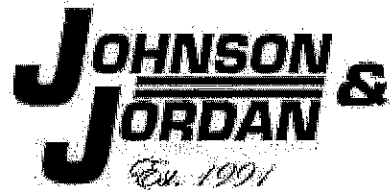


SUBMITTAL REVIEW



MECHANICAL CONTRACTORS
Celebrating 25 Years
 18 Mussey Rd, Scarborough, Me

Reviewed By:
 Jacob Marin, PE
 Johnson & Jordan, Inc

Date: 2/16/2018
Job Number: 17418

Job:
 WEX Building – Core/Shell
 1 Hancock St.
 Portland, ME

Submittal(s):

We are hereby submitting the following documents for your

Actions:

- NET – No Exceptions Taken*
- CTN – Conditional to Notations*
- R&R – Revise & Resubmit*
- RRP – Resubmit for Records*
- REJ - Rejection*

<u>NO.</u>	<u>ITEM</u>	<u>ACTION</u>	<u>NOTATIONS</u>
1	ERV	CTN	remove Trane packaged controls, provide unit stripped of any controls except for dampers and VFDs. Johnson and Jordan will provide all sensors, flow switches, freeze protection, damper actuators, control valves/actuators, and DDC Controllers
			ADDED SMOKE DET. IN RETURN & DAMPERS (rev – 2-16-18, JRM)

Jacob Martin, PE
 Johnson & Jordan, Inc.



TRANE®

Submittal

Trane U.S. Inc.

Prepared For:

<customer>

<company>

Date: 2/12/2018

Customer P.O. Number:

Customer Project Number:

Sold To:

Job Number:

Job Name: Wex

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

Product Summary

Qty	Model Description
2	Horizon™ - Horizon™ - Outdoor Air Unit (D/K/N)
1	Horizon™ Revision 6 - Horizon™ - Outdoor Air Unit (Revision 6)

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

Product Data - Horizon™ - Outdoor Air Unit (D/K/N)

Size	Qty	Description	Model Number
N360	2	Horizon™ - Outdoor Air Unit (D/K/N)	OAND360D4-F00000LN-A1J00001JR-G71B2B400

Tag(s): ERV-1 East, ERV-2 West

Unit Voltage: 460-3-60

Airflow Configuration: Horizontal Discharge/Horizontal Return

Installation: Outdoor

Evaporator Coil: Chilled Water

Indoor Blower Motor: Direct Drive w/VFD

Heat Type: Indirect Fired (IF)

Fuel Type: Natural Gas

439 Stainless Steel Furnace: 350 Mbtu/h, (10:1 Turndown NG, 8:1 Turndown LP)

Unit Controls: Non DDC - Terminal Strip

Powered Exhaust: Direct Drive w/VFD & Gravity Damper

Energy Recovery & Conservation: ERC-6876A

Damper Options: 2-Position Outdoor and Return Air Dampers

Filters: MERV-8

Smoke Detectors: Return

Electrical Options: Non-Fused Disconnect Switch w/115v Outlet

Air Flow Monitoring: IFM Piezo Ring and PE Piezo Ring

Curb Selection: Aux Mod Knockdown Curb

Warranty: 1-Year Labor DX Gas Heat or Cooling Only

Warranty: 1-Year Parts Only (manufacturer warranty)

Supply Discharge Air Sensor (FLD)

2 inch Double Wall Construction

Stainless Steel Drip Pan

Blower HP - 5

Blower RPM - 2113

Supply Fan - CF180x2

Exhaust RPM - 2018

Exhaust HP - 7.5

Exhaust Fan - CF200

Product Data - Horizon™ - Outdoor Air Unit (Revision 6)

Size	Qty	Description	Model Number
D000	1	Horizon™ - Outdoor Air Unit (Revision 6)	OADG000C3-G0000AE00-J3AN00001-11E00003C-A00002000-AA1001000-000000000

Tag(s): AHU-B

Unit Voltage: 460-3-60

Curb Selection: Standard Knockdown Curb - Primary Cabinet

Warranty: 1-Year Parts Only (manufacturer warranty)

Airflow Configuration: Vertical Discharge/Vertical Return/Exhaust

Indoor Coil Type: Glycol/Chilled Water Coil 6-Row

Heat Type - Primary: Indirect Fired NG (IF) - Standard Efficiency (80%)

Heat Capacity - Primary: 150 MBH, (10:1 Turndown NG, 8:1 Turndown LP)

Supply Fan Motor Type: Direct Drive w/Shaft Grounding Ring w/VFD

Fan Piezo Rings: Supply Fan Piezo Ring

Unit Controls: Space Control

Building Interface: BACnet

Filter Options: MERV-8 30%, MERV-14 95%

Damper Options: Modulating OA & RA Dampers w/Economizer

Exhaust Dampers: Barometric Relief Dampers

Electrical Options: Non-Fused Disconnect

Smoke Detector: Return Smoke Detector

Installation: Outdoor

Convenience Outlet: Convenience Outlet

Controls Display: TD7 Factory Installed

Thermostat: Thumbwheel Thermostat

Supply Discharge Air Sensor (FLD)

2 inch Double Wall Construction

Stainless Steel Drip Pan

Blower HP - 5

Blower RPM - 1002

Supply Fan - ANPA 25

Tag: **ERV-1 East**

Comments:

Unit Information

Model:	Horizon™	Unit Length:	302 in	Weight Operating:	7370 lb*
Size:	N360	Unit Width:	101 in	<i>Note: Weight does not include CURB weight. See CURB submittal for actual</i>	
Quantity:	1	Unit Height:	93 in		
Supply Airflow:	9,600 CFM	Elevation:	0 ft	Refrigerant Charge	
Outside Airflow:	9,600 CFM	Ambient Air DB:	0 F	Circuit 1:	27.28 lbs
Minimum Airflow:	2,865 CFM			Circuit 2:	27.28 lbs

Cooling Performance

Gross Total Capacity:	312.4 MBh	Evaporator Face Area:	22.08 sq ft
Gross Sensible Capacity:	219.6 MBh	Evaporator Rows / FPI:	6 / 12
Net Total Capacity:	293.1 MBh	Entering Fluid Temp:	44 F
Net Sensible Capacity:	200.3 MBh	Leaving Fluid Temp:	52.1 F
Entering Air DB / WB (Coil):	79.1 / 68 F	Fluid Flow:	82 GPM
Leaving Air DB / WB (Coil):	58.4 / 58 F	Fluid Pressure Drop:	6.2 ft. H2O
Leaving Air DB / WB (Unit):	60.6 / 58.8 F	Fluid Type:	Propylene
Air Velocity:	435 fpm	Percent Glycol:	30 %
Coil Air PD:	0.45 in H2O		

Heating Performance

Heat Type:	Gas Furnace	Entering Air DB:	45.6 F
Input Capacity:	350 MBh	Leaving Air DB:	72.6 F
Output Capacity:	280 MBh	Coil Air PD:	0.62 in H2O

Energy Recovery Wheel ERC-6876A

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

Summer Conditions

Ventilation Supply		Outside	
Airflow:	9,600 CFM	Airflow:	9,745 CFM**
DB:	79.1 F	DB:	89.0 F
WB:	68.1 F	WB:	73.0 F
PD:	0.80 in H2O		
Return		Exhaust	
Airflow:	8,345 CFM	Airflow:	8,490 CFM
DB:	74.0 F	DB:	85.4 F
WB:	65.0 F	WB:	71.0 F
ESP:	1.00 in H2O	ERV PD:	0.66 in H2O

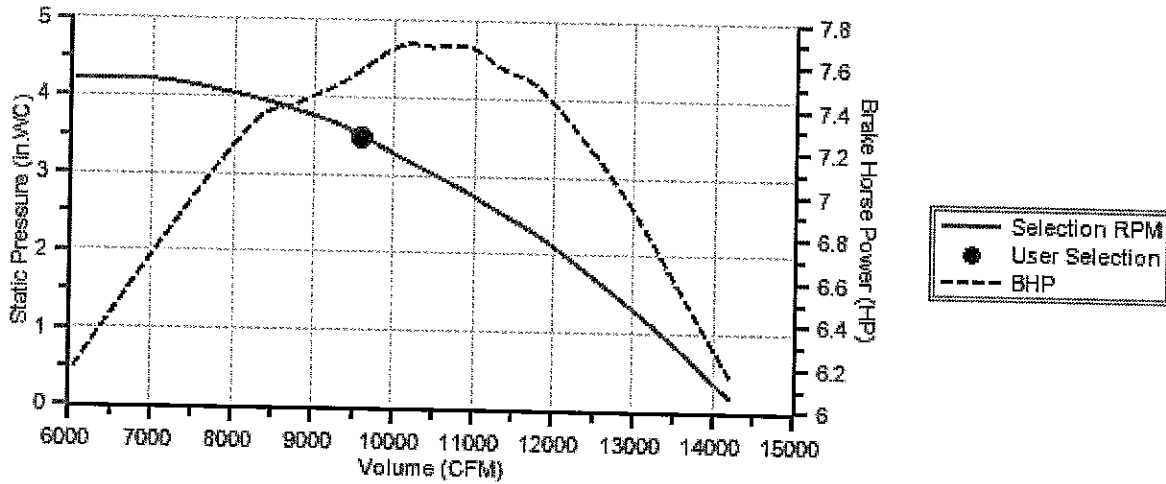
Winter Conditions

Ventilation Supply		Outside	
Airflow:	9,600 CFM	Airflow:	9,745 CFM**
DB:	45.7 F	DB:	-5.0 F
WB:	43.0 F	WB:	-6.0 F
PD:	0.71 in H2O		
Return		Exhaust	
Airflow:	8,345 CFM	Airflow:	8,490 CFM
DB:	72.0 F	DB:	13.7 F
WB:	60.0 F	WB:	13.7 F
ESP:	1.00 in H2O	ERV PD:	0.62 in H2O

Total Capacity:	176.21 MBH		
Sensible Capacity:	103.88 MBH	Eff:	0.76
Latent Capacity:	72.33 MBH	Eff:	0.71

Total Capacity:	749.56 MBH		
Sensible Capacity:	533.07 MBH	Eff:	0.76
Latent Capacity:	216.49 MBH	Eff:	0.71

Supply Fan CF180x2



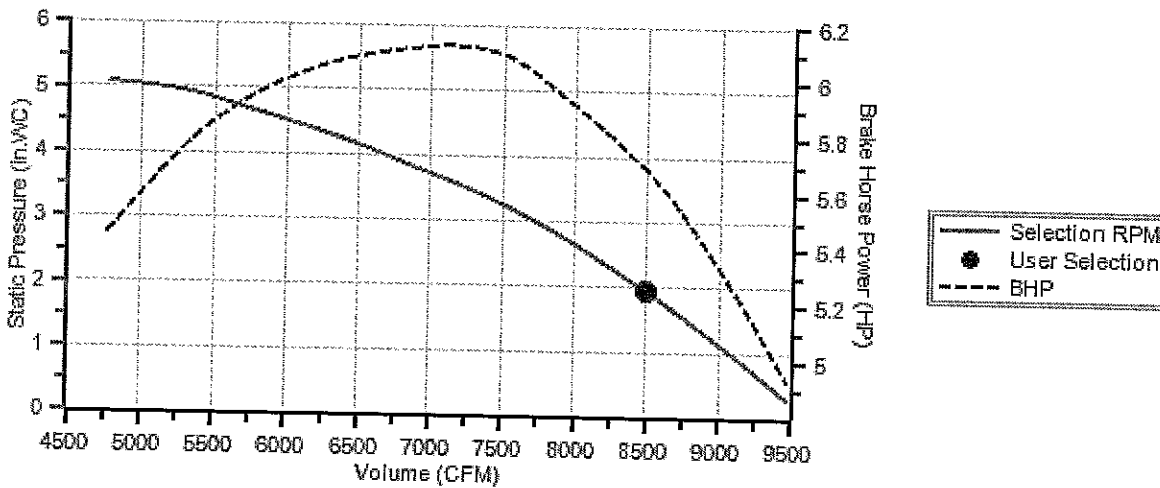
Supply Pressure Drop Summary

External Static Pressure:	1.25 in H2O
Internal Pressure Drop:	2.24 in H2O
Total Static Pressure:	3.49 in H2O

Supply Fan Conditions

Fan Motor BHP:	7.57 BHP
Operating RPM:	2113 RPM
Minimum RPM:	1154 RPM

Exhaust Fan CF200



Exhaust Pressure Drop Summary

Return External Static Pressure:	1.00 in H2O
Exhaust Internal Pressure Drop:	0.95 in H2O
Total Exhaust Static Pressure	1.95 in H2O

Exhaust Fan Conditions

Fan Motor BHP:	5.68 BHP
Operating RPM:	2018 RPM

Unit Electrical Data

Unit Voltage-Ph-Hz:	460-3-60	Min Circuit Ampacity - MCA:	26.1 Amps
Unit Amps - FLA:	23.79 Amps	Maximum Fuse Size - MFS:	35 Amps

Electrical Summary

<u>Component</u>	<u>Fan Service</u>	<u>Qty</u>	<u>HP (ea.)</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
ERV/HRV		1	0.17	0.29		
	Exhaust	1	7.5	9.3		
	Supply	2	5	6.6		
Controls		1		1		

Notes

1. See option list schedule for selected options.
2. See catalog for dimension and weight
3. For single point power connection, Unit Electrical amps include the greater of compressor or electrical heat amps
4. For dual point power connections (electrical heat), Unit Electrical Data does not include electric heat power requirements

Tag: **AHU-B**

Comments:

Unit Information

Model:	Horizon™ Revision 6	Unit Length:	148 in	Weight Operating:	2143 lb*
Size:	D000	Unit Width:	95 in	<i>Note: Weight does not include CURB weight. See CURB submittal for actual</i>	
Quantity:	1	Unit Height:	68 in	Refrigerant Charge	
Supply Airflow:	3,300 CFM	Elevation:	0 ft	Circuit 1:	lbs
Outside Airflow:	800 CFM	Ambient Air DB:	0 F		
Minimum Airflow:	2,344 CFM				

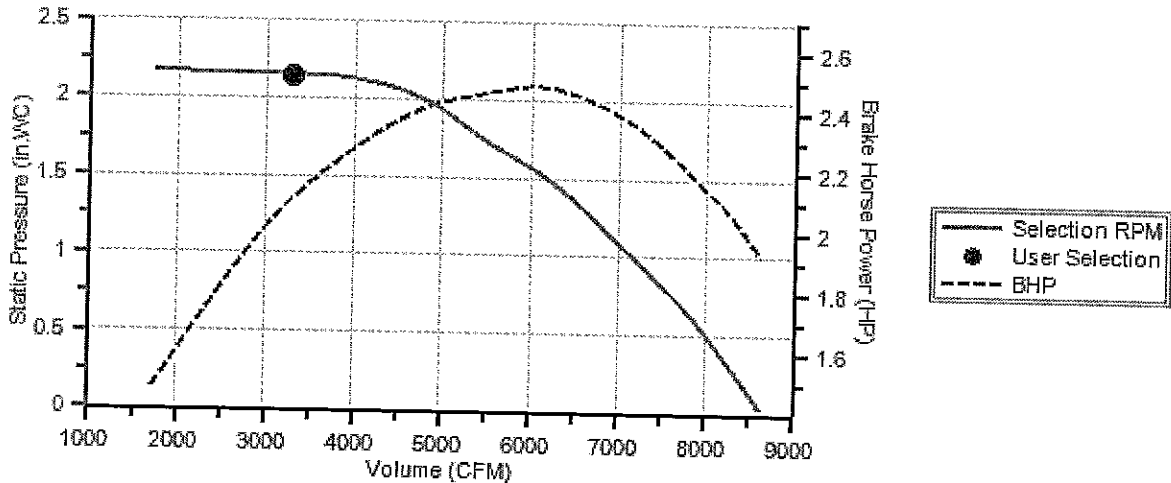
Cooling Performance

Gross Total Capacity:	141.7 MBh	Evaporator Face Area:	15.97 sq ft
Gross Sensible Capacity:	98.2 MBh	Evaporator Rows / FPI:	6 / 12
Net Total Capacity:	136.4 MBh	Entering Fluid Temp:	44 F
Net Sensible Capacity:	92.9 MBh	Leaving Fluid Temp:	54 F
Entering Air DB / WB (Coil):	80 / 67 F	Fluid Flow:	30 GPM
Leaving Air DB / WB (Coil):	53 / 52.9 F	Fluid Pressure Drop:	7.1 ft. H2O
Leaving Air DB / WB (Unit):	54.8 / 53.7 F	Fluid Type:	Propylene
Air Velocity:	207 fpm	Percent Glycol:	30 %
Coil Air PD:	0.13 in H2O		

Heating Performance

Heat Type:	Gas Furnace	Entering Air DB:	50 F
Input Capacity:	150 MBh	Leaving Air DB:	83.7 F
Output Capacity:	120 MBh	Coil Air PD:	0.47 in H2O

Supply Fan ANPA 25



Supply Pressure Drop Summary

External Static Pressure:	1.50 in H2O
Internal Pressure Drop:	0.64 in H2O
Total Static Pressure:	2.14 in H2O

Supply Fan Conditions

Fan Motor BHP:	2.09 BHP
Operating RPM:	1002 RPM
Minimum RPM:	617 RPM

Unit Electrical Data

Unit Voltage-Ph-Hz:	460-3-60	Min Circuit Ampacity - MCA:	8.7 Amps
Unit Amps - FLA:	7.2 Amps	Maximum Fuse Size - MFS:	15 Amps

Electrical Summary

Component	Fan Service	Qty	HP (ea.)	FLA (ea.)	RLA (ea.)	LRA (ea.)
	Supply	1	5	6.2		
Controls		1		1		

Notes

1. See option list schedule for selected options.
2. See catalog for dimension and weight
3. For single point power connection, Unit Electrical amps include the greater of compressor or electrical heat amps
4. For dual point power connections (electrical heat), Unit Electrical Data does not include electric heat power requirements

Tag: **ERV-2 West**

Comments:

Unit Information

Model:	Horizon™	Unit Length:	302 in	Weight Operating:	7370 lb*
Size:	N360	Unit Width:	101 in	<i>Note: Weight does not include CURB weight. See CURB submittal for actual</i>	
Quantity:	1	Unit Height:	93 in	Refrigerant Charge	
Supply Airflow:	9,600 CFM	Elevation:	0 ft	Circuit 1:	27.28 lbs
Outside Airflow:	9,600 CFM	Ambient Air DB:	0 F	Circuit 2:	27.28 lbs
Minimum Airflow:	2,865 CFM				

Cooling Performance

Gross Total Capacity:	312.4 MBh	Evaporator Face Area:	22.08 sq ft
Gross Sensible Capacity:	219.6 MBh	Evaporator Rows / FPI:	6 / 12
Net Total Capacity:	293.1 MBh	Entering Fluid Temp:	44 F
Net Sensible Capacity:	200.3 MBh	Leaving Fluid Temp:	52.1 F
Entering Air DB / WB (Coil):	79.1 / 68 F	Fluid Flow:	82 GPM
Leaving Air DB / WB (Coil):	58.4 / 58 F	Fluid Pressure Drop:	6.2 ft. H2O
Leaving Air DB / WB (Unit):	60.6 / 58.8 F	Fluid Type:	Propylene
Air Velocity:	435 fpm	Percent Glycol:	30 %
Coil Air PD:	0.45 in H2O		

Heating Performance

Heat Type:	Gas Furnace	Entering Air DB:	45.6 F
Input Capacity:	350 MBh	Leaving Air DB:	72.6 F
Output Capacity:	280 MBh	Coil Air PD:	0.62 in H2O

Energy Recovery Wheel ERC-6876A

** TAB Outside airflow through OA Intake to this value

Summer Conditions

Ventilation Supply		Outside	
Airflow:	9,600 CFM	Airflow:	9,745 CFM**
DB:	79.1 F	DB:	89.0 F
WB:	68.1 F	WB:	73.0 F
PD:	0.80 in H2O		
ERV		Exhaust	
		Airflow:	8,490 CFM
		DB:	85.4 F
		WB:	71.0 F
Return		ERV PD: 0.66 in H2O	
Airflow:	8,345 CFM		
DB:	74.0 F		
WB:	65.0 F		
ESP:	1.00 in H2O		

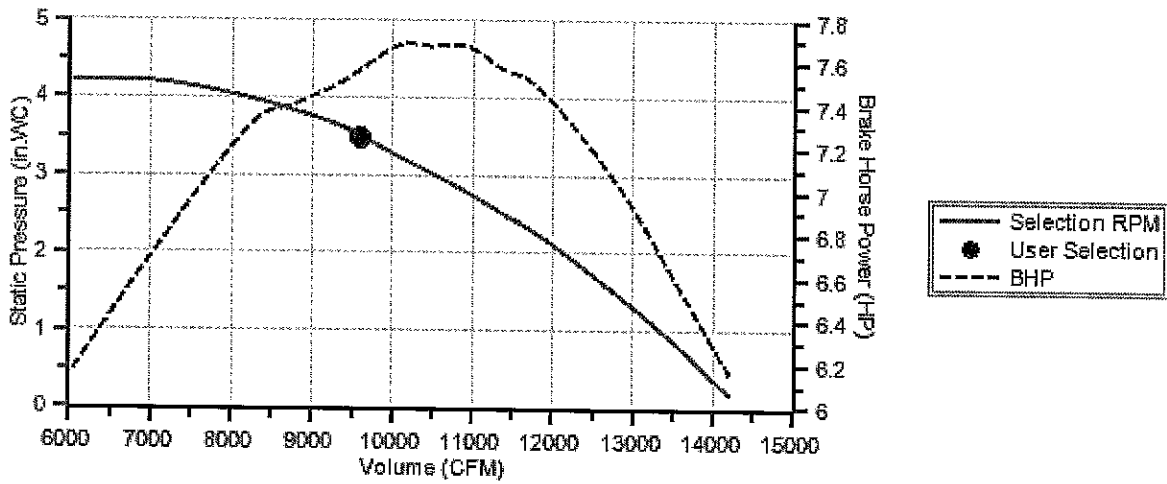
Winter Conditions

Ventilation Supply		Outside	
Airflow:	9,600 CFM	Airflow:	9,745 CFM**
DB:	45.7 F	DB:	-5.0 F
WB:	43.0 F	WB:	-6.0 F
PD:	0.71 in H2O		
ERV		Exhaust	
		Airflow:	8,490 CFM
		DB:	13.7 F
		WB:	13.7 F
Return		ERV PD: 0.62 in H2O	
Airflow:	8,345 CFM		
DB:	72.0 F		
WB:	60.0 F		
ESP:	1.00 in H2O		

Total Capacity:	176.21	MBH	
Sensible Capacity:	103.88	MBH	Eff. 0.76
Latent Capacity:	72.33	MBH	Eff. 0.71

Total Capacity:	749.56	MBH	
Sensible Capacity:	533.07	MBH	Eff. 0.76
Latent Capacity:	216.49	MBH	Eff. 0.71

Supply Fan CF180x2



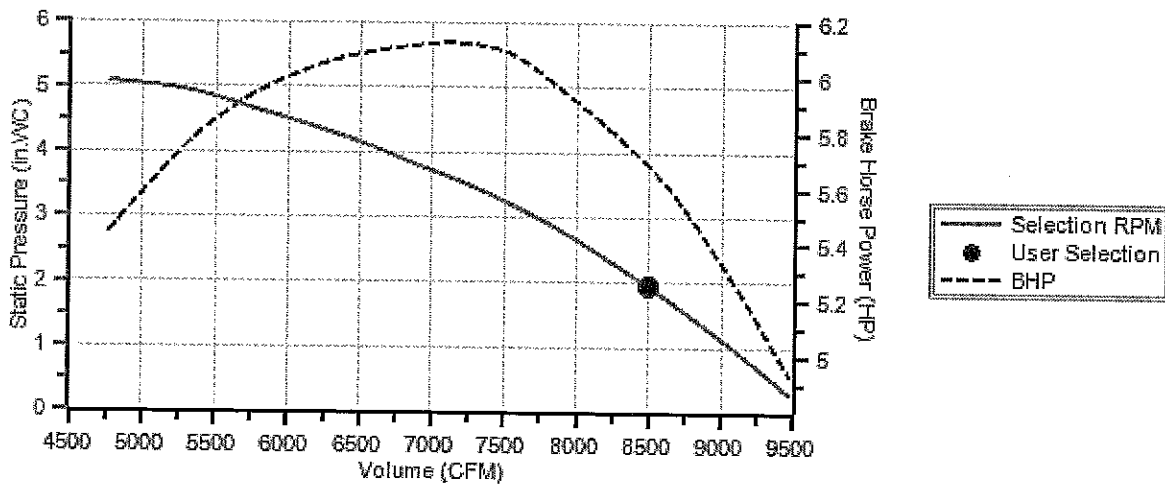
Supply Pressure Drop Summary

External Static Pressure:	1.25 in H2O
Internal Pressure Drop:	2.24 in H2O
Total Static Pressure:	3.49 in H2O

Supply Fan Conditions

Fan Motor BHP:	7.57 BHP
Operating RPM:	2113 RPM
Minimum RPM:	1154 RPM

Exhaust Fan CF200



Exhaust Pressure Drop Summary

Return External Static Pressure:	1.00 in H2O
Exhaust Internal Pressure Drop:	0.95 in H2O
Total Exhaust Static Pressure	1.95 in H2O

Exhaust Fan Conditions

Fan Motor BHP:	5.68 BHP
Operating RPM:	2018 RPM

Unit Electrical Data

Unit Voltage-Ph-Hz:	460-3-60	Min Circuit Ampacity - MCA:	26.1 Amps
Unit Amps - FLA:	23.79 Amps	Maximum Fuse Size - MFS:	35 Amps

Electrical Summary

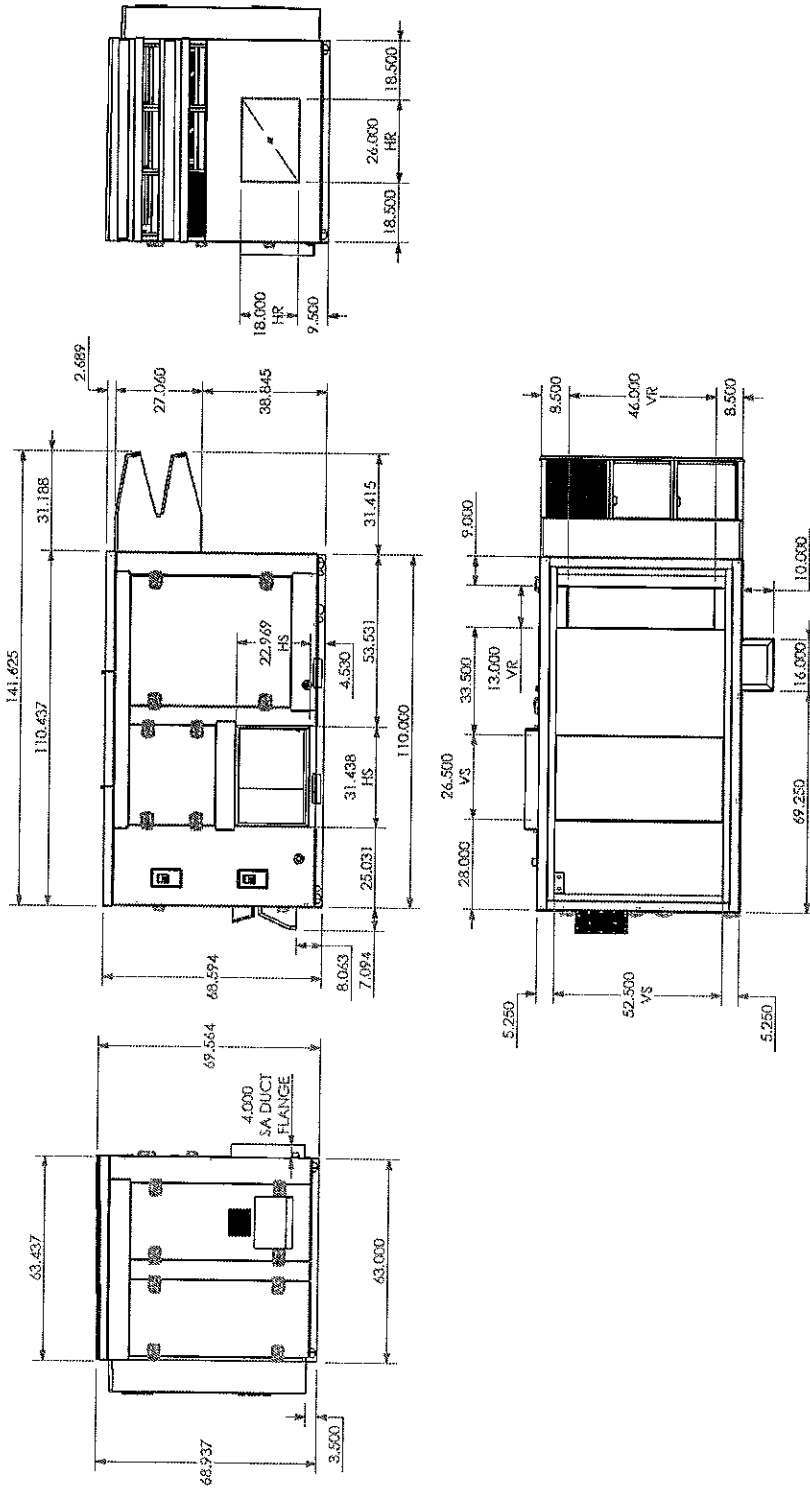
<u>Component</u>	<u>Fan Service</u>	<u>Qty</u>	<u>HP (ea.)</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
ERV/HRV		1	0.17	0.29		
	Exhaust	1	7.5	9.3		
	Supply	2	5	6.6		
Controls		1		1		

Notes

1. See option list schedule for selected options.
2. See catalog for dimension and weight
3. For single point power connection, Unit Electrical amps include the greater of compressor or electrical heat amps
4. For dual point power connections (electrical heat), Unit Electrical Data does not include electric heat power requirements

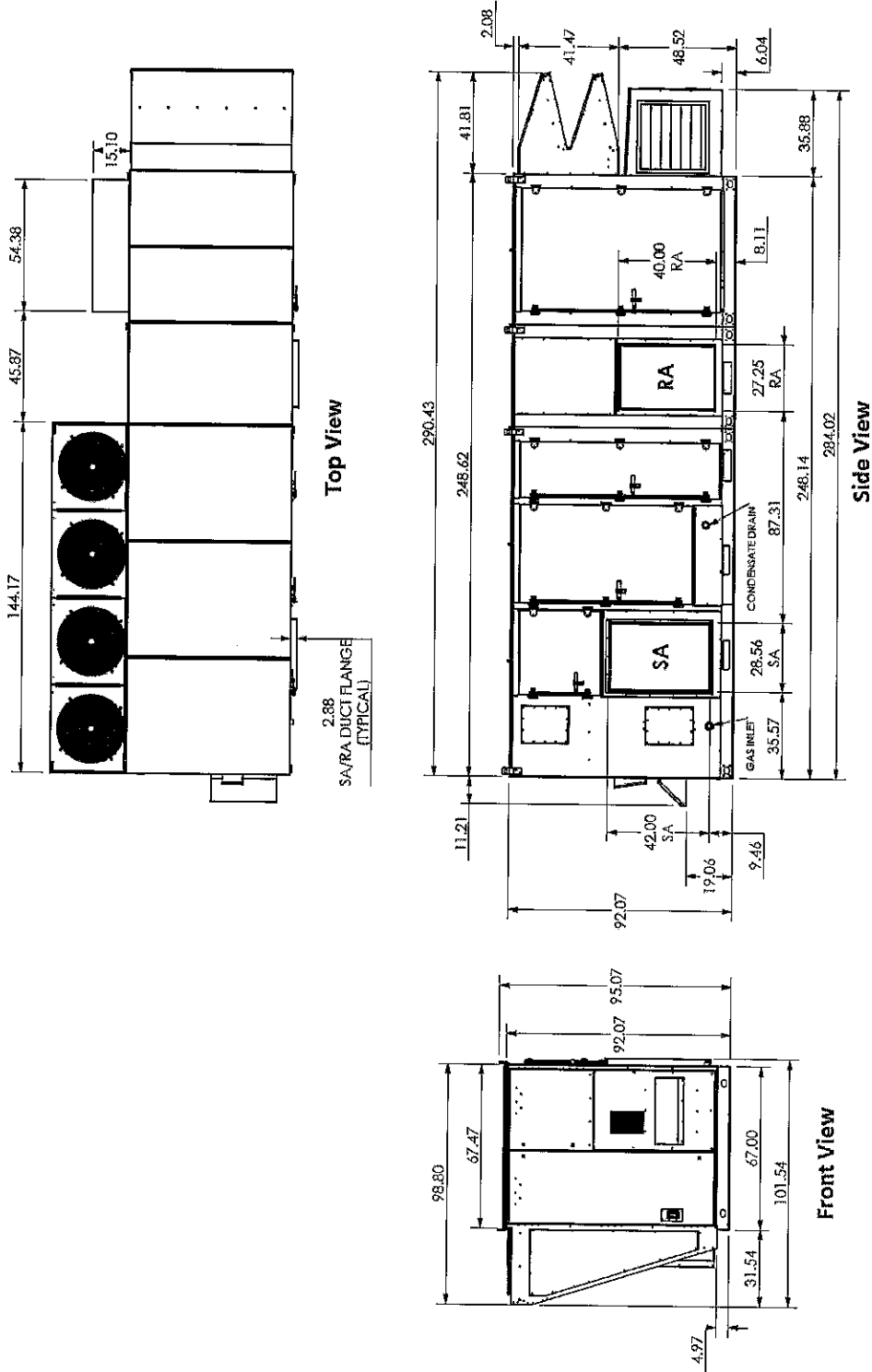
Unit Dimensions - 10-20 Ton Chilled Water PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-B



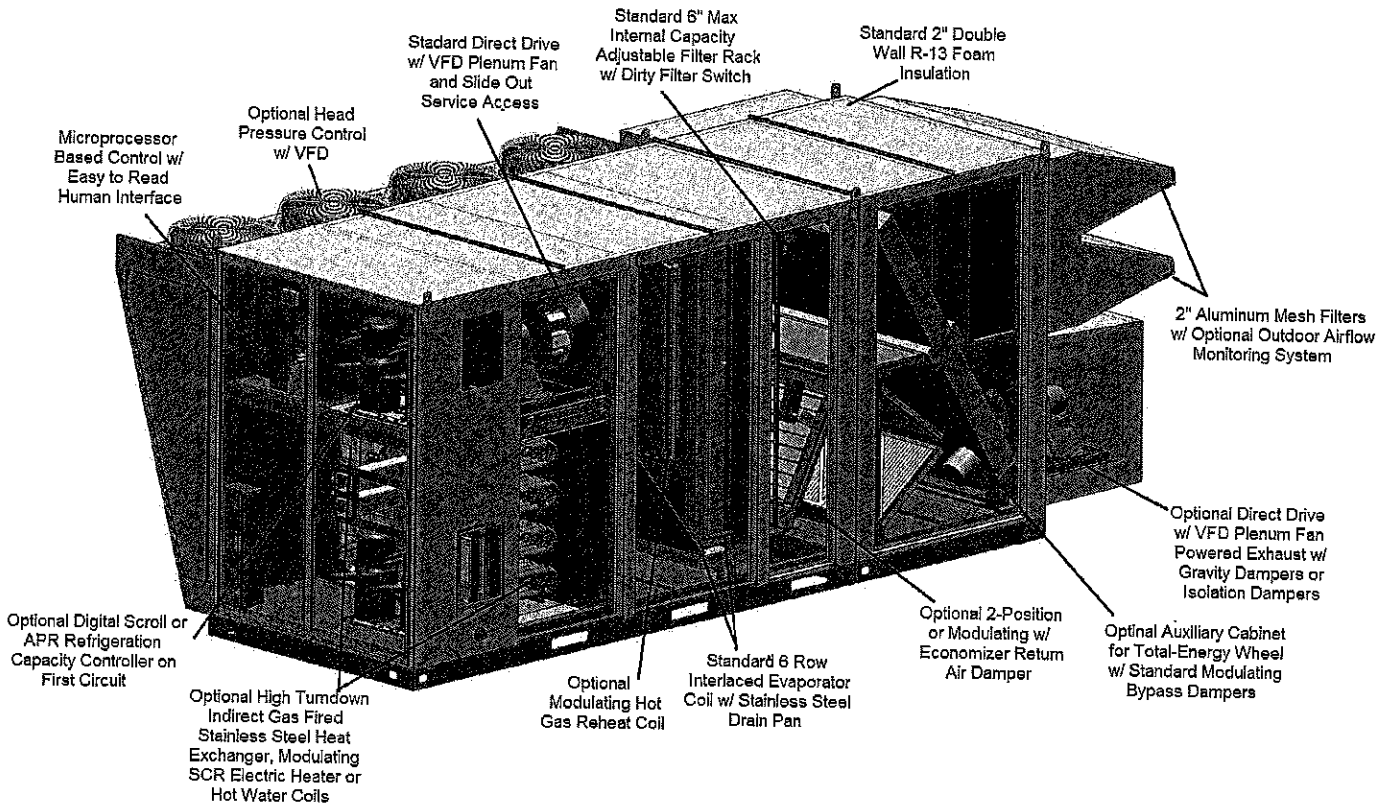
Unit Dimensions - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: ERV-1 East, ERV-2 West



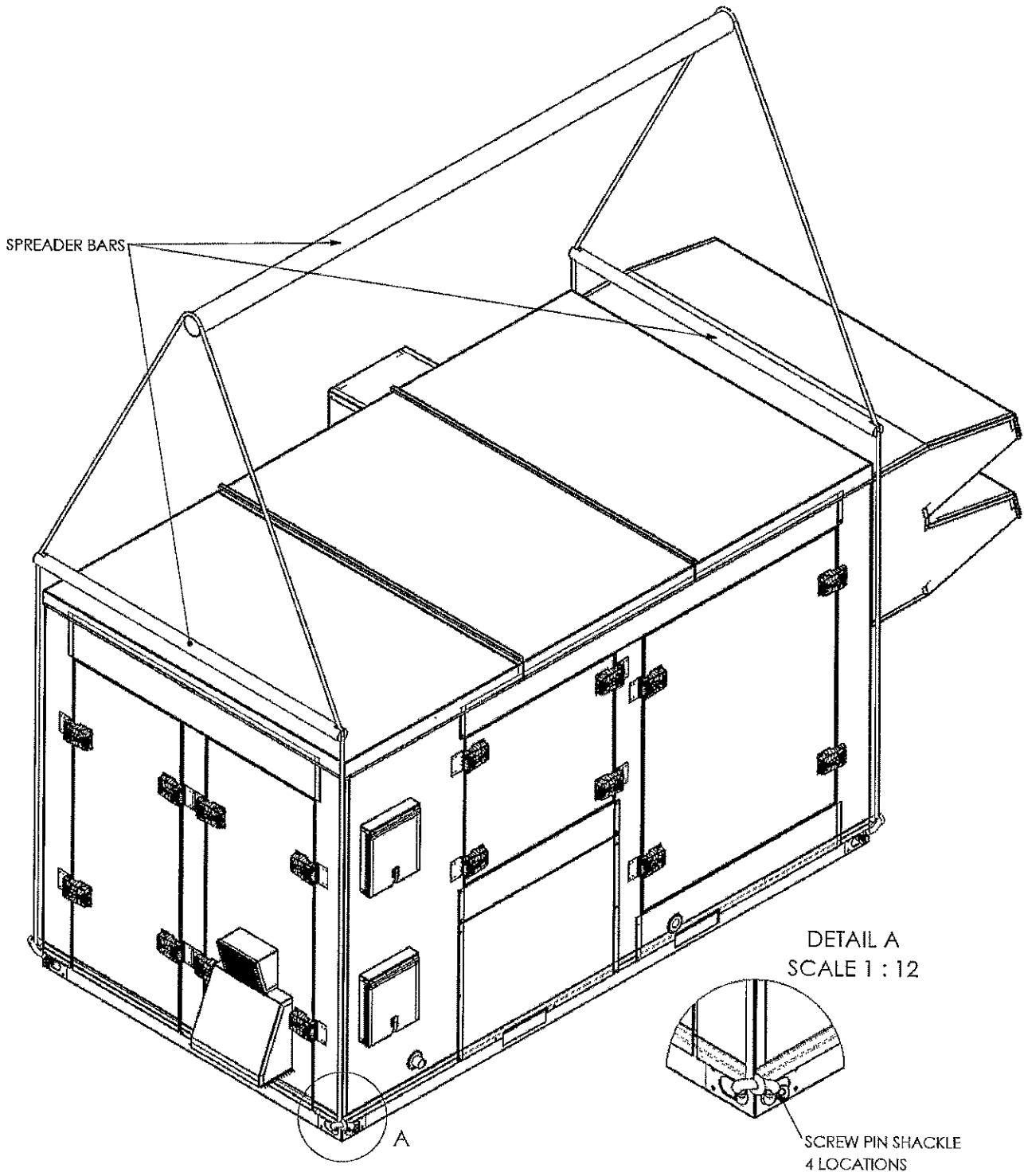
Component Layout - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: ERV-1 East, ERV-2 West



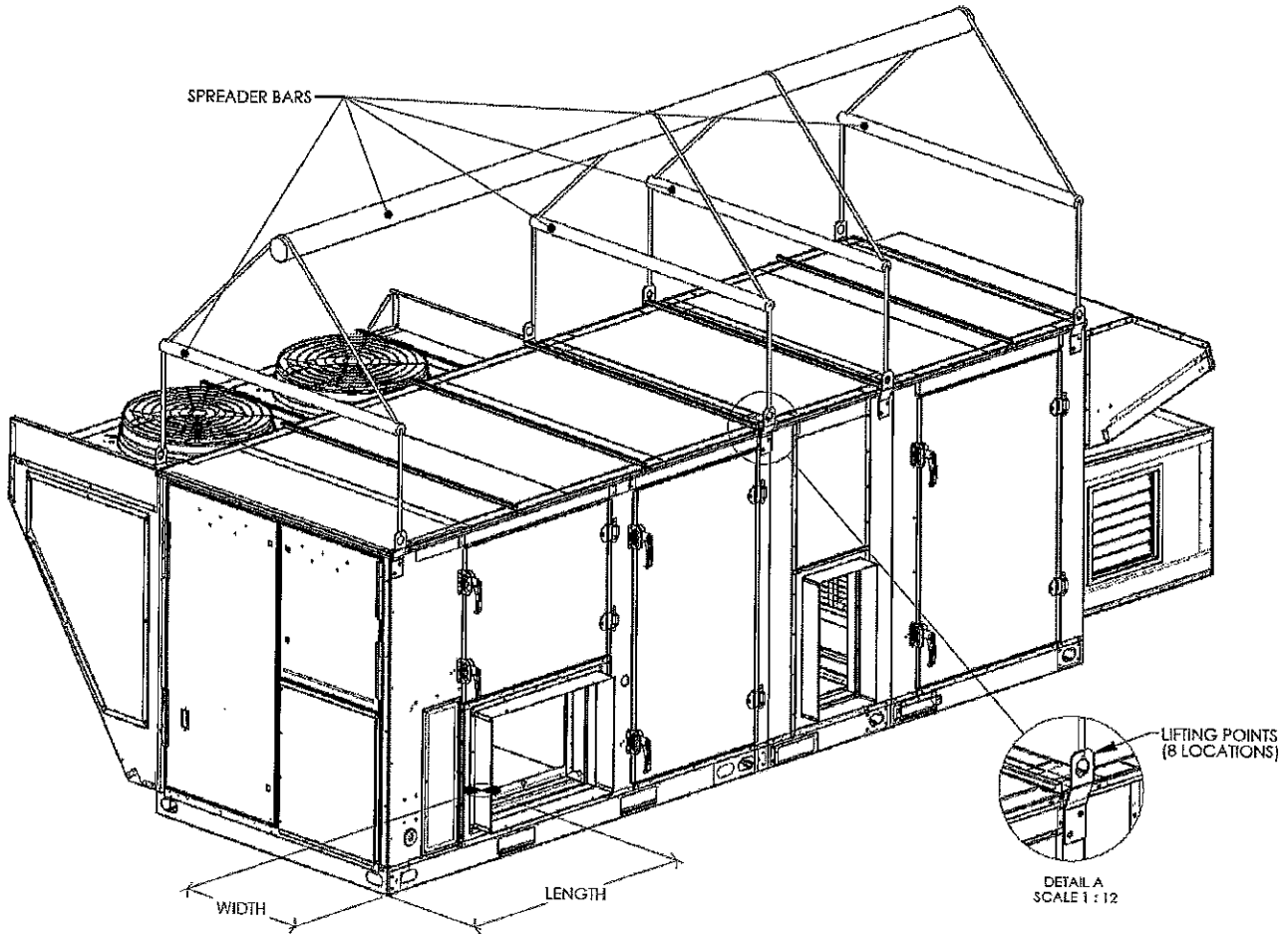
Rigging Diagram - 10-20 Ton PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-B



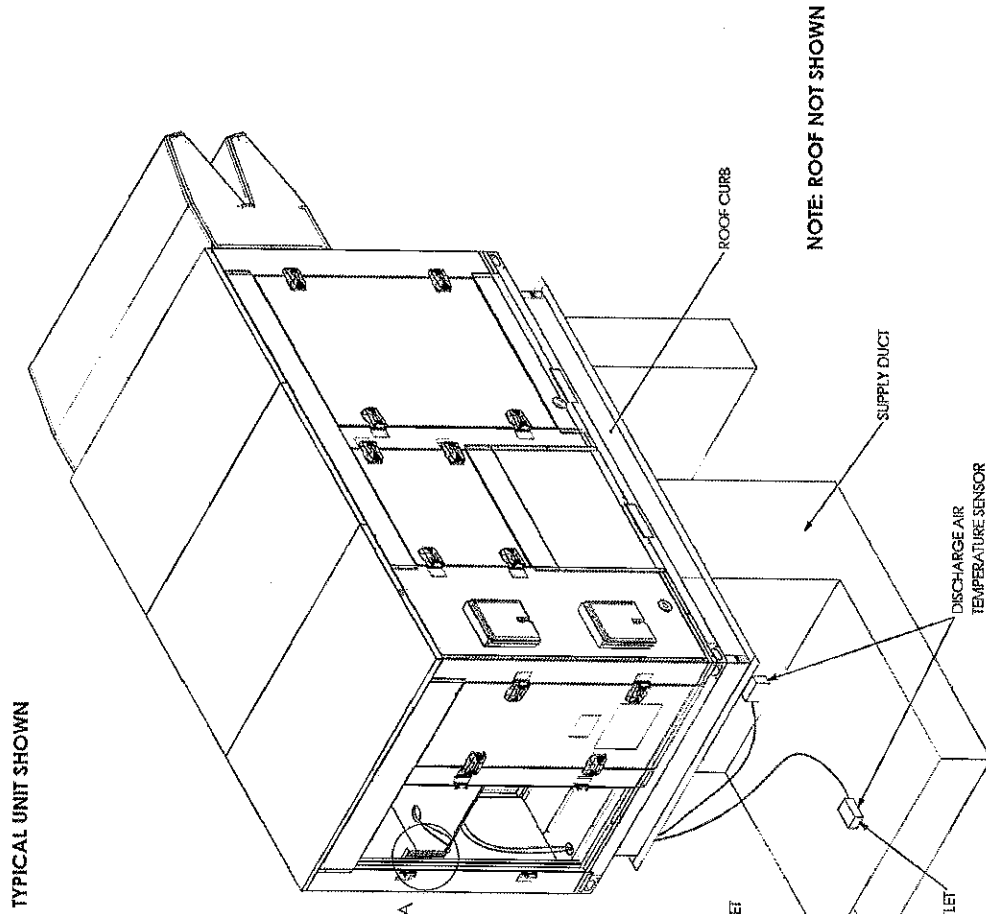
Rigging Diagram - 5-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: ERV-1 East, ERV-2 West



Field Wiring - 3-54 Ton R-410A PKGD Unitary Cooling Rooftop

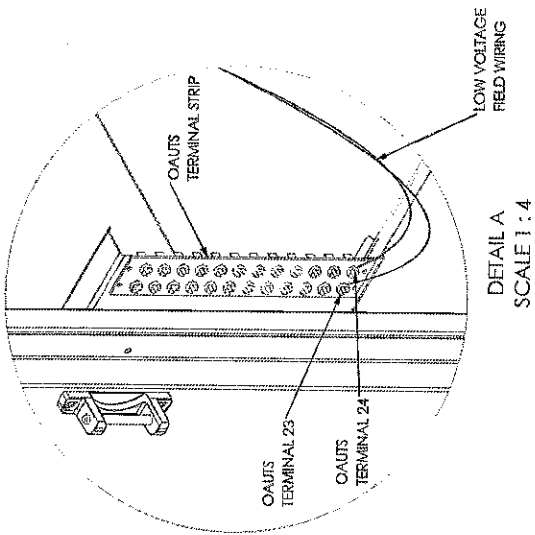
Qty: 3 Tags: AHU-B, ERV-1 East, ERV-2 West



NOTE: ROOF NOT SHOWN

SENSOR LOCATION WHEN CHANGE IN DUCT DIRECTION OCCURS WITHIN 4 FEET OF UNITS OUTLET

TYPICAL UNIT SHOWN

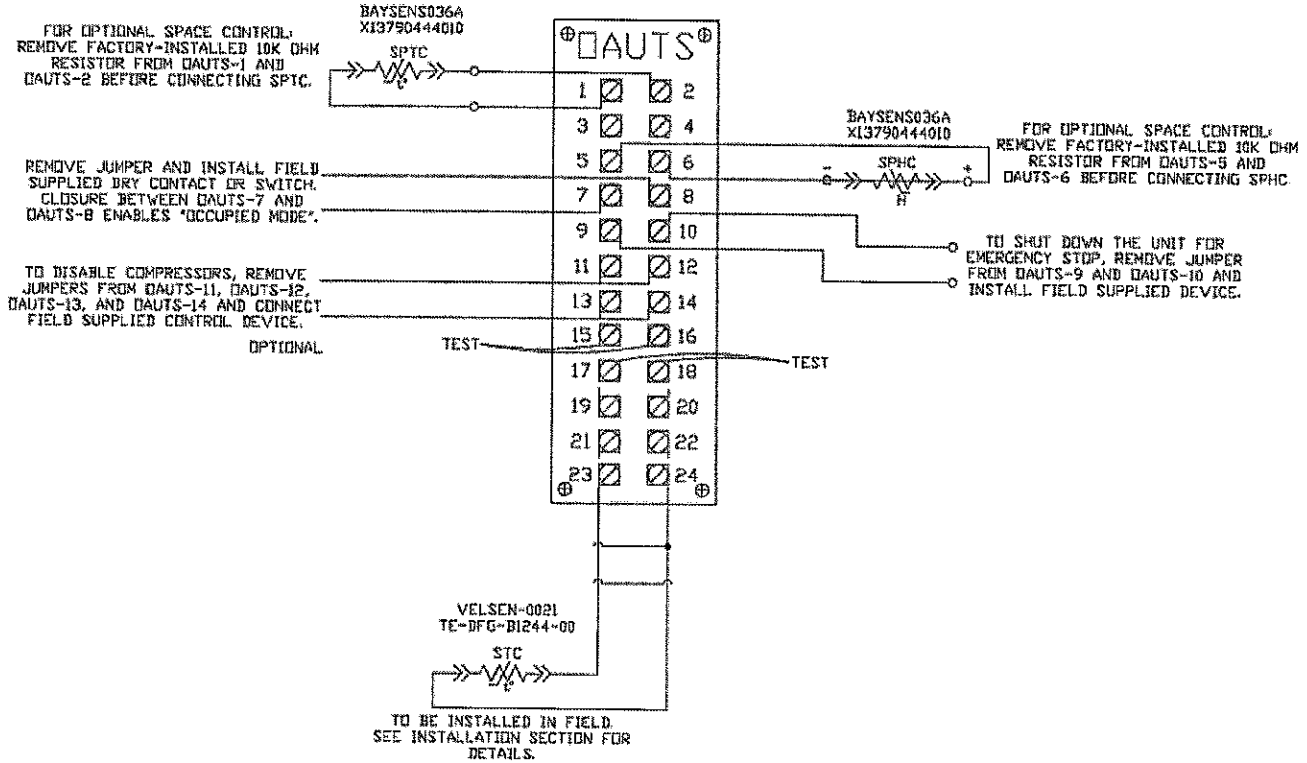


INSTALLATION INSTRUCTIONS:

1. DISCHARGE AIR TEMPERATURE SENSOR IS PROVIDED FROM THE FACTORY. IT IS SHIPPED LOOSE IN THE CONTROLS COMPARTMENT.
2. INSTALL DISCHARGE AIR TEMPERATURE SENSOR IN THE SUPPLY DUCT, MINIMUM 4 FEET FROM THE UNIT OUTLET. IF CHANGE OF DUCT DIRECTION OCCURS WITHIN 4 FEET, LOCATE THE SENSOR 4 FEET BEYOND THE CHANGE IN DIRECTION.
3. ROUTE FIELD SUPPLIED LOW VOLTAGE WIRING AS SHOWN.
4. CONNECT LOW VOLTAGE WIRING TO TERMINALS OAUITS-23 AND OAUITS-24.

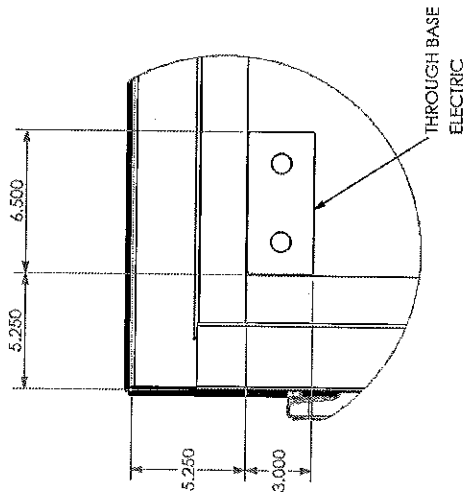
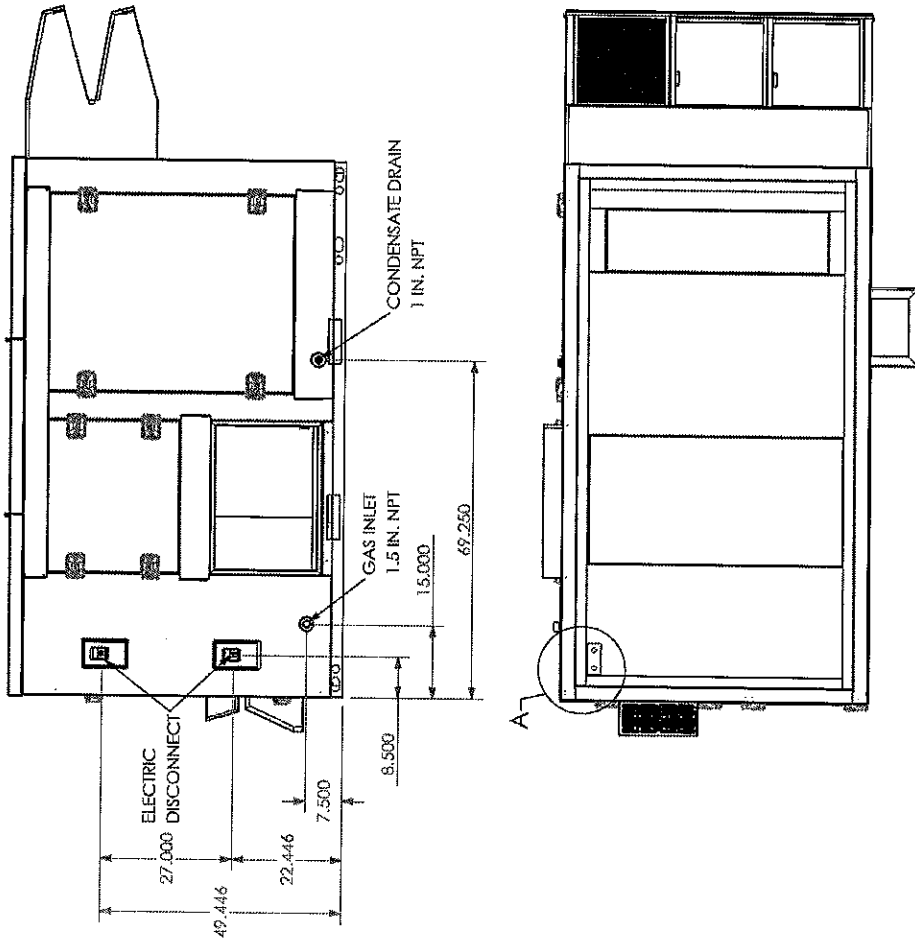
Field Wiring - 3-54 Ton T-410A PKGD Unitary Cooling Rooftop

Qty: 3 Tags: AHU-B, ERV-1 East, ERV-2 West



Utility Connections - 10-20 Ton Chilled Water PKGD Unitary Cooling Rooftop

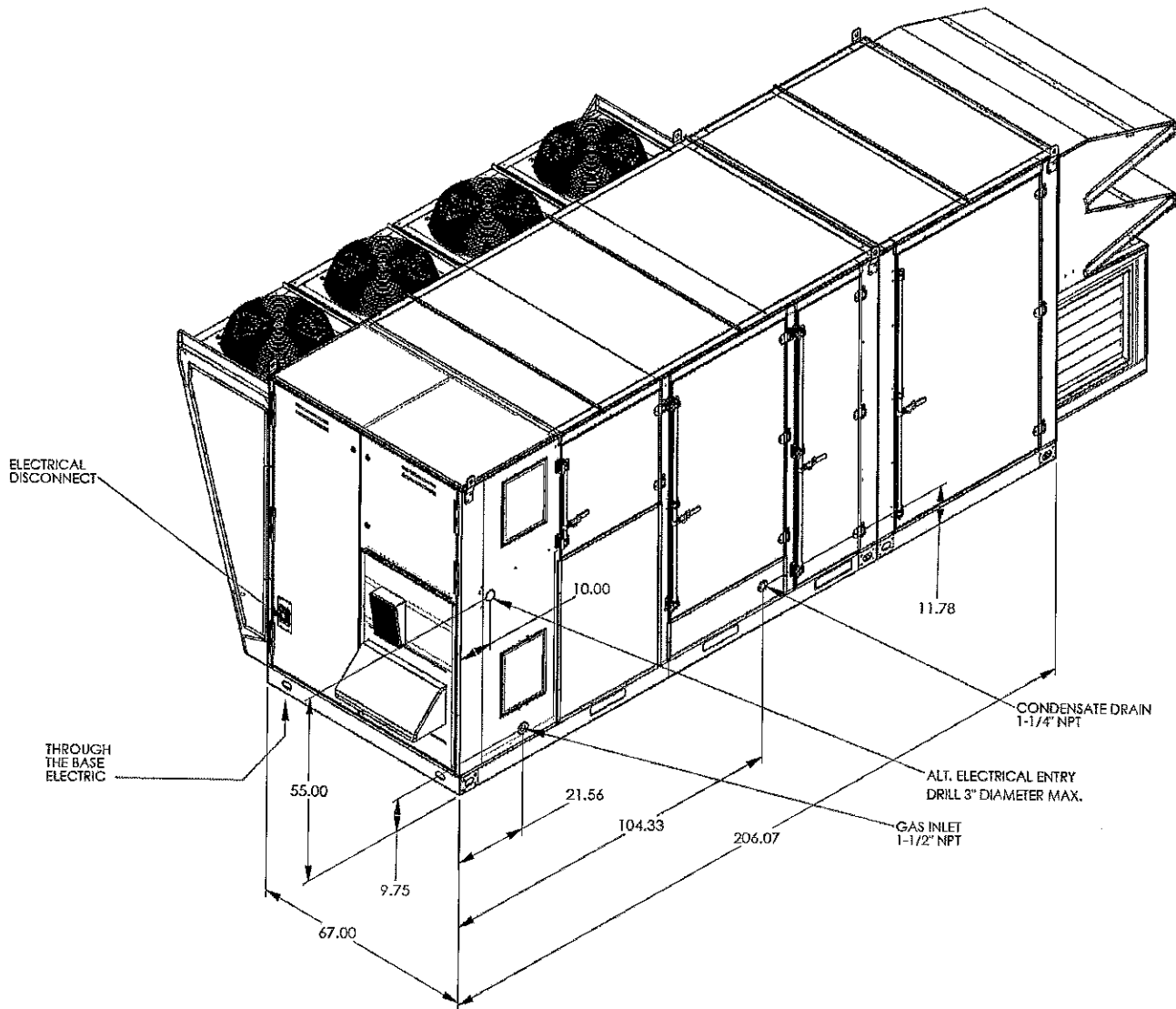
Qty: 1 Tags: AHU-B



DETAIL A
SCALE 1 : 8

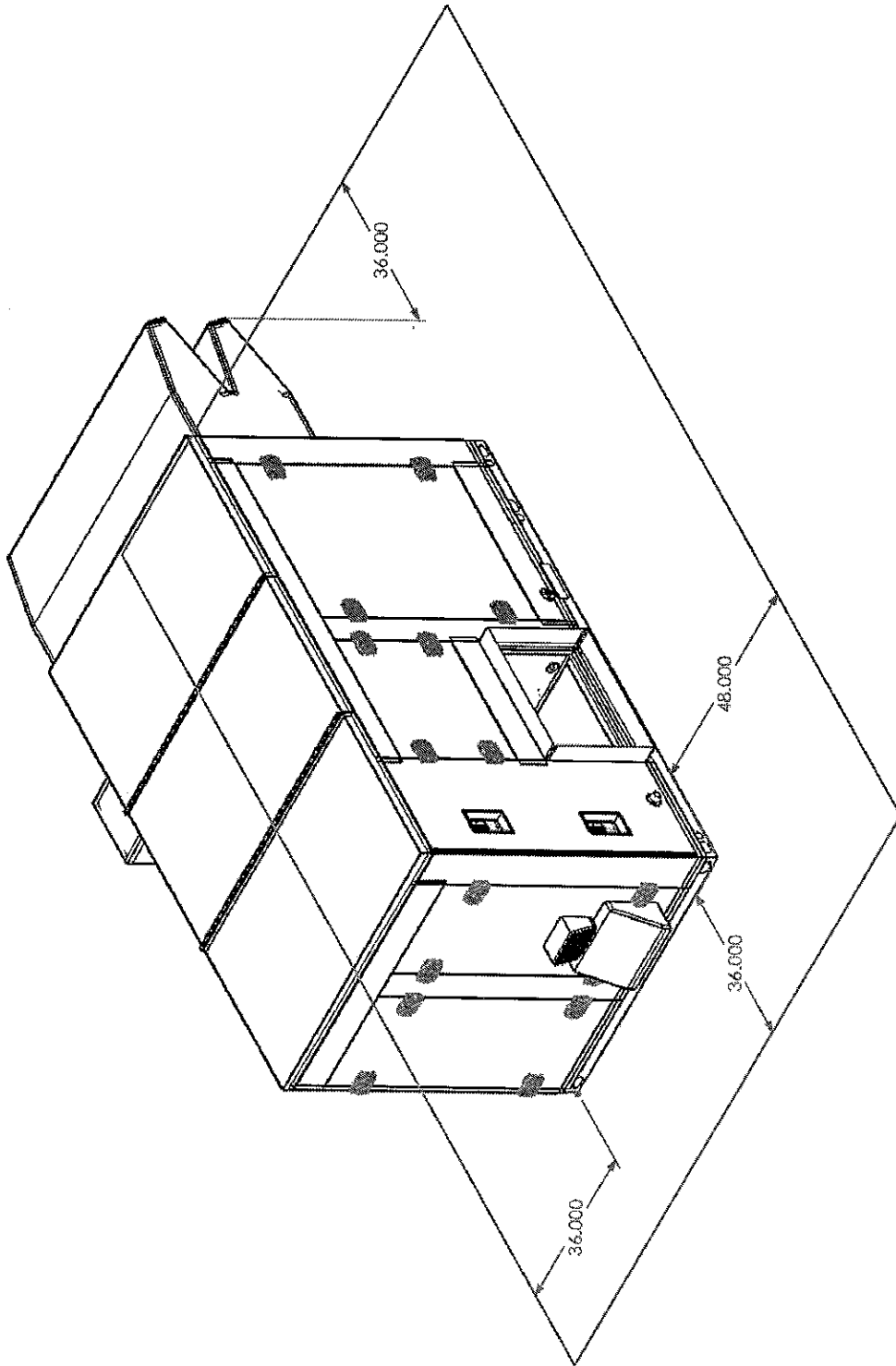
Utility Connections - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: ERV-1 East, ERV-2 West



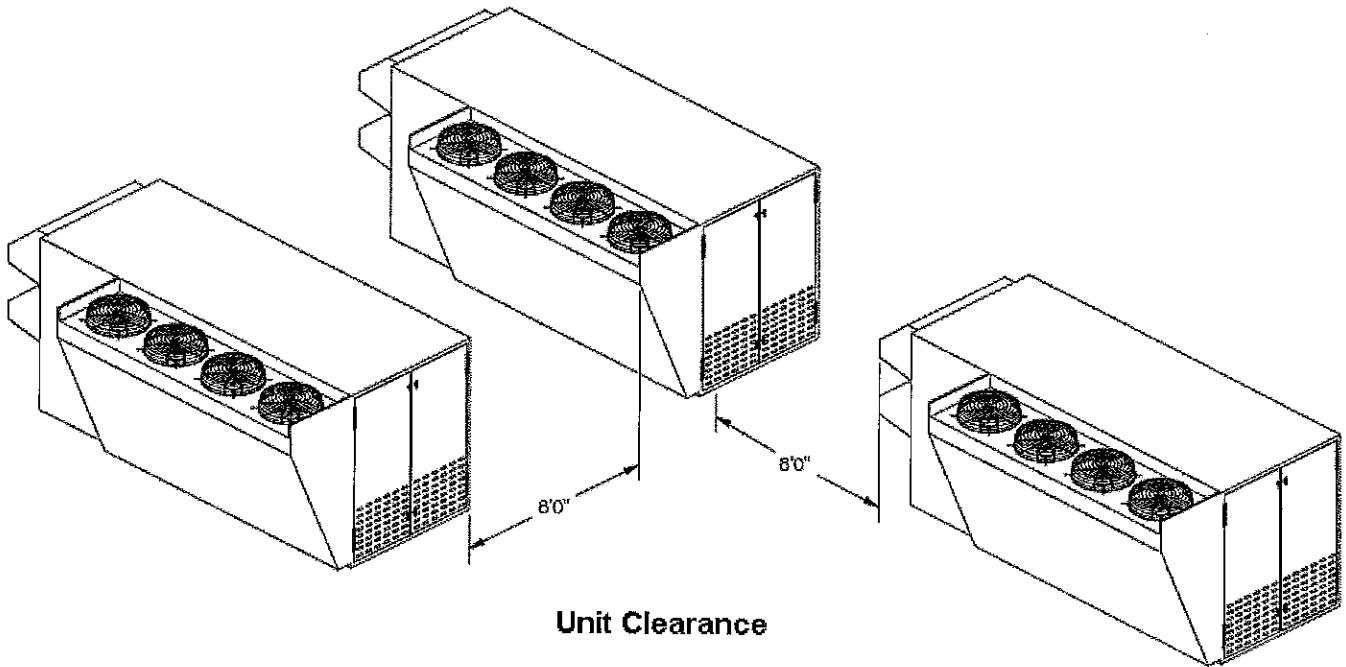
Clearance Diagram - 10-20 Ton Chilled Water PKGD Unitary Cooling Rooftop

Qty: 1 Tags: AHU-B

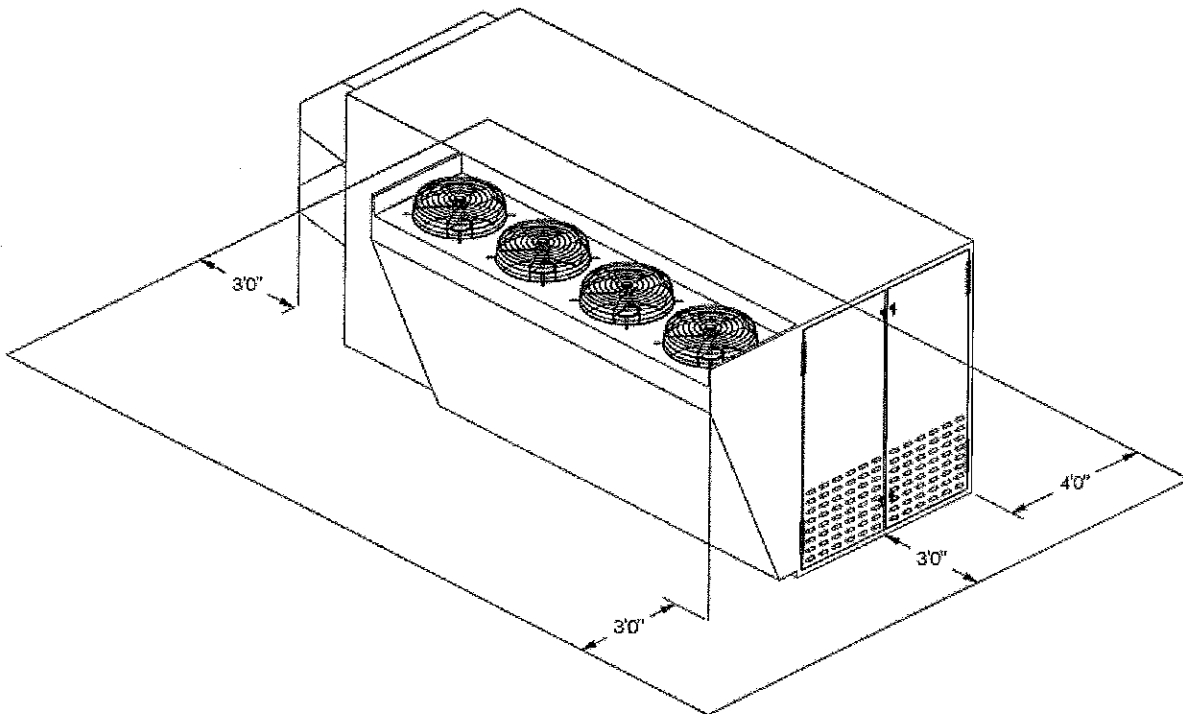


Clearance Diagram - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: ERV-1 East, ERV-2 West



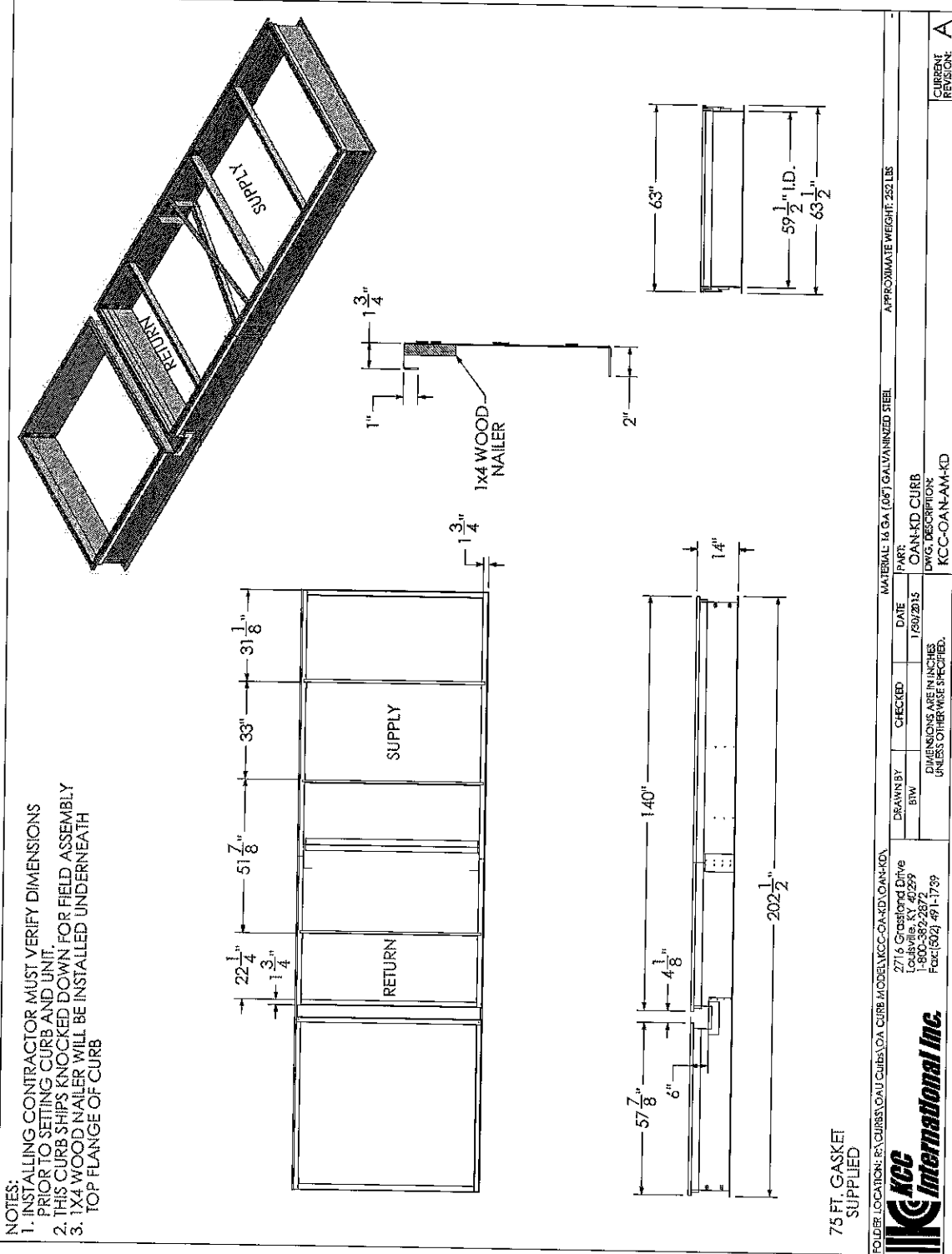
Unit Clearance



Service Clearance

Roof Curb - 30-54 Ton R410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: ERV-1 East, ERV-2 West



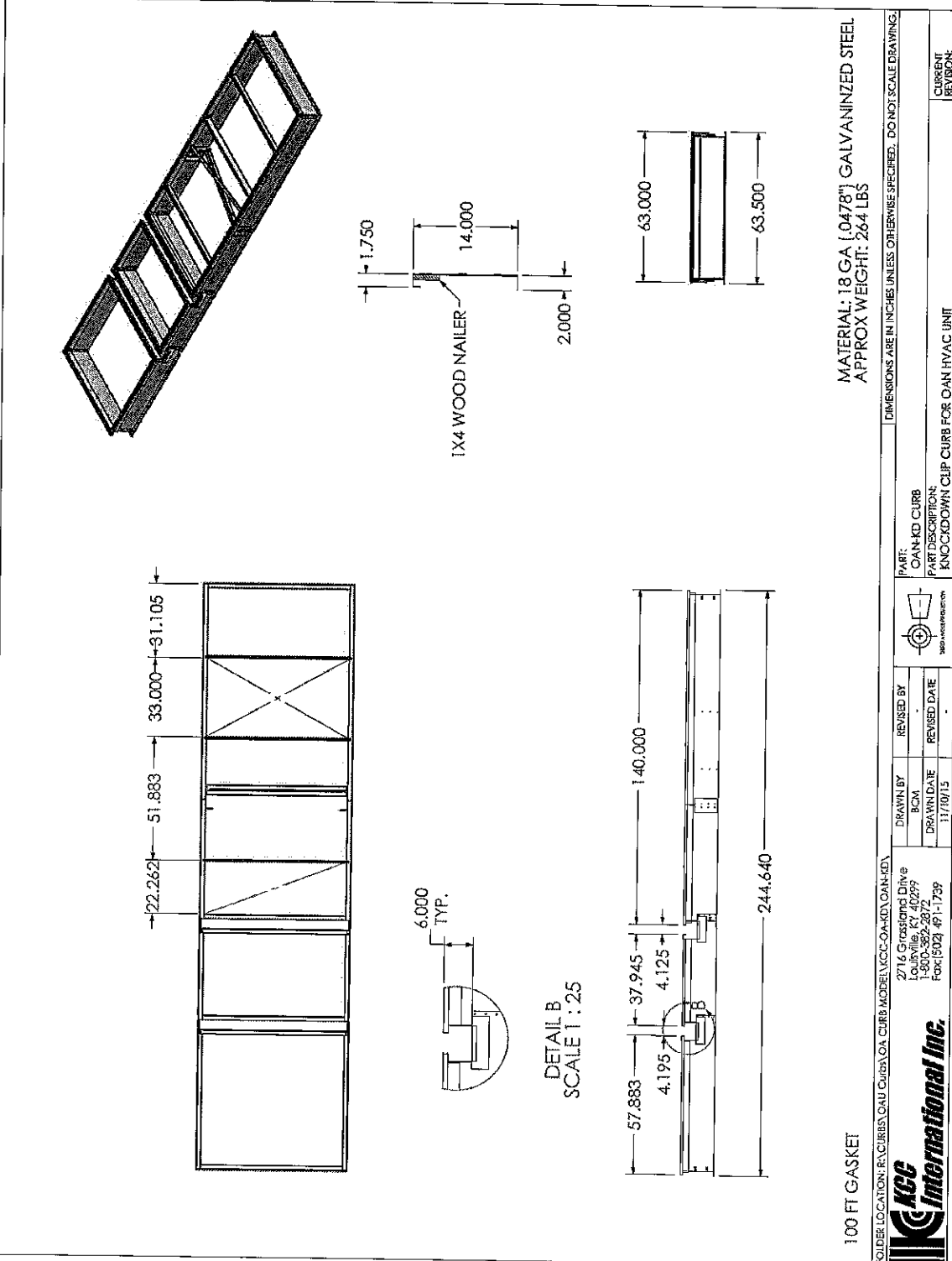
- NOTES:**
1. INSTALLING CONTRACTOR MUST VERIFY DIMENSIONS PRIOR TO SETTING CURB AND UNIT.
 2. THIS CURB SHIPS KNOCKED DOWN FOR FIELD ASSEMBLY.
 3. 1X4 WOOD NAILER WILL BE INSTALLED UNDERNEATH TOP FLANGE OF CURB.

75 FT. GASKET SUPPLIED

FOLDER LOCATION: E:\CURBS\OAU CURBS\OAU CURB MODEL\KCC-OAU-KD\OAU-KD		MATERIAL: 16 GA. (08") GALVANIZED STEEL		APPROXIMATE WEIGHT: 252 LBS	
2716 Greystone Drive Columbus, GA 31906 1-800-352-2372 Fax: (502) 491-1739	DATE: 1/30/2015	CHECKED:	DATE:	PART: OAU-KD CURB	
KCC International Inc.	DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.				
	CURRENT REVISION: A				

Roof Curb - 30-54 Ton R410A PKGD Unitary Cooling Rooftop

Qty: 2 Tags: ERV-1 East, ERV-2 West



100 FT GASKET

MATERIAL: 18 GA (.0478") GALVANIZED STEEL
APPROX WEIGHT: 264 LBS

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. DO NOT SCALE DRAWING.

KCC International Inc.
 2716 Grassland Drive
 Louisville, KY 40299
 1-800-352-2872
 Fax: (502) 491-1739

DRAWN BY	REVISOR
BCM	
DRAWN DATE	REVISOR DATE
11/19/15	

PART: OAK-KD CURB
PART DESCRIPTION: KNOCKDOWN CLIP CURB FOR OAK HVAC UNIT

CURRENT REVISION:

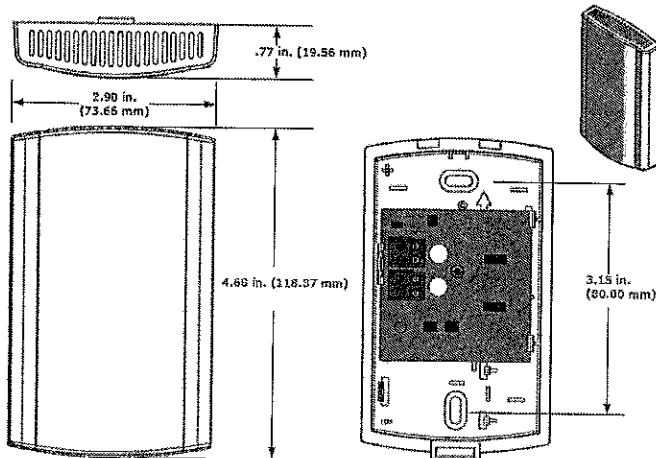
Field Wiring - Space Temperature & Relative Humidity Sensor (Optional)

Qty: 1 Tags: AHU-B

Sensor Specifications

Accuracy:	±3% RH over 20-95% RH at 77°F (25°C). Includes hysteresis, linearity, and repeatability.
Operating temperature range:	From -20°F to 140°F (-29°C to 60°C)
Supply voltage:	18-36 Vdc
Drift rate:	Less than 1% per year
Operating measurement range:	0-99% RH, noncondensing
Sensing element:	Polymer capacitive
Output characteristics:	4-20 mA for 0-100% RH (X13790486010 is 20- mA for 0-100% RH)
Repeatability:	0.5% RH
Hysteresis:	Less than 1% RH
Sensitivity:	0.1% RH
Storage temperature:	From -85°F to 158°F (-65°C to 70°C)
Thermistor resistance:	10 kΩ at 77°F
Temperature accuracy:	±0.36°F (±0.2°C)

Sensor Dimensions and Locating Best Practices



Mounting

Proper location of the **room humidity sensor** is important to ensure accurate measurement. Place the sensor in an area of the room with good air circulation.

Places to avoid when locating the sensor:

- Locations subject to draft from windows, doors, or diffusers
- Surfaces with an uncooled or unheated area behind them, such as an outside wall or the wall of an unoccupied store room
- Near heat sources, such as radiant heat from the sun, heat from appliances, or heat from concealed pipes or chimneys
- Dead spots behind doors, draperies, or in corners
- Walls having excessive vibration
- Corrosive environments such as near swimming pools or in hospital rooms

To mount the **room humidity sensor**, first choose a flat interior surface that is approximately 54 inches (1.4 m) from the floor and then:

1. Remove sensor cover by pressing on the thumb tab at the bottom of the enclosure. Tilt the cover forward and raise it over the top of the back plate.
2. Feed the wires through the base.
3. Attach sensor to drywall or plaster (hardware not included with the sensor).
Note: For a 2 x 4 junction box, mount the sensor using two #6-32 screws.
4. Connect the controller wires to the terminals on the sensor (refer to the next section about wiring).
5. Replace cover by engaging tab hinges on top of the unit and then push to snap in place.

Options - Supply/Return Smoke Detector

Qty: 3 Tags: AHU-B, ERV-1 East, ERV-2 West

INSTALLATION AND MAINTENANCE INSTRUCTIONS



156-2967-0058

D4120 Duct Smoke Detector
D4S Sensor Component
D4P120 Power Board Component

3825 Ohio Avenue, St. Charles, Illinois 60174
1-800-SENSOR2, FAX: 630-377-6495
www.systemsensor.com

NOTE: The D4120 duct detector consists of D4P120 Power Board component and the D4S Sensor component.

SPECIFICATIONS

Operating Temperature: D4120 & D4S: -4° to 158° F (-20° to 70° C) D4P120: -40° to 158° F (-40° to 70° C)
Storage Temperature: D4120 & D4S: -22° to 158° F (-30° to 70° C) D4P120: -40° to 158° F (-40° to 70° C)
Humidity: 0% to 95% Relative Humidity Non-condensing
Air Velocity: 100 to 4000 ft./min. (0.5 to 20.3 m/sec.)
D4120 Footprint Dimensions: Rectangular - 14.38 in L x 5 in W x 2.5 in D (37cm L x 12.7cm W x 6.35cm D)
Square - 7.75 in L x 9 in W x 2.5 in D (19.7cm L x 22.9cm W x 6.35cm D)
D4S/D4P120 Footprint Dimensions: 7.75 in L x 5 in W x 2.5 in D (19.7cm L x 12.7cm W x 6.35cm D)
D4120 Weight: 2.5 pounds; 1.14 kg

Electrical

Table with 4 columns: Parameter, 20-29 VDC, 24 VAC 50-60-Hz, 120 VAC 50-60 Hz. Rows include Power supply voltage, Input capacitance, Reset Voltage, Reset Time, Power Up Time, Alarm response time, Sensitivity Test, Current Requirements, Max. standby current, Max. alarm current.

CONTACT RATINGS

Table with 2 columns: Contact Type, Rating. Includes Alarm initiation contacts (SPST), Alarm auxiliary contacts (DPDT), Supervisory Contacts (SPDT).

ACCESSORY CURRENT LOADS AT 24 VDC

Table with 4 columns: DEVICE, STANDBY, TROUBLE, ALARM. Lists various devices like APA151, MHRAM1W, RA400Z/RA100Z, etc.

NOTE: Any combination of accessories may be used such that the given accessory loads are: 110mA or less at the Aux output, and 50mA or less at the Alarm output.

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IMPORTANT: This detector must be tested and maintained regularly following NFPA 72 requirements. The detector should be cleaned at least once a year.

[1] LIMITATIONS OF DUCT SMOKE DETECTORS

WARNING

The National Fire Protection Association has established that DUCT DETECTORS MUST NOT BE USED AS A SUBSTITUTE FOR OPEN AREA DETECTOR PROTECTION as a means of providing life safety. Nor are they a substitute for early warning in a building's regular fire detection system.

System Sensor supports this position and strongly recommends that the user read NFPA Standards 90A, 72, and 101. The D4120 Air Duct Smoke Detectors are listed per UL 268A.

This device will not operate without electrical power. Fire situations may cause an interruption of power. The system safeguards should be discussed with your local fire protection specialist.

This device will not sense smoke unless the ventilation system is operating and the cover is installed.

For this detector to function properly, it MUST be installed according to the instructions in this manual. Furthermore, the detector MUST be operated within ALL electrical and environmental specifications listed in this manual. Failure to comply with these requirements may prevent the detector from activating when smoke is present in the air duct.

NOTICE: This manual shall be left with the owner/user of this equipment.

SS-300-000

Options - Trane Controls TD7 Display

Qty: 1 Tags: AHU-B



BAS-PRC068-EN

Product Data Sheet

Tracer™ TD7 Display

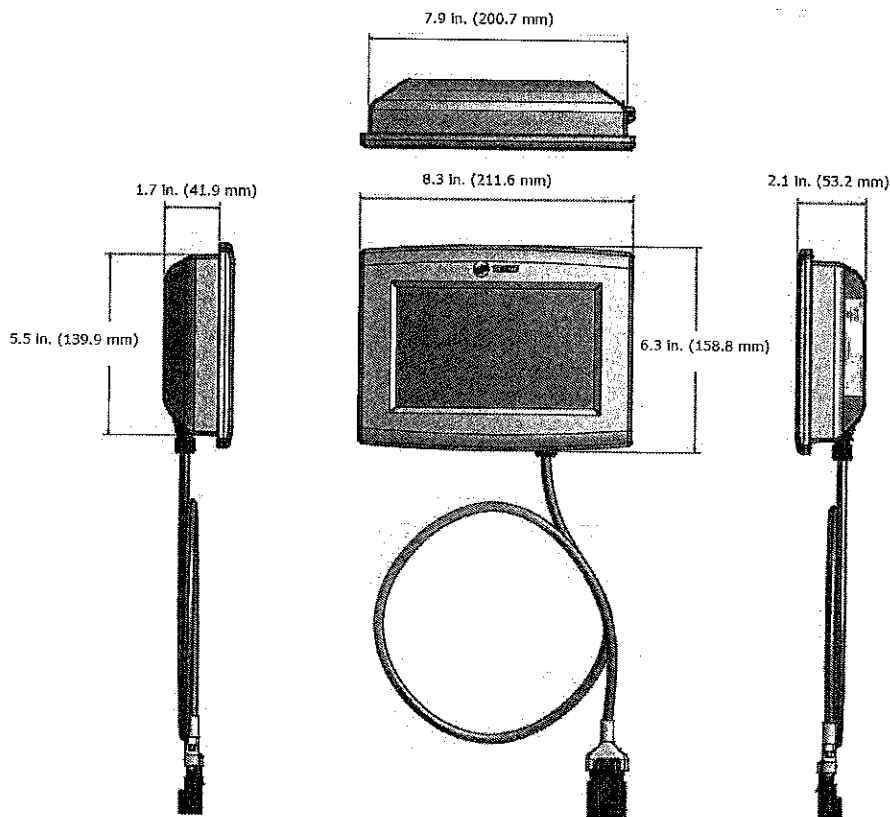
for the Tracer™ UC600 Programmable Controller

The Tracer™ TD7 Display features a touch-sensitive color screen that provides for ease of viewing and editing of Tracer UC600 data. Building operators can easily monitor space temperature and relative humidity, change setpoints, and enter point overrides with time-limits with a just a few touches of the screen.

Scheduling capability and access to custom graphics are available with Tracer UC600 Version 3.0 or higher.

The TD7 Display communicates exclusively with the Tracer UC600 Programmable controller (one Tracer UC600 per TD7), and is ideal for use with the following types of applications:

- Air-handling units (AHUs)
- Central heating and cooling plants
- Rooftop units
- Cooling towers
- Chillers
- Generic input/output (I/O) control



Options - Trane Controls TD7 Display

Qty: 1 Tags: AHU-B



Features and Benefits

Feature	Benefit
7-inch WVGA touch-sensitive color screen	Allows for easy navigation for viewing data and making operational changes.
Display preferences	Choose how to view dates, times, units (SI, IP), screen brightness, data format, and backlight timeout.
Scheduling—supports up to 3 weekly schedules	Easy to set up and access (3 schedule types supported: Analog, Binary, Multistate)
Custom data graphs	Create and view graphically formatted data logs. Up to 8 custom data graphs can be created with a maximum of 4 data logs per graph.
Custom graphics	TD7 supports up to 10 graphics. Perform overrides, link to alarms, reports, or other graphics directly from a graphic.
Icon-labeled alarm categories	Easily and quickly identify alarm severities with distinctive, colorful icons.
Three Customizable Reports	Select up to 36 pieces of data per report (maximum of 3 custom reports).
Built-in All Points Report	View all points that have been configured in a single report.
Point overrides with timeout feature	Set up point overrides to expire at designated times.
Optional user security	Set up security for overriding/releasing points, release all overrides, custom report editing, Date and Time edit
Multiple mounting options	Can be mounted to meet customer preferences and needs. See "Mounting Options," p. 4. Can also be remotely mounted up to 100 meters.
Language options	25 built-in languages are supported and selectable for all TD7 screens.

Specifications and Agency Compliance

Specification	
Input power:	24 Vac +/- 15%, 21 VA, 50, or 60 Hz
Storage temperature:	-67°F to 203°F (-55°C to 95°C) Humidity: Between 5% to 100% (Condensing)
Operating temperature:	Temperature: -40°F to 158°F (-40°C to 70°C) Humidity: Between 5% to 100% (Condensing)
Mounting weight:	Mounting surface must support 1.625 lb (0.737 kg) Mounting Type: VESA (75 mm x 75 mm)
Environmental rating (enclosure):	IP56 (dust and strong water jet protected) with optional sealed Ethernet cable (PN: X19070632020)
Agency Compliance	<ul style="list-style-type: none"> • UL916 PAZX, Open Energy Management Equipment • UL94-5V, Flammability • FCC CFR Title 47, Part 15.109: Class A Limit, (30 MHz—4 GHz) • CE EMC Directive 2004/108/EC • CE EMC Directive 2004/108/EC

Supported Languages

English (United States)	Greek
German	Czech
Dutch	Romanian
Italian	Russian
Spanish (Spain)	Arabic (Gulf Regions)
Spanish (Mexico)	Hebrew
Portuguese (Portugal)	Thai
Portuguese (Brazil)	Chinese Simplified (China)
Swedish	Chinese Simplified (Taiwan)
Norwegian	Japanese
French	Korean
Polish	Indonesian
Hungarian	

Mounting Options

The TD7 Display can be mounted using either of the following:

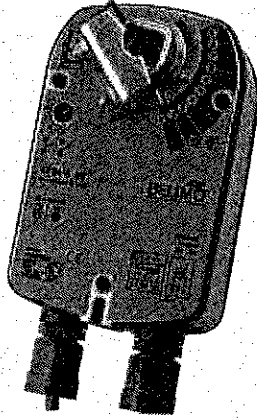
- Large Enclosure with display-capable door 120 VAC (order number: X13651553-01)
- Large Enclosure with display-capable door 230 VAC (order number: X13651555-01)
- TD7 Display Low Profile Mounting Bracket VESA 75 mm (order number: X05010511010)
- TD7 Display Portable Carry Case (order number: 31800912B)
- Any user-supplied VESA 75 mm mounting bracket

Options - 2 Position Damper Actuator

Qty: 2 Tags: ERV-1 East, ERV-2 West

LF24(-S) US

On/Off, Spring Return, 24V



Torque min. 35 in-lb, for control of air dampers

Application

For On/Off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is On/Off from an auxiliary contact, digital output, or a manual switch.

The actuator is mounted directly to a damper shaft from 3/8" up to 1/2" in diameter by means of its universal clamp, 1/2" shaft centered at delivery. For shafts up to 3/4" use K6-1 accessory. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.

Operation

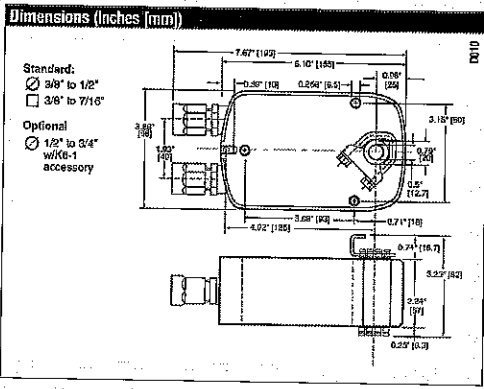
The LF series actuators provide true spring return operation for reliable fail-safe application and positive close off on air tight dampers. The spring return system provides consistent torque to the damper with, and without, power applied to the actuator.

The LF series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°.

The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode.

The LF24-S US version is provided with one built in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°. The auxiliary switch in the LF24-S is double insulated so an electrical ground connection is not necessary.

Technical Data		LF24(-S) US
Power supply		24 VAC ± 20% 50/60 Hz 24 VDC ± 10%
Power consumption	running	5 W
	holding	2.6 W
Transformer sizing		7 VA (class 2 power source)
Electrical connection (LF24-S US has 2 cables)		3 ft, 18 GA appliance cable 1/2" conduit connector
Overload protection		electronic throughout 0 to 95° rotation
Angle of rotation		max. 95°, adjust. with mechanical stop
Torque		35 in-lb [4 Nm]
Direction of rotation		reversible with cw/ccw mounting
Position indication		visual indicator, 0° to 95° (0° is spring return position)
Running time (nominal)	motor	< 40 to 75 sec
	spring	< 25 sec @ -4°F to 122°F [-20°C to 50°C] < 60 sec @ -22°F [-30°C]
Humidity		5 to 95% RH non-condensing
Ambient temperature		-22°F to 122°F [-30°C to 50°C]
Storage temperature		-40°F to 176°F [-40°C to 80°C]
Housing		NEMA type 2 / IP54
Housing material		zinc coated steel
Agency listings		cULus acc. to UL 873 and CAN/GSA C22.2 No. 24-93
Noise level (max)	running	< 50 db (A)
	spring return	62 db (A)
Servicing		maintenance free
Quality standard		ISO 9001
Weight	LF24	3.1 lbs (1.40 kg)
	LF24-S	3.2 lbs (1.45 kg)
LF24-S US		
Auxiliary switch		1 x SPDT 3A (0.5A) @ 250 VAC, UL Approved adjustable 0° to 95° (double insulated)

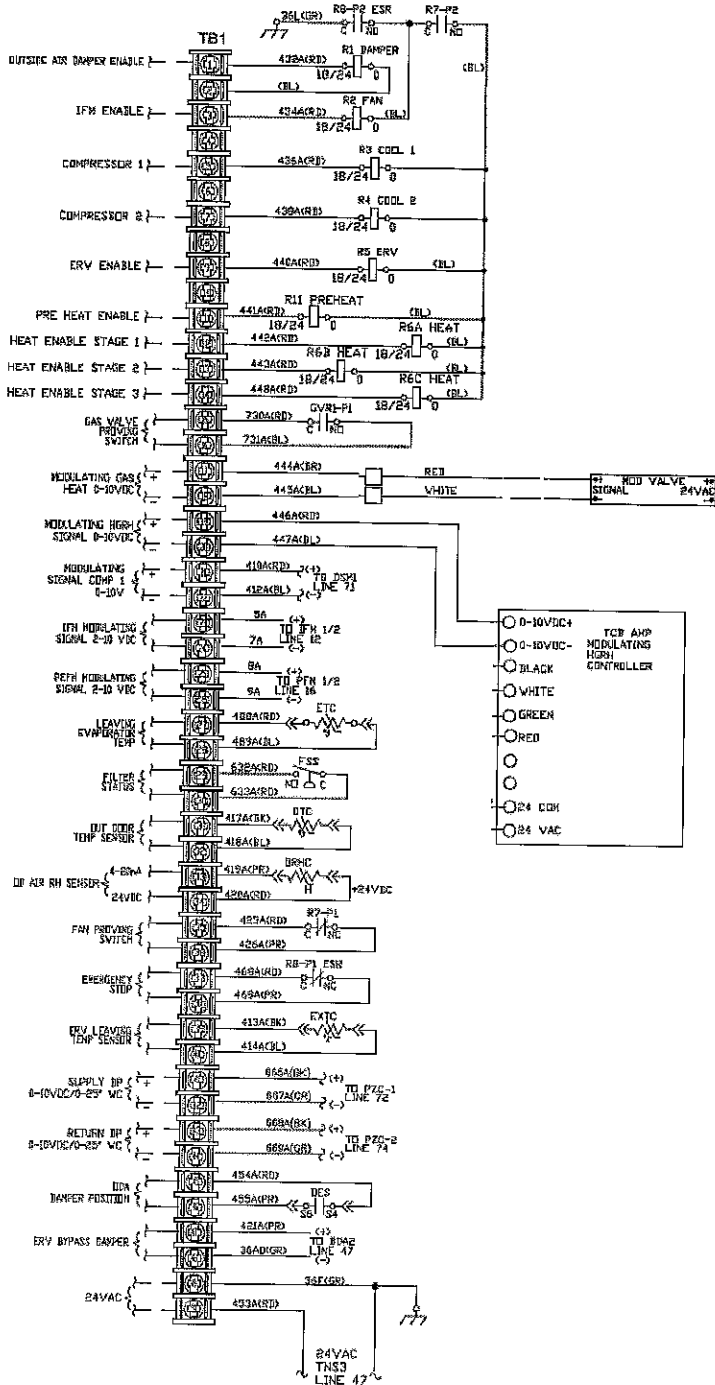


M/0024 - CE70 - Subject to change. © Belimo North America (USA), Inc.

Unit Controls - No Controls Example Schematic

Qty: 2 Tags: ERV-1 East, ERV-2 West

SAMPLE NO CONTROLS SCHEMATIC. SELECTED UNIT COULD BE DIFFERENT THAN WHAT IS SHOWN BELOW. CONTACT FACTORY FOR UNIT SPECIFIC WIRING DIAGRAM



Mechanical Specifications - Tag(s): ERV-1 East, ERV-2 West, AHU-B**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. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT).

Indoor Coil Type: Glycol/Chilled Water Coil 6-Row**Chilled Water Coils**

The chilled water coil is ARI performance certified and shall bear the ARI symbol. Tubes are to be mechanically expanded into fins (secondary surface) for maximum heat transfer and shall be 6 rows. Materials are to be 1/2 in. diameter x (0.020) wall thickness. Secondary surface (fins) shall be of the plate-fin design using aluminum with die-formed collars. Fin design is waffle in a staggered tube pattern to meet performance requirements. Collars will hold fin spacing at specified density, and cover the entire tube surface. Fins are to be free of oils and oxidation. The coil shall have MPT connections constructed of copper.

The optional Cooney Freeze Block is designed to allow ice to form within the tubes, without restriction, by discharging a small amount of water into the drain pan. Each expansion header has a factory installed Cooney Freeze Block Valve that is both pressure and thermally activated. The valve will open when outside air below 35°F comes in contact with the header or return end of the coil, or when the internal pressure of the coil exceeds 300 psi. The valve will automatically reset and allow the coil to resume normal operation, when the pressure decreases, or when the temperature increases.

Heat Capacity - Primary: 150 MBH, (10:1 Turndown NG, 8:1 Turndown LP)

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 439 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. Minimum incoming gas pressure of 7" W.C. and Maximum pressure of 14" W.C. required.

Evaporator Coil: Chilled Water

Chilled Water Coils

The chilled water coil is ARI performance certified and shall bear the ARI symbol. Tubes are to be mechanically expanded into fins (secondary surface) for maximum heat transfer and shall be 6 rows. Materials are to be 1/2 in. diameter x (0.020) wall thickness. Secondary surface (fins) shall be of the plate-fin design using aluminum with die-formed collars. Fin design is waffle in a staggered tube pattern to meet performance requirements. Collars will hold fin spacing at specified density, and cover the entire tube surface. Fins are to be free of oils and oxidation. The coil shall have MPT connections constructed of copper.

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Indoor Blower Motor: Direct Drive w/VFD

Supply Fan motor shall be direct drive type with factory installed Variable Frequency Drive (unless no controls option is selected, VFD can be provided by others). All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT). All Fans shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

Fan Piezo Rings: Supply Fan Piezo Ring

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

Unit Controls: Space Control

Space Control

Operation During Occupied

Optional space temperature and/or humidity sensors must be installed, wired to unit, configured as "installed" at the main unit controller. All modes are enabled by the main unit control module. The control module calculates dewpoint based on sensed air temperature and humidity.

Emergency Stop

When the contacts at Terminal OAUTS 9 and 10 are open, the unit's operation will be in Alarm Status. Unit will begin normal operation upon closure of OAUTS 9 and 10.

Important: Cycling power to unit to clear alarm may not resolve alarm condition.

Starting Sequence

When 3-phase is powered to the unit the main unit controller and the RTRM will initialize. Initialization process requires approximately 3 minutes. The unit is placed in occupied operation via either the BAS or by closing connection between unit terminals OAUTS 7 and 8. The unit must not be in lockout.

No Return Air Damper Installed

The outdoor air damper will be commanded to open. The damper end switch will make causing the main unit controller to initialize the indoor fan starting sequence. If the unit is equipped with a VFD on the indoor fan(s) the sequence will begin by sending a preset run signal (field adjustable between 50 percent and 100 percent). If the unit is equipped with an ECM fan the sequence will begin by controlling to a field adjustable CFM setpoint. If after 30 seconds the indoor fan proving switch does not prove the indoor fan on, the main unit controller will command the indoor fan off and signal an alarm.

With Return Air Damper Installed

Identical to sequence with no return air damper except the outdoor air and return air dampers will be commanded to move to their preset occupied positions. For units equipped with Modulating Dampers this is the Minimum OA Damper Position, unless other Economizer or Ventilation demand a higher volume of outdoor air. Outdoor air damper end

switch is disabled when the return air damper is installed.

Economizer Mode

Economizer is field adjustable between Enthalpy or Dry Bulb with the binary value Economizer Control Type (defaulted from factory as enthalpy). Modulating dampers are required for Economizer Mode.

If the unit is not in Free Cooling Mode during Economizer Mode then the damper will be locked at the Maximum OA Damper Position. Mechanical cooling will not be locked out during this time.

Enthalpy Economizer

Economizer Mode is enabled based on outdoor air enthalpy, return air enthalpy and outdoor air temperature.

Operation in economizer mode is enabled when the outdoor air enthalpy remains below return air enthalpy and continues until outdoor air enthalpy rises above return air enthalpy by 3 btu/lb or when the outdoor air temperature rises above 80°F.

Dry Bulb Economizer

Economizer Mode is enabled based on outdoor air temperature and return air temperature. Operation in economizer mode is enabled when the outdoor air temperature is below return air temperature and continues until conditions call for dehumidification or when the outdoor air temperature is above the return air temperature by 3°F.

Free Cooling Mode

Free Cooling Mode is enabled when the Outdoor Air Temperature is cooler than five degrees below the Occupied Cooling Setpoint and the unit is in Economizer Mode. During Free Cooling Mode mechanical cooling is locked out and the dampers will modulate to maintain the Occupied Cooling Setpoint.

Ventilation Mode

Ventilation mode is enabled base on space temperature and outdoor air temperature. Operation in Ventilation Mode is enabled when the space temperature is between the Occupied Cooling Setpoint and the Occupied Heating Setpoint, and the outdoor temperature is between the Outdoor Air Cooling Setpoint and the Outdoor Air Heating Setpoint.

Operation in Ventilation Mode continues until conditions call for dehumidification or when the space and outdoor air temperature fall outside of those two conditions.

During Ventilation Mode both cooling and heat will be locked out and the outdoor air damper will remain at the Minimum OA Damper Position

Heating Mode

Non-Heat Pump Units

Heating Mode is enabled based on Outdoor Air Heating Setpoint (OAHS), Occupied Heating Setpoint, and Occupied Cooling Setpoint. If the outdoor air temperature is lower than the OAHS then Heating Mode shall be enabled. If the outdoor air temperature is above the OAHS but the unit is not calling for cooling or dehumidification then the unit shall switch between Heating and Cooling Mode as necessary to maintain an average temperature of the Occupied Cooling Setpoint and the Occupied Heating Setpoint.

During Heating Mode the main unit controller will modulate the heating output to maintain the Occupied Heating Setpoint. Maximum discharge air heating temperature is adjustable but cannot exceed 120°F for gas or hot water heat and 90°F for electric heat. Hot gas reheat is disabled when heating is enabled.

Units with hot water heat will have a normally open water valve shipped loose. The enable and the control signal are factory installed. Wiring between the controls and the valve is field installed.

Air Source Heat Pump Units

Heating mode is enabled based on Outdoor Air Heating Setpoint (OAHS), Occupied Heating Setpoint, and Occupied Cooling Setpoint. If the outdoor air temperature is lower than the OAHS then Heating Mode shall be enabled. If the outdoor air temperature is above the OAHS but the unit is not calling for cooling or dehumidification then the unit shall switch between Heating and Cooling Mode as necessary to maintain an average temperature of the Occupied Cooling Setpoint and the Occupied Heating Setpoint.

During Heating Mode Compressor 1 will be staged on. If after a 3-minute minimum delay the space temperature is still below the setpoint, the second, third, and fourth stages of heating (Compressors 2, 3, and 4) will be staged on sequentially following individual 3-minute minimum delays between each call. During operation in heating mode, the main unit controller will enable hot gas reheat at 100 percent.

Auxiliary Heating Mode will be enabled if the compressor heat is not able to maintain setpoint for more than 10 minutes (delay extended to 20 minutes when coming from Unoccupied Mode) or if the Outdoor Air Temperature is below 0 degrees. Auxiliary heating mode will disable the compressors from running and modulate the heating output to maintain the Occupied Heating Setpoint. Auxiliary heating mode will be disabled when the OAT rises 5°F above the temperature that it switched from DX heating to auxiliary heating. Maximum discharge air heating temperature is adjustable but cannot exceed 125°F for gas heat and 90°F for electric heat.

Demand Defrost Control for Air Source Heat Pumps

Outdoor coil defrosting occurs only when operating in DX heating mode with outdoor temperature below 52°F and Condenser Coil Temperature below 35°F. The first defrost cycle after power-up occurs after thirty minutes operating time at these conditions. Twelve minutes after completion of the defrost cycle, the temperature difference between the outdoor coil and outdoor air is calculated resulting in a Clean Coil Delta T (DT) and is used as an indicator of conditions with a defrosted coil. Over time, as frost accumulates on the coil, the coil temperature will drop, increasing

the temperature difference. When the temperature difference between the outdoor coil and outdoor air reaches 1.8x DT, a defrost cycle is initiated. While defrosting, the reversing valve(s) are in the cooling position, outdoor fan(s) are off, outdoor damper closes, return damper opens, the supply fan runs at minimum, and the compressor(s) continue to operate. If the optional return damper is not installed, the outdoor damper will remain open. The defrost cycle is terminated when the coil temperature rises high enough to indicate that the frost has been eliminated. At the end of each defrost cycle, the outdoor fan comes on 5 seconds before the reversing valve is de-energized to reduce noise.

Water Source Heat Pump Units

Heating mode is enabled based on Outdoor Air Heating Setpoint (OAHS), Occupied Heating Setpoint, and Occupied Cooling Setpoint. If the outdoor air temperature is lower than the OAHS then Heating Mode shall be enabled. If the outdoor air temperature is above the OAHS but the unit is not calling for cooling or dehumidification then the unit shall switch between Heating and Cooling Mode as necessary to maintain an average temperature of the Occupied Cooling Setpoint and the Occupied Heating Setpoint.

During Heating Mode Compressor 1 will be staged on. If after a 3-minute minimum delay the space temperature is still below the setpoint, the second, third, and fourth stages of heating (Compressors 2, 3, and 4) will be staged on sequentially following individual 3-minute minimum delays between each call. During operation in heating mode, the main unit controller will enable hot gas reheat at 100 percent.

Auxiliary Heating Mode will be enabled if the Outdoor Air Temperature Active (if unit is equipped with optional ERV then the temperature will be after the ERV) falls below 0°F, the compressor heat is not able to maintain setpoint for more than 10 minutes, the Water Flow switch opens for more than 10 seconds, or the leaving water temperature falls below 35°F/20°F (water only/glycol). Auxiliary heating mode will disable the compressors from running and modulate the heating output to maintain the Occupied Heating Setpoint.

Auxiliary heating mode will be disabled when the Outdoor Air Temperature Active rises above 0°F, when the leaving water temperature rises above 51°F/35°F (water only/ glycol), and when the OAT rises 5°F above the temperature that it switched from DX heating to auxiliary heating. Maximum discharge air heating temperature is adjustable but cannot exceed 125°F for gas heat and 90°F for electric heat. If no auxiliary heat is provided, unit will be disabled when the Outdoor Air Temperature Active falls below 0°F.

Dehumidification Mode

Dehumidification Mode is enabled on Outdoor Air Dewpoint Setpoint (OADS) or Space Dewpoint Setpoint (SPDS). If there is no call for Heating Mode and the outdoor air dewpoint is above or equal to the OADS or the space dewpoint is above or equal to the SPDS then Dehumidification Mode shall be enabled. Dehumidification Mode will remain active until the space or outdoor air dewpoints fall below the setpoints by 2 degrees, or if Heating Mode is enabled.

Units Equipped with Direct Expansion Cooling

Compressor control is based on Evaporator Leaving Air Temperature Setpoint. With dehumidification enabled, if evaporator leaving air temperature is above setpoint first stage dehumidification (Compressor 1) will start.

Compressor staging is similar to Heating Mode. During operation in Dehumidification Mode, the main unit controller will enable hot gas reheat and it will modulate to maintain the Occupied Cooling Setpoint.

Hot Gas Reheat Purge

Following continuous 30-minute hot gas reheat operation at less than 100 percent reheat capacity a purge cycle will be initiated. During the purge cycle, the hot gas reheat signal is set and held at 100 percent for a period of 3 minutes. Following the purge cycle, normal operation resumes.

Units Equipped with Chilled Water

During Dehumidification Mode the chilled water valve relay will be enabled and an analog output control is based on the Evaporator Leaving Air Temperature Setpoint. Chilled Water Valve will be field supplied and installed.

Cooling Mode

Cooling Mode is enabled based on Outdoor Air Cooling Setpoint (OACS), Occupied Heating Setpoint, and Occupied Cooling Setpoint. If the outdoor air temperature is above the OACS then Cooling Mode shall be enabled. If the outdoor air temperature is below the OACS but the unit is not calling for heating or dehumidification then the unit shall switch between Heating and Cooling Mode as necessary to maintain an average temperature of the Occupied Cooling Setpoint and the Occupied Heating Setpoint.

Units Equipped with Direct Expansion Cooling

Compressor staging is identical to dehumidification however the control temperature is the Occupied Cooling Setpoint. Should the space temperature begin to fall too low, the hot gas reheat shall be enabled and modulate to maintain the Occupied Cooling Setpoint.

Units Equipped with Chilled Water

During Cooling Mode the chilled water valve relay will be enabled and an analog output control is based on the Occupied Cooling Setpoint. Chilled Water Valve is field supplied and installed.

Operation During Unoccupied

Optional space temperature and/or humidity sensors must be installed, wired to unit, configured as "installed" at the main unit controller. All modes are enabled by the main unit control module. The control module calculates dewpoint

based on sensed air temperature and humidity.

Emergency Stop

When the contacts at Terminal OAUTS 9 and 10 are open, the unit's operation will be in Alarm Status. Unit will begin normal operation upon closure of OAUTS 9 and 10.

Important: Cycling power to unit to clear alarm may not resolve alarm condition.

Starting Sequence

Indoor fan proving sequence is identical to occupied operation.

With Return Air Damper Installed

The outdoor air damper will be commanded to close and the return air damper will open. Outdoor air damper end switch is disabled when the return air damper is installed.

No Return Air Damper Installed

Identical to occupied sequence no return air damper installed.

Unoccupied Heating Mode

Unoccupied Heating Mode is enabled when the Space Temperature falls below the Unoccupied Heating Setpoint - 1. Unoccupied Heating Mode will continue until the Space Temperature rises above the Unoccupied Heating Setpoint + 3. The heat shall be modulated to maintain 90°F for the Discharge Air Temperature. For heat pumps, determination of heat pump operation or auxiliary heat operation is identical to Occupied Heating Mode.

Unoccupied Dehumidification Mode

When no call for Unoccupied Heating Unoccupied Dehumidification Mode is enabled when the Space Dewpoint rises above the Unoccupied Dewpoint Setpoint + 1. Unoccupied Dehumidification Mode shall be disabled when the Space Dewpoint falls below the Unoccupied Dewpoint Setpoint - 1. During Unoccupied Dehumidification the cooling is driven to 53°F leaving the indoor coil. If the unit is equipped with HGRH it shall modulate to maintain 60°F for the Discharge Air Temperature. Unoccupied cooling is enabled when space temperature reaches Unoccupied Cooling Setpoint + 2°.

Unoccupied Cooling Mode

When no call for Unoccupied Heating or Unoccupied Dehumidification exists, Unoccupied Cooling Mode is enabled when the Space Temperature rises above the Unoccupied Cooling Setpoint + 2. Unoccupied Cooling Mode shall continue until the Space Temperature falls below the Unoccupied Cooling Setpoint - 2. During Unoccupied Cooling Mode the cooling is driven to 53°F leaving the indoor coil.

Filter Options: MERV-8 30%, MERV-14 95%

Aluminum Mesh Filters (D, K and N Cabinets) and Galvanized Mesh Bird Screen (B and G Cabinets) shall be installed on the intake of the unit. In addition, one row of 2 inch MERV-8 rated prefilters (30 percent) and 4 inch MERV-14 final filter (95 percent) installed prior to the evaporator coil. Unit shall be equipped with a 6" filter rack upstream of the evaporator. Frame shall be field-adjustable to match any filter combination specified in the attached selection.

439 Stainless Steel Furnace: 350 Mbtu/h, (10:1 Turndown NG, 8:1 Turndown LP)

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 439 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. Minimum incoming gas pressure of 7" W.C. and Maximum pressure of 14" W.C. required.

Unit Controls: Non DDC - Terminal Strip

Non DDC - Electromechanical. Terminal strip wiring only. In this case all factory safeties that are programmed are removed along with the standard Trane UC600 along with all factory programs. The Horizon manufacturer warranty is still valid on all components unless the affected part is receiving a signal from the field supplied controller or BAS. Falcon claims made relative to a component failure based on the signal will be rejected. After a successful run test and shipment a manufacturer workmanship warranty is provided on all units sold with no controls. The standard twelve (12) months from start up or eighteen (18) months from shipment is still provided to guarantee the quality of workmanship that we provide to the customer. This warranty does not cover any damages or defects caused by field provided components and only manufacturer defects.

Powered Exhaust: Direct Drive w/VFD & Gravity Damper

Powered Exhaust Fan motor shall be direct drive type with factory installed Variable Frequency Drive to (unless no controls option is selected and the VFD is to be provided by others) 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). All Fan(s) shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

Electrical Options: Non-Fused Disconnect

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.

Factory wired Voltage/Phase monitor shall be included as standard. In the event of any of the following, the units will be shut down and a fault code will be stored in the monitor for the most recent 25 faults. Upon correction of the fault condition the unit will reset and restart automatically.

1. Phase Unbalance Protection: Factory set 2%
2. Over/Under/Brown Out Voltage Protection: +/-10% of nameplate voltage
3. Phase Loss/Reversal

Energy Recovery & Conservation: ERC-6876A

The rotor media shall be light weight and must be made of aluminum. Paper or fibrous media are not acceptable. The rotor media must be coated to prohibit corrosion; etched or oxidized surfaces are not acceptable. All surfaces must be coated with a nonmigrating adsorbent layer of desiccant prior to being formed into the honeycomb media structure to insure that all surfaces are coated and that adequate latent capacity is provided. The desiccant must be designed for the adsorption of water vapor. The media shall be cleanable with low temperature steam, hot water or light detergent without degrading the latent recovery.

Smoke Detector: Return Smoke Detector

Smoke detector shall be factory installed photoelectric smoke detector mounted in the return 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.

Damper Options: 2-Position Outdoor and Return Air Dampers

The unit shall have a factory installed and integrated 100% outdoor air hood with damper controlled a by direct coupled actuator and 2 inch permanent and washable aluminum mesh filters accessible through a hinged access panel. The unit is factory equipped with a return air damper controlled by a direct coupled actuator that is electrically interlocked with the outdoor air damper to allow 100% return air recirculation in the Unoccupied cooling mode.

Filters: MERV-8

Aluminum Mesh Filters (D, K and N Cabinets) and Galvanized Mesh Bird Screen (B and G Cabinets) 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. Unit shall be equipped with a 6" filter rack upstream of the evaporator. Frame shall be field-adjustable to match any filter combination specified in the attached selection.

Smoke Detectors: Return

Smoke detector shall be factory installed photoelectric smoke detector mounted in the return 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/115v 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, 10 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.

Johnson and Jordan
Mechanical contractors

Submittal
WEX
Core & Shell

#17418

SUBMITTAL #1

GENERAL CONTRACTOR Cianbro Const.
SUBMITTED BY JOHNSON & JORDAN
SCARBOROUGH, ME.
(207) 883-8345
SUBCONTRACTOR Johnson & Jordan
SUPPLIER Trane
SPECIFICATION SECTION M 602
PARAGRAPH Schedule
ITEM Air Cooled Chiller
CH 1,2

JOHNSON & JORDAN, INC.

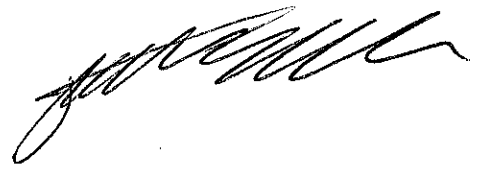
18 Mussey Rd. Scarborough, ME

Approved JB Approved as Noted _____

Re-Submit _____ Reviewed _____

Subject to Architects Approval x _____

Date 11/30/17 by Tim Michaud TM





TRANE®

Submittal

Prepared For: Tim Michaud

Date: November 29, 2017

Customer P.O. Number:
Customer Project Number:

Sold To: Johnson & Jordan

Job Number:
Job Name:
WEX - Portland

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

Product Summary

Qty	Product
2	Air-Cooled Chillers Tagged CH-1, 2

Daniel Broderick
Trane
860 Spring Street, Unit 1
Westbrook, ME 04092
Phone: (207) 828-1777
Cell:
Fax: (207) 828-1511

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

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

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Tag Data - Air-Cooled Stealth (TM) (Qty: 2)

Item	Tag(s)	Qty	Description
A1	CH-1, CH-2	2	Air-Cooled Stealth (TM) (RTAE)

Product Data - Air-Cooled Stealth (TM)

Item: A1 Qty: 2 Tag(s): CH-1, CH-2

- Air-cooled Series R model RTAE 165 t
- 460 volt 3 phases
- InvisiSound Ultimate - compressor attenuation, line wraps and reduced fan speed
- UL listed to US and Canadian Safety Standard
- ASME pressure vessel code
- Refrigerant charge HFC-134a
- AHRI certified
- ASHRAE 90.1 - all versions compliant
- Standard cooling (40 to 65F/4.4 to 18C)
- 3 pass evaporator
- Fluid type = propylene glycol
- Grooved pipe
- Factory installed flow switch - glycol fluid (15 cm/s)
- Factory insulation - all cold parts 0.75"
- Low ambient (0 to 105F)
- Complete Coat epoxy coated fins
- Adaptive Frequency Drive 3rd generation
- Single point connection main line unit power-ancillary items require other power
- Circuit breaker high fault rated panel
- High amp short circuit rating 65,000 amps
- Line reactors (~30% TDD)
- 15a 115v convenience outlet
- Tracer TD7 Display
- BACnet MS/TP interface
- Architectural louvered panels
- Elastomeric isolators
- Start-up & 1st year labor warranty whole unit

Performance Data - Air-Cooled Stealth (TM)

Tags	CH-1, CH-2
Refrigeration capacity (tons)	148.34
Total power (kW)	162.78
Compressor power (kW)	154.55
Cooling efficiency (EER)	10.936
IPLV.IP (EER)	18.670
NPLV.IP (EER)	17.755
Leaving fluid evap (F)	42.00
Entering fluid evap (F)	53.99
Flow evap (gpm)	313.84
Fluid pressure drop evap (ft H2O)	30.08
Evap fouling factor (hr-sq ft-deg F/ Btu)	0.000100
Evap fluid concentration (%)	30.00
Evap fluid freeze point (F)	9.19
Min flow evap (gpm)	124.00
Fluid pressure drop min flow evap (ft H2O)	4.38
Max flow evap (gpm)	456.00
Fluid pressure drop max flow evap (ft H2O)	68.55
Saturated evap temp - ckt 1 (F)	37.38
Saturated evap temp - ckt 2 (F)	38.01
Ambient air temp (F)	95.00
Saturated cond temp - ckt 1 (F)	126.36
Saturated cond temp - ckt 2 (F)	126.69
RLA - comp A - AFD input (A)	130.00
RLA - comp B - AFD input (A)	130.00
Number of condenser fans (Each)	10.00
RLA - condenser fan (each) (A)	2.70
Fan power (kW)	7.82
Fan speed	700
Single point power MCA (A)	323.00
Single point power MOP (A)	450.00
Short circuit current rating (A)	65000.00
Refrig (HFC-134a) - ckt 1 (lb)	181.0
Refrig (HFC-134a) - ckt 2 (lb)	181.0
Oil charge - ckt 1 (gal)	3.00
Oil charge - ckt 2 (gal)	3.00
Drive cooling charge - ckt 1 (gal)	1.23
Drive cooling charge - ckt 2 (gal)	1.67
Shipping weight (lb)	13177.0
Operating weight (lb)	13323.0
Length (in)	283.625
Width (in)	87.813
Height (in)	95.750
Run part load sound	Yes
A-weighted sound power (dBA)	91
A-weighted 75% sound power (dBA)	91
A-weighted 50% sound power (dBA)	83
A-weighted 25% sound power (dBA)	81
A-weighted sound pressure (dBA)	63
A-weighted 75% sound pressure (dBA)	63
A-weighted 50% sound pressure (dBA)	54
A-weighted 25% sound pressure (dBA)	51
Rated refrigeration capacity (AHRI) (tons)	162.06
Rated cooling efficiency (AHRI) (EER)	11.491

Job Information



Air-Cooled Stealth (TM)

Tag	CH-1, CH-2	Nominal tonnage	165 ton
Model number	RTAE165		
Quantity	1	TOPSS version number	206

General Data

Refrigeration capacity	148.3 tons	IPLV.IP	18.67 EER
Cooling efficiency	10.94 EER	NPLV.IP	17.75 EER

Evaporator Information

Evaporator application	Standard cooling (40-65F)	Evaporator configurations	3 pass evaporator
Evap fouling factor	0.000100 hr-sq ft-deg F/ Btu	Evaporator fluid type	Propylene glycol
Leaving fluid evap	42.00 F	Evap fluid concentration	30.00 %
Entering fluid evap	53.99 F	Evap fluid freeze point	9.19 F
Flow evap	313.8 gpm	Saturated evap temp - ckt 2	38.0 F
Fluid pressure drop evap	30.1 ft H2O	Saturated evap temp - ckt 1	37.4 F
Flow switch	Flow switch other - 15 cm/s		

Condenser Information

Ambient air temp	95.0 F	Saturated cond temp - ckt 1	126.4 F
Elevation	0.000 ft	Saturated cond temp - ckt 2	126.7 F
Condenser fin options	CompleteCoat fins	RLA - condenser fan (each)	2.70 Each
Number of condenser fans	10.00 Each	Unit application	Low ambient
Fan power	7.820 kW		

Electrical Information

Compressor starter	AFD3	RLA - comp A - AFD input	130.00 A
Incoming power line connection	Single point power	RLA - comp B - AFD input	130.00 A
Unit voltage	460.0 volt 3 phases	Short circuit current rating	65000.00 A
Unit hertz	60.0 hertz	Short circuit withstand rating	High amp
Total power	162.8 kW	Single point power MCA	323.00 A
Compressor power	154.6 kW	Single point power MOP	450.00 A
Transformer	No transformer	Power line connection type	CB high fault rated

Physical Information

Length	283.625 in	Refrig (HFC-134a) - ckt 1	181.0 lb
Width	87.813 in	Refrig (HFC-134a) - ckt 2	181.0 lb
Height	95.750 in	Oil charge - ckt 1	3.00 gal
Operating weight	13323.0 lb	Oil charge - ckt 2	3.00 gal
Shipping weight	13177.0 lb	Drive cooling charge - ckt 1	1.23 gal
		Drive cooling charge - ckt 2	1.67 gal

11/29/201 TOPSS version number 206

Data generation date

FLD = Furnished by Trane U.S. Inc. dba Trane /
Installed by Others

Equipment Submittal

Page 1 of 2

Page 5 of 23

Air-Cooled Stealth (TM)

Job Information



Tag	CH-1, CH-2	Nominal tonnage	165 ton
Model number	RTAE165		
Quantity	1	TOPSS version number	206

Acoustical Performance

Unit sound package	Ultimate	Fan speed	700
A-weighted sound power	91 dBA	A-weighted sound pressure *	63 dBA
A-weighted 75% sound power	91 dBA	A-weighted 75% sound pressure	63 dBA
A-weighted 50% sound power	83 dBA	A-weighted 50% sound pressure	54 dBA
A-weighted 25% sound power	81 dBA	A-weighted 25% sound pressure	51 dBA
Note: * At 30 feet in free field.			

This unit complies with the efficiency requirements of all versions of ASHRAE Standard 90.1 and CANS/CSA C743.

Certified in accordance with the AHRI Air-Cooled Water-Chilling Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Unit contains freeze protection fluids in the evaporator with a leaving chilled fluid temperature above 32°F [0°C] and is certified when rated per the Standard with water. Certified units may be found in the AHRI Directory at www.ahridirectory.org.



Information for LEED Projects

ASHRAE 90.1/CSA compliance	ASHRAE 90.1 - all versions up to 2016	Cooling efficiency	10.94 EER
Refrig (HFC-134a) - ckt 1	181.0 lb	IPLV.IP	18.67 EER
Refrig (HFC-134a) - ckt 2	181.0 lb	Compressor power	154.6 kW
Rated refrigeration capacity (AHRI)	162.1 tons	Fan power	7.820 kW
Rated cooling efficiency (AHRI)	11.49 EER		
<p>Note: This product meets the minimum efficiency requirements of ASHRAE Standard 90.1 and CANS/CSA C743 for all versions (which are based on AHRI standard rating conditions) and, therefore, also meets the LEED "Minimum Energy Performance" prerequisite in the Energy and Atmosphere section. Refer to the product catalog for performance at AHRI standard rating conditions.</p>			
<p>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.</p>			

Mechanical Specifications - Air-Cooled Stealth (TM)**Item: A1 Qty: 2 Tag(s): CH-1, CH-2****General**

Units are leak and pressure tested at 390 psig (2689 kPa) high side, 250 psig (1724 kPa) low side, then evacuated and charged. All Air-cooled Stealth(TM) chillers are factory tested to confirm operation prior to shipment.

Standard power connections include main three phase power to the compressors, condenser fans and control power transformer.

Note: A separate field supplied low voltage power source is required to power the evaporator freeze protection.

Unit panels, structural elements and control boxes are constructed of galvanized steel and mounted on a bolted galvanized steel base. Unit panels, control boxes and the structural base are finished with a baked on powder paint.

Anytime water only is present in the evaporator, the Trane UC800 controller must have flow control of the chilled water system. Flow control can be done either directly or through an input to a building automation system to conduct an action resulting in minimum flow through the chiller evaporator barrel to avoid potentially catastrophic damage to the evaporator due to freezing. If the system has sufficient glycol to protect down to the lowest expected ambient, flow control is optional.

General

Units are leak and pressure tested at 390 psig (2689 kPa) high side, 250 psig (1724 kPa) low side, then evacuated and charged. All Air-cooled Stealth(TM) chillers are factory tested to confirm operation prior to shipment.

Standard power connections include main three phase power to the compressors, condenser fans and control power transformer.

Note: A separate field supplied low voltage power source is required to power the evaporator freeze protection and convenience outlet.

Unit panels, structural elements and control boxes are constructed of galvanized steel and mounted on a bolted galvanized steel base. Unit panels, control boxes and the structural base are finished with a baked on powder paint.

Anytime water only is present in the evaporator, the Trane UC800 controller must have flow control of the chilled water system. Flow control can be done either directly or through an input to a building automation system to conduct an action resulting in minimum flow through the chiller evaporator barrel to avoid potentially catastrophic damage to the evaporator due to freezing. If the system has sufficient glycol to protect down to the lowest expected ambient, flow control is optional.

Factory Refrigerant Charge (HFC-134a)

Packaged units ship with a full operating charge of oil and HFC-134a refrigerant.

Evaporator

The evaporator is a tube-in-shell heat exchanger design with internally and externally finned copper tubes roller expanded into the tube sheet. The evaporator is designed, tested and stamped in accordance with ASME Pressure Vessel Code Section VIII for a refrigerant side working pressure of 200 psig (1379 kPa). The evaporator is designed for a water side working pressure of 150 psig (1034 kPa). Water connections are grooved pipe. Each shell includes a vent, a drain and fittings for temperature control sensors and is insulated with UV resistant 0.75 inch Armaflex II or equal insulation (K=0.28). Insulation also covers the liquid and suction line and evaporator heads. Heaters, with thermostat, are provided to help protect the evaporator from freezing at ambient temperatures down to -20 F (-29 C), depending on application.

Operating Temperature

Unit is designed for operation in standard leaving evaporator temperature (equal to or greater than 40.0 F).

Pressure Vessel Code

Chiller complies with ASME Pressure Vessel Code Section VIII. ASME nameplates are attached to applicable pressure vessels including oil separators.

Condenser and Fans

Air-cooled condenser coils have aluminum fins mechanically bonded to internally finned aluminum tubing. The tubing is a long life alloy designed to deliver corrosion performance that meets or exceeds microchannel coils. The condenser

coil has an integral subcooling circuit. Condensers are factory proof tested at 525.00 psi and leak tested with helium in a mass spectrometer chamber at 150.00 psi. All tube connections are mechanical except the brazed copper to aluminum inlet and outlet connections.

Completely assembled coils are dipped and baked in an electro-mechanically bonded flexible epoxy coating. Provides uniform epoxy coating of all surfaces on aluminum fins, aluminum tubes, coil frames, and heads of condenser. No associated surfaces remain bare. Allows for corrosion resistance without performance degradation. Coils with coating passed 6000-hour salt spray test.

Condenser fans are direct-drive vertical discharge. The condenser fan motors are permanent magnet motors with integrated drive to provide variable speed fan control for all fans. They are designed with permanently lubricated ball bearings, internal temperature and current overload protection, and customer fault feedback as a standard product offering. The fan impeller is a nine bladed-shrouded fan made from heavy-duty molded plastic.

Low ambient units will start and operate between 0.0 F to 105.0 F ambient.

InvisiSound Ultimate

Each rotary screw compressor will have a muffler as standard and each condenser fan will be low noise as standard. In addition to these sound reducing features, InvisiSound Ultimate adds insulating sound material to the suction and discharge lines of each refrigerant circuit; adds a flexible, metallic connection at the suction and discharge of each compressor and a pre-formed 'sound box' encapsulating each compressor and reduces the maximum speed of each condenser fan.

Note: Elastomeric isolators are required with this package.

Compressor and Lube Oil System

The rotary screw compressor is semi-hermetic, direct drive with capacity control via an adaptive frequency drive, rolling element bearings, differential refrigerant pressure oil pump and oil heater. The motor is a suction gas cooled, hermetically sealed, permanent magnet motor. An oil separator is provided separate from the compressor. Oil filtration is provided internal to the compressor. Check valves in the compressor discharge and lube oil system are also provided.

Drive Cooling System

Each refrigeration circuit has a compressor drive cooling circuit. Each drive cooling circuit includes a wet rotor circulation pump that circulates a secondary heat transfer fluid in a closed system between the adaptive frequency drive components and a brazed plate heat exchanger. The pump is fed from a thermal expansion tank with a vented-pressure cap which is also used as the circuit pressure relief. The circuit also includes a particulate strainer and a drain valve for servicing.

Refrigeration Circuits

Each unit has two refrigerant circuits, with one rotary screw compressor per circuit. Each refrigerant circuit includes a compressor suction and discharge service valve, liquid line shutoff valve, removable core filter, liquid line sight glass with moisture indicator, charging port and an electronic expansion valve. Fully modulating compressors and electronic expansion valves provide variable capacity modulation over the entire operating range.

Unit Controls

All unit controls are housed in an outdoor rated weather tight enclosure with removable plates to allow for customer connection of power wiring and remote interlocks. All controls, including sensors, are factory mounted and tested prior to shipment. Microcomputer controls provide all control functions including startup and shut down, leaving chilled water temperature control, evaporator flow proving, compressor staging and speed control, electronic expansion valve modulation, condenser fan sequencing and speed control, anti-recycle logic, automatic lead/lag compressor starting and load limiting.

The UC-800 unit control module, utilizing Adaptive Control microprocessor, automatically takes action to avoid unit shut-down due to abnormal operating conditions associated with low refrigerant pressure, high condensing pressure, AFD/Compressor current overload, low oil return or low AFD cooling, low discharge superheat, and high compressor discharge temperature. Should the abnormal operating condition continue until a protective limit is violated, the unit will be shut down. Unit protective functions of the UC800, include loss of chilled water flow, evaporator freezing, loss of refrigerant, low refrigerant pressure, high refrigerant pressure, high compressor motor temperature, and loss of oil to the compressor.

Unit Display

A full color TD-7 AdaptiView touch screen display indicates all important unit and circuit parameters, in logical groupings

on various screens. The parameters including chilled water set point, leaving chilled water temperature, demand limit set point, evaporator and condenser refrigerant temperatures and pressures, compressor and fan speeds, and all pertinent electrical information. The display also provides on screen trending graphs of predefined parameters as well as customizable trend graphs based on user defined parameters from a list of all available parameters. The display also provides indication of the chiller and circuits top level operating modes with detailed sub-mode reports available with a single key press, as well as diagnostics annunciation and date and time stamped diagnostic history. The standard color display is fully outdoor rated, and, can be viewed in full daylight without opening any control panel doors.

The display is outdoor capable including an UV resistant touchscreen with an operating range between --40.0 F to 158.2 F operating temperature.

Chilled Water Reset

This provides the control logic and factory installed sensors to reset leaving chilled water temperature. The set point can be reset based on ambient temperature or return evaporator water temperature.

Factory Mounted Flow Proving

The factory installed evaporator water flow switch is provided with the control logic and relays to turn the chilled water flow on and off as the chiller requires for operation and protection. The flow switch installed on this chiller is designed for use with glycol in the evaporator with a set point of 15 cm/s.

Adaptive Frequency Drive

All RTAE chillers utilize Trane's Adaptive Frequency Drive, 3rd Generation (AFD3) technology for controlling the compressor. AFD3 is a family of new generation adaptive frequency drives specifically designed for Trane water chillers. AFD3 incorporates the Trane communication protocol enabling seamless integration with the unit controller. AFD3 data such as drive status, temperatures, modes and diagnostic information are accessible to the unit controller and through the Tracer TU service tool.

AFD3 contains technology that enables the drive to last longer and with less down time. The technology enables operation on various power systems including alternative energy sources. AFD3 will protect itself and the compressor motor from over current, low or high line voltage, phase loss, incoming phase imbalance, and over temperature due to loss of drive cooling or loss of panel ventilation.

AFD3 incorporates improved serviceability and troubleshooting tools to identify the issue quickly and get the chiller back up and running. All AFD3 control circuits are powered with class 2 low voltage - separate from main power allowing service on the controls with the panel door open. Additionally, the main electronic control modules can be serviced with the standard Trane screw driver. The AFD3 further incorporates another Trane service tool to allow for firmware upgrades through Tracer TU.

High Fault Circuit Breaker

A molded case high interrupting capacity circuit breaker, factory wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.

Short Circuit Current Rating (SCCR)

A short circuit current rating offers a measure of safety for what the starter panel enclosure is able to withstand in the event of an explosion caused by a short circuit.

BACnet BCI-C Interface

BACNet Interface allows the user to easily interface with using BACNet MS/TP via a single twisted-pair wiring to a factory-installed and tested communication board.

Architectural Louvered Panels

Louvered panels cover the complete condensing coil and service area beneath the condenser.

Elastomeric Isolators

Isolators provide isolation between chiller and structure to help eliminate vibration transmission. Elastomeric isolators are more effective and recommended over spring isolators.

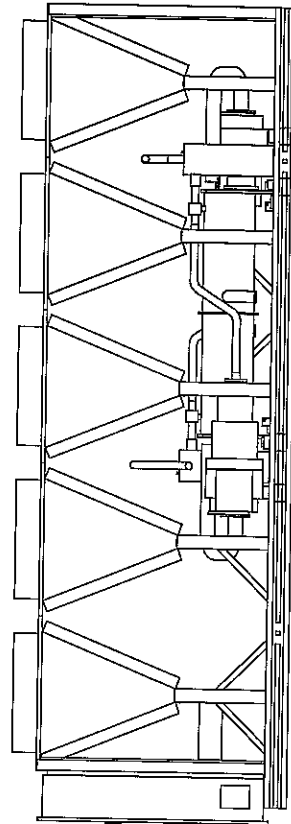
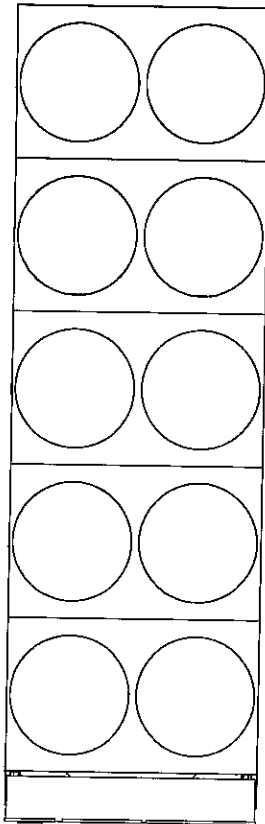
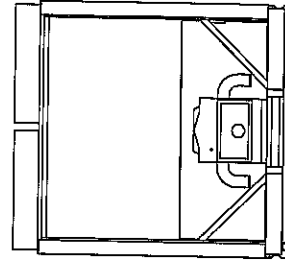
Convenience Outlet

Provides a 15 amp, 115 volt (60 Hz) convenience outlet on the unit.

Note: An additional field supplied power connection must be provided to power the convenience outlet.

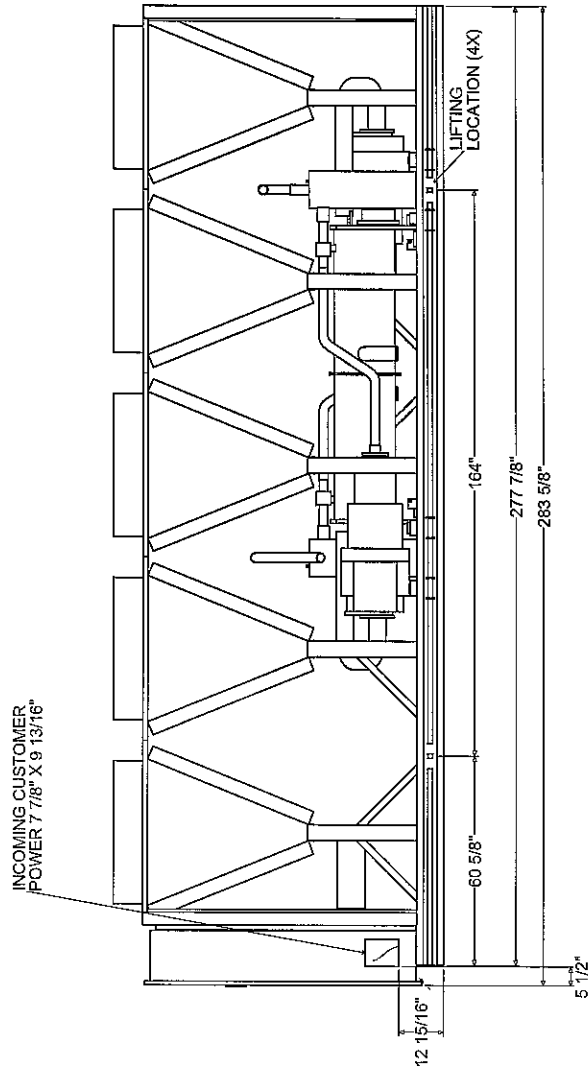
Unit Dimensions - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

NOMINAL TONS	185
WATER CONNECTION DIAMETER (INLET/OUTLET)	4" (100mm)
WATER VOLUME	4337 in3



Unit Dimensions - Air-Cooled Stealth (TM)

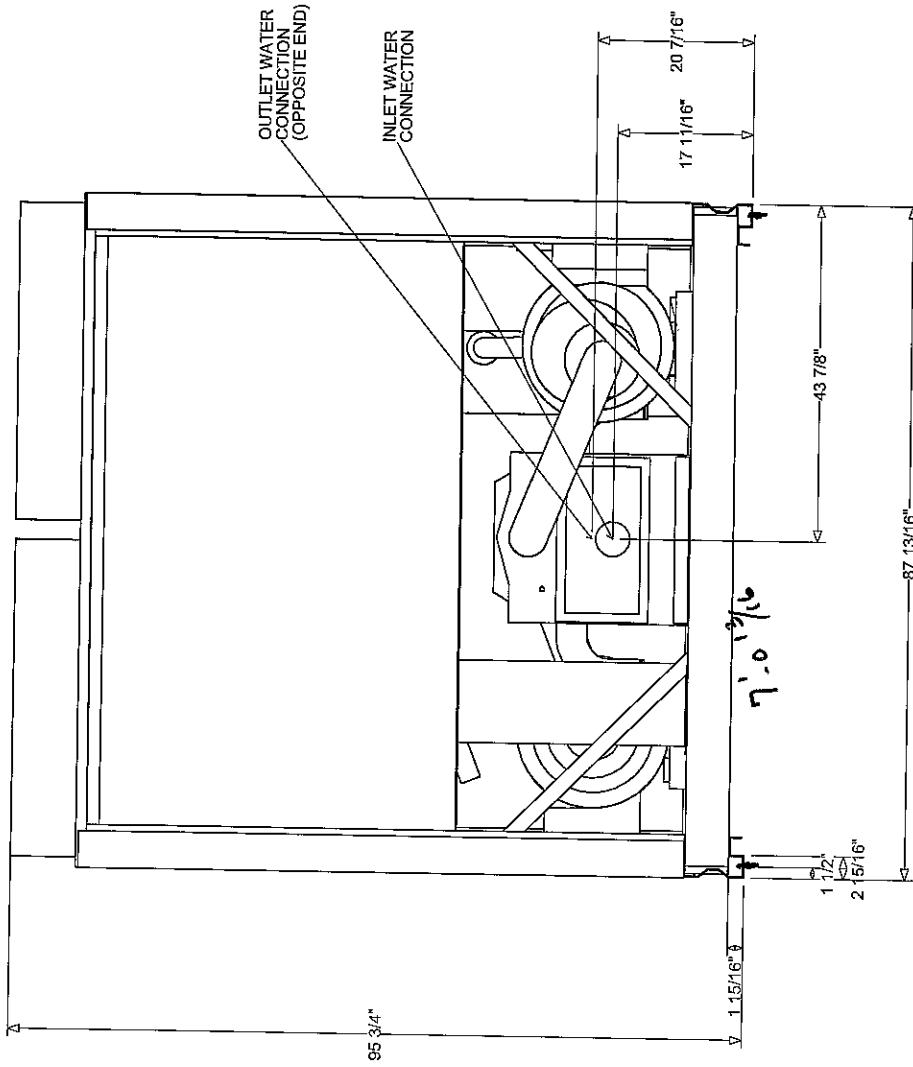
Item: A1 Qty: 2 Tag(s): CH-1, CH-2



RIGHT SIDE VIEW

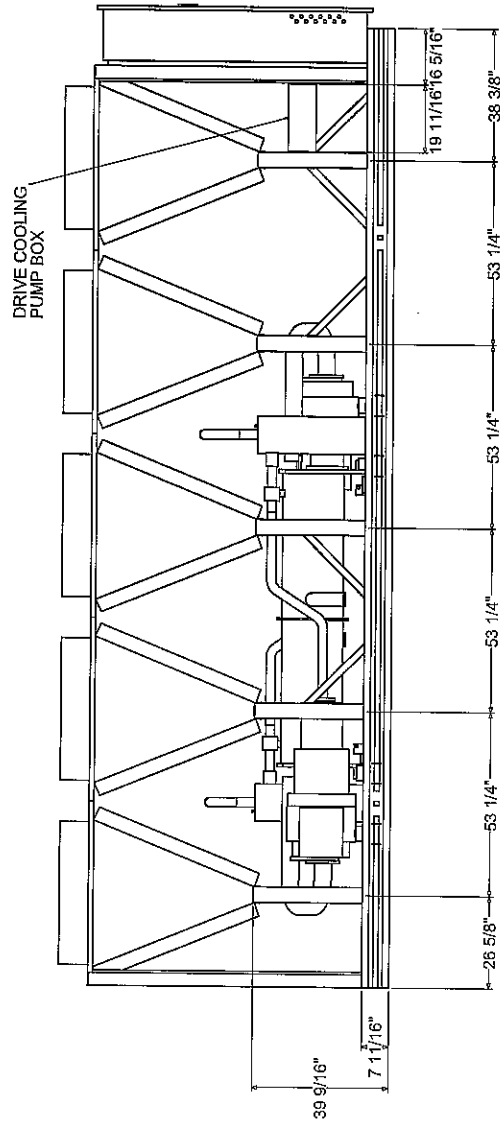
Unit Dimensions - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

ADD 1/8" PER SIDE
TO WIDTH OF UNIT FOR
LOUVER PANEL OPTION.



END VIEW
NON CONTROL PANEL END

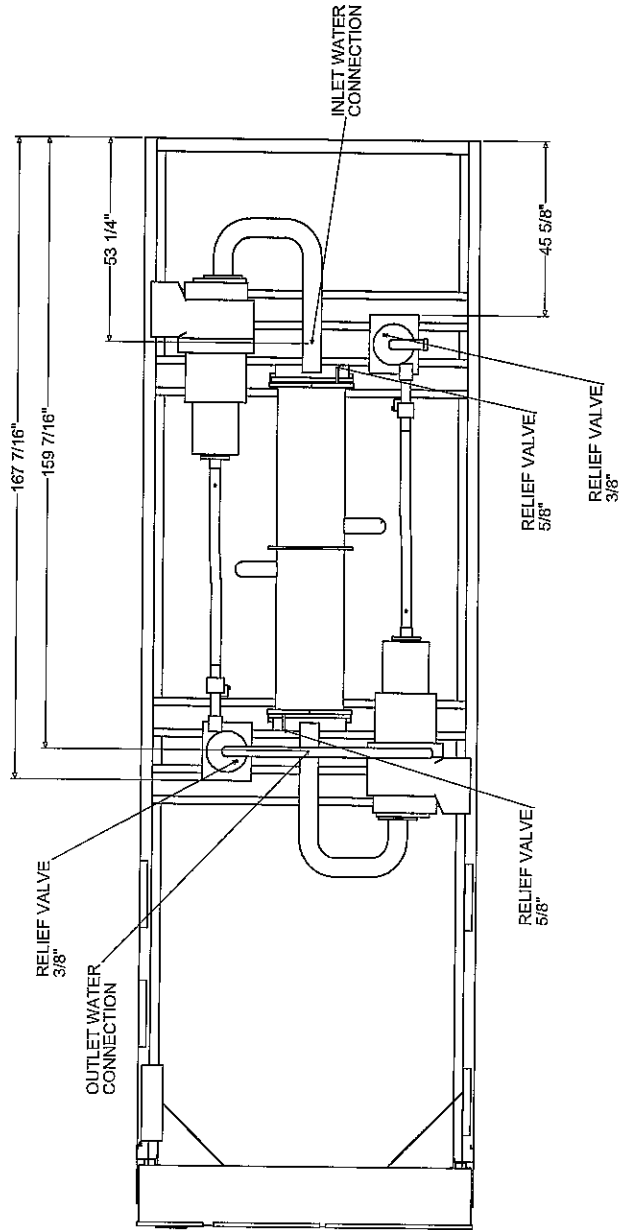
Unit Dimensions - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2



LEFT SIDE VIEW

Unit Dimensions - Air-Cooled Stealth (TM)

Item: A1 Qty: 2 Tag(s): CH-1, CH-2



TOP VIEW
(CONDENSER REMOVED FOR CLARITY)

Weight, Clearance & Rigging Diagram - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

TOTAL SHIPPING WEIGHT
13177.0 lb

LIFT 1 WEIGHT	LIFT 2 WEIGHT	LIFT 3 WEIGHT	LIFT 4 WEIGHT
3864.5 lb	2875.8 lb	2810.3 lb	3626.4 lb

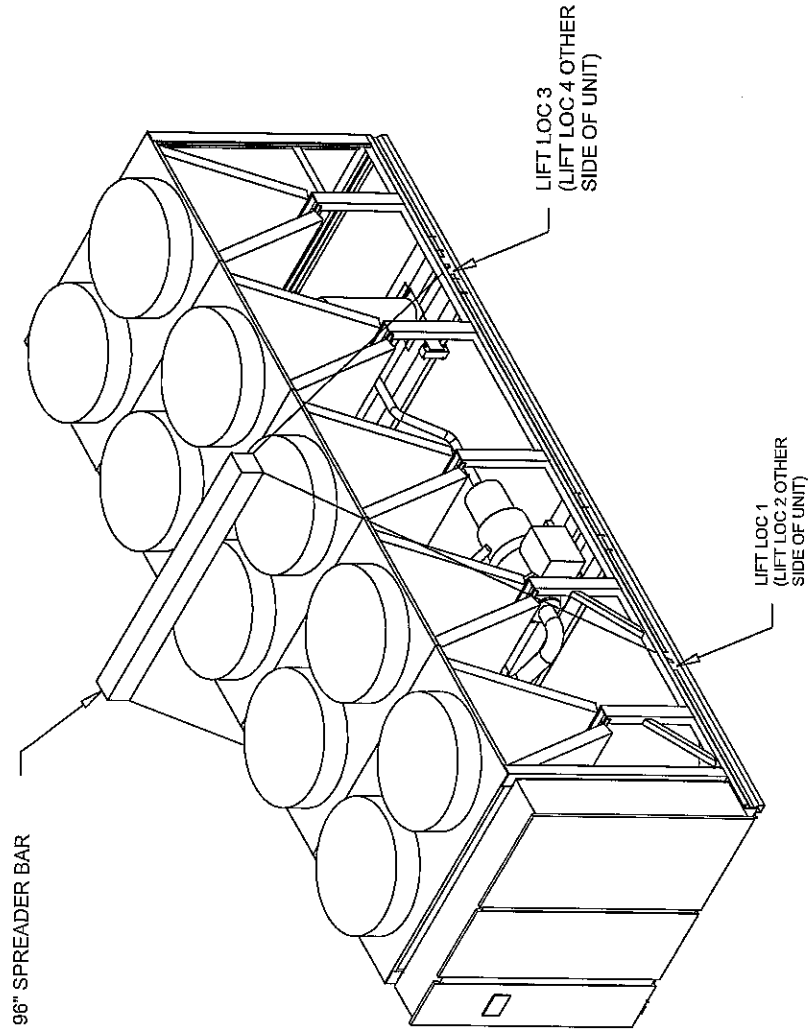
NOTES:

1. LIFTING CHAINS/CABLES WILL NOT BE THE SAME LENGTH. ADJUST TO KEEP UNIT LEVEL WHILE LIFTING.
2. DO NOT FORK LIFT UNIT.
3. WEIGHTS ARE TYPICAL FOR UNITS WITH R-134A CHARGE.
4. WEIGHTS ARE TYPICAL FOR UNITS WITHOUT LOUVER PANELS.
5. ADD 800.0 lb TO TOTAL WEIGHT FOR ULTRA LOW NOISE OPTION.

WARNING
LIFTING AND MOVING INSTRUCTIONS!
 Use the spreader bar as shown in diagram. Refer to installation instructions located inside control panel for further rigging information.

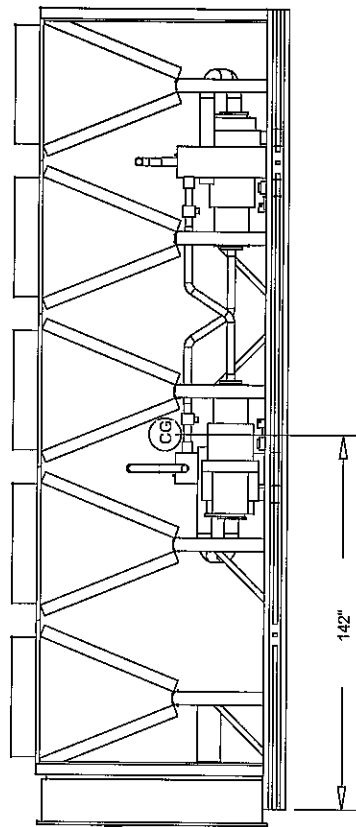
Other lifting arrangements could result in death, serious injury or equipment damage.

DO NOT ALLOW LIFTING STRAPS TO CONTACT UNIT DURING LIFT!

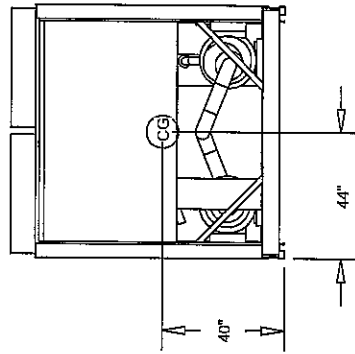


Weight, Clearance & Rigging Diagram - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

CENTER OF GRAVITY



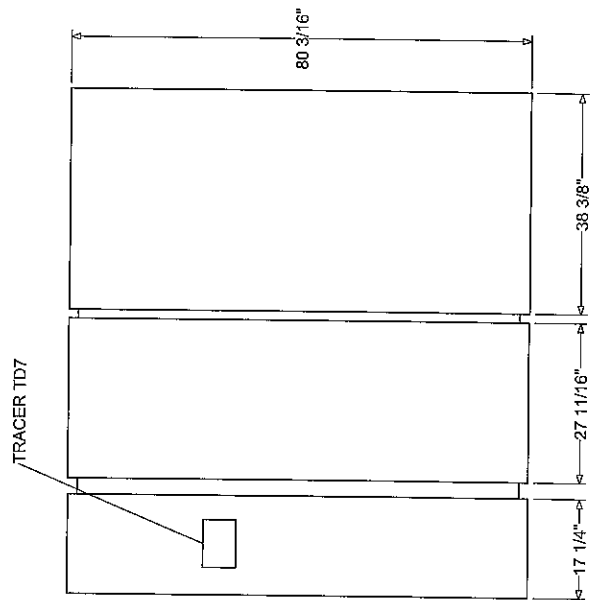
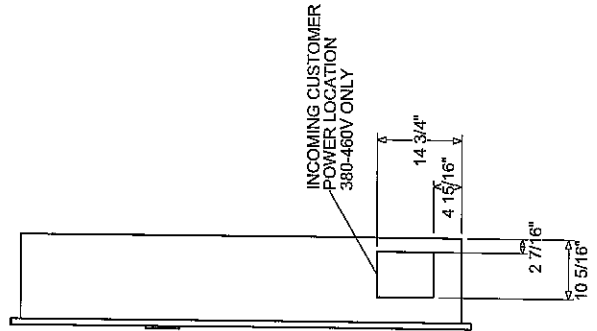
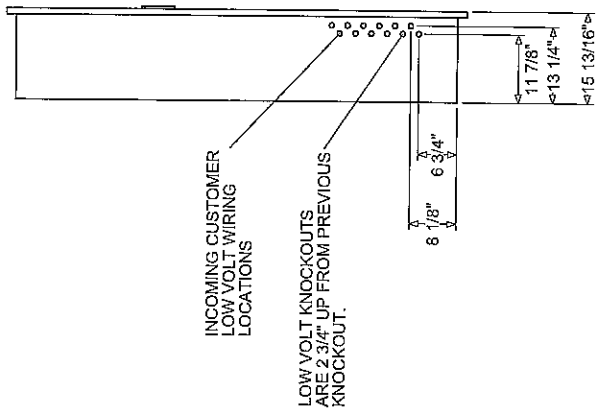
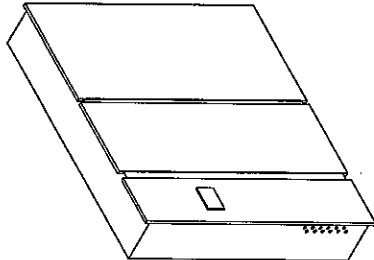
RIGHT SIDE VIEW



END VIEW (NON CONTROL PANEL)

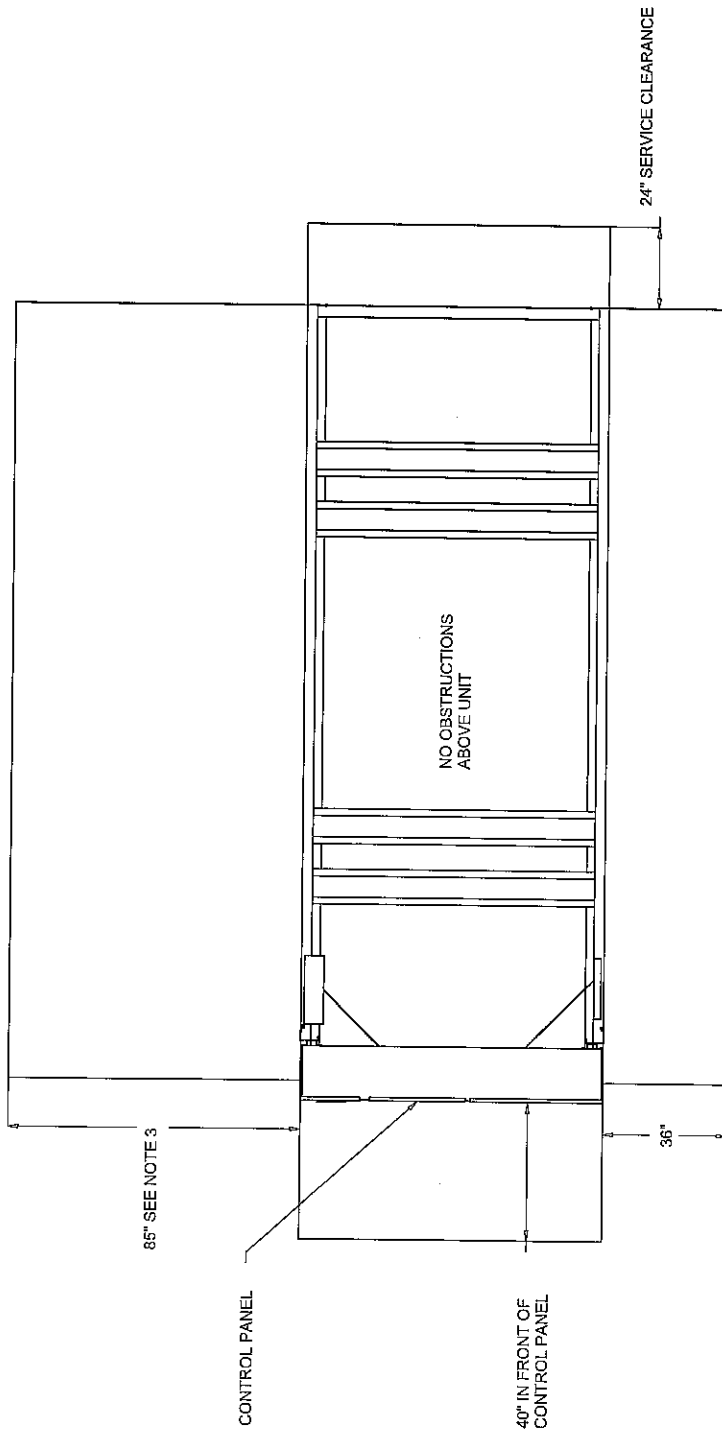
Accessory - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

CUSTOMER WIRE SELECTION TABLE
POWER WIRE CONNECTION TO CIRCUIT BREAKER
CIR 1 & 2 (SINGLE POINT POWER) LUG WIRE SIZE RANGE (PER PHASE)
(2) MAX CONDUCTORS PER PHASE 4/0 AWG - 500MCM
SHORT CIRCUIT RATING
65kA



Accessory - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

UNIT CLEARANCE



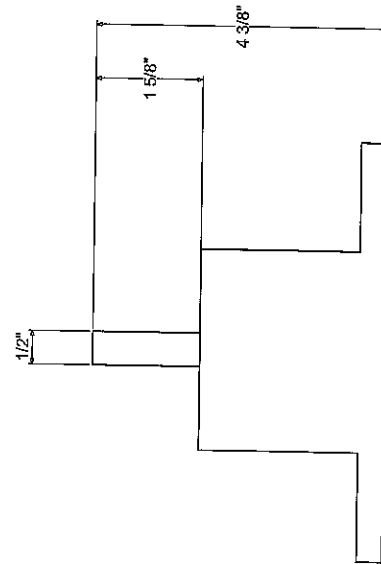
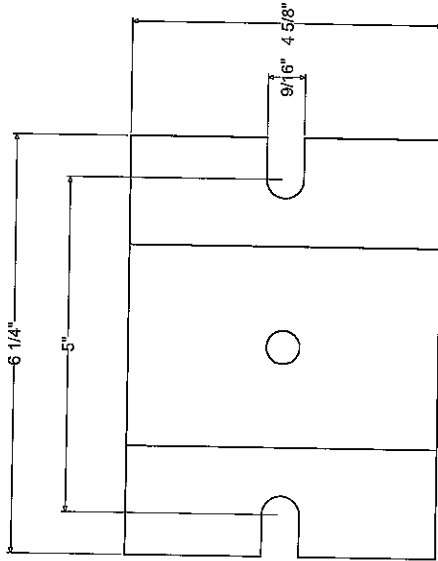
- NOTES:
1. AREA ABOVE UNIT REQUIRED FOR OPERATION, MAINTENANCE, ACCESS PANEL AND AIR FLOW. NO OBSTRUCTIONS ABOVE UNIT.
 2. FOR OBSTRUCTIONS ON MULTIPLE UNITS, REFER TO THE CLOSE SPACING BULLETIN.
 3. CLEARANCE OF 85" ON THE SIDE OF THE UNIT IS REQUIRED FOR COIL REPLACEMENT. PREFERRED SIDE FOR COIL REPLACEMENT IS SHOWN (LEFT SIDE OF UNIT, AS FACING CONTROL PANEL), HOWEVER EITHER SIDE IS ACCEPTABLE.

Accessory - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

NEOPRENE ISOLATOR DIMENSIONS

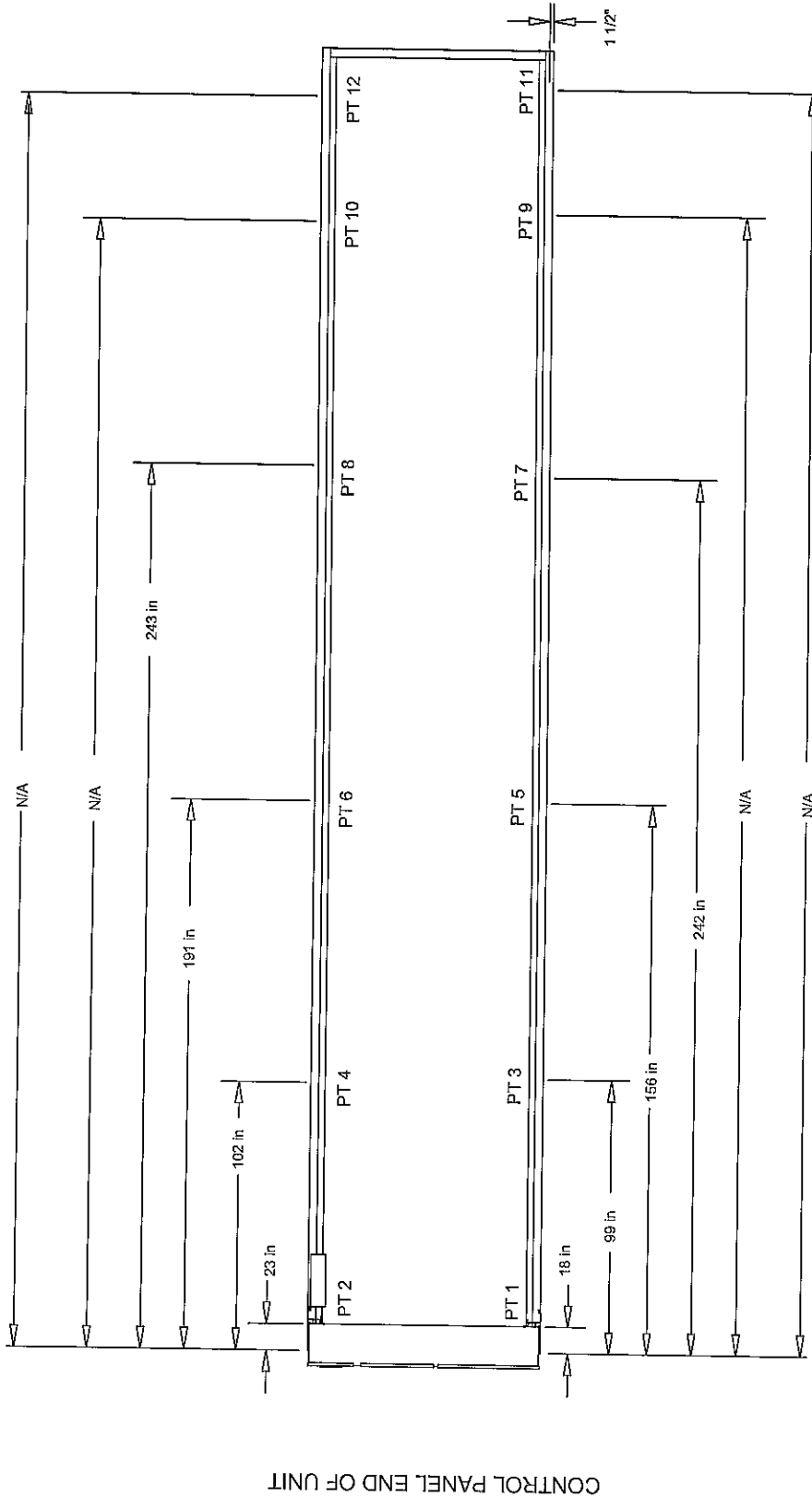
POINT LOCATIONS 1,2,7 & 8
(4X) RDP4-WR BRICK RED
MAX LOAD 2250.0 lb

POINT LOCATIONS 3, 4, 5 & 6
(4X) RDP4-WR LIME
MAX LOAD 3000.0 lb



Accessory - Air-Cooled Stealth (TM)
 Item: A1 Qty: 2 Tag(s): CH-1, CH-2

MOUNTING LOCATIONS AND POINT LOAD WEIGHTS											
POINT 1	POINT 2	POINT 3	POINT 4	POINT 5	POINT 6	POINT 7	POINT 8	POINT 9	POINT 10	POINT 11	POINT 12
1538.6 lb	1340.8 lb	1958.6 lb	1687.5 lb	1807.8 lb	1941.5 lb	1521.9 lb	1536.5 lb	N/A	N/A	N/A	N/A



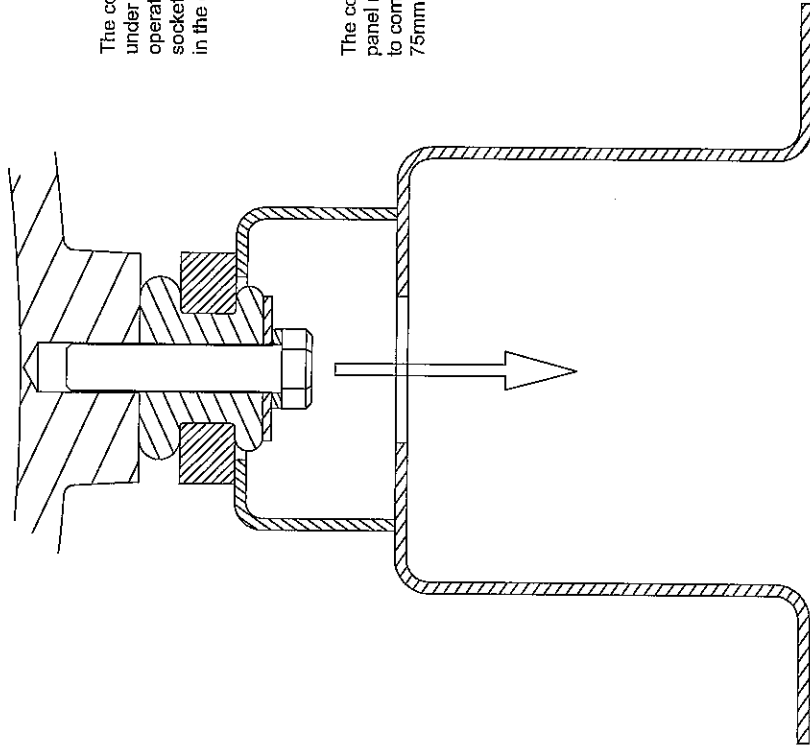
NOTE:
 1. ISOLATOR LOCATIONS ARE DIMENSIONED FROM END OF UNIT BASE.
 2. WEIGHTS INCLUDES LOUVER PANELS AND FACTORY OIL AND REFRIGERANT CHARGE.
 3. DRAWING IS NOT TO SCALE. DRAWING IS A REPRESENTATION OF UNIT BASE FOR ALL SIZE UNITS.
 4. ADD 800.0 lb TO TOTAL WEIGHT FOR UNITS WITH ULTRA LOW NOISE OPTION.

POINT LOCATIONS 1,2,7 & 8
 (4X) RDP4-WR BRICK RED
 MAX LOAD 2250.0 lb

POINT LOCATIONS 3, 4, 5 & 6
 (4X) RDP4-WR LIME
 MAX LOAD 3000.0 lb

TOTAL OPERATING WEIGHT 13323.0 lb
 MOUNTING HOLE DIAMETER 5/8"

Accessory - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2



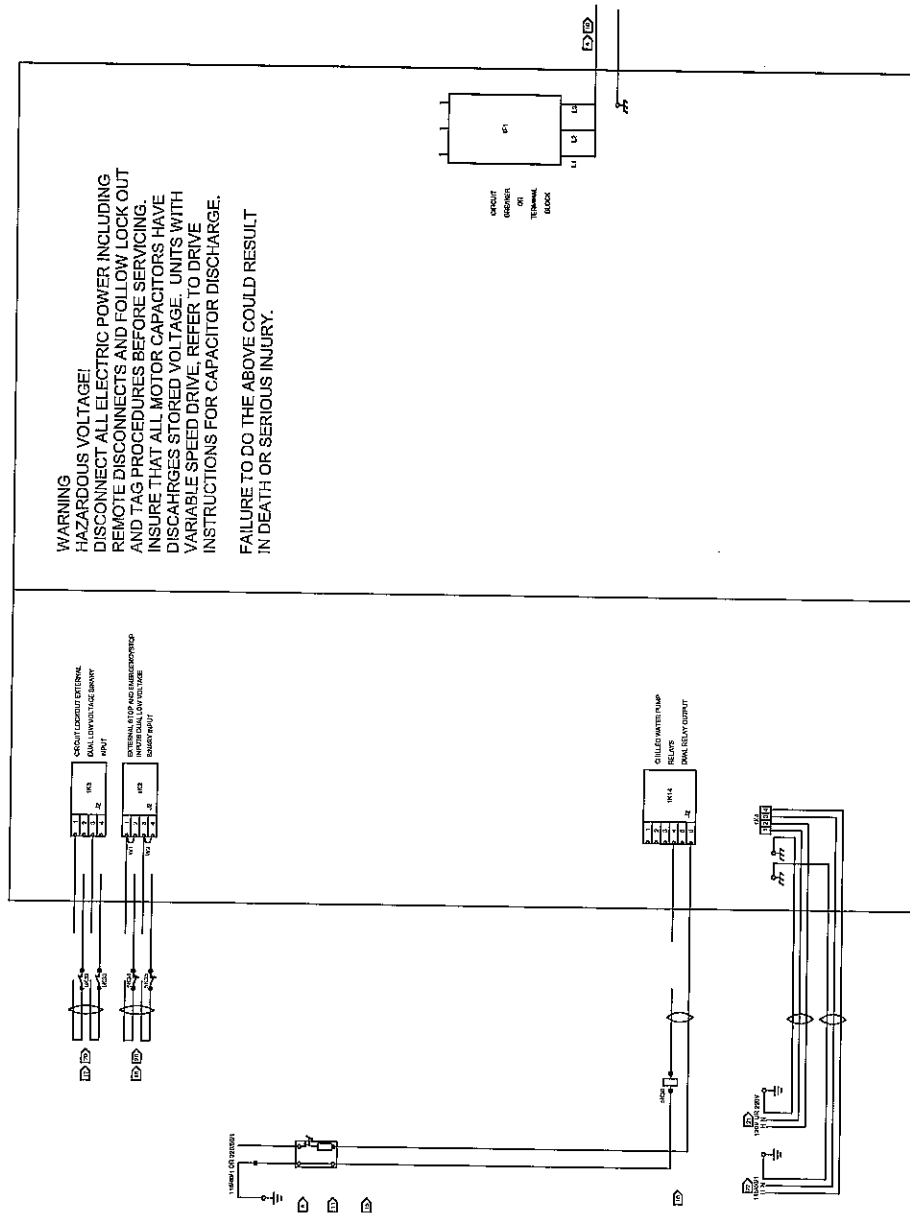
NOTICE
REMOVE COMPRESSOR SHIPPING
BOLTS BEFORE CHILLER OPERATION
The compressor shipping bolts must be removed from under all three compressor feet prior to chiller operation to assure maximum low noise. Use a 24mm socket for the M16 x 75mm bolts. Store the bolts in the control panel for future use.

INSTALL COMPRESSOR SHIPPING
BOLTS BEFORE COMPRESSOR
REMOVAL
The compressor shipping bolts that are stored in the control panel must be installed under all three compressor feet prior to compressor removal. Use a 24mm socket for the M16 x 75mm bolts.

LOW NOISE COMPRESSOR BOLTS

Field Wiring - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

FIELD WIRING PAGE 1 OF 2



Field Wiring - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

FIELD WIRING PAGE 2 OF 2

GENERAL NOTES

1. CAUTION-DO NOT ENERGIZE THE UNIT UNTIL CHECK OUT AND STARTUP PROCEDURES HAVE BEEN COMPLETED.
2. ALL MOTORS ARE PROTECTED FROM PRIMARY SINGLE PHASE FAILURES.
3. CAUTION-TRANE PUMP CONTROL MUST BE USED TO PROVIDE PUMP CONTROL. EVAPORATOR CHILLED WATER PUMP MUST BE CONTROLLED BY THE CHILLER OUTPUT. FAILURE TO COMPLY WITH THIS REQUIREMENT MAY RESULT IN DAMAGE OF THE UNIT.

- 4 SINGLE SOURCE POWER IS PROVIDED AS STANDARD ON THESE PRODUCTS, FIELD CONNECTIONS ARE MADE TO 1F1.

WIRING REQUIREMENTS

5. RECOMMENDED FIELD WIRING CONNECTIONS ARE SHOWN BY DASHED LINES
6. DO NOT RUN LOW VOLTAGE CONTROL WIRING (30 VOLTS OR LESS) IN CONDUIT WITH 110 VOLT OR HIGHER WIRING. DO NOT EXCEED THE FOLLOWING MAXIMUM RUN LENGTH FOR A GIVEN SIZE: 14 AWG, 5000 FT; 16 AWG, 2000 FT; 18 AWG, 1000 FT.
- 7 SHIELDED TWISTED PAIR LEADS ARE REQUIRED FOR CONNECTIONS TO THE COMMUNICATIONS INTERFACE MODULE (1K0). THE SHIELD SHOULD BE GROUNDED AT THE RTAE CONTROL PANEL END.
- 8 CUSTOMER SUPPLIED POWER 115/60/1PH OR 220/60/1PH TO POWER RELAYS. MAX. FUSE SIZE IS 20 AMPS. GROUND ALL CUSTOMER SUPPLIED POWER SUPPLIES AS REQUIRED BY APPLICABLE CODES. GREEN GROUND SCREWS ARE PROVIDED IN UNIT CONTROL PANEL.
- 9 WIRED TO NEXT UNIT. 22 AWG SHIELDED COMMUNICATION WIRE EQUIVALENT TO HELIXLF22P0014216 RECOMMENDED. THE SUM TOTAL OF ALL INTERCONNECTED CABLE SEGMENTS NOT TO EXCEED 4500 FT. CONNECTION TOPOLOGY SHOULD BE DAISY CHAIN. REFER TO BUILDING AUTOMATION SYSTEM (BAS) COMMUNICATION INSTALLATION LITERATURE FOR END OF LINE TERMINATION RESISTOR REQUIREMENTS.

- 11 ALL FIELD WIRING MUST BE IN ACCORDANCE WITH NATIONAL ELECTRIC CODE AND LOCAL REQUIREMENTS. CONTACT RATINGS AND REQUIREMENTS

CONTACT RATINGS AND REQUIREMENTS

- 15 ALL CUSTOMER CONTROL CIRCUIT WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION RATING OF 300 VOLTS. EXCEPT AS NOTED, ALL CUSTOMER WIRING CONNECTIONS ARE MADE TO CIRCUIT BOARD MOUNTED BOX LUGS WITH A WIRE RANGE OF 14 TO 18 AWG OR DIN RAIL MOUNTED SPRING FORCE TERMINALS.
 - 16 UNIT PROVIDED DRY CONTACTS FOR THE CONDENSER/CHILLED WATER PUMP CONTROL. RELAY CONTACT RATINGS AT 120VAC: 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, OR 1/3 HP, 7.2 FLA. CONTACTS ARE RATED FOR 6 AMPS GENERAL PURPOSE DUTY 240 VOLTS.
 - 17 CUSTOMER SUPPLIED CONTACTS FOR ALL LOW VOLTAGE CONNECTIONS MUST BE COMPATIBLE WITH DRY CIRCUIT 24 VOLTS DC FOR A 12 mA RESISTIVE LOAD. SILVER OR GOLD PLATED CONTACTS RECOMMENDED.
 - 18 THE CONTACTS FOR AUTO STOP AND EMERGENCY STOP SWITCHES ARE JUMPERED AT THE FACTORY BY JUMPERS 1W1 & 1W2 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED, REMOVE THE JUMPERS AND CONNECT TO THE DESIRED CONTROL CIRCUIT.
19. SOLID OVALS REPRESENT MAX NUMBER OF CONDUITS AND/OR CABLE GLANDS USED.
- 20 CONNECTIONS ARE INTENDED FOR CLASS 2 ONLY.
 - 21 CIRCUIT 3 REQUIRES 15A PROTECTION AT 120V..
 - 22 CIRCUIT 4 REQUIRES 15A PROTECTION.

Johnson and Jordan
Mechanical contractors

Submittal
WEX
Core & Shell

#17418

SUBMITTAL #5

GENERAL CONTRACTORCianbro Const.
SUBMITTED BY JOHNSON & JORDAN
SCARBOROUGH, ME.
(207) 883-8345
SUBCONTRACTORJohnson & Jordan
SUPPLIER Blake Equipment
SPECIFICATION SECTION N/A
PARAGRAPHM601 Sch.
ITEMBoilers

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed _____

Subject to Architects Approval x _____

Date 12/15/17 by Tim Michaud _____

Peak Performance Solutions

Wex Building- Hancock – Condensing Boilers Letter of Transmittal

To: Johnson And Jordan 18 Mussey Road Scarborough Maine	Date: 12/12/2017 Job: 30604 Customer PO: 12882
--	--

We are sending: Attached Via _____ the following items:
 Submittals Shop Drawings Plans Samples
 Specifications Copy of letter Change order Other

Copies	Date	No	Description
E-copy	12/12/2017		Qty (4) Camus 1600 MBH Dynaforce Condensing Boilers

These are transmitted as checked below:

- For Approval
- For your use

Remarks: This equipment has not been released for production and requires your approval.

Signed: *Nick Melanson*
Direct Dial: (207) 740-6550
Email: nick.melanson@blakeequip.com

If enclosures are not as noted, kindly notify us at once.

TABLE OF CONTENTS

TAB 1 – DYNAFORCE CODE SHEET

TAB 2 – DYNAFORCE SPECIFICATION SHEET

TAB 3 – DYNAFORCE WIRING DIAGRAM

TAB 4 – SOLA CONTROLLER

TAB 5 – WARRANTY SHEET

Boiler Pricing and Additional options

Boiler Order Codes

The entire line of Camus Boilers are inspected and tested to ASME requirements, as required. When ordering a Camus Boiler, please follow the instructions below. Example included for your reference.

Please note that commission sales processing is available on all Camus orders. Please consult Factory for further details.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
D	F	N	H	3	5	0	0	9	5	M	G	N	0	0	6	0	0	9

1, 2 - Product Name	Order Code
Advantus	AV
Dynaforce	DR
DynaFlame	DF
DynaMax	DM
TH Series	TH
MicoFlame Series 1 and 2 (Models 0060 thru 2000)	MF
MicoFlame Grande (Models 2010 thru 4000)	MG
BlueFlame	BF

* CeraFlame, SureFlame and DynaPac are still available for order. Please contact factory for pricing and lead-times.

3 - Fuel Type	Order Code
Natural Gas	N
Propane	P
Dual Fuel (This is an option - refer to separate list pricing)	D

4 - Product Type	Order Code
Hydronic Heating	H
Domestic Hot Water (DHW)	W
Combination	C

5, 6, 7, 8 - Model	Order Code
1600	
Refer to model size in boiler pricing	0060 thru 6000

9, 10 - Efficiency	Order Code
95	
Refer to efficiency stated in boiler pricing	83 thru 95

11 - Firing Mode	Order Code
On/Off	0
2 Stage	2
3 Stage	3
4 Stage	4
Modulating (default for AV, DR, DF, DM & TH)	M

12 - Heat Exchanger Options (H Stamp)	Order Code
Copper	G
Cu-Ni	H
Stainless Steel (Default for AV, DR, DM & TH)	S

13 - HLW marking (consult factory for lead times on AV, DR, DM & TH)	Order Code
Yes (additional charges apply for DM & TH - refer to boiler pricing)	Y
No	N

14 - Code Requirements (additional charges may apply)	Order Code
No Code Required	0
CSD-1	1
IRI	2
FM	3
Kentucky	4

15 - Elevation		Order Code
0-1999 feet		0
2000-4500 feet		1
Over 4500 feet (consult factory for de-rate)		2
16 - Relief Valve set pressure		Order Code
30 psi		1
45 psi		2
50 psi		3
60 psi		4
75 psi		5
100 psi		6
125 psi		7
150 psi		8
160 psi		9
17 - Glycol application		Order Code
Water		0
Glycol (additional charges may apply) - Glycol systems checklist to be submitted with purchase order		1
18, 19 - Vent Size		Order Code
08"		04 thru 16
Refer to recommended vent size charts (applies to AV, DR and DF only)		XX
Use this code if vent size unknown at time of order. Size must be confirmed prior to shipping.		

All items in this book are FOB our factory, unless otherwise noted.



Typical Specifications For Dynaforce® Hydronic Heating Boilers Models DR(H) 0300 – DR(H) 5000

The heating boiler shall be a CAMUS Dynaforce® model 1600 having an input rating of 1,600,000 Btu (kW) /hr. and 1,517,000 Btu (kW)/hr output for hydronic heating.

The hydronic heating boiler shall be design certified by CSA International and shall meet the requirements of ANSI Z21.13, and CSA 4.9. The heating boiler shall be vented as a Category II or IV condensing appliance.

Performance Overview:

- Boiler shall operate up to 99% thermal efficiency
- Heat exchanger shall be a fully condensing vertical cylindrical counter-flow water tube design with 439 grade tubes and 316L grade headers of stainless steel construction and all welded design with constant allowable system return temperatures of 40F.
- Fine tuned combustion premix providing homogeneous air and gas combustion mix to a radial burner incorporating a knitted stainless steel wrap ensuring stable light off and efficient clean combustion.
- 5:1 gas input turn down ratio with sustained efficient combustion characteristics throughout entire modulating range
- Oxides of Nitrogen (NOx) of 9 ppm corrected to 3% oxygen.
- Category II venting certification with Category II and IV venting options.
- The boiler is fully factory fire tested to obtain optimum combustion characteristics and to establish certified gas input rates.
- System safety and operating devices and controls are fully configured, calibrated and factory tested.
- Models consist of an input range of 300 MBTUH to 4999 MBTUH
- The boiler shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard.

Combustion Chamber:

The combustion chamber shall be an all welded stainless steel construction and an integral part of the heat exchanger which shall be an all welded vertical cylindrical stainless steel counter-flow design consisting of an upper burner section for primary heat transfer and a lower section for extracting latent heat from flue gases. Stainless steel access heat exchanger wraps shall be provided for ease of service and inspection of the external heat exchanger and an easily removable radial fired knitted fiber stainless steel burner to access the internal combustion chamber for inspection, service, and cleaning. A window view port shall be provided for visual inspection of the boiler combustion during firing.

Heat Exchanger:

The stainless steel heat exchanger shall be inspected and tested to A.S.M.E. Section IV requirements. The A.S.M.E. Section IV seal of approval will not be provided as standard for jurisdictions not requiring the A.S.M.E. Section IV seal of approval. The stainless steel heat exchanger shall be a 12 pass construction with a maximum working pressure of 160 psig (1100 kPa). The heat exchanger shall be of 439 grade stainless steel welded construction with a vertical cylindrical counter-flow water tube design complete with integral 439 grade stainless steel finned heat transfer tubes and 316L waterways. The heat exchanger design shall be capable of 40°F constant system return temperatures and have a fully condensing heat exchanger complete with condensate trap and drains. A pressure relief valve of 125 lb/hr shall be furnished with the heater.

← PLEASE VERIFY!!!!

Gas Train:

The gas train shall consist of a pressure regulating electro-hydraulic proportional air/gas main gas actuator providing a slow opening, fast closing shutoff valve and proportional 1:1 air/gas ratio control, a fast closing safety shutoff gas pressure regulator with 1 PSI allowable static pressure, and a low gas pressure switch. Optional high gas pressure switch is available. A factory pre-set combination metering valve and orifice shall be provided for setting combustion parameters. Models DR 300 – DR 5000 operate with a 5:1 turndown ratio.

Burner/Combustion:

The combustion air fan draws gas under negative pressure and mixes it with air to generate a fine tuned air gas mixture which is delivered under positive pressure to the radial knitted stainless steel burner. Combustion modulation is established by either a pulse width modulation signal on models (DR300 – DR1000) or by a variable frequency drive on models (DR1200 – DR5000). The burner shall be a 100% stainless steel vertical mounted radial fired type with stainless knitted metal fiber construction. The burner shall combust a precise amount of premixed combustion air and gas to provide equal distribution of heat for heat transfer throughout the entire heat exchanger. Combustion products are exhausted under minimum back pressure. Combustion operates with a 5:1 turn down ratio while sustaining combustion characteristics throughout the entire modulating range. Operation of up to 99% thermal efficiency and shall be certified for Oxides of Nitrogen (NOx) of 9 ppm corrected to 3% oxygen.

Firing Mode:

The burner combustion shall operate as proportional modulating with a 5:1 turndown ratio with a minimum 20% firing rate. Multiple boiler "Cascade" firing algorithms are proportional modulation. Light off shall be at no more than 50% input to assure rumble free soft start. Combustion shall be optionally suitable for natural gas, propane and dual fuels operation.



Typical Specifications For
 Dynaforce® Hydronic Heating Boilers
 Models DR(H) 0300 – DR(H) 5000

Controls:

Standard controls include a SOLA electronic proportional integrated combination ignition limit/operator control accurate to 1°F (0.5°C) having a 4-20 mA output signal suitable for control of a variable frequency motor drive or a pulse width modulation signal output for modulating fan speeds. Controls are lead lag "Cascade" ready for control of up to eight boilers c/w indoor outdoor reset and lead lag point or modulating control. Control shall be equipped and ready with 4-20 mA remote set point or modulating control, capable with 0-10 VDC remote set point or modulating control. Control is BMS Modbus RTU protocol ready and capable of other alternate protocol conversions with additional optional gateway protocol converter. Control shall be supplied with a mounted touchscreen display which shall also provide for control system configuration and set up, readouts of boiler target, differential and inlet/outlet temperatures as well as accumulated runtime, enunciator diagnostics, and firing rates. Touchscreen display shall provide full diagnostics including real time data logging and support for up to eight (8) boilers in "Cascade" sequencing application, Modbus ready. The complete control package shall be mounted on the front panel with a hinged door for easy access to all control modules. The boiler safety control string shall be furnished with controls for low gas pressure, optional high gas pressure, fan air proving, blocked flue, water pressure, high limit, stack limit and flow switch. A flow switch shall be installed on the boiler outlet. Additional control safeties shall include flue gas stack temperature, flame rectification, fan speed, and auto recycling high limit.

Ignition Module:

The ignition module shall employ a direct igniter with 3 tries for ignition followed by lockout for DR 300 - DR 2500. A proven pilot is used on DR 3000 – DR 5000. Trial for ignition shall proceed with 15 seconds between retries. Ignition control shall include times for pre-purge, pre-ignition, ignition, and post purge.

Venting Options

The following venting options shall be utilized:

- Category II Venting – single or combined vent*
- Category IV Outside Air (Horizontal & Vertical)
- Category IV Through-wall Venting (Horizontal & Vertical)
- Outdoor Venting
- Category II & IV Direct Venting

* Category II combined vent shall only employ an engineered designed vent system prepared by a certified vent manufacturer

The following category II and IV optional vent materials shall be utilized

- Stainless or AL29-4C for all system applications
- PPE or polypropylene for all system applications
- PVC for select low temperature systems only – consult factory
- CPVC for domestic hot water systems and select low temperature systems – consult factory

External Jacket and Fasteners:

The external jacket shall be of 430 stainless steel mirror finish panels and a powder paint coated access top cover assembled utilizing interference fit locks and minimal non-strip self tap screws for ease of removal and access to the heat exchanger and combustion air / gas control.

Heat Exchanger Water Content

Model	Water Content (Gal)
300	5.7
350	5.7
400	6.3
500	6.3
600	6.6
800	6.6
1000	8.9
1200	8.9
1400	9.6
1600	9.9
1800	9.9
2000	11.4
2500	13.2
3000	15.6
3500	18.6
4000	18.6
4500	20.1
5000	21.2

Voltage Requirement

Model	Voltage Requirement	Max Amp Draw – Boiler Only
300 - 2000	120VAC, 60Hz	20
2500	120VAC, 60Hz	30
3000-3500	208/230VAC, 60Hz*	30
4000 - 5000	208/230VAC, 60Hz, 3 Phase**	30
1200 - 5000 ^Δ	460VAC, 60Hz, 3 Phase	10

*This is a 4-wire power supply requiring two (2) lives, a neutral and a ground

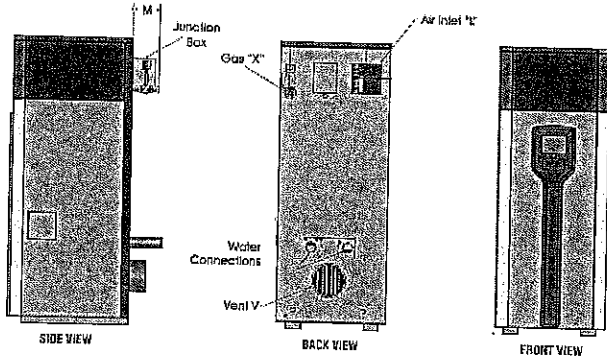
**This is a 5-wire power supply requiring three (3) lives, a neutral and a ground

^Δ Optional power supply available upon request

SUBMITTAL DATA SHEET – DYNAFORCE® – HYDRONIC HEATING

Input & Output

Model	Input [MBTU/hr]	Output [MBTU/hr]
0300	300	282
0350	350	329
0400	399	375
0500	500	470
0600	600	564
0800	800	752
1000	1000	940
1200	1200	1138
1400	1400	1327
1600	1600	1517
1800	1800	1708
2000	2000	1896
2500	2500	2370
3000	3000	2835
3500	3500	3307
4000	4000	3780
4500	4500	4253
5000	4999	4724



Heat Exchanger Head Loss & Flow

Model	10°F Rise		15°F Rise		20°F Rise	
	US GPM	ΔP-Ft.	US GPM	ΔP-Ft.	US GPM	ΔP-Ft.
300	57.0	0.5	38.0	0.3	N/A	N/A
350	66.5	0.7	44.3	0.4	N/A	N/A
400	76.0	1.0	50.1	0.5	N/A	N/A
500	95.0	1.6	63.3	0.8	N/A	N/A
600	113.9	2.5	75.9	1.3	N/A	N/A
800	152.0	6.6	101.3	3.2	76.0	1.9
1000	189.8	11.4	128.5	5.4	95.0	3.2

Model	20°F Rise		25°F Rise	
	US GPM	ΔP-Ft.	US GPM	ΔP-Ft.
1200	113.8	10.0	91.0	6.6
1400	132.8	14.0	106.2	9.2
1600	151.8	14.1	121.4	9.3
1800	170.9	14.3	136.7	9.4
2000	189.8	20.8	151.8	13.6
2500	237.2	27.1	189.8	17.7
3000	284.6	27.3	227.7	17.8
3500	331.8	33.0	265.4	21.5
4000	379.5	36.9	303.6	24.0
4500	426.9	55.8	341.5	36.3
5000	474.0	60.0	379.2	39.0

Dynaforce® Dimensions

Model	Ø Dim. "L" (in.) Air Inlet	Ø Dim. "V" (in.) Vent CAT. IV up to 100 Ft. Equiv. Length (As Shipped)	Ø Dim. "V" (in.) Vent CAT. II	Dim. "M" (in.)	Ø Dim. "W" (in.) Water	Ø Dim. "X" (in.) Gas	Weight (lbs.)
300	6	4	4	5	1 1/2	3/4	500
350	6	4	5	5	1 1/2	3/4	500
400	6	4	5	5	1 1/2	1	500
500	6	5	5	5	1 1/2	1	560
600	8	5	6	5	2	1	585
800	8	6	6	5	2	1	640
1000	8	6	7	5	2	1	750
1200	10	7	8	5	2 1/2	1 1/4	845
1400	10	7	8	5	2 1/2	1 1/4	845
1600	12	7	9	5	2 1/2	1 1/4	875
1800	12	8	9	5	2 1/2	1 1/4	1115
2000	12	8	10	5	3	1 1/4	1138
2500	12	9	10	5 1/2	3	1 1/2	1250
3000	12	9	10	5 1/2	3	1 1/2	1425
3500	12	10	12	7	4	2	1840
4000	12	10	12	7	4	2	1912
4500	14	12	12	7 1/2	4	2 1/2	2000
5000	14	12	12	8	4	2 1/2	2200

Please consult submittal drawings located on www.camus-hydronics.com for detailed dimensional references.

Model # DRNC1600

Of Units 4

Type of Gas Natural Gas

Total Input 1,600,000 BTU/hr

Flow 121.4 USGPM @ Allowable Pressure Drop 9.3 ft.

Total Output 1,517,000 BTU/hr

Optional Accessories Protocol Translator, Acid Neutralizer Kit

CSD-1 Asme Rating

99-0129
Rev 06

CAMUS

hydronics Ltd.

Quantity of Four (4)

NEUTRALIZER SPECIFICATIONS

Neutralizer Model: FMC J12-58

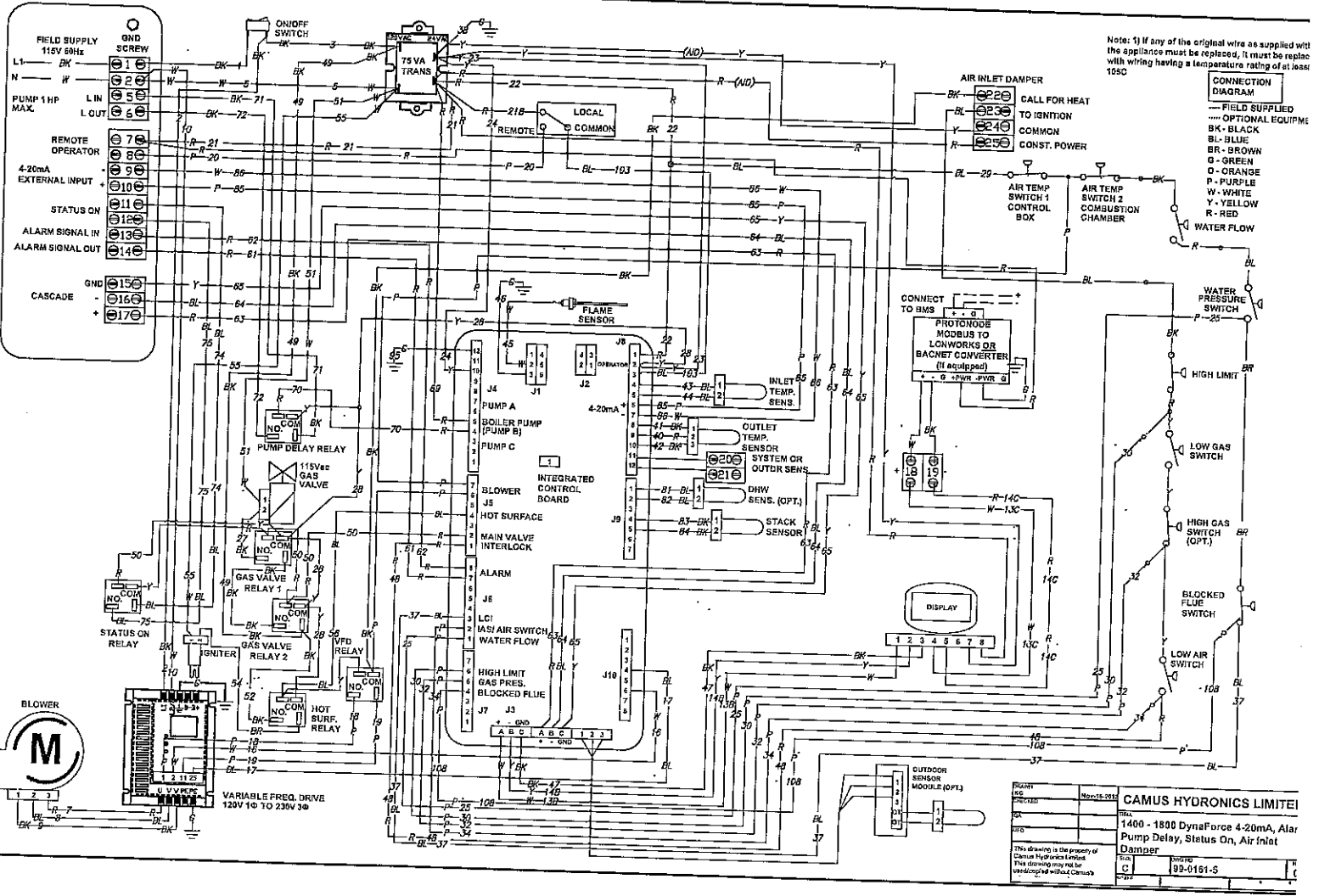
Applicable for inputs up to 2 million Btu/hr

- Overall length; 15 ³/₄"
- Diameter 1 ¹/₄" pvc
- Overall weight; 1 lb 7 ¹/₂ oz
- Contents ; calcium carbonate
- 5/8 " hose barb connection each end
- Contents is consumed as neutralization takes place. Refill cartridges are available
- Sized for average life of one year
- May be used in series to achieve desired Ph.

Neutralizer Model: FMCJ-250-58

Applicable for inputs from 2.5 million to 6.0 million Btu/hr

- Overall length; 16"
- Diameter 2 ¹/₂" pvc
- Overall weight; 3 lbs
- Contents ; calcium carbonate
- 5/8 " hose barb connection each end
- Contents is consumed as neutralization takes place. Refill cartridges are available
- Sized for average life of one year
- May be used in series to achieve desired Ph.

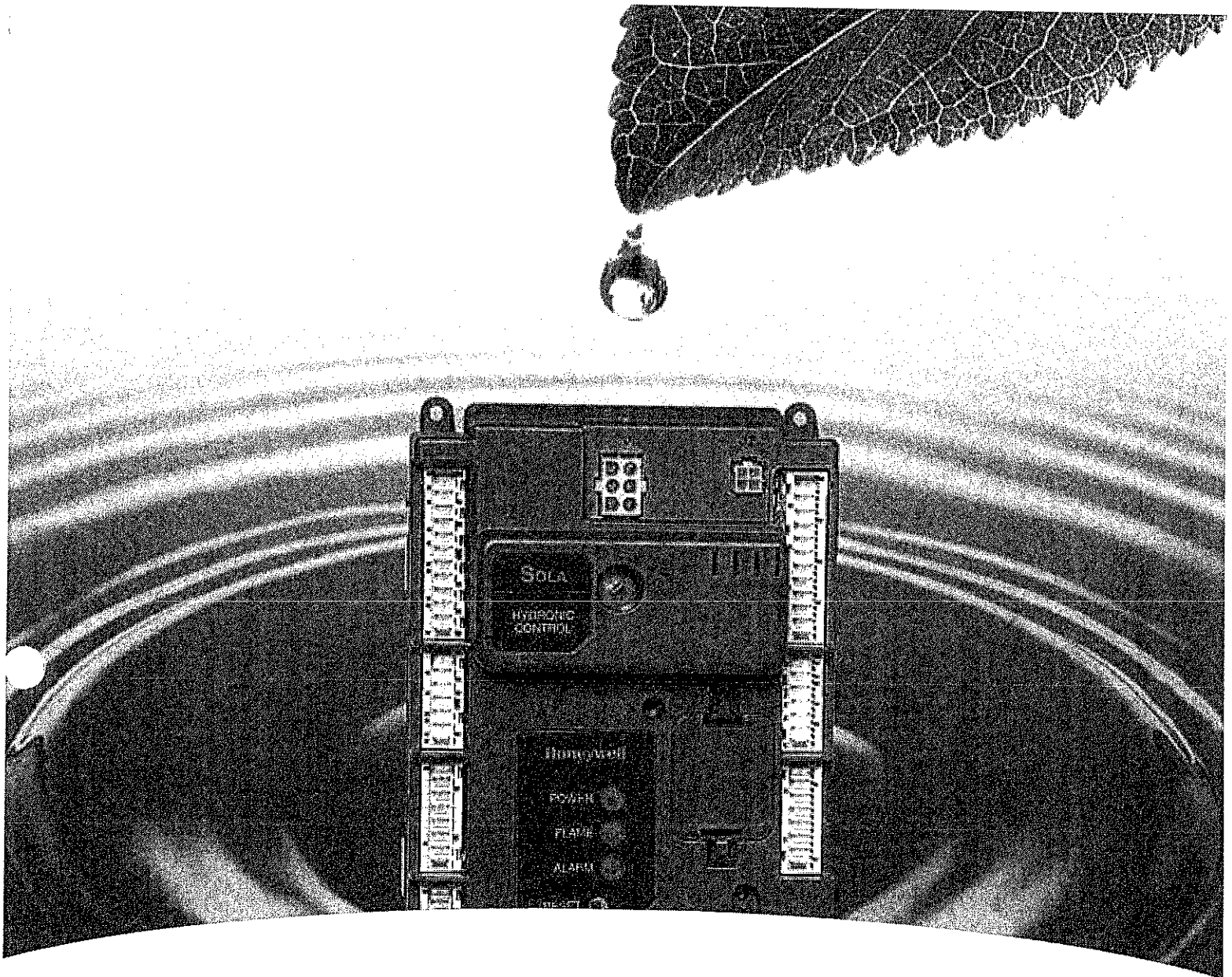


Model	1400-1800	CAMUS HYDRONICS LIMITED
Part No.	1400 - 1800 DynaForce 4-20mA, Alarm Pump Delay, Status On, Air Inlet Damper	
Rev.	C	93-0181-5

© 1993 Camus Hydronics Limited. This drawing may not be reproduced without Camus Hydronics Limited's written permission.

SOLA Hydronic Control

Honeywell



The key to integrated hydronic boiler control. Honeywell's SOLA Hydronic Control integrates eleven control functions into a single compact device. Reduced installation, wiring and maintenance, along with features such as setback, outdoor reset and fan and burner modulation save you money and provide a green solution. Unlock the door to programming flexibility with features such as flame safeguard, pump control, on-board igniter, central heating/domestic hot water high limits, PID load control and operating controls. For flexible integrated hydronic boiler control – backed by Honeywell reliability – turn to the Honeywell SOLA Hydronic Control.

SOLA Hydronic Control

Blue Is Green

Honeywell's SOLA Hydronic Control helps save time, money and the planet! With SOLA, less fuel is used, meaning less CO₂ and other greenhouse gases are released into the atmosphere. Get green and save green with the following SOLA features:

- Setback / Time of Day
- Outdoor Reset
- Fan and Burner Modulation

Plus, the SOLA Hydronic Control integrates eleven control functions into one compact device, reducing wiring and installation time and control count. With the Honeywell SOLA Hydronic Control, blue is green!

11 Integrated Control Functions

1. Primary flame safeguard control
2. Igniter / Spark generator
3. Central heat operating control
4. Central heat high limit control
5. Central heat PID load control
6. Outdoor reset control
7. 3 Pump outputs, 5 assignable functions
8. Domestic hot water operating control
9. Domestic hot water high limit control
10. Domestic hot water PID load control
11. Stack temperature high limit control

Safety/Boiler Protection

Frost protection, Slow start, Anti-condensation, 3 Delta-T functions, Outlet and heat exchanger T-rise, Stack limit, Boiler limit, Domestic hot water limit

Learn More

For more information please contact your Honeywell distributor. Or visit <http://customer.honeywell.com>.

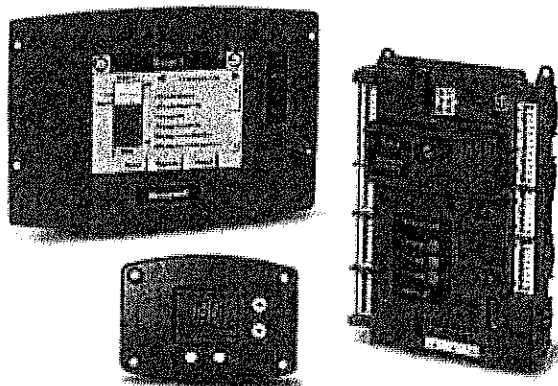
Automation and Control Solutions

In the U.S.:

Commercial/Industrial Combustion Controls
Honeywell
1985 Douglas Drive North
Golden Valley, MN 55422-3992

In Canada:

Honeywell Limited
35 Dynamic Drive
Toronto, Ontario M1V 4Z9
www.honeywell.com



Choose Your SOLA Hydronic Control

Item	R7910A 1001	R7910A 1019	R7910A 1027	R7910A 1084
24Vac Control Circuit	•	•	•	•
24Vac Demand Input	•	•	•	•
24Vac Load Circuit	•			•
120Vac Load Circuit		•	•	
Modulation Output: PWM	•		•	•
Modulation Output: 4-20mA or 0-10Vdc	•	•	•	•
High/Low Fire Switch Inputs		•		
Flame Rod Flame Detection	•	•	•	•
UV Flame Detection	•	•	•	
Thermostat Input /Heat Anticipator				•

Interface Options

S7999B1026 System Operator Interface

Touchscreen interface for individual and multiple SOLA local/remote configuration, control, monitoring, diagnostics and trend analysis.

S7999C1008 Local Operator Interface

Touchscreen interface for individual SOLA local/remote configuration, control, monitoring and diagnostics.

S7910A1008 Local Keyboard Display Module

LCD interface for monitoring and setpoint adjustment of an individual SOLA control.

Other Components

Connectors: 50032893-001 Connector Bag Assembly

Sensors: 10KOhm or 12KOhm NTC Temperature Sensors

Flame Detectors: Flame Rod or UV C7027, C7035, C7044

Control Transformers: AT72D, AT88A

Typical Applications

The SOLA Hydronic Control works with hydronic low mass and commercial boilers. Typical applications include apartment buildings, hospitals, retail complexes, schools, universities and office complexes.

Honeywell

ProtoNode
LonWorks®, BACnet®, Metasys® N2,
Multi-Protocol Device Server



A Sierra Monitor Company

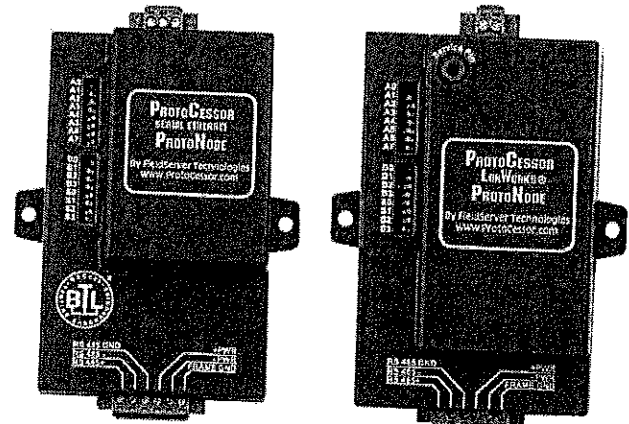
ProtoNode is an external, high performance, low cost Building and Industrial Automation multi-protocol gateway for OEMs wanting to provide protocol translation between Serial-Serial, Serial-Ethernet and Ethernet-Ethernet devices using LonWorks®, BACnet®, Metasys® N2 by JCI, Modbus, DNP3, and more.

ProtoNode is designed to be used by OEM customers who need to quickly and easily enable their new or legacy devices to interface with other protocols. The extensive FieldServer driver library, coupled with the FieldServer experience in protocol translation gateways provides the OEM customer with confidence that their products will meet the interface requirements for foreign networks.

Configuration Auto-Selector enables manufacturers to preload multiple predefined configurations onto each ProtoNode. DIP switches select specific configurations based upon application. The result is that the manufacturer can meet multiple installation requirements with the same component with no concerns about selecting a specific component for each job, saving manufacturing costs, installation costs and enhancing customer satisfaction.

This feature supports Modbus RTU, Modbus TCP, BACnet IP, JCI Metasys N2OPEN, DNP 3.0, AllenBradley EtherNet/IP and LonWorks. There are various scenarios on how this feature can be employed:

- Common device protocol interface to multiple protocols
- Multiple devices interface to common protocol
- ProtoNode reads a register on OEM device to automatically load proper configuration



ProtoNode RER

ProtoNode LER



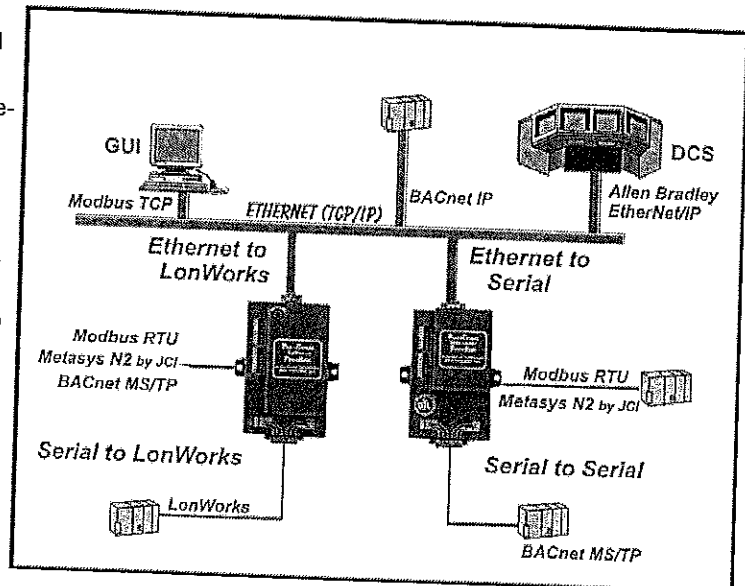
For quick and simple installation the ProtoNode RER and LER have DIP switches for setting the Node-ID, MAC address and Baud-Rate (Auto-Baud for BACnet MS/TP is supported).

ProtoNode RER is based on an ARM9 processor for fast performance includes two RS-485 and one Ethernet port. The device can be programmed in the field or pre-programmed in the factory. BACnet BTL certified (B-ASC).

ProtoNode LER includes a LonWorks port plus Ethernet and RS-485 ports. BACnet BTL pending.

Features/Benefits

- ✓ The most flexible and versatile multi-protocol Device Server on the market.
- ✓ Configuration Auto-Selector to select from pre-loaded defined configurations.
- ✓ BACnet International's BTL certified for the ProtoNode RER.
- ✓ BACnet COV support provides fast data communication while reducing the traffic over a BACnet network.
- ✓ Supports virtual nodes allowing multiple OEM controllers to connect to a single ProtoNode and seen as separate controllers on the various field networks.
- ✓ Interfaces to over 85 Building and Industrial Automation Protocols.
- ✓ Easily supports OEM's custom proprietary host serial or Ethernet protocols.
- ✓ Multi-Client and Multi-Server support ensures interoperability between any Industrial and or Building Automation protocols.
- ✓ Flash upgradeable.



Metasys® is a registered trademark of Johnson Controls, Inc.
 LonWork® is a registered trademark of Echelon Corp.
 BACnet® is a registered trademark of ASHRAE.

Specifications

Supported Electrical Connections:

ProtoNode Serial (Model RER):

- 1 - 6 pin Phoenix Connector
 - ✓ 1 RS-485 +/- Ground port
 - ✓ Power +/- Frame Ground port
- 1 - 3 pin Phoenix connector RS-485
 - ✓ 1 RS-485 +/- Ground port
- 1 Ethernet -10/100 Ethernet port

ProtoNode LonWorks (Model LER):

- 1 - 6 pin Phoenix Connector
 - ✓ 1 RS-485 +/- Ground port
 - ✓ Power +/- Frame Ground port
- 1 Ethernet -10/100 Ethernet port
- 1 FTT-10 LonWorks port

Operating

Power Requirements: 9-30 VDC or VAC or 5 VDC

Current draw @ 12V

RER @ 12V = 150 mA

LER @ 12V = 279 mA

Environmental

Operating Temp.: -40°F to 187°F (-40°C to 85°C)

Relative Humidity: 5-90% RH, non-condensing

Enclosure

Dimensions: 4.37 x 2.75 x 1.50 inches (L x W x H)
(11.10 x 7.00 x 3.81 cm)

Approvals

BACnet Testing Labs (BTL) B-ASC on ProtoNode RER

Warranty

Warranty: Two years return to factory

Supported protocols:

- LonWorks (*ProtoNode LER only*)

Serial (RS-485) Protocols (*ProtoNode LER and RER*)

- Allen Bradley DF1
- BACnet MS/TP
- DNP 3.0 Serial
- JBus
- Metasys N2
- Modbus RTU
- TL1

Ethernet Protocols (*ProtoNode LER and RER*)

- Allen Bradley EtherNet/IP
- Allen Bradley CSP
- BACnet IP
- BACnet Ethernet
- Modbus TCP/IP
- GE-EGD
- GE-SRTP
- OPC
- SNMP
- XML

FieldServer Technologies has a full library of over 80 drivers so check with ProtoCessor sales to determine what additional protocols are available to meet specific application needs.



FieldServer Technologies offers a full range of OEM devices to enable manufacturers to easily provide the protocols their customers demand:

- ✓ **ProtoCessor** - embedded protocol translator
- ✓ **ProtoCarrier** - daughter cards to enable addition of ProtoCessor without hardware redesign
- ✓ **ProtoConnect** - semi-custom protocol OEM solution
- ✓ **ProtoNode** - external fully enclosed protocol OEM solution. In addition to the ProtoNode LER and RER, ask about the ProtoNode RAR and BRE.
 - The **ProtoNode RAR** is particularly designed for cost sensitive high volume applications that support RS-485 to RS-485 conversion (for Modbus RTU, BACnet MS/TP or Metasys N2 conversion), and can support 100-150 Modbus RTU registers. The protocol mapping is programmed at the factory and cannot be changed in the field.
 - **ProtoNode BRE** includes two serial ports that can be configured as RS-232 or RS-485 plus an Ethernet port. (see separate ProtoNode BRE datasheet)

Camus General Warranty

Camus Hydronics Limited ("Camus") extends the following LIMITED WARRANTY to the owner of the appliance, provided that the product has been installed and operated in accordance with the Installation Manual provided with the equipment. Camus will furnish a replacement for, or at Camus option repair, any part that within the period specified below, shall fail in normal use and service at its original installation location due to any defect in workmanship, material or design. The repaired or replacement part will be warranted for only the unexpired portion of the original warranty. This warranty does not cover failures or malfunctions resulting from: (1) Failure to properly install, operate or maintain the equipment in accordance with Camus' manual; (2) Abuse, alteration, accident, fire, flood, foundation problems and the like; (3) Sediment or lime build-up, freezing, or other conditions causing inadequate water circulation; (4) Pitting and erosion caused by high water velocity; (5) Failure of connected systems devices, such as pump or controller; (6) Use of non-factory authorized accessories or other components in conjunction with the system; (7) failing to eliminate air from, or replenish water in, the connected water system; (8) Chemical contamination of combustion air or use of chemical additives to water.

HEAT EXCHANGER

If within 10 years after initial installation of the Heating appliance (12 years for DynaMax series only), a heat exchanger shall prove upon examination by Camus to be defective in material or workmanship, Camus will exchange or repair such part or portion based on the following pro-rated limited warranty: Percentage shown is the amount that would be covered by Camus Hydronics Limited if deemed warranty based on the number of years the boiler has been in service.

Years In Service	BlueFlame Heating	BlueFlame DHW	CeraFlame Heating	CeraFlame DHW	SureFlame Heating	SureFlame DHW	DynaFlame (STAINLESS STEEL)	DynaFlame Heating (COPPER/CU-NI HTX)	DynaFlame DHW (COPPER/CU-NI HTX)	DF Cond. Secondary HTX	DynaForce	Advantus	DynaMax Heating	DynaMax DHW and Combi	TH Series	MicoFlame Heating	MicoFlame DHW	MF Cond. Secondary HTX
1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
5	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
6	40%		40%		40%		100%	40%		100%	100%	100%	100%	100%	100%	100%	100%	100%
7	35%		35%		35%		100%	35%		100%	100%	100%	100%	100%	100%	40%	100%	100%
8	30%		30%		30%		100%	30%		100%	100%	100%	100%	100%	100%	35%	100%	100%
9	25%		25%		25%		100%	25%		100%	100%	100%	70%	100%	100%	30%	100%	100%
10	20%		20%		20%		100%	20%		100%	100%	100%	60%	100%	100%	25%	100%	100%
11											100%	100%	50%	100%	100%	20%	100%	100%
12												100%	40%	100%	100%	20%	100%	100%

~~COPPER/CU-NI HEAT EXCHANGER - Heat Exchanger shall be warranted for 20 years from date of installation against "Thermal Shock" (excluded if caused by appliance operation at large changes exceeding 150°F between the water temperature at intake and appliance temperature or operating at appliance temperatures exceeding 230°F).~~

STAINLESS STEEL HEAT EXCHANGER - Heat Exchanger shall be warranted for 20 years from date of installation against "Thermal Shock" (excluded if caused by appliance operation at large changes exceeding 150°F between the water temperature at intake and appliance temperature or operating at appliance temperatures exceeding 210°F).

BURNER

BlueFlame Series - If within ONE year after initial installation of the boiler a burner shall prove upon examination by Camus to be defective in material or workmanship, Camus will exchange or repair such part or portion.

All other Series - If within FIVE years after initial installation of the boiler a burner shall prove upon examination by Camus to be defective in material or workmanship, Camus will exchange or repair such part or portion.

ANY OTHER PART

If any other part fails within one (1) year after installation, or eighteen (18) months from date of factory shipment based on Camus' records, whichever comes first, Camus will furnish a replacement or repair that part. Replacement parts will be shipped f.o.b. our factory.

HOW TO MAKE A CLAIM

Any claim under this warranty shall be made directly to Camus Hydronics Limited Canadian Head Office

SERVICE LABOR RESPONSIBILITY

Camus shall not be responsible for any labour expenses to service, repair or replace the components supplied. Such costs are the responsibility of the owner.

DISCLAIMERS

Camus shall not be responsible for any water damage. Provisions should be made that in the event of a water/boiler or fitting leak, the resulting flow of water will not cause damage to its surroundings.



OSA INTERNATIONAL

Certificate of Compliance

Certificate: 2324652

Master Contract: 211484

Project: 2324652

Date Issued: July 23, 2010

Issued to: Camus Hydronics Ltd.
6226 Netherhart Rd
Mississauga, ON L5T 1B7
Canada
Attention: Claudio Petracca



Glen Brown

Issued by: Glen Brown

PRODUCTS

- CLASS 2902 13 - COMMERCIAL HEATERS (GAS) - Water Heaters.
- CLASS 2902 93 - COMMERCIAL HEATERS (GAS) - Water Heaters-Certified to U.S. Standards
- CLASS 1502 82 - BOILERS (GAS) - Steam and Hot Water - Commercial - Certified to U.S. Standards
- CLASS 1502 02 - BOILERS (GAS) - Steam and Hot Water - Commercial

MODELS:

DR(N,P)(H, W) Series (DYNAFORCE)

Floor Mounted Hot Water Boilers

and Instantaneous Water Heaters

APPLICABLE REQUIREMENTS

ANSI Z21.13a-2010•CSA 4.9a-2010 – Gas-Fired Low Pressure Steam and Hot Water Boilers

ANSI Z21.10.3b-2008•CSA 4.3b-2008 – Gas Water Heaters