

Johnson and Jordan
Mechanical contractors

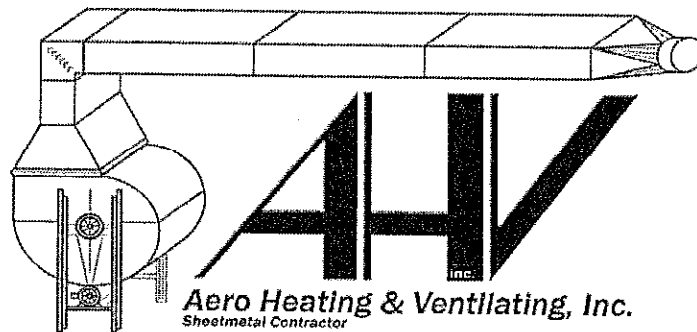
Submittal
WEX
Core & Shell

SUBMITTAL #25

#17418

GENERAL CONTRACTOR Cianbro Const.
SUBMITTED BY JOHNSON & JORDAN
SCARBOROUGH, ME.
(207) 883-8345
SUBCONTRACTOR Johnson & Jordan
SUPPLIER Aero Sheet Metal
SPECIFICATION SECTION N/A
PARAGRAPH N/A
ITEM Square & Round
Duct

18 Mussey Rd. Scarborough, ME
Approved _____ Approved as Noted _____
Re-Submit _____ Reviewed _____
Subject to Architects Approval x
Date 2/7/18 by Tim Michaud _____



WEX Office Core

Aero H&V Submittal

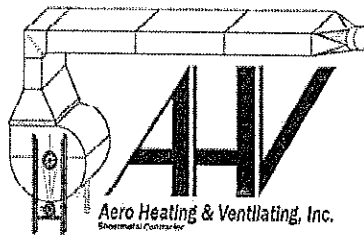
**Square & Round Duct
Construction**



Schedule of Material Application

Job Name: WEX Office Core

System Section	Sealant Class	Pressure Class	Material	Notes
Grease Duct for Tenant Fit-up Shaft	Welded	-	Black Iron	
Aluminum Duct for Tenant Fit-up Shaft	B	2"	Aluminum	<i>A/E: VERIFY TYPE 2 EQUIPMENT REQUIREMENTS</i>
Supply Duct for Tenant Fit-up Shaft	B	2"	Galv.	
Return Duct for Tenant Fit-up Shaft	B	Neg. -2"	Galv.	
AHU-B Ductwork Tenant Fit-up TO BE DETERMINED DUCT NOT IN CURRENT SCOPE	TBD	TBD	Galv.	TBD Tenant Space –DUCT NOT IN CURRENT SCOPE
EF-1 Duct at Louver EL-1	B	Neg. - 2"	Galv.	
ERV 1 & 2 Exhaust Air	B	Neg. - 2"	Galv.	
ERV 1 & 2 Supply /Ventilation Air (VA)	B	2"	Galv.	



Project: **WEX Office Core**

Rectangular Duct Construction Standards
2" Static Pressure (positive or negative)
TDF – 5' Joints with 2 ½' reinforcement spacing

Duct Size	Duct Gauge	JTR	Intermediate Reinforcement
0 – 26	26	NR	NR
27 – 36	26	NR	MPT
37 – 42	24	NR	MPT
43 – 54	22	NR	MPT
55 – 60	22	JTR	MPT
61 – 72	20	JTR	MPT
73 - 96	20	JTR	(2) MPT
97 & up	18	JTR	2.5 x 3/16 th ext angle

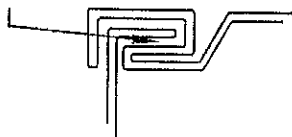
Notes:

1. NR is not required
2. JTR is joint reinforcement same as center tie rod
3. EMT is ½" up to 39" and ¾" 40" and over positive pressure, see end notes for negative pressure
4. Drive = T-1, S-Lock = T-6, TDF = T-25
5. 0-18 in 1" and 2" systems may be slip and drive in lieu of TDF
6. MPT is MidPanel Tie Rod

Aero Project Name:

Aero Project #:

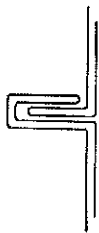
Pocket sealed at ends
when lock is sealed



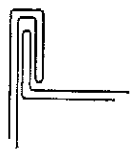
Pittsburgh Lock L-1



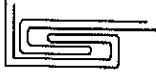
Grooved Seam also Called
Flat Lock or Pipe Lock L-3



Standing Seam L-4



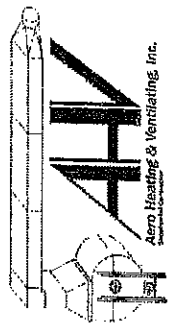
Single Corner Seam L-5



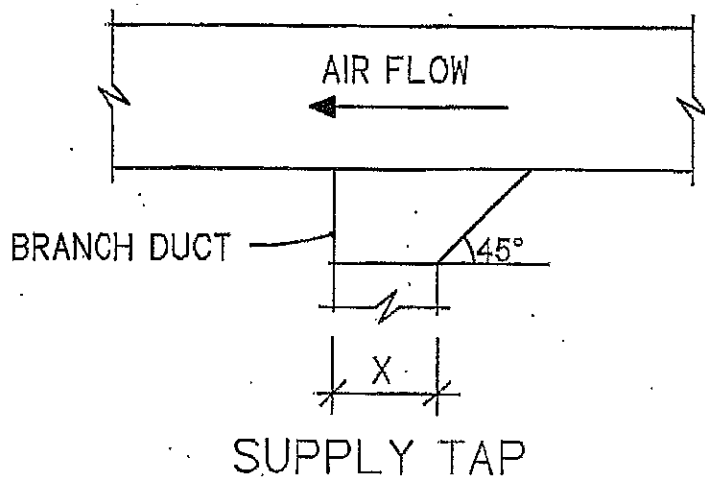
Double Corner Seam L-6

Longitudinal Seams - Rectangular Duct

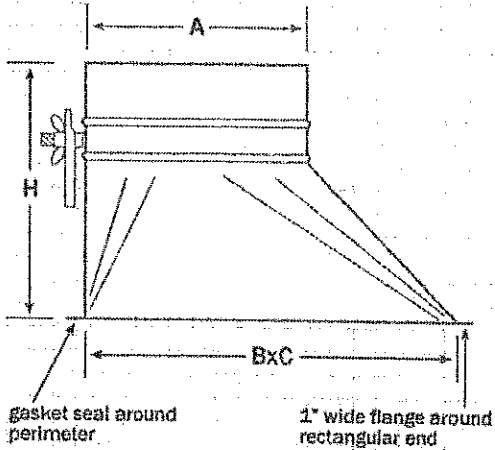
* Information taken from SMACNA Metal and Flexible 2005



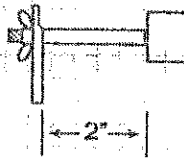
Branch Connection



High Efficiency Take-Off (HETD)



OPTION: 2" Shaft Extension Handle



Key

- A = Diameter, nominal size
- BxC = Base
- H = Height
- HETD - With damper

Materials Available

- Galvanized, 26 ga.
- Complete with peel & stick neoprene gasket

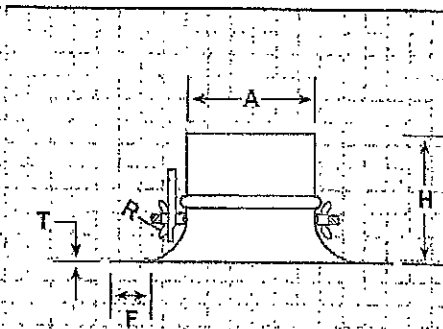
Options Available

- 2" Stand-offs (see shaft extension handle drawing to the left)

Dimensions

(A)	(BxC)	(H)	26 Ga. Weight
4"	10"x5.0"	9.5"	1.04#
5"	10"x5.0"	9.5"	1.60#
6"	12"x6.0"	9.5"	1.80#
7"	12"x6.0"	9.5"	2.00#
8"	12"x6.0"	9.5"	2.20#
9"	15"x6.0"	10.5"	2.80#
10"	16"x6.75"	10.5"	3.00#
12"	18"x8.5"	10.5"	3.60#
14"	20"x9.5"	10.5"	4.20#
16"	24"x12.0"	10.5"	6.60#

Bellmouth Take-Off with Damper (BTOBD)



Key

A = Pipe size (small end) H = Overall height
 R = Radius T = Flange thickness (gauge)
 F = Flange length

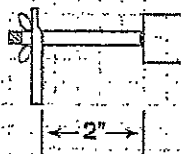
Materials Available

- Galvanized
- Sizes 4"-12" available in 24 gauge, stamped
- Sizes 14"-36" available in 20 gauge, spun

Options Available

- Sizes 4" to 36"
- Peel & stick gasket is standard on BTOBD
- 2" standoff

OPTION: 2" Shaft Extension Handle

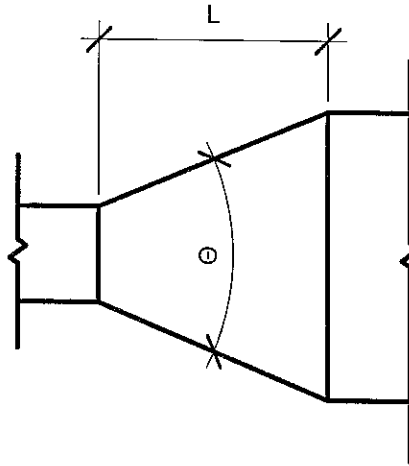


Dimensions

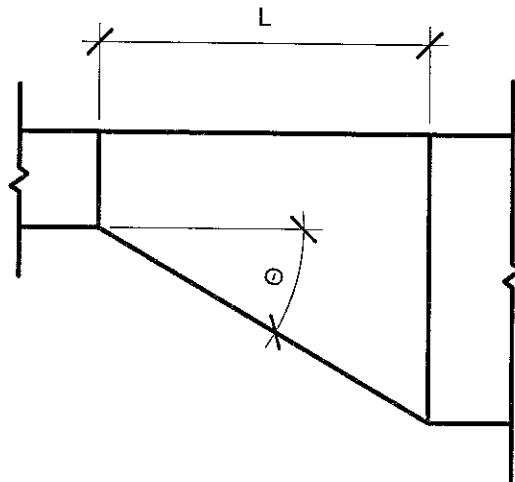
Size	(A)	(R)	(F)	(H)	(I)	Gauge	Weight Each
4"	3 7/8"	1.0"	1"	8.00"	.027"	24 ga.	1.0#
5"	4 7/8"	1.0"	1"	8.50"	.027"	24 ga.	1.2#
6"	5 15/16"	1.0"	1"	9.25"	.027"	24 ga.	1.6#
7"	6 7/8"	1.0"	1"	9.00"	.027"	24 ga.	2.4#
8"	7 15/16"	1.0"	1"	9.25"	.027"	24 ga.	2.4#
9"	8 7/8"	1.0"	1"	9.00"	.027"	24 ga.	3.0#
10"	9 15/16"	1.0"	1"	9.75"	.027"	24 ga.	2.1#
12"	11 15/16"	1.0"	1"	5.50"	.027"	24 ga.	2.6#
14"	13 7/8"	1.0"	.75"	6.50"	.034"	20 ga.	4.2#
16"	15 7/8"	2.0"	.75"	8.50"	.034"	20 ga.	6.4#
18"	17 7/8"	2.0"	1"	8.50"	.034"	20 ga.	7.4#
20"	19 7/8"	2.0"	1"	8.50"	.034"	20 ga.	8.2#
22"	21 7/8"	2.0"	1"	8.50"	.034"	20 ga.	9.0#
24"	23 7/8"	2.0"	1"	8.50"	.034"	20 ga.	9.4#
26"	25 7/8"	2.0"	1"	8.50"	.034"	20 ga.	13.0#
28"	27 7/8"	2.0"	1"	8.50"	.034"	20 ga.	13.0#
30"	29 7/8"	2.0"	1"	8.50"	.034"	20 ga.	17.0#
32"	31 7/8"	2.0"	1"	8.50"	.034"	20 ga.	17.0#
34"	33 7/8"	2.0"	1"	8.50"	.034"	20 ga.	21.0#
36"	35 7/8"	2.0"	1"	8.50"	.034"	20 ga.	21.0#

- 4", 5", 7" & 9" are short BTO's
- Peel & stick gasket is not available on 18"-36"

TRANSITIONS



CONCENTRIC TRANSITION
 AX. 45° DIVERGING, 60° CONVERGING



ECCENTRIC TRANSITION
 θ MAX. 30°
 (EXCEPT 45° IS PERMITTED
 AT ROUND TO FLAT OVAL)

AERO
 HEATING &
 VENTILATING

TRANSITIONS

CONCENTRIC &
 ECCENTRIC

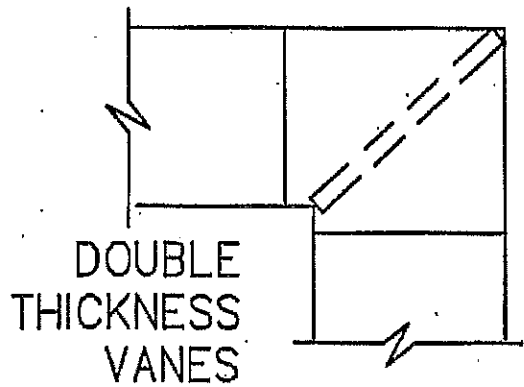
Date 1/30/2018

Drawn by AMJ



Scale 1/2" = 1'-0"

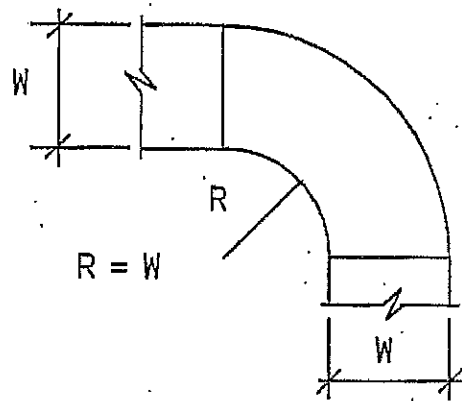
RECTANGULAR ELBOWS



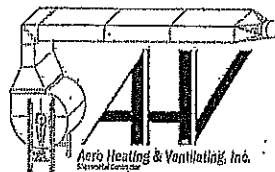
SQUARE ELBOW



RECTANGULAR ELBOWS



RADIUS ELBOW



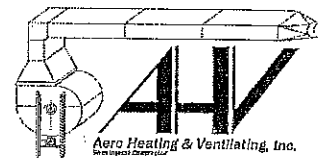
Aero Heating Ventilating, Inc.
Round Duct Construction Standards

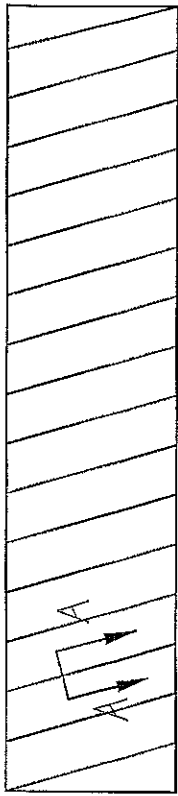
Spiral Seam Pipe

Size	Gauge	Reinforcement Interval	Gauge	Reinforcement Interval
	Up to 10" Pos.		2" Neg.	
4	28	none	28	none
6	28	none	28	none
8	28	none	28	none
10	28	none	28	none
12	28	none	28	none
14	28	none	28	none
16	26	none	26	10'
18	26	none	26	10'
20	26	none	26	10'
22	26	none	26	10'
24	26	none	26	10'
26	24	none	24	10'
28	24	none	24	10'
30	24	none	24	10'
36	24	none	24	10'
42	24	none	24	10'
44-54	22	none	22	10'
56-60	22	none	22	10'

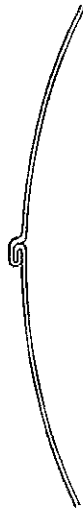
Notes:

1. No reinforcement is required on positive pressure.
2. Angle ring reinforcement for 2" neg pressure up to 54" is 1x1x1/8
3. Angle ring reinforcement for 2" neg pressure up to 56-60" is 1 1/4 x 1 1/4 x 3/16
6. Joints are beaded coupling

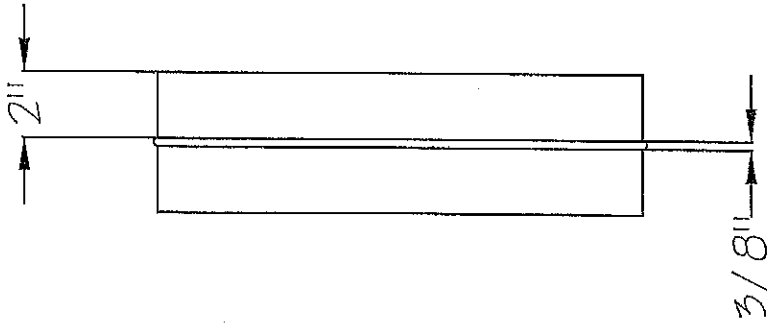




Spiral Duct Elevation View



Spiral Duct Seam
Section A-A



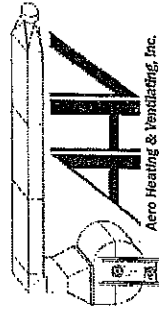
Slip Joint Coupling

* coupling gauge same as duct

Spiral Seam - Round Duct

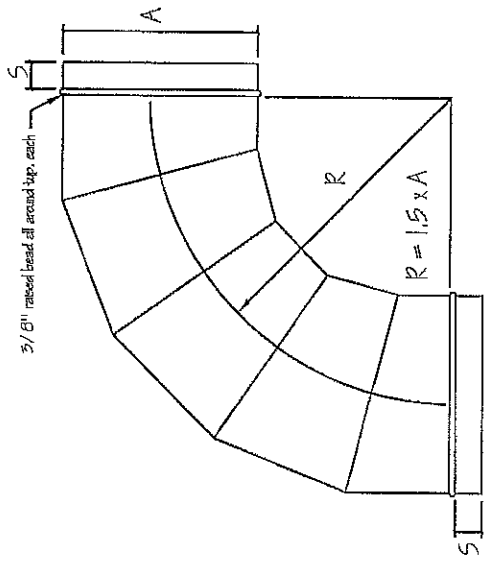
Information taken from SMACNA Metal and Flexible Manual 2005

* for gauges see "Round Duct Construction Standards"



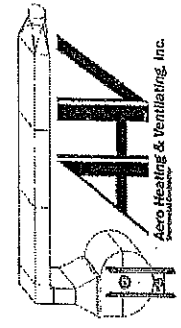
Duct Size	Gauge	115"	Joint
10 to 26	24	2"	slp
27 to 36	22	2"	slp
37 to 50	20	3"	slp
51 to 60	18	3"	slp

Construction Notes:
 1. All fittings to be spot welded or riveted construction
 2. Information taken from SMACNA 2005 Metal & Flexible Manual
 3. 90 deg els are 5 gpre, 60 deg elbows are 3 gpre, and 45 deg elbows are 2 gpre.

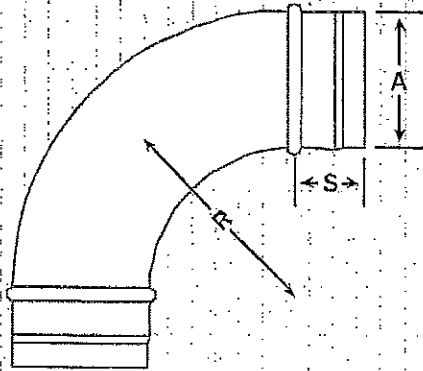


Round Elbows

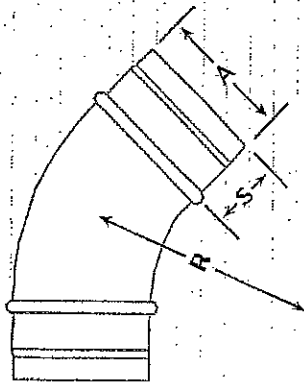
NTS



90° Die Stamped Flangeless Elbow
Galvanized (DSE90)
Galvaneal (NDSE90)



45° Die Stamped Flangeless Elbow
Galvanized (DSE45)
Galvaneal (NDSE45)



Key

A = Diameter
R = 1-1/2 A (centerline radius)
S = 2"

Materials Available

- Galvanized (3" to 7") 24 gauge
- Galvanized (8" to 12") 22 gauge
- Galvaneal (paint grip) (5" to 12") 22 gauge

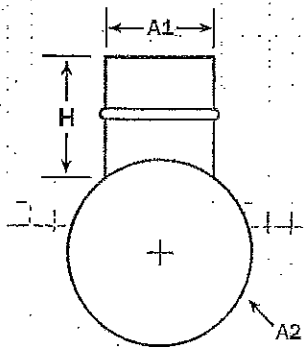
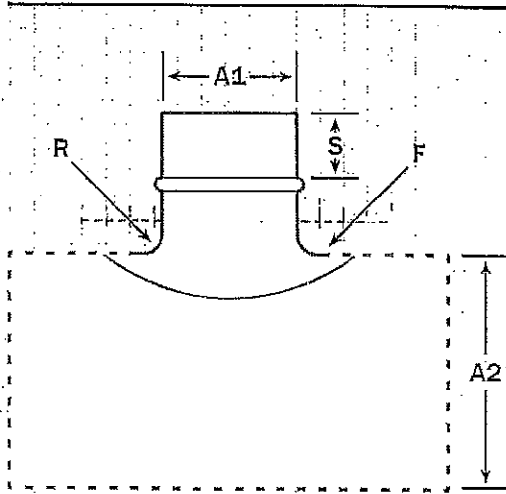
Welding Process

Flangeless elbows are continuously stitch welded on the throat and heel from end to end (past the bead).

Dimensions

Size	(A)	90° (R)	Wt. Per 90° Elbow (DSE90)	Wt. Per 90° Elbow (NDSE90)
3"	2-7/8"	4.5"	0.8#	0.8#
4"	3-7/8"	6.0"	1.4#	1.4#
5"	4-7/8"	7.5"	1.8#	2.5#
6"	5-7/8"	9.0"	2.2#	3.4#
7"	6-7/8"	10.5"	3.5#	4.4#
8"	7-7/8"	12.0"	4.7#	5.4#
9"	8-7/8"	13.5"	6.1#	5.9#
10"	9-7/8"	15.0"	7.6#	6.4#
12"	11-7/8"	18.0"	10.2#	9.0#
Size	(A)	45° (R)	Wt. Per 45° Elbow (DSE45)	Wt. Per 45° Elbow (NDSE45)
3"	2-7/8"	4.5"	0.6#	0.6#
4"	3-7/8"	6.0"	0.8#	0.8#
5"	4-7/8"	7.5"	1.0#	1.5#
6"	5-7/8"	9.0"	1.5#	2.0#
7"	6-7/8"	10.5"	1.8#	2.6#
8"	7-7/8"	12.0"	3.0#	3.2#
9"	8-7/8"	13.5"	3.5#	4.0#
10"	9-7/8"	15.0"	4.2#	4.8#
12"	11-7/8"	18.0"	6.5#	6.6#

90° Die Stamped Saddle Tap (DSTB & DSTNB)



Key

A1 = Branch (nominal) size R = Radius
A2 = Pipe (nominal) size F = Flange on pipe

R = 0.787" (4 on 4 – 6 on 20/22/24),
1.0" (8 on 8 – 12 on 22/24)

F = 1.0" (4 on 4 – 8 on 20/22/24),
2.0" (10 on 10 – 12 on 22/24)

S = 1-1/4" (4 on 4 – 5 on 16/24),
1-1/2" (6 on 6 – 12 on 22/24)

Materials Available

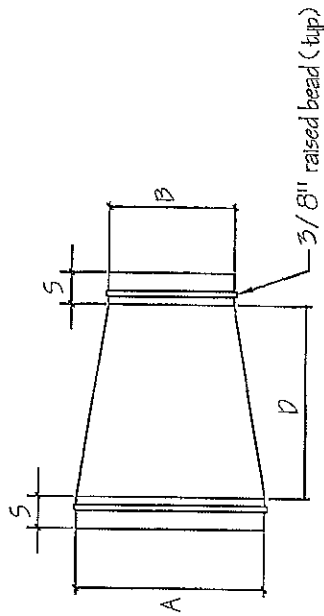
- Galvanized, 24 ga.

Options Available

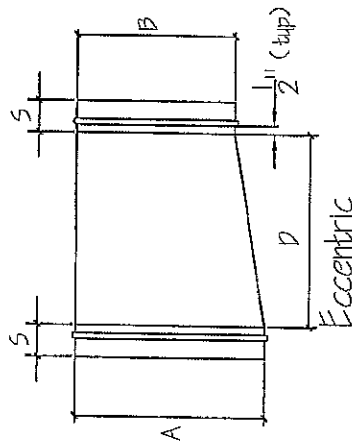
- Damper collars in 6" lengths (see DSTDC6 spec)
- Bead or no bead

Dimensions

(A1)	(A2)	Weight Each	(H)
4"	4"	0.4#	2"
4"	5"	0.4#	2"
4"	6"-7"	0.4#	2"
4"	8"	0.4#	2"
4"	9"-10"	0.4#	2"
4"	12"-14"	0.4#	2"
4"	16"-24"	0.4#	2"
5"	5"	0.7#	2-1/8"
5"	6"-7"	0.7#	2-1/8"
5"	8"-9"	0.7#	2-1/8"
5"	10"	0.7#	2-1/8"
5"	12"-14"	0.7#	2-1/8"
5"	16"-24"	0.7#	2-1/8"
6"	6"	0.8#	3-1/8"
6"	8"	0.8#	3-1/8"
6"	10"-12"	0.7#	3-1/8"
6"	14"-18"	0.7#	3-1/8"
6"	20"-24"	0.6#	3-1/8"
8"	8"	1.1#	3-3/8"
8"	10"	1.3#	3-3/8"
8"	12"-14"	1.1#	3-3/8"
8"	16"-18"	1.1#	3-3/8"
8"	20"-24"	1.0#	3-3/8"
10"	10"	1.8#	3-3/8"
10"	12"	2.0#	3-3/8"
10"	14"-16"	1.8#	3-3/8"
10"	18"-20"	1.8#	3-3/8"
10"	22"-24"	1.7#	3-3/8"
12"	12"	2.3#	3-1/2"
12"	14"-16"	2.0#	3-1/2"
12"	18"-20"	2.3#	3-1/2"
12"	22"-24"	2.1#	3-1/2"



Concentric



Eccentric

Concentric		Eccentric	
A minus B 2" and 4"	D 4"	A minus B 2" & 4"	D 8"
3" to 4"	8"	3" to 4"	16"
5" to 6"	12"	5" to 6"	24"

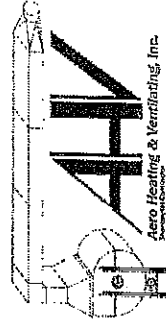
Construction		Joint	
Duct Size	Gauge	S	slip
4 to 14	28	2"	slip
16 to 18	26	2"	slip
19 to 24	26	2"	slip
25 to 42	24	2"	slip
41 to 60	22	3"	slip
61 to 96	22	3"	slip

Construction Notes

1. All fittings to be spot welded or riveted construction
2. Fitting length to change ratio is 4:1

Round Transitions

NTS



SUBMITTAL REVIEW



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

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

Date: 1/5//2018
Job Number: 17418

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

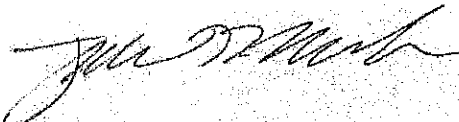
Submittal(s):

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	CAMUS BOILERS	NET	-PROVIDE WITH 75 PSI RELIEF VALVE (BOILERS ARE IN PENTHOUSE)



Jacob Martin, PE
Johnson & Jordan, Inc.

Johnson and Jordan
Mechanical contractors

Submittal
WEX
Core & Shell

#17418

SUBMITTAL #5

GENERAL CONTRACTOR Cianbro Const.
SUBMITTED BY JOHNSON & JORDAN
SCARBOROUGH, ME.
(207) 883-8345
SUBCONTRACTOR Johnson & Jordan
SUPPLIER Blake Equipment
SPECIFICATION SECTION N/A
PARAGRAPH M601 Sch.
ITEM Boilers

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	Date: 12/12/2017	Job: 30604
18 Mussey Road Scarborough Maine	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 - HI W 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 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 retrials. 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 ^A	460VAC, 60Hz, 3 Phase	10

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

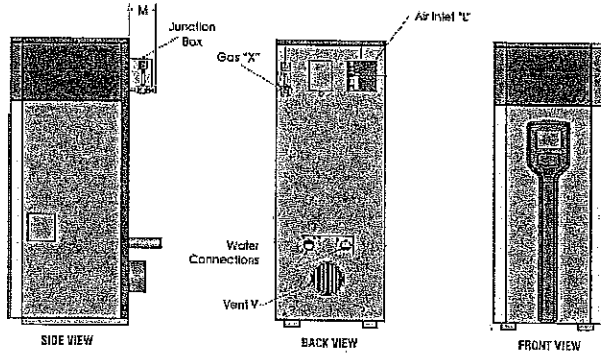
**This is a 5-wire power supply requiring three (3) lives, a neutral and a ground

^A 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	1706
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	126.5	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	132.0	14.0	100.2	9.2
1600	151.8	14.1	121.4	9.3
1800	170.9	14.3	136.7	8.4
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	6 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

CAMUS

hydronics Ltd.

Quantity of Four (4)

NEUTRALIZER SPECIFICATIONS

Neutralizer Model: FMC J12-58

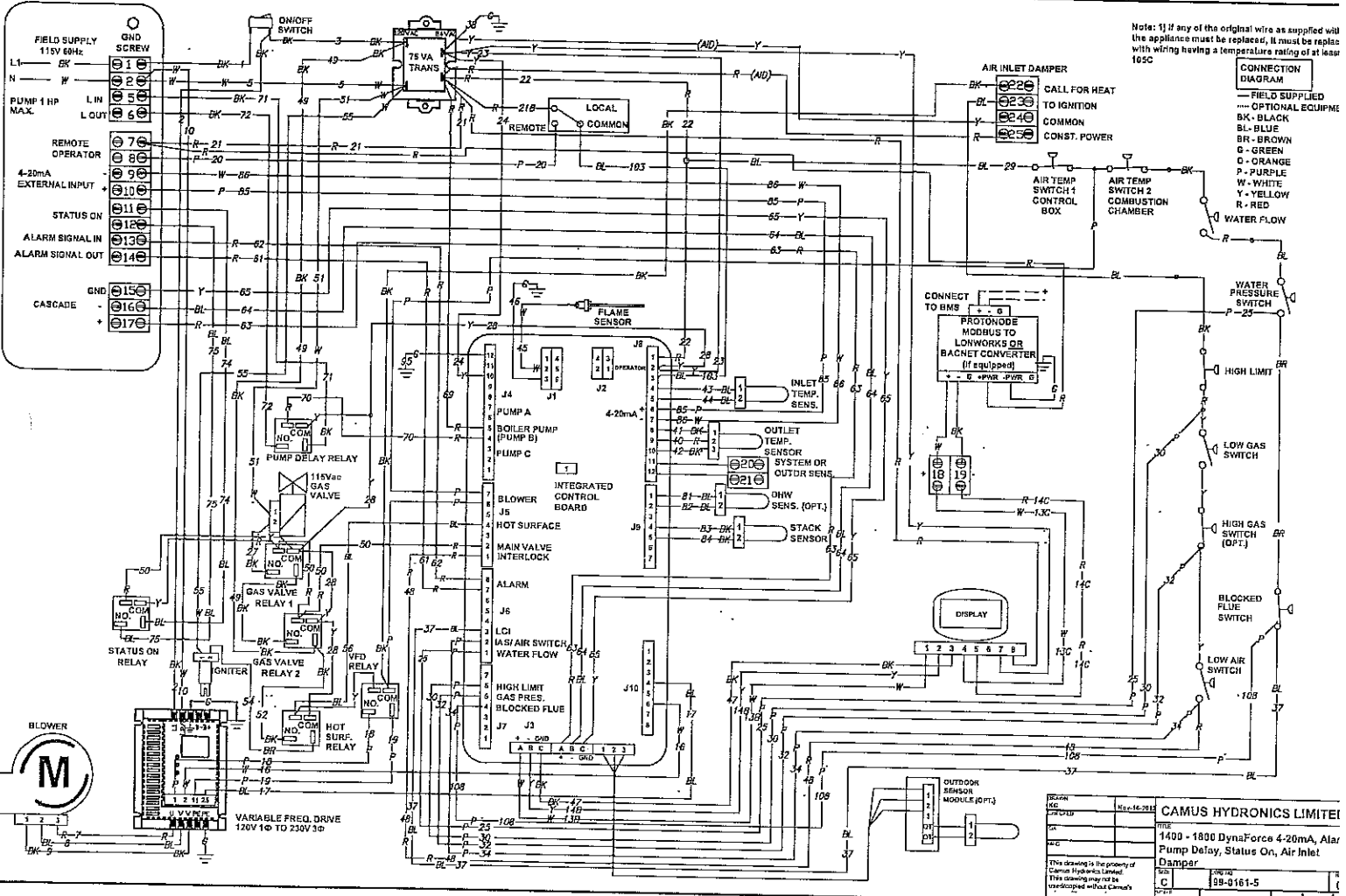
Applicable for inputs up to 2 million Btu/hr

- Overall length; 15 $\frac{3}{4}$ "
- Diameter 1 $\frac{1}{4}$ " pvc
- Overall weight; 1 lb 7 $\frac{1}{2}$ 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 $\frac{1}{2}$ " 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.



Note: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring having a temperature rating of at least 105C.

CONNECTION DIAGRAM

- FIELD SUPPLIED
- OPTIONAL EQUIPME
- BK - BLACK
- BL - BLUE
- BR - BROWN
- G - GREEN
- O - ORANGE
- P - PURPLE
- W - WHITE
- Y - YELLOW
- R - RED

REV	DATE	BY	CHKD

CAMUS HYDRONICS LIMITE

1400 - 1800 DynaForce 4-20mA, Alarm Pump Delay, Status On, Air Inlet Damper

Rev: C
Date: 88-0181-5

SUBMITTAL REVIEW



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

Date: 1/17//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

Jacob Martin, PE
Johnson & Jordan, Inc.



TRANE[®]

Submittal

Trane U.S. Inc.

Prepared For:
Tim Michaud

Date: 11/29/2017

**Sold To: Johnson &
Jordan**

Customer P.O. Number:
Customer Project Number:

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 (N) Tagged ERV-1, 2

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-F00001LN-A1J00AF1JR-G70B0B400

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: Trane UC600 - Discharge Air Control w/BACNET w/Display

Powered Exhaust: Direct Drive w/VFD & Gravity Damper

Energy Recovery & Conservation: ERC-6876A

Damper Options: 2-Position Outdoor Air Damper

Filters: MERV-8

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

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			

Free Cooling Performance

Gross Total Capacity:	295.4	MBh	Evaporator Face Area:	22.08	sq ft
Entering Air DB:	20	F	Evaporator Rows / FPI:	6 / 12	
Leaving Air DB:	48.4	F	Entering Fluid Temp:	60	F
Air Velocity:	435	fpm	Leaving Fluid Temp:	52.4	F
Coil Air PD:	0.38	in H2O	Fluid Flow:	82	GPM
			Fluid Pressure Drop:	6.2	ft. H2O
			Fluid Type:	Propylene	
			Percent Glycol:	30	%

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

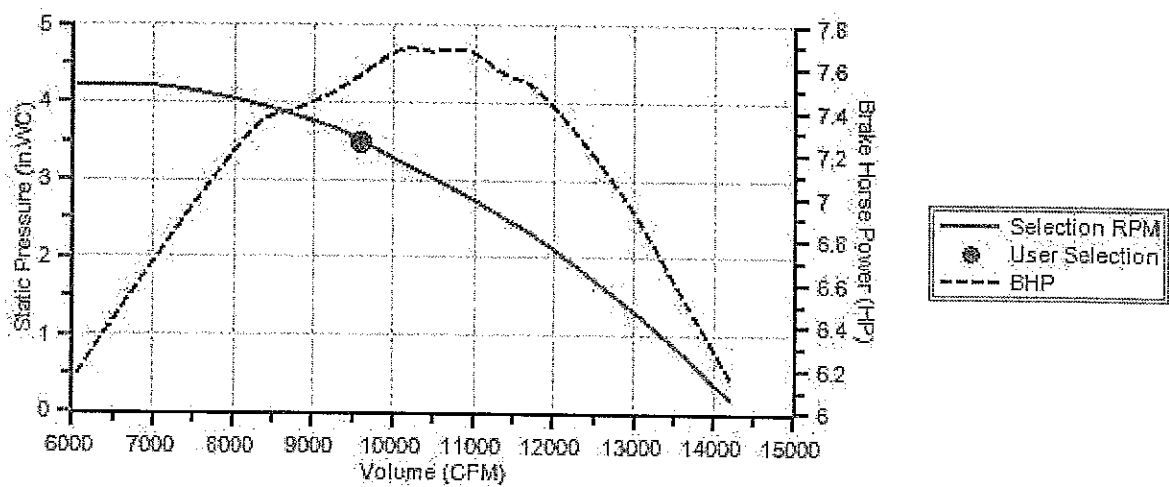
Summer Conditions	
<u>Ventilation Supply</u>	<u>Outside</u>
Airflow: 9,600 CFM	Airflow: 9,745 CFM**
DB: 79.1 F	DB: 89.0 F
WB: 68.1 F	WB: 73.0 F
PD: 0.80 in H2O	
<u>Return</u>	<u>Exhaust</u>
Airflow: 8,345 CFM	Airflow: 8,490 CFM
DB: 74.0 F	DB: 85.4 F
WB: 65.0 F	WB: 71.0 F
ESP: 1.00 in H2O	ERV PD: 0.66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

Winter Conditions	
<u>Ventilation Supply</u>	<u>Outside</u>
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	
<u>Return</u>	<u>Exhaust</u>
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



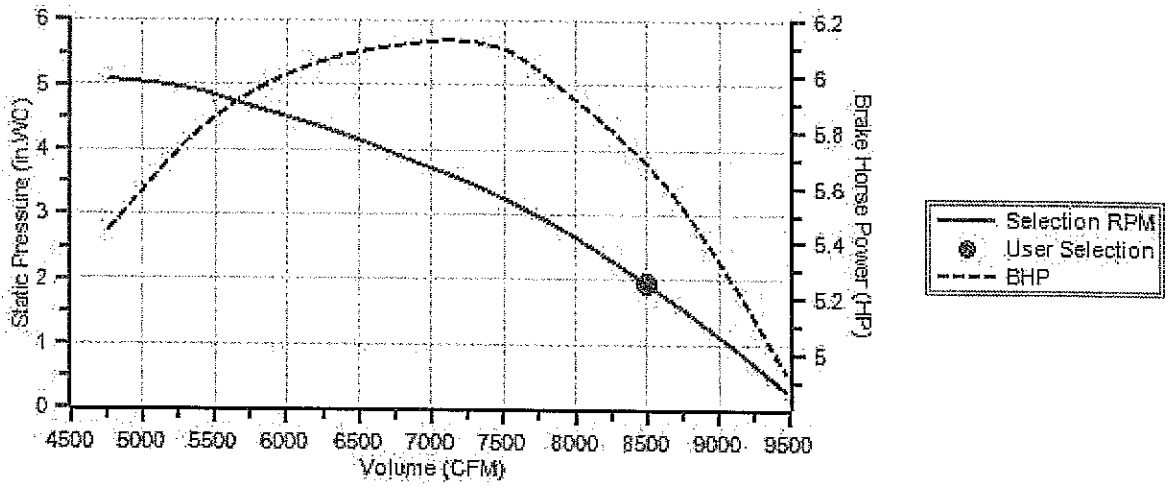
Supply Pressure Drop Summary

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:	25.3 Amps
Unit Amps - FLA:	22.99 Amps	Maximum Fuse Size - MFS:	30 Amps

Electrical Summary

Component	Fan Service	Qty	HP (ea.)	FLA (ea.)	RLA (ea.)	LRA (ea.)
ERV/HRV		1	0.17	0.29		
	Exhaust	1	7.5	9.3		
	Supply	2	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

Free Cooling Capacity

Customer: KCC International
Project: Chilled Water Coil
Item: OAN 30-45T

Date: 11/7/2017

Units: English

Propylene Glycol Coil Coil Qty: 1 Model: 60x53 - 6R - 0.5/144

Input

Airside Requirements:

Coil Application:		Heating
Air Flow:	SCFM	9,550
Capacity:	Btu/Hr.	312,285
Entering Air Dry-Bulb:	°F	20.0
Leaving Air Dry-Bulb:	°F	50.0
Air Pressure:	PSIA	14.696
Coil Hand:		Right Hand

Tubeside Requirements:

Tubeside Fluid:		Propylene Glycol
Flow Rate:	GPM	82.0
Entering Fluid Temperature:	°F	60.0
Glycol Percent:		30%

Output

Coil Selection:

Model Number:		60x53 - 6R - 0.5/144
Tube Size:	In.	0.500
Arrangement:		1.25 x 1.083 Staggered
Fin Surface:		Corrugated
Face Area / Coil:	ft ²	22.1
Face Velocity / Coil:	Ft/Min. (STD)	432.5
Number Of Circuits:	Qty	48
Tube Velocity:	Ft/Second	2.9
Reynolds Number:		2,895
Circuitry Flow:		Thermal Counter Flow
Tube Material:		Copper
Tube Wall:	In.	0.016
Fin Material:		Aluminum
Fin Thickness:	In.	0.0055
Header OD:	In.	2.625
Header Material:		Std.Type 'L' Copper
Connection OD:	In.	2.625
Casing Material:		16 Ga. Galv. Steel (Std.)
Casing Depth:	In.	8.500
Dry Weight:	Lbs./Coil	381

Coil Rating

Capacity:

Capacity / Coil:	Btu/Hr.	295,414
Leaving Air Dry-Bulb:	°F	48.4
Air Friction:	In.H2O/Coil	0.38
Surface Condition:		Dry
Leaving Fluid Temperature:	°F	52.4
Fluid Pressure Drop:	Ft.H2O/Coil	6.25

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		
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

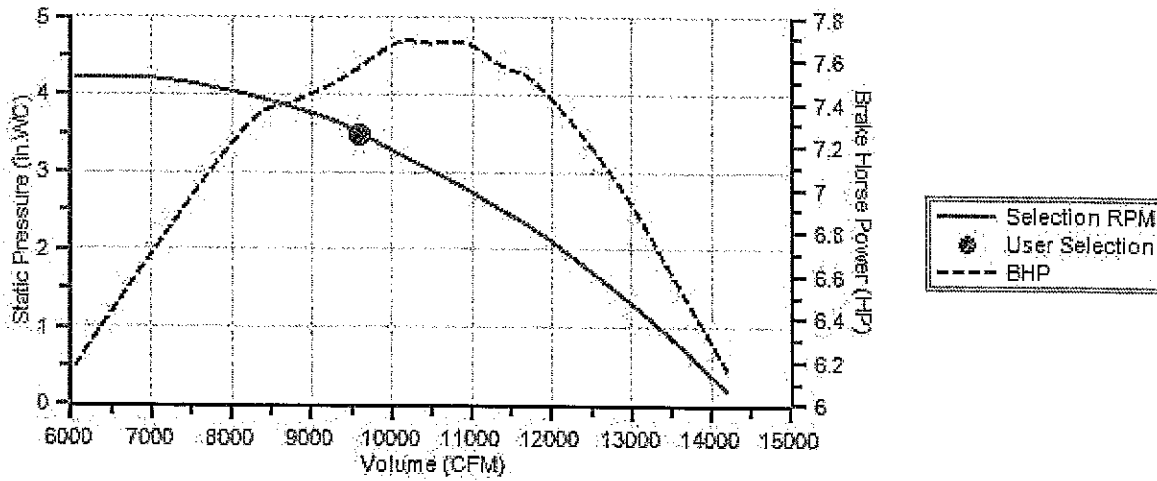
Heat Type:	Gas Furnace	Entering Air DB:	45.6 F
Input Capacity:	350 MBh	Leaving Air DB:	72.6 F
Output Capacity:	280 MBh	Coil Air PD:	0.62 in H2O

Energy Recovery Wheel ERC-6876A

** TAB Outside airflow through OA Intake to this value

Summer Conditions				Winter Conditions			
Ventilation Supply		Outside		Ventilation Supply		Outside	
Airflow:	9,600 CFM	Airflow:	9,745 CFM**	Airflow:	9,600 CFM	Airflow:	9,745 CFM**
DB:	79.1 F	DB:	89.0 F	DB:	45.7 F	DB:	-5.0 F
WB:	68.1 F	WB:	73.0 F	WB:	43.0 F	WB:	-6.0 F
PD:	0.80 in H2O			PD:	0.71 in H2O		
Return		Exhaust		Return		Exhaust	
Airflow:	8,345 CFM	Airflow:	8,490 CFM	Airflow:	8,345 CFM	Airflow:	8,490 CFM
DB:	74.0 F	DB:	85.4 F	DB:	72.0 F	DB:	13.7 F
WB:	65.0 F	WB:	71.0 F	WB:	60.0 F	WB:	13.7 F
ESP:	1.00 in H2O	ERV PD:	0.66 in H2O	ESP:	1.00 in H2O	ERV PD:	0.62 in H2O
Total Capacity:	176.21 MBH	Total Capacity:	749.56 MBH	Total Capacity:	176.21 MBH	Total Capacity:	749.56 MBH
Sensible Capacity:	103.88 MBH	Eff. 0.76		Sensible Capacity:	533.07 MBH	Eff. 0.76	
Latent Capacity:	72.33 MBH	Eff. 0.71		Latent Capacity:	216.49 MBH	Eff. 0.71	

Supply Fan CF180x2



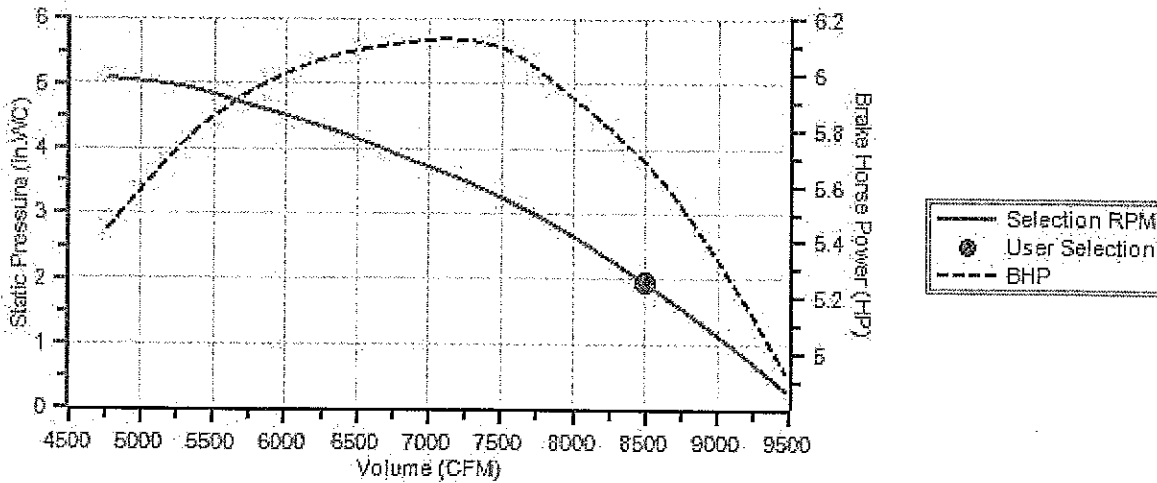
Supply Pressure Drop Summary

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

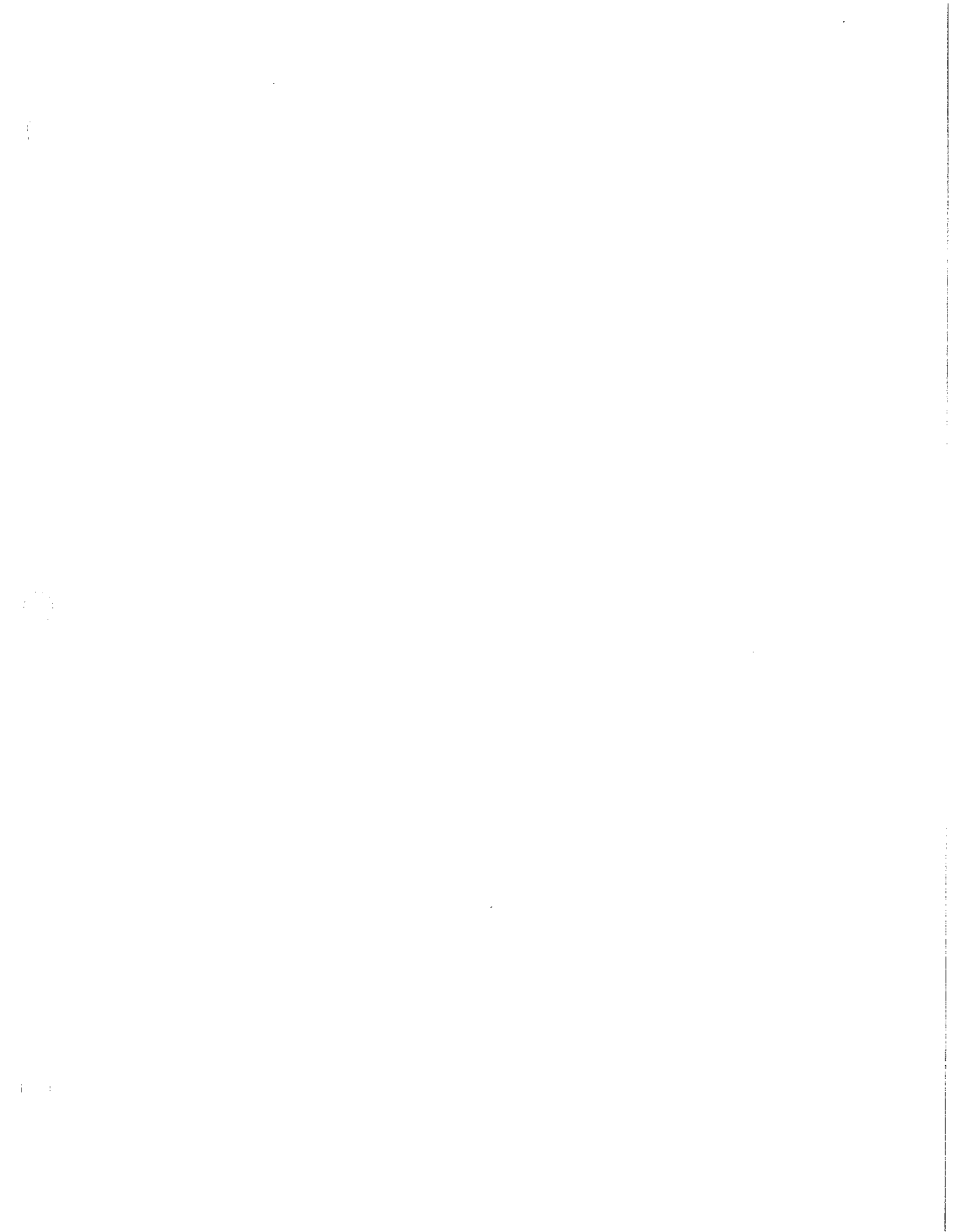
Unit Voltage-Ph-Hz: 460-3-60
 Unit Amps - FLA: 22.99 Amps
 Min Circuit Ampacity - MCA: 25.3 Amps
 Maximum Fuse Size - MFS: 30 Amps

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	6.2		
Controls		1		1		

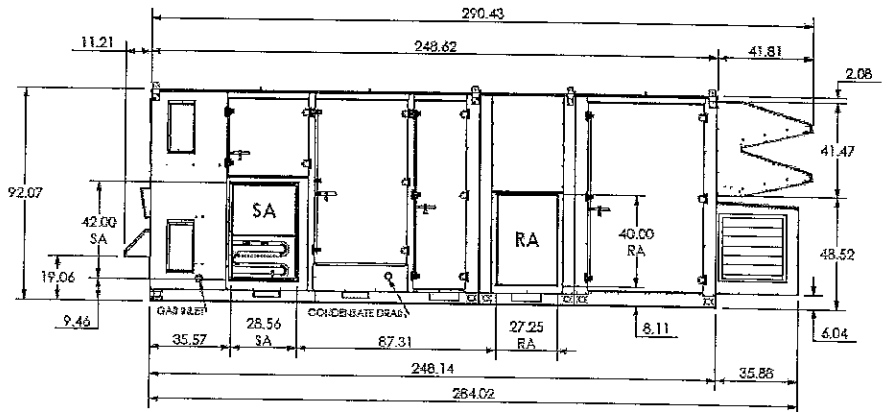
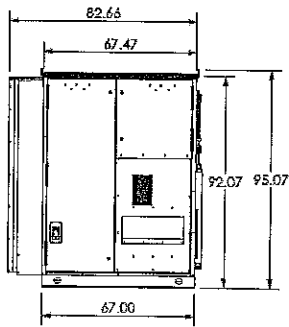
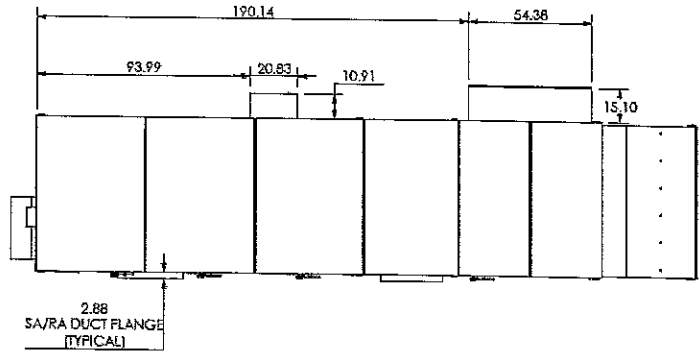
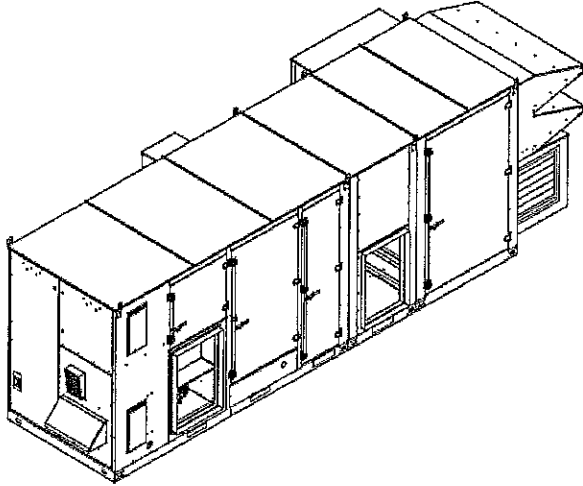
Notes

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



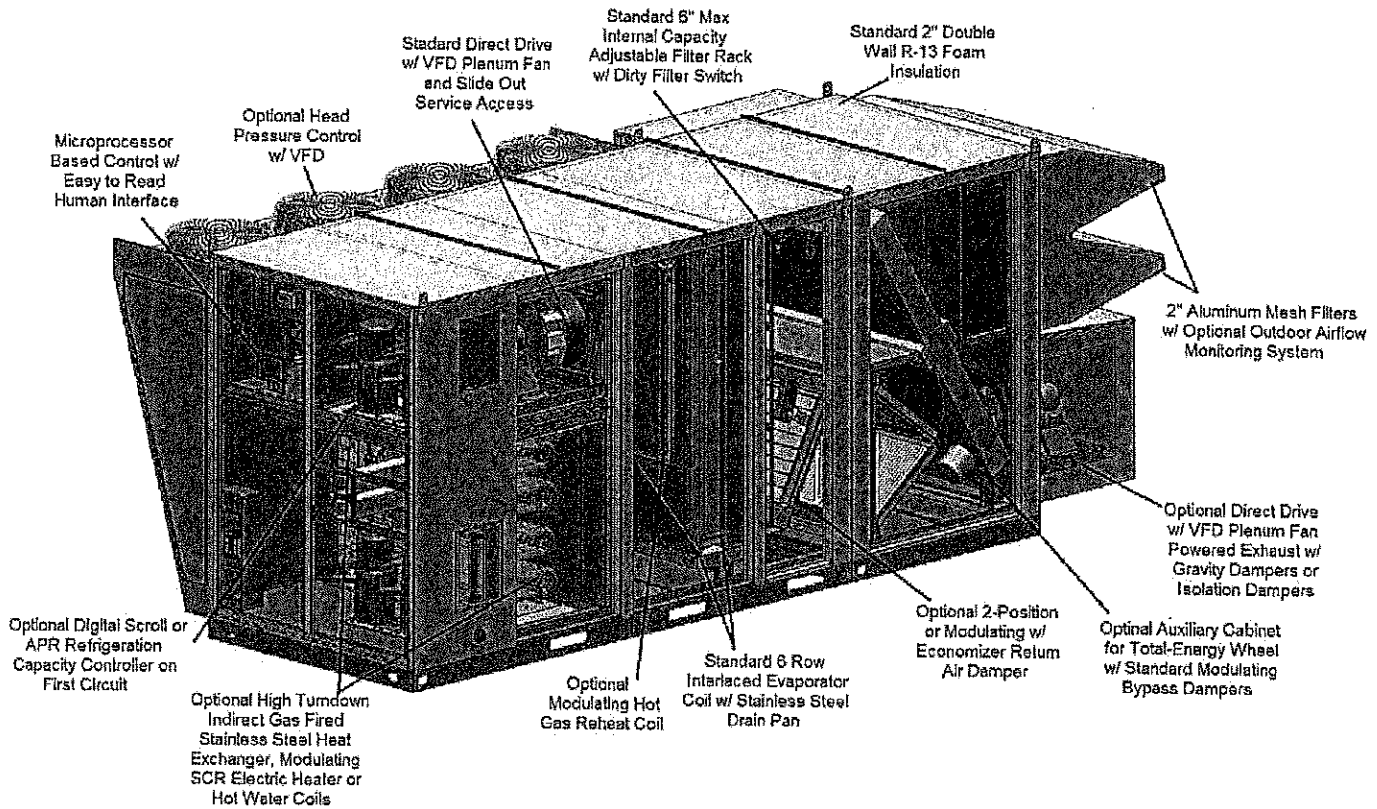
Unit Dimensions - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

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



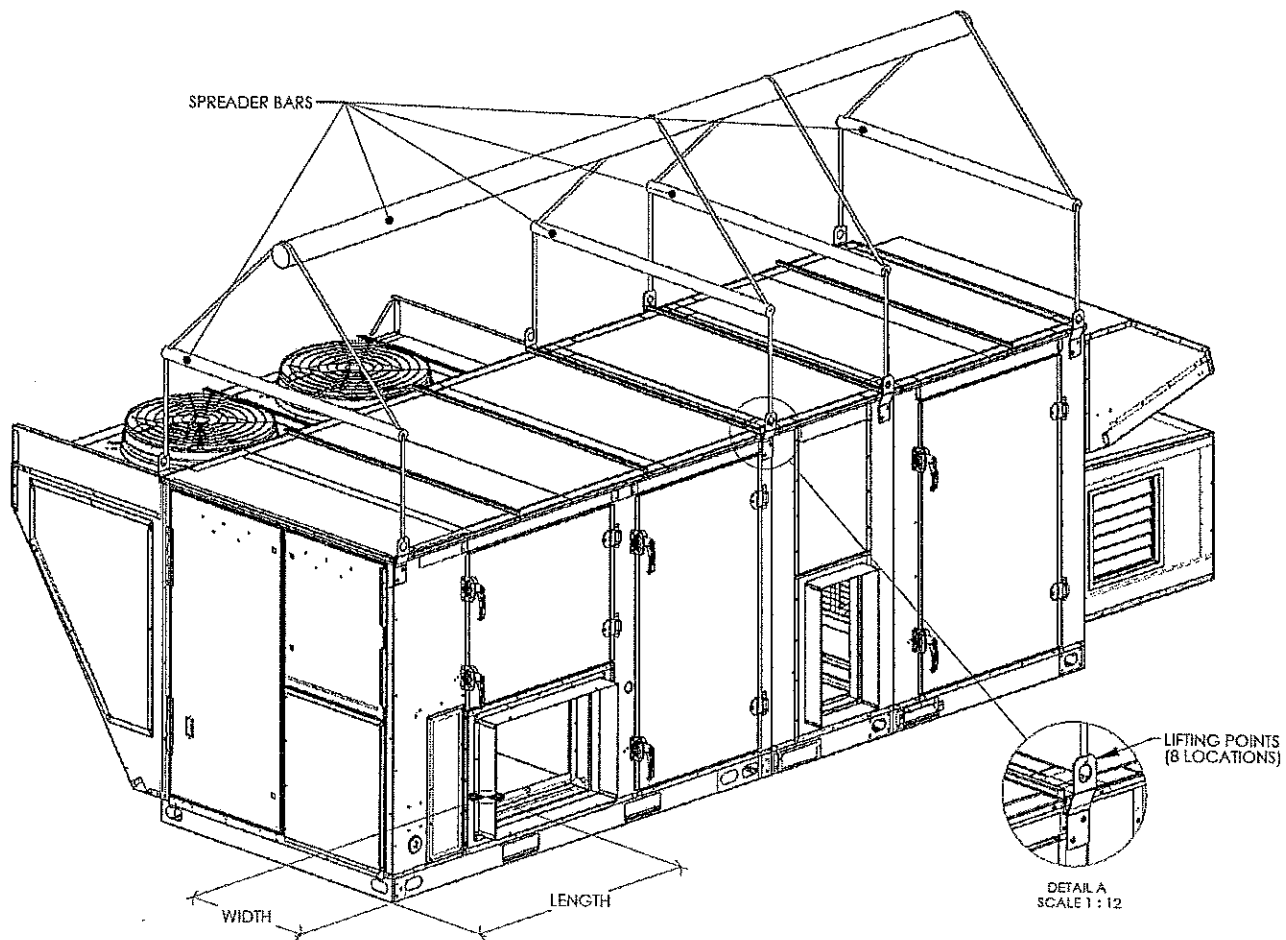
Component Layout - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

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



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

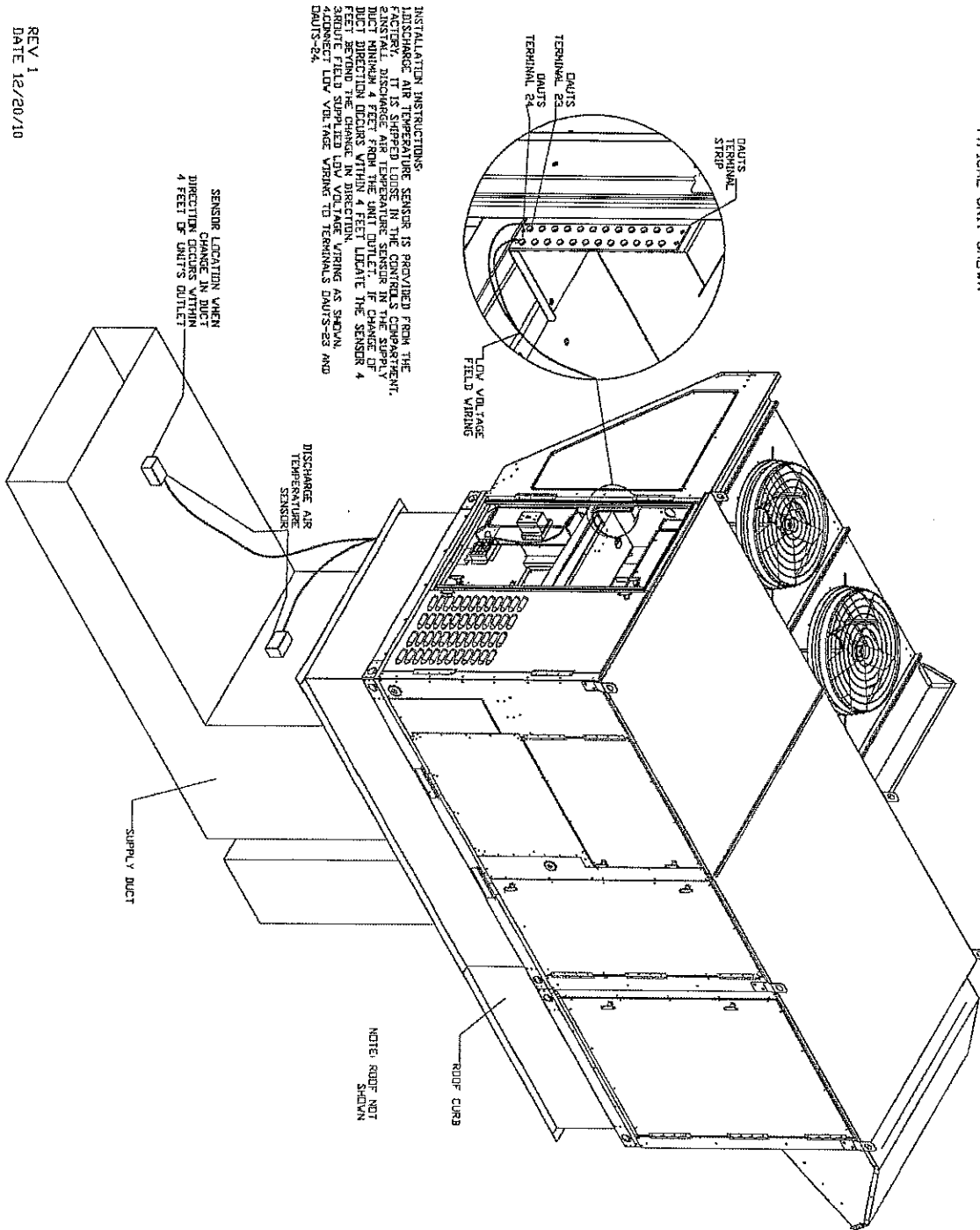
Qty: 2 Tags: ERV-1 East, ERV-2 West



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

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

TYPICAL UNIT SHOWN



INSTALLATION INSTRUCTIONS:
 DISCHARGE AIR TEMPERATURE SENSORS ARE PROVIDED FROM THE FACTORY. IT IS SHIPPED LOOSE IN THE CONTROL COMPARTMENT. INSTALL DISCHARGE AIR TEMPERATURE SENSORS IN THE SUPPLY DUCT MINIMUM 4 FEET FROM THE UNIT OUTLET. IF CHANGE OF DUCT DIRECTION OCCURS WITHIN 4 FEET LEAVE THE SENSOR 4 FEET FROM THE UNIT OUTLET. FIELD WIRING AS SHOWN. SERVICE FIELD SUPPLIED BY VOLTAGE WIRING AS SHOWN. 4-CONNECT LOW VOLTAGE WIRING TO TERMINALS DAUITS-23 AND DAUITS-24.

SENSOR LOCATION WHEN DIRECTION CHANGES WITHIN 4 FEET OF DAUITS OUTLET

DISCHARGE AIR TEMPERATURE SENSORS

SUPPLY DUCT

NOTE: ROOF NOT SHOWN

ROOF CURB

LOW VOLTAGE FIELD WIRING

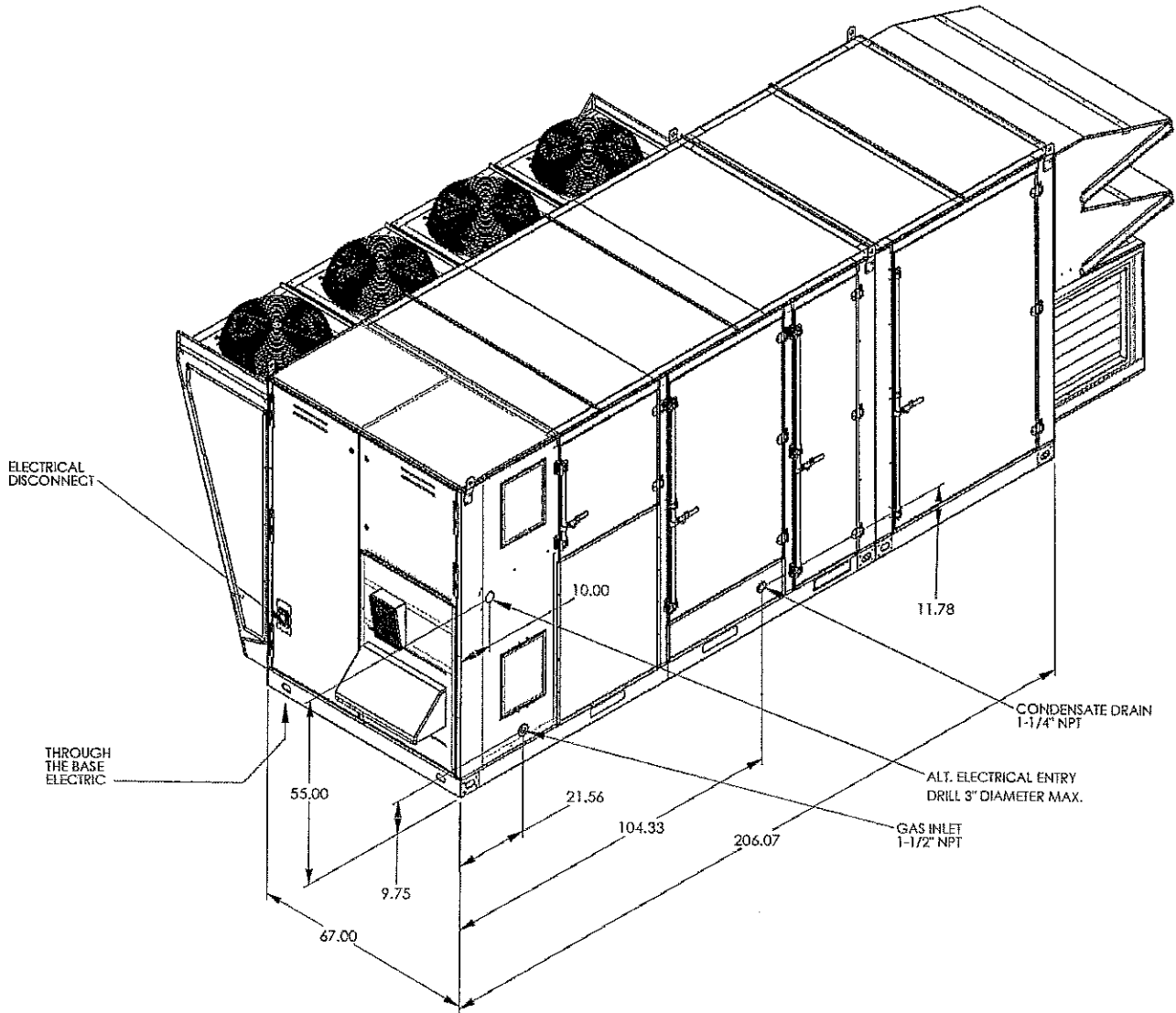
DAUITS TERMINAL STRIP

DAUITS TERMINAL 23
 DAUITS TERMINAL 24

REV 1
 DATE 12/20/10

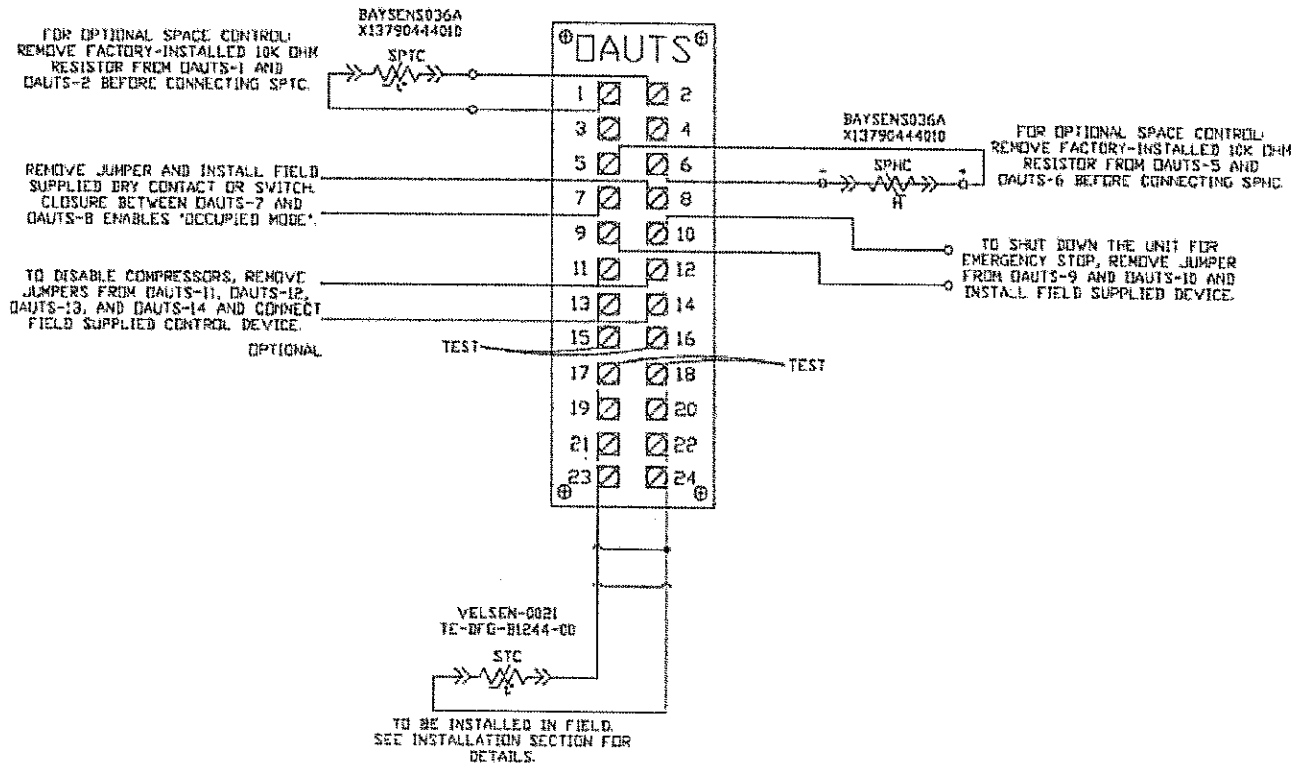
Utility Connections - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

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



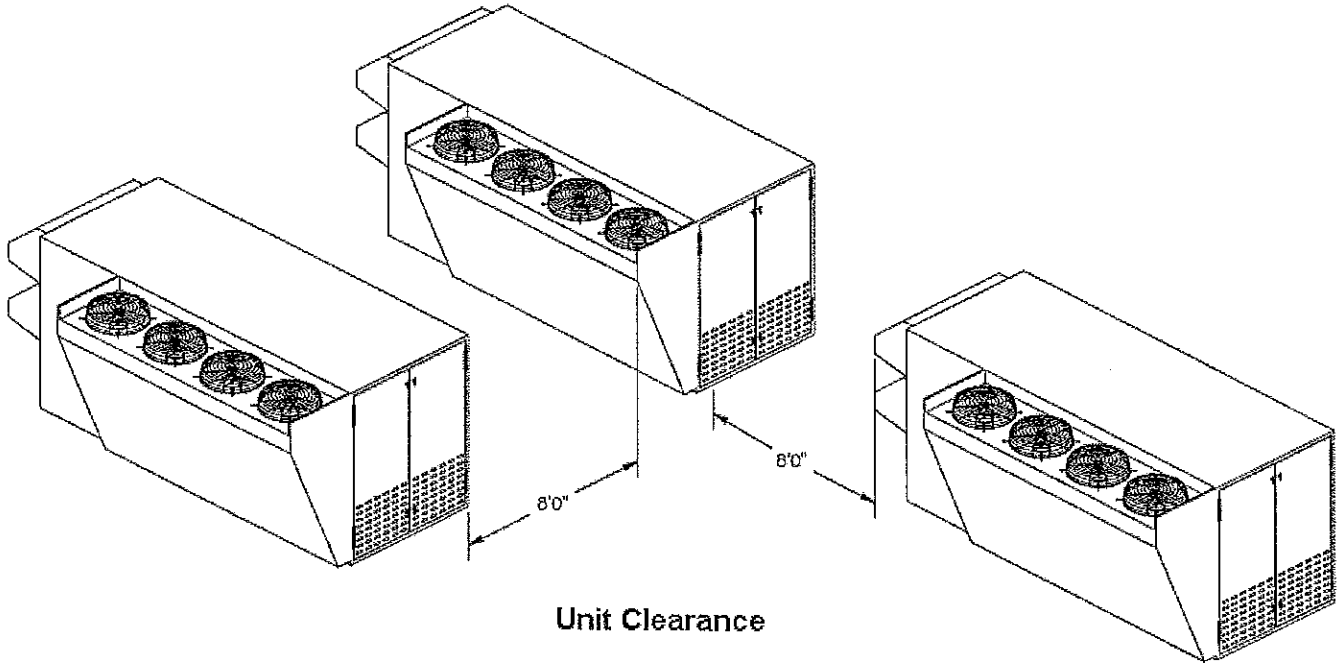
Field Wiring - 3-54 Ton T-410A PKGD Unitary Cooling Rooftop

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

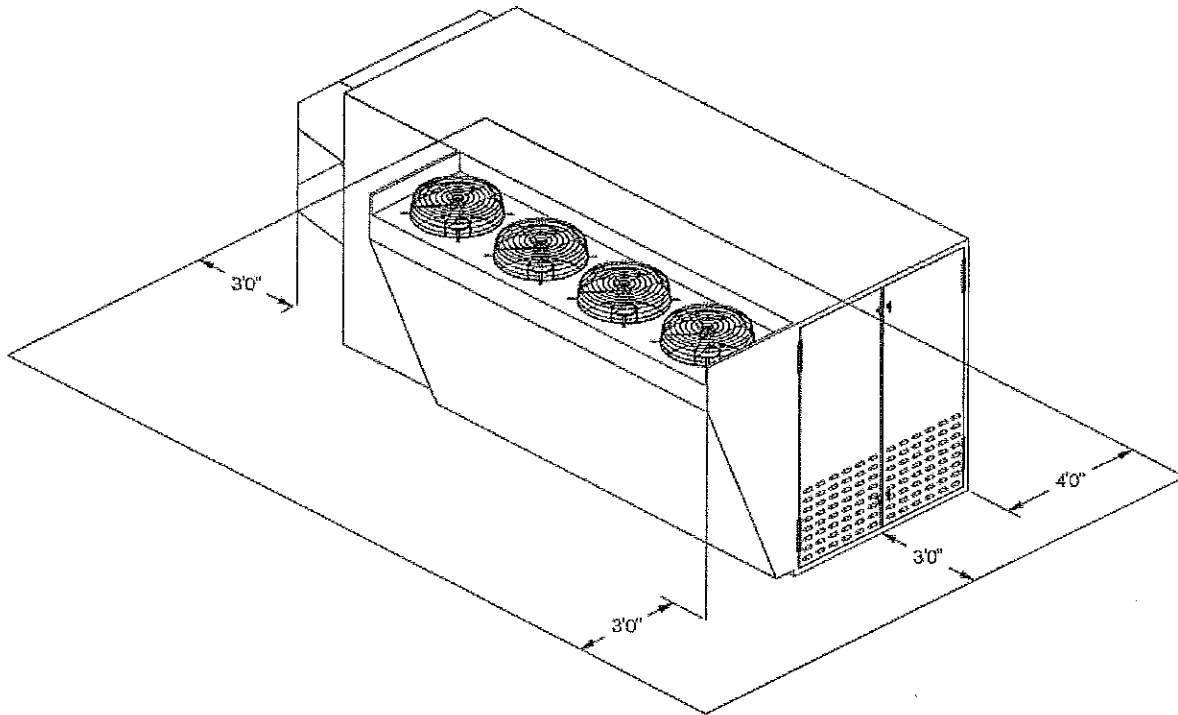


Clearance Diagram - 30-54 Ton R-410A PKGD Unitary Cooling Rooftop

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



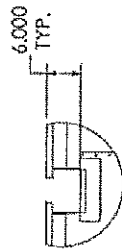
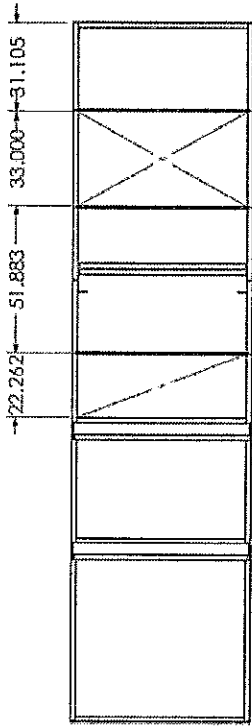
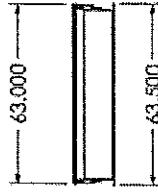
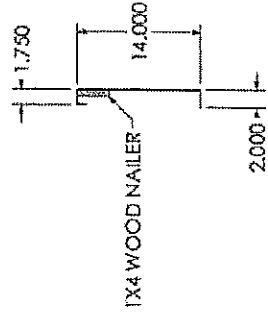
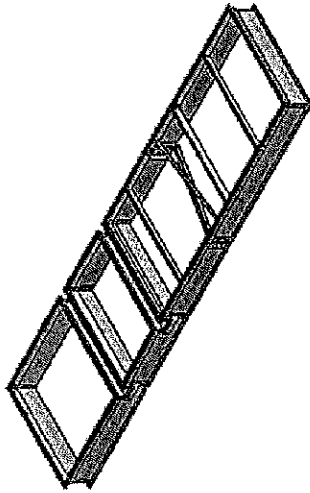
Unit Clearance



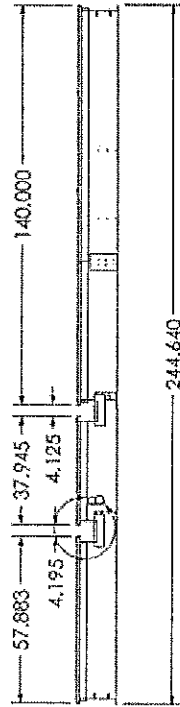
Service Clearance

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

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



DETAIL B
SCALE 1 : 25



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

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

100 FT GASKET

FOLDER LOCATION: R:\CUSTOMERS\OASU\CURB\OX CURB MODEL\EXC-OASU-ERV-ON-ADA

2715 Grassland Drive
Louisville, KY 40299
1-800-382-2872
Fax: (502) 491-1739



PART: OASU-KD CURB
PART DESCRIPTION: RINOC DOWN CLIP CURB FOR OASU HVAC UNIT

DRAWN BY	REVISED BY
BCM	
DRAWN DATE	REVISED DATE
11/30/15	



11/30/15

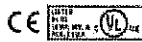
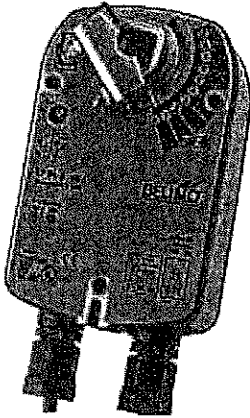
CURRENT

REVISION:

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.

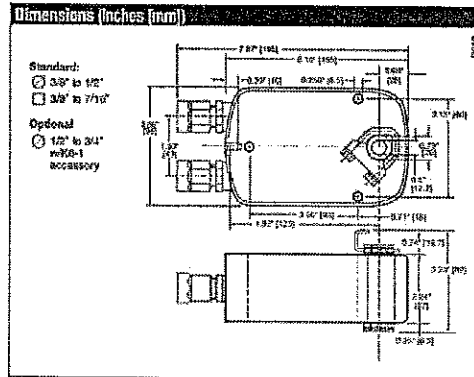
The LF series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°.

The actuator may be stalled anywhere in its normal rotation without the need of mechanical and 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 safely interlocking 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	2.5 W
Transformer sizing		7 VA (class 2 power source)
Electrical connection		3 ft, 18 GA appliance cable
(LF24-S US has 2 cables)		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/CSA G22.2 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)



M1024 - (5/16) - Subject to change. © Belimo Americas (USA), Inc.



Product Data Sheet

Tracer™ TD7 Display

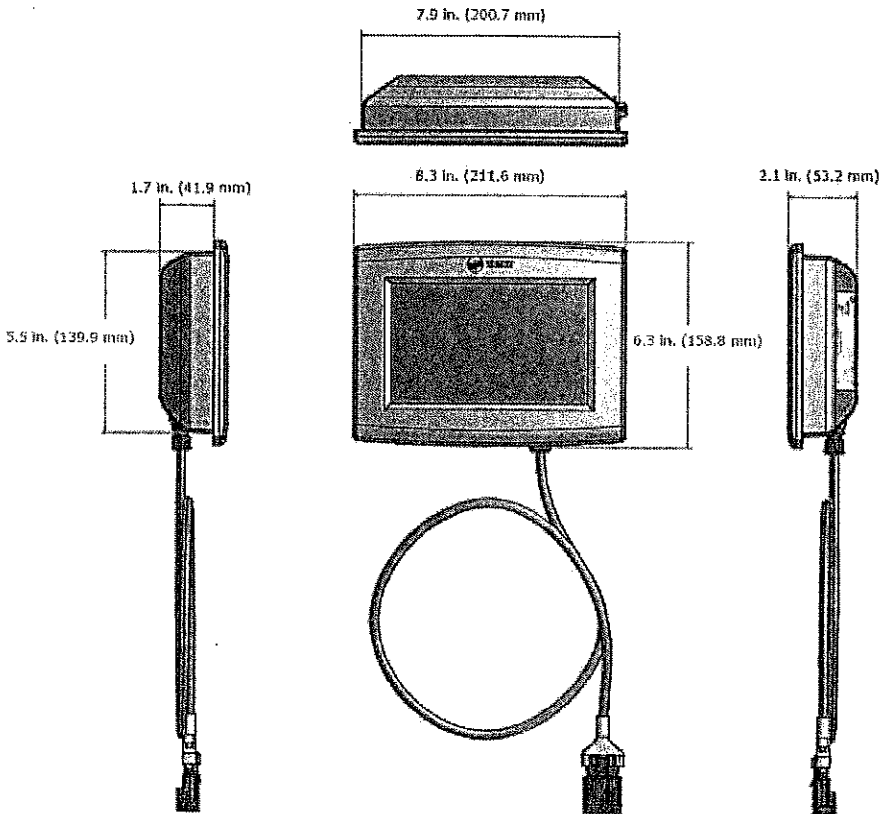
for the Tracer™ UC600 Programmable Controller

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



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

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).

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.

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.

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.

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: Trane UC600 - Discharge Air Control w/BACNET w/Display

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

Sequence of Operations:

Discharge Air Control with Indirect Fired Gas or Electric Heat and Modulating HGRH, ERV, and Powered Ex.

Sequence of Operation—"Occupied"

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.

Starting Sequence with 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 by sending a preset run signal (field adjustable between 50 percent and 100 percent) to the indoor fan VFD or ECM. 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.

Starting Sequence with Optional 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. Outdoor air damper end switch is disabled when the return air damper is installed.

Operating Modes

- A. Economizer
- B. Heating
- C. Dehumidification
- D. Cooling

All modes are enabled by the main unit control module. The control module calculates dewpoint based on sensed outdoor air temperature and humidity.

A. Economizer Mode

Economizer is field adjustable between Enthalpy or Dry Bulb with the binary value Economizer Control Type (defaulted from factory as enthalpy).

Enthalpy Economizer

Modulating dampers are required for 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.

If the Outdoor Air Temperature is more than two degrees below the Discharge Air Cooling Setpoint then the DX cooling will be locked out and the dampers will modulate to maintain the Discharge Air Cooling Setpoint. If the Outdoor Air Temperature is above that point by a deadband of 1 degree then the outdoor air damper shall open to the Maximum Damper Position and allow DX cooling to stage, as necessary.

Dry Bulb Economizer

Modulating dampers are required for 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.

If the Outdoor Air Temperature is more than two degrees below the Discharge Air Cooling Setpoint then the DX cooling will be locked out and the dampers will modulate to maintain the Discharge Air Cooling Setpoint. That lockout has a deadband of 1 degree. If the Outdoor Air Temperature is above that point then the outdoor air damper will open to the Maximum Damper Position and allow DX cooling to stage, as necessary.

B. Heating Mode.

Non-heat Pump Units

Heating mode is enabled based on Outdoor Air Heating Setpoint (OAHS) and Outdoor Air Cooling Setpoint (OACS). 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 a space temperature setpoint that is an average temperature of the Occupied Space Cooling Setpoint and the Occupied Space Heating Setpoint.

During Heating Mode the main unit controller will modulate the heating output to maintain the Discharge Air Heating Setpoint. Hot gas reheat is disabled when heating is enabled.

Air Source Heat Pump Units

Heating mode is enabled based on Outdoor Air Heating Setpoint (OAHS) and Outdoor Air Cooling Setpoint (OACS). 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 a space temperature setpoint that is an average temperature of the Occupied Space Cooling Setpoint and the Occupied Space Heating Setpoint.

During Heating Mode Compressor 1 will be staged on. If after a 3-minute minimum delay the discharge 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 (OAT) falls below 32°F, the compressor heat is not able to maintain setpoint for more than 10 minutes, or the outdoor coil temperature falls below the Condenser Coil Temperature Setpoint (field adjustable; default is 0°F). If the condenser coil is below setpoint the condenser fan will run in order to defrost the coil. Auxiliary heating mode will disable the compressors from running and modulate the heating output to maintain the Discharge Air Heating Setpoint. Auxiliary heating mode will be disabled when the OAT rises above 35°F or when the outdoor coil temperature rises 5°F above the Condenser Coil Temperature Setpoint, and when the OAT rises 5°F above the temperature that it switched from DX heating to auxiliary heating.

Water Source Heat Pump Units

Heating mode is enabled based on Outdoor Air Heating Setpoint (OAHS). The outdoor air temperature is lower than the OAHS then Heating Mode shall be enabled.

During Heating Mode Compressor 1 will be staged on. If after a 3-minute minimum delay the discharge 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 Space 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.

D. Dehumidification Mode

Dehumidification Mode is enabled on Outdoor Air Dewpoint Setpoint (OADS). If there is no call for Heating Mode and the outdoor air dewpoint is above or equal to the OADS then Dehumidification Mode shall be enabled.

Dehumidification Mode will remain active until the space or outdoor air dewpoints rise above the setpoints by 2 degrees, or if Heating Mode is enabled.

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. If after a 3-minute minimum delay the evaporator leaving air temperature is still above the setpoint, the second, third, and fourth stages of dehumidification (Compressor 2, 3, and 4) will be staged on sequentially following individual 3-minute minimum delays between each call. During operation in Dehumidification Mode, the main unit controller shall enable hot gas reheat and it will modulate to maintain the Discharge Air 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.

E. Cooling Mode.

If the outdoor air temperature is above than the Outdoor Air Heating Setpoint (OAHS) and the controller is not calling for dehumidification then Cooling Mode shall be enabled. Compressor staging is identical to dehumidification however the control temperature is the Discharge Air Cooling Setpoint. Should the discharge temperature begin to fall too low the hot gas reheat shall be enabled and modulate to maintain the Discharge Air Cooling Setpoint.

Optional Features

Digital Compressors

Main unit controller will modulate digital compressor to maintain either Evap Leaving Temp Setpoint or Discharge Air Cooling Setpoint depending on mode of operation. Remaining compressors will be staged as described in mode.

Exhaust Fan Operation

Exhaust with Isolation Dampers

When the indoor fan operation has been proven and the unit is in occupied there will be a call for the exhaust. When there is a call for the exhaust the isolation dampers will be powered and the powered exhaust will be enabled once the end switch on the exhaust actuators are proven. If the unit is equipped with modulating dampers, the exhaust fan speed will modulate to maintain the Return Duct Pressure Setpoint (factory defaulted to 1" WC). If modulating dampers are not equipped, the exhaust will maintain a constant volume of airflow.

During Unoccupied the powered exhaust will be shut off.

Exhaust with Gravity Dampers

When the indoor fan operation has been proven and the unit is in occupied there will be a call for the exhaust. If the unit is equipped with modulating dampers, the exhaust fan speed will modulate to maintain the Return Duct Pressure Setpoint (factory defaulted to 1" WC). If modulating dampers are not equipped, the exhaust will maintain a constant volume of airflow.

During Unoccupied the powered exhaust will be shut off.

Energy Wheel Operation

The ERV is interlocked with indoor fan and exhaust fan operation in occupied heating, dehumidification or cooling modes. When operating in Economizer Mode or Ventilation Mode the ERV is disabled and the ERV by-pass dampers will open, powered exhaust remains on. During Unoccupied both the ERV and the powered exhaust will be shut off.

During ERV operation, if the Exhaust Temperature across the ERV drops below 25°F, the outdoor air bypass damper will start to slowly modulate open. If after the bypass dampers modulate to 100 percent open and the exhaust temp across the ERV drops below 15°F (2°F Deadband) for 5 minutes, the unit controller will command the ERV off.

Note: For units with optional ERV defrost heater, the control sequence will engage heater at frost condition rather than stop ERV.

Optional Demand Control CO2 Ventilation

With CO2 sensor (field supplied and installed) and modulating damper option selected with the unit, the UC600 will look at the CO2 sensor value and compare it to the CO2 Setpoint. If the CO2 level in the space is higher than the setpoint, the UC600 will modulate the outdoor air damper open (PID loop in the controller is configurable) until the CO2 levels in the space are within the setpoint value. The UC600 will then close the OA damper (or minimum position based on the value in the PID loop) and wait for the space CO2 level to change again.

Non-Heat Pump Head Pressure Control

The Trane Horizon™ OAU head pressure variable speed control option (if selected) allows increased reheat capacity and mechanical cooling for ambient conditions as low as 0°F. A temperature sensor on the header of the condenser coil will measure the liquid temperature. Variable frequency drives will adjust the speed of two condenser fans as needed to maintain a condenser temperature of 105°F.

Water Source Heat Pump Head Pressure Control

When a call for cooling or dehumidification exists, the head pressure controller will be powered. The controller will modulate the normally open water valve to maintain a user defined refrigerant pressure setpoint on the liquid line.

Sequence of Operation—"Unoccupied"

Optional space temperature and/or humidity sensors must be installed and wired to unit and configured as "installed" at the main unit controller to enable unoccupied sequences.

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.

Starting Sequence

Indoor fan proving sequence is identical to occupied operation.

Starting Sequence with Optional 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.

Starting Sequence with No Return Air Damper Installed

Identical to occupied sequence no return air damper installed.

Operating Modes

- A. Unoccupied Heating
- B. Unoccupied Dehumidification
- C. Unoccupied Cooling

A. Heating Mode.

Non-heat Pump Units

Unoccupied heating is enabled based on UNOCC Space Heating Setpoint. Unoccupied heating is enabled when space temperature reaches unoccupied space heating setpoint + 2°. The modulating gas heat or SCR electric heat will continue to raise the discharge air temperature to a maximum of 90°F and continue to supply heated 90° air to the space until the space temperature reaches setpoint + 6°. Unit operation is discontinued when unoccupied space heating is satisfied.

Heat Pump Units

Unoccupied heating is enabled based on UNOCC Space Heating Setpoint. Unoccupied heating is enabled when space temperature reaches unoccupied space heating setpoint + 2°. The unit will continue to raise the discharge air temperature to a maximum of 90°F and continue to supply heated 90°F air to the space until the space temperature reaches setpoint + 4°. Unit operation is discontinued when unoccupied space heating is satisfied.

Determination of heat pump operation or auxiliary heat operation is identical to Occupied Heating Mode.

C. Dehumidification Mode.

When no call for unoccupied heating exists, unoccupied dehumidification is enabled based on UNOCC Space Dewpoint Setpoint. During unoccupied dehumidification operation dehumidification capacity is restricted to 50 percent (only half of the compressors are allowed to come on).

Unoccupied dehumidification is enabled when space dewpoint reaches UNOCC Space Dewpoint Setpoint + 1°. Dehumidification stops at setpoint - 1°. Unit operation is discontinued when unoccupied space dehumidification is satisfied.

C. Cooling Mode. When no call for unoccupied heating or unoccupied dehumidification exists, unoccupied cooling is enabled based on UNOCC Space Cooling Setpoint. During unoccupied space cooling operation cooling capacity is restricted to 50 percent (only half of the compressors are allowed to come on). Unoccupied cooling is enabled when space temperature reaches unoccupied space cooling setpoint + 2°. Cooling stops at setpoint - 2°. Unit operation is discontinued when unoccupied space cooling is satisfied.

Powered Exhaust/ERV Sequence of Operation

Powered Exhaust/ERV operation is disabled during unit "Unoccupied" operating modes.

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.

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.

Damper Options: 2-Position Outdoor Air Damper

The unit shall have a factory installed and integrated 100% outdoor air hood with damper controlled by direct coupled actuator and 2 inch permanent and washable aluminum mesh filters accessible through a hinged access panel. The return air damper tray is blocked off to allow 100% outdoor airflow.

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.

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.

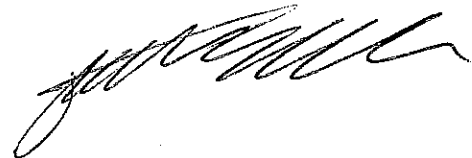
18 Mussey Rd. Scarborough, ME

Approved JRM Approved as Noted _____

Re-Submit _____ Reviewed _____

Subject to Architects Approval x _____

Date 11/30/17 by Tim Michaud TM





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


TRANE
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

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		

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.

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.

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.

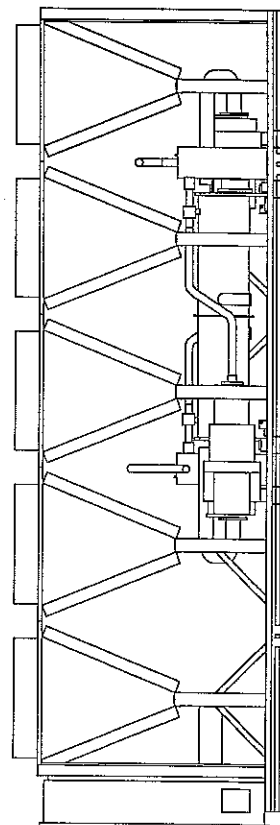
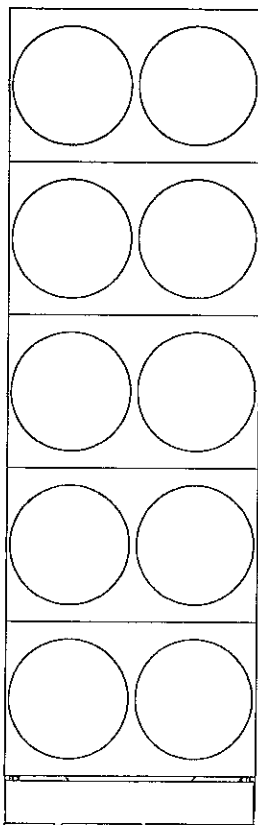
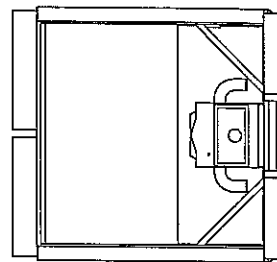
Convenience Outlet

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

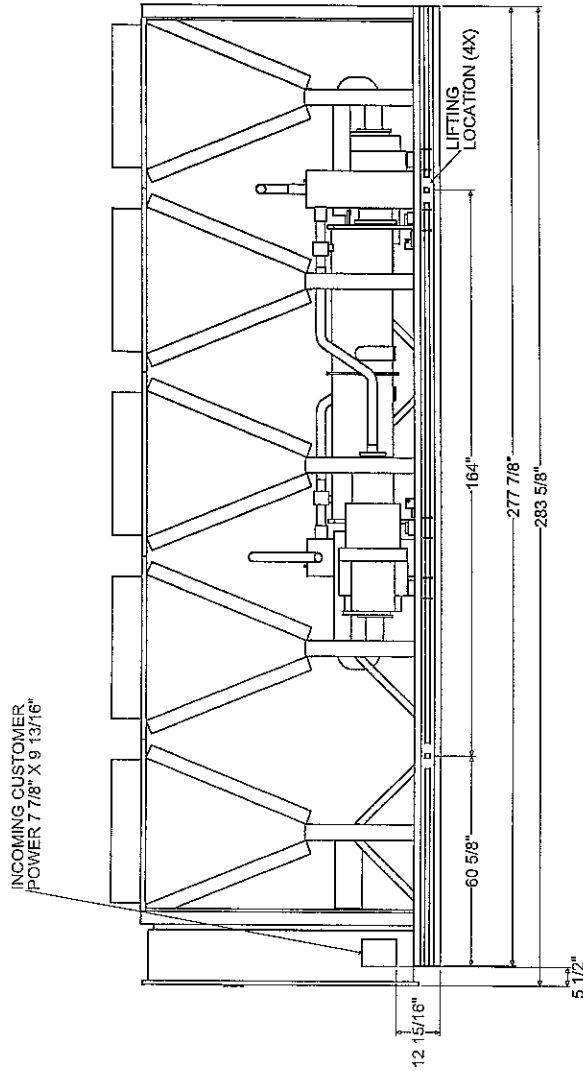
Note: An additional field supplied power connection must be provided to power the convenience outlet.

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



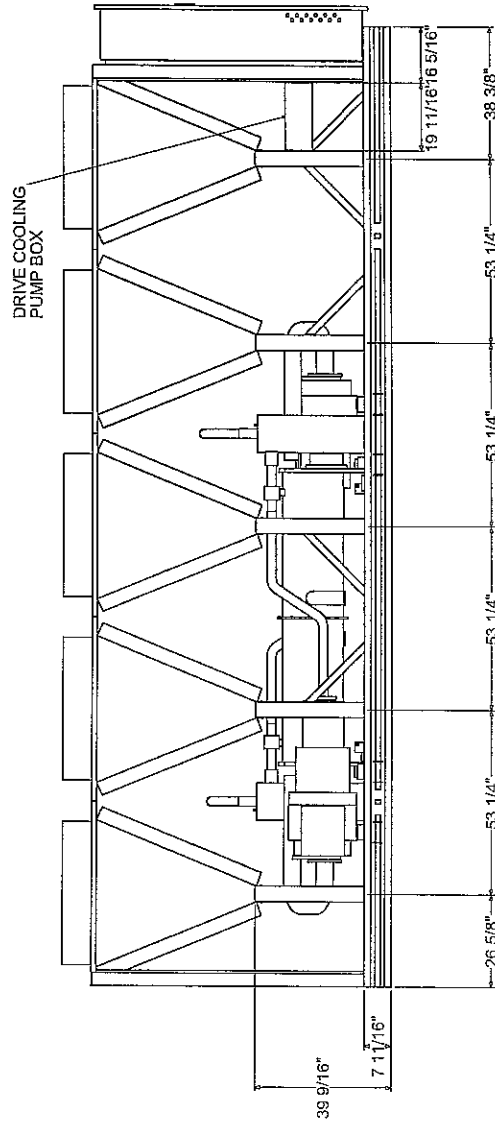
Unit Dimensions - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2



RIGHT SIDE VIEW

Unit Dimensions - Air-Cooled Stealth (TM)

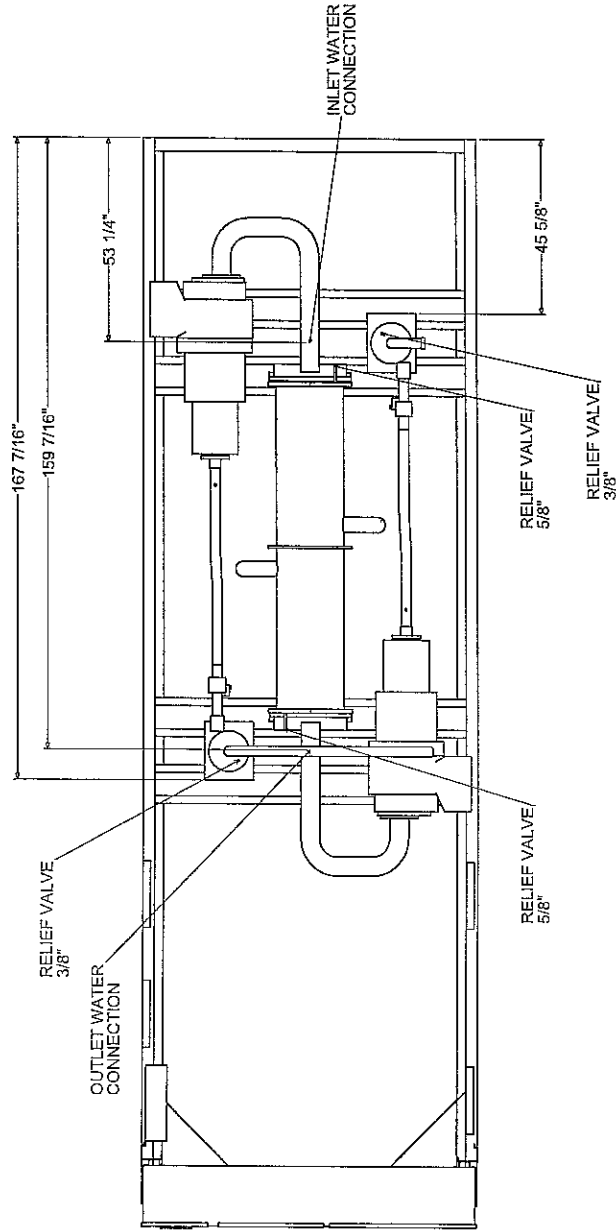
Item: A1 Qty: 2 Tag(s): CH-1, CH-2



LEFT SIDE VIEW

Unit Dimensions - Air-Cooled Stealth (TM)

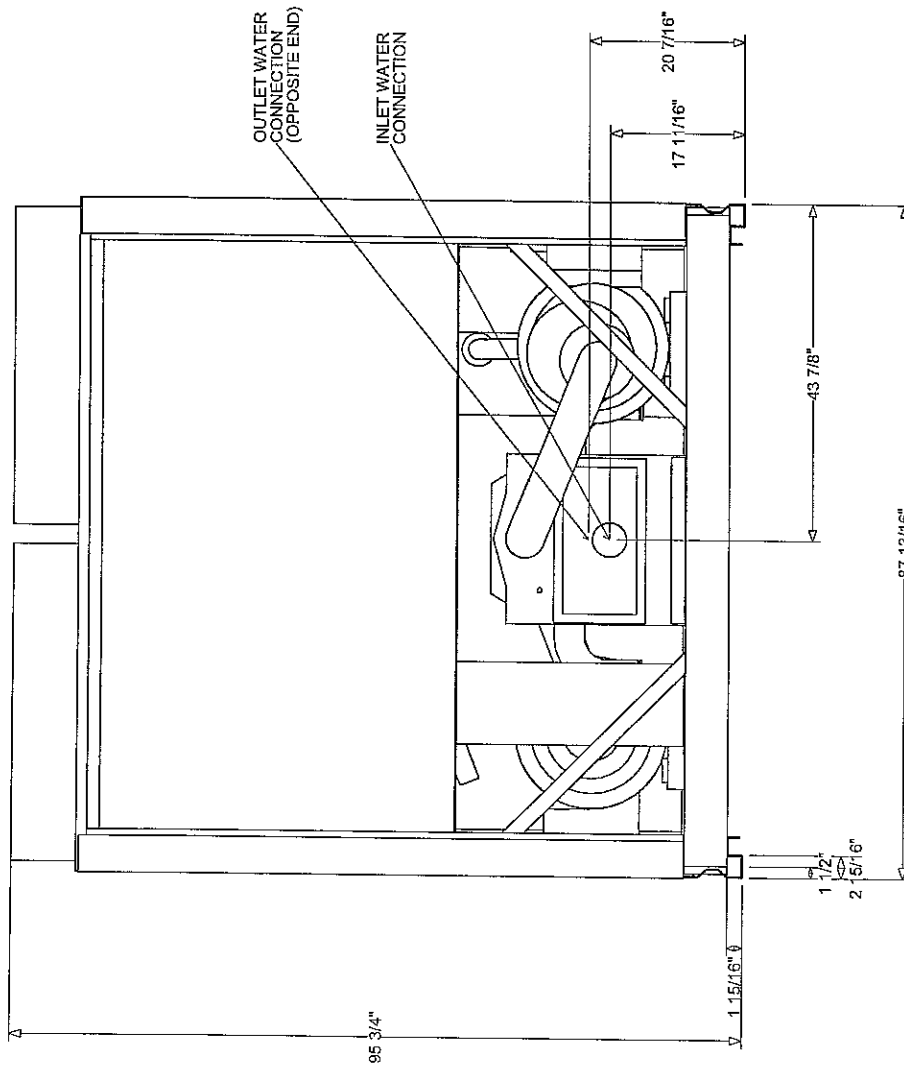
Item: A1 Qty: 2 Tag(s): CH-1, CH-2



TOP VIEW
(CONDENSER REMOVED FOR CLARITY)

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

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

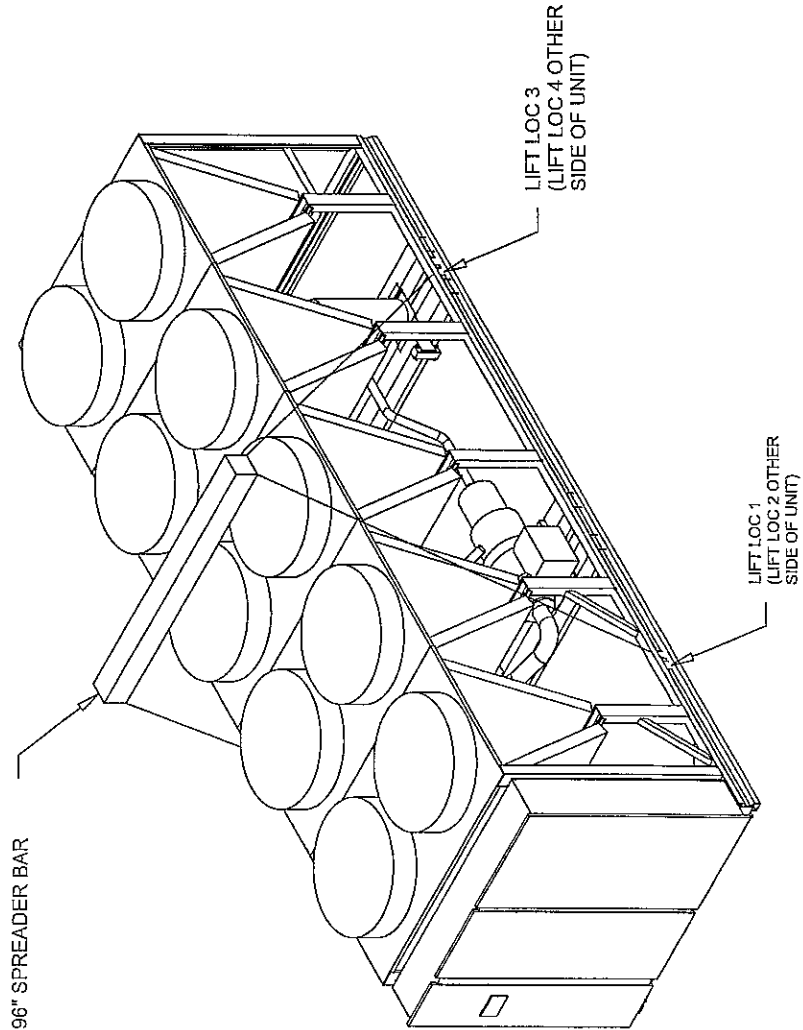
NOTES:

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.

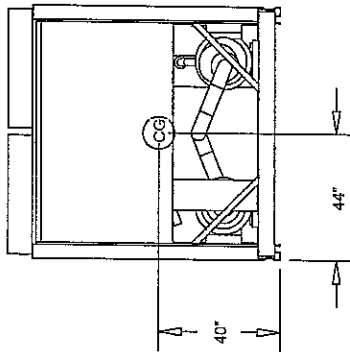
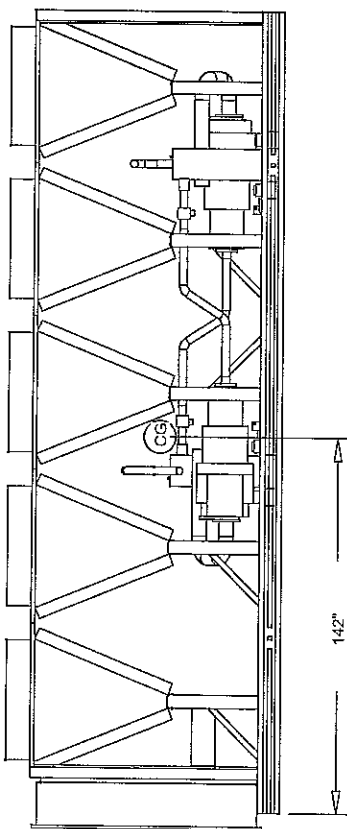
Other lifting arrangements could result in death, serious injury or equipment damage.

DO NOT ALLOW LIFTING STRAPS TO CONTACT UNIT DURING LIFT!



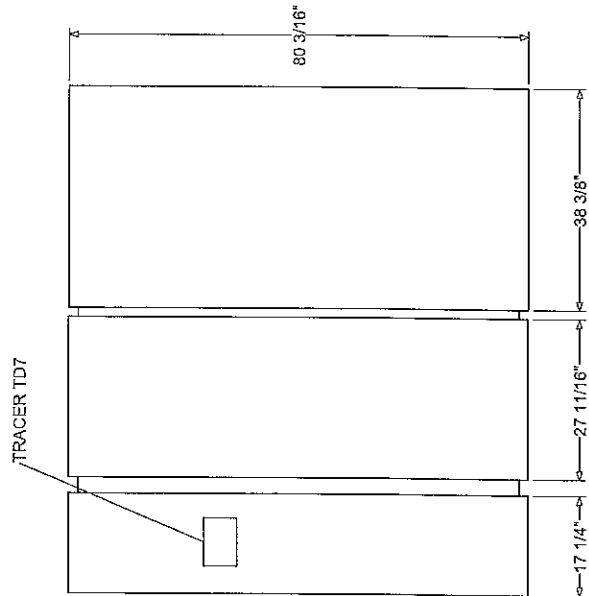
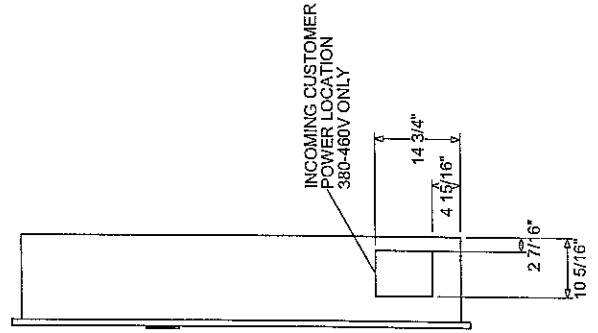
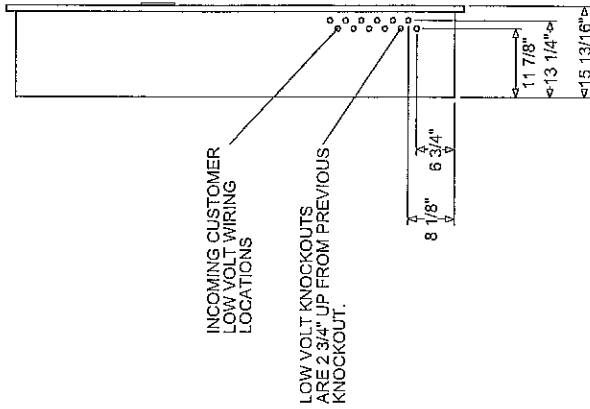
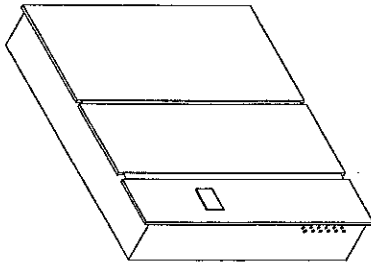
Weight, Clearance & Rigging Diagram - Air-Cooled Stealth (TM)
Item: A1 Qty: 2 Tag(s): CH-1, CH-2

CENTER OF GRAVITY



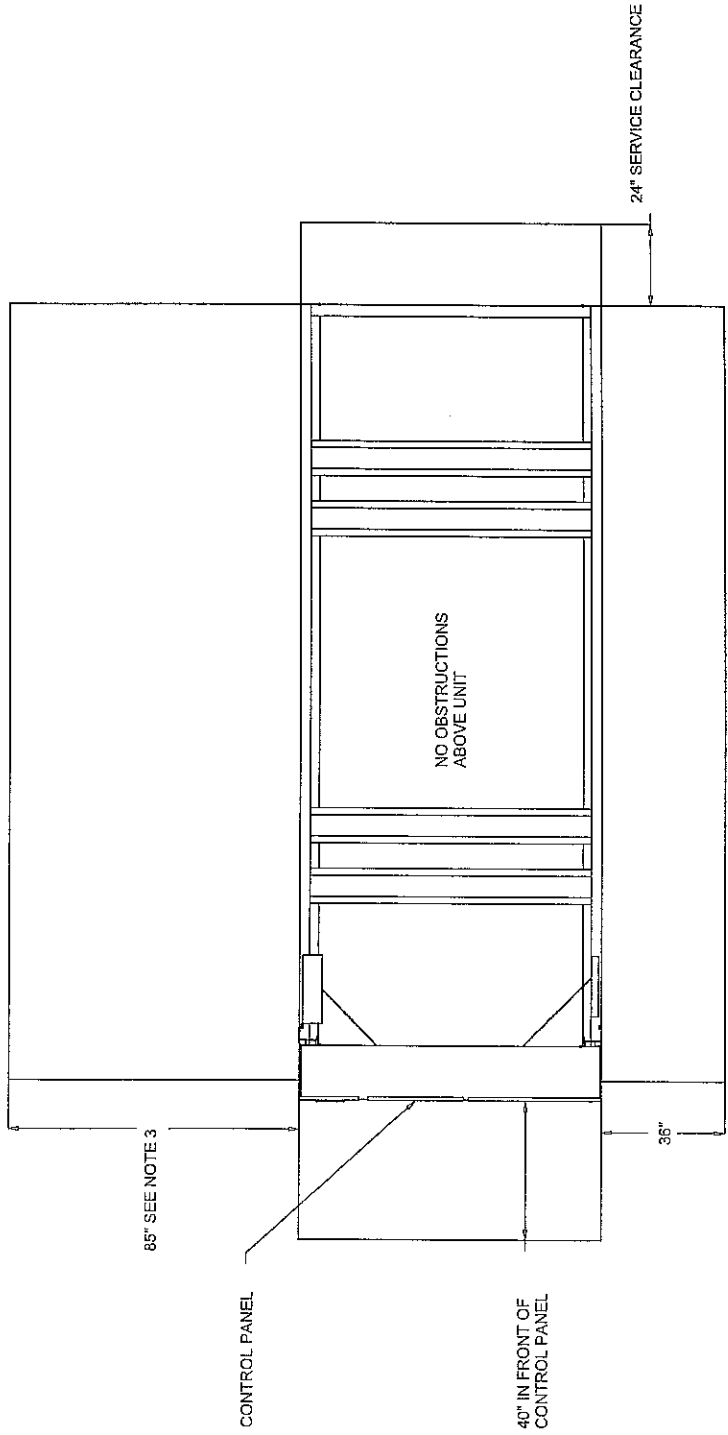
Accessory - Air-Cooled Stealth (TM)
 Item: A1 Qty: 2 Tag(s): CH-1, CH-2

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



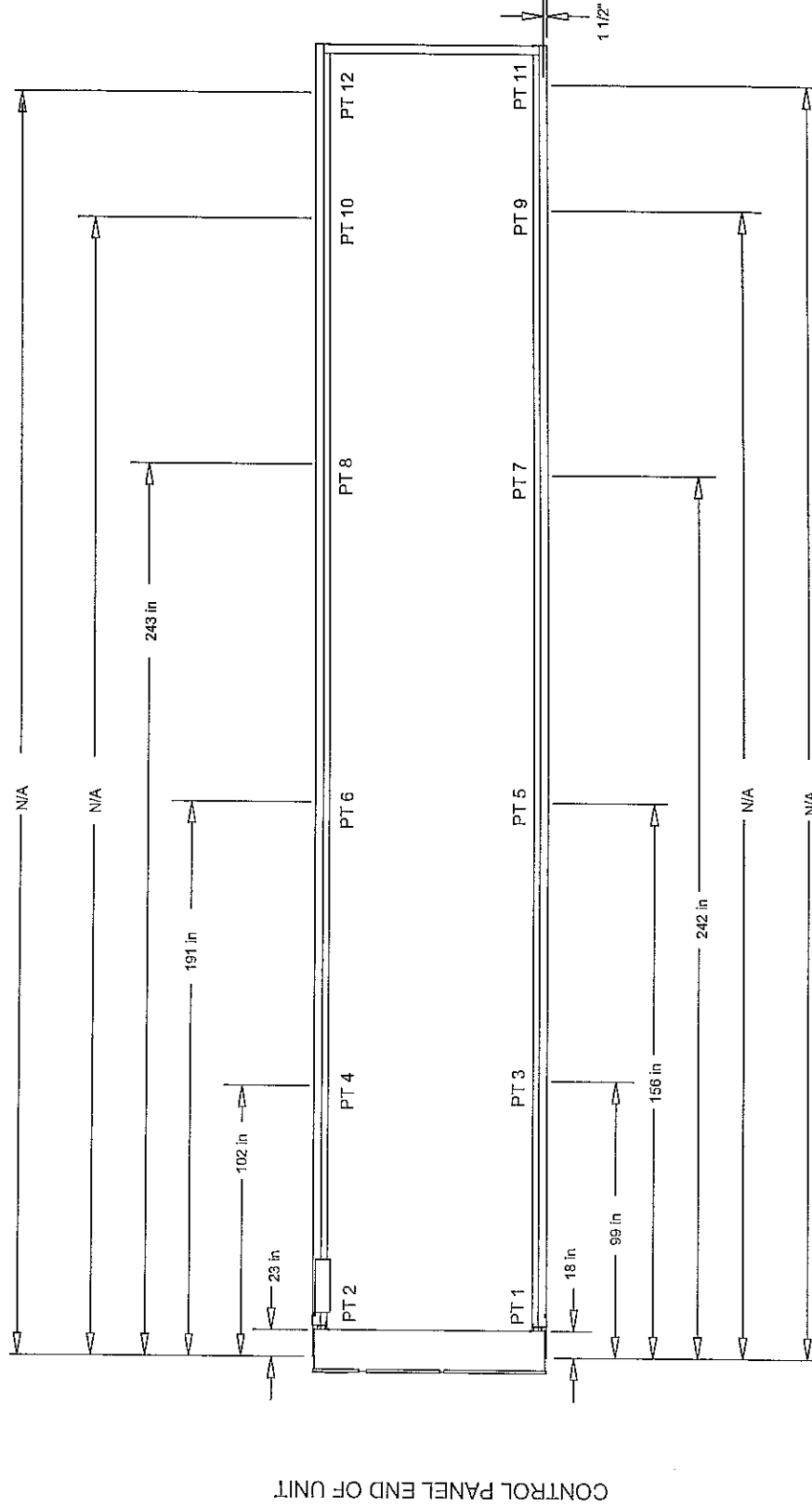
TOP VIEW

- NOTES:
1. AREA ABOVE UNIT REQUIRED FOR OPERATION, MAINTENANCE, ACCESS PANEL AND AIR FLOW. NO OBSTRUCTIONS ABOVE UNIT.
 2. FOR OBSTRUCTIONS OR 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

MOUNTING LOCATIONS AND POINT LOAD WEIGHTS

POINT	POINT	POINT	POINT	POINT	POINT	POINT	POINT	POINT	POINT	POINT	POINT	POINT
1	2	3	4	5	6	7	8	9	10	11	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	



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

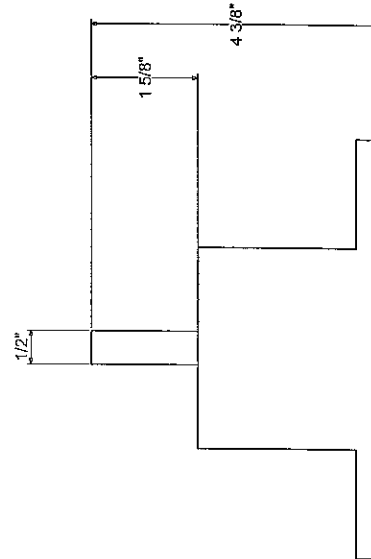
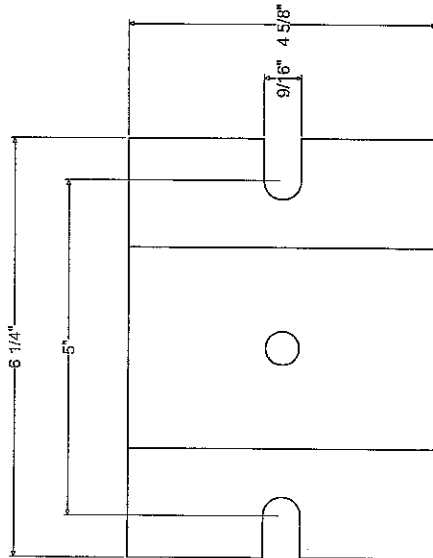
POINT LOCATIONS 3, 4, 5 & 6
 (4X) RDP4-WR LIME
 MAX LOAD 3000.0 lb

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

NOTE:
 1. ISOLATOR LOCATIONS ARE DIMENSIONED FROM END OF UNIT BASE.
 2. WEIGHTS INCLUDES OLIVER 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.

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

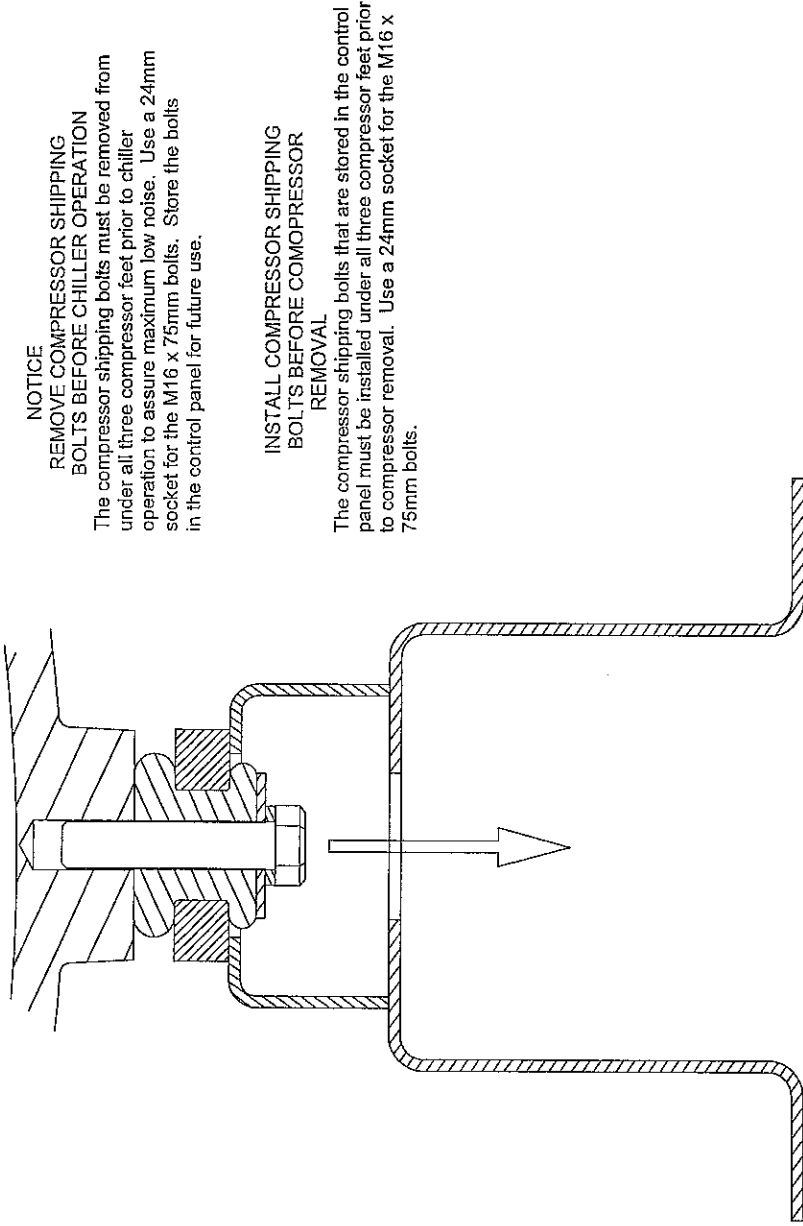
NEOPRENE ISOLATOR DIMENSIONS



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



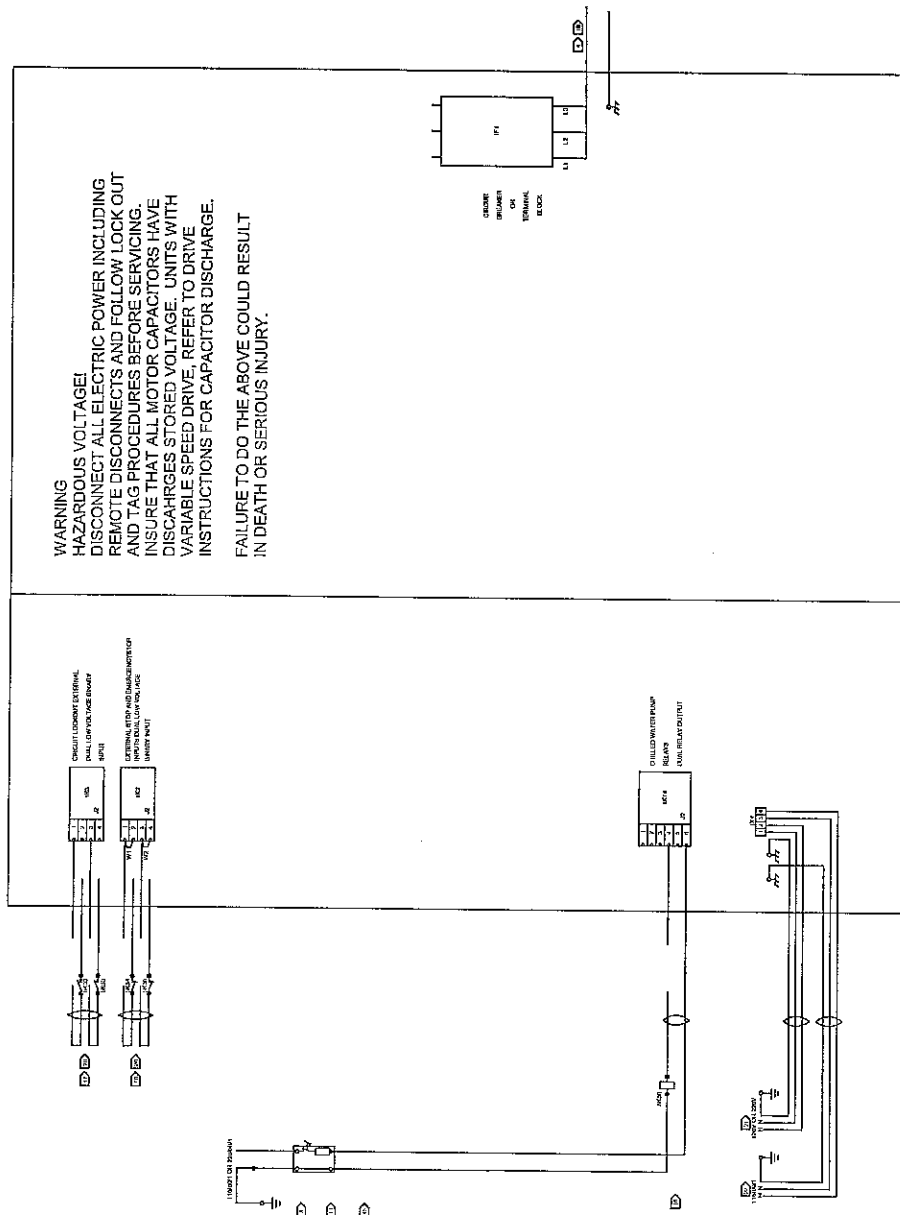
NOTICE
REMOVE COMPRESSOR SHIPPING
BOLTS BEFORE CHILLER OPERATION
 The compressor shipping bolts must be removed from under all three compressor feet prior to chiller operation to assure maximum low noise. Use a 24mm socket for the M16 x 75mm bolts. Store the bolts in the control panel for future use.

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 OT 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 (1K8). THE SHIELD SHOULD BE GROUNDED AT THE RTAE CONTROL PANEL END.
- 8 CUSTOMER SUPPLIED POWER 115/60/1PH OR 220/50/1PH 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 HELIX LF22P0014216 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 5 AMPS GENERAL PURPOSE DUTY 240 VOLTS.
 - 17 CUSTOMER SUPPLIED CONTACTS FOR ALL LOW VOLTAGE CONNECTIONS MUST BE COMPATABLE 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.