

# Modular Make-Up Air Unit

## Model MSX

Commercial, Industrial, and Kitchen Applications

- 800 - 48,000 cfm
- 4 in. wg External Static Pressure
- Hot Water, Electric or Steam Heating
- Packaged DX (2.5 to 16 tons), Split DX Cooling, Chilled Water or Evaporative Cooling
- Forward-Curved or Direct Drive Backward-Curved Plenum Supply Fan Options



## Product Overview

Model MSX is an ideal make-up air unit where gas-fired heating is not desired or available. The flexible design offers coil heating and/or cooling options with airflow capacities up to 48,000 cfm and 4 in. wg. An untempered option is also available. The result is a highly configurable product for numerous applications at an attractive cost.



## Kitchens

**Greenheck's Solution:** A typical kitchen system has an exhaust fan that operates based on appliance usage. A Greenheck make-up air unit with optional heating or 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 tempered supply air also conditions the outside air to increase employee comfort.

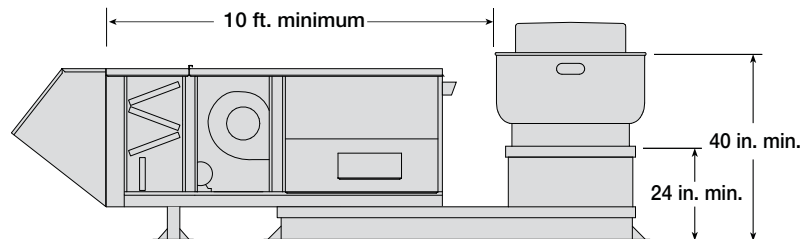
**Easy Installation:** The Greenheck combination package simplifies installation in kitchen ventilation applications. The pre-engineered combination extension ensures that the supply fan, exhaust fan, and curb all interface properly to reduce field labor costs.



Equally important, Greenheck's combination packages are specifically designed to comply with the National Fire Protection Association (NFPA) Standard 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.

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



Combination Package

## Commercial and Industrial



**Greenheck's Solution:** Greenheck's line of commercial and industrial make-up air units are designed to provide supply air for general, process and combustion exhaust.

**Flexible Designs:** Units are available with optional mixing box designed to combine outdoor air and return air to commercial and industrial spaces. This provides heating in the winter months with the benefits of economizer operation in mild conditions. Variable frequency drives (VFDs) are also available for building pressure control or direct control from a Building Management System (BMS).

## Temperature Controls

### Discharge Temperature Control

In make-up air units, the unit-controlled heat output is based on discharge temperature. A factory-mounted discharge temperature sensor feeds information back to the unit control center. The furnace(s) either stage or modulate the heat output to satisfy the discharge temperature set point.



### Room Override Thermostat

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

## Unit Controls



**Microprocessor** - The optional microprocessor controller is factory programmed, wired, and tested prior to shipment. The controller can operate stand-alone or integrate with a Building Management System (BMS) using BACnet® MS/TP or IP, LonWorks® or Modbus® RTU protocols. This controller is responsible for operating the unit in an energy efficient manner while controlling temperature.



**Network Interface** - An optimal solution for connecting a make-up air unit to a BMS. The network interface offers an easy-to-use, integral 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 from a remote panel or contact closures provided by others.

**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.



**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** - 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.



**Temperature Supply Control Panel (TSCP):** Our industrial panel features a Permatector™ coated steel box in a NEMA-1 enclosure. The **severe duty** panel is constructed of stainless steel satisfying NEMA-3, 3R, 4, 4X and 12 enclosure ratings.



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

# MSX Standard and Optional Features

## 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 (4,000 hr/salt spray rating under ASTM B117 testing conditions)
  - Baked enamel coatings available in 16 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 Dampers

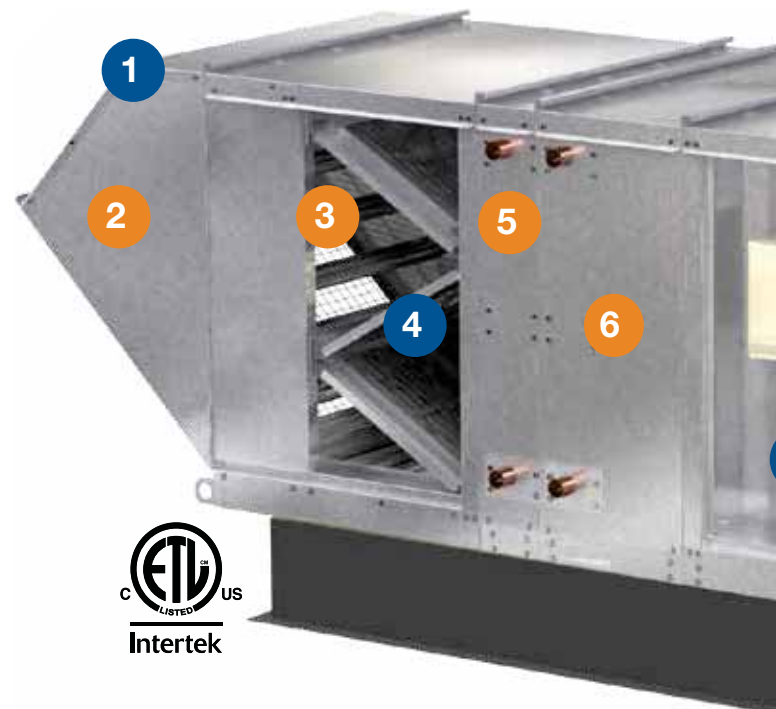
- Low-leakage non-insulated inlet damper with factory-mounted and wired actuators
- Low-leakage insulated or non-insulated outlet damper

## 4 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

## 5 Heating Options

- Hot water coils
- Standard steam coils
- Steam distributing coils for improved freeze resistance
- Optional ElectroFin® coil coating
- Coils tested in accordance with AHRI 410
- Optional face and bypass steam or hot water coils
- Electric heater up to 218 kW
  - Single-point power connection
  - SCR/VSCR modulating control



## 6 Cooling Options

*All cooling options include a stainless steel drain pan*

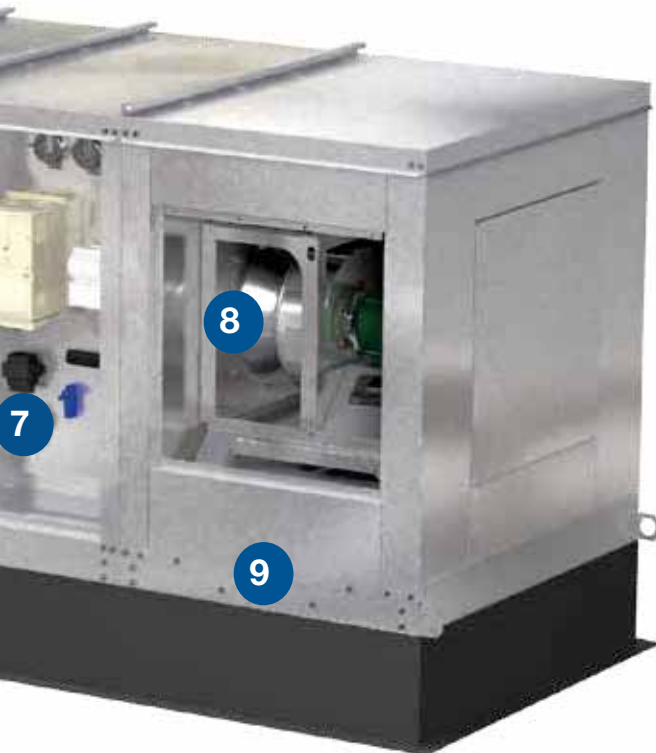
- Evaporative cooler
- Optional ElectroFin® coil coating
- Coils tested in accordance with AHRI 410
- Chilled water coils
- Split DX coil (coils only)
- Packaged direct expansion (PDX)  
*Includes low sound condenser fans. Only available on forward-curved fan models.*

## 7 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 prewired for single-point power connection

## 8 Supply Fan Options

- Forward-curved fan with optional factory-provided VFD
- Direct drive backward-curved plenum fan with factory-provided VFD (shown)
- Balanced wheels to ensure a vibration-free operation



## 9 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 supply fan models only offer neoprene isolators.

**S**

Standard Feature

**O**

Optional Feature

## Optional Electrical Accessories

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

**Coil Freeze Protection** – Adjustable temperature sensing capillary tube which will disable the fan motor at 35°F. This freeze protection is NOT a substitute for draining of water-filled coils.

**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.

**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.

**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.

**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.

**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.

**Smoke Detector** – 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.

Providing unconditioned make-up air through ceiling diffusers or perforated kitchen hood plenums can create an uncomfortable work environment during summer months in commercial kitchens. 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 be detrimental to the food preparation process, significantly increase equipment first cost, and annual energy cost.

The packaged DX cooling option is specifically designed for kitchen applications.

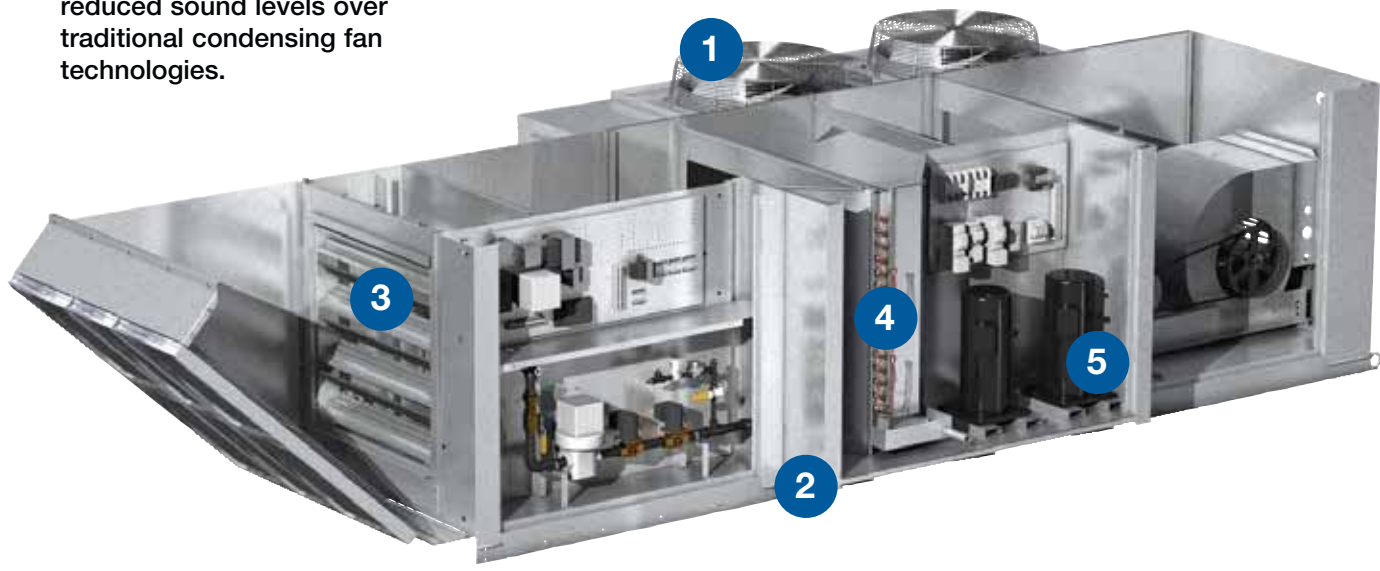
- **Airflow Arrangement** - Optional Variable Air Volume or Constant Volume 100% Outdoor Air
- **Performance Range** - 800 to 7,500 cfm
- **Cooling Capacity** - 2.5 to 16 Nominal Cooling Tons

The packaged DX cooling option is designed to cool the kitchen make-up air to a 65-85°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 and low pressure cutouts and crank case heaters	Increased compressor life
Low discharge temperature cutout	Prevents coils from freezing

**1 Condensing Fans**  
The 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 Dampers**  
Optional factory-installed, powered, low leakage inlet damper (pictured). Optional low leakage outlet dampers also available.

**4 Condenser and Evaporator Coils**  
The copper tubes are mechanically expanded in aluminum fins. Evaporator coils are mounted on a stainless steel drain pan.

**5 Compressors**  
The high-efficiency hermetically sealed scroll compressors are mounted on neoprene isolators to minimize noise and vibration transmission. Crankcase heaters are also provided as standard for exceptional compressor life and system reliability.

## Weatherhoods



Birdscreen



Aluminum Mesh  
Filtered



Louvered



Thru-Wall

## Filter Section



V-Bank



Mixing Box

## Supply Fan Options



Forward-Curved



Backward-Curved

## Discharge Options



Top or Bottom Discharge



Left or Right Discharge  
(only available on backward-  
curved plenum option)

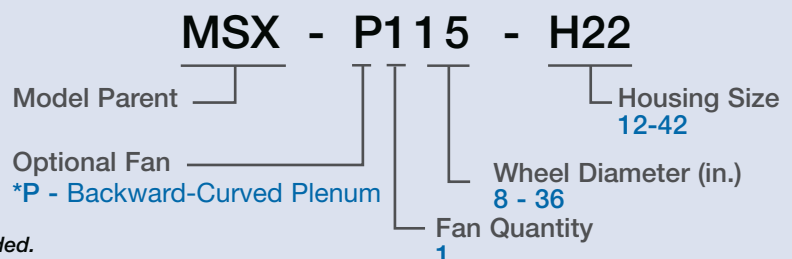


End Discharge

### 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.*



# Additional Make-Up Air Products



**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**



**Direct Gas - Vertical  
Model VSU**



## 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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