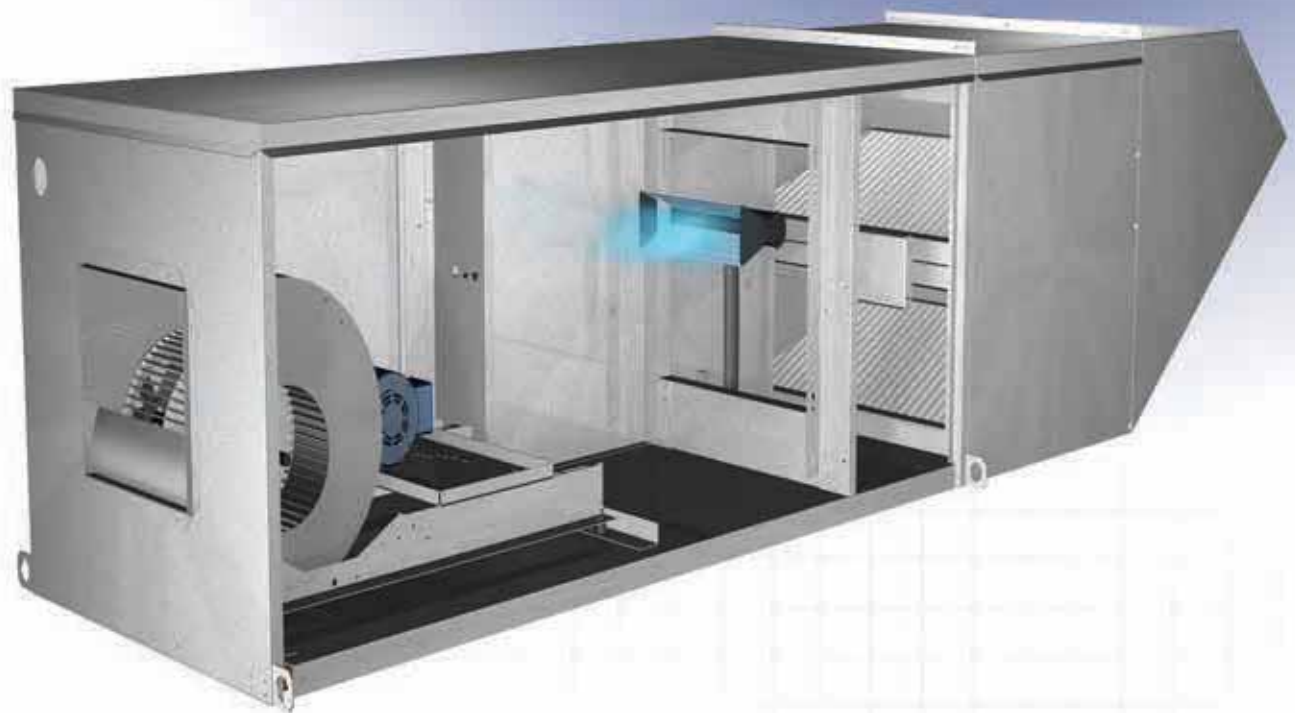
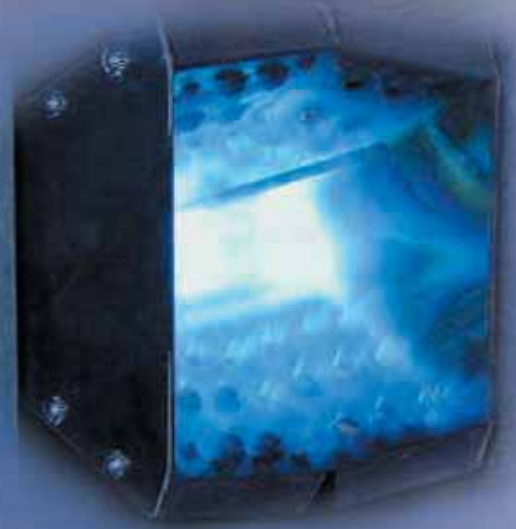


# Direct Gas-Fired Make-Up Air Models DG and DGX

Commercial, Industrial and Kitchen Applications

- 800 - 48,000 cfm
- 4 in. wg External Static Pressure
- Direct Gas-Fired Heating
- Optional Cooling
  - Packaged DX (2.5 to 16 tons)
  - Split DX
  - Chilled Water
  - Evaporative Cooling
- Supply Fan Options
  - Belt Drive Forward-Curved
  - Direct Drive Backward-Curved Plenum
  - Direct Drive Mixed Flow Plenum



## Direct Gas-Fired Make-Up Air Units

Greenheck's direct gas-fired make-up air units provide tempered outdoor air to a wide range of applications — from kitchens to industrial facilities. Greenheck offers two model types with various levels of construction and control accessories for maximum flexibility and performance.



Model DG



Model DGX

Multiple fan and cabinet sizes provide airflow capacities up to 48,000 cfm and external static pressure capabilities up to 4.0 in. wg. All fans are tested in our accredited laboratory to ensure accurate fan performance. All units are factory-wired and tested prior to shipment. Each unit is checked for proper operation of the gas train, electrical components, and airflow.



Model DG shall be ETL Listed to ANSI Z83.4/CAN 3.7.

DGX shall be ETL Listed to ANSI Z83.4/CSA 3.7-M99 (for non-recirculating) or ANSI Z83.18 (for recirculation).

## Direct Gas Technology

Greenheck's direct gas technology uses direct gas-fired line burners with capacities up to 4,800,000 BTU/hr to provide efficient heating in any climate. A 92% thermal efficiency reduces gas consumption for maximum energy savings for both natural gas and propane fuel sources.



Features	Benefits
High-quality cast aluminum burners with stainless steel mixing plates	Provides superior resistance to corrosion for a long operating life
High turndown burner ratio (25:1)	Eliminates burner cycling at mild conditions
Electronically modulating temperature control system	Maintains precise discharge air temperature

## Industrial

**Greenheck's Solution:** Greenheck's industrial make-up air units are designed to provide outdoor air for buildings with process or combustion exhaust. The introduction of tempered supply air maintains positive building pressure, reducing the introduction of unconditioned outdoor air into the building. This improves indoor air quality and space comfort.

**Flexible Designs:** In addition to the constant volume 100% outdoor air arrangement, Greenheck's direct gas-fired make-up air products are also available with variable air volume or 80/20 recirculation to easily match supply air requirements as mechanical exhaust rates vary.

**Supply Fans:** The DGX is available with one of three supply fan arrangements. **Forward-curved** supply fans are competitive for any price sensitive application and are typically suitable for applications requiring less than 2 in. wg of external static pressure. **Backward-curved plenum** supply fans are capable of handling up to 4 in. wg of external static pressure. **Mixed flow plenum** supply fans are extremely efficient in low to medium pressure applications, substantially reducing required horsepower and operating cost. Both plenum fan designs include a factory-mounted VFD providing an inherent soft-start for the supply fan. This flexibility in fan options allows for five possible discharge arrangements, simplifying installations. These features make Greenheck's DGX model an outstanding option for a variety of new or retrofit applications.



## Kitchens

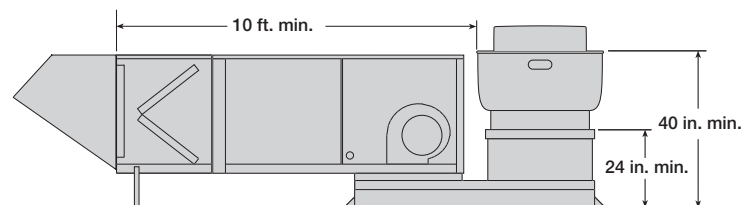
**Greenheck's Solution:** A typical kitchen system has an exhaust fan that operates based on appliance usage. A Greenheck direct gas make-up air unit with integral heating and optional cooling is interlocked with an exhaust fan to deliver outside air to maintain a slight negative pressure in the kitchen relative to the adjacent dining space. The delivery of tempered supply air increases employee comfort and overall building energy efficiency.

**Maximum Energy Savings:** An optional variable air volume arrangement is available for reduced energy consumption during non-peak hours of operation.

**Easy Installation:** The Greenheck combination package simplifies installation in kitchen ventilation applications. The pre-engineered combination extension ensures that the supply fan, exhaust fan, and curb all interface properly to reduce field labor costs.

Equally important, Greenheck's combination packages are specifically designed to comply with the National Fire Protection Association (NFPA) code 96 which states:

- Exhaust duct must terminate at least 24 inches above the roof deck.
- Exhaust fan discharge must be at least 40 inches above the roof deck.
- Supply air intake must have a horizontal separation of 10 feet from the exhaust discharge.



Model DGX Combination Package

*Note: Consult local codes and the authority having jurisdiction if questions concerning the use of this product.*

## Variable Air Volume (VAV) - Models DG and DGX

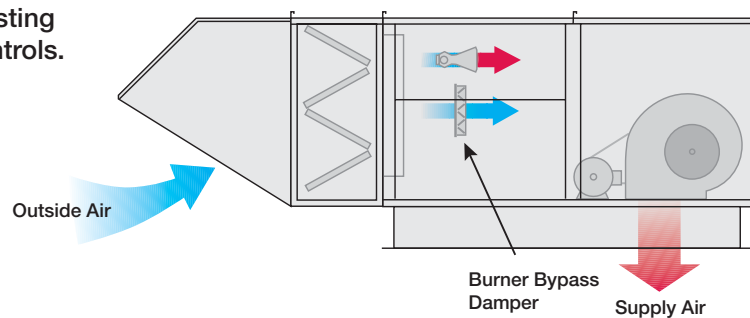
The VAV arrangement varies the fan speed based on building conditions to reduce costs associated with introducing ventilation air. The high turndown rate of the burner (25:1) and an airflow turndown capability of 50% provides consistent discharge temperature control as the supply airflow changes.

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
- Kitchen energy management system controls. A remote or unit-mounted VFD provides seamless integration with Vari-Flow or Melink® energy management systems.



## 80/20 Recirculation - Model DGX only

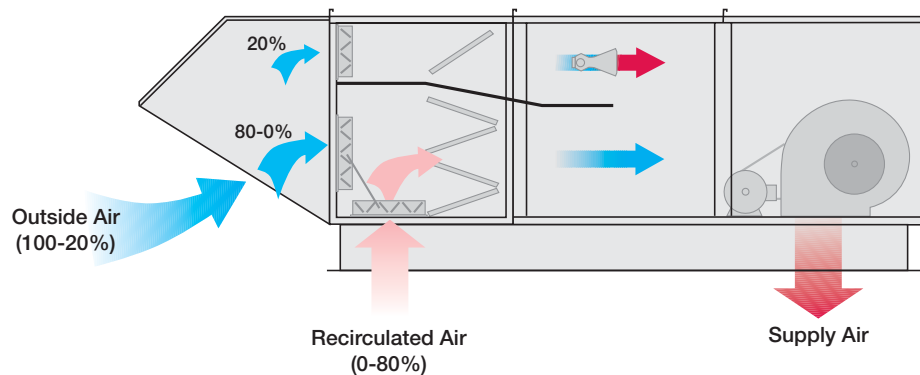
The 80/20 recirculation arrangement is recommended when the ventilation equipment provides the primary source of heating for the space. This is commonly found in large manufacturing or industrial facilities.

All units selected with the recirculation option include:

- An integral filter section with outdoor air and mixing dampers. Up to 80% of the air from the space can be filtered and recirculated to combine with 20% outside air.
- The integral filter section includes built-in separation of outdoor and return airstreams to eliminate the possibility of contaminants from the recirculated air passing through the burner.
- Optional night setback sequences will allow the unit to satisfy the heating requirements of the space during unoccupied time periods.

### 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



## Unit Controls

### Microprocessor

The optional microprocessor controller controls all aspects of unit operation and is factory-programmed, wired and tested to match the configuration for each job. The controller is the ideal option for integrating into a building management system and offers the ability to control as many or as few communication points as needed. Network communication is available over the following protocols: BACnet®, LonWorks®, or Modbus®.



### Remote Interface

The optional remote interface provides flexibility to the end-user since every control point parameter can be accessed without the need to physically access the unit. Available with the microprocessor and network interface.



### Remote Panel



The optional remote panel is designed for surface mounting to control and monitor basic unit operation through switches and indicating lights. Switches control fan, heating, and cooling enable. Indicating lights provide status of the fan, heating, and cooling. Temperature control dials and/or room temperature sensors can be mounted on the panel for easy access. The panel is available in a Permator™ coated NEMA-1 enclosure or stainless steel NEMA 4X enclosure.

## Temperature Controls

### Discharge Temperature Control

A factory-installed control allows the unit to discharge at a field-adjustable temperature by electronically modulating a gas valve. A room override thermostat is also available



### Room Override Thermostat

Works with the discharge temperature control option to temporarily increase the discharge temperature if the room drops below space set point. The room sensor may be wall/beam mounted or included on a remote control panel.



### Network Interface

The optional network interface allows a building management system (BMS) the ability to monitor a variety of temperatures and unit status points. The network interface integrates with the following protocols: BACnet®, LonWorks®, or Modbus®.



**Monitor only:** Allows the BMS to monitor the status and functions of the unit through a factory-installed network interface. All control commands will be provided by terminal style signals contact closures provided by others.

### Room Thermostat

The room thermostat gives users the ability to view the room temperature and control the active room set point from the adjustable display. The room thermostat also has the ability to send the unit into temporary occupied mode. The room thermostat is shipped loose for field installation and is connected to the microprocessor with Modbus® wiring. Optional averaging sensors are available for up to four temperature readings.



### Room Temperature 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

A field supplied 2-10 VDC signal or 4-20 mA signal provides open loop control of the burner firing rate. Greenheck includes field-adjustable minimum and maximum settings to prevent over and under firing the burner.



## Cooling Coils - Model DGX only

Both chilled water and direct expansion coils for split systems are available. The cooling section includes the cooling coil, drain pan, and insulated double-wall construction. Chilled water and direct expansion cooling coils are available with the following features:

- Airflow capacity up to 11,700 cfm
- Various coil depths and circuiting optional to meet a wide variety of cooling applications
- Insulated double-sloped stainless steel drain pan for positive draining
- Coils constructed with copper tubes mechanically bonded to aluminum fins
- Coil performance is rated in accordance with AHRI 410
- Condensate drain, overflow, and coil connections are stubbed through the wall of the unit
- Optional ElectroFin® coil coating



## Evaporative Cooling - Models DG and DGX

The evaporative cooling section mounts directly to the front of the unit eliminating transition or ductwork. The evaporative cooling section includes the following features:

- Airflow capacity up to 60,000 cfm
- 12-inch media depth producing a 90% cooling effectiveness
- CELdek® or GLASdek® evaporative cooling media options
- Stainless steel sump and cooling frame around the media
- Painted or galvanized steel housing construction
- Integral louvered intake and 2-inch aluminum mesh filters
- Drain and overflow connections stubbed through the wall of the unit for convenience



The following control options are available:

- **Recirculating Pump:** Includes a pump that recirculates water over the evaporative media and is activated by a call for cooling. A field-adjustable bleed-off valve keeps mineral concentrations low.
- **Auto Drain and Flush:** Includes a recirculating pump and a field-adjustable timer that will periodically flush the sump to minimize mineral build-up.

## Packaged Direct Expansion - Model DGX only

Providing unconditioned make-up air can create an uncomfortable work environment during summer months. Although conditioned make-up air can increase comfort levels, the need to cool and dehumidify this air to a 55°F supply air temperature can significantly increase equipment first cost and annual energy consumption.

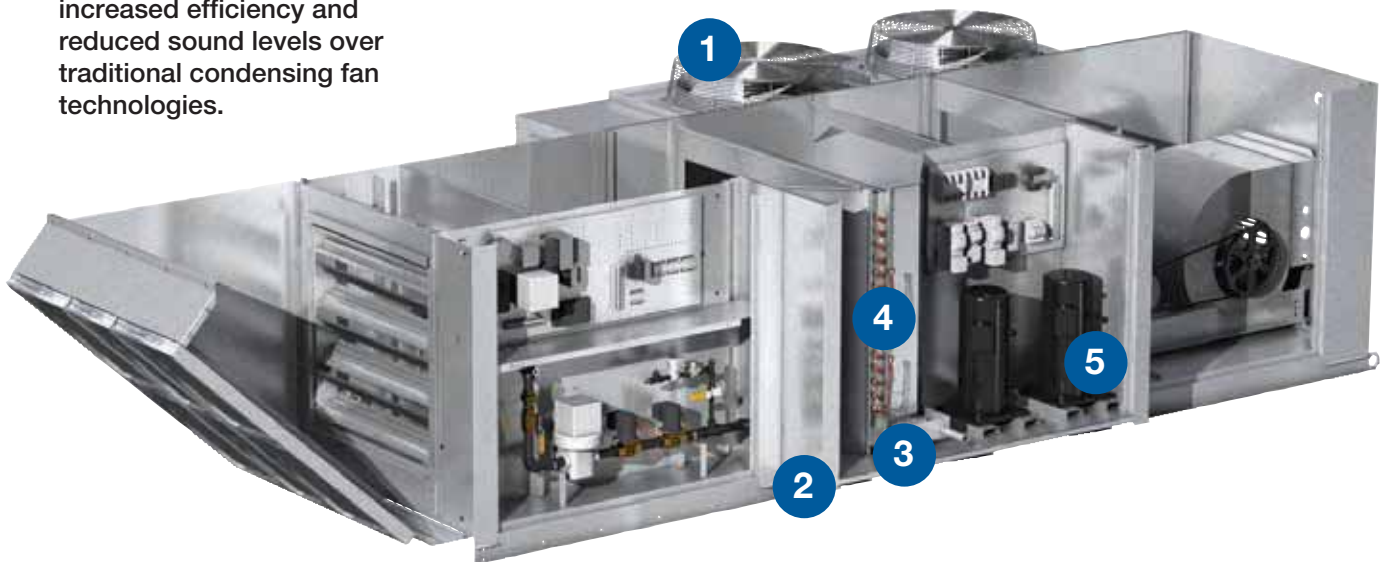
- **Airflow Arrangement** - Optional Variable Air Volume or Constant Volume 100% Outdoor Air
- **Performance Range** - 800 to 7,500 cfm
- **Cooling Capacity** - 2.5 to 16 Nominal Cooling Tons

The packaged DX cooling option is designed to sensibly cool the outside air to a 65-75°F supply air condition to improve space comfort and enhance employee productivity at an economical first cost.

Features	Benefits
Draw-thru cooling arrangement	Even airflow across coils for efficient cooling operation and less chance of water carryover
Standard high/low pressure cutouts and crank case heaters	Increased compressor life
Low discharge temperature cutout	Assists in preventing frost from forming on the coil during part load conditions or low airflows
Optional variable capacity compressor	Modulates DX cooling system for precise temperature control, saving operational energy

**1 Condensing Fans**  
Standard direct drive condensing fans with serrated blades provide increased efficiency and reduced sound levels over traditional condensing fan technologies.

**2 Service Access**  
Standard lift-off or optional hinged panels provide easy access to refrigeration components. Components are mounted in an isolated compartment to allow service without affecting airflow.



**3 Drain Pan**  
The evaporator coil is mounted on an insulated double-sloped stainless steel drain pan.

**4 Condenser and Evaporator Coils**  
Copper tubes are mechanically expanded in aluminum fins. Optional ElectroFin® coil coating for added corrosion resistance.

**5 Compressors**  
Hermetic sealed scroll compressors are mounted on neoprene isolators to minimize noise and vibration transmission. An optional variable capacity compressor is available for the lead circuit.

**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:
  - Permator™ (2,500 hr/salt spray rating under ASTM B117 testing conditions)
  - Hi-Pro Polyester (5,000 hr/salt spray rating under ASTM B117 testing conditions)
  - Baked Enamel coatings available in various standard colors or custom color match

## 2 Weatherhood

- Weatherhood with birdscreen features a wire mesh intake, preventing large debris from damaging the filters. An additional filter section is required
- Aluminum mesh filtered weatherhood eliminates the need for an additional filter section
- Louvered weatherhood includes a drainable blade louver at intake with 2-inch aluminum mesh filters
- The thru-wall sleeve provides an attachment interface between the weatherhood and burner section. The sleeve accommodates walls up to 15 inches (38 cm) in depth

## 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-inch MERV 14 pleated disposable
- 2-inch MERV 8 and 2-inch MERV 13 pleated disposable
- 2-inch MERV 8 and 4-inch MERV 14 pleated disposable

## 4 Dampers

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

## 5 Direct Gas-Fired System

- High-quality cast aluminum burners with stainless steel mixing plates
- Up to 25:1 turndown ratio
- Electronic modulation burner control
- Flame safeguard with optional digital fault indicator
- FM Global gas train configurations available
- 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



## 6 Control Center

- 24 volt control voltage
- Magnetic motor starter with solid state overload protection
- Control transformer
- Disconnect switch
- Distribution terminal strip
- Factory prewired for single point power connection



**7**

### Cooling Options

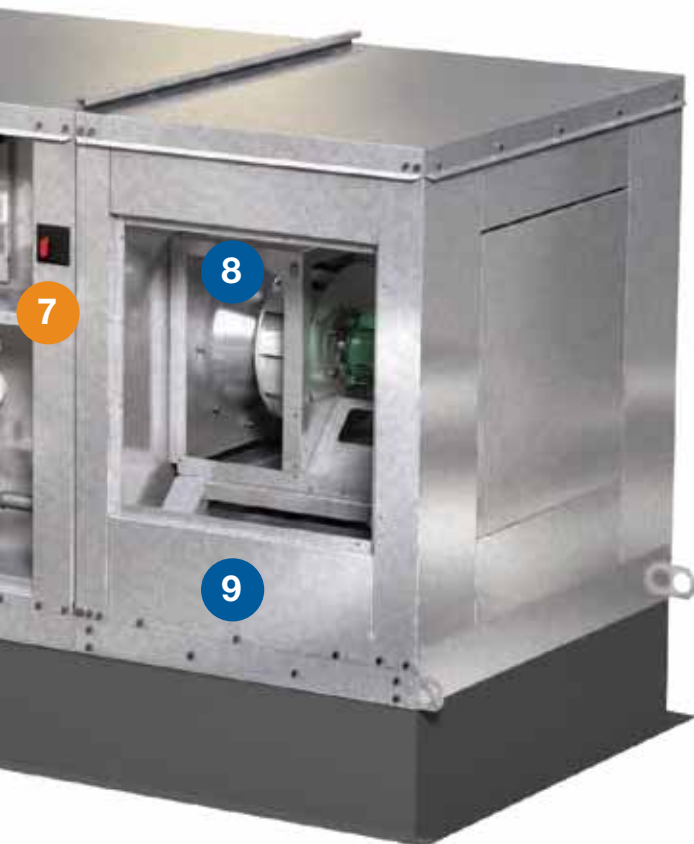
All cooling options include a stainless steel drain pan

- Evaporative cooler
- Chilled water coils
- Split DX coil (coils only)
- Packaged direct expansion (PDX)  
*Includes condensing fans and coils.*

**8**

### Supply Fan Options

- Belt driven, forward-curved fan with optional factory-provided VFD
- Direct drive, backward-curved plenum fan with factory-provided VFD (shown)
- Direct drive, mixed flow plenum fan with factory-provided VFD


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### Vibration Isolators

The entire fan and motor assembly is mounted on vibration isolators to minimize noise transmission into the building. Neoprene or spring isolators are available on forward-curved supply fan models. Backward-curved and mixed flow supply fan models only offer neoprene isolators.

## 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), the 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.

**CO<sub>2</sub> 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 and the current status of the unit. The display is detachable and can be used on multiple units. 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/off based on a field-adjustable set point.

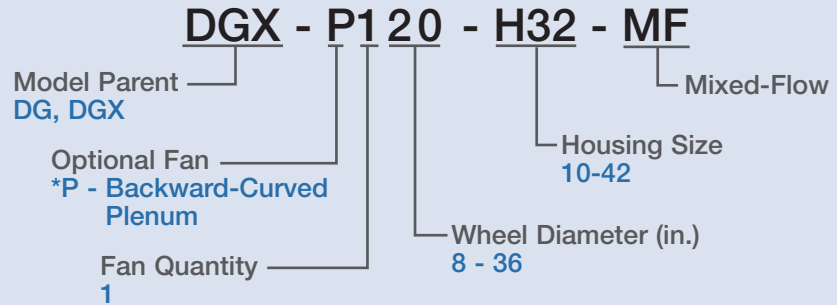
**Inlet Damper End Switch** – Will not allow starter to engage until the end switch is proved, ensuring the inlet damper is fully open before unit operation.

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

## Model Number Code

The model number code is designed to completely identify the unit. The correct code letters must be specified to designate the configurations and size.

*\*If no P is shown, then a forward-curved fan is provided.*



## Model DG - Standard

Model DG sets the standard for an efficient approach to tempered make-up air applications. Several intake and filtering configurations and optional evaporative cooling is available. The variable volume arrangement provides seamless integration with Vari-Flow and Melink® kitchen energy management systems.

- **Airflow Arrangement** - Constant Volume 100% Outdoor Air and Variable Air Volume
- **Performance Range** - 800 to 15,000 cfm
- **Heating Capacity** - Up to 1,600,000 BTU/hr
- **Cooling Capacity** - Evaporative cooling up to 12,000 cfm



## Model DGX - Configurable

Model DGX is a highly configurable direct gas-fired heating and cooling system that incorporates a modular design for maximum flexibility. Provides make-up air across a broad range of applications with expanded heating, cooling, and airflow capacities.

- **Airflow Arrangement** - Constant Volume 100% Outdoor Air, Variable Air Volume and Recirculation (80/20)
- **Performance Range** - 800 to 48,000 cfm
- **Heating Capacity** - Up to 4,800,000 BTU/hr
- **Cooling Capacity**
  - Evaporative cooling up to 48,000 cfm
  - Chilled water cooling up to 11,700 cfm
  - Split DX cooling up to 11,700 cfm
  - Packaged DX cooling up to 7,500 cfm



	DG	DGX
<b>INTAKE OPTIONS</b>		
Aluminum Mesh Filtered Weatherhood/Intake	Optional	Optional
Birdscreen Weatherhood	Optional	Optional
Louvered Weatherhood	Optional	Optional
Thru-Wall Weatherhood	—	Optional
<b>AIRFLOW ARRANGEMENT</b>		
80/20 Recirculation	—	Optional
Constant Volume 100% Outdoor Air	Optional	Optional
Variable Air Volume	Optional	Optional
<b>SUPPLY FAN OPTIONS</b>		
Backward-Curved Plenum	—	Optional
Forward-Curved	Standard	Optional
Mixed Flow	—	Optional
<b>TEMPERATURE CONTROLS</b>		
Discharge Temperature Control	Optional	Optional
Discharge Temperature Control with Room Override	Optional	Optional
Discharge Temperature Control by External DDC Signal	—	Optional
<b>UNIT CONTROLS</b>		
Network Interface - Monitoring Only	—	Optional
Remote Panel	Optional	Optional
Microprocessor	—	Optional
<b>COOLING OPTIONS</b>		
Chilled Water	—	Optional
Direct Expansion (DX)	—	Optional
Evaporative	Optional	Optional
Packaged Direct Expansion (PDX)	—	Optional
<b>DISCHARGE OPTIONS</b>		
Bottom Discharge	Optional	Optional
End Discharge	Optional	Optional
Left or Right Discharge	—	Optional
Top Discharge	—	Optional
<b>OPTIONS &amp; ACCESSORIES</b>		
Auxiliary Contacts	Optional	Optional
Combination Package	Optional	Optional
Dirty Filter Sensor	Optional	Optional
Inlet or Outlet Dampers	Optional	Optional
Double-Wall Construction	Optional	Optional
Duct Adapter	Optional	Optional
Duct Liner Insulation	Optional	Optional
Exhaust Fan Starter(s)	Optional	Optional
Freeze Protection	Optional	Optional
Gas Pressure Regulator	Optional	Optional
Inlet Air Sensor – Heat	Optional	Optional
Roof Curbs	Optional	Optional
Service Receptacle	Optional	Optional
Special Coatings	Optional	Optional
Variable Frequency Drive (VFD)	Optional	Optional
V-Bank Filter Section	Optional	Optional

## Weatherhoods



Birdscreen



Aluminum Mesh  
Filtered



Louvered



Thru-Wall  
DGX only

## Filters



Aluminum Mesh



MERV 8 or 13



MERV 14

## Supply Fans



Forward-Curved  
(Top, Bottom, End)



Backward-Curved  
(Top, Bottom, Left, Right, End)

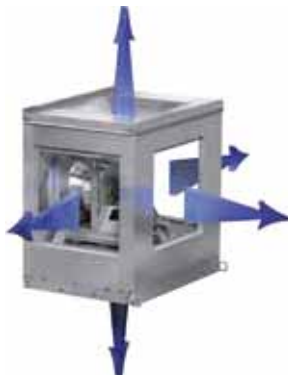


Mixed Flow  
(Bottom, Left, Right, End)

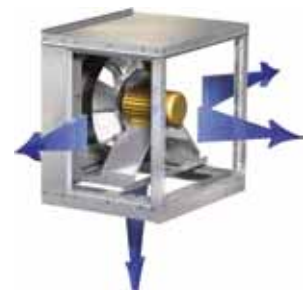
## Discharge Options



Top, Bottom, End  
(Forward-Curved)



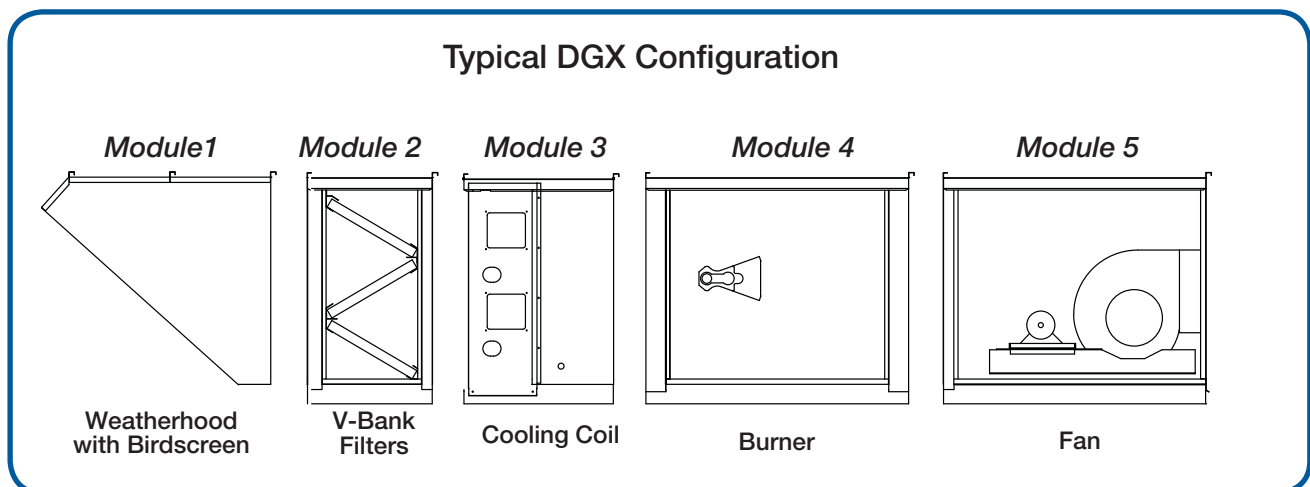
Top, Bottom, Left, Right, End  
(Backward-Curved)



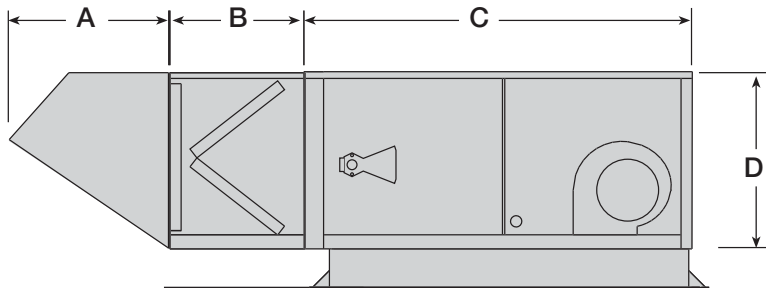
Bottom, Left, Right, End  
(Mixed Flow)

	Model	DGX-H12	DGX-H22	DGX-H32	DGX-H35	DGX-H38	DGX-H42
Unit	Airflow Range (cfm)	800-3,000	2,600-6,500	6,500-15,000	15,000-23,000	24,000-34,000	32,000-48,000
	Approximate Weight* (lbs)	700	1,100	1,500	2,300	3,000	4,000
	Height (in.)	39	44.9	48.7	54.6	63.9	67.9
	Width (in.)	33.7	44.1	53.1	78.5	95.5	100.3
	Overall Width with Evaporative Cooling (in.)	33.7	>4,800 cfm = 60.6	≤9,000 cfm = 66.5 >9,000 cfm = 96.5	120.5	95.5	100.3
<b>Lengths (in.)</b>							
Module 1	Birdscreen Weatherhood	29.9	45.6	47.3	47.1	60.9	70.0
	Aluminum Mesh Filtered Weatherhood	31.5	47.1	48.7	47.8	65.3	68.9
	Louvered Weatherhood	13.8	16.9	16.9	-	-	-
	Thru-Wall	69.9	82.3	104.7	120.6	-	-
	Evaporative Cooling	30.2	30.2	≤9,000 cfm = 34.7 >9,000 cfm = 38.1	38.1	98.5	116.5
Module 2	V-Bank Filter Section	21.5	24.1	25.8	27.7	30.8	31.1
	80/20 Filter Section	-	44.1	50.2	51.3	50	55
Module 3	Cooling Coil (standard)	30	30	-	-	-	-
	Cooling Coil (high capacity)	50.4	69.4	98.1	-	-	-
Module 4	Burner	37.6	52.3	52.5	54.9	58.1	58.1
Module 5	Forward-Curved Fan	42.5	52.2	65.9	62	71.5	75.5
	Backward-Curved Fan	25.1	32.2	51.0			

\*Weight based on DGX with optional birdscreen weatherhood, V-bank filter section and forward-curved downblast fan discharge.



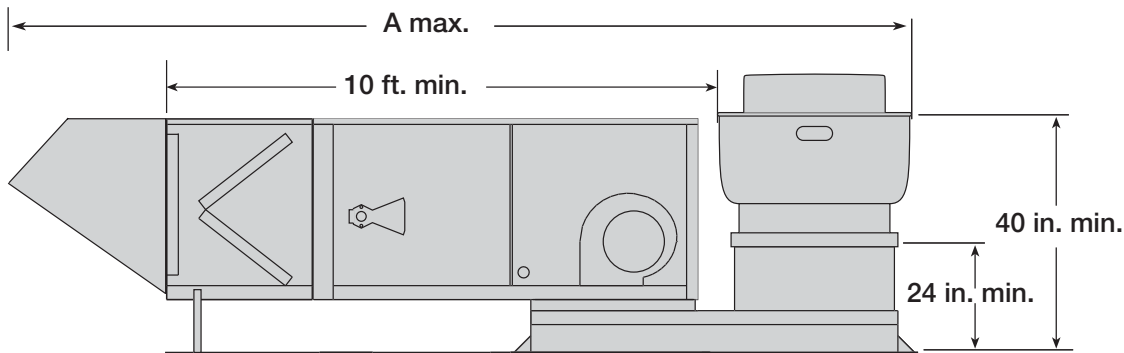
## Model DG Stand-Alone



Model	A			B	C	D	Width	Approximate Weight	Airflow Range (CFM)
	Aluminum Mesh	Louvered	Birdscreen						
DG-H10	31.8	27.5	26.2	27.8	78.3	33.8	28	600	800 - 3,000
DG-H20	34.8	30.3	32.2	30.3	86.3	33.8	37	700	2,600 - 6,500
DG-H30	65.3	33.3	28.1	33	101.8	42.5	48	1,100	6,500 - 15,000

All dimensions are shown in inches. All weights are shown in pounds and includes birdscreen weatherhood and 2-inch filter section.

## Model DG with Combination Package

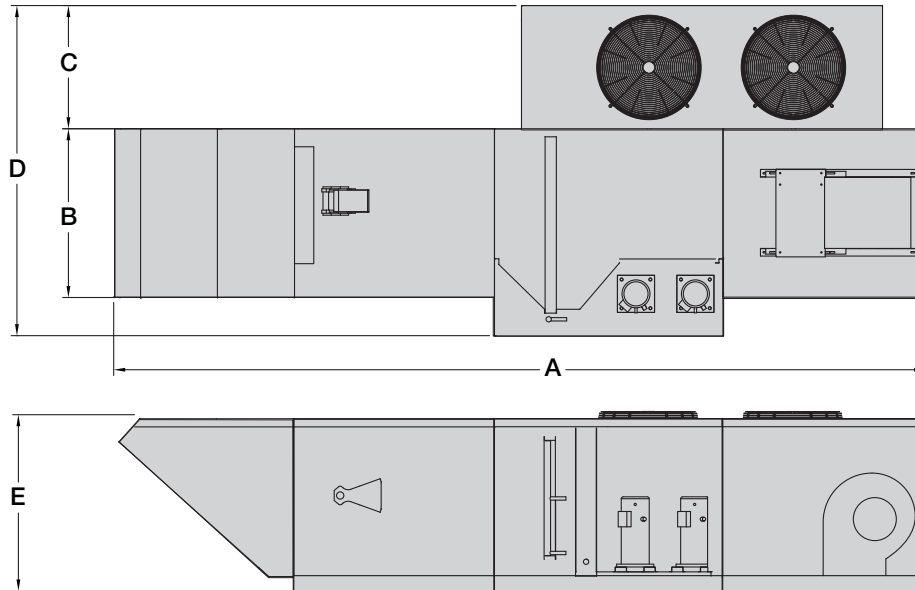


Model	A	Width	Approximate Weight
DG-H10	185.7	35.5	900
DG-H20	204.8	50	1,200
DG-H30	227.0	58.8	1,700

All dimensions are shown in inches and based on largest available CUBE exhaust fan.

All weights are shown in pounds and includes birdscreen weatherhood, 2-inch filter section, curb, fan pack extension and equipment support.

## Model DGX with Packaged DX Cooling



Model	Nominal Tons	Dimensions					Approximate Weight
		A	B	C	D	E	
DGX-H12	2.5 - 8	156	33.8	25.5	70	39	1,500
DGX-H22	7 - 10	212	45	32	87	45	2,200
DGX-H32	10 - 16	237	52	35.5	99	49	2,800

All dimensions are shown in inches. All weights are shown in pounds and includes filtered weatherhood and packaged DX cooling.

# Additional Make-Up Air Products



**Indirect Gas - Standard  
Model IG**



**Indirect Gas - Configurable  
Model IGX**



**Direct Gas- Vertical  
Model VSU**



**Direct Gas- Industrial  
Model TSU**



**Modular Supply  
Model MSX**



**Non-Tempered - Standard  
Model MSF**



## 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](http://greenheck.com) within the product area tabs and in the Library under Warranties.

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Prepared to Support  
Green Building Efforts

