



GLOBAL  
FINISHING  
SOLUTIONS

# Air Make-Up Units



- Eliminate problems with contaminated air and temperature stratification
- Create balanced building pressure and maintain proper comfort levels
- Improve indoor air quality
- 100 percent fresh air
- 80/20 or variable recirculating airflow
- Cooling and humidity control available
- Curing/bake systems

GFS' direct gas fired air make-up units (AMU) provide an economical source of replacement air and are furnished with a heater, filters, motor and blower, controls, mounting hardware and auxiliary equipment. Mounting arrangement options include horizontal or vertical, indoor or outdoor, platform or ceiling suspended.

# AIR MAKE-UP UNITS

## HOW AIR MAKE-UP UNITS WORK

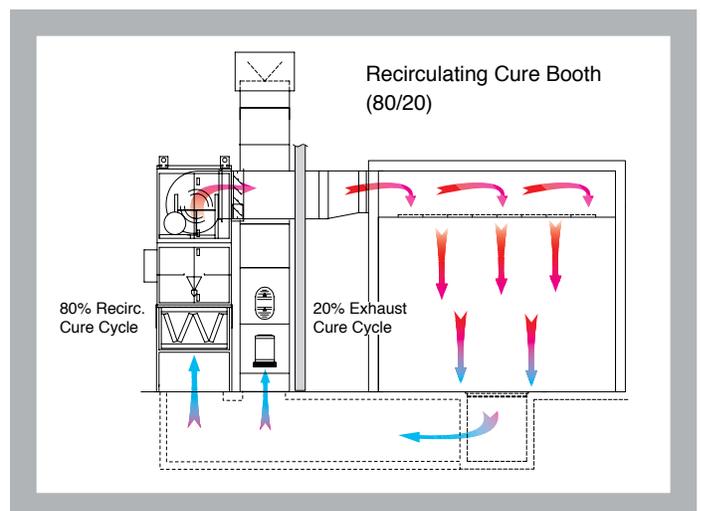
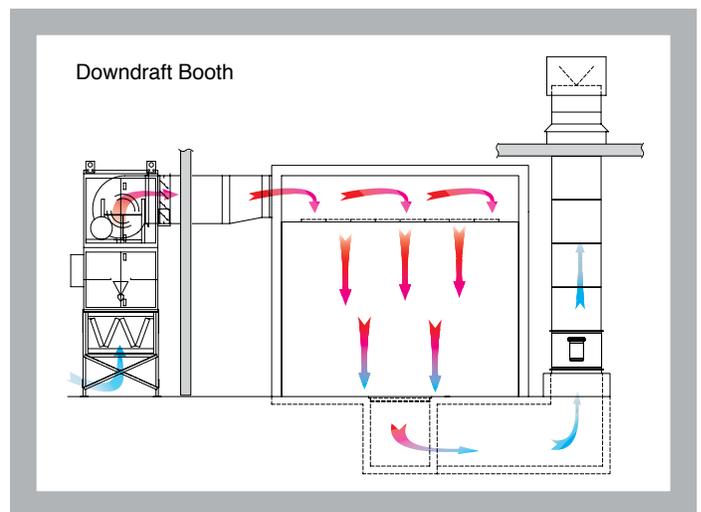
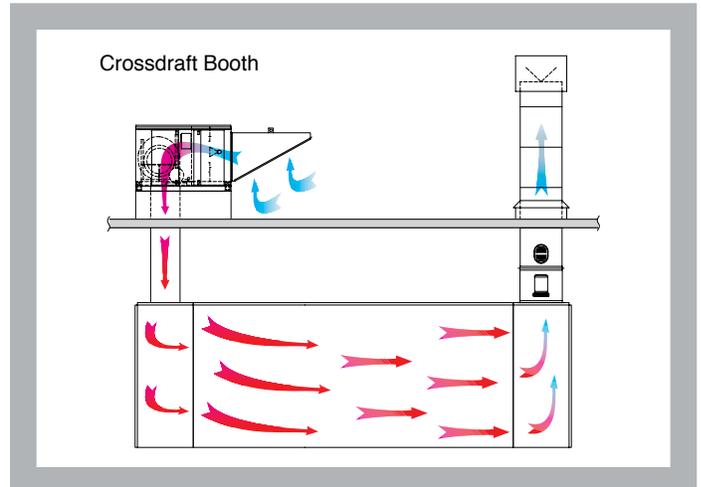
Air make-up units replace contaminated air exhausted from industrial and commercial buildings or spray booths, with fresh, heated outdoor air. AMUs maintain a constant leaving-air temperature regardless of the incoming, outdoor air temperature. Air make-up units replenish equal amounts of fresh air for every cubic foot of air exhausted.

A direct-fired burner with a turndown ratio of 30:1 that is 100 percent efficient - all the heat goes directly into the airstream. The high turndown capability allows the flame to adjust to outdoor air temperature swings throughout heating season. For example, a unit with a maximum temperature rise of 90 degree in the winter can adjust down to as little as a 3 degree temperature rise for milder spring and fall weather.

## DURING SPRAY BOOTH OPERATIONS

A spray booth's exhaust system is removing significant quantities of shop or plant air. A typical 10 ft. x 8 ft. x 6 ft. paint booth may exhaust more than 8,000 cubic feet of air per minute. If replacement air is pulled directly from outside, this volume may be sufficient to cool the interior of the building and may adversely affect the quality of coatings. An air make-up unit, which supplies conditioned and filtered air to the booth, may be required to minimize temperature variations and remove particles that compromise finish quality.

In the case of pressurized paint booths, air replacement is introduced directly into the booth, eliminating the need for air to be drawn from the facility. This allows for greater control over the temperature and filtration quality in both the facility and the spray booth environment, therefore improving working conditions and lowering overall operating costs.



# TYPES & SIZING

## CONSIDERATIONS

- Fresh air intake vs. shop air intake
- Unit size arrangement
- Proximity of the AMU air discharge to the spray booth
- Access for installation and service
- Heat type
- Discharge type



## TEMPERATURE RISE

Temperature rise is the temperature of the air discharged from the unit in relation to the ambient outside air temperature.

For example, assume a facility is in an area where the winter low temperature is negative 10 degrees and the desired booth temperature is 70 degrees. The air make-up unit must be able to provide at least an 80 degree temperature rise in order to reach the desired temperature inside the booth.

## UNIT MOUNTING ARRANGEMENTS

- Vertical/horizontal
- Indoor/outdoor
- Platform/ceiling suspended

## HEATING TYPES

- Natural gas or propane
- Steam
- Hot water
- Indirect fired
- Electric heated

## DISCHARGE TYPE

- Horizontal: End, bottom or top
- Vertical: Side or top

## CURING/BAKE SYSTEMS

### VARIABLE SPEED UNIT (FORCE DRY)

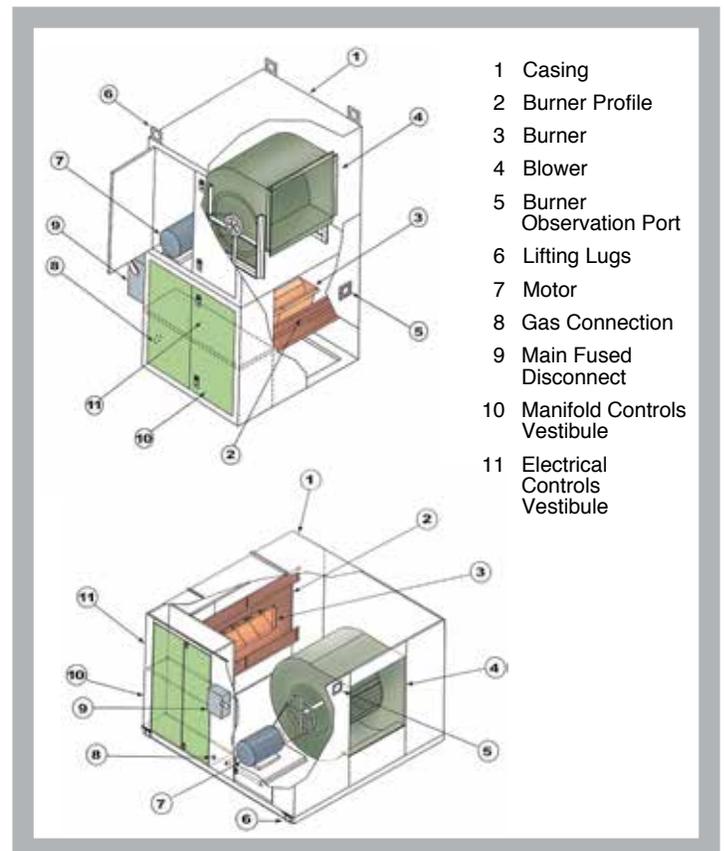
The air make-up unit is designed with a variable speed drive/motor and damper package to discharge either 140 or 160-degree Fahrenheit air for accelerated curing cycle. This design reduces airflow 50 percent during the curing mode. This system always uses outside air during the cure mode to ensure good clean air for the cure cycle.

This unit also includes an auto-balance system with a variable frequency drive (VFD) to automatically adjust the airflow of the exhaust fan(s), to ensure proper booth balance, not only during the curing mode but during the painting mode as well.

### RECIRCULATING UNIT (CURE ONLY)

The air make-up unit is designed with a variable speed drive/motor and damper package to discharge either 140 or 160-degree Fahrenheit air for accelerated curing cycle. This design recirculates up to 80 percent of the air while exhausting 20 percent to atmosphere.

This design provides further energy efficiency through the recirculation of heated air, requiring less for the heating unit. This system also includes an auto-balance system with a variable frequency drive to automatically adjust the airflow of the exhaust fan(s), to ensure proper booth balance, not only during the curing mode but during the painting mode as well.



# CONFIGURATIONS

## CONSTANT VOLUME SYSTEM

(100 PERCENT REPLACEMENT)

The constant volume system provides a consistent rate of supply air to the facility. The direct-fired air system heater warms the fresh air on intake, eliminating energy losses associated with alternative heat sources.

In most applications, the intake air is of slightly higher volume than the exhausted air, resulting in a positive building pressure for best results. However, these units can be adjusted to intake less volume than the exhaust for applications requiring a negative building pressure.

## VARIABLE AIR VOLUME SYSTEM

When air replacement requirements fluctuate and constant-volume or two-speed systems are not suitable, a variable air volume system is the solution. By integrating a VFD into the motor system, automatic adjustments can be made to the system during operation to compensate for changing conditions. Several options are available to control these adjustments:

- A potentiometer can be used to manually adjust CFM
- Preset VFM levels can be programmed and manually selected
- A pressure control device can be added to automatically adjust the CFM relative to the building pressure.

The VFD allows for much lower energy costs due to smooth motor startup and the elimination of power spikes. Integrated safety features have been added to ensure safe burner operation.

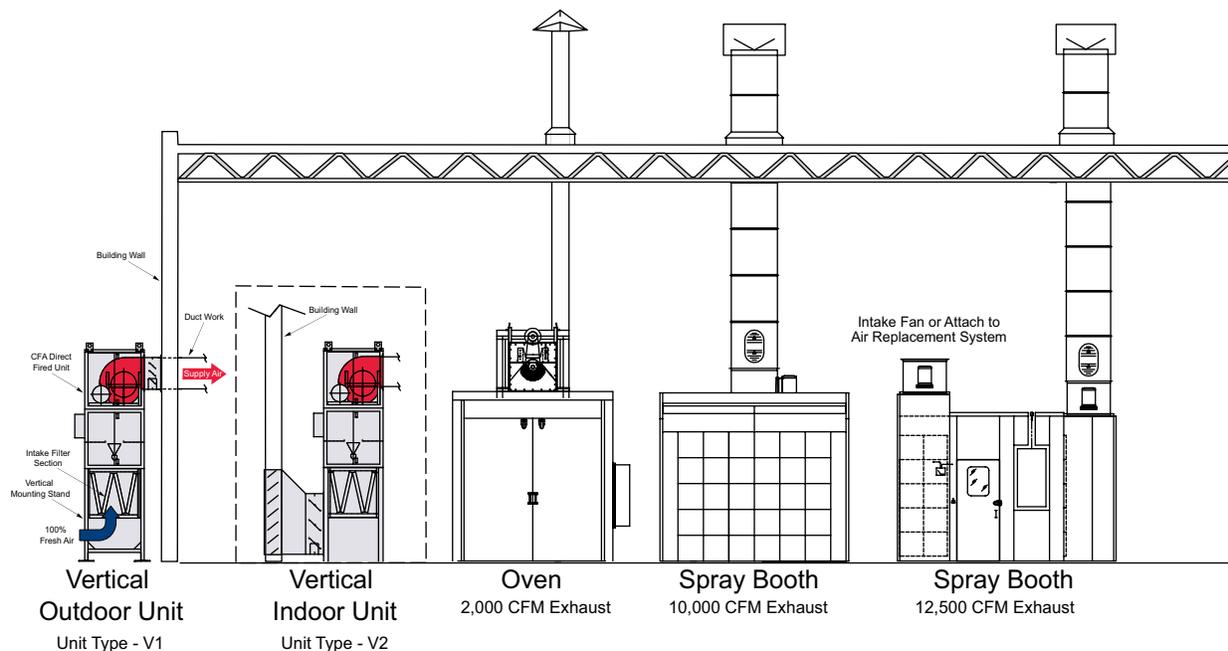
## 80/20 SYSTEMS

For operations requiring recirculating capability, an 80/20 system can provide energy-efficient make-up air and heating functions. By drawing at least 20 percent outside air, and up to 80 percent recirculated air from the building, the 80/20 system reduces the energy needed for heating. The ratio of new-to-recirculated air varies according to the requirements of the building environment.

Automatic sensors and pressure monitors continually adjust to maintain the most consistent working environment, the most efficient operation and lowest operating cost. These units can be configured as a fully-functional building heat unit, a supplementary air make-up or as a combination of both.

## SAMPLE CONFIGURATIONS

The following illustrations are for example purposes ONLY, contact GFS for the configuration that fits your needs.



# AUTO-BALANCING SYSTEMS

## VARIABLE FREQUENCY DRIVES (VFD)

### FEATURES

- Automatically adjust fan motor speeds based on actual airflow conditions and maintains an air balance within a paint spray booth that keeps paint fumes from escaping and preventing dust from entering.
- Provides constant air pressure and consistent exhaust airflow for spray booths to operate at their optimum rate and efficiency.
- Provides a consistency of controlled temperature.



### BENEFITS

- Greatly improved process control
- Increases transfer efficiency
- Controls and directs overspray into filtration systems
- Controls and exhausts VOCs from the work place
- Extends dry filter usage up to 50 percent
- Decreases energy cost up to 40 percent as compared to damper systems
- Provides a cleaner system and paint finishes

## VFD APPLICATIONS

### DIRECT-FIRED AIR MAKE-UP UNITS

Designed to provide greater energy savings and efficiency when variable air volumes are needed for multiple stations such as manual applications to automatic electrostatic.

### AUTO-BALANCE SYSTEM

Designed to automatically keep the paint booth balanced when in operation. It is recommended by GFS on all pressurized booths. This system consists of a variable frequency drive that controls the exhaust fan motor, differential pressure gauge and sensing probes.

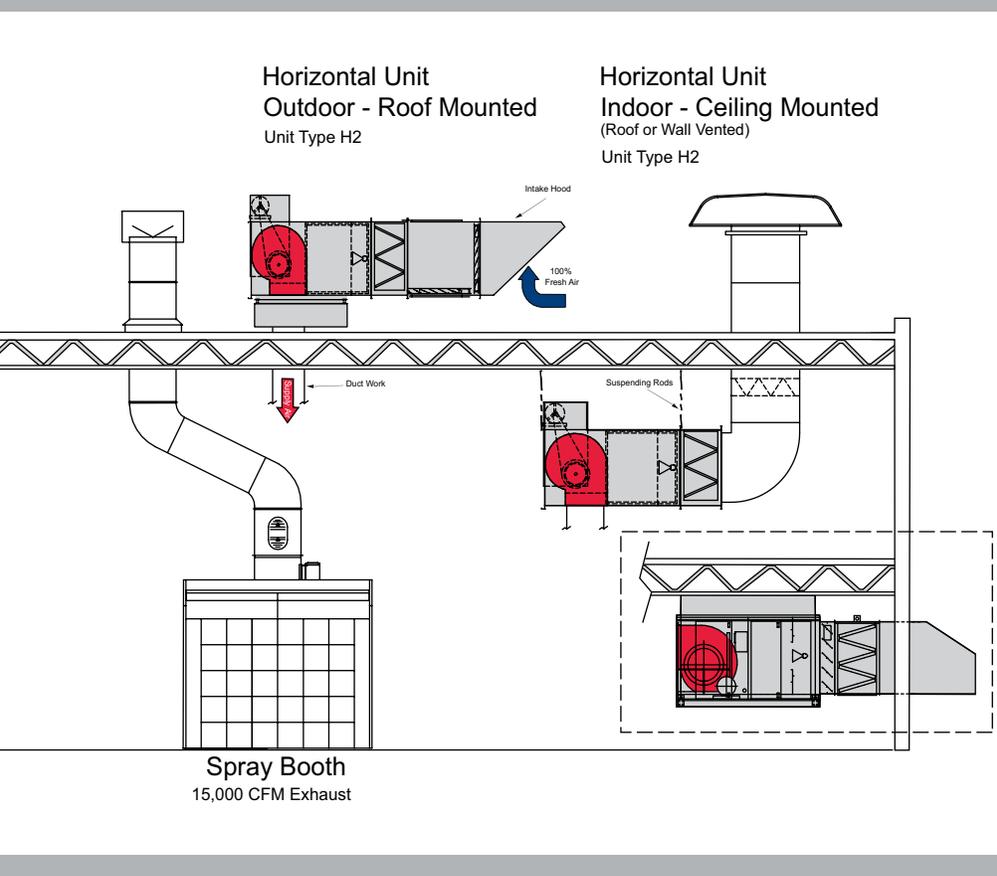
The system monitors the interior booth pressure and will adjust the exhaust fan RPM's to what is needed for the volume of exhaust air based on what the incoming intake air is. The result is a booth that is balanced automatically and will stay in balance as the filters load up with paint over spray. System will increase useful filter life, provide a constant airflow through the booth and the ability to control booth pressure.

### CONSTA-FLOW SYSTEM

Designed to automatically adjust the exhaust fan to the changing conditions of the exhaust filters. This system is recommended by GFS on all paint booths with conveyor openings and /or booths with multiple filter stages that have high static pressure when loading.

This system consists of a variable frequency drive that controls the exhaust fan motor, differential pressure gauge and sensing probes.

The system monitors the static pressure and will adjust the exhaust fans RPMs to what is needed for the volume of exhaust air based on how loaded the filter are. The result is a booth with constant air flow as the filters load up with paint and will increase filter life.

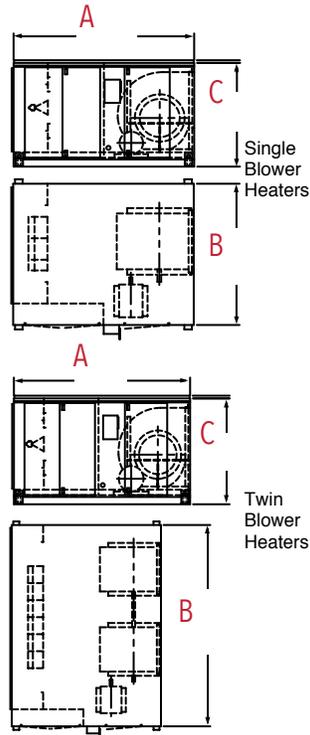


# AIR MAKE-UP UNIT HEATERS

## Horizontal Units

Model	Unit Dimensions		
	A	B	C
RAM-12	70	46	38
RAM-15	70	46	38
RAM-18	82	60	54
RAM-20	82	60	54
RAM-22	100	79	58
RAM-25	100	79	58
RAM-27	100	88	66
RAM-30	100	88	66
RAM-33	112	98	76
RAM-36	112	98	76
RAM-222*	100	146	58
RAM-225*	100	146	58
RAM-227*	100	156	66
RAM-230*	100	156	66

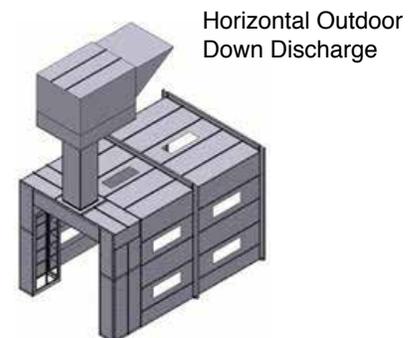
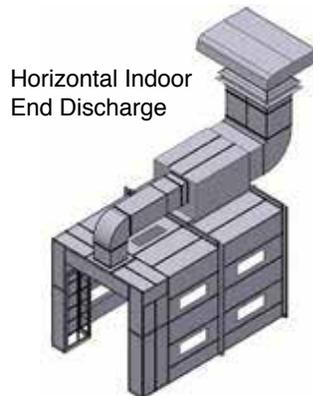
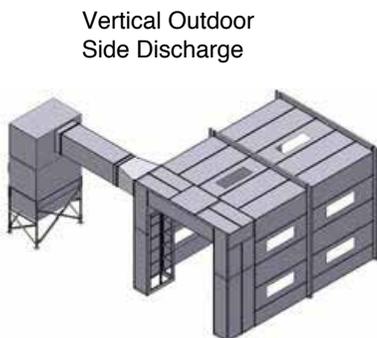
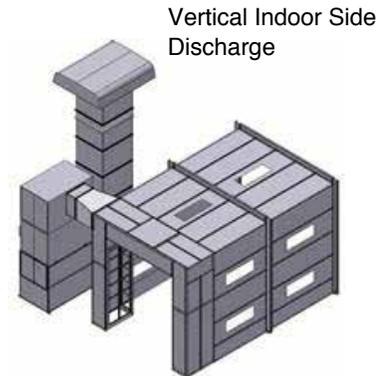
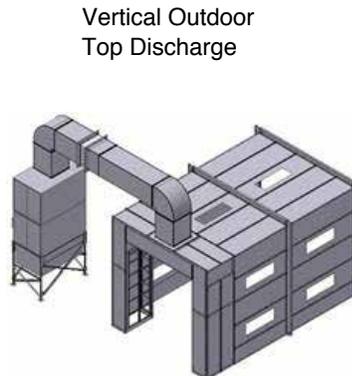
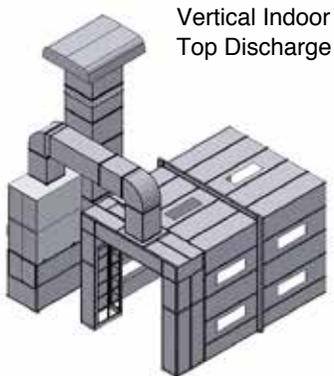
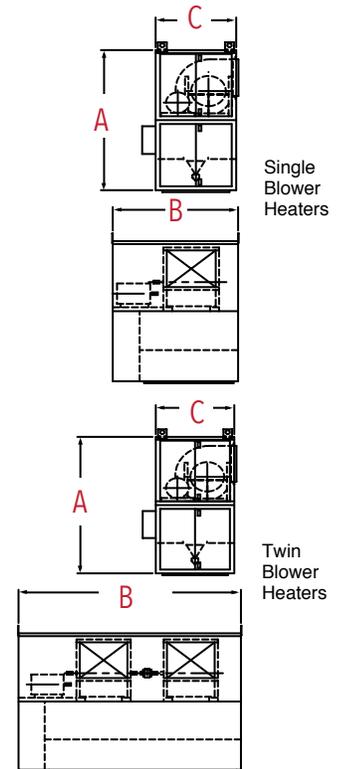
\* indicates twin blowers



## Vertical Units

Model	Unit Dimensions		
	A	B	C
CFA-12	70	50	36
CFA-15	70	50	36
CFA-18	82	65	50
CFA-20	82	65	50
CFA-22	100	80	50
CFA-25	100	80	50
CFA-27	110	88	60
CFA-30	110	88	60
CFA-33	128	112	70
CFA-36	128	112	70
CFA-222*	100	146	50
CFA-225*	100	146	50
CFA-227*	110	156	60
CFA-230*	110	156	60
CFA-233*	128	191	70

\* indicates twin blowers



# CONTROLS

## STANDARD FEATURES

- Structural G90 galvanized base or tube frame
- Heavy gauge G90 galvanized steel casing
- Interlocked wall seam and roof panels
- Weatherproof construction
- Hinged service doors with flush-mount latches
- Six discharge options

## ACCESSORIES & OPTIONS

- Inlet hood with 2 in. cleanable filter with bird screen
- Fresh air V-Bank filter sections
- Return air V-Bank filter sections (recirc. only)
- External/internal discharge dampers
- Intake dampers
- Air diffuser heads
- Vertical mounting stand (enclosed and open)
- Roof curbs
- Casing insulation with G90 galvanized steel liners
- Control panel with operating lights
- Spring isolated blower and motor
- Painted casing

## STANDARD CONTROL PANEL

- Standard air replacement control panel includes:
- Summer-off-winter switch
- Temperature discharge dial 40-80 degree
- Blower "On" pilot light
- Burner "On" pilot light
- Flame failure pilot light
- Terminal strip



All designs, specifications and components are subject to change at the manufacturer's sole discretion at any time without notice. Data published herein is informational in nature and shall not be construed to warrant suitability of the unit for any particular purpose as performance may vary with the conditions encountered.



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## From America's Heartland to Your Front Door

Made in Wisconsin, USA



With more than 200,000 square feet of manufacturing space and state-of-the-art equipment, GFS has the capability and talent to build our equipment from scratch. Virtually every part of our products are built in-house, including the sheet steel, control panels, ductwork, lights and hinges.

All of GFS' products are fully designed and manufactured in our Osseo, Wisconsin facility. With a strong history in manufacturing, Wisconsin is home to a large and diversified economy. Among good company, some of America's largest manufacturers have placed their roots in this state, including Briggs & Stratton, Harley-Davidson, Johnson Controls, Mercury Marine, Oshkosh and Rockwell Automation.



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