

*Quality People. Building Solutions.*

Comfort Systems USA (Arkansas), Inc.  
P.O. Box 16620  
Little Rock, AR 72231  
Phone 501-834-3320  
Fax 501-834-5416

**Date:** 8/25/2023

**Return Request:** 9/5/2023

**Project:** ASU Mid-South RC & UC Chiller Replacement

**Supplier:** Airetech

**Manufacturer:** Greenheck

**Submittal:** Commercial Kitchen Ventilation System

**Submittal Number:** 23 38 13-01

**Drawing # and Installation:** Mechanical Drawings

**ARCHITECT**

Witsell Evans Rasco  
901 W. Third Street  
Little Rock, AR 72201  
501-374-5300

**ENGINEER**

Pettit & Pettit  
201 E. Markham St. #400  
Little Rock, AR 72201  
501-374-3731

**GENERAL CONTRACTOR**

Baldwin & Shell  
3725 Champion Hills Driver, Suite 1300  
Memphis, TN 38125  
901-755-2952

**MECHANICAL SUBCONTRACTOR**

Comfort Systems USA (Arkansas), Inc.  
9924 Landers Rd.  
N. Little Rock, AR 72117  
501-834-3320

Notes:

**CSUSA PROJECT NO.**

**23-1024**

[jon@comfortar.com](mailto:jon@comfortar.com)



## **SUBMITTAL DATA**

EQUIPMENT: Greenheck Kitchen Hood Systems

TAGS: KH-1 & 2, KEF-1 & 2, KMAU-1 & 2

PROJECT: ASU Mid-South Chiller Replacement

LOCATION: West Memphis, AR

ENGINEER:



CONTRACTOR:



DATE: 8/21/2023

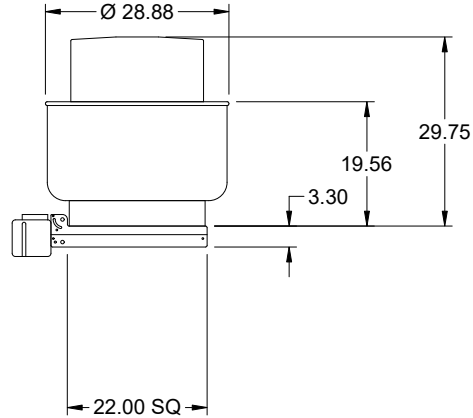
SUBMITTED BY: Forrest Moseley  
forrest@airetechcorp.com

# Model: CUBE-140-7

## Belt Drive Upblast Centrifugal Roof Exhaust Fan

Previously: CUBE-141-7

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	74
Weight w/ Acc's (lb)	108
Max T Motor Frame Size	145
Standard Curb Cap Size (in.)	22 x 22
Roof Opening (in.)	18.5 x 18.5

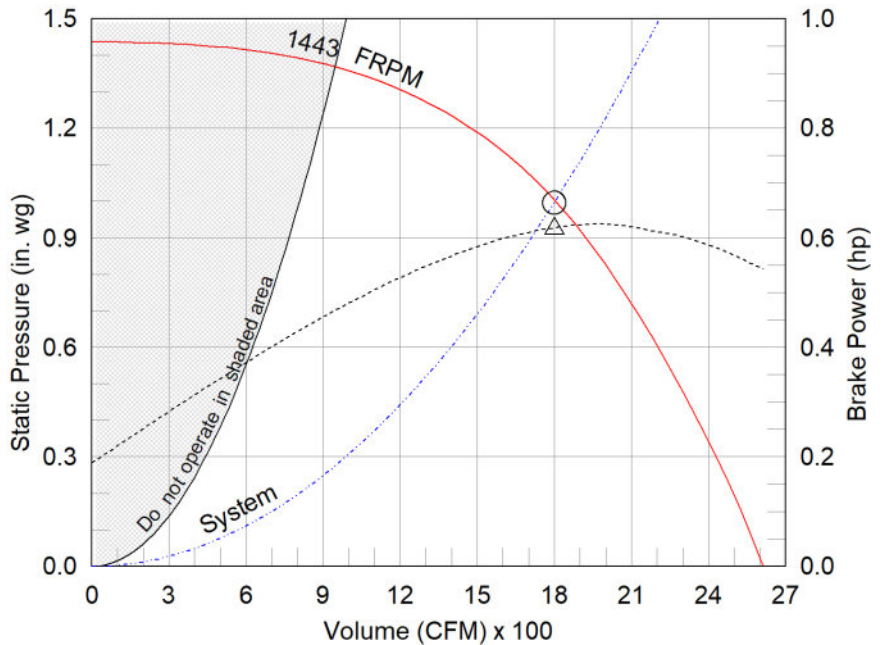


OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.

Performance	
Requested Volume (CFM)	1,800
Actual Volume (CFM)	1,800
Total External SP (in. wg)	0.996
Fan RPM	1443
Operating Power (hp)	0.62
Elevation (ft)	338
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.074
Drive Loss (%)	7.6
Tip Speed (ft/min)	5,524
Static Eff. (%)	50

Misc Fan Data	
Fan Eff. Index (FEI)	-
Outlet Velocity (ft/min)	1,047

Motor	
Motor Included	Yes
Size (hp)	3/4
Voltage/Cycle/Phase	115/60/1
Enclosure	ODP
Motor RPM	1725
Efficiency Rating	Standard
Windings	1
NEC FLA* (Amps)	13.8
Min. Circuit Ampacity (MCA)	17.25
Max. Overcurrent Protection (MOP)	35
Short Circuit Current Rtg (SCCR)	5 kA



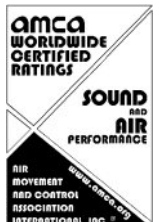
- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

### Notes:

All dimensions shown are in units of in.  
\*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory.  
MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).  
LwA - A weighted sound power level, based on ANSI S1.4 dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International  
Sones - calculated using ANSI/AMCA 301 at 5 ft

### Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones



## Model: CUBE-140-7

### Belt Drive Upblast Centrifugal Roof Exhaust Fan

#### Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Drain trough - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Bearings meet or exceed temperature rating of fan - Static resistant belts - Corrosion resistant fasteners - Internal lifting lugs

#### Selected Options & Accessories:

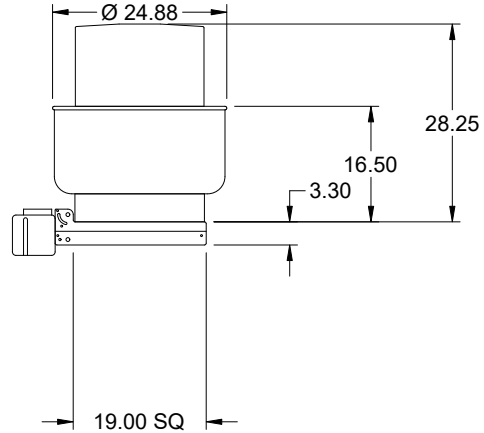
Standard Curb Cap Size - 22 Square  
UL/cUL 705 Listed - Supplement SC - "Power Ventilators for Restaurant Exh. Appliances" (Formerly UL 762)  
Switch, NEMA-1, Toggle,  
Junction Box Mounted & Wired  
Curb Extension-Galv., VCE-22-G15.25, Shipped Loose From Factory  
Hinge, Factory Installed  
High Temp Curb Seal Rated for Continuous Duty at 1500 F (Factory Attached)  
Grease Trap (PN 475538)  
Heat Baffle (Attached)  
Conduit Chase Qty 1  
Unit Warranty: 1 Yr (Standard)

# Model: CUBE-120-5

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Previously: CUBE-121-5

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	68
Weight w/ Acc's (lb)	100
Max T Motor Frame Size	56
Standard Curb Cap Size (in.)	19 x 19
Roof Opening (in.)	15.5 x 15.5

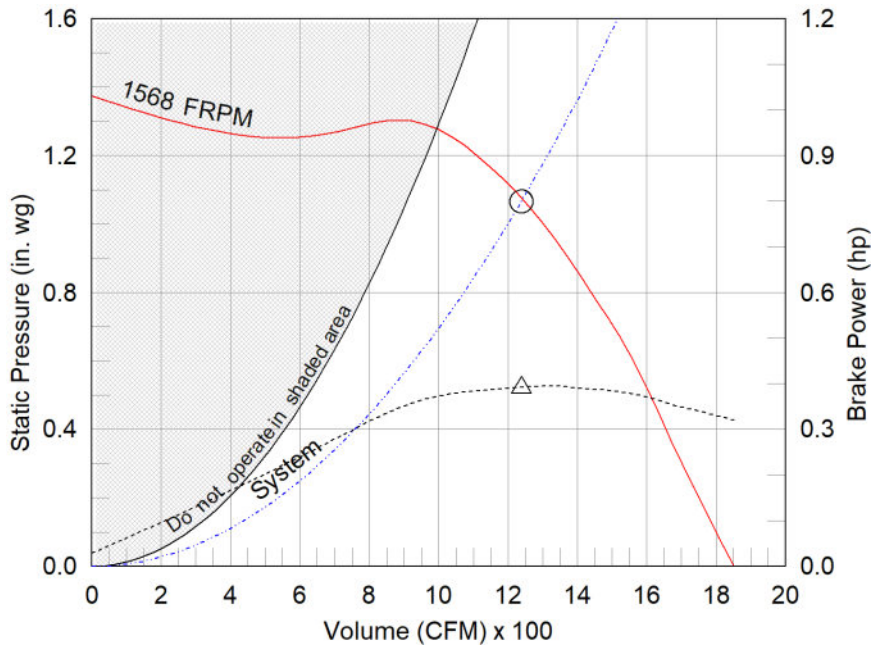


OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.

Performance	
Requested Volume (CFM)	1,238
Actual Volume (CFM)	1,238
Total External SP (in. wg)	1.066
Fan RPM	1568
Operating Power (hp)	0.39
Elevation (ft)	338
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.074
Drive Loss (%)	9.5
Tip Speed (ft/min)	5,363
Static Eff. (%)	59

Misc Fan Data	
Fan Eff. Index (FEI)	-
Outlet Velocity (ft/min)	967

Motor	
Motor Included	Yes
Size (hp)	1/2
Voltage/Cycle/Phase	115/60/1
Enclosure	ODP
Motor RPM	1725
Efficiency Rating	Standard
Windings	1
NEC FLA* (Amps)	9.8
Min. Circuit Ampacity (MCA)	12.25
Max. Overcurrent Protection (MOP)	25
Short Circuit Current Rtg (SCCR)	5 kA



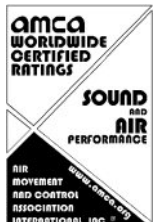
- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- - - System curve
- - - Brake horsepower curve

**Notes:**

All dimensions shown are in units of in.  
\*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory.  
MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).  
LwA - A weighted sound power level, based on ANSI S1.4  
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International  
Sones - calculated using ANSI/AMCA 301 at 5 ft

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones



## Model: CUBE-120-5

### Belt Drive Upblast Centrifugal Roof Exhaust Fan

#### Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Curb cap with prepunched mounting holes - Motor and drives isolated on shock mounts - Drain trough - Ball bearing motors - Adjustable motor pulley - Adjustable motor plate - Fan shaft mounted in ball bearing pillow blocks - Bearings meet or exceed temperature rating of fan - Static resistant belts - Corrosion resistant fasteners - Internal lifting lugs

#### Selected Options & Accessories:

Standard Curb Cap Size - 19 Square  
UL/cUL 705 Listed - Supplement SC - "Power Ventilators for Restaurant Exh. Appliances" (Formerly UL 762)  
Switch, NEMA-1, Toggle,  
Junction Box Mounted & Wired  
Curb Extension-Galv., VCE-19-G15.25, Shipped Loose From Factory  
Hinge, Factory Installed  
High Temp Curb Seal Rated for Continuous Duty at 1500 F (Factory Attached)  
Grease Trap (PN 475538)  
Heat Baffle (Attached)  
Conduit Chase Qty 1  
Unit Warranty: 1 Yr (Standard)

**GXEW** Type 1, X-Tractor (Spark Arrestor Incl.) Filter Single Wall - Exhaust Only Wall Canopy

Model	Hood Length (in.)	Width (in.)	Bottom Width (in.)	Height (in.)		Exhaust Volume (CFM)	Exhaust SP (in. w.g.)	Double Island
				Front	Back			
GXEW	98	48	48	24	24	1800	0.682	No

**Selected Options & Accessories:**

Option or Accessory	Description
Mounting Height	80 in. off Finished Floor.
Integral Air Space	Factory Mounted on Back - 3" wide 28 lbs
Ceiling Enclosures	16 in. High on Left Front Right
Filter Type	Stainless Steel X-Tractor (Spark Arrestor Incl.) Filters 54 lbs
Left Full End Skirt	45 in High 42.5 in Top Width 36.5 in Bottom Width 10 lbs
Right Full End Skirt	45 in High 42.5 in Top Width 36.5 in Bottom Width 10 lbs

**Material:** 430 SS Where Exposed  
**UL Listing:** UL 710 w/out Exhaust Fire Damper  
**Features:**  
 Performance Enhancing Lip (PEL)  
 Standing Seam Construction for Superior Strength  
 Stainless Steel Finish for Higher Corrosion Resistance  
**Hood End Conditions:**  
 Back Wall - Limited Combustible

**Section Data:**

Length (in.)	Volume (CFM)	Exhaust Rate (CFM/FT)	SP (in. wg)	Filter Qty		Filter Ht. (in.)	Cooking Load	Light Qty	Light Type	Foot Candles	Drain Location	Hood Weight (LBS)
				16" W	20" W							
98	1800	220	0.682	6	0	20	Heavy	5	Incandescent / CFL	48.61	Left/Right	262.2

**Exhaust Collar Data:**

Collar Num.	Collar Size (LxW) in. or Diameter (in.)	Pos. Off Left (in.)	Pos Off Back (in.)	Velocity (fpm)	Mounting Option
1	14	34	9	1684	Shipped Loose Exhaust Collar(s)

**External Supply Plenum Data:**

Supply: 1944 CFM      MUA: 1440 CFM      AC: 504 CFM

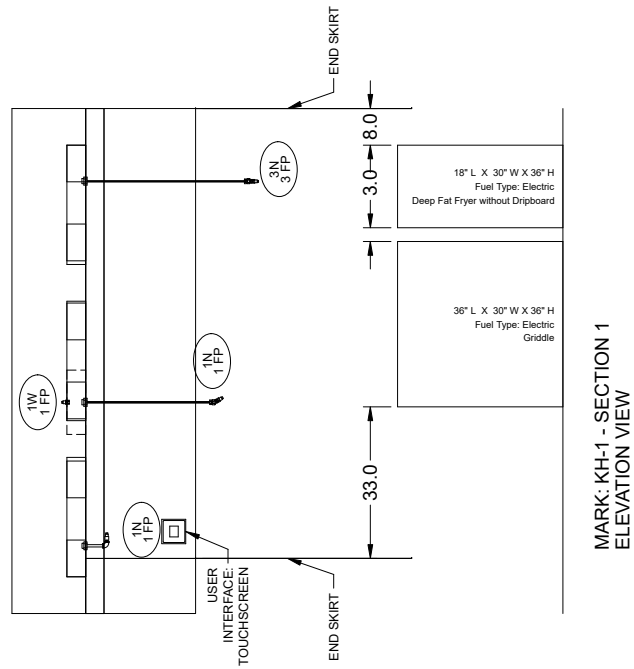
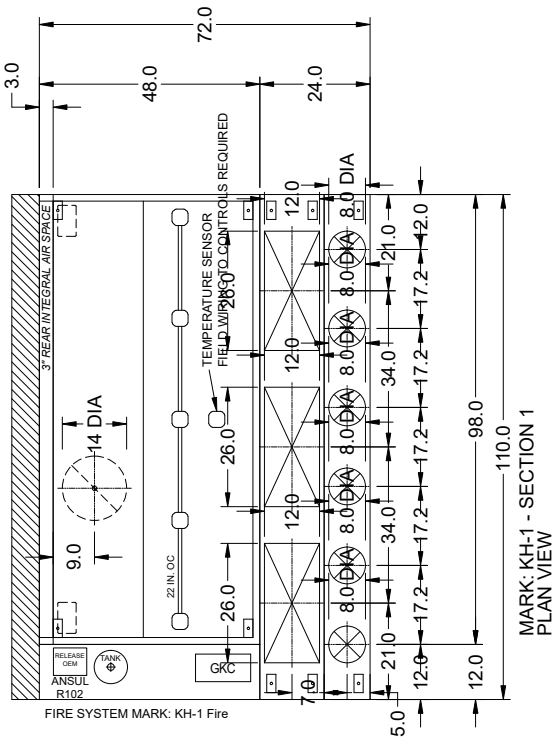
Plenum Num.	Side	Type	Length (in.)	Width (in.)	Height (in.)	Volume (CFM)	Weight (lbs)	SP (in. wg)	Insulated	MBD	LED Lights
1	Front	Split Air Curtain Supply (SSP) - MUA	110	14	4	1440	65	0.01	No	Yes	No
1	Front	Split Air Curtain Supply (SSP) - AC	110	10	4	504	54	0.01	Yes	Yes	No

**External Supply Collar Data:**

Section Num.	Plenum Num.	Side	Collar Num.	Collar Shape	Collar Size (LxW) in. or Diameter (in.)	Pos. Off Left (in.)	Pos. Off Front (in.)	Velocity (fpm)	Mounting Option
1	1	Front	1	rectangular	26 x 12	21	7	222	Factory Mounted Supply Collar(s)
1	1	Front	2	rectangular	26 x 12	55	7	222	Factory Mounted Supply Collar(s)
1	1	Front	3	rectangular	26 x 12	89	7	222	Factory Mounted Supply Collar(s)
1	1	Front	1	round	8	12	5	241	Factory Mounted Supply Collar(s)
1	1	Front	2	round	8	29.2	5	241	Factory Mounted Supply Collar(s)
1	1	Front	3	round	8	46.4	5	241	Factory Mounted Supply Collar(s)
1	1	Front	4	round	8	63.6	5	241	Factory Mounted Supply Collar(s)
1	1	Front	5	round	8	80.8	5	241	Factory Mounted Supply Collar(s)
1	1	Front	6	round	8	98	5	241	Factory Mounted Supply Collar(s)

**Utility Cabinet Data:**

Descripton	Length (in.)	Width (in.)	Height (in.)	Weight (lbs)
Left Utility Cabinet	48	12	24	134



NOTE: All dimensions are in units of in.

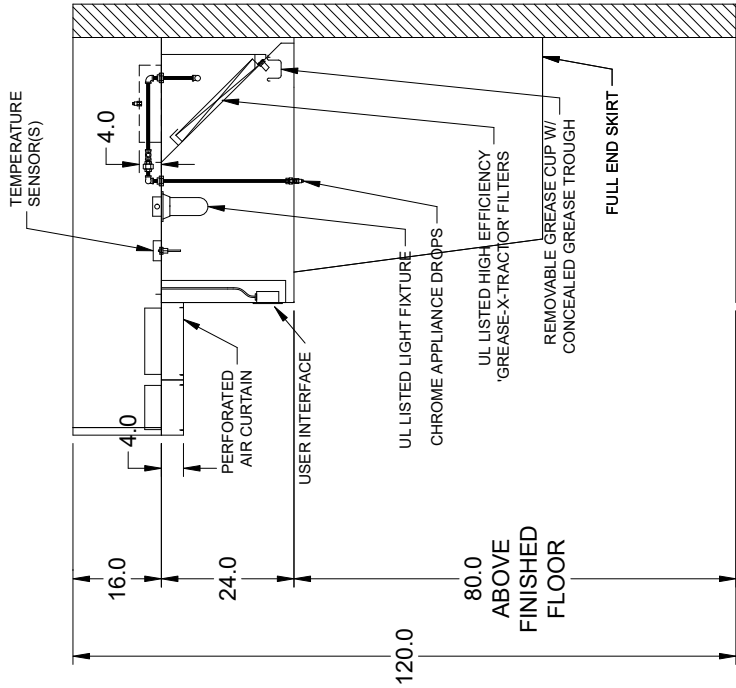




Hanger Bracket Locations			
Sec #	Brkt #	Distance Off Left (in)	Distance Off Front (in)
1	1	3.50	2.50
1	2	94.50	2.50
1	3	3.50	44.00
1	4	94.50	44.00

Bracket Mounting Position for a 4 Bracket Hood	
3	4
BACK	FRONT
1	2



MARK: KH-1

NOTE: All dimensions are in units of in.



## Constant Volume

Greenheck Kitchen Controls

### Standard Construction Features:

Includes control system, Fan Starters (unless otherwise stated), Temperature Sensors, Touchscreen. IMC 507.2.1.1 compliant. UL/ULC Listed.

### Options & Accessories:

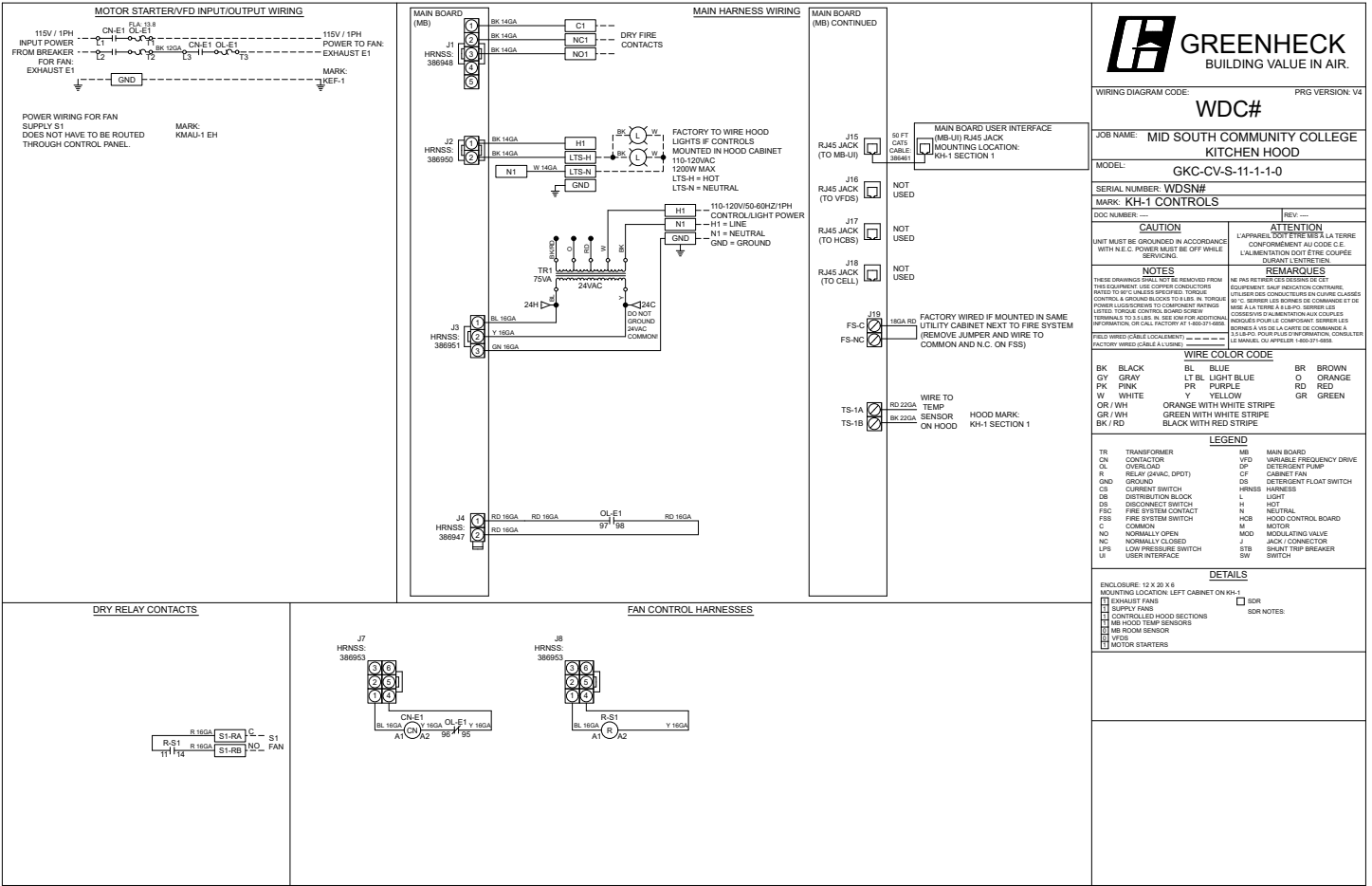
Mounting Option	Left Cabinet on KH-1
Exhaust Fan Quantity	1
Supply Fan Quantity	1
Hood Light Control	Yes
User Interface	Full Color Touchscreen
Touchscreen Mounting Location	Face Mount Left Side of Hood - KH-1 Section 1
Exhaust During Fire	Exhaust fans will run at max speed when in fire mode

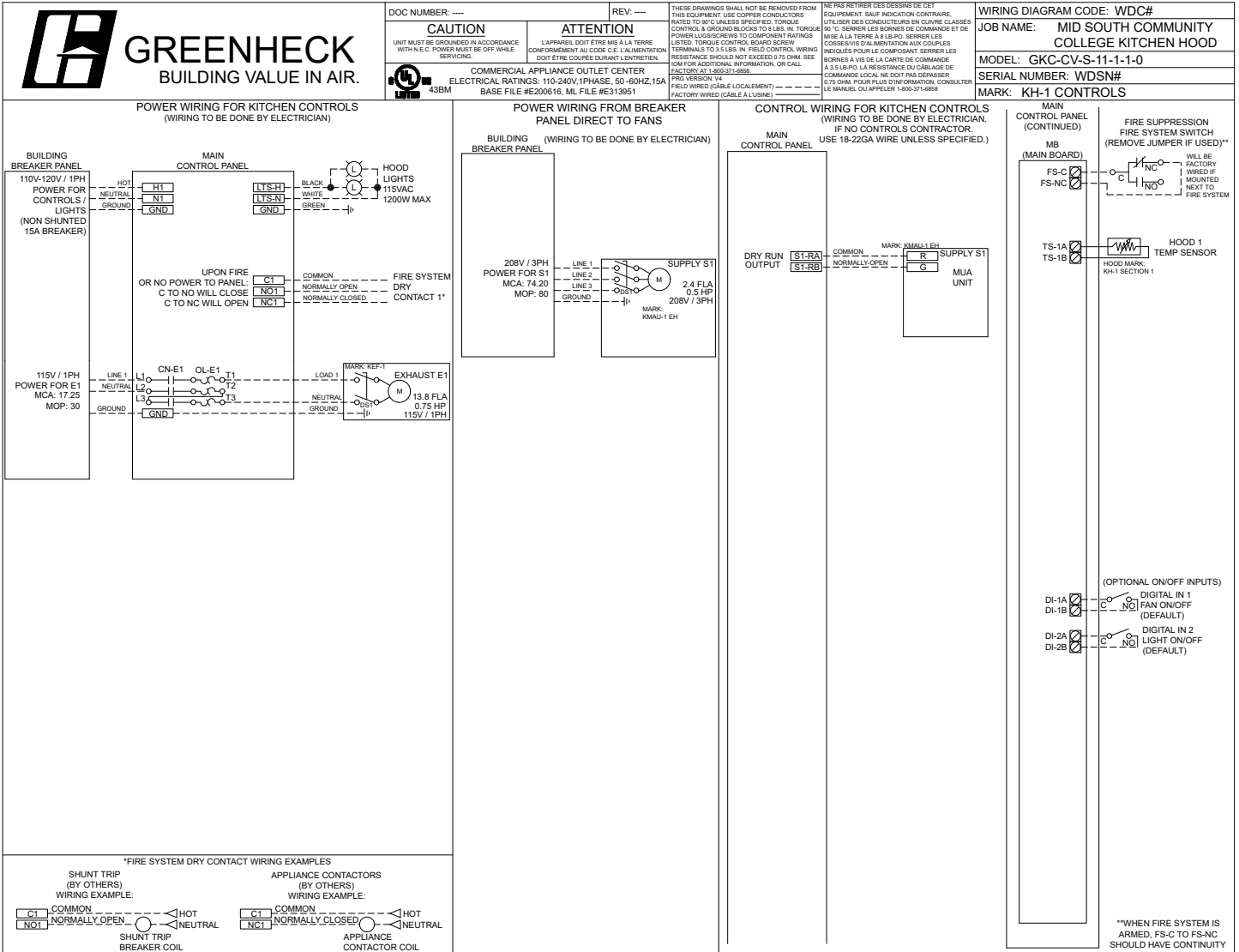
### Controlled Fans:

Fan Mark	Fan Type	Supplied By	Phase	HP	Voltage	NEC FLA	Starter/VFD Required	Starter/VFD Provided
KEF-1	Exhaust	Manufacturer	1	0.75	115	13.8	Yes	Yes
KMAU-1 EH	Supply	Manufacturer	3	0.5	208	2.4	No	No

### Controlled Hood Sections and Fan Relationships:

KH-1 Section - Number of Sensors = 1	
	Exhaust Fan Name - KEF-1
	Supply Fan Name - KMAU-1 EH







## Gas Valve

Quantity: 1  
Ansul  
Mechanical  
2 in.

**Labor Information:**

Hook-up of detection line and supply line is included.  
Surface mounting of the manual pull station in a pre-determined location is included.  
Charging and arming of the system is included.  
Permit Included  
Hood Puff Test Fee Included

**Items which may be supplied by the factory, but are not installed or hooked-up by the factory OR the installing distributor:**

Gas valve (not applicable for PCU)  
Microswitch(es)  
Remote mounted cabinets, enclosures, or tank brackets

**Not included unless explicitly stated elsewhere in the quote as included:**

Special, signed, or sealed drawings required to satisfy a state or local code  
Parts or labor required to correct piping due to cooking equipment changes or deviation from approved drawings  
More than two trips to the jobsite, special transportation, or overnight lodging requirement in remote areas. Typical travel distance is defined as the first 50 miles from the distributor's office  
A shut-off device (e.g. shunt-trip breaker) for electric cooking equipment  
All electrical connections required to shut down fan(s), electric cooking equipment, activate an alarm system, etc. aside from what is explicitly stated as "factory-wired" in the Accurex control's scope (if provided)  
Installation of the gas shut-off valve  
Pre-test  
Full dump test or any other system test requirement outside of a standard puff test  
Special classes or additional labor for access to security sensitive areas  
Union labor, government labor, or prevailing wages required for field hook-up  
Any dismantling or reassembly required where access to the fire suppression piping has been blocked  
Plan examination fees  
Rough-in conduit for remote pull station (for flush mounted pull station) or gas valve  
Additional remote pull stations beyond the quantity specified in the submittals

**GXEW** Type 1, X-Tractor Filter Single Wall - Exhaust Only Wall Canopy

Model	Hood Length (in.)	Width (in.)	Bottom Width (in.)	Height (in.)		Exhaust Volume (CFM)	Exhaust SP (in. w.g.)	Double Island
				Front	Back			
GXEW	66	48	48	24	24	1238	0.662	No

**Selected Options & Accessories:**

Option or Accessory	Description
Mounting Height	80 in. off Finished Floor.
Integral Air Space	Factory Mounted on Back - 3" wide 20 lbs
Ceiling Enclosures	16 in. High on Left Front Right
Filter Type	Stainless Steel X-Tractor Filters 36 lbs
Left Full End Skirt	45 in High 42.5 in Top Width 36.5 in Bottom Width 10 lbs
Right Full End Skirt	45 in High 42.5 in Top Width 36.5 in Bottom Width 10 lbs

**Material:** 430 SS Where Exposed  
**UL Listing:** UL 710 w/out Exhaust Fire Damper  
**Features:**  
 Performance Enhancing Lip (PEL)  
 Standing Seam Construction for Superior Strength  
 Stainless Steel Finish for Higher Corrosion Resistance  
**Hood End Conditions:**  
 Back Wall - Limited Combustible

**Section Data:**

Length (in.)	Volume (CFM)	Exhaust Rate (CFM/FT)	SP (in. wg)	Filter Qty		Filter Ht. (in.)	Cooking Load	Light Qty	Light Type	Foot Candles	Drain Location	Hood Weight (LBS)
				16" W	20" W							
66	1238	225	0.662	4	0	20	Heavy	3	Incandescent / CFL	43.04	Left/Right	190.04

**Exhaust Collar Data:**

Collar Num.	Collar Size (LxW) in. or Diameter (in.)	Pos. Off Left (in.)	Pos Off Back (in.)	Velocity (fpm)	Mounting Option
1	12	33	8	1576	Shipped Loose Exhaust Collar(s)

**External Supply Plenum Data:**

Supply: 1390 CFM MUA: 990 CFM AC: 400 CFM

Plenum Num.	Side	Type	Length (in.)	Width (in.)	Height (in.)	Volume (CFM)	Weight (lbs)	SP (in. wg)	Insulated	MBD	LED Lights
1	Front	Split Air Curtain Supply (SSP) - MUA	78	14	4	990	46	0.01	No	Yes	No
1	Front	Split Air Curtain Supply (SSP) - AC	78	10	4	400	38	0.02	Yes	Yes	No

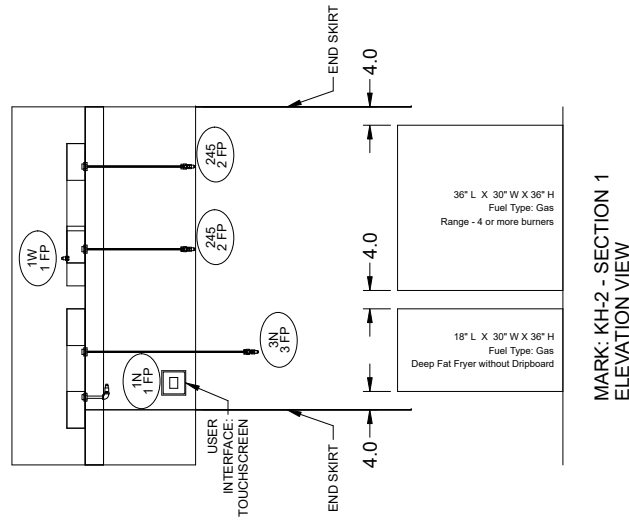
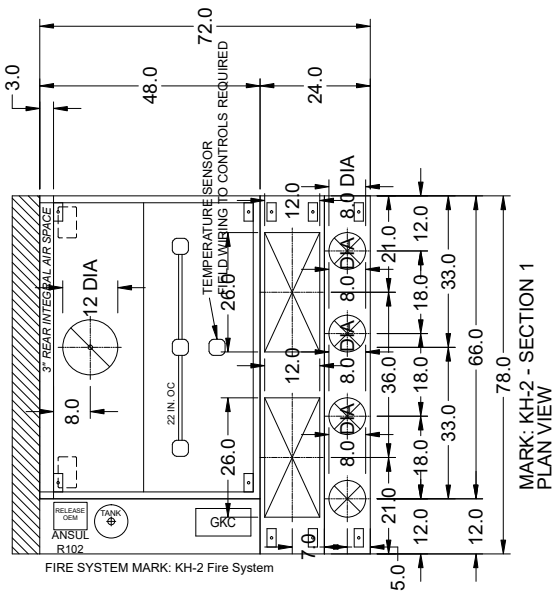
**External Supply Collar Data:**

Section Num.	Plenum Num.	Side	Collar Num.	Collar Shape	Collar Size (LxW) in. or Diameter (in.)	Pos. Off Left (in.)	Pos. Off Front (in.)	Velocity (fpm)	Mounting Option
1	1	Front	1	rectangular	26 x 12	21	7	228	Factory Mounted Supply Collar(s)
1	1	Front	2	rectangular	26 x 12	57	7	228	Factory Mounted Supply Collar(s)
1	1	Front	1	round	8	12	5	286	Factory Mounted Supply Collar(s)
1	1	Front	2	round	8	30	5	286	Factory Mounted Supply Collar(s)
1	1	Front	3	round	8	48	5	286	Factory Mounted Supply Collar(s)
1	1	Front	4	round	8	66	5	286	Factory Mounted Supply Collar(s)

**Utility Cabinet Data:**

Descripton	Length (in.)	Width (in.)	Height (in.)	Weight (lbs)
Left Utility Cabinet	48	12	24	134





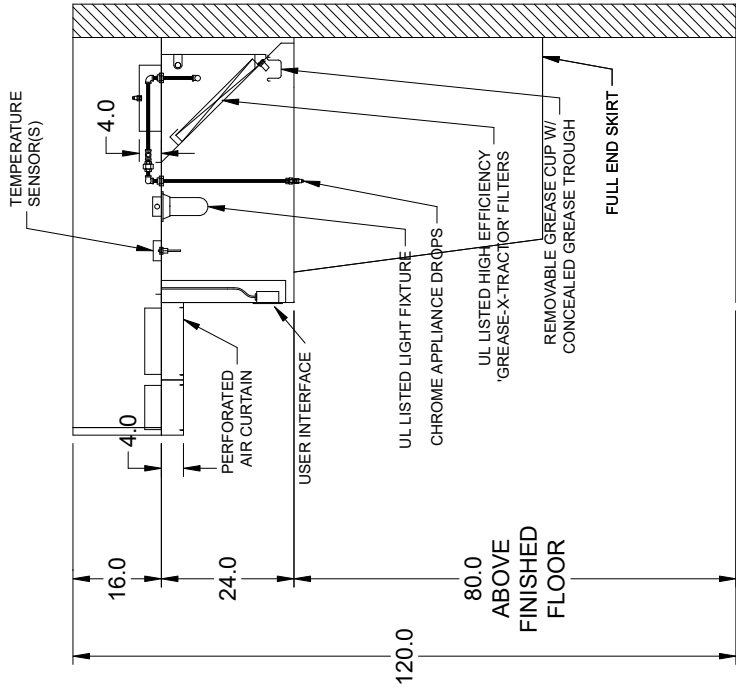
NOTE: All dimensions are in units of in.



Hanger Bracket Locations			
Sec #	Brkt #	Distance Off Left (in)	Distance Off Front (in)
1	1	3.50	2.50
1	2	62.50	2.50
1	3	3.50	44.00
1	4	62.50	44.00

Bracket Mounting Position for a 4 Bracket Hood	
3	4
1	2
BACK FRONT	



MARK: KH-2

NOTE: All dimensions are in units of in.



**Constant Volume**

Greenheck Kitchen Controls

**Standard Construction Features:**

Includes control system, Fan Starters (unless otherwise stated), Temperature Sensors, Touchscreen. IMC 507.2.1.1 compliant. UL/ULC Listed.

**Options & Accessories:**

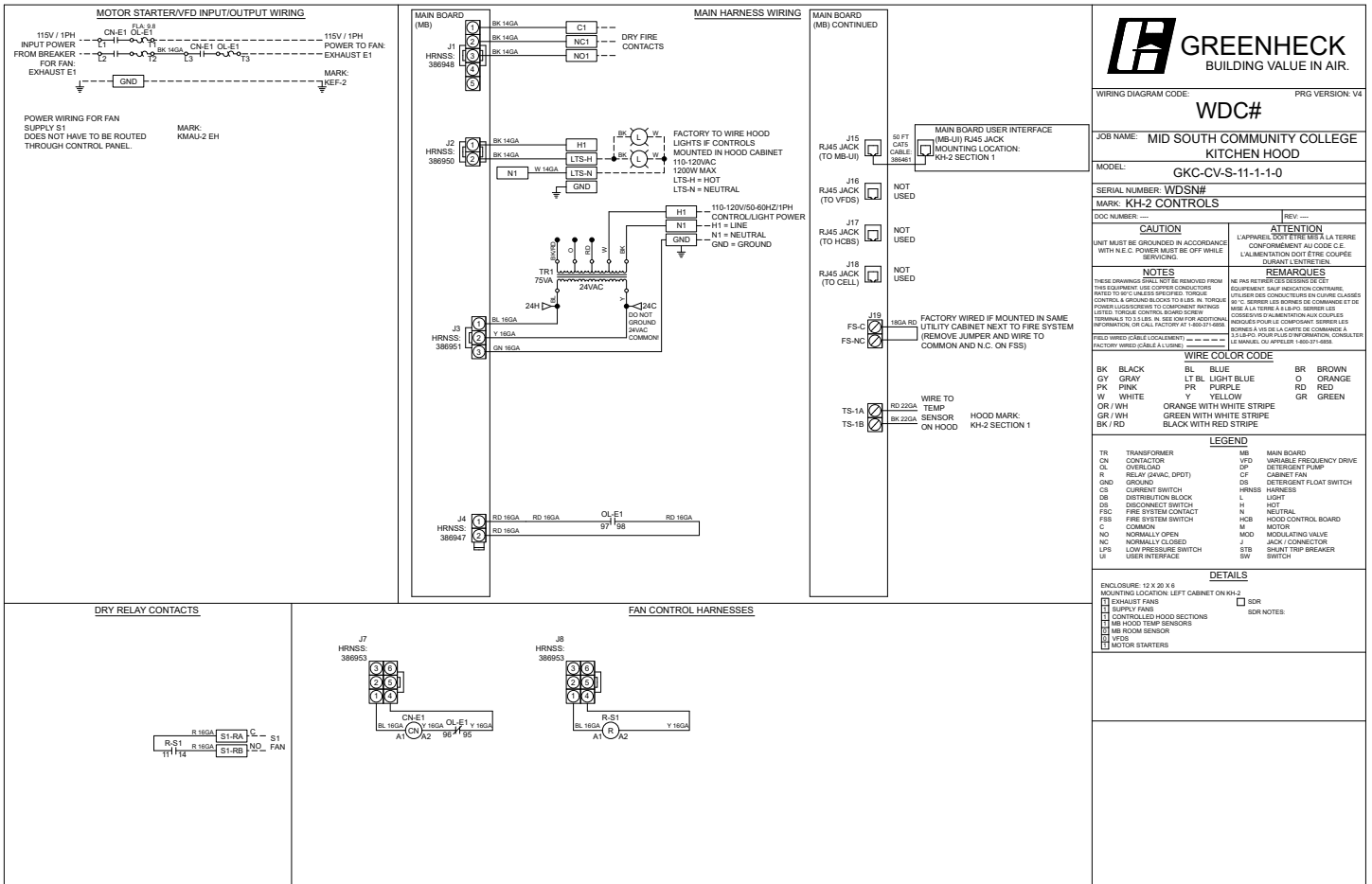
Mounting Option	Left Cabinet on KH-2
Exhaust Fan Quantity	1
Supply Fan Quantity	1
Hood Light Control	Yes
User Interface	Full Color Touchscreen
Touchscreen Mounting Location	Face Mount Left Side of Hood - KH-2 Section 1
Exhaust During Fire	Exhaust fans will run at max speed when in fire mode

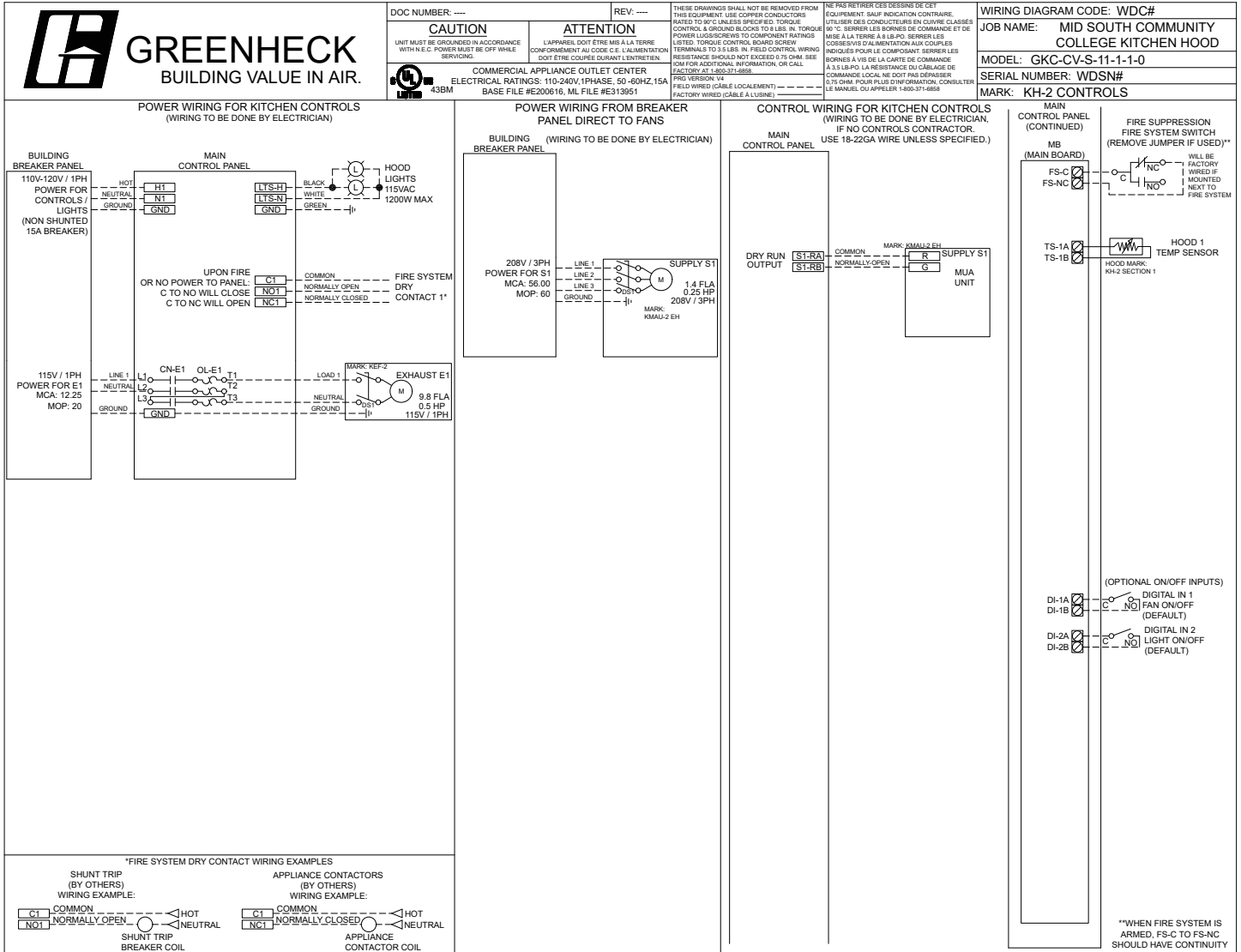
**Controlled Fans:**

Fan Mark	Fan Type	Supplied By	Phase	HP	Voltage	NEC FLA	Starter/VFD Required	Starter/VFD Provided
KEF-2	Exhaust	Manufacturer	1	0.5	115	9.8	Yes	Yes
KMAU-2 EH	Supply	Manufacturer	3	0.25	208	1.4	No	No

**Controlled Hood Sections and Fan Relationships:**

KH-2 Section - Number of Sensors = 1	
	Exhaust Fan Name - KEF-2
	Supply Fan Name - KMAU-2 EH







## Gas Valve

Quantity: 1  
Ansul  
Mechanical  
2 in.

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**Labor Information:**

Hook-up of detection line and supply line is included.  
Surface mounting of the manual pull station in a pre-determined location is included.  
Charging and arming of the system is included.  
Permit Included  
Hood Puff Test Fee Included

**Items which may be supplied by the factory, but are not installed or hooked-up by the factory OR the installing distributor:**

Gas valve (not applicable for PCU)  
Microswitch(es)  
Remote mounted cabinets, enclosures, or tank brackets

**Not included unless explicitly stated elsewhere in the quote as included:**

Special, signed, or sealed drawings required to satisfy a state or local code  
Parts or labor required to correct piping due to cooking equipment changes or deviation from approved drawings  
More than two trips to the jobsite, special transportation, or overnight lodging requirement in remote areas. Typical travel distance is defined as the first 50 miles from the distributor's office  
A shut-off device (e.g. shunt-trip breaker) for electric cooking equipment  
All electrical connections required to shut down fan(s), electric cooking equipment, activate an alarm system, etc. aside from what is explicitly stated as "factory-wired" in the Accurex control's scope (if provided)  
Installation of the gas shut-off valve  
Pre-test  
Full dump test or any other system test requirement outside of a standard puff test  
Special classes or additional labor for access to security sensitive areas  
Union labor, government labor, or prevailing wages required for field hook-up  
Any dismantling or reassembly required where access to the fire suppression piping has been blocked  
Plan examination fees  
Rough-in conduit for remote pull station (for flush mounted pull station) or gas valve  
Additional remote pull stations beyond the quantity specified in the submittals



## MSX-P112-H12-MF

### Unit Performance

Design Conditions					
Elevation (ft)	Summer		Winter (°F)	Supply (CFM)	Outdoor Air (CFM)
	DB (°F)	WB (°F)			
338	99.3	81.1	15.3	1,440	1,440

Unit Specifications					
Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing
1	1,069 (+/- 5%)	None	Electric	Outdoor/Indoor	UL / cUL 1995

Configuration				
Unit Orientation	Unit Configuration	Outdoor Air Intake	Return Air Intake	Supply Air Discharge
Horizontal	Constant Volume 100% OA	End	-	Bottom

Heating Specifications					
Type	Capacity (kW)	Temperature Rise (°F)	Capacity Control	Performance	
				EAT (°F)	LAT (°F)
Electric	20.4	44.8	Modulating (SCR)	15.3	60.1

Air Performance									
Type	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Fan			
						Qty	Type	Size (in.)	Drive-Type
Supply	1,440	0.39	0.558	1475	0.24	1	Mixed Flow	15	Direct-Drive

Motor Specifications					
Motor	Qty	Size (HP)	Enclosure	Efficiency	RPM
Supply Fan Motor	1	1/2	ODP	Standard	1725

Electrical Specifications				
Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	SCCR
Unit	208/60/3	74.2	80	5kA



### CONSTRUCTION FEATURES AND ACCESSORIES

Unit	
Unit Installation - Indoor or Outdoor	Std
Unit Construction - Double Wall	X
Wall Insulation - 1in. fiberglass - Tempering on	X
Base Insulation - 1in. fiberglass - entire unit base pan	Std
Paneled Bottom - Sheet metal liner for base insulation	
Corrosion Resistant Fasteners	Std
Access and Connections - Right side when facing intake	X
Service Access - Hinged access doors	X
Unit Finish - G90 Galvanized	X
Finish Color	
Supply Fan - Direct-drive, mixed flow plenum	X
Supply Fan and Motor Vibration isolation - Neoprene	X
Controls	
Unit Controls - Terminal strip	X
Remote Panel	
BMS Communication	
BMS Protocol	
Temperature Control - Discharge control	X
Supply Fan VFD - VFD by factory	X
Supply Fan Control - Constant Volume	X
Unoccupied Mode (Night Setback)	
Recirculation Control	
Control Accessories	
Remote display	
Heating Inlet Air Sensor	X
Cooling Inlet Air Sensor	
Dirty Filter Switch	
Fire Stat Type III (Ships loose)	
120V/24V Smoke Detector (Ships loose)	
Inlet Damper End Switch	
External Cooling Lockout Relay	
Freeze Protection (Supply Air Low Limit)	
Auxiliary Supply Starter Contacts	
Auxiliary Exhaust Starter Contacts	
Heating Coil Freeze Protection	
Airflow Proving Monitoring Contact	

Accessories	
Factory Installed, Lockable, NEMA 3R Disconnect	Std
Weatherhood - Aluminum Mesh filtered	X
Supply Air Filters	
Outdoor Air Inlet Damper - Low leakage	X
Supply Air Outlet Damper	
Return Air Damper	
Diffuser	
Roof Curb - GPI	X
Combination Curb - 140	X
Electrofin Coil Coating	
Fan Bearing Extended Lube Lines	
Inlet Damper Module	X
Spare Belts	
Spare Filters	
Motor with Shaft Grounding	
Service Outlet	
Service Lights	
Warranty Options	
Unit Warranty - 18 months (std.)	X
5 Year Compressor Warranty	

Standard Option	Std
Not Included	
Included	X

#### Notes

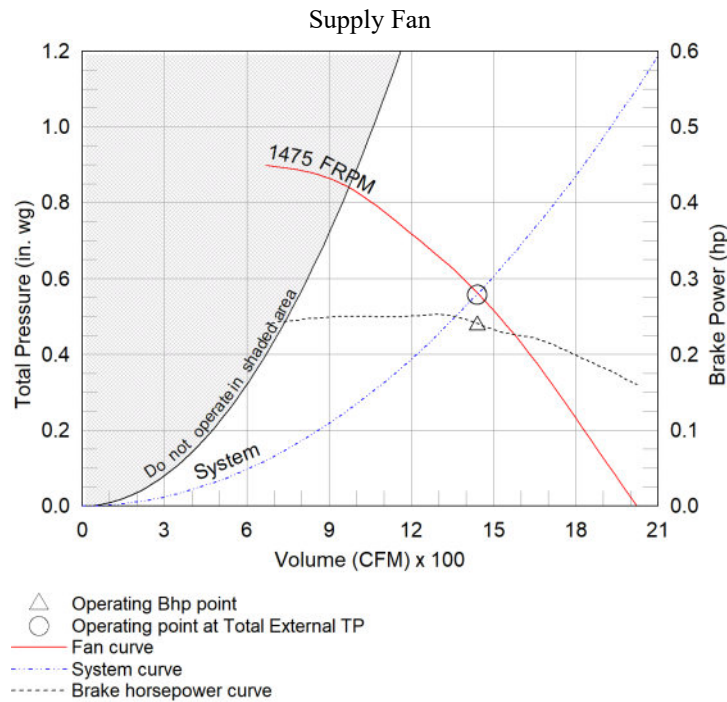
Damper(s) supplied are low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft<sup>2</sup> @ 1 in.wg), Class 1A

### Fan Charts And Performance

Supply Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (HP)	Qty	Type	Drive-Type
1,440	0.39	0.558	1475	0.24	1	1/2	1	Mixed Flow	Direct

Pressure Drop (in. wg)							
Diffuser	Weatherhood	Filter	Damper	Cooling	Heating	External	Total
-	0.026	-	0.017	-	0.125	0.39	0.558

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
64	66	62	61	70	69	65	67	75	64	12.2

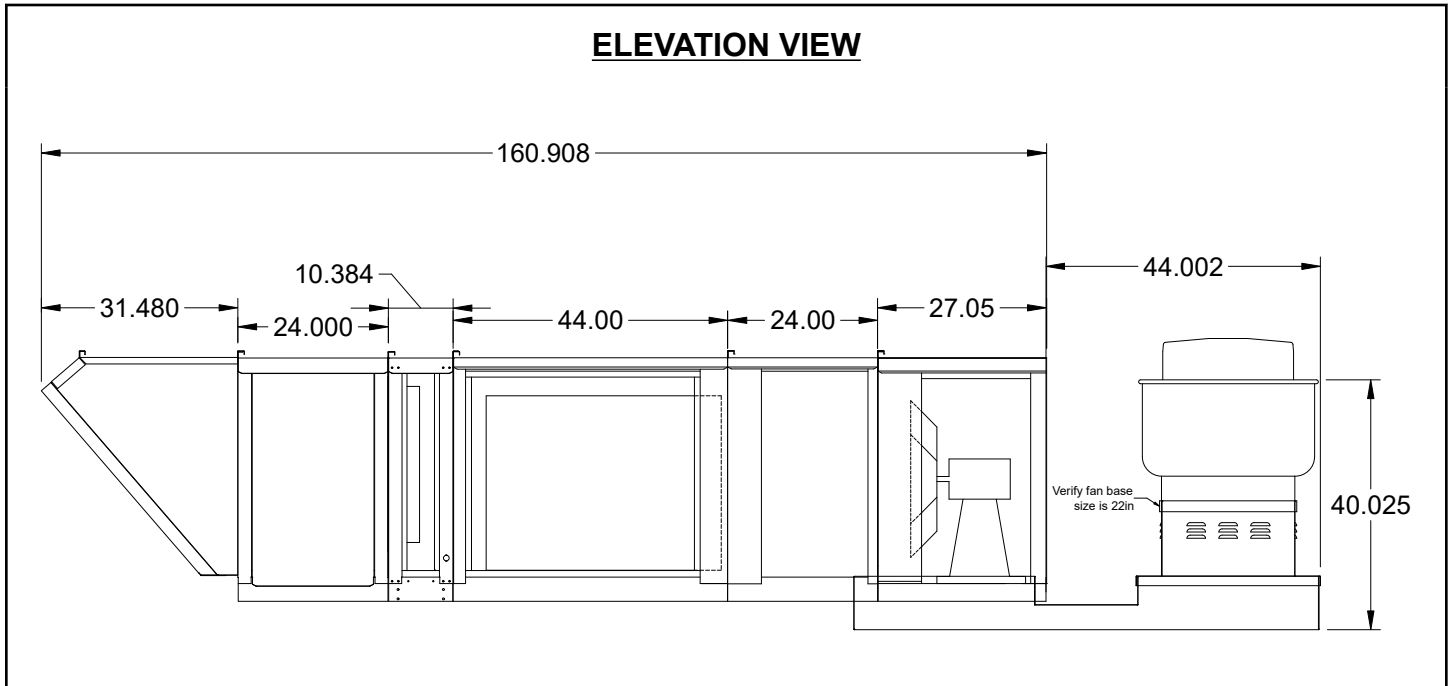


### Heating Specifications

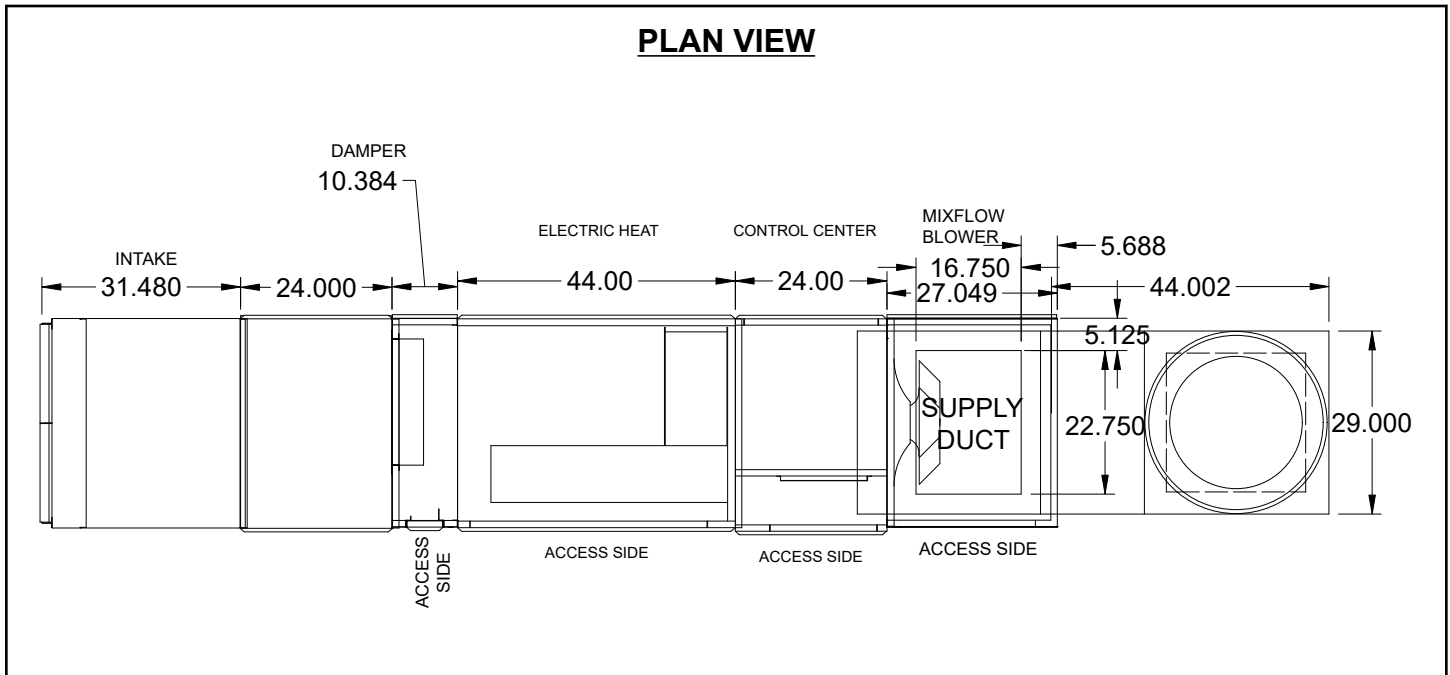
Heating Performance					
Type	Capacity (kW)	Temperature Rise (°F)	Capacity Control	Performance	
				EAT (°F)	LAT (°F)
Electric	20.4	44.8	Modulating (SCR)	15.3	60.1

Unit Details
Open coil heating elements
High grade Nickel-Chrome alloy coils

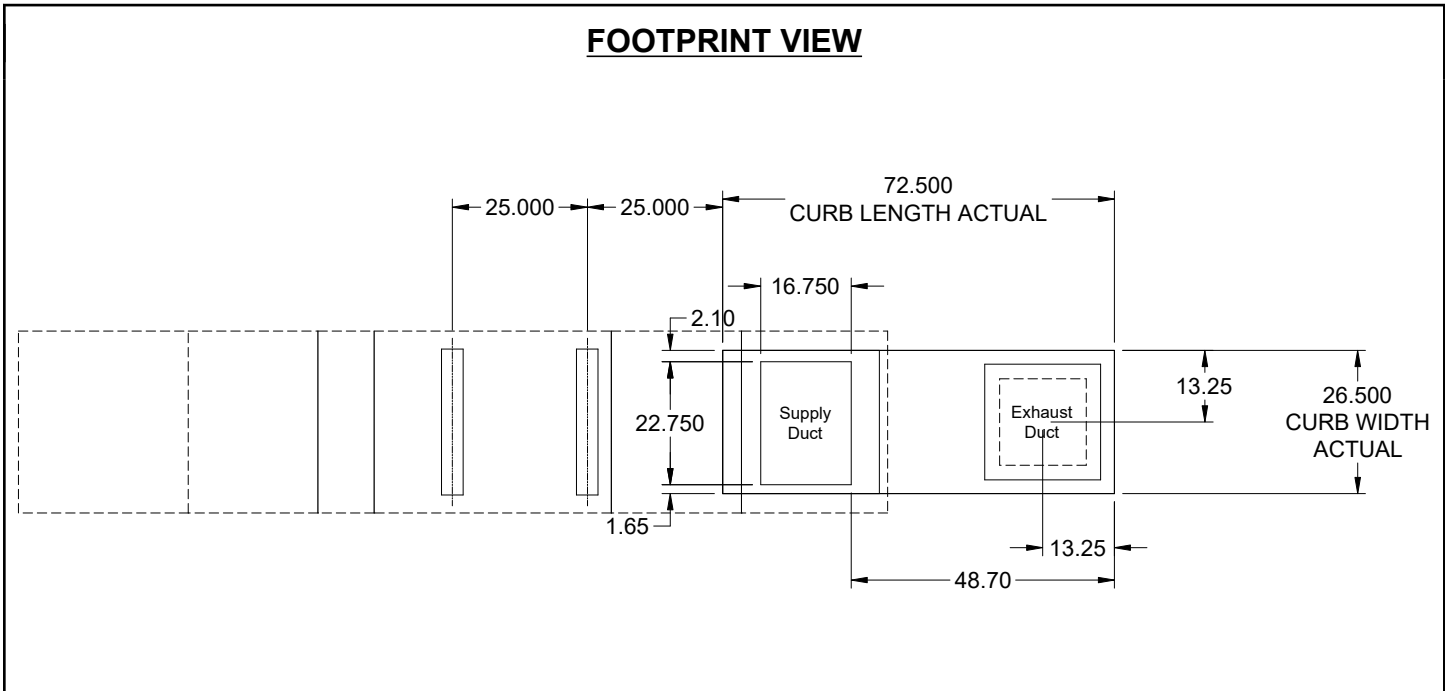
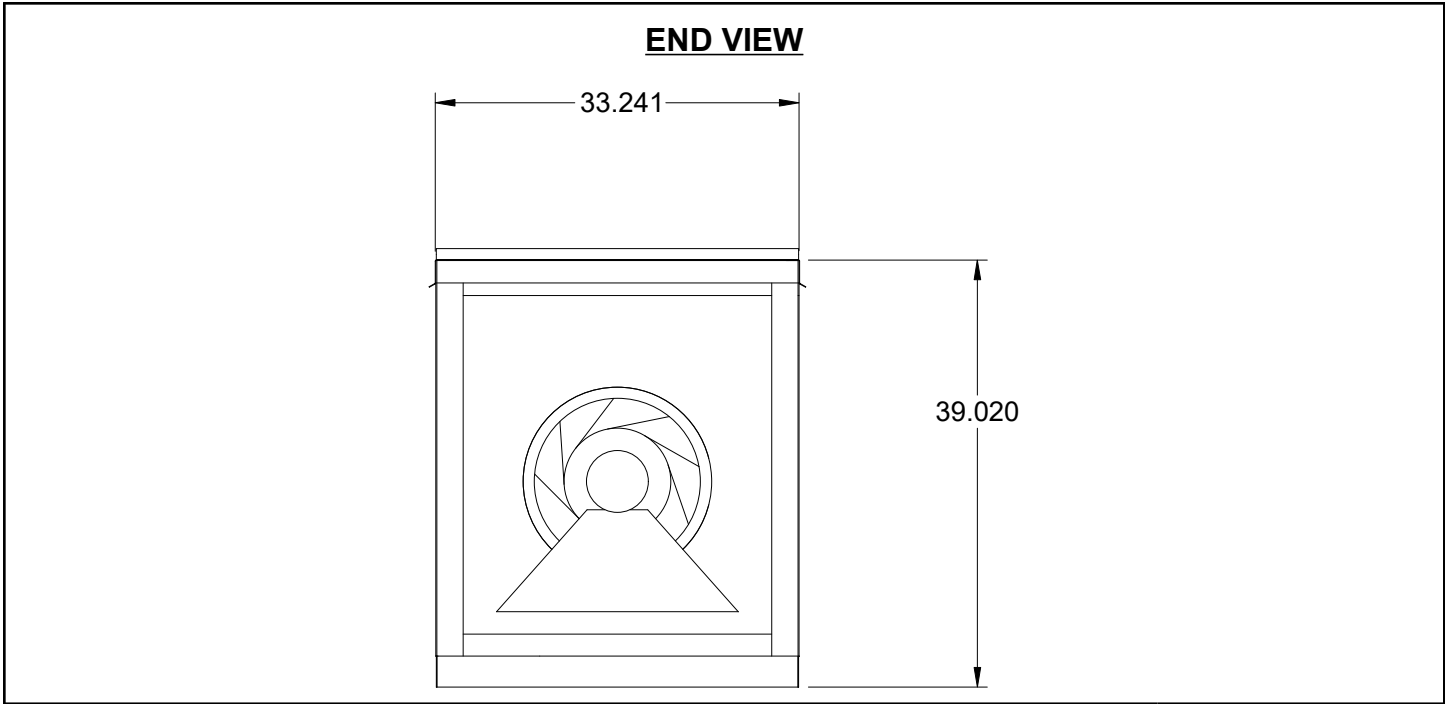
SCR controller
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**Notes - Elevation View**  
Standard configuration for unit access is on the right-hand side, when looking into the unit intake in the direction of airflow.  
Order of unit sections is from intake of unit to discharge of unit.  
Sections included on this unit: Weatherhood Section, Spacer Section, Damper Section, Heating Section, Control Center Module Section, Blower Section  
Insulation: Double Wall, from the Electric Heater through end of unit.



**Notes - Plan View**  
Standard configuration for unit access is on the right-hand side, when looking into the unit intake in the direction of airflow.

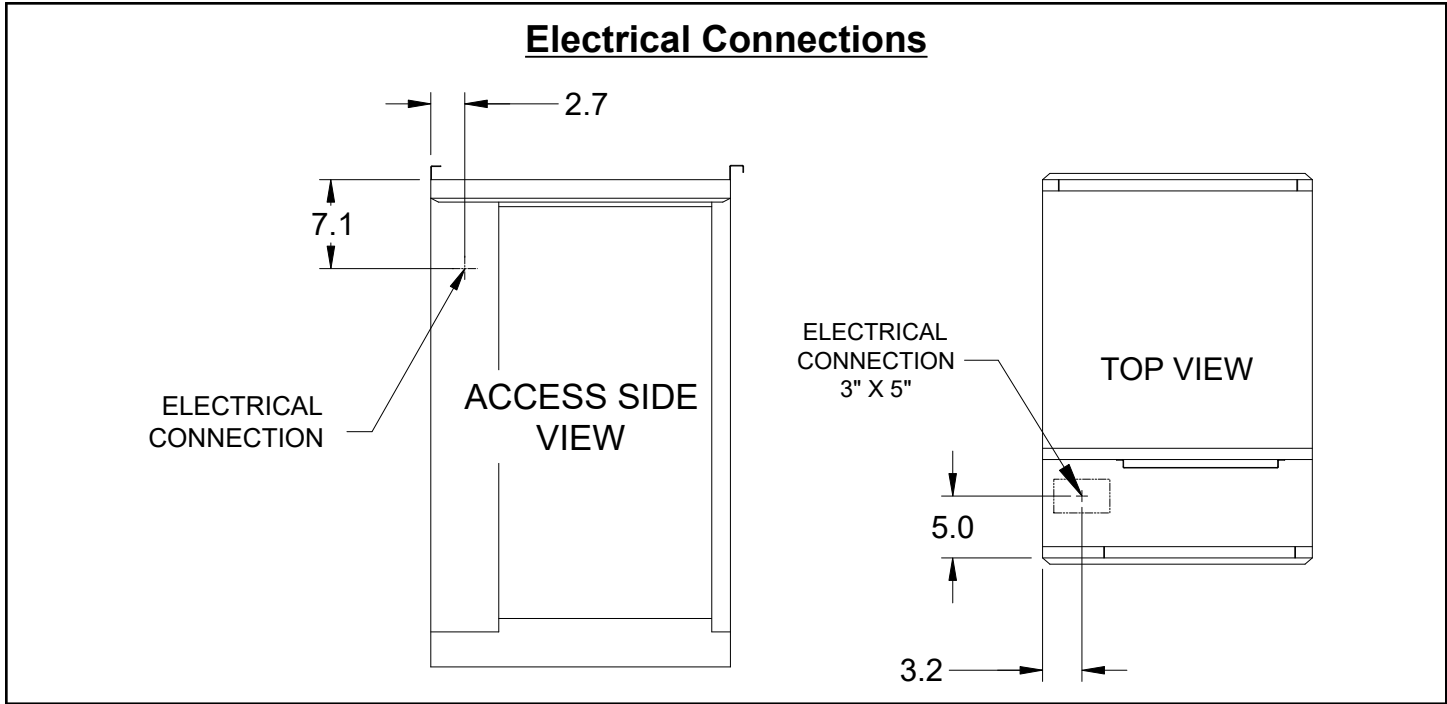


**Notes - Footprint View**

**Minimum Roof Opening:** The minimum roof opening size is the illustrated duct diameter plus 0.25 in. on all sides. For example: If the duct size is 14 x 14 in. square, the minimum roof opening size is 14.5 x 14.5 in. square.

**Maximum Roof Opening:** There must be a minimum perimeter of 1.75 in. between the roof opening and the roof curb. For example: If the roof curb is 75 x 30 in. square, the maximum roof opening is 71.5 x 26.5 in. inches square.

The weatherhood and filter sections of the make-up air unit extend beyond the curb. This is by design, to prevent water infiltration.



### Clearance Specifications

Recommended Minimum Combustible Clearances				
	Floor (in.)	Top (in.)	Sides (in.)	Ends (in.)
Insulated Units	0	0	0	0
Non-Insulated Units	0	6	6	6

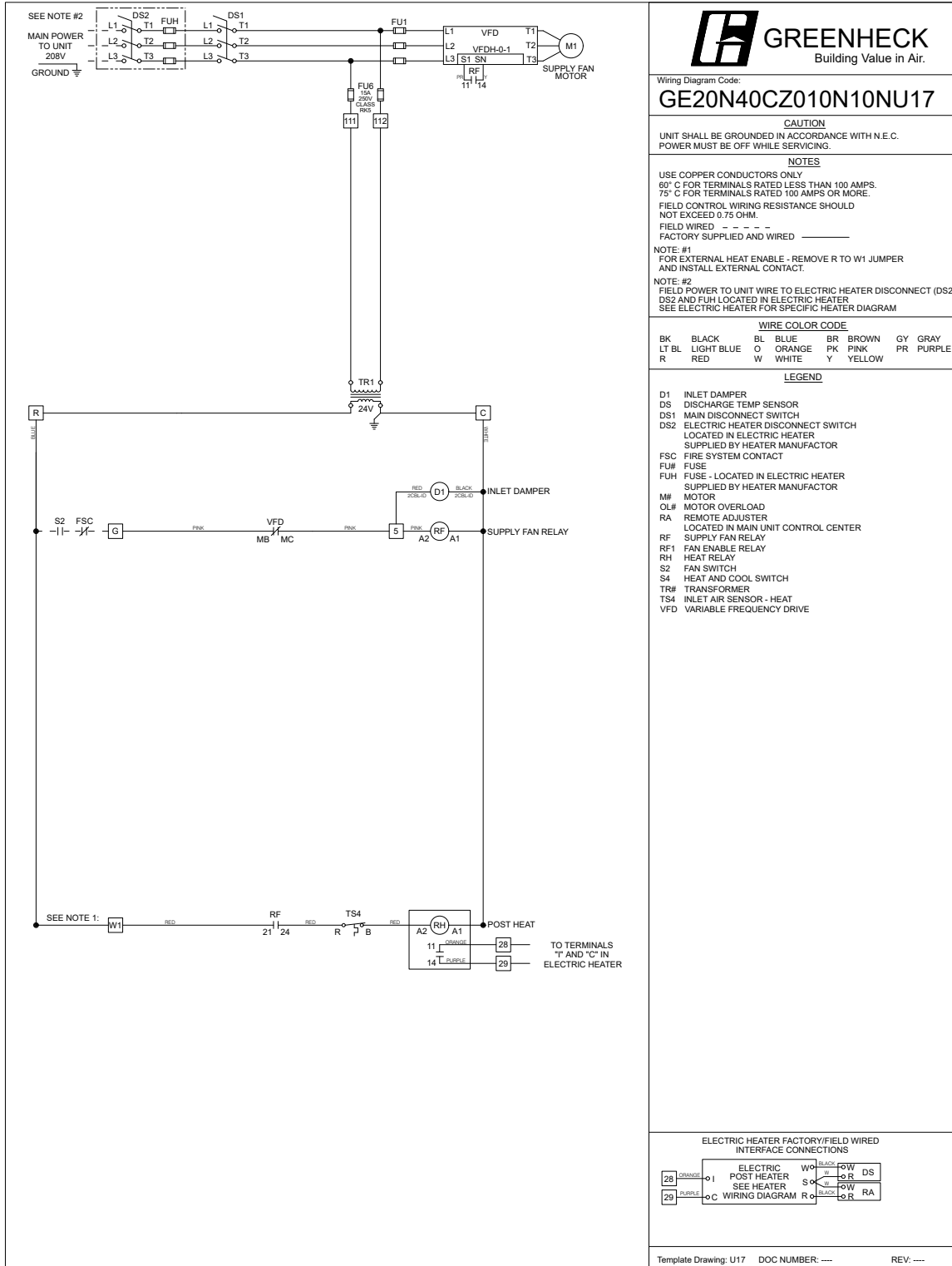
**Notes - Combustible Clearances**  
 Clearance to combustibles is defined as the minimum distance required between the heating source and the adjacent combustible surfaces to ensure the adjacent surface's temperature does not exceed 90 F above the ambient temperature.

Recommended Minimum Service Clearances	
Housing 32 and less (in.)	Housing 35 and higher (in.)
42 on the controls side of the unit	48 on the controls side of the unit

**Notes - Service Clearances**  
 To ensure ample space for component removal (evaporative cooling media, coils, filters, etc.), service clearances should be 6 in. wider than the width of the module itself.

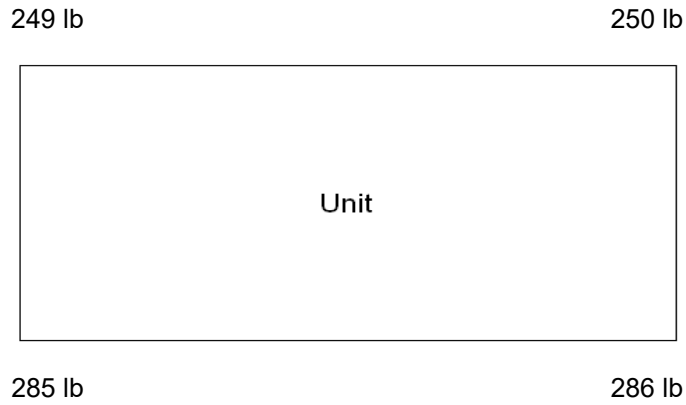


**Wiring Diagram**



Manufacturer reserves the right to change, modify, or improve this product at anytime

**Corner Weights**



## SEQUENCE OF OPERATIONS

### Unit Controls

The unit shall be provided from the factory with:

- 24VAC Transformer
- Terminal Strip
- Supply fan VFD
- Factory mounted and wired outdoor air inlet damper with actuator

### Field Provided Control Requirements

The following field provided control signals must be provided for proper operation of the unit (Reference the unit wiring diagram for additional information):

- Supply fan enable – Contact closure between R and G (24VAC)

### Unit Start-Up Sequence

- Supply Fan Enable Is Received
- Outdoor air inlet damper actuator is energized
- Supply Fan Is Enabled

### Supply Fan Sequence

The unit has been provided with a factory mounted variable frequency drive (VFD). The variable frequency drive shall control the supply fan speed as indicated by the following sequence:

#### Constant Volume

The VFD shall be programmed from the factory for a constant supply fan speed. This is to be adjusted for air balancing only and is not to be modulated.

### Heating Control

A heating enable signal must be present and the supply fan must be enabled before the unit will enable heating.

#### Heating Inlet Air Sensor (Heating Lockout)

The heating will be locked out when the outside air temperature is above the heating inlet air sensor set point (typical 65 F, adj.)

#### Electric Heating (Discharge Control)

The electric heater shall include fully modulating controls. The controls shall allow the heater to maintain a supply temperature set point. The supply temperature set point is controlled by a dial in the unit control center.

## Warranty Statement for Make-Up Air

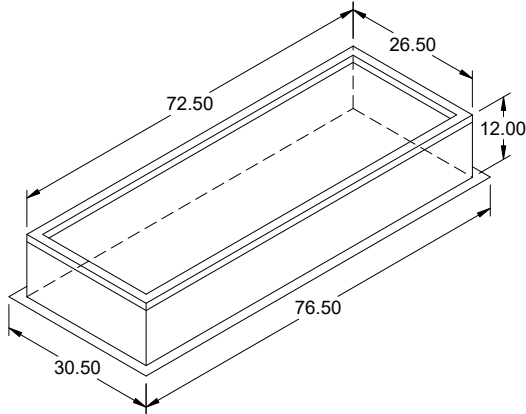
### Unit Warranty

Greenheck warrants the equipment to be free from defects in material and workmanship for a period of 18 months from the date of shipment. Initial startup must be completed within six months of the shipment date, and a startup report must be submitted to Greenheck.

### Warranty Notes

Any component which proves defective during the warranty period will be repaired or replaced at Greenheck's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product. These warranties are exclusive and are in lieu of all other warranties, whether written, oral, or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose. No person (including any agent or salesperson) has authority to expand Seller's obligation beyond the terms of this warranty, or to state that the performance of the product is other than that published by Seller.

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



## Model: GPI

### Roof Curb

#### Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in. aluminum - Straight Sided without a cant - 2 in. mounting flange - 3 lb density insulation - Height - Available from 12 in. to 42 in. as specified in 0.5 in. increments. Notes: - The maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in.. - The minimum roof opening dimension should be at least 2.5 in. more than the damper dimension or recommended duct size. - The Roof Opening Dimension may or may not be the same as the Structural Opening Dimension. - Damper Tray is optional and must be specified. Tray size is same as damper size. - Security bars are optional and must be specified. Frames and gridwork are all 12 ga steel. Gridwork is welded to the frame and the frame is welded to the curb.

#### General

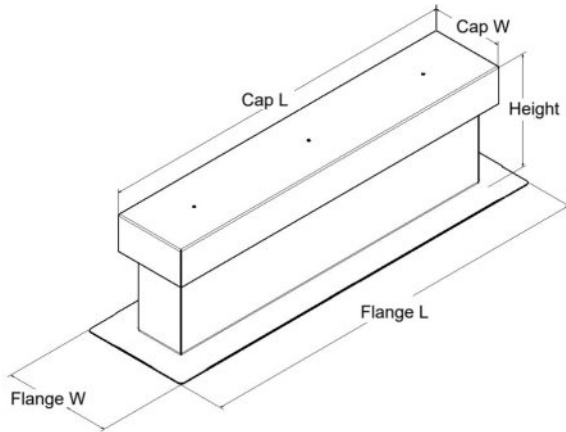
Tag	Qty	Model	Sizing Method	Undersizing (in.)	Weight (lb)	Shipped Assembled	Union Label
	1	GPI-28 x 74	Nominal	1.5	57	Yes	No Preference

#### Dimensions

Curb Height (in.)	Nominal Outside Width (in.)	Nominal Outside Length (in.)	Actual Outside Width (in.)	Actual Outside Length (in.)	Flange Width (in.)	Flange Length (in.)
12	28	74	26.5	72.5	30.5	76.5

#### Accessories

Material	Security Bars	Liner	Insulation (in.)	Insulation R Value
Galvanized	No	No	1	R4.3



## Model: GESI

### Flat or Pitched Roof Equipment Support

#### Standard Construction Features:

- Welded construction (see Material Note) - Wood nailer - Flashing cap. NOTES: - MAXIMUM design load of 400 lb per isolator. MATERIAL NOTE: - If Length <= 44 OR Height <= 12: Galvanized is 18 ga and Aluminum is 0.064 in. - If Length > 44 OR Height > 12: Galvanized is 16 ga and Aluminum is 0.080 in.

#### Dimensions

ID#	Tag	Qty	Length (in.)	Flange Width (in.)	Flange Length (in.)	Base Width (in.)	Base Length (in.)	Cap Width (in.)	Cap Length (in.)
Unit		2	27	7.5	4	4	0	5	1.5

#### Accessories

ID#	Material	Width (in.)	Height (in.)	Sizing
Unit	Galvanized	4	20	Nominal

## MSX-P109-H12-MF

### Unit Performance

Design Conditions					
Elevation (ft)	Summer		Winter (°F)	Supply (CFM)	Outdoor Air (CFM)
	DB (°F)	WB (°F)			
338	99.3	81.1	15.3	990	990

Unit Specifications					
Qty	Weight (lb)	Cooling Type	Heating Type	Unit Installation	Unit ETL Listing
1	1,052 (+/- 5%)	None	Electric	Outdoor/Indoor	UL / cUL 1995

Configuration				
Unit Orientation	Unit Configuration	Outdoor Air Intake	Return Air Intake	Supply Air Discharge
Horizontal	Constant Volume 100% OA	End	-	Bottom

Heating Specifications					
Type	Capacity (kW)	Temperature Rise (°F)	Capacity Control	Performance	
				EAT (°F)	LAT (°F)
Electric	15.5	49.5	Modulating (SCR)	15.3	64.8

Air Performance									
Type	Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Fan			
						Qty	Type	Size (in.)	Drive-Type
Supply	990	0.39	0.535	1899	0.17	1	Mixed Flow	11	Direct-Drive

Motor Specifications					
Motor	Qty	Size (HP)	Enclosure	Efficiency	RPM
Supply Fan Motor	1	1/4	ODP	Standard	1725

Electrical Specifications				
Power Supply	Rating (V/C/P)	MCA (A)	MOP (A)	SCCR
Unit	208/60/3	56	60	5kA



### CONSTRUCTION FEATURES AND ACCESSORIES

Unit	
Unit Installation - Indoor or Outdoor	Std
Unit Construction - Double Wall	X
Wall Insulation - 1in. fiberglass - Tempering on	X
Base Insulation - 1in. fiberglass - entire unit base pan	Std
Paneled Bottom - Sheet metal liner for base insulation	
Corrosion Resistant Fasteners	Std
Access and Connections - Right side when facing intake	X
Service Access - Hinged access doors	X
Unit Finish - G90 Galvanized	X
Finish Color	
Supply Fan - Direct-drive, mixed flow plenum	X
Supply Fan and Motor Vibration isolation - Neoprene	X
Controls	
Unit Controls - Terminal strip	X
Remote Panel	
BMS Communication	
BMS Protocol	
Temperature Control - Discharge control	X
Supply Fan VFD - VFD by factory	X
Supply Fan Control - Constant Volume	X
Unoccupied Mode (Night Setback)	
Recirculation Control	
Control Accessories	
Remote display	
Heating Inlet Air Sensor	X
Cooling Inlet Air Sensor	
Dirty Filter Switch	
Fire Stat Type III (Ships loose)	
120V/24V Smoke Detector (Ships loose)	
Inlet Damper End Switch	
External Cooling Lockout Relay	
Freeze Protection (Supply Air Low Limit)	
Auxiliary Supply Starter Contacts	
Auxiliary Exhaust Starter Contacts	
Heating Coil Freeze Protection	
Airflow Proving Monitoring Contact	

Accessories	
Factory Installed, Lockable, NEMA 3R Disconnect	Std
Weatherhood - Aluminum Mesh filtered	X
Supply Air Filters	
Outdoor Air Inlet Damper - Low leakage	X
Supply Air Outlet Damper	
Return Air Damper	
Diffuser	
Roof Curb - GPI	X
Combination Curb - 120	X
Electrofin Coil Coating	
Fan Bearing Extended Lube Lines	
Inlet Damper Module	X
Spare Belts	
Spare Filters	
Motor with Shaft Grounding	
Service Outlet	
Service Lights	
Warranty Options	
Unit Warranty - 18 months (std.)	X
5 Year Compressor Warranty	

Standard Option	Std
Not Included	
Included	X

#### Notes

Damper(s) supplied are low leakage, motorized VCD-23 (leakage rate of 3 CFM/ft<sup>2</sup> @ 1 in.wg), Class 1A

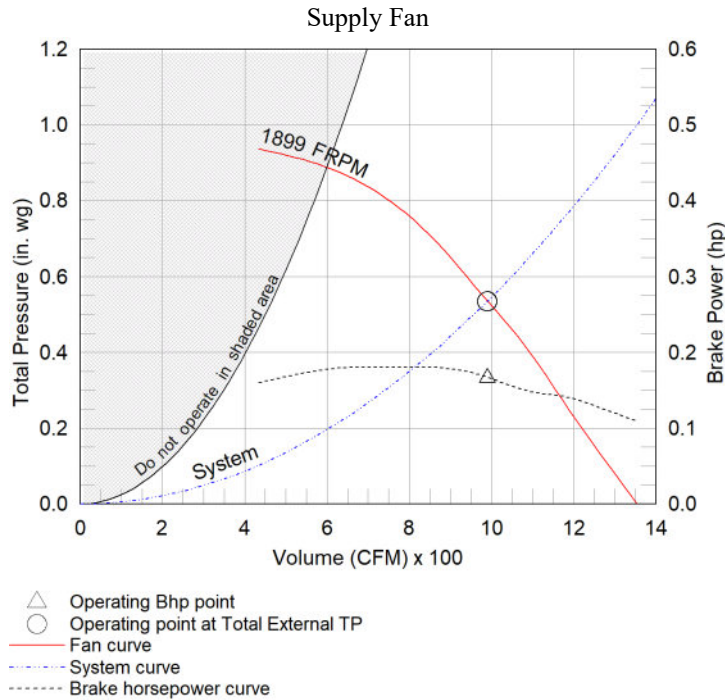


### Fan Charts And Performance

Supply Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (HP)	Qty	Type	Drive-Type
990	0.39	0.535	1899	0.17	1	1/4	1	Mixed Flow	Direct

Pressure Drop (in. wg)							
Diffuser	Weatherhood	Filter	Damper	Cooling	Heating	External	Total
-	0.012	-	0.008	-	0.125	0.39	0.535

Sound Performance in Accordance with AMCA										
Sound Power by Octave Band								Lwa	dBA	Sones
62.5	125	250	500	1000	2000	4000	8000			
63	65	64	64	73	70	70	60	77	66	12.6

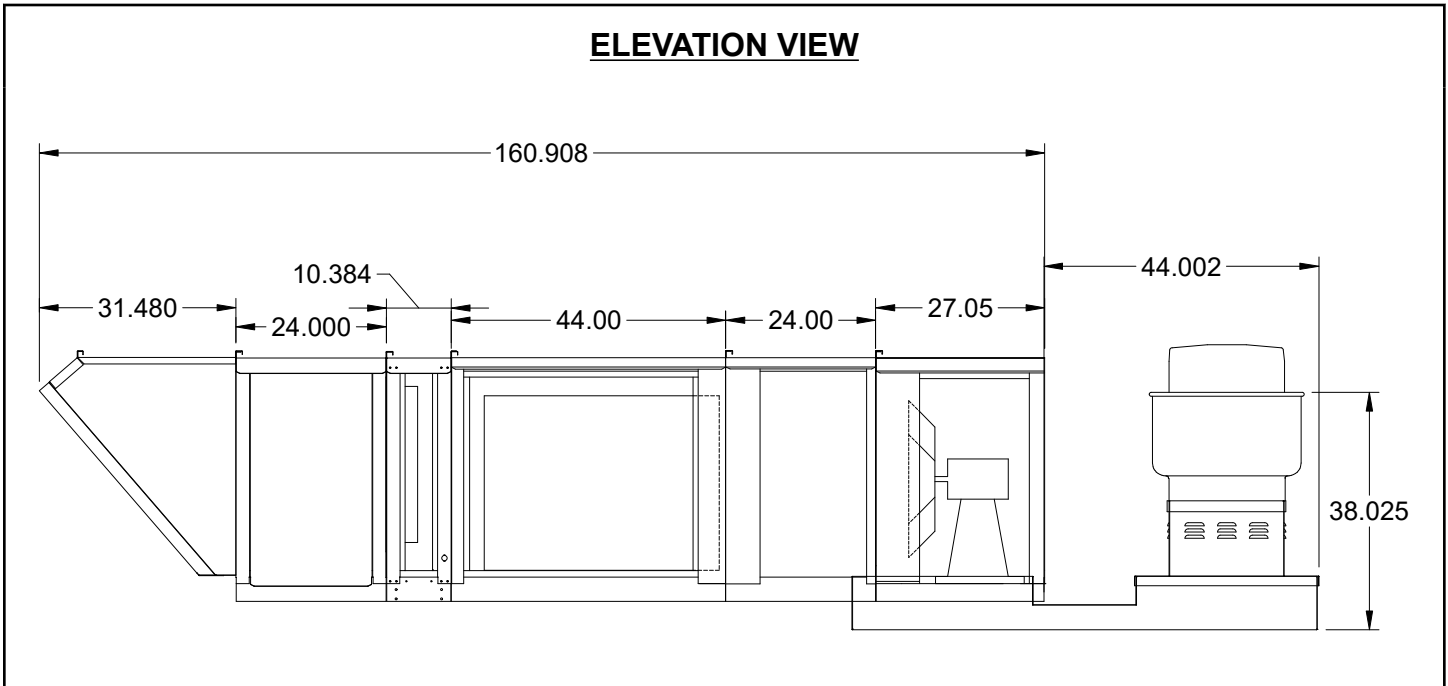


### Heating Specifications

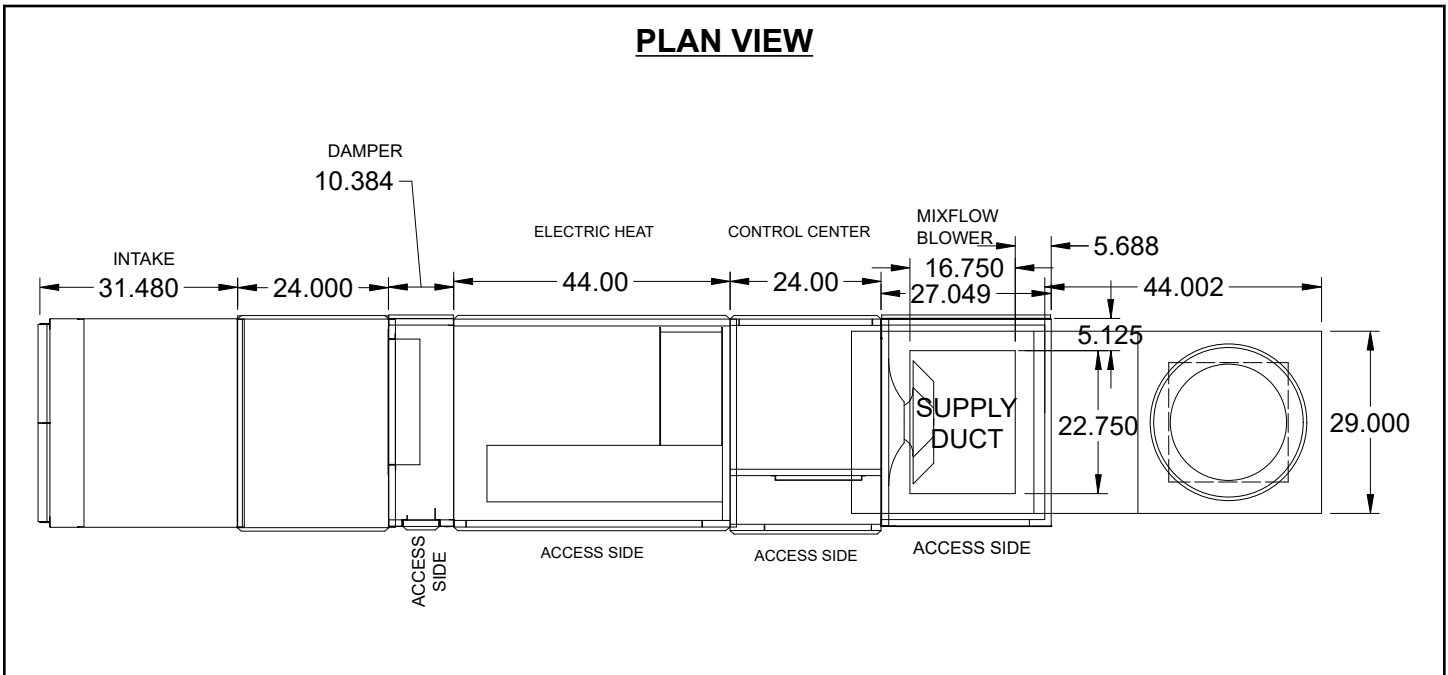
Heating Performance					
Type	Capacity (kW)	Temperature Rise (°F)	Capacity Control	Performance	
				EAT (°F)	LAT (°F)
Electric	15.5	49.5	Modulating (SCR)	15.3	64.8

Unit Details
Open coil heating elements
High grade Nickel-Chrome alloy coils

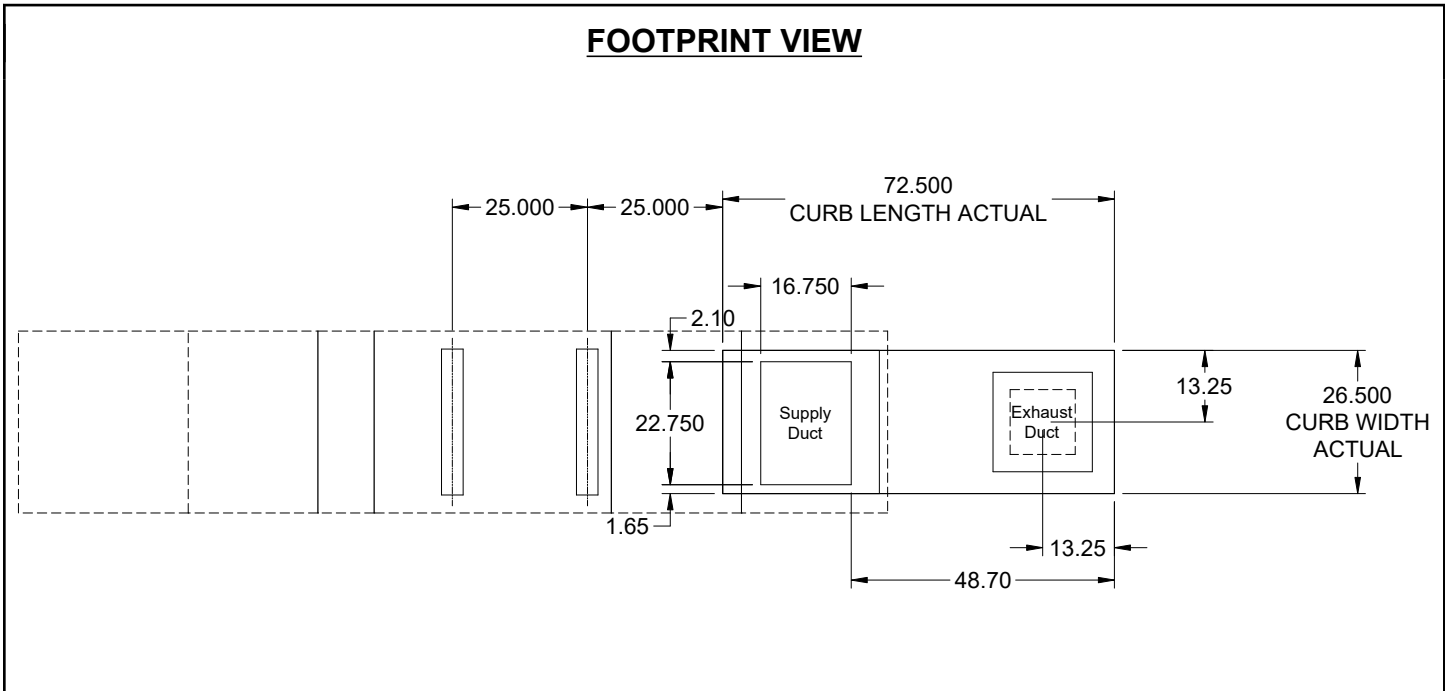
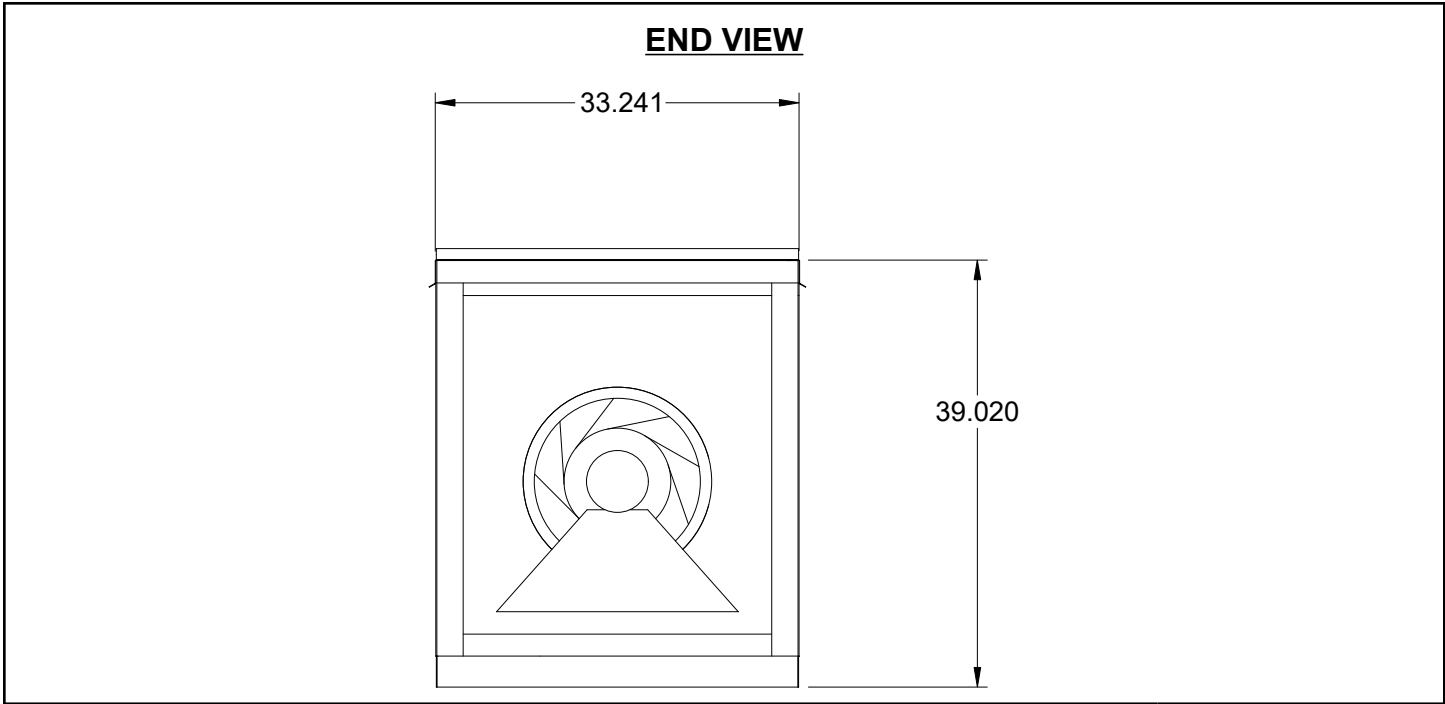
SCR controller
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**Notes - Elevation View**  
Standard configuration for unit access is on the right-hand side, when looking into the unit intake in the direction of airflow.  
Order of unit sections is from intake of unit to discharge of unit.  
Sections included on this unit: Weatherhood Section, Spacer Section, Damper Section, Heating Section, Control Center Module Section, Blower Section  
Insulation: Double Wall, from the Electric Heater through end of unit.



**Notes - Plan View**  
Standard configuration for unit access is on the right-hand side, when looking into the unit intake in the direction of airflow.

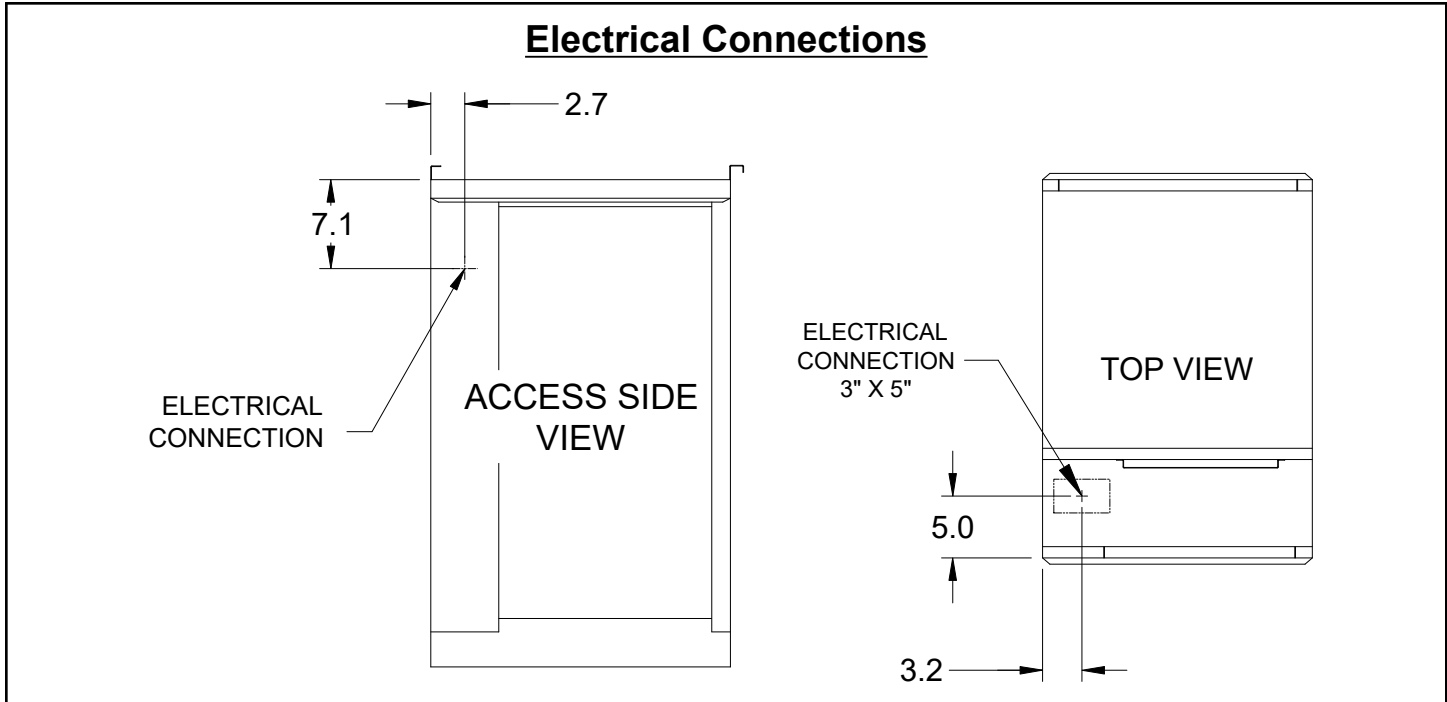


**Notes - Footprint View**

**Minimum Roof Opening:** The minimum roof opening size is the illustrated duct diameter plus 0.25 in. on all sides. For example: If the duct size is 14 x 14 in. square, the minimum roof opening size is 14.5 x 14.5 in. square.

**Maximum Roof Opening:** There must be a minimum perimeter of 1.75 in. between the roof opening and the roof curb. For example: If the roof curb is 75 x 30 in. square, the maximum roof opening is 71.5 x 26.5 in. inches square.

The weatherhood and filter sections of the make-up air unit extend beyond the curb. This is by design, to prevent water infiltration.



### Clearance Specifications

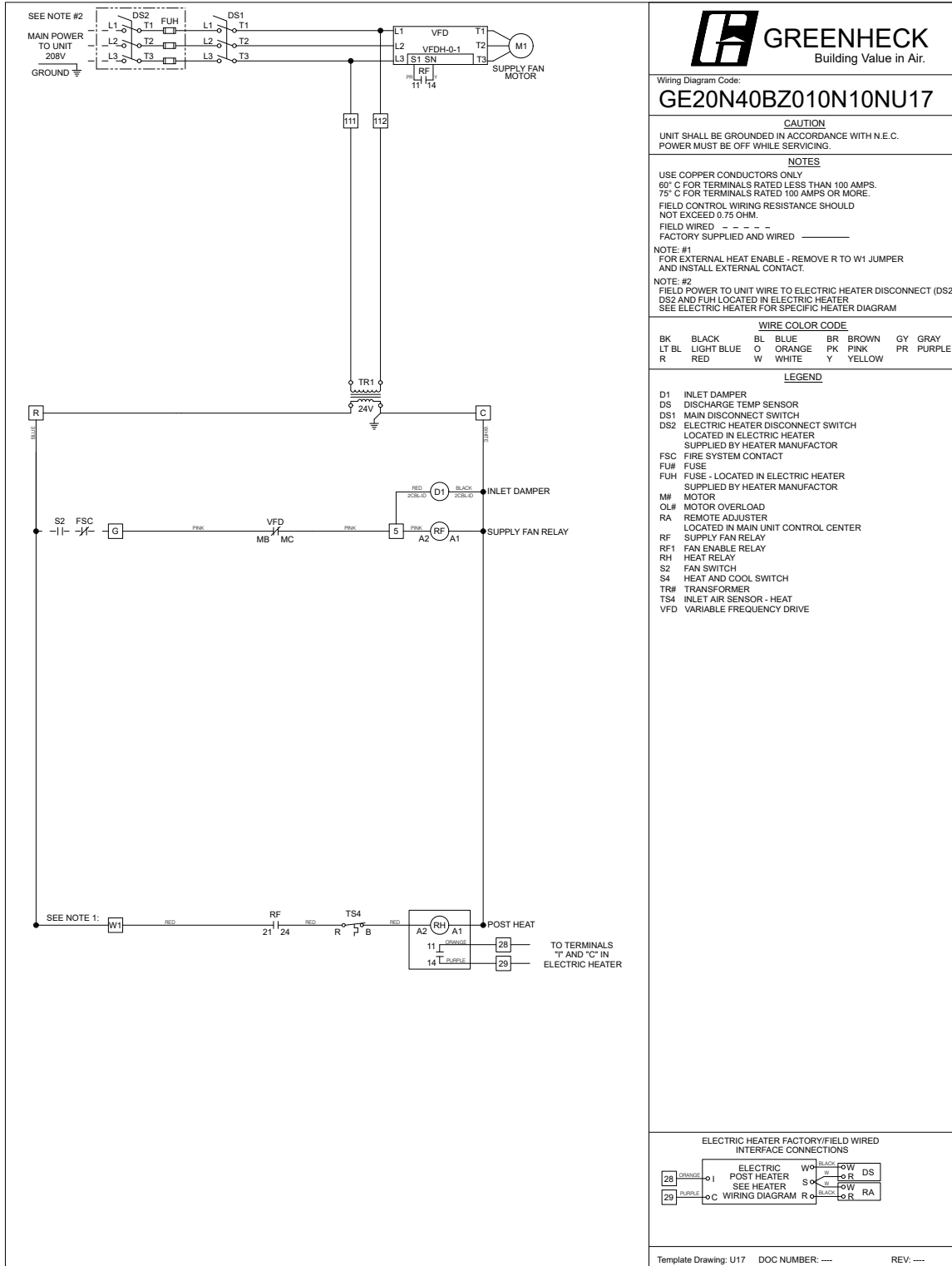
Recommended Minimum Combustible Clearances				
	Floor (in.)	Top (in.)	Sides (in.)	Ends (in.)
Insulated Units	0	0	0	0
Non-Insulated Units	0	6	6	6

**Notes - Combustible Clearances**  
 Clearance to combustibles is defined as the minimum distance required between the heating source and the adjacent combustible surfaces to ensure the adjacent surface's temperature does not exceed 90 F above the ambient temperature.

Recommended Minimum Service Clearances	
Housing 32 and less (in.)	Housing 35 and higher (in.)
42 on the controls side of the unit	48 on the controls side of the unit

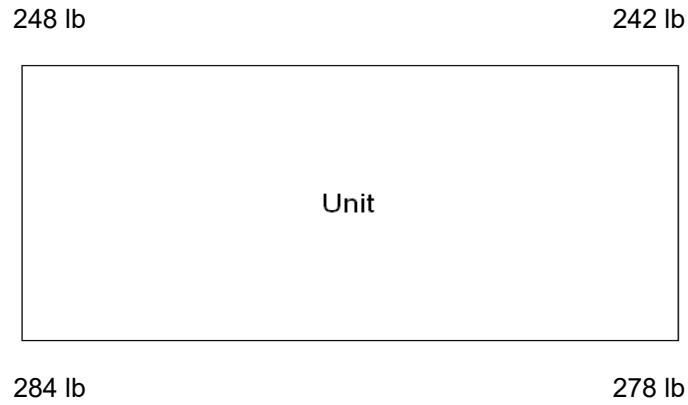
**Notes - Service Clearances**  
 To ensure ample space for component removal (evaporative cooling media, coils, filters, etc.), service clearances should be 6 in. wider than the width of the module itself.

**Wiring Diagram**



Manufacturer reserves the right to change, modify, or improve this product at anytime

**Corner Weights**





## SEQUENCE OF OPERATIONS

### Unit Controls

The unit shall be provided from the factory with:

- 24VAC Transformer
- Terminal Strip
- Supply fan VFD
- Factory mounted and wired outdoor air inlet damper with actuator

### Field Provided Control Requirements

The following field provided control signals must be provided for proper operation of the unit (Reference the unit wiring diagram for additional information):

- Supply fan enable – Contact closure between R and G (24VAC)

### Unit Start-Up Sequence

- Supply Fan Enable Is Received
- Outdoor air inlet damper actuator is energized
- Supply Fan Is Enabled

### Supply Fan Sequence

The unit has been provided with a factory mounted variable frequency drive (VFD). The variable frequency drive shall control the supply fan speed as indicated by the following sequence:

#### Constant Volume

The VFD shall be programmed from the factory for a constant supply fan speed. This is to be adjusted for air balancing only and is not to be modulated.

### Heating Control

A heating enable signal must be present and the supply fan must be enabled before the unit will enable heating.

#### Heating Inlet Air Sensor (Heating Lockout)

The heating will be locked out when the outside air temperature is above the heating inlet air sensor set point (typical 65 F, adj.)

#### Electric Heating (Discharge Control)

The electric heater shall include fully modulating controls. The controls shall allow the heater to maintain a supply temperature set point. The supply temperature set point is controlled by a dial in the unit control center.

## Warranty Statement for Make-Up Air

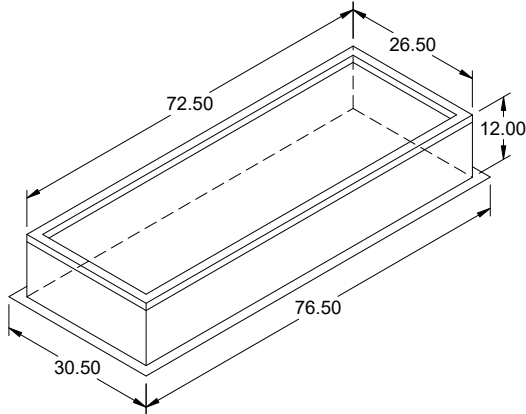
### Unit Warranty

Greenheck warrants the equipment to be free from defects in material and workmanship for a period of 18 months from the date of shipment. Initial startup must be completed within six months of the shipment date, and a startup report must be submitted to Greenheck.

### Warranty Notes

Any component which proves defective during the warranty period will be repaired or replaced at Greenheck's sole option when returned to our factory, transportation prepaid. All warranties do not include labor costs associated with troubleshooting, removal, or installation. Greenheck will not be liable for any consequential, punitive, or incidental damages resulting from use, repair, or operation of any Greenheck product. These warranties are exclusive and are in lieu of all other warranties, whether written, oral, or implied, including the warranty of merchantability and the warranty of fitness for a particular purpose. No person (including any agent or salesperson) has authority to expand Seller's obligation beyond the terms of this warranty, or to state that the performance of the product is other than that published by Seller.

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



## Model: GPI

### Roof Curb

#### Standard Construction Features:

- Roof Curb fits between the building roof and the fan mounted directly to the roof support structure - Constructed of either 18 ga galvanized steel or 0.064 in. aluminum - Straight Sided without a cant - 2 in. mounting flange - 3 lb density insulation - Height - Available from 12 in. to 42 in. as specified in 0.5 in. increments. Notes: - The maximum roof opening dimension should not be greater than the "Actual" top outside dimension minus 2 in.. - The minimum roof opening dimension should be at least 2.5 in. more than the damper dimension or recommended duct size. - The Roof Opening Dimension may or may not be the same as the Structural Opening Dimension. - Damper Tray is optional and must be specified. Tray size is same as damper size. - Security bars are optional and must be specified. Frames and gridwork are all 12 ga steel. Gridwork is welded to the frame and the frame is welded to the curb.

#### General

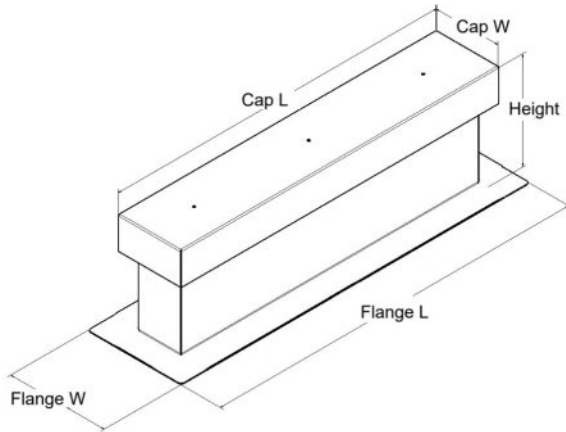
Tag	Qty	Model	Sizing Method	Undersizing (in.)	Weight (lb)	Shipped Assembled	Union Label
	1	GPI-28 x 74	Nominal	1.5	57	Yes	No Preference

#### Dimensions

Curb Height (in.)	Nominal Outside Width (in.)	Nominal Outside Length (in.)	Actual Outside Width (in.)	Actual Outside Length (in.)	Flange Width (in.)	Flange Length (in.)
12	28	74	26.5	72.5	30.5	76.5

#### Accessories

Material	Security Bars	Liner	Insulation (in.)	Insulation R Value
Galvanized	No	No	1	R4.3



## Model: GESI

Flat or Pitched Roof Equipment Support

### Standard Construction Features:

- Welded construction (see Material Note) - Wood nailer - Flashing cap. NOTES: - MAXIMUM design load of 400 lb per isolator. MATERIAL NOTE: - If Length <= 44 OR Height <= 12: Galvanized is 18 ga and Aluminum is 0.064 in. - If Length > 44 OR Height > 12: Galvanized is 16 ga and Aluminum is 0.080 in.

### Dimensions

ID#	Tag	Qty	Length (in.)	Flange Width (in.)	Flange Length (in.)	Base Width (in.)	Base Length (in.)	Cap Width (in.)	Cap Length (in.)
Unit		2	27	7.5	4	4	0	5	1.5

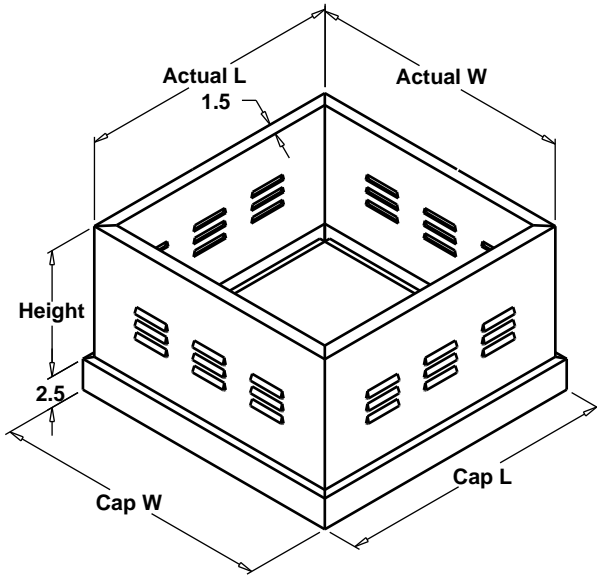
### Accessories

ID#	Material	Width (in.)	Height (in.)	Sizing
Unit	Galvanized	4	20	Nominal

# VCE Vented Curb Extension

## STANDARD CONSTRUCTION FEATURES

- Welded Aluminum (0.064 in.) or galvanized (18 ga) construction
  - Louvered vents to vent heat
  - Designed to provide required 40 in. minimum discharge height above roof line when used with an 8 in. high roof curb and Greenheck model CUBE fan per NFPA 96.
- NOTE: Damper Trays are not available.



NOTES: All dimensions shown are in units of inches

Mark	Qty.	Cap W x L	Actual W x L	Height
KEF-1	1	22 x 22	21 x 21	15.25
KEF-2	1	19 x 19	18 x 18	15.25