

Vertical Direct Gas-Fired Make-Up Air Model VSU

- Industrial, Manufacturing and Warehouse Applications
- 800 - 64,000 cfm
- Direct Gas-Fired Heating
- up to 7,000,000 Btu/hr



The Greenheck model VSU uses direct gas-fired technology to provide efficient ventilation and heating in any climate. A 92% thermal efficient line burner reduces gas consumption for maximum energy savings for both natural gas and propane fuel sources. The vertical configuration removes the equipment weight load from the roof and offers an easier means of installation. Ground level filters, dampers, and controls also greatly simplify equipment start-up and maintenance.

The VSU is specifically designed for providing heating and make-up air for industrial, manufacturing and warehouse facilities. Airflow volumes range from 800 to 64,000 cfm and heating capacities up to 7,000,000 Btu/hr are available.

Constant Volume 100% Outdoor Air

A constant volume 100% outdoor air arrangement is recommended when outdoor air is required to replenish a constant volume exhaust air system. This option provides efficient heating of the make-up air and minimizes unwanted infiltration. Common applications include paint booths, warehouses, factories and other industrial applications. Benefits include low operating cost, low initial cost, efficiency, simplicity and reliability.

Variable Air Volume (VAV)

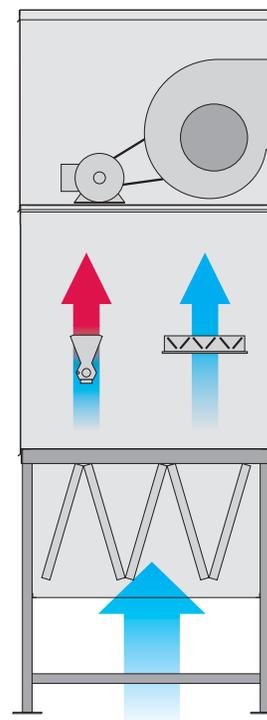
The VAV arrangement varies the fan speed based on building conditions to reduce costs associated with introducing ventilation air. The high turndown rate of the burner (25:1) and an airflow turndown capability of 50% provides consistent discharge temperature control as the supply airflow changes.

All units selected with the VAV arrangement include:

- Factory-installed and programmed variable frequency drive (VFD) for adjusting the fan speed
- A patented burner bypass damper which maintains a consistent volume of air across the burner as supply airflow varies to ensure complete combustion. The bypass damper is self-adjusting for minimal maintenance and requires no controls.

Airflow Control Strategies

- VFD with building static pressure control
- VFD with remote balancing potentiometer
- VFD controlled by a 2-10 VDC or 4-20 mA external signal
- VFD with two-speed operation controlled by a remote switch



Burner Bypass Damper

The variable volume arrangement includes a patented burner bypass damper that maintains the pressure drop across the burner as air volumes change. This ensures that complete and proper combustion occurs. This bypass damper is self-adjusting, designed for minimal maintenance, and requires no controls.

80/20 Recirculation

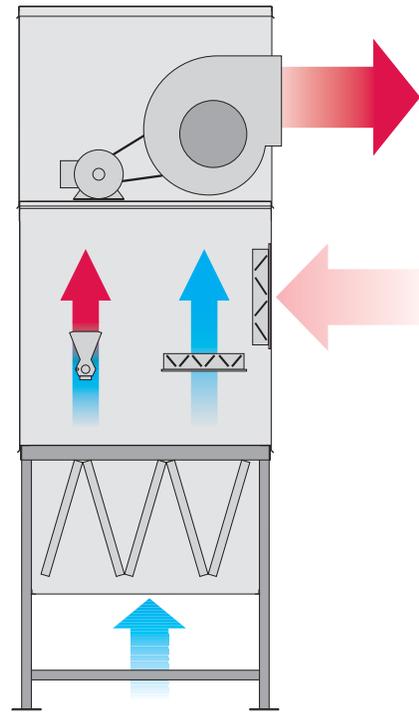
The 80/20 recirculation arrangement is recommended when the ventilation equipment provides the primary source of heating for the space. This airflow arrangement is commonly used in large manufacturing or industrial facilities with variable exhaust systems.

All units selected with the recirculation option include:

- The ability to position the return and outside air dampers to deliver a mix of 0-80% return air with 20-100% outside air.
- Optional night setback sequences that will allow the unit to satisfy the heating requirements of the space during unoccupied time periods.
- A bypass to eliminate the possibility of contaminants from the recirculated air entering the burner.

Airflow Control Strategies

- Modulating dampers with building static pressure control
- Modulating dampers with remote balancing potentiometer
- Modulating dampers controlled by a 2-10 VDC or 4-20 mA external signal
- Two position dampers controlled manually with a remote switch or time clock



Burner Bypass Damper

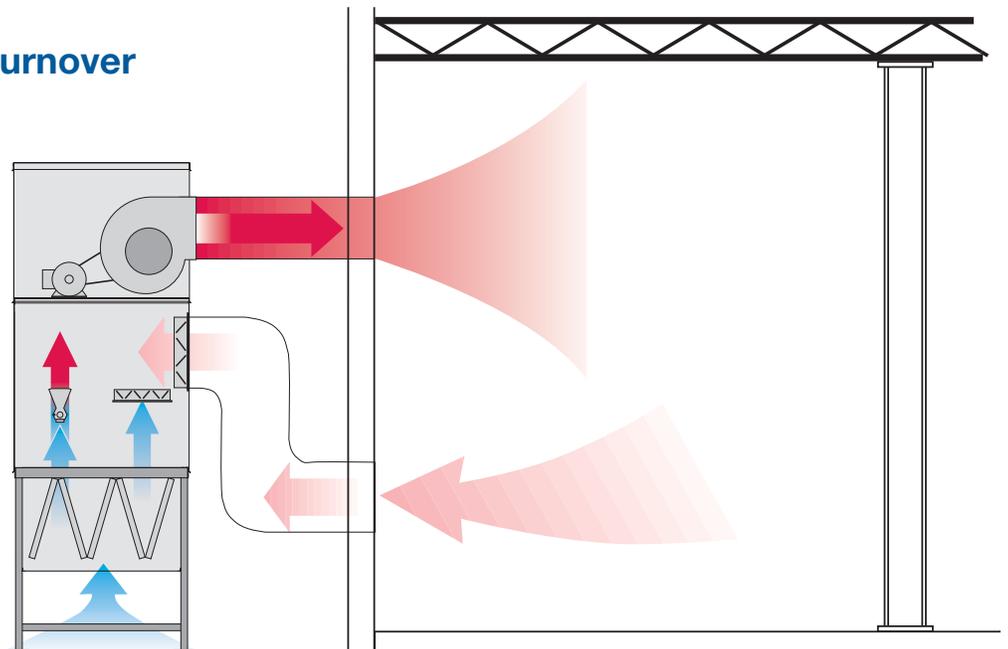
The 80/20 recirculation arrangement includes a patented burner bypass damper that maintains the pressure drop across the burner as outside air volumes change. This ensures that complete and proper combustion occurs. This bypass damper is self-adjusting, designed for minimal maintenance, and requires no controls.

Benefits versus Air Turnover

The 80/20 recirculation arrangement provides the space heating function with several advantages over indirect gas-fired air turnover units.

More Efficient - The direct fired burners are 92% efficient, compared to standard 80% efficient air turnover units.

Fresh Air - The recirculation arrangement provides a continuous source of fresh outdoor air and positively pressurizes the building combating infiltration in the space.



S Standard Feature **O** Optional Feature

1 Construction

- Constructed of heavy-gauge G90 galvanized steel
- Single or double-wall construction with 1-inch fiberglass insulation
- Removable access panels with optional hinged doors
- Available finishes include:
 - Permatector™ (1,800 hr/salt spray rating under ASTM B117 testing conditions)
 - Hi-Pro Polyester (4,000 hr/salt spray rating under ASTM B117 testing conditions)
 - Baked Enamel coatings available in 16 standard colors or custom color match

2 Dampers

- Low-leakage non-insulated inlet damper with factory-mounted and wired actuators
- Low-leakage insulated or non-insulated outlet damper

3 Filter Section

- V-bank filter section or mixing box
- 2-inch washable aluminum mesh
- 2-inch MERV 8 pleated disposable
- 2-inch MERV 13 pleated disposable

4 Control Center

- 24 volt control voltage
- Magnetic motor starter with solid-state overload protection
- Control transformer
- Disconnect switch
- Distribution terminal strip
- UL Listed, Recognized, or Classified electrical components
- Factory wired for single point power connection

5 Direct Gas-Fired System

- High-quality cast aluminum burners with stainless steel mixing plates
- 25:1 turn down ratio
- Electronic modulation burner control
- Flame safeguard with optional digital fault indicator - *available on pilot ignition systems only*
- FM Global gas train configurations available above 400,000 Btu/hr



6 Vibration Isolators

- Fan and motor assemblies are mounted on neoprene vibration isolators to minimize noise transmission into the building.



7 Supply Fan Options

- Forward-curved supply fans with optional factory-provided VFD
- Balanced wheels to ensure a vibration-free operation
- Extended lube lines are available on blowers sized 120 or larger.



8 Equipment Stand

- Fully-welded, hot-rolled steel construction
- Standard baked enamel coating (concrete grey)
- 24-, 48-, and 60-inch heights available

Optional Electrical Controls

Auxiliary Contacts - Normally open and normally closed contacts are available for supply fan status and supply fan interlocks.

Cooling Relay - When interlocked with a rooftop unit (RTU), this relay can be used to lockout a call for heat from the make-up air unit when there is a simultaneous call for cooling from the RTU.

CO₂ Sensor - Shipped loose for field-mounting and wiring in the supply or return air duct.

Dirty Filter Sensor - Monitors the pressure drop across the filter section. If the pressure drop is higher than the field-adjustable setting, the switch will trip and indicate that the filters need to be cleaned or replaced. An indicator light may be wall/beam mounted or provided with a remote panel.

Exhaust Fan Starter(s) - Factory-mounted and wired for an electrical interlock between the supply and exhaust fan(s).

Fire Stat Type III - Shipped loose for field-mounting and wiring in the supply or return air duct. Contains two normally open and two normally closed contacts for alarm notification.

Flame Safeguard Display - Interfaces with the flame safeguard. It displays a detailed history of the faults that have occurred as well as the current status of the MUA unit. The display is detachable and can be used on multiple units. MUA must have pilot ignition for this option to be valid.

Freeze Protection - Automatically shuts down the supply fan when the discharge temperature is below the set point for an extended amount of time. This prevents the unit from discharging non-tempered air into the building and freezing pipes and other temperature sensitive items.

Heating Inlet Air Sensor - Automatically turns the heat on and off based on a field-adjustable set point.

High/Low Gas Pressure Switches - Automatically shuts down the burner if the manifold pressure/inlet gas pressure is too high/low for the burner to operate properly.

Inlet Damper End Switch - Will not allow starter to engage until end switch is proved, ensuring that the inlet damper is fully open before unit operation.

Night Set-Back with 7-day Time-Clock -

Thermostats are available to set the unit to energy saving modes during unoccupied hours.

Service Receptacle - A 115 volt GFCI outlet can be shipped loose or mounted externally in a NEMA-3R box for the convenience of service personnel. A separate 115 volt power source is required.

Temperature Controls

Discharge Temperature Control

This factory-installed control allows the user to field adjust a constant supply air discharge temperature. This option offers the ability to incorporate a room override thermostat.



Room Override Thermostat

The optional room override thermostat works with the discharge temperature control option to momentarily elevate the discharge temperature if the room drops below the space set point. The room sensor may be wall/beam mounted or be included on the remote control panel.



Space Control

This control allows the user to select a space temperature set point. The unit will then adjust the discharge temperature to achieve the desired space temperature set point. The room sensor may be wall/beam mounted or included on a remote control panel.



External Control

This control allows a field supplied 2-10 VDC signal, a 4-20 mA signal, or Building Management System command to control the modulation of the burner. Greenheck includes field-adjustable minimum and maximum settings to prevent over and underfiring of the burner.



Unit Controls

Remote Panel - Greenheck offers two types of remote control panels featuring a variety of switches, thermostats, temperature selectors and indicator lights. Installation and field wiring is easy by using a numbered terminal strip for point-to-point wiring between the make-up air unit and the remote panel.



Industrial/Severe Duty: The industrial panel features a variety of switches and indicator lights mounted on a Permatector™ coated steel box in a NEMA-1 enclosure. The severe duty panel offers a variety of indicator lights and switches mounted in/on a stainless steel panel satisfying the following NEMA enclosure requirements: 3, 3R, 4, 4X, 12.



Kitchen (KSCP): Features light toggle switches for kitchen hood lights, fans and tempering. A stainless steel faceplate for flush wall mounting and a junction box is included.

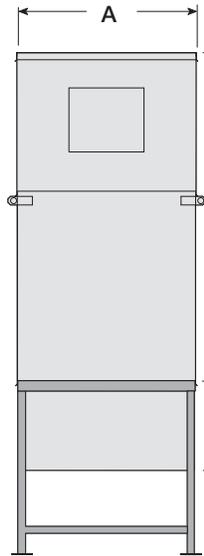
Network Interface Controller - An optimum solution for connecting a make-up air unit to a Building Management System (BMS). The network interface controller offers an easy-to-use, remote-mounted display. It easily integrates to BACnet® IP, BACnet® MSTP, Lonworks® or Modbus. Two operating options are available:



Monitor only: Allows the BMS to monitor the status and functions of the unit through a factory-installed controller. Control commands will be provided by terminal style signals external to the unit.

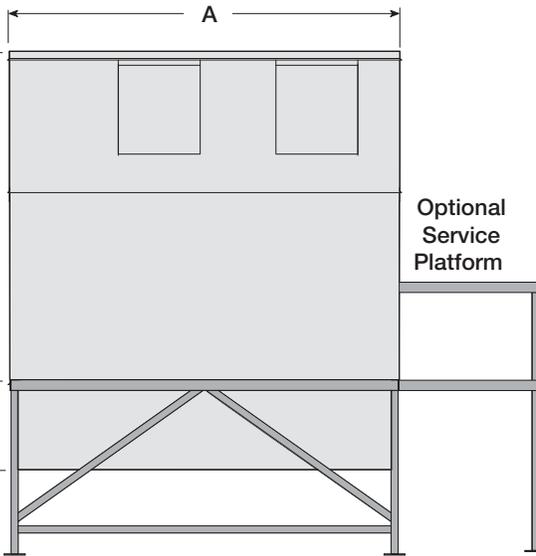
Monitor and Control: Allows the BMS to monitor the status and command the basic functions of the unit through a factory-installed controller. A remote panel is not available with this option.

Housing Sizes 20 & 30



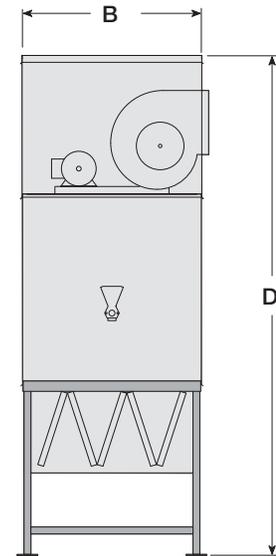
FRONT VIEW

Housing Sizes 40 & 50



FRONT VIEW

Housing Sizes 20 thru 50



SIDE VIEW

Model	A	B	C	D	Approx. Weight (lbs.)*	Airflow Range (CFM)
VSU-20	40	40	78	128	1,200	2,500 - 6,500
VSU-30	52	53	92	146	1,700	6,000 - 12,000
VSU-40	111	54	95	144	3,750	14,000 - 28,000
VSU-50	156	63	107	184	5,500	32,000 - 60,000

All dimensions are shown in inches.

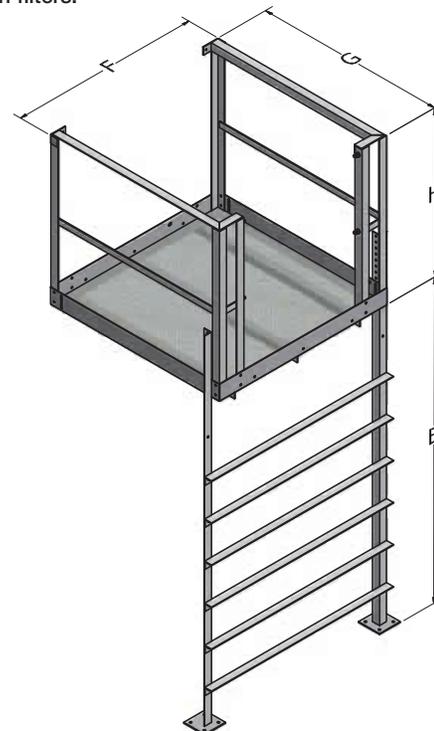
*All weights are shown in pounds and include 2-inch aluminum mesh filters.

Optional Service Platform

The minimum distance from the ground to the filter intake is 24 inches. For housing size 50, the minimum distance is 48 inches. This is intended to minimize debris and moisture from being entrained in the make-up air. In locations where heavy snow fall is common, this dimension may need to be greater. Specify the minimum clearance dimension when ordering.

Housing Size	20, 30, 40			50		
	24 in.	48 in.	60 in.	24 in.	48 in.	60 in.
E	60.75	84.75	96.75	60.75	84.75	96.75
F	44	44	44	57.5	57.5	57.5
G	42.25	42.25	42.25	42.25	42.25	42.25
H	42	42	42	42	42	42

All dimensions are shown in inches.



Cross bracing for service platform legs are not intended to be used for platform access.



**Direct Gas - Economy
Model DGK**



**Indirect Gas - Economy
Model IGK**



**Direct Gas - Standard
Model DG**



**Indirect Gas - Standard
Model IG**



**Direct Gas - Configurable
Model DGX**



**Indirect Gas - Configurable
Model IGX**



**Direct Gas - Industrial
Model TSU**



**Hot Water, Steam and Electric
Model MSX**



Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Specific Greenheck product warranties are located on greenheck.com within the product area tabs and in the Library under Warranties.

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