Indirect Gas-Fired Make-Up Air

Models IGK, IG and IGX

Commercial, Industrial, and Kitchen Applications

GREENHECK

Building Value in Air.

November

2016

Indirect Gas-Fired Overview

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

Model IGK

Model IG

Model IGX

Multiple blower and cabinet sizes provide airflow capacities up to 15,000 cfm and external static pressure capabilities up to 2.0 in. wg. All blowers are tested 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.

Indirect Gas Technology

Greenheck's indirect gas technology uses 80% efficient tubular-style heat exchangers with capacities up to 1,200,000 BTU/hr to provide efficient heating in any climate. Single, double, and triple furnace units are available with up to 8:1 staged turndown or 16:1 modulating turndown per furnace. Greenheck's furnace design guarantees a long furnace life in the most compact and flexible unit configuration available.

With indirect gas-fired units, the flame is never introduced into the supply airstream, making these units ideal for applications where combustion by-products are a concern, such as sleeping quarters.

Features	Benefits
Power venting with post purge cycle	Prevents corrosive combustion gases from condensing within the heat exchanger
Horizontally firing burners and four-pass heat exchanger tubes	Makes stainless steel burners unnecessary and drip pans obsolete
Stainless steel or aluminized steel heat exchanger material	Yields maximum heat exchanger life with proper material selection

Product Certifications

Greenheck takes pride in offering a high quality, reliable product. We invest our resources into designing, testing and manufacturing products to ensure customer satisfaction.

IGK, IG and IGK models shall be ETL and cETL Listed to ANSI Z83.8 and CSA 2.6. Indirect gas-fired units are Listed to UL 1995. Both are harmonized standard between USA and Canada.

AHRI Certified coils. To guarantee your coil is going to perform as required, check for AHRI Certification.

Heat Exchanger Material Selection

Selecting the proper heat exchanger material can greatly increase the life of the furnace. Heat stress cracking can reduce furnace life if the wrong heat exchanger material is selected. To select the best heat exchanger material, the application and climate should be considered.

- Aluminized steel is recommended for mild climates, where the airstream temperature rise is less than 60ºF.
- Stainless steel is recommended for colder climates, where the airstream temperature rise exceeds 60ºF.

Winter Design Temp.	Required Temp. Rise	Recommended Heat Exchanger Material
-10ºF	80ºF	Stainless
0ºF	70ºF	Stainless
10ºF	60ºF	Aluminized
20ºF	50ºF	Aluminized
20ºF	40ºF	Aluminized

*Assumes a discharge temperature of 70ºF.

Kitchens

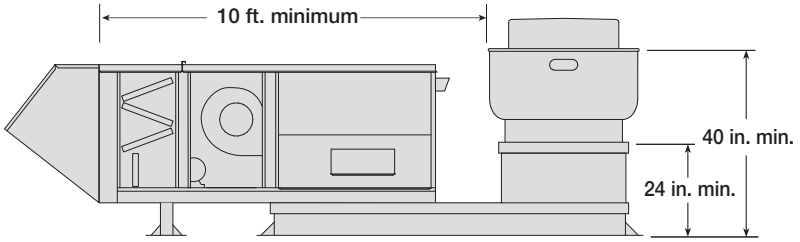
Greenheck's Solution: A typical kitchen system has an exhaust fan that operates based on appliance usage. A Greenheck indirect gas make-up air unit with integral heating and optional cooling is interlocked with an exhaust fan to deliver outside air to maintain a slight negative pressure in the kitchen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

Easy Installation: The Greenheck combination package (model IG and IGX only) 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:

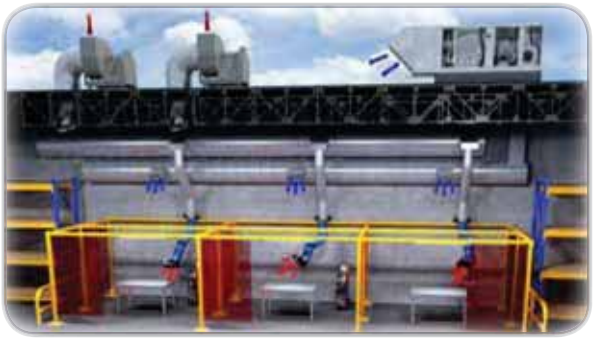
- Exhaust duct must terminate at least 24 inches above the roof deck.
- Exhaust fan discharge must be at least 40 inches above the roof deck.
- Supply air intake must have a horizontal separation of 10 feet from the exhaust discharge.

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



Model IG 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.

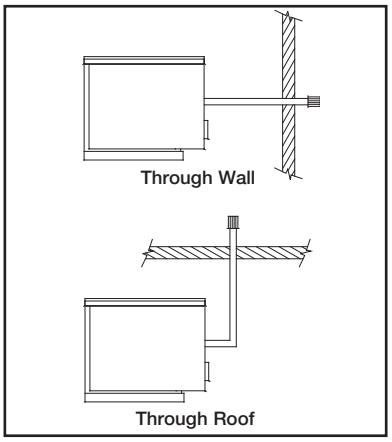
Flexible Designs: Units are available with an optional mixing box designed to combine outdoor air and return air to commercial and industrial spaces. This provides heating in the winter months with the benefits of economizer operation in mild conditions. Variable frequency drives (VFDs) are also available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

Venting Options and Furnace Controls

Venting Options

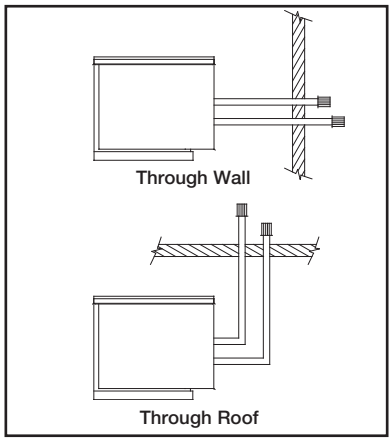
When your application calls for indoor installation, Greenheck offers multiple venting options:

Basic Indoor Venting



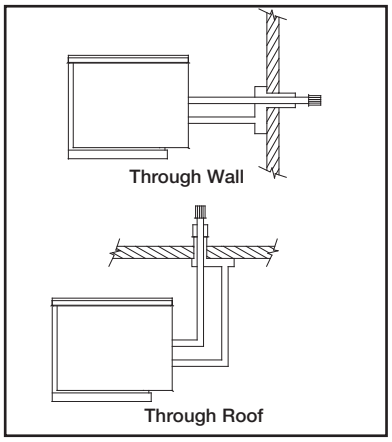
Indoor air is used for combustion. Combustion by-products vent outdoors through a vent line.

Separate 2-Pipe Venting



Outdoor air is used for combustion. Combustion by-products vent outdoors through a vent line. Requires one opening for each line.

Concentric Venting



Outdoor air is used for combustion. Combustion by-products vent outdoors through a vent line. Only one opening is needed.

Furnace Controls

Electronic Modulation

The benefit of electronic modulation is that it enables precise Leaving Air Temperature (LAT) control. As outdoor air temperatures vary, the furnace can modulate the gas flow and deliver a constant LAT.

Control	Operation Points*	IGK	IG	IGX
2:1 Modulating	Anywhere from 50 to 100%	-	X	X
4:1 Modulating	Anywhere from 25 to 100%	-	X	X
8:1 Modulating+	Anywhere from 12.5 to 100%	-	-	X
12:1 Modulating+	Anywhere from 8.33 to 100%	-	-	X
16:1 Modulating^	Anywhere from 6.25 to 100%	-	-	X
24:1 Modulating	Anywhere from 4.17 to 100%	-	-	X
32:1 Modulating^	Anywhere from 3.13 to 100%	-	-	X
48:1 Modulating+^	Anywhere from 2.01 to 100%	-	-	X

*Percentage of maximum furnace output. +Multiple furnace units only. ^Patent pending option.

Multi-Staged

When maximum turndown ratio is desired, multi-stage control is the answer. A single furnace unit (<400 mbh) can have an 8:1 turndown ratio.

Control	Operation Points*	IGK	IG	IGX
1-Stage	100%	X	X	X
2-Stage	50, 100%	X	X	X
8-Stage	12½, 25, 37½, 50, 62½, 75, 87½, 100%	-	X	X

*Percentage of maximum furnace output.

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.

Furnace Controller

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.

Cooling Options

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.

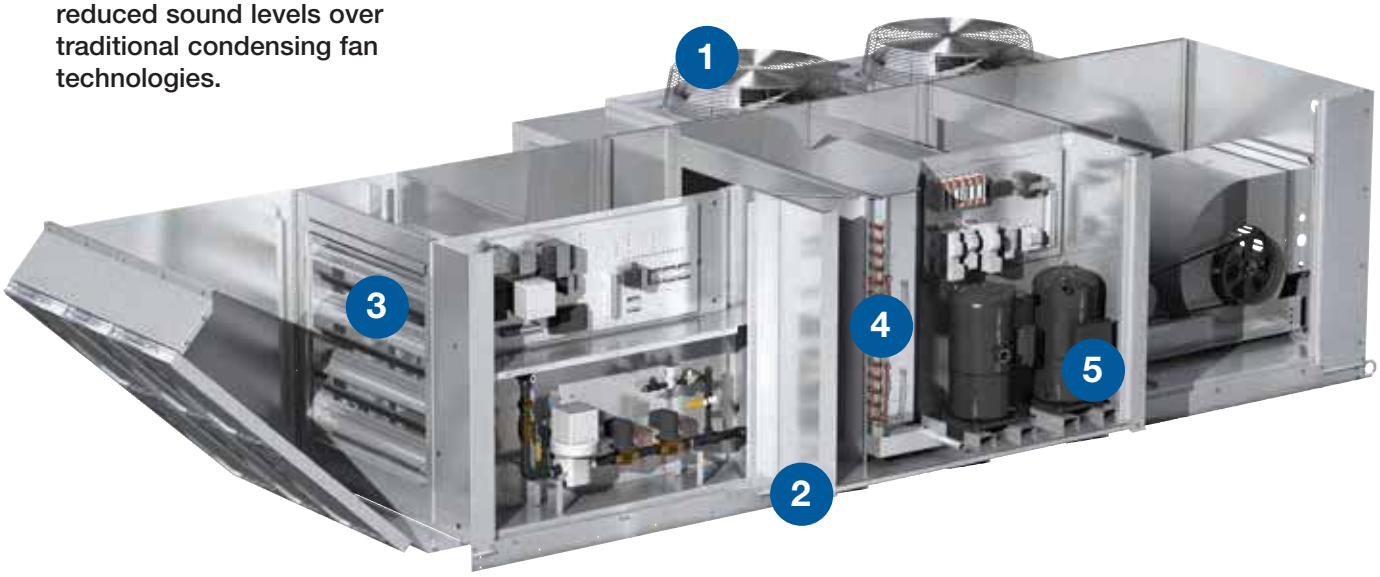
- Airflow Arrangement - Optional Variable Air Volume or Constant Volume 100% Outdoor Air
- Performance Range - 800 to 7,500 cfm
- Cooling Capacity - 2.5 to 16 Nominal Cooling Tons

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.

Cooling Coils - Model IGX

Both chilled water and direct expansion coils for split systems are available. 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.

Chilled Water Coils: Available from two to six rows and various circuiting configurations to meet various load conditions. Airflow ranges up to 11,700 cfm in both water and glycol applications.

Direct Expansion (DX) Coils: DX coils for use in split systems are available from two to six rows. Circuiting options include single, face-split, and interlaced arrangements.

Evaporative Cooling - Models IG and IGX

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

The entire section mounts directly to the front of the 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 and fill are also available. Airflow capacity for evaporative cooling is up to 46,000 cfm. The evaporative cooling section for units above 9,000 cfm ship separately.

Recommended for exterior installation only.

Control Options:

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 pump to minimize mineral build-up.

IGX Standard and Optional Features

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1 Construction

- Constructed of heavy-gauge G90 galvanized steel
- Single or double-wall construction with 1-inch fiberglass insulation
- Hinged or lift off doors and access panels
- Special Coatings - Permatector™ coating is available for a durable, long-lasting finish. Decorative coatings are also available in a variety of colors to match existing building fixtures. Consult your Greenheck representative for coating selections.
- Designed for maximum weather resistance
- Lifting lugs

2 Weatherhood

- Weatherhood with birdscreen features a wire mesh intake, preventing large debris from damaging the filters. An additional filter section is required.
- The 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.

3 Dampers

- Low-leakage, factory-mounted and wired, insulated or non-insulated dampers

4 Filters

- 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 Blowers

- Double-width, double-inlet forward-curved wheels
- Balanced wheels to ensure a vibration-free operation

6 Cooling Options *(not shown)*

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.

C ETL LISTED US
Intertek

7 Indirect Gas-Fired System

- Power vented with integral pre-purge and post-purge control
- ETL Listed to ANSI standard Z83.8 and CSA 2.6
- 80% thermal efficiency
- Up to 8-Stage or 16:1 modulating control per furnace - patent pending
- Direct spark ignition system
- Easy access burner controls
- Insulated double-wall construction

8 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

9 Vibration Isolators

- The entire fan and motor assembly is mounted on vibration isolators to minimize noise transmission into the building. Neoprene or spring vibration isolators available.

S Standard Feature O Optional Feature

Optional Electrical Controls

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.

CO_2 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.

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.

Model Comparison

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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.

IGX - 1 20 - H32

- **IGX** — Model Parent: IGK, IG, IGX
- **1** — Blower Quantity: 1
- **20** — Wheel Diameter (in.): 8 - 20
- **H32** — Housing Size: 10-32

Model IGK - Economy

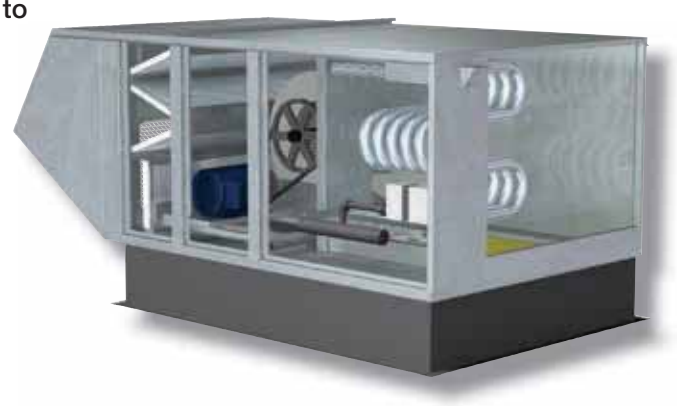
Model IGK is designed to be the most economical, compact, and simple approach for indoor or outdoor applications.

- Airflow Arrangement - 100% outdoor air
- Performance Range - 800 to 5,000 cfm
- Heating Capacity - Up to 400,000 BTU/hr

Model IG - Standard

The model IG sets the standard for an efficient approach to tempered make-up air applications. Several intake and filtering configurations and optional evaporative cooling are available.

- Airflow Arrangement - 100% outdoor air and recirculation
- Performance Range - 800 to 7,000 cfm
- Heating Capacity - Up to 400,000 BTU/hr
- Cooling Capacity - Evaporative cooling up to 7,000 cfm



Models IGX - Configurable

The model IGX is a highly configurable indirect gas-fired heating system that incorporates a modular design for maximum flexibility. The IGX also has expanded heating, cooling, and airflow capacities to provide make-up air across a broad range of commercial and industrial applications. Use the IGX in applications ranging from kitchens to large manufacturing or industrial facilities.

- Airflow Arrangement - 100% outdoor air variable air volume and recirculation
- Performance Range - 800 to 15,000 cfm
- Heating Capacity - Up to 1,200,000 BTU/hr
- Cooling Capacity
  - Evaporative cooling up to 14,000 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

Option Comparison

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	IGK	IG	IGX
Intake Options			
Birdscreen Weatherhood	—	Optional	Optional
Aluminum Mesh Filtered Weatherhood	Standard	—	Optional
Louvered Weatherhood	—	Optional	Optional
Airflow Arrangement			
100% Outdoor Air	Standard	Optional	Optional
Recirculation	—	Optional	Optional
Variable Air Volume	—	—	Optional
Furnace Control			
Staged Control	Standard	Optional	Optional
Modulating Control	—	Optional	Optional
Unit Controls			
Microprocessor	—	—	Optional
Network Interface	—	—	Optional
Remote Panel	Optional	Optional	Optional
Cooling Options			
Evaporative	—	Optional	Optional
Direct Expansion (DX)	—	—	Optional
Packaged Direct Expansion (PDX)	—	—	Optional
Chilled Water	—	—	Optional
Discharge Options			
Downblast Discharge	Standard	Optional	Optional
Horizontal Discharge	—	Optional	Optional
Combination Package	—	Optional	Optional
Options & Accessories			
V-Bank Filter Section	—	Optional	Optional
Outdoor Air Dampers	Optional	Optional	Optional
Discharge Air Dampers	—	Optional	Optional
Duct Liner Insulation	Standard	Standard	Optional
Double-Wall Construction	—	Standard	Optional
Exhaust Fan Starter(s)	—	Optional	Optional
Dirty Filter Sensor	—	Optional	Optional
Freeze Protection	—	Optional	Optional
Inlet Air Sensor	Standard	Optional	Optional
Variable Frequency Drive (VFD)	—	—	Optional
Service Receptacle*	—	Optional	Optional
Auxiliary Contacts	Optional	Optional	Optional
Gas Pressure Regulator*	Optional	Optional	Optional
Special Coatings	Optional	Optional	Optional
Roof Curbs*	Optional	Optional	Optional
Duct Adapter*	Optional	Optional	Optional
Aluminum or Stainless Steel Heat Exchanger	Optional	Optional	Optional

**Ships loose for field installation.*

Intake and Discharge Options

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Weatherhoods

Birdscreen
IG & IGX only

Aluminum Mesh Filtered
IGK & IGX only

Louvered
IG & IGX only

Filter Section

V-Bank
IG & IGX only

Mixing Box
IG & IGX only

Supply Fan

Forward-Curved

Discharge Options

Downblast Discharge
IG, IGK & IGX

Horizontal Discharge
IG & IGX only

CAPS

Greenheck's Computer Aided Product Selection (CAPS) software provides all available configuration options for each model type and dynamically calculates corresponding performance data and drawings for optimum usability. The user interface is designed with the customer in mind and maintains an environment that is easy to operate and understand. Contact your local Greenheck Representative for a comprehensive submittal package for your next project.

Dimensional Data & Weights

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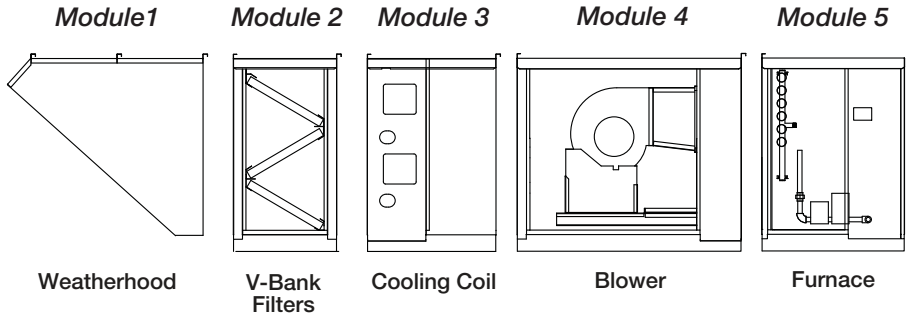
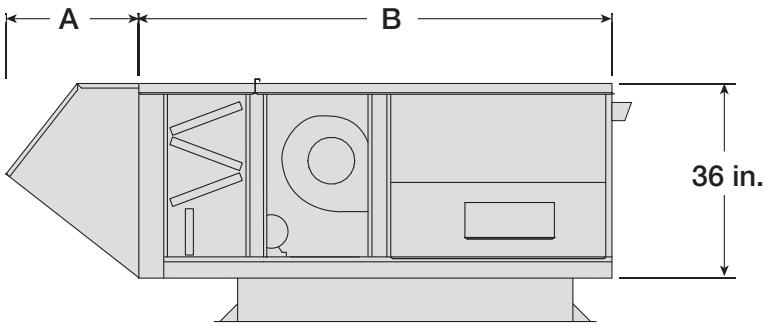
	Model	IGX-H12	IGX-H22	IGX-H32
Unit	Airflow Range (cfm)	800 - 3,500	2,600 - 7,000	4,000 - 15,000
	Approximate Weight* (lbs.)	900	1,300	2,300
	Height (in.)	39	45	48.7
	Width (in.)	44.6	<350 mbh = 44.6 ≥350 mbh = 53.9	52.2
	Overall Width with Evaporative Cooling (in.)	44.6	≤4,800 cfm = 44.6 >4,800 cfm = 60.6	≤9,000 cfm = 66.5 >9,000 cfm = 96.5
	Lengths (in.)			
Module 1	Birdscreen Weatherhood	30	45.6	47.3
	Aluminum Mesh Filtered Weatherhood	31.4	47.1	48.7
	Louvered Weatherhood	13.8	16.9	16.9
	Evaporative Cooling	30.2	≤4,800 cfm = 30.2 >4,800 cfm = 34.7	≤9,000 cfm = 34.7 >9,000 cfm = 38.1
Module 2	V-Bank Filter Section	21.5	24.1	25.8
	Mixing Box Filter Section	30.7	34	40.7
Module 3	Cooling Coil (standard)	30	30	-
	Cooling Coil (high capacity)	50.4	69.4	98.1
Module 4	Blower	42.5	52.2	66
Module 5	Furnace(s) (quantity of 1/2/3)	33.2	33.2/66.4	33.2/66.4/99.6

**Weight based on IGX with optional birdscreen weatherhood, V-bank filter section and downblast fan discharge.*

Typical IGX Configuration



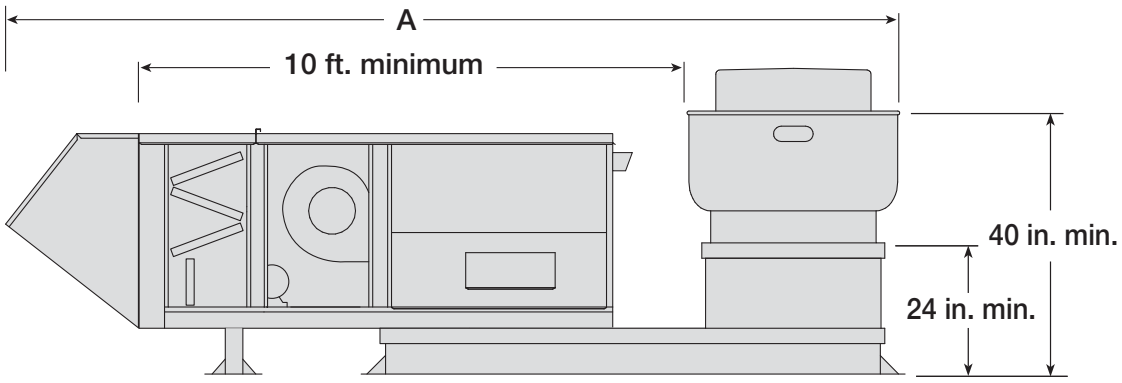
IG Stand Alone



Model	A		B		Width	Approx. Weight (lbs.)	Airflow Range (cfm)
	Louvered	Birdscreen	100% OA	Recirculation			
	(inches)						
IG-H10	11.5	26	73.2	90	43.5	750	800 - 3,000
IG-H20			76.3	93	52.5	850	2,000 - 5,000
IG-H30			85.3	102	52.5	1,100	3,500 - 7,000

All weights include weatherhood and 2-inch filter section.

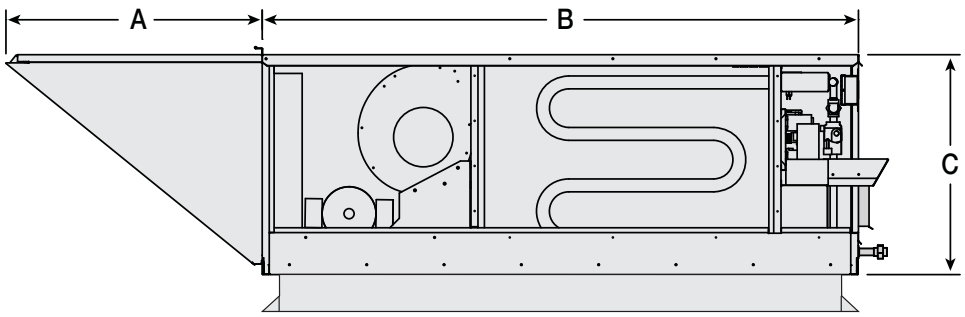
IG with Combination Package



Model	A	Width	Approx. Weight (lbs.)*
	(inches)		
IG-H10	182	48.0	1,100
IG-H20	183	52.5	1,400
IG-H30	181	52.5	1,700

All weights include weatherhood, 2-inch filter section, curb, fan pack extension and equipment support.
*Based on largest available CUBE exhaust fan.

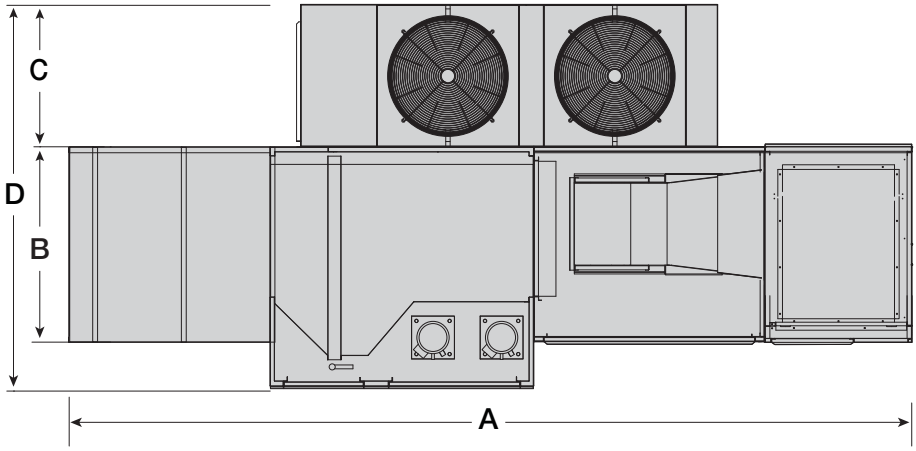
IGK

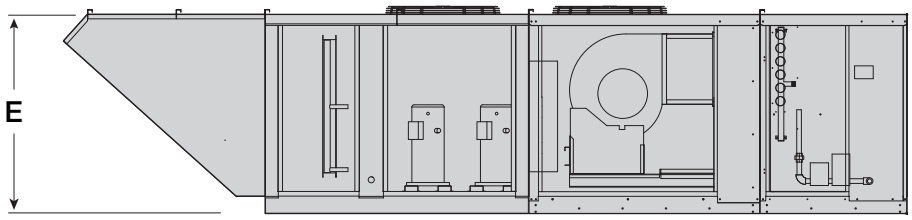


Model	A	B	C	Width	Approx. Weight (lbs.)	Airflow Range (cfm)
	(inches)					
IGK-H05	39.8	92.5	34.0	31.6	800	800 - 3,000
IGK-H15				40.1	950	2,000 - 5,000

All weights include weatherhood.

IGX with Packaged DX Cooling





Model	Nominal Tons	A	B	C	D	E	Approx. Weight (lbs.)
		(inches)					
IGX-H12	2.5, 4, 5, 8	151.8	44.1	29.1	73.2	39.0	1,700
IGX-H22	7, 10	192.2	44.1	32.1	86.3	45.0	2,300
IGX-H32	10, 12, 16	216.0	52.2	35.3	100.1	48.7	3,000

All weights include weatherhood and packaged DX cooling.
^ Dimension is for one furnace only. Add 33.2 inches for each additional furnace.

Additional Make-Up Air Products

GREENHECK
Building Value in Air.

Direct Gas - Economy
Model DGK

Direct Gas - Standard
Model DG

Direct Gas - Configurable
Model DGX

Direct Gas - Vertical
Model VSU

Direct Gas - Industrial
Model TSU

Modular Supply
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.

U.S. GREEN BUILDING COUNCIL MEMBER

Prepared to Support Green Building Efforts

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