

Modular Supply Make-Up Air Unit

Model MSX

- Flexible Design
- Factory Assembled

Heating Options

- Hot Water
- Steam
- Electric

Cooling Options

- Evaporative
- Direct Expansion
- Chilled Water



Model MSX Modular Supply Unit

The Greenheck model MSX is an ideal make-up air unit where gas-fired heating is **not** desired. Coil heating and/or cooling tempering options are available with airflow volumes up to 48,000 cfm. The MSX may also be used for untempered applications.

A flexible design concept enables each product to be customized for its application. Units are factory assembled and wired to minimize field installation labor. The result is a semi-custom product at an attractive cost.



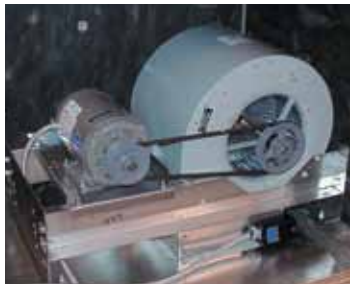
MSX shown with optional filter section, hot water coil and horizontal discharge.



Reliable Fan Performance

Air performance ratings from Greenheck's AMCA registered test chamber ensure accurate data.

Double-width, double inlet forward curved wheels for high efficiency and low sound levels are constructed of heavy gauge steel. Wheels are balanced to ensure vibration free operation.



Vibration Isolators

The entire fan and motor assembly is mounted on vibration isolators to minimize noise transmission to the building. Spring isolators are available in lieu of neoprene isolators.



Durable Construction

Designed for maximum weather resistance, MSX housings are constructed of heavy gauge G90 galvanized steel. Lifting lugs are standard.

Control Center (Optional)

The control center includes the following standard components:

- Magnetic motor starter with solid state overload protection
- Control transformer with fusing
- Disconnect switch
- Individual motor fusing
- Distribution terminal strip



Premium grade control components are selected for reliable operation. All electrical components are UL Listed, recognized or classified and factory prewired for single point power connection.

Shafts

Shafts are precision turned, ground and polished steel sized so that the first critical speed is at least 25% over the maximum operating speed.

Bearings

Shafts rotate in permanently lubricated, heavy duty ball bearings. Bearings are selected for a minimum average (L₁₀) life in excess of 100,000 hours at maximum operation speeds.

Access Panels

Large access panels are provided for easy inspection and maintenance of motors, drives, fan wheels, filters, and heater controls.

Factory Wired and Tested

All units are tested prior to shipment. Units are checked for proper fan and controls operation.



Heating Coils

Hot water, steam and electric heating is available with the model MSX. The heating section consists of the heating coil factory installed in a pre-engineered coil housing. Water and steam coil connections are stubbed through the wall for convenience.

For proper coil sizing, use Greenheck CAPS selection software or contact your local representative. All heating options are available with airflow capacity up to 48,000 cfm.

The heating coil section is installed upstream of the fan section for a draw through arrangement and provide a streamlined transition to adjacent MSX sections.

Hot Water and Steam

Hot water and steam coils are available in either a 100% thru-coil airflow or face and by-pass arrangement. Coils have copper tubes with permanently expanded aluminum fins and are tested and rated in accordance with AHRI 410.



Electric Heat

Electric heaters are UL Listed and feature open coil heating elements. Heater control cabinets are installed completely within the heating section, are factory wired up to 200 kW and meet all requirements of the National Electric Code.



Evaporative Cooling



The evaporative cooling section includes a galvanized steel housing with a louvered intake, 2-inch aluminum mesh filters and a stainless steel evaporative cooling module. The evaporative cooling media is Munters CELdek or GLASdek and has a depth of 12 inches for 90% cooling effectiveness.

The entire section mounts directly to the front of the MSX unit, eliminating transition or ductwork by others. Drain and overflow are conveniently tapped through the side of the cooling section. The supply line connection is field located where convenient. Freeze protection and automatic drain & fill options are also available.

Airflow capacity for evaporative cooling is up to 48,000 cfm. The evaporative cooling section for the housing size 32 through 42 ships separately.

Cooling Coils



Chilled water or direct expansion (DX) cooling is available with the model MSX. The cooling section includes the cooling coil, sloped stainless steel drain pan and insulated double wall construction. Drain and coil connections are stubbed through the wall for convenience.

For proper coil sizing, use Greenheck CAPS selection software or contact your local representative. Four row and six row chilled water or DX coils are available with airflow capacity up to 30,000 cfm.

Cooling coil sections are installed upstream of the fan section for a draw through arrangement and provide a streamlined transition to adjacent MSX sections. DX coils require remote condensing units.

Mixing Box

The mixing box option expands the make-up air application capabilities of the MSX. This section includes low leakage control dampers for outdoor and return air and an actuator in a face and bypass configuration. Either 2 inch pleated 30% filters or 2 inch aluminum mesh filters available within the mixing box section. Double wall construction is available.

Greenheck offers three standard airflow control options with the MSX.

- **Building Pressure Control:** Outdoor air and return air dampers modulate to maintain desired building pressure. Furnace control is based on discharge temperature. A remote control panel with photohelic gauge is required with this option.
- **Potentiometer Control:** Enables manual control of the outdoor air and return air damper positions. A remote control panel is required with this option.
- **External Signal:** Outdoor air and return air dampers modulate based on an external 2-10 VDC or 4-20 mA signal.

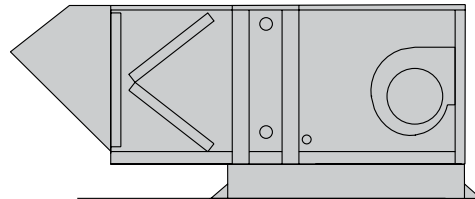


Weatherhoods for MSX units with a mixing box include a mist eliminator to prevent moisture from entering the mixing box section.

Arrangements

Downblast, Horizontal or Upblast Discharge

Model MSX is available in either downblast (Arrangement DB), horizontal (Arrangement HZ), or upblast (Arrangement UB) discharge.



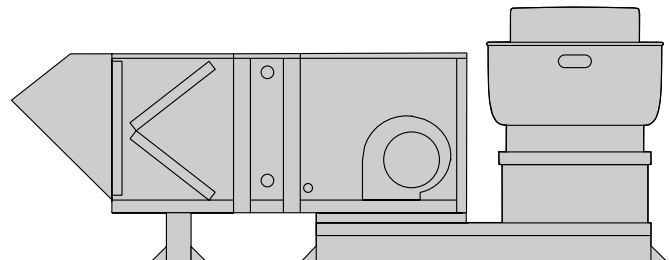
Kitchen Combination Package

The Greenheck combination package simplifies installation and reduces field labor costs for kitchen ventilation systems. The pre-engineered design ensures that the supply fan, exhaust fan, curb and combination extension components interface properly.

Equally important, Greenheck combination packages are specifically designed to comply with NFPA 96.

NFPA 96 states:

- Exhaust duct must terminate at least 24 inches (610 mm) above the roof deck
- Fan discharge must be at least 40 inches (1016 mm) above the roof deck
- Air intake shall have a horizontal separation of 10 feet (3.048 m) from the exhaust discharge



See Greenheck's Series C catalog for complete details on the model CUBE exhaust fan.

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

Remote Control Panels

Industrial type remote control panels feature a variety of switches and indicator lights mounted on a Permator™ coated galvaneal steel box. If room override is specified, the override thermostat is factory mounted on the remote panel as shown at right.



Kitchen style remote panels feature toggle switches and a stainless steel face plate for flush mounting to a wall. The junction box is also included.



Additional Accessories

Air Filter Gauge

The air filter gauge indicates when filters become dirty. An indicator light may be wall/beam mounted or provided with a remote control panel.

Motorized Dampers

Intake or discharge dampers are available to prevent backdrafts when the fan is not in operation. Intake dampers are factory mounted and wired.

Spring Vibration Isolation

Spring vibration isolators are available in lieu of neoprene isolators.

Exhaust Fan Starter(s)

Exhaust fan starters may be added to the control center.

Inlet Air Sensor

An on/off type duct stat automatically de-energizes the gas system and interrupts the flow of gas to the burners when the inlet air temperature is above the desired setting.

115 Volt GFCI Service Receptacle

A 115 volt GFCI outlet is mounted externally in a NEMA-3R box for the convenience of field service personnel. A separate 115 volt power source is required.

Roof Curbs

Factory provided roof curbs are available to ensure compatibility between make-up air unit and roof curb. Standard construction is G90 galvanized steel.

2-Speed Motor

A 1/3 reduction 2-speed motor is available. Consult the factory for 1/2 reduction 2-speed motor availability.

Smoke Detector

Photoelectric smoke detector is available for duct mounting.

Freezestat

An on/off type discharge duct stat (with a timer) prevents the discharge of cold air into the building when the unit is not providing adequate tempering.

Equipment Supports

Factory provided equipment supports may be required in addition to a roof curb, depending on the specified unit configuration. Standard construction is G90 galvanized steel.

Special Coatings

Greenheck's Permator™ powder paint is available if a painted look is desired. Decorative baked enamel paints are also available in a variety of colors to match existing building fixtures. Consult your Greenheck representative for paint selections.

Fiberglass Insulation

Fiberglass insulation is used to line the housing to prevent the formation of condensation and to form an acoustical barrier. Insulation is included for units specified with mixing box option.

Weatherhood

A galvanized steel weatherhood with birdscreen is available. A mist eliminator is an optional weatherhood accessory.

Duct Adapter

Duct adapter is available with factory supplied curbs and allows an easy method for connecting ductwork to curb.

Double Wall Construction

An interior metal liner is available to isolate insulation from the airstream. One inch thick insulation is included with this option.

Discharge Diffuser

Diffusers are available as either 3-way for horizontal discharge or 4-way for downblast discharge.

Housing Size 12

Blower Size	CFM		Total Pressure in inches wg						
			0.50	0.75	1.00	1.25	1.50	1.75	2.00
108	800	RPM	993	1109	1216	1311	1399	-	-
		BHP	0.21	0.26	0.31	0.35	0.40	-	-
	1,200	RPM	1238	1347	1445	1530	-	-	-
		BHP	0.51	0.59	0.68	0.75	-	-	-
109	1,500	RPM	880	1014	1140	1255	1361	1460	-
		BHP	0.36	0.45	0.54	0.63	0.73	0.84	-
	2,500	RPM	1154	1244	1329	1419	1503	1587	-
		BHP	1.1	1.2	1.4	1.6	1.7	1.9	-
110	2,500	RPM	906	995	1082	1166	1247	1325	1402
		BHP	0.79	0.93	1.1	1.2	1.4	1.5	1.7
	3,500	RPM	1131	1202	1275	1340	1401	1464	-
		BHP	1.8	2.0	2.2	2.4	2.6	2.8	-

Housing Size 22

Blower Size	CFM		Total Pressure in inches wg						
			0.50	0.75	1.00	1.25	1.50	1.75	2.00
112	2,600	RPM	662	761	853	934	1009	-	-
		BHP	.58	.72	.86	1.0	1.2	-	-
	3,500	RPM	756	839	920	993	1065	1133	1195
		BHP	1.0	1.3	1.5	1.7	1.9	2.1	2.3
	4,400	RPM	871	939	1006	1073	1137	1197	1254
		BHP	1.8	2.1	2.4	2.6	2.9	3.1	3.3
115	5,000	RPM	671	741	808	871	931	986	1038
		BHP	1.7	2.0	2.3	2.6	2.9	3.2	3.5
	6,000	RPM	749	812	870	929	982	1035	1086
		BHP	2.6	2.9	3.3	3.7	4.0	4.4	4.8
	7,000	RPM	833	889	943	994	1044	1093	-
		BHP	3.7	4.2	4.6	5.0	5.5	5.9	-

Housing Size 32

Blower Size	CFM		Total Pressure in inches wg						
			0.50	0.75	1.00	1.25	1.50	1.75	2.00
118	7,000	RPM	566	627	685	738	790	839	885
		BHP	2.1	2.5	2.8	3.2	3.6	4.0	4.4
	8,500	RPM	636	690	740	790	836	880	923
		BHP	3.3	3.8	4.2	4.7	5.1	5.6	6.1
	10,000	RPM	712	759	805	849	891	933	-
		BHP	5.0	5.5	6.1	6.6	7.1	7.7	-
120	10,000	RPM	542	590	634	678	723	765	803
		BHP	3.6	4.0	4.5	5.0	5.6	6.1	6.6
	12,500	RPM	633	672	711	748	784	820	855
		BHP	6.3	6.9	7.5	8.1	8.7	9.3	10.0
	15,000	RPM	731	763	795	829	861	892	-
		BHP	10.2	10.9	11.6	12.3	13.1	13.8	-

Note: The air performance data shown does not include internal static pressure losses due to items such as filters, dampers and coils. For exact air performance data based on specific unit configuration, use the Greenheck CAPS selection program.

Housing Size 35

Blower Size	CFM		Total Pressure in inches wg						
			0.50	0.75	1.00	1.25	1.50	1.75	2.00
122	15,000	RPM	573	605	637	667	698	727	755
		BHP	7.5	8.3	8.9	9.6	10.4	11.1	11.9
	17,000	RPM	634	662	690	718	745	772	799
		BHP	10.6	11.4	12.2	12.9	13.6	14.4	15.3
	19,000	RPM	697	720	746	771	796	821	-
		BHP	14.5	15.2	16.1	17.0	17.8	18.6	-
125	19,000	RPM	530	563	594	625	655	683	711
		BHP	8.9	9.8	10.7	11.7	12.8	13.8	14.8
	21,000	RPM	573	603	631	660	688	715	741
		BHP	11.6	12.6	13.5	14.6	15.7	16.9	18.0
	23,000	RPM	616	643	671	697	723	748	-
		BHP	14.9	15.9	16.9	18.0	19.2	20.4	-

Housing Size 38

Blower Size	CFM		Total Pressure in inches wg						
			0.50	0.75	1.00	1.25	1.50	1.75	2.00
127	24,000	RPM	422	451	478	504	530	554	578
		BHP	10.1	11.6	13.0	14.3	15.8	17.2	18.6
	30,000	RPM	501	525	548	571	593	613	-
		BHP	18.1	19.6	21.4	23.2	24.9	26.6	-
130	26,000	RPM	355	384	412	440	467	494	520
		BHP	9.9	11.2	12.5	13.9	15.2	16.8	18.3
	34,000	RPM	430	454	477	499	519	542	564
		BHP	19.9	21.5	23.1	24.8	26.4	28.3	30.1

Housing Size 42

Blower Size	CFM		Total Pressure in inches wg						
			0.50	0.75	1.00	1.25	1.50	1.75	2.00
133	32,000	RPM	343	371	397	422	446	467	488
		BHP	14.0	15.7	17.5	19.2	21.0	22.6	24.3
	40,000	RPM	401	426	448	470	491	512	531
		BHP	25.0	27.1	29.1	31.5	33.7	35.8	37.9
136	42,000	RPM	385	405	426	445	464	482	499
		BHP	25.6	27.7	29.8	32.0	34.1	36.3	38.5
	48,000	RPM	429	447	465	483	500	517	-
		BHP	36.7	39.0	41.5	44.0	46.4	48.9	-

Note: The air performance data shown does not include internal static pressure losses due to items such as filters, dampers and coils. For exact air performance data based on specific unit configuration, use the Greenheck CAPS selection program.

General: Make-up air unit shall be as manufactured by Greenheck Fan Corporation or approved equal provided all specifications are met. Greenheck Model MSX is used as the basis of design. Performance shall be as scheduled on plans. All untempered and coil units shall be listed to UL 1995.

Hot Water or Steam Coil: Coil shall be factory tested and rated in accordance with AHRI 410. Coils shall have copper tubes with permanently expanded aluminum fins, 12 fpi or less. Coil connections shall be stubbed out through the make-up air unit housing wall.

Electric Heat: Electric heaters shall be UL Listed and feature open coil heating elements. Heater control cabinets shall be installed completely within the heating section and be factory wired up to 200 kW and meet all requirements of the National Electric Code. A separate power source shall be provided for the electric heater.

Unit Casing and Frames: Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined, there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at jobsite. All components shall be easily accessible through removable doors.

Insulation: Models provided with a mixing box shall be insulated from the return section to the supply discharge. Insulation shall be in accordance with NFPA 90A and tested to meet UL 181 erosion requirements. Double wall shall be provided if specified.

Fan Section: Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels shall be balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120 and larger). Bearings shall be selected for a minimum (L₁₀) life in excess of 100,000 hours at maximum cataloged speeds.

Motors and Drives: Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.

Electrical: All internal electrical components shall be prewired for single point power connection, excluding electric heaters. All electrical components shall be

UL Listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 120 VAC circuit, integral disconnect switch with separate motor fusing and terminal strip. Contactors, Class 20 adjustable overload protection and single phase protection shall be standard.

Filter Section: Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 feet per minute. Filters shall be easily accessible through a removable access panel.

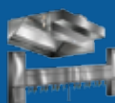
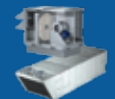
Weatherhood: Weatherhood shall be constructed of G90 galvanized steel with birdscreen mounted at the intake.

Recirculation (optional): Recirculation airflow shall be controlled by adjustment of return damper position. Input signal for return damper shall be from building pressure sensors, potentiometer, external signal, or manual switch. Recirculated air shall not be permitted to pass across the burner. Return air shall be filtered.

Variable Volume (optional): Volume shall be varied by either a 2-speed motor or variable frequency drive. Input signal for fan speed shall be from building pressure sensors, potentiometer, external signal, or manual switch.

Cooling Coil: Direct expansion (DX) or chilled water coil shall be factory tested and rated in accordance with AHRI 410. Coils shall have copper tubes with permanently expanded aluminum fins, 12 fpi or less. DX coils shall be equipped with distributors to receive expansion valves at the liquid connections. Drain pans shall extend at least 12 inches downstream of coil and be sloped to drain connection.

Evaporative Cooling Section: Evaporative cooling section shall include a galvanized steel housing with louvered intake, 2-inch aluminum mesh filters and a stainless steel evaporative cooling module all provided by the make-up air unit manufacturer. The louver shall be stationary type with drainable blades, designed to withstand wind loads of 25 PSF. Evaporative cooling media shall be Munters CELdek with a depth of 12 inches for a cooling effectiveness of 90%. Drain and overflow connections shall be piped through the side of the evaporative cooling section.



Our Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the shipment date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

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

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Prepared to Support
Green Building Efforts