



# Operation & Maintenance Manual

## VUD, VUF, VDF & HCD Series Unit Ventilator



**IMPORTANT:** Read and save this manual for future reference.  
This manual is to be left with the equipment owner

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# INTRODUCTION

## ABOUT THE UNIT VENTILATOR

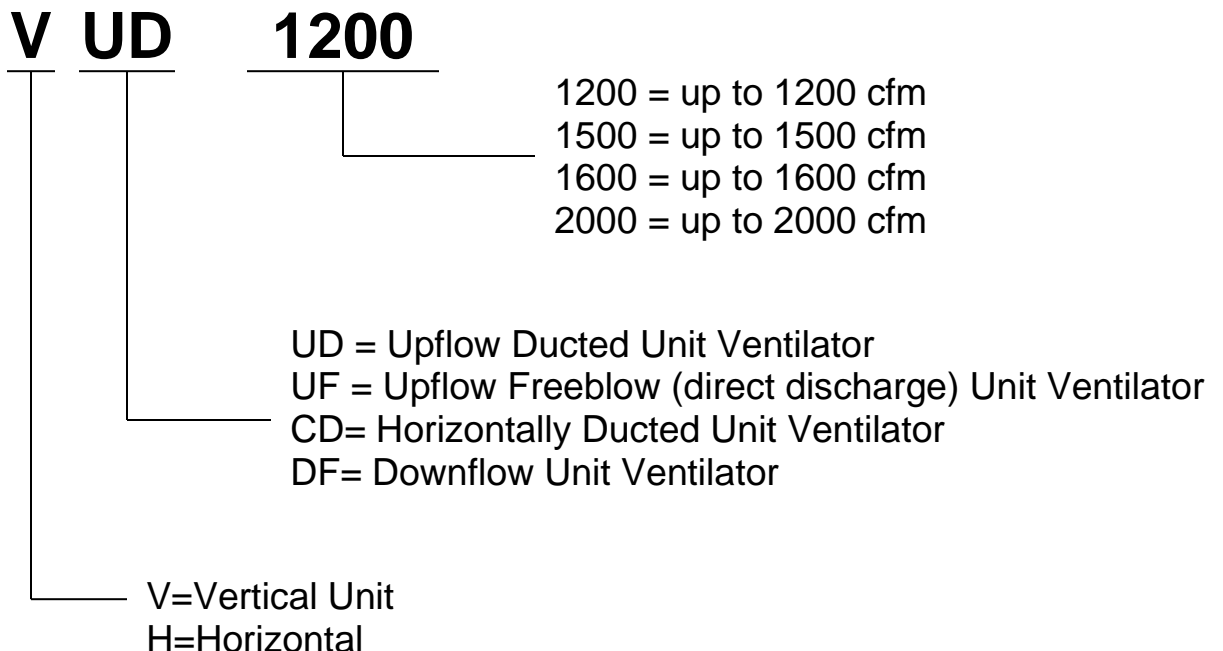
The Temspec unit ventilator is designed as means for providing heating, cooling and ventilation to the classroom. Our goal is to help create an enhanced learning environment by focusing on the following points when designing our equipment:

- COOLING, HEATING, HUMIDITY AND VENTILATION CONTROL
- AIR DISTRIBUTION
- SOUND ATTENUATION

By installing the vertical unit ventilator into the classroom, superior control can be obtained for each room. Because the unit can be ducted, an even distribution of air can be achieved throughout the room. The unit ventilator is constructed with heavy gauge metal and sound absorbing insulation for optimal sound attenuation.

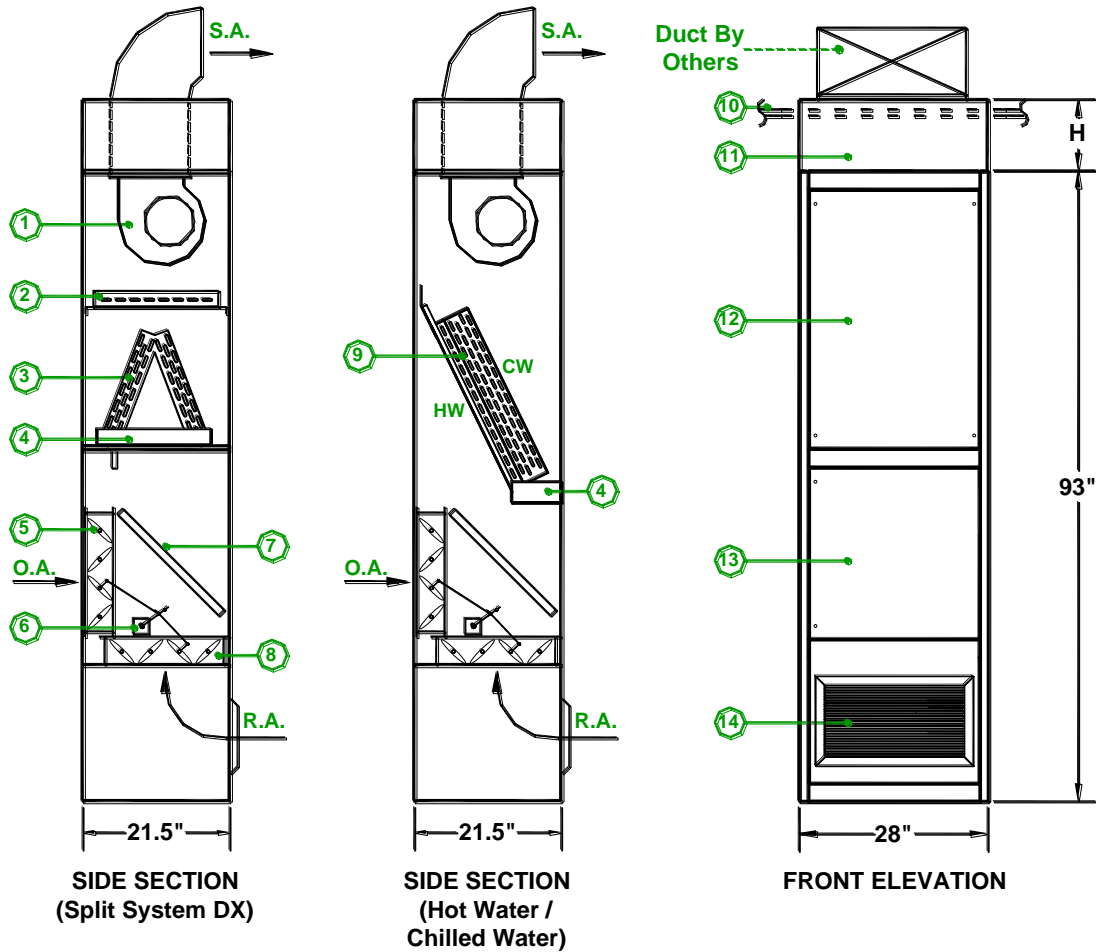
By applying sound engineering principles and thorough testing, we ensure the highest quality of performance in our unit ventilators.

## NOMENCLATURE FOR NON-COMPRESSORIZED UNIT VENTILATORS



# TYPICAL LAYOUT

## Model VUD 1200 (Upflow, Ducted Configuration)



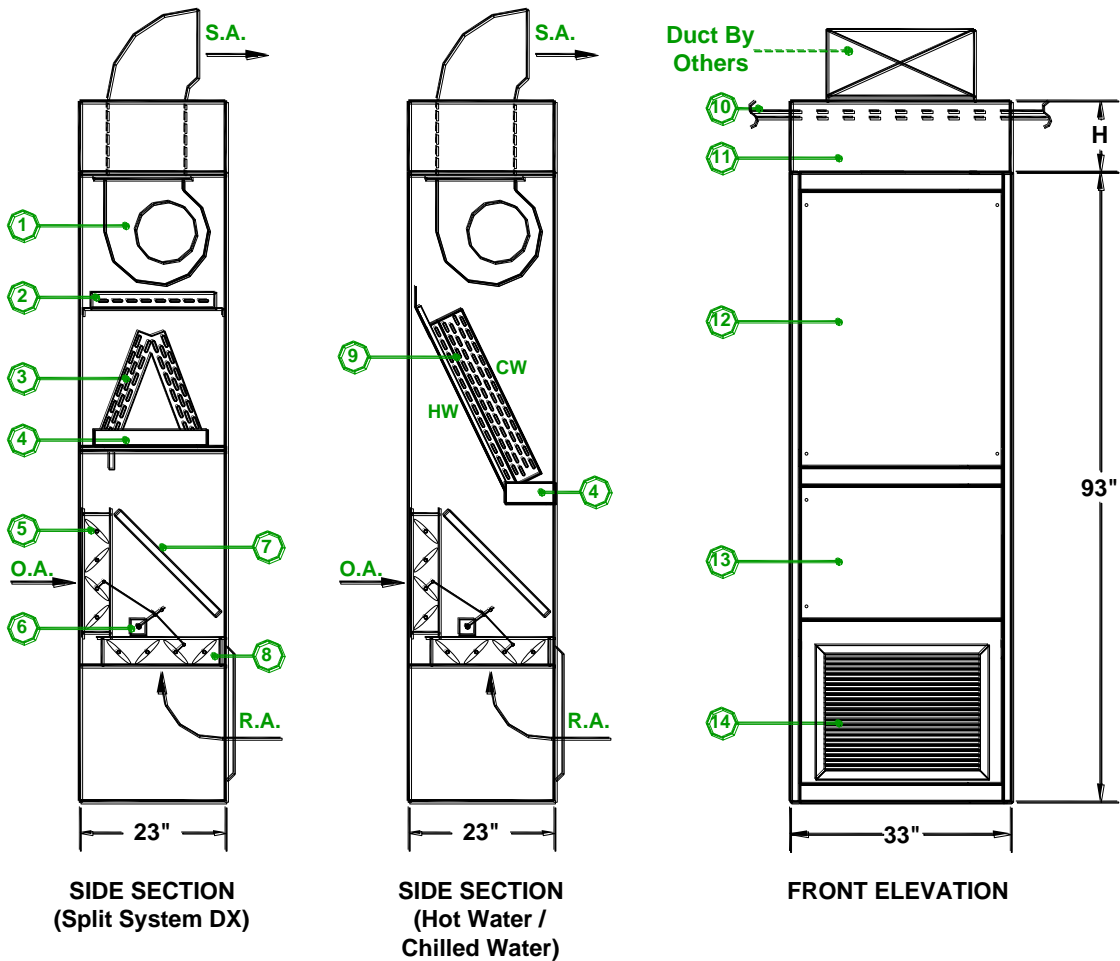
S.A. Supply Air      O.A. Outdoor Air      R.A. Return Air

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Supply air fan.</li> <li>2. Hot water coil. Optional electric or steam coil available.</li> <li>3. DX cooling coil.</li> <li>4. Drain pan.</li> <li>5. Outdoor air damper.</li> <li>6. Spring return mixed air damper actuator.</li> <li>7. Filters.</li> </ul> | <ul style="list-style-type: none"> <li>8. Return air damper.</li> <li>9. 2 pipe or 4 pipe (hot water coil can be in the reheat position).</li> <li>10. Ceiling tile.</li> <li>11. Top extension (optional).</li> <li>12. Coil access panel.</li> <li>13. Hinged filter access panel.</li> <li>14. Heavy duty return air grille.</li> </ul> |
|---|--|

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.

# TYPICAL LAYOUT

## Model VUD 1600 (Upflow, Ducted Configuration)



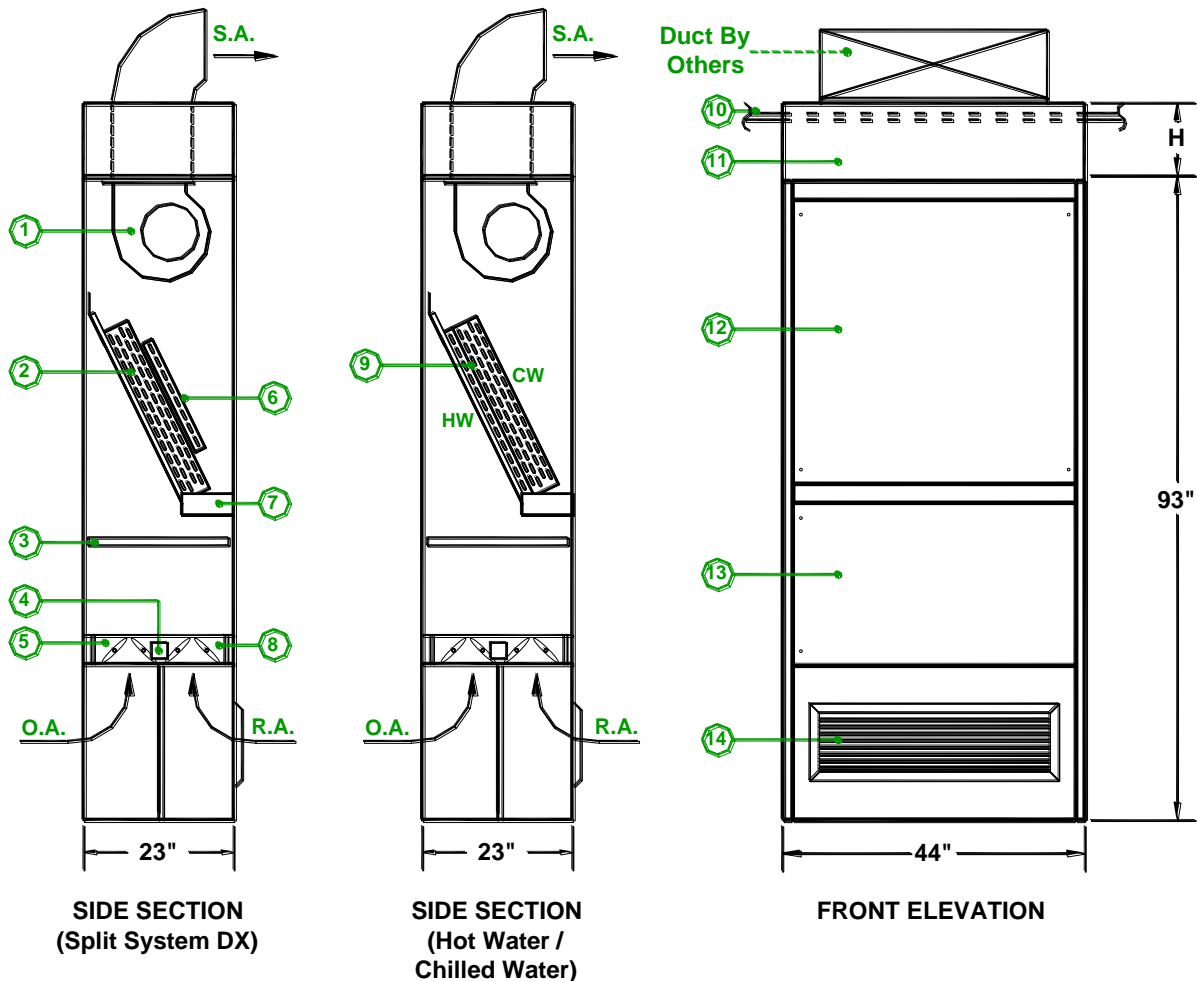
S.A. Supply Air      O.A. Outdoor Air      R.A. Return Air

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Supply air fan.</li> <li>2. Hot water coil. Optional electric or steam coil available.</li> <li>3. DX cooling coil.</li> <li>4. Drain pan.</li> <li>5. Outdoor air damper.</li> <li>6. Spring return mixed air damper actuator.</li> <li>7. Filters.</li> </ul> | <ul style="list-style-type: none"> <li>8. Return air damper.</li> <li>9. 2 pipe or 4 pipe (hot water coil can be in the reheat position).</li> <li>10. Ceiling tile.</li> <li>11. Top extension (optional).</li> <li>12. Coil access panel.</li> <li>13. Hinged filter access panel.</li> <li>14. Heavy duty return air grille.</li> </ul> |
|---|--|

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.

# TYPICAL LAYOUT

## Model VUD 2000 (Upflow, Ducted Configuration)



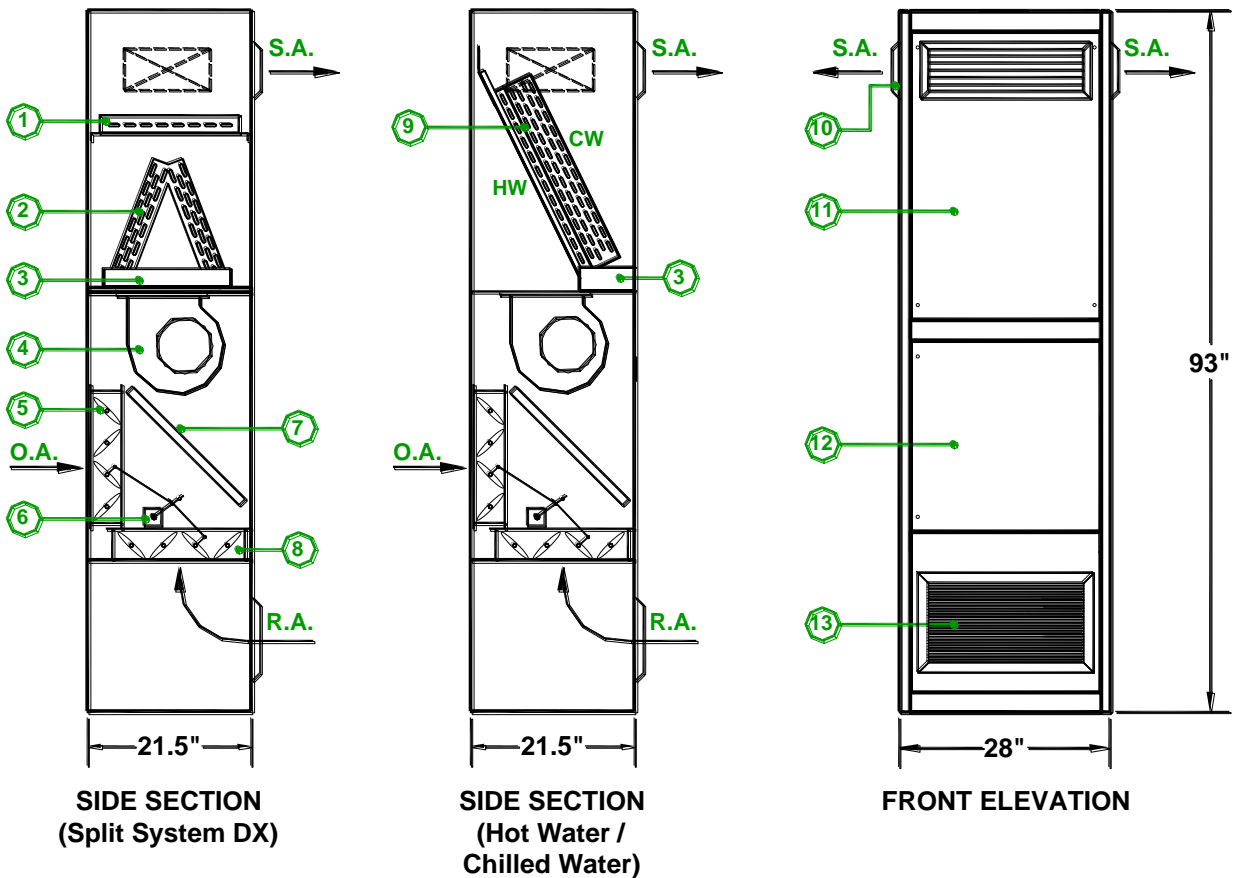
**S.A.** Supply Air      **O.A.** Outdoor Air      **R.A.** Return Air

1. Dual supply air fans.
2. DX cooling coil.
3. Filters.
4. Spring return mixed air damper actuator.
5. Outdoor air damper.
6. Hot water coil. Optional electric or steam coil available.
7. Drain pan.
8. Return air damper.
9. 2 pipe or 4 pipe (hot water coil can be in the reheat position).
10. Ceiling tile.
11. Top extension (optional).
12. Coil access panel.
13. Hinged filter access panel.
14. Heavy duty return air grille.

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.

# TYPICAL LAYOUT

## Model VUF 1200 (Upflow, Freeblow Configuration)



**S.A.** Supply Air

**O.A.** Outdoor Air

**R.A.** Return Air

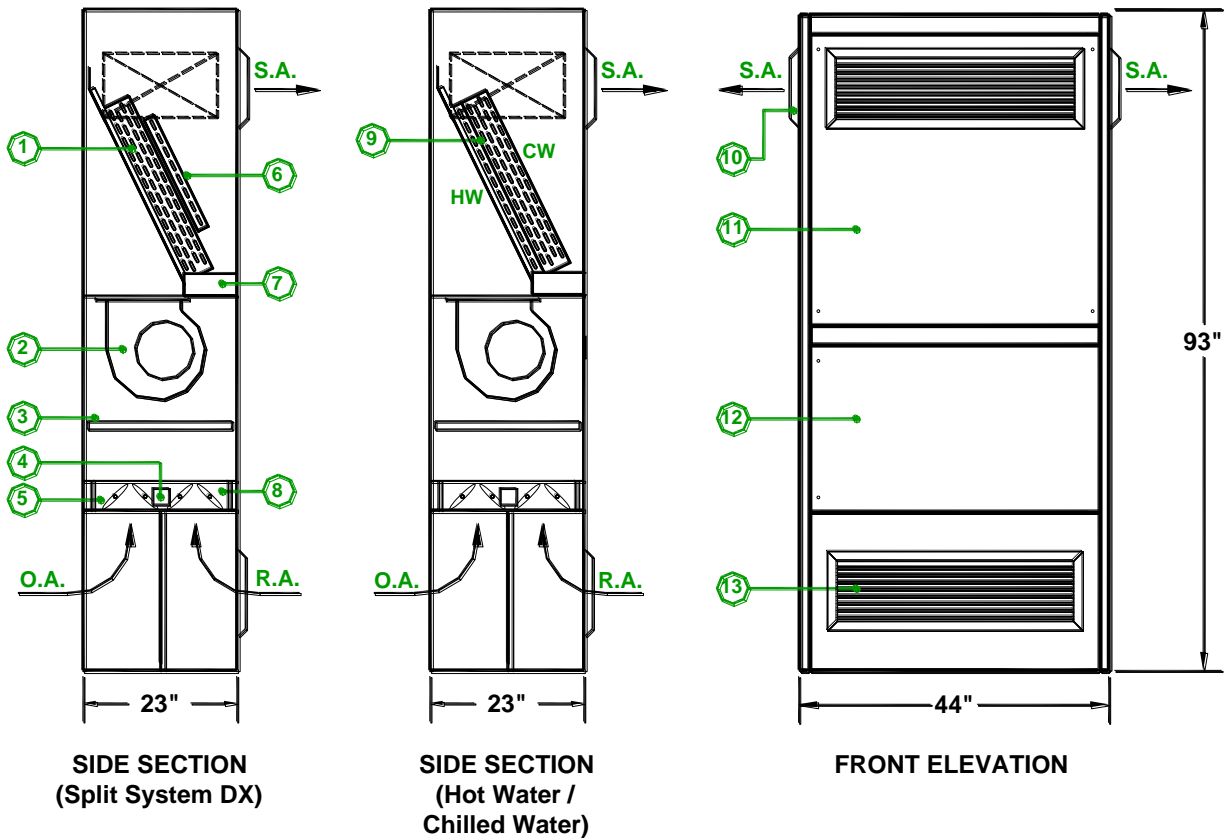
1. Hot water coil. Optional electric or steam coil available.
2. DX cooling coil.
3. Drain pan.
4. Supply air fan.
5. Outdoor air damper.
6. Spring return mixed air damper actuator.
7. Filters.

8. Return air damper.
9. 2 pipe or 4 pipe (hot water coil can be in the reheat position).
10. Double deflection supply air grille.
11. Coil access panel.
12. Hinged filter access panel.
13. Heavy duty return air grille.

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.

# TYPICAL LAYOUT

## Model VUF 1500 (Upflow, Freeblow Configuration)




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S.A. Supply Air      O.A. Outdoor Air      R.A. Return Air

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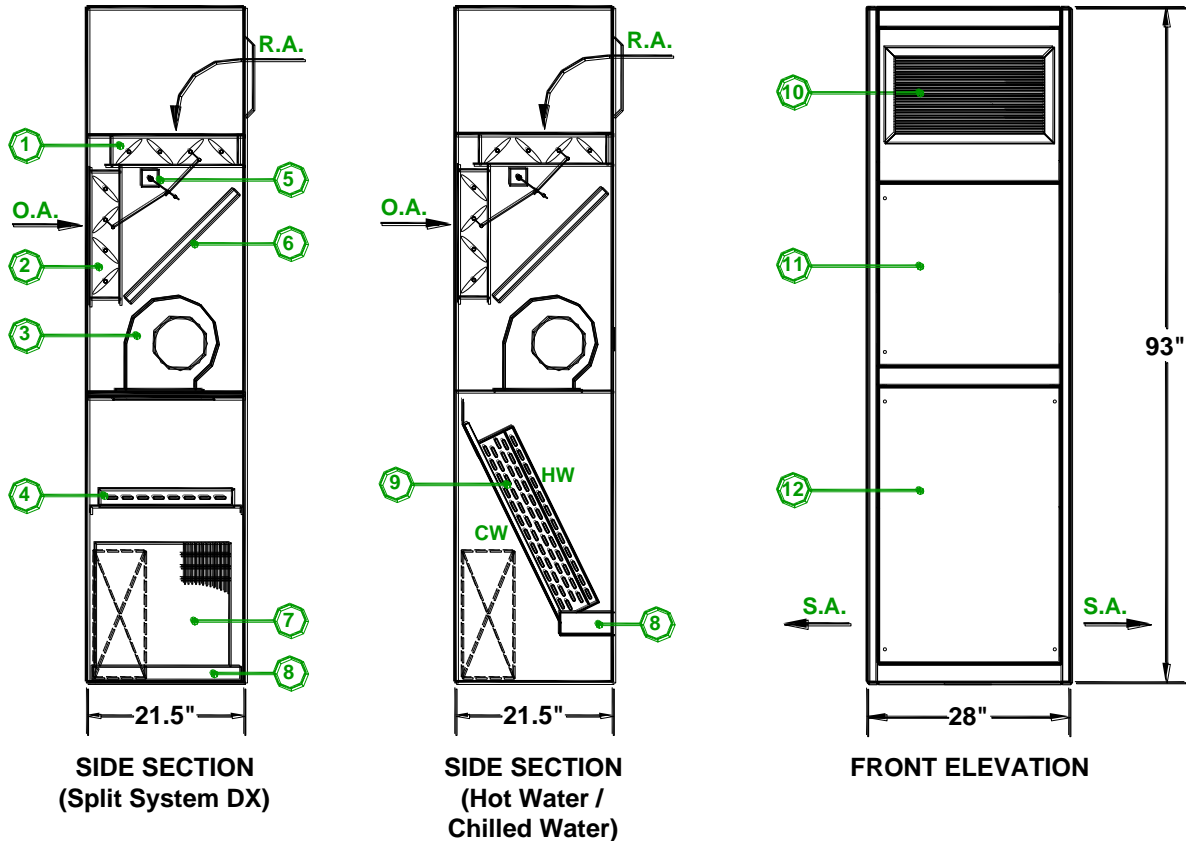
- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. DX cooling coil.</li> <li>2. Dual supply air fans.</li> <li>3. Filters.</li> <li>4. Spring return mixed air damper actuator.</li> <li>5. Outdoor air damper.</li> <li>6. Hot water coil. Optional electric or steam coil available.</li> <li>7. Drain pan.</li> </ul> | <ul style="list-style-type: none"> <li>8. Return air damper.</li> <li>9. 2 pipe or 4 pipe (hot water coil can be in the reheat position).</li> <li>10. Double deflection grilles.</li> <li>11. Coil access panel.</li> <li>12. Hinged filter access panel.</li> <li>13. Heavy duty return air grille.</li> </ul> |
|---|--|

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.



# TYPICAL LAYOUT

## Model VDF 1200 (Downflow Configuration)



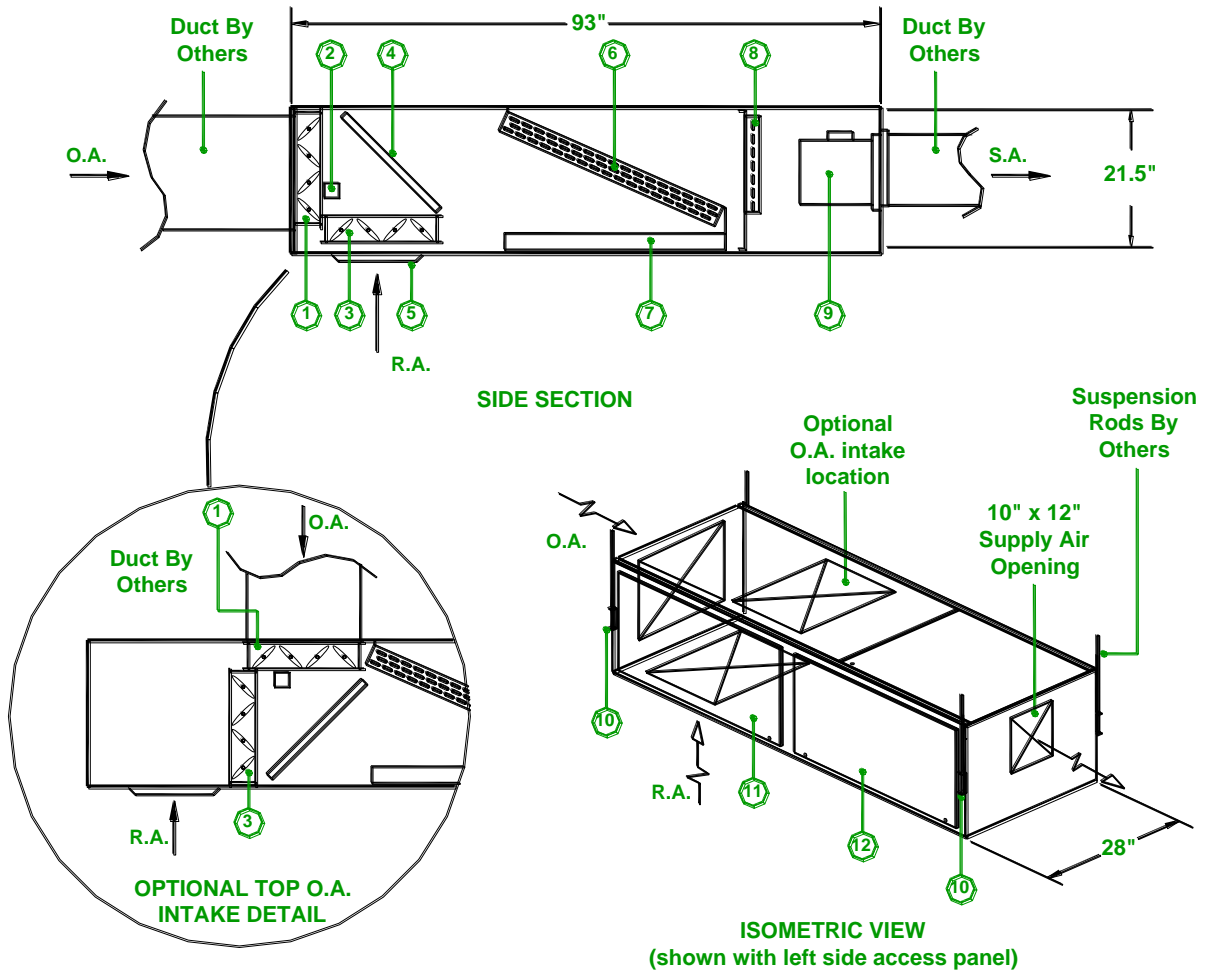
**S.A.** Supply Air      **O.A.** Outdoor Air      **R.A.** Return Air

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Return Air damper.</li> <li>2. Outdoor air damper.</li> <li>3. Supply air fan.</li> <li>4. Hot water coil. Optional electric or steam coil available.</li> <li>5. Spring return mixed air damper actuator.</li> <li>6. Filters.</li> <li>7. Slab type DX cooling coil.</li> </ul> | <ul style="list-style-type: none"> <li>8. Drain pan.</li> <li>9. 2 pipe or 4 pipe (hot water coil can be in the reheat position).</li> <li>10. Heavy duty return air grille.</li> <li>11. Hinged filter access panel.</li> <li>12. Coil access panel.</li> </ul> |
|---|--|

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.

# TYPICAL LAYOUT

## Model HCD 1200 (Horizontal Configuration)



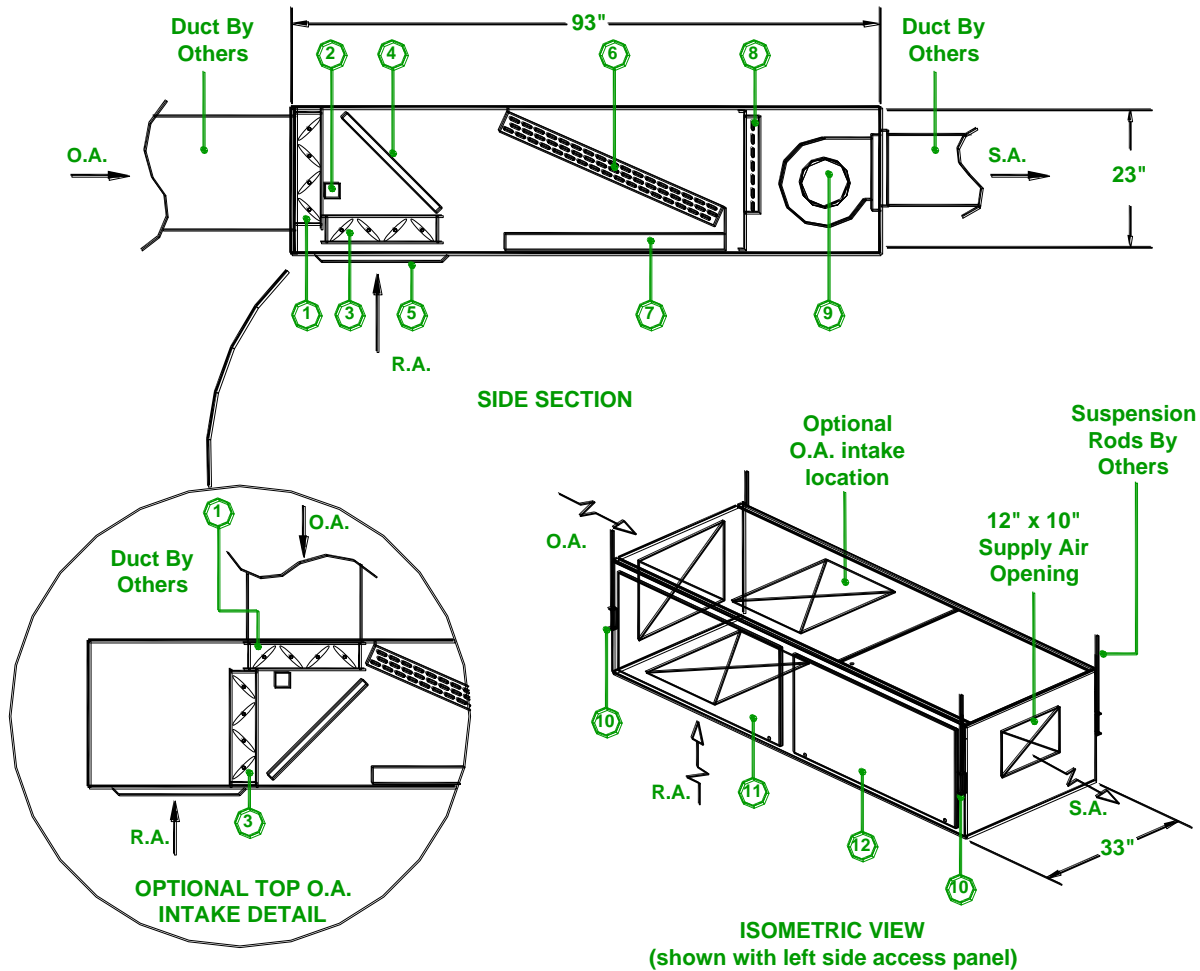
S.A. Supply Air      O.A. Outdoor Air      R.A. Return Air

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Outdoor air damper.</li> <li>2. Spring return mixed air damper actuator.</li> <li>3. Return air damper.</li> <li>4. Filters.</li> <li>5. Heavy duty return air grille or duct collar.</li> <li>6. Split DX or hot water/chilled water coil (2 pipe or 4 pipe).</li> <li>7. Drain pan. Drain pan is removable when option for bottom access panels is selected.</li> </ul> | <ul style="list-style-type: none"> <li>8. Hot water coil for split system DX or heating only units. Optional steam and electric heater also available.</li> <li>9. Supply air fan.</li> <li>10. Mounting brackets (4 per unit).</li> <li>11. Left or Right side hinged filter access panel. Bottom hinged access panel also available.</li> <li>12. Left or Right side hinged coil access panel. Bottom hinged access panel also available.</li> </ul> |
|---|--|

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.

# TYPICAL LAYOUT

## Model HCD 1600 (Horizontal Configuration)



S.A. Supply Air      O.A. Outdoor Air      R.A. Return Air

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Outdoor air damper.</li> <li>2. Spring return mixed air damper actuator.</li> <li>3. Return air damper.</li> <li>4. Filters.</li> <li>5. Heavy duty return air grille or duct collar.</li> <li>6. Split DX or hot water/chilled water coil (2 pipe or 4 pipe).</li> <li>7. Drain pan. Drain pan is removable when option for bottom access panels is selected.</li> </ol> | <ol style="list-style-type: none"> <li>8. Hot water coil for split system DX or heating only units. Optional steam and electric heater also available.</li> <li>9. Supply air fan.</li> <li>10. Mounting brackets (4 per unit).</li> <li>11. Left or Right side hinged filter access panel. Bottom hinged access panel also available.</li> <li>12. Left or Right side hinged coil access panel. Bottom hinged access panel also available.</li> </ol> |
|---|--|

**NOTE:** The component arrangement shown above may vary slightly from that in the unit ventilator supplied.

# OPERATION

## Typical Modes of Operation

The following are typical modes of operation for a classroom unit ventilator. Please refer to the manual provided by the control's contractor for a more specific controls sequence.

### 1. Unoccupied Condition

During the “unoccupied heat” mode (night set-back) space temperature is maintained by a signal from the thermostat/controller to either the modulating control valve, modulating face and bypass damper actuator or electric coil triac. The powered exhaust damper (if applicable) and the outdoor air damper are fully closed, and the return air damper is fully open. The supply air fan operates on call from the thermostat/controller.

### 2. Occupied Condition

The unit ventilator is switched to “occupied heat” by the thermostat/controller. In this mode a signal is sent from the thermostat/controller to either the modulating control valve, modulating face and bypass damper actuator or electric coil triac to maintain room temperature at set point. The outdoor air damper is held at a minimum position in the heating mode. The supply air fan runs continuously.

### 3. Economizer (up to 100% outdoor air)

The first stage of cooling is the “economizer” mode during which all stages of heating are off. The outdoor air and the return air dampers modulate to maintain the room at the “economizer” set point. If the mixed air falls to a programmed temperature (usually 52°F) the outdoor air damper will modulate towards closed until the mixed air temperature rises again (typically to 55°F). In this “free cooling” mode the ability of the unit ventilator to provide sufficient cooling is limited only by the outdoor air temperature and the total C.F.M. rating of the unit.

### 4. Cooling

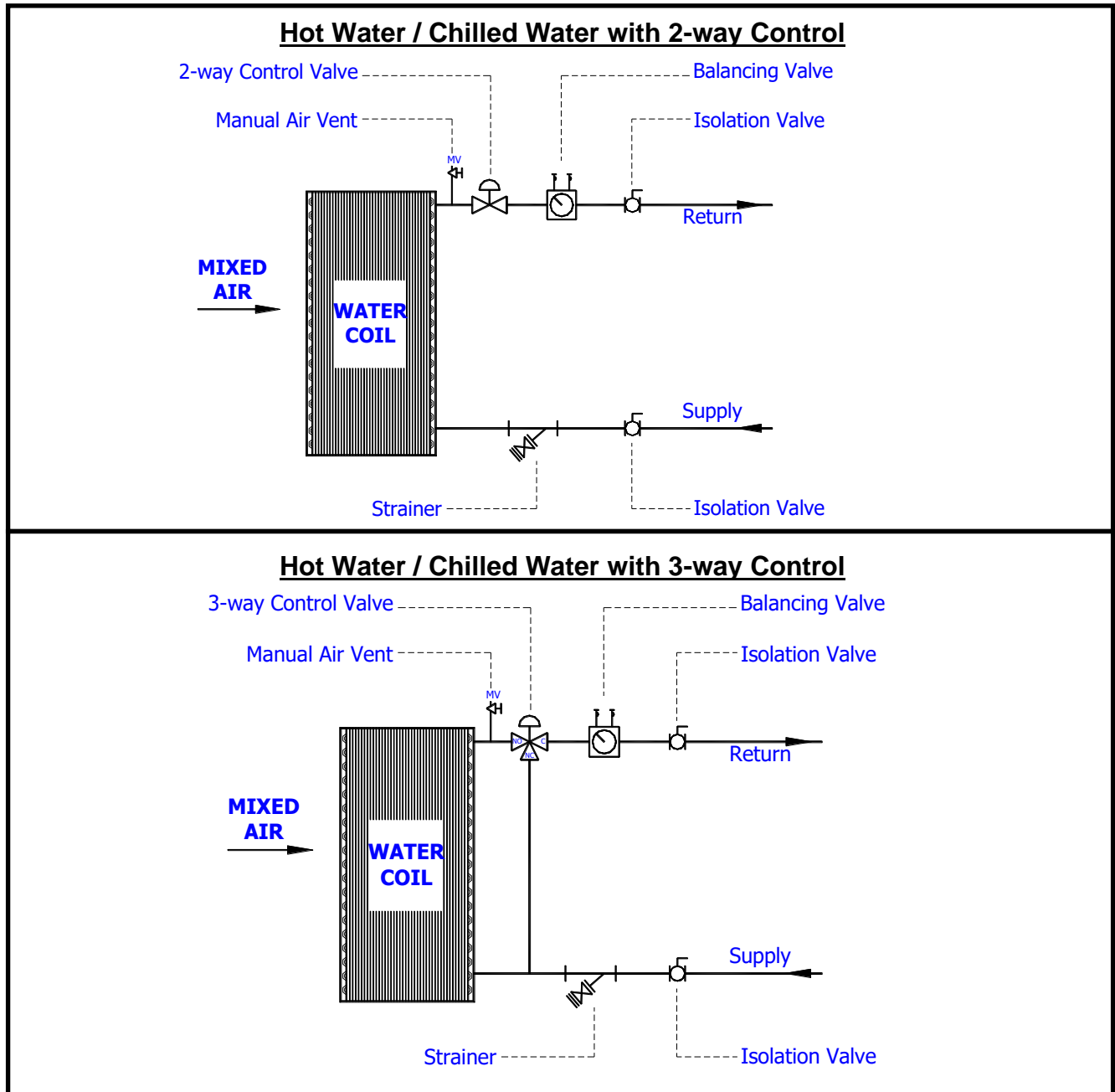
The unit can be equipped with a split system DX evaporator coil that would work in conjunction with a remote condensing unit (provided by others) or can be equipped with a chilled water coil. The system maintains the “set temperature plus 5°F” and the cooling is cycled on call from the thermostat/controller. In this mode the outdoor air damper will return to minimum position. During night set-back the mechanical cooling and economizer should be locked out.

### 5. Freeze Protection

For units with a steam or hot water coil, some type of freeze protection is usually implemented. This can be by either a low limit temperature control (autoreset or manual reset) or by using a supply air sensor and programming from the controller. When a mixed air temperature is determined to be too low, then the outdoor air damper will close, and the control valve will fully open. In some cases, the fan will also shut down until the temperature returns to normal levels.

## Hot Water Circuit

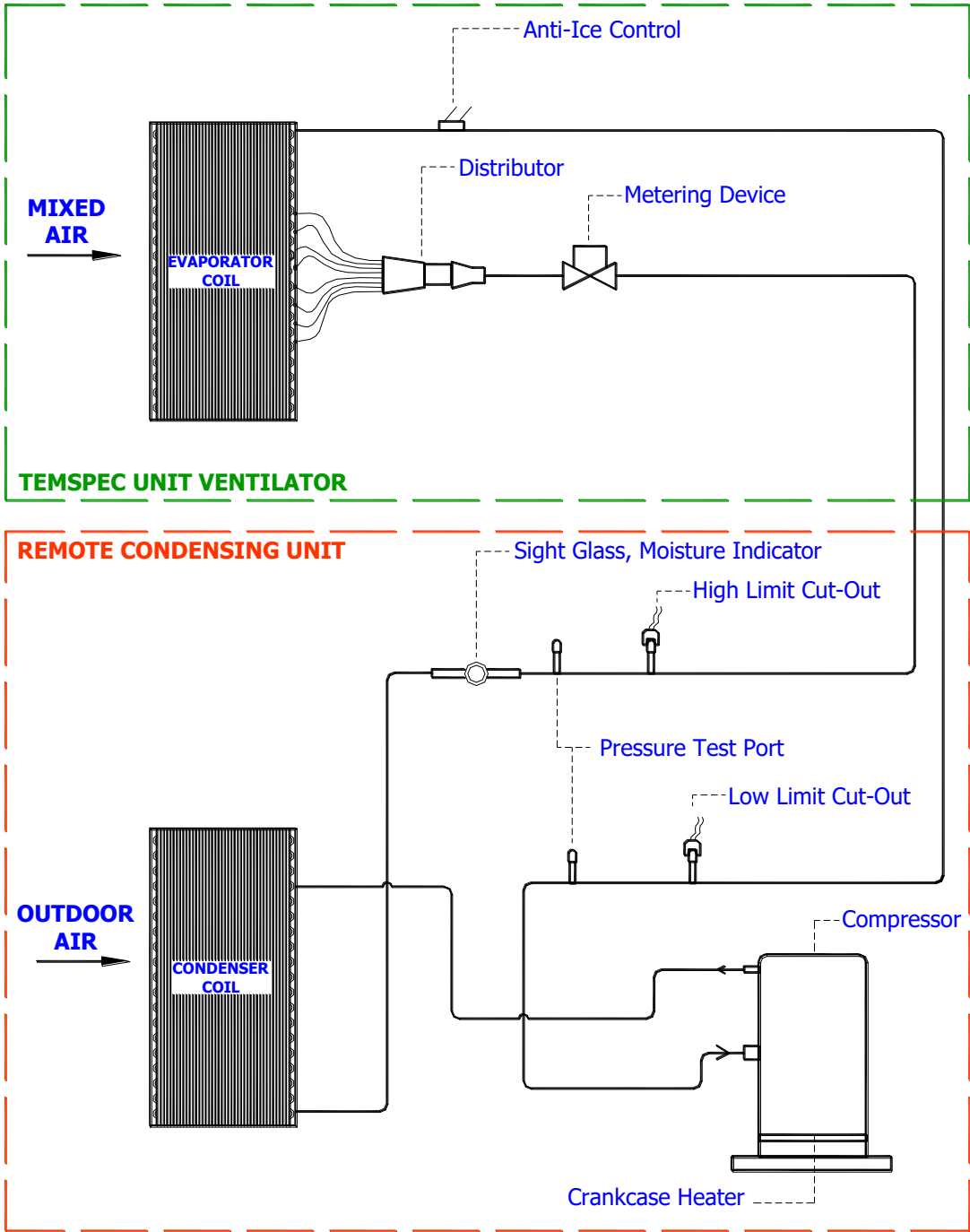
The following are typical hot water piping schematics for a unit ventilator. Please refer to the unit ventilator “shop drawings” for a more specific layout.



**Warning:** City water is very corrosive to brass components. Provide water treatment as soon as the system is charged to avoid premature leaks and/ or failure of internal components.

# Refrigeration Circuit

The following is a typical split system refrigeration circuit.



## Electrical Circuit

The electrical circuit in the unit ventilator is highly dependent on the controller and sequence that is being utilized. The unit can be supplied with a 115V, 208V, 277V or 460V power. Each unit comes standard with an unfused disconnect. A copy of the electrical schematic can be found folded in a pouch inside of the unit ventilator.

## Dampers

The outdoor air dampers and return air dampers are mechanically linked. As the outdoor air dampers open, the return air dampers close. A spring return damper actuator is connected to a linkage that extends to both sets of dampers. The damper actuator manufacturer can vary. Please refer to the wiring schematic for the damper actuator model type.

## Powered Exhaust (optional)

Internal powered exhaust is an optional feature that is provided with our vertical series unit ventilators. This feature comes with a fan and damper module that is mounted into the return air section of the unit. Control should be setup by the temperature controls contractor to operate as an on/off device as the outdoor air damper opens and closes.

## Filtration

Typically, 1" disposable filters are provided in the unit with an extra set shipped loose for when the unit is ready for start-up. Please refer to the "shop drawings" for specific details on filter construction and thickness. Below are sizes and quantity per unit for the different model types.

<b><u>Model Number</u></b>	<b><u>Filter Size</u></b>	<b><u>Quantity Per Unit</u></b>
VUD, VDF, VUF, HCD 1200	12" x 20" nominal	2
VUD, HCD 1600	12" x 24" nominal	2
VUD 2000, VUF 1500	16" x 21" nominal	2

# MAINTENANCE

## Servicing the Unit

Access to the components is gained by removing the front access panels. Typically, the panels are fastened by heavy duty Phillips head screws. When removing the access panel (vertical style units), loosen but do not remove the screws. Carefully store the panel in a place where it will not get damaged. The horizontal style units utilize hinged access panels.

**CAUTION:** Disconnect power before servicing the unit.

The filter access panels have a “kill switch” installed that will shut the supply air fan off once the panel is removed. This will only disconnect the power to the supply air fans. Be sure to disconnect ALL power by turning the remote disconnect switch to the off position.

### Drain Pan Instruction

- Please check the drain pan for proper drainage as part of commissioning.
- Check to make sure the drain pan overflow switch didn't come loose or shift during shipping as part of commissioning.
- The unit should be checked to ensure the drain pan is level, free of debris, and the drain line properly connected to the riser stub-out.

## Maintenance Schedule

Frequency maintenance greatly depends on the surrounding conditions (inside and outside of the building). The following is a typical maintenance schedule for a classroom unit ventilator.

Every **3 months** – Change filters

Every **12 months** – Vacuum out drain pans  
– Clean strainer in hydronic circuit (if applicable)

Every **24 months** – Clean evaporator coil  
– Vacuum any loose debris from interior of the unit  
– Inspect dampers to ensure that there is a proper seal when closed



## Changing the Filters

The outdoor and indoor conditions will determine the frequency of filter changes. Temspec recommends that the filters be changed every 3 months as a rule-of-thumb. Note that dirty filters will affect the overall performance of the unit.

To change the filters, open / remove the filter access panel by loosening the Phillips head screws. Unclip the filters and replace.

## Cleaning the Evaporator Coil

To clean the evaporator coil, purchase a suitable evaporator coil cleaning solution such as those offered by NU-CALGON ([www.nucalgon.com](http://www.nucalgon.com)). Follow the manufacturers instructions for use.

**Note:** Chlorine based or anti-fungal “pucks” or “socks” are acceptable when placed in the evaporator drain pan. Be sure to vacuum the drain pan during the cleaning process.

If the filters are regularly changed, the heating coils do not require cleaning.

**WARNING:** Do NOT use chlorine-based cleaners or anti-fungal treatments on the aluminum fins of coil.

## Motors

Temspec provides motors that are permanently lubricated. No maintenance is required.

# TROUBLESHOOTING

## Basic Trouble Shooting Guidelines

<u>Problem</u>	<u>Action Required</u>
<ul style="list-style-type: none"> <li>●Supply fan not running</li> </ul>	<ul style="list-style-type: none"> <li>●Verify that the disconnect is in the on position</li> <li>●Verify that thermostat / controller is not in unoccupied mode (night set-back)</li> <li>●Check the fan relay to see if it energizing and de-energizing properly</li> <li>●Check to see if the 24V transformer is defective</li> <li>●Ensure that wire connections are secured properly</li> <li>●Check to see if motor is burned out</li> </ul>
<ul style="list-style-type: none"> <li>●Compressor shot cycles</li> </ul>	<ul style="list-style-type: none"> <li>●Ensure that there are no obstructions which would cause the unit to cut-out on high head pressure</li> <li>●Check refrigerant level. If the level is to low, the unit will cut-out on low pressure. The Refrigerant type and the amount is posted on the metallized CSA label located on the fan housing.</li> </ul>

NOTE: Temspec does not recommend the use of a Unit Ventilator during construction/drywall installation as a space heater or air conditioner. Motor exposure to drywall dust can reduce motor life and leads to premature failure



# REPLACEMENT PARTS

## Limited Warranty

TEMSPEC INCORPORATED warrants the equipment from factory defects in material or workmanship for a period of one year.

For this warranty to be valid, the unit(s) must be installed and maintained in accordance with the manufacturer's printed instructions. It does not cover parts damaged by vandalism, improper installation, maintenance or abuse.

Should any replacement parts be required within the warranty period, they will be supplied at no charge, freight prepaid to the jobsite. The cost of labor or incidental expenses incurred in the repair or replacement of parts does not form part of this warranty.

The warranty period commences from the date of shipment, except when otherwise agreed at the point of sale (see specific warranty terms and conditions for details).

## Parts Sales

Contact the factory at: 1-888-TEMSPEC or (905) 670-3595

sales@temspec.com

Ask for 'parts sales'

Be sure to provide the unit serial number, which is located on the metalized CSA label, on the fan housing, inside the units.