Submittal Item

Project [1012100] - Cumberland County Civic Center **View Date** 3/1/2013

WBRC Architects & Engineers
44 Central Street
Bangor, ME 04401-5116
Phone: (207) 947-4511
Fax: (207) 947-4628

Submittal Item No.
00187

General Information

Item No.	00187	**Revision**	0
Package No. Rev.	00023.0		
Description	Submittal - Packaged, Indirect-Fired, Outdoor, Makeup-Air Units		
CSI Code	23 74 13 - Packaged, Outdoor, Central-Station Air-Handling Units	**Submitting Company**	Johnson and Jordan, Inc.
Reference No.		**Copies Required**	
Status	*Approved*	**Item Type**	*Product Data*
Responsible Team Member	Michael johanning (WBRC Architects & Engineers)		
Item Notes			
Primary Response			
Submission Notes			
Review Notes			

Dates

Material Required on Site		**Required Lead Time (days)**	
Approved Submittal Required By	2/27/2013	***Required Review Time (days)***	
Submission Due	2/27/2013		

Supporting Documents

Document Type	Document	Open	Description	Date	Size (KB)
Doc	1012100-01279		187 - Packaged Indirect-Fired Outdoor Makeup...	3/1/2013	2617

Distribution

Recipient	Company	Method	Date
Anthony Passmore	Cianbro	Email: apassmor@cianbro.com	3/1/2013
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Cynthia (Charlie) Quimby	WBRC Architects & Engineers	Email: charlie.quimby@wbrcae.com	2/20/2013
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Suzan M. West	Cianbro	Email: swest@cianbro.com	3/1/2013
Timothy Michaud	Johnson and Jordan, Inc.	Email: tmichaud@johnsonandjordan.com	3/1/2013

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 23 74 13 SUBMITTAL NO. 187 CIANBRO CORPORATION: By: AJP Date: 02/20/2013	☒ 1 - Reviewed, No Exception Taken ☐ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS · ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication; processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: DMonroe DATE: 3.1.13

Johnson and Jordan
Mechanical contractors

SUBMITTAL

SUBM #23
Phase Two

C.C.C.C
#12191

GENERAL CONTRACTOR ..... **Cianbro Corporation**

SUBMITTED BY ..... JOHNSON & JORDAN
SCARBOROUGH, ME.
(207) 883-8345

SUBCONTRACTOR ..... Johnson and Jordan

SUPPLIER ..... Trane

SPECIFICATION SECTION 237413

PARAGRAPH 2.1

ITEM ..... Package Roof Top Units
AHU 6-8

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME
Approved_____ Approved as Noted_____
Re-Submit_____ Reviewed_____x_____
Subject to Architects Approval _x_____
Date__2-18-13_____ By___T.M._____

Submittal

Trane U.S. Inc.

Engineer: WBRC

Prepared For:
Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074 U.S.A.
Customer P.O. Number: 182347
Customer Project Number:

Date: February 15, 2013

Job Name:
Cumberland County Civic Center
1 Civic Center Square
Portland, ME 04101
Job Number: A223063

Trane is pleased to provide the enclosed submittal for your review and approval.

PACKAGED GAS/ELECTRIC ROOFTOP UNITS

Qty	***Description***	***Tag(s)***
	Packaged Gas/Electric Rooftop Unit	
1	Trane Model YHC102E4R 8.5 Ton Packaged Gas/Electric Rooftop Unit	AHU-6

Notes:

- *Unit submitted with BACNET communications interface. Confirm required interface at time of equipment release.*
- *24" high non-seismic spring isolation roof curb provided. Standard 14" non isolated curb shown in submittal for dimensions only*

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Dan Broderick
Trane U.S. Inc. dba Trane
860 Spring Street, Unit #1
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

Tag Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	AHU-6	1	YHC102E4R - 8.5 Ton	YHC102E4RYA--H0C1A2B60000A000

Product Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): AHU-6

DX cooling, gas heat
High efficiency
Convertible configuration
8.5 Ton
460v/3ph/60hz
Microprocessor controls
Medium gas heat stainless steel heat exchanger
0-100% Economizer with Comparative Enthalpy Control and Barometric Relief
Hinged panels
2" pleated filters - MERV 8
Condenser coil hail guard
Through the base electrical w/ Circuit breaker disconnect
Powered convenience
BACnet Communications Interface – *confirm required interface*
Demand control ventilation
CO2 duct mounted, sensor only (fld)
24" high spring isolated non-seismic roof curb (fld) – *standard curb shown for reference only*
Flue stack (fld)
fld = Furnished by Trane U.S. Inc. dba Trane / Installed by Others

Mechanical Specifications - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): AHU-6

General
The units shall be convertible airflow. The operating range shall be between 115°F and 0°F in cooling as standard from the factory for units with microprocessor controls. Operating range for units with electromechanical controls shall be between 115°F and 40°F. Cooling performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be cULus listed and labeled, classified in accordance for Central Cooling Air Conditioners.

Casing
Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have lifting handles and be removed and reinstalled by removing two fasteners while providing a water and air tight seal. All exposed vertical panels and top covers in the indoor air section shall be insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material. The base of the unit shall be insulated with 1/8 inch, foil-faced, closed-cell insulation. All insulation edges shall be either captured or sealed. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting, with forklift capabilities on three sides of the unit.

Unit Top
The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top.

Two-Inch Pleated Filters
2" pleated media filters shall be available on all models.

Compressors
All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors.

Crankcase heaters shall be included on 6-10 ton units.

Dual compressors are outstanding for humidity control, light load cooling conditions and system back-up applications. Dual compressors are available on 7½-10 ton models and allow for efficient cooling utilizing 3-stages of compressor operation for all high efficiency models.

Indoor Fan
The following units shall be equipped with a direct drive plenum fan design (T/YSC120E, T/YHC092,102, 120E). Plenum fan design shall include a backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor. All plenum fan designs will have a variable speed adjustment potentiometer located in the control box. 3-5 ton units (standard efficiency 3-phase or high efficiency 3-phase with optional motor) are belt driven, FC centrifugal fans with adjustable motor sheaves. 3-5 ton units (1-phase or high efficiency 3-phase) have multispeed, direct drive motors. All 6-8½ ton units (standard efficiency) shall have belt drive motors with an adjustable idler-arm assembly for quick-adjustment to fan belts and motor sheaves. All motors shall be thermally protected. All 10 tons and 7½-8½ (high efficiency) have variable speed direct drive motors. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Outdoor Fans
The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motor shall be permanently lubricated and shall have built-in thermal overload protection.

Evaporator and Condenser Coils
Internally finned, 5/16" copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. The microchannel type condenser coil is standard for the T/YSC 10 ton models and 7½ ton high efficiency models. The microchannel type condenser coil is not offered on the 7½ ton dehumidification model. Due to flat streamlined tubes with small ports, and metallurgical tube-to-fin bond, microchannel coil has better heat transfer performance. Microchannel condenser coil can reduce system refrigerant charge by up to 50% because of smaller internal volume, which leads to

better compressor reliability. Compact all-aluminum microchannel coils also help to reduce the unit weight. All-aluminum construction improves re-cyclability. Galvanic corrosion is also minimized due to all aluminum construction. Strong aluminum brazed structure provides better fin protection. In addition, flat streamlined tubes also make microchannel coils more dust resistant and easier to clean. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil and condenser coil shall be leak tested to 600 psig. The assembled unit shall be leak tested to 465 psig. The condenser coil shall have a patent pending 1+1+1 hybrid coil designed with slight gaps for ease of cleaning. A removable, reversible, double-sloped condensate drain pan with through the base condensate drain is standard.

Tool-less Hail Guards
Tool-less, hail protection quality coil guards are available for condenser coil protection.

Controls
Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device. A choice of microprocessor or electromechanical controls shall be available. Microprocessor controls provide for all 24V control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point, and provides better building comfort. A centralized microprocessor shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection. 24-volt electromechanical control circuit shall include control transformer and contactor

High Pressure Control
All units include High Pressure Cutout as standard.

Phase monitor
Phase monitor shall provide 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator. There are no field adjustments. The module will automatically reset from a fault condition.

BACnet Communications
The BACnet communications interface allows the unit to communicate directly with a generic open protocol BACnet MS/TP Network Building Automation System Controls.

Refrigerant Circuits
Each refrigerant circuit offer thermal expansion valve as standard. Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers.

Gas Heating Section
The heating section shall have a progressive tubular heat exchanger design using stainless steel burners and corrosion resistant steel throughout. An induced draft combustion blower shall be used to pull the combustion products through the firing tubes. The heater shall use a direct spark ignition (DSI) system. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat/zone sensor. Units shall be suitable for use with natural gas or propane (field-installed kit) and also comply with the California requirement for low NOx emissions (Gas/Electric Only).

Hinged Access Doors
Sheet metal hinges are available on the Filter/Evaporator, Supply Fan/Heat, and the Compressor/Control Access Doors.

Powered or Unpowered Convenience Outlet
This is a GFCI, 120v/15amp, 2 plug, convenience outlet, either powered or unpowered. When the convenience outlet is powered, a service receptacle disconnect will be available. The convenience outlet is powered from the line side of the disconnect or circuit breaker, and therefore will not be affected by the position of the disconnect or circuit breaker. This option can only be ordered when the Through the Base Electrical with either the Disconnect Switch or Circuit Breaker option is ordered.

Plenum Fan
The following unit shall be equipped with a direct drive plenum fan design (all 10 tons and 7.5-8.5 ton high efficiency units). Plenum fan design shall include a backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor. All plenum fan designs will have a variable speed adjustment potentiometer located in the control box.

Economizer
This accessory shall be available with or without barometric relief. The assembly includes fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment off cycle. Optional solid state or differential enthalpy control shall be available for either factory or field installation. The economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.

Through the Base Electrical Access
An electrical service entrance shall be provided allowing electrical access for both control and main power connections inside the curb and through the base of the unit. Option will allow for field installation of liquid-tight conduit and an external field-installed disconnect switch.

Through the Base Electrical with Circuit Breaker
This option is a thermal magnetic, molded case, HACR Circuit Breaker with provisions for through the base electrical connections. The circuit breaker will be installed in a water tight enclosure in the unit with access through a swinging door. Wiring will be provided from the switch to the unit high voltage terminal block. The circuit breaker will provide overcurrent protection, be sized per NEC and UL guidelines, and be agency recognized by UL/CSA.

Electrical/General Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): AHU-6

ELECTRICAL / GENERAL DATA

GENERAL (2)(4)(6)

Model:	YHC102E	Oversized Motor	
Unit Operating Voltage:	414-506	MCA:	N/A
Unit Primary Voltage:	460	MFS	N/A
Unit Secondary Voltage	--	MCB:	N/A
Unit Hertz:	60		
Unit Phase:	3		
EER	13.0		
Standard Motor		Field Installed Oversized Motor	
MCA:	22.9	MCA:	N/A
MFS:	30.0	MFS:	N/A
MCB:	30.0	MCB:	N/A

HEATING PERFORMANCE

HEATING - GENERAL DATA

Heating Model:	Medium
Heating Input (Btu):	150,000/105,000
Heating Output (Btu):	121,500/84,000
No. Burners:	3
No. Stages	2
Gas Inlet Pressure	
Natural Gas (Min/Max)	4.5/14
LP (Min/Max):	10.0/14.0
Gas Pipe Connection Size:	3/4"

INDOOR MOTOR

Sandard Motor		Oversized Motor		Field Installed Oversized Motor	
Number:	1	Number:	N/A	Number:	N/A
Horsepower:	3.6	Horsepower:	N/A	Horsepower:	N/A
Motor Speed (RPM):	--	Motor Speed (RPM):	N/A	Motor Speed (RPM):	N/A
Phase	3	Phase	N/A	Phase	N/A
Full Load Amps:	4.3	Full Load Amps:	N/A	Full Load Amps:	N/A
Locked Rotor Amps:	--	Locked Rotor Amps:	N/A	Locked Rotor Amps:	N/A

COMPRESSOR Circuit 1/2

Number:	2
Horsepower:	4.3 / 2.7
Phase:	3
Rated Load Amps:	9.6 / 5.1
Locked Rotor Amps:	62.0 / 46.0

OUTDOOR MOTOR

Number:	1
Horsepower:	0.75
Motor Speed (RRM):	1100
Phase:	1
Full Load Amps:	1.5
Locked Rotor Amps:	4.6

POWER EXHAUST ACCESSORY (3)

(Field Installed Power Exhaust)

Phase:	N/A
Horsepower:	N/A
Motor Speed (RPM):	N/A
Full Load Amps:	N/A
Locked Rotor Amps:	N/A

FILTERS

Type:	Throwaway
Furnished:	Yes
Number:	3 / 2
Recommended	20"x25"x2" 20"x30"x2"

REFRIGERANT (2)

Type	R-410
Factory Charge	
Circuit #1	12.8 lb
Circuit #2	11.8 lb

NOTES:

1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory
4. Value includes oversized motor
5. Value does not include Power Exhaust Accessory.
6. EER is rated at AHRI conditions and in accordance with DOE test procedures.

3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Job Information

TRANE

Cumberland County Civic Center
Portland ME
(B16)Daniel Broderick

Tag	AHU-6		
Quantity	1	Model number	YHC102

Unit Information

Tonnage	8.5 Ton	Unit function	DX cooling, gas heat
Min. unit operating weight	1359.0 lb	Max. unit operating weight	1591.0 lb
Design Airflow	3100 cfm		

Cooling Information

Gross Total Capacity	101.19 MBh	Gross Sensible Capacity	77.34 MBh
Gross Latent Capacity	23.85 MBh	Net Total Capacity	87.15 MBh
Net Sensible Capacity	73.30 MBh	Net Sensible Heat Ratio	0.75 Number
Cooling Entering DB	80.00 F	Cooling Entering WB	67.00 F
Cooling Leaving Unit DB	58.51 F	Cooling Leaving Unit WB	57.02 F
Ambient Temp	95.00 F		

Heating Information

Heating capacity	Medium gas heat SSHX 3ph	Input Heating Capacity	150.00 MBh
Output Heating Capacity	120.00 MBh	Heating EAT	59.00 F
Heating LAT	95.10 F	Heating Delta T	36.10 F

Motor/Electrical Information

Voltage	460/60/3	Design ESP	0.950 in H2O
Indoor Motor Power	1.09 kW	Indoor mtr operating power	1.47 bhp
Indoor RPM	1273 rpm	Outdoor Motor Power	0.64 kW
Compressor Power	6.46 kW	System Power	8.19 kW
MCA	22.90 A	MOP	30.00 A
Compressor 1 RLA	9.60 A	Evaporator fan FLA	4.30 A
Condenser fan FLA	1.50 A		

Electrical values provided are estimated only and are subject to change without notice and may differ from nameplate values.

Field installed low or high static drive kits may be needed. Please check the fan performance tables in the product catalog for application ranges.

2/15/2013 Product Version 2002.09.04.1

3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Job Information

TRANE

Cumberland County Civic Center
Portland ME
(B16)Daniel Brodarick

Tag	AHU-6		
Quantity	1	Model number	YHC102

Information for LEED Projects

ASHRAE 90.1	Yes	IEER	15.00
Refrig charge (HFC-410A) - ckt 1	12.8 lb	Compressor Power	6.46 kW
Refrig charge (HFC-410A) - ckt 2	11.8 lb	Outdoor Motor Power	0.64 kW
Rated capacity (AHRI)	98.20 MBh	Indoor mtr operating power	1.47 bhp
EER @ AHRI Conditions	13.0 EER	Exhaust fan power	0.85 kW

Note: This product meets the minimum equipment efficiency requirements of ASHRAE Standard 90.1-2007 and -2010 (which are based on AHRI standard rating conditions); and, therefore, also meets the LEED "Minimum Energy Performance" prerequisite in the Energy and Atmosphere section. The power data listed above is at actual user-entered conditions. Refer to the product catalog for performance at AHRI standard rating conditions.

The LEED Green Building Rating System™ developed by the U.S. Green Building Council provides independent, third-party verification that a building project meets green building and performance measures.

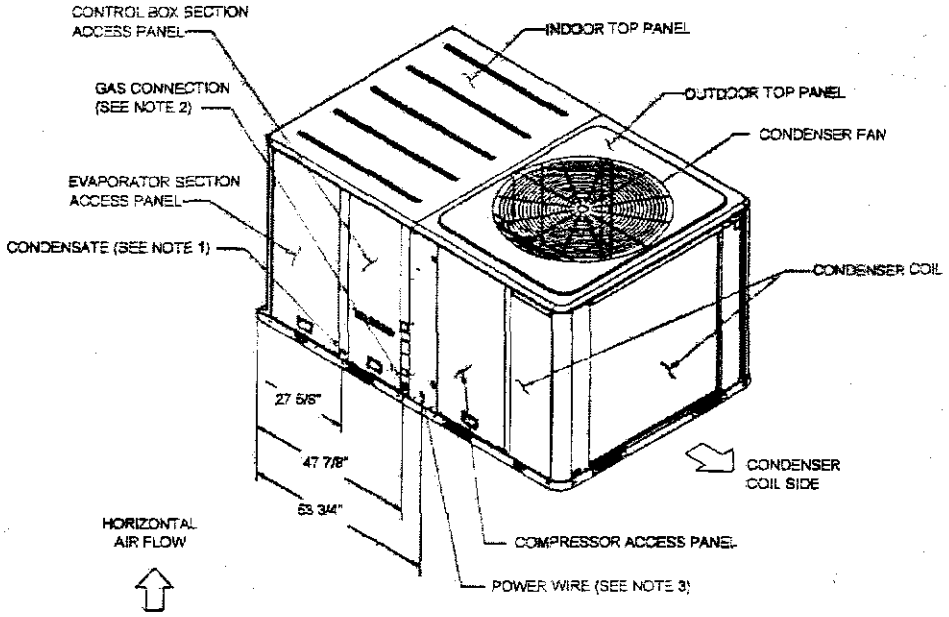
Electrical values provided are estimates only and are subject to change without notice and may differ from nameplate values.

Field installed low or high static drive kits may be needed. Please check the fan performance tables in the product catalog for application ranges.

2/15/2013 Product version 2502.09.R4.1

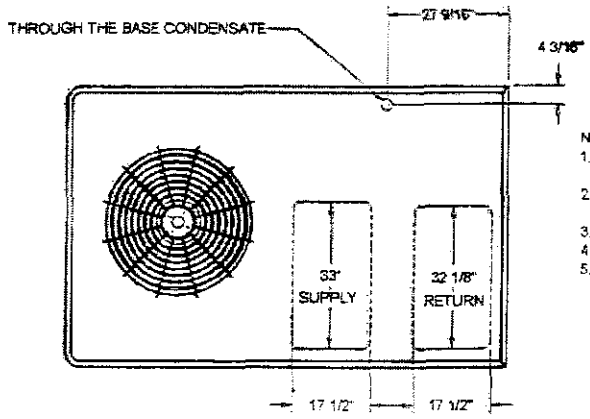
Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): AHU-6



PACKAGED GAS / ELECTRICAL

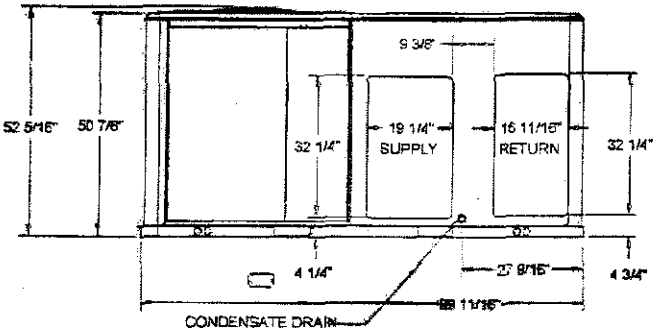
ISOMETRIC VIEW

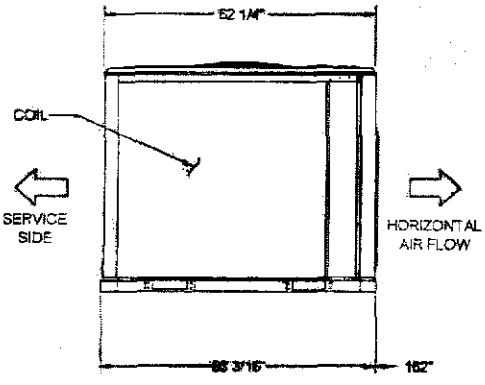


NOTES:
1. ALTERNATE CONDENSATE DRAIN CONNECTION 3/4" - 14 NPT DIA. HOLE
2. 1/2" NPT GAS CONNECTION (80 mbh, 120 mbh) ; 3/4" NPT GAS CONNECTION (150mbh, 200mbh, 250mbh)
3. UNIT POWER WIRE 1 3/8" DIA. HOLE
4. THRU -THE -BASE ELECTRICAL AND GAS IS NOT STANDARD ON ALL UNITS.
5. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION

PLAN VIEW UNIT

DIMENSION DRAWING

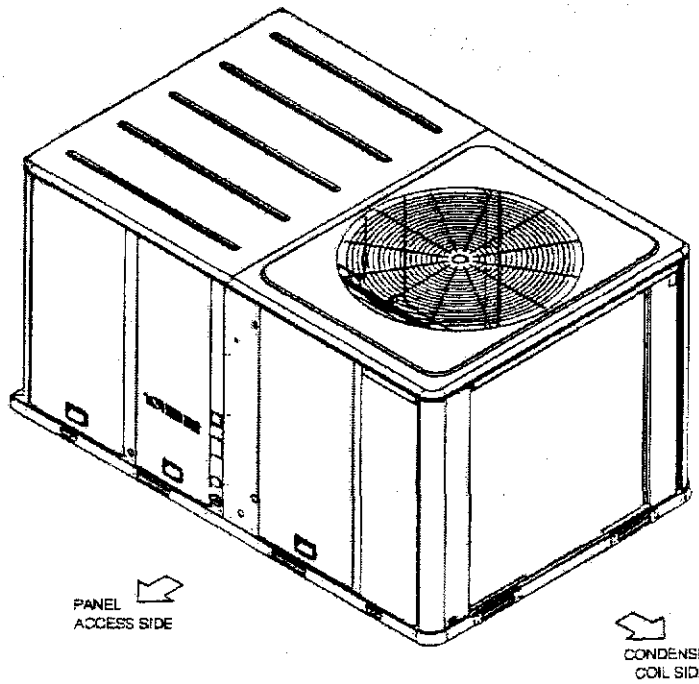


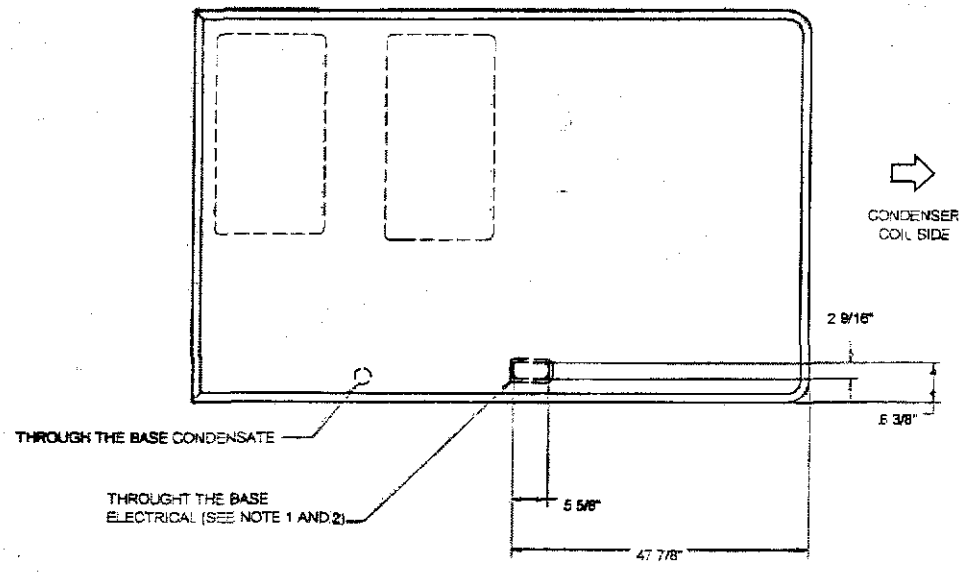


PACKAGED GAS / ELECTRICAL

DIMENSION DRAWING

Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): AHU-6





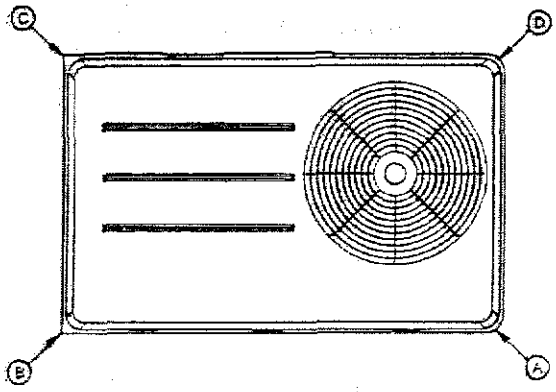
NOTES:
1. THRU -THE -BASE ELECTRICAL IS NOT STANDARD
   VERIFY OPTION IN PRODUCT DATA IN THIS DOCUMENT.
2. VERIFY WEIGHT, CONNECTION, OPTION CONFIGURATION AND
   ALL DIMENSION WITH INSTALLER DOCUMENTS
   BEFORE INSTALLATION

THRU THE BASE ELECTRICAL

PLAN / ISO VIEW DRAWING

Weight, Clearance & Rigging Diagram - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): AHU-6



PACKAGED GAS / ELECTRICAL

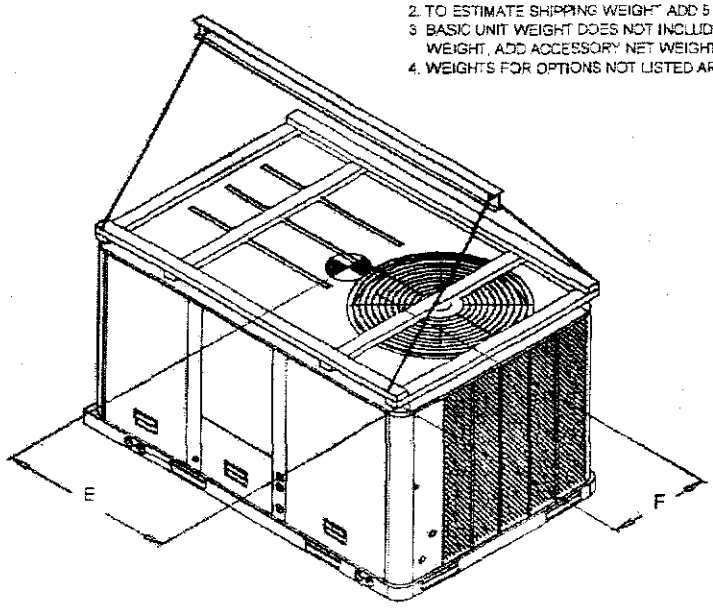
CORNER WEIGHT

INSTALLED ACCESSORIES NET WEIGHT DATA

ACCESSORY	WEIGHTS
ECONOMIZER	36.0 lb
MOTORIZED OUTSIDE AIR DAMPER	
MANUAL OUTSIDE AIR DAMPER	
BAROMETRIC RELIEF	
OVERSIZED MOTOR	
BELT DRIVE MOTOR	
POWER EXHAUST	
THROUGHT THE BASE ELECTRICAL/GAS (FIOPS)	13.0 lb
UNIT MOUNTED CIRCUIT BREAKER (FIOPS)	5.0 lb
UNIT MOUNTED DISCONNECT (FIOPS)	
POWERED CONVENIENCE OUTLET (FIOPS)	50.0 lb
HINGED DOORS (FIOPS)	12.0 lb
HAIL GUARD	30.0 lb
SMOKE DETECTOR, SUPPLY / RETURN	
NOVAR CONTROL	
STAINLESS STEEL HEAT EXCHANGER	6.0 lb
REHEAT	
ROOF CURB	

BASIC UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITY	
SHIPPING	NET	(A)	387.0 lb	(C)	284.0 lb	(E) LENGHT	(F) WIDTH
1553.0 lb	1359.0 lb	(B)	376.0 lb	(D)	303.0 lb	48"	28"

NOTE:
1. CORNER WEIGHTS ARE GIVEN FOR INFORMATION ONLY.
2. TO ESTIMATE SHIPPING WEIGHT ADD 5 LBS TO NET WEIGHT.
3. BASIC UNIT WEIGHT DOES NOT INCLUDE ACCESSORY WEIGHT. TO OBTAIN TOTAL WEIGHT, ADD ACCESSORY NET WEIGHT TO BASIC UNIT WEIGHT.
4. WEIGHTS FOR OPTIONS NOT LISTED ARE >5 LBS.

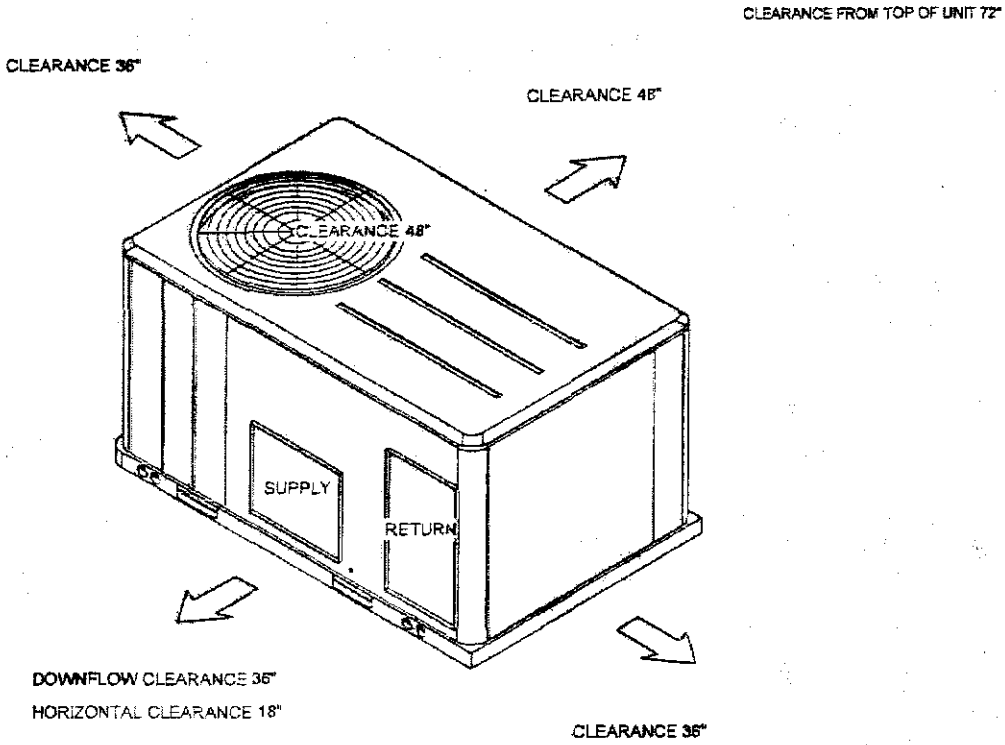


PACKAGED GAS / ELECTRICAL

RIGGING AND CENTER OF GRAVITY

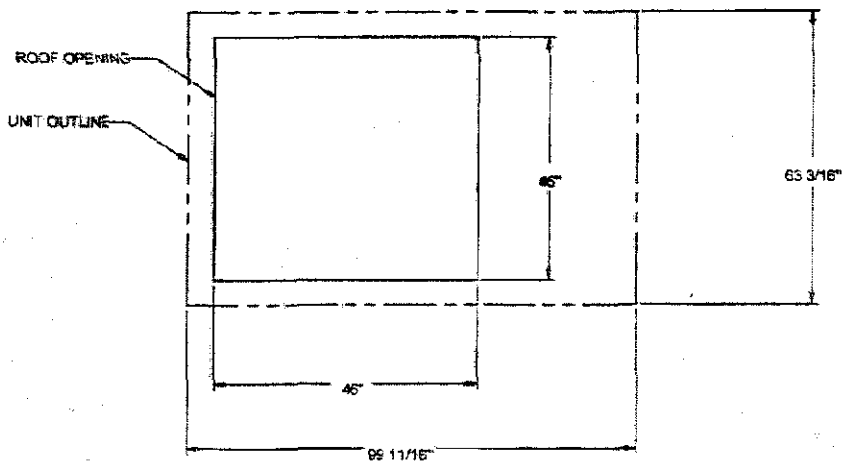
Weight, Clearance & Rigging Diagram - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): AHU-6



PACKAGED GAS / ELECTRIC

CLEARANCE

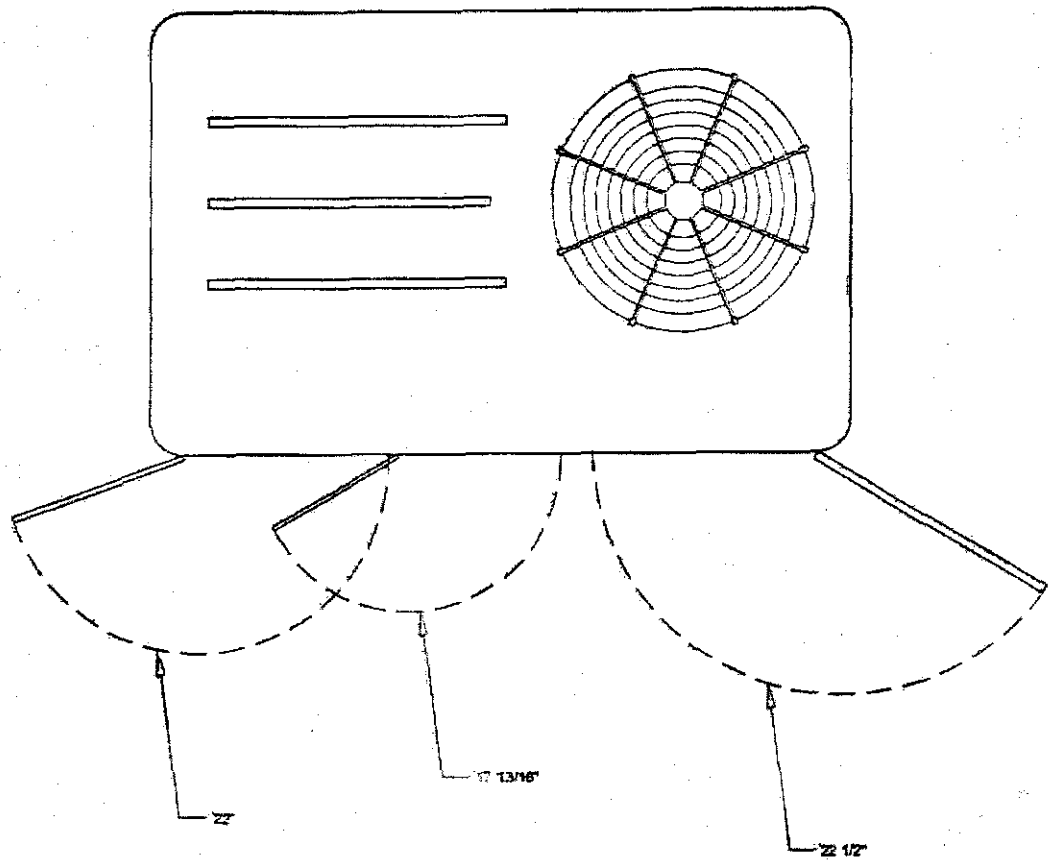


PACKAGED GAS / ELECTRIC

DOWNFLOW TYPICAL ROOF OPENING

Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

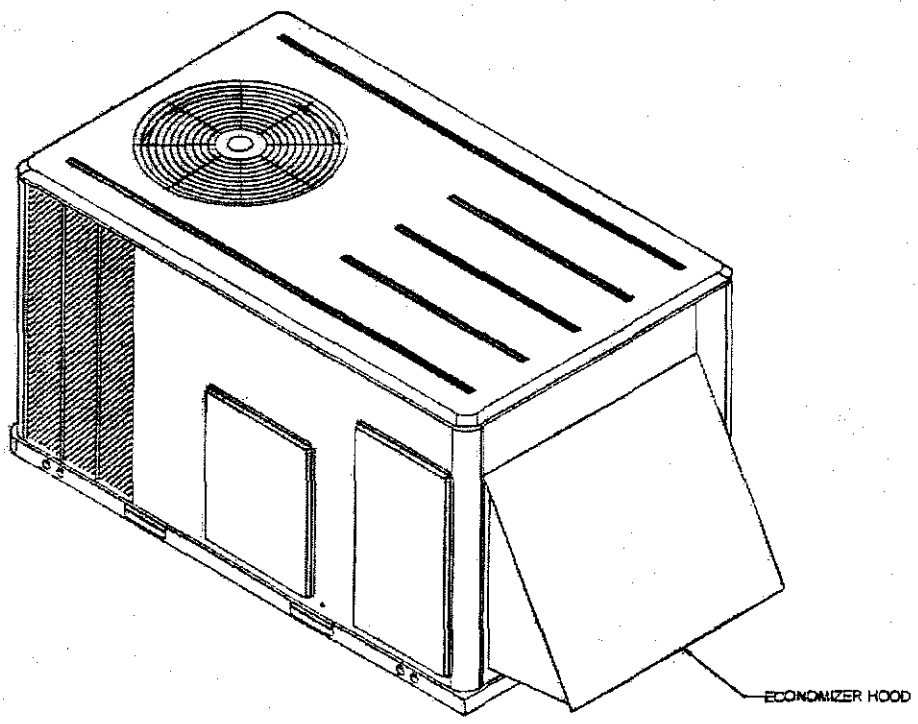
Item: A1 Qty: 1 Tag(s): AHU-6

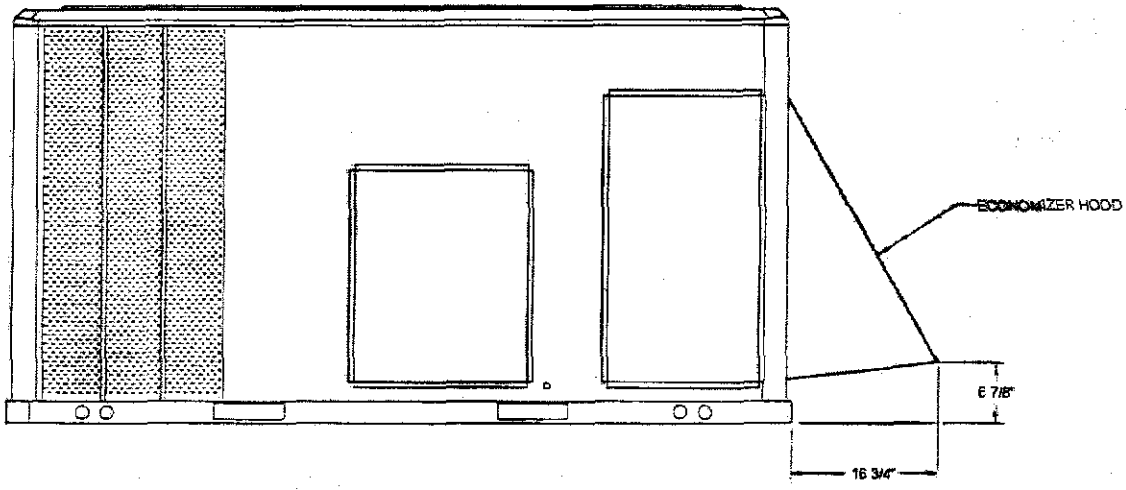


SWING DIAMETER - HINGED DOOR(S) OPTION

ACCESSORY

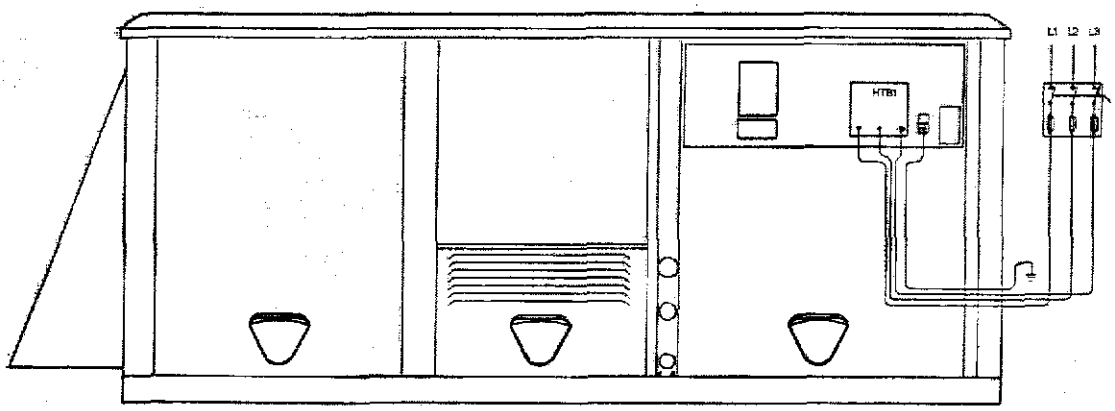
Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): AHU-6





ECONOMIZER HOOD
ACCESSORY

Field Wiring - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): AHU-6



ZONE SENSOR WIRE TABLE

WIRE SIZE	MAXIMUM WIRE LENGTH
22 GAUGE	1800'
20 GAUGE	3000'
18 GAUGE	4500'
16 GAUGE	7200'
14 GAUGE	11700'

NOTE:

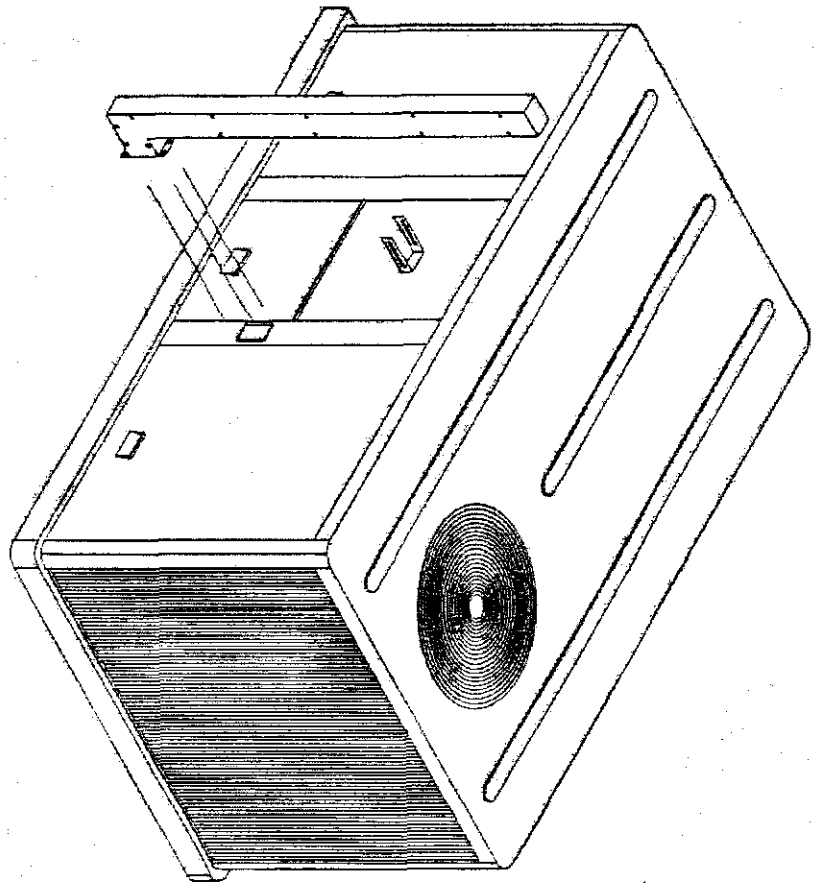
1. All wiring and devices shown dashed to be supplied and installed by the customer in accordance with national and local electrical codes.
2. Low voltage control wiring must not be run in conduit with power wiring.

Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop – Flue Stack

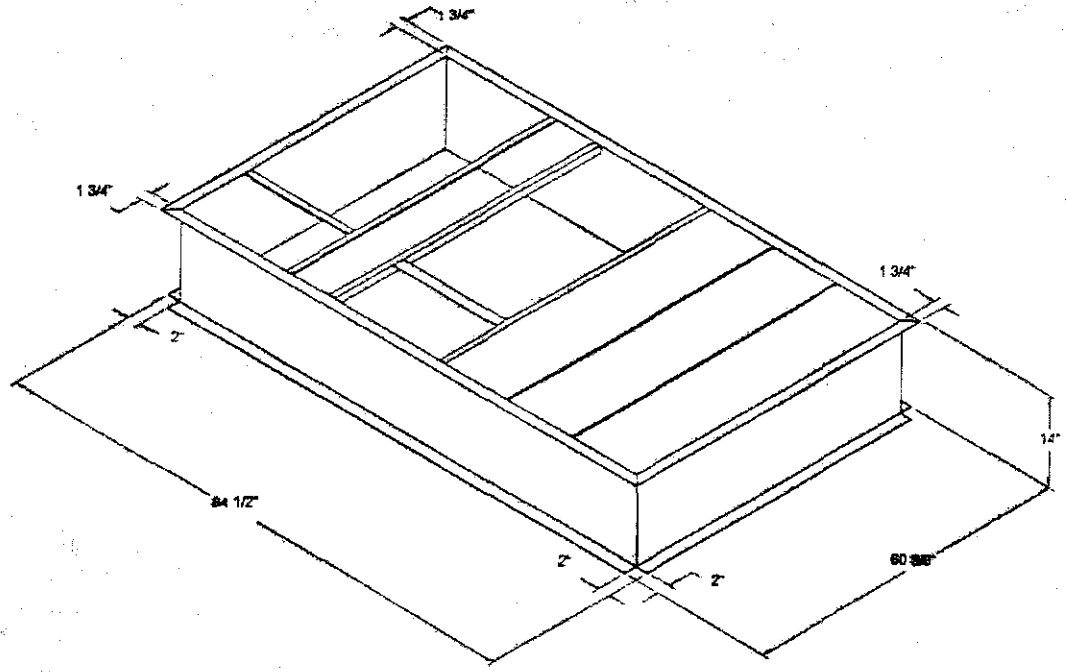
Item: A1 Qty: 1 Tag(s): AHU-6

Installation Instructions

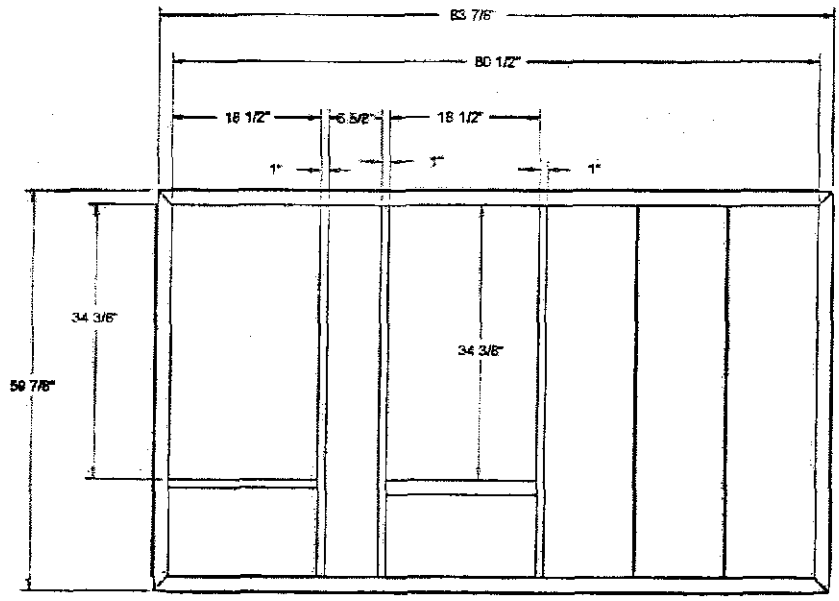
1) Remove (2) screws at junction of roof and post that contains flue exhaust.
2) Place brace over holes exposed by removing (2) screws, and reinstall screws (loosely)
3) Center the stack over the exhaust and install screws in the (4) holes in stack
4) Level stack and install screws in sides through bracket.
5) Tighten all screws
6) If additional bracing is required it MUST be installed



Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop – *reference only*
Item: A1 Qty: 1 Tag(s): AHU-6



GAS / ELECTRICAL ISOMETRIC ROOF TOP CURB
ACCESSORY

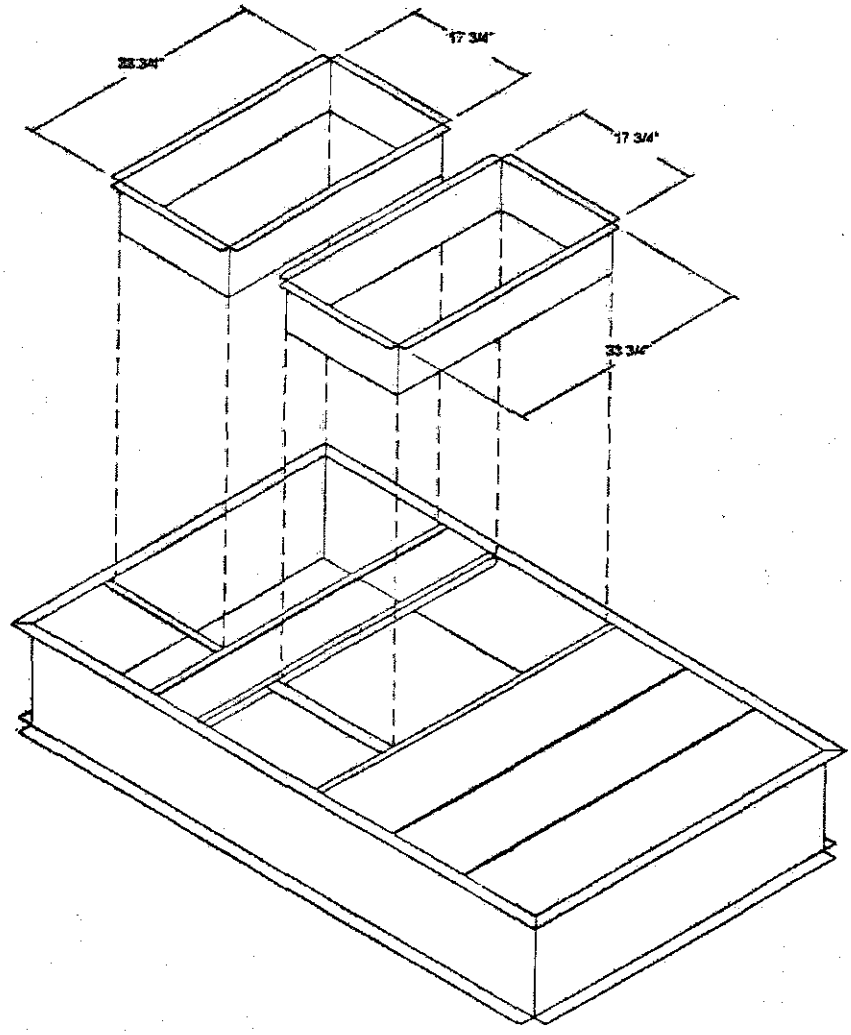


GAS / ELECTRICAL TOP VIEW ROOF TOP CURB
ACCESSORY

Standard curb shown for reference only. 24" high spring isolated non-seismic curb is being provided.

Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): AHU-6

Downflow Duct Connections - Field Fabricated
All Flanges - 1 1/4"



DUCT CONNECTIONS
ACCESSORY

Submittal

Trane U.S. Inc.

Engineer: WBRC

Date: February 15, 2013

Prepared For:
Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074 U.S.A.
Customer P.O. Number: 182347
Customer Project Number:

Job Name:
Cumberland County Civic Center
1 Civic Center Square
Portland, ME 04101
Job Number: A223063

Trane is pleased to provide the enclosed submittal for your review and approval.

PACKAGED GAS/ELECTRIC ROOFTOP UNITS

Qty	***Description***	***Tag(s)***
	Packaged Gas/Electric Rooftop Unit	
1	Trane Model Packaged YHD300F4R 25 Ton Gas/Electric Rooftop Unit	AHU-8

Notes:

- *Unit submitted with BACNET communications interface. Confirm required interface at time of equipment release.*
- *24" high non-seismic spring isolation roof curb provided. Standard 14" non isolated curb shown in submittal for dimensions only*

Dan Broderick
Trane U.S. Inc. dba Trane
860 Spring Street, Unit #1
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Tag Data - Packaged Gas/Electric Rooftop Units (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	AHU-8	1	YHD300F4R - 25 Ton	YHD300F4RZA--H3C1A2B6A000A00000000000000

Product Data - Packaged Gas/Electric Rooftop Units

Item: A1 Qty: 1 Tag(s): AHU-8

High efficiency Gas/Electric rooftop
Downflow
25 Ton
460v/3ph/60hz
Reliatel
Gas Heat – Stainless Steel Heat Exchanger – High Heat
0-100% Economizer with Comparative Enthalpy Control and Barometric Relief
High Efficiency Belt Drive
Hinged panels
2" Pleated Filters
Condenser coil hail guard
Through the base electric w/ Unit Mounted Circuit Breaker
Powered convenience outlet
BACnet communications interface – *Confirm required interface prior to release*
TXV
Demand ventilation controls
CO2 duct mounted, sensor only (fld)
5 Year compressor warranty
24" high spring isolated non-seismic roof curb (fld) – *standard curb shown for reference only*
Flue stack (fld)
fld = Furnished by Trane U.S. Inc. dba Trane / Installed by Others

Mechanical Specifications - Packaged Gas/Electric Rooftop Units
Item: A1 Qty: 1 Tag(s): AHU-8

General
The units shall be dedicated downflow or horizontal airflow. The operating range shall be between 115°F and 0°F in cooling as standard from the factory for all units. Cooling performance shall be rated in accordance with AHRI testing procedures. All units shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation and control sequence, before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be UL listed and labeled, classified in accordance to UL 1995/C 22.2, 236-05 3rd Edition.

Casing
Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. In order to ensure a water and air tight seal, service panels shall have lifting handles and no more than three screws to remove. All exposed vertical panels and top covers in the indoor air section shall be insulated with a 1/2 inch, 1 pound density foil-faced, fire-resistant, permanent, odorless, glass fiber material. The base of the downflow unit shall be insulated with 1/2 inch, 1 pound density foil-faced, closed-cell material. The downflow unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 11/8 inch high supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting.

Unit Top
The top cover shall be one piece, or where seams exist, double hemmed and gasket sealed to prevent water leakage.

Filters
Two inch standard filters shall be factory supplied on all units. Optional two inch pleated media filters shall be available.

Compressors
All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of nameplate voltage. Internal overloads shall be provided with the scroll compressors. All models shall have crankcase heaters, phase monitors and low and high pressure control as standard.

Crankcase Heaters
These band heaters provide improved compressor reliability by warming the oil to prevent migration during off-cycles or low ambient conditions. These are standard on all Voyager models.

Refrigerant Circuits
Each refrigerant circuit shall have independent fixed orifice or thermostatic expansion devices, service pressure ports, and refrigerant line filter driers factory installed as standard. An area shall be provided for replacement suction line driers.

Evaporator and Condenser Coils
Microchannel coils will be burst tested by the manufacturer. Internally finned, 5/16¿ copper tubes mecnanically bonded to a configured aluminum plate fin shall be standard for evaporator coils. Microchannel condenser coils shall be standard on all units. Coils shall be leak tested to ensure the pressure integrity. The evaporator coil and condenser coil shall be leak tested to 225 psig and pressure tested to 450 psig. Sloped condensate drain pans are standard.

Gas Heating Section
The heating section shall have a drum and tube heat exchanger design using corrosion resistant steel components. A forced combustion blower shall supply premixed fuel to a single burner ignited by a pilotless hot surface ignition system. In order to provide reliable operation, a negative pressure gas valve shall be used on standard furnaces and a pressure switch on furnaces with modulating heat that requires blower operation to initiate gas flow. On an initial call for heat, the combustion blower shall purge the heat exchanger 45 seconds before ignition. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat. Units shall be suitable for use with natural gas or propane (field installed kit) and shall also comply with California requirements for low NOx emissions. The 12½- 25 tons shall have two stage heating (Gas/Electric Only).

Outdoor Fans
The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge

position. The fan motor(s) shall be permanently lubricated and shall have built-in thermal overload protection.

Indoor Fan
Units above shall have belt driven, FC centrifugal fans with adjustable motor sheaves. Units with standard motors shall have an adjustable idler-arm assembly for quick-adjustment of fan belts and motor sheaves. All motors shall be thermally protected. Oversized motors shall be available for high static application. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Controls
Unit shall be completely factory wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device. ReliaTel controls shall be provided for all 24 volt control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point, and provides better building comfort. A centralized control shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.

High Pressure Cutout
This option is offered for units that do not have High Pressure cutout as standard.

Economizer - Downflow
The assembly includes fully modulating 0-100 percent motor and dampers, barometric relief, minimum position setting, preset linkage, wiring harness with plug, fixed dry bulb and spring return actuator. The barometric relief damper shall be standard with the downflow economizer and shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment "off" cycle. Solid state enthalpy and differential enthalpy control shall be field-installed.

Discharge Line Thermostat
A bi-metal element discharge line thermostat is installed as a standard option on the discharge line of each system. This standard option provides extra protection to the compressors against high discharge temperatures in case of loss of charge, extremely high ambient and other conditions which could drive the discharge temperature higher. Discharge line thermostat is wired in series with high pressure control. When the discharge temperature rises above the protection limit, the bi-metal disc in the thermostat switches to the off position, opening the 24 VAC circuit. When the temperature on the discharge line cools down, the bi-metal disc closes the contactor circuit, providing power to the compressor. When the thermostat opens the fourth time, the ReliaTel control must be manually reset to resume operation on that stage.

Stainless Steel Heat Exchanger
Gas heat exchanger shall be of drum and tube design constructed from a minimum 304 Grade stainless steel. The stainless steel heat exchanger shall have a 10-year warranty as standard (Gas/ Electric Only).

Tool-less Hail Guards
Tool-less, hail protection quality coil guards are available for condenser coil protection.

Through the Base Electrical with Circuit Breaker
This option is a thermal magnetic, molded case, HACR Circuit Breaker with provisions for through the base electrical connections. The circuit breaker will be installed in a water tight enclosure in the unit with access through a swinging door. Factory wiring will be provided from the switch to the unit high voltage terminal block. The circuit breaker will provide overcurrent protection, be sized per NEC and UL guidelines, and be agency recognized by UL/CSA.

Through the Base Electrical with Disconnect Switch
Three-pole, molded case, disconnect switch with provisions for through the base electrical connections are available. The disconnect switch will be installed in the unit in a water tight RT-PRC028-EN 121 enclosure with access through a swinging door. Factory wiring will be provided from the switch to the unit high voltage terminal block. The switch will be UL/CSA agency recognized.

Note: The disconnect switch will be sized per NEC and UL guidelines but will not be used in place of unit overcurrent protection.

Hinged Access Doors
Sheet metal hinges are available on the Filter/Evaporator Access Door and the Compressor/Control Access Door. This option is available on all downflow models.

Two-Inch Pleated Filters
Two inch pleated media filters shall be available on all models.

BACnet Communications
The BACnet communications interface allows the unit to communicate directly with a generic open protocol BACnet MS/TP Network Building Automation System Controls.

Powered or Unpowered Convenience Outlet
This option is a GFCI, 120v/15amp, 2 plug, convenience outlet, either powered or unpowered. When the convenience outlet is powered, a service receptacle disconnect will be available. The convenience outlet is powered from the line side of the disconnect or circuit breaker, and therefore will not be affected by the position of the disconnect or circuit breaker. This option can only be ordered when the Through the Base Electrical with either the Disconnect Switch, or Circuit Breaker, option is ordered. This option is available on all downflow models (Gas/Electric Only).

Reference or Comparative Enthalpy
Reference Enthalpy is used to measure and communicate outdoor humidity. The unit receives and uses this information to provide improved comfort cooling while using the economizer. Comparative Enthalpy measures and communicates humidity for both outdoor and return air conditions, and return air temperature. The unit receives and uses this information to maximize use of economizer cooling, and to provide maximum occupant comfort control. Reference or Comparative Enthalpy option shall be available when a factory or field installed Downflow Economizer is ordered. This option is available on all downflow models.

Comparative Enthalpy-Factory Installed
This option will be factory installed to measure and communicate humidity for both outdoor and return air conditions, and return air temperature. The unit will receive and use this information to maximize use of economizer cooling, and to provide maximum occupant comfort control.

Electrical/General Data - Packaged Gas/Electric Rooftop Units

Item: A1 Qty: 1 Tag(s): AHU-8

ELECTRICAL / GENERAL DATA

GENERAL PERFORMANCE

		Standard Motor (1)(3)(4)	
Model (Ton): (10)(11)(12)(13)(14)	YHD300F (25.0)	Minimum Circuit Ampacity:	56.0
Unit Operating Voltage Range:	414-506	Maximum Fuse Size:	70.0
Unit Primary Voltage:	460	Maximum (HACR) Circuit Breaker:	70.0
Unit Secondary Voltage:	-		
Unit Hertz:	60	Standard Oversized Motor (5)(4)	
Unit Phase:	3	Minimum Circuit Ampacity:	
		Maximum Fuse Size:	
EER: (7)	10.6	Maximum (HACR) Circuit Breaker:	

Accessory Oversized Motor (6)(4)	
Minimum Circuit Ampacity:	
Maximum Fuse Size:	
Maximum (HACR) Circuit Breaker:	

GAS HEATING

Heating Models:	High
Heating and 1 Stage Input (Btu/h)	400,000 / 300,000
Heating and 1 Stage Output (Btu/h):	324,000 / 243,000
Min./Max. Gas Input -	
Pressure Natural or LP (in w.c):	2.5/14.0
Gas Connection Pipe Size:	3/4"

COMPRESSOR

	Circuit #1 / 2
Number:	2
Horsepower:	12.8/6.9
Phase:	3
Rated Load Amps:	21.2/12.2
Locked Rotor Amps:	158.0/100.0

INDOOR MOTOR

Standard Motor	
Number:	1
Horsepower:	7.5
Motor Speed (RPM):	3,450
Phase:	3
Full Load Amps:	11.0
Locked Rotor Amps:	74.0

Standard Oversized Motor (6)	
Number:	
Horsepower:	
Motor Speed (RPM):	
Phase:	
Full Load Amps:	
Locked Rotor Amps:	

Accessory Oversized Motor (6)	
Number:	
Horsepower:	
Motor Speed (RPM):	
Phase:	
Full Load Amps:	
Locked Rotor Amps:	

OUTDOOR MOTOR

Number: (8)	2
Horsepower:	1.0
Motor speed (RPM):	1,125
Phase:	1
Full Load Amps:	2.9
Locked Rotor Amps:	5.8

POWER EXHAUST

(Field Installed Power Exhaust)

Horsepower:	N/A
Motor Speed (RPM):	N/A
Phase:	N/A
Full Load Amps:	N/A
Locked Rotor Amps:	N/A

COMBUSTION BLOWER MOTOR

(Gas-Fired Heating only)

Horsepower:	0.1
Motor Speed (RPM):	3500/2800
Phase:	1
Full Load Amps:	0.8
Locked Rotor Amps:	2.00

FILTER

Type:	Throwaway
Furnished:	Yes
Number:	8 / 4
Recommended Size:	20"x20"x2" / 20"x16"x2"

REFRIGERANT

	Circuit #1 / 2
Type: (2)	R-410
Factory Charge Circuit #1 / 2:	12.7 lb / 6 13/16"

NOTES:

1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory
4. Value does not include Heater
5. Value include Standard Motor
6. Value include Oversized Motor
7. EER is rated at AHRI conditions and in accordance with DOE test procedures.
8. For Compressor Motors and Condenser Fan Motors; Amp draw for each motor, multiply value by number of motors to determine total amps
9. HP for each compressor
10. TXV/Face-Split Option (Downflow Only): YCD211E3,4,W (EER):12; (System Power kW): 17.33; (Refrigerant Control): Expansion Valve;
11. TXV/Face-Split Option (Downflow Only): YCD241E3,4,W (EER):11; (System Power kW): 22; (Refrigerant Control): Expansion Valve;
12. TXV/Face-Split Option (Downflow Only) YCD301E3,4,W (EER):11; (System Power kW): 25.45; (Refrigerant Control): Expansion Valve;
13. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270 or 370
14. AFUE is rated in accordance with DOE test procedures

12 1/2 -25 Ton Packaged Unitary Gas/Elec Rooftop - CTO

TRANE

Cumberland County Civic Center

Tag	AHU-8		
Quantity	1	Model number	YHD300

Unit Information

Tonnage	25 Ton	Unit function	Gas/Electric
Min. Unit Operating Weight	1952.0 lb	Max Unit Operating Weight	2375.0 lb
Design Airflow	10000 cfm		

Cooling Information

Gross Total Capacity	291.19 MBh	Gross Sensible Capacity	222.24 MBh
Gross Latent Capacity	68.95 MBh	Net Total Capacity	264.44 MBh
Net Sensible Capacity	195.49 MBh	Net Sensible Heat Ratio	0.74 Number
Cooling Entering Dry Bulb	80.00 F	Cooling Entering Wet Bulb	67.00 F
Cooling Leaving Unit DB	62.17 F	Cooling Leaving Unit WB	58.89 F
Ambient Temp	95.00 F		

Heating Information

Heating capacity	Gas Heat - SS Ht Ex - High	Output Htg Capacity	324.00 MBh
Output Htg Capacity w/Fan	350.75 MBh	Heating EAT	63.00 F
Heating LAT	92.86 F		

Motor/Electrical Information

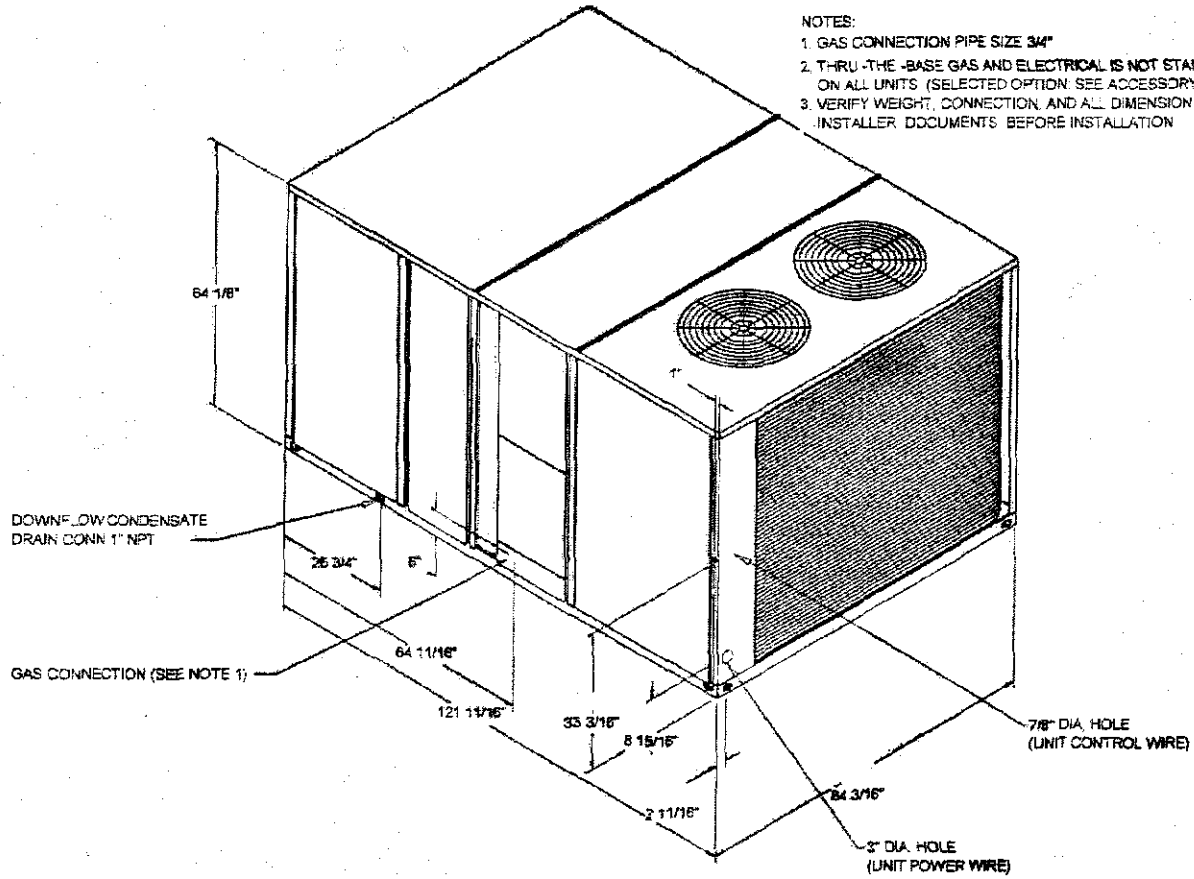
Voltage	460/60/3	Design ESP	0.800 in H2O
Indoor Motor Power	6.33 kW	Indoor Mtr. Operating Power	8.49 bhp
Indoor RPM	898 rpm	Outdoor Motor Power	2.11 kW
Compressor Power	20.93 kW	System Power	29.37 kW
MCA	56.00 A	MOP	70.00 A
Compressor 1 RLA	21.20 A	Compressor 2 RLA	12.20 A
Evaprator Fan FLA	11.00 A	Condenser Fan FLA	2.90 A

LEED Information

ASHRAE 90.1	Yes		
Refrig charge (HFC-410A) - ckt 1	12.7 lb	Refrig charge (HFC-410A) - ckt 2	6.8 lb
Compressor Power	20.93 kW	Outdoor Motor Power	2.11 kW
Rated capacity (AHRI)	272.00 MBh	Exhaust fan power	0.56 kW
Indoor Mtr. Operating Power	8.49 bhp	SEER @ AHRI	

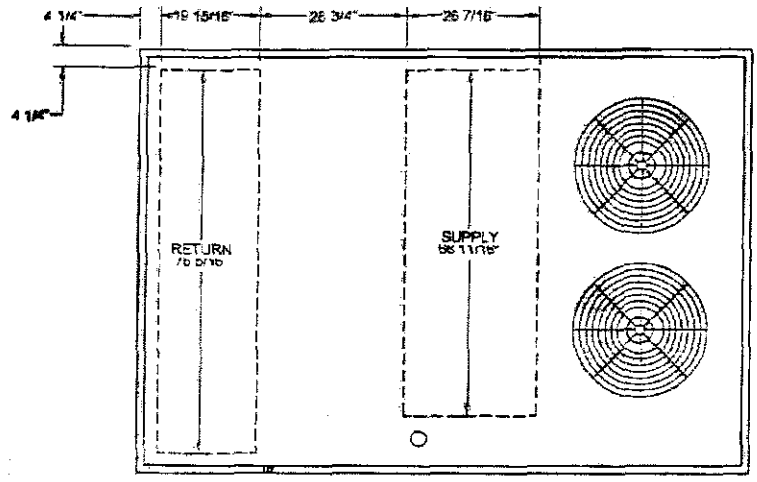
Unit Dimensions - Packaged Gas/Electric Rooftop Units

Item: A1 Qty: 1 Tag(s): AHU-8



PACKAGED GAS/ELECTRIC - DOWNFLOW

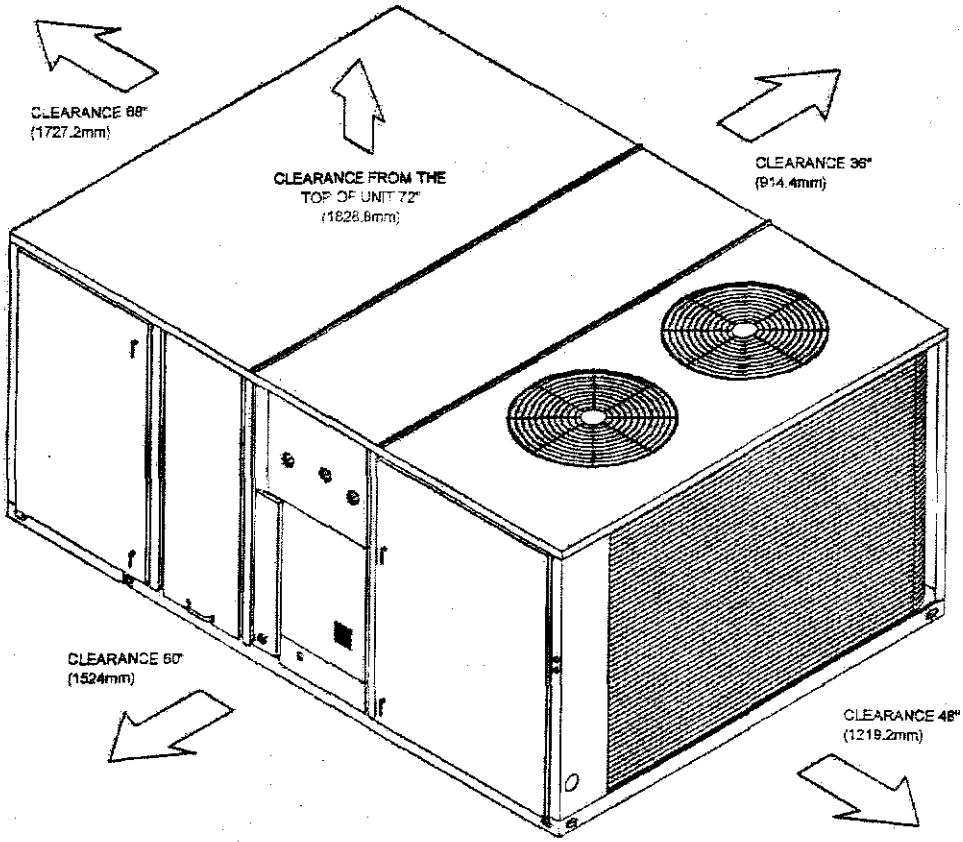
ISOMETRIC DRAWING



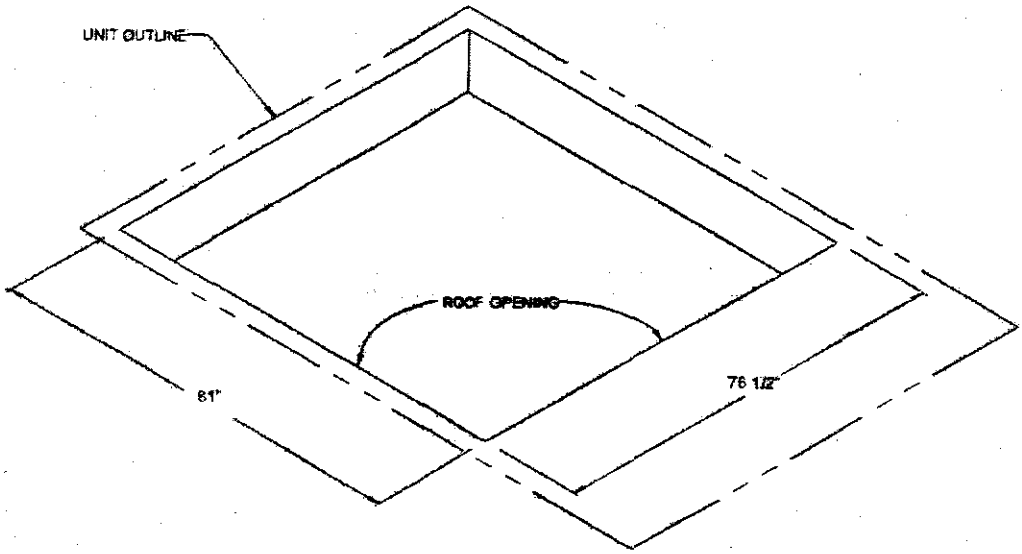
PACKAGED GAS/ELECTRIC - DOWNFLOW

PLAN VIEW DRAWING

Weight, Clearance & Rigging Diagram - Packaged Gas/Electric Rooftop Units
Item: A1 Qty: 1 Tag(s): AHU-8



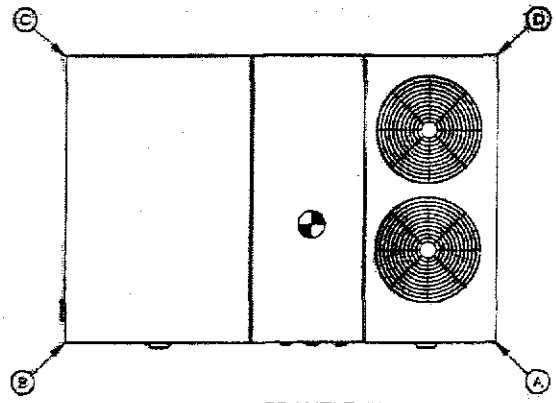
DOWNFLOW-PACKAGED GAS/ELECTRIC CLEARANCE



DOWNFLOW-PACKAGED GAS/ELECTRIC ROOF OPENING CLEARANCE

Weight, Clearance & Rigging Diagram - Packaged Gas/Electric Rooftop Units

Item: A1 Qty: 1 Tag(s): AHU-8



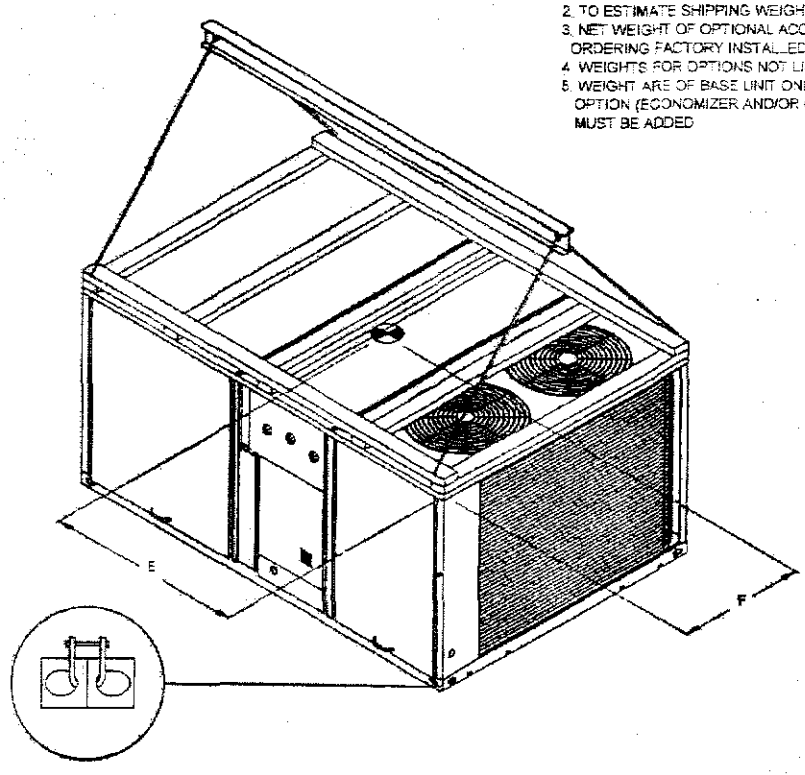
CORNER WEIGHT

INSTALLED OPTIONS NET WEIGHT DATA

Accessory	Accessory
Economizer	80.0 lb
Motorized Outside Air Damper	
Manual Outside air Damper	
Oversized Motor	
High Static Drive	
Thru the Base Electrical	23.0 lb
Unit Mounted Circuit Breaker	10.0 lb
Unit Mounted Disconnect	
Power Exhaust	
Hinged Doors	27.0 lb
Zone Sensor	
LPG Conversion Kit	
Powered Convenience Outlet	36.0 lb
Roof Curb	

BASE UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITY	
SHIPPING	NET	(A)	(B)	(C)	(D)	E	F
2684.0 lb	2207.0 lb	702.0 lb	579.0 lb	422.0 lb	507.0 lb	57"	35"

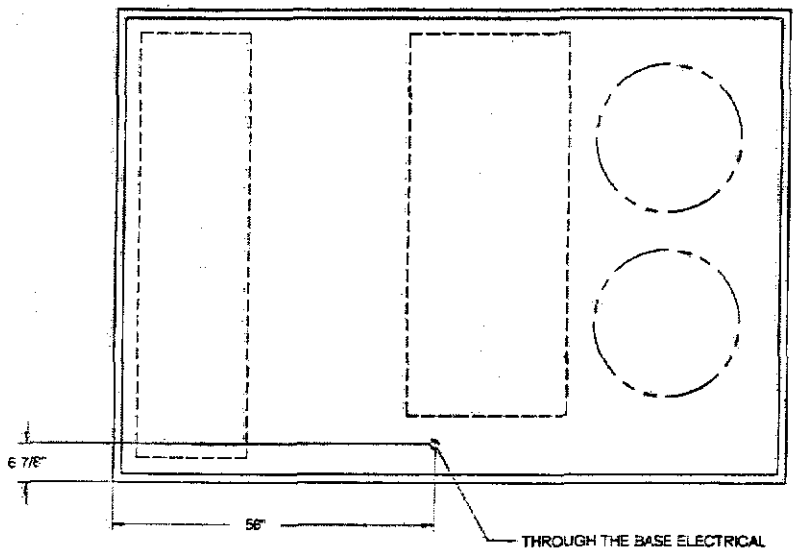
NOTE:
1. CORNER WEIGHTS ARE GIVEN FOR INFORMATION ONLY
2. TO ESTIMATE SHIPPING WEIGHT OF OPTION/ACCESSORIES ADD 5 LBS TO NET WEIGHT.
3. NET WEIGHT OF OPTIONAL ACCESSORIES SHOULD BE ADD TO UNIT WEIGHT WHEN ORDERING FACTORY INSTALLED ACCESSORIES.
4. WEIGHTS FOR OPTIONS NOT LISTED ARE < 5 LBS.
5. WEIGHT ARE OF BASE UNIT ONLY. FOR TOTAL WEIGHT, 10 DIGIT FACTORY INSTALLED OPTION (ECONOMIZER AND/OR OVERSIZED MOTOR OR FIOP/ACCESSORY WEIGHT MUST BE ADDED



RIGGING AND CENTER OF GRAVITY

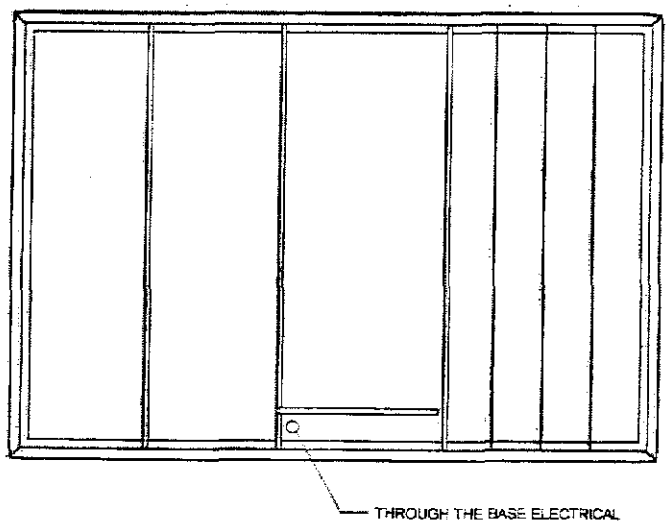
Weight, Clearance & Rigging Diagram - Packaged Gas/Electric Rooftop Units

Item: A1 Qty: 1 Tag(s): AHU-8



THROUHG THE BASE ELECTRICAL

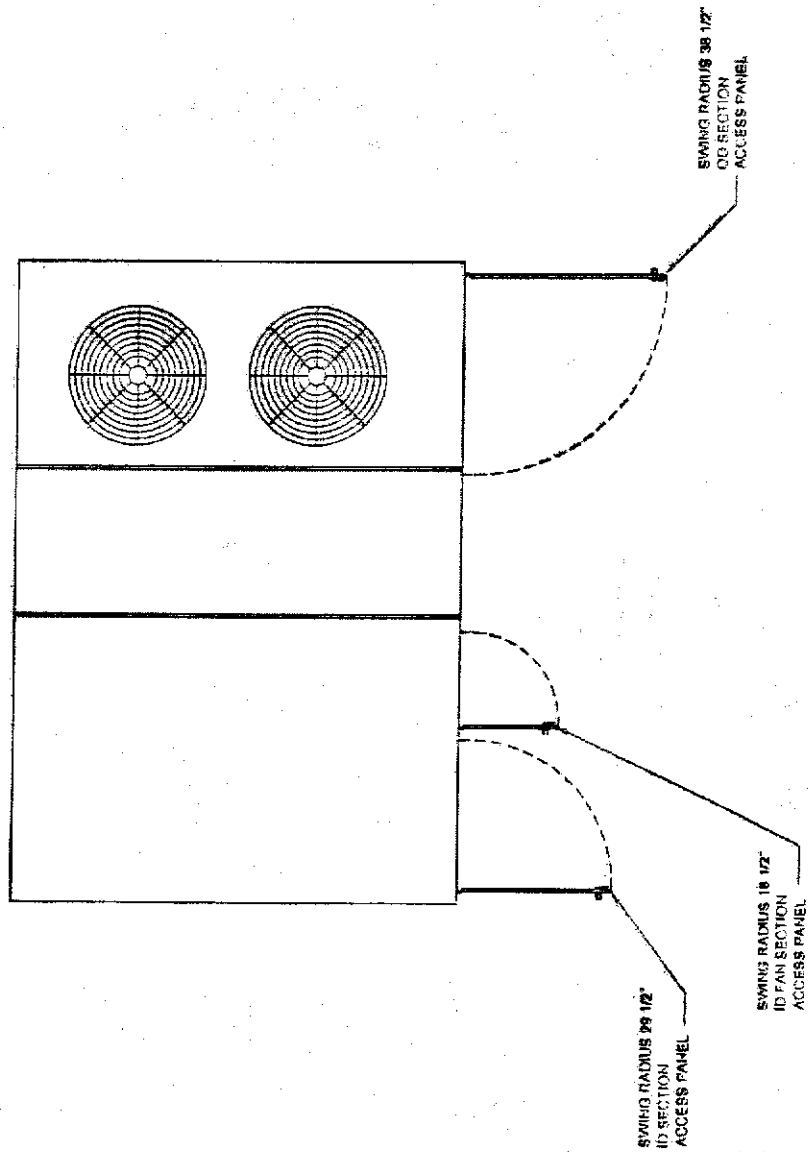
ACCESSORY-PLAN VIEW



THROUHG THE BASE ELECTRICAL ROOF CURB

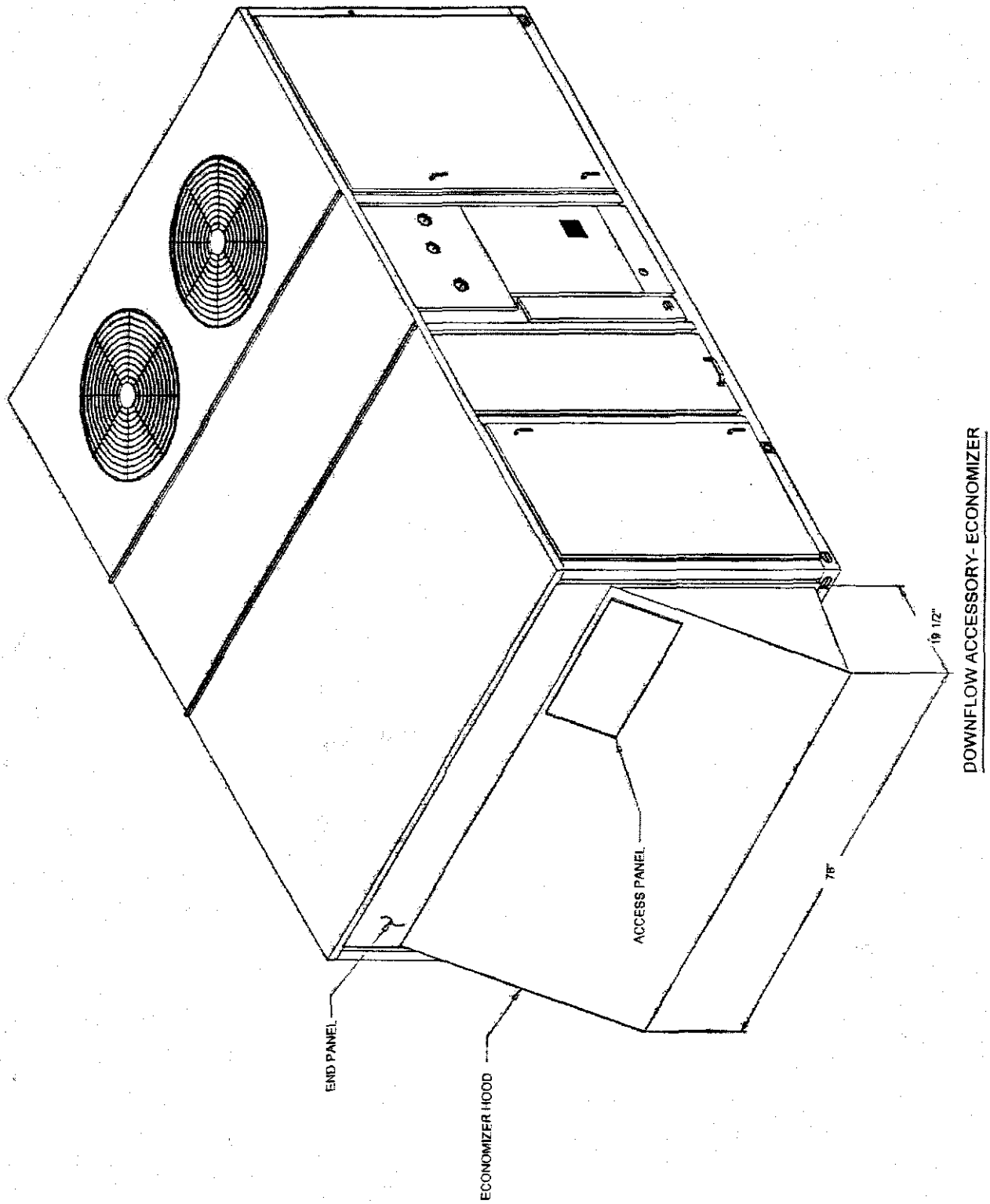
ACCESSORY-PLAN VIEW

Accessory - Packaged Gas/Electric Rooftop Units
Item: A1 Qty: 1 Tag(s): AHU-8



ACCESSORY-HINGGING ACCESS DOORS

Accessory - Packaged Gas/Electric Rooftop Units
Item: A1 Qty: 1 Tag(s): AHU-8

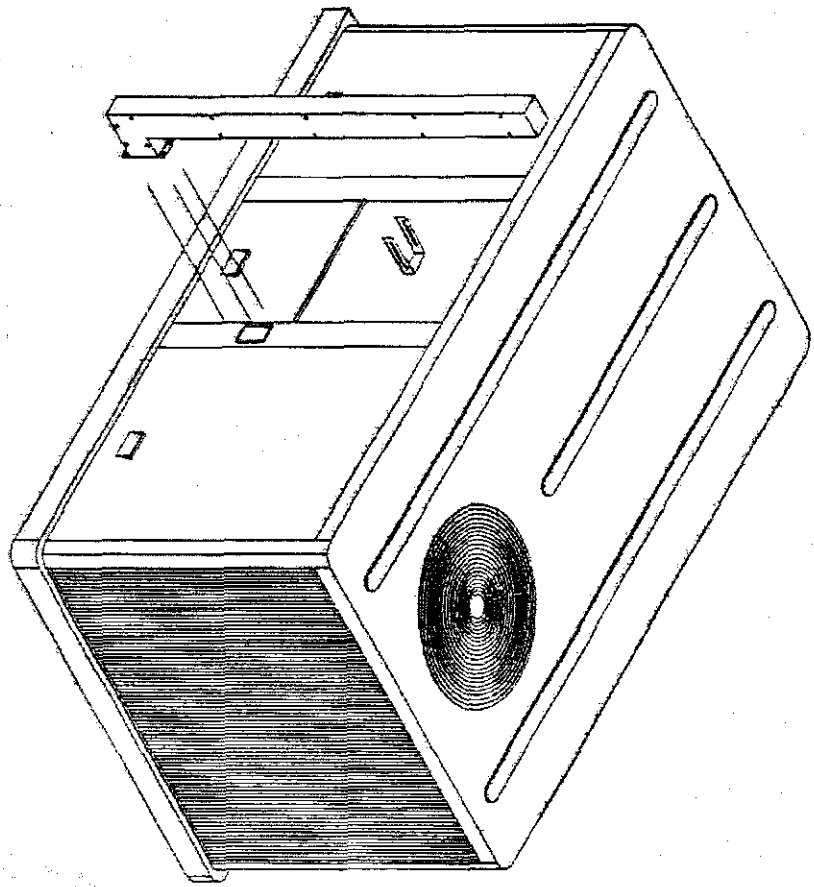


Accessory - Packaged Gas/Electric Rooftop Units – flue stack

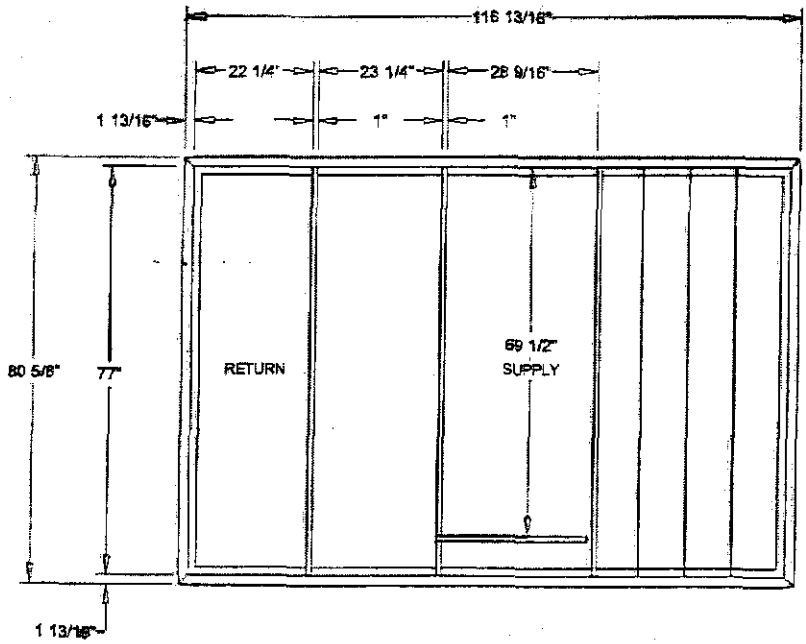
Item: A1 Qty: 1 Tag(s): AHU-8

Installation Instructions

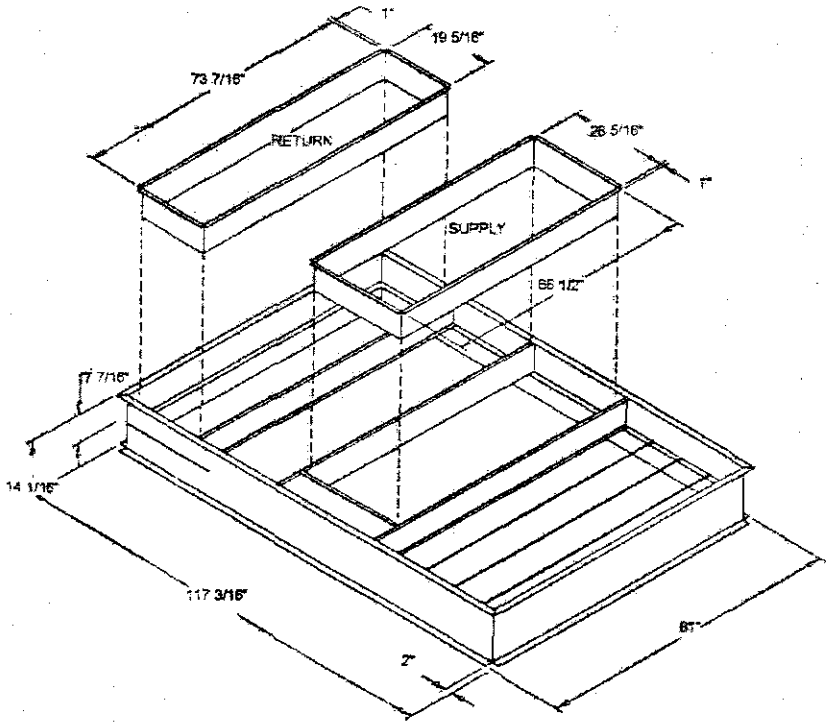
1) Remove (2) screws at junction of roof and post that contains flue exhaust.
2) Place brace over holes exposed by removing (2) screws, and reinstall screws (loosely)
3) Center the stack over the exhaust and install screws in the (4) holes in stack
4) Level stack and install screws in sides through bracket.
5) Tighten all screws
6) If additional bracing is required it MUST be installed



Accessory - Packaged Gas/Electric Rooftop Units
Item: A1 Qty: 1 Tag(s): AHU-8



ACCESSORY-ROOF CURB



ACCESSORY-DOWNFLOW DUCT CONNECTIONS

Standard curb shown for reference only. 24" high spring isolated non-seismic curb is being provided.

TRANE

Submittal

Trane U.S. Inc.

Engineer: **WBRC**

Date: **2/15/2013**

Sold To: Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074 U.S.A.
Customer P.O. Number: **182347**
Customer Project Number:

Job Name:
Cumberland County Civic Center
1 Civic Center Square
Portland, ME 04101
Job Number: **A223063**

Trane is pleased to provide the enclosed submittal for your review and approval.

SECTION 237413 PACKAGED OUTDOOR AIR HANDLING UNITS

Qty	*Description*	*Tag(s)*
	Packaged Curb Mounted Multi-Function Heating, Cooling and Ventilation Unit	
1	Trane Model OA1D144 Rooftop Heating, Cooling and Ventilation Unit	AHU-7

Notes:

- *24" high seismic rated curb provided. Standard curb shown for reference only.*
- *Providing BACNET interface – confirm prior to releasing unit*

Dan Broderick
Trane U.S. Inc. dba Trane
860 Spring Street, Unit #1
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Product Data - Packaged curb mounted multi-function heating, cooling and ventilation unit

Size	Qty	Description	Model Number
1144	1	Packaged curb mounted multi-function heating, cooling and ventilation unit	OA1D144A4-D1A1A0EP-A1G00AF1EP-C30B1B1A0

Tag(s): AHU-7

Unit Voltage: 460-3-60
Evaporator Type: DX 6 Row Interlaced
Hot Gas Reheat: Modulating
Compressor: Scroll Compressor, Both Circuits
Condenser: Air Cooled
Capacity Control: APR Valve on 1st Circuit
Heat Type: Indirect - Fired (IF)
Fuel Type: Natural Gas
409 Stainless Steel Furnace: 250 Mbtu/h, 1:8 Turndown
Unit Controls: Trane UC600 - Outdoor Air Control w/BACNET w/Display
Powered Exhaust: Variable Speed Direct Drive
Energy Recovery & Conservation: ERC-4136C
Filters: MERV-8
Smoke Detectors: Supply
Electrical Options: Non-Fused Disconnect Switch w/120v Outlet
Air Flow Monitoring: IFM Fan Piezo Ring
Hailguard: Condenser Hailguard
Curb Selection: Aux Mod 1" Vibration Isolation
Warranty: 5-Year Standard Scroll Compressor* / 25-Year Heat Exchanger
Supply Discharge Air Sensor (FLD)
Plenum Fan with Direct Drive Motor and Factory VFD
2 inch Double Wall Construction
Stainless Steel Drip Pan
Blower HP - 5
Blower RPM - 2613
Supply Fan - CM1TC165.0
Exhaust RPM - 2517
Exhaust HP - 5
Exhaust Fan - CM1TC165.0

Mechanical Specifications - Tag(s): AHU-7

General

The units shall be down discharge airflow. Cooling performance shall be rated in accordance with ARI testing procedures. All units shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be ETL listed and labeled, classified in accordance to UL 1995/CAN/CSA No. 236-M40 for Central Cooling Air Conditioners. Canadian units shall be CSA Certified.

Casing

Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 1000 hours in a salt spray test in compliance with ASTM B45. Unit shall have a 2 inch thick Antimicrobial Insulation. All insulation edges shall be either captured or sealed. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.

Unit Top

The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top

Sensors

A factory installed combination outdoor air sensor located in the outdoor air hood is designed to sense both outdoor air temperature and relative humidity for use by the microprocessor controller to make required ventilation, cooling, dehumidification and heating decisions. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes. A factory installed sensing tube is designed to sense the supply air temperature downstream of the indoor fan section.

Indoor Fans

Supply Fan motor shall be direct drive type with factory installed Variable Frequency Drive (TR200). All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT).

Evaporator Type: DX 6 Row Interlaced

Internally finned, 5/16 inch copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil shall be leak tested to 500 psig and pressure tested to 500 psig. A Stainless Steel double-sloped condensate drain pan with provision for through the unit wall condensate drain is standard. Evaporator coil will have 6 interlaced rows for superior sensible and latent cooling.

Hot Gas Reheat: Modulating

This option shall consist of a modulating hot-gas reheat coil located on the leaving air side of the evaporator coil pre-piped and circuited with a low pressure switch. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes.

Compressor: Scroll Compressor, Both Circuits

All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors. Crankcase heaters shall be included.

Condenser: Air Cooled

(Micro-Channel Coil) - Coil shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a corrosion-resistant coating

Capacity Control: APR Valve on 1st Circuit

Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers. Capacity is controlled by Adiabatic Proportional Regulator (APR) installed on the lead circuit.

409 Stainless Steel Furnace: 250 Mbtu/h, 1:8 Turndown

Primary heat is supplied using indirect fired gas heating. The heating section shall have a progressive tubular heat exchanger design using Stainless Steel burners and type 409 Stainless Steel tubes. An induced draft combustion blower shall be used to pull the combustion products through the firing tubes. The heater shall use a direct spark ignition (DS) system. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition. After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat/zone sensor. Units shall be comply with the California requirement for low NOx emissions. Unit shall be suitable for use with Natural Gas.

Unit Controls: Trane UC600 - Outdoor Air Control w/BACNET w/Display

Unit is completely factory wired with necessary controls and contactor pressure lugs for power wiring. Units will provide an external location for mounting fused disconnect device. Micro-processor controls are provided for all 24 volt control functions. The resident control algorithms will make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring outdoor temperature and humidity as well as indoor temperature. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. A centralized micro-processor (OACM) will provide anti-short cycle timing for a higher level of machine protection. Terminals are provided for a field installed dry contact or switch closure to put the unit in the Occupied or Unoccupied modes.

Powered Exhaust: Variable Speed Direct Drive

Powered Exhaust Fan motor shall be direct drive type with factory installed Variable Frequency Drive to allow variable air volume operation. *All motors shall be thermally protected. All fan motors shall meet the U.S. Energy Policy Act of* 2005 (EPACT).

Energy Recovery & Conservation: ERC-4136C

The rotating wheel heat exchanger is composed of a rotating cylinder in an insulated cassette frame complete with seals, drive motor and drive belt. The total energy recovery wheel is coated with silica gel desiccant permanently bonded by a patented and proprietary process without the use of binders or adhesives, which may degrade desiccant performance. The substrate is a lightweight polymer and will not degrade nor require additional coatings for application in marine or coastal environments. Coated segments are washable with detergent or alkaline coil cleaner and water. Desiccant will not dissolve nor deliquesce in the presence of water or high humidity. As the wheel rotates between the ventilation and exhaust air streams it picks up sensible and latent heat energy and releases it into the colder air stream. The driving force behind the exchange is the difference in temperatures between the opposing air streams which is also called the thermal gradient.

Filters: MERV-8

Aluminum Mesh Filters shall be installed on the intake of the unit. In addition, one row of 2 inch MERV-8 rated filters (30 percent) shall be installed prior to the evaporator coil.

Smoke Detectors: Supply

Smoke detector shall be factory installed photoelectric smoke detector mounted in the supply air section. The detector will be wired for continuous power whenever the unit is energized. Upon detection of smoke, the detector will shut down all unit operations. Local codes may dictate the location of detectors.

Electrical Options: Non-Fused Disconnect Switch w/120v Outlet

A 3-pole, molded case, disconnect switch with provisions for through the base electrical connections shall be installed. The disconnect switch will be installed in the unit in a water tight enclosure. Wiring will be provided from the switch to the unit high voltage terminal block. The switch will be UL/CSA agency recognized. The disconnect switch will be sized per NEC and UL guidelines but will not be used in place of unit overcurrent protection. A powered 120 volt, 15 amp, 2 plug convenience outlet shall be factory installed. A service receptacle disconnect shall be installed. The convenience outlet is powered from the line side of the disconnect or circuit breaker, and therefore will not be affected

by the position of the disconnect or circuit breaker.

Air Flow Monitoring: IFM Fan Piezo Ring

Air flow measurement will be accomplished through the use of Piezo Ring technology installed in the supply fan wheel area.

Hailguard: Condenser Hailguard

Hail guards shall be installed on the outside of the condenser coil. The guards shall consist of perforated metal, of the same gauge and color as the unit itself. Airflow through the hail guards shall not be restricted due to location or size of the perforations. Guards shall be removable to accommodate coil cleaning.

TRANE

Project Name: **Cumberland County Civic Center** Tag: **AHU-7**

Representative: AHU-7 Comments:

Unit Information

Model:	OA	Unit Length:	161 in	Weight Operating:	3583 lb*
Size:	1144	Unit Width:	88 in	***Note: Weight does not include CURB weight. See CURB submittal for actual***	
Quantity:	1	Unit Height:	60 in		
Supply Airflow:	3,400 CFM			**Refrigerant Charge**	
Outside Airflow:	3,400 CFM			Circuit 1:	17.81 lbs
Ambient Air DB:	95 F			Circuit 2:	13.56 lbs

Cooling Performance

Gross Total Capacity:	144 MBh	Evaporator Face Area:	8.64 sq ft
Gross Sensible Capacity:	97.2 MBh	Evaporator Rows / FPI:	6 / 12
Net Total Capacity:	136.8 MBh	Condenser Face Area:	21.67 sq ft
Net Sensible Capacity:	90 MBh	Condenser Rows / FPI :	2 / 12
Entering Air DB / WB (Coil):	79.4 / 67.2 F	Air Velocity:	398 fpm
Leaving Air DB / WB (Coil):	53.5 / 53.4 F	Coil Air PD:	0.55 in H2O
Leaving Air DB / WB (Reheat):	67.16 / 58.83 F	EER:	8.8
Leaving Air DB / WB (Unit):	69.5 / 59.7 F	Watts:	14486

Heating Performance

Heat Type:	Gas Furnace	Entering Air DB:	43.1 F
Input Capacity	250 MBh	Leaving Air DB:	97.1 F
Output Capacity:	200 MBh	Coil Air PD:	0.13 in H2O

Energy Recovery Wheel ERC-4136C

Summer Conditions				Winter Conditions			
Ventilation Supply		Outside		Ventilation Supply		Outside	
Airflow:	3,400 CFM	Airflow:	3,557 CFM**	Airflow:	3,400 CFM	Airflow:	3,557 CFM**
DB:	79.4 F	DB:	88.0 F	DB:	43.1 F	DB:	-3.0 F
WB:	67.3 F	WB:	71.0 F	WB:	36.3 F	WB:	-4.0 F
PD:	0.76 in H20			PD:	0.76 in H20		
Return		Exhaust		Return		Exhaust	
Airflow:	3,555 CFM	Airflow:	3,712 CFM	Airflow:	3,555 CFM	Airflow:	3,712 CFM
DB:	75.0 F	DB:	82.7 F	DB:	70.0 F	DB:	27.9 F
WB:	65.0 F	WB:	68.6 F	WB:	53.0 F	WB:	25.8 F
ESP:	0.75 in H20	ERV PD:	0.79 in H20	ESP:	0.75 in H20	ERV PD:	0.79 in H20

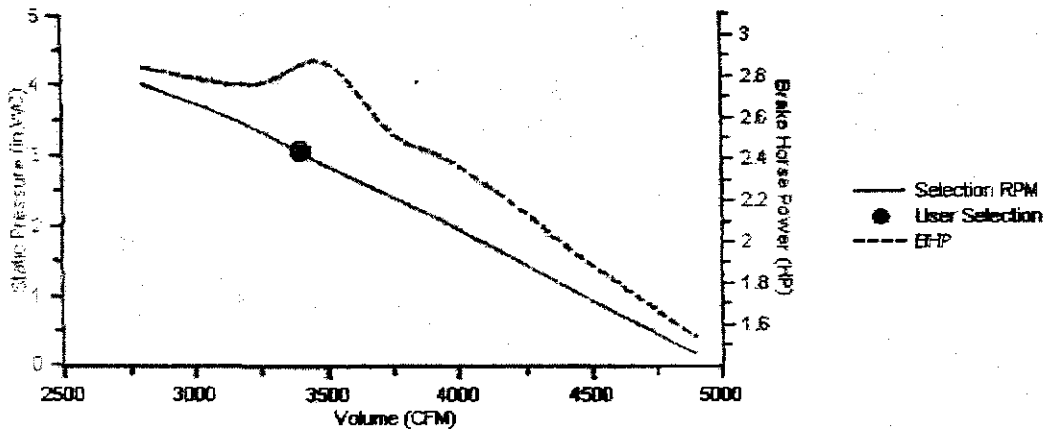
*** TAB Outside airflow through OA Intake to this value*

TRANE

Tag: AHU-7

Project Name: Cumberland County Civic Center

Supply Fan CM1TC165.0



Supply Pressure Drop Summary

External Static Pressure:	**1.00** in H2O
Internal Pressure Drop:	**2.06** in H2O
Total Static Pressure:	**3.06** in H2O

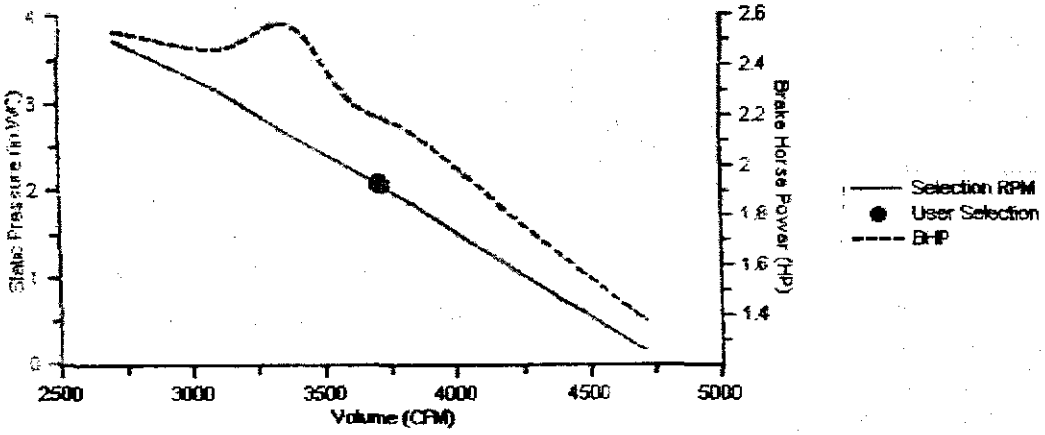
Supply Fan Conditions

Fan Motor BHP:	**2.83** BHP
Fan RPM:	**2613** RPM
Fan Name:	**CM1TC165.0**

TRANE

Project Name: **Cumberland County Civic Center** Tag: **AHU-7**

Exhaust Fan CM1TC165.0



Exhaust Pressure Drop Summary

Return External Static Pressure:	**0.75**	In H2O
Exhaust Internal Pressure Drop:	**1.33**	in H2O
Total Exhaust Static Pressure	**2.08**	in H2O

Exhaust Fan Conditions

Fan Motor BHP:	**2.20**	BHP
Fan RPM:	**2517**	RPM
Fan Name:	**CM1TC165.0**	

Motors

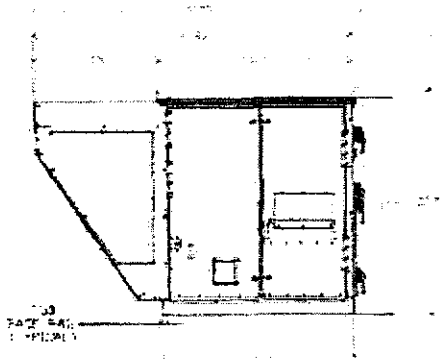
Compressor / ERV	Fan Service	Qty	HP (ea.)	FLA (ea.)	RLA (ea.)	LRA (ea.)
Controls		**1**		**1**		
ERV/HRV		**1**	**0.5**	**1.1**		
	Exhaust	**1**	**5**	**5.6**		
Scroll		**2**			**10.9**	**62**
	Supply	**1**	**5**	**5.6**		
	Condenser	**2**	**1**	**1.7**		

Unit Electrical Data

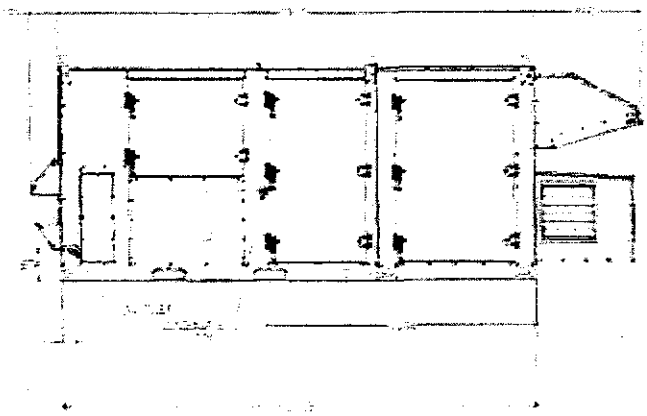
Unit Voltage-Ph-Hz:	**460-3-60**	Min Circuit Ampacity - MCA:	**41.2** Amps
Unit Amps - FLA:	**38.5** Amps	Maximum Fuse Size - MFS:	**50** Amps

Unit Dimensions - 5-15 Ton R-410A PKGD Unitary Cooling Rooftop

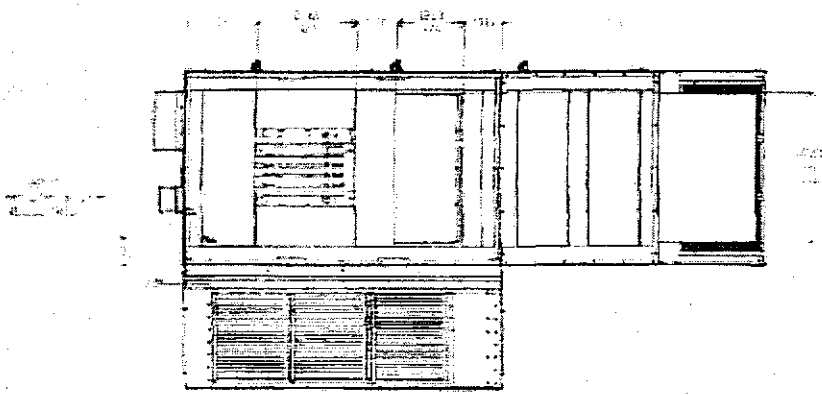
Qty: 1 Tags: AHU-7, AHU-7



Front View



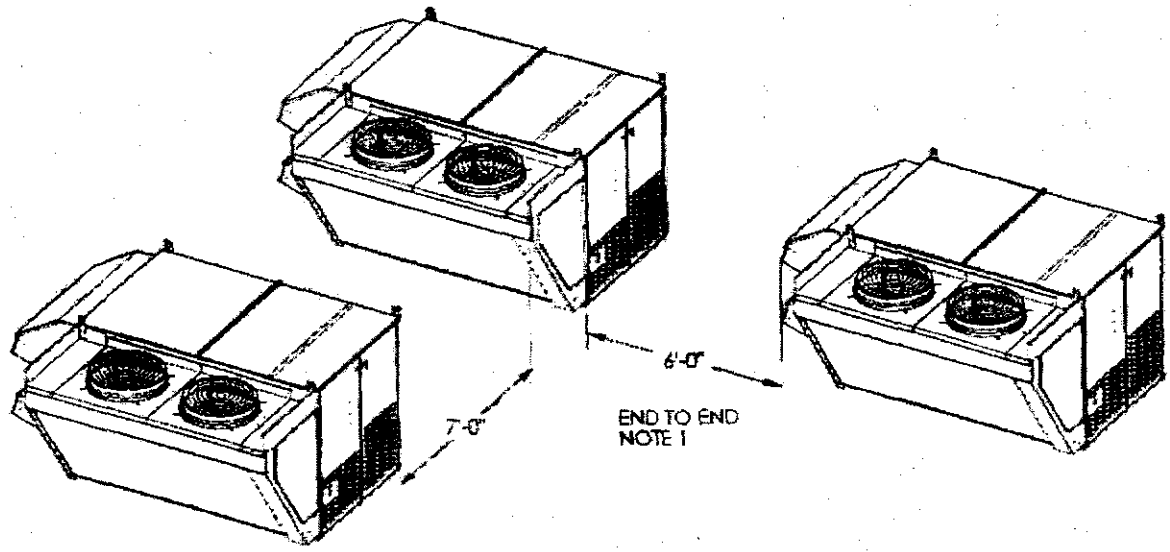
Side View



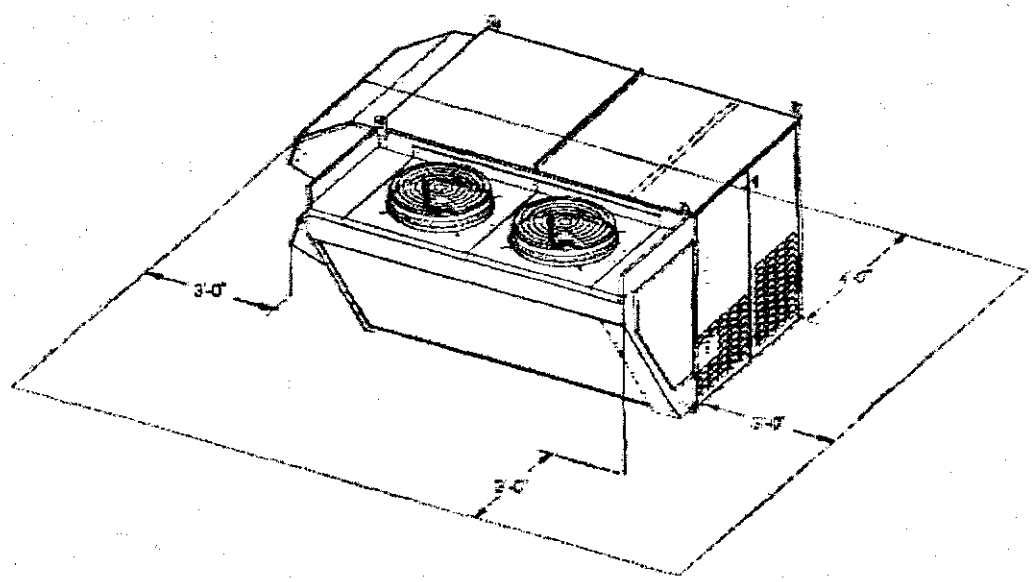
Bottom View

Clearance Diagram - 5-15 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-7



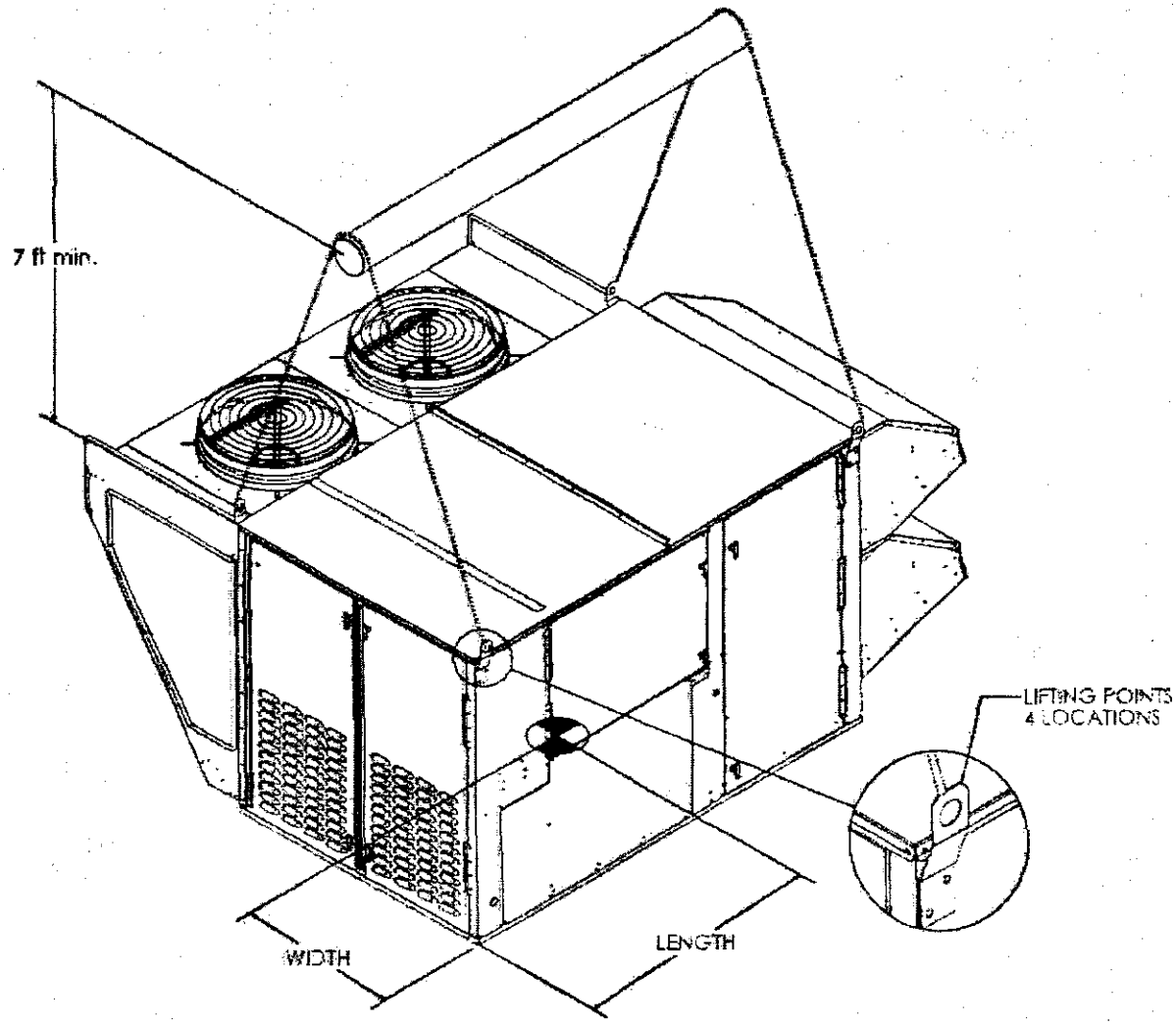
Unit Clearance



Service Clearance

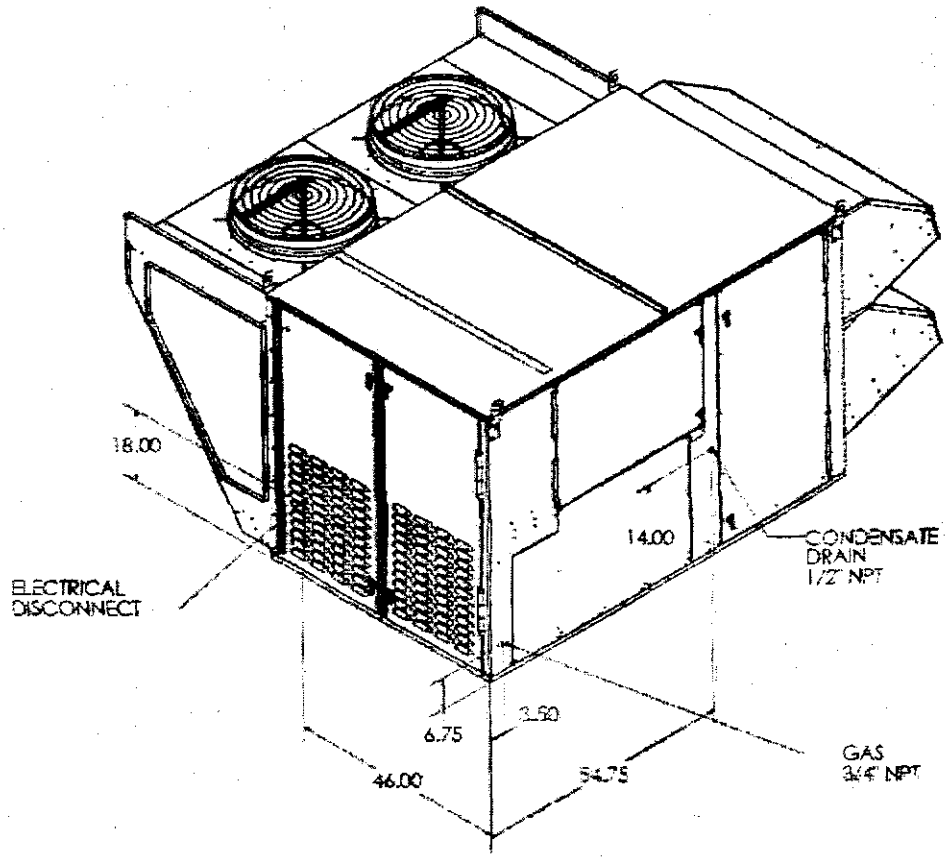
Rigging Diagram - 5-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-7



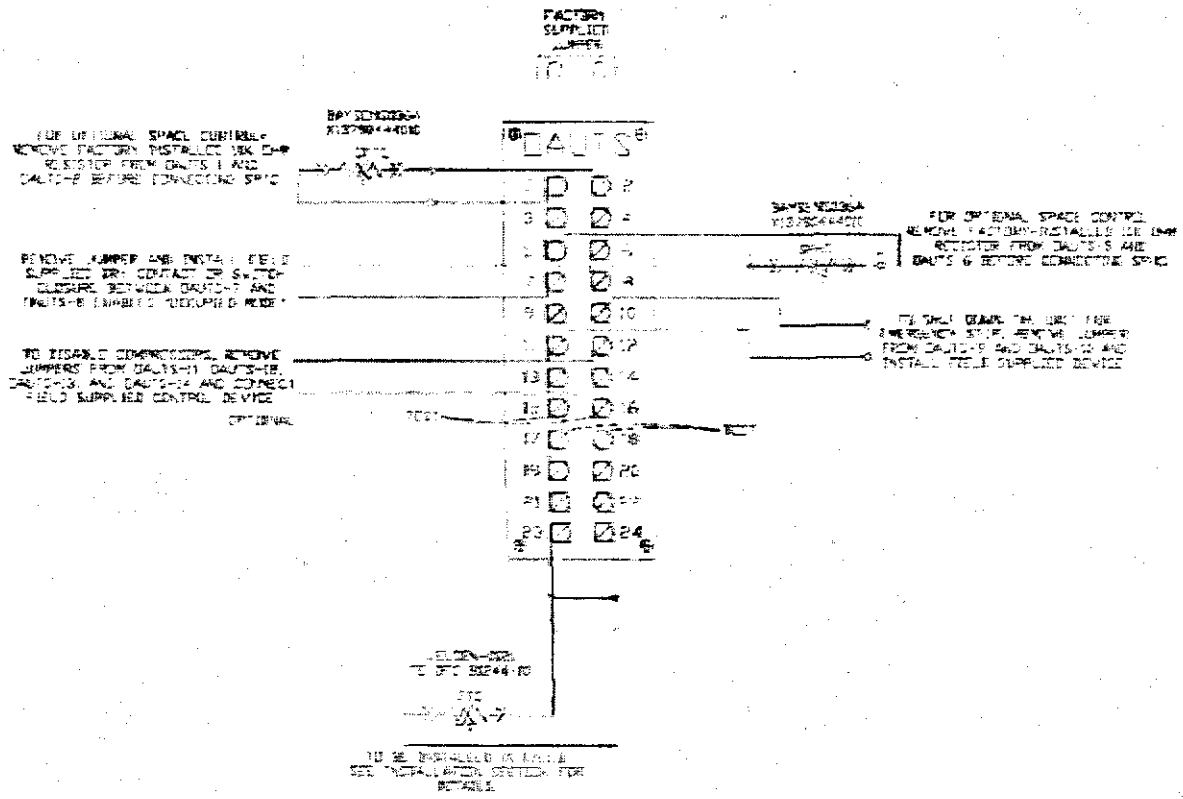
Utility Connections - 5-15 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-7



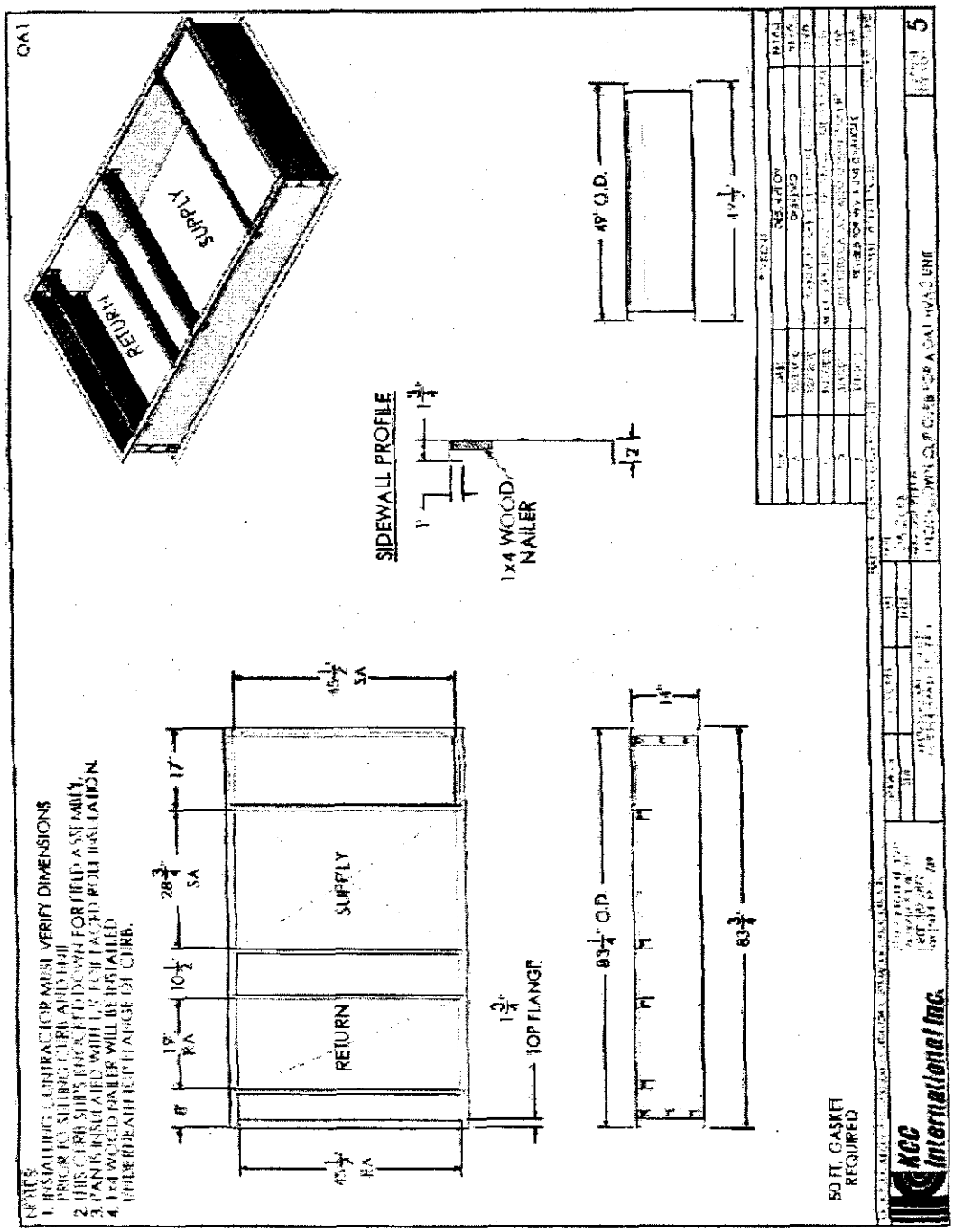
Field Wiring - 5-54 Ton T-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-7



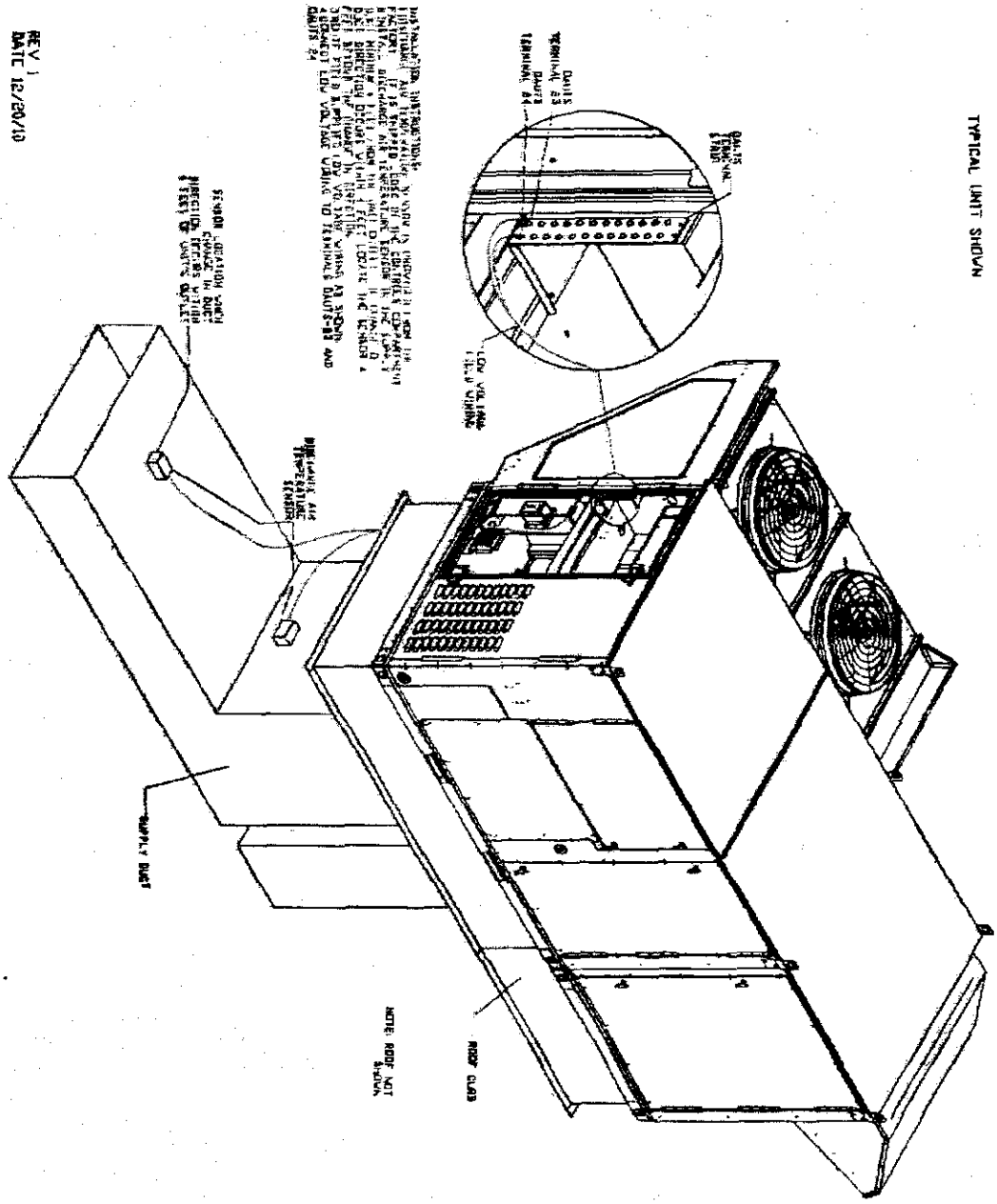
Roof Curb - 5-15 Ton R410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-7



Field Wiring - 5-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: All Tags



Submittal Item

Project [1012100] - Cumberland County Civic Center

View Date 12/12/2012

WBRC Architects & Engineers
44 Central Street
Bangor, ME 04401-5116
Phone: (207) 947-4511
Fax: (207) 947-4628

Submittal Item No.
00080

General Information

Item No.	00080	**Revision**	0
Package No. Rev.	00023.0		
Description	Product Data - Packaged, Indirect-Fired, Outdoor, Makeup-Air Units		
CSI Code	23 74 23.16 - Packaged, Indirect-Fired, Outdoor, Heating-Only Makeup-Air Units	**Submitting Company**	Johnson and Jordan, Inc.
Reference No.	1.4 A	**Copies Required**	
Status	Approved As Noted	**Item Type**	Product Data
Responsible Team Member	Michael johanning (WBRC Architects & Engineers)		
Item Notes	AHU 5		
Primary Response			
Submission Notes			
Review Notes			

Dates

Material Required on Site		**Required Lead Time (days)**	
Approved Submittal Required By	12/7/2012	**Required Review Time (days)**	
Submission Due	12/7/2012		

Supporting Documents

Document Type	Document	Open	Description	Date	Size (KB)
Doc	1012100-00550		080 - Packaged Indirect-Fired Outdoor Makeup...	12/12/2012	1777

Distribution

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Cynthia (Charlie) Quimby	WBRC Architects & Engineers	Email: charlie.quimby@wbrcae.com	11/30/2012
Frank Welch	Eastern Fire Protection, Inc.	Email: welchfp@efp-efs.com	12/12/2012
Jason Queen	E.S. Boulos Electrical, Inc.	Email: jqueen@esboulos.com	12/12/2012
Michael johanning	WBRC Architects & Engineers	Email: michael.johanning@wbrcae.com	11/30/2012
Michelle Curtis	New England Tech Air & Maine Steel	Email: mcurtis@newengiandtechair.com	12/12/2012
Peter Bilodeau	Industrial Roofing Companies (IRC)	Email: peterbilodeau@ircmaine.com	12/12/2012
Suzan M. West	Cianbro	Email: swest@cianbro.com	12/12/2012
Timothy Michaud	Johnson and Jordan, Inc.	Email: tmichaud@johnsonandjordan.com	12/12/2012

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 23 74 23.16 SUBMITTAL NO. 080 CIANBRO CORPORATION: By: AJP Date: 11/30/2012	☐ 1 - Reviewed, No Exception Taken ☒ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS · ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: DMonroe DATE: 12.12.12 SEE MARKED REVIEW COMMENTS

Johnson and Jordan
Mechanical contractors

SUBMITTAL **SUBM #24**
C.C.C.C
#12191

GENERAL CONTRACTOR ..... **Cianbro Corporation**

SUBMITTED BY ..... JOHNSON & JORDAN
SCARBOROUGH, ME.
(207) 883-8345

SUBCONTRACTOR ..... Johnson and Jordan

SUPPLIER ..... Trane

SPECIFICATION SECTION 23742316-1

PARAGRAPH ..... Part 1

ITEM ..... Roof Top AHU -5

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME
Approved_____ Approved as Noted_____
Re-Submit_____ Reviewed_____x_____
Subject to Architects Approval _x_____
Date__11-29-12_____ By___T.M._____

Submittal

Prepared For: Tim Michaud

Date: November 28, 2012

Customer P.O. Number:
Customer Project Number:

Sold To: Johnson & Jordan

Job Number:
Job Name:
Cumberland County Civic Center Phase I

Trane U.S. Inc. dba Trane is pleased to provide the enclosed submittal for your review and approval.

Product Summary

Qty	Product
1	5 Ton R410A PKGD Unitary Gas/Electric Rooftop Tagged AHU-5

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Dan Broderick
Trane
30 Thomas Drive
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Cell:
Fax: (207) 828-1511

Table Of Contents

Tag Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-1	1	5 Ton R410A PKGD Unitary Gas/Electric	YHC060F4RYA--G2C1A1B60100000000000000000

Product Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): ~~RTU-1~~ TAG AHU-5

DX cooling, gas heat
High efficiency
Convertible configuration
5 Ton
Major design sequence
460/60/3
Microprocessor controls 3ph
Medium gas heat stainless steel heat exchanger
Economizer Comparative Enthalpy 0-100%
Optional belt drive motor 3ph
Hinged panels/2 in pleated filters Merv 8
Standard condenser coil w/hail guard
Through the base electrical 3ph
Non-fused disconnect
Powered convenience outlet 3ph
BACnet Communications Interface 3 ph
Frostat 3ph
Roof curb (Fld)
Power exhaust (Fld)
CO2 duct mounted, field sensor kit (Fld)

Performance Data - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Tags	RTU-1
Design Airflow (cfm)	2000
Airflow Application	Downflow
Cooling Entering DB (F)	80.00
Cooling Entering WB (F)	67.00
Ent Air Relative Humidity (%)	51.08
Ambient Temp (F)	95.00
Evap Coil Leaving Air Temp (DB) (F)	58.78
Evap Coil Leaving Air Temp (WB) (F)	57.16
Cooling Leaving Unit DB (F)	60.78
Cooling Leaving Unit WB (F)	57.93
Gross Total Capacity (MBh)	61.00
Gross Sensible Capacity (MBh)	45.83
Gross Latent Capacity (MBh)	15.17
Net Total Capacity (MBh)	57.35
Net Sensible Capacity (MBh)	42.18
Net Sensible Heat Ratio (Number)	0.74
Heating EAT (F)	57.00
Heating LAT (F)	86.90
Heating Delta T (F)	29.90
Input Heating Capacity (MBh)	80.00
Output Heating Capacity (MBh)	64.00
Output Heating Cap. w/Fan (MBh)	67.65
Design ESP (in H2O)	1.250
Component SP (in H2O)	0.135
Field supplied drive kit required	None
Indoor mtr operating power (bhp)	1.13
Indoor RPM (rpm)	1137
Indoor Motor Power (kW)	0.84
Outdoor Motor Power (kW)	0.36

Tags	RTU-1
Compressor Power (kW)	3.70
System Power (kW)	4.91
IPLV @ AHRI (IPLV)	0.0
MCA (A)	12.30
MOP (A)	15.00
Compressor 1 RLA (A)	52.00
Compressor 2 RLA (A)	0.00
Evaporator fan FLA (A)	2.50
Condenser fan FLA (A)	1.00
Evaporator face area (sq ft)	9.89
Evaporator rows (Each)	4.00
Evaporator fin spacing (Per Foot)	192
Evaporator face velocity (ft/min)	202
Min. unit operating weight (lb)	755.0
Max. unit operating weight (lb)	976.0
Fan motor heat (MBh)	3.65
Dew Point (F)	56.12
Rated capacity (AHRI) (MBh)	62.00
Exhaust fan power (kW)	0.65
Refrig charge (HFC-410A) - ckt 1 (lb)	6.1
Refrig charge (HFC-410A) - ckt 2 (lb)	0.0
ASHRAE 90.1	Yes
Saturated Suction Temp Circuit 1 (F)	51.94
Saturated Discharge Temp Circuit 1 (F)	112.39
Saturated Suction Temp Circuit 2 (F)	0.00
Saturated Discharge Temp Circuit 2 (F)	0.00
EER @ AHRI Conditions (EER)	15.0
Total Static Pressure (in H2O)	1.385

Mechanical Specifications - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): RTU-1

General
The units shall be convertible airflow. The operating range shall be between 115°F and 0°F incooling as standard from the factory for units with microprocessor controls. *Operating* range for units with electromechanical controls shall be between 115°F and 40°F. Cooling performance shall be rated in accordance with ARI testing procedures. *All units* shall be factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be cULus listed and labeled, classified in accordance for Central Cooling Air Conditioners.

Casing
Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have lifting handles and be removed and reinstalled by removing two fasteners while providing a water and air tight seal. All exposed vertical panels and top covers in the indoor air section shall be insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material. The base of the unit shall be insulated with 1/8 inch, foil-faced, closed-cell insulation. All insulation edges shall be either captured or sealed. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting, with forklift capabilities on three sides of the unit.

Unit Top
The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top.

Two-Inch Pleated Filters
2" pleated media filters shall be available on all models.

Compressors
All units shall have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors.

Crankcase heaters shall be included on 6-10 ton units.

Dual compressors are outstanding for humidity control, light load cooling conditions and system back-up applications. Dual compressors are available on 7½-10 ton models and allow for efficient cooling utilizing 3-stages of compressor operation for all high efficiency models.

Indoor Fan
The following units shall be equipped with a direct drive plenum fan design (T/YSC120E, T/YHC092,102, 120E). Plenum fan design shall include a backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor. All plenum fan designs will have a variable speed adjustment potentiometer located in the control box. 3-5 ton units (standard efficiency 3-phase or high efficiency 3-phase with optional motor) are belt driven, FC centrifugal fans with adjustable motor sheaves. 3-5 ton units (1-phase or high efficiency 3-phase) have multispeed, direct drive motors. All 6-8½ ton units (standard efficiency) shall have belt drive motors with an adjustable idler-arm assembly for quick-adjustment to fan belts and motor sheaves. All motors shall be thermally protected. All 10 tons and 7½-8½ (high efficiency) have variable speed direct drive motors. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Outdoor Fans
The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motor shall be permanently lubricated and shall have built-in thermal overload protection.

Evaporator and Condenser Coils
Internally finned, 5/16" copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. The microchannel type condenser coil is standard for the T/YSC 10 ton models and 7½ ton high efficiency models. The microchannel type condenser coil is not offered on the 7½ ton dehumidification model. Due to flat streamlined tubes with small ports, and metallurgical tube-to-fin bond, microchannel coil has better heat transfer performance. Microchannel condenser coil can reduce system refrigerant charge by up to 50% because of smaller internal volume, which leads to

better compressor reliability. Compact all-aluminum microchannel coils also help to reduce the unit weight. All-aluminum construction improves re-cyclability. Galvanic corrosion is also minimized due to allaluminum construction. Strong aluminum brazed structure provides better fin protection. In addition, flat streamlined tubes also make microchannel coils more dust resistant and easier to clean. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil and condenser coil shall be leak tested to 600 psig. The assembled unit shall be leak tested to 465 psig. The condenser coil shall have a patent pending 1+1+1 hybrid coil designed with slight gaps for ease of cleaning. A removable, reversible, double-sloped condensate drain pan with through the base condensate drain is standard.

Tool-less Hail Guards
Tool-less, hail protection quality coil guards are available for condenser coil protection.

Controls
Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device. A choice of microprocessor or electromechanical controls shall be available. Microprocessor controls provide for all 24V control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point, and provides better building comfort. A centralized microprocessor shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection. 24-volt electromechanical control circuit shall include control transformer and contactor

High Pressure Control
All units include High Pressure Cutout as standard.

Phase monitor
Phase monitor shall provide 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator. There are no field adjustments. The module will automatically reset from a fault condition.

BACnet Communications
The BACnet communications interface allows the unit to communicate directly with a generic open protocol BACnet MS/TP Network Building Automation System Controls.

Refrigerant Circuits
Each refrigerant circuit offer thermal expansion valve as standard. Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers.

Gas Heating Section
The heating section shall have a progressive tubular heat exchanger design using stainless steel burners and corrosion resistant steel throughout. An induced draft combustion blower shall be used to pull the combustion products through the firing tubes. The heater shall use a direct spark ignition (DSI) system. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition After three unsuccessful ignition attempts, the entire heating system shall be locked out until manually reset at the thermostat/zone sensor. Units shall be suitable for use with natural gas or propane (field-installed kit) and also comply with the California requirement for low NOx emissions (Gas/Electric Only).

Hinged Access Doors
Sheet metal hinges are available on the Filter/Evaporator, Supply Fan/Heat, and the Compressor/Control Access Doors.

Powered or ~~Unpowered~~ Convenience Outlet
This is a GFCI, 120v/15amp, 2 plug, convenience outlet, either powered or ~~unpowered~~. When the convenience outlet is powered, a service receptacle disconnect will be available. The convenience outlet is powered from the line side of the disconnect or circuit breaker, and therefore will not be affected by the position of the disconnect or circuit breaker. This option can only be ordered when the Through the Base Electrical with either the Disconnect Switch or Circuit Breaker option is ordered.

Economizer
This accessory shall be available with or without barometric relief. The assembly includes fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment off cycle. Optional solic state or differential enthalpy

control shall be available for either factory or field installation. The economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.

Through the Base Electrical Access
An electrical service entrance shall be provided allowing electrical access for both control and main power connections inside the curb and through the base of the unit. Option will allow for field installation of liquid-tight conduit and an external field-installed disconnect switch.

Through the Base Electrical with Disconnect Switch
This 3-pole, molded case, disconnect switch with provisions for through the base electrical connections are available. The disconnect switch will be installed in the unit in a water tight enclosure with access through a swinging door. Wiring will be provided from the switch to the unit high voltage terminal block. The switch will be UL/CSA agency recognized.

Note: The disconnect switch will be sized per NEC and UL guidelines but will not be used in place of unit overcurrent protection.

Frostat
This option is to be utilized as a safety device. The Frostat opens when temperatures on the evaporator coil fall below 10°F. The temperature will need to rise to 50°F before closing. This option should be utilized in low airflow or high outside air applications. (Cooling with Electric Heat Only.)

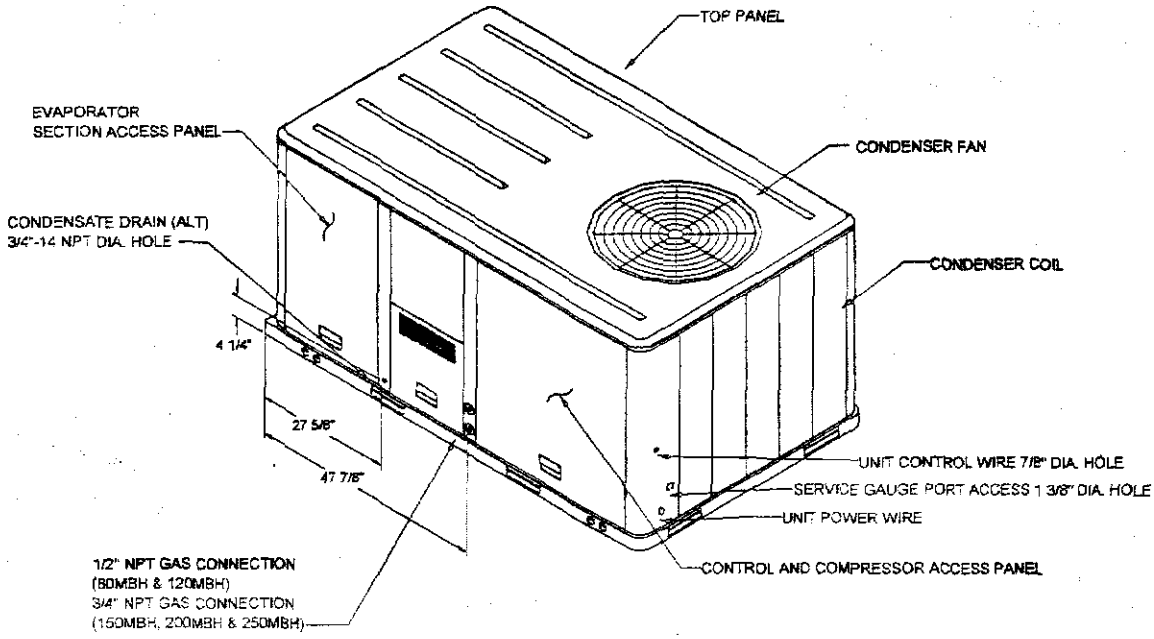
Accessory - Powered Exhaust
The powered exhaust shall provide exhaust of return air, when using an economizer, to maintain better building pressurization.

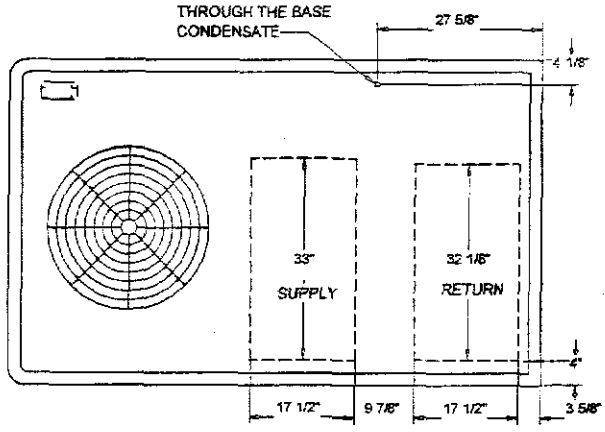
Accessory - Roof Curb
The roof curb shall be designed to mate with the unit's downflow supply and return and provide support and a water tight installation when installed properly. The roof curb design shall allow field fabricated rectangular supply/return ductwork to be connected directly to the curb. Curb design shall comply with NRCA requirements. Curb shall be shipped knocked down for field assembly and shall include wood nailer strips.

Accessory - CO2 Sensing
The CO2 sensor shall have the ability to monitor space occupancy levels within the building by measuring the parts per million of CO2 (Carbon Dioxide) in the air. As the CO2 levels increase, the outside air damper modulates to meet the CO2 space ventilation requirements.

Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): RTU-1~~-1~~5

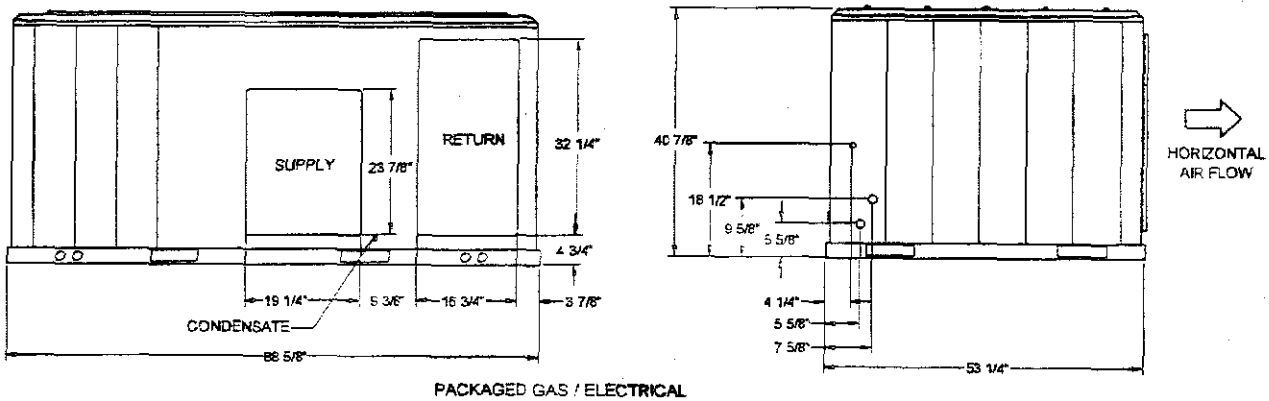




PLAN VIEW UNIT

DIMENSION DRAWING

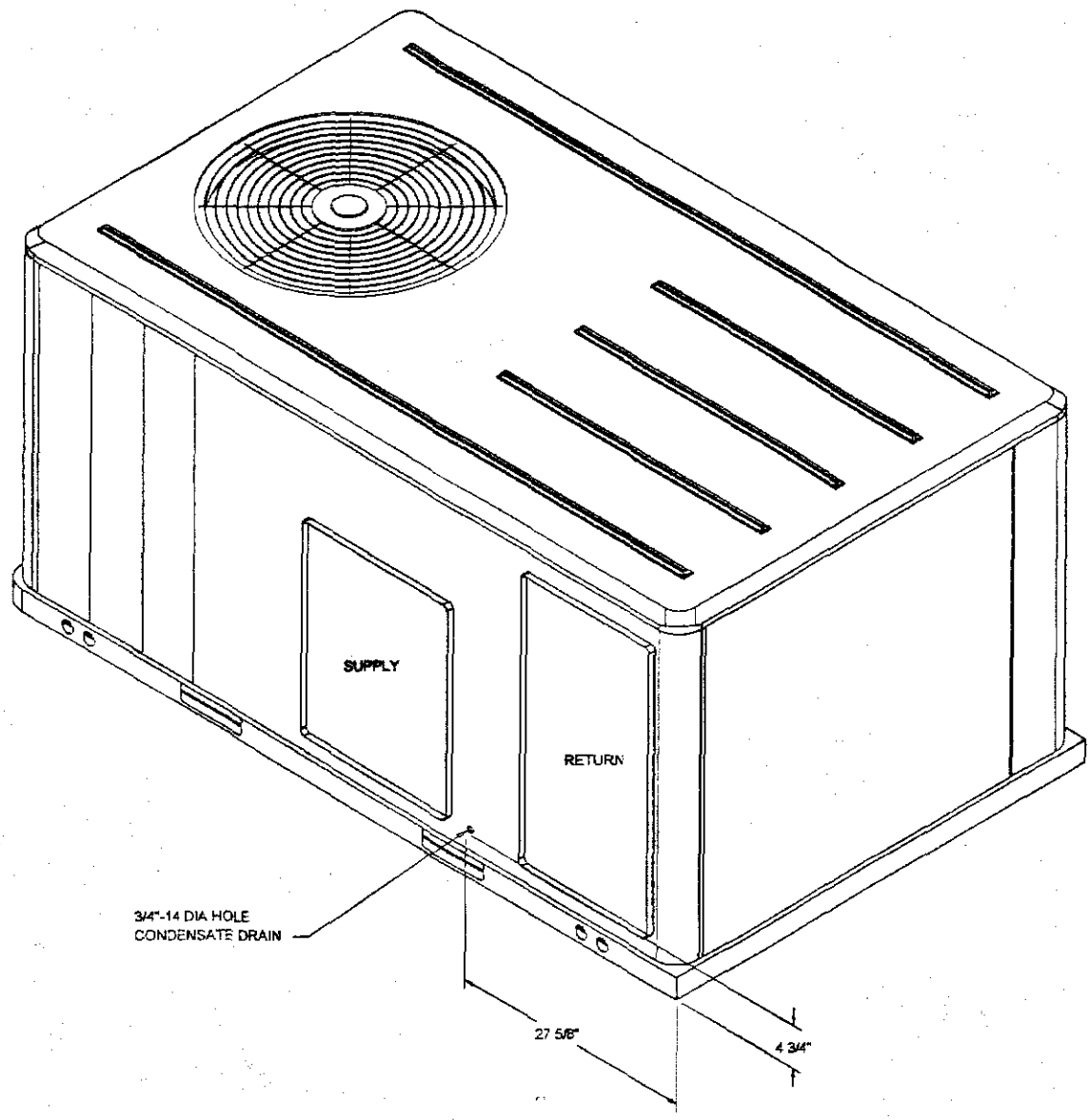
NOTES:
1. THRU -THE -BASE ELECTRICAL AND GAS IS NOT STANDARD ON ALL UNITS.
2. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION



PACKAGED GAS / ELECTRICAL

DIMENSION DRAWING

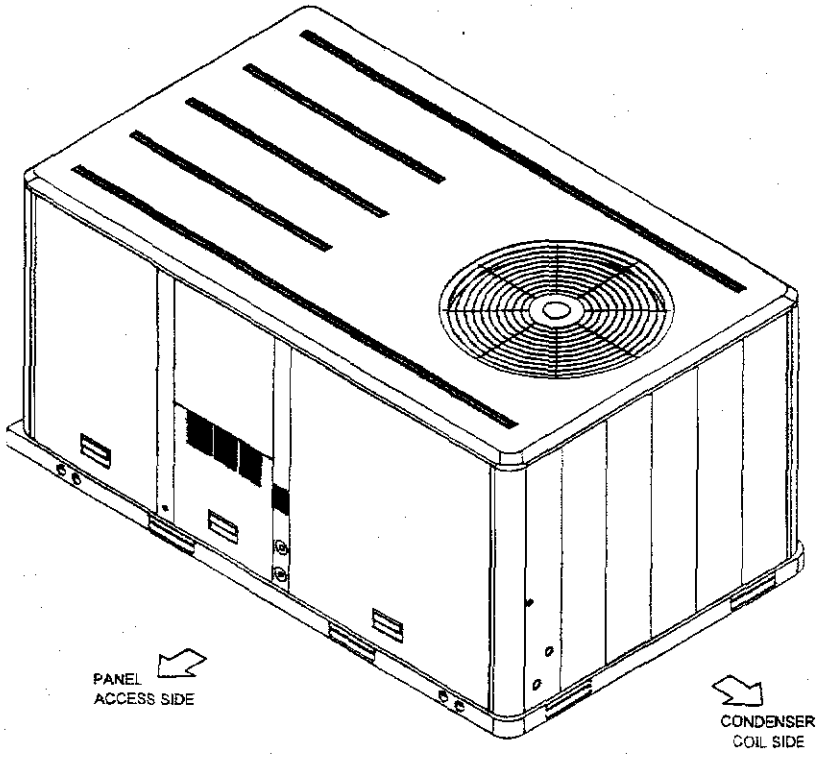
Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): RTU-~~1~~5

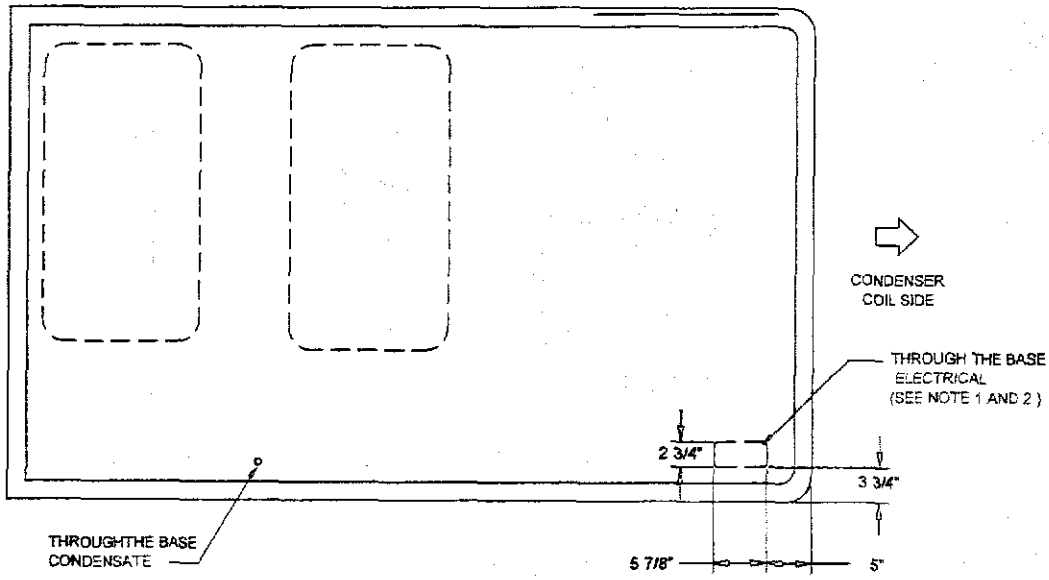


ISOMETRIC-PACKAGED COOLING

Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): RTU-1





PANEL
ACCESS SIDE

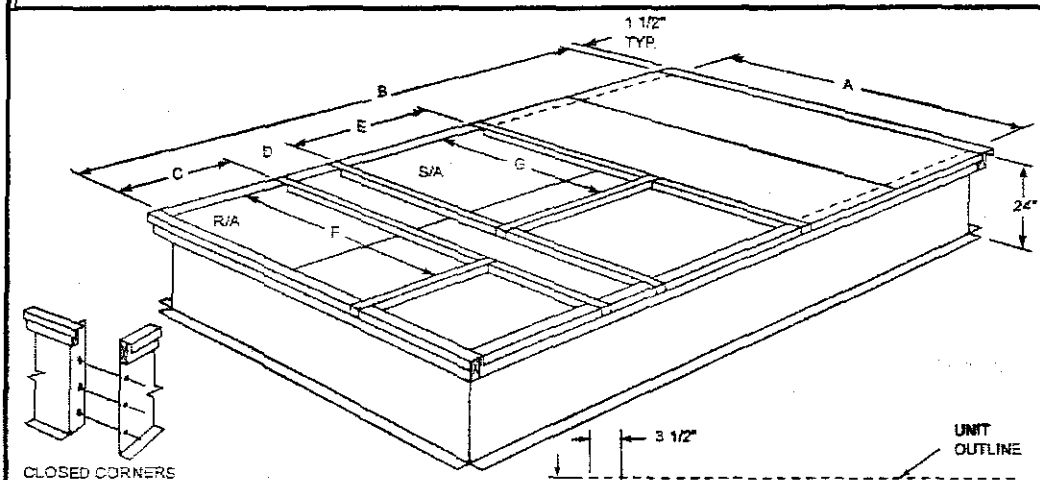
NOTES:
1. *THRU -THE -BASE GAS AND ELECTRICAL IS NOT STANDARD.* VERIFY OPTION IN PRODUCT DATA IN THIS DOCUMENT.
2. VERIFY WEIGHT, CONNECTION, OPTION CONFIGURATION AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION

THRU THE BASE ELECTRICAL

PLAN / ISC VIEW DRAWING

ROOF CURB FOR TRANE
TSC/YSC036-120E/F & THC/YHC036-120E/F & WSC036-120E & TCH/YHC092F

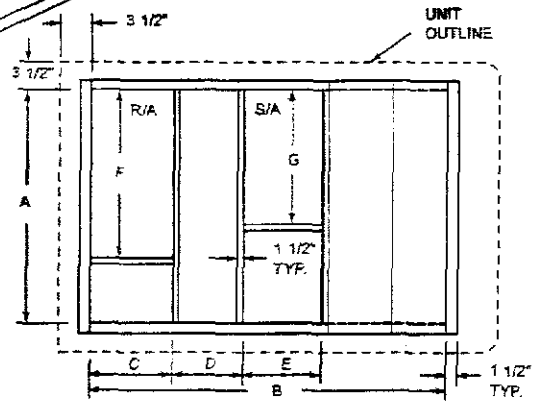
1



CLOSED CORNERS

NOTES:
1. HEAVY GA. GALV. STEEL CONST.
2. 1" x 4" WOOD NAILER
3. 1/4" x 1 1/4" GASKETING
4. SHIPPED K.D. WITH ASSEMBLY HARDWARE
5. DUCT WORK MUST BE FIELD SUPPORTED

OPTIONS:
1. ADDITIONAL HEIGHTS AVAILABLE
2. PITCHED ROOF APPLICATIONS
3. INSULATED CURB
4. ALUMINUM CONSTRUCTION
5. STANDING SEAM METAL ROOF APPLICATIONS
6. ALUMINUM VIBRATION ISOLATION RAILS
7. BURGLAR BARS
8. POWER EXHAUST CURB



DIMENSIONAL DATA

TRANE MODEL	PLENUMS INC. MODEL	A	B	C	D	E	F	G
TSC/YSC036-060E/F THC/YHC036E/F & WSC036/048E	TC42A24	37 7/16"	61 3/4"	14 9/16"	8 3/8"	16 3/4"	25 3/16"	17 7/8"
TSC/YSC/072-120E/F & THC/YHC048-072E/F WSC060-092E & THC/YHC092F	TC43A24	46 3/8"	80 1/2"	18 1/4"	8 5/8"	18 1/ 2"	34 3/8"	34 3/8"
THC/YHC090-120E/F & WSC120E	TC4424	56 3/8"	80 1/2"	18 1/4"	8 5/8"	18 1/ 2"	34 3/8"	34 3/8"

Plenums Incorporated
P.O. BOX 1890 PINELLAS PARK, FL 33780-1890
PHONE: 800-237-2275 • FAX: 800-238-1819
www.plenums.com • admin@plenums.com

PROVIDE 1-1/2" THICK INSULATION AS SPECIFIED, SECTION 23 74 13.16 PARAGRAPH 2.12.B.1.b

Unit Dimensions - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): RTU-1

ELECTRICAL / GENERAL DATA

GENERAL [2][4][6]

Model	YHC060F	Oversized Motor	
Unit Operating Voltage:	414-506F	MCA:	N/A
Unit Primary Voltage:	460	MFS:	N/A
Unit Secondary Voltage	–	MCB:	N/A
Unit Hertz:	60		
Unit Phase:	3		
SEER	15.0		
Standard Motor		Field Installed Oversized Motor	
MCA:	12.3	MCA:	N/A
MFS:	20.0	MFS:	N/A
MCB:	20.0	MCB:	N/A

HEATING PERFORMANCE

HEATING - GENERAL DATA

Heating Model:	Medium
Heating Input (Btu)	80,000
Heating Output (Btu):	64,000
No. Burners:	2
No. Stages	1
Gas Inlet Pressure	
Natural Gas (Min/Max):	4.5/14.5
LP (Min/Max):	11.0/14.0
Gas Pipe Connection Size:	1/2"

INDOOR MOTOR

Sandard Motor		Oversized Motor		Field Installed Oversized Motor	
Number:	1	Number:	N/A	Number:	N/A
Horsepower:	1.0	Horsepower:	N/A	Horsepower:	N/A
Motor Speed (RPM):	–	Motor Speed (RPM):	N/A	Motor Speed (RPM):	N/A
Phase	3	Phase	N/A	Phase	N/A
Full Load Amps:	2.5	Full Load Amps:	N/A	Full Load Amps:	N/A
Locked Rotor Amps:	16.1	Locked Rotor Amps:	N/A	Locked Rotor Amps:	N/A

COMPRESSOR Circuit 1/2

Number:	1
Horsepower:	4.1
Phase:	3
Rated Load Amps:	7.1
Locked Rotor Amps:	52.0

OUTDOOR MOTOR

Number:	1
Horsepower:	0.40
Motor Speed (RRM):	1075
Phase:	1
Full Load Amps:	1.0
Locked Rotor Amps:	2.8

POWER EXHAUST ACCESSORY [3]

(Field Installed Power Exhaust)

Phase:	1
Horsepower:	0.33
Motor Speed (RPM):	1075
Full Load Amps:	1.1
Locked Rotor Amps:	2.0

FILTERS

Type:	Throwaway
Furnished:	Yes
Number	4
Recommended	16"x25"x2"

REFRIGERANT [2]

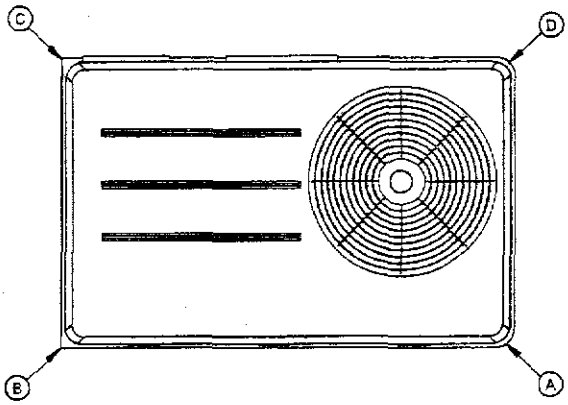
Type	R-410
Factory Charge	
Ciruit #1	6.1 lb
Ciruit #2	N/A

NOTES:

1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only.
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory.
4. Value includes oversized motor.
5. Value does not include Power Exhaust Accessory.
6. EER is rated at AHRI conditions and in accordance with DOE test procedures.

Weight, Clearance & Rigging Diagram - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): RTU-1



PACKAGED GAS / ELECTRICAL

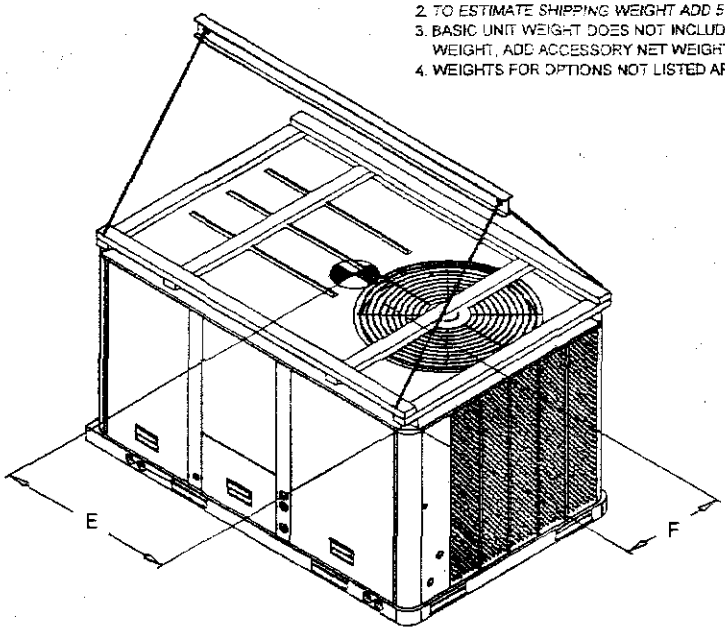
CORNER WEIGHT

INSTALLED ACCESSORIES NET WEIGHT DATA

ACCESSORY	WEIGHTS
ECONOMIZER	
MOTORIZED OUTSIDE AIR DAMPER	
MANUAL OUTSIDE AIR DAMPER	
BAROMETRIC RELIEF	
OVERSIZED MOTOR	
BELT DRIVE MOTOR	31.0 lb
POWER EXHAUST	40.0 lb
THROUGHT THE BASE ELECTRICAL (FIOPS)	5.0 lb
UNIT MOUNTED CIRCUIT BREAKER (FIOPS)	
UNIT MOUNTED DISCONNECT (FIOPS)	5.0 lb
POWERED CONVENIENCE OUTLET (FIOPS)	
HINGED DOORS (FIOPS)	
HAIL GUARD	
SMOKE DETECTOR, SUPPLY / RETURN	
NOVAR CONTROL	
STAINLESS STEEL HEAT EXCHANGER	6.0 lb
REHEAT	
ROOF CURB	

BASIC UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITY	
SHIPPING	NET	A	239.0 lb	C	152.0 lb	(E) LENGHT	(F) WIDTH
850.0 lb	755.0 lb	B	214.0 lb	D	151.0 lb	44"	21"

NOTE:
1. CORNER WEIGHTS ARE GIVEN FOR INFORMATION ONLY.
2. *TO ESTIMATE SHIPPING WEIGHT ADD 5 LBS TO NET WEIGHT.*
3. BASIC UNIT WEIGHT DOES NOT INCLUDE ACCESSORY WEIGHT. TO OBTAIN TOTAL WEIGHT, ADD ACCESSORY NET WEIGHT TO BASIC UNIT WEIGHT.
4. WEIGHTS FOR OPTIONS NOT LISTED ARE >5 LBS.

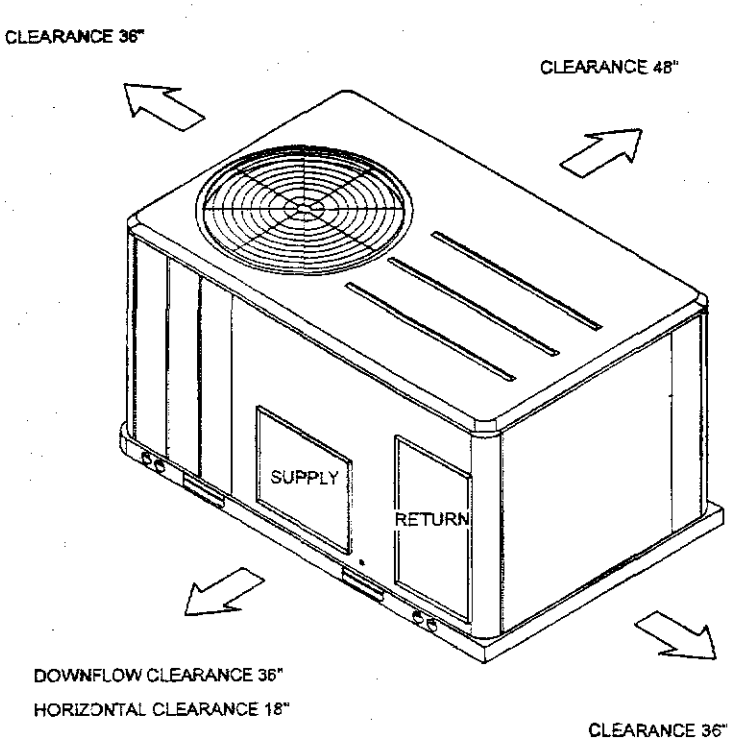


PACKAGED GAS / ELECTRICAL

RIGGING AND CENTER OF GRAVITY

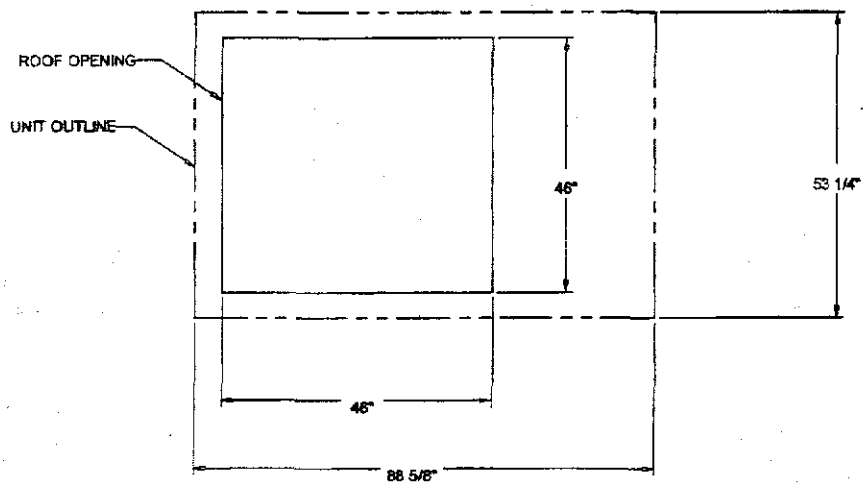
Weight, Clearance & Rigging Diagram - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item: A1 Qty: 1 Tag(s): RTU-1



PACKAGED GAS / ELECTRIC

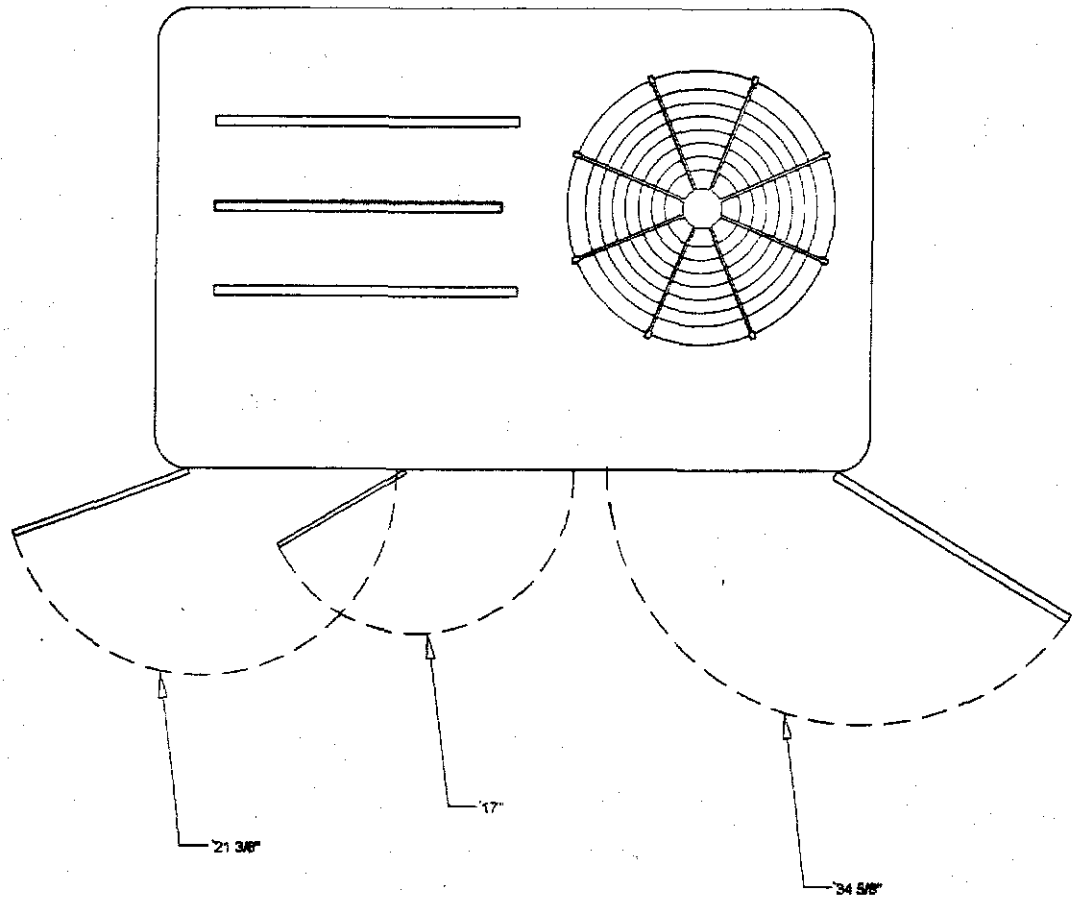
CLEARANCE



PACKAGED GAS / ELECTRIC

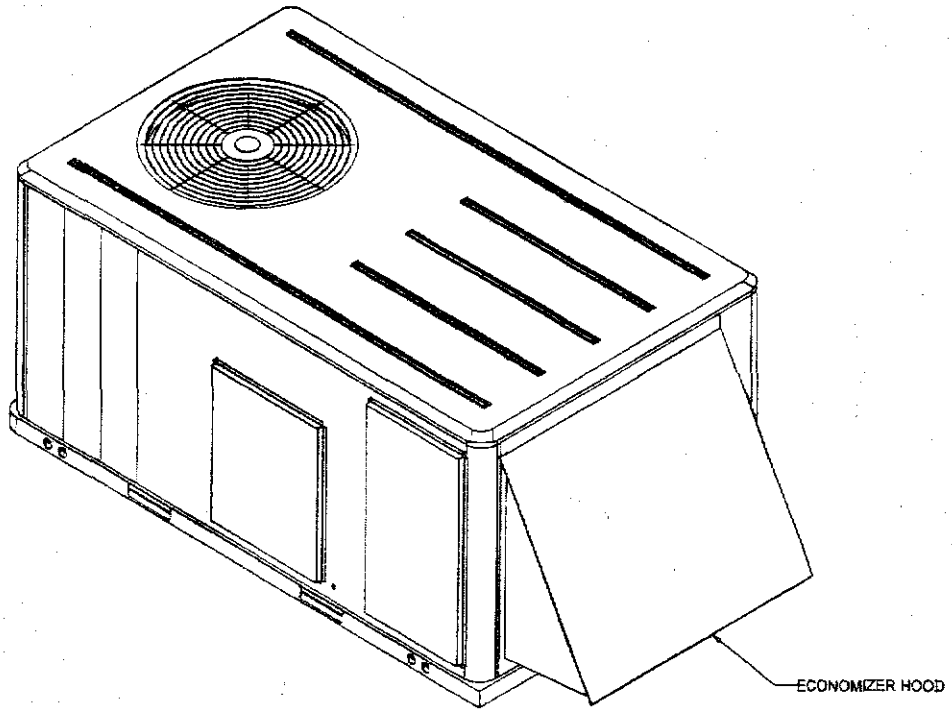
DOWNFLOW TYPICAL ROOF OPENING

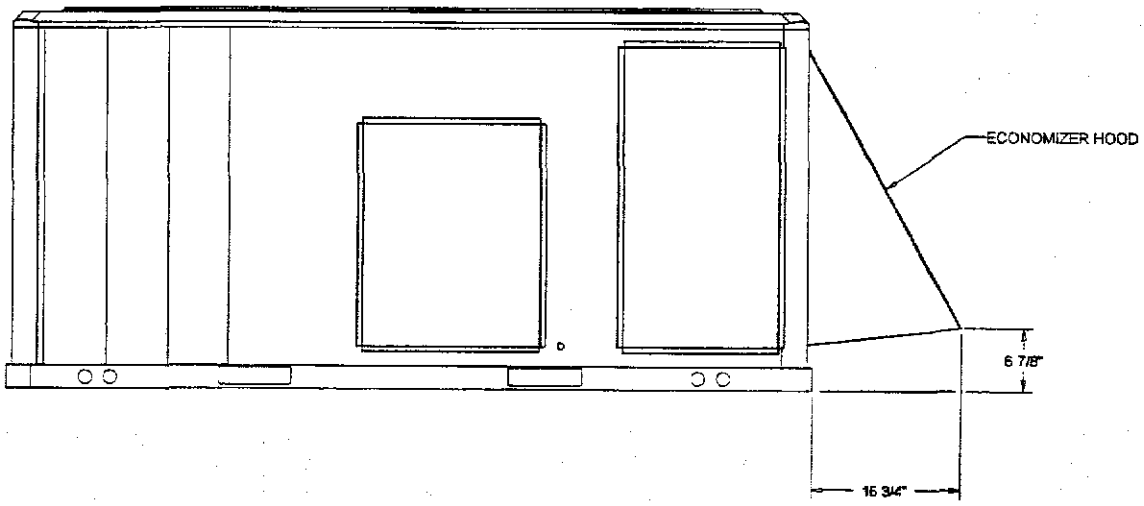
Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): RTU-1



SWING DIAMETER - HINGED DOOR(S) OPTION
ACCESSORY

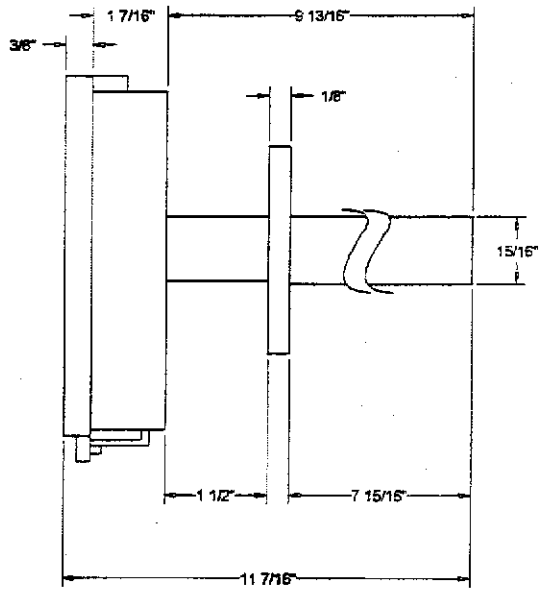
Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): RTU-1

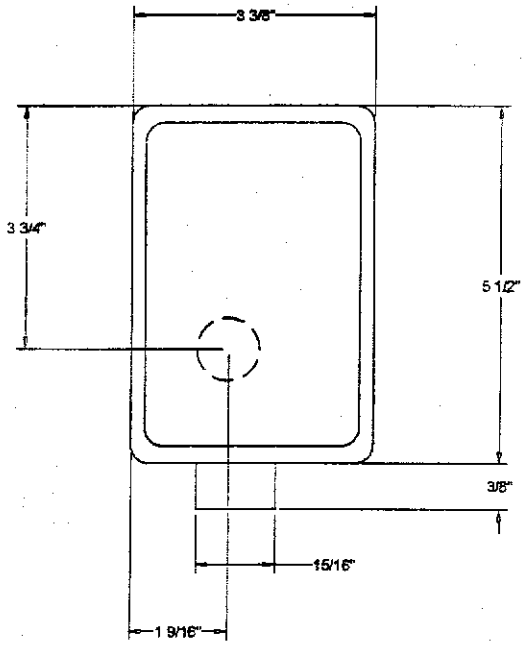


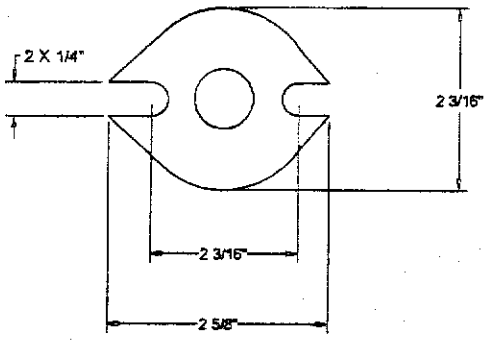


ACCESSORY - ECONOMIZER HOOD

Accessory - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): RTU-1







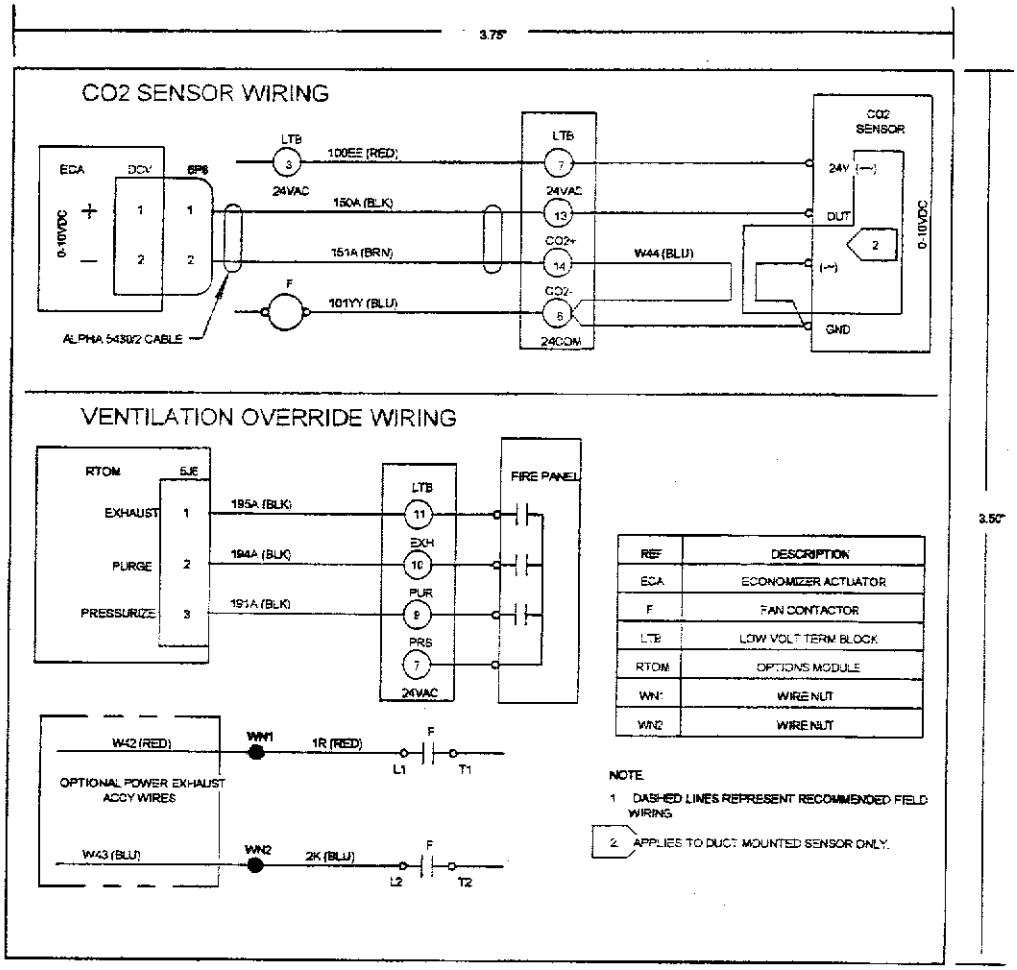
MOUNTING PLATE

NOTES:
1. SEE ENGINEERING SPECIFICATION FOR DETAILS.
2. VERIFY ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION.

BAYCO2K003B - DUCT MOUNT CO2

ACCESSORY

Field Wiring - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop
Item: A1 Qty: 1 Tag(s): RTU-1



REF	DESCRIPTION
ECA	ECONOMIZER ACTUATOR
F	FAN CONTACTOR
LTB	LOW VOLT TERM BLOCK
RTOM	OPTIONS MODULE
WN1	WIRE NUT
WN2	WIRE NUT

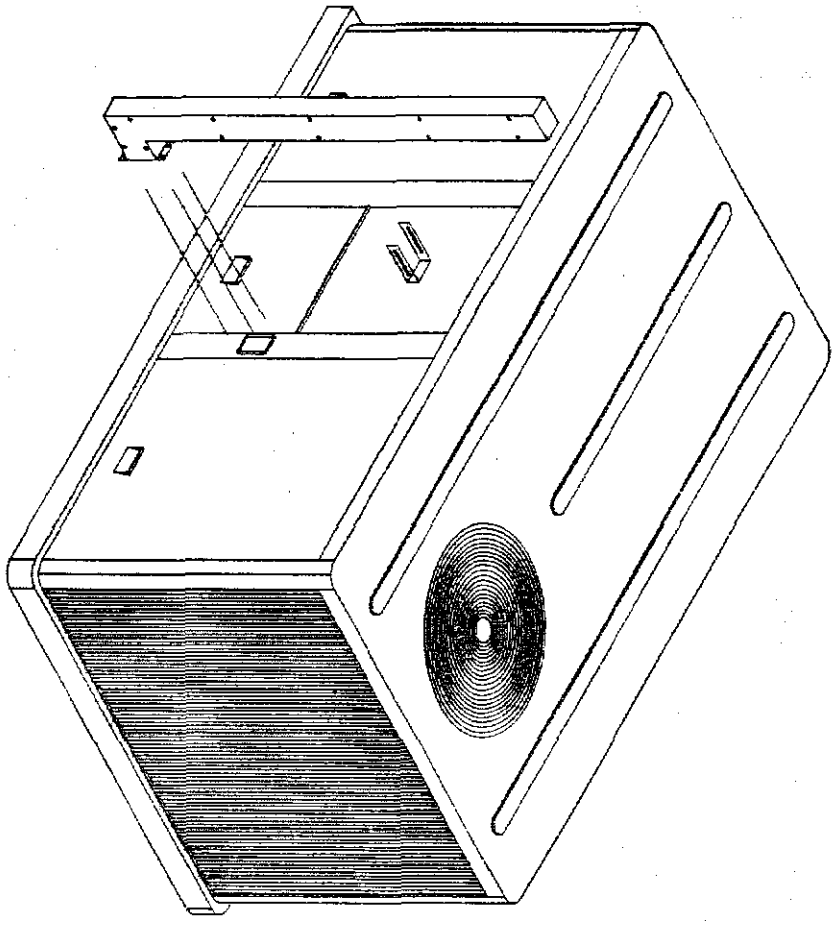
NOTE
1 DASHED LINES REPRESENT RECOMMENDED FIELD WIRING.
2 APPLIES TO DUCT MOUNTED SENSOR ONLY.

NOTES:
1. PRINT ON STRIP-TAC PLUS WITH BLACK LETTERS
2. REDUCE TRIMMED LABEL TO SIZE INDICATED.

Vertical Flue Extension option – field installed

Installation Instructions

1) Remove (2) screws at junction of roof and post that contains flue exhaust.
2) Place brace over holes exposed by removing (2) screws, and reinstall screws (loosely)
3) Center the stack over the exhaust and install screws in the (4) holes in stack
4) Level stack and install screws in sides through bracket.
5) Tighten all screws
6) If additional bracing is required it MUST be installed



Field Installed Options - Part/Order Number Summary
This is a report to help you locate field installed options that arrive at the jobsite. This report provides part or order numbers for each field installed option, and references it to a specific product tag. It is NOT intended as a bill of material for the job.

Product Family - 3-10 Ton R410A PKGD Unitary Gas/Electric Rooftop

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-1	1	5 Ton R410A PKGD Unitary Gas/Electric	YHC060F4RYA-G 2C1A1B60100000 000000000000

Field Installed Option Description	Part/Ordering Number
Power exhaust	BAYPWRX071A
CO2 duct mounted, field sensor kit	BAYCO2K003B

Submittal Item

Project [1012100] - Cumberland County Civic Center

View Date 3/5/2013

WBRC Architects & Engineers
44 Central Street
Bangor, ME 04401-5116
Phone: (207) 947-4511
Fax: (207) 947-4628

Submittal Item No.
00156

General Information

Item No.	00156	**Revision**	0
Package No. Rev.	00023.0		
Description	Submittal - Condensing Boilers		
CSI Code	23 52 16 - Condensing Boilers	**Submitting Company**	Johnson and Jordan, Inc.
Reference No.	2.1	**Copies Required**	
Status	Approved As Noted	**Item Type**	Product Data
Responsible Team Member	Michael johanning (WBRC Architects & Engineers)		
Item Notes			
Primary Response			
Submission Notes			
Review Notes			

Dates

Material Required on Site		**Required Lead Time (days)**	
Approved Submittal Required By	2/18/2013	**Required Review Time (days)**	
Submission Due	2/18/2013		

Supporting Documents

Document Type	Document	Open	Description	Date	Size (KB)
Doc	1012100-01299		156 - Condensing Boilers - Submittal - Response	3/5/2013	2686

Distribution

Recipient	Company	Method	Date
Anthony Passmore	Cianbro	Email: apassmor@cianbro.com	3/5/2013
Bradley P. Smith	Cianbro	Email: bsmith@cianbro.com	3/5/2013
Brett A. Dyer	Cianbro	Email: bdyer@cianbro.com	3/5/2013
Brian Larsen	Cianbro	Email: blarsen@cianbro.com	3/5/2013
Bruce Cummings	Cianbro	Email: bcumming@cianbro.com	3/5/2013
Cynthia (Charlie)	WBRC Architects &	Email: charlie.quimby@wbrcae.com	2/11/2013

Quimby	Engineers		
Michael johanning	WBRC Architects & Engineers	Email: michael.johanning@wbrcae.com	2/11/2013
Suzan M. West	Cianbro	Email: swest@cianbro.com	3/5/2013
Timothy Michaud	Johnson and Jordan, Inc.	Email: tmichaud@johnsonandjordan.com	3/5/2013

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 23 52 16 SUBMITTAL NO. 156 CIANBRO CORPORATION: By: AJP Date: 02/11/2013	☐ 1 - Reviewed, No Exception Taken ☒ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other. Held for Record, Not Reviewed WBRC ARCHITECTS • ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: DMonroe DATE: 3.5.13

BOILERS B-1 AND B-2 REVIEWED NO EXCEPTION TAKEN.

NOTE: SUBMIT WATER HEATERS UNDER SEPARATE COVER UNDER DIV 22

FIA INC.

Fluid Industrial Associates, INC. 7 Sixth Road, PO Box 2414, Woburn, Massachusetts 01888 TEL: (781) 938-8900 FAX: (781) 933-3965 website: www.fiainc.com

Submittal Data

PROJECT:	Cumberland County Civic Center
LOCATION:	Portland, ME
ENGINEER:	WBRC Engineers
CONTRACTOR:	Johnson & Jordan
REPRESENTATIVE:	FIA Inc. – Kim Garrant
EQUIPMENT:	boilers B-1,2,3 model : FBN2000
MANUFACTURER:	Lochinvar Crest boilers

REMARKS:

EQUIPMENT IS ON HOLD FOR APPROVAL PENDING RETURN OF APPROVED SUBMITTALS AND HARD COPY OF PURCHASE ORDER.

Lochinvar®
High Efficiency Water Heaters, Boilers and Pool Heaters

CREST COMMERCIAL BOILER Submittal Sheet

FBN-Sub-01

CREST COMMERCIAL CONDENSING BOILER

JOB NAME Cumberland County Civic Center
LOCATION Portland, ME
ARCH./ENGR. WBRC Engineers
WHOLESALER Redlon & Johnson
MECH. CONTRACTOR Johnson & Jordan
MODEL NO. FBN2000
TYPE GAS natural gas
Btu/hr INPUT 1,999,000
Btu/hr OUTPUT 1,840,000
NOTES flue damper DRH30001

SMART TOUCH™ FEATURES

- **SMART TOUCH™ Touchscreen Operating Control**
- **Full-Color 8" Touchscreen LCD Display**
- **Built-in Cascading Sequencer for up to 8 Boilers**
- **Building Management System Integration with 0-10 VDC Input**
- **Modbus Communications**
- **Outdoor Reset Control with Outdoor Air Sensor**
- **Password Security**

Domestic Hot Water Prioritization
Low Water Flow Safety Control & Indication
Inlet & Outlet Temperature Readout
Freeze Protection
Service Reminder
Time Clock

- **Data Logging**

Hours Running, Space Heating
Hours Running, Domestic Hot Water
Ignition Attempts
Last 10 Lockouts

- **Programmable System Efficiency Optimizers**

Night Setback
Anti-Cycling
Outdoor Air Reset Curve
Ramp Delay
Boost Temperature & Time

- **Three Pump Control**

System Pump
Boiler Pump
Domestic Hot Water Pump

- **High-Voltage Terminal Strip**

120 VAC / 60 Hertz / 1 Phase Power Supply
System and Boiler Pump Contacts

- **Low-Voltage Terminal Strip**

24 VAC Auxiliary Device Relay
Auxiliary Proving Switch Contacts
Alarm on Any Failure Contacts
Runtime Contacts
DHW Thermostat Contacts
Unit Enable/Disable Contacts
System Sensor Contacts
DHW Tank Sensor Contacts
Outdoor Air Sensor Contacts
Cascade Contacts
0-10 VDC BMS External Control Contact

STANDARD FEATURES

92% Thermal Efficiency (AHRI)
Up to 99% Thermal Efficiency in Low Temperature Applications
Modulating Burner with up to 25:1 Turndown
Direct-Spark Ignition
Low-NOx Operation
Sealed Combustion
Low Gas Pressure Operation
Vertical or Horizontal Venting
Category IV Venting up to 100 Feet
ASME "H" Stamped Heat Exchanger
316L Stainless Steel Fire Tubes
160 psi Working Pressure
On/Off Switch
Adjustable High Limit with Manual Reset
Low Water Cutoff with Manual Reset & Test
High & Low Gas Pressure Switches w/Manual Reset
Low Air Pressure Switches
Inlet & Outlet Temperature Sensors
High Voltage Terminal Strip
Low Voltage Terminal Strip
Downstream Gas Test Cocks
50 psi ASME Relief Valve
Temperature & Pressure Gauge
Zero Clearances to Combustible Materials
10-Year Limited Warranty (See Warranty for Details)
1-Year Warranty on Parts (See Warranty for Details)

OPTIONAL EQUIPMENT

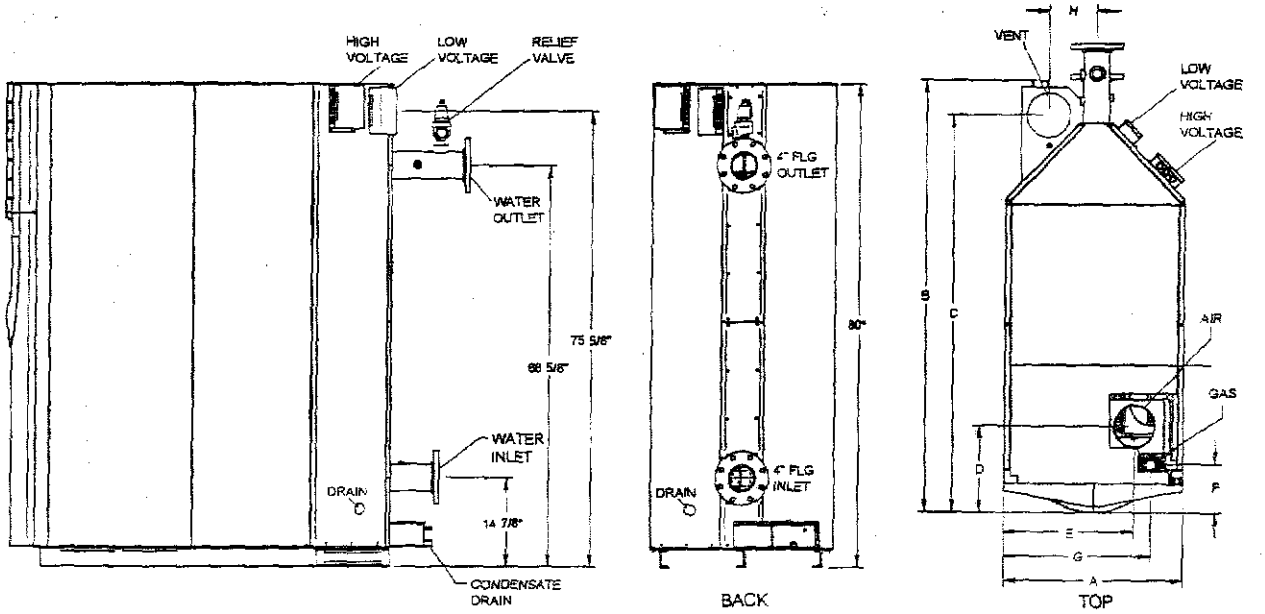
- [x] Alarm Bell
- [x] BMS Gateway
- [x] Condensate Neutralization Kit
- [ ] SMART TOUCH PC Software
- [ ] Common Vent Kits
- [ ] Vent Termination Kits
- [ ] Dual Fuel Gas Train

Electrical Options:
- [ ] 208V/3Ø/60Hz
- [ ] 240V/3Ø/60Hz
- [ ] 240V/3Ø/50Hz
- [ ] 480V/3Ø/60Hz

CODES & REGISTRATIONS

ANSI Z21.13/CSA Certified
ASME certified, "H" Stamp / National Board
California Code Compliant
CSD1 / Factory Mutual / GE Gap Compliant
South Coast Air Quality Management District Qualified
Canadian Registration Number (CRN)
AHRI Certified

CREST Commercial Boiler Dimensions & Specifications



CREST HEATING BOILER

Model Number	Input MBH Min.	Input MBH Max.	AHRI Thermal %	Output MBH	NET I=B=R MBH	Turndown*
FBN1500	60	1,500	92.0%	1,380	1,200	25:1
FBN2000	80	1,999	92.0%	1,840	1,600	25:1
FBN2500	125	2,500	92.0%	2,300	2,000	20:1
FBN3000	150	3,000	92.0%	2,760	2,400	20:1
FBN3500	200	3,500	92.0%	3,220	2,800	18:1

DIMENSIONS AND SPECIFICATIONS

Model Number	A	B	C	D	E	F	G	H	Gas Conn.	Air Inlet	Vent Size	Operating Wt. (lbs.)	Shipping Wt. (lbs.)
FBN1500	30-3/4"	71-1/8"	65-3/4"	14-3/8"	22-5/8"	8-1/2"	25-1/4"	8-1/8"	1-1/2"	8"	8"	3,496	1,900
FBN2000	30-3/4"	71-1/8"	65-1/8"	14-7/8"	22-3/8"	8-1/4"	25-3/16"	9-5/8"	1-1/2"	8"	8"	3,054	2,150
FBN2500	34-1/4"	76-3/8"	70-1/4"	17-3/4"	26-1/8"	9-3/4"	29-3/16"	11-3/16"	2"	8"	9"	3,652	2,560
FBN3000	40-1/2"	83-5/8"	76-3/8"	17-3/8"	31-3/8"	9-7/8"	34-3/4"	11-1/2"	2"	10"	10"	4,126	2,920
FBN3500	40-1/2"	83-1/4"	75-5/8"	17-1/4"	31-3/8"	9-7/8"	34-3/4"	12-7/8"	2"	10"	10"	4,744	3,225

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models. Low NOx on FB2500 - FB3500 models, consult factory.
**Turndown rate reduced on LP gas models.*

VENTING OPTIONS

- ☐ Direct Vent Vertical
- ☐ Direct Vent Horizontal
- ☐ Vertical Vent with Sidewall Air Intake
- ☐ Sidewall Vent with Rooftop Air Intake
- ☐ Vertical Vent with Optional Room Air
- ☐ Sidewall Vent with Optional Room Air

Lochinvar®
High Efficiency Water Heaters, Boilers and Pool Heaters

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www.Lochinvar.com

1-11—Printed in U.S.A.

Lochinvar®
High Efficiency Water Heaters, Boilers and Pool Heaters

CREST BOILER PRODUCT SUMMARY
(FB) 1,500,000-3,500,000 BTU/HR

	FB-1500	FB-2000	FB-2500	FB-3000	FB-3500
WATER					
GALLON CAPACITY	96	132	161	181	215
HEATING SURFACE (SQ. FT.)	119.0	157.0	195.0	237.0	272.0
INLET WATER CONNECTION	4" Flanged	4" Flanged	4" Flanged	4" Flanged	4" Flanged
OUTLET WATER CONNECTION	4" Flanged	4" Flanged	4" Flanged	4" Flanged	4" Flanged
DRAIN	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"
20°F ΔT WATER FLOW (GPM)	135.0	185.0	225.0	265.0	315.0
HEAD LOSS (FT. OF HD.)	1.7	2.3	3.0	3.5	4.0
35°F ΔT WATER FLOW (GPM)	80.0	105.0	130.0	155.0	185.0
HEAD LOSS (FT. OF HD.)	1.5	2.1	2.8	3.3	3.8
MAX. WORKING PRESSURE (PSI)	160	160	160	160	160
# OF RELIEF VALVES	1	1	1	1	1
RELIEF VALVE SIZE	1-1/2"	1-1/2"	1-1/2"	1-1/2"	2"
RELIEF VALVE RATING (MBH)	3,075,000	3,075,000	3,075,000	3,075,000	4,237,000
RELIEF VALVE PRESSURE RATING (PSI)	50 lbs.	50 lbs.	50 lbs.	50 lbs.	50 lbs.
GAS					
BTU/HR INPUT	1,500,000	2,000,000	2,500,000	3,000,000	3,500,000
BTU/HR OUTPUT (HIGH FIRE)	1,380,000	1,840,000	2,300,000	2,760,000	3,220,000
BTU/HR OUTPUT (LOW FIRE)	55,200	73,600	115,000	138,000	184,000
HORSE POWER (INPUT)	589	786	982	1,178	1,375
INLET CONNECTION	1-1/2"	1-1/2"	2"	2"	2"
MAX. INLET PRESSURE, NAT	14" w.c.	14" w.c.	14" w.c.	14" w.c.	14" w.c.
MIN. INLET PRESSURE, NAT	4" w.c.	4" w.c.	4" w.c.	4" w.c.	4" w.c.
MAX. INLET PRESSURE, LP	14" w.c.	14" w.c.	14" w.c.	14" w.c.	14" w.c.
MIN. INLET PRESSURE, LP	4" w.c.	4" w.c.	4" w.c.	4" w.c.	4" w.c.
BTU/HR INPUT	1,500,000	2,000,000	2,500,000	3,000,000	3,500,000
BTU/HR OUTPUT (HIGH FIRE)	1,380,000	1,840,000	2,300,000	2,760,000	3,220,000
BTU/HR OUTPUT (LOW FIRE)	55,200	73,600	115,000	138,000	184,000
ELECTRICAL *					
VOLTAGE/HEATER (VAC)	120	120	120	120	120
VOLTAGE/CONTROL (VAC)	24	24	24	24	24
TOTAL AMPS	6.0	7.3	10.2	13.6	19.7
# OF ELECTRICAL CONNECTIONS	4	4	4	4	4
DIMENSIONS					
HEIGHT	80"	80"	80"	80"	80"
WIDTH	30-3/4"	30-3/4"	34-1/4"	40-1/2"	40-1/2"
DEPTH	76-7/8"	76-7/8"	83"	86-1/8"	86-1/8"
SHIPPING WEIGHT	1,900	2,150	2,560	2,920	3,225
OPERATING WEIGHT	2,496	3,054	3,652	4,126	4,744
SERVICE CLEARANCES (RECOMMENDED)					
FRONT	36"	36"	36"	36"	36"
BACK (PIPING)	36"	36"	36"	36"	36"
RIGHT SIDE	24"	24"	24"	24"	24"
LEFT SIDE	24"	24"	24"	24"	24"
TOP	36"	36"	36"	36"	36"
DIRECT VENTING					
VENT SIZE	7"	8"	9"	10"	10"
AIR INLET SIZE	7"	7"	8"	10"	10"
VENT CATEGORY	IV	IV	IV	IV	IV
VENT MATERIAL	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel

* Electrical - For alternate voltages and amp draws, please consult the factory or the installation and operation manual.

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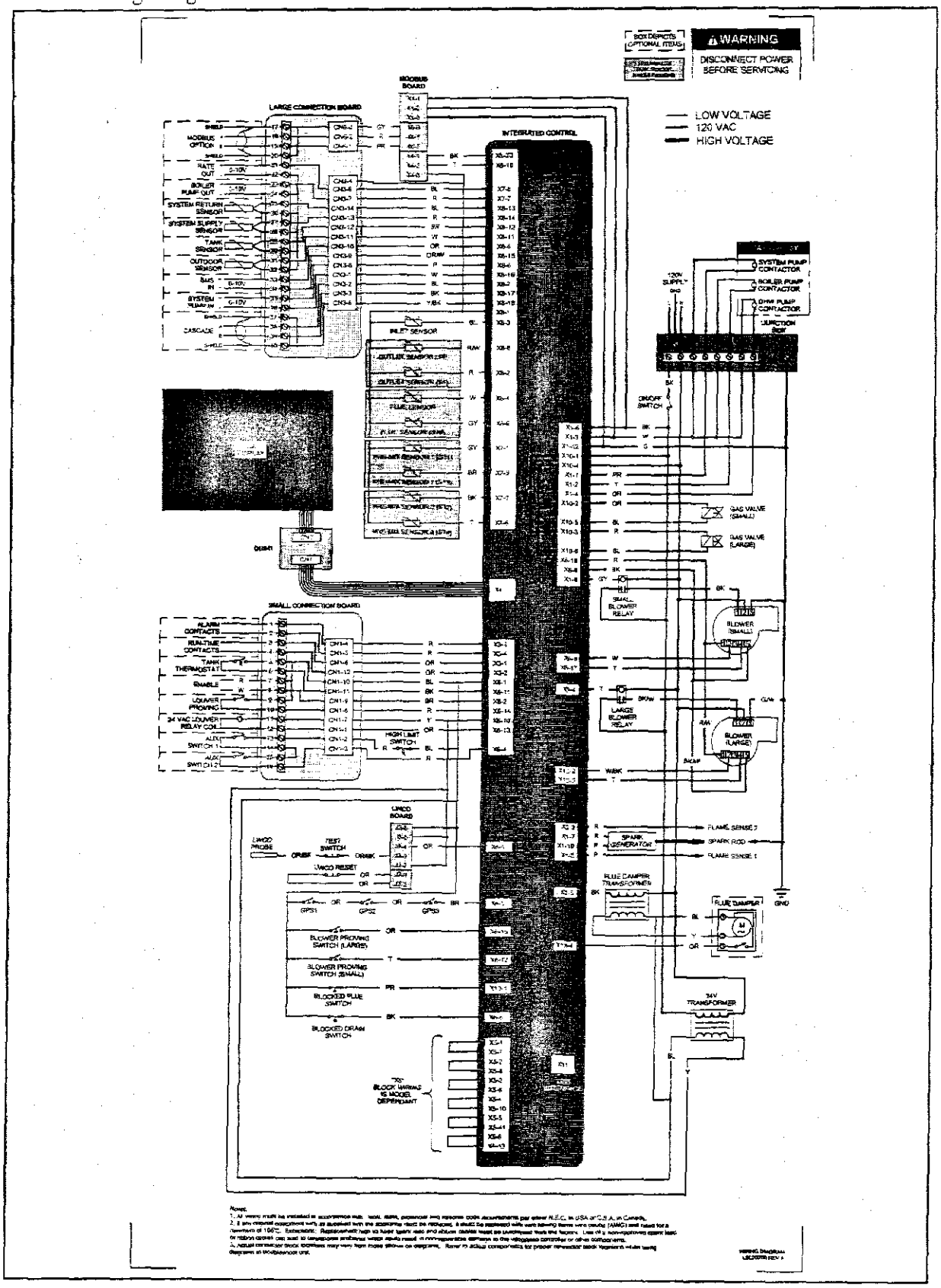
www.Lochinvar.com

Crest Wiring Diagram



HIGH EFFICIENCY COMMERCIAL BOILERS

CREST
CONDENSING BOILER

SMART TOUCH

MODBUS PROTOCOL

6 SEQUENCER AND

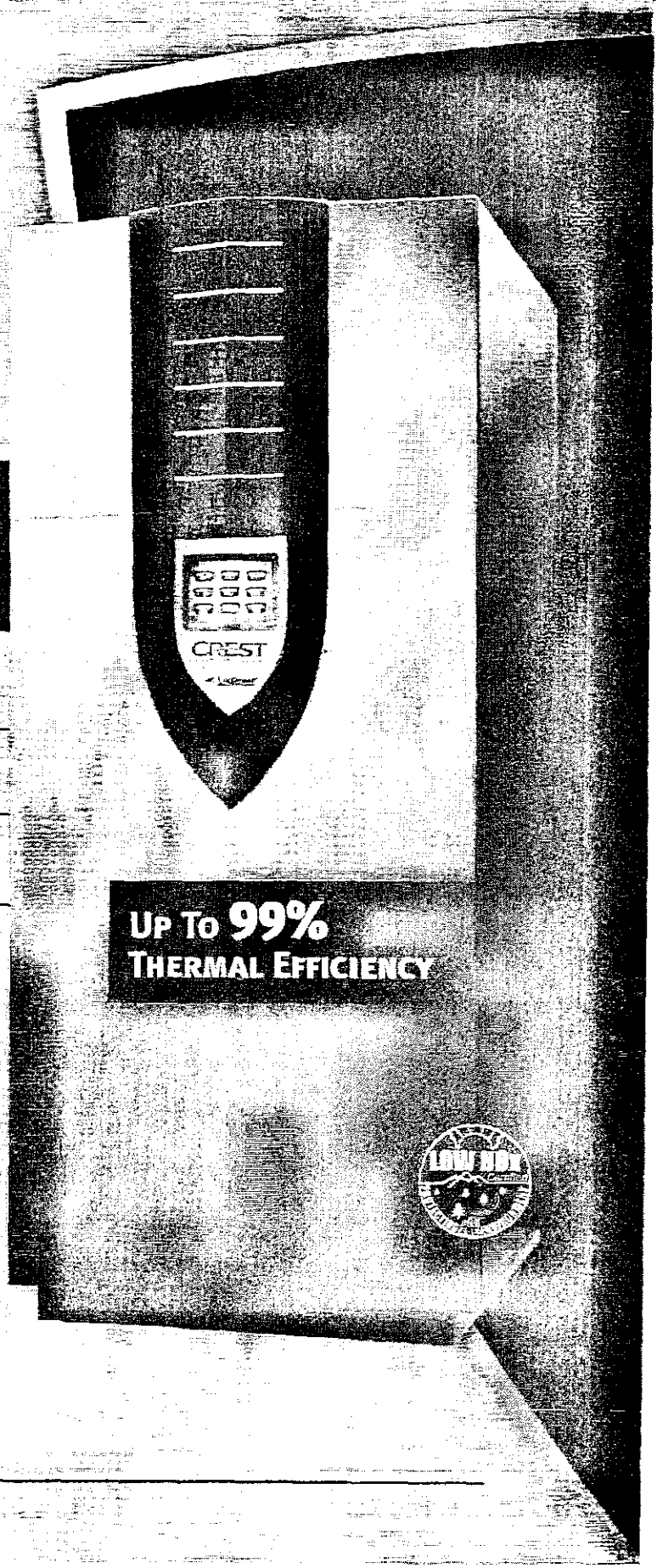
LOADING CAPABILITY

7 INPUTS FROM 1.5 TO 5.0 MILLION BTU/HR

FIRING RATE MODULATION UP TO 25:1

DIRECT-VENT FLEXIBILITY TO 100 FEET

FLEXIBLE FLOW RATES UP TO 350 GPM



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High Efficiency Water Heaters and Boilers

CREST®
CONDENSING BOILER

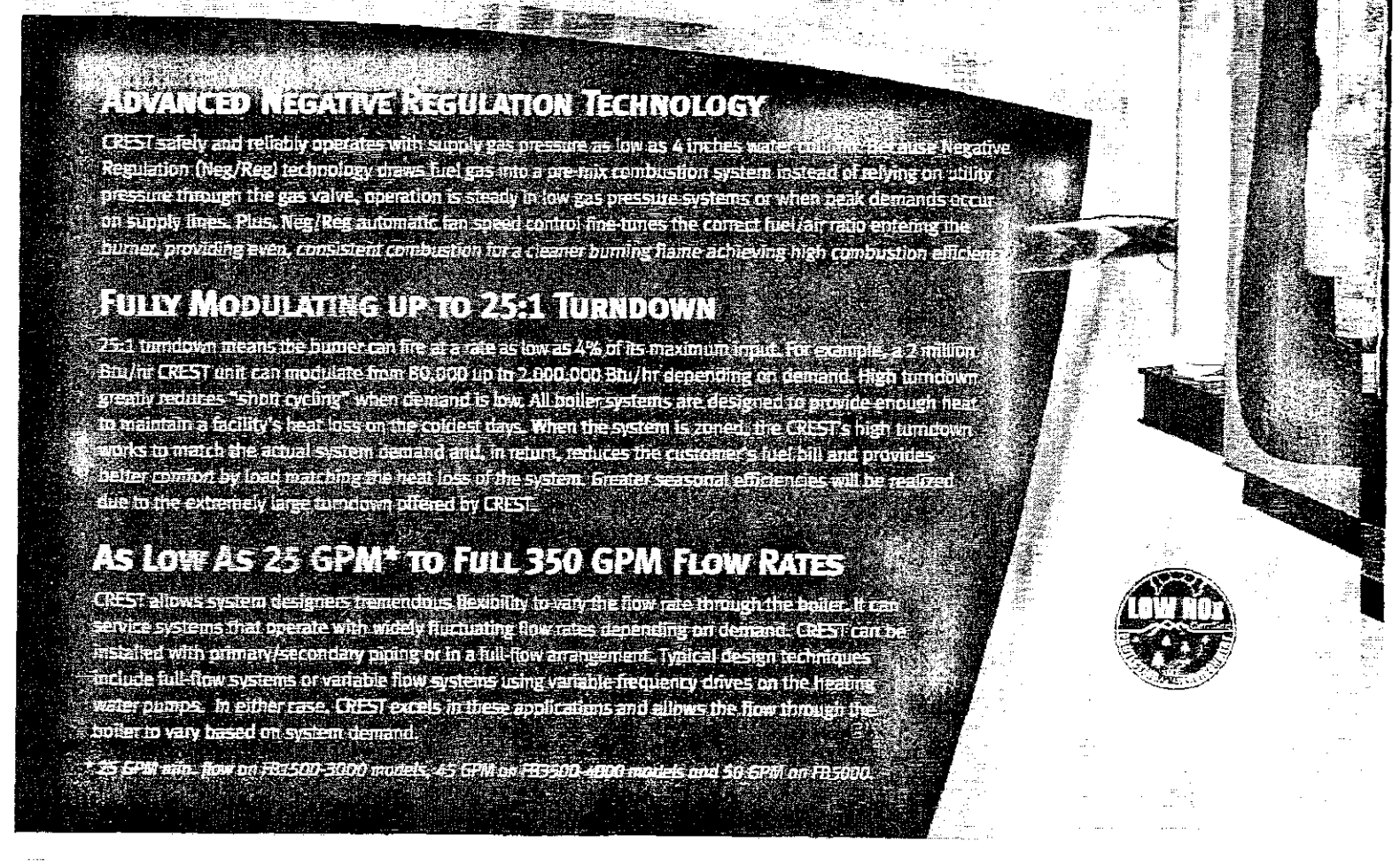
Fire Tube Innovation up to 5.0 Million BTU

Lochinvar® has taken the fire-tube concept in an innovative new direction with the CREST® modulating-condensing boiler. With sizes that range from 1.5 to 5.0 million Btu/hr, you have the opportunity to utilize Lochinvar leading-edge technology in your largest applications. With thermal efficiencies up to 99% in low water temperature applications, CREST is positioned to provide exceptional energy-saving performance.

The advanced CREST introduces a combustion system with a unique burner design with up to 25:1 turndown. The burner fires into an array of 316L stainless steel fire-tubes that transfer the heat to the surrounding water with exceptionally high efficiency.

CREST communicates seamlessly and in real time with building management systems by utilizing an on-board MODBUS protocol. The SMART TOUCH™ control has a built-in cascading component that communicates with up to eight units, providing total command without an external control or complex and expensive control logic programming by the BMS integrator.

Yes, innovative fire-tube boiler technology integrated with our SMART TOUCH™ operating control makes the CREST a genuine game-changer among commercial boilers.



Advanced Negative Regulation Technology

CREST safely and reliably operates with supply gas pressure as low as 4 inches water column. Because Negative Regulation (Neg/Reg) technology draws fuel gas into a pre-mix combustion system instead of relying on utility pressure through the gas valve, operation is steady in low gas pressure systems or when peak demands occur on supply lines. Plus, Neg/Reg automatic fan speed control fine-tunes the correct fuel/air ratio entering the burner, providing even, consistent combustion for a cleaner burning flame achieving high combustion efficiency.

Fully Modulating up to 25:1 Turndown

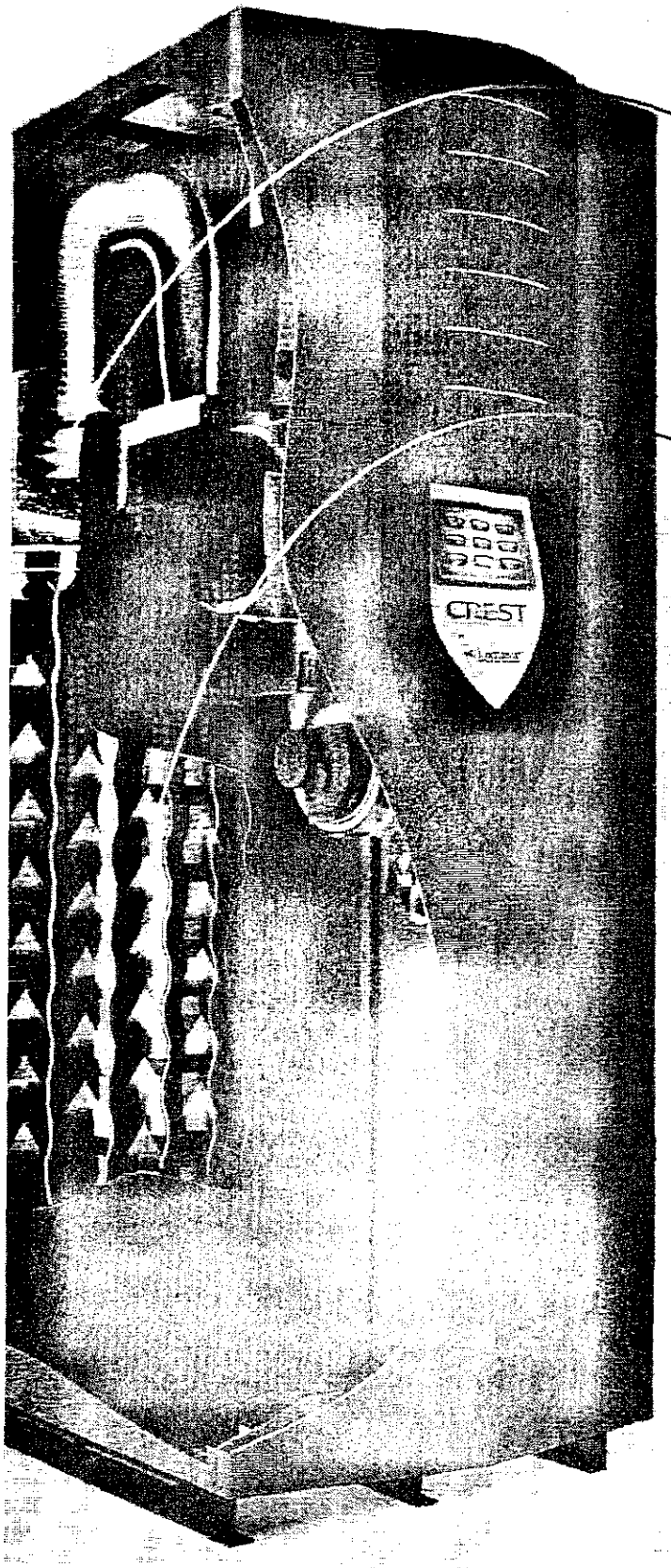
25:1 turndown means the burner can fire at a rate as low as 4% of its maximum input. For example, a 2 million Btu/hr CREST unit can modulate from 80,000 up to 2,000,000 Btu/hr depending on demand. High turndown greatly reduces "short cycling" when demand is low. All boiler systems are designed to provide enough heat to maintain a facility's heat loss on the coldest days. When the system is zoned, the CREST's high turndown works to match the actual system demand and, in return, reduces the customer's fuel bill and provides better comfort by load matching the heat loss of the system. Greater seasonal efficiencies will be realized due to the extremely large turndown offered by CREST.

As Low As 25 GPM* to Full 350 GPM Flow Rates

CREST allows system designers tremendous flexibility to vary the flow rate through the boiler. It can service systems that operate with widely fluctuating flow rates depending on demand. CREST can be installed with primary/secondary piping or in a full-flow arrangement. Typical design techniques include full-flow systems or variable flow systems using variable frequency drives on the heating water pumps. In either case, CREST excels in these applications and allows the flow through the boiler to vary based on system demand.

* 25 GPM min. flow on FB0500-3000 models, 45 GPM on FB3500-4800 models and 56 GPM on FB5000.

LOW NOx



The CREST Combustion System

CREST's top-mounted, single micro metal fiber burner is actually "two combustion systems in one," each with its own blower/gas valve assembly to power the combustion process from air/gas intake to driving heat energy down and through the fire-tubes to exhaust venting through the bottom of the unit.

In a 2 Million BTU/Hr CREST

The upper portion of the burner fires first and, with 5:1 turndown, modulates from 80,000 to 400,000 Btu/hr.

When demand exceeds 400,000 Btu/hr., the lower portion of the burner fires and modulates from 320,000 to 1,600,000 Btu/hr.

With the entire burner firing at capacity, the total input is 400,000 + 1,600,000 = 2,000,000 Btu/hr.

The CREST's patent-pending dual-system design is truly an industry first.

The CREST Heat Exchanger

Heat energy and combustion products flow downward into fire-tubes from the burner.

Energy from inside fire-tubes heats water flowing through the heating vessel.

As water is heated, it flows up through the heating vessel and out into the system.

Cold water returning from the system enters the heating vessel to maximize efficiency.

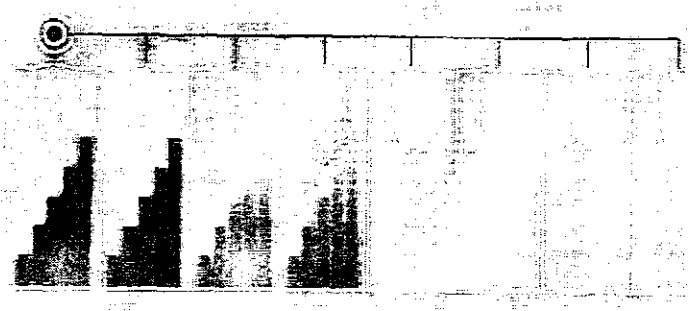
Condensate is drained into a stainless steel collector, to be piped to a suitable floor drain.

The flue outlet is located at the bottom of the unit.

Built-In Cascading Sequencer

Sequences up to an 8-boiler system using simple 2-wire daisy-chain connection, eliminating cost and uncertainty of separate "third party" sequencer. On demand, one boiler functions as the leader and modulates to capacity. Increasing load then "cascades" to additional "lag" boilers in sequence as needed. Lead-lag rotation shifts "first on" boiler role every 24 hours, distributing equal lead-lag runtimes to each unit.

CREST's ability to sequence up to eight units that each have as much as 25:1 turndown means that the combined system has the potential of operating with modulation of up to 200:1 turndown. A bank of eight 2.0M Btu CREST's would be able to provide as little as 80,000 Btu/hr and as much as 16,000,000 Btu/hr of heating output. In addition, the CREST Cascade can be set for "Efficiency Optimization" with each boiler firing at the same low BTU/hr input rates to receive the benefits of the highest thermal efficiency.



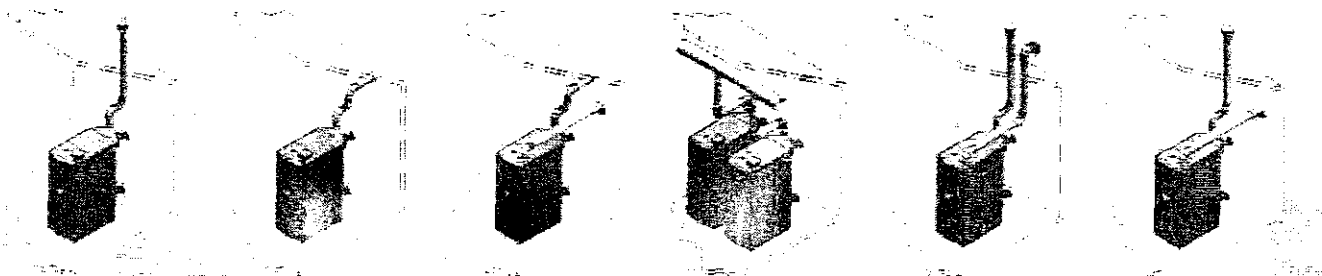
Unequaled Control and Monitoring Functions That Are Easy to Use

The CREST features Lochinvar's popular, all-in-one SMART TOUCH™ operating control. Amplified with an 8-inch touchscreen, the multi-color interface offers the best info-graphics and visual control content in the boiler industry today. It is smartly dressed with distinctive features and control parameters. It provides the operator with outstanding functionality, ease of operation and customized data retrieval. The CREST's SMART TOUCH control can be integrated directly into a Building Automation System via ModBus protocol and other communication protocols via a gateway device.

- MODBUS COMMUNICATION
- BUILDING MANAGEMENT SYSTEM CONTROL
- PC CONNECTION
- OUTDOOR RESET
- NIGHT TEMPERATURE SETBACK
- HOT WATER GENERATOR COMPATIBILITY
- SYSTEM AND BOILER PUMP CONTROLS
- FREEZE PROTECTION
- PRODUCT SERVICE DUE INDICATOR
- PASSWORD SECURITY

Direct-Venting up to 100 Feet

CREST offers 6 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using AL29-4C stainless steel (Category IV) vent pipe. Intake and exhaust runs can terminate horizontally through a sidewall or vertically through the roof. Additionally, CREST boilers installed in multiples of 2 or more can be common-vented, eliminating much of the time and material cost of venting multiple boilers individually.



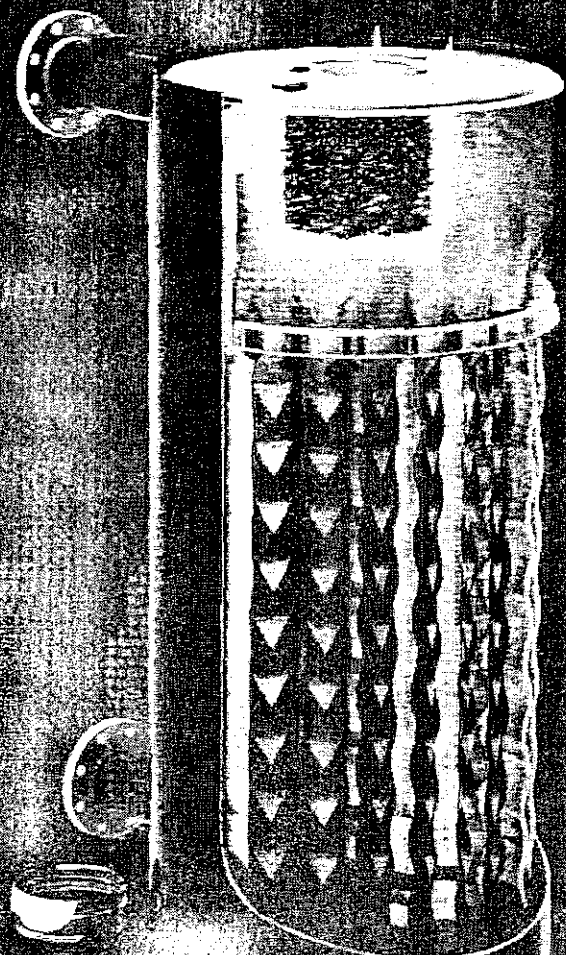
Room Air Vertical | **Room Air Sidewall** | **Direct-Vent Sidewall** | **Common-Vent*** | **Direct-Vent Vertical** | **Vertical w/Sidewall Air**

*Contact Lochinvar for information on common venting of CREST boilers.

The Industry's First Wave™ Fire-Tube Boiler Is Also the Industry's Best

Through an extensive research and design program, Lochinvar has taken fire-tube boiler technology to a new level. The CREST® boiler features the Wave™ 316L stainless steel fire-tube. Each CREST Fire-Tube has a larger input capacity than other industry fire-tubes, which means fewer tubes and welds. This exclusive, new design provides superior heat transfer in every fire-tube.

The Wave™ fire-tube employs a unique wave pattern that creates turbulence as the flue gas products flow down the tube, scrubbing the energy from the flue products. The Wave™ design also enhances the life of the heat exchanger by allowing the fire-tubes to flex, operating stress-free with none of the adverse effects suffered by traditional fire-tube boilers.

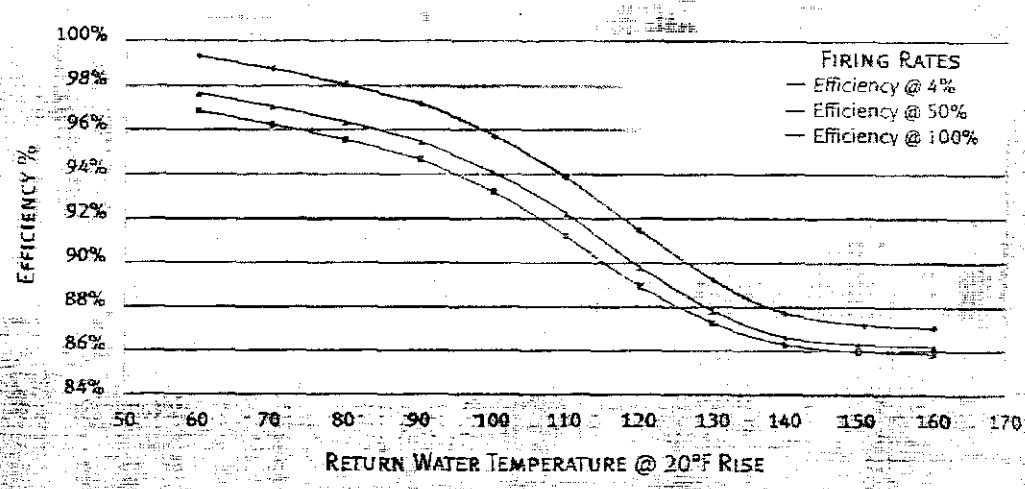


Each fire-tube is welded into the heat exchanger vessel and surrounded by water. The heat transfer process is enhanced by the water's counterflow. As the water flows up inside the vessel, the super-heated flue products flow down the fire-tube. With one pass, the heat is effectively captured from the flue products reaching condensing temperatures. At the top of the vessel, the combustion chamber is also water-backed for additional heat transfer.

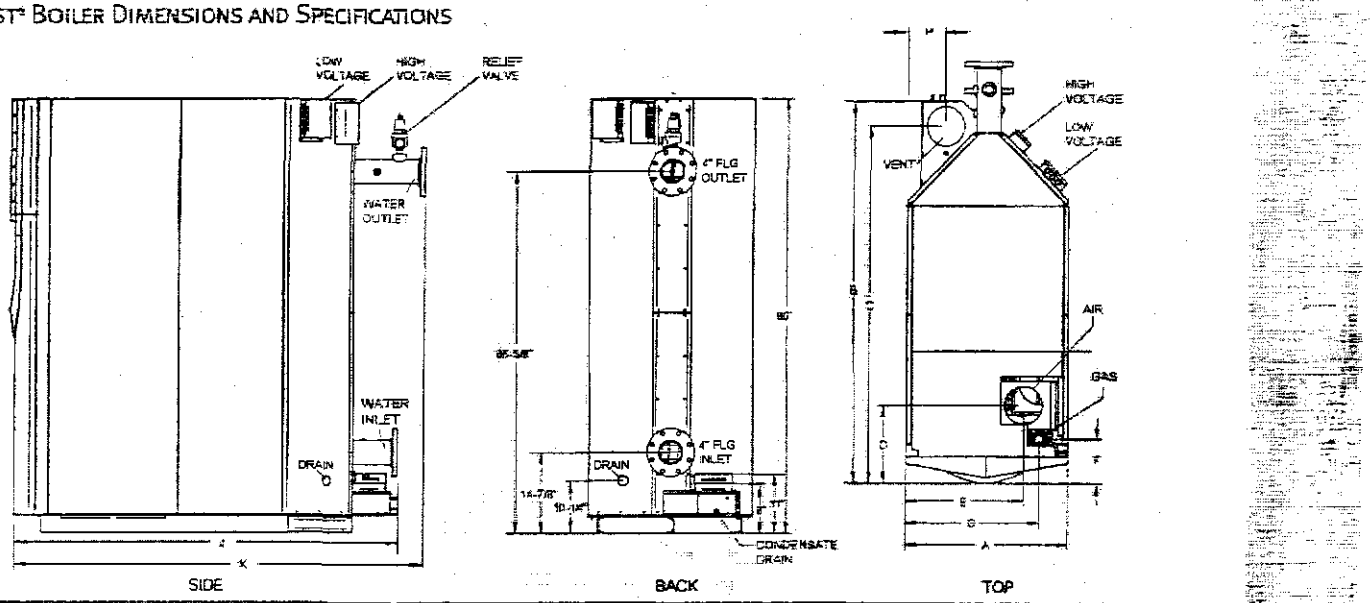
Finally, the CREST heat exchanger can operate with flow rates from as low as 25 GPM* to 350 GPM, comfortably suited to a wide variety of boiler system designs.

*25 GPM min. flow on FB1500-3000 models, 45 GPM on FB3500-4000 models and 50 GPM on FB5000.

CREST Boiler Efficiency



CREST® BOILER DIMENSIONS AND SPECIFICATIONS



SIDE BACK TOP

CREST HEATING BOILER — DIMENSIONS AND SPECIFICATIONS

Model Number	Input MBH Min.	Input MBH Max.	AHRI Thermal %	Output MBH	NET I=B=R MBH	Turndown*	A	B	C	D	E	F	G	H	J	K	Gas Conn.	Air Inlet	Vent Size	Operating Wt. (lbs.)	Shipping Wt. (lbs.)
FBN1500	60	1,500	92.0%	1,380	1,200	25:1	30-3/4"	71-1/8"	65-3/4"	14-3/8"	22-3/8"	8-1/2"	25-1/4"	8-1/8"	74-5/8"	77-5/8"	1-1/2"	7	7	2,496	1,900
FBN2000	80	2,000	92.0%	1,840	1,600	25:1	30-3/4"	71-1/8"	65-1/8"	14-7/8"	22-3/8"	8-1/4"	25-3/8"	8-5/8"	74-7/8"	76-7/8"	1-1/2"	8	8	3,054	2,150
FBN2500	125	2,500	92.0%	2,300	2,000	20:1	34-1/4"	76-3/8"	70-1/4"	17-3/4"	26-1/8"	9-3/4"	27-3/8"	11-3/8"	78"	83"	2"	8	9	3,652	2,360
FBN3000	150	3,000	92.0%	2,760	2,400	20:1	46-1/2"	83-5/8"	76-3/8"	17-3/8"	31-3/8"	9-1/8"	34-3/4"	11-1/2"	85-1/8"	87-1/8"	2"	10	10	4,176	2,920
FBN3500	200	3,500	92.0%	3,220	2,800	18:1	46-1/2"	83-1/4"	75-5/8"	17-1/4"	31-3/8"	9-1/8"	34-3/4"	12-7/8"	84-1/8"	86-1/8"	2"	10	10	4,744	3,225
FBN4000	235	4,000	92.0%	3,770	3,225	17:1	53-1/2"	109"	100-3/4"	31-3/4"	40-3/4"	14-1/2"	45-3/4"	12-3/4"	106-1/4"	108-1/4"	2-1/2"	12	12	6,900	4,750
FBN5000	300	5,000	92.0%	4,650	4,043	16:1	53-1/2"	109"	100-3/4"	28"	40-3/4"	31"	45-1/2"	12-3/4"	109-1/4"	108-1/4"	2-1/2"	14	14	8,000	5,550

Notes: *Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models and to "D" for dual fuel models.*
*For Low NOx on FB2500 - FB5000 models, consult factory. *Turndown rate reduced on LP gas models.*

SMART TOUCH™ FEATURES

- **SMART TOUCH™ Touchscreen Operating Control**
- **Full-Color 8" Touchscreen LCD Display**
- **Built-in Cascading Sequencer for up to 8 Boilers**
  - Cascade Multiple Sized Boilers
  - Lead/Lag Cascade
  - Efficiency Optimized Cascade
- **Front-End Loading Capability with Copperfin II and Powerfin Boilers**
- **Building Management System Integration with 0-10 VDC Input**
- **Modbus Communications**
- **Outdoor Reset Control with Outdoor Air Sensor**
- **Password Security**
- **Domestic Hot Water Prioritization**
  - DHW tank piped with priority in the boiler loop
  - DHW tank piped as a zone in the system with the pumps controlled by the Smart System
  - DHW Modulation Limiting
  - Separately Adjustable SH/DHW Switching Times*
- Low Water Flow Safety Control & Indication
- Inlet & Outlet Temperature Readout
- Freeze Protection
- Service Reminder
- Time Clock
- **Data Logging**
  - Hours Running, Space Heating
  - Hours Running, Domestic Hot Water
  - Hours Running, Modulation Rate
  - Ignition Attempts
  - Last 10 Lockouts
- **Programmable System Efficiency Optimizers**
  - Night Setback
  - Anti-Cycling
  - Outdoor Air Reset Curve
  - Ramp Delay
  - Boost Temperature & Time
- **Three Pump Control**
  - System Pump
  - Boiler Pump
  - Domestic Hot Water Pump
- **High-Voltage Terminal Strip**
  - 120 VAC / 60 Hertz / 1 Phase Power Supply (FB1500-3500)
  - 208 VAC / 60 Hertz / 3 Phase Power Supply (FB4000-5000)
  - System Pump, Boiler Pump and DHW Pump Power
- **Low-Voltage Terminal Strip**
  - 24 VAC Auxiliary Device Relay
  - Auxiliary Proving Switch Contacts
  - Alarm on Any Failure Contacts
  - Runtime Contacts
  - DHW Thermostat Contacts
  - Unit Enable/Disable Contacts
  - System Sensor Contacts
  - DHW Tank Sensor Contacts
  - Outdoor Air Sensor Contacts
  - Cascade Contacts
  - 0-10 VDC BMS External Control Contact

OPTIONAL EQUIPMENT

- Alarm Bell
- BMS Gateway - BACnet or LonWorks
- Condensate Neutralization Kit
- SMART TOUCH PC Software
- Common Vent Kits
- Dual Fuel Gas Train*
- Electrical Options (Shipped Loose):
  - 208V/3Ø/60Hz (Models FB1500-3500 only)
  - 480V/3Ø/60Hz
  - 600V/3Ø/60Hz

CODES & REGISTRATIONS

- ANSI Z21.13/CSA Certified
- ASME certified, "H" Stamp / National Board
- California Code Compliant
- CSD1 / Factory Mutual / GE Gap Compliant
- South Coast Air Quality Management District Qualified
- Canadian Registration Number (CRN)
- AHRI Certified

STANDARD FEATURES

- Up to 92% Thermal Efficiency (AHRI)
- Up to 99% Thermal Efficiency in Low Temperature Applications
- Modulating Burner with up to 25:1 Turndown
- Direct-Spark Ignition
- Low-NOx Operation
- Sealed Combustion
- Low Gas Pressure Operation
- Vertical or Horizontal Venting
- Category IV Venting up to 100 Feet
- ASME "H" Stamped Heat Exchanger
- 316L Stainless Steel Fire Tubes
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Low Water Cutoff with Manual Reset & Test
- High & Low Gas Pressure Switches w/Manual Reset
- Low Air Pressure Switches
- Condensate Trap w/ Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors
- High Voltage Terminal Strip
- Low Voltage Terminal Strip
- Downstream Gas Test Cocks
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)

Registered Under U.S. Patent #5286594

Lochinvar, LLC
300 Maddox Simpson Parkway
Lebanon, Tennessee 37090
P: 615-889-8900 / F: 615-547-1069
www.lochinvar.com

Submittal Item

Project [1012100] - Cumberland County Civic Center

View Date 3/8/2013

WBRC Architects & Engineers
44 Central Street
Bangor, ME 04401-5116
Phone: (207) 947-4511
Fax: (207) 947-4628

Submittal Item No.
00188

General Information

Front Discharge

Item No.	00188	**Revision**	0
Package No. Rev.	00023.0		
Description	Submittal - Indoor, Direct Gas Fired Heating & Ventilating Units		
CSI Code	23 74 23.16 - Packaged, Indirect-Fired, Outdoor, Heating-Only Makeup-Air Units	**Submitting Company**	Johnson and Jordan, Inc.
Reference No.		**Copies Required**	
Status	Approved	**Item Type**	Product Data
Responsible Team Member	Michael johanning (WBRC Architects & Engineers)		
Item Notes			
Primary Response			
Submission Notes			
Review Notes			

Dates

Material Required on Site		**Required Lead Time (days)**	
Approved Submittal Required By	2/27/2013	**Required Review Time (days)**	
Submission Due	2/27/2013		

Supporting Documents

Document Type	Document	Open	Description	Date	Size (KB)
Doc	1012100-01355		188 - Indoor Direct Gas Fired Heating Ventil...	3/7/2013	803

Distribution

Recipient	Company	Method	Date
Anthony Passmore	Cianbro	Email: apassmor@cianbro.com	3/8/2013
Bradley P. Smith	Cianbro	Email: bsmith@cianbro.com	3/8/2013
Brett A. Dyer	Cianbro	Email: bdyer@cianbro.com	3/8/2013
Brian Larsen	Cianbro	Email: blarsen@cianbro.com	3/8/2013
Bruce Cummings	Cianbro	Email: bcumming@cianbro.com	3/8/2013

Cynthia (Charlie) Quimby	WBRC Architects & Engineers	Email: charlie.quimby@wbrcae.com	2/20/2013
Michael johanning	WBRC Architects & Engineers	Email: michael.johanning@wbrcae.com	2/20/2013
Suzan M. West	Cianbro	Email: swest@cianbro.com	3/8/2013
Timothy Michaud	Johnson and Jordan, Inc.	Email: tmichaud@johnsonandjordan.com	3/8/2013

CIANBRO

SUBMITTAL CERTIFICATION FORM

PROJECT: Cumberland County Civic Center Renovation Project

PHYSICAL & MAILING ADDRESS: Cianbro Corp.
210 Hunnewell Ave
Pittsfield, ME 04967
207-487-3311

CONTRACTORS PROJECT NUMBER: 1012100

ARCHITECT / ENGINEER: WBRC Architects & Engineers ADDRESS: 44 Central Street
Bangor, ME 04101
207-947-4511

CONTRACTOR'S STAMP	ENGINEER'S STAMP
☐ NO EXCEPTIONS TAKEN ☐ EXCEPTIONS AS NOTED ☑ REVIEWED FOR INFORMATION ONLY ☐ RETAINED FOR RECORD ☐ REVISE AND RESUBMIT REVIEWING IS ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE SUBCONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE SITE FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES SPECIFICATION SECTION: 23 74 23.16 SUBMITTAL NO. 188 CIANBRO CORPORATION: By: AJP Date: 02/20/2013	X 1 - Reviewed, No Exception Taken ☐ 2 - Reviewed, Revise as Noted ☐ 3 - Revise and Resubmit ☐ 4 - Rejected ☐ 5 - Other, Held for Record, Not Reviewed WBRC ARCHITECTS · ENGINEERS This review is only for general conformance with the design concept and the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents and applicable laws, codes and regulations. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes, means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all trades and performing all Work in a safe and satisfactory manner. REVIEWER: DMonroe DATE: 3.7.13

Johnson and Jordan
Mechanical contractors

SUBMITTAL **SUBM #26**
Phase Two

C.C.C.C
#12191

GENERAL CONTRACTOR ..... **Cianbro Corporation**

SUBMITTED BY ..... JOHNSON & JORDAN
SCARBOROUGH, ME.
(207) 883-8345

SUBCONTRACTOR ..... Johnson and Jordan

SUPPLIER ..... Trane

SPECIFICATION SECTION 237413-1

PARAGRAPH 1.4

ITEM ..... MAU -1

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME
Approved_____ Approved as Noted_____
Re-Submit_____ Reviewed_____x_____
Subject to Architects Approval _x_____
Date__2-18-13_____ By___T.M._____

Submittal

Trane U.S. Inc.

Engineer: WBRC

Date: February 15, 2013

Prepared For:
Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074 U.S.A.
Customer P.O. Number: 182347
Customer Project Number:

Job Name:
Cumberland County Civic Center
1 Civic Center Square
Portland, ME 04101
Job Number: A223063

Trane is pleased to provide the enclosed submittal for your review and approval.

SECTION 237423.16 OUTDOOR, INDIRECT GAS-FIRED HEATING AND VENTILATING UNITS

Qty	***Description***	***Tag(s)***
	Gas Fired Make Up Air Unit	
1	Trane Model GRAA50P Outdoor Gas Heating Unit	MAU-1

Notes:

- *Controller and control interface by other*
- *5hp motor required based on specified 0.75" ESP and accessories provided.*
- *24" high non-seismic spring isolation roof curb provided. Standard 14" non isolated curb shown in submittal for dimensions only*

Dan Broderick
Trane U.S. Inc. dba Trane
860 Spring Street, Unit #1
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Tag Data - Indirect Fired Gas Heating Units (Outdoor) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	MUA-1	1	GRAA50P	GRAA50PFLF0

Product Data - Indirect Fired Gas Heating Units (Outdoor)

Item: A1 Qty: 1 Tag(s): MUA-1

Rooftop gas heating unit
Standard temperature rise furnace 20 - 60 F (-7 - 16 C) per furnace - *left hand connections*
500 MBH input
Power venting
460/60/3 main power supply
Rooftop arrangement "C" - Standard blower with downflow supply plenum
Electronic modulating gas control with external 4 - 20 mA input, all furnaces – *controller and control interface by others*
Natural gas
409 stainless steel heat exchanger package (*all furnace sections*)
409 Stainless steel furnace drip pan
5 HP Single speed high efficiency open drip proof supply fan motor with magnetic starter – *scheduled 0.75" ESP and accessories require use of 5hp motor*
100% outside air opening with outside air hood with moisture eliminators
2-position outside air damper w/ spring return, low leak dampers
Air flow proving switch
Double wall construction
Status indicator lamps (electrical cabinet)
2" MERV 8 pleated media filter
Hinged service access door
30 amp 460-575/60/3 fused disconnect (fld)
Remote control station (fld)
24" high spring isolated non-seismic insulated roof curb (ffd)
Interlock relay 24/115v coil spdt 10a (fld)
10 year heat exchanger warranty
fld = Furnished by Trane U.S. Inc. dba Trane / Installed by Others

Mechanical Specifications - Indirect Fired Gas Heating Units (Outdoor)
Item: A1 Qty: 1 Tag(s): MUA-1

General
Units are completely factory assembled, piped, wired and test fired. All units contain duct furnaces that are A.G.A and C.G.A. certified and conform with the latest ANSI Standards for safe and efficient performance. Units are mounted on metal rails with lifting and anchor holes and are suitable for slab or curb mounting. Units are available for operation on either natural or LP (propane) gas. The firing rate of each furnace will not exceed 400 MBh and contains its own heat exchanger, flue collector, venting, burners, safety and ignition controls. All units are ETL and CSA certified for electrical safety in compliance with UL 1995 safety standard for heating, ventilating and cooling equipment. All units are in compliance with FM (Factory Mutual) requirements. Standard control relays socket mounted with terminal block connections.

All control wiring terminates at terminal strips (single point connection) and include an identifying marker corresponding to the wiring diagram. Motor and control wiring is harnessed with terminal block connections. Casings are die formed, 18 gauge [1.3 mm] galvanized steel and finished in air dry enamel. Service and access panels are provided through easily removable side access panels with captive fasteners. Fan sections and supply plenums (when provided) are insulated with fire resistant, odoriess, matte faced 1" [25 mm] glass fiber material. Outside air hoods, when provided, ship with a wire mesh inlet screen. Standard heat exchanger construction consists of 20 gauge [1.0 mm] aluminized steel tubes and 18 gauge [1.3 m] aluminized steel headers. Standard drip pan construction is corrosion resistant aluminized steel.

Standard flue collector construction is corrosion resistant aluminized steel. Burners are die formed, corrosion resistant aluminized steel, with stamped porting and stainless steel port protectors. Port protectors prevent foreign matter from obstructing the burner ports. Burners are individually removable for ease of inspection and servicing. The entire burner assembly is easily removed with its slide out drawer design. The pilot is accessible through an access plate without removing the burner drawer assembly.

Filter rack is constructed of galvanized steel with access through the side service panel. Electrical cabinet is isolated from the air stream with a non removable access panel interior to the outer service panel. There is provision in this cabinet for component mounting, wire routing and high voltage isolation. Motor and control wiring is harnessed with terminal block connections. Standard units are provided with 24 volt combination single stage automatic gas valves, including main operating valve and pilot safety shutoff, pressure regulator, manual main and pilot shutoff valve, and adjustable pilot valve. Gas valves are suitable for NEC Class 2 use for a maximum inlet gas pressure of 0.5 psi (14" W.C.) [3.4 kPa] on natural gas. All rooftop units are provided with a low voltage circuit breaker rated for 150% of the units normal 24 volt operating load.

Each duct furnace is provided with a 24 volt high temperature limit switch, a (redundant) combination gas valve and a fan time delay relay. The fan time delay relay delays the fan start until the heat exchanger reaches a predetermined temperature. It also allows the fan to operate after burner shutdown, removing residual heat from the heat exchanger. Double and triple furnace units contain a reverse airflow interlock switch. The normally closed switch, when activated, causes the gas valves to close and continue blower operation. All units provided with a solid state ignition control system which ignites the intermittent pilot by spark during each cycle of operation. When pilot flame is proven, main burner valve opens to allow gas flow to the burners. Pilot and burners are extinguished during the off cycle.

Standard Temperature Rise Furnace
Each duct furnace shall have a lower pressure drop across the heat exchanger, allowing higher air flow capacities and an 80% eff rating with delta T of 20-60F per furnace.

Air Handling Fan(s)
Centrifugal fan is belt driven, forward curved with double inlet, statically and dynamically balanced. The blower wheel is fixed on a keyed shaft, supported with rubber grommet on bearing only and ball bearing secured. An access interlock switch is installed in the blower compartment and will disengage the blower upon removing the service panel. An override is incorporated into the access interlock switch for serviceability.

Power vent
Power vent units are provided with a vent fan. Outside air for combustion and products of combustion have individual air inlet and discharge grilles located in the upper section of the furnace service panel. An air proving switch is installed and disengages gas flow if for any reason the drafter has failed to operate. (Power venting and 100% shutoff ignition systems are required for compliance with IRI (Industrial Risk Insurers).

Electronic Modulating 4 - 20 mA / 0 - 10 VDC Gas Control
Provides modulated heat output. Ignition is at full fire (100% input), and modulates the gas input from 100% to 40% rated input. The modulating gas valve shall operate in response to a 4 - 20 mA or a 0 - 10 VDC input from an external

DDC control. When "furnace one only" is specified on double and triple furnaces, additional furnace sections will have single stage on/off control.

Type 409 Stainless Steel Heat Exchanger
Heat exchanger tubes and headers shall be 20 gauge [1.0 mm] type 409 stainless steel. Burners and flue collector shall be 409 Stainless Steel. 409 stainless steel is recommended where outside air is used for make up air in areas where outside temperatures are 40 F [4 C] or below.

Motor
All motors are ball bearing type with resilient base mount. Windings are Class "B", with service factors of 1/2 to 3/4 hp = 1.25 and 1 to 15 hp = 1.15.

Dampers-General
Dampers are of the opposed blade type, constructed of galvanized steel with neoprene nylon bushings, blades to be mechanically interlocked.

Low Leak Dampers
Optional low leak dampers are of the opposed blade type, construction of galvanized steel with neoprene nylon bushings and vinyl blade edge seals, blades to be mechanically interlocked.

Units with outside air or return air only are provided with damper, two position spring return damper motor and controls. The motor powers the damper full open when the unit is on and full closed when the unit is off.

Drip Pan
409 stainless steel furnace drip pan replaces the standard aluminized steel furnace drip pan.

Moisture Eliminators
Moisture Eliminators provided in place of an inlet screen on the outside air hood. Includes a pressure switch.

Interlock Relay 24/115V Coil
Relay has a selectable coil voltage of 24 or 115 volts and single pole double throw 10 amp contacts with LED on indicator lamp. Relay is utilized as an auxiliary relay.

Status Indicator Lamps
Status indicator lamps include power on, blower on and one lamp per stage of heat mounted in the electrical cabinet.

Wall Mounted Remote Control Station
Provides 6 LED status lamps with System On/Off, Fan Auto/On, Heat Auto/Off, Cool Auto/Off Auxiliary On/Off switching and Modulating damper potentiometer mounting. Designed for easy installation with plug in terminal block wiring and wall mounting bracket. (Auxiliary On/Off may be used with the Evaporative Cooler fill and drain kit)

Hinged Service Access Door
Hinged service access door is mounted to the access side of the Blower/Motor/Filter Compartment. The hinged service access door includes quick opening tool-less latches and full perimeter gasketing to assure a water tight seal and door stops to guard against closure while open. The remaining cabinets are supplied with a standard removable door.

Double Wall Construction
Double wall cabinet construction will be provided by the manufacturer on applicable filter / damper, blower, coil and plenum cabinets. The construction will consist of a 24 gauge inner liner wall with 1" 1 1/2 LB density insulation. Access doors on the specified side will be hinged and of the same double wall design. Double wall is not available on the applicable evaporative cooler and furnace sections.

Performance Data - Indirect Fired Gas Heating Units (Outdoor)

Item: A1 Qty: 1 Tag(s): MUA-1

Table PD-4 (Continued) — Rooftop Gas Heating Units Accessory Pressure Loss Data — Rooftop Arrangements B,C,D,E

		Pressure Loss (Inches of Water)										
		Rainhood		Filters					Supply	Evaporative Media		Return or Outside
		With		Throwaway	Washable		Pleated		Air			Air
Capacity	CFM	Screen	Mat/Elim.	2"	1"	2"	1"	2"	Plenum	8"	12"	Damper
	2,900	.03	.04	.07	.01	.02	.09	.05	.02	.04	.05	.04
	3,100	.03	.05	.08	.02	.02	.11	.06	.03	.04	.07	.05
	3,400	.04	.06	.10	.02	.03	.13	.07	.04	.06	.08	.06
	3,700	.05	.07	.11	.02	.03	.15	.09	.04	.06	.09	.07
35	4,000	.05	.08	.12	.03	.04	.17	.10	.05	.07	.11	.08
	5,000	.09	.12	.16	.04	.06	.24	.14	.08	.11	.17	.13
	6,000	.12	.17		.06	.09	.33	.20	.11	.16	.24	.19
	7,000	.17	.23		.09	.13	.42	.27	.15	.22	.33	.25
	8,000	.22	.31		.11	.16			.19	.29	.44	.33
	9,000	.28	.39						.24	N/A	N/A	.42
	3,200	.03	.04	.07	.01	.02	.09	.05	.02	.04	.06	.04
	3,500	.04	.05	.09	.02	.02	.11	.06	.03	.05	.07	.05
	4,000	.04	.06	.10	.02	.03	.12	.07	.04	.06	.09	.07
	4,400	.05	.07	.11	.03	.04	.15	.09	.05	.07	.11	.08
40	4,500	.06	.08	.12	.02	.04	.18	.10	.05	.09	.13	.10
	5,000	.07	.10	.13	.03	.05	.19	.11	.06	.09	.14	.10
	6,000	.10	.14	.17	.05	.07	.26	.16	.08	.14	.20	.15
	7,000	.13	.18		.07	.09	.33	.21	.11	.18	.27	.20
	8,000	.17	.24		.09	.12	.42	.26	.15	.24	.36	.25
	8,500	.20	.28		.10	.14			.17	.27	.41	.30
	3,000	.05	.07	.12	.03	.04	.16	.09	.05	.06	.10	.05
	3,500	.07	.10	.14	.04	.05	.21	.12	.07	.09	.13	.11
50	4,000	.09	.13	.17	.05	.07	.26	.16	.09	.11	.17	.15
	4,500	.12	.16		.05	.09	.31	.19	.12	.15	.22	.19
	5,000	.15	.20		.07	.11	.38	.23	.14	.18	.27	.23
	5,500	.18	.25		.09	.13	.44	.28	.17	.22	.32	.28
	3,700	.05	.07	.12	.03	.03	.15	.09	.05	.05	.09	.07
	4,000	.05	.09	.12	.03	.04	.17	.10	.06	.07	.11	.08
60	5,000	.09	.12	.16	.04	.06	.24	.14	.09	.11	.17	.13
	6,000	.12	.17		.06	.09	.33	.20	.13	.16	.24	.19
	6,500	.14	.20		.07	.11	.38	.23	.16	.19	.29	.23
	4,500	.07	.10	.14	.04	.05	.20	.12	.05	.09	.14	.11
	5,000	.09	.12	.16	.04	.06	.24	.14	.08	.11	.17	.13
70	6,000	.12	.17		.06	.09	.33	.20	.11	.16	.24	.19
	7,000	.17	.23		.09	.13	.43	.27	.15	.22	.33	.25
	8,000	.22	.31		.11	.16			.19	.29	.44	.33
	5,000	.07	.10	.15	.03	.05	.19	.11	.06	.09	.14	.10
80	6,000	.10	.14	.17	.05	.07	.26	.16	.08	.14	.20	.15
	7,000	.13	.19		.07	.09	.33	.21	.11	.18	.27	.20
	8,000	.17	.24		.09	.12	.42	.26	.15	.24	.36	.25

ESP	0.75"
Hood/eliminator	0.16"
2" pleated filters	0.19"
supply plenum	0.12"
OA damper	0.19
Total static pressure	1.41

Performance Data - Indirect Fired Gas Heating Units (Outdoor)

Item: A1 Qty: 1 Tag(s): MUA-1

Table PD-2 — Rooftop Gas Heating Units Performance Data — Furnace Type (A,B) Standard Temperature Rise — Rooftop Arrangement B,C,D,E

Capacity					TOTAL EXTERNAL STATIC PRESSURE INCHES OF WATER																	
Furnace	TR		Input	Output	0.2		0.4		0.6		0.8		1		1.2		1.4		1.6		1.8		2	
Type	(F)	CFM	BTU/H	BTU/H	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	61	1,200	100,000	80,000	575	0.16	705	0.23	825	0.31	940	0.4	1040	0.5	1135	0.6	1220	0.7	1300	0.8	1375	0.91	1440	1.02
	49	1,500			655	0.26	765	0.35	870	0.44	965	0.54	1050	0.64	1150	0.75	1225	0.87	1315	0.99	1390	1.12	1460	1.24
10-A,B	37	2,000			795	0.55	890	0.65	975	0.77	1055	0.88	1130	1	1205	1.12	1280	1.25	1355	1.39	1425	1.54	1490	1.68
	29	2,500			950	1.01	1030	1.12	1105	1.25	1175	1.39	1240	1.54	1305	1.68	1365	1.83	1425	1.98	1485	2.13	1545	2.29
	25	3,000			1110	1.68	1175	1.82	1240	1.95	1305	2.1	1365	2.27	1420	2.44	1475	2.62	1530	2.79	1580	2.97	1635	3.14
	21	3,500			1270	2.59	1330	2.77	1385	2.93	1440	3.08	1495	3.25	1550	3.43	1600	3.63	1650	3.83	1695	4.04	1745	4.25
	55	2,000	150,000	120,000	695	0.44	785	0.54	880	0.63	965	0.75	1045	0.87	1120	0.98	1195	1.11	1270	1.24	1345	1.37	1415	1.52
	44	2,500			805	0.78	890	0.91	970	1.04	1045	1.15	1120	1.28	1190	1.43	1255	1.57	1320	1.72	1380	1.86	1440	2.01
15-A,B	37	3,000			935	1.28	1005	1.44	1075	1.6	1140	1.75	1205	1.88	1270	2.02	1335	2.18	1390	2.35	1450	2.53	1500	2.7
	32	3,500			1065	1.97	1130	2.15	1190	2.33	1250	2.52	1305	2.7	1360	2.87	1420	3.02	1475	3.17	1525	3.35	1580	3.55
	28	4,000			1200	2.86	1255	3.08	1310	3.28	1365	3.49	1415	3.7	1465	3.91	1515	4.12	1565	4.3	1615	4.48	1660	4.65
	25	4,500			1340	4.04	1390	4.26	1435	4.49	1485	4.72	1530	4.95										
	59	2,500	200,000	160,000	555	0.44	650	0.55	740	0.66	820	0.79	895	0.89	965	1.02	1035	1.14	1105	1.28	1170	1.41	1230	1.56
	49	3,000			630	0.71	710	0.83	790	0.96	865	1.1	935	1.23	1000	1.37	1065	1.52	1125	1.66	1180	1.81	1240	1.96
20-A,B	37	4,000			790	1.58	855	1.72	915	1.86	975	2.03	1035	2.21	1090	2.39	1145	2.57	1200	2.76	1250	2.94	1300	3.13
	29	5,000			965	2.98	1010	3.15	1060	3.32	1110	3.5	1160	3.7	1205	3.9	1255	4.12	1300	4.25	1345	4.57	1390	4.8
	27	5,500			1060	3.92	1095	4.11	1135	4.3	1180	4.49	1225	4.7	1270	4.91								
	61	3,000	250,000	200,000	615	0.69	695	0.8	775	0.93	850	1.07	920	1.21	985	1.34	1050	1.49	1110	1.63	1170	1.78	1225	1.93
	53	3,500			690	1.05	760	1.17	830	1.31	900	1.46	955	1.62	1025	1.78	1085	1.94	1140	2.11	1195	2.27	1250	2.44
25-A,B	46	4,000			770	1.53	830	1.66	895	1.87	955	1.97	1015	2.14	1070	2.32	1125	2.51	1180	2.69	1235	2.87	1295	3.06
	41	4,500			855	2.13	905	2.25	960	2.44	1015	2.61	1070	2.79	1125	2.98	1175	3.19	1225	3.39	1275	3.6	1320	3.8
	37	5,000			940	2.86	985	3.05	1030	3.23	1080	3.4	1130	3.59	1180	3.79	1230	4	1275	4.22	1320	4.45	1365	4.66
	34	5,500			1025	3.8	1065	3.98	1110	4.17	1150	4.36	1195	4.56	1240	4.77	1285	4.98						
	60	3,700	300,000	240,000	665	0.78	760	0.91	860	1.11	945	1.32	1030	1.54	1110	1.76	1190	2.01	1270	2.26	1345	2.53	1415	2.81
	55	4,000			690	0.89	790	1.09	885	1.29	970	1.51	1050	1.74	1125	1.98	1200	2.22	1275	2.48	1345	2.76	1415	3.05
30-A,B	44	5,000			815	1.59	895	1.85	975	2.1	1055	2.32	1125	2.58	1195	2.88	1260	3.17	1325	3.46	1385	3.75	1445	4.05
	37	6,000			945	2.6	1015	2.91	1080	3.23	1150	3.53	1215	3.79	1280	4.07	1340	4.39	1400	4.74				
	34	6,500			1010	3.25	1075	3.58	1140	3.92	1200	4.26	1260	4.58	1320	4.86								
	32	7,000			1075	4	1140	4.35	1200	4.71														
	57	4,500	350,000	280,000	535	0.7	640	0.9	730	1.11	815	1.32	890	1.55	970	1.78	1040	2.02	1110	2.28	1175	2.55	1235	2.82
	52	5,000			575	0.91	670	1.13	755	1.36	835	1.59	910	1.83	980	2.08	1050	2.33	1115	2.6	1180	2.88	1240	3.16
35-A,B	43	6,000			650	1.46	735	1.72	810	1.99	880	2.26	950	2.54	1015	2.82	1080	3.1	1140	3.39	1195	3.69	1255	4
	37	7,000			795	2.25	865	2.51	875	2.81	940	3.12	1000	3.44	1060	3.76	1120	4.09	1175	4.41	1230	4.74		
	32	8,000			820	3.27	890	3.56	940	3.87	1000	4.21	1060	4.57	1115	4.94								
	30	8,500			860	3.88	920	4.18	980	4.51	1035	4.86												
	59	5,000	400,000	320,000	560	0.89	655	1.1	745	1.33	825	1.56	900	1.8	970	2.04	1040	2.3	1105	2.56	1170	2.84	1230	3.12
	46	6,500			675	1.78	750	2.03	825	2.3	895	2.6	960	2.9	1025	3.2	1085	3.5	1145	3.8	1200	4.12	1255	4.44
40-A,B	42	7,000			715	2.19	785	2.44	855	2.73	920	3.04	985	3.36	1045	3.68	1105	4	1160	4.33	1215	4.66	1270	4.99
	37	8,000			800	3.18	860	3.46	920	3.76	980	4.09	1040	4.45	1095	4.81								
	35	8,500			840	3.77	895	4.07	955	4.38	1015	4.72												
	123	5,000	500,000	400,000	645	0.73	730	0.85	805	0.95	880	1.12	950	1.26	1015	1.4	1075	1.55	1135	1.69	1195	1.84	1250	1.98
	105	5,500			730	1.12	800	1.25	870	1.39	935	1.55	1000	1.71	1060	1.87	1115	2.03	1175	2.2	1225	2.36	1280	2.53
50-A,B	92	6,000			815	1.63	875	1.77	940	1.92	1000	2.09	1055	2.27	1110	2.46	1165	2.64	1220	2.82	1270	3.01	1320	3.19
	82	6,500			900	2.27	955	2.43	1010	2.59	1065	2.77	1120	2.97	1170	3.17	1220	3.37	1270	3.58	1320	3.78	1365	3.99
	74	7,000			990	3.07	1040	3.25	1085	3.42	1135	3.61	1185	3.81	1235	4.03	1280	4.25	1325	4.47	1370	4.7	1415	4.93
	67	7,500			1080	4.05	1120	4.23	1165	4.43	1210	4.63	1255	4.84										
	120	8,700	600,000	480,000	705	0.82	805	0.99	900	1.2	985	1.42	1055	1.64	1145	1.87	1225	2.12	1305	2.39	1375	2.65	1450	2.94
	111	4,000			740	1	840	1.18	930	1.4	1010	1.63	1090	1.86	1165	2.1	1240	2.36	1310	2.63	1385	2.91	1455	3.2
60-A,B	88	5,000			880	1.79	960	2.05	1035	2.27	1110	2.59	1180	2.82	1250	3.11	1310	3.4	1370	3.69	1430	3.99	1490	4.29
	74	6,000			1025	2.95	1090	3.27	1155	3.57	1220	3.83	1285	4.11	1345	4.43	1405	4.78						
	68	6,500			1095	3.69	1160	4.03	1220	4.37	1280	4.67	1340	4.95										
	115	4,500	700,000	560,000	590	0.8	685	1.01	770	1.22	855	1.43	930	1.56	1005	1.9	1075	2.15	1140	2.41	1205	2.68	1265	2.96
	103	5,000			630	1.04	720	1.27	805	1.5	880	1.74	950	1.98	1020	2.23	1090	2.49	1155	2.76	1215	3.05	1275	3.34
70-A,B	86	6,000			720	1.68	800	1.95	870	2.22	940	2.5	1005	2.78	1070	3.06	1130	3.35	1190	3.65	1245	3.95	1300	4.27
	74	7,000			815	2.55	885	2.85	950	2.17	1010	3.49	1070	3.81	1130	4.15	1185	4.46	1240	4.79				
	65	8,000			910	3.7	970	4.03	1030	4.36	1085	4.75												
	118	5,000	800,000	640,000	605	0.98	695	1.21	780	1.44	860	1.67	935	1.91	1005	2.16	1070	2.42	1135	2.69	1200	2.97	1260	3.26
80-A,B	98	6,000			690	1.59	770	1.84	845	2.12	915	2.39	980	2.67	1045	2.95	1105	3.24	1165	3.53	1225	3.84	1280	4.15
	84	7,000			780	2.41	850	2.7	915	3.01	980	3.33	1040	3.65	1100	3.97	1155	4.29	1210	4.62	1265	4.96		
	74	8,000			870	3.51	930	3.81	990	4.15	1050	4.51	1105	4.87										

Notes:

1. Refer to Accessory Pressure Loss table.
2. Values are based on the "Basic Packaged Unit" which includes pressure drop of the duct furnace(s) and "system effect" of the blower module.
3. Brake horsepower (BHP) includes drive losses.
4. Unit leaving air temperature is limited to 150 F (66 C) and is equal to: Entering Air Temperature + Duct Furnace(s) Temperature Rise.
5. "Total External Pressure" is the sum of the unit's "internal" accessory pressure losses) plus the external static pressure.
6. Ratings shown are for elevations between 0 and 2000 ft. (610 m). For unit installation in the U.S.A. above 2000 ft. (610 m), the unit input must be derated 4% for each 1000 ft. (305 m) above sea level; refer to local codes, or in absence of local codes, refer to the National Fuel Gas Code, ANSI Standard Z223.1-1992 (N.F.P.A. No. 54), or the latest edition.

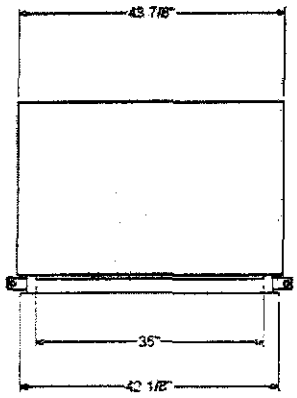
For installation in Canada, any references to deration at altitudes in excess of 2000 ft. (610 m) are to be ignored. At altitudes of 2000 to 4500 ft. (610 to 1372 m), the unit must be derated to 90% of the normal rating, and be so marked in accordance with the C.G.A. certification.

At 4500cfm, 0.75" ESP (1.41" TSP):

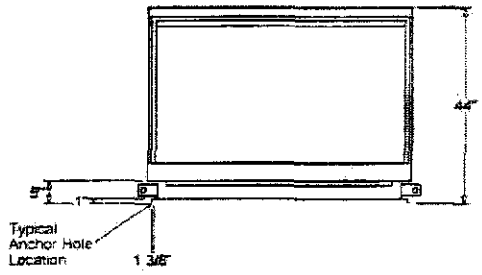
Temp rise	82
rpm	1220
BHP	3.37

Unit Dimensions - Indirect Fired Gas Heating Units (Outdoor)

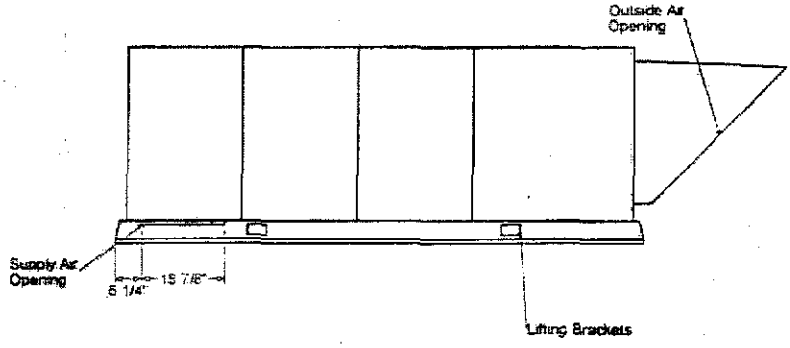
Item: A1 Qty: 1 Tag(s): MUA-1



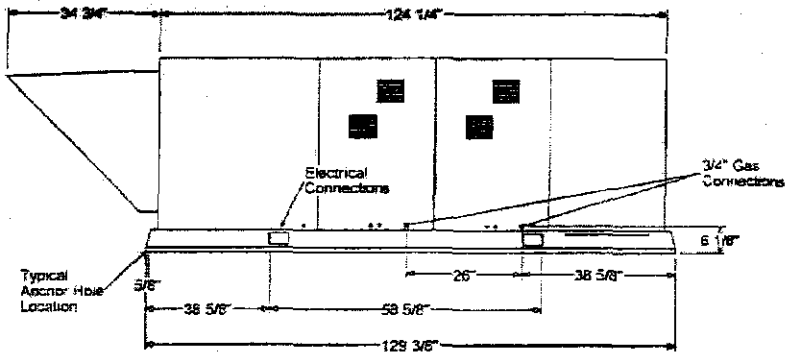
FRONT VIEW



BACK VIEW

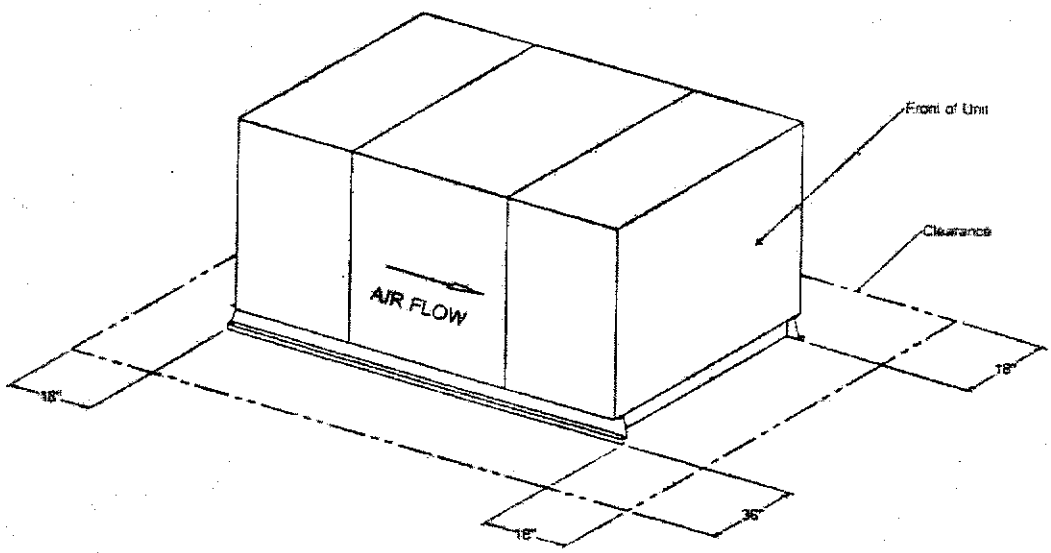


RIGHT VIEW



LEFT VIEW

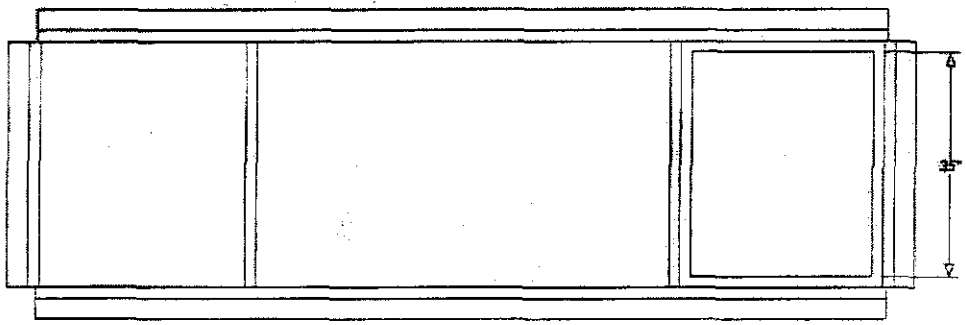
Weight, Clearance & Rigging Diagram - Indirect Fired Gas Heating Units (Outdoor)
Item: A1 Qty: 1 Tag(s): MUA-1



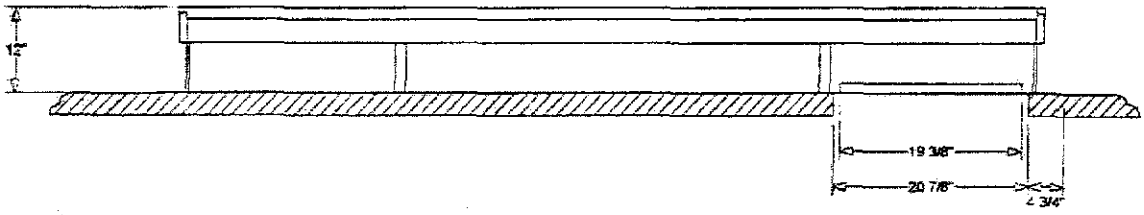
WEIGHTS
Unit = 1155 lbs [524 kg] net/1314 lbs [596 kg] ship
Motor = 100 lbs [45 kg]
Outside air hood = 51 lbs [23 kg]

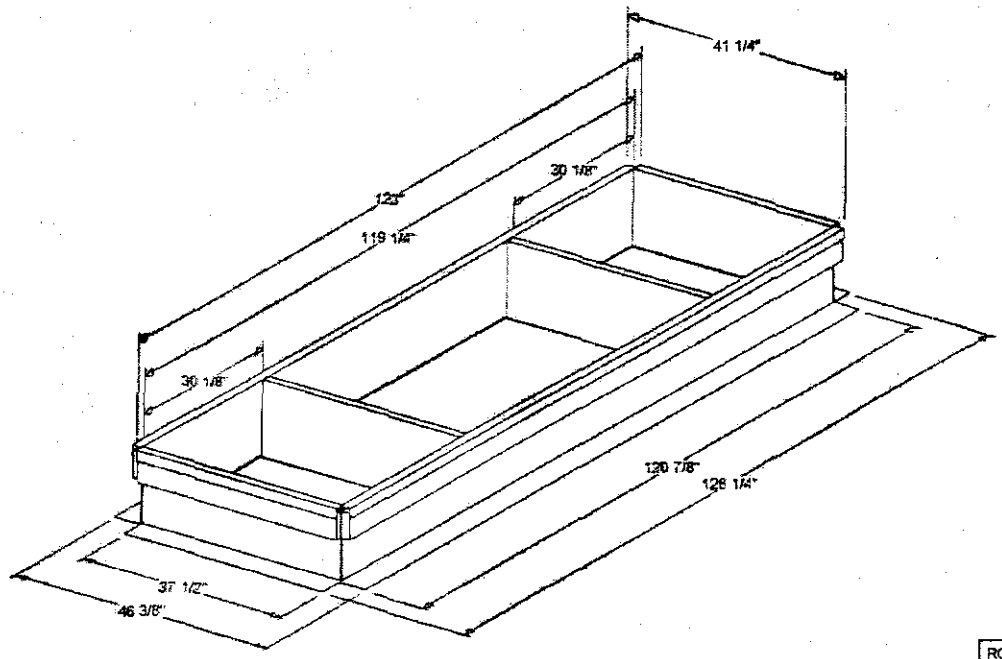
Accessory - Indirect Fired Gas Heating Units (Outdoor)
Roof curb arrangement "C"
Item: A1 Qty: 1 Tag(s): MUA-1

Roof curb ships knocked down for full assembly



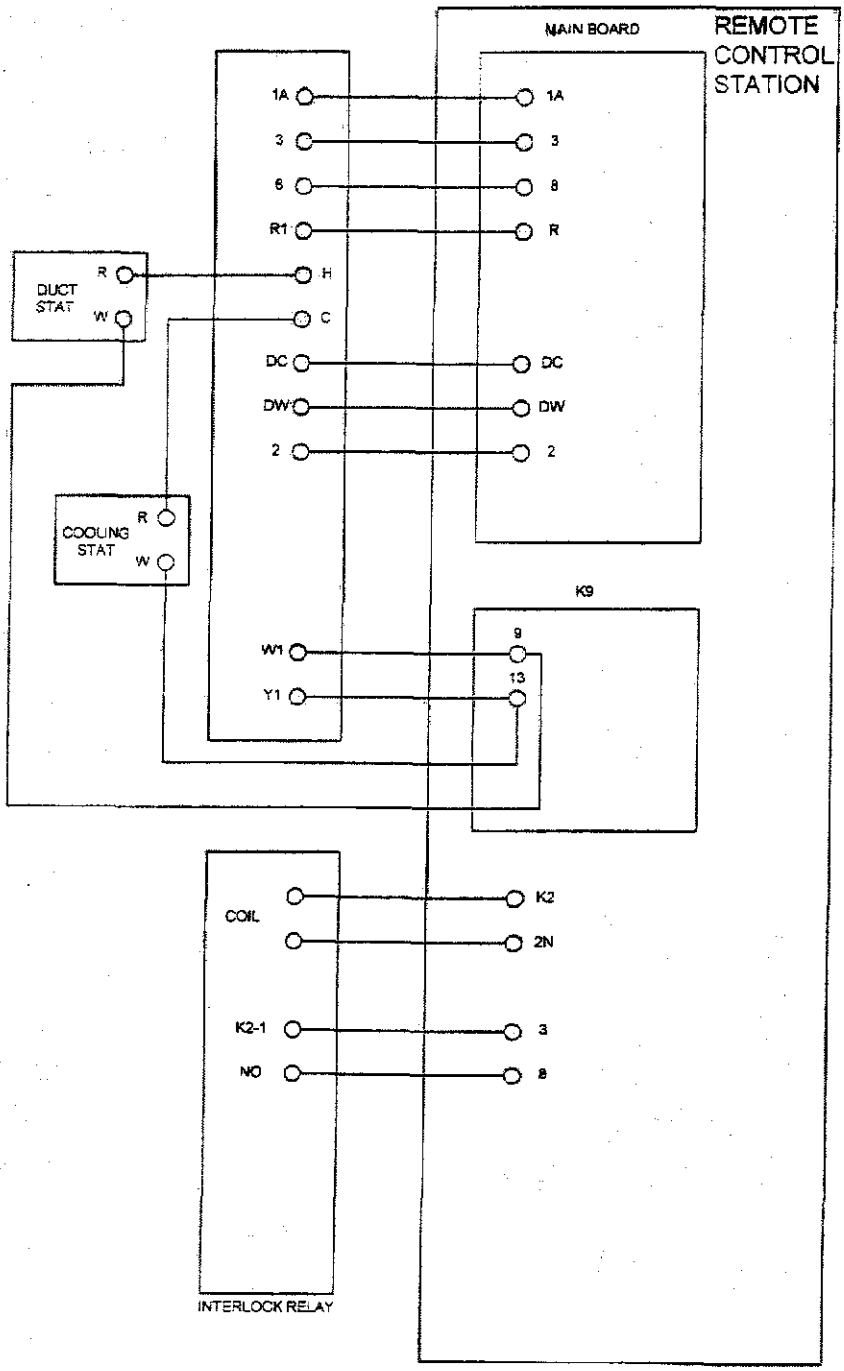
Standard curb shown for dimensional reference only. Providing 24" tall spring isolated non-seismic roof curb.





ROOF CURB WEIGHT
197 lb

Field Wiring - Indirect Fired Gas Heating Units (Outdoor)
Item: A1 Qty: 1 Tag(s): **MUA-1**



REMOTE CONTROL STATION SHOWN IS TYPICAL FOR COOLING AND HEATING APPLICATIONS. COMBINATIONS OF REMOTE CONTROL STATION AND OTHER THERMOSTAT ACCESSORIES ARE SIMILIAR.

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.

FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ AVERTISSEMENT

TENSION DANGEREUSE!

COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.

NE PAS RESPECTER CES MESURES DE PRÉCAUTION PEUT ENTRAÎNER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

⚠ ADVERTENCIA

¡VOLTAJE PELIGROSO!

DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUSO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA LAS UNIDADES CON EJE DE DIRECCIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR.

EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

ATTENTION

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!

LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.

L'UTILISATION DE TOUT AUTRE CONDUCTEUR PEUT ENDOMMAGER L'ÉQUIPEMENT.

PRECAUCIÓN

¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!

LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.

SI NO LO HACE, PUEDE OCASIONAR DAÑO AL EQUIPO

Field Wiring - Indirect Fired Gas Heating Units (Outdoor)
Item: A1 Qty: 1 Tag(s): **MUA-1**