readings recorded during factory performance testing

Sound

Table 13: Noise Criteria Rating

Unit Size	Motor Speed	Daikin Applied NC Rating*
03	High	22
	Medium	22
	Low	22
04	High	26
	Medium	22
	Low	22
06	High	44
	Medium	34
	Low	28
08	High	34
	Medium	31
	Low	28
10	High	46
	Medium	34
	Low	31
12	High	54
	Medium	39
	Low	32



* ASHRAE Standard 70-2006

Table 14: Casing Radiated (Free Blow) Sound Data

Model	CFM	ESP	1/3 Octave Band Frequencies (Hz)								A-wgt (dBA)
			63	125	250	500	1000	2000	4000	8000	
			Sound Power, dB								
03	300	—	59	61	49	43	38	33	27	32	48
	225	—	64	57	44	39	34	28	26	32	45
	175	—	60	52	42	38	32	26	26	32	42
04	400	—	60	60	61	49	42	37	31	32	54
	350	—	59	62	54	46	39	34	28	32	50
	300	—	59	61	49	43	38	33	27	32	48
06	400	—	67	61	42	42	39	35	29	31	48
	500	—	59	66	46	44	40	33	28	31	51
08	800	—	65	73	58	54	48	43	33	32	59
	700	—	63	72	55	51	46	40	30	32	57
	600	—	64	68	53	48	44	36	28	32	54
10	1000	—	68	73	64	58	53	49	39	33	62
	900	—	67	73	61	56	51	46	36	32	60
	800	—	65	73	58	54	48	43	33	32	59
	700	—	63	72	55	51	46	40	30	32	57
	600	—	64	68	53	48	44	36	28	32	54
12	1200	—	71	75	70	64	57	53	45	36	66
	1100	—	70	75	67	61	55	51	42	34	64
	1000	—	68	73	64	58	53	49	39	33	62
	900	—	67	73	61	56	51	46	36	32	60

Table 15: Ducted Discharge Sound Data

Model	CFM	ESP	1/3 Octave Band Frequencies (Hz)								A-wgt (dBA)
			63	125	250	500	1000	2000	4000	8000	
			Sound Power, dB								
03	400	0.0	67	57	60	48	37	31	28	32	53
	350	0.0	67	60	53	45	35	30	27	32	49
	300	0.0	66	57	49	42	35	30	27	32	47
	225	0.0	66	54	46	39	34	29	26	32	45
	175	0.0	65	52	40	37	34	28	26	32	43
	400	0.2	66	59	66	52	38	31	29	33	58
	350	0.2	65	56	61	49	37	31	28	32	54
	300	0.2	67	59	55	46	36	29	27	32	50
	225	0.2	65	55	49	43	36	32	29	32	46
175	0.2	67	58	50	42	34	28	27	32	47	
06	500	0.0	65	62	52	44	35	29	28	32	50
	450	0.0	66	61	50	42	33	28	27	32	48
	400	0.0	67	60	49	42	34	30	28	32	48
	350	0.0	74	53	43	38	32	28	28	32	49
	500	0.2	67	64	56	47	38	33	30	32	52
	450	0.2	68	61	54	45	36	32	29	32	50
	400	0.2	64	59	52	44	34	29	28	32	48
08	900	0.0	70	69	69	59	46	40	38	36	63
	800	0.0	70	68	64	55	43	37	34	33	59
	700	0.0	71	69	61	52	41	37	34	33	57
	600	0.0	68	65	57	48	38	32	29	32	53
	812	0.2	72	68	68	58	45	40	37	35	62
	700	0.2	68	67	63	53	43	38	34	34	58
	600	0.2	68	67	60	50	41	36	32	33	56
10	1000	0.0	72	68	63	55	47	39	36	33	58
	900	0.0	72	66	60	53	44	36	33	32	56
	800	0.0	69	65	57	50	41	34	30	32	54
	700	0.0	70	65	53	46	38	32	28	32	52
	600	0.0	68	63	49	43	36	29	27	32	50
	1000	0.2	73	70	65	57	48	40	37	34	60
	900	0.2	74	67	62	54	46	38	35	33	58
	800	0.2	71	65	59	51	43	35	33	33	55
	700	0.2	69	65	56	49	40	33	30	32	53
600	0.2	67	63	52	45	37	31	29	32	50	
12	1200	0.0	75	70	68	61	52	45	52	37	63
	1100	0.0	74	70	66	58	50	42	39	35	61
	1000	0.0	72	68	63	55	47	39	36	33	58
	1200	0.2	77	70	71	62	53	46	43	38	65
	1100	0.2	79	69	67	61	50	43	40	36	63
	1000	0.2	73	70	65	57	48	40	37	34	60

Dimensional Data

Side and Top Discharge Unit Dimensions

Figure 8: Side and Top Discharge Common Dimensions (inches)

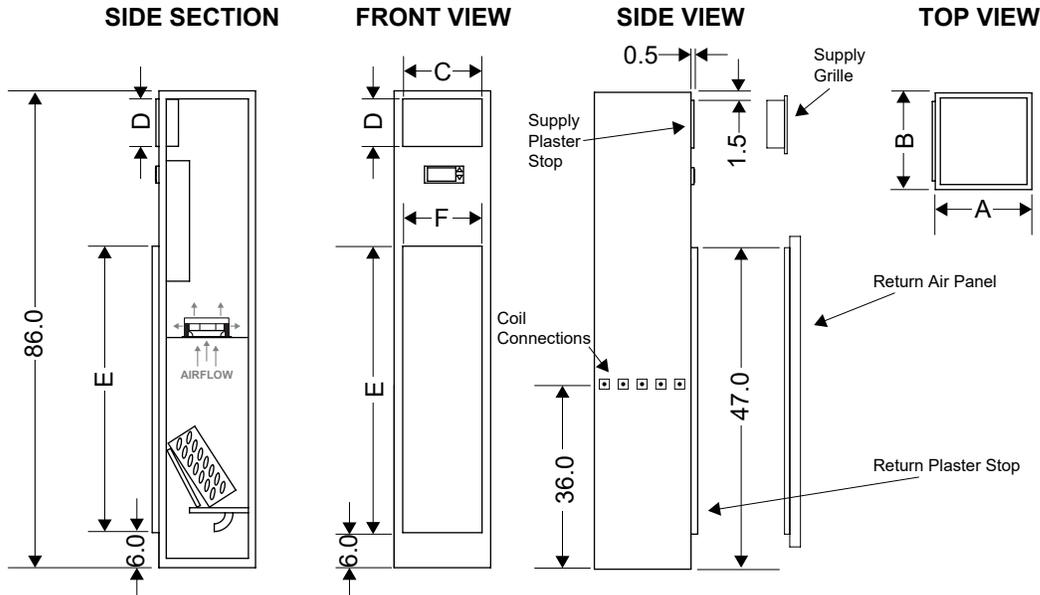


Table 16: Side and Top Discharge Common Dimensions (inches)

Size	A	B	C	D	E	F
300	15.75	15.75	14	6	52	12
400	15.75	15.75	14	6	52	12
600	20	18	14	8	52	14
800	20	18	14	10	52	14
1000	24	18	16	10	54	17.616
1200	24	18	16	12	54	17.616

Figure 9: Side and Top Discharge Detail Dimensions (inches)

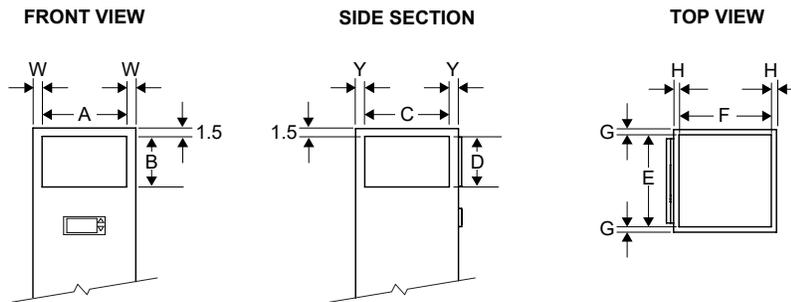


Table 17: Side and Top Discharge Detail Dimensions (inches)

Unit Size	Top Only				One Side with Top								Two Sides with Top								Three Sides with Top													
	E	F	G	H	A	B	W	C	D	Y	E	F	G	H	A	B	W	C	D	Y	E	F	G	H	A	B	W	C	D	Y	E	F	G	H
300	10	10	2.75	2.75	12	6	1.75	12	6	1.75	10	10	2.75	2.75	12	6	1.75	12	6	1.75	10	10	2.75	2.75	12	6	1.75	12	6	1.75	10	10	2.75	2.75
400	12	12	1.75	1.75	12	6	1.75	12	6	1.75	10	10	2.75	2.75	12	6	1.75	12	6	1.75	10	10	2.75	2.75	12	6	1.75	12	6	1.75	10	10	2.75	2.75
600	14	14	2	3	14	8	2	14	8	3	12	12	3	4	14	5	2	14	5	3	10	10	4	5	14	5	2	14	5	3	10	10	4	5
800	14	14	2	3	14	10	2	14	10	3	12	12	3	4	14	8	2	14	8	3	12	12	3	4	14	5	2	14	5	3	10	10	4	5
1000	16	16	1	4	14	10	2	14	10	5	14	14	2	5	14	8	2	14	8	5	12	12	3	6	14	5	2	14	5	5	12	12	3	6
1200	16	16	1	4	14	12	2	14	12	5	14	14	2	5	14	10	2	14	10	5	12	12	3	6	14	8	2	14	8	5	12	12	3	6

NOTE: Supply airflows are balanced by using a combination of grilles and registers (a grille with a damper). When units are ducted, all unit-mounted supply openings are balanced with registers. When units are not ducted, at least one supply air opening must be fitted with a grille, with the remaining supply air openings being fitted with registers.

Side Discharge Unit Dimensions

Figure 10: Side Discharge Common Dimensions (inches)

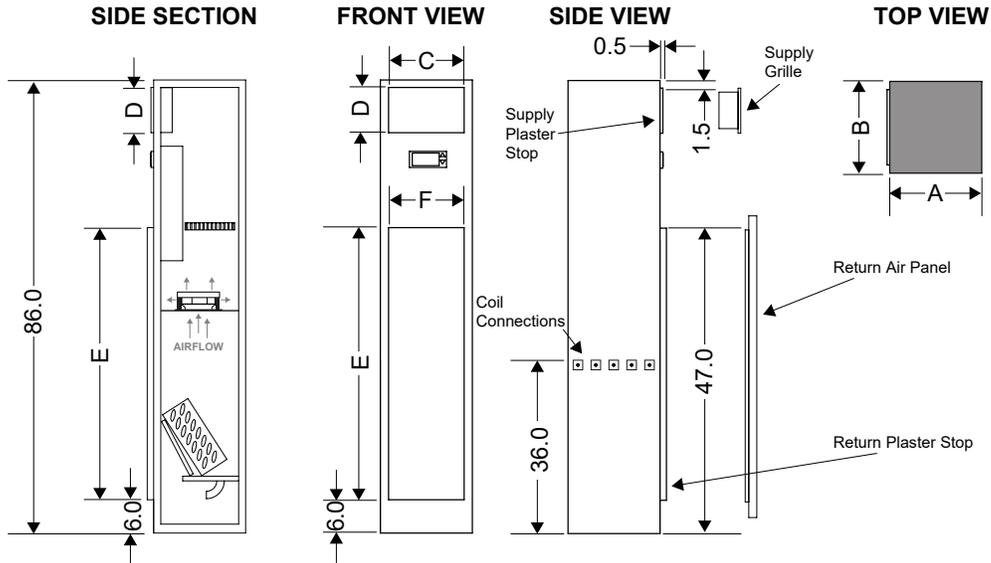


Table 18: Side Discharge Common Dimensions (inches)

Size	A	B	C	D	E	F
300	15.75	15.75	14	12	52	12
400	15.75	15.75	14	12	52	12
600	20	18	14	12	52	14
800	20	18	14	14	52	14
1000	24	18	16	14	54	17.616
1200	24	18	16	14	54	17.616

Figure 11: Side Discharge Detail Dimensions (inches)

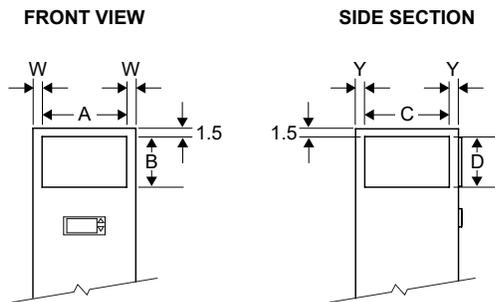


Table 19: Side Discharge Detail Dimensions (inches)

Unit Size	One Opening						Two Openings						Three Openings					
	A	B	W	C	D	Y	A	B	W	C	D	Y	A	B	W	C	D	Y
300	12	12	1.75	12	12	1.75	12	6	1.75	12	6	1.75	12	6	1.75	12	6	1.75
400	12	12	1.75	12	12	1.75	12	6	1.75	12	6	1.75	12	6	1.75	12	6	1.75
600	14	12	2	14	12	3	14	8	2	14	8	3	14	5	2	14	5	3
800	14	14	2	14	14	3	14	8	2	14	8	3	14	8	2	14	8	3
1000	16	14	1	16	14	4	14	10	2	14	10	4	14	8	2	14	8	4
1200	16	14	1	16	14	4	14	12	2	14	12	4	14	10	2	14	10	4

NOTE: Supply airflows are balanced by using a combination of grilles and registers (a grille with a damper). When units are ducted, all unit-mounted supply openings are balanced with registers. When units are not ducted, at least one supply air opening must be fitted with a grille, with the remaining supply air openings being fitted with registers.

Return Air Panels

Figure 12: Return Air Panel Common Dimensions

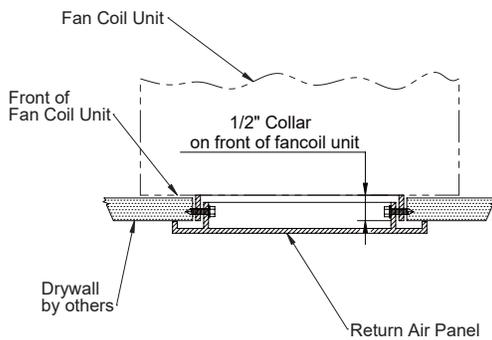
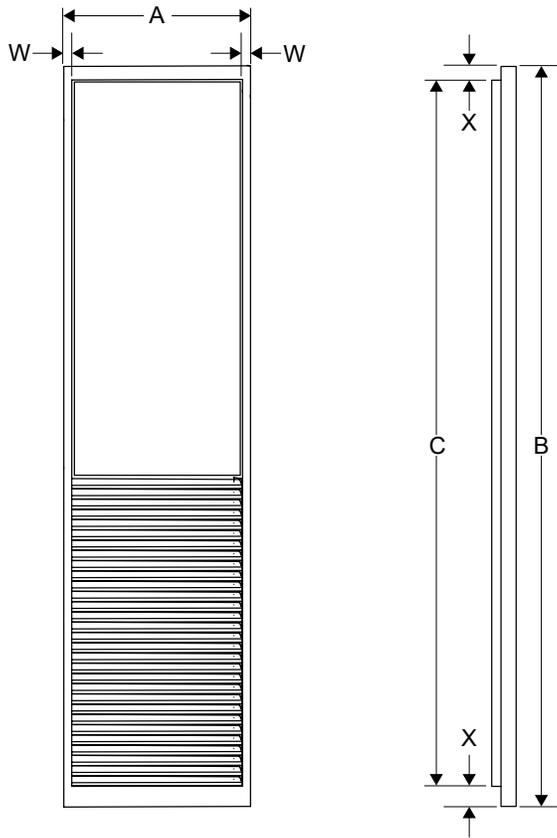


Table 20: Return Air Common Dimensions (inches)

Unit Size	A	B	C	W	X-Top	X-Bottom
300	14.303	54.178	51.928	1.125	1.214	1.036
400	14.303	54.178	51.928	1.125	1.214	1.036
600	16.366	54.178	51.928	1.125	1.214	1.036
800	16.336	54.178	51.928	1.125	1.214	1.036
1,000	19.866	56.178	53.928	1.125	1.214	1.036
1,300	19.866	56.178	53.928	1.125	1.214	1.036

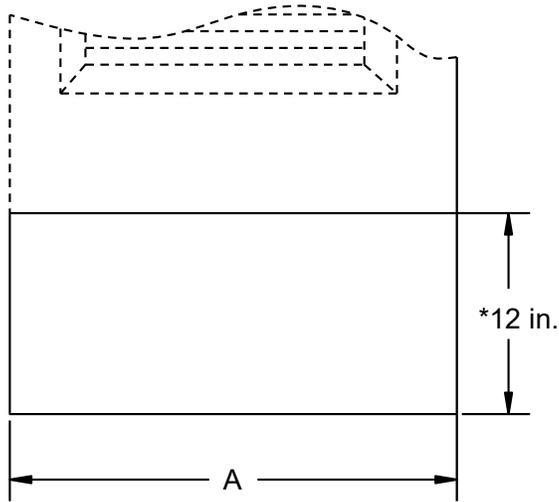
Fan Coil Weights

Table 21: Estimated Weights for OptiLine Units, lb (kg)

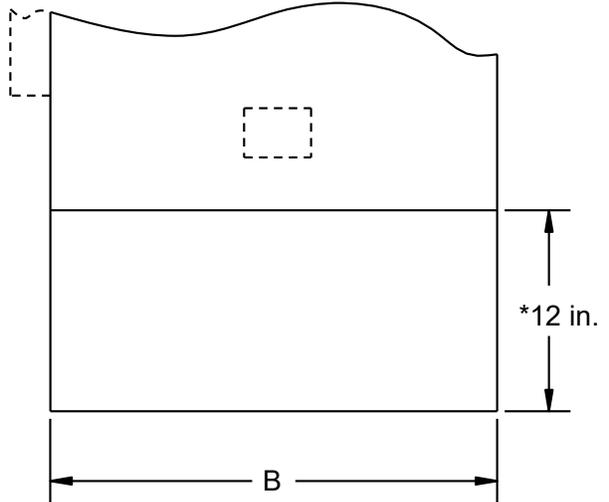
Size	Weight without Risers	Weight with Risers
300	130 (59)	157 (71)
400	130 (59)	157 (71)
600	170 (77)	197 (90)
800	180 (82)	207 (94)
1000	210 (95)	237 (108)
1200	220 (100)	247 (112)

Raised Base Options

Figure 13: Raised Base



Front View



Side View

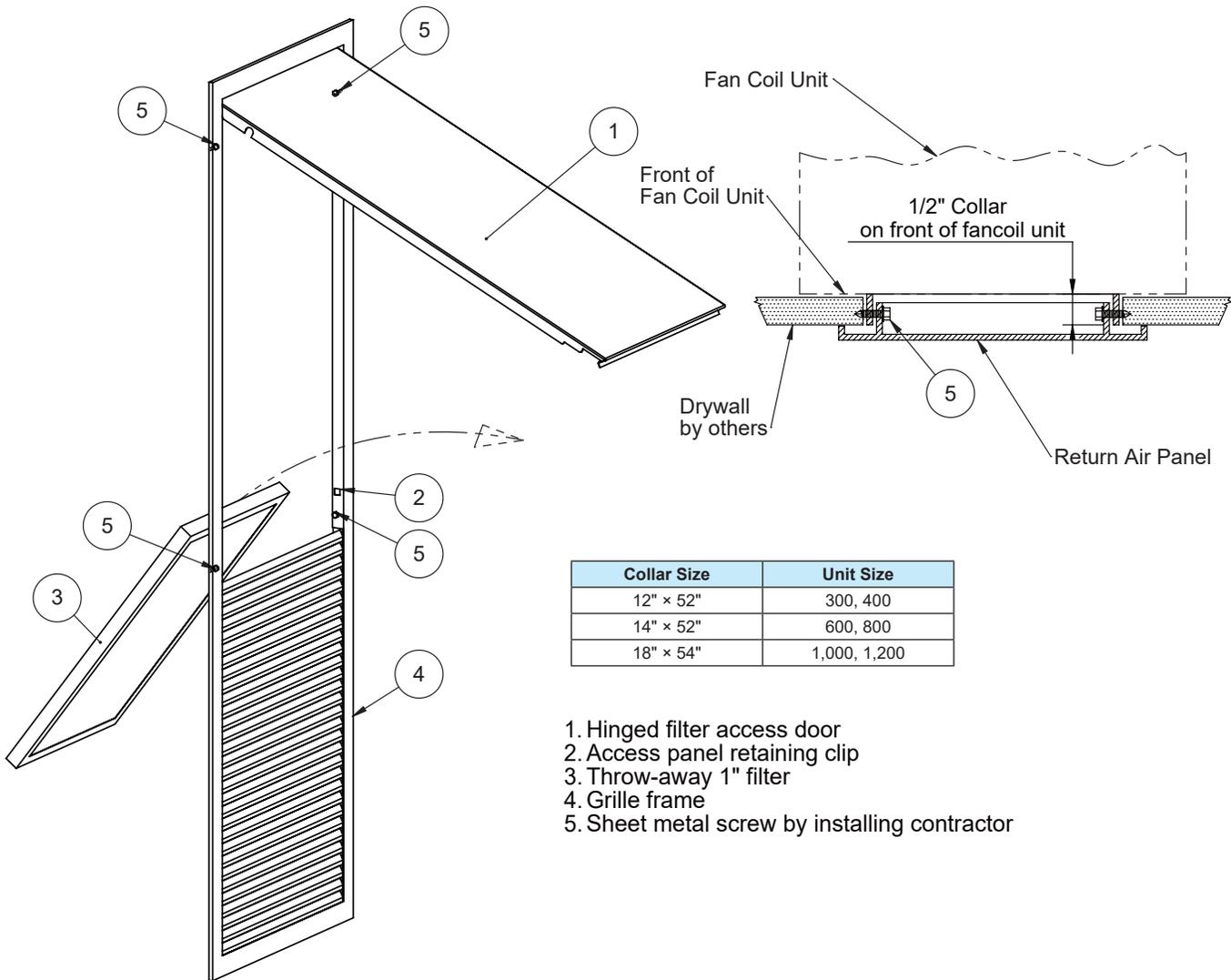
*Available in 4-inch, 8-inch and 12-inch heights (shown)

Table 22: Raised Base Dimensions (inches)

Size	A	B
300	16	16
400	16	16
600	20	20
800	20	20
1000	24	20
1200	24	20

Return Air Panels

Figure 14: Return Air Panel with Hinged Filter Access



Collar Size	Unit Size
12" x 52"	300, 400
14" x 52"	600, 800
18" x 54"	1,000, 1,200

- 1. Hinged filter access door
- 2. Access panel retaining clip
- 3. Throw-away 1" filter
- 4. Grille frame
- 5. Sheet metal screw by installing contractor

Sequence of installation by the contractor:

- A. If the drywall has not been installed flush with the outer edge of the collar on the unit and if the gap between the inner surface of the drywall and the outer edge of the collar exceeds 1/2", the opening will have to be sleeved.
- B. Insert the grille into the 1/2" deep collar on the fan coil unit so that the grille frame is against the drywall.
- C. Lift the hinged panel in the grille and secure the grille by fitting four sheet metal screws as shown above. Do not overtighten the screws as this might distort the grille frame and cause the hinged panel to be a loose fit in the retaining clips.
- D. Install the filter and close the access panel.

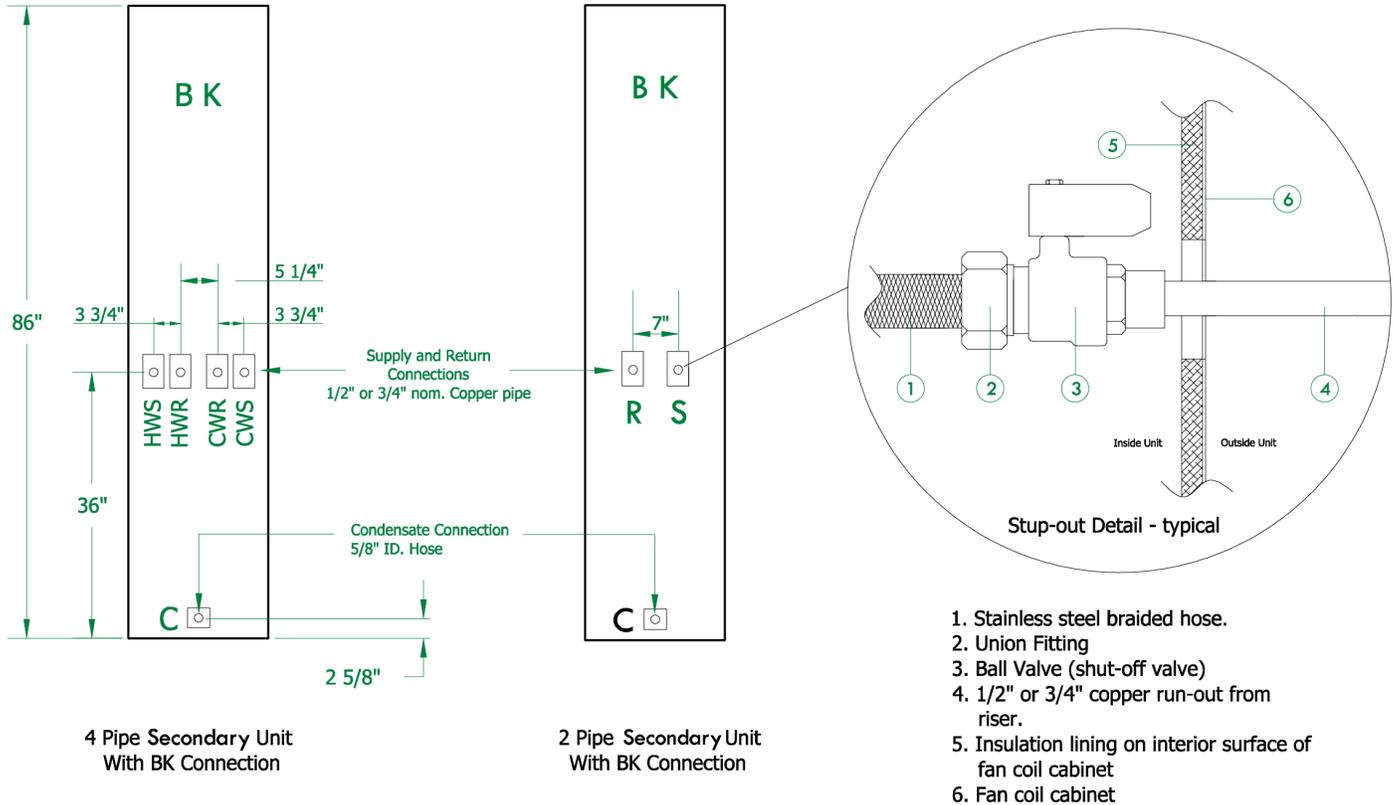
Table 23: Filter Size Chart

Unit Size	03 – 04	06 – 08	10 – 12
1" Filter Size	12" x 20"	14" x 25"	16" x 25"

System Considerations

Mechanical Specifications

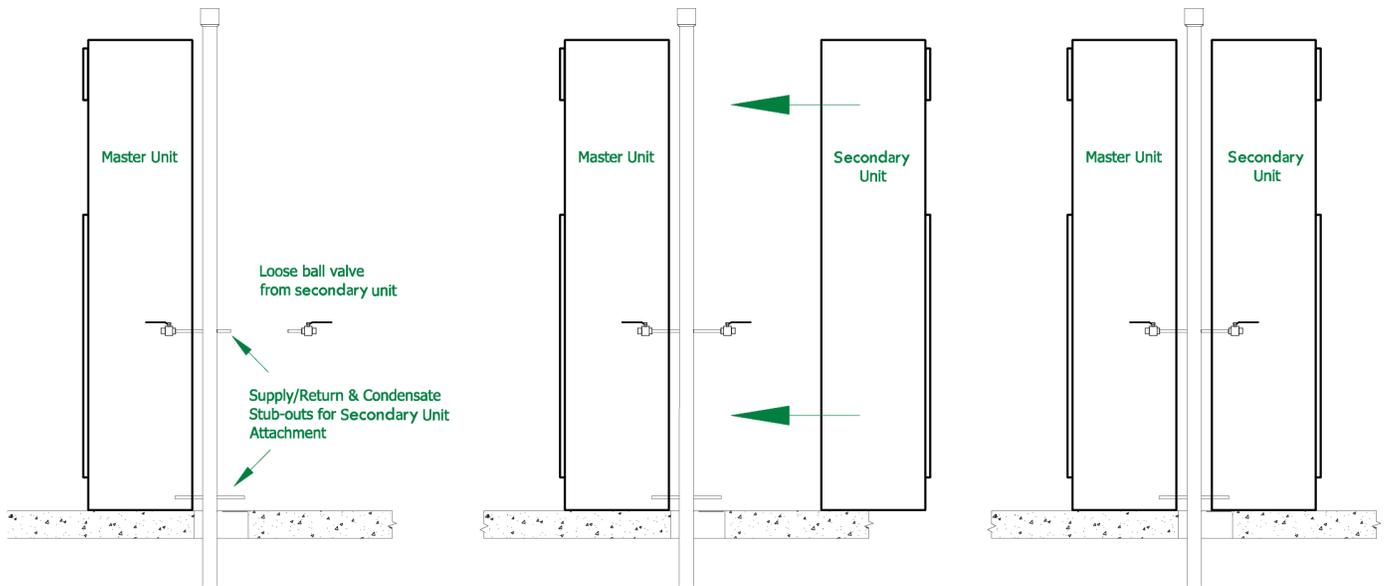
Figure 15: Fan Coil Units without Risers



4 Pipe Secondary Unit With BK Connection

2 Pipe Secondary Unit With BK Connection

1. Stainless steel braided hose.
2. Union Fitting
3. Ball Valve (shut-off valve)
4. 1/2" or 3/4" copper run-out from riser.
5. Insulation lining on interior surface of fan coil cabinet
6. Fan coil cabinet



1) Install Master Unit with risers

2) Solder ball valve from secondary unit onto stub-out for master unit

3) Slide secondary unit into place over top of ball valve

4) Make union connection from hose to ball valve inside secondary unit

5) Make condensate connection

Certifications

Performance: Unit performance is certified by AHRI in accordance with ANSI/AHRI 440-2008: Performance Rating of Room Fan Coils

Safety: All standard units are agency listed in the United States and Canada and comply with the requirements of the current editions of UL 1995/C22.2 No. 236.

Construction

The cabinets shall be fabricated from 20 gauge steel lined with 1-inch fiberglass insulation bonded with a thermosetting resin and coated on the airstream side with an acrylic facing. In addition, there is an option available for 1/2-inch closed cell cabinet insulation which provides the same thermal efficiency as 1" fiberglass.

The drain pan shall be acrylic (black polyester powder) coated 20 gauge galvanized steel or ABS positively sloped in two directions towards the outlet. The metal drain pan shall be insulated on the underside with 1/2-inch fiberglass insulation. The drain hose from the outlet to the condensate riser shall form a running trap. An optional Stainless Steel drain pan is available as well as a float switch. The float switch will close CW control valve upon detection of high water level in condensate drain pan.

Fan

Backward inclined ECM impeller fans constructed of UL94-5VA rated material

Motors

The fan motor shall be an electronically commutated, brushless DC motor (ECM) with sealed bearings. All motors have a maximum ambient operating temperature of 160oF and are permanently lubricated. The motor can accept a 0-10VDC signal configured to deliver the specified airflow with no special tools. A 3 speed controller board is available allowing the fan to be compatible with a conventional 3 speed thermostat.

An unfused service disconnect switch shall be included, mounted inside the unit behind the motor cover.

Coils

The coil shall have aluminum fins mechanically bonded to 1/2-inch copper tube. The coil shall be factory pressure tested at no less than 300 psig. A manual air vent shall be incorporated at the high point, and drain cock at the low point of the connecting pipework to the coil.

Piping Packages

The piping package shall include: Ball type shut-off valves on the coil supply and returns (combined with balancing valves or strainers when used), and a two- or three-way control valve with two-position actuator. Chilled water and hot water valves are normally closed.

Control valves are also available in 3 wire floating point or 2-10V DC modulating valves. Additionally balancing waves (manual or automatic) and strainers supplied as riser system dictates. These devices are provided as combo-valves with the shut-off on supply and return and be equipped with PT ports.

Electrical Heat

Units with electric heat shall be wired for single-stage operation with an open wire nickel-chrome element. An auto-reset high limit device shall be included.

Filters

A one-inch MERV. 10 disposable filter shall be shipped loose with return air access panel.

Units equipped with one inch MERV 10 filters have a rating based on ASHRAE Standard 52.2. The average dust spot efficiency is no less than 35 to 40 percent when tested in accordance with ASHRAE 52.1 atmospheric dust spot method.

Controls - Thermostat

The fan coil manufacturer shall supply a low voltage (24V) digital programmable thermostat with remote sensor option and energy savings contacts for remote mounting, or optionally unit mounted. Remote mounted thermostats are connected to a terminal strip that is mounted inside the unit. The thermostat is shipped loose for installation after the unit is installed, dry-wall is applied and the walls are painted.

Riser Package

Risers are available in both type "L" and type "M" copper for supply, return and condensate pipes. Riser insulation is available in 1/2-inch and one-inch wall thickness for closed cell foam (polyolefin), closed cell elastomeric (similar to Armaflex®) and fiberglass (wrapped with vapor barrier).

Riser diameter and insulation thickness are subject to physical limitations. Contact Daikin Applied when risers are larger than 3.0 inches in diameter. The risers shall have an approximately 3.0 inch swaged expansion at the top end to allow a 3.0 inch insertion of the riser from above without the use of couplings. Risers may be provided plain ended in lieu of swaged for field supplied/installed fittings (similar to Pro-Press®).

The riser insulation shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less in compliance with ASTM E 84. The insulation shall be continuous over the riser length within the height of the cabinet. Provision for insulation beyond the ends of the cabinet shall be the responsibility of the installing contractor.

The specification of riser anchoring, expansion loops and fire stopping requirements are not detailed in this specification and are not part of the Daikin Applied fan coils scope.

Return Air Access Panel

The return air access panel shall have a fixed blade return air grille in the lower portion with filter access achieved by removal of the panel. The panel installs flush on to the drywall which has been applied directly to the front of the unit. The panel is of stamped steel construction and shall be finished in standard white baked enamel. The panel secures to the unit by a hook on the bottom edge and two quarter-turn fasteners in the upper corners. The panel is shipped loose for installation after the unit is installed, dry-wall is applied and the walls are painted.

There is also a return air access panel with hinged filter access as an option. Stamped steel construction with return air grille in lower portion of grille and hinged filter access in the top portion. Secured to the two-inch flange on the front of the unit with sheet metal screws. Drywall is framed out in front of the unit and is not applied directly to the unit face.

Supply Air Grilles and Registers

Supply air grilles and registers shall be provided for unit mounting locations. The grilles shall be steel, have double deflection airfoil blades and shall be finished in standard white baked enamel.

The grilles shall attach to the collar of the fan coil unit by spring clips. When a unit has more than one supply air opening a balancing damper (horizontal in the front) is included with the grille (register) to balance the air flow (screw holes optional). Any supply air grilles which are part of supply air ductwork shall be provided by the sheet metal contractor. Grilles are shipped loose for installation after the unit is installed, dry-wall applied and the walls are painted.

A line of sight baffle with acoustical wrap shall be included in units which have left and right or front and back supply air openings.

There is also an option to upgrade the supply air grille material to aluminum as well as the option to provide custom colors for return air panels and supply air grilles/registers.

Raised Bases

Raised bases are available in heights of 4 inches, 8 inches or 12 inches. An access panel is available only in the 12-inch option. If a condensate pump is required, 12-inch high raised base with access panel is required.

Efficient, Quiet Fans and Motors

Variable-speed, electronically commutated motors, ECM, coupled with BI direct drive fans provide the quietest and most efficient operation available today.

The fan is variable speed accepting a 0-10VDC signal from the thermostat. The thermostat looks at the temperature difference between set point and actual and will control the fan speed to the lowest value to maintain comfort. (PID Control). This control strategy offers significant energy savings over the life the unit.

EC motors are inherently more efficient than PSC motors, approximately 20%, and up to 60% more efficient at part load.

Figure 16: 300-400 CFM ECM High Efficiency Impeller Fan



Figure 17: 600-1200 CFM ECM High Efficiency Impeller Fan



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