



BENNETT ENGINEERING

MECHANICAL • ELECTRICAL
(207) 865-9475

- | | |
|---|--|
| <input checked="" type="checkbox"/> NO EXCEPTIONS TAKEN | <input type="checkbox"/> SUBMIT SPECIFIED ITEM |
| <input type="checkbox"/> MAKE CORRECTIONS NOTED | <input type="checkbox"/> REJECTED-SEE REMARKS |
| <input type="checkbox"/> AMEND & RE-SUBMIT | <input type="checkbox"/> SEE COMMENTS BELOW |

CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE, FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATION OF THE WORK WITH THAT OF OTHER TRADES AND THE SATISFACTORY PERFORMANCE OF THE WORK.

Justin M. Valliere, P.E.
SIGNATURE

12/21/16
REVIEW DATE

Project: Carleton Street Housing

Submittal: 230000-9 Corridor Ventilation Unit

Comments: NONE

BENCHMARK

34 Thomas Drive
Westbrook, ME 04092
Ph: (207)591-7600
Fax: (207)591-7604

Transmittal

To: Archetype Architects
48 Union Wharf # 2
Portland, ME 04101
Ph: (207)772-6022 Fax: (207)772-6022

Transmittal #: 41

Date: 12/19/2016

Job: 10-16-1833 Carleton Street
Apartments

Subject: Submittal 230000-9 Corridor
Ventilation Unit

WE ARE SENDING YOU Attached Under separate cover via
 Shop drawings Prints Plans Samples
 Copy of letter Change order Specifications Submittal

Copies	Date	No.	Description
1		230000-9 Rev 0	Corridor Ventilation Unit

THESE ARE TRANSMITTED as checked below:

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> For approval | <input type="checkbox"/> Approved as submitted | <input type="checkbox"/> Resubmit ___ copies for approval |
| <input type="checkbox"/> For your use | <input type="checkbox"/> Approved as noted | <input type="checkbox"/> Submit ___ copies for distribution |
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| <input type="checkbox"/> For review and comment | <input type="checkbox"/> Other | <input type="checkbox"/> PLEASE SIGN AND RETURN TO OUR OFFICE |
| <input type="checkbox"/> FOR BIDS DUE | | |

Remarks:

Copy To:

From: Andrew Mosley (BENCHMARK)

BENCHMARK

34 Thomas Drive
Westbrook, ME 04092
Ph: (207)591-7600
Fax: (207)591-7604

Submittal Cover Sheet

Job: 10-16-1833
Carleton Street Apartments
17 Carleton Street
Portland, ME 04101

Spec Section No: 230000
Submittal No: 9
Revision No: 0
Sent Date: 12/19/2016

Submittal Title: Corridor Ventilation Unit

Contractor:
BENCHMARK
Andrew Mosley

Contractor's Stamp

x Reviewed-No Except

Reviewed for general conformance with the design concept and contract documents. Markings or comments shall not be construed as relieving the Subcontractor from compliance with the Project plans and specifications, nor departure therefrom. The Subcontractor remains responsible for details and accuracy, for conforming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing the work in a safe manner.

BENCHMARK

Architect (Primary):
Archetype Architects

Architect's Stamp

Engineer

Engineer's Stamp

Damon Mechanical Services
Mechanical Engineers and Contractors

<u>SUBMITTAL CERTIFICATE</u>	
PROJECT:	17 Carleton St Senior Housing
LOCATION:	Portland, ME
PROJECT NUMBER:	16038
ENGINEER	Bennett Engineering
SUBCONTRACTOR/VENDOR:	Damon Mechanical Services
SUBMITTED BY:	Damon Mechanical Services
CONTACT/PHONE:	Mike Lowe / 207- 784-7461
SPECIFICATION SECTION:	230000
SUB PARAGRAPH:	2.12
TITLE	Corridor Ventilation Unit (HVAC-1)
PREPARED BY:	Mike Lowe, Project Manager
SIGNATURE:	
DATE:	October 17, 2016
SUBMITTED FOR REVIEW:	Yes
CONTAINS VARIATIONS?:	No

SUBMITTAL

Job Title: **CARLETON ST SENIOR HOUSING**

Contractor: DAMON MECHANICAL

Elevation: (ft) 62

Date: 10/11/16

Submitted By: William Czaja

BUCKLEY ASSOCIATES INC

510 MAIN ST

GORHAM , ME 04038

US

Phone: (207)773-0078

Fax: (207)773-0074

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P.O. Box 410 Schofield, WI 54476 (715) 359-6171 FAX (715) 355-2399

www.greenheck.com

RV-35

CONSTRUCTION FEATURES AND ACCESSORIES

Unit Overview

Model	Supply (CFM)	Outside Air (CFM)	Recirc (CFM)	Exhaust (CFM)	Heating	Cooling	Electrical V/C/P
RV-35-7.5	1,800	1,800	0	0	Indirect Gas	Packaged DX	208/60/3

Features

- Exterior housing constructed of galvanized steel
- Direct-drive backward inclined plenum blowers with factory mounted VFDs
- Ball bearing motors
- Corrosion resistant fasteners
- Internally lined with galvanized steel metal creating a double wall
- Insulated with 2 in. 1.5# R8 density insulation
- Internally mounted control center with motor starters, 24 VAC control transformer(s), control circuit fusing

Options and Accessories

- UL\cUL1995
- Weatherhood: Downturned Hood
- Supply Filters - 2" Pleated MERV 8, 4-20x20x2
- Roof Curbs - GKD-47.19/90.24-G14"
- Outdoor Air Dampers - Motorized Low Leakage
- Damper End Switch - Outdoor Air Damper
- Painted Exterior - Permatecor Concrete Gray (RAL 7023)
- Microprocessor Controls
- Supply Fan Controls - Constant Volume (on/off)
- Room Sensing - Temperature
- Phase and Brown Out Protection
- Unit Disconnect - Mounted By Factory
- Spare Filter Final, Quantity Set of 2
- Low Sound Condenser Fan Package
- Furnace Controls: 4:1 Modulating



Note: Unit is provided with factory mounted and wired disconnect switch.

PERFORMANCE AND SPECIFICATIONS

Description/Arrangement

Model	Qty	Unit Weight (lb)	Outdoor Air Discharge	Outdoor Air Intake	Exhaust Air Discharge	Return Air Intake
RV-35-7.5	1	1,930	Bottom	End	N/A	N/A

Design Conditions

Elevation (ft)	Summer DB (F)	Summer WB (F)	Winter DB (F)
62	88	74	-10

Air Performance

Type	Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor Qty/Size (hp)	Size (in.)/Type
Supply	1,800	0.5	0.845	1582	0.38	Qty 1 (1)	14/Plenum

Electrical/Motor Specifications

V/C/P	Unit MCA (amps)	Unit MOP (amps)	Enclosure	Supply Motor RPM	Supply Efficiency	Exhaust Motor RPM	Exhaust Efficiency
208/60/3	39.8	60	ODP	1750	PE	N/A	N/A

Heating/Cooling Specifications

Heating Type	Gas Type	Input (MBH)	Output (MBH)	LAT (F)	Temp. Rise (F)	Furnace Size	Furnace Control
Indirect Gas	Natural	200.0	160.0	72.3	82.3	200	4:1 Modulating

Cooling Type	Total Capacity (MBH)	Sensible Capacity (MBH)	Compressor Quantity	Lead Compressor Type	Condensing Unit By
Packaged DX	93.3	52.0	1	Digital Scroll	Greenheck

Sound Performance in Accordance with AMCA

Fan	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Supply	30	42	54	61	56	58	56	51	64	52	6.0

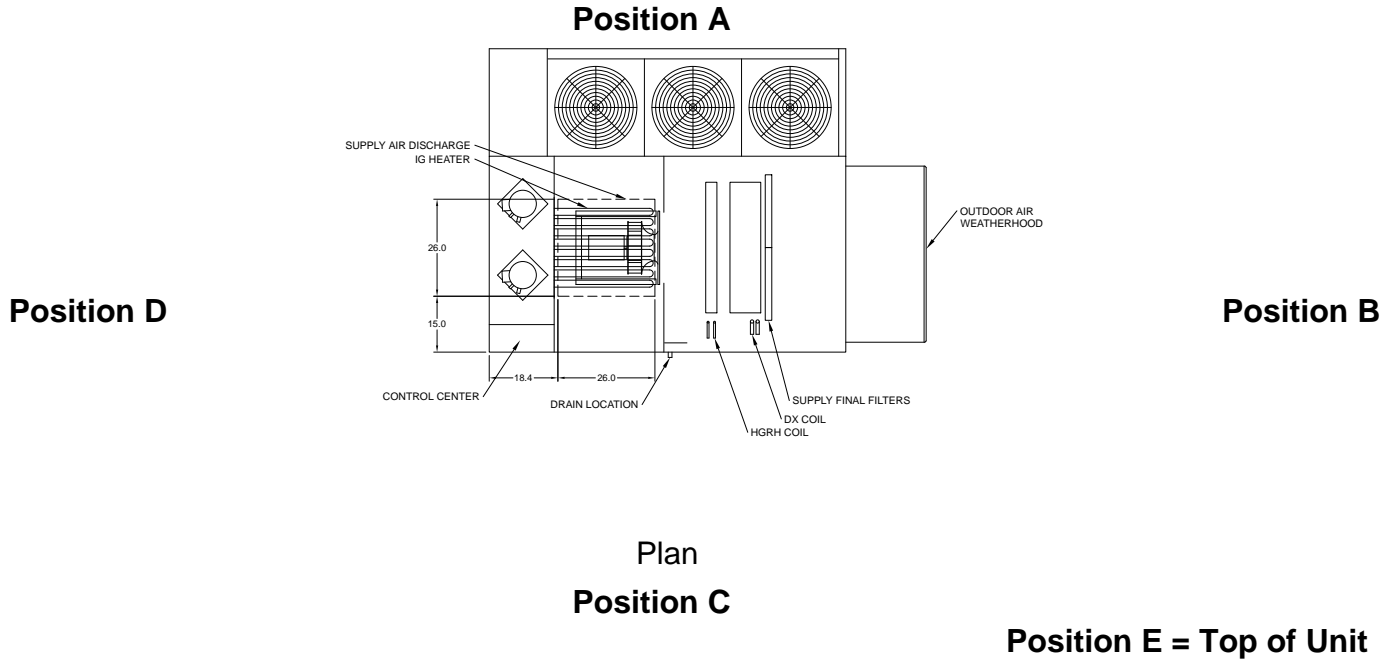
Unit Pressure Drop (in. wg)

Air Stream	Weatherhood	Damper Section	Filter Section	Cooling Section	Heating Section
Supply	0.028	0.027	0.024	0.138	0.039
Exhaust	0	0	0	N/A	N/A

Note: The unit base line performance incorporates the pressure drop of the energy wheel.

Note: Filter pressure drop is based off of clean filters.

RADIATED SOUND



RV-35: Supply Air Flow Nominal, Largest Tonnage Condensing Section Available, PDX units only

Free Field Plane	Octave Band (Sound Power Lw)								Lw	LwA
	1	2	3	4	5	6	7	8		
A	81	82	83	82	79	74	68	60	89	84
B	75	73	75	73	71	64	59	52	81	75
C	71	73	71	71	67	64	59	53	78	73
D	72	73	74	75	70	66	63	54	80	76
E	97	88	82	80	78	75	70	61	98	84

AMCA 320-07 - Laboratory Methods of Sound Testing of Fans Using Sound Intensity
 Tests conducted in accordance with this standard.
 Free field measurement plane created 1 foot from unit on all sides and top.
 Sound Intensity measured in Watts/m².
 Sound data converted to Sound Power (Lw) for the chart above.
 A-Weighted Sound Power was determined using AMCA Standard 301-90 Clause 9.1.

COOLING PERFORMANCE

Packaged DX Cooling

Nominal Tonnage	Total Capacity (MBH)	Sensible Capacity (MBH)	Refrigerant Type	Lead Compressor Type	Compressor Quantity	Condensing Unit
7.5	93.3	52.0	R-410A	Digital Scroll	1	By Greenheck

Hot Gas Reheat

Type	Capacity (MBH)	LAT (F)
Modulating	37.1	80.4

Condensing Unit Details

The RV will come equipped with the following components:

- Hermetic scroll type compressors
- Compressors mounted in a compartment to be serviceable without affecting airflow and on neoprene vibration isolation to minimize vibration transmission and noise
- Crankcase heater on compressor
- Thermal expansion valve for refrigerant flow control
- Variable capacity scroll compressor
- Liquid-Line filter drier
- High pressure manual reset cutout
- Low-pressure auto-reset cutout
- Time delay relays for compressor protection
- Service/charging valves
- Moisture-indicating sight glass
- Direct drive condensing fans with external rotors and molded fan blades
- Condensing coils with 5/16" copper tubes mechanically bonded to aluminum fins

Packaged DX Coil Details

Face Area (ft ²):	6.8
Rows Deep (Evap Coil):	3
Fins Per Inch:	10
Face Velocity (ft/min):	264
Entering Dry Bulb (F):	88.0
Entering Wet Bulb (F):	73.9
Leaving Dry Bulb (F):	61.4
Leaving Wet Bulb (F):	59.3
Cool Coil SP (in. wg):	0.138
Refrigerant Velocity (ft/min):	16
Suction Temp. (F):	43.4
Refrigerant:	R-410A
Evaporator Cap. (MBH):	93.3

Compressor and Condenser Details

Compressor 1 RLA (amps):	24
Compressor 1 LRA (amps):	187
Compressor 2 RLA (amps):	0
Compressor 2 LRA (amps):	0
Condenser Fan QTY:	2
Condenser Motor 1 HP:	0.94
Condenser Motor 2 HP:	0.94
Condenser Motor 1 FLA:	2.0
Condenser Motor 2 FLA:	2.0

Note: Digital Scroll is on lead circuit only.

HEATING PERFORMANCE

Indirect Gas Heating

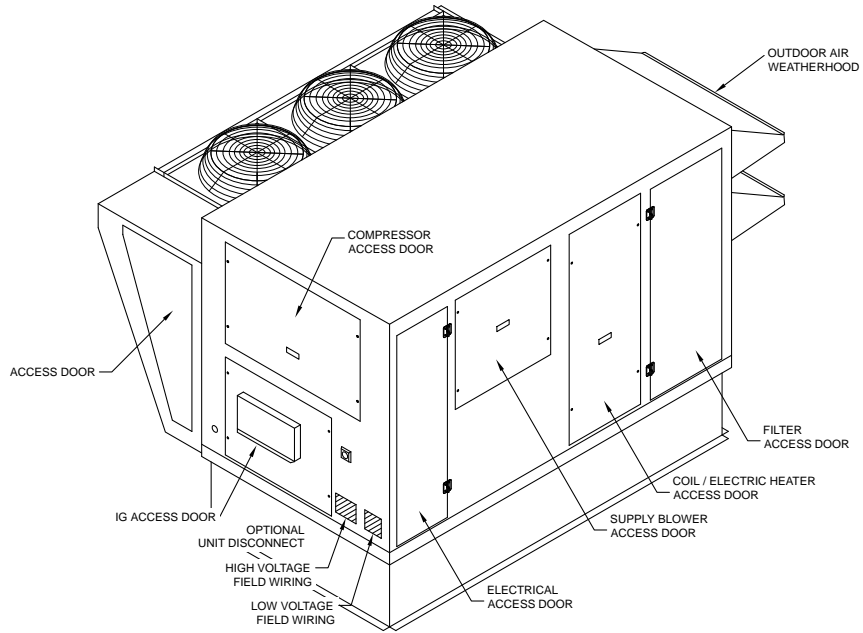
Heating Type	Gas Type	Input (MBH)	Output (MBH)	LAT (F)	Temp. Rise (F)	Furnace Control
Indirect Gas	Natural	200.0	160.0	72.3	82.3	4:1 Modulating

Indirect Gas Unit Details

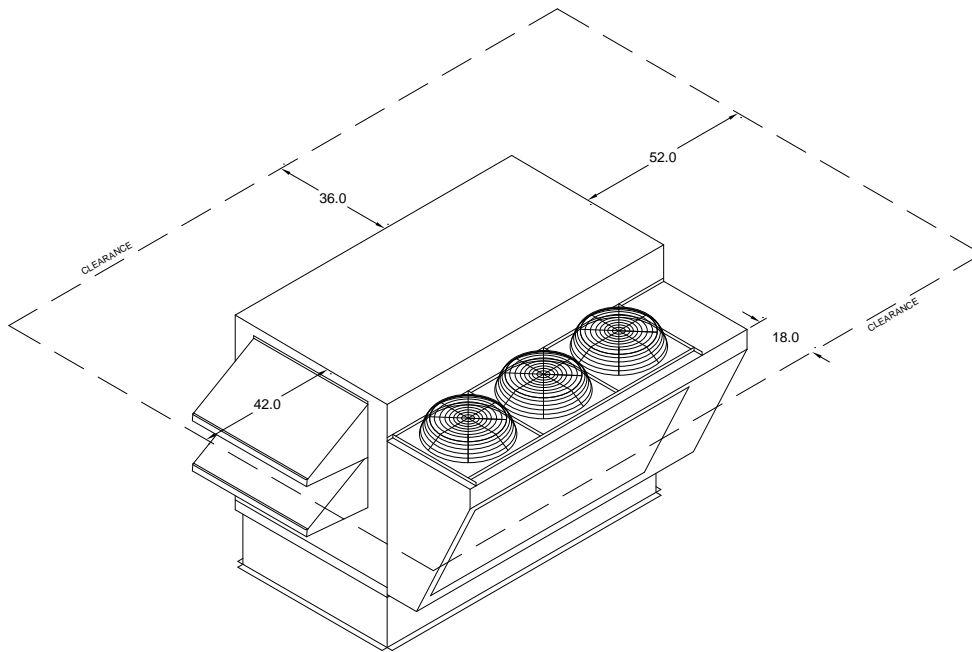
The RV will come equipped with the following:

- Power venting
- ETL listed to ANSI standard Z83.8 and CSA 2.6
- High Thermal efficiency
- Direct spark ignition
- Tubular heat exchanger
- 409 Stainless Steel heat exchange tubes
- 3/4" Gas Connection
- At least 6 in. wg of natural gas pressure (14 in. wg for LP) is required at the units gas connection in order to achieve maximum performance

ISOMETRIC DRAWINGS

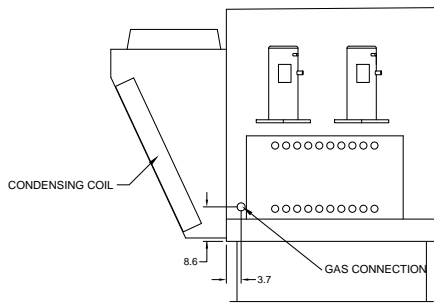
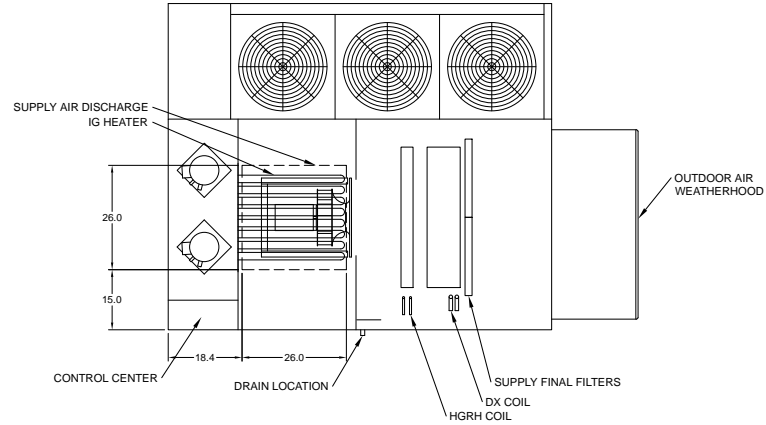


Back Right Isometric

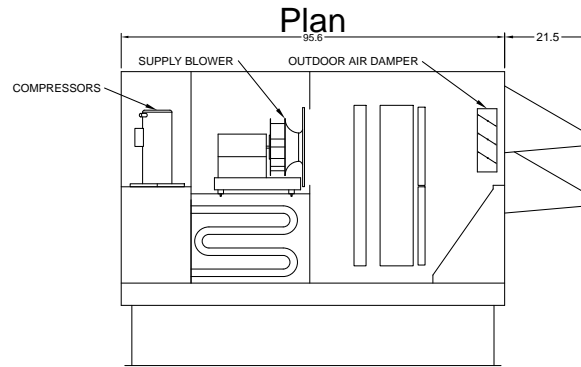


Front Left Isometric

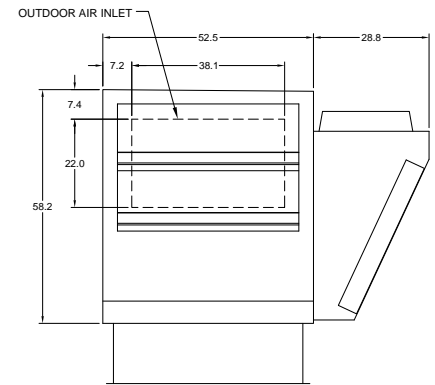
OVERVIEW DRAWINGS



Left End



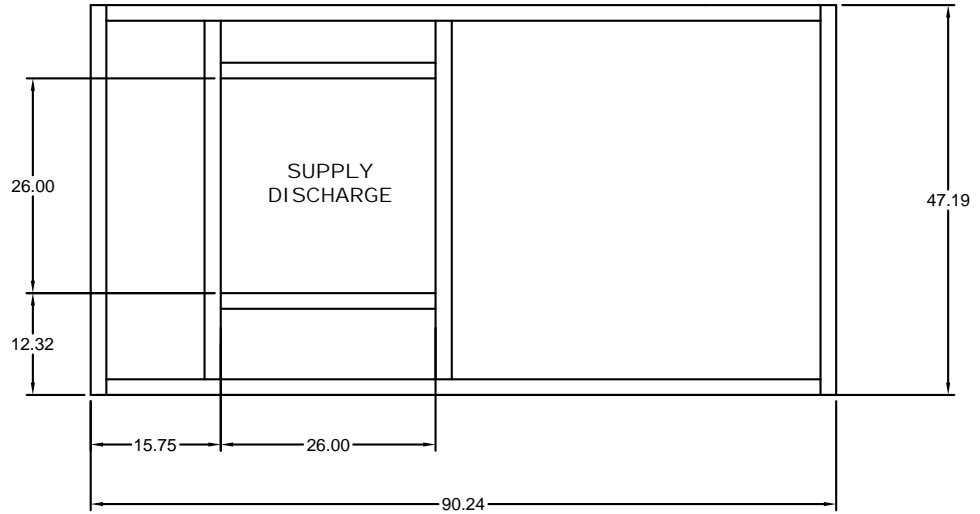
Elevation



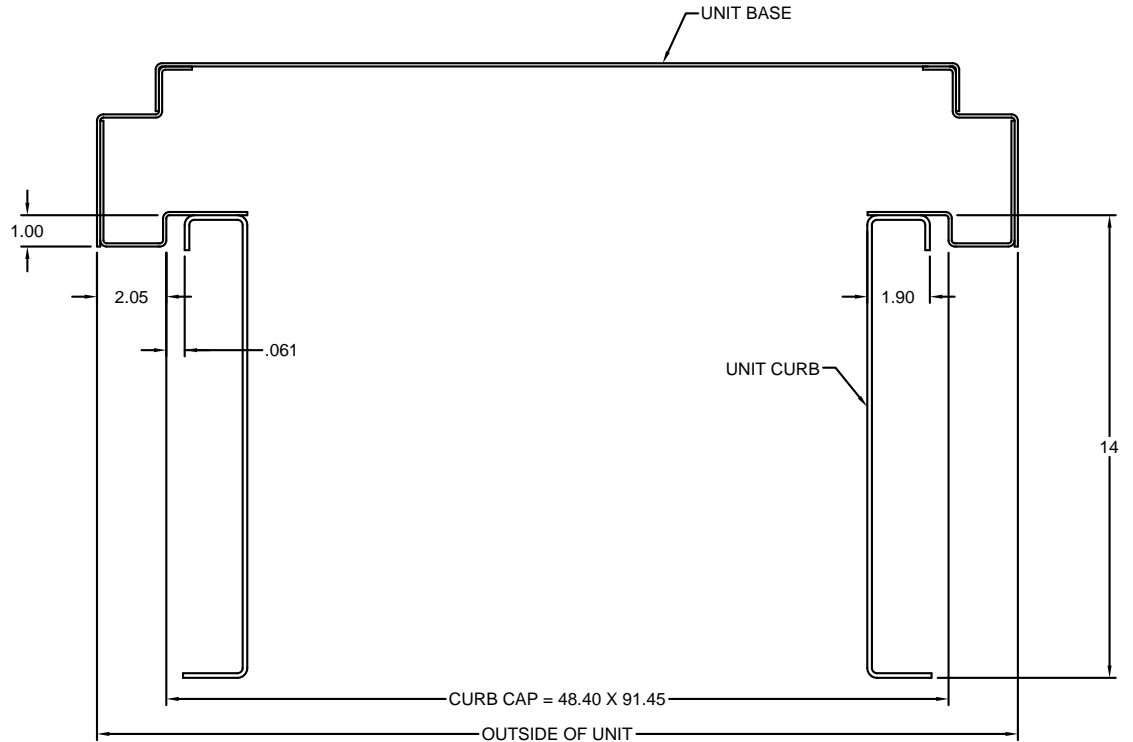
Right End

FOOTPRINT DRAWINGS

**Top View
of Curb**



**Cross-Section
View of Unit
on Curb**



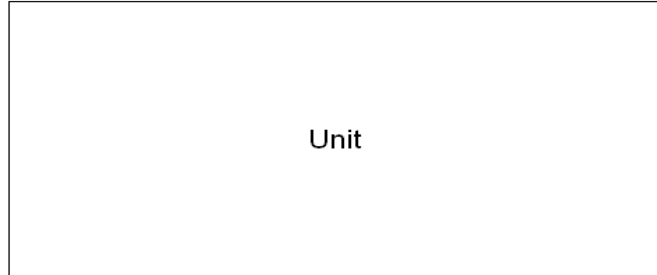
NOTES: All dimensions shown are in units of in.'s
If unit is selected with side or end discharge/return, there will not be bottom connections supplied with the curb.

Curb Weight: 162 lb

Corner Weights

618 lb

608 lb

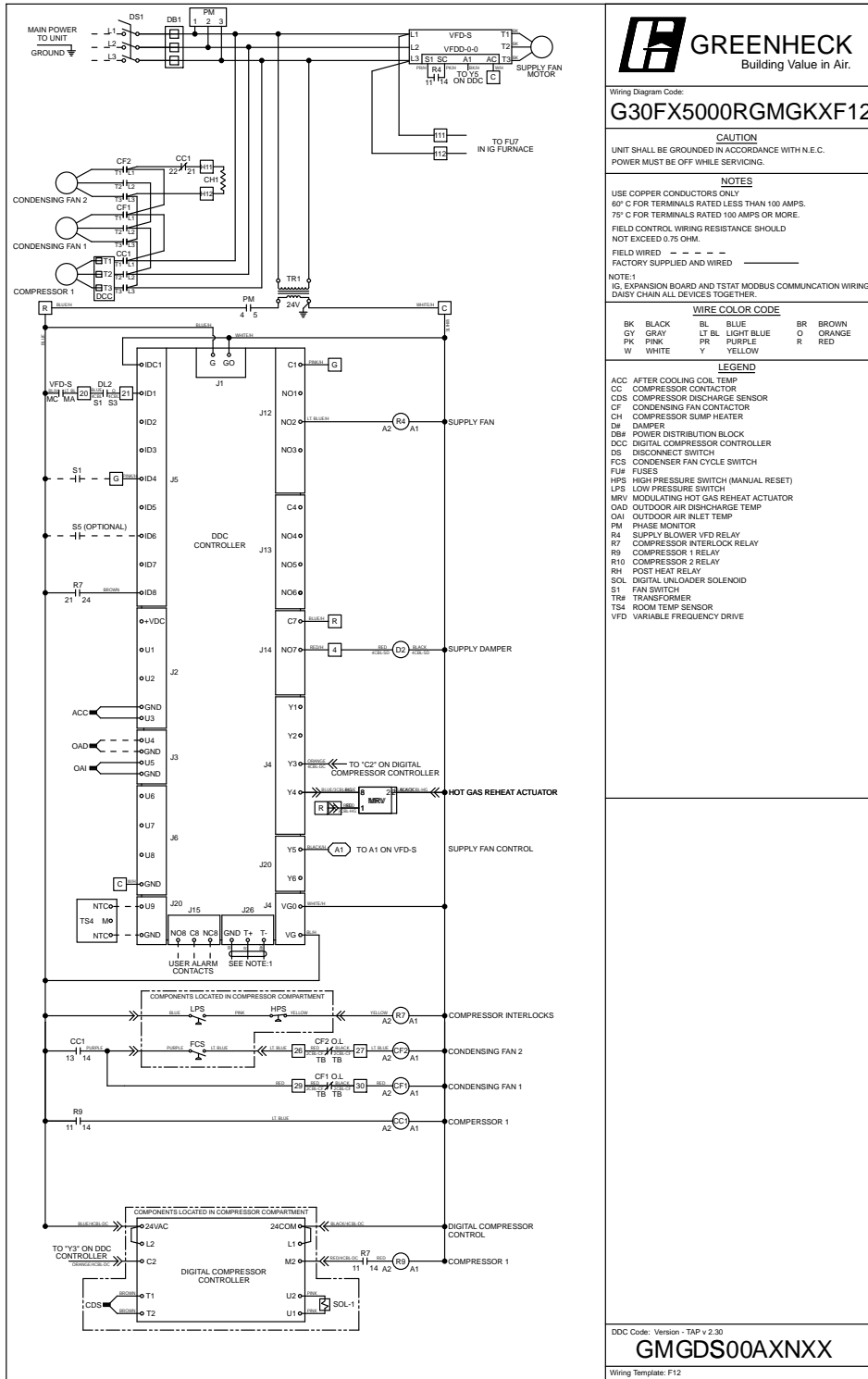


355 lb

349 lb

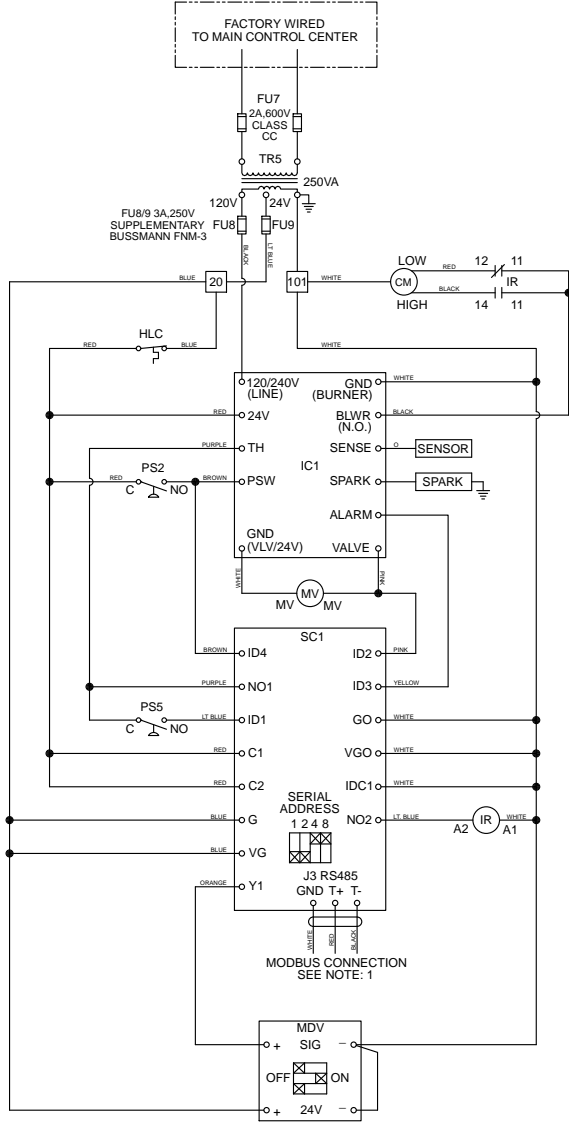
Note: Estimated corner weights are shown looking down on unit and the outside air intake will be on the right. Weights are applied at the base of the unit. Images not drawn to scale.

WIRING DIAGRAM



20 101

INDIRECT GAS WIRING DIAGRAM
FURNACE 1 - 4:1 MODULATING



Wiring Diagram Code:
G4K51P1RX0000S06

CAUTION
UNIT SHALL BE GROUNDED IN ACCORDANCE WITH N.E.C.
POWER MUST BE OFF WHILE SERVICING.

NOTES
USE COPPER CONDUCTORS ONLY
60° C FOR TERMINALS RATED LESS THAN 100 AMPS.
75° C FOR TERMINALS RATED 100 AMPS OR MORE.
FIELD CONTROL WIRING RESISTANCE SHOULD
NOT EXCEED 0.75 OHM.
FIELD WIRED - - - - -
FACTORY SUPPLIED AND WIRED _____

NOTE: 1
MODBUS COMMUNICATION WIRING. DAISY CHAIN TO
ALL MODBUS DEVICES.

WIRE COLOR CODE

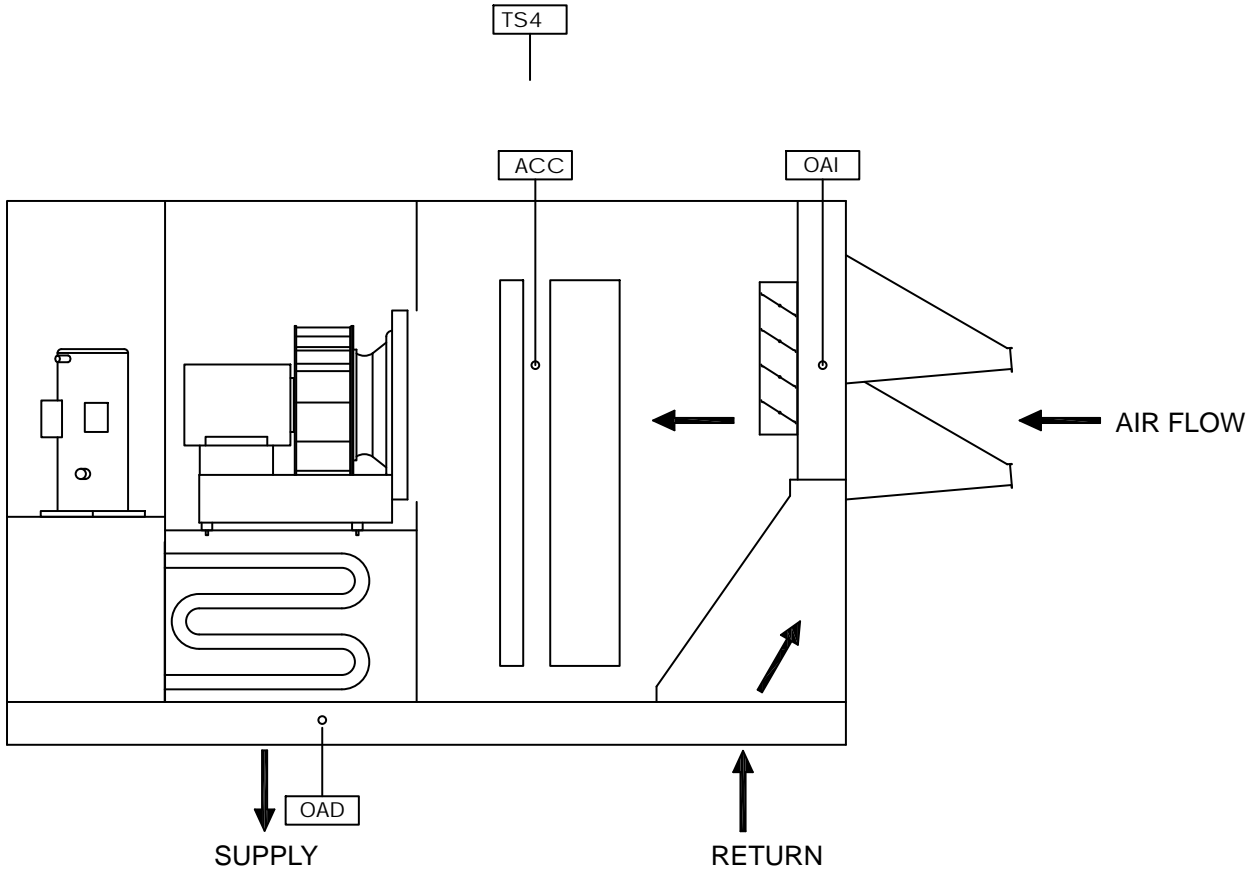
BK	BLACK	BL	BLUE	BR	BROWN
GY	GRAY	LT BL	LIGHT BLUE	O	ORANGE
PK	PINK	PR	PURPLE	R	RED
W	WHITE	Y	YELLOW		

LEGEND

CM	COMBUSTION BLOWER MOTOR
FU#	FUSE(S)
HLC	HIGH TEMPERATURE LIMIT CONTROL
IC1	IGNITION CONTROL
IR	INDUCTION RELAY
MDV	MODULATING VALVE
MV	MAIN GAS VALVE
PS2	COMBUSTION AIR PROVING SWITCH
PS5	HIGH SPEED PRESSURE SWITCH
R5	MAIN GAS VALVE MONITORING
R6	LOW SPEED PRESSURE SWITCH
R7	IGNITION CONTROLLER ALARM MONITORING
SC1	STAGE CONTROLLER
TR#	TRANSFORMER(S)

Wiring Template: S06

MONITORING POINTS



Item	Description	Type
OAI	Outdoor Air Intake Temperature Sensor	10K Ohm NTC (Carel)
OAD	Outdoor Air Discharge Temperature Sensor	10K Ohm NTC (Carel)
ACC	After Cooling Coil Temperature Sensor	10K Ohm NTC (Carel)
TS4	*Room Temp Sensor	10K Ohm NTC (Carel)

*Shipped loose sensor.

Microprocessor Controller Sequence of Operation

MICROPROCESSOR CONTROLLER: Controller shall be provided with required sensors and programming for rooftop unit. Controller shall be factory programmed, mounted and tested. Controller shall have a LCD readout for changing set points and monitoring unit operation.

UNIT START COMMAND:

- Factory mounted and wired outdoor air and recirculated air damper actuators are powered.
- Optional return air damper actuator is powered.
- Exhaust fan starts after a 10 second (adjustable) delay.
- Supply fan starts 5 seconds (adjustable) after exhaust fan.
- Tempering options and energy wheel option to function as described below.

UNIT STOP COMMAND (OR DE-ENERGIZED):

- Supply fan, exhaust fan, energy wheel and tempering options de-energized.
- Outdoor air damper actuator is spring return close, and the recirculated air damper actuator is spring open.
- Optional return air damper is spring return close.

OCCUPIED/UNOCCUPIED MODES: Shall be based on a 7-day time clock internal to the controller. The schedule shall be set by the end user. When a user initiates an override input, the DDC would switch from unoccupied to occupied mode. The DDC will return to the scheduled occupied/unoccupied mode after the override time has expired (60 min, adjustable). If internal time clock is disabled, a remote contact or a BMS can control the occupied/unoccupied mode.

Occupied Mode:

1. Supply fan ON.
2. Exhaust fan ON.
3. Energy wheel control per below.
4. Heating per below.
5. Cooling per below.
6. Damper control per below.

Unoccupied Mode (Unit Off): Default setting when there is no recirculation damper or room temperature sensor.

1. Supply fan OFF
2. Exhaust fan OFF
3. Tempering OFF
4. Outdoor air damper closed
5. Return damper closed
6. Recirculation damper open

SUPPLY BLOWER SEQUENCE: The supply blower is provided with a factory mounted variable frequency drive. The supply blower speed can be controlled with the following sequences.

Constant Volume (on/off): The supply blower is provided with a factory mounted VFD, and is intended to operate at a constant speed (adjustable set point in controller) during operation. This speed needs to be set during test and balance of the unit.

COOLING SEQUENCE: The cooling is controlled to maintain the supply temperature set point. The mechanical cooling will be locked out when the outside air is < 55°F - 2°F hysteresis, adjustable.

Packaged DX Cooling (Digital Scroll): DDC will provide a modulating signal for cooling. From 10-50%, the digital scroll will be controlled to maintain the discharge temperature. From 50-100%, the second stage will be on in combination with the digital scroll compressor to maintain the discharge temperature.

DEHUMIDIFICATION SEQUENCE: The cooling is controlled to maintain the cooling-coil set point. The dehumidification sequence will be locked out when the OA is <10°F above the cold-coil set point. The mechanical cooling will be locked out when the outside air is < 55°F - 2°F hysteresis, adjustable.

Packaged DX Cooling (Digital Scroll): DDC will provide a modulating signal for dehumidification. From 10-50%, the digital scroll will be controlled to maintain the after-coil temperature. From 50-100%, the second stage will be on in combination with the digital scroll compressor to maintain the after-coil temperature.

REHEAT SEQUENCE: While the unit is in dehumidification mode, the outdoor air can be reheated via Primary Heating Source, On/Off Hot Gas Reheat or Modulating Hot Gas Reheat for Space Neutral Applications.

Primary Heating Source: The main heating source is enabled to reheat the air to meet the supply temperature set point (adj.).

Modulating Hot Gas Reheat: The controller will modulate the hot gas reheat valve with a 0-10 V signal to maintain the supply temperature set point (adj.).

HEATING SEQUENCE: The heating is controlled to maintain the supply temperature set point. The heating will be locked out when the outside air is > 70°F + 2°F hysteresis, adjustable.

Indirect Gas Furnace: DDC will operate the indirect gas furnace to maintain the supply temperature set point (adj.).

SUPPLY SET POINT RESET FUNCTION. Either a room temperature sensor or the outdoor air reset function (if no room temperature sensor wired to controller) will determine the supply temperature of the unit.

BUILDING FREEZE PROTECTION: If the supply air temperature drops below 35°F (adjustable), the DDC will de-energize the unit and activate the alarm output after a preset time delay.

ALARMS INDICATION: DDC shall have one digital output for remote indication of an alarm condition. Possible alarms include:

Supply and Exhaust Air Alarm: DDC monitors proving switch on each blower and displays an alarm in case of blower failure.

DX Alarm: DDC monitors the refrigerant pressure and shuts off refrigeration circuit in the case of high or low refrigerant pressure.

Temperature Sensor Alarm: DDC will send an alarm in the case of a failed air temperature sensor.

Pressure Sensor Alarm: DDC will send an alarm in the case of a failed pressure sensor.

Optional Accessories: The following accessories can be ordered with the unit to expand the functionality or usability of the controller.

Room Temperature Sensor: The room temperature sensor is a field mounted sensor that can provide a real-time temperature of the space being served. The user will input a desired room temperature setting, and the controller will adjust the discharge temperature of the unit to compensate for changes in room temperature.

Phase and Brown Out Protection: Factory mounted and wired component which monitors the main power coming into the unit. If a phase drops out or exceeds the limitations, or if the incoming voltage exceeds the acceptable range, the component will turn off the unit to help protect the electrical systems.

Unit Warranty

Limited Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of 1 year(s) from the purchase date. 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.

The warranty does 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.

This warranty is exclusive, and is 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.

Heat Exchanger Extended Warranty

Limited Warranty

Greenheck warrants the stainless steel heat exchanger to be free from defects in material and workmanship for a period of 5 years from the purchase date. Any stainless steel heat exchanger which proves defective during the warranty period will be repaired, or replaced, at Greenheck's sole option when returned to our factory, transportation prepaid.

The warranty does 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.

This warranty is exclusive, and is 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.

Compressor Extended Warranty

Limited Warranty

Greenheck warrants the refrigerant compressor/compressors to be free from defects in material and workmanship for a period of 5 years from the purchase date. Any compressor which proves defective during the warranty period will be repaired, or replaced, at Greenheck's sole option when returned to our factory, transportation prepaid.

The warranty does 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.

This warranty is exclusive, and is 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.