



Wold Architects and Engineers
220 North Smith Street, Suite 310
Palatine, IL 60067
woldae.com | 847 241 6100

Project Manual

**McHenry West High School
Culinary Lab Renovations
Early Equipment Package**

McHenry Community High School District No. 156

4716 West Crystal Lake Road
McHenry, IL 60050
January 25, 2023



Book 1 of 1

Set No: _____
Comm No: 223112a

**SECTION 00 01 01
PROJECT TITLE PAGE**

PROJECT MANUAL

PROJECT IDENTIFICATION

QUOTE FORM AND

GENERAL REQUIREMENTS

FOR

McHenry West High School – Culinary Lab Renovations – Early Equipment Package
4724 West Crystal Lake Road
McHenry, Illinois 60050

McHenry Community High School District No. 156
4716 West Crystal Lake Road
McHenry, Illinois 60050

QUOTE TIME: 12:00 p.m. CST

QUOTE DATE: Friday, February 10, 2023

BID PLACE:

Via Email

FlackHugh@dist156.org

ISSUE DATE: January 25, 2023

END OF SECTION 00 01 01

**SECTION 00 01 03
PROJECT DIRECTORY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Identification of project team members and their contact information.

1.02 OWNER:

- A. Name: McHenry Community High School District No. 156
 - 1. Address: 4716 West Crystal Lake Road, McHenry, Illinois 60050

1.03 CONSULTANTS:

- A. Mechanical Engineer:
 - 1. Company Name: Wold Architects and Engineers.
 - a. Address: 220 North Smith Street, Suite 310, Palatine, Illinois 60067
 - b. Telephone: (847) 241-6100

1.04 CONSTRUCTION MANAGER:

- A. Company Name: Lamp, Inc.
 - 1. Address: 460 North Grove Avenue
 - 2. Telephone: (847) 741-7220

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 00 01 03

**SECTION 00 01 05
CERTIFICATIONS PAGE**

**McHenry West High School – Culinary Lab Renovations – Early Equipment Package
McHenry Community High School District No. 156**

Mechanical Engineer: Wold Architects and Engineers

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Illinois.

Signature:  _____

Typed Name: Matthew T. Verdun

Registration: 062.059546

Date Signed: January 25, 2023

END OF SECTION 00 01 05

SECTION 00 01 10

TABLE OF CONTENTS

| <u>Section No.</u> | <u>Title</u> |
|--------------------------------|--|
| <u>Division 00</u> | <u>Procurement and Contracting Requirements</u> |
| 00 01 01 | Project Title Page |
| 00 01 03 | Project Directory |
| 00 01 05 | Certifications Page |
| 00 01 10 | Table of Contents |
| | <u>Bidding Requirements</u> |
| 00 11 13 | Advertisement for Quotes |
| 00 41 13 | Quote Form |
| 00 41 16 | Basis-of-Design Requirements |
| <u>Division 01 – 49</u> | Not Used |

END OF SECTION 00 01 10

**SECTION 00 11 13
ADVERTISEMENT FOR QUOTES**

**MCHENRY WEST HIGH SCHOOL – CULINARY LAB RENOVATIONS – EARLY EQUIP. PACKAGE
4724 WEST CRYSTAL LAKE ROAD
MCHENRY, ILLINOIS 60050**

McHenry Community High School District No. 156 will receive single prime sealed quotes for McHenry West High School Culinary Lab Renovations – Early Equipment Package until 12:00 p.m. CST on Friday, February 10, 2023 via email to Hugh Flack, Director of Buildings and Grounds at FlackHugh@dist156.org. Quotes will be opened live via videoconference at 2:00 p.m. CST on Friday, February 10, 2023.

Quote documents, including the Quote Form and Specifications, will be available from the office of the Mechanical Engineer. Contact Matt Verdun, mverdun@woldae.com, for distribution of documents in PDF format.

This project includes: Purchase of roof-mounted dedicated outside air unit, including roof curb. Equipment shall be delivered to the project site, with handling and installation provided as work of another contract.

Make proposals on the quote form supplied in the Project Manual. Proposals shall be submitted via email to the Director of Buildings and Grounds in PDF format.

Proposals may not be withdrawn within thirty (30) days after the scheduled time of opening, without the consent of the Owner. The Owner reserves the right to accept any quote or to reject any or all quotes, or parts of such quotes, and waive informalities or irregularities.

The Owner requires equipment delivery to the project site on or before July 7, 2023.

**Board of Education
McHenry Community High School District No. 156**

END OF SECTION 00 11 13

SECTION 00 41 13
QUOTE FORM

THE PROJECT AND THE PARTIES

2.01 QUOTE TO:

- A Quotes Due:
 - Time: 12:00 p.m. CST
 - Date: Friday, February 10, 2023
- B Quotes shall be received via email by:
 - Hugh Flack, Director of Buildings and Grounds
 - FlackHugh@dist156.org
- C Public Opening:
 - 1. All Quotes shall be read aloud at 2:00 p.m. CST on Friday, February 10, 2023 via videoconference.
 - 2. Requests for access to the videoconference shall be emailed to Hugh Flack at the email address above no later than 5:00 p.m. CST on Tuesday February 7, 2023. A link to the meeting will be provided soon thereafter.
 - 3. The videoconference will be held using Zoom software. Attendees are responsible for any costs associated with use of the software and shall download all necessary software, applications, etc. and establish any necessary login credentials prior to the meeting.

2.02 FOR:

- A Project: McHenry West High School – Culinary Lab Renovations – Early Equipment Package
- B Project Number: 223112a
 - McHenry West High School
 - 4724 West Crystal Lake Road
 - McHenry, Illinois 60050

We have examined the Contract Documents for the proposed Culinary Lab Renovations – Early Equipment Package as prepared by Wold Architects and Engineers, Palatine, Illinois, and the conditions affecting the work.

2.03 ACCEPTANCE

- A Contractor agrees to deliver all equipment and accessories to McHenry West High School no later than July 7, 2023. Indicate the anticipated equipment lead time in the space below. Failure to provide information may result in rejection of the Quote.
- B Included with this Quote Form is the basis-of-design equipment, which indicates the equipment performance data, features/options, and controls. Shop drawings submitted with the quote shall prove conformance with these requirements as an equal by other manufacturers. Failure to meet the requirements of the basis-of-design equipment may result in rejection of the quote.
- C Each quote must include all costs for items required to complete all work, including all necessary material(s), overhead, profit, and applicable taxes and freight. Handling of the unit will be work of the Installing Contractor, coordinate delivery date/time and site access a minimum of 72-hours in advance of delivery.
- D Contractor is to submit shop drawings with this quote to ensure conformance with the design intent.
- E Return completed quote form and equipment shop drawings to Hugh Flack on or before quote date at quote time.
- F I understand this quote may not be withdrawn for a period of thirty (30) days from the date quotes are due.

2.04 RESPONSIBLE CONTRACTOR COMPLIANCE

A By signing this quote form, I am an Owner or Officer of the firm name listed on the quote form and I verify under oath that as a Prime Contractor I am in compliance with the Responsible Contractor criteria as defined in Illinois Procurement Code (30 ILCS 500, Sec. 1-15).

2.05 BASE QUOTE

A The Quoter agrees to provide equipment, including delivery to the project site, for the Base Quote Sum of:

_____ Dollars \$ _____

B To the best of the Quoter's knowledge, the anticipated lead time for equipment, from the date of approved shop drawing to delivery to the project site, is approximately:

_____ Weeks from Approved Shop Drawing

2.06 QUOTE FORM SIGNATURE(S)

(Quoter- print the full name of your firm)
was hereunto affixed in the presence of:

(Authorized signing officer, Title)

(Signature)

END OF SECTION 00 41 13

SECTION 00 41 16
BASIS-OF-DESIGN REQUIREMENTS

Refer to attached Greenheck product submittal for equipment basis-of-design requirements. All performance, capacity, features, options, controls, etc. shall be provided by the manufacturer. Failure to meet these requirements may result in rejection of quote.

END OF SECTION 00 41 16

RV-10-7I-E-J1 Unit Performance

| Design Conditions | | | | | | | |
|-------------------|--------|--------|---------------|--------------|-------------------|------------------|-------------------|
| Elevation (ft) | Summer | | Winter DB (F) | Supply (CFM) | Outdoor Air (CFM) | Recirc Air (CFM) | Exhaust Air (CFM) |
| | DB (F) | WB (F) | | | | | |
| 673 | 95.0 | 75.0 | -10.0 | 1,200 | 1,200 | - | - |

| Unit Specifications | | | | | | |
|---------------------|----------------|--------------|--------------|-------------------|------------------|----------------------|
| Qty | Weight (lb) | Cooling Type | Heating Type | Unit Installation | Unit ETL Listing | Furnace ETL Listing |
| 1 | 1,148 (+/- 5%) | Packaged DX | Indirect Gas | Outdoor | ULcUL 1995 | ANSI Z83.8 / CSA 2.6 |

| Configuration | | | | |
|---------------|-----------|--|-------------|-----------|
| Outdoor Air | | | Exhaust Air | |
| Intake | Discharge | | Intake | Discharge |
| End | Side | | End | - |

| ASHRAE 90.1-2019 Compliance | | | |
|-----------------------------|-----------------------------|-----------------------|------------|
| | ASHRAE 90.1 Min. Efficiency | Calculated Efficiency | Compliance |
| EER | 11 | 11 | ✓ |
| IEER | 12.7 | 18.1 | ✓ |

| Cooling Specifications | | | | | | | |
|------------------------|----------------------|-------------------------|----------------------|--------------|-------------|----------------|---------|
| Type | Total Capacity (MBH) | Sensible Capacity (MBH) | Lead Compressor Type | Coil (DB/WB) | | Reheat | |
| | | | | EAT (F) | LAT (F) | Capacity (MBH) | LAT (F) |
| Packaged DX | 85.9 | 52.8 | Inverter Scroll | 95.0 / 75.0 | 54.2 / 54.1 | 39.4 | 83.9 |

| Heating Specifications | | | | | | | | |
|------------------------|----------|-------------|--------------|------------------|---------|----------|-------------|---------|
| Type | Gas Type | Input (MBH) | Output (MBH) | Temperature Rise | | Turndown | Performance | |
| | | | | Min (F) | Max (F) | | EAT (F) | LAT (F) |
| Indirect Gas | Natural | 150.0 | 120.0 | 8.0 | 93.0 | 12:1 | -10.0 | 82.6 |

| Air Performance | | | | | | | |
|-----------------|--------------------|----------------------|-------------------|------|-----|--------|------------|
| Type | Total Volume (CFM) | External SP (in. wg) | Total SP (in. wg) | FRPM | Fan | | |
| | | | | | Qty | Type | Drive-Type |
| Supply | 1,200 | 0.75 | 2.191 | 1819 | 1 | Plenum | Direct |

| Motor Specifications | | | | | | |
|----------------------|-----|----------------------|-----------|-----------|------------|------|
| Motor | Qty | Operating Power (hp) | Size (hp) | Enclosure | Efficiency | RPM |
| Supply | 1 | 0.67 | 3/4 | ODP | SE | 1760 |

| Electrical Specifications | | | | |
|---------------------------|----------------|---------|---------|--------------------|
| Power Supply | Rating (V/C/P) | MCA (A) | MOP (A) | Fan Power (W/CFM)* |
| Unit | 460/60/3 | 13.8 | 20.0 | 0.417 |

*Fan Power (W/CFM) = (Supply BHP + Exhaust BHP) / Supply CFM

Construction Features And Accessories

| Unit | |
|--|-----|
| Unit Installation - Outdoor | Std |
| Unit Construction - Double Wall | Std |
| Insulation - 2 inch 2.4# R13 foam | Std |
| Corrosion Resistant Fasteners | Std |
| Hinged Access | Std |
| Factory Wired Non-Fused Disconnect Switch | X |
| Direct Drive Plenum Blower & Motor Assemblies | X |
| Factory Wired VFDs | Std |
| Unit Finish - Permatector, Concrete Gray (RAL 7023) | X |
| Stainless Steel Condensate Drain Pan and Connection | Std |
| Condensate Drain Trap | Std |
| Controls | |
| Unit Controls - Full Control | Std |
| Internally Mounted Control Center with 24 VAC control transformer(s) | Std |
| BMS Protocol - BACNetIP | X |
| BMS Monitoring Points | |
| Supply Fan Control - Single Zone VAV | X |
| Exhaust Fan Control | |
| Exhaust Fan Only Power | |
| Energy Wheel Rotation Sensor | |
| Web-Based User Interface | Std |
| Outd/Rec. Air Damper Ctrl - Constant Position-Adj. Setpoint | X |
| Economizer Control | |
| Furnace Control - 12:1 Modulating | X |
| Control Accessories | |
| Remote Display | |
| Dirty Filter Sensor(s) - Supply | X |
| Airflow Monitor | |
| Room Thermostat - Temperature | X |
| Phase/Brownout Protection | Std |
| Economizer Fault Detection Diagnostics | |

| Accessories | |
|---|-----|
| Recirc Air Damper - Low Leakage | X |
| Outdoor Air Damper - Low Leakage | X |
| Return Air Damper | |
| Roof Curb - GKD - 39.62/77.91-G24 | X |
| Supply Air Filters - 2" Merv 8 And 2" Merv 13, 2-12x24x2, 2-24x24x2 | X |
| Service Outlet - Factory mounted and wired | X |
| Piping Vestibule | |
| Service Lights | |
| Condensate Overflow Switch | |
| Spare Filters | |
| Exhaust Discharge Gravity Backdraft Damper | |
| ElectroFin Coil Coating | |
| Motor Shaft Grounding | |
| UV Lights | |
| Bipolar Ionization | |
| Smoke Detector(s), Both - Shipped Loose | X |
| Barometric Relief Damper | |
| Energy Core Bypass Damper | |
| Power Venting | Std |
| Hail Guards | X |
| Warranty Options | |
| Unit Warranty - 18 Months (Std.) | Std |
| Compressor Warranty - 18 Months (Std.) | Std |
| Furnace HX Warranty - 25 Yrs. | Std |

| | |
|-----------------|-----|
| Standard Option | Std |
| Not Included | |
| Included | X |

Notes
 Outdoor Air Damper supplied is low leakage, motorized VCD-23 (leakage rate of 3 CFM / ft² @ 1 in. wg), Class 1A

Special Design Requests

| Special Design Number |
|-----------------------|
|-----------------------|

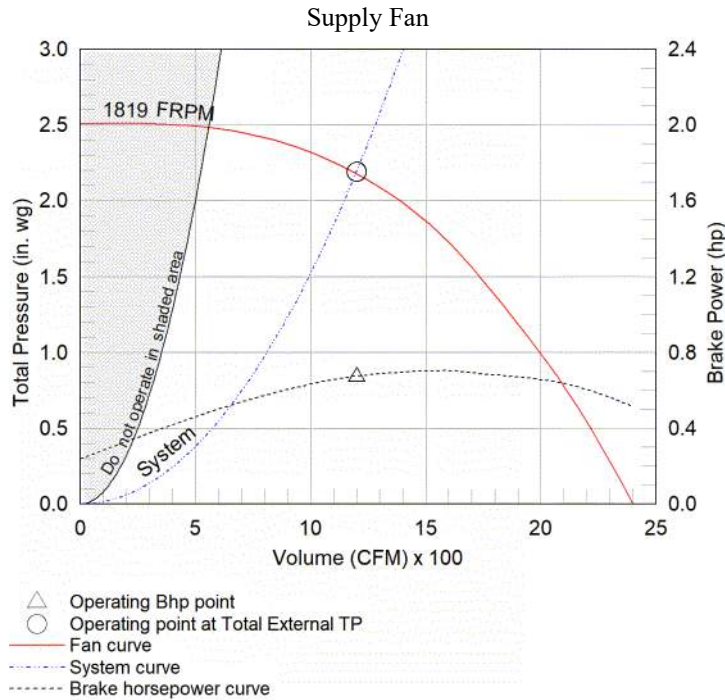
| |
|---|
| Special Design Request for "Add for OA/RA dampers controlled by bldg press sensor provided by factory.", (E2200920) |
|---|

Supply 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 |
| 1,200 | 0.75 | 2.191 | 1819 | 0.67 | 1 | 3/4 | 1 | Plenum | Direct |

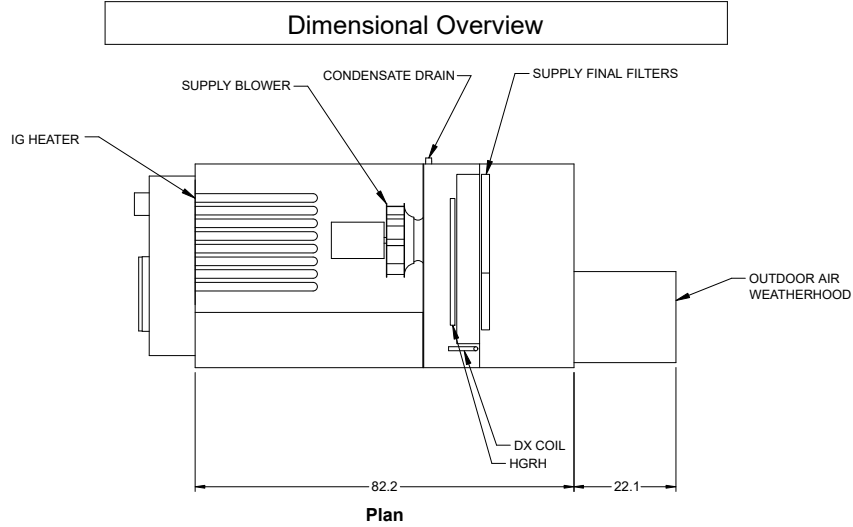
| Pressure Drop (in. wg) | | | | | | |
|------------------------|--------|--------|---------|---------|----------|-------|
| Weatherhood | Filter | Damper | Cooling | Heating | External | Total |
| 0.03 | 0.35 | - | 0.232 | 0.039 | 0.75 | 2.191 |

| Sound Performance in Accordance with AMCA | | | | | | | | | | |
|---|-----|-----|-----|------|------|------|------|-----|-----|-------|
| Sound Power by Octave Band | | | | | | | | Lwa | dBA | Sones |
| 62.5 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | |
| 80 | 76 | 83 | 81 | 69 | 66 | 65 | 65 | 80 | 69 | 16 |



Radiated Sound

Position A



Position D

Position B

Position C

"E" is the Top Plane

Supply Air Flow Nominal, Largest Tonnage Condensing Section Available, PDX units only

| Radiated Sound Levels | | | | | | | | | | |
|-----------------------|-------------------|----|----|----|----|----|----|----|----------|-----------|
| Plane | Octave Bands (Lw) | | | | | | | | Plane Lw | Plane LwA |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| A | 80 | 74 | 80 | 77 | 76 | 69 | 61 | 57 | 85 | 80 |
| B | 82 | 77 | 88 | 86 | 75 | 71 | 67 | 60 | 91 | 86 |
| C | 84 | 72 | 81 | 78 | 70 | 65 | 58 | 53 | 87 | 78 |
| D | 74 | 69 | 74 | 72 | 71 | 64 | 53 | 48 | 79 | 74 |
| E | 78 | 75 | 79 | 76 | 73 | 68 | 62 | 58 | 84 | 78 |
| Total | 88 | 81 | 90 | 88 | 80 | 75 | 69 | 64 | 94 | 88 |

| 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/m ² . |
| 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. |
| Plane E sound data was measured above the top plane of the unit. |

Cooling Performance

| Cooling Specifications | | | | | | | | | |
|------------------------|------------------|------|-----------------|------|----------------|----------|----------------|---------|-----------------------------|
| Nominal Tonnage | Entering Air (F) | | Leaving Air (F) | | Capacity (MBH) | | Reheat | | Condensing Ambient Temp (F) |
| | DB | WB | DB | WB | Total | Sensible | Capacity (MBH) | LAT (F) | |
| 7.0 | 95.0 | 75.0 | 54.2 | 54.1 | 85.9 | 52.8 | 39.4 | 83.9 | 95.0 |

| Coil Information | | | | | | | | | |
|----------------------|---------------|-----------|--------------------|------------------|-------------|---------------------------|------------------------------|------------------|--|
| PDX Coil Model | Fins Per Inch | Rows Deep | Face Vel. (ft/min) | Coil PD (in. wg) | Refrigerant | Refrig. Velocity (ft/min) | Face Area (ft ²) | Suction Temp (F) | |
| DR516L06T14-24x35-LH | 14 | 6 | 206 | 0.232 | R-410A | 1,349 | 5.8 | 48.8 | |

| Compressor Details | | | | | |
|----------------------|----------------|------------------------|----------|--------------------|----------|
| Lead Compressor Type | Compressor Qty | Compressor RLA/MRC (A) | | Compressor LRA (A) | |
| | | Comp. #1 | Comp. #2 | Comp. #1 | Comp. #2 |
| Inverter Scroll | 1 | 8.3 | - | NA | - |

| Unit Details |
|---|
| Refrigerant charges provided by the factory are approximate and may require adjustment in the field |
| Hermetic scroll type compressors |
| Compressors mounted on neoprene vibration isolation |
| Stainless steel double sloped drain pan |
| Moisture-indicating sight glass |
| Service/charging valves |
| Refrigerant high pressure switch (manual reset) |
| Liquid-Line filter drier |
| Low sound condensing fan with EC motor for modulating head pressure control. |
| Inverter scroll compressor |
| Electronic expansion valve |

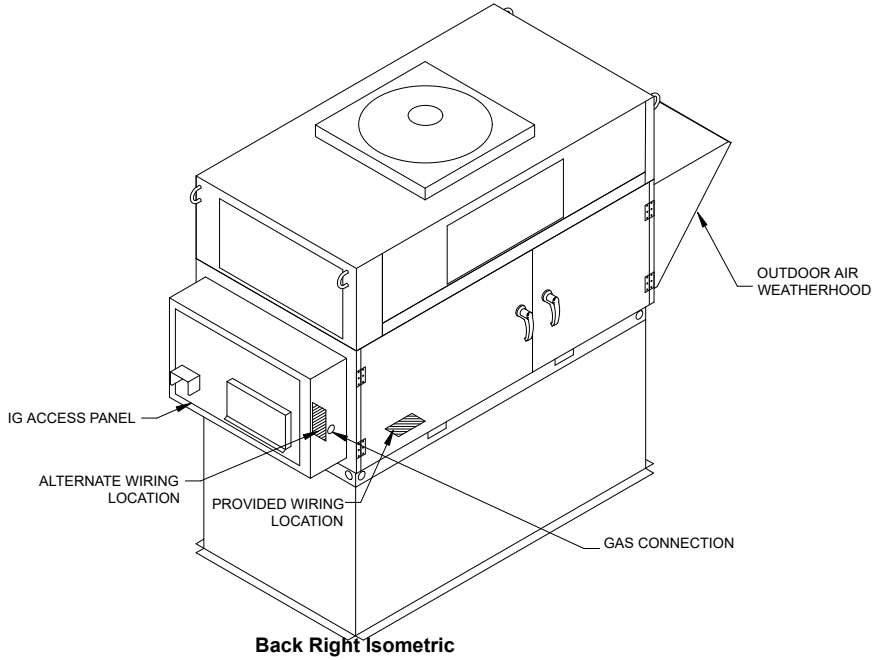
Heating Performance

| Heating Specifications | | | | | | | | |
|------------------------|----------|-------------|--------------|------------------|---------|----------|-------------|---------|
| Type | Gas Type | Input (MBH) | Output (MBH) | Temperature Rise | | Turndown | Performance | |
| | | | | Min (F) | Max (F) | | EAT (F) | LAT (F) |
| Indirect Gas | Natural | 150.0 | 120.0 | 8.0 | 93.0 | 12:1 | -10.0 | 82.6 |

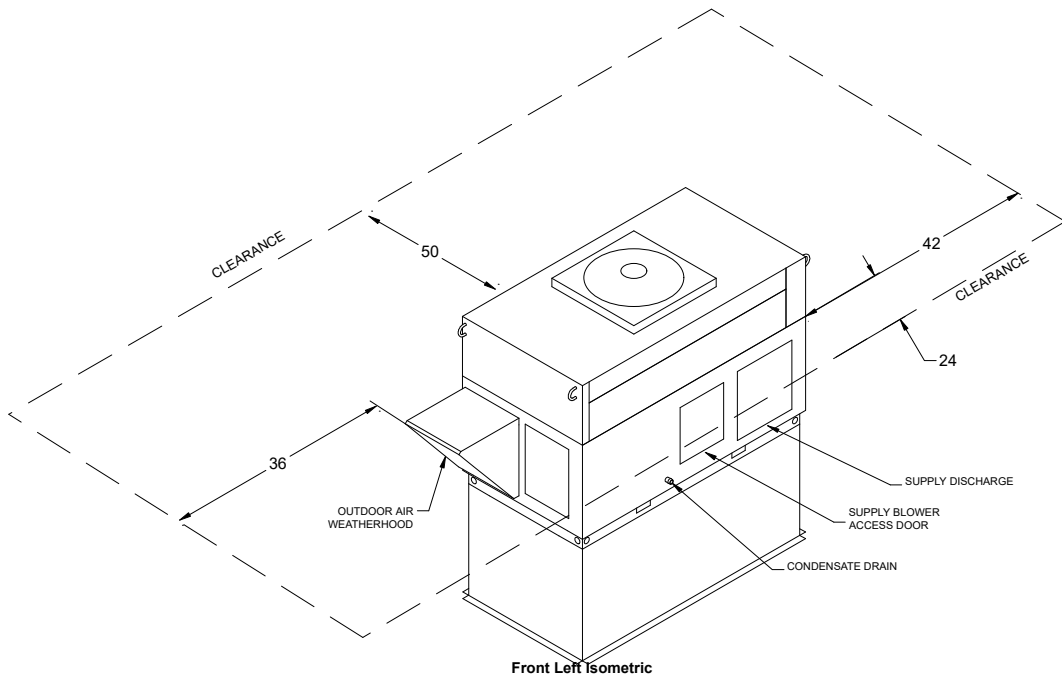
| Unit Details |
|--|
| ANSI standard Z83.8 and CSA 2.6 |
| High Thermal efficiency |
| Direct spark ignition |
| 3/4" Gas Connection |
| At least 6 in. wg of natural gas pressure (14 in. wg for LP) is required at the units gas connection in order to achieve maximum performance |
| Power Venting |
| 24 Volt Control Power |
| Stainless Steel heat exchange tubes |
| Unit controller maximum allowable supply discharge air set point is 100F (37.8C) |

Isometric Drawings

Component Layout

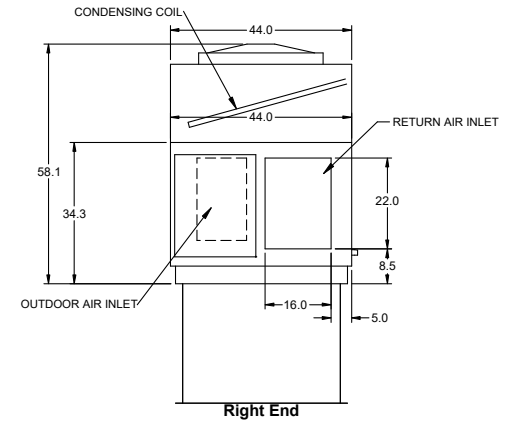
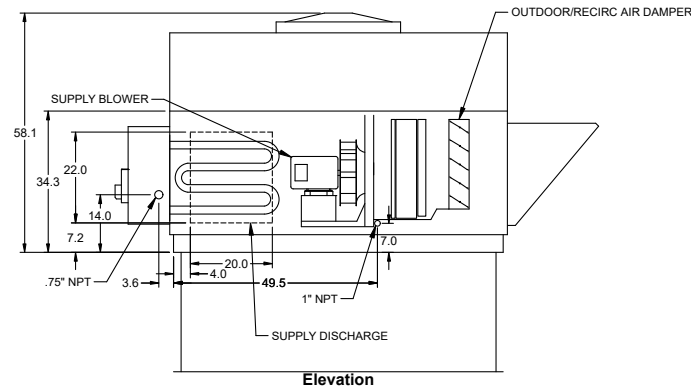
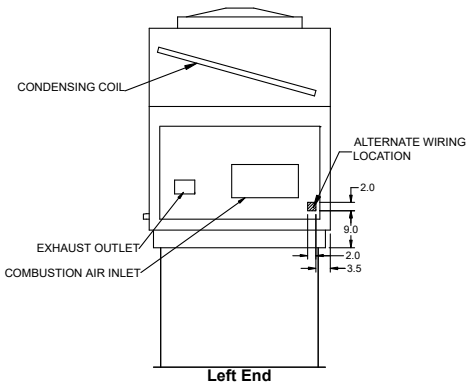
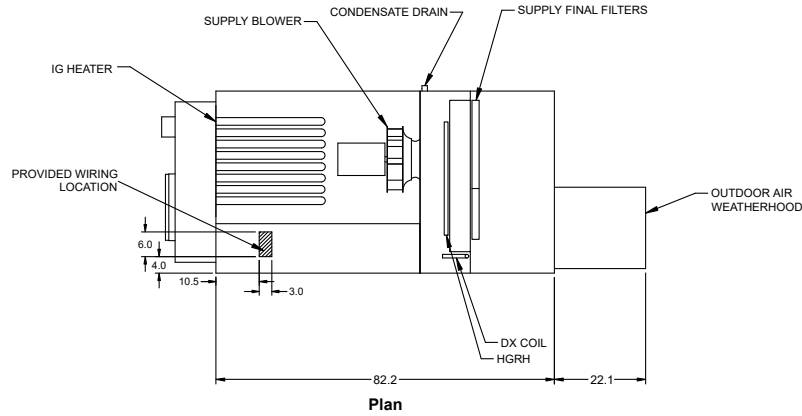


Service Clearances

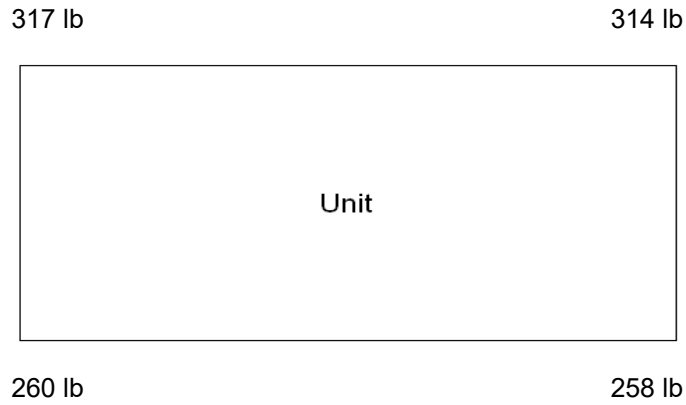


Overview Drawings

Dimensional Overview



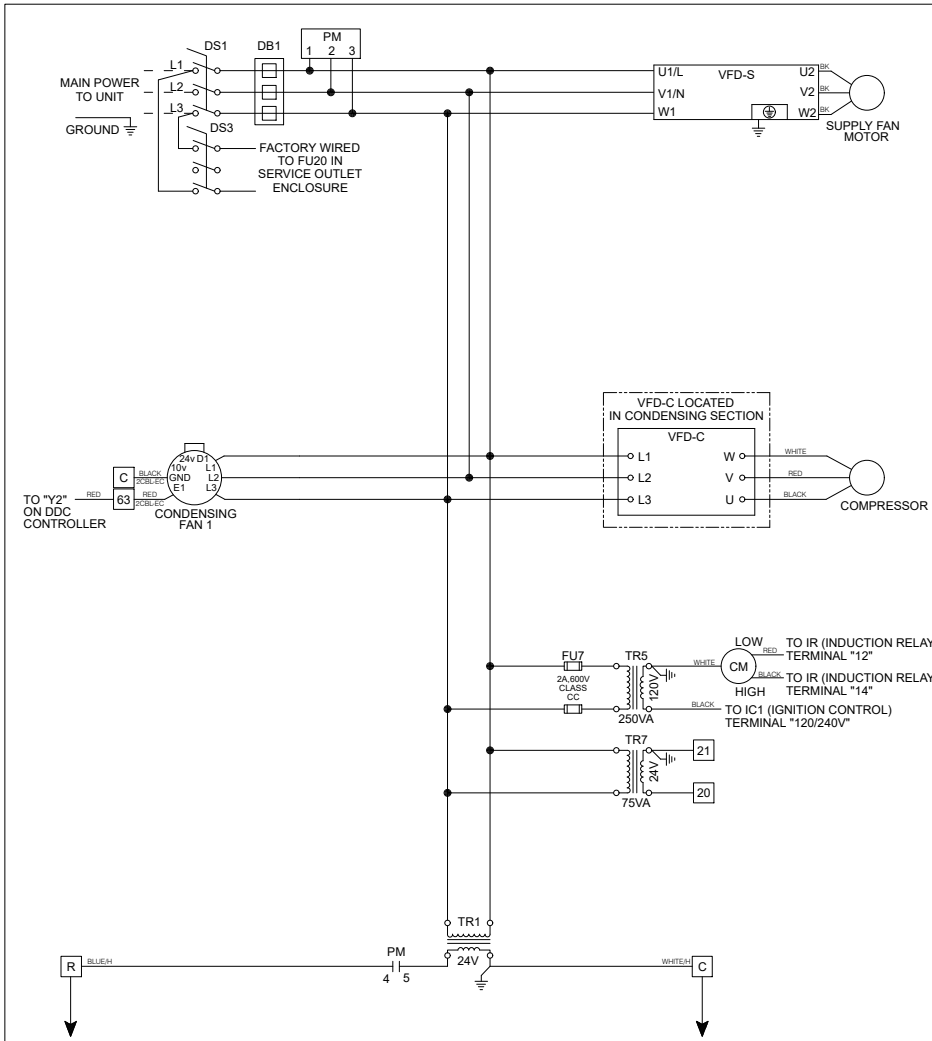
Unit Corner Weights



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



Wiring Diagram Code:
G11G1F0XK40X05X00HJ21H0300EH27

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 _____

WIRE COLOR CODE

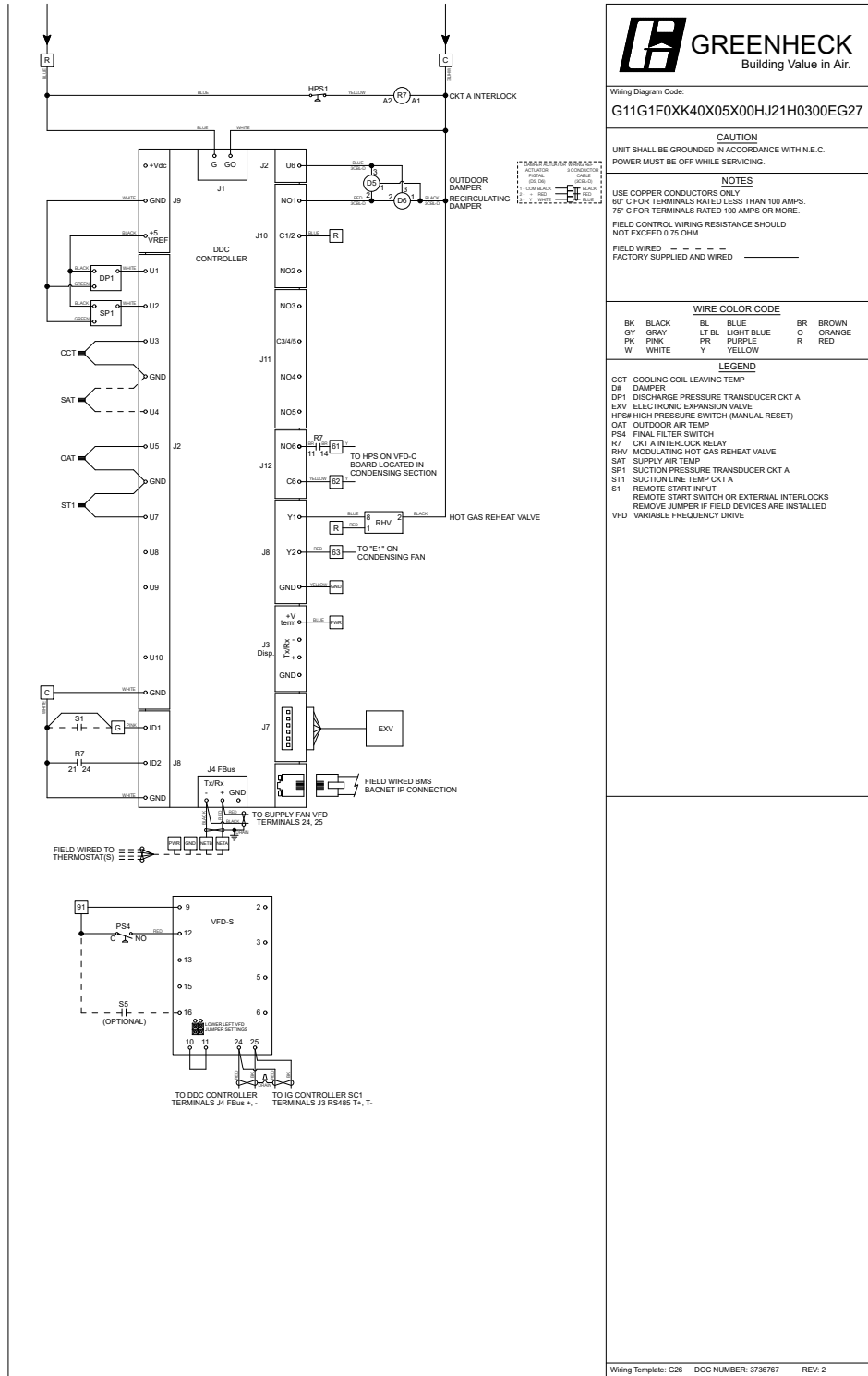
| | | | | | |
|----|-------|-------|------------|----|--------|
| BK | BLACK | BL | BLUE | BR | BROWN |
| GY | GRAY | LT BL | LIGHT BLUE | O | ORANGE |
| PK | PINK | PR | PURPLE | R | RED |
| W | WHITE | Y | YELLOW | | |

LEGEND

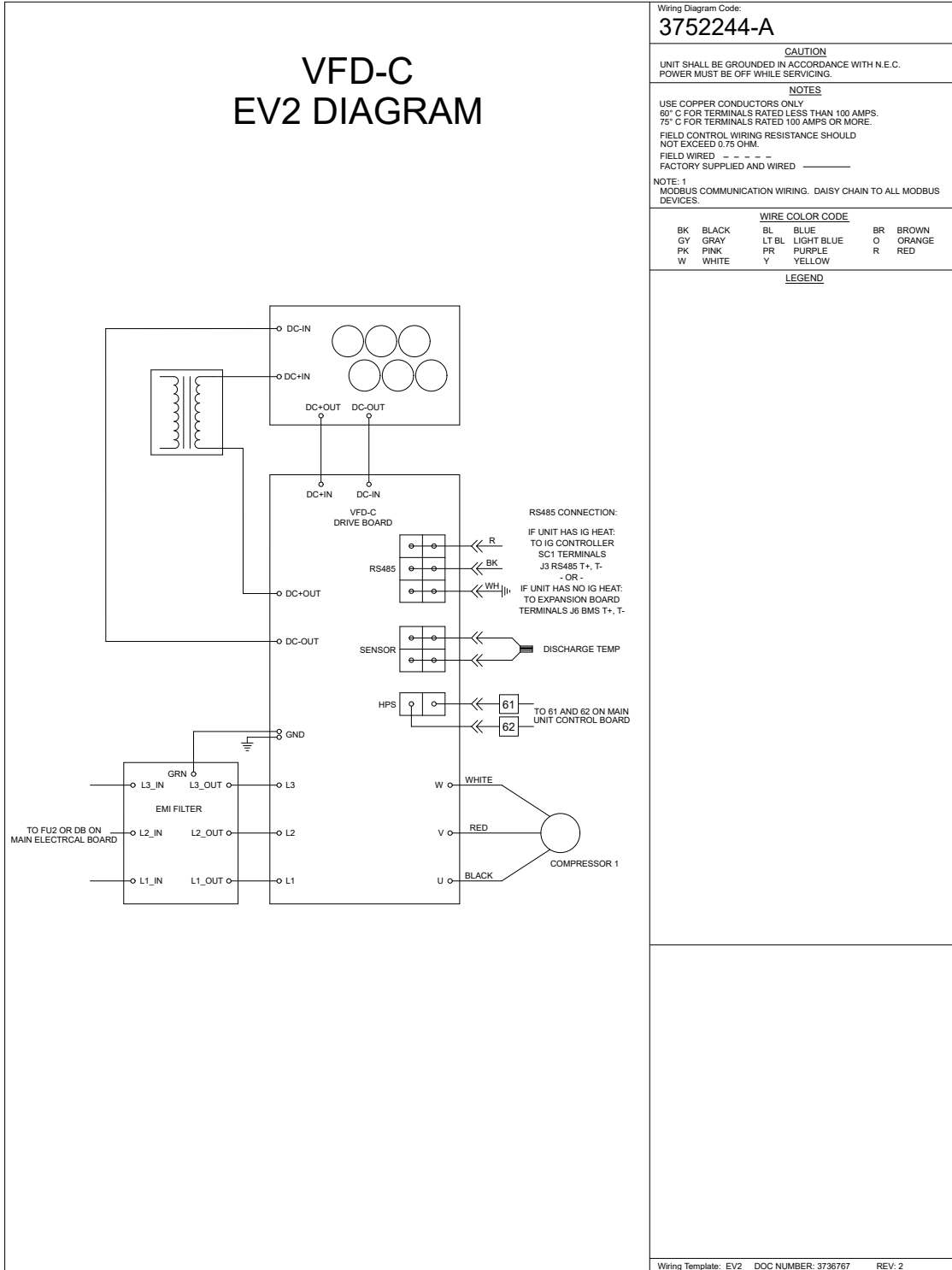
| | |
|-----|--|
| CM | COMBUSTION BLOWER MOTOR LOCATED IN IG FURNACE COMPARTMENT |
| DB# | POWER DISTRIBUTION BLOCK |
| DS | DISCONNECT SWITCH |
| FU# | FUSES |
| PM | PHASE VOLTAGE MONITOR |
| TR# | TRANSFORMER |
| VFD | VARIABLE FREQUENCY DRIVE |

Wiring Template: H27 DOC NUMBER: 3736767 REV: 2

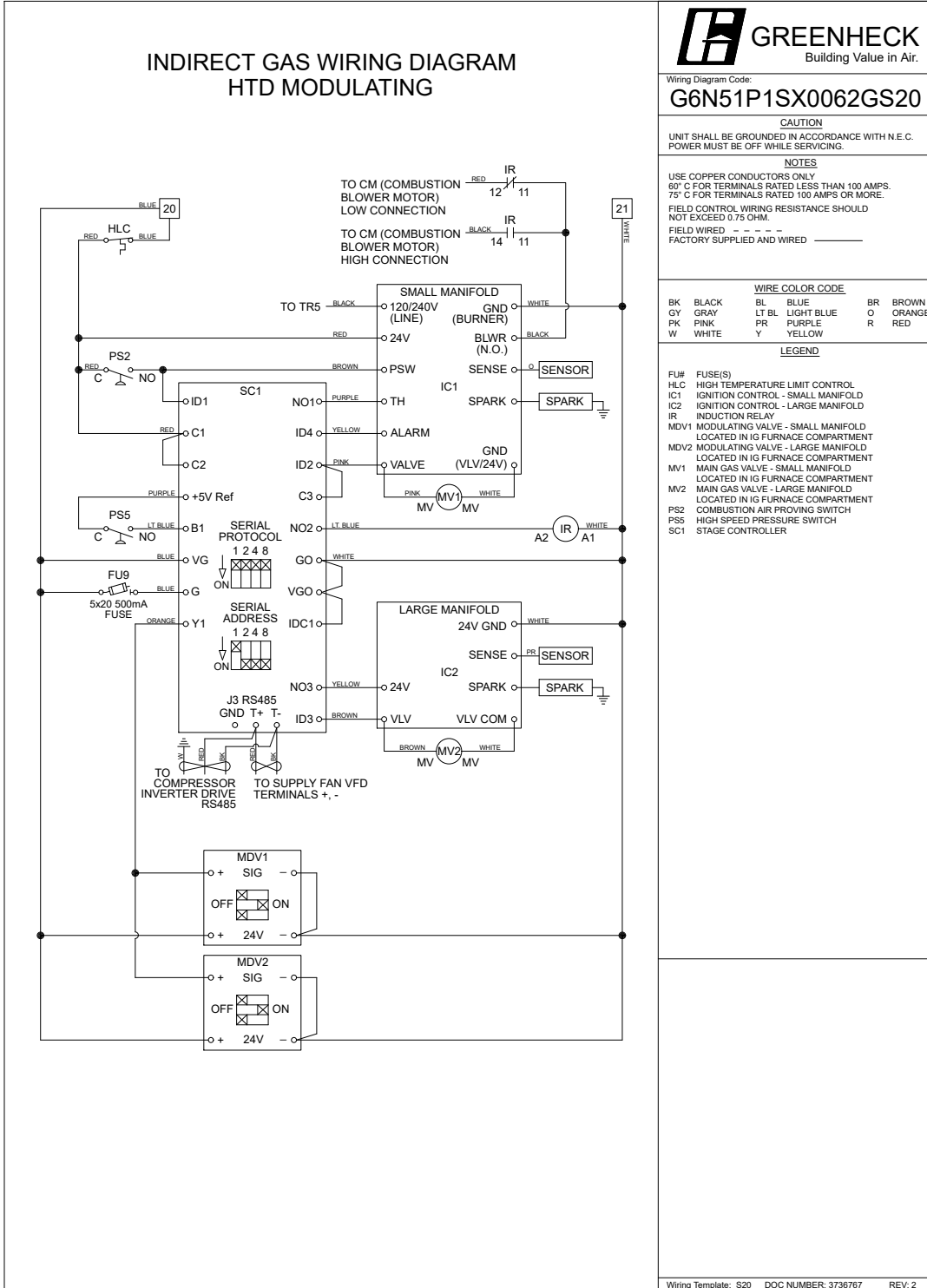
Wiring Diagram 2



Wiring Diagram 3



**INDIRECT GAS WIRING DIAGRAM
HTD MODULATING**



Wiring Diagram Code:
G6N51P1SX0062GS20

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 - - - - -

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

LEGEND

- FU# FUSE(S)
- HLC HIGH TEMPERATURE LIMIT CONTROL
- IC1 IGNITION CONTROL - SMALL MANIFOLD
- IC2 IGNITION CONTROL - LARGE MANIFOLD
- IR INDUCTION RELAY
- MDV1 MODULATING VALVE - SMALL MANIFOLD LOCATED IN IG FURNACE COMPARTMENT
- MDV2 MODULATING VALVE - LARGE MANIFOLD LOCATED IN IG FURNACE COMPARTMENT
- MV1 MAIN GAS VALVE - SMALL MANIFOLD LOCATED IN IG FURNACE COMPARTMENT
- MV2 MAIN GAS VALVE - LARGE MANIFOLD LOCATED IN IG FURNACE COMPARTMENT
- PS2 COMBUSTION AIR PROVING SWITCH
- PS5 HIGH SPEED PRESSURE SWITCH
- SC1 STAGE CONTROLLER

Greenheck Network Interface v8 Modbus/BACnet Points List

| Variable | Description | BACnet Object | ModBus Object | Read or Write | Text or Unit of M | | Included |
|---|--|---------------|---------------|---------------|-------------------|-------------|----------|
| | | | | | Active | Inactive | |
| Space_Temp_Analog_Input | Space Temperature | AI-1 | 30002 | R | | °F | X |
| Supply_Temp_Analog_Input | Supply Temperature | AI-2 | 30004 | R | | °F | X |
| Outside_Air_Temp_Analog_Input | Outside Air Temperature | AI-3 | 30006 | R | | °F | X |
| Mixed_Temp_Analog_Input | Mixed Temperature | AI-4 | 30008 | R | | °F | |
| Cold_Coil_1_Temp_Analog_Input | Cold Coil 1 Temperature | AI-5 | 30010 | R | | °F | X |
| Return_Temp_Analog_Input | Return Temperature | AI-7 | 30014 | R | | °F | |
| Exhaust_Temp_Analog_Input | Exhaust Temperature | AI-8 | 30016 | R | | °F | |
| Space_RH_Analog_Input | Space % Relative Humidity | AI-9 | 30018 | R | | % | |
| Outside_RH_Analog_Input | Outside % Relative Humidity | AI-10 | 30020 | R | | % | |
| Return_RH_Analog_Input | Return % Relative Humidity | AI-11 | 30022 | R | | % | |
| Return_Duct_Static_Pressure_Analog_Input | Return Duct Static Pressure | AI-12 | 30024 | R | | "wc | |
| Space_Static_Pressure_Analog_Input | Space Static Pressure | AI-13 | 30026 | R | | "wc | |
| Supply_Duct_Static_Pressure_Analog_Input | Supply Duct Static Pressure | AI-14 | 30028 | R | | "wc | |
| Space_CO2_1_Analog_Input | Space 1 CO2 ppm | AI-15 | 30030 | R | | ppm | |
| Return_CO2_Analog_Input | Return CO2 ppm | AI-17 | 30034 | R | | ppm | |
| Circuit_A_Discharge_Temp_Analog_Input | Circuit A Discharge Temperature | AI-20 | 30040 | R | | °F | X |
| Circuit_A_Suction_Temp_Analog_Input | Circuit A Suction Temperature | AI-21 | 30042 | R | | °F | X |
| Circuit_B_Discharge_Temp_Analog_Input | Circuit B Discharge Temperature | AI-22 | 30044 | R | | °F | X |
| Circuit_B_Suction_Temp_Analog_Input | Circuit B Suction Temperature | AI-23 | 30046 | R | | °F | X |
| Circuit_A_Discharge_Pressure_Analog_Input | Circuit A Discharge Pressure | AI-28 | 30056 | R | | psig | X |
| Circuit_A_Suction_Pressure_Analog_Input | Circuit A Suction Pressure | AI-29 | 30058 | R | | psig | X |
| Circuit_B_Discharge_Pressure_Analog_Input | Circuit B Discharge Pressure | AI-30 | 30060 | R | | psig | X |
| Circuit_B_Suction_Pressure_Analog_Input | Circuit B Suction Pressure | AI-31 | 30062 | R | | psig | X |
| Aux_In_Customer_1 | Customer defined auxiliary input | AI-36 | 30072 | R | | selectable | |
| Aux_In_Customer_2 | Customer defined auxiliary input | AI-37 | 30074 | R | | selectable | |
| Aux_In_Customer_3 | Customer defined auxiliary input | AI-38 | 30076 | R | | selectable | |
| Aux_In_Customer_4 | Customer defined auxiliary input | AI-39 | 30078 | R | | selectable | |
| Aux_In_Customer_5 | Customer defined auxiliary input | AI-40 | 30080 | R | | selectable | |
| Aux_In_Customer_6 | Customer defined auxiliary input | AI-41 | 30082 | R | | selectable | |
| Aux_In_Customer_7 | Customer defined auxiliary input | AI-42 | 30084 | R | | selectable | |
| Aux_In_Customer_8 | Customer defined auxiliary input | AI-43 | 30086 | R | | selectable | |
| Aux_In_Customer_9 | Customer defined auxiliary input | AI-44 | 30088 | R | | selectable | |
| Aux_In_Customer_10 | Customer defined auxiliary input | AI-45 | 30090 | R | | selectable | |
| Temperature_Setpoint | Main Temperature Set point Supply, Space, or Return target temperature | AV-1 | 40002 | RW | | °F | X |
| Temperature_Heat_Cool_Deadband | Heat/Cool Spt Deadband when Room or Return control is active Clg Spt = Deadband /2 + Temp Spt Htg Spt = Deadband /2 - Temp Spt | AV-2 | 40004 | RW | | Delta in °F | X |
| Temperature_Setpoint_Unoccupied | Main Temperature Set point Supply, Space, or Return target temperature | AV-3 | 40006 | RW | | °F | X |
| Temperature_Heat_Cool_Deadband_Unoccupied | Heat/Cool Spt Deadband when Room or Return control is active Clg Spt = Deadband /2 + Temp Spt Htg Spt = Deadband /2 - Temp Spt | AV-4 | 40008 | RW | | Delta in °F | X |
| Cooling_Coil_Setpoint_Min | Cooling Coil Leaving Air Setpoint | AV-5 | 40010 | RW | | °F | X |
| Cooling_Coil_Setpoint_Max | Maximum Coil Leaving Setpoint | AV-6 | 40012 | RW | | °F | X |
| Dehumidification_Setpoint | Dehumidification Setpoint %RH for Space or Return control | AV-7 | 40014 | RW | | % | |
| Outside_Dewpoint_Setpoint | Outside Dewpoint Dehumidification Trigger | AV-8 | 40016 | RW | | °F | |
| Indoor_Dewpoint_Setpoint | Indoor Dewpoint Dehumidification Trigger | AV-9 | 40018 | RW | | °F | |
| Unocc_Indoor_Dewpoint_Setpoint | Unoccupied Indoor Dewpoint Dehumidification Trigger | AV-10 | 40020 | RW | | °F | |
| Unoccupied_Dehumidification_Setpoint | Unoccupied Dehumidification %RH Setpoint | AV-11 | 40022 | RW | | °F | |
| Economizer_Temp_Enable_Setpoint | Economizer Ambient Temp Enable Setpoint Allow Econ when OAT is less than Setpoint | AV-12 | 40024 | RW | | °F | |
| Economizer_Enthalpy_Enable_Setpoint | Economizer Enthalpy Enable Setpoint Allow Econ when OA Enthalpy is less than Setpoint | AV-13 | 40026 | RW | | btu/lb | |
| Cooling_Lockout_Setpoint | Cooling Ambient Lockout Setpoint | AV-17 | 40034 | RW | | °F | X |
| Heating_Lockout_Setpoint | Heating Ambient Lockout Setpoint | AV-18 | 40036 | RW | | °F | X |
| Preheat_Lockout_Setpoint | Preheat Ambient Lockout Setpoint | AV-19 | 40038 | RW | | °F | |
| Economizer_Lockout_Setpoint | Economizer Ambient Lockout Setpoint | AV-20 | 40040 | RW | | °F | |
| Return_Duct_Static_Pressure_Setpoint | Return Duct Static Pressure Setpoint | AV-21 | 40042 | R | | "wc | |
| Space_Static_Pressure_Setpoint | Space Static Pressure Setpoint | AV-22 | 40044 | RW | | "wc | |
| Supply_Duct_Static_Pressure_Setpoint | Supply Duct Static Pressure Setpoint | AV-23 | 40046 | RW | | "wc | |
| Space_CO2_Setpoint | Space CO2 Setpoint | AV-24 | 40048 | RW | | ppm | |
| Outside_Air_Damper_Minimum_Setpoint_Occ | Outside Air Damper Minimum Setpoint | AV-24 | 40050 | RW | | % | X |
| Outside_RH_from_BMS | Outside RH from BMS Used when source selection is set to BMS | AV-26 | 40052 | RW | | % | X |
| Outside_Temp_from_BMS | Outside Temp from BMS Used when source selection is set to BMS | AV-27 | 40054 | RW | | °F | X |
| Return_RH_from_BMS | Return RH from BMS Used when source selection is set to BMS | AV-28 | 40056 | RW | | % | X |
| Return_Temp_from_BMS | Return Temp from BMS Used when source selection is set to BMS | AV-29 | 40058 | RW | | °F | X |

Greenheck Network Interface v8 Modbus/BACnet Points List

| Variable | Description | BACnet Object | ModBus Object | Read or Write | Text or Unit of M | | Included |
|---|--|---------------|---------------|---------------|-------------------|-----------------|----------|
| | | | | | Active | Inactive | |
| Space_1_CO2_from_BMS | Space 1 CO2 from BMS Used when source selection is set to BMS | AV-30 | 40060 | RW | | ppm | X |
| Return_CO2_from_BMS | Return CO2 from BMS Used when source selection is set to BMS | AV-32 | 40062 | RW | | ppm | X |
| Space_RH_from_BMS | Space RH from BMS Used when source selection is set to BMS | AV-33 | 40066 | RW | | % | X |
| Space_Static_from_BMS | Space Static from BMS Used when source selection is set to BMS | AV-34 | 40068 | RW | | "wc | X |
| Space_Temp_from_BMS | Space Temp from BMS Used when source selection is set to BMS | AV-35 | 40070 | RW | | °F | X |
| SF_Control_Signal_BMS | BMS to control signal for supply fan speed | AV-36 | 40072 | RW | | % | X |
| EF_Control_Signal_BMS | BMS to control signal for exhaust fan speed | AV-37 | 40074 | RW | | % | X |
| OAD_Control_Signal_BMS | Allows the BMS to control OAD position | AV-38 | 40076 | RW | | % | X |
| Aux_BMS_Analog_Output_1 | BMS Commanded auxiliary analog output | AV-39 | 40078 | RW | | selectable | X |
| Unit_Status_Mode | Unit Status Mode - See Table | AV-40 | 30092 | R | | Real | X |
| Supply_Temperature_Calculated_Setpoint | Active Supply Temperature Setpoint | AV-41 | 30094 | R | | °F | X |
| Cooling_1_Ramp_Capacity | Cooling Ramp 1 Status Value | AV-42 | 30096 | R | | % | X |
| Defrost_Ramp | Defrost Ramp | AV-44 | 30100 | R | | % | |
| Economizer_Ramp | Economizer Ramp | AV-45 | 30102 | R | | % | |
| Head_Pressure_Control_Ramp_1_Ramp | Head Pressure Control Ramp 1 | AV-46 | 30104 | R | | % | X |
| Head_Pressure_Control_Ramp_2_Ramp | Head Pressure Control Ramp 2 | AV-47 | 30106 | R | | % | |
| HP_Ramp_Capacity | Heat Pump Heating Ramp | AV-50 | 30112 | R | | % | |
| Heating_Capacity | Heating Ramp | AV-51 | 30114 | R | | % | X |
| Case_Heat_Control_Ramp | Case Heat Ramp | AV-52 | 30116 | R | | % | |
| Hot_Gas_Reheat_Ramp | Hot Gas Reheat Ramp | AV-53 | 30118 | R | | % | X |
| Outside_Dewpoint | Outside Dewpoint | AV-54 | 30120 | R | | °F | |
| Outside_Enthalpy | Outside Enthalpy | AV-55 | 30122 | R | | btu/lb | |
| Return_Dewpoint | Return Dewpoint | AV-56 | 30124 | R | | °F | |
| Return_Enthalpy | Return Enthalpy | AV-57 | 30126 | R | | btu/lb | |
| Space_Dewpoint | Space Dewpoint | AV-58 | 30128 | R | | °F | |
| Space_Enthalpy | Space Enthalpy | AV-59 | 30130 | R | | btu/lb | |
| Circuit_A_Superheat | Circuit A Superheat | AV-60 | 30132 | R | | °F | X |
| Circuit_B_Superheat | Circuit B Superheat | AV-61 | 30134 | R | | °F | X |
| Total_Exhaust_Fan_CFM_BMS | Total Exhaust Fan CFM | AV-64 | 30140 | R | | CFM | X |
| Total_Supply_Fan_CFM_BMS | Total Supply Fan CFM | AV-65 | 30142 | R | | CFM | X |
| OAD_CFM_BMS | OAD CFM | AV-66 | 30144 | R | | CFM | X |
| Active_Temperature_Setpoint | Active Temperature Setpoint | AV-67 | 30146 | R | | °F | X |
| Chilled_Water_1_Valve_Analog_Output | Chilled Water 1 Valve Analog Output | AV-68 | 30148 | R | | % | |
| Electric_Heater_1_Analog_Output | Electric Heater 1 Analog Output | AV-70 | 30152 | R | | % | |
| Energy_Recovery_Analog_Output | Energy Recovery Analog Output | AV-72 | 30156 | R | | % | |
| Exhaust_Fan_Speed_Analog_Output | Exhaust Fan Speed Analog Output | AV-73 | 30158 | R | | % | |
| Hot_Water_Valve_1_Analog_Output | Hot Water Valve 1 Analog Output | AV-74 | 30160 | R | | % | |
| Mod_Gas_Furnace_1_Analog_Output | Mod Gas Furnace 1 Analog Output | AV-76 | 30164 | R | | % | X |
| Outside_Air_Damper_Analog_Output | Outside Air Damper Analog Output | AV-78 | 30168 | R | | % | X |
| Supply_Fan_Speed_Analog_Output | Supply Fan Speed Analog Output | AV-79 | 30170 | R | | % | X |
| Modulating_Compressor_Analog_Output_BMS | First Modulating Compressor Analog Output - BMS | AV-80 | 30172 | R | | % | X |
| Circuit_A_Sat_Discharge_Temperature | Circuit A Saturated Discharge Temperature | AV-82 | 30176 | R | | °F | X |
| Circuit_B_Sat_Discharge_Temperature | Circuit B Saturated Discharge Temperature | AV-83 | 30178 | R | | °F | X |
| Circuit_A_Sat_Suction_Temperature | Circuit A Saturated Suction Temperature | AV-86 | 30184 | R | | °F | X |
| Circuit_B_Sat_Suction_Temperature | Circuit B Saturated Suction Temperature | AV-87 | 30186 | R | | °F | X |
| Coil_Temperature_Calculated_Setpoint | Calculated Coil Leaving Set point | AV-90 | 30192 | R | | °F | X |
| Unoccupied_Cooling_Setpoint | Active Cooling Setpoint - Unoccupied | AV-91 | 30194 | R | | °F | X |
| Unoccupied_Heating_Setpoint | Active Heating Setpoint - Unoccupied | AV-92 | 30196 | R | | °F | X |
| Temperature_Reset_Mode | Occupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside | IV-1 | 40080 | RW | | Integer | X |
| Temperature_Reset_Mode_Unoccupied | Unoccupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside | IV-2 | 40082 | RW | | Integer | X |
| Active_Temperature_Reset_Mode | Active Occupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside | IV-3 | 30198 | R | | Integer | X |
| Active_Temperature_Reset_Mode_Unocc | Active Unoccupied Reset Type Setpoint 1-No Reset(Supply Temp Control) 2-Space 3-Return 4-Outside | IV-4 | 30200 | R | | Integer | X |
| LatestAlm | Most recent alarm - See Alarm Table | IV-5 | 30202 | R | | Integer | X |
| Device_Enable_DO_Word | Device Enable DO Word - See Table | IV-6 | 30206 | R | | Bit Pack | X |
| Ref_Ckt_PressTemp_Alarm_Word | Refrigeration Circuit Word - See Table | IV-7 | 30210 | R | | Bit Pack | X |
| Device_Offline_Word | Device Offline Word - See Table | IV-8 | 30214 | R | | Bit Pack | X |
| Device_Alarm_Word | Device Alarm Word - See Table | IV-9 | 30218 | R | | Bit Pack | X |
| System_Word | System Word - See Table | IV-10 | 30222 | R | | Bit Pack | X |
| Unit_Status_Word | Unit Status Word - See Table | IV-11 | 30226 | R | | Bit Pack | X |
| Exhaust_Fan_1_Status_Digital_Inpu | Exhaust Fan Status | BI-1 | 10009 | R | | Active Inactive | X |
| Supply_Fan_1_Status_Digital_Input | Supply Fan Status | B-2 | 10010 | R | | Active Inactive | X |

Greenheck Network Interface v8 Modbus/BACnet Points List

| Variable | Description | BACnet Object | ModBus Object | Read or Write | Text or Unit of M | | Included |
|--|--|---------------|---------------|---------------|-------------------|------------|----------|
| | | | | | Active | Inactive | |
| Exhaust_Fan_1_Status_Digital_Input | Exhaust Fan Status | BI-1 | 10009 | R | Active | Inactive | X |
| Supply_Fan_1_Status_Digital_Input | Supply Fan Status | B-2 | 10010 | R | Active | Inactive | X |
| BMS_Watchdog | BMS Watchdog command Used to determine BMS comm status Must heartbeat within the watch dog timeout delay to detect comm status | BV-1 | 2 | RW | Active | Inactive | X |
| System_Enable | Master system enable/disable point | BV-2 | 3 | RW | Enable | Disable | X |
| BMS_Occupancy_Command | Occupancy Command | BV-3 | 4 | RW | Unoccupied | Occupied | X |
| Reset_All_Alarms | Alarm Reset Command | BV-4 | 5 | RW | Reset | Normal | X |
| Exhaust_Only_Mode_BMS_Cmd | Emergency Exhaust Mode Command | BV-5 | 6 | RW | Enable | Disable | |
| Pressurization_Only_Mode_BMS_Cmd | Emergency Pressurization Mode Command | BV-6 | 7 | RW | Enable | Disable | |
| Outside_RH_Source_BMS | Outside RH Source Selection | BV-7 | 8 | RW | BMS | Local | X |
| Outside_Temp_Source_BMS | Outside Temp Source Selection | BV-8 | 9 | RW | BMS | Local | X |
| Return_RH_Source_BMS | Return RH Source Selection | BV-9 | 10 | RW | BMS | Local | X |
| Return_Temp_Source_BMS | Return Temp Source Selection | BV-10 | 11 | RW | BMS | Local | X |
| Space_1_CO2_Source_BMS | Space 1 CO2 Source Selection | BV-11 | 12 | RW | BMS | Local | X |
| Space_2_CO2_Source_BMS | Space 2 CO2 Source Selection | BV-12 | 13 | RW | BMS | Local | X |
| Return_CO2_Source_BMS | Return CO2 Source Selection | BV-13 | 14 | RW | BMS | Local | X |
| Space_RH_Source_BMS | Space RH Source Selection | BV-14 | 15 | RW | BMS | Local | X |
| Space_Static_Source_BMS | Space Static Source Selection | BV-15 | 16 | RW | BMS | Local | |
| Space_Temp_Source_BMS | Space Temp Source Selection | BV-16 | 17 | RW | BMS | Local | X |
| SF_Control_Source_BMS | Allows the BMS to control supply fan speed | BV-17 | 18 | RW | BMS | Local | X |
| EF_Control_Source_BMS | Allows the BMS to control exhaust fan speed | BV-18 | 19 | RW | BMS | Local | |
| OAD_Control_Source_BMS | Allows the BMS to control OAD position | BV-19 | 20 | RW | BMS | Local | |
| Aux_BMS_Digital_Output_1 | BMS Commanded auxiliary digital output | BV-20 | 21 | RW | Active | Inactive | |
| Aux_BMS_Digital_Output_2 | BMS Commanded auxiliary digital output | BV-21 | 22 | RW | Active | Inactive | |
| Occupied | Occupancy | BV-22 | 10002 | R | Occupied | Unoccupied | X |
| Global_Alarm | General alarm point Optionally set to indicate any alarm is active, or a shutdown alarm is active | BV-23 | 10003 | R | Alarm | Normal | X |
| BMS_Watchdog_Active | Status of the BMS watchdog heartbeat | BV-24 | 10004 | R | Active | Inactive | X |
| OAD_Feedback_Error_Not_Economizing.Active | Feedback indicates OAD is not opening during economizer | BV-25 | 10005 | R | Alarm | Normal | |
| OAD_Feedback_Error_Economizing.Active | Feedback indicates OAD is open | BV-26 | 10006 | R | Alarm | Normal | |
| OAD_Feedback_Error_OAD_Not_Modulating.Active | Feedback indicates the OAD is not modulating | BV-27 | 10007 | R | Alarm | Normal | |
| OAD_Feedback_Error_Excess_OA.Active | Feedback indicates the OAD is not closing | BV-28 | 10008 | R | Alarm | Normal | |

| System Word Table (IV-10) | |
|---------------------------|--|
| Bit | System Word |
| 0 | Heat Wheel Enable |
| 1 | Preheat Enable |
| 2 | Reversing Valve (Cooling (0)/Heating(1)) |
| 3 | |
| 4 | |
| 5 | |
| 6 | Supply Temp Low Limit Alarm |
| 7 | Supply Temp High Limit Alarm |
| 8 | Supply High Duct Static Alarm.Active |
| 9 | Supply Fan 1 Alarm |
| 10 | Exhaust Fan 1 Alarm |
| 11 | Drain Pan Alarm |
| 12 | Freeze Stat Alarm |
| 13 | Filter Alarm |
| 14 | Space High Static Alarm |
| 15 | Return Low Static Alarm |
| 16 | Shutdown Input Alarm |
| 17 | Energy Recovery Wheel High Diff Pressure |
| 18 | Energy Recovery Wheel Rotation Alarm |
| 19 | |
| 20 | Heat Pump Heating Lock Out Alarm |
| 21 | Permanent Memory - Too Many Writes |
| 22 | BMS Offline Alarm |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | Heat-Cool Only - Dehumidification Request Active |
| 29 | Heat-Cool Only - Heating Request Active |
| 30 | Heat-Cool Only - Coil Setpoint Alarm Active |
| 31 | Heat-Cool Only - Supply Setpoint Alarm Active |

| Unit Status Word Table (IV-11) | |
|--------------------------------|--------------------------------------|
| Bit | Unit Status Word |
| 0 | Off/Standby |
| 1 | Unoccupied Start |
| 2 | Occupied Start |
| 3 | Opening Dampers |
| 4 | Dampers Open |
| 5 | Fan Start Delay |
| 6 | Exhaust Fan On |
| 7 | Supply Fan On |
| 8 | System On |
| 9 | Soft Shutdown |
| 10 | System Disabled |
| 11 | Remote Off |
| 12 | System Shutdown Alarm |
| 13 | Supply Fan Only |
| 14 | Exhaust Fan Only |
| 15 | Purge Mode (Supply and Exhaust Only) |
| 16 | Case Heat Active |
| 17 | Fans Only |
| 18 | Economizing |
| 19 | Energy Recovery Active |
| 20 | Cooling |
| 21 | Heating |
| 22 | Dehumidifying |
| 23 | Hot Gas Reheat Active |
| 24 | HGRH Purging |
| 25 | Dehum w/Heat |
| 26 | Energy Recovery Defrost Active |
| 27 | Heat Pump Defrost Active |
| 28 | Morning Warm Up/Cool Down Active |
| 29 | Winter Ramp Active |
| 30 | |
| 31 | Overrides Active |

| Device Enable DO Word Table (IV-6) | |
|------------------------------------|--|
| Bit | Device Enable DO Word |
| 0 | Compressor 1 Start |
| 1 | Compressor 2 Start |
| 2 | Compressor 3 Start |
| 3 | Compressor 4 Start |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | Condenser Fan Ramp 1 Stage 1 Start |
| 9 | Condenser Fan Ramp 1 Stage 2 Start |
| 10 | Condenser Fan Ramp 1 Stage 3 Start |
| 11 | |
| 12 | Condenser Fan Ramp 2 Stage 1 Start |
| 13 | Condenser Fan Ramp 2 Stage 2 Start |
| 14 | Condenser Fan Ramp 2 Stage 3 Start |
| 15 | |
| 16 | Furnace 1 Start (External Furnace Controller Only) |
| 17 | Furnace 2 Start (External Furnace Controller Only) |
| 18 | |
| 19 | |
| 20 | Supply Fan Start |
| 21 | Exhaust Fan Start |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |

| Unit Status Word Table (IV-11) | |
|--------------------------------|---|
| Bit | Ref_Ckt_PressTemp_Alarm_Word |
| 0 | Circuit A Discharge Pressure Sensor Alarm |
| 1 | Circuit A Discharge Temp Sensor Alarm |
| 2 | Circuit A Suction Pressure Sensor Alarm |
| 3 | Circuit A Suction Temp Sensor Alarm |
| 4 | Circuit B Discharge Pressure Sensor Alarm |
| 5 | Circuit B Discharge Temp Sensor Alarm |
| 6 | Circuit B Suction Pressure Sensor Alarm |
| 7 | Circuit B Suction Temp Sensor Alarm |
| 8 | Circuit A High Pressure Switch Alarm |
| 9 | Circuit A Low Pressure Switch Alarm |
| 10 | Circuit B High Pressure Switch Alarm |
| 11 | Circuit B Low Pressure Switch Alarm |
| 12 | Circuit A High Sat Discharge Temp Alarm |
| 13 | Circuit B High Sat Discharge Temp Alarm |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |

| Device Alarm Word Table (IV-9) | |
|--------------------------------|--|
| Bit | Device_Alarm_Word -Ext |
| 0 | Cold Coil Temperature Sensor Alarm |
| 1 | |
| 2 | Mixed Temperature Sensor Alarm |
| 3 | Supply Duct Static Pressure Sensor Alarm |
| 4 | Supply Fan AFMS Alarm |
| 5 | Supply Air Temp Sensor Alarm |
| 6 | Exhaust Fan AFMS Alarm |
| 7 | Exhaust Temperature Sensor Alarm |
| 8 | Outside Air Temp Sensor Alarm |
| 9 | Outside RH Sensor Alarm |
| 10 | OAD AMD Alarm |
| 11 | Greentrol OAD AFMS Alarm |
| 12 | Return CO2 Sensor Alarm |
| 13 | Return Duct Static Pressure Sensor Alarm |
| 14 | Return Temperature Sensor Alarm |
| 15 | Return RH Sensor Alarm |
| 16 | Space CO2 Sensor Alarm |
| 17 | Space RH Sensor Alarm |
| 18 | Space Static Pressure Sensor Alarm |
| 19 | Space Temperature Sensor Alarm |
| 20 | IG Furnace Alarm |
| 21 | |
| 22 | Inverter Scroll 1 Alarm |
| 23 | |
| 24 | EVD Valve A Alarm |
| 25 | |
| 26 | SF VFD Alarm |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |

| Device Offline Word Table (IV-8) | |
|----------------------------------|----------------------------|
| Bit | Device_Offline_Word - Ext |
| 0 | Space TStat 1 Offline |
| 1 | Space TStat 2 Offline |
| 2 | Space TStat 3 Offline |
| 3 | Space TStat 4 Offline |
| 4 | VFD Offline Supply Fan |
| 5 | |
| 6 | |
| 7 | |
| 8 | Expansion Board 1 Alarm |
| 9 | Expansion Board 2 Alarm |
| 10 | Expansion Board 3 Alarm |
| 11 | Expansion Board 4 Alarm |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | Master Unit Offline Alarm |
| 28 | Slave Unit 1 Offline Alarm |
| 29 | Slave Unit 2 Offline Alarm |
| 30 | Slave Unit 3 Offline Alarm |
| 31 | Slave Unit 4 Offline Alarm |

| UNIT STATUS MODE TABLE (AV-40) | | | |
|--------------------------------|-----------------------|----|---|
| 0 | Off/Standby | 17 | Fans Only Purge |
| 1 | Unoccupied Start | 18 | Case Heat Active |
| 2 | Occupied Start | 19 | Fans Only |
| 3 | Opening Dampers | 20 | Economizing |
| 5 | Dampers Open | 21 | Cooling |
| 6 | Fan Start Delay | 22 | Heating |
| 7 | Exhaust Fan Start | 23 | Dehumidifying |
| 8 | Supply Fan Start | 25 | HGRH Purging |
| 9 | Startup Delay | 26 | Energy Recovery Defrost Active |
| 10 | System On | 29 | Dehumidifying w/Heat |
| 11 | Soft Shutdown | 30 | Overrides |
| 12 | System Disabled | 31 | Expansion Offline |
| 13 | Remote Off | 33 | Energy Recovery Active |
| 14 | System Shutdown Alarm | 34 | Hot Gas Reheat Active |
| 15 | Pressurization Only | 35 | Morning Warm Up/Cool Down Active (Sequence) |
| 16 | Exhaust Only | 36 | Heat Pump Defrost |

| Alarm Table (Latest Alarm IV-5) | | | | | |
|---------------------------------|---|-----|--|-----|---|
| 0 | No Active Alarms | 63 | Supply Air Temperature - Low Limit Shutdown | 117 | High SDT Lockout - Circuit A |
| 1 | Supply Fan 1 Run - Status Not Proven | 64 | Heat Wheel Rotation - Not Detected | 118 | High SDT Lockout - Circuit B |
| 2 | Freeze Protection - Thermostat Tripped | 65 | Slave Unit 1 Offline - | 121 | Inverter 1 Alarm - |
| 3 | High Supply Duct - Static Pressure | 66 | Slave Unit 2 Offline - | 123 | Inverter 1 Lockout - Cycle Power to Unit |
| 4 | Low Return Duct - Static Pressure | 67 | Slave Unit 3 Offline - | 125 | High SDT Lockout - Circuit A |
| 5 | Outside Air Temp - Sensor Value Not Valid | 68 | Slave Unit 4 Offline - | 126 | Inverter 1 Foldback - Input Current |
| 6 | Supply Air Temperature - Sensor Value Not Valid | 69 | Master Unit Offline - | 127 | Inverter 1 Foldback - Inverter Temp |
| 7 | Cold Coil 1 Temp - Sensor Value Not Valid | 70 | Heat Pump Defrost - Mode is Active | 131 | Inverter 1 Comms Lost - Compressor Offline |
| 9 | Exhaust Air Temp - Sensor Value Not Valid | 71 | Multi Devices per Ch - Contact Tech Support | 133 | Space Thermostat 1 - Sensor Offline |
| 10 | Mixed Air Temperature - Sensor Value Not Valid | 74 | Shutdown Contact - In Alarm Position | 134 | Space Thermostat 2 - Sensor Offline |
| 11 | Return Air Temperature - Sensor Value Not Valid | 75 | Comp Maint Alarm - Run Hours Spt Reached | 135 | Space Thermostat 3 - Sensor Offline |
| 12 | Space Temperature - Sensor Value Not Valid | 76 | Supply Air Temperature - High Limit Shutdown | 136 | Space Thermostat 4 - Sensor Offline |
| 13 | Return Air RH - Sensor Value Not Valid | 77 | Space High Static Pres - Shutdown | 137 | IG Furnace 1. No flame - after 3 tries |
| 14 | Space RH - Sensor Value Not Valid | 78 | Internal Board Temp - Exceeds -40F or 158F | 138 | IG Furnace 1 Large - no flame after 3 tries |
| 15 | Outside RH - Sensor Value Not Valid | 79 | BMS Offline - Watchdog is FALSE | 139 | IG Furnace 1 combust - fan high pressure sw |
| 16 | Low Pressure Switch - Circuit A | 80 | Clg Coil Setpt Input - Value is not valid | 140 | IG Furnace 1 Ignition - controller alarm |
| 17 | Low Pressure Switch - Circuit B | 81 | Sup Air Setpt Input - Value is not valid | 141 | IG Furnace 1 pressure - switch fault alarm |
| 20 | High Pressure Switch - Circuit A | 82 | BACnet License - Not Installed | 142 | High SDT Lockout - Circuit B |
| 21 | High Pressure Switch - Circuit B | 83 | Low Suction SH ExV A - EVD 1 Alarm | 143 | IG Furnace 1 - Max retrys |
| 24 | Damper End Switch Fail - Dampers are not open | 84 | Low Suction SH ExV B - EVD 1 Alarm | 144 | IG Furnace 1 - High Limit Trip |
| 25 | Exhaust Fan 1 Run - Status Not Proven | 85 | LOP A EVD 1 - Low Operating Pressure | 145 | IG Furnace - pCOe 1 Offline |
| 26 | Filters are Dirty - Replace Filters | 87 | MOP A EVD 1 - Max Operating Pressure | 146 | IG Furnace 1 IC fault - Check Furnace Wiring |
| 27 | Cond Drain Pan Full - Check Drain | 89 | EEV A EVD 1 - Motor Alarm | 147 | IG Furnace 2 No flame - after 3 tries |
| 28 | Exp Board 1 Status - Board is Offline | 91 | LowSuct A EVD 1 - Refrigerant Temp | 148 | IG Furnace 2 Large - no flame after 3 tries |
| 29 | Exp Board 2 Status - Board is Offline | 93 | High Condensing Temp - EVD 1 | 149 | IG Furnace 2 combust - fan high pressure sw |
| 31 | Exp Board 4 Status - Board is Offline | 94 | Sens S1 EVD 1 - Sensor Value Not Valid | 150 | IG Furnace 2 Ignition - controller alarm |
| 32 | Non-Volatile Memory Er - Contact Tech Support | 95 | Sens S2 EVD 1 - Sensor Value Not Valid | 151 | IG Furnace 2 pressure - switch fault alarm |
| 33 | Space 1 CO2 - Sensor Value Not Valid | 96 | Sens S3 EVD 1 - Sensor Value Not Valid | 152 | IG Furnace 2 combust - fan proving alarm |
| 34 | Space Static Pressure - Sensor Value Not Valid | 97 | Sens S4 EVD 1 - Sensor Value Not Valid | 153 | IG Furnace 2 - Max retrys |
| 35 | Supply Duct Stat Press - Sensor Value Not Valid | 98 | EVD 1 EEPROM Damaged - Call Tech Support | 154 | IG Furnace 2 - High Limit Trip |
| 36 | Return Duct Stat Press - Sensor Value Not Valid | 99 | Incomplete Closing - EVD 1 | 155 | IG Furnace - pCOe 2 Offline |
| 37 | Sup Fan AFMS - Sensor Value Not Valid | 101 | Emergency Closing - EVD 1 | 156 | IG Furnace 2 IC fault - Check Furnace Wiring |
| 38 | Exh Fan AFMS - Sensor Value Not Valid | 101 | EVD 1 Battery - | 157 | Outside Air Greentrol - Offline or Flow Error |
| 39 | Outside Damper AFMS - Sensor Value Not Valid | 102 | FW Incompatibility - EVD 1 | 158 | Exhaust Air Greentrol - Offline or Flow Error |
| 40 | Space Setpt Adj Slider - Sensor Value Not Valid | 106 | EVD 1 Config Error - | 159 | Supply Air Greentrol - Offline or Flow Error |
| 42 | Return CO2 - Sensor Value Not Valid | 105 | High Discharge Temp - First Inverter | 170 | OA Damper Fault - Not Econ and should be |
| 42 | Discharge Press Ckt A - Sensor Value Not Valid | 106 | Low Discharge Pressure - First Inverter | 171 | OA Damper Fault - Econ and shouldn't be |
| 43 | Discharge Press Ckt A - Sensor Value Not Valid | 106 | Low Discharge Pressure - First Inverter | 171 | OA Damper Fault - Econ and shouldn't be |
| 44 | Discharge Press Ckt B - Sensor Value Not Valid | 107 | High Suction Pressure - First Inverter | 172 | OAD Fault - Damper not Modulating |
| 47 | Suction Press Ckt A - Sensor Value Not Valid | 108 | Low Suction Pressure - First Inverter | 173 | OAD Fault - Excess Outdoor Air |
| 48 | Suction Press Ckt B - Sensor Value Not Valid | 109 | High Current - First Inverter | 174 | IG Furnace 1 - Combustion Fan Alarm |
| 51 | Discharge Temp Ckt A - Sensor Value Not Valid | 110 | High Pressure Ratio - First Inverte | 175 | IG Furnace 2 - Combustion Fan Alarm |
| 52 | Discharge Temp Ckt B - Sensor Value Not Valid | 111 | Low Pressure Ratio - First Inverter | 176 | Supply Fan - VFD Offline |
| 55 | Suction Temp Ckt A - Sensor Value Not Valid | 112 | Low Delta P - First Inverter | 177 | OA Damper Fault - Not Econ and should be |
| 56 | Suction Temp Ckt B - Sensor Value Not Valid | 113 | High Discharge Press - First Inverter | 178 | Return Fan - VFD Offline |
| 59 | Ckt A High Saturated - Discharge Temperature | 114 | Compressor Staging - Order Skipped | 179 | Energy Recovery - VFD Offline |
| 60 | Ckt B High Saturated - Discharge Temperature | 115 | Heat Pump Heating - Locked Out | 180 | Embedded EVD Error |
| | | 116 | EVD 1 Error - Unexpected Position | 181 | SF VFD Alarm - Check VFD |

Factory Controller Sequence of Operation

FACTORY 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 (Unit will be enabled to start once a jumper is placed between R to G):

- Factory mounted and wired outdoor air and recirculated air damper actuators are powered.
- Supply fan starts after after a (adj.) delay.
- Tempering options to function as described below.

UNIT STOP COMMAND (OR DE-ENERGIZED):

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

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 controller will switch from unoccupied to occupied mode. The controller will return to the scheduled occupied/unoccupied mode after the override time has expired. If internal time clock is disabled, a remote contact or a BMS can control the occupied/unoccupied mode.

Occupied Mode:

- Damper control per below.
- Supply fan ON.
- Heating per below.
- Cooling per below.

Unoccupied mode (Cycle on Room Temp):The unit will cycle to maintain unoccupied room set points if there is a call for unoccupied heating, cooling or dehumidification.

- Supply fan OFF
- Recirculation air damper open.
- Outdoor air damper closed.
- On a call for heating (room temp set point – differential) supply fan cycles ON, and the heating increases the room temperature. Unit cycles off when room temperature reaches the unoccupied set point (adj.).
- On a call for cooling (room temp set point + differential) supply fan cycles ON, and the cooling decreases the room temperature. Unit cycles off when room temperature reaches the unoccupied set point (adj.).

MORNING WARMUP/COOL DOWN: Prior to occupancy, the unit will run using the warmup or cool down sequence until the occupied set point is achieved. The heating or cooling mode must not be locked out and the space temperature is below or above set point by the unoccupied hysteresis (adj.) (This Sequence must be field configured.)

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

Single Zone VAV: The controller will use a space mounted temperature sensor modulate the supply blower speed to maintain the room-air temperature set point.

OUTDOOR AIR AND RE-CIRCULATED (RECIRC) AIR DAMPER CONTROL: The outdoor and recirculated air dampers are factory mounted and wired. Outside air damper and recirculation damper will be inverse positions of each other. Example, when the outside air damper is set to 35% opening, the recirculation damper will be at 65% opening. The modulating actuator will be controlled to dictate position by the following sequence.

Constant Position-Adj. Setpoint: The outside air damper and recirculation damper will be modulating dampers that will be hold a constant position set by the minimum damper setpoint (adj.).

Supply Fan Reset: The active source will be set to local from the factory (Minimum outdoor air percentage will be constant, set using the controller) and can be field configured to Supply Fan Reset (The minimum and maximum positions are reset based off supply fan speed).

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 (adj.).

Packaged DX Cooling (Inverter Scroll): The controller will provide a modulating signal for cooling. From 0-100%, the inverter scroll will be controlled to maintain discharge temperature. The electronic expansion valve will modulate to maintain 8.0 F of superheat. The controller will provide a modulating signal for cooling. From 0-50%, the inverter scroll will be controlled to maintain discharge temperature. From 50-100% the second stage will be on in combination with the inverter scroll compressor to maintain the discharge temperature. The electronic expansion valve will modulate to maintain 8.0 F of superheat.

Modulating Hot Gas Reheat Sequence: During dehumidification the modulating HGRH is controlled to maintain the supply temperature set point.

Modulating Head Pressure Control: Lead condenser fan will have an EC motor and will modulate to maintain a head pressure set point.

DEHUMIDIFICATION CONTROL 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(adj.) above the cold-coil set point (adj.).

Cold Coil Set Point Control: The controller will control the cooling to maintain a cold coil set point. The active set point will set to local control (55 F, adj.) from the factory and can be field adjusted locally or by the BMS.

REHEAT SEQUENCE: While the unit is in dehumidification mode the outdoor air will be reheated via Modulating Hot Gas Reheat for space neutral applications.

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 > 80 F (adj.). Maximum allowable discharge air set point is 100 F.

Indirect Gas Furnace: The controller will modulate the indirect gas furnace to maintain the supply temperature set point (adj.).

TEMPERATURE CONTROL SEQUENCE: The unit will maintain the supply air discharge setpoint per the following. Adjustable locally or by BMS.

Space Setpoint Control: The supply setpoint will adjust between minimum (adj.) and maximum (adj.) limits, to satisfy the desired space temperature setpoint. Adjustable locally or by BMS.

BUILDING FREEZE PROTECTION: If the supply air temperature drops below 35 F (adj.) for 300s (adj.), the controller will de-energize the unit and activate the alarm output.

ALARMS INDICATION: The controller will display alarms and have one digital output for remote indication of an alarm condition. Possible alarms include:

Building Management System: The controller will send all alarms to the BMS.

Dirty Filter Alarm: A digital signal is sent to the controller indicating an increased pressure drop across the supply air filter (Must be adjusted in field during start up). The controller will then provide a dirty filter alarm.

Supply Air Alarm: The controller monitors the proving switch on supply blower and sends an alarm in the case of the blower proving switch not engaging for 30s (adj.).

DX Alarm: The controller monitors the refrigerant pressure. In the case of low refrigerant pressure the compressors will shut down until refrigerant pressure returns to normal values and the controller will send an alarm. In the case of high refrigerant pressure the compressors will shut down, requiring a manual reset and the controller will send a alarm.

Temperature Sensor Alarm: The controller sends an alarm in the case of a failed air temperature sensor.

ACCESSORIES: The following accessories will be included with the unit to expand the functionality or usability of the controller.

BMS Interfacing: A BMS port or serial card is provided with the controller for field interfacing with a building management system. Each card is sent out with the default parameters, and the controls contractor must change the appropriate addresses to match the BMS settings.

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

120V/24V Photoelectric Smoke Detector: Duct smoke detectors are shipped loose for field mounting and wiring in the supply and exhaust air ducts. Each duct smoke detector contains 2 normally open and 2 normally closed contacts for alarm notification. (To disable unit based off smoke detection smoke detectors contacts must be field wired between R and G)

Warranty Statement for Dedicated Outdoor Air Systems (DOAS)

Unit Warranty

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

Heat Exchanger Extended Warranty

Greenheck warrants the stainless steel heat exchanger to be free from defects in material and workmanship for a period of 25 years from the shipment date.

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.

GKD Roof Curb

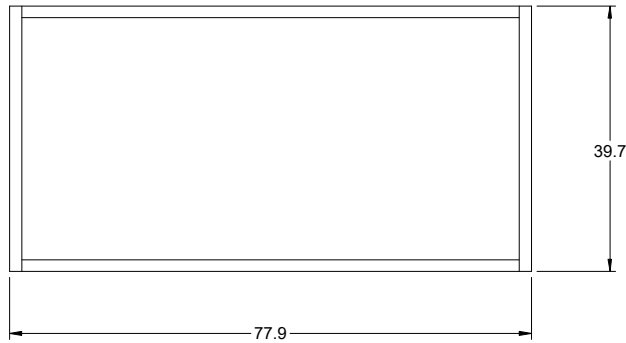
Model: GKD-39.62/77.91-G24

| Curb Height (in.) | Curb Length (in.) | Curb Width (in.) | Material | Finish Type | Duct Adapter | Curb Weight (lb) |
|-------------------|-------------------|------------------|------------|-------------|--------------|------------------|
| 24 | 77.91 | 39.62 | Galvanized | Galvanized | Yes | 120 |

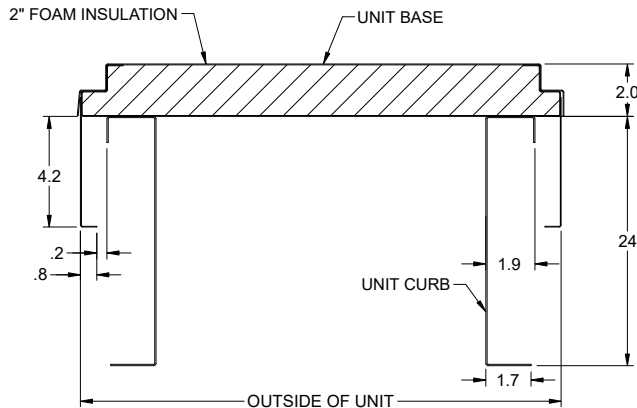
| Standard Construction Features: |
|---|
| All dimensions shown are actual and in units of in.'s |
| If unit is selected with side or end discharge/return, there will not be bottom connections supplied with the curb. |
| 14 gauge galvanized steel (perimeter channels). |
| 14 gauge galvanized steel (interior channels). |
| Ships knocked down for field assembly. |
| Curb insulation to be provided by others. |

Curb Detail

**Top View
of Curb**



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



END OF SECTION 00 41 16