

City of Portland, Maine - Building or Use Permit

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 10-1234	Date Applied For: 10/05/2010	CBL: 434 C001001
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Location of Construction: 331 VERANDA ST	Owner Name: PENOBSCOT BAY MEDICAL AS	Owner Address: PO BOX 9746	Phone:
Business Name:	Contractor Name: Johnson & Jordan	Contractor Address: 18 Mussey Road Scarborough	Phone (207) 883-8345
Lessee/Buyer's Name	Phone:	Permit Type: HVAC	

Proposed Use: Commercial / Medical Office - Install Mechanical Equipment & Roof Top units	Proposed Project Description: Install Mechanical Equipment & Roof Top units
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Dept: Zoning **Status:** Approved with Conditions **Reviewer:** Ann Machado **Approval Date:** 10/05/2010

Note: **Ok to Issue:**

- 1) This permit is being issued with the condition that the noise requirement of section 14-151(b) will be met.
- 2) This permit is being approved on the basis of plans submitted. Any deviations shall require a separate approval before starting that work.

Dept: Building **Status:** Approved with Conditions **Reviewer:** Jeanine Bourke **Approval Date:** 10/13/2010

Note: **Ok to Issue:**

- 1) The installation must comply with the State of Maine Gas Regulations and the IMC 2003.
- 2) Application approval based upon information provided by applicant. Any deviation from approved plans requires separate review and approval prior to work.

Dept: Fire **Status:** Approved with Conditions **Reviewer:** Capt Keith Gautreau **Approval Date:** 10/06/2010

Note: **Ok to Issue:**

- 1) Install shall comply with all manufacture's specifications.
- 2) Install shall comply with NFPA 54.
A compliance letter is required

SCANNED

Please
Issue, Mail
Scan &
give to
tx Nick A.

Call
SMRT
for
PDF'S

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 10-1234	Issue Date:	CBL: 434 C001001
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Business Name:	Contractor Name: Johnson & Jordan	Contractor Address: 18 Mussey Road Scarborough	Phone 2078838345
Lessee/Buyer's Name	Phone:	Permit Type: HVAC	Zone: RP

Past Use: Commercial / Medical Office	Proposed Use: Commercial / Medical Office - Install Mechanical Equipment & Roof Top units	Permit Fee: \$7,410.00	Cost of Work: \$739,000.00	CEO District: 4
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Proposed Project Description:
Install Mechanical Equipment & Roof Top units

FIRE DEPT: Approved Denied
*See Conditions

INSPECTION: Use Group: B Type: HVAC
DMC-2003
Signature: (Signature) Date: 10/13/10

PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)
Action: Approved Approved w/Conditions Denied
Signature: Date:

Permit Taken By: ldobson	Date Applied For: 10/05/2010	Zoning Approval	
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- This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
- Building permits do not include plumbing, septic or electrical work.
- Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work..

Special Zone or Reviews

Shoreland
 Wetland
 Flood Zone
 Subdivision
 Site Plan

Maj Minor MM

Date: 10/5/10 ABM

Zoning Appeal

Variance
 Miscellaneous
 Conditional Use
 Interpretation
 Approved
 Denied

Date:

Historic Preservation

Not in District or Landmark
 Does Not Require Review
 Requires Review
 Approved
 Approved w/Conditions
 Denied

Date: ABM

PERMIT ISSUED

OCT 13 2010

City of Portland

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT ADDRESS DATE PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE DATE PHONE



FILL IN AND SIGN WITH INK

APPLICATION FOR PERMIT HEATING OR POWER EQUIPMENT

PERMIT ISSUED

OCT 13 2010

To the INSPECTOR OF BUILDINGS, PORTLAND, ME.

The undersigned hereby applies for a permit to install the following heating, cooking or power equipment in accordance with the Laws of Maine, the Building Code of the City of Portland, and the following specifications:

Location / CBL 434-E-1 Use of Building MEDICAL OFFICE Date 10-4-10

Name and address of owner of appliance Martin's Point

Installer's name and address JOHNSON AND JORDAN INC

18 MUSSEY ROAD SCARBOROUGH 04074 Telephone 207-883-8345

Location of appliance:

- Basement
- Attic
- Floor
- Roof

Type of Chimney:

- Masonry Lined
- Metal
- Factory built _____

RECEIVED

OCT - 5 2010

Department of Building Inspections
Portland, Maine



CITY OF PORTLAND, MAINE
Department of Building Inspections

Original Receipt

Received from

Location of Work

Cost of Construction \$ _____

Permit Fee \$ _____

Building Fee: _____

Site Fee: _____

Certificate of Occupancy Fee: _____

Total: \$19410

Building (1L) _____

Plumbing (1S) _____

Electrical (1Z) _____

Site Plan (1Z) _____

Other HOAC-011

CBL: 434-E-1

Check #: 19970

Total Collected \$ \$19410

Taken by: [Signature]

**No work is to be started until permit issued.
Please keep original receipt for your records.**

WHITE - Applicant's Copy
YELLOW - Office Copy
PINK - Permit Copy

Signature of Installer _____

White - Inspection Yellow - File Pink - Applicant's Gold - Assessor's Copy



Pizzagalli Construction
331 Veranda Street
Portland ME 04103

TRANSMITTAL

No. 0492

PROJECT: Martin's Point Medical Office Building

DATE: 10/05/2010

TO: Portland, Maine, City of
P.O. Box 544
Portland ME 04112-0544

RE: Martin's Point Certificate of Occupancy

ATTN: Nicholas Adams

JOB: 12800

WE ARE SENDING:	SUBMITTED FOR:	ACTION TAKEN:
<input type="checkbox"/> Shop Drawings	<input type="checkbox"/> Approval	<input type="checkbox"/> Approved as Submitted
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> Approved as Noted
<input type="checkbox"/> Prints	<input type="checkbox"/> As Requested	<input type="checkbox"/> Returned After Loan
<input type="checkbox"/> Change Order	<input type="checkbox"/> Review and Comment	<input type="checkbox"/> Resubmit
<input type="checkbox"/> Plans		<input type="checkbox"/> Submit
<input type="checkbox"/> Samples	SENT VIA:	<input type="checkbox"/> Returned
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached <input type="checkbox"/> Separate Cover	<input type="checkbox"/> Returned for Corrections
<input type="checkbox"/> Other:		<input type="checkbox"/> Due Date:
		<input type="checkbox"/> Other:

Line	Item	Package	Code	Qty	Date	Description	Status
1				1	10/05/2010	New Health Center Plumbing Permit	
2				1	10/05/2010	Domestic Water Lab Analysis Report	
3				1	10/05/2010	New Health Center Electrical Permit	
4				1	10/05/2010	New Health Center Fire Alarm Permit	
5				1	10/05/2010	New Health Center HVAC Permit- Including Drawings SG001, SF103, and a letter from SMRT stating that the roof structure is designed to support equipment loads	

REMARKS:

CC: Pizzagalli Construction, Jared Ballard
Pizzagalli Construction, Tim Street

Signed: _____
Nick Duncan

PLUMBING APPLICATION

Department of Health and Human Services
Division of Environmental Health

Town or Plantation: Portland, MAINE

Street Subdivision Lot #: 331 VERANDA STREET

PREVIOUS OWNER'S NAME: MARTINS POINT HEALTH CARE

Last: _____ First: _____

Applicant Name: Johnson, JORDAN

Mailing Address of Owner/Applicant (If Different): 12 MUSSEY RD
SCARBOROUGH, ME. 04074

PORTLAND PERMIT # 11004 APPLICANTS COPY

Date Permit Issued: 7/29/09 11/10/90 If Double Fee Charged

FEE _____

Local Plumbing Inspector Signature: _____ L.P.I. # 31601

THE WORK SPECIFIED IN THIS APPLICATION IS HEREBY AUTHORIZED TO BE INSTALLED IN ACCORDANCE WITH THE RULES. THIS PERMIT EXPIRES AFTER TWO YEARS FROM DATE ISSUED UNLESS WORK HAS COMMENCED.

Owner/Applicant Statement

I certify that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Local Plumbing Inspectors to deny a Permit.

[Signature] 7/29/09
Signature of Owner/Applicant Date

Caution: Inspection Required

I have inspected the installation authorized above and found it to be in compliance with the Maine Plumbing Rules.

Local Plumbing Inspector Signature _____ Date Approved _____

PERMIT INFORMATION

This Application is for 1. <input checked="" type="checkbox"/> NEW PLUMBING 2. <input type="checkbox"/> RELOCATED PLUMBING	Type of Structure To Be Served: 1. <input type="checkbox"/> SINGLE FAMILY DWELLING 2. <input type="checkbox"/> MODULAR OR MOBILE HOME 3. <input type="checkbox"/> MULTIPLE FAMILY DWELLING 4. <input checked="" type="checkbox"/> OTHER - SPECIFY <u>MEDICAL OFFICE Building</u>	Plumbing To Be Installed By: 1. <input checked="" type="checkbox"/> MASTER PLUMBER 2. <input type="checkbox"/> OIL BURNERMAN 3. <input type="checkbox"/> MFG'D. HOUSING DEALER/MECHANIC 4. <input type="checkbox"/> PUBLIC UTILITY EMPLOYEE 5. <input type="checkbox"/> PROPERTY OWNER LICENSE # <u>0,2,4,60</u>
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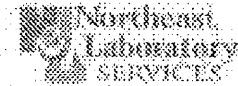
Hook-Up & Piping Relocation Maximum of 1 Hook-Up	Column 2		Column 1	
	Number	Type of Fixture	Number	Type of Fixture
OR HOOK-UP: to public sewer in those cases where the connection is not regulated and inspected by the local Sanitary District. HOOK-UP: to an existing subsurface wastewater disposal system. PIPING RELOCATION: of sanitary lines, drains, and piping without new fixtures.	<u>10</u>	Hosebibb / Sillcock	—	Bathtub (and Shower)
	<u>20</u>	Floor Drain	<u>2</u>	Shower (Separate)
	—	Urinal	<u>68</u>	Sink
	—	Drinking Fountain	<u>30</u>	Wash Basin <u>LABORATORIES</u>
	<u>9</u>	Indirect Waste	<u>23</u>	Water Closet (Toilet)
	—	Water Treatment Softener, Filter, etc.	—	Clothes Washer
	<u>1</u>	Grease / Oil Separator	—	Dish Washer
	<u>11</u>	Roof Drain	—	Garbage Disposal
	—	Bidet	—	Laundry Tub
	<u>3</u>	Other: <u>MOP RECEPTOR</u>	<u>2</u>	Water Heater
	<u>54</u>	Fixtures (Subtotal) Column 2	<u>125</u>	
			<u>54</u>	Total Fixtures
			<u>1,090.00</u>	
			<u>N/A</u>	
			<u>N/A</u>	
			<u>1,090.00</u>	Permit Fee

SEE PERMIT FEE SCHEDULE FOR CALCULATING FEE 1090.00

From: aadams

10/04/2010 09:04

#136 P.001/002



P.O. Box 788
Waterville, Maine 04903-0788

227 China Road
Winslow, Maine 04801

Administrative Offices
Phone: 207-873-7711
Fax: 207-873-7022

Customer Service
Phone: 800-244-8378
Fax: 207-873-7022

ANALYSIS REPORT

Attention: JOHNSON & JORDAN
18 MUSSEY RD
SCARBOROUGH ME 04074

Lab ID Number: PJ09801
P.O. Number: PJ09801 Martins Point
Date Collected: 09/30/2010 01:45 PM
Date Received: 10/01/2010 09:00 AM
Date Reported: 10/04/2010

Well Owner: PWD Martins Point MOB
Well Location: 331 Varanda St Portland ME
Well Type:
Sample Type: Potability

Parameter	Result	Unit	Detection Limit	Method	Preparation Date/Time	Analysis Date/Time	Analyst
E. coli - Colilert MPN Enumeration	<1	MPN/100mL	1	SM9223B	10/01/10 9:50	10/02/10 10:00	SAH
Nitrite-Nitrogen, Total	<0.20	mg/L	0.2	EPA 300.0	10/01/10 12:03	10/01/10 12:03	MJC
Nitrate-Nitrogen, Total	<2.0	mg/L	2.0	EPA 300.0	10/01/10 12:03	10/01/10 12:03	MJC
Total Coliform Colilert MPN Enumeration	<1	MPN/100mL	1	SM9223B	10/01/10 9:50	10/02/10 10:00	SAH

Comments:

This water is satisfactory for drinking for the above tests only.

Results are reported on a wet weight basis.

This report shall not be reproduced, except in full, without written permission from Northeast Laboratory Services.

Results meet the requirements of the NELAC standards unless otherwise noted above

If you have any questions regarding your results please call 1-800-244-8378 ext 301.

Reviewed By: James F. Galasyn
James F. Galasyn Ph.D., Chemistry Lab Manager

Review Date: 10/04/2010

Analytical results and reports are generated by NEL at the request of and for the exclusive use of the person or entity (client) named on this report. Results, reports or copies of same will not be released by NEL to any third party without the prior express written consent from the client named in this report. This report applies only to those samples taken at the time, place and location referenced by the client. This report makes no express or implied warranty or guarantee as to the sampling methodology used by the individual performing the sampling. The client is solely responsible for the use and interpretation of these results and NEL makes no express or implied warranties as to such use or interpretation. NEL is not able to make and does not make a determination as to the environmental soundness, safety or health of a property from only the samples sent to their laboratory for analysis. Unless otherwise specified by the Client, NEL reserves the right to dispose of all samples after the testing of such samples is sufficiently completed or after a thirty-day period, whichever period is greater. NEL liability extends only to the cost of the testing.

Winslow lab is accredited by the State of Maine Department of Health and Human Services, Maine Center for Disease Control and Prevention (ME00009) and by the National Environmental Laboratory Accreditation Program (NELAP) through the State of Florida Department of Health, Bureau of Laboratories (E87820).

ELECTRICAL PERMIT

City of Portland, Me.



To the Chief Electrical Inspector, Portland Maine:
 The undersigned hereby applies for a permit to make electrical installations
 in accordance with the laws of Maine, the City of Portland Electrical Ordinance,
 National Electrical Code and the following specifications:

Date _____
 Permit # 20094315
 CBL# 434-C1

LOCATION: 331 Veranda St. METER MAKE & # _____
 CMP ACCOUNT # _____ OWNER Martin's Point
 TENANT Martin's Point Medical office Building PHONE # _____

							TOTAL EACH FEE		
OUTLETS	<u>1129</u>	Receptacles	<u>200</u>	Switches		Smoke Detector	.20	<u>265.80</u>	
FIXTURES		Incandescent	<u>1071</u>	Fluorescent		Strips	.20	<u>214.20</u>	
SERVICES		Overhead		Underground		TTL AMPS <800	15.00		
		Overhead	<u>1</u>	Underground		>800	25.00		
Temporary Service	<u>1</u>	Overhead		Underground		TTL AMPS <u>200 Amp</u>	25.00	<u>25.00</u>	
							25.00		
METERS	<u>1</u>	(number of)					1.00	<u>1.00</u>	
MOTORS	<u>15</u>	(number of)					2.00	<u>30.00</u>	
RESID/COM		Electric units					1.00		
HEATING		oil/gas units		Interior		Exterior	5.00		
		Ranges		Cook Tops		Wall Ovens	2.00		
APPLIANCES		Insta-Hot		Water heaters		Fans	2.00		
		Dryers		Disposals		Dishwasher	2.00		
		Compactors		Spa		Washing Machine	2.00		
		Others (denote)					2.00		
MISC. (number of)		Air Cond/win					3.00		
		Air Cond/cent				Pools	10.00		
	<u>17</u>	HVAC		EMS		Thermostat	5.00	<u>85.00</u>	
		Signs					10.00		
		Alarms/res					5.00		
	<u>1</u>	Alarms/com					15.00	<u>15.00</u>	
	<u>6</u>	Heavy Duty(CRKT)					2.00	<u>12.00</u>	
		Circus/Carnv					25.00		
		Alterations					5.00		
		Fire Repairs					15.00		
	<u>7</u>	E Lights					1.00	<u>7.00</u>	
		E Generators					20.00	<u>20.00</u>	
PANELS		Service	<u>12</u>	Remote		Main	4.00	<u>48.00</u>	
TRANSFORMER		0-25 Kva					5.00		
	<u>4</u>	25-200 Kva					8.00	<u>32.00</u>	
		Over 200 Kva					10.00		
							TOTAL AMOUNT DUE		
							MINIMUM FEE	45.00	<u>251.00</u>

CONTRACTORS NAME Seabee Electric MASTER LIC. # 17768
 ADDRESS 84 Pleasant Hill Rd. Scarborough LIMITED LIC. # _____
 TELEPHONE 883-5448

SIGNATURE OF CONTRACTOR [Signature]
 White Copy - Office • Yellow Copy - Applicant

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 09-0993	Issue Date:	CBL: 434 C001001
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Location of Construction: 331 VERANDA ST	Owner Name: PENOBSCOT BAY MEDICAL AS	Owner Address: PO BOX 9746	Phone:
Business Name:	Contractor Name: Norris, Inc.	Contractor Address: 2257 W Broadway, PO Box 2551 Sout	Phone 2078833473
Lessee/Buyer's Name	Phone:	Permit Type: Fire Alarm System	Zoning R-1P

Past Use: Commercial / Medical Office - connected w/ permit# 090308	Proposed Use: Commercial / Medical Office - install a Fire Alarm for Martins Point Health	Permit Fee: \$220.00	Cost of Work: \$19,600.00	CEO District: 4
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FIRE DEPT.: w/ conditions 3/8/10	<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Denied	INSPECTION: Use Group B/S-2 Type 2B Fire Alarm IBC-2003
Signature: <i>[Signature]</i>	Signature: <i>[Signature]</i> 3/9/10	

Proposed Project Description:
install a Fire Alarm for Martins Point Health

PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)

Action: Approved Approved w/Conditions Denied

Signature: _____ Date: _____

Permit Taken By: Ldobson
Date Applied For: 09/10/2009

Zoning Approval

- This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
- Building permits do not include plumbing, septic or electrical work.
- Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work..

Special Zone or Reviews

Shoreland
 Wetland
 Flood Zone
 Subdivision
 Site Plan

Maj Minor MM

Date: *[Signature]* 9/25/10

Zoning Appeal

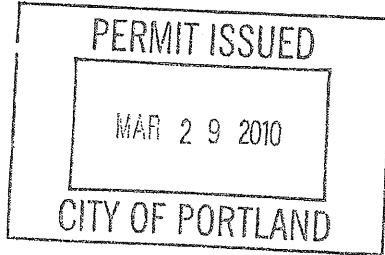
Variance
 Miscellaneous
 Conditional Use
 Interpretation
 Approved
 Denied

Date: _____

Historic Preservation

Not in District or Landmark
 Does Not Require Review
 Requires Review
 Approved
 Approved w/Conditions
 Denied

Date: *[Signature]*



CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT	ADDRESS	DATE	PHONE
------------------------	---------	------	-------

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE	DATE	PHONE
---	------	-------

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK CITY OF PORTLAND

BUILDING INSPECTION PERMIT

Permit Number: 090993

Please Read
Application And
Notes, If Any,
Attached

This is to certify that PENOBSCOT BAY MEDICAL ASSOCIATES/Norris, Inc.

has permission to install a Fire Alarm for Martins Point Health

AT 331 VERANDA ST CBL 434 C001001

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of buildings and structures, and of the application on file in this department.

Apply to Public Works for street line and grade if nature of work requires such information.

Notification of inspection must be given and written permission procured before this building or part thereof is lathed or otherwise closed-in. 24 HOUR NOTICE IS REQUIRED.

A certificate of occupancy must be procured by owner before this building or part thereof is occupied.

PERMIT ISSUED

OTHER REQUIRED APPROVALS

Fire Dept. *[Signature]* 262

Health Dept. 2009.9.2009

Appeal Board

Other

CITY OF PORTLAND

Department Name

[Signature] 3/9/10
Director - Building & Inspection Services

PENALTY FOR REMOVING THIS CARD

City of Portland, Maine - Building or Use Permit

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 09-0993	Date Applied For: 09/10/2009	CBL: 434 C001001
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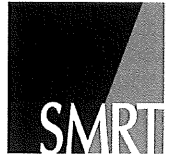
Location of Construction: 331 VERANDA ST	Owner Name: PENOBSCOT BAY MEDICAL AS	Owner Address: PO BOX 9746	Phone:
Business Name:	Contractor Name: Norris, Inc.	Contractor Address: 2257 W Broadway, PO Box 2551 Sout	Phone (207) 883-3473
Lessee/Buyer's Name	Phone:	Permit Type: Fire Alarm System	

Proposed Use: Commercial / Medical Office - install a Fire Alarm for Martins Point Health	Proposed Project Description: install a Fire Alarm for Martins Point Health
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Dept: Zoning	Status: Approved	Reviewer: Marge Schmuckal	Approval Date: 09/25/2009
Note:	Ok to Issue: <input checked="" type="checkbox"/>		

Dept: Building	Status: Approved with Conditions	Reviewer: Jeanine Bourke	Approval Date: 03/08/2010
Note:	Ok to Issue: <input checked="" type="checkbox"/>		
<ol style="list-style-type: none"> 1) Separate permits are required for any electrical, plumbing, sprinkler, fire alarm or HVAC or exhaust systems. Separate plans may need to be submitted for approval as a part of this process. 2) Fire Alarm systems shall be installed per Sec. 907 of the IBC 2003 			

Dept: Fire	Status: Approved with Conditions	Reviewer: Ben Wallace Jr.	Approval Date: 03/08/2010
Note:	Ok to Issue: <input checked="" type="checkbox"/>		
<ol style="list-style-type: none"> 1) The sprinkler system shall have supervisory and water flow devices by zone (floor). 2) Smoke detectors are required in defined egress areas such as stairs, corridors, elevator lobbies and vestibules and spaced as per NFPA 72-2010 edition. 3) Elevator recall shall not be initiated by pull stations or smoke detectors other than elevator lobby, shaft and machine room smoke detectors. 4) Duct detectors are supervisory devices - NOT alarm devices. 5) Fire Alarm system shall be maintained. If system is to be off line over 4 hours a fire watch shall be in place. Dispatch notification required 874-8576. 6) Fire alarm system requires a wireless master box connection per city ordinance. Masterbox design and installation shall be as approved be City Electrical Division. 7) Installation of a Fire Alarm system requires a Knox Box to be installed per city crdinance 8) In addition to master box requirements, Central Station monitoring is required and shall be by point. 9) As-built documents shall be submitted in pdf to the Building Inspections Office upon completion of job. 10) System acceptance and commissioning must be co-ordinated with alarm and suppression system contractors and the Fire Department. Call 874-8703 to schedule. 11) All fire alarm records required by NFPA 72 should be stored in an approved cabinet located at the FACP labeled "FIRE ALARM RECORDS". Records cabinate, FACP, annunciator(s), and pull stations shall be keyed alike. 12) The fire alarm system shall comply with the City of Portland Standard for Signaling Systems for the Protection of Life and Property. All fire alarm installation and servicing companies shall have a Certificate of Fitness from the Fire Department. 			



October 5, 2010

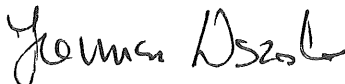
Jared Ballard
331 Veranda Street
Portland, ME 04103

Re: Martin's Point Health Care Medical Office Building

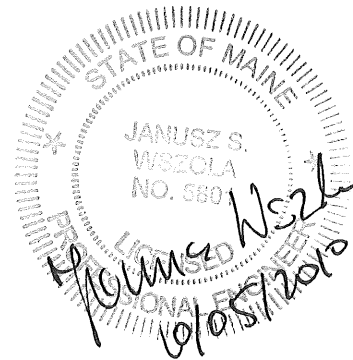
Dear Jared:

SMRT certifies that the roof structure of the Martin's Point Health Care Main Office Building has been designed in compliance with the structural requirements of IBC 2003, and will resist the loads of mechanical units as described in the Mechanical Unit Schedule on the Roof Level Framing Plan SF103 of the Construction Drawings.

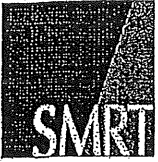
Sincerely,
SMRT


Janusz Wszola, PE

144 Fore Street
P.O. Box 618
Portland, ME 04104
p 207.772.3846 f 207.772.1070 email:sbenson@smrtinc.com



cc: File 08139/21



Submittal Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 87-237316-1

Portland, ME 04103

Submittal Title: Modular Outdoor Air-Handling Unit

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other

- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

SMRT, Inc.

REVIEW DATE: 9/22/2009

BY: TAC

08139-12 #87

Remarks:

Contractor shall coordinate curb dimensions for the submitted unit with framing layout for supporting curb per note #2/SF 103.

HVAC ROOF TOP AIR HANDLERS

weight.	AHU-1	18,234.00 lbs
weight	AHU-2	15,731.00 lbs
SOUND DATA	AHU-1	See page 13 of 40
SOUND DATA	AHU-2	See page 13 of 41

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

SPECIFICATION SECTION: 237316

PARAGRAPH: PART 2 PRODUCTS

DRAWINGS: M-602
Air Handling Unit Schedule

ITEM: MODULAR OUTDOOR AIR-HANDLING UNITS

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed KL

Subject to Architects Approval KL

Date 2/4/09 By YJA

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

MODULAR OUTDOOR AIR-HANDLING UNITS

MANUFACTURER: TRANE

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey road
Scarborough, Maine 04074
Contact: Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619

1. AHU-1
2. AHU-2

Please note the humidifier generators and disbursement grids for AHU-1 & 2 are purchased separately from the humidifier manufacturer not from the AHU manufacturer. The disbursement grids will be field installed in the air-handlers. The AHU manufacturer is providing a cabinet section with access door, drain pan and piping cabinet to accommodate the installation of the disbursement grid and humidifier piping connections as well as for future service accessibility.

1.

AHU-1



TRANE

Submittal

Trane U.S. Inc.

Engineer: SMRT Inc

Date: July 29, 2009

Prepared For:

Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074

Customer P.O. Number: 145426

Customer Project Number:

Job Name:

Martin's Point Health Care – Medical Office Building

Job Number: A2-21345

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

<u>Qty</u>	<u>Description</u>	<u>Tag(s)</u>
	Air Handling Units	
1	Trane T-Series Climate Changer® Outdoor Central Station Air Handling Unit	AHU-1
	<ul style="list-style-type: none"> • Unit size 57 • Return Fan Section with 32" AF fan, 15hp 460v/3ph/60hz ODP NEMA premium efficiency motor, internally spring and flex duct isolated fan/motor assembly, left side motor/drive location with access door, factory mounted Trane TR200 variable frequency drive w/ bypass, marine light, fan mounted flow meter, airflow switch, fan discharge temperature sensor, spare belt. • Economizer Section with right side parallel blade exhaust air damper with hood, parallel blade return air damper, 2 left side outside air dampers (1 – Traq™ airflow reassuring station, 1 – parallel blade) with hoods w/ moisture eliminators, right side access door, marine light, electronic damper actuator(s), averaging temperature sensor. • Angled Filter Section with 2" angled filter rack, 2 sets of MERV 8 pleated filters, dirty filter switch, left side access door. • Extended-Medium Coil Section with 1 row type 5W hot water coil with CompleteCoat™ Epoxy coating, sloped stainless steel drain pan, right side coil and drain pan connections, leaving air low limit. • Medium-Large Blank Section (for field installed and provided humidifier) with sloped stainless steel drain pan with right side connection, left side access door, marine light. • Medium-Large Coil Section with 8 row type WD chilled water coil with CompleteCoat™ Epoxy coating, sloped stainless steel drain pan, right side coil and drain pan connections. • Single piping cabinet covering the hot water coil, blank and chilled water coil sections with up and downstream access doors mounted on unit's right side. <i>Standard side access doors are still shown on attached drawings but will not be provided.</i> • Supply Fan Section with 32" AF fan, 30hp 460v/3ph/60hz ODP NEMA premium efficiency motor, internally spring and flex duct isolated fan/motor assembly, left side motor/drive location with access door, factory mounted Trane TR200 variable frequency drive w/ bypass, marine light, fan mounted flow meter, airflow switch, fan discharge temperature sensor, spare belt. • Factory mounted variable volume control system with MP580 controller • Single point power connection (two fan motors and lights) • All marine lights wired to single switch with GFI outlet • Entire unit of 2" solid double wall construction • Factory painted unit – <i>Trane Slate Gray</i> • UL Listed Unit • Standard 14" tall non-seismic roof curb 	

Dan Broderick
Trane
30 Thomas Drive
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

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

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Mechanical Specifications – T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57

Qty: 1 Tag(s): AHU-1

GENERAL

The units must be rigged and lifted in strict accordance with the Installation Operation and Maintenance manual (CLCH-SVX06A-EN). The units are to be installed in strict accordance with the specifications.

Units may be shipped fully assembled up to nominal 25,000 cfm units or disassembled to the minimum component size according to shipping or jobsite requirements. Units shipped in one piece will have no more than 6 points of lift required. These lift points will be permanently attached to the unit base and be designed to accept standard rigging devices. Units shipped in sections will have no more than 4 points of lift required. Units are UL and CUL listed L1995, CSA C-22.2 as manufactured by the factory. Modifications to the units at the job site or by a third party may void this listing. Refer to the Product Data Sheet for door and drain pan connection locations. This mechanical specification describes options selected from all or just one of the T-Series units on the job.

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change design and specification without notice.

Unit Construction

The unit panels feature galvanized steel double wall construction. The casing is able to withstand up to 6 inches of static pressure with no more than 0.005 inch (0.127mm) deflection per inch (25.4mm) of panel span. The entire length and width under the base is sealed for additional water management protection.

Motor Wiring Conduit

High voltage wiring from either a wiring raceway/trough or directly from a motor starter or variable frequency drive to the air handling unit motor(s) shall be done

through flexible conduit. Wiring through conduit shall not compromise the UL or ETL certification of the unit.

Panel Construction

Panels feature solid double wall construction with totally enclosed closed-cell insulation providing a minimum R-value of 12. The insulation conforms to NFPA 90 requirements.

Access Doors

Access doors are fully insulated double-wall construction (with solid galvanized steel interior panels). Automotive style neoprene gasketing around the full perimeter of the access doors minimize air leakage. All access doors have a single door handle system. The first handle movement relieves unit pressure.

Stainless Steel IAQ Drain Pan

Drain pans have two-way sloping stainless IAQ drain pan to allow for proper condensate removal in sections specified.

Marine Light

A factory-mounted, 120-volt, weather resistant (enclosed and gasketed), UL listed wet location fluorescent light fixture shall be provided in sections of unit as specified. Fixture shall be complete with junction box, Lexan housing and lens, magnetic ballast, and 13 watt fluorescent bulb.

Unit Roof

Unit roof is constructed of two pieces. Inner roof is installed in such a manner as to prevent air bypass between internal components. Outer roof is sloped either from one side of unit to other, or from center to sides of the unit. Roof assembly overhangs all walls of units by 2" (50.8mm) minimum.

Unit Paint

External surfaces of all unit casings shall be prepared and painted. Color to be standard "Slate Gray". Paint system shall

have been tested in accordance with ASTM B117 for a minimum of 500 consecutive hours and shall meet the following requirements following the salt-spray test:

- Mean scribe creepage rating of at least 6 per ASTM D1654 procedure A
- Blister size no larger than #6 per ASTM D714
- Blister density no greater than Medium per ASTM D714
- No onset of red rust

Factory Supplied Roof Curb

Unit to be mounted to factory-supplied 14-inch tall roof curb. Curb will be shipped to jobsite disassembled. Contractor will be responsible for assembly and mounting to roof structure per T-Series Climate Changer Roof Curb IOM (CLCH-IN-18). On units requiring external piping cabinet(s), factory supplied curb to include curb for external pipe cabinet(s) and pipe cabinet curb(s) to main unit curb gutter(s).

External Light Switch and Receptacle

A combination light switch and 120 volt GFI outlet shall be factory installed on the exterior of the unit casing on or near the main access door to the supply fan. Light switch shall be capable of controlling all interior factory installed service lights. GFI outlet shall be sized for a maximum capacity of 15 amps, at 120 volts. Switch and light assembly shall not compromise the UL or ETC certification of the unit.

ECONOMIZER SECTION

This section supports damper assemblies for outside, return, and /or exhaust air.

Economizer Dampers

Dampers modulate the volume of outside, return, or exhaust air. Dampers are Ruskin CD-60 with double skin air foil blades, ultra low-leak metal compressible jamb seals, and extruded vinyl blade edge seals. The dampers are rated for a maximum leakage rate

of 3 (cfm)/(foot squared) at 1" wg and 8 (cfm)/(foot squared) at 4" wg. Blades rotate on stainless steel sleeve bearings. Dampers are arranged in parallel or opposed blade configuration.

Traq Dampers with Airflow Monitoring Station - 2nd Outside Air Damper Position

A factory-mounted damper and air flow monitoring station is provided in the right side opening to modulate and measure airflow. Damper blades are galvanized steel, housed in a galvanized steel frame, and mechanically fastened to a rotating axle rod. The damper is rated for a maximum leakage rate of 1 percent of nominal airflow at 1 inch wg. The airflow measurement station measures from 15 to 100 percent of total outside air and/or return air. The airflow measurement station adjusts for temperature variations and provides a 2-10 VDC signal that corresponds to cfm for controlling and documenting airflow. The accuracy of the airflow measurement station is ± 5 percent.

Marine Light

A factory-mounted, 120-volt, weather resistant (enclosed and gasketed), UL listed wet location fluorescent light fixture shall be provided in sections of unit as specified. Fixture shall be complete with junction box, Lexan housing and lens, magnetic ballast, and 13 watt fluorescent bulb.

Averaging Temperature Sensor

A 10,000 ohm at 25°C, Type II thermistor sensor shall be serpentine across the module. All capillaries bends shall be radiused and fastened with capillary clips to prevent crimping and minimize wear.

ANGLED FILTERS

Filter sections have filter racks, an access door for filter installation & removal, and block-offs as required to prevent air bypass around filters. Units can be supplied with 2-inch (51.8mm) or 4-inch (103.6mm) flat filters.

Pleated Media

Filters are 2-inch thick, made with 100% synthetic fibers that are continuously laminated to a supported steel wire grid with water repellent adhesive. Filters are capable of operating up to 625 fpm face velocity without loss of filter efficiency and holding capacity. Filters have a rated average dust spot efficiency of not less than 35 to 40 percent when tested in accordance with ASHRAE 52.1 atmospheric dust spot method, and MERV 8 rating based on ASHRAE Standard 52.2.

Filter Status Switch

A differential pressure switch piped to both sides of the filter will indicate filter status.

External Pipe Cabinet

A piping cabinet with access door is supplied factory assembled of the same construction as the main unit casing. Piping cabinets are shipped separately for field installation on the side of the unit. *Special upstream and down stream access doors will be provided as shown on page 17 of submittal. Standard side doors will not be provided.*

COILS

Coils have aluminum plate fins and seamless copper tubes. (Copper fins are available on 5/8 inch (15.9mm) tube coils.) Fin collars are drawn, belled, and firmly bonded to the tubes by mechanical expansion of the tubes.

Coils are installed such that headers and return bends are enclosed by unit casings. Coil casings are a minimum of 16-gauge galvanized steel formed end supports, top, and bottom channels. If two or more coils are stacked in the unit, intermediate drain channels are installed between coils to drain condensate to the main drain pans without flooding the lower coils or passing condensate through the airstream of the lower coil.

Coil Casing

Coil casings are a minimum of 16-gauge stainless steel formed end supports, top, and bottom channels in lieu of standard galvanized.

Water Coils

Supply and return headers are clearly labeled on the outside of the unit to ensure that direction of coil water flow is counter to direction of unit airflow. Coils are burst tested to 300 psig and proof tested under water to 200 psig. Coil types are UW,UU,W,WD,D,DD,D1,D2,K,P, 5A,5W and TT coils.

Tube Material

Tubes are 5/8 inch (15.9mm) OD, 0.020 inch (0.51mm) thick copper. (Refer to the Product Data Sheet)

Coil Coating

Coil shall have a flexible epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation and a uniform dry film thickness from 0.8 - 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and a cross-hatch adhesion of 4B-5B per ASTM B3359-93. Impact resistance shall be up to 160 in/lb per ASTM D2794-93. Humidity and water immersion resistance shall be up to a minimum 1000 and 260 hours respectively (ASTM D2247-92 and ASTM D870-02). Corrosion durability shall be confirmed through testing to no less than 5,000 hours salt spray per ASTM B117-90 using scribed aluminum test coupons.

BLANK / ACCESS / INSPECTION

Additional unit length is provided to allow extra interior space for, access to, or inspection of unit components. This section may also be used for field installed components.

Marine Light

A factory-mounted, 120-volt,

weather resistant (enclosed and gasketed), UL listed wet location fluorescent light fixture shall be provided in sections of unit as specified. Fixture shall be complete with junction box, Lexan housing and lens, magnetic ballast, and 13 watt fluorescent bulb.

FAN SECTIONS

Fans are factory balanced. Fan shafts are solid, protectively coated with lubricating oil, and designed so fan will not exceed 75 percent of the first critical speed at any cataloged rpm. Fan wheels are keyed to the shaft to prevent slipping. Access doors are provided on the drive side of the fan section. A separate power source is required for each fan section without single point power. Units with single point power require one power source in the supply fan section.

Air Foil Fan

The air foil (AF) fan is a double-width, double-inlet, multiblade type as required for stable operation and optimum energy efficiency. Bearings are self-aligning, antifriction bearings with a L-50 life of 200,000 hours. Refer to Product Data Sheets. For any bearing requiring relubrication, the grease line shall be extended to the fan support bracket on the drive side. Fan performance is certified as complying with ARI Standard 430-89.

Motor Voltage

460 Volt / 3 Phase / 60 Hz. (Refer to the Product Data Sheet)

Open Drip-Proof Motor

The motor is a T-frame, squirrel cage, open drip-proof with horsepower, type, and electrical characteristics as shown on equipment schedule. Motor is mounted inside the unit casing integral to an isolated fan assembly. A slide base permits adjustment of drive belt tension. (Refer to the Product Data Sheet)

Fixed Pitch Drives

Sheaves are fixed pitch for

constant speed at the specified rpm.

Fan Isolation

Two Inch (51.8mm) Spring Isolators - Fan and motor assembly (sizes #10 - #100) is internally isolated from the unit casing with 2 inch (51.8mm) deflection spring isolators. The fan discharge is also isolated from unit casing by a flexible canvas duct. The isolation system is designed to resist loads produced by external forces such as earthquakes and conform to the current requirements for Seismic Zone IV.

Fan Options

Inverter balancing. Fan systems will be checked with a variable frequency drive for resonant frequencies. Fans, shafts, and drives will meet vibrations tolerance specs from 25% to 100% of selected RPM.

VFD Options

The VFD includes an oversized control transformer to power the factory mounted control system. Power wiring from the VFD transformer to the controls, start/stop relay, start/stop wiring to the VFD, and analog speed signal are wired and tested at the factory.

Fan Discharge Temperature Sensor

Thermistor type sensor (10,000 ohm @ 77 degrees F) is mounted in the fan discharge.

Airflow Switch

A differential pressure switch piped to the discharge and suction sides of the fan indicates fan status.

Flow Meter

Provide an air measurement system to measure fan airflow directly or measure differential pressure that can be used to calculate fan airflow. The system shall predict airflow within +/-5% accuracy when operating from 45% to 95% wide-open volume. The submitted fan air performance and noise levels shall not be affected by the

installation of the device. Any device that provides an obstruction to the fan inlet will not be accepted.

FACTORY MOUNTED DIRECT DIGITAL CONTROL (DDC) SYSTEM

"Turn-key" control systems are engineered, mounted, wired, and tested in the factory to reduce installed costs, save time, and improve reliability. Each control system is fully functional as a standalone unit or can be tied to a Tracer building automation system.

EX2 Expansion Module

An expansion module for the Tracer MP580 controller. Up to four EX2 modules can be connected to a Tracer MP580. Each EX2 adds six universal inputs, four binary outputs, and four analog outputs.

Unit Mounted Controller

The DDC controller is factory mounted in the unit.

Customer Interface Relays

10 amp DPDT relays are provided as required for binary outputs of the controller for customer interface to remote exhaust fans, relief dampers, pumps, condensing units, etc.

Low Limit

Low limits are double pole low limit switches wired to a momentary push button reset circuit. Capillaries are serpentine across the leaving side of the coil. Bends of the capillaries are curved and fastened with capillary clips to prevent crimping and minimize wear. A separate low limit is provided for each coil in a coil stack.

VFD / Disconnect Package w/ Bypass

Combination VFD / disconnect packages with bypass are factory mounted and wired in a weather-tight cabinet and include:

- circuit breaker disconnect
- two contactor bypass
- Pulse Width Modulated (PWM)

VFD w/ intelligent power modules

d) LCD display and keypad

e) English language electrical values, parameters, self test, faults, and diagnostics

f) form C fault contacts

g) 0-10 V speed input signal

h) VFD/OFF/Bypass Auto/Bypass hand switch

i) Electronic manual speed control VFD-Hand-Off switch

j) auto restart after momentary power loss


k) critical frequency avoidance

l) power wiring from VFD to motor

m) voltage and FLA are factory-set for the exact motor used in the air handler

n) Factory commissioning

Outdoor T-Series Climate Changer air handler

Job Name	Martin's Point MOB	
User Name	(B16)Daniel Broderick	
Address	Portland ME	

Outdoor T-Series Climate Changer air handler	AHU-1
Quantity	1
Job Comments	

Unit level		Module Position:	0
Actual airflow	25000 cfm	UL listed unit	Yes
Unit size	57	Unit length (less hoods)	354.500 in
Unit shipping split type	Maximum Size Splits	Unit width	124.000 in
Roof curb type	14" tall roof curb	Roof curb weight	784.8 lb
Paint	Factory painted - gray	Rigging unit weight	16803.7 lb
Light wiring	Lights wired to extl switch w/GFI	Installed unit weight	18234.1 lb
Power wiring	Single point pwr (2-fan motors &		

Fan		Module Position:	1
Fan [1]-1			
Insulation	Solid dble wall	Fan wheel balance	Inverter balance
Fan airflow	20000 cfm	Motor class	ODP NEMA premium efficiency
Fan size and type	D57 - 32" AF	Motor frame type	T-frame
Fan discharge	Front - top	Cycle	60 cycle/sec
Drive location	Left	Drive service factor and type	1.5 fixed
Motor HP	15	Light	Yes
Motor voltage	460/3	Starter or VFD mounted and wired	TR2 VFD/ discon. w/ byp
ESP	1.50 in H2O	Fan discharge temperature sensor	Fan mounted
Total static pressure	2.56 in H2O	Bearing type	Standard heavy duty
BHP	11.601 hp	Fan module PD	1.69 in H2O
Max BHP	13.083 hp	Unit controller	MP580 Unit Controller
Speed	891 rpm	Unit low limit	Unit Low Limit
Module	Fan	Fan discharge loss PD	0.19 in H2O
Access door	Left	Module length	68.500 in
Inlet location	Horizontal return fan	Module weight	3707.0 lb
Fan isolation	Spring		

Coil performance data is certified in accordance with ARI standard 410. Propylene glycol and calcium chloride, or mixtures thereof, are not covered under the scope of ARI 410.

Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Economizer		Module Position:	2
Module	Economizer module	Exhaust damper airflow	20000 cfm
Economizer module type	Return fan	1st outside damper area	10.27 sq ft
Insulation	Solid dble wall	1st outside damper pressure drop	0.26 in H2O
Access door	Right	1st hood and eliminator pressure drop	0.26 in H2O
Outside air location	Left	1st outside air path pressure drop	0.52 in H2O
Economizer capability	0-100% outside air	2nd outside damper area	4.36 sq ft
1st outside air damper type	Parallel	2nd outside damper pressure drop	0.49 in H2O
1st outside air hood type	Yes	2nd hood and eliminator pressure drop	0.26 in H2O
2nd outside air damper type	TRAQ	2nd outside air path pressure drop	0.75 in H2O
2nd outside air hood type	Yes	Total outside air PD	0.75 in H2O
Return air damper type	Parallel	Return damper area	10.27 sq ft
Exhaust damper type	Parallel	Return damper pressure drop	0.66 in H2O
Exhaust hood	Yes	Exhaust damper area	8.64 sq ft
Light	Yes	Exhaust damper PD	0.66 in H2O
Economizer damper actuator(s)	Electronic damper actuator(s)	Exhaust hood PD	0.20 in H2O
Averaging temperature sensor	Yes	Total exhaust air PD	0.86 in H2O
Outside airflow	25000 cfm	Supply fan total air PD	0.75 in H2O
1st outside airflow	12500 cfm	Exhaust fan total air PD	0.86 in H2O
2nd outside airflow	12500 cfm	Module length	84.000 in
Return damper airflow	20000 cfm	Module weight	2779.0 lb

Flat or angled filters		Module Position:	3
Filter module PD	0.56 in H2O	Dirty filter switch	Yes
Filter condition	Mid-Life	Filter airflow	25000 cfm
Angled or flat filter module	Angled	Filter area	96.70 sq ft
Insulation	Solid dble wall	Filter PD	0.56 in H2O
Access door	Left	Module length	31.000 in
Filter frame	2" (51mm)	Module weight	887.0 lb
Unit filter type	Pleated media - MERV 8		

Coil performance data is certified in accordance with ARI standard 410. Propylene glycol and calcium chloride, or mixtures thereof, are not covered under the scope of ARI 410.

Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Horizontal coil		Module Position:	4
Horizon [4]-1			
Horizontal coil module	Extended medium	Fin spacing	110 Per Foot
Module	Horizontal coil	Fin type	Prima flo E
Insulation	Solid dble wall	Fin material	Aluminum
Drain pan	RH stainless	Tube mat/wall thickness	.020" (0.508mm) copper
Coil application	Heating	Turbulators	No
Coil system type	Hot water	Corrosion resistant coating	CompleteCoat(TM) Epoxy E-coat
Coil supply/cabinet side	Right	Face area	54.50 sq ft
External piping/service module	Std depth - std door design	Face velocity	459 ft/min
Coil casing	Galvanized	Air PD	0.08 in H2O
Apply ARI ranges	Yes	ARI 410-01 classification	ARI rated
Actual airflow	25000 cfm	Leaving fluid temp	110.00 F
EDB	40.00 F	Fluid PD	1.69 ft H2O
LDB	65.00 F	Fluid velocity	2.09 ft/sec
Total capacity	677.81 MBh	Volume	8.28 gal
Max fluid PD	20.00 ft H2O	Reynolds number	19048.11 Each
ASP	0.00 in H2O	Coil installed weight	310.2 lb
Entering fluid temp	140.00 F	Coil rigging weight	241.2 lb
Fluid temp drop	30.00 F	Finned width top or single coil	36" (914 mm)
Standard fluid flow rate	45.28 gpm	Finned width middle coil	36" (914 mm)
Fouling factor	0.00050 hr-sq ft-deg F/Btu	Total cap ent coil type #1	338.91 MBh
Fluid type	Water	Total cap ent coil type #2	338.91 MBh
Low limit switch	Leaving	Top or single coil dry weight	120.6 lb
Target valve pressure drop	4.00 psig	Middle coil dry weight	120.6 lb
Coil height	Unit - Max Face Area	Module length	20.000 in
Coil type	5W	Module and coil weight	1037.9 lb
Rows	1		

Access		Module Position:	5
Module	Access/blank	External piping/service module	Std depth - std door design
Access/blank module size	Medium large	Light	Yes
Insulation	Solid dble wall	ASP	0.00 in H2O
Access inspection door	Left	Module length	31.000 in
Drain pan	RH stainless	Module weight	977.0 lb
External piping cabinet location	Right		

Coil performance data is certified in accordance with ARI standard 410. Propylene glycol and calcium chloride, or mixtures thereof, are not covered under the scope of ARI 410.

Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Horizontal coil		Module Position:	6
Horizon [6]-1			
Horizontal coil module	Medium large	Coil type	WD
Module	Horizontal coil	Rows	8
Insulation	Solid dble wall	Fin spacing	93 Per Foot
Drain pan	RH stainless	Fin type	Prima flo H
Coil application	Cooling	Fin material	Aluminum
Coil system type	Chilled water	Tube matl/wall thickness	.020" (0.508mm) copper
Coil supply/cabinet side	Right	Turbulators	Yes
External piping/service module	Std depth - std door design	Corrosion resistant coating	CompleteCoat(TM) Epoxy E-coat
Coil casing	Stainless	Face area	56.77 sq ft
Apply ARI ranges	No	Face velocity	440 ft/min
Actual airflow	25000 cfm	Air PD	0.65 in H2O
EDB	80.70 F	ARI 410-01 classification	Outside scope
EWB	63.00 F	Leaving fluid temp	56.00 F
LDB	52.00 F	Fluid PD	5.07 ft H2O
LWB	51.54 F	Fluid velocity	1.66 ft/sec
Sensible capacity	786.69 MBh	Volume	60.63 gal
Total capacity	818.28 MBh	Reynolds number	1591.19 Each
Max fluid PD	20.00 ft H2O	Coil installed weight	2111.7 lb
ASP	0.00 in H2O	Coil rigging weight	1535.2 lb
Entering fluid temp	44.00 F	Finned width top or single coil	37" (940 mm)
Fluid temp rise	12.00 F	Finned width middle coil	37" (940 mm)
Standard fluid flow rate	149.98 gpm	Total cap ent coil type #1	409.14 MBh
Fouling factor	0.00000 hr-sq ft-deg F/Btu	Total cap ent coil type #2	409.14 MBh
Fluid type	Propylene Glycol	Top or single coil dry weight	767.6 lb
Fluid concentration	35.00 %	Middle coil dry weight	767.6 lb
Target valve pressure drop	4.00 psig	Module length	31.000 in
Coil height	Unit - Max Face Area	Module and coil weight	3338.4 lb

Fan		Module Position:	7
Fan [7]-1			
Insulation	Solid dble wall	Fan isolation	Spring
Fan airflow	25000 cfm	Fan wheel balance	Inverter balance
Fan size and type	E57 - 32" AF	Motor class	ODP NEMA premium efficiency
Fan discharge	Bottom - front	Motor frame type	T-frame
Drive location	Left	Cycle	60 cycle/sec
Motor HP	30	Drive service factor and type	1.5 fixed
Motor voltage	460/3	Light	Yes
ESP	2.50 in H2O	Starter or VFD mounted and wired	TR2 VFD/ discon. w/ byp
Total static pressure	4.54 in H2O	Airflow switch	Yes
BHP	25.111 hp	Fan discharge temperature sensor	Fan mounted
Max BHP	28.319 hp	Fan module PD	2.50 in H2O
Speed	1154 rpm	Unit controller	MP580 Unit Controller
Module	Fan	Unit low limit	Unit Low Limit
Access door	Left	Module length	83.000 in
Inlet location	Supply fan	Module weight	4723.0 lb

Coil performance data is certified in accordance with ARI standard 410. Propylene glycol and calcium chloride, or mixtures thereof, are not covered under the scope of ARI 410.

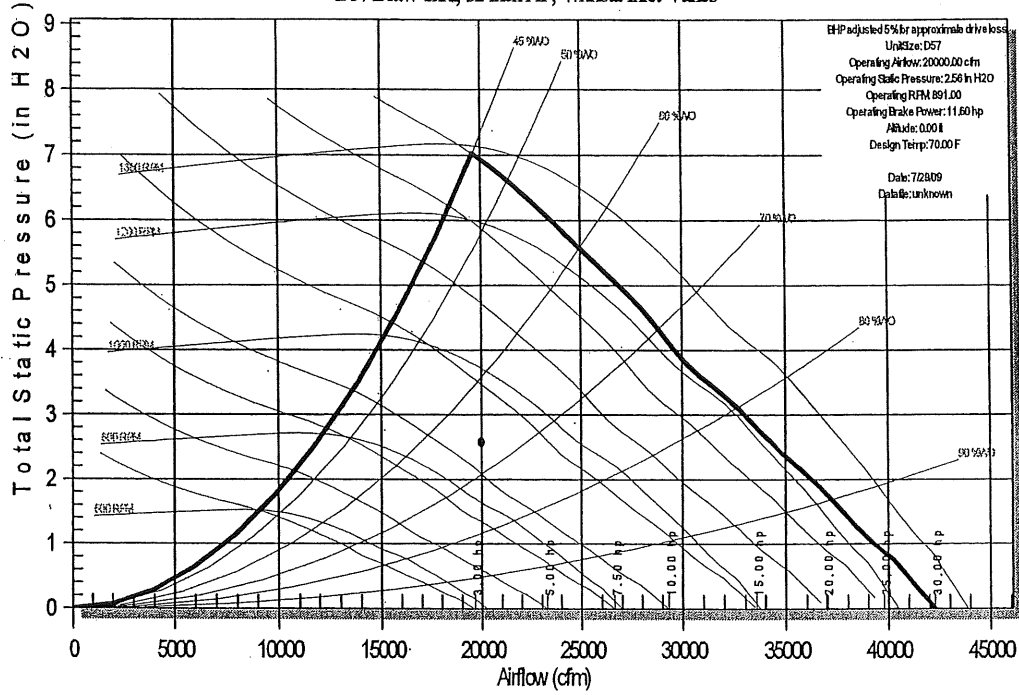
Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Fan Curve - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

H. Return

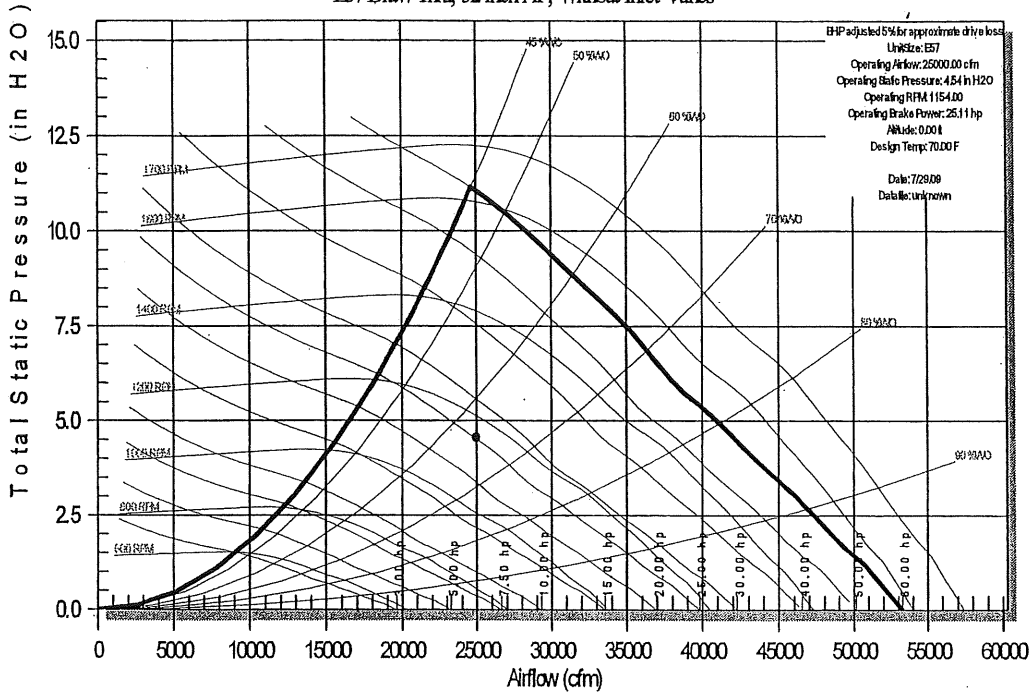
D57 Draw-Thru, 32-inch AF, Without Inlet Vanes



Fan Curve - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

H. Supply

E57 Draw-Thru, 32-inch AF; Without Inlet Vanes



Acoustics - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57

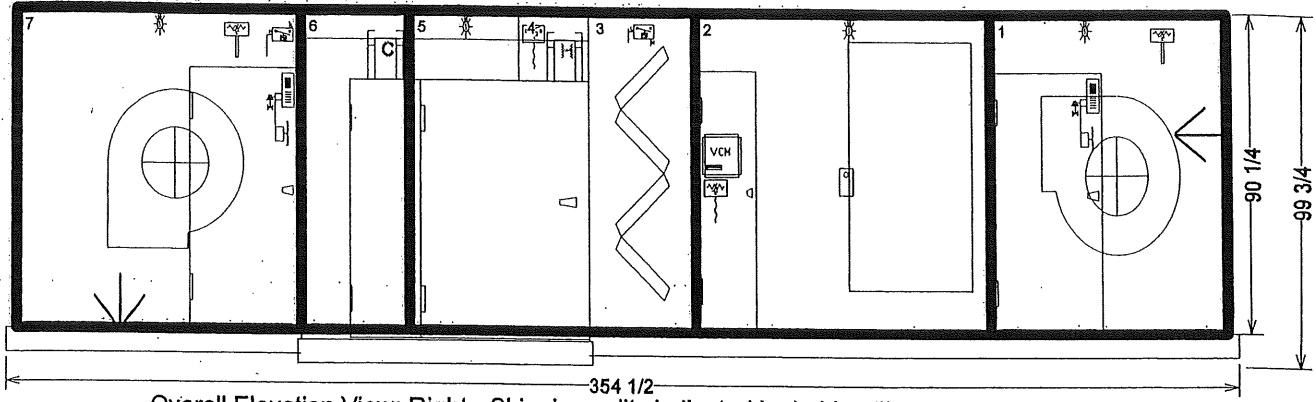
Qty: 1 Tag(s): AHU-1

Total Acoustics

	63Hz	125Hz	250Hz	500Hz	1 kHz	2 kHz	4 kHz	8 kHz
Front Discharge	94	99	100	94	91	84	82	77
Side Discharge								
Ducted Inlet	91	88	89	86	79	77	71	63
Casing	92	89	82	73	65	62	56	56

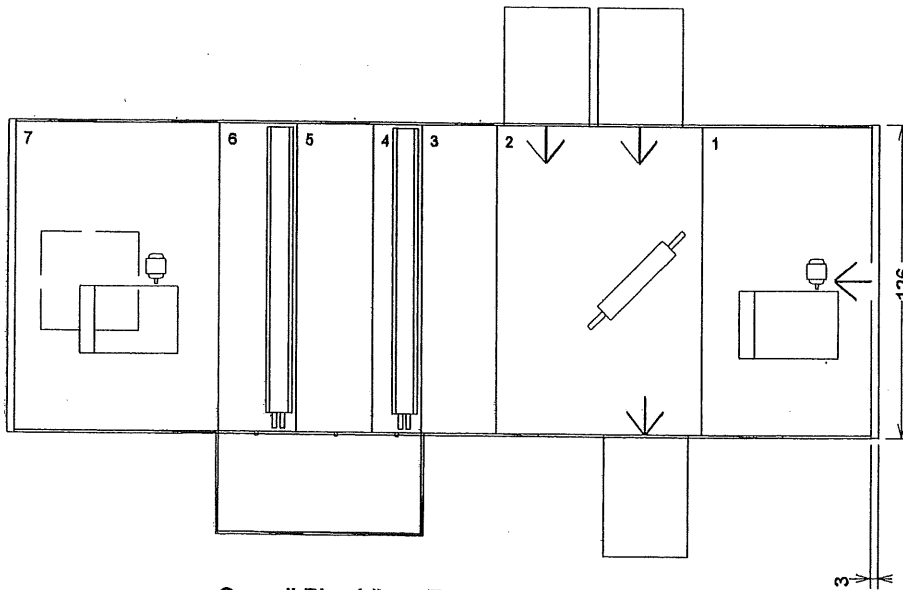
SOUND DATA

As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 Qty: 1 Tag(s): AHU-1



Overall Elevation View: Right - Shipping splits indicated by bold outline. - Measurements in inches

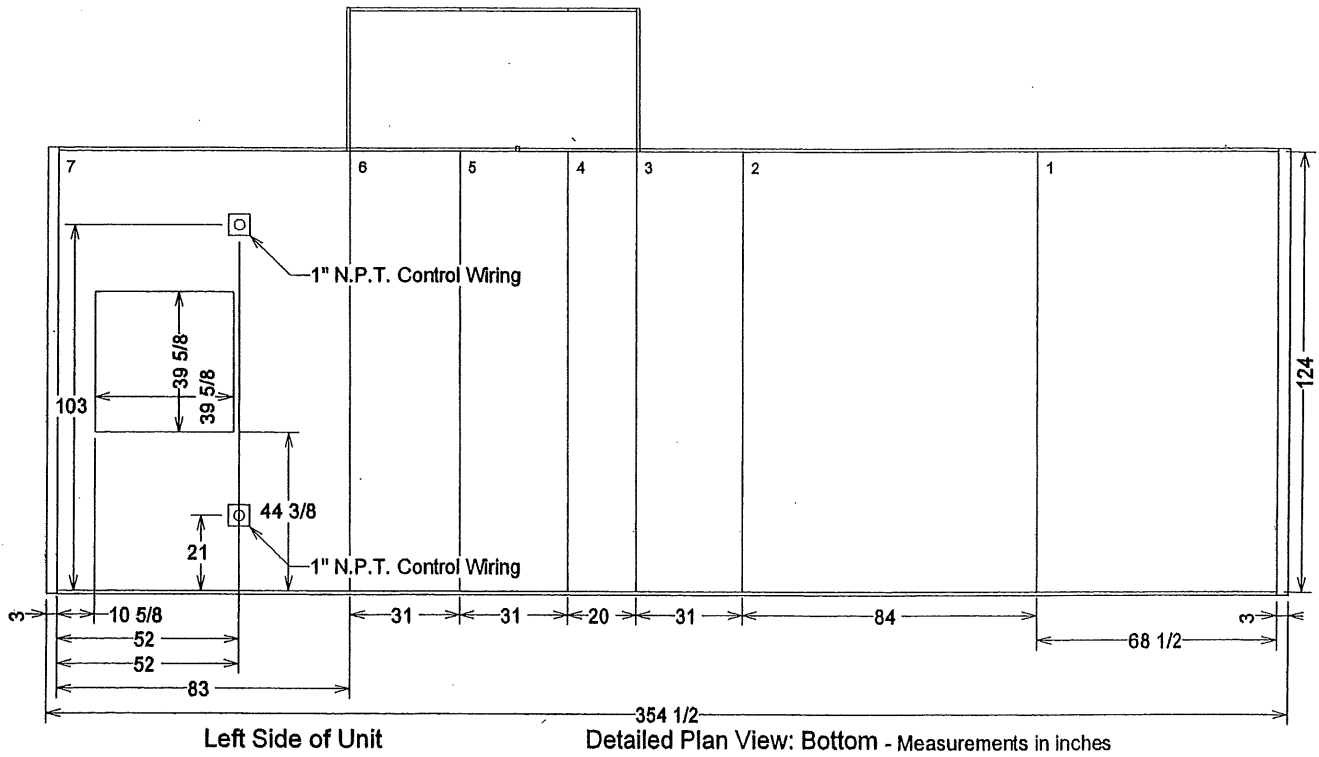
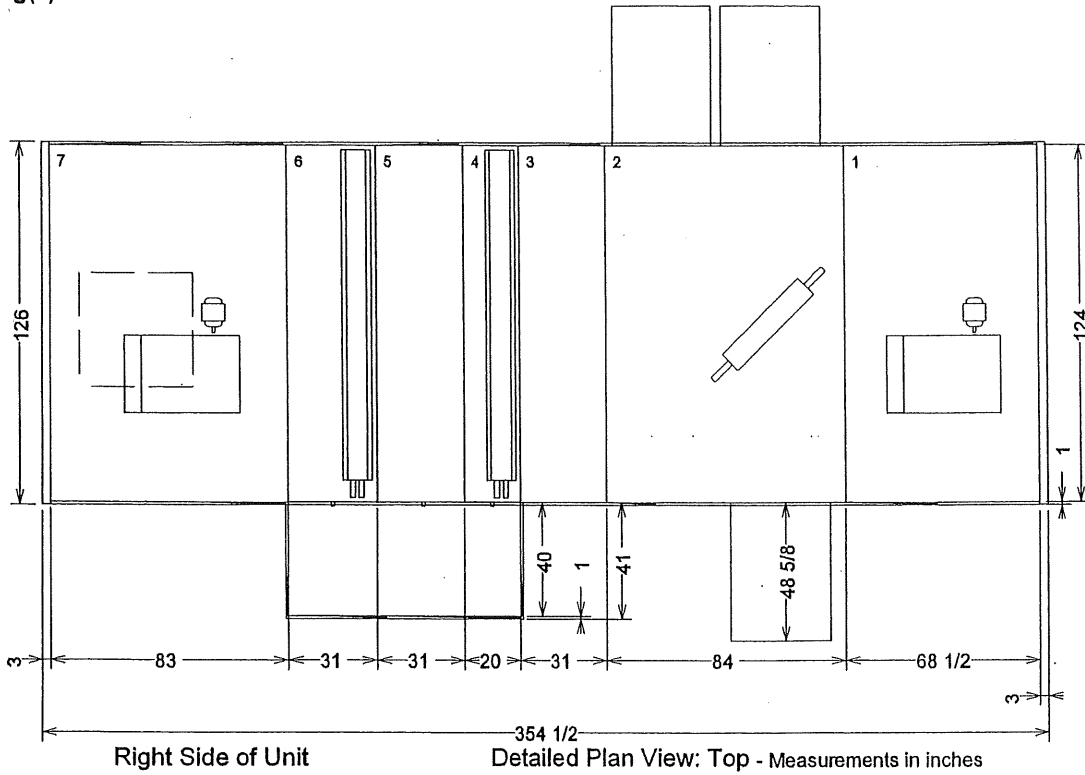
Pos #	Module	Length	Weight
1	Fan	68 1/2	3707.00
2	Economizer	84	2779.00
3	Flat or angled filters	31	887.00
4	Horizontal coil	20	1037.85
5	Access	31	977.00
6	Horizontal coil	31	3338.35
7	Fan	83	4723.00
		Installed Unit Weight 17449.21 lbs	



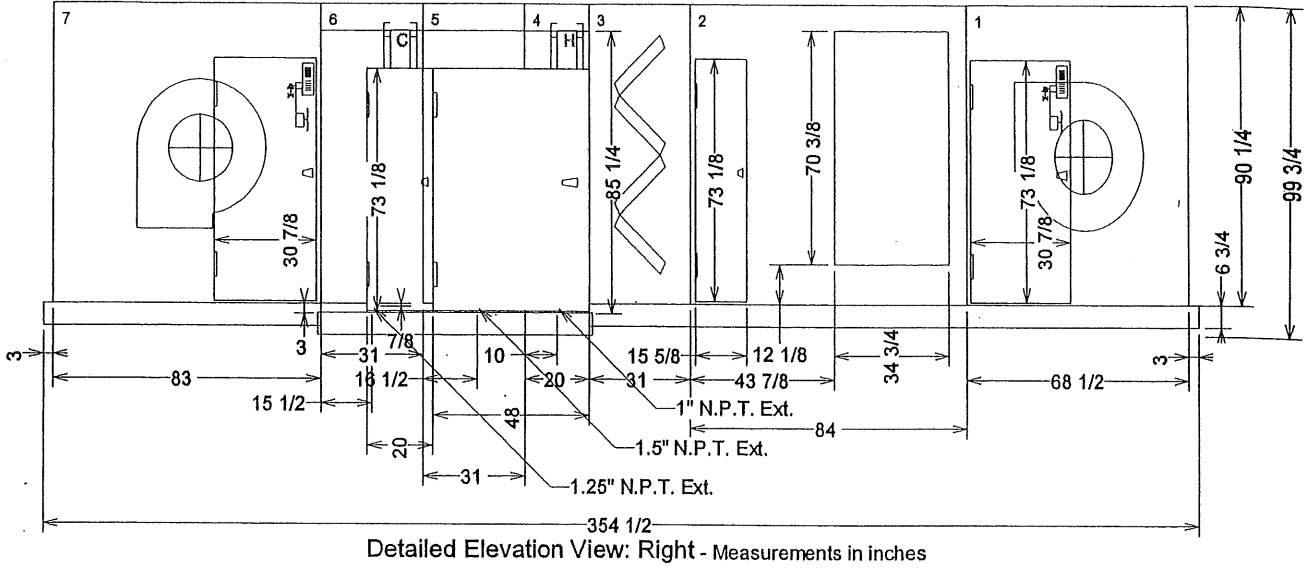
Overall Plan View: Top - Measurements in inches

As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57

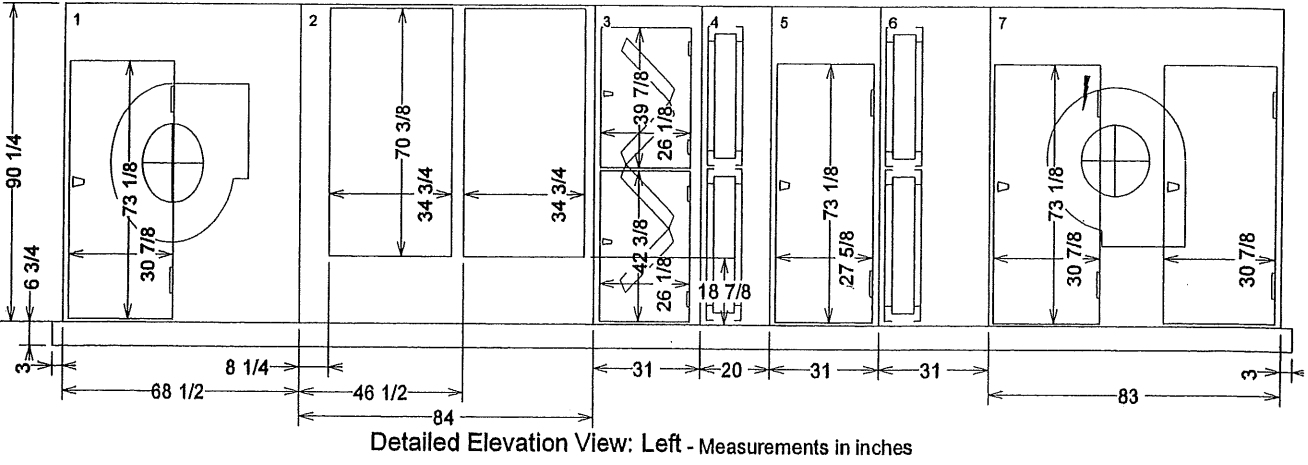
Qty: 1 Tag(s): AHU-1



As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

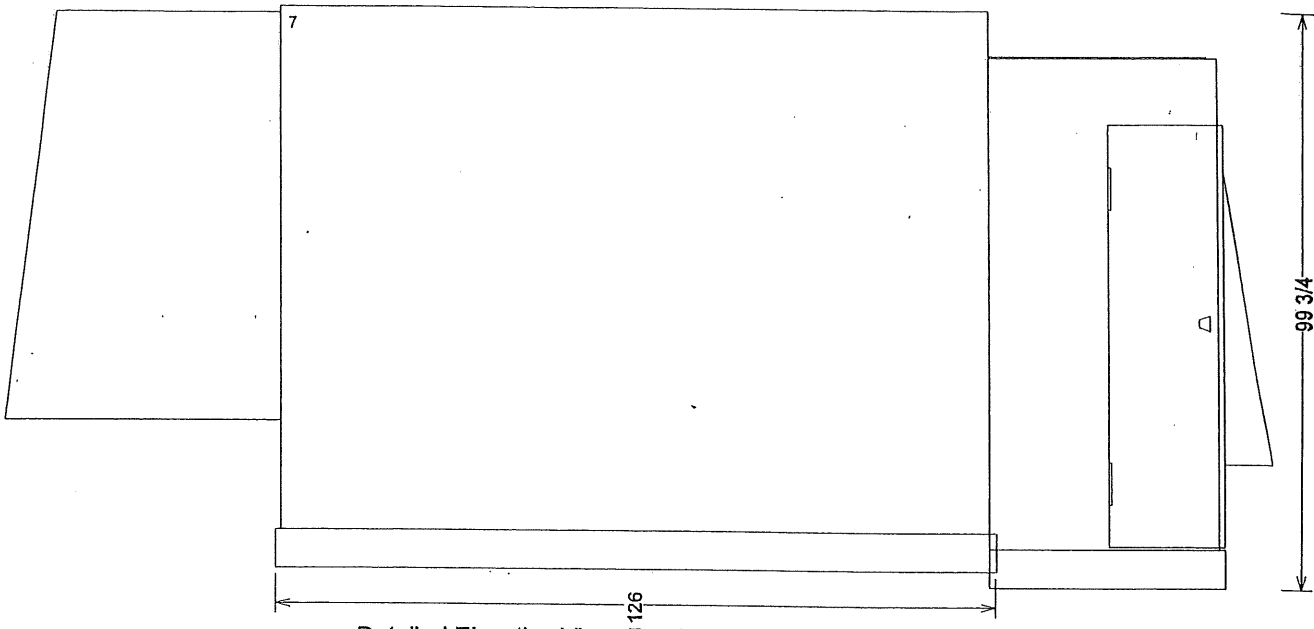


Detailed Elevation View: Right - Measurements in inches

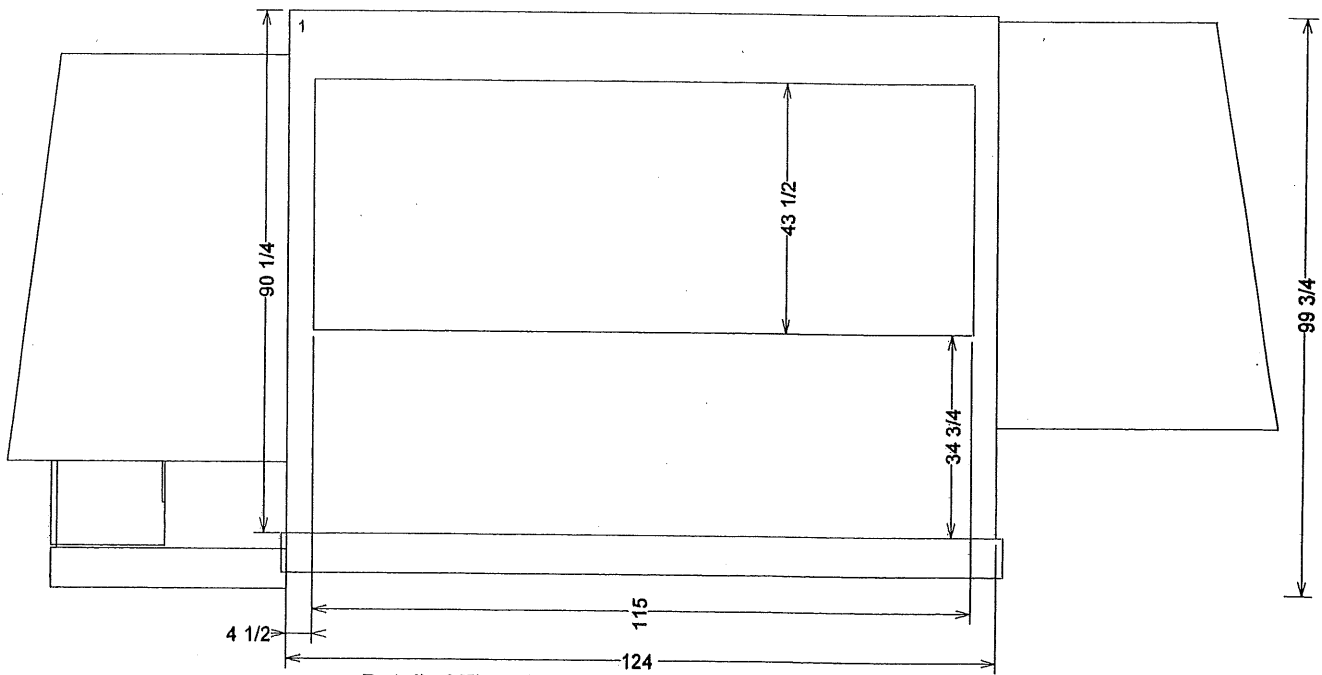


Detailed Elevation View: Left - Measurements in inches

As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

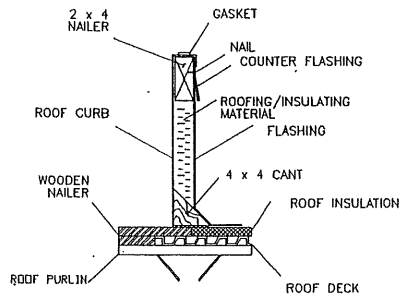
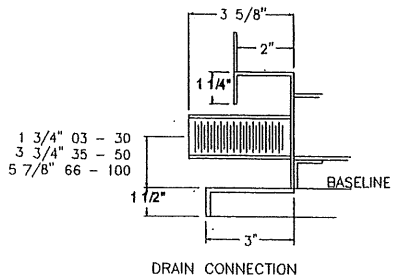
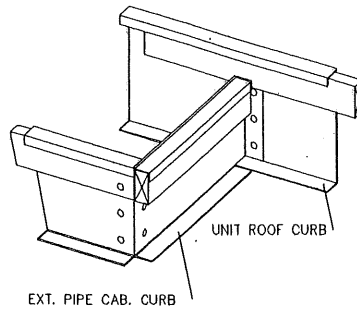
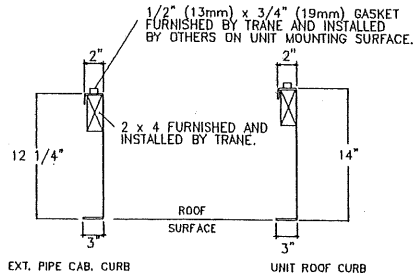


Detailed Elevation View: Front - Measurements in inches

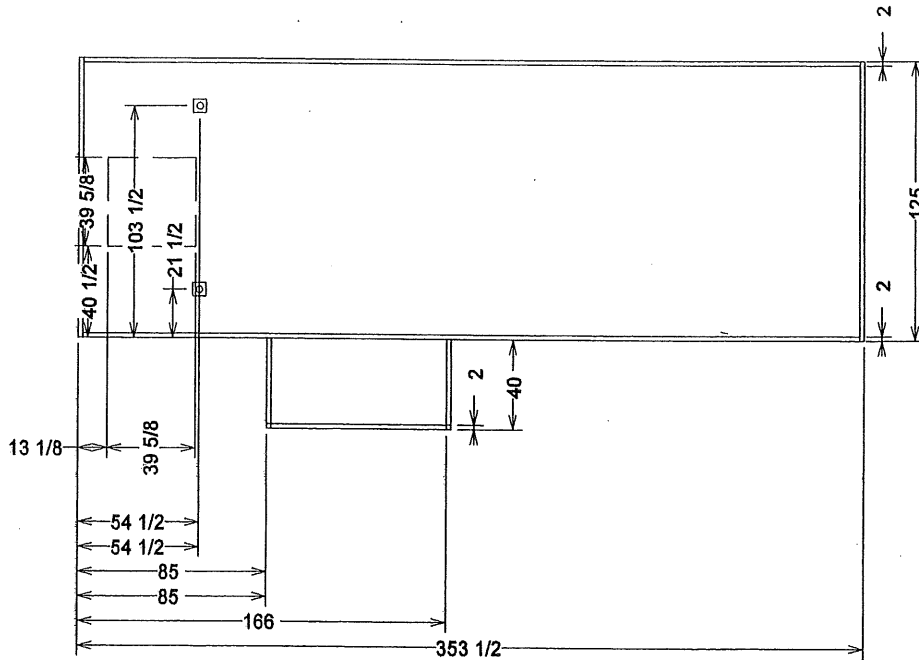


Detailed Elevation View: Back - Measurements in inches

As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

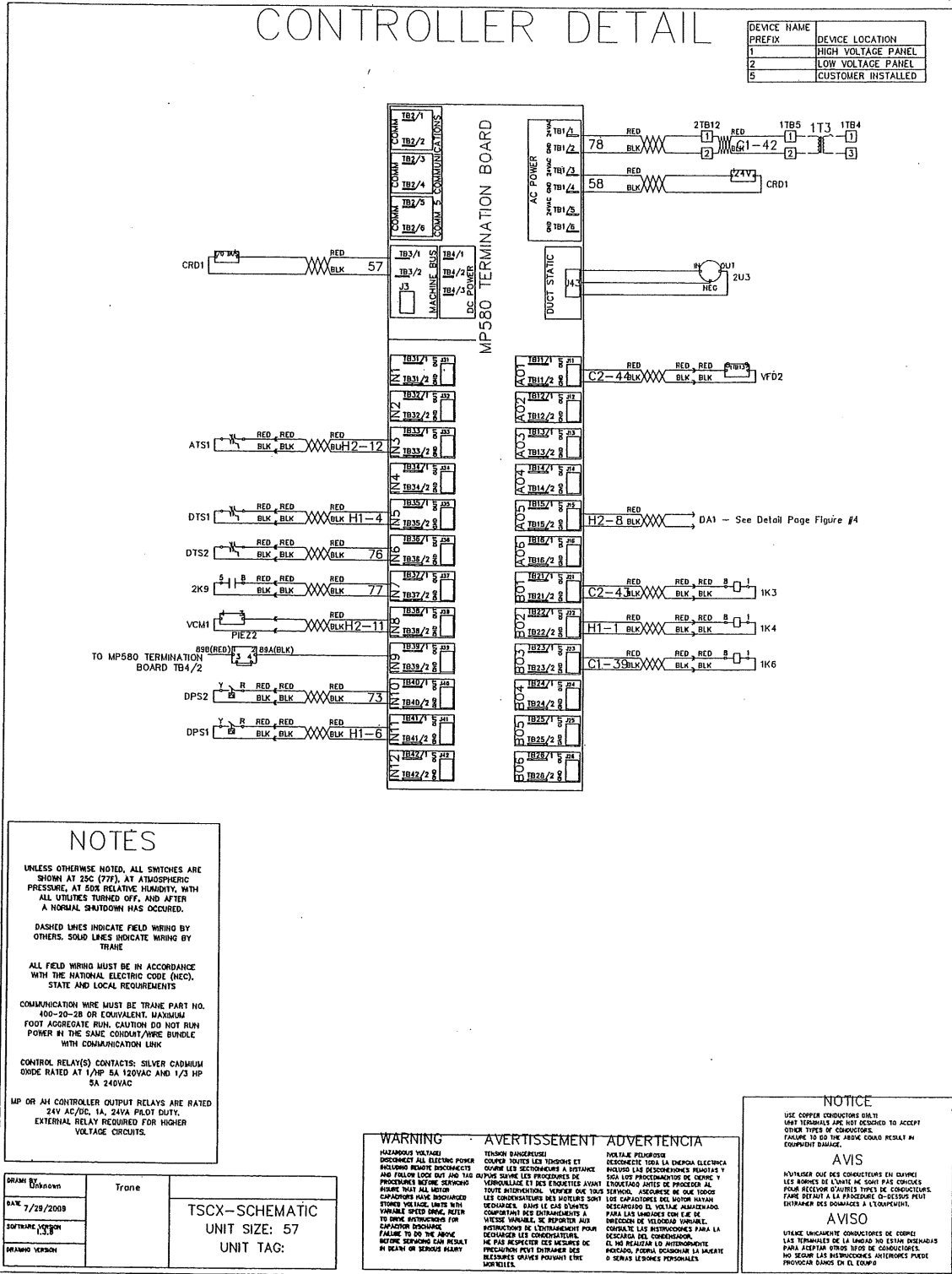


NOTE: MATERIALS TO ATTACH ROOF CURB TO ROOF ARE TO BE SUPPLIED BY THE INSTALLER.



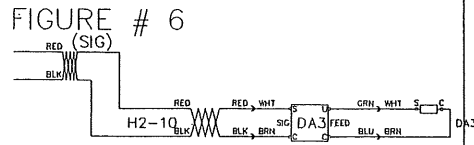
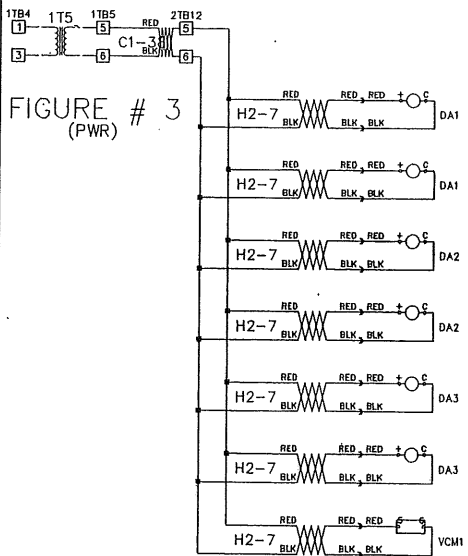
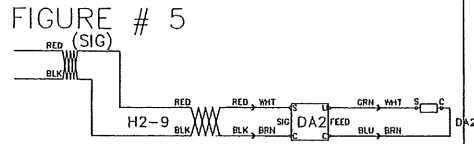
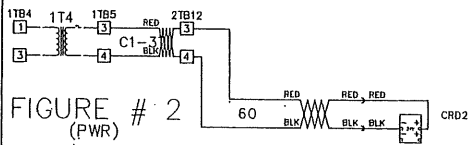
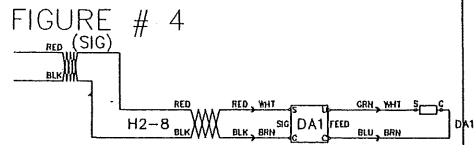
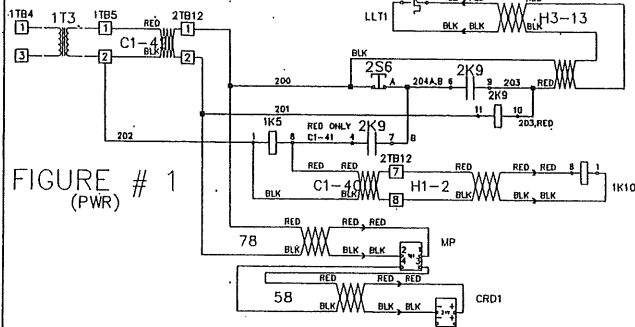
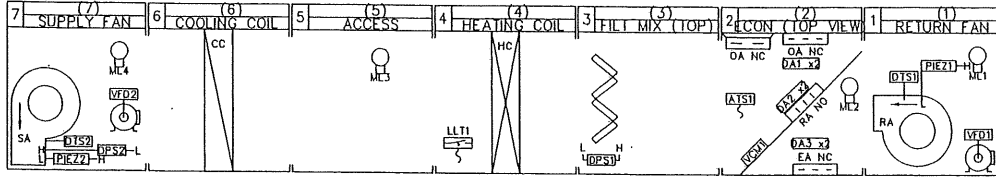
Detailed Plan View: Curb - Measurements in inches

As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1



As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 Qty: 1 Tag(s): AHU-1

WIRING DETAIL



DRAWN BY: Unknown DATE: 7/29/2009 SOFTWARE VERSION: DRAWING VERSION:	Trane	TSCX-SCHMATIC UNIT SIZE: 57 UNIT TAG:
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As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 Qty: 1 Tag(s): AHU-1

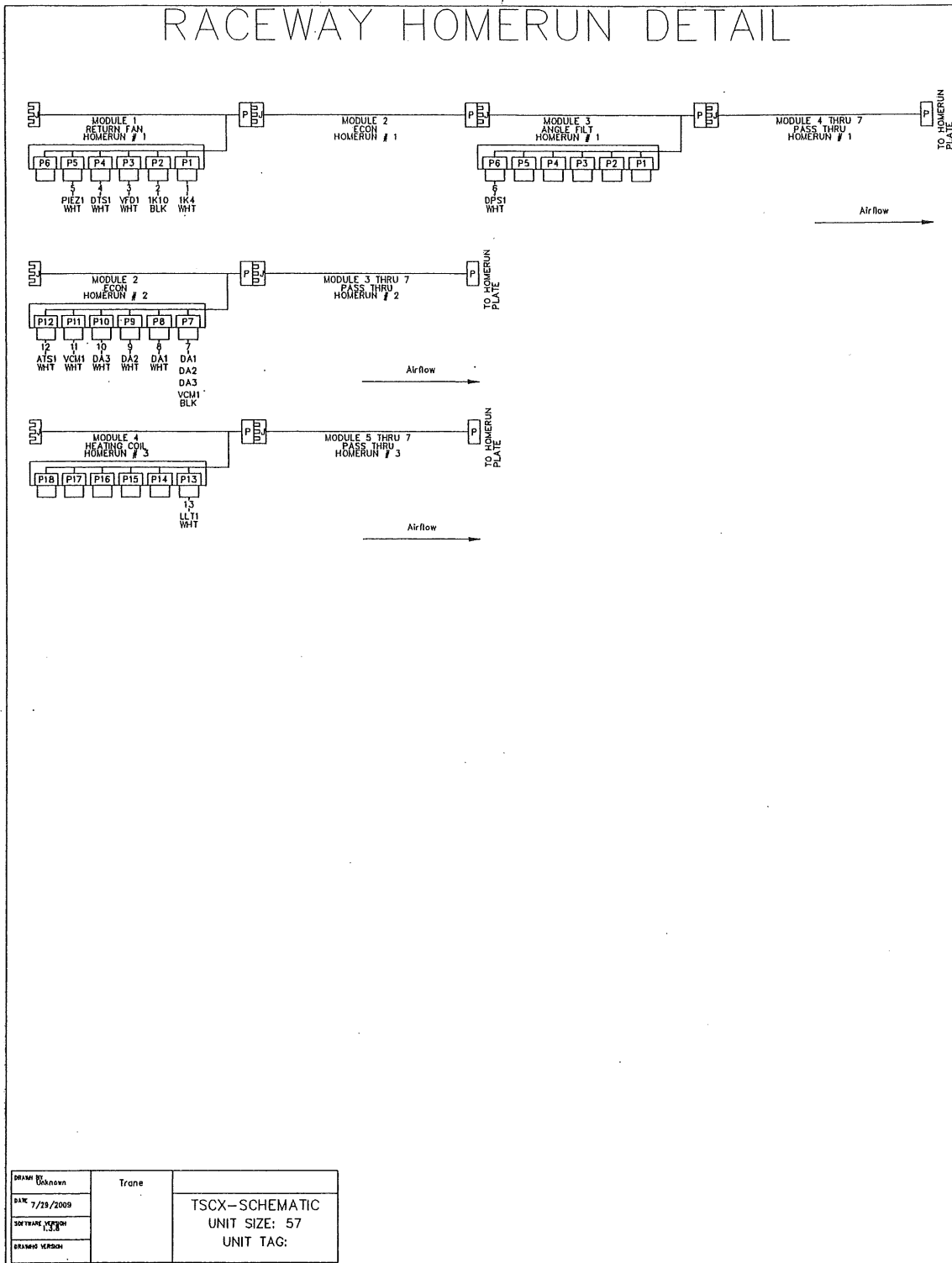
LEGEND DETAIL

POS#	DESCRIPTION	PT	LABEL	PWR HR-WIRE	SIGNAL HR-WIRE	CROSSOVER CABLE-WIRE	XFMR	PWR VA
0	75VA TRANSFORMER		1T3			C1-42		
0	75VA TRANSFORMER		1T4			C1-37		
0	75VA TRANSFORMER		1T5			C1-38		
0	Differential Press. Transmitter	J43	2U3					
0	MP580 Controller		MP	78			1T3	43
0	Expansion card		CRD1	58	57		1T3	22
0	Expansion card		CRD2	60	59		1T4	22
0	Customer Interface Relay	B03	1K6			C1-39		
1	Field wired Marine Light		ML1					
1	Return/Exhaust Fan S/S	B02	1K4		H1-1			
1	Return/Exhaust Fan Low Limit Circuit Relay		1K10	H1-2		C1-40	1T3	1
1	Return/Exhaust Fan Speed	A07	VFD1		H1-3			
1	Discharge Air Sensor	IN5	DTS1		H1-4			
1	Flow meter	IN21	PIEZ1	H1-5(RED)	H1-5(BLK)			
2	Damper Actuator	A05	DA1	H2-7	H2-8		1T5	20
2	Damper Actuator	A08	DA2	H2-7	H2-9		1T5	20
2	Damper Actuator	A09	DA3	H2-7	H2-10		1T5	20
2	Ventilation Control Module	IN8	VCM1	H2-7	H2-11		1T5	8
2	Averaging Temperature Sensor	IN3	ATS1		H2-12			
2	Field wired Marine Light		ML2					
3	Dirty Filter Switch	IN11	DPS1		H1-6			
4	Low Limit (Normally open-WHT)		LLT1		H3-13			
5	Field wired Marine Light		ML3					
7	Field wired Marine Light		ML4					
7	Supply Fan Low Limit Circuit Relay		1K5			C1-41	1T3	1
7	Low Limit Reset Circuit Relay	IN7	2K9		77		1T3	2
7	Supply Fan S/S	B01	1K3			C2-43		
7	Supply Fan Speed	A01	VFD2			C2-44		
7	Discharge Air Sensor	IN6	DTS2		76			
7	Air Flow Switch	IN10	DPS2		73			
7	Flow meter	IN9	PIEZ2	89B	89A			

DRAWN BY: <u>UNKNOWN</u> DATE: <u>7/29/2009</u> SOFTWARE VERSION: <u>1.3.8</u> DRAWING VERSION:	Trane TSCX--SCHEMATIC UNIT SIZE: 57 UNIT TAG:
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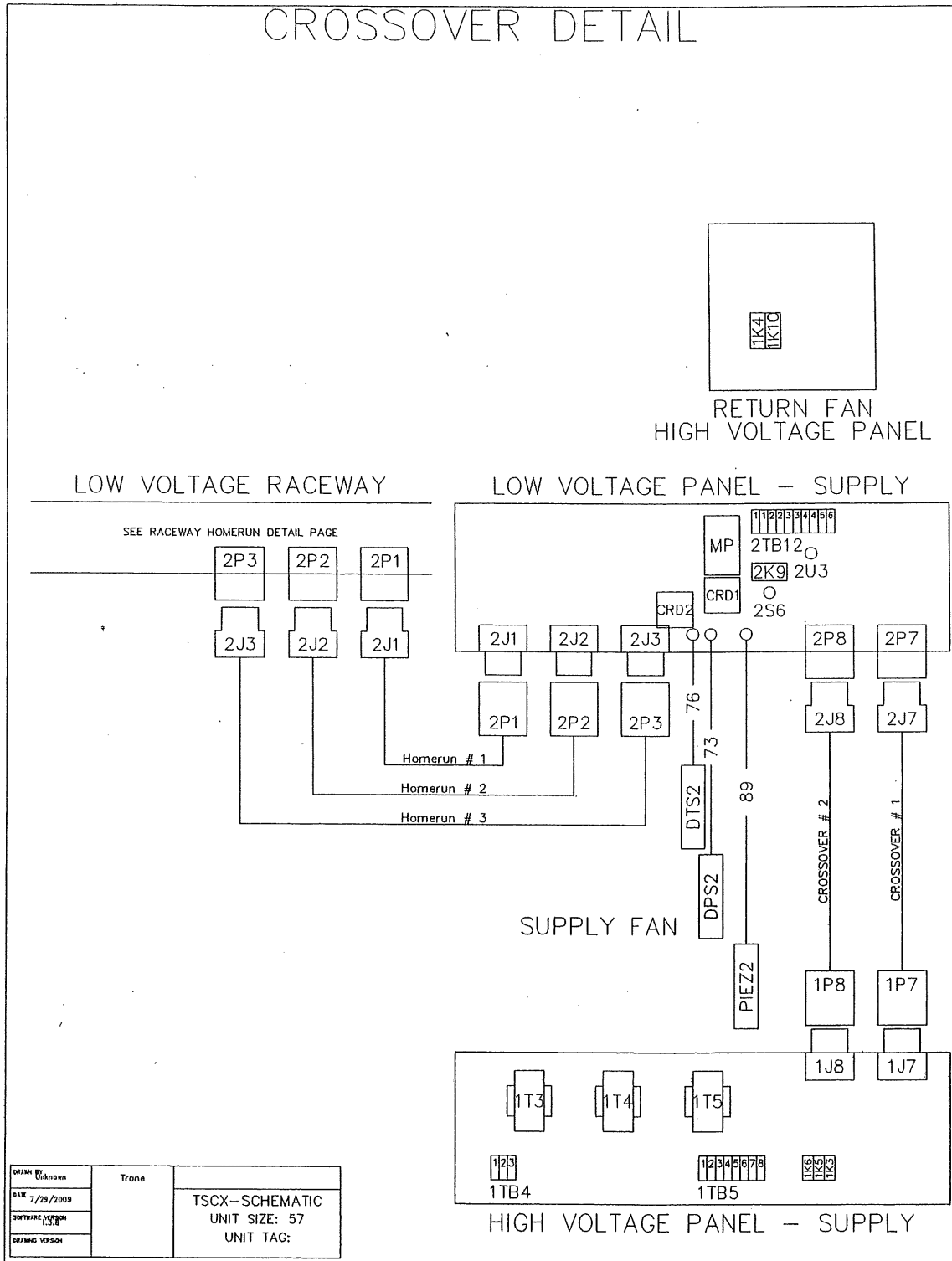
As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 Qty: 1 Tag(s): AHU-1

RACEWAY HOMERUN DETAIL



As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57

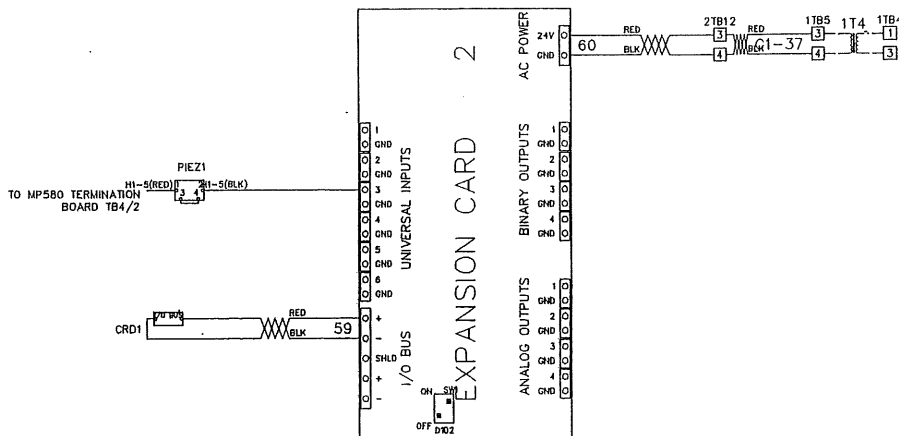
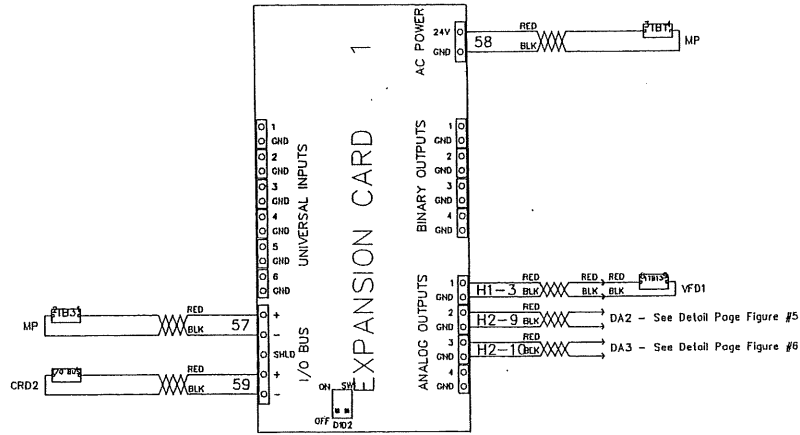
Qty: 1 Tag(s): AHU-1



DRAWN BY: Unknown DATE: 7/29/2009 SOFTWARE VERSION: 13.8 DRAWING VERSION:	Trane	TSCX - SCHEMATIC UNIT SIZE: 57 UNIT TAG:
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As-Built - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 Qty: 1 Tag(s): AHU-1

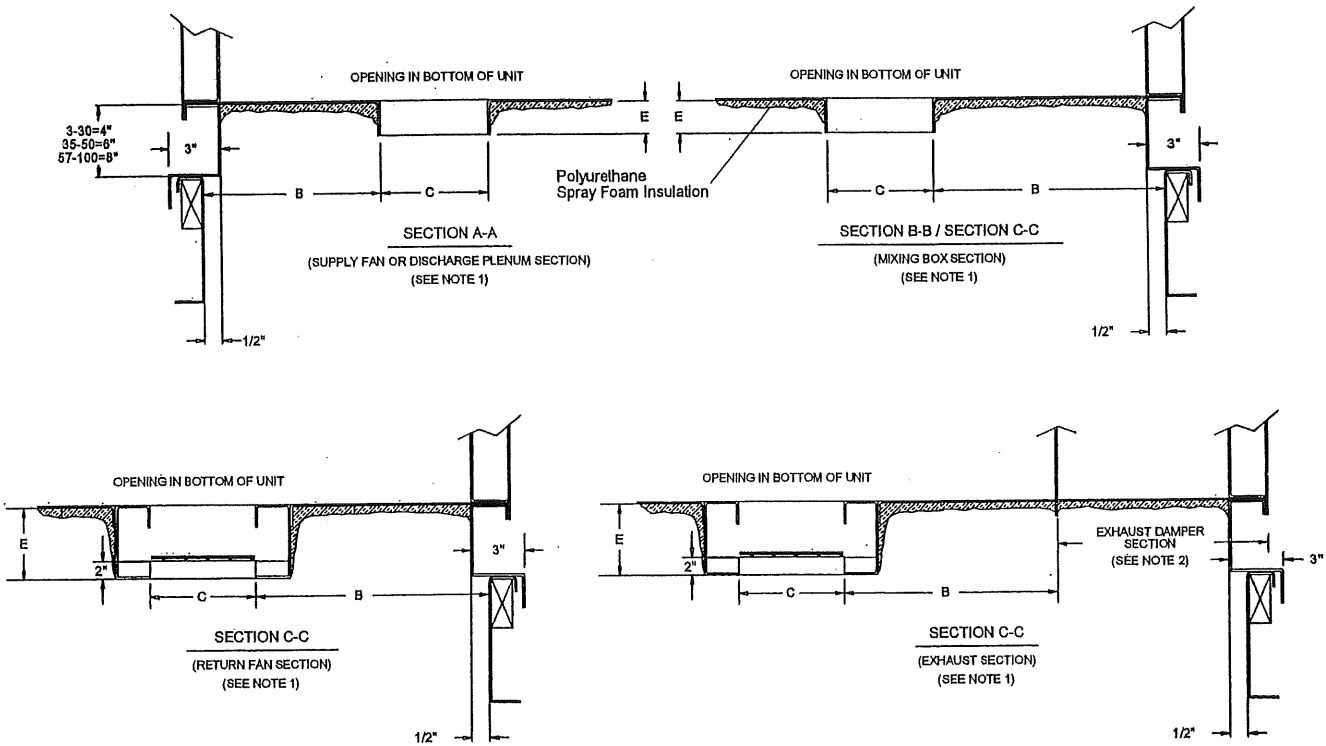
EXPANSION CARD DETAIL



<table border="1"> <tr> <td>DRAWN BY</td> <td>Unknown</td> </tr> <tr> <td>DATE</td> <td>7/29/2009</td> </tr> <tr> <td>SOFTWARE VERSION</td> <td>1.3.3</td> </tr> <tr> <td>DRAWING VERSION</td> <td></td> </tr> </table>	DRAWN BY	Unknown	DATE	7/29/2009	SOFTWARE VERSION	1.3.3	DRAWING VERSION		<table border="1"> <tr> <td>Trane</td> <td>TSCX--SCHEMATIC UNIT SIZE: 57 UNIT TAG:</td> </tr> </table>	Trane	TSCX--SCHEMATIC UNIT SIZE: 57 UNIT TAG:
DRAWN BY	Unknown										
DATE	7/29/2009										
SOFTWARE VERSION	1.3.3										
DRAWING VERSION											
Trane	TSCX--SCHEMATIC UNIT SIZE: 57 UNIT TAG:										

Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Discharge Detail
 Qty: 1 Tag(s): AHU-1

RELATIONSHIP OF CURB TO UNIT AS-BUILT

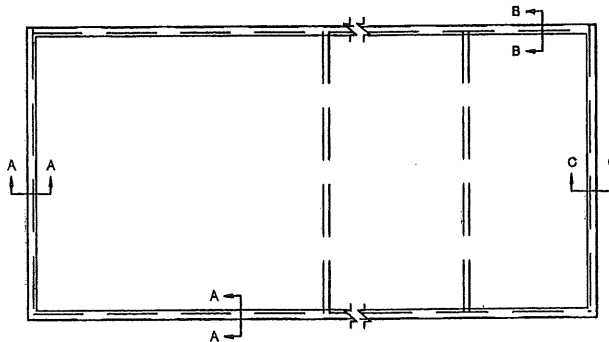


MODULE	E
Mixing Box	5
Discharge Plenum	5
Bottom Front Discharge Fan	4
Bottom Front Discharge Plenum Fan	5
Exhaust / Return Fan	7,875

For Reference Only. Not All Units Selected Include Above Modules.

NOTE:

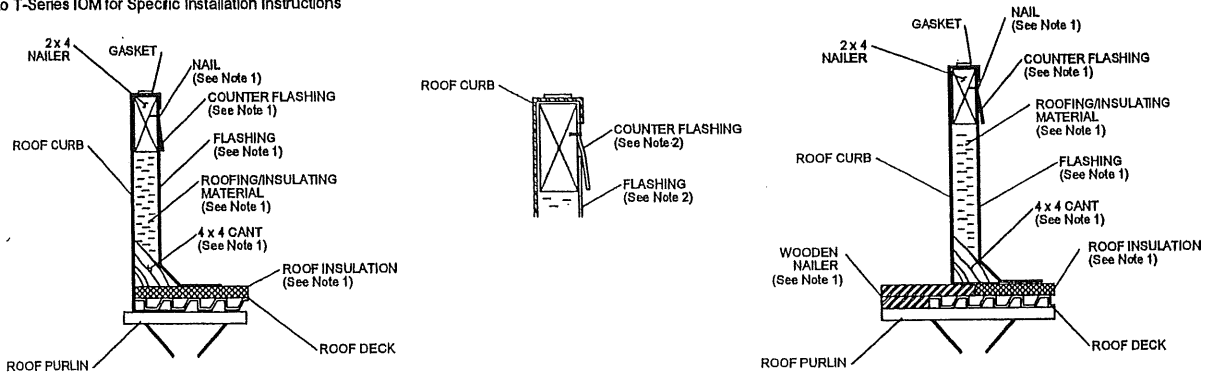
1. B and C are Representative of Dimensions on the Accessory As-Built Used to Locate Opening(s) in the Roof Surface.
2. Add the Exhaust Damper Section Dimension on the Unit As-Built to the B Dimension.
3. All Supply and Return openings in the base of the unit must be ducted. Duct work must be attached to the inside of the flange (see dimension E) located in the opening in the bottom of the unit. Mounting hardware must extend from the inside of the duct, through the duct work, and into the flange.



Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Roof Curb Mounting Detail
 Qty: 1 Tag(s): AHU-1

Recommendation for Roof Curb Installation

Refer to T-Series IOM for Specific Installation Instructions

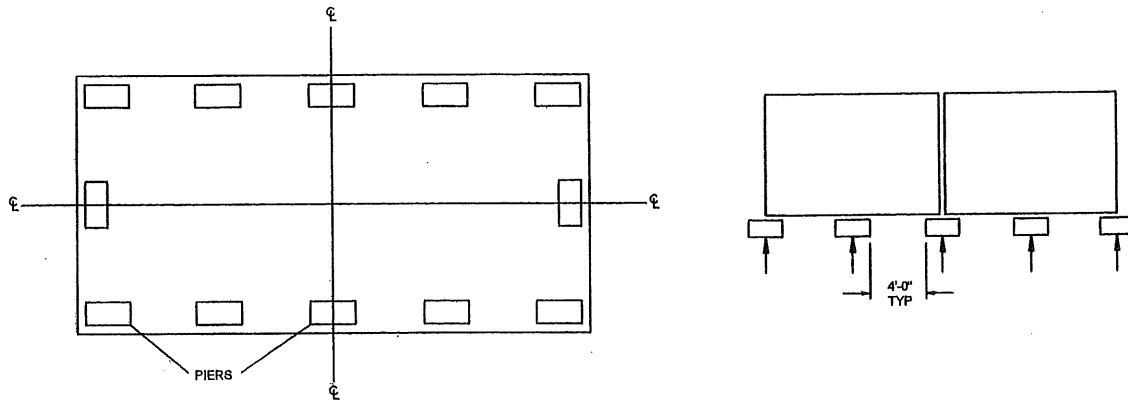


Note:

1. Materials to Attach Roof Curb to Roof are to be Supplied by the Installer.
2. Flashing or Counter Flashing Should Not Come to or Over Top of Curb.
3. Roof Curb must be Mechanically Fastened to Roof Surface.

Recommendation for Pier Mounting

Refer to T-Series IOM for Specific Installation Instructions



Note:

1. Pier Supports Should be Inside 3" Flat of Unit Base. Unit Cannot be Supported by Unit Base Drip Leg.
2. Pier Supports Should be No Wider than 2 3/4", Due to Supports Perpendicular to Airflow.
3. Piers Beneath Shipping Splits Must be Structurally Sound to Support the Weight of the Unit.

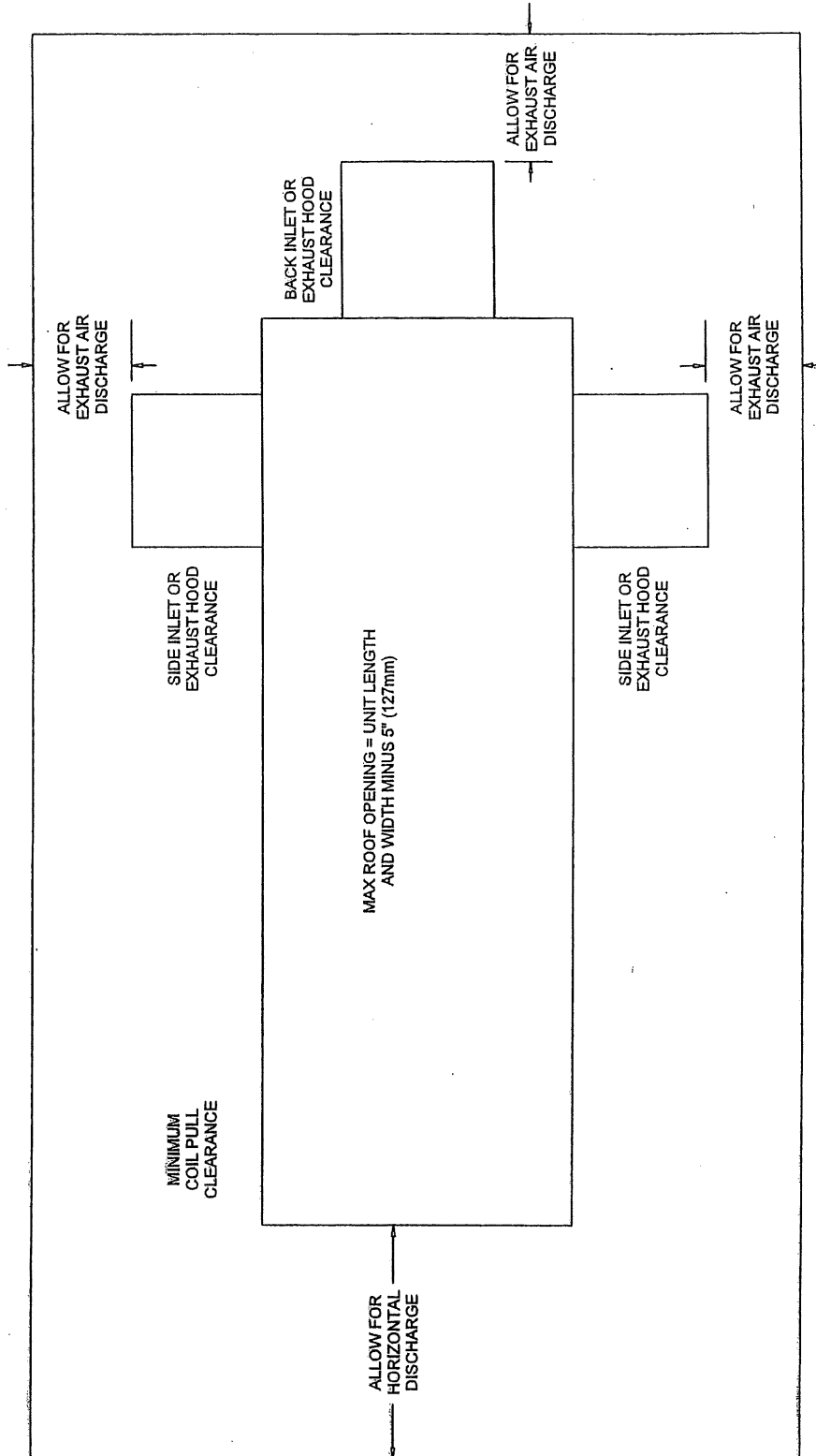
Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57

Filter Schedule

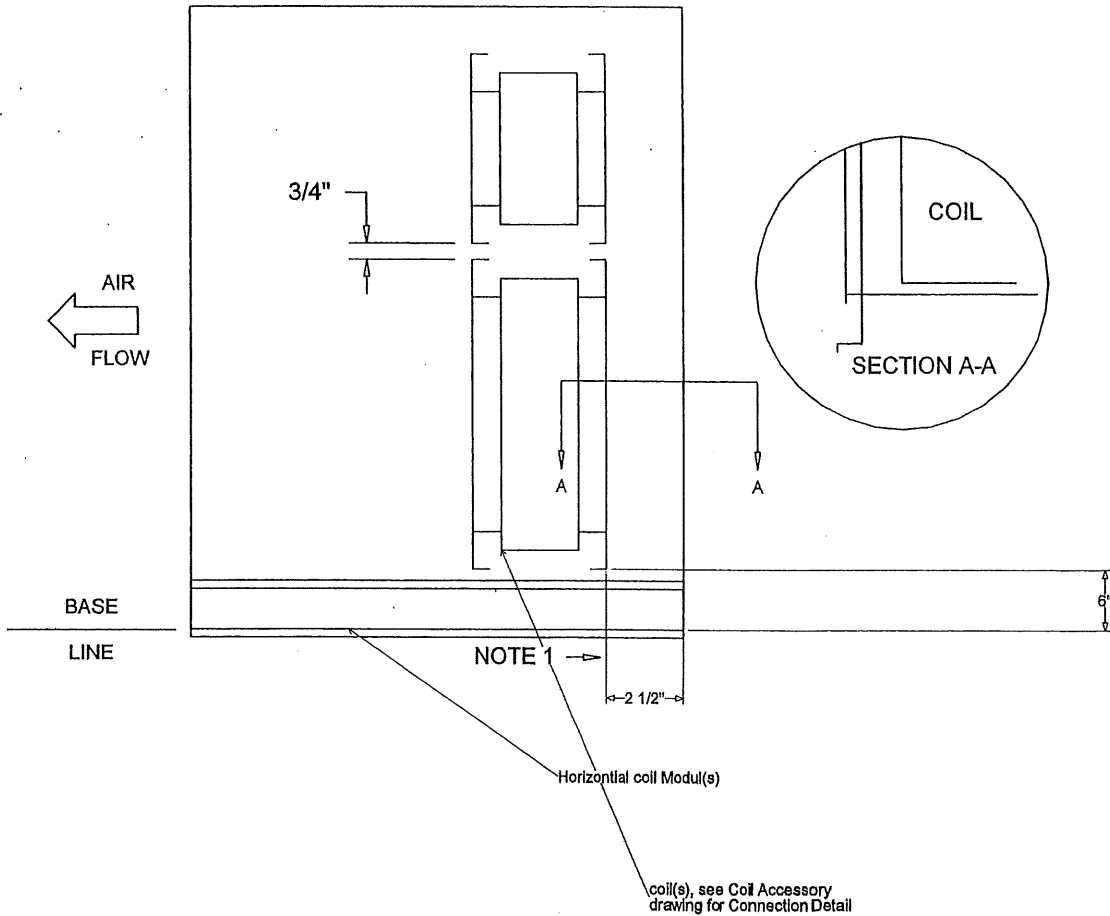
Qty: 1 Tag(s): AHU-1

Filters		Unit Size
		57
Angled		
2"	Area (Ft2)	96.67
	Qty.	30 – 20" X 20"
		6 – 16" X 20"

Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
TYPICAL UNIT CLEARANCE DETAIL
Qty: 1 Tag(s): AHU-1



Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
HOT WATER COIL LOCATION DETAIL
 Qty: 1 Tag(s): AHU-1



UNIT SIZE	COIL SIZE	QUANTITY	AREA ft2
57	UNIT	2-36 X 109	54.60

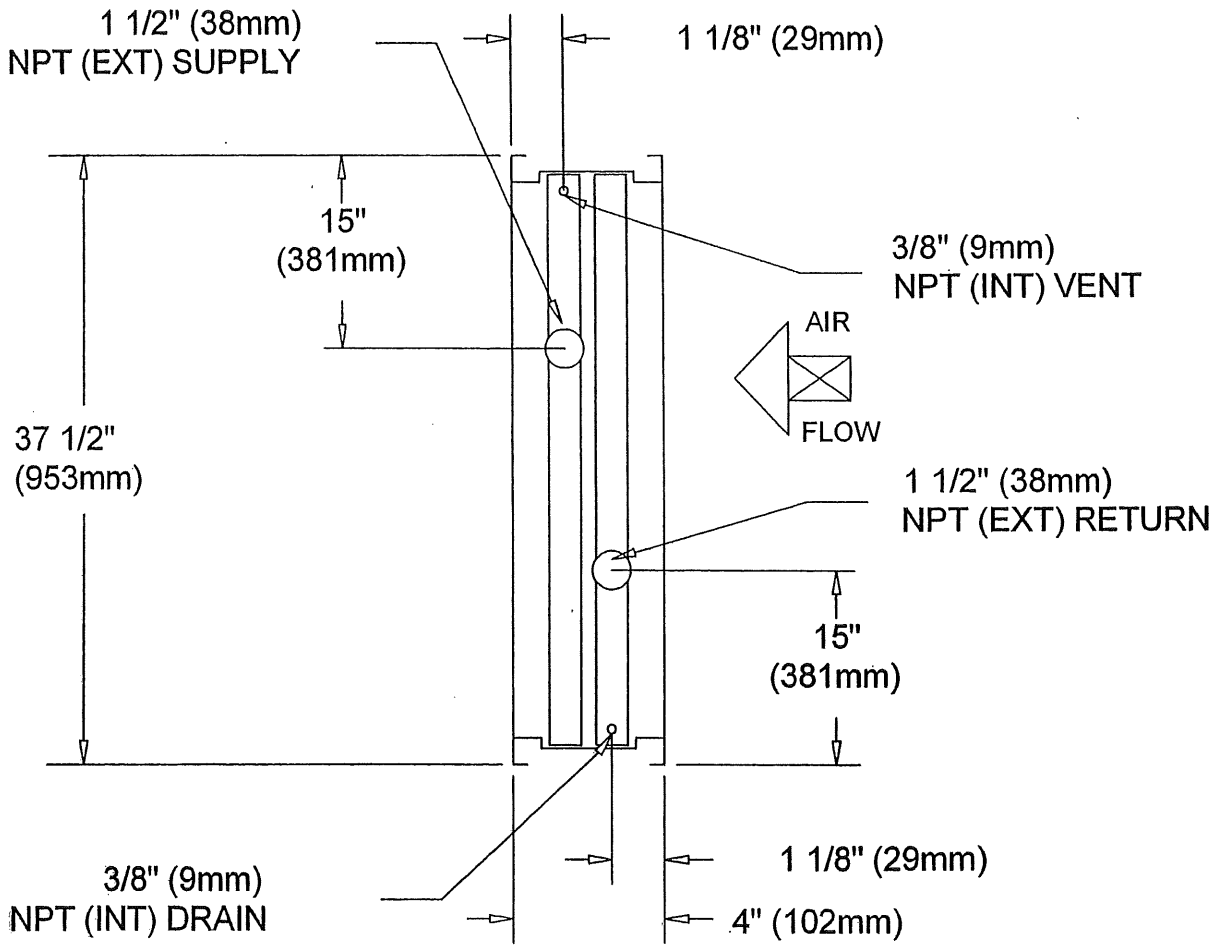
NOTES

1. THE HORIZONTAL DIMENSION FOR AN 8 ROW UU,UW,UF IN A MEDIUM COIL MODULE.

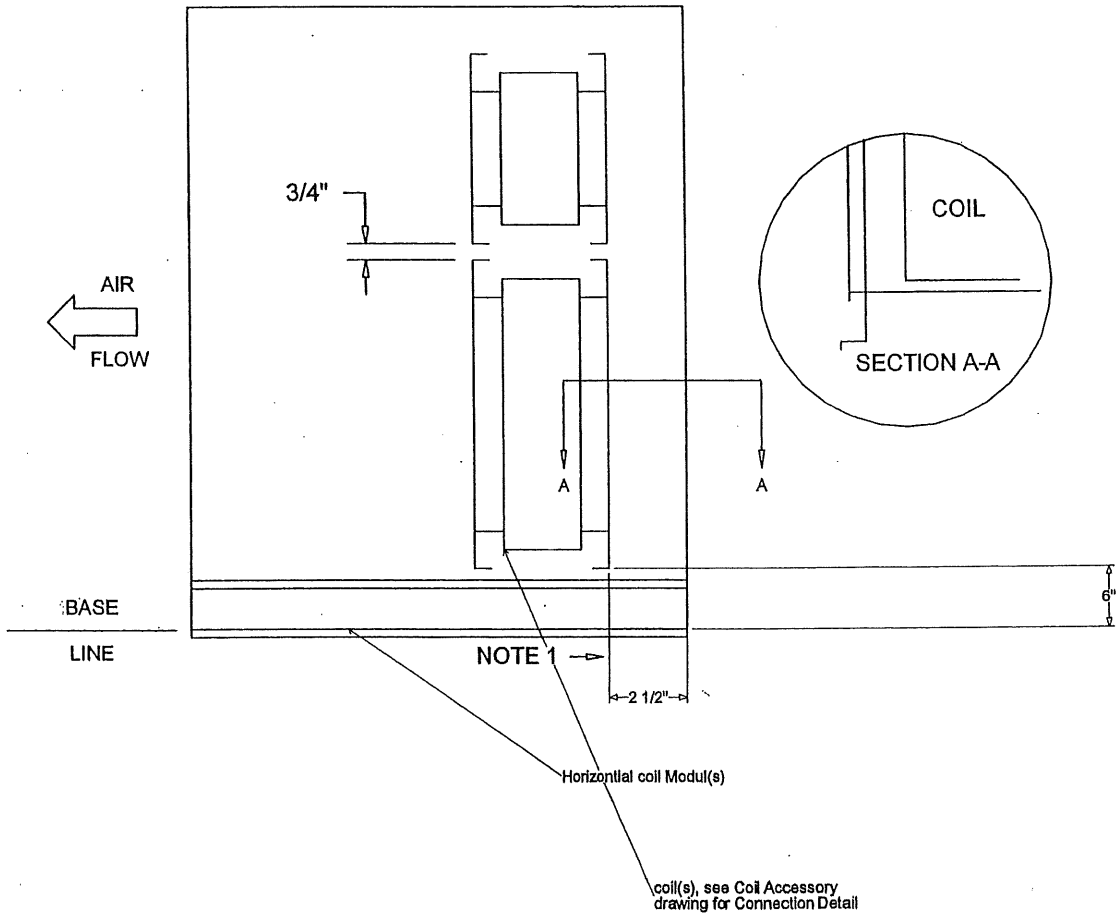
UNIT SIZES 3-30 MINUS 1/2".
 UNIT SIZES 35-40 MINUS 5/8".

Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Hot Water Coil - 5W 1 ROW COIL
Qty: 1 Tag(s): AHU-1

36" 5W 1 ROW



Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 CHILLED WATER COIL LOCATION DETAIL TSCB
 Qty: 1 Tag(s): AHU-1



NOTES

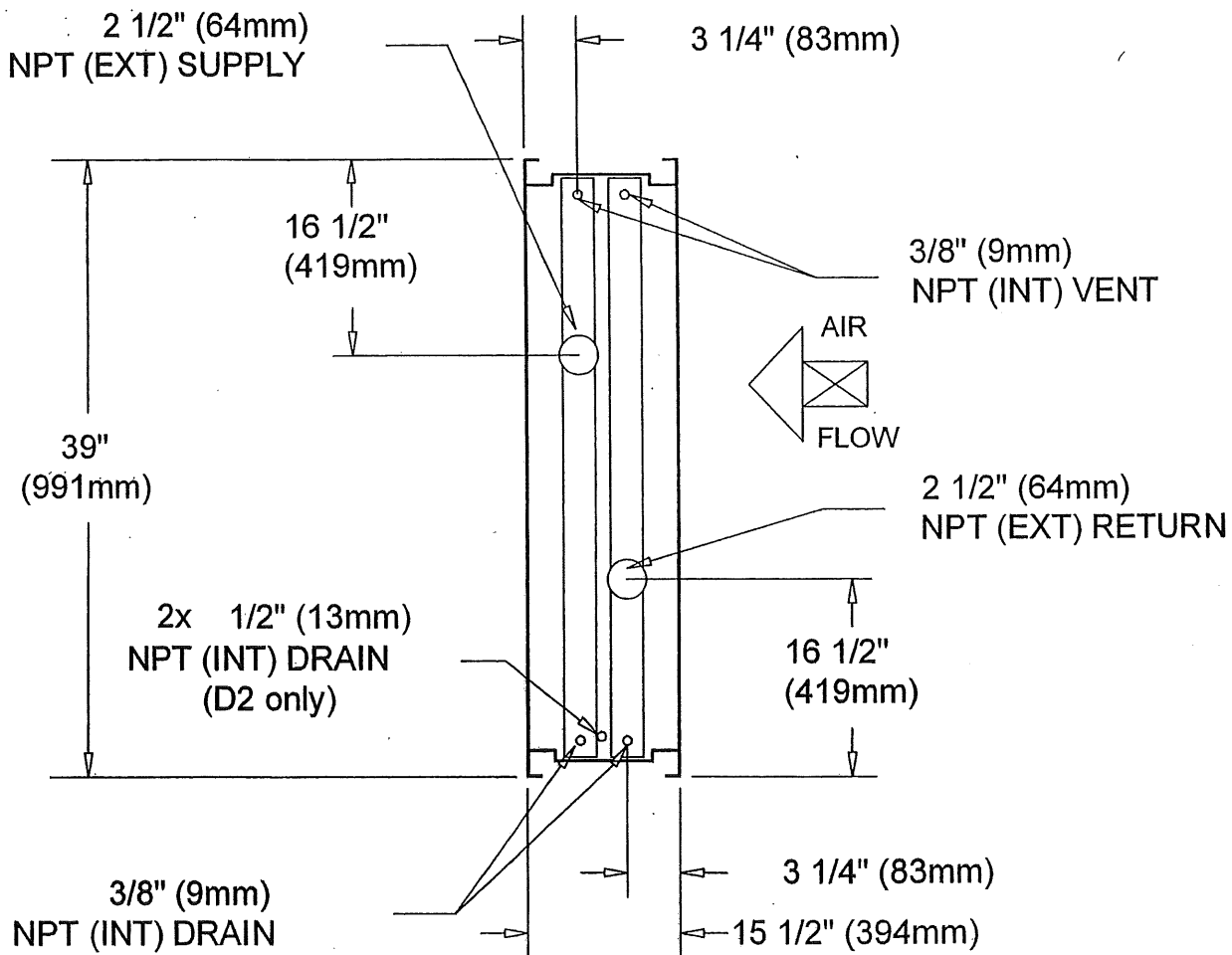
1. THE HORIZONTAL DIMENSION FOR AN 8 ROW UU,UW,UF IN A MEDIUM COIL MODULE.

UNIT SIZES 3-30 MINUS 1/2".
 UNIT SIZES 35-40 MINUS 5/8".

UNIT SIZE	COIL SIZE	QUANTITY	AREA ft2
57	UNIT	2-37.5 X 109	56.77

Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Chilled Water Coil - WD 8 ROW COIL AL FINS
Qty: 1 Tag(s): AHU-1

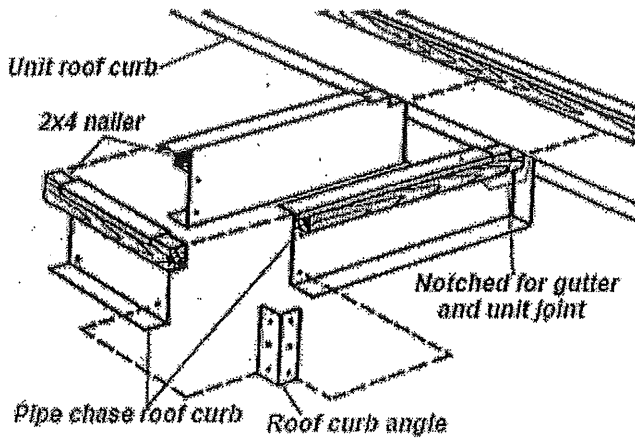
37" WD or D2 8 ROW



Note: D2 option is a dual serpentine coil drainable at each row and at the headers as opposed to the WD coil which is drainable at the headers only.

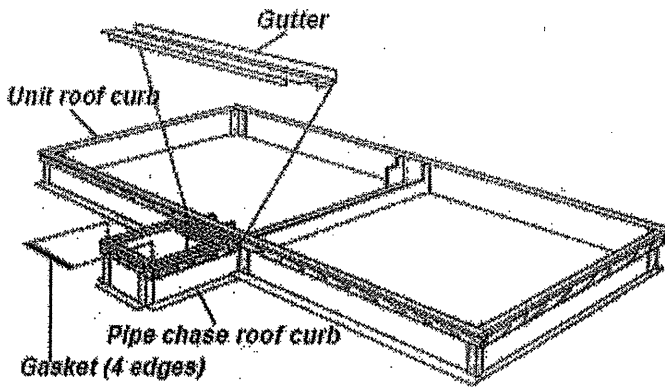
Accessory - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Piping Cabinet - Trane Supplied Roof Curb
Qty: 1 Tag(s): AHU-1

Trane Curb - External Pipe Cabinet Assembly



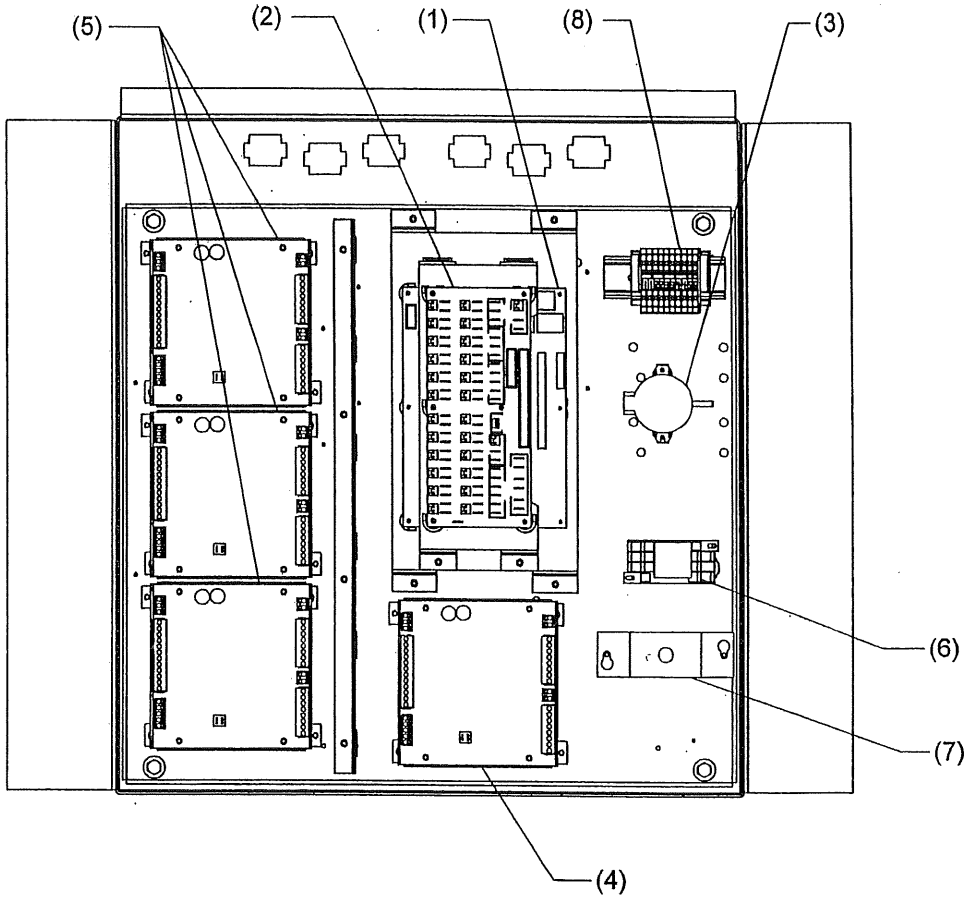
Gutter Not Shown

Trane Curb – External Pipe Cabinet Gutter Installation



Field Wiring - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

T-SERIES CONTROLLER LAYOUT

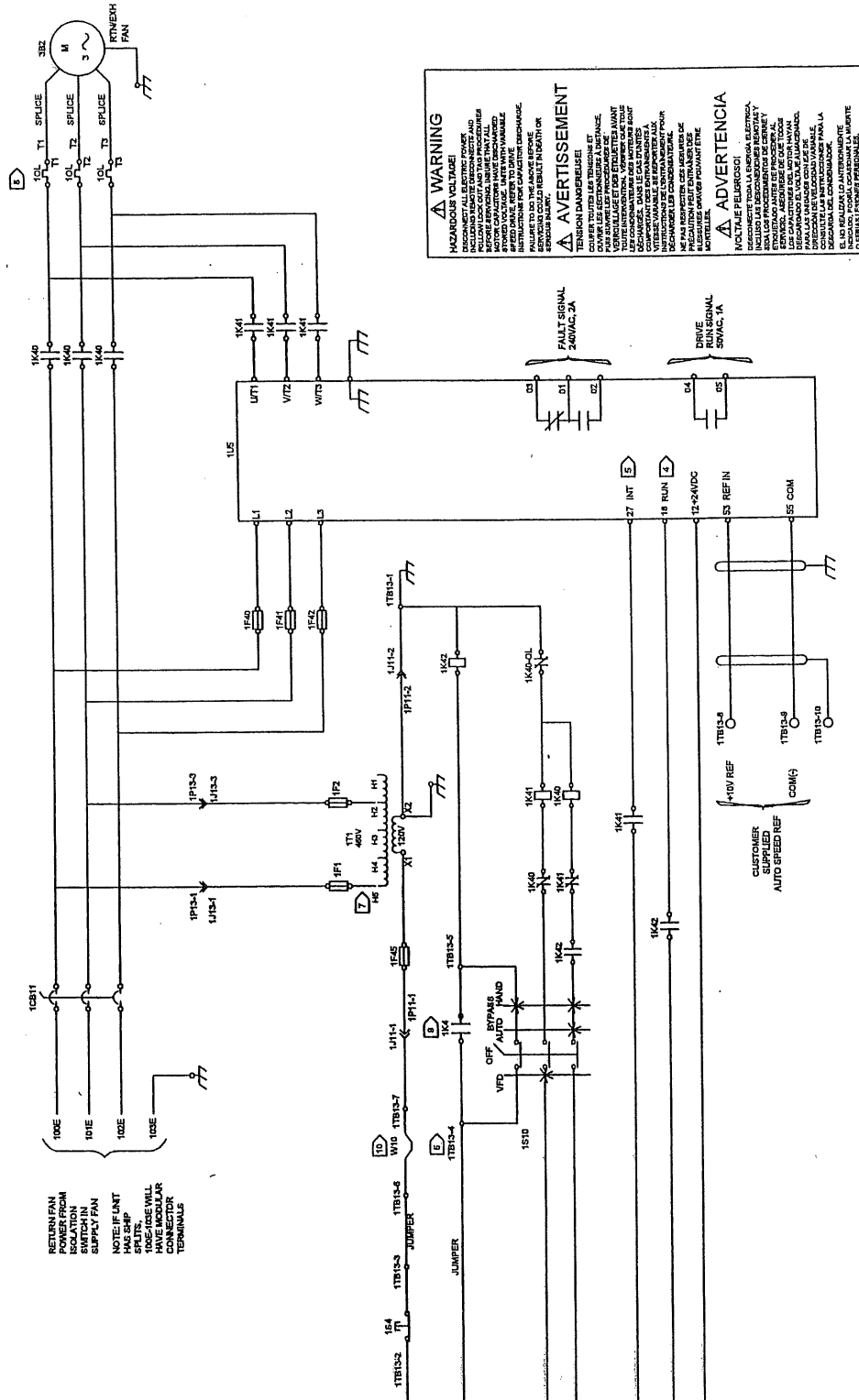


- 1. CONTROLLER MAINBOARD.
- 2. TERMINATION BOARD.
- 3. DUCT STATIC SENSOR.
- 4. EXPANSION CARD 1 (MP580 CONTROLLER ONLY).
- 5. EXPANSION CARDS 2-4 (MP580 CONTROLLER ONLY).
- 6. LOW LIMIT RESET RELAY.
- 7. LOW LIMIT RESET PUSH BUTTON.
- 8. TERMINAL STRIP.

NOTE:

1. NUMBER OF ITEMS SHOWN WILL VARY DEPENDING ON COMPLEXITY OF CONTROLS SYSTEM AND TYPE OF CONTROLLER SPECIFIED.

Field Wiring - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 Qty: 1 Tag(s): AHU-1



RETURN FAN
POWER FROM
MOTOR TO
SWITCH IN
SUPPLY FAN

NOTE: IF LANT
HWS SAMP
EPLTS.
HWS SAMP
HAVE MODULAR
CONNECTOR
TERMINALS

100E 100F 100G 100H 100I 100J 100K 100L 100M 100N 100O 100P 100Q 100R 100S 100T 100U 100V 100W 100X 100Y 100Z

1P1 1P2 1P3 1P4 1P5 1P6 1P7 1P8 1P9 1P10 1P11 1P12 1P13 1P14 1P15 1P16 1P17 1P18 1P19 1P20 1P21 1P22 1P23 1P24 1P25 1P26 1P27 1P28 1P29 1P30 1P31 1P32 1P33 1P34 1P35 1P36 1P37 1P38 1P39 1P40

1S1 1S2 1S3 1S4 1S5 1S6 1S7 1S8 1S9 1S10 1S11 1S12 1S13 1S14 1S15 1S16 1S17 1S18 1S19 1S20 1S21 1S22 1S23 1S24 1S25 1S26 1S27 1S28 1S29 1S30 1S31 1S32 1S33 1S34 1S35 1S36 1S37 1S38 1S39 1S40

1J1 1J2 1J3 1J4 1J5 1J6 1J7 1J8 1J9 1J10 1J11 1J12 1J13 1J14 1J15 1J16 1J17 1J18 1J19 1J20 1J21 1J22 1J23 1J24 1J25 1J26 1J27 1J28 1J29 1J30 1J31 1J32 1J33 1J34 1J35 1J36 1J37 1J38 1J39 1J40

1U5 1U6 1U7 1U8 1U9 1U10 1U11 1U12 1U13 1U14 1U15 1U16 1U17 1U18 1U19 1U20 1U21 1U22 1U23 1U24 1U25 1U26 1U27 1U28 1U29 1U30 1U31 1U32 1U33 1U34 1U35 1U36 1U37 1U38 1U39 1U40

1F1 1F2 1F3 1F4 1F5 1F6 1F7 1F8 1F9 1F10 1F11 1F12 1F13 1F14 1F15 1F16 1F17 1F18 1F19 1F20 1F21 1F22 1F23 1F24 1F25 1F26 1F27 1F28 1F29 1F30 1F31 1F32 1F33 1F34 1F35 1F36 1F37 1F38 1F39 1F40

1K41 1K42 1K43 1K44 1K45 1K46 1K47 1K48 1K49 1K50 1K51 1K52 1K53 1K54 1K55 1K56 1K57 1K58 1K59 1K60 1K61 1K62 1K63 1K64 1K65 1K66 1K67 1K68 1K69 1K70 1K71 1K72 1K73 1K74 1K75 1K76 1K77 1K78 1K79 1K80

1T1 1T2 1T3 1T4 1T5 1T6 1T7 1T8 1T9 1T10 1T11 1T12 1T13 1T14 1T15 1T16 1T17 1T18 1T19 1T20 1T21 1T22 1T23 1T24 1T25 1T26 1T27 1T28 1T29 1T30 1T31 1T32 1T33 1T34 1T35 1T36 1T37 1T38 1T39 1T40

⚠ WARNING
 HAZARDOUS VOLTAGE!
 DISCONNECT ALL ELECTRIC POWER
 BEFORE ATTEMPTING TO REMOVE
 COVER FROM THIS UNIT. WARNING
 INCLUDES LOCK OUT AND TAG PROCEDURES
 TO PREVENT ACCIDENTAL RESTART.
 RESTART PROCEDURES ARE DESCRIBED
 IN THE INSTRUCTIONS FOR CAPACITOR
 DISCHARGE. ALWAYS USE THE
 INSTRUCTIONS FOR CAPACITOR DISCHARGE.
 ALWAYS TO DO SO. ALWAYS IN QUALITY
 APPROVED WIRING.

⚠ AVERTISSEMENT
 TENSION DANGEREUSE!
 COUPEZ TOUS LES ALIMENTATIONS
 AVANT D'ESSAYER D'ENLEVER LE
 COUVERCLE DE L'UNITÉ. AVERTISSEMENT
 INCLUT LE LOCK OUT ET LA MARQUAGE
 POUR ÉVITER LE REPARTAGE.
 LES PROCÉDURES DE REPARTAGE SONT
 DÉCRITES DANS LES INSTRUCTIONS
 POUR LA DÉCHARGE DES CONDENSATEURS.
 TOUJOURS LE FAIRE EN SUIVANT LES
 INSTRUCTIONS POUR LA DÉCHARGE DES
 CONDENSATEURS. TOUJOURS LE FAIRE
 EN SUIVANT LES INSTRUCTIONS POUR
 LA DÉCHARGE DES CONDENSATEURS.

⚠ ADVERTENCIA
 ¡NO TOQUE PELIGROSOS!
 INCLUIDO EL PROCEDIMIENTO DE
 DETACHAMIENTO DEL APARATO DE
 LA ENERGÍA. AVERTISSEMENT
 INCLUIDO LAS DISPOSICIONES DE
 DETACHAMIENTO DE LA ENERGÍA.
 REPARTAGE SONT DÉCRITES DANS
 LES INSTRUCTIONS POUR LA DÉCHARGE
 DES CONDENSATEURS. TOUJOURS LE
 FAIRE EN SUIVANT LES INSTRUCTIONS
 POUR LA DÉCHARGE DES CONDENSATEURS.
 ES LA REALIZAR LA ANTERIORMENTE
 O EN LAS ESTERES PERSONALES.

CAUTION
 USE COPPER COIL WIRE FOR ALL CONNECTIONS EXCEPT AT THE MAIN
 UNIT TERMINALS AND FOR THE WIRING TO THE MAIN UNIT. DO NOT USE
 OTHER TYPES OF CONNECTIONS.
 INSURE TO DO ANY WIRING DAMAGE TO THE
 EQUIPMENT.

PRECAUCIÓN
 NOTAR QUE PARA TODAS LAS CONEXIONES EXCEPTO EN LOS
 TERMINALES DE LA UNIDAD NO ESTÁN DESEADAS
 PARA OTROS TIPOS DE CONEXIONES.
 EN EL PROCESO DE CUALQUIER DAÑO AL EQUIPO.
 EVITAR EL DAÑO EN CUALQUIER PUNTO.

ATTENTION
 UTILISER UNiquement des conducteurs de cuivre
 aux bornes de la unité et pour les câbles
 allant vers l'unité. D'autres types de
 câbles sont interdits.

Field Wiring - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

CAUTION

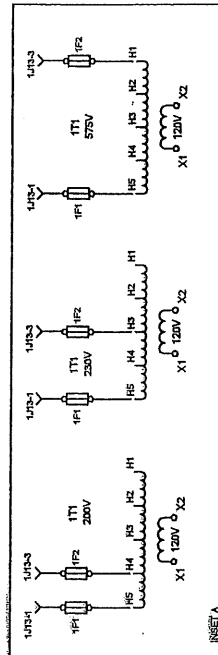
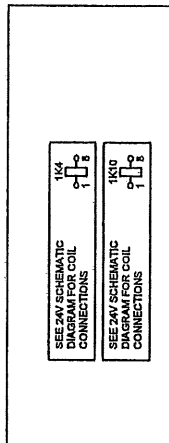
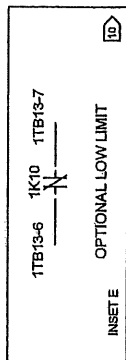
USE COPPER CONDUCTORS ONLY.
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT
OTHER TYPES OF CONDUCTORS.
DO NOT USE ANY TAP OR JUMP WIRE CONNECTED TO THE
EQUIPMENT.

PRECAUCIÓN

UTILÍZSE SÓ COM CONDUTORES DE CUPRO.
AS BORNAS DA UNIDADE NÃO SÃO DESIGNADAS
PARA ACEPTAR OUTROS TIPOS DE CONDUTORES.
NÃO USE FIOS DE LIGAMENTO OU CONDUTORES DE
LIGAMENTO CONECTADOS AO EQUIPAMENTO.

ATTENTION

UTILISE UNICAMENTE CONDUTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO SE DISEÑARON
PARA ACEPTAR OTROS TIPOS DE CONDUTORES.
NO USE HILOS DE UNIÓN O CONDUTORES DE
UNIÓN CONECTADOS AL EQUIPO.



BUSBMAN CLASS T DRIVE FUSE PART NO		PART NO	
AMP FUSE	VOLTAGE	1F5	1F6
200/230	460	JUN-15	JUN-15
		JUN-15	JUN-15
		JUN-20	JUN-20
		JUN-25	JUN-25
		JUN-30	JUN-30
		JUN-35	JUN-35
		JUN-40	JUN-40
		JUN-45	JUN-45
		JUN-50	JUN-50
		JUN-55	JUN-55
460	575	JUN-60	JUN-60
		JUN-65	JUN-65
		JUN-70	JUN-70
		JUN-75	JUN-75
		JUN-80	JUN-80
		JUN-85	JUN-85
		JUN-90	JUN-90
		JUN-95	JUN-95
		JUN-100	JUN-100
		JUN-105	JUN-105

FUSE RATING (AMPS) - 600V CLASS T-P-C-C TIME DELAY		LINE VOLTAGE	
1F1	1F2	200V	230V
100	100	200	230V
150	150	250	280
200	200	300	350
250	250	350	400
300	300	400	460
350	350	460	520
400	400	520	575
450	450	575	630
500	500	630	690
550	550	690	750
600	600	750	810

DEVICE PREFIX LOCALIZATION CODE	
AREA	LOCAL ION
1	HIGH VOLTAGE PANEL
2	LOW VOLTAGE PANEL (UNIT SCHEMATIC)
3	AIR HANDLER SECTION

DEVICE DESIGNATION	LEGEND	DESCRIPTION
1CS11		VFD CIRCUIT BREAKER
1F1,1F2		CONTROL CIRCUIT PRIMARY FUSE(S)
1F4,1F41,1F42		CONTROL CIRCUIT SECONDARY FUSE
1F45		CONTROL CIRCUIT SECONDARY FUSE
1K4		RTN/EXH FAN START/STOP RELAY
1K10		RTN/EXH FAN LOW LIMIT RELAY
1K40		BYPASS CONTACTOR
1K41		ISOLATION CONTACTOR
1K42		RUN PERMISSIVE RELAY
1OL		OVERLOAD RELAY
1P1/1F1,1		PLUG/JACK (POWER TRANSFORMER-SECONDARY)
1P3/1J1,3		PLUG/JACK (POWER TRANSFORMER-PRIMARY)
1S4		RTN/EXH FAN STOP SWITCH
1S10		VFD/OFF/BYPASS AUTO/BYPASS HAND SWITCH
1T1		PRIMARY TRANSFORMER
1TBS		TERMINAL STRIP CONTROL CIRCUIT
1U5		DRIVE CONTROLLER (AFE)
3BZ		RTN/EXH FAN MOTOR

NOTES:

1. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. PHANTOM LINES INDICATE CONTROL OPTION. REF. CONTROL PANEL SCHEMATIC FOR SPECIFIC DETAIL.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS. OTHER COUNTRIES APPLICABLE NATIONAL AND/OR LOCAL REQUIREMENTS SHALL APPLY. FIELD CONDUCTORS SHALL HAVE INSULATION RATING NOT LESS THAN 600V.
3. MINIMUM CIRCUIT AMPACITY AND POWER ISOLATION SWITCH SIZE DETERMINED FROM TOTAL LOAD ON FUSE. FAN CIRCUIT BREAKER SIZE ARE BASED ON THE INVERTER LINE INPUT CURRENT FOR THIS FAN PER ARTICLE 430-2 OF THE NATIONAL ELECTRICAL CODE. TERMINAL IS AS RUN.
4. PROGRAM TERMINAL Z7 INV. COASTING STOP.
5. CLOSURES TO RUN IN VFD AUTO MODE OR BYPASS AUTO.
6. CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 200 OR 230V OR 575V REFER TO INSET A.
7. THE OVERLOAD RELAY TRIP SETTING MUST BE ADJUSTED TO CORRESPOND WITH THE MOTOR FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
8. 1K4 RELAY ONLY PROVIDED WITH SELECTION OF FACTORY CONTROLS.
9. REMOVE JUMPER AND INSTALL FIELD INTERLOCK.
10. REFER TO INSET E.

WARNING
HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER
BEFORE SERVICING. LOCK AND TAG
AND FOLLOW LOCK OUT AND TAG
PROCEDURES BEFORE SERVICING.
CAPACITORS HAVE DISCHARGED
ENERGY WHICH CAN CAUSE
SERIOUS INJURY OR DEATH.
READ AND FOLLOW ALL SAFETY
INSTRUCTIONS FOR
SERVICING THIS EQUIPMENT.
DO NOT TOUCH THE ABOVE
EQUIPMENT UNLESS YOU ARE
PROPERLY TRAINED AND
EQUIPPED FOR THIS TASK.

AVERTISSEMENT
TENSION DANGEREUSE!
COUPER TOUTES LES TENSIONS ET
SERVICER. VERROUILLER ET
ETIQUETER AVANT
SERVICER. LES CONDENSATEURS
ONT DES ENERGIES STOCKEES
QUI PEUVENT CAUSER DE
SERIEUSES BLESSES OU LA
MORT. LIRE ET SUIVRE TOUS
LES INSTRUCTIONS DE
SERVICER CE MATERIEL.
NE PAS TOUCHER LE MATERIEL
CI-DESSUS SAUF SI VOUS
ETES BIEN FORME ET EQUIPE
POUR CE TRAVAIL.

ADVERTENCIA
¡ALTA TENSION PELIGROSA!
DESCONECTE TODA LA ENERGIA ELECTRICA
ANTES DE SERVICIAR. BLOQUEE Y
ETIQUETE ANTES DE SERVICIAR.
LOS CAPACITORES DEL MOTOR HAYAN
ALMACENADO ENERGIA QUE PUEDE
CAUSAR LESIONES GRAVES O LA
MUERTE. LEA Y SIGA TODAS LAS
INSTRUCCIONES PARA LA
SERVICIAR ESTE EQUIPO.
NO TOQUE EL EQUIPO A MENOS
QUE USTED ESTE BIEN ENTRENADO
Y EQUIPADO PARA ESTE TRABAJO.

SPP - MCA & MOP VALUE CALCULATIONS

Transformers				
	200 V	230 V	460 V	575 V
100 VA	0.5	0.4	0.2	0.2
350 VA	1.8	1.5	0.8	0.8
500 VA	2.5	2.2	1.1	0.9
2000 VA	10.0	8.7	4.3	3.5

CHART #1				
IEC Motor FLA				
IEC				
Motor Hp	200 V	230 V	460 V	575 V
1	4.8	4.2	2.1	1.7
1.5	6.9	6.0	3.0	2.4
2	7.8	6.8	3.4	2.7
3	11.0	9.6	4.8	3.9
5	17.5	15.2	7.6	6.1
7.5	25.3	22.0	11.0	9.0
10	32.2	28.0	14.0	11.0
15	48.3	42.0	21.0	17.0
20	62.1	54.0	27.0	22.0
25	78.2	68.0	34.0	27.0
30	92.0	80.0	40.0	32.0
40	120.0	104.0	52.0	41.0
50	---	130.0	65.0	52.0
60	---	---	77.0	62.0
75	---	---	99.0	77.0
100	---	---	124.0	99.0

CHART #2				
VFD Line Input Current				

Motor Hp	200 V	230 V	460 V	575 V
1	6.3	6.3	2.5	2.3
1.5	6.3	6.3	2.5	2.3
2	7.3	7.3	3.4	2.6
3	10.4	10.4	4.8	3.8
5	15.8	15.8	8.3	5.9
7.5	23.8	23.8	10.6	9.2
10	32.2	32.2	14.2	11.1
15	48.3	48.3	21.0	16.6
20	61.9	61.9	27.6	21.4
25	78.2	78.2	34.0	28.3
30	92.0	92.0	41.0	31.2
40	117.0	101.3	53.0	39.9
50	---	126.6	64.0	50.6
60	---	---	77.0	60.4
75	---	---	104.0	75.0
100	---	---	128.0	92.4

CHART #3				
VFD Line Input Current				

Max Combined				
Motor Hp	200 V	230 V	460 V	575 V
1	6.3	6.3	2.5	2.3
1.5	6.9	6.3	3.0	2.4
2	7.8	7.3	3.4	2.7
3	11.0	10.4	4.8	3.9
5	17.5	16.8	8.3	6.1
7.5	25.3	23.8	11.0	9.2
10	32.2	32.2	14.2	11.1
15	48.3	48.3	21.0	17.0
20	62.1	61.9	27.6	22.0
25	78.2	78.2	34.0	27.0
30	92.0	92.0	41.0	32.0
40	120.0	104.0	53.0	41.0
50	---	130.0	65.0	52.0
60	---	---	77.0	62.0
75	---	---	104.0	77.0
100	---	---	128.0	99.0

NOTES:

- 1.) Starter full-load current based on NEC Table 430.250, 3-Phase, AC Motors, pg 70-311.
- 2.) All Starter / Starter configurations shares a transformer located in the supply fan high voltage box.
- 3.) All configurations have a transformer controlling wired lights, controls, and low limit options are located in supply fan high voltage box.

Continued on next page...

Field Wiring - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
Qty: 1 Tag(s): AHU-1

NOTES:

- 1.) Starter full-load current based on NEC Table 430.250, 3-Phase, AC Motors, pg 70-311.
- 2.) All Starter / Starter configurations shares a transformer located in the supply fan high voltage box.
- 3.) All configurations have a transformer controlling wired lights, controls, and low limit options are located in supply fan high voltage box.

No Wired Lights & No Controls & No Low Limit Options

- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/o BP] (1)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/o BP] (1)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [Starter]
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [Starter] (2)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer]
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/ BP] (1)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [100 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [100 VA Transformer]
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [Starter]
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/ BP] (1)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [350 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [350 VA Transformer]

Controls &/or Low Limit Options (No Wired Lights)

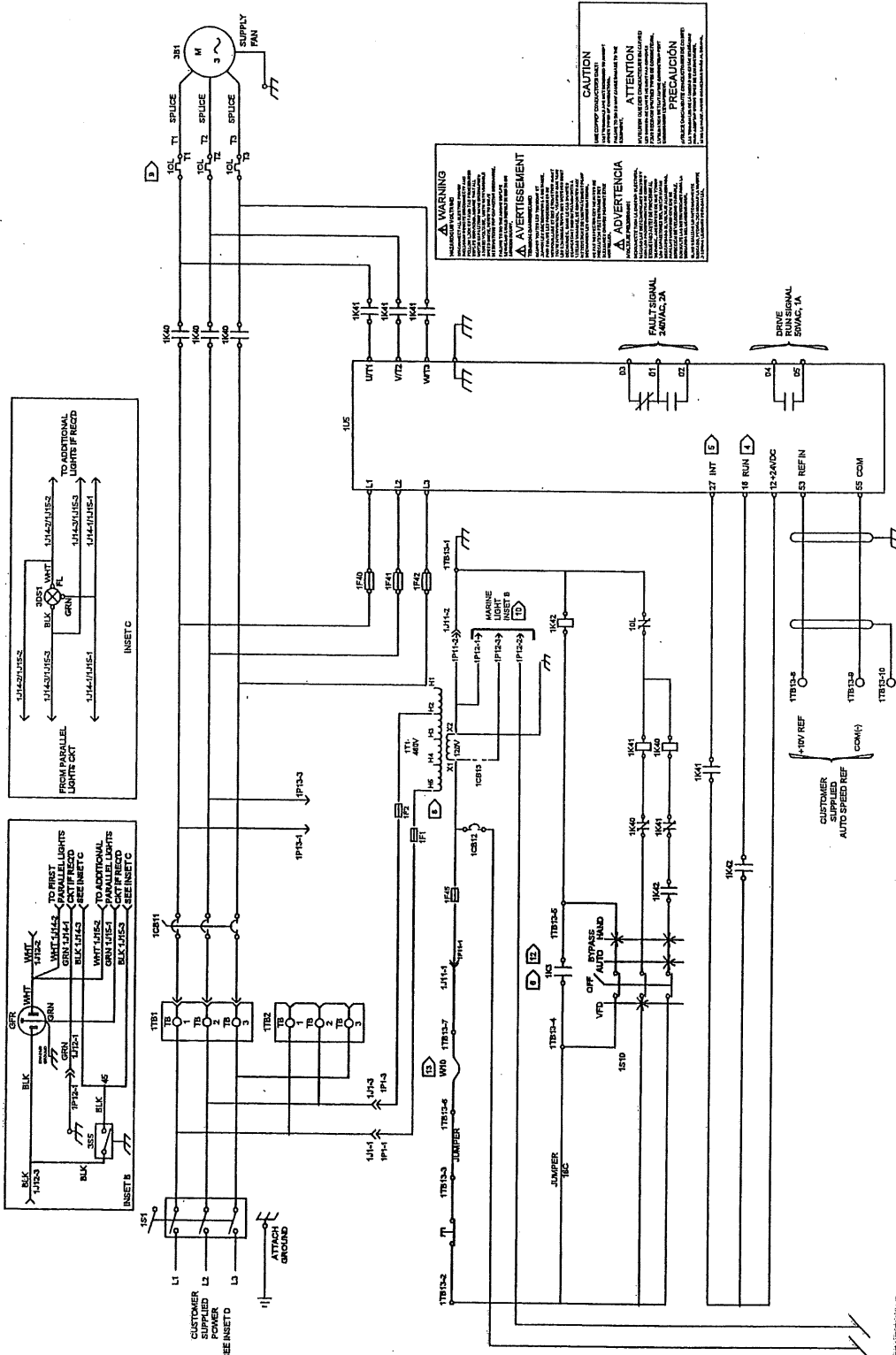
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [Starter] (2)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [500 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [500 VA Transformer]
- or
- or
- or
- or

Wired Lights Option

- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [Starter] (2)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [2000 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [2000 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/ BP] (1)
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [2000 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [2000 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [Starter]
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [Starter]
MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer] + [2000 VA Transformer]
MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer] + [2000 VA Transformer]

Field Wiring - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57

Qty: 1 Tag(s): AHU-1

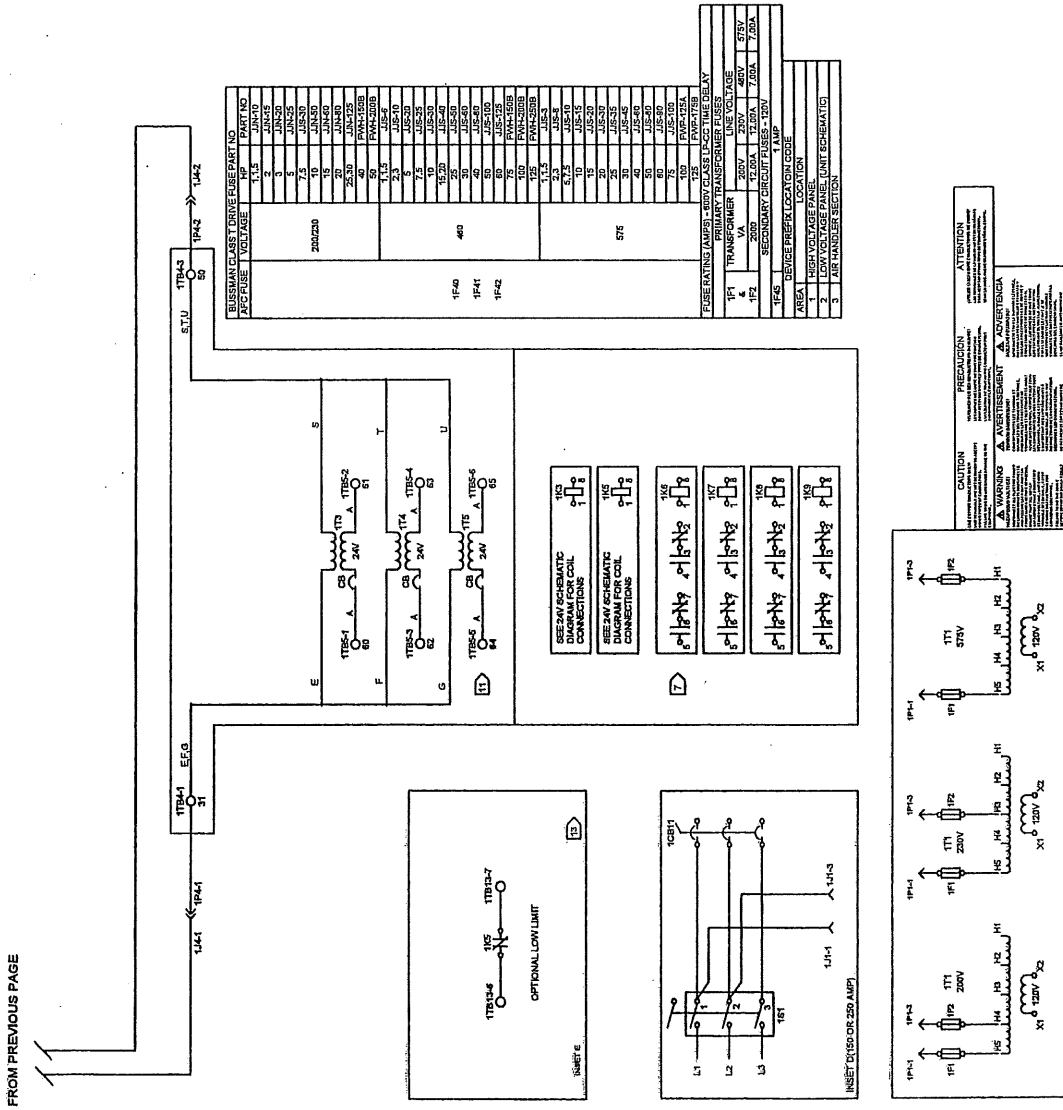


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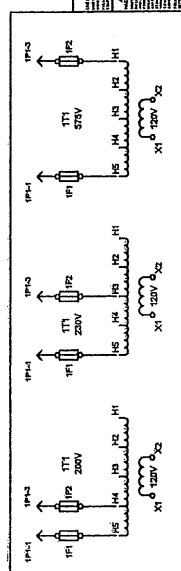
Field Wiring - T-Series Climate Changer™ Outdoor Central Station Air Handling Unit Size 57
 Qty: 1 Tag(s): AHU-1

TERMINAL	DESCRIPTION
1F0	BUSSMAN CLASS T DRIVE FUSE PART NO. 1F0
1F1	1F1
1F2	1F2
1F3	1F3
1F4	1F4
1F5	1F5
1F6	1F6
1F7	1F7
1F8	1F8
1F9	1F9
1F10	1F10
1F11	1F11
1F12	1F12
1F13	1F13
1F14	1F14
1F15	1F15
1F16	1F16
1F17	1F17
1F18	1F18
1F19	1F19
1F20	1F20
1F21	1F21
1F22	1F22
1F23	1F23
1F24	1F24
1F25	1F25
1F26	1F26
1F27	1F27
1F28	1F28
1F29	1F29
1F30	1F30
1F31	1F31
1F32	1F32
1F33	1F33
1F34	1F34
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1F92	1F92
1F93	1F93
1F94	1F94
1F95	1F95
1F96	1F96
1F97	1F97
1F98	1F98
1F99	1F99
1F100	1F100

- NOTES:**
- DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. REFER TO THE FIELD WIRING SCHEMATIC FOR SPECIFIC DETAIL.
 - ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS, OTHER APPLICABLE CODES AND MANUFACTURER'S INSTRUCTIONS. INSULATION RATING NOT LESS THAN 600V.
 - THE MINIMUM CIRCUIT AMPACITY, THE MAXIMUM FUSE SIZE, AND DISCONNECT SIZE ARE CALCULATED BASED ON THE INVERTER INPUT CURRENTS PER ARTICLE 430.4 OF THE NATIONAL ELECTRICAL CODE.
 - PROGRAM TERMINAL 11 AS RUN.
 - PROGRAM TERMINAL 17 RUN, COASTING STOP.
 - CLOSES TO RUN IN VFD AUTO MODE OR BYPASS AUTO.
 - RELAY COILS ARE 24VDC. MINIMUM CODE: 16 HP 5AMP @ 24VDC, 16 HP 1AMP @ 24VDC.
 - CONTROL TRANSFORMER SHOWN FOR 480V PRIMARY. FOR 200 OR 230V PRIMARY REFER TO THE FIELD WIRING SCHEMATIC. SETTINGS MUST BE ADJUSTED TO CORRESPOND WITH THE MOTOR FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
 - FOR MARINE LIGHT WIRING REQUIREMENTS REFER TO INSET B.
 - IEEE 24V SCHEMATIC DIAGRAM FOR ACTUAL QUANTITY OF TRANSFORMERS.
 - NO RELAY ONLY PROVIDED WITH SELECTION OF FACTORY CONTROLS.
 - TRANSFORMERS AND METALL FIELD INTERLOCK REFER TO INSET C.



CAUTION
 FUSE RATING FOR PROTECTION OF THE TRANSFORMER
 FUSE RATING FOR PROTECTION OF THE MOTOR
WARNING AVERTISSEMENT
 THE FOLLOWING INFORMATION IS FOR YOUR PROTECTION AND THE PROTECTION OF OTHERS. READ AND UNDERSTAND THIS INFORMATION BEFORE ATTEMPTING TO INSTALL OR MAINTAIN THIS EQUIPMENT. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN DEATH, SERIOUS INJURY, OR PROPERTY DAMAGE.



2.

AHU-2



TRANE

Submittal

Trane U.S. Inc.

Engineer: SMRT Inc

Date: July 29, 2009

Prepared For:

Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074

Customer P.O. Number: 145426

Customer Project Number:

Job Name:

Martin's Point Health Care – Medical Office Building

Job Number: A2-21345

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

<u>Qty</u>	<u>Description</u>	<u>Tag(s)</u>
	Air Handling Units	
1	Trane T-Series Climate Changer® Outdoor Central Station Air Handling Unit	AHU-2
	<ul style="list-style-type: none"> • Unit size 50 • Return Fan Section with 32" AF fan, 7.5hp 460v/3ph/60hz ODP NEMA premium efficiency motor, internally spring and flex duct isolated fan/motor assembly, right side motor/drive location with access door, factory mounted Trane TR200 variable frequency drive w/ bypass, marine light, fan mounted flow meter, airflow switch, fan discharge temperature sensor, spare belt. • Economizer Section with left side parallel blade exhaust air damper with hood, parallel blade return air damper, 2 right side outside air dampers (1 – Traq™ airflow reassuring station, 1 – parallel blade) with hoods w/ moisture eliminators, right side access door, marine light, electronic damper actuator(s), averaging temperature sensor. • Angled Filter Section with 2" angled filter rack, 2 sets of MERV 8 pleated filters, dirty filter switch, right side access door. • Extended-Medium Coil Section with 1 row type 5W hot water coil with CompleteCoat™ Epoxy coating, sloped stainless steel drain pan, left side coil and drain pan connections, leaving air low limit. • Medium-Large Blank Section (for field installed and provided humidifier) with sloped stainless steel drain pan with left side connection, right side access door, marine light. • Medium-Large Coil Section with 8 row type WD chilled water coil with CompleteCoat™ Epoxy coating, sloped stainless steel drain pan, left side coil and drain pan connections. • Single piping cabinet covering the hot water coil, blank and chilled water coil sections with up and downstream access doors mounted on unit's left side. <i>Standard side access doors are still shown on attached drawings but will not be provided.</i> • Supply Fan Section with 32" AF fan, 25hp 460v/3ph/60hz ODP NEMA premium efficiency motor, internally spring and flex duct isolated fan/motor assembly, right side motor/drive location with access door, factory mounted Trane TR200 variable frequency drive w/ bypass, marine light, fan mounted flow meter, airflow switch, fan discharge temperature sensor, spare belt. • Factory mounted variable volume control system with MP580 controller – <i>mounted on left side</i> • Single point power connection (two fan motors and lights) • All marine lights wired to single switch with GFI outlet • Entire unit of 2" solid double wall construction • Factory painted unit – <i>Trane Slate Gray</i> • UL Listed Unit • Standard 14" tall non-seismic roof curb 	

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

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Mechanical Specifications - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50

Qty: 1 Tag(s): AHU-2

GENERAL

The units must be rigged and lifted in strict accordance with the Installation Operation and Maintenance manual (CLCH-SVX06A-EN). The units are to be installed in strict accordance with the specifications.

Units may be shipped fully assembled up to nominal 25,000 cfm units or disassembled to the minimum component size according to shipping or jobsite requirements. Units shipped in one piece will have no more than 6 points of lift required. These lift points will be permanently attached to the unit base and be designed to accept standard rigging devices. Units shipped in sections will have no more than 4 points of lift required. Units are UL and CUL listed L1995, CSA C-22.2 as manufactured by the factory. Modifications to the units at the job site or by a third party may void this listing. Refer to the Product Data Sheet for door and drain pan connection locations. This mechanical specification describes options selected from all or just one of the T-Series units on the job.

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change design and specification without notice.

Unit Construction

The unit panels feature galvanized steel double wall construction. The casing is able to withstand up to 6 inches of static pressure with no more than 0.005 inch (0.127mm) deflection per inch (25.4mm) of panel span. The entire length and width under the base is sealed for additional water management protection.

Motor Wiring Conduit

High voltage wiring from either a wiring raceway/trough or directly from a motor starter or variable frequency drive to the air handling unit motor(s) shall be done

through flexible conduit. Wiring through conduit shall not compromise the UL or ETL certification of the unit.

Panel Construction

Panels feature solid double wall construction with totally enclosed closed-cell insulation providing a minimum R-value of 12. The insulation conforms to NFPA 90 requirements.

Access Doors

Access doors are fully insulated double-wall construction (with solid galvanized steel interior panels). Automotive style neoprene gasketing around the full perimeter of the access doors minimize air leakage. All access doors have a single door handle system. The first handle movement relieves unit pressure.

Stainless Steel IAQ Drain Pan

Drain pans have two-way sloping stainless IAQ drain pan to allow for proper condensate removal in sections specified.

Marine Light

Where indicated, a factory-mounted, 120-volt, weather resistant (enclosed and gasketed), UL listed wet location fluorescent light fixture shall be provided in sections of unit as specified. Fixture shall be complete with junction box, Lexan housing and lens, magnetic ballast, and 13 watt fluorescent bulb.

External Light Switch and Receptacle

A combination light switch and 120 volt GFI outlet shall be factory installed on the exterior of the unit casing on or near the main access door to the supply fan. Light switch shall be capable of controlling all interior factory installed service lights. GFI outlet shall be sized for a maximum capacity of 15 amps, at 120 volts. Switch and light assembly shall not compromise the UL or ETC certification of the unit.

Unit Roof

Unit roof is constructed of two pieces. Inner roof is installed in such a manner as to prevent air bypass between internal components. Outer roof is sloped either from one side of unit to other, or from center to sides of the unit. Roof assembly overhangs all walls of units by 2" (50.8mm) minimum.

Unit Paint

External surfaces of all unit casings shall be prepared and painted. Color to be standard "Slate Gray". Paint system shall have been tested in accordance with ASTM B117 for a minimum of 500 consecutive hours and shall meet the following requirements following the salt-spray test:

- Mean scribe creepage rating of at least 6 per ASTM D1654 procedure A
- Blister size no larger than #6 per ASTM D714
- Blister density no greater than Medium per ASTM D714
- No onset of red rust

Factory Supplied Roof Curb

Unit to be mounted to factory supplied 14-inch tall roof curb. Curb will be shipped to jobsite disassembled. Contractor will be responsible for assembly and mounting to roof structure per T-Series Climate Changer Roof Curb IOM (CLCH-IN-18). On units requiring external piping cabinet(s), factory supplied curb to include curb for external pipe cabinet(s) and pipe cabinet curb(s) to main unit curb gutter(s).

ECONOMIZER SECTION

This section supports damper assemblies for outside, return, and /or exhaust air.

Economizer Dampers

Dampers modulate the volume of outside, return, or exhaust air. Dampers are Ruskin CD-60 with double skin air foil blades, ultra low-leak metal compressible jamb seals, and extruded vinyl blade edge seals. The dampers are

rated for a maximum leakage rate of 3 (cfm)/(foot squared) at 1" wg and 8 (cfm)/(foot squared) at 4" wg. Blades rotate on stainless steel sleeve bearings. Dampers are arranged in parallel or opposed blade configuration.

Traq Dampers with Airflow Monitoring Station - 2nd Outside Air Damper Position

A factory-mounted damper and air flow monitoring station is provided in the right side opening to modulate and measure airflow. Damper blades are galvanized steel, housed in a galvanized steel frame, and mechanically fastened to a rotating axle rod. The damper is rated for a maximum leakage rate of 1 percent of nominal airflow at 1 inch wg. The airflow measurement station measures from 15 to 100 percent of total outside air and/or return air. The airflow measurement station adjusts for temperature variations and provides a 2-10 VDC signal that corresponds to cfm for controlling and documenting airflow. The accuracy of the airflow measurement station is ± 5 percent.

Marine Light

A factory-mounted, 120-volt, weather resistant (enclosed and gasketed), UL listed wet location fluorescent light fixture shall be provided in sections of unit as specified. Fixture shall be complete with junction box, Lexan housing and lens, magnetic ballast, and 13 watt fluorescent bulb.

Averaging Temperature Sensor

A 10,000 ohm at 25°C, Type II thermistor sensor shall be serpentine across the module. All capillaries bends shall be radiused and fastened with capillary clips to prevent crimping and minimize wear.

ANGLED FILTERS

Filter sections have filter racks, an access door for filter installation & removal, and block-offs as required to prevent air bypass around filters. Units can be supplied with 2-inch (51.8mm) flat

filters.

Pleated Media

Filters are 2-inch thick, made with 100% synthetic fibers that are continuously laminated to a supported steel wire grid with water repellent adhesive. Filters are capable of operating up to 625 fpm face velocity without loss of filter efficiency and holding capacity. Filters have a rated average dust spot efficiency of not less than 35 to 40 percent when tested in accordance with ASHRAE 52.1 atmospheric dust spot method, and MERV 8 rating based on ASHRAE Standard 52.2.

Filter Status Switch

A differential pressure switch piped to both sides of the filter will indicate filter status.

External Pipe Cabinet

A piping cabinet with access door is supplied factory assembled of the same construction as the main unit casing. Piping cabinets are shipped separately for field installation on the side of the unit. *Special upstream and down stream access doors will be provided as shown on page 17 of submittal. Standard side doors will not be provided.*

COILS

Coils have aluminum plate fins and seamless copper tubes. (Copper fins are available on 5/8 inch (15.9mm) tube coils.) Fin collars are drawn, belled, and firmly bonded to the tubes by mechanical expansion of the tubes.

Coils are installed such that headers and return bends are enclosed by unit casings. Coil casings are a minimum of 16-gauge galvanized steel formed end supports, top, and bottom channels. If two or more coils are stacked in the unit, intermediate drain channels are installed between coils to drain condensate to the main drain pans without flooding the lower coils or passing condensate through the airstream

of the lower coil.

Coil Casing

Coil casings are a minimum of 16-gauge stainless steel formed end supports, top, and bottom channels in lieu of standard galvanized.

Water Coils

Supply and return headers are clearly labeled on the outside of the unit to ensure that direction of coil water flow is counter to direction of unit airflow. Coils are burst tested to 300 psig and proof tested under water to 200 psig. Coil types are UW,UU,W,WD,D,DD,D1,D2,K,P, 5A,5W and TT coils.

Tube Material

Tubes are 5/8 inch (15.9mm) OD, 0.020 inch (0.51mm) thick copper. (Refer to the Product Data Sheet)

Coil Coating

Coil shall have a flexible epoxy polymer e-coat uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation and a uniform dry film thickness from 0.8 - 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and a cross-hatch adhesion of 4B-5B per ASTM B3359-93. Impact resistance shall be up to 160 in/lb per ASTM D2794-93. Humidity and water immersion resistance shall be up to a minimum 1000 and 260 hours respectively (ASTM D2247-92 and ASTM D870-02). Corrosion durability shall be confirmed through testing to no less than 5,000 hours salt spray per ASTM B117-90 using scribed aluminum test coupons.

BLANK / ACCESS / INSPECTION

Additional unit length is provided to allow extra interior space for, access to, or inspection of unit components. This section may also be used for field installed components.

Marine Light

A factory-mounted, 120-volt, weather resistant (enclosed and gasketed), UL listed wet location fluorescent light fixture shall be provided in sections of unit as specified. Fixture shall be complete with junction box, Lexan housing and lens, magnetic ballast, and 13 watt fluorescent bulb.

FAN SECTION

Fans are factory balanced. Fan shafts are solid, protectively coated with lubricating oil, and designed so fan will not exceed 75 percent of the first critical speed at any cataloged rpm. Fan wheels are keyed to the shaft to prevent slipping. Access doors are provided on the drive side of the fan section. A separate power source is required for each fan section without single point power. Units with single point power require one power source in the supply fan section.

Air Foil Fan

The air foil (AF) fan is a double-width, double-inlet, multiblade type as required for stable operation and optimum energy efficiency. Bearings are self-aligning, antifriction bearings with a L-50 life of 200,000 hours. Refer to Product Data Sheets. For any bearing requiring relubrication, the grease line shall be extended to the fan support bracket on the drive side. Fan performance is certified as complying with ARI Standard 430-89.

Motor Voltage

460 Volt / 3 Phase / 60 Hz. (Refer to the Product Data Sheet)

Open Drip-Proof Motor

The motor is a T-frame, squirrel cage, open drip-proof with horsepower, type, and electrical characteristics as shown on equipment schedule. Motor is mounted inside the unit casing integral to an isolated fan assembly. A slide base permits adjustment of drive belt tension. (Refer to the Product Data Sheet)

Fixed Pitch Drives

Sheaves are fixed pitch for constant speed at the specified rpm.

Fan Isolation

Two Inch (51.8mm) Spring Isolators - Fan and motor assembly (sizes #10 - #100) is internally isolated from the unit casing with 2 inch (51.8mm) deflection spring isolators. The fan discharge is also isolated from unit casing by a flexible canvas duct. The isolation system is designed to resist loads produced by external forces such as earthquakes and conform to the current requirements for Seismic Zone IV.

Fan Options

Inverter balancing. Fan systems will be checked with a variable frequency drive for resonant frequencies. Fans, shafts, and drives will meet vibrations tolerance specs from 25% to 100% of selected RPM.

VFD Options

The VFD includes an oversized control transformer to power the factory mounted control system. Power wiring from the VFD transformer to the controls, start/stop relay, start/stop wiring to the VFD, and analog speed signal are wired and tested at the factory.

Fan Discharge Temperature Sensor

Thermistor type sensor (10,000 ohm @ 77 degrees F) is mounted in the fan discharge.

Airflow Switch

A differential pressure switch piped to the discharge and suction sides of the fan indicates fan status.

Flow Meter

Provide an air measurement system to measure fan airflow directly or measure differential pressure that can be used to calculate fan airflow. The system shall predict airflow within +/-5% accuracy when operating from 45% to 95% wide-open volume. The submitted fan air

performance and noise levels shall not be affected by the installation of the device. Any device that provides an obstruction to the fan inlet will not be accepted.

FACTORY MOUNTED DIRECT DIGITAL CONTROL (DDC) SYSTEM

"Turn-key" control systems are engineered, mounted, wired, and tested in the factory to reduce installed costs, save time, and improve reliability. Each control system is fully functional as a standalone unit or can be tied to a Tracer building automation system.

EX2 Expansion Module

An expansion module for the Tracer MP580 controller. Up to four EX2 modules can be connected to a Tracer MP580. Each EX2 adds six universal inputs, four binary outputs, and four analog outputs.

Unit Mounted Controller

The DDC controller is factory mounted in the unit.

Customer Interface Relays

10 amp DPDT relays are provided as required for binary outputs of the controller for customer interface to remote exhaust fans, relief dampers, pumps, condensing units, etc.

Low Limit

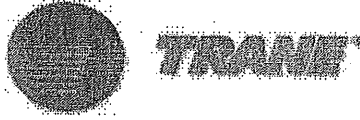
Low limits are double pole low limit switches wired to a momentary push button reset circuit. Capillaries are serpentine across the leaving side of the coil. Bends of the capillaries are curved and fastened with capillary clips to prevent crimping and minimize wear. A separate low limit is provided for each coil in a coil stack.

VFD / Disconnect Package w/ Bypass

Combination VFD / disconnect packages with bypass are factory mounted and wired in a weather-tight cabinet and include: a) circuit breaker disconnect

- b) two contactor bypass
- c) Pulse Width Modulated (PWM)
VFD w/ intelligent power modules
- d) LCD display and keypad
- e) English language electrical
values, parameters, self test,
faults, and diagnostics
- f) form C fault contacts
- g) 0-10 V speed input signal
- h) VFD/OFF/Bypass Auto/Bypass
hand switch
- i) Electronic manual speed control
VFD-Hand-Off switch
- j) auto restart after momentary
power loss
- k) critical frequency avoidance
- l) power wiring from VFD to motor
- m) voltage and FLA are
factory-set for the exact motor
used in the air handler
- n) Factory commissioning

Outdoor T-Series Climate Changer air handler

Job Name	Martin's Point MOB	
User Name	(B16)Daniel Broderick	
Address	Portland ME	

Outdoor, T-Series Climate Changer air handler	AHU-2
Quantity	1
Job Comments	

Unit level		Module Position:	
		0	
Actual airflow	20000 cfm	UL listed unit	Yes
Unit size	50	Unit length (less hoods)	354.500 in
Unit shipping split type	Maximum Size Splits	Unit width	124.000 in
Roof curb type	14" tall roof curb	Roof curb weight	784.8 lb
Paint	Factory painted - gray	Rigging unit weight	14402.4 lb
Light wiring	Lights wired to extl switch w/GFI	Installed unit weight	15731.5 lb
Power wiring	Single point pwr (2-fan motors &		

Fan		Module Position:	
		1	
Fan [1]-1		Fan wheel balance	Inverter balance
Insulation	Solid dble wall	Motor class	ODP NEMA premium efficiency
Fan airflow	16000 cfm	Motor frame type	T-frame
Fan size and type	D50 - 32" AF	Cycle	60 cycle/sec
Fan discharge	Front - top	Drive service factor and type	1.5 fixed
Drive location	Right	Light	Yes
Motor HP	7.5	Starter or VFD mounted and wired	TR2 VFD/ discon. w/ byp
Motor voltage	460/3	Fan discharge temperature sensor	Fan mounted
ESP	1.50 in H2O	Bearing type	Standard heavy duty
Total static pressure	2.09 in H2O	Fan module PD	1.62 in H2O
BHP	7.271 hp	Unit controller	MP580 Unit Controller
Max BHP	8.200 hp	Unit low limit	Unit Low Limit
Speed	766 rpm	Fan discharge loss PD	0.12 in H2O
Module	Fan	Module length	68.500 in
Access door	Right	Module weight	3650.0 lb
Inlet location	Horizontal return fan		
Fan isolation	Spring		

Coil performance data is certified in accordance with ARI standard 410. Propylene glycol and calcium chloride, or mixtures thereof, are not covered under the scope of ARI 410.

Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Economizer

Module Position:

2

Module	Economizer module	Exhaust damper airflow	16000 cfm
Economizer module type	Return fan	1st outside damper area	12.37 sq ft
Insulation	Solid dble wall	1st outside damper pressure drop	0.12 in H2O
Access door	Left	1st hood and eliminator pressure drop	0.22 in H2O
Outside air location	Right	1st outside air path pressure drop	0.34 in H2O
Economizer capability	0-100% outside air	2nd outside damper area	4.36 sq ft
1st outside air damper type	Parallel	2nd outside damper pressure drop	0.31 in H2O
1st outside air hood type	Yes	2nd hood and eliminator pressure drop	0.22 in H2O
2nd outside air damper type	TRAQ	2nd outside air path pressure drop	0.53 in H2O
2nd outside air hood type	Yes	Total outside air PD	0.53 in H2O
Return air damper type	Parallel	Return damper area	12.37 sq ft
Exhaust damper type	Parallel	Return damper pressure drop	0.31 in H2O
Exhaust hood	Yes	Exhaust damper area	12.37 sq ft
Light	Yes	Exhaust damper PD	0.31 in H2O
Economizer damper actuator(s)	Electronic damper actuator(s)	Exhaust hood PD	0.16 in H2O
Averaging temperature sensor	Yes	Total exhaust air PD	0.47 in H2O
Outside airflow	20000 cfm	Supply fan total air PD	0.53 in H2O
1st outside airflow	10000 cfm	Exhaust fan total air PD	0.47 in H2O
2nd outside airflow	10000 cfm	Module length	84.000 in
Return damper airflow	16000 cfm	Module weight	2005.0 lb

Flat or angled filters

Module Position:

3

Filter module PD	0.56 in H2O	Dirty filter switch	Yes
Filter condition	Mid-Life	Filter airflow	20000 cfm
Angled or flat filter module	Angled	Filter area	80.60 sq ft
Insulation	Solid dble wall	Filter PD	0.56 in H2O
Access door	Right	Module length	31.000 in
Filter frame	2" (51mm)	Module weight	753.7 lb
Unit filter type	Pleated media - MERV 8		

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Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Horizontal coil		Module Position: 4	
Horizon [4]-1			
Horizontal coil module	Extended medium	Fin spacing	97 Per Foot
Module	Horizontal coil	Fin type	Prima flo H
Insulation	Solid dble wall	Fin material	Aluminum
Drain pan	LH stainless	Tube mat/wall thickness	.020" (0.508mm) copper
Coil application	Heating	Turbulators	No
Coil system type	Hot water	Corrosion resistant coating	CompleteCoat(TM) Epoxy E-coat
Coil supply/cabinet side	Left	Face area	47.69 sq ft
External piping/service module	Std depth - std door design	Face velocity	419 ft/min
Coil casing	Galvanized	Air PD	0.07 in H2O
Apply ARI ranges	Yes	ARI 410-01 classification	ARI rated
Actual airflow	20000 cfm	Leaving fluid temp	110.00 F
EDB	40.00 F	Fluid PD	1.32 ft H2O
LDB	65.00 F	Fluid velocity	1.91 ft/sec
Total capacity	542.25 MBh	Volume	7.30 gal
Max fluid PD	20.00 ft H2O	Reynolds number	17415.41 Each
ASP	0.00 in H2O	Coil installed weight	272.0 lb
Entering fluid temp	140.00 F	Coil rigging weight	211.2 lb
Fluid temp drop	30.00 F	Finned width top or single coil	30" (762 mm)
Standard fluid flow rate	36.23 gpm	Finned width middle coil	33" (838 mm)
Fouling factor	0.00050 hr-sq ft-deg F/Btu	Total cap ent coil type #1	258.21 MBh
Fluid type	Water	Total cap ent coil type #2	284.04 MBh
Low limit switch	Leaving	Top or single coil dry weight	100.6 lb
Target valve pressure drop	4.00 psig	Middle coil dry weight	110.6 lb
Coil height	Unit - Max Face Area	Module length	20.000 in
Coil type	5W	Module and coil weight	1167.7 lb
Rows	1		

Access		Module Position: 5	
Module	Access/blank	External piping/service module	Std depth - std door design
Access/blank module size	Medium large	Light	Yes
Insulation	Solid dble wall	ASP	0.00 in H2O
Access inspection door	Right	Module length	31.000 in
Drain pan	LH stainless	Module weight	836.0 lb
External piping cabinet location	Left		

Coil performance data is certified in accordance with ARI standard 410. Propylene glycol and calcium chloride, or mixtures thereof, are not covered under the scope of ARI 410.

Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

All weights and dimensions are approximate. Certified prints on request.

Outdoor T-Series Climate Changer air handler

Horizontal coil		Module Position: 6	
Horizon [6]-1			
Horizontal coil module	Medium large	Coil type	WD
Module	Horizontal coil	Rows	8
Insulation	Solid dble wall	Fin spacing	91 Per Foot
Drain pan	LH stainless	Fin type	Prima flo H
Coil application	Cooling	Fin material	Aluminum
Coil system type	Chilled water	Tube mat/wall thickness	.020" (0.508mm) copper
Coil supply/cabinet side	Left	Turbulators	Yes
External piping/service module	Std depth - std door design	Corrosion resistant coating	CompleteCoat(TM) Epoxy E-coat
Coil casing	Stainless	Face area	47.69 sq ft
Apply ARI ranges	No	Face velocity	419 ft/min
Actual airflow	20000 cfm	Air PD	0.59 in H ₂ O
EDB	80.70 F	ARI 410-01 classification	Outside scope
EWB	63.00 F	Leaving fluid temp	56.00 F
LDB	52.00 F	Fluid PD	4.44 ft H ₂ O
LWB	51.53 F	Fluid velocity	1.58 ft/sec
Sensible capacity	629.35 MBh	Volume	51.08 gal
Total capacity	655.11 MBh	Reynolds number	1516.54 Each
Max fluid PD	20.00 ft H ₂ O	Coil installed weight	1715.7 lb
ASP	0.00 in H ₂ O	Coil rigging weight	1232.2 lb
Entering fluid temp	44.00 F	Finned width top or single coil	30" (762 mm)
Fluid temp rise	12.00 F	Finned width middle coil	33" (838 mm)
Standard fluid flow rate	120.08 gpm	Total cap ent coil type #1	311.96 MBh
Fouling factor	0.00000 hr-sq ft-deg F/Btu	Total cap ent coil type #2	343.15 MBh
Fluid type	Propylene Glycol	Top or single coil dry weight	586.7 lb
Fluid concentration	35.00 %	Middle coil dry weight	645.4 lb
Target valve pressure drop	4.00 psig	Module length	31.000 in
Coil height	Unit - Max Face Area	Module and coil weight	2698.4 lb

Fan		Module Position: 7	
Fan [7]-1			
Insulation	Solid dble wall	Fan isolation	Spring
Fan airflow	20000 cfm	Fan wheel balance	Inverter balance
Fan size and type	D50 - 32" AF	Motor class	ODP NEMA premium efficiency
Fan discharge	Bottom - front	Motor frame type	T-frame
Drive location	Right	Cycle	60 cycle/sec
Motor HP	25	Drive service factor and type	1.5 fixed
Motor voltage	460/3	Light	Yes
ESP	2.90 in H ₂ O	Starter or VFD mounted and wired	TR2 VFD/ discon. w/ byp
Total static pressure	4.65 in H ₂ O	Airflow switch	Yes
BHP	19.748 hp	Fan discharge temperature sensor	Fan mounted
Max BHP	22.272 hp	Fan module PD	2.90 in H ₂ O
Speed	1083 rpm	Unit controller	MP580 Unit Controller
Module	Fan	Unit low limit	Unit Low Limit
Access door	Right	Module length	83.000 in
Inlet location	Supply fan	Module weight	3836.0 lb

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Air-handling performance data is certified in accordance with ARI standard 430. Air handlers with Q-fans, air handlers with plenum fans, and vertical draw-thru air handlers where the coil is mounted immediately below the fan module are not covered under the scope of ARI 430.

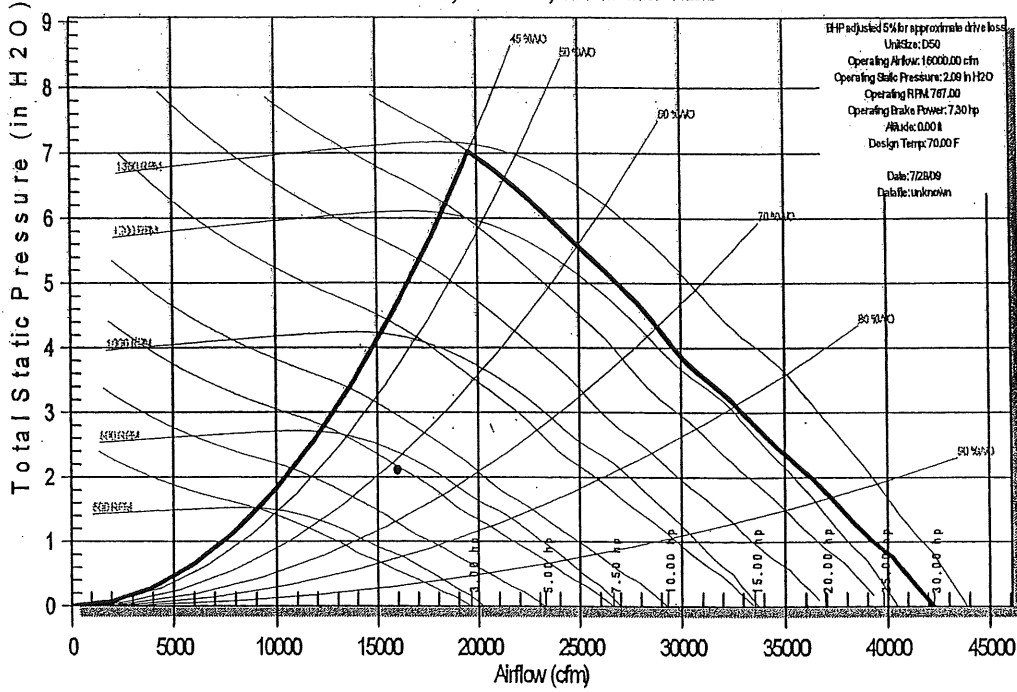
All weights and dimensions are approximate. Certified prints on request.

Fan Curve - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50

Qty: 1 Tag(s): AHU-2

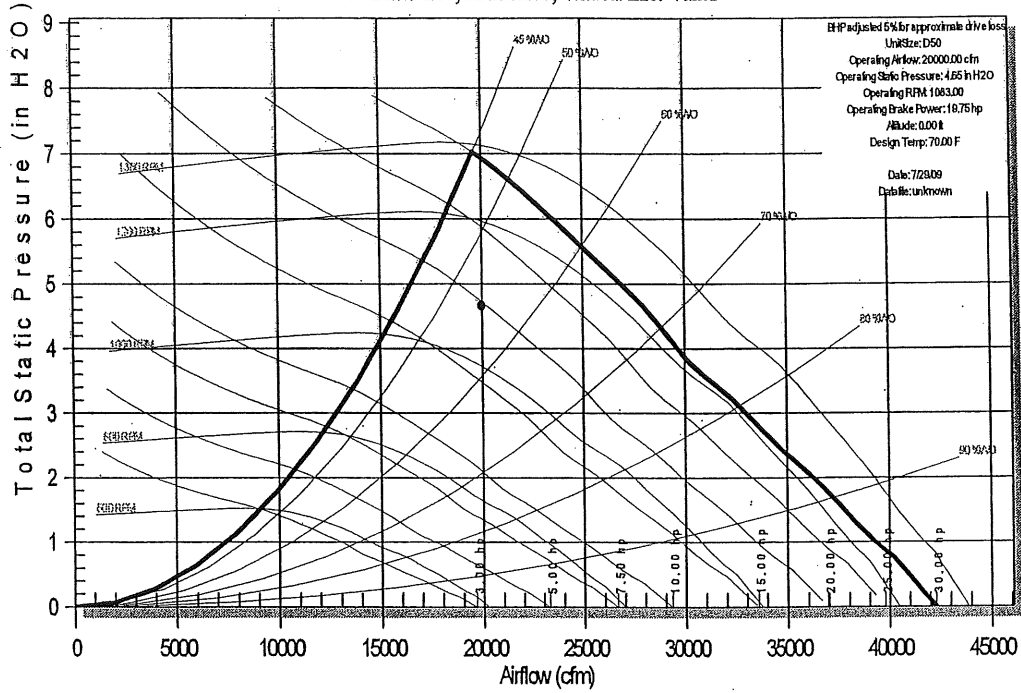
H. Return

D50 Draw-Thru, 32-inch AF, Without Inlet Vanes



Fan Curve - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

H. Supply
D50 Draw-Thru, 32-inch AF, Without Inlet Vanes



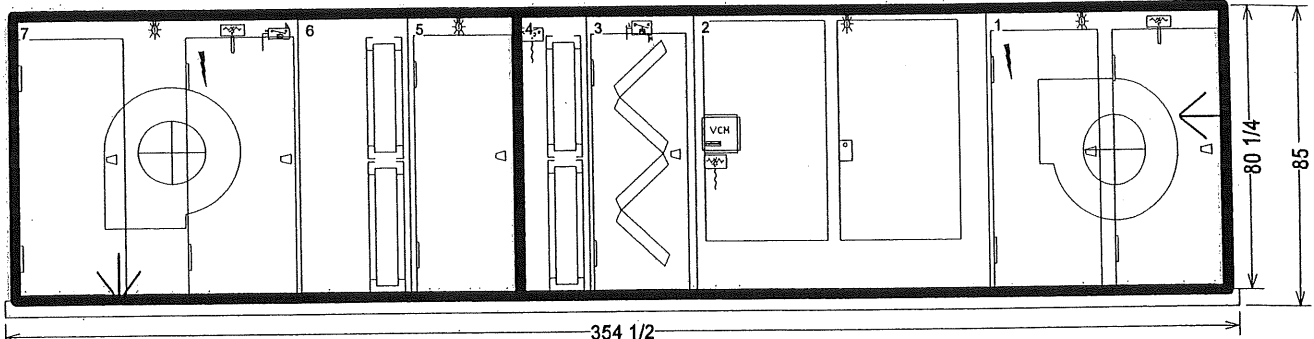
Acoustics - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

Total Acoustics

	63Hz	125Hz	250Hz	500Hz	1 kHz	2 kHz	4 kHz	8 kHz
Front Discharge	92	98	96	90	86	81	80	76
Side Discharge								
Ducted Inlet	88	84	85	82	75	73	68	60
Casing	89	86	79	71	63	61	54	55

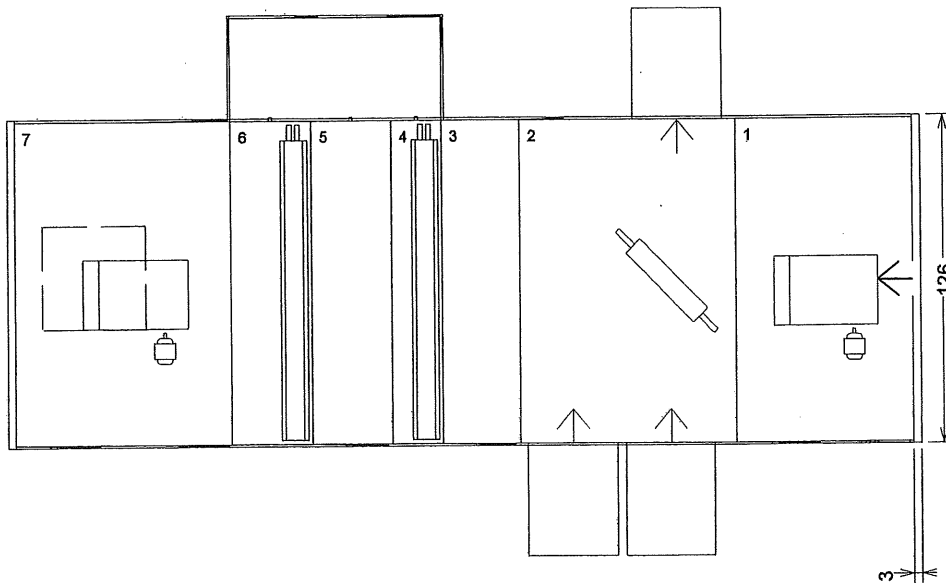
SOUND DATA

As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2



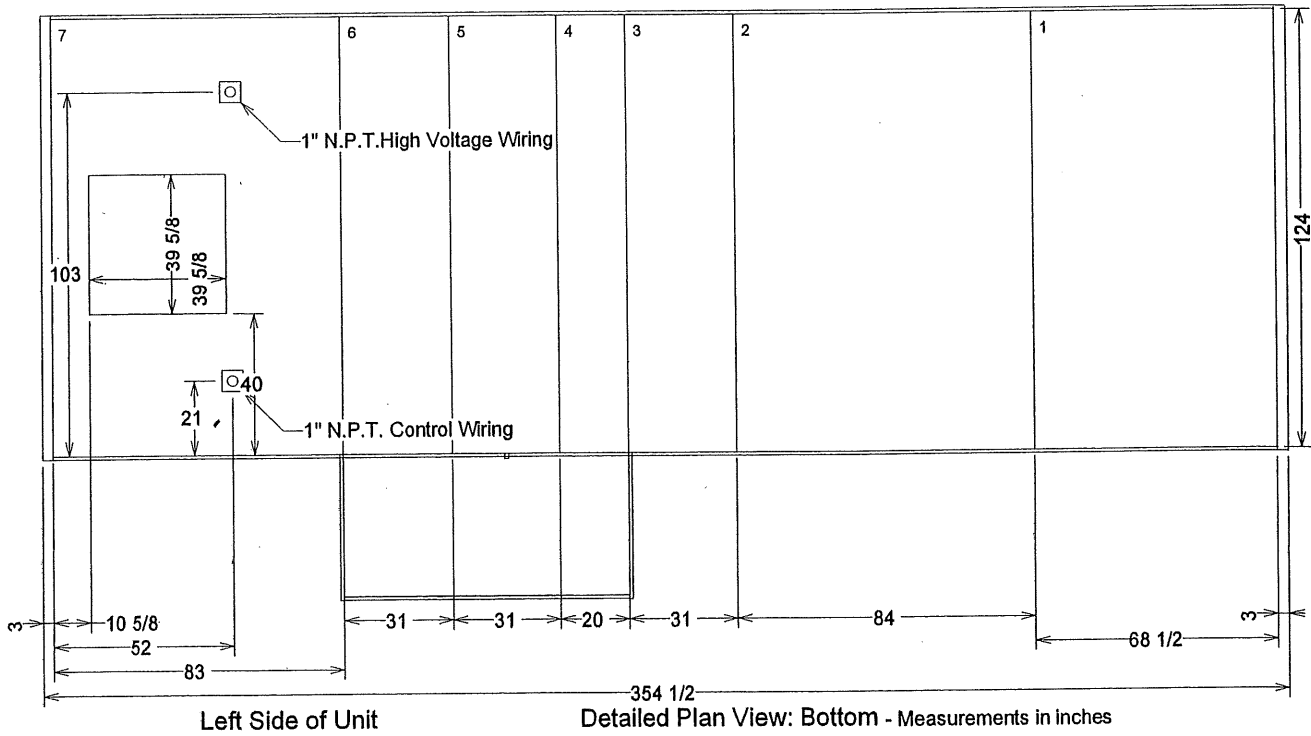
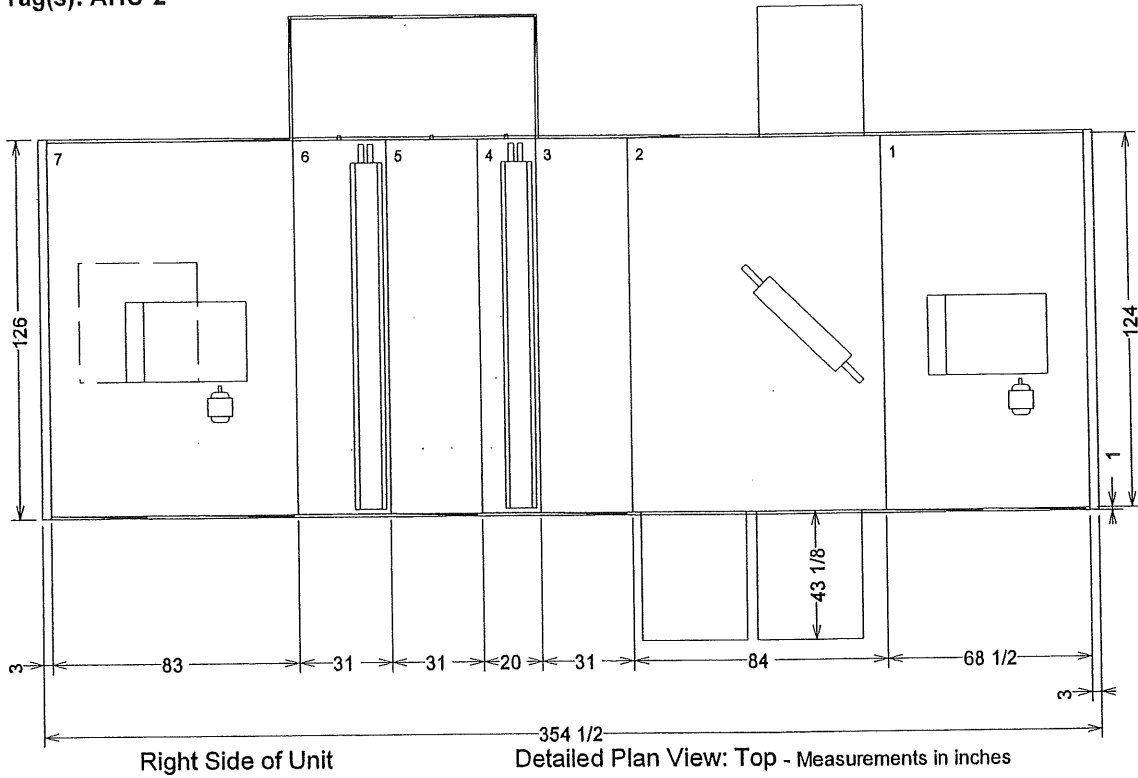
Overall Elevation View: Right - Shipping splits indicated by bold outline. - Measurements in inches

Pos #	Module	Length	Weight
1	Fan	68 1/2	3650.00
2	Economizer	84	2005.00
3	Flat or angled filters	31	753.67
4	Horizontal coil	20	1167.65
5	Access	31	836.00
6	Horizontal coil	31	2698.35
7	Fan	83	3836.00
			Installed Unit Weight 14946.68 lbs



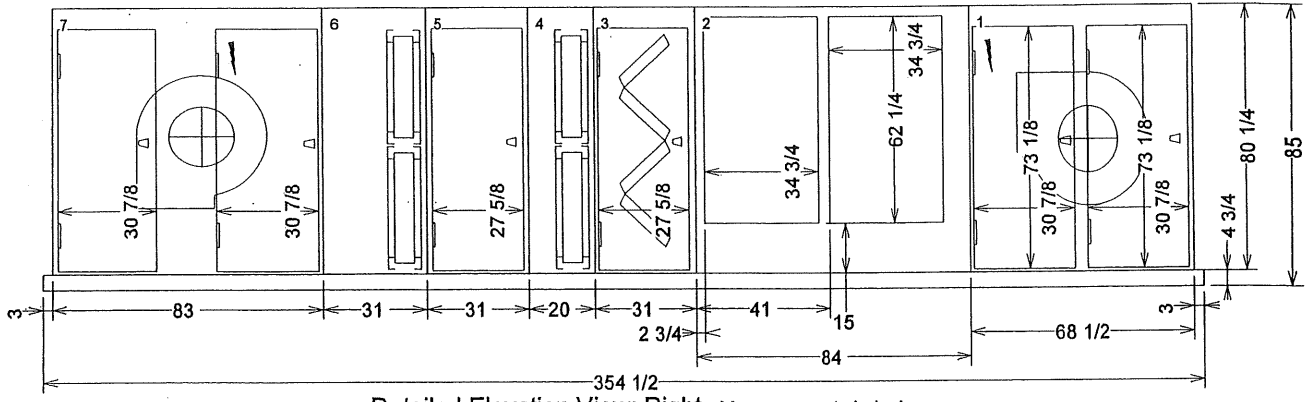
Overall Plan View: Top - Measurements in inches

As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

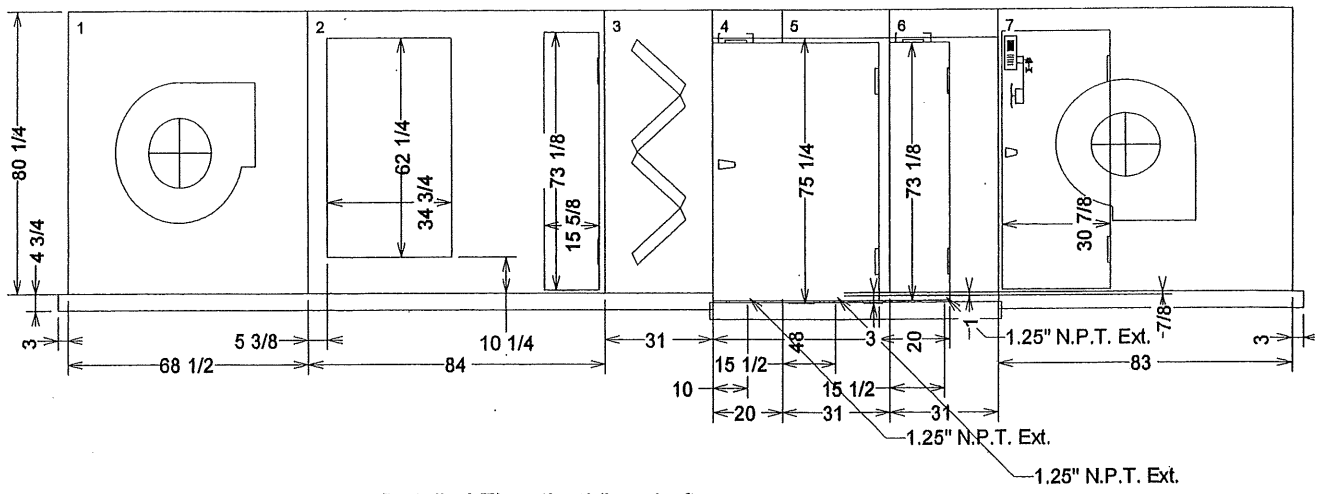


As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50

Qty: 1 Tag(s): AHU-2

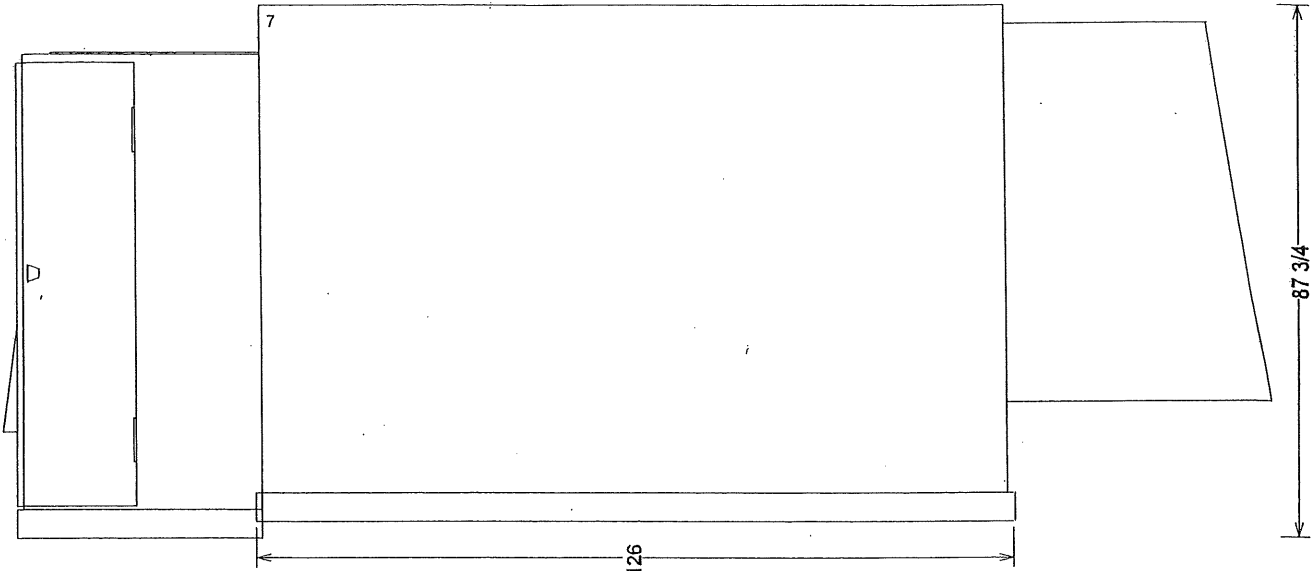


Detailed Elevation View: Right - Measurements in inches

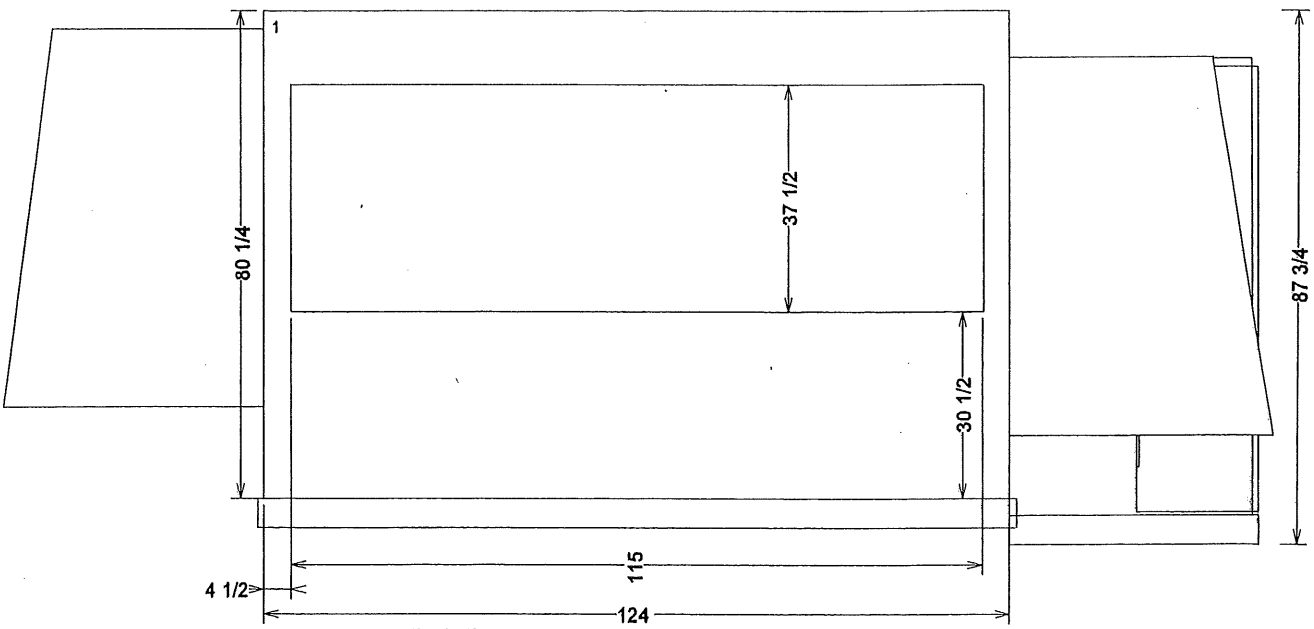


Detailed Elevation View: Left - Measurements in inches

As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

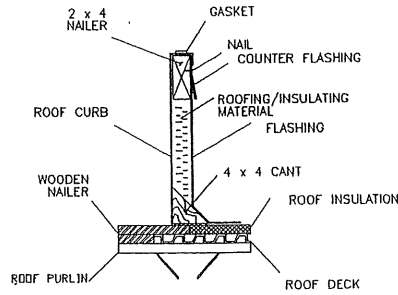
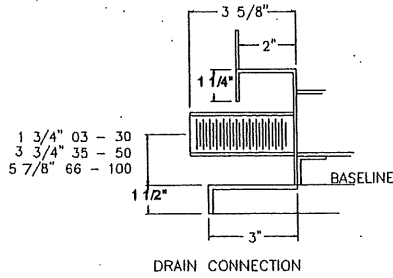
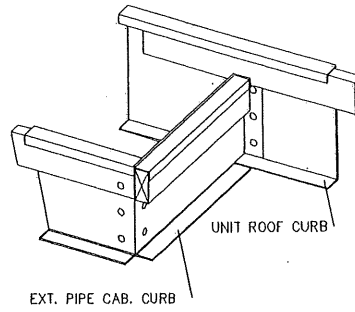
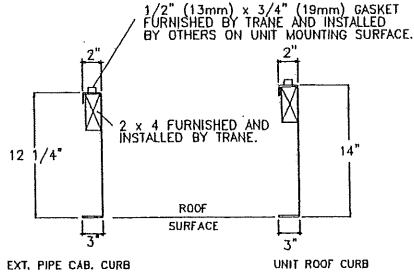


Detailed Elevation View: Front - Measurements in inches

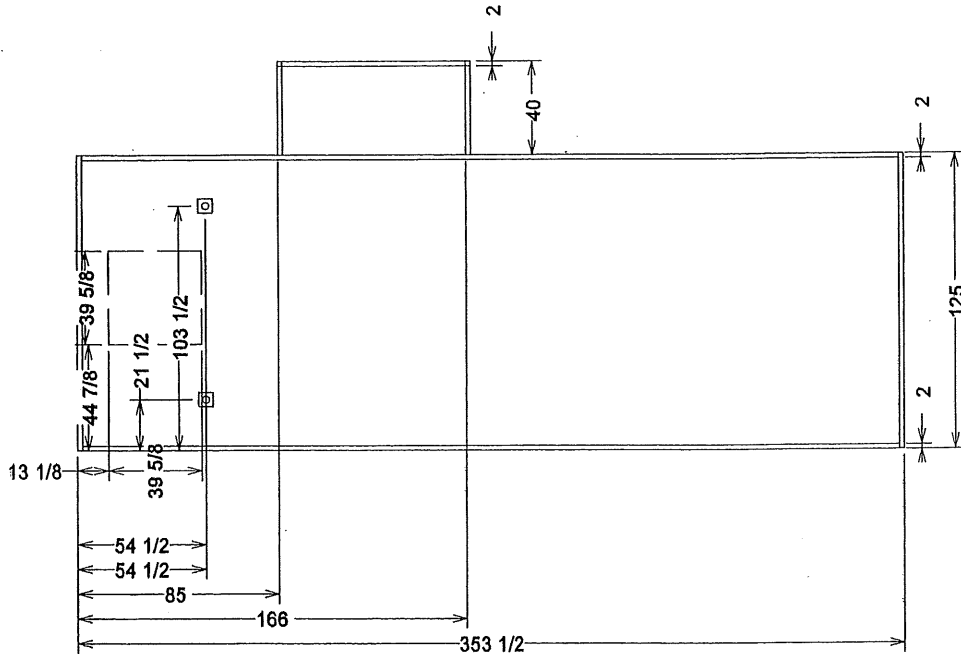


Detailed Elevation View: Back - Measurements in inches

As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2



NOTE:
 MATERIALS TO ATTACH ROOF CURB TO ROOF ARE TO BE SUPPLIED BY THE INSTALLER.

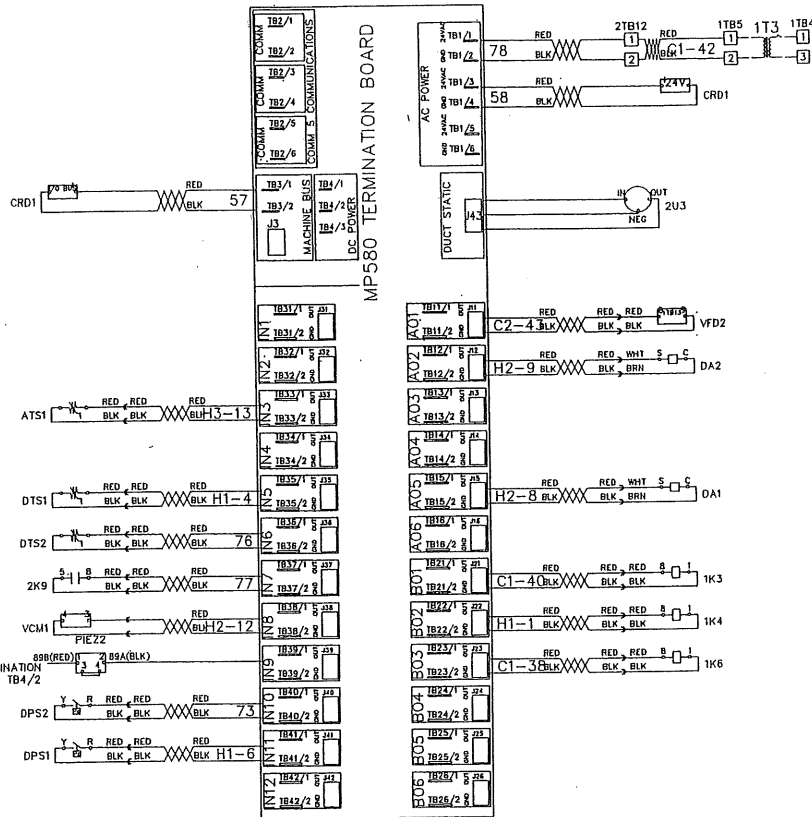


Detailed Plan View: Curb - Measurements in inches

As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

CONTROLLER DETAIL

DEVICE NAME PREFIX	DEVICE LOCATION
1	HIGH VOLTAGE PANEL
2	LOW VOLTAGE PANEL
5	CUSTOMER INSTALLED



NOTES

UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25C (77F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.

DASHED LINES INDICATE FIELD WIRING BY OTHERS. SOLID LINES INDICATE WIRING BY TRANE

ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS

COMMUNICATION WIRE MUST BE TRANE PART NO. 400-20-28 OR EQUIVALENT, MAXIMUM FOOT AGGREGATE RUN. CAUTION DO NOT RUN POWER IN THE SAME CONDUIT/WIRE BUNDLE WITH COMMUNICATION LINK

CONTROL RELAY(S) CONTACTS: SILVER CADMIUM OXIDE RATED AT 1/HP 5A 120VAC AND 1/3 HP 5A 240VAC

HP OR AH CONTROLLER OUTPUT RELAYS ARE RATED 24V AC/DC, 1A, 24VA PILOT DUTY. EXTERNAL RELAY REQUIRED FOR HIGHER VOLTAGE CIRCUITS.

DRAWN BY: Unknown	Trane	TSCX-SCHMATIC UNIT SIZE: 50 UNIT TAG:
DATE: 7/29/2009		
SOFTWARE: Unknown		
REVISION: Unknown		

WARNING

HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND LOCK/LEAVE OUT AND TAG THE DEVICES BEFORE SERVICING ANYTHING. CAPACITORS HAVE DISCHARGED STORED VOLTAGE. ALWAYS WEAR VARIABLE SPEED DRIVE. REFER TO OWNER INSTRUCTIONS FOR CAPACITOR DISCHARGE. FAILURE TO DO THE ABOVE BEFORE SERVICING CAN RESULT IN DEATH OR SERIOUS INJURY.

AVERTISSEMENT ADVERTENCIA

TENSION DANGEREUSE! COUPER TOUTES LES TENSIONS ET OUVRIRE LES SÉCHÉTEURS À DISTANCE AVANT DE COMMENCER LE TRAVAIL. VERIFIER QUE TOUTES LES CAPACITANCES DU MOTEUR AYANT DESCHARGES. TOUJOURS PORTER UN CASQUE À VITESSE VARIABLE. SE REPORTER AUX INSTRUCTIONS DE L'ÉQUIPEMENT POUR DÉCHARGER LES CONDENSATEURS. NE PAS RESPECTER CES MESURES DE PRECAUTION PEUT ENTRAINER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

NOTICE

USE COPPER CONDUCTORS ONLY! WIRE TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS. FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVIS

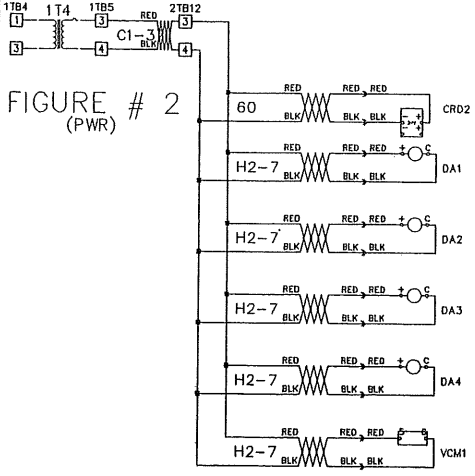
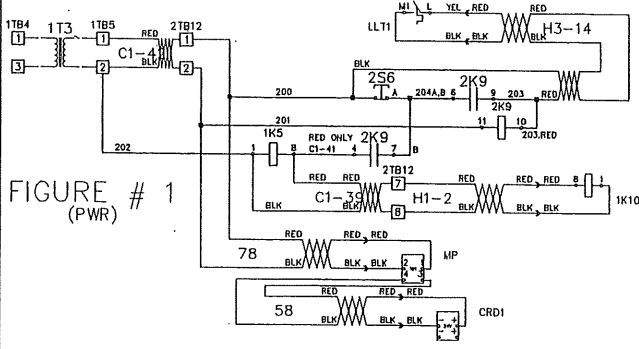
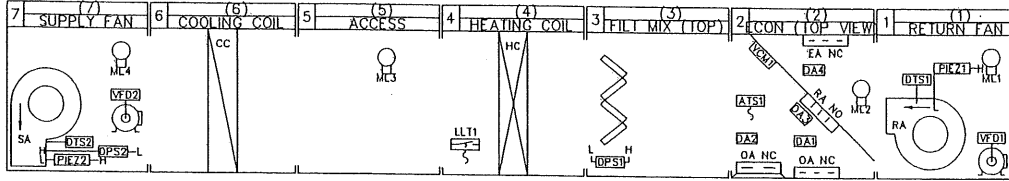
UTILISER QUE DES CONDUCTEURS EN COPPER! LES TERMINAUX DE L'UNITÉ NE SONT PAS CONÇUS POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS. FAIRE SÉRIEUX À LA PROCÉDURE EN-DESSUS PEUT ENTRAINER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO

UTILICE ÚNICAMENTE CONDUCTORES DE COPPER! LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES. NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.

As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
 Qty: 1 Tag(s): AHU-2

WIRING DETAIL



DRAWN BY: Unknown DATE: 7/29/2009 SOFTWARE VERSION: 1.0.1.1 DRAWING VERSION:	Trone	TSCX-SCHMATIC UNIT SIZE: 50 UNIT TAG:
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As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

LEGEND DETAIL

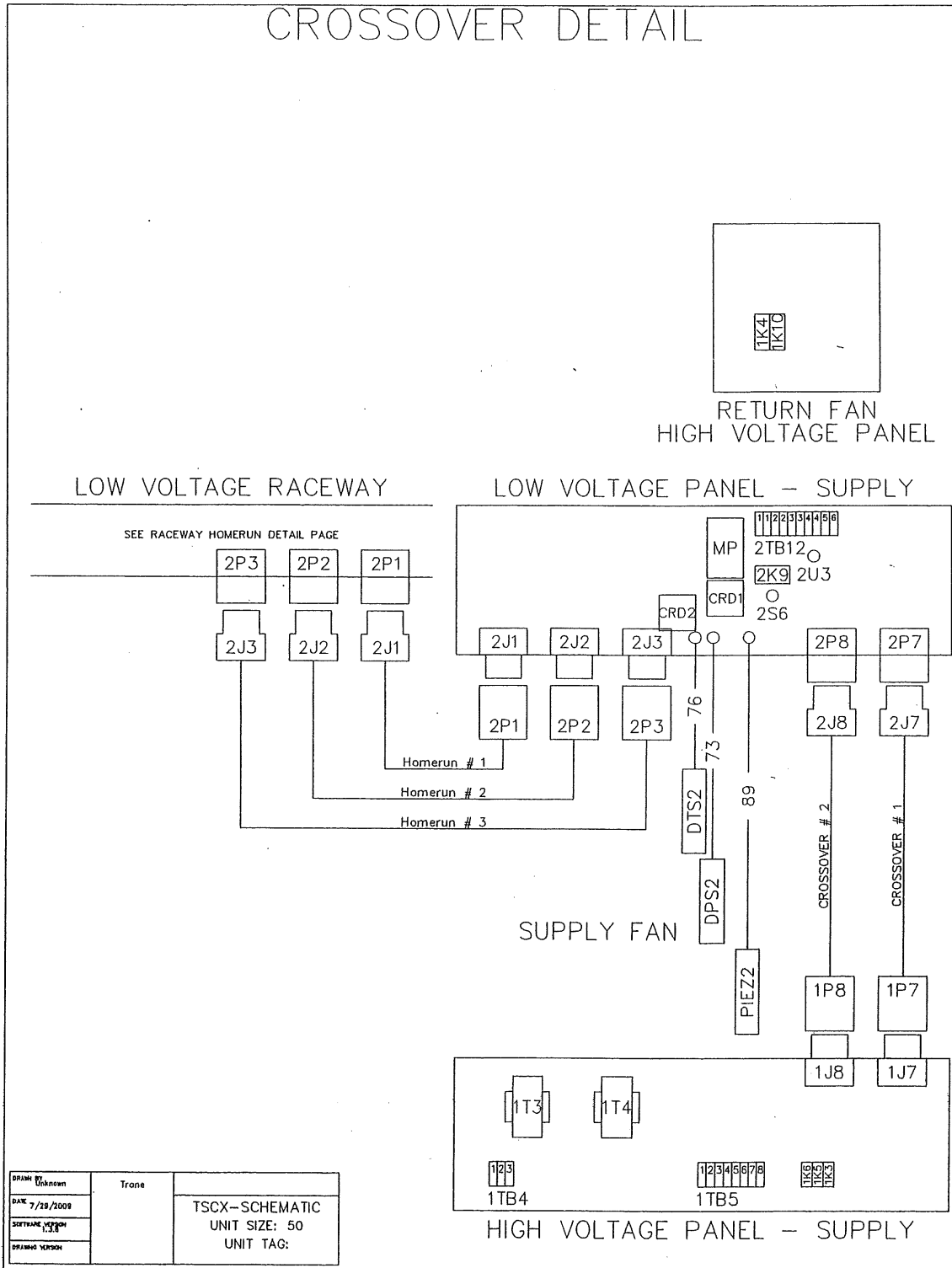
POS#	DESCRIPTION	PT	LABEL	PWR HR - WIRE	SIGNAL HR - WIRE	CROSSOVER CABLE - WIRE	XFMR	PWR VA
0	75VA TRANSFORMER		1T3			C1-42		
0	75VA TRANSFORMER		1T4			C1-37		
0	Differential Press. Transmitter	J43	2U3					
0	MP580 Controller		MP	78			1T3	43
0	Expansion card		CRD1	58	57		1T3	22
0	Expansion card		CRD2	60	59		1T4	22
0	Customer Interface Relay	B03	1K6			C1-38		
1	Field wired Marine Light		ML1					
1	Return/Exhaust Fan S/S	B02	1K4		H1-1			
1	Return/Exhaust Fan Low Limit Circuit Relay		1K10	H1-2		C1-39	1T3	1
1	Return/Exhaust Fan Speed	A07	VFD1		H1-3			
1	Discharge Air Sensor	IN5	DTS1		H1-4			
1	Flow meter	IN21	PIEZ1	H1-5(RED)	H1-5(BLK)			
2	Damper Actuator	A05	DA1	H2-7	H2-8		1T4	10
2	Damper Actuator	A02	DA2	H2-7	H2-9		1T4	10
2	Damper Actuator	A08	DA3	H2-7	H2-10		1T4	10
2	Damper Actuator	A09	DA4	H2-7	H2-11		1T4	10
2	Ventilation Control Module	IN8	VCM1	H2-7	H2-12		1T4	8
2	Averaging Temperature Sensor	IN3	ATS1		H3-13			
2	Field wired Marine Light		ML2					
3	Dirty Filter Switch	IN11	DPS1		H1-6			
4	Low Limit (Normally open-WHT)		LLT1		H3-14			
5	Field wired Marine Light		ML3					
7	Field wired Marine Light		ML4					
7	Supply Fan Low Limit Circuit Relay		1K5			C1-41	1T3	1
7	Low Limit Reset Circuit Relay	IN7	2K9		77		1T3	2
7	Supply Fan S/S	B01	1K3			C1-40		
7	Supply Fan Speed	A01	VFD2			C2-43		
7	Discharge Air Sensor	IN6	DTS2		76			
7	Air Flow Switch	IN10	DPS2		73			
7	Flow meter	IN9	PIEZ2	89B	89A			

DRAWN BY: Unknown DATE: 7/29/2009 SOFTWARE VERSION: 1.3.3 DRAWING VERSION:	Trane	TSCX-SCHEMATIC UNIT SIZE: 50 UNIT TAG:
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As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50

Qty: 1 Tag(s): AHU-2

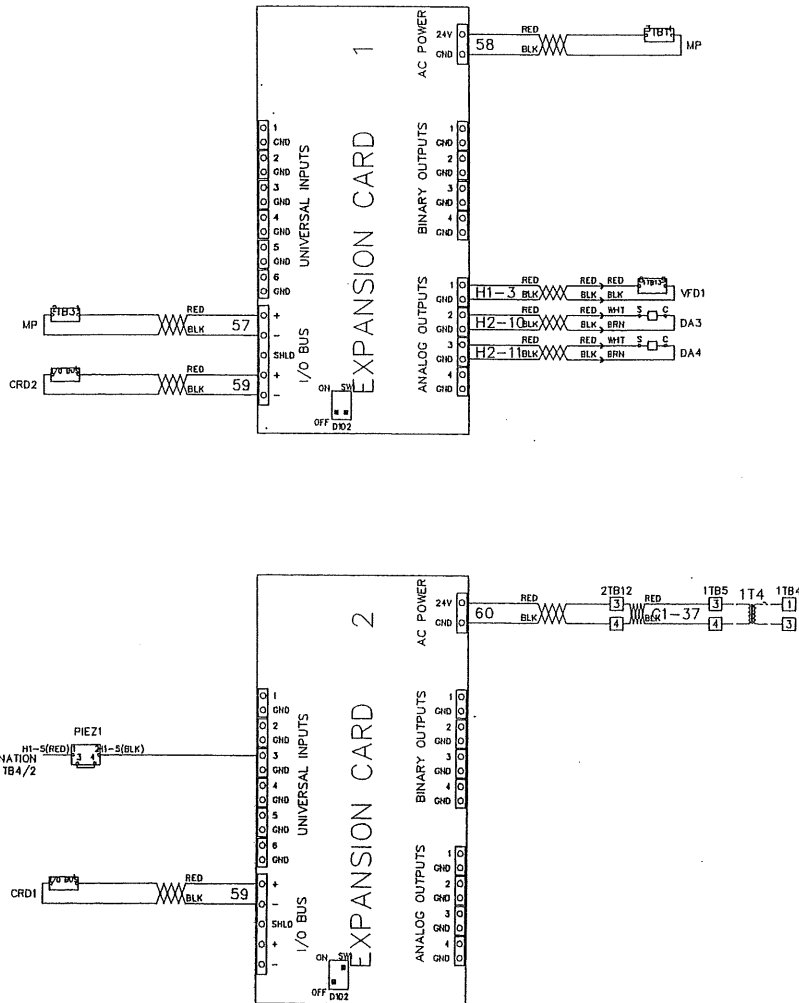
CROSSOVER DETAIL



DRAWN BY: UNKNOWN DATE: 7/29/2009 SOFTWARE: UNKNOWN DRAWING NUMBER: UNKNOWN	Trane	TSCX-SCHMATIC UNIT SIZE: 50 UNIT TAG:
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As-Built - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
 Qty: 1 Tag(s): AHU-2

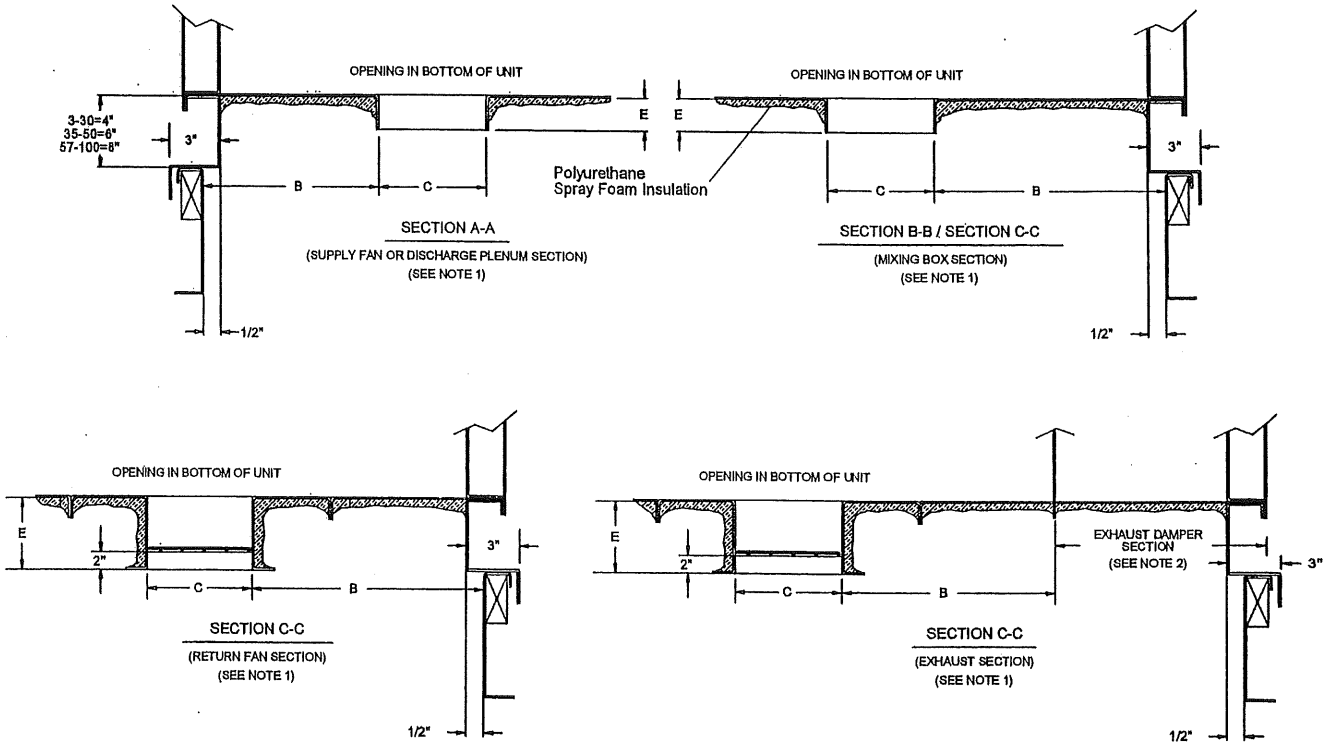
EXPANSION CARD DETAIL



DRAWN BY DATE 7/29/2009 SOFTWARE VERSION DRAWING VERSION	Trane	TSCX-SCHEMATIC UNIT SIZE: 50 UNIT TAG:
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Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Discharge Detail
Qty: 1 Tag(s): AHU-2

RELATIONSHIP OF CURB TO UNIT AS-BUILT

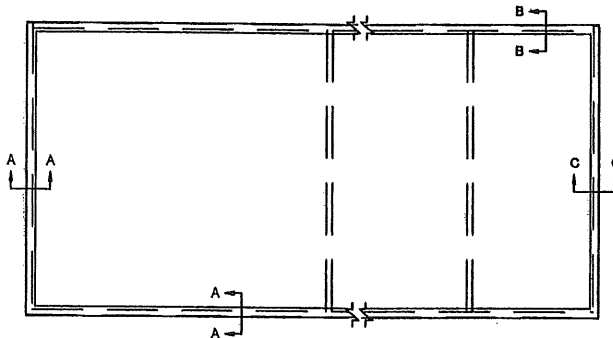


MODULE	E
Mixing Box	5
Discharge Plenum	5
Bottom Front Discharge Fan	4
Bottom Front Discharge Plenum Fan	5
Exhaust / Return Fan	5.875

For Reference Only. Not All Units Selected Include Above Modules.

NOTE:

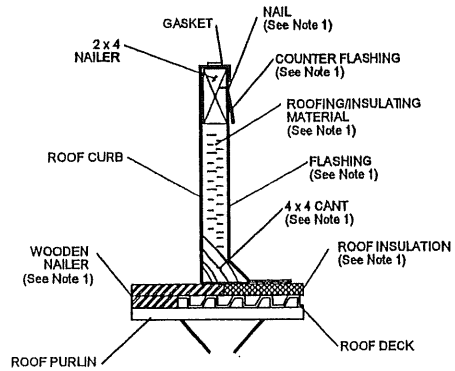
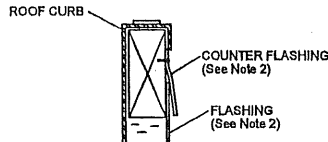
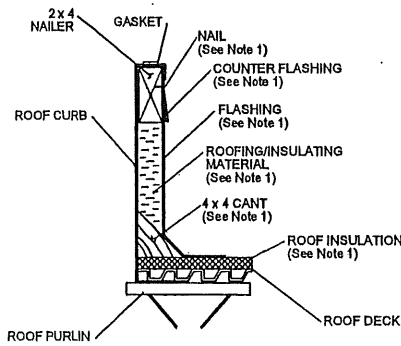
1. B and C are Representative of Dimensions on the Accessory As-Built Used to Locate Opening(s) in the Roof Surface.
2. Add the Exhaust Damper Section Dimension on the Unit As-Built to the B Dimension.
3. All Supply and Return openings in the base of the unit must be ducted. Duct work must be attached to the inside of the flange (see dimension E) located in the opening in the bottom of the unit. Mounting hardware must extend from the inside of the duct, through the duct work, and into the flange.



Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Roof Curb Mounting Detail
 Qty: 1 Tag(s): AHU-2

Recommendation for Roof Curb Installation

Refer to T-Series IOM for Specific Installation Instructions

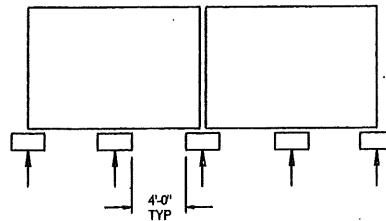
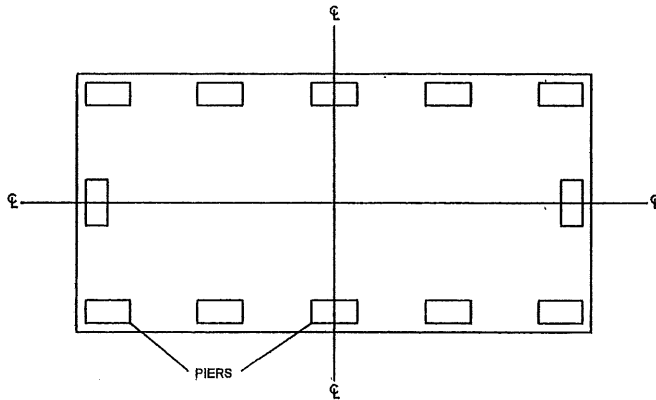


Note:

1. Materials to Attach Roof Curb to Roof are to be Supplied by the Installer.
2. Flashing or Counter Flashing Should Not Come to or Over Top of Curb.
3. Roof Curb must be Mechanically Fastened to Roof Surface.

Recommendation for Pier Mounting

Refer to T-Series IOM for Specific Installation Instructions



Note:

1. Pier Supports Should be Inside 3' Flat of Unit Base. Unit Cannot be Supported by Unit Base Drip Leg.
2. Pier Supports Should be No Wider than 2 3/4", Due to Supports Perpendicular to Airflow.
3. Piers Beneath Shipping Splits Must be Structurally Sound to Support the Weight of the Unit.

Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50

Filter Schedule

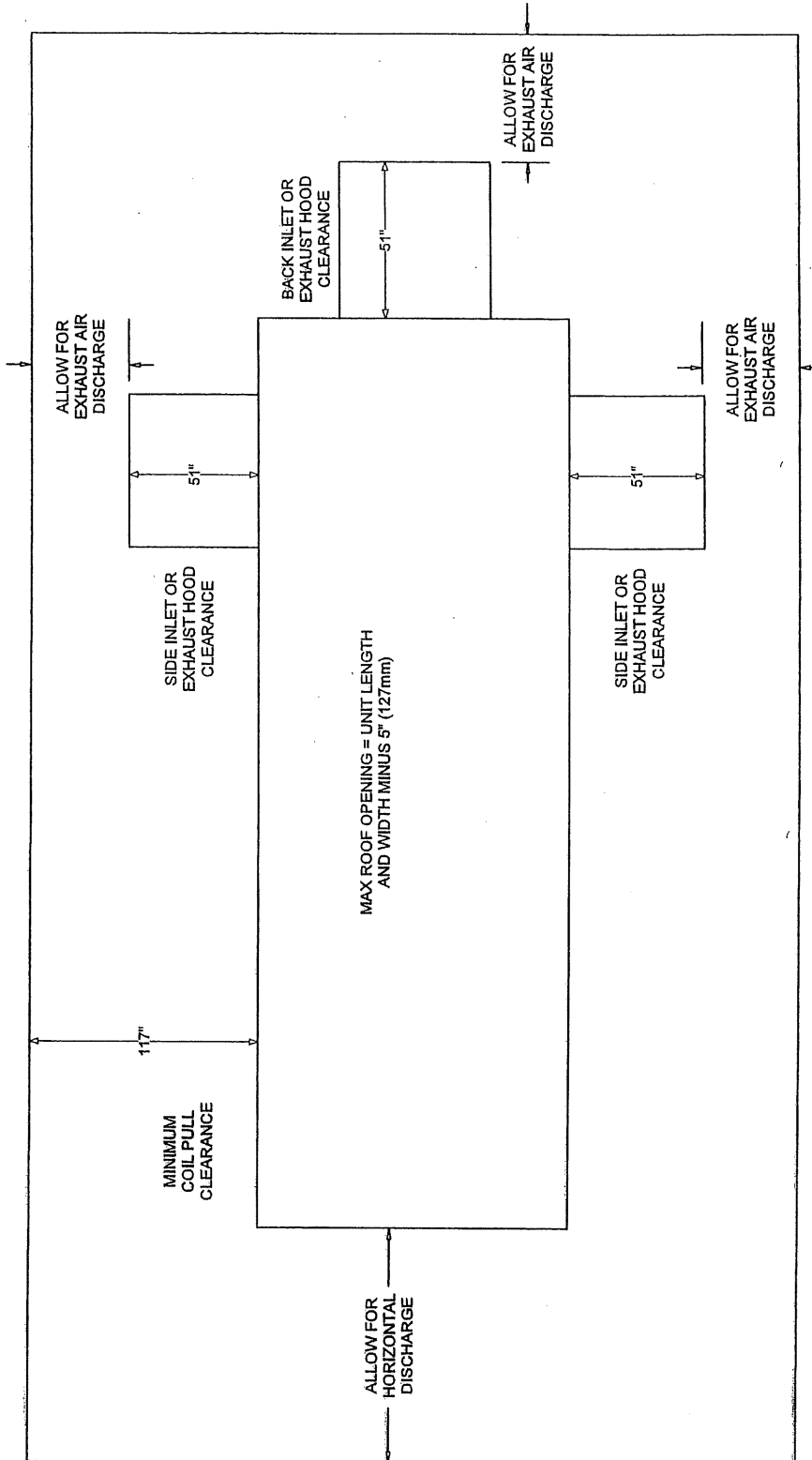
Qty: 1 Tag(s): AHU-2

Filters		Unit Size
		50
Angled		
2"	Area (Ft2)	80.60
	Qty.	20 - 20" x 25"
		4 - 16" x 25"

Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50

TYPICAL UNIT CLEARANCE DETAIL

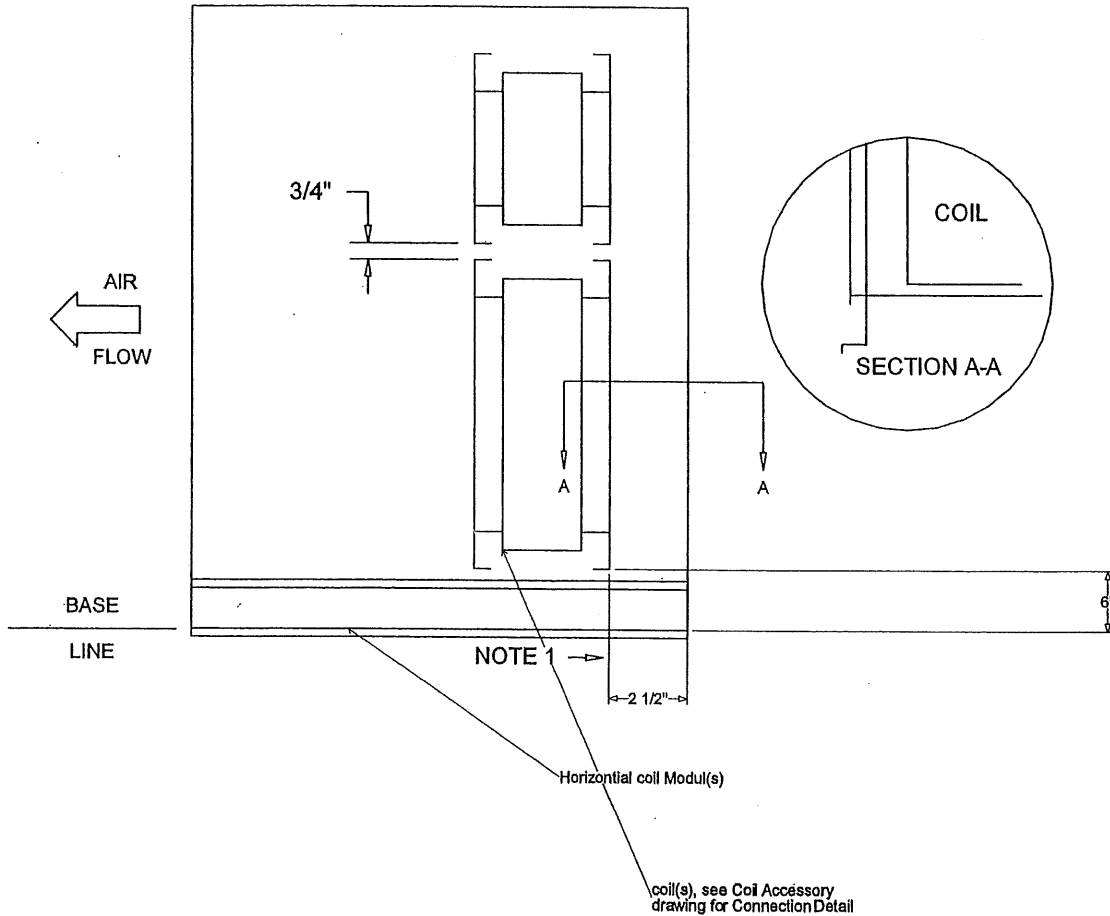
Qty: 1 Tag(s): AHU-2



Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50

COIL LOCATION DETAIL

Qty: 1 Tag(s): AHU-2



UNIT SIZE	COIL SIZE	QUANTITY	AREA ft ²
50	UNIT	30 X 109	47.69
		33 X 109	

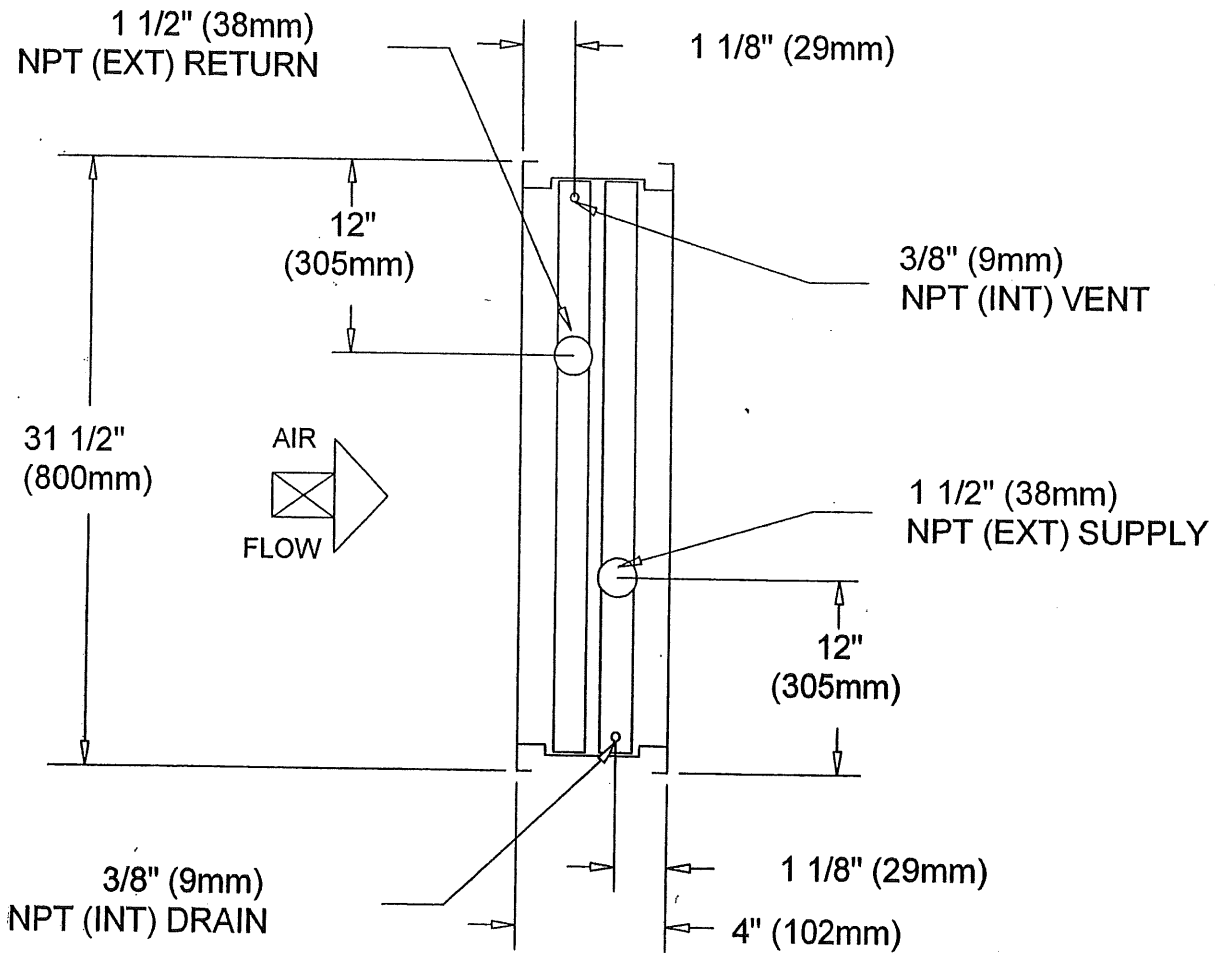
NOTES

1. THE HORIZONTAL DIMENSION FOR AN 8 ROW UU,UW,UF IN A MEDIUM COIL MODULE.

UNIT SIZES 3-30 MINUS 1/2".
UNIT SIZES 35-40 MINUS 5/8".

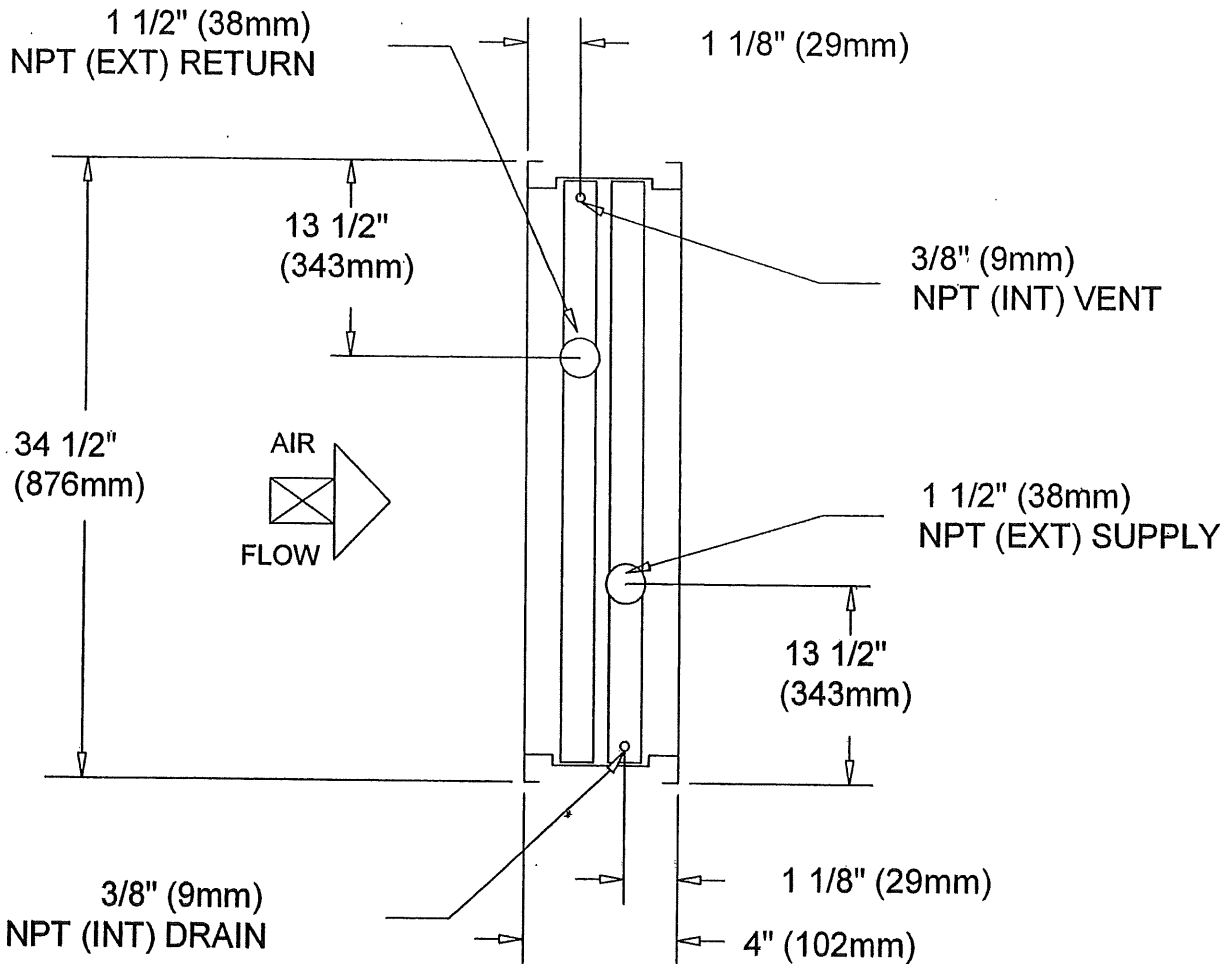
Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Hot Water Coil - 5W 1 ROW TOP COIL
Qty: 1 Tag(s): AHU-2

30" 5W 1 ROW



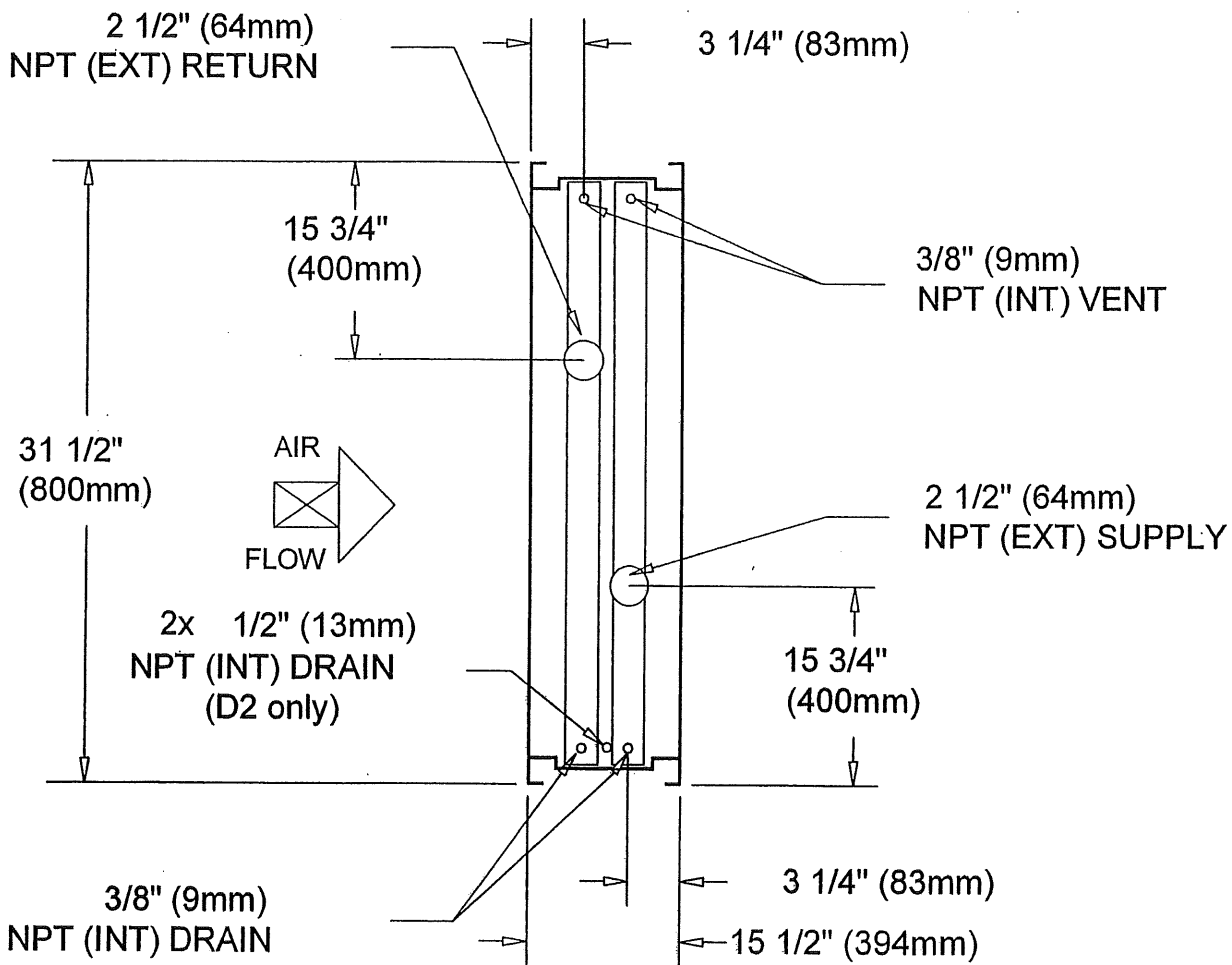
Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Hot Water Coil - 5W 1 ROW BOTTOM COIL
Qty: 1 Tag(s): AHU-2

33" 5W 1 ROW



Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Chilled Water Coil - WD 8 ROW TOP COIL
Qty: 1 Tag(s): AHU-2

30" WD or D2 8 ROW

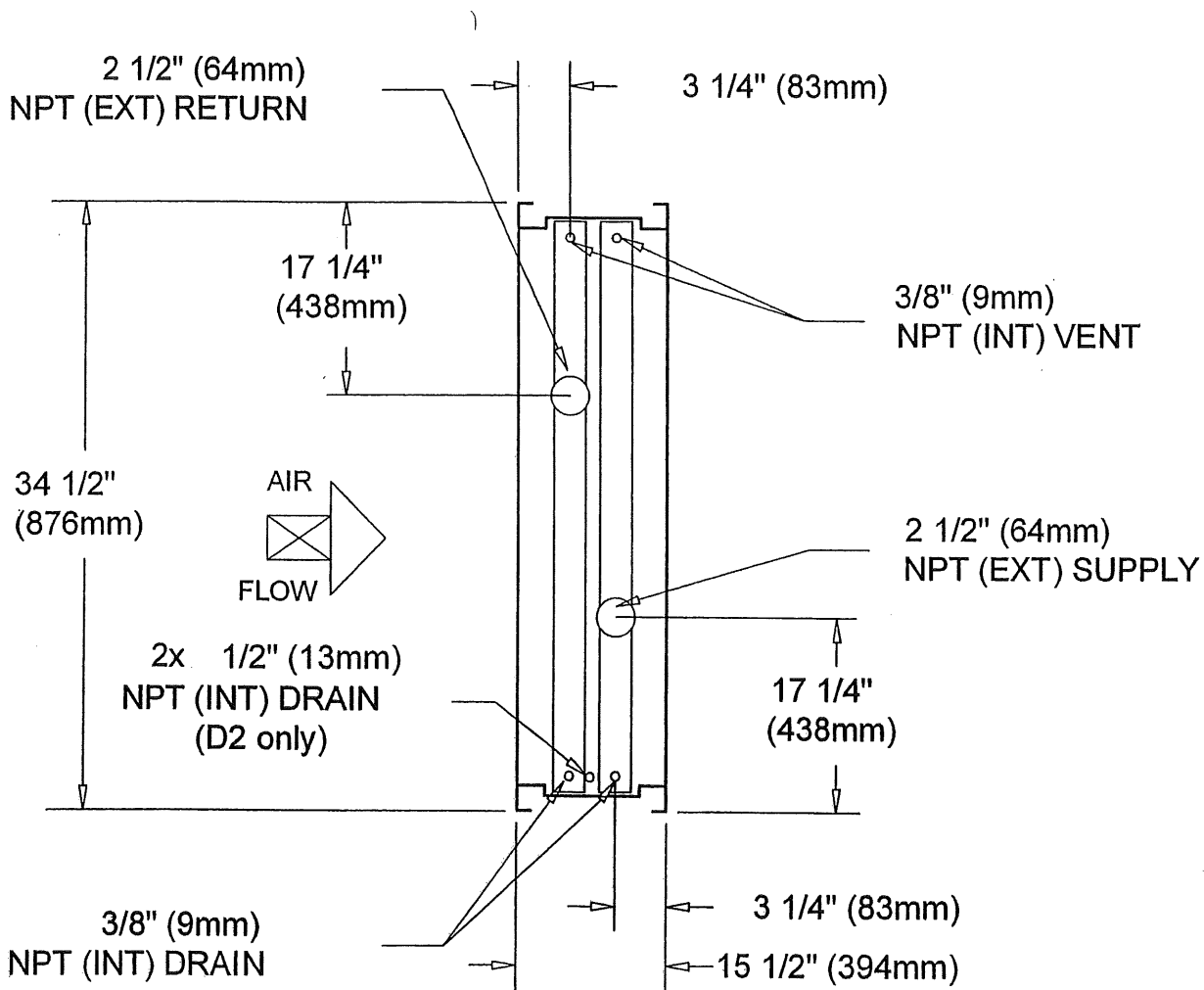


Note: D2 option is a dual serpentine coil drainable at each row and at the headers as opposed to the WD coil which is drainable at the headers only.

Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Chilled Water Coil - WD 8 ROW BOTTOM COIL

Qty: 1 Tag(s): AHU-2

33" WD or D2 8 ROW



Note: D2 option is a dual serpentine coil drainable at each row and at the headers as opposed to the WD coil which is drainable at the headers only.

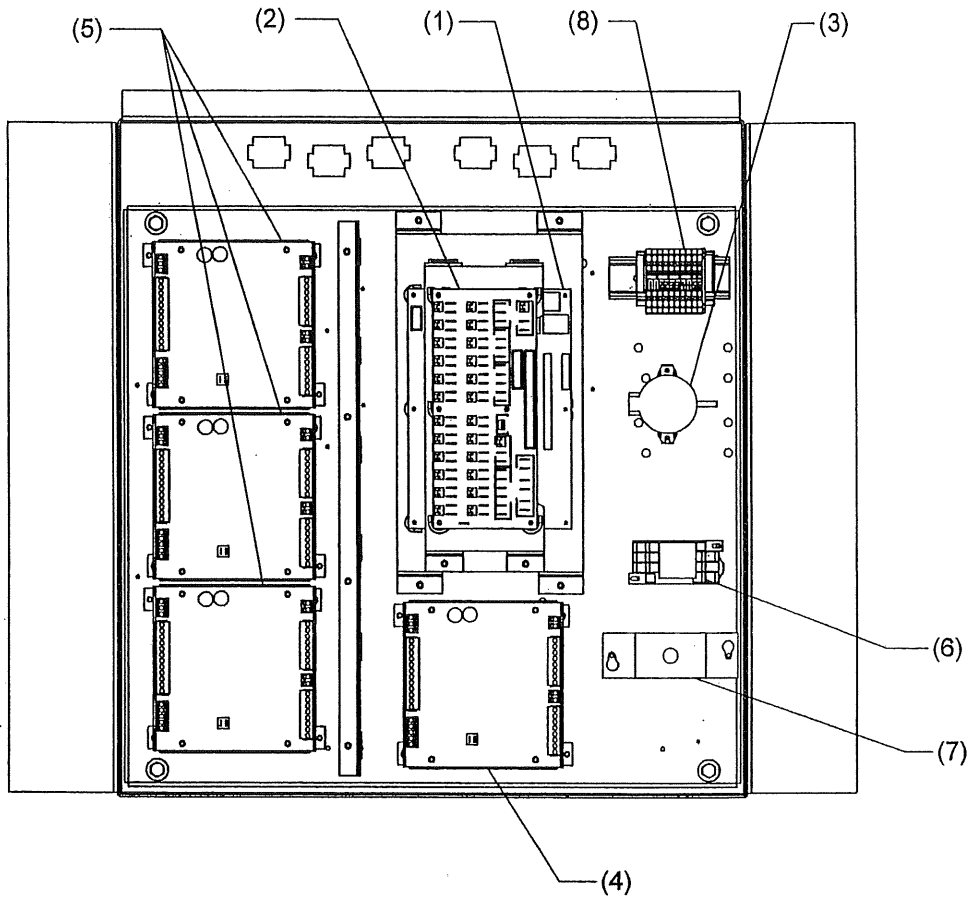
Accessory - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Piping Cabinet - Trane Supplied Roof Curb
Qty: 1 Tag(s): AHU-2

Trane Curb - External Pipe Cabinet Assembly

Trane Curb – External Pipe Cabinet Gutter Installation

Field Wiring - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

T-SERIES CONTROLLER LAYOUT

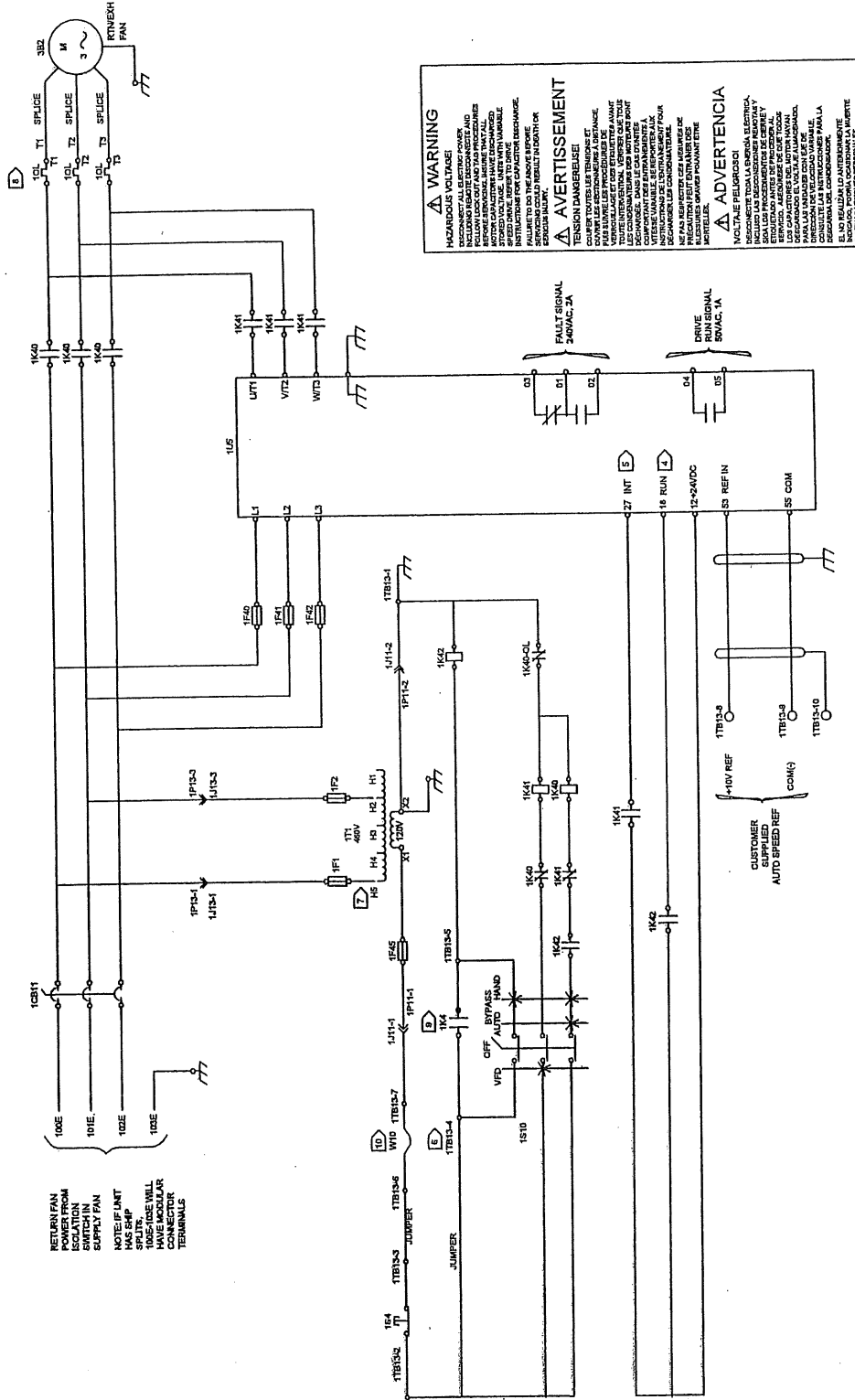


- 1. CONTROLLER MAINBOARD.
- 2. TERMINATION BOARD.
- 3. DUCT STATIC SENSOR.
- 4. EXPANSION CARD 1 (MP580 CONTROLLER ONLY).
- 5. EXPANSION CARDS 2-4 (MP580 CONTROLLER ONLY).
- 6. LOW LIMIT RESET RELAY.
- 7. LOW LIMIT RESET PUSH BUTTON.
- 8. TERMINAL STRIP.

NOTE:

1. NUMBER OF ITEMS SHOWN WILL VARY DEPENDING ON COMPLEXITY OF CONTROLS SYSTEM AND TYPE OF CONTROLLER SPECIFIED.

Field Wiring - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
 Qty: 1 Tag(s): AHU-2



⚠ WARNING
 HAZARDOUS VOLTAGE!
 DISCONNECT ALL ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING TO WIRE OR SERVICING. FOLLOW LOCK-OUT AND TAG PROCEDURES TO PREVENT ACCIDENTAL RE-ENERGIZATION. ALL ELECTRICAL WORK SHOULD BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) AND ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS. FAILURE TO DO SO MAY RESULT IN DEATH OR SERIOUS INJURY.

⚠ AVERTISSEMENT
 TENSION DANGEREUSE!
 COUPER TOUTES LES TENSIONS DE LA UNITÉ AVANT D'ESSAYER DE BRANCHER OU DE RÉPARER. SUIVRE LES PROCÉDURES DE VERROUILLAGE ET D'ÉTIQUETAGE POUR ÉVITER LA RE-ÉNERGISATION ACCIDENTELLE. TOUS LES TRAVAUX ÉLECTRIQUES DOIVENT ÊTRE RÉALISÉS EN CONFORMITÉ AVEC LE CODE NATIONAL ÉLECTRIQUE (NEC) ET TOUTES LES RÉGLEMENTATIONS LOCALES, ÉTAT ET FÉDÉRALES APPLICABLES. LE NON-RESPECT DE CES PROCÉDURES PEUT CAUSER LA MORT OU DES BLESSURES GRAVES.

⚠ ADVERTENCIA
 VOLTAJE PELIGROSO!
 DESCONECTAR TODA LA ENERGÍA ANTES DE INTENTAR CABLEAR O REPARAR. SIGUIR LOS PROCEDIMIENTOS DE BLOQUEO Y ETIQUETADO PARA EVITAR LA RE-ENERGIZACIÓN ACCIDENTAL. TODOS LOS TRABAJOS ELÉCTRICOS DEBEN REALIZARSE DE ACUERDO CON EL CÓDIGO NACIONAL ELÉCTrico (NEC) Y TODAS LAS REGULACIONES LOCALES, ESTATALES Y FEDERALES APLICABLES. EL NO REALIZAR LA ANTERIORMENTE MENCIONADA PROCEDIMIENTO PUEDE CAUSAR LA MUERTE O LESIONES GRAVES.

CAUTION
 USE COPPER CONDUCTORS ONLY!
 DO NOT USE ALUMINUM CONDUCTORS UNLESS SPECIFICALLY APPROVED TO ACCEPT OTHER TYPES OF CONDUCTORS.
 FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

PRECAUCIÓN
 NO UTILICE ALUMINUM CONDUCTORES DE COBRE!
 LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
 EL NO USAR, PUEDE CAUSAR DAÑO AL EQUIPO.

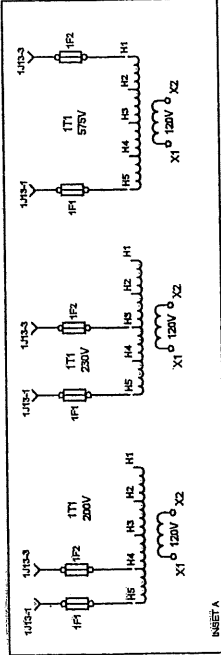
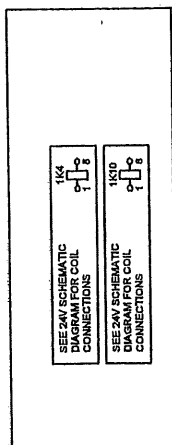
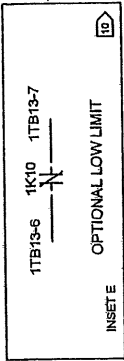
ATTENTION
 UTILISE UNiquement des conducteurs de cuivre!
 Les terminales de la Unité ne sont pas conçues pour accepter d'autres types de conducteurs.
 Si le non usage, peut causer l'endommagement de l'équipement.

Field Wiring - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
Qty: 1 Tag(s): AHU-2

CAUTION
USE COPPER CONDUCTORS ONLY.
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT
ANY OTHER TYPES OF CONDUCTORS.
USE ONLY COPPER WIRE AS SPECIFIED IN THE
EQUIPMENT.

PRECAUCIÓN
UTILIZAR SOLO CONDUCTORES DE COBRE.
LAS BORNAS DEL UNIDAD NO SON DISEÑADAS
PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
UTILIZAR SOLO CABLE DE COBRE COMO SE
ESPECIFICA EN EL EQUIPAMIENTO.

ATTENTION
UTILISE UNICAMENTE CONDUCTEURS DE COBRE.
LES BORNAS DE L'UNITÉ NE SONT PAS CONÇUES
POUR ACEPTER D'AUTRES TIPO DE CONDUCTEURS.
SI NO LO HACE, PUEDE OCASIONAR DAÑO AL EQUIPO.



BUSMAN CLASS	DRIVE FUSE PART NO	HP	JUN NO
200/230	1F1	1.15	JUN-10
	1F2	2	JUN-15
	1F3	3	JUN-20
	1F4	5	JUN-25
	1F5	7.5	JUN-30
	1F6	10	JUN-35
	1F7	15	JUN-40
	1F8	20	JUN-45
	1F9	25	JUN-50
	1F10	30	JUN-55
460	1F11	1.15	JUN-10
	1F12	2.3	JUN-15
	1F13	5	JUN-20
	1F14	7.5	JUN-25
	1F15	10	JUN-30
	1F16	15	JUN-35
	1F17	20	JUN-40
	1F18	25	JUN-45
	1F19	30	JUN-50
	1F20	40	JUN-55
575	1F21	1.15	JUN-10
	1F22	2.3	JUN-15
	1F23	5	JUN-20
	1F24	7.5	JUN-25
	1F25	10	JUN-30
	1F26	15	JUN-35
	1F27	20	JUN-40
	1F28	25	JUN-45
	1F29	30	JUN-50
	1F30	40	JUN-55

FUSE RATING (AMPS) - 600V CLASS LP-GC TIME DELAY	PRIMARY TRANSFORMER FUSE RATING
1F1	200V 200V 460V 575V
1F2	100 100 200 250
1F3-1F10	200 200 400 500
1F11-1F20	100 100 200 250
1F21-1F30	200 200 400 500

DEVICE PREFIX	LOCATION	CODE
1	HIGH VOLTAGE PANEL	
2	LOW VOLTAGE PANEL	
3	AIR HANDLER SECTION	

DEVICE DESIGNATION	DESCRIPTION
1B1	VFD CIRCUIT BREAKER
1F1, 1F2	CONTROL CIRCUIT PRIMARY FUSES
1F40, 1F41, 1F42	APD FUSES
1F45	CONTROL CIRCUIT SECONDARY FUSE
1K4	RTWESH FAN START/STOP RELAY
1K10	RTWESH FAN LOW LIMIT RELAY
1K40	BYPASS CONTACTOR
1K41	ISOLATION CONTACTOR
1K42	RUN PERMISSIVE RELAY
1OL	OVERLOAD RELAY
1P11/1J11	PLUG/JACK (POWER TRANSFORMER-SECONDARY)
1P13/1J13	PLUG/JACK (POWER TRANSFORMER-PRIMARY)
1S4	RTWESH FAN STOP SWITCH
1S10	VFD OFF/BYPASS AUTO/BYPASS HAND SWITCH
1T1	PRIMARY TRANSFORMER
1T13	TERMINAL STRIP CONTROL CIRCUIT
1U5	DRIVE CONTROLLER (AFS)
3B2	RTWESH FAN MOTOR

- NOTES:
- DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. REFER TO THE FIELD WIRING CONTROL PANEL SCHEMATIC FOR SPECIFIC DETAIL.
 - ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS, OTHER COUNTRIES APPLICABLE NATIONAL AND/OR LOCAL REQUIREMENTS SHALL APPLY. FIELD CONDUITS SHALL HAVE INSULATION RATING NOT LESS THAN 600V.
 - MINIMUM CIRCUIT AMPACITY AND POWER ISOLATION SWITCH SIZE DETERMINED FROM THE LOAD CURRENT. THE MAXIMUM FUSE AND CIRCUIT BREAKER SIZE ARE BASED ON THE INVERTER LINE INPUT CURRENT FOR THIS FAN PER ARTICLE 430-2 OF THE NATIONAL ELECTRICAL CODE.
 - PROGRAM TERMINAL 18 AS RUN.
 - PROGRAM TERMINAL 27 INV. COASTING STOP.
 - CLOSES TO RUN IN VFD AUTO MODE OR BYPASS AUTO.
 - CONTROL TRANSFORMER SHOWN FOR 460V PRIMARY. FOR 200 OR 230V OR 575V REFER TO INSET A.
 - THE OVERLOAD RELAY TRIP SETTING MUST BE ADJUSTED TO CORRESPOND WITH THE MOTOR FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
 - 1K4 RELAY ONLY PROVIDED WITH SELECTION OF FACTORY CONTROLS.
 - REMOVE JUMPER AND INSTALL FIELD INTERLOCK.
 - REFER TO INSET E.

WARNING
HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRICAL POWER
BEFORE WORKING ON THIS UNIT.
DO NOT TOUCH ANY ELECTRICAL
COMPONENTS UNTIL YOU ARE
CERTAINLY SURE THAT ALL
ELECTRICAL POWER HAS BEEN
DISCONNECTED AND THE
EQUIPMENT IS COMPLETELY
DEENERGIZED.
FAILURE TO FOLLOW THESE
PRECAUTIONS CAN RESULT IN
DEATH OR SERIOUS INJURY.

AVERTISSEMENT
TENSION DANGEREUSE!
COUPEZ TOUTE L'ÉLECTRICITÉ
AVANT DE TRAVAILLER SUR
CETTE UNITÉ.
NE TOUCHEZ AUCUN
ÉLÉMENT ÉLECTRIQUE
JUSQU'À CE QUE VOUS
SÛRIFIÉS QU'IL N'Y A PLUS
D'ÉLECTRICITÉ ET QUE L'ÉQUIPEMENT
EST DÉBRAYÉ.
NE SUIVEZ PAS CES PROCÉDURES
SANS SÛRÉTÉ, CE PEUT CAUSER
LA MORT OU DES BLESSURES
GRAVES.

ADVERTENCIA
¡ALTA TENSIÓN PELIGROSA!
DESCONECTE TODA LA ENERGÍA ELÉCTRICA
ANTES DE TRABAJAR EN ESTE EQUIPO.
NO TOQUE NINGUNA PARTE ELÉCTRICA
HASTA ESTE SEGURO DE QUE TODA LA
ENERGÍA ELÉCTRICA HA SIDO
DESCONECTADA Y EL EQUIPO ESTÁ
COMPLETAMENTE DESCARGADO.
NO SIGA ESTAS INSTRUCCIONES PARA LA
REPARACIÓN SIN ESTAR SURE DE QUE
NO HAY NINGUNA ENERGÍA ELÉCTRICA
O ENERGÍA RESIDUA EN EL EQUIPO.

Field Wiring - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
 Qty: 1 Tag(s): AHU-2

SPP - MCA & MOP VALUE CALCULATIONS

Transformers				
	200 V	230 V	460 V	575 V
100 VA	0.5	0.4	0.2	0.2
350 VA	1.6	1.5	0.8	0.8
500 VA	2.5	2.2	1.1	0.9
2000 VA	10.0	8.7	4.3	3.5

CHART #1				
NEC Motor FLA				
Motor Hp	200 V	230 V	460 V	575 V
1	4.8	4.2	2.1	1.7
1.5	6.9	6.0	3.0	2.4
2	7.8	6.8	3.4	2.7
3	11.0	9.8	4.8	3.9
5	17.5	15.2	7.6	6.1
7.5	25.3	22.0	11.0	9.0
10	32.2	28.0	14.0	11.0
15	48.3	42.0	21.0	17.0
20	62.1	54.0	27.0	22.0
25	78.2	68.0	34.0	27.0
30	92.0	80.0	40.0	32.0
40	120.0	104.0	52.0	41.0
50	---	130.0	65.0	52.0
60	---	---	77.0	62.0
75	---	---	99.0	77.0
100	---	---	124.0	99.0

CHART #2				
VFD Line Input Current				
Motor Hp	200 V	230 V	460 V	575 V

1	6.3	6.3	2.5	2.3
1.5	8.3	8.3	2.5	2.3
2	7.3	7.3	3.4	2.6
3	10.4	10.4	4.8	3.8
5	16.8	16.8	6.3	5.9
7.5	23.8	23.8	10.6	9.2
10	32.2	32.2	14.2	11.1
15	48.3	48.3	21.0	16.8
20	61.9	61.9	27.6	21.4
25	78.2	78.2	34.0	28.3
30	92.0	92.0	41.0	31.2
40	117.0	101.3	53.0	39.9
50	---	126.8	64.0	50.8
60	---	---	77.0	60.4
75	---	---	104.0	75.0
100	---	---	128.0	92.4

CHART #3				
VFD Line Input Current				
Max Combined				
Motor Hp	200 V	230 V	460 V	575 V

1	6.3	6.3	2.5	2.3
1.5	8.9	8.3	3.0	2.4
2	7.8	7.3	3.4	2.7
3	11.0	10.4	4.8	3.9
5	17.5	16.8	6.3	6.1
7.5	25.3	23.8	11.0	9.2
10	32.2	32.2	14.2	11.1
15	48.3	48.3	21.0	17.0
20	62.1	61.9	27.6	22.0
25	78.2	78.2	34.0	27.0
30	92.0	92.0	41.0	32.0
40	120.0	104.0	53.0	41.0
50	---	130.0	65.0	52.0
60	---	---	77.0	62.0
75	---	---	104.0	77.0
100	---	---	128.0	99.0

NOTES:

- 1.) Starter full-load current based on NEC Table 430.250, 3-Phase, AC Motors, pg 70-311.
- 2.) All Starter / Starter configurations shares a transformer located in the supply fan high voltage box.
- 3.) All configurations have a transformer controlling wired lights, controls, and low limit options are located in supply fan high voltage box.

Continued on next page...

Field Wiring - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
 Qty: 1 Tag(s): AHU-2

SPP - MCA & MOP VALUE CALCULATIONS

NOTES:

- 1.) Starter full-load current based on NEC Table 430.250, 3-Phase, AC Motors, pg 70-311.
- 2.) All Starter / Starter configurations shares a transformer located in the supply fan high voltage box.
- 3.) All configurations have a transformer controlling wired lights, controls, and low limit options are located in supply fan high voltage box.

No Wired Lights & No Controls & No Low Limit Options

- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/o BP] (1)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/o BP] (1)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [Starter]
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [Starter] (2)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer]
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/ BP] (1)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [100 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [100 VA Transformer]
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [Starter]
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/ BP] (1)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [350 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [350 VA Transformer]

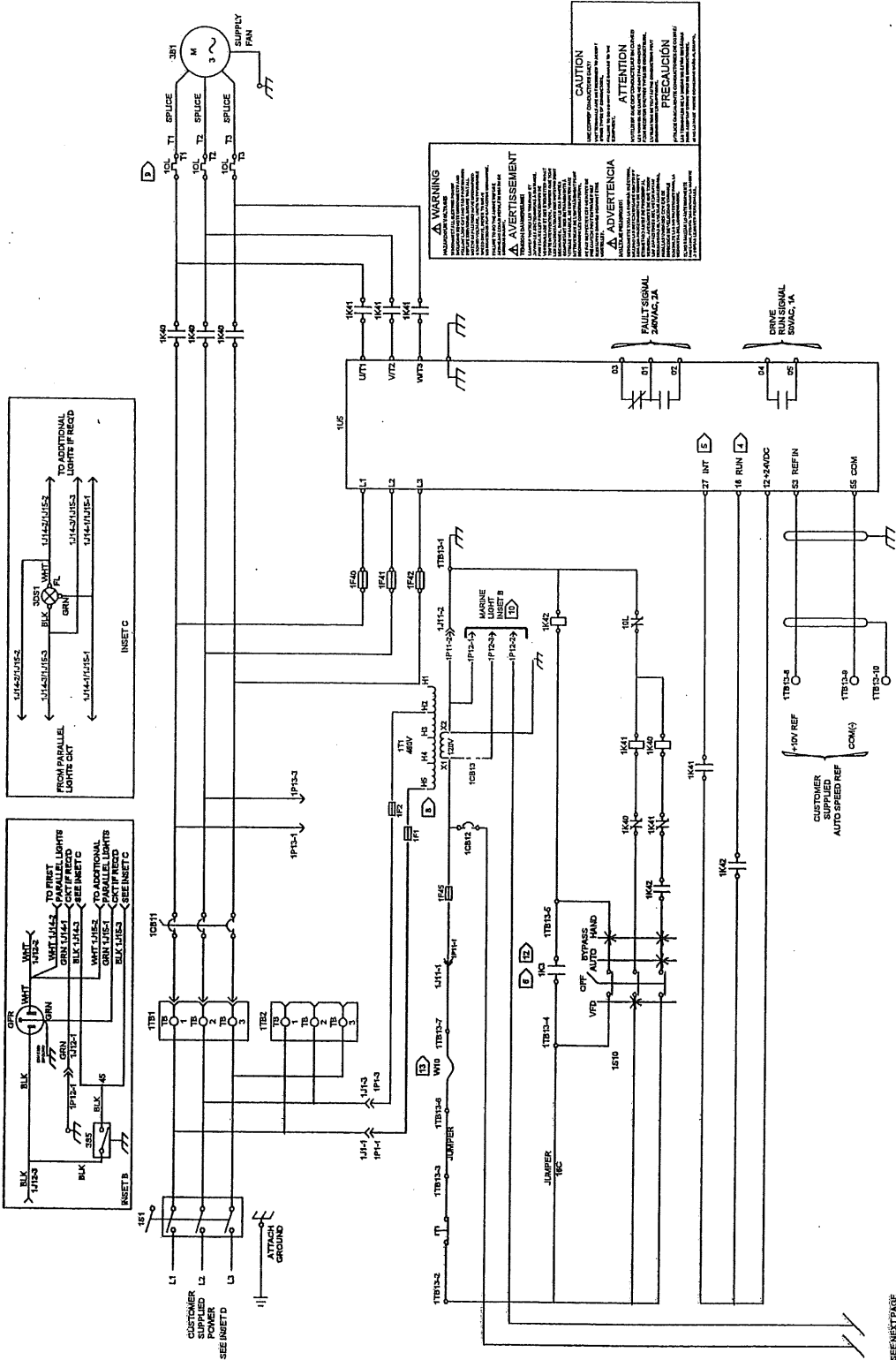
Controls &/or Low Limit Options (No Wired Lights)

- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [Starter] (2)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [500 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [500 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/ BP] (1)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [500 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [500 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [Starter]
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [Starter]
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer] + [500 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer] + [500 VA Transformer]

Wired Lights Option

- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/o BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [Starter] (2)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [2000 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [2000 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [VFD w/ BP] (1)
- or
- Supply Fan [Starter] & Return/Exhaust Fan [VFD w/ BP] (1)
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [2000 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [100 VA Transformer] + [2000 VA Transformer]
- Supply Fan [VFD w/o BP] & Return/Exhaust Fan [Starter]
- or
- Supply Fan [VFD w/ BP] & Return/Exhaust Fan [Starter]
 MCA = [1.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer] + [2000 VA Transformer]
 MOP = [2.25 x Motor (Hp maximum)] + [Motor (Hp minimum)] + [350 VA Transformer] + [2000 VA Transformer]

Field Wiring - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
 Qty: 1 Tag(s): AHU-2

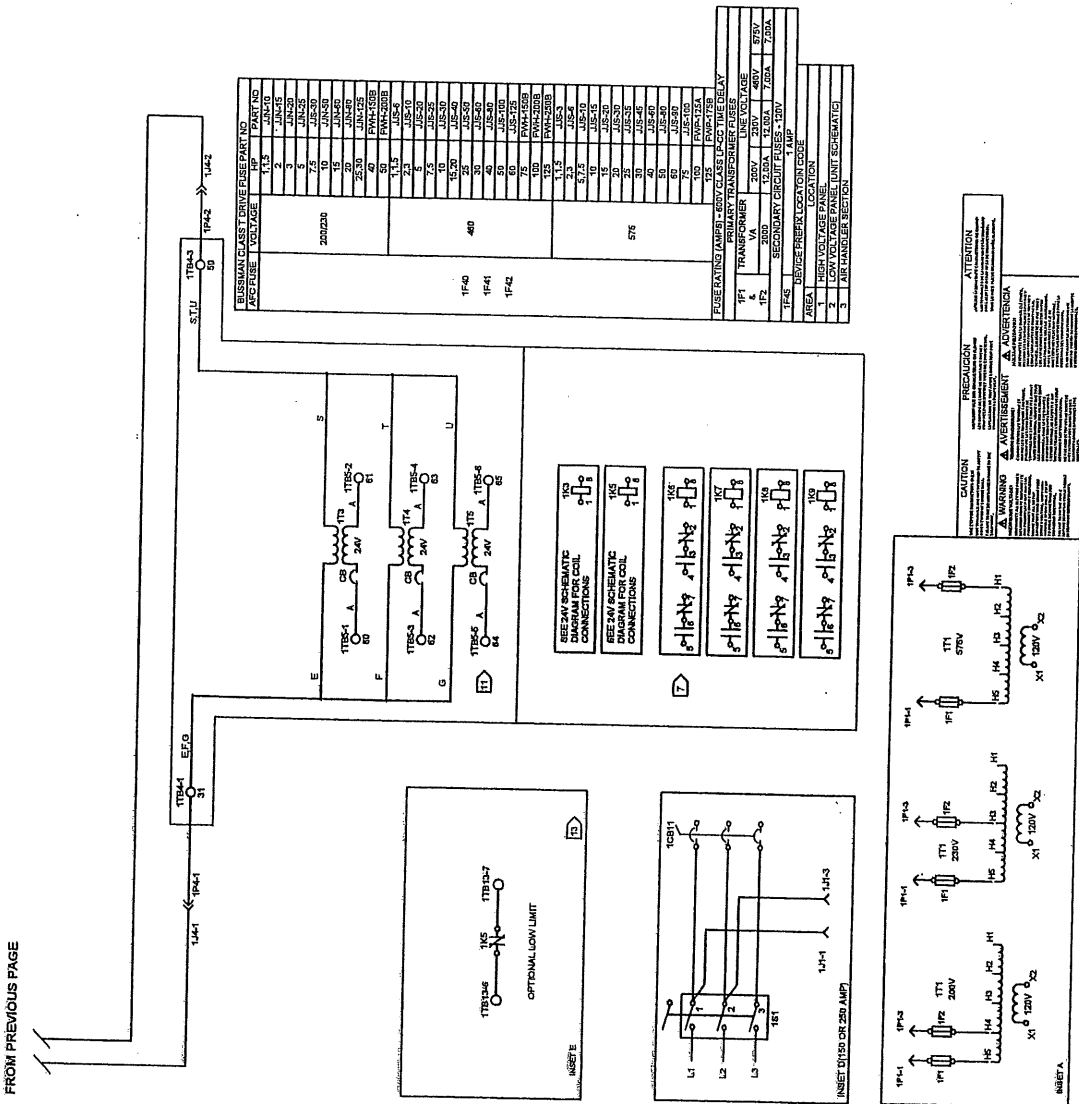


SEE NEXT PAGE

Field Wiring - T-Series Climate Changer® Outdoor Central Station Air Handling Unit Size 50
 Qty: 1 Tag(s): AHU-2

DEVICE DESCRIPTION	LEGEND	DESCRIPTION
12B11	12B11	VFD CIRCUIT BREAKER
12B12, 12B13	12B12, 12B13	SECONDARY CIRCUIT BREAKER (B)
1F1, 1F2	1F1, 1F2	CONTROL CIRCUIT PRIMARY FUSE (B)
1F40, 1F41, 1F42	1F40, 1F41, 1F42	JAC FUSES (B)
1F43	1F43	CONTROL CIRCUIT SECONDARY FUSE
1F44	1F44	JAC (MARINE LIGHT)
1F45	1F45	JAC (MARINE LIGHT)
1F46	1F46	SUPPLY FAN START STOP RELAY
1F47, 1F48, 1F49	1F47, 1F48, 1F49	CUSTOMER INTERFACE RELAYS
1F49	1F49	BYPASS CONTACTOR
1F50	1F50	CONTROL TRANSFORMER RELAY
1F51	1F51	CONTROL TRANSFORMER RELAY
1F52	1F52	CONTROL TRANSFORMER RELAY
1F53	1F53	PLUGWACK (24V TRANSFORMER-PRIMARY)
1F54	1F54	PLUGWACK (24V TRANSFORMER)
1F55	1F55	PLUGWACK (24V TRANSFORMER)
1F56	1F56	PLUGWACK (24V TRANSFORMER)
1F57	1F57	PLUGWACK (24V TRANSFORMER)
1F58	1F58	PLUGWACK (24V TRANSFORMER)
1F59	1F59	PLUGWACK (24V TRANSFORMER)
1F60	1F60	PLUGWACK (24V TRANSFORMER)
1F61	1F61	PLUGWACK (24V TRANSFORMER)
1F62	1F62	PLUGWACK (24V TRANSFORMER)
1F63	1F63	PLUGWACK (24V TRANSFORMER)
1F64	1F64	PLUGWACK (24V TRANSFORMER)
1F65	1F65	PLUGWACK (24V TRANSFORMER)
1F66	1F66	PLUGWACK (24V TRANSFORMER)
1F67	1F67	PLUGWACK (24V TRANSFORMER)
1F68	1F68	PLUGWACK (24V TRANSFORMER)
1F69	1F69	PLUGWACK (24V TRANSFORMER)
1F70	1F70	PLUGWACK (24V TRANSFORMER)
1F71	1F71	PLUGWACK (24V TRANSFORMER)
1F72	1F72	PLUGWACK (24V TRANSFORMER)
1F73	1F73	PLUGWACK (24V TRANSFORMER)
1F74	1F74	PLUGWACK (24V TRANSFORMER)
1F75	1F75	PLUGWACK (24V TRANSFORMER)
1F76	1F76	PLUGWACK (24V TRANSFORMER)
1F77	1F77	PLUGWACK (24V TRANSFORMER)
1F78	1F78	PLUGWACK (24V TRANSFORMER)
1F79	1F79	PLUGWACK (24V TRANSFORMER)
1F80	1F80	PLUGWACK (24V TRANSFORMER)
1F81	1F81	PLUGWACK (24V TRANSFORMER)
1F82	1F82	PLUGWACK (24V TRANSFORMER)
1F83	1F83	PLUGWACK (24V TRANSFORMER)
1F84	1F84	PLUGWACK (24V TRANSFORMER)
1F85	1F85	PLUGWACK (24V TRANSFORMER)
1F86	1F86	PLUGWACK (24V TRANSFORMER)
1F87	1F87	PLUGWACK (24V TRANSFORMER)
1F88	1F88	PLUGWACK (24V TRANSFORMER)
1F89	1F89	PLUGWACK (24V TRANSFORMER)
1F90	1F90	PLUGWACK (24V TRANSFORMER)
1F91	1F91	PLUGWACK (24V TRANSFORMER)
1F92	1F92	PLUGWACK (24V TRANSFORMER)
1F93	1F93	PLUGWACK (24V TRANSFORMER)
1F94	1F94	PLUGWACK (24V TRANSFORMER)
1F95	1F95	PLUGWACK (24V TRANSFORMER)
1F96	1F96	PLUGWACK (24V TRANSFORMER)
1F97	1F97	PLUGWACK (24V TRANSFORMER)
1F98	1F98	PLUGWACK (24V TRANSFORMER)
1F99	1F99	PLUGWACK (24V TRANSFORMER)
1F100	1F100	PLUGWACK (24V TRANSFORMER)

- NOTES:
- DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DOTTED LINES INDICATE CONTROL OPTION.
 - ALL FIELD WIRING MUST BE PERMITTED TO THE FIELD BY THE ELECTRICAL CODE (NEC), STATE AND LOCAL REQUIREMENTS. OTHER COUNTRIES APPLICABLE NATIONAL AND/OR LOCAL REQUIREMENTS OTHER THAN THE NATIONAL ELECTRICAL CODE SHALL HAVE INSULATION RATING NOT LESS THAN 900V.
 - THE MINIMUM CIRCUIT AMPACITY, THE MAXIMUM FUSE SIZE, AND DISCONNECT SIZE ARE CALCULATED BASED ON THE INSTALLED INPUT LINE CURRENTS PER ARTICLE 430.3 OF THE NATIONAL ELECTRICAL CODE.
 - PROGRAM TERMINAL 14 IS RUN.
 - PROGRAM TERMINAL 27 IS IN CONSTANT STOP.
 - CLERK TO RUN IN VFD AUTO MODE OR BYPASS AUTO.
 - RELAY/CONTACTS: SILVER-CADMIUM COATED - 14 HP 5AMP @ 120V AC, 15 HP 5AMP @240V AC.
 - CONTROL TRANSFORMER SHOWN FOR 480V PRIMARY. FOR 240V OR 208V OR 575V REFER TO INSET A.
 - CONTROL TRANSFORMER MUST BE ADJUSTED TO CORRESPOND WITH THE INPUT FULL LOAD CURRENT AS SHOWN ON THE MOTOR NAMEPLATE.
 - FOR MARINE LIGHT WIRING REQUIREMENTS REFER TO INSET B.
 - SEE 24V SCHEMATIC DIAGRAM FOR ACTUAL QUANTITY OF TRANSFORMERS.
 - 160 RELAY ONLY PROVIDED WITH SELECTION OF FACTORY CONTROLS.
 - 160 RELAY ONLY PROVIDED WITH SELECTION OF FACTORY CONTROLS.
 - 160 RELAY ONLY PROVIDED WITH SELECTION OF FACTORY CONTROLS.
 - 160 RELAY ONLY PROVIDED WITH SELECTION OF FACTORY CONTROLS.





HVAC
 Air Cooled Chiller
 Weight: (1) 12,500 lbs
 Sound 68dB @ 30ft.

**Submittal
 Review Memo**

Project Name: MPHC MOB - Constr Administration **Job #:** 0813912
To: Jared Ballard
 Pizzagalli Construction **Submittal #:** 107-236429-1
 131 Presumpscot Street
 Portland, ME 04103
Submittal Title: Modular Water Chillers Pre-Construction Submittals

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 9/23/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 # 107

Remarks:

RE-SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

SPECIFICATION SECTION: 236429

PARAGRAPH: Part 2 Products

DRAWINGS: N/A

ITEM: MODULAR WATER CHILLERS

JOHNSON & JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed X

Subject to Architects Approval X

Date 7/14/09 By YJU

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

MODULAR WATER CHILLERS

MANUFACTURER: TRANE

SUPPLIER: TRANE

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey road
Scarborough, Maine 04074
Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619



TRANE

Resubmittal

Trane U.S. Inc.

Engineer: SMRT Inc

Date: September 12, 2009

Prepared For:

Johnson & Jordan Inc

18 Mussey Road

Scarborough, ME 04074

Customer P.O. Number: 145426

Customer Project Number:

Job Name:

Martin's Point Health Care – Medical Office Building

Job Number: A2-21345

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

<u>Qty</u>	<u>Description</u>	<u>Tag(s)</u>
1	Air-Cooled Chiller Airstack™ Modular Air-Cooled Chiller <ul style="list-style-type: none"> • 460v/3ph/60hz • Airstack™ submittal attached 	CH-1

Notes:

- The revised selection with the AHRI certification is attached.
- Airstack™/Multistack™ chillers are listed with ETL. The units are approved to the UL 1995 Standard for Safety for Heating and Cooling Equipment ANSI/UL 1995 3rd edition. And CAN/CSA C22.2 236-05 dated February 18, 2005.
- NFPA 70 refers to the National Electric Code which typically applies to customer wiring not to the chiller. Airstack™/Multistack™ does follow the guidelines laid out in the NEC.

This resubmittal for approval addresses the Engineer's comments on the original submittal dated 7/30/09 returned as "Revise and Resubmit".

The conflicting performance data was due to refinements in the selection program during the certification process as the chiller transitioned from design to production. Only the final certified performance is included in this resubmittal. Per correspondence with the Engineer, this revised performance is acceptable.

There are no physical changes to the Chiller or accessories as originally submitted. This resubmittal for approval completely replaces the original dated 7-30-09.

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 Trane
 30 Thomas Drive
 Westbrook, ME 04092-3824
 Phone: (207) 828-1777
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 E-Mail: djbroderick@trane.com

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

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PACKAGED CHILLER

Tuesday, August 18, 2009

Job Name Martins Point
Location
Customer

Engineer
Architect
Contractor

Multistack Job Number
Customer P.O. Number
Sales Representative Jeff Charette

Submitted by Jeff Charette / EW
Quote # QEW081820097
Approved by

Date:

GENERAL INFORMATION

Chiller (1) ASP30X2H2A1 - R410A (MF) & (2) ASP30X2H2A1 - R410A (SF) & (2) ASP30X2H2A1 - R410A (SR)

Freecool
Other

CHILLER FEATURES

- Stainless Steel Evaporator
- Lead Compressor Sequencing (24hrs)
- Automatic Internal Rescheduling If Fault Occurs
- Automatic Logging Of Any Fault Condition
- Electronic Chilled Water Control
- Multiple Independent Ref. Systems
- Quick Interconnect Modular Design
- Dual Condenser Fans Per Module
- Designed For Quiet Operation
- Pressure Controlled 1140 RPM Fan Motors
- Filters In Evaporator Supply Headers
- Stainless Steel Inlet Header
- Al/Cu Condenser Coils
- R-410A Refrigerant
- Warranty: All Parts (1 Year)
- Warranty: Compressor Parts (5 Year)
- Single Point Power Connection
- Lifting Frame
- Interoperability Web Portal (BACnet or Modbus)
- Heresite® Coated Condenser Coils
- Var. Flow Evap (Mot. Valve Supply, Man. Valve Return)

DIMENSIONS & WEIGHTS (Units are in inches & lb)

(Dimensions & Weights do not include J-Boxes)

Length: 268 **Weight:** 11500 lb (Total Dry Weight)
 Width: 72 12500 lb (Total Wet Weight)
 Height: 95

CHILLED WATER DESIGN

Entering Temperature: 56.0 °F
 Leaving Temperature: 44.0 °F
 Evap. Flow Rate: 302.0 GPM
 Evap. Pressure Drop: 10.9 Feet
 (35% Propylene Glycol in Evaporator Loop)

FULL LOAD CHILLER PERFORMANCE

Ambient Design: 95°F Low: 20°F
 Cooling Capacity: 134.4 Tons
 Power Input: 167.9 KW
 kW/Ton: 1.249

PART LOAD CHILLER PERFORMANCE

% Load	KW/ton	COP
100%	1.249	2.8
75%	0.980	3.6
50%	0.797	4.4
25%	0.713	4.9
NPLV =	0.868	4.1

SOUND PRESSURE:

Yields: 68 dB @ 30 ft

ELECTRICAL DATA

MAIN POWER SUPPLY: 460 / 60 / 3

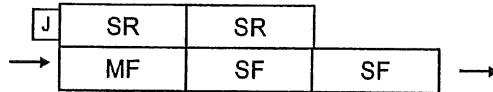
CIRCUIT(S) CAPACITY

Minimum Circuit Ampacity (amps)
Maximum Over Current Protection (MOP)

CHILLER
CIRCUIT
302
350

RLA/FLA (At ARI Conditions): ASP30X2 (Comp: 26, Fan: 3.5)

CHILLER LAYOUT



First Letter: M=Master Chiller, S=Slave Chiller, P=Pump, F=Free Cool, G=Glycol Feeder. Second Letter: F=Front Module, R=Rear Module

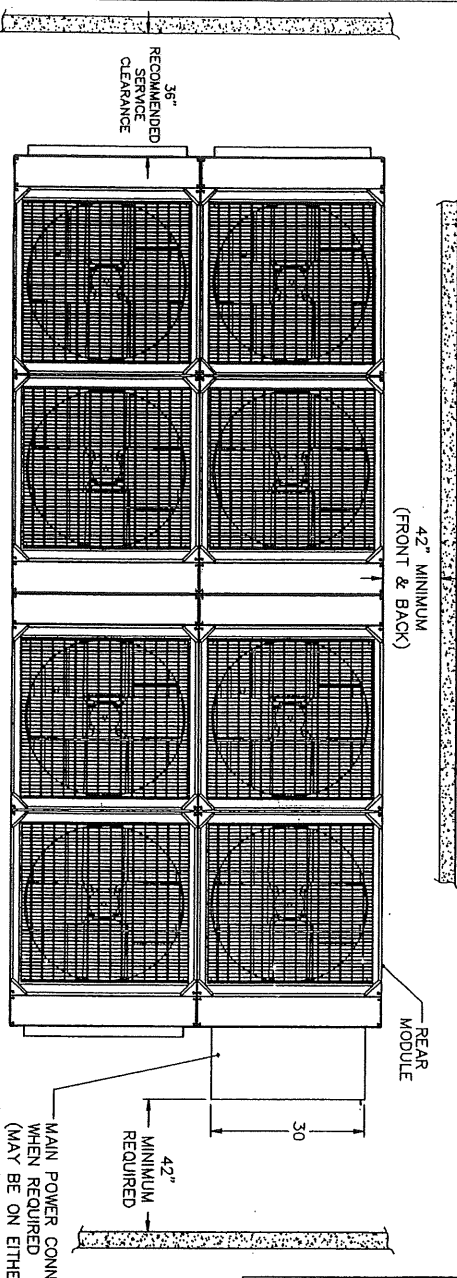
IMPORTANT: To assure full equipment design performance, life and reliability, the MULTISTACK chiller must be piped in accordance with Installation Manual unless specifically authorized otherwise by MULTISTACK in writing.



Rating certified in accordance with AHRI Standard 550/590 Water-Chilling Packages using the vapor compression cycle.

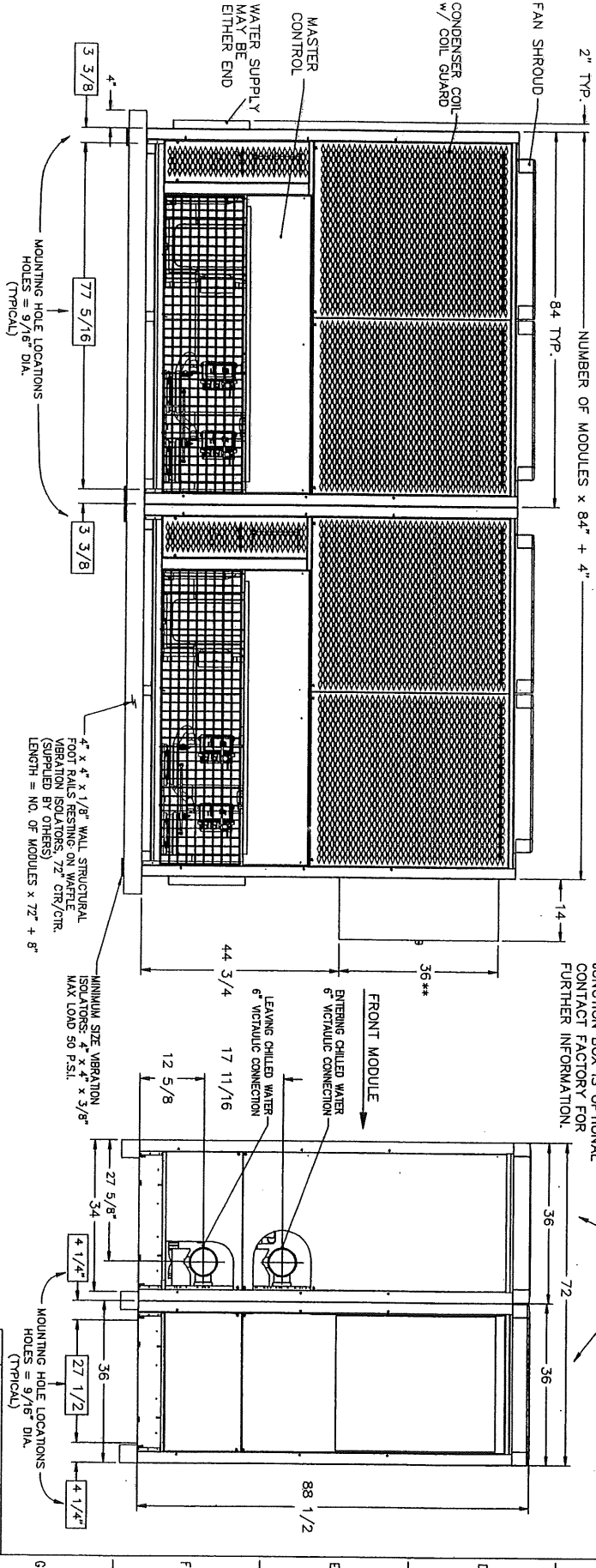


REVISION	A	DATE	8/30/09	BY	KRO
REVISED WEIGHT LABEL	TO ASP-30X FROM ASP-30A				
MULTISTACK Sporto, Wisconsin 54656 ALL DIMENSIONS IN INCHES / DO NOT SCALE DRAWINGS FIRST USED ON 570 SHIRT SPEC ASBY NO.					
SCALE	NONE	DATE	10-24-08	DATE	10-24-08
C 500-0205	A	SUBMITTAL ASP-30X - 84" LONG 6" HEADERS			



SINGLE MODULE WEIGHT
 ASP-30X = 2300 LBS

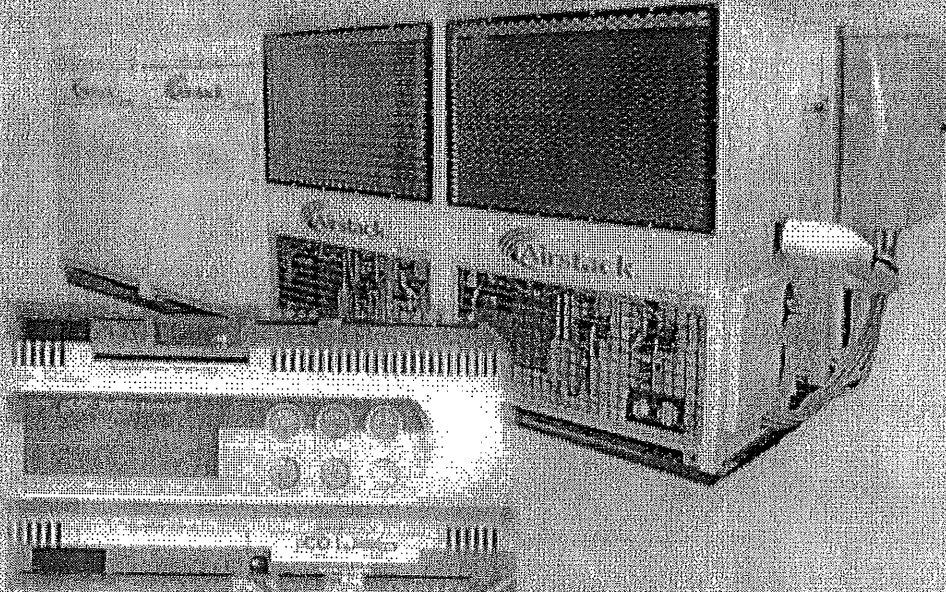
NO OBSTRUCTION ALLOWED
 ABOVE FANS



1 2 3 4 5 6 7 8 9 10 11

C 500-0205

AIR COOLED PACKAGED CHILLER



MASTER CONTROLLER

PCO² CONTROLLER USER MANUAL

CONTROLLER FOR "ASP"
AIR-COOLED PACKAGED CHILLER
Tandem Compressors w/ VFD for Fan Control
for Version - MCASV_H14, MCALV_H14, & MCABV_H14



MFG BY AIRSTACK, A DIVISION OF MULTISTACK®

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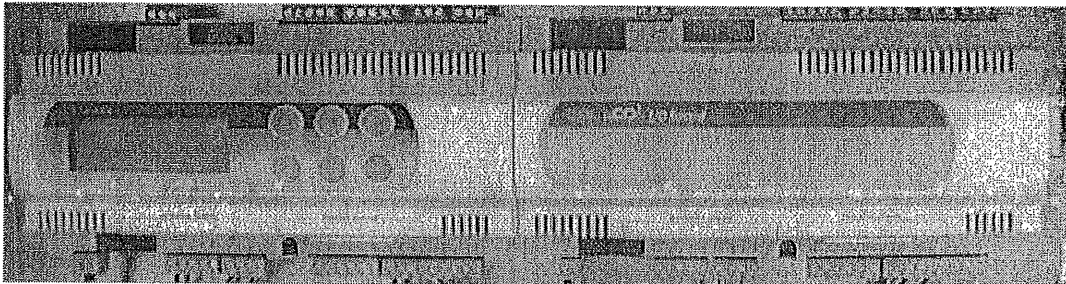
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Introduction

An Airstack Air-cooled Packaged Chiller (ASP) is a modular air-cooled chiller system, composed of one or more modules controlled by one *master controller*, to provide chilled liquid to an external circuit. Each chiller system may be composed of up to 14 *mechanical cooling* modules. These *mechanical cooling* modules interconnect through a common chill water header system. Each module contains 2 scroll compressors, a stainless steel brazed plate heat exchanger, copper tube with aluminum fin condenser coils, two fans, and other related control components. Each ASP chiller system is operated by a microprocessor based controller that monitors the status of each refrigerant circuit and provides a signal to operate compressors and fans as required. The system uses the entering chill water temperature (ECHWT), when in *auto mode*, to determine the need for cooling to the external circuit.

Module Board

Each module has a *module board*, which sends information to the *master controller* regarding the temperatures, pressures, and activity of the module. The feedback from the *module board* determines the status of its circuits. The *module board* performs safety checks and alerts the *master controller* when something is wrong. Loss of communication with the *master controller* results in the shutting down of the module, unless the module is running in *manual mode*.




Master


Module


Master Controller


The *master controller* is equipped with a 4x20 character LCD with backlight and a six button keypad. These aid the operator in setting *SYSTEM VARIABLES*, checking faults, monitoring the status of the chiller system, and monitoring the status of individual modules. The *master controller* is also the interface to field supplied remote connections such as Remote Start/Stop, flow switch inputs, customer alarm outputs, and CHILL WATER RESET and LOAD LIMIT RESET signals. There is also an optional communication link for remote monitoring and control of the chiller system.

Master Controller Keys

 The **UP** arrow button is used to go back to the previous category on the screen or to increase the value of a digit in a numeric variable field.

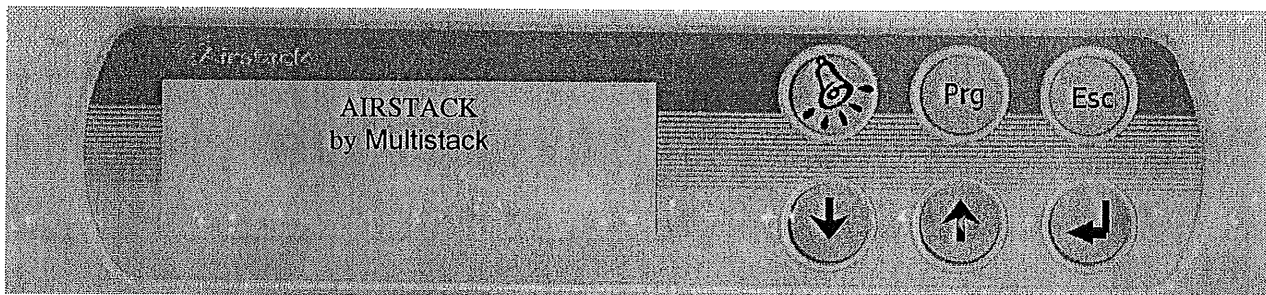
 The **DOWN** arrow button is used to advance to the next category on the screen or to decrease the value of a digit in a numeric variable field.

 The **ENTER** button is used to make a selection from any of the menu screens in the program. It is also used to enter and exit *edit mode* while in the *SYSTEM VARIABLES* screens.

 The **ALARM** button is the menu for current system or module faults. When the backlight is red, it indicates that a fault has occurred.

Prg The **PROGRAM** button goes to the *MAIN MENU* from any screen in the program.

Esc The **ESCAPE** button goes to the previous screen or the *status screen*, if you are at the top of the *MAIN MENU*.






Controller Setup

On each controller, master or module, there is a set of 6 DIP switches. These switches define the network of the chiller system and identify each module in the system. The DIP switches are set in binary code addressing, where the first slot is a value of 1, the second is a value of 2, the third is a value of 4, the fourth is a value of 8, the fifth is a value of 16, and the sixth is a value of 32. The following DIP switch would give an address of 30 to its controller. (The black square is the switch position.)

ON	<table style="border-collapse: collapse; text-align: center;"> <tr> <td style="width: 15px; height: 15px; background-color: white;"></td> <td style="width: 15px; height: 15px; background-color: black;"></td> <td style="width: 15px; height: 15px; background-color: white;"></td> <td style="width: 15px; height: 15px; background-color: black;"></td> <td style="width: 15px; height: 15px; background-color: white;"></td> <td style="width: 15px; height: 15px; background-color: black;"></td> <td style="width: 15px; height: 15px; background-color: white;"></td> </tr> <tr> <td style="font-size: 8px;">1</td> <td style="font-size: 8px;">2</td> <td style="font-size: 8px;">3</td> <td style="font-size: 8px;">4</td> <td style="font-size: 8px;">5</td> <td style="font-size: 8px;">6</td> <td></td> </tr> </table>								1	2	3	4	5	6		= 30
1	2	3	4	5	6											

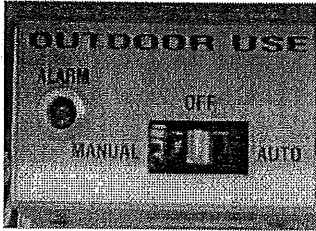
Switches	Value
ON	
2	= 2
3	= 4
4	= 8
5	= 16
	<u>30</u>

The following are the addressing parameters for setting up an ASP chiller network:

-  Mechanical Cooling Addresses – 1 thru 14
-  Master Controller Address – 30
-  Remote LCD Display – 32

In setting up the network, the *master controller* must have an address of 30. The first *mechanical cooling* module would be 1, the next 2 and so on. For more help in DIP switch settings, see Appendix A on page 18.

Manual/Off/Auto Switch



Each *mechanical cooling* module has a *Manual/Off/Auto* switch. In *manual mode*, the staging of the compressors is done by its module board. The control is independent of the other modules and is based on the LCHW of that module. When *auto mode* is selected, the staging of the compressors is handled by the *master controller*. The *master controller* will determine how many compressors need to be on to satisfy the load requirements. Control of the compressors is based on the system ECHW when in *auto mode*.

Disabled mode (off) selection disables the module and the compressors are not allowed to run. However, the fans will still cycle on and off based on the pressure in that module.

Main Menu

The *MAIN MENU* displays the options the user can access in the program. Press the **Prg** button to get to the *MAIN MENU* and then use the **UP** and **DOWN** arrow buttons to scroll through the menu. The **ENTER** button allows displaying of the sub-menu that the greater than sign (>) is located beside. The *MAIN MENU* contains *ON/OFF CONTROL*, *STATUS*, *SYSTEM VARIABLES*, *FAULT REVIEW*, *LOAD PROFILE*, *SECURITY*, and *BAS INTEFACE*.

On/Off Control Screen

Upon power up, the initial screen will go through a 12 second delay before giving control to the user. The *ON/OFF CONTROL* screen will be the next screen. It allows the user to command the chiller on or off. The display will read 'CHILLER OFF, PUSH ENTER TO START'. Pushing the **ENTER** button, will display a message of '30 SECONDS TO START!' and will change to 'CHILLER ON, PUSH ENTER TO STOP'. After the 30 second delay, the first compressor will turn on and the display will change to the *status screen*. The last line of the screen also can show critical system faults such as *WAITING FOR CHW FLOW* and *WAITING FOR EX2 INPUT*.

System Variables

Once power is connected to the *master controller*, the *SYSTEM VARIABLES* can be accessed. These variables determine how the chiller system will run and are assigned a default values. For most installations, these values will provide optimum performance. However, special operating conditions may require different settings.

Use the **UP** or **DOWN** arrow buttons to locate the *SYSTEM VARIABLES* in the *MAIN MENU*. The greater than sign (>) is the cursor indicator. Press the **ENTER** button to enter the *SYSTEM VARIABLES MENU*. Press **ENTER** on *Mechanical Cooling* to access the variables for the chiller. To change the value of a variable, press the **ENTER** button. A blinking block cursor will appear in that system variables' value field indicating that the program is in *edit mode*. Use the **UP** or **DOWN** arrow buttons to change the value of the variable. To save the new setting, press the **ENTER** button, pressing the **Esc** button will not save the change. The cursor will move back to the upper left corner of the screen indicating that the program is no longer in *edit mode*. An asterisk (*) next to the variables indicates that the *SYSTEM VARIABLES* are **locked** and cannot be adjusted. For assistance on unlocking the *SYSTEM VARIABLES*, see *SECURITY* on page 14.

Mechanical Cooling System Variables

The following is a list of *SYSTEM VARIABLES* for the *mechanical cooling* modules:

1. **UPPER SETPOINT:** The entering chill water temperature (ECHW – System sensor) at full load. When the water entering the chiller is at or above this setpoint, all available compressors should be running.

2. **LOWER SETPOINT:** The leaving chill water temperature (LCHW – System sensor) at *full load*. The temperature drop across this chiller is based on flow rate. If the design temperature drop (ΔT) is 10°F across the chiller, then the LOWER SETPOINT should be 10°F below the UPPER SETPOINT.
3. **VSP SETPOINT:** A percentage used to determine the *no load* chill water temperature. If the UPPER SETPOINT is at 55°F, the LOWER SETPOINT is at 45°F, and the VSP is at 50%, then the *no load* point would be 50% of the difference between the UPPER SETPOINT and the LOWER SETPOINT settings, which is 10°F. Therefore, all compressors would be on a 55°F and all compressors would be off at 50°F by the temperature of the ECHW Sensor.
4. **LOAD LIMIT:** A percentage used to limit the maximum system load. If this variable is set to 75% on a 4 compressor chiller, then only 3 of the compressors would be available to run at any given time.
5. **T-DIFF (Time Difference):** The minimum time in seconds between starts of compressors. This time should be set to half of the loop time. The loop time is the time it takes for the water to make one pass through the entire CHW loop of the building. When the temperature of the ECHW becomes close to the required temperature, T-Diff goes to 2 times T-Diff. When unloading compressors, T-Diff goes to half of T-Diff.
6. **FAIL INDIC (Failure Indicator):** A percentage value which provides for an output signal whenever compressors of the indicated value have failed. A 0% setting will give an output signal after any failure within the system.
7. **LEAD COMP.:** Determines which compressor is the first on and the last off. The compressors will appear in a format of M1-1, M1-2, M2-1, etc. This format stands for Module #1 – Compressor #1 and so on. See Appendix D on page 23 for more information on compressor rotations.
8. **MAN. SETPOINT:** Please see page 8 on *manual mode* operation for further details.
9. **MAN. RANGE:** Please see page 8 on *manual mode* operation for further details.
10. **MAN. OFFSET:** Please see page 8 on *manual mode* operation for further details.
11. **NUM OF MODULES:** This is the number of *mechanical cooling* modules that are in the chiller system.
12. **FAN SETPT:** The point, measured in psig, where the fans turn off.
13. **FAN OFFSET:** The value, measured in psig, when added to the FAN SETPOINT where the fans turn on. **Ex.** If the FAN SETPOINT is at 235 psig and the FAN OFFSET is at 30 psig, the fans will come on at 265 psig. They will then turn off at 235 psig.
14. **HP CUTOUT:** The point where a high pressure fault occurs based on the high pressure transducer. Note: Each module also has a mechanical high pressure switch with a manual reset. If this setting is set higher than the switch setting, the mechanical switch will take the module offline with a high pressure fault.
15. **SEQUENCE:** Determines the order in which the compressors will turn on or off.
STANDARD – The compressors turn on in numerical order starting with the lead compressor.
ODD/EVEN – Brings one compressor in each module on before the second compressor in any module is allowed to run. If the LEAD COMPRESSOR ends in -2 (M1-2, M2-2, etc), then all even compressors would start before the odd compressors. If the LEAD COMPRESSOR ends in -1 (M1-1, M2-1, etc), then all odd compressors would start before the even compressors. See Appendix D on page 23 for more information on compressor rotations.
16. **INDEXING:** The indexing can either be ON or OFF. If ON, the lead compressor advances by one every 24 hours at midnight. If OFF, the LEAD COMPRESSOR stays the same. See Appendix D on page 23 for more information on compressor rotations.

Standard Application

Program Version Format MCASV_.H12

System Variable Ranges & Default Settings **

Mechanical Cooling

The following table defines all of the *SYSTEM VARIABLE* ranges and default values for *mechanical cooling* modules with the standard program.

System Variable	Range	Default Value
UPPER SETPOINT	45°F to 80°F	55°F
LOWER SETPOINT	40°F to 70°F	45°F
VSP VALUE	0% to 80%	50%
LOAD LIMIT	0% to 100%	100%
T-DIFF	15 to 200 sec	90 sec
FAIL INDIC	0% to 90%	0%
LEAD COMP.	M1-1 to M14-2	M1-1
NUM OF MODULES	1 to 14	1
FAN SETPT.	170 to 350 psig	200 psig
FAN OFFSET	20 to 60 psig	30 psig
HP CUTOUT	300 to 425 psig	365 psig
SEQUENCE	STANDARD or ODD/EVEN	STANDARD
INDEXING	OFF or ON	ON

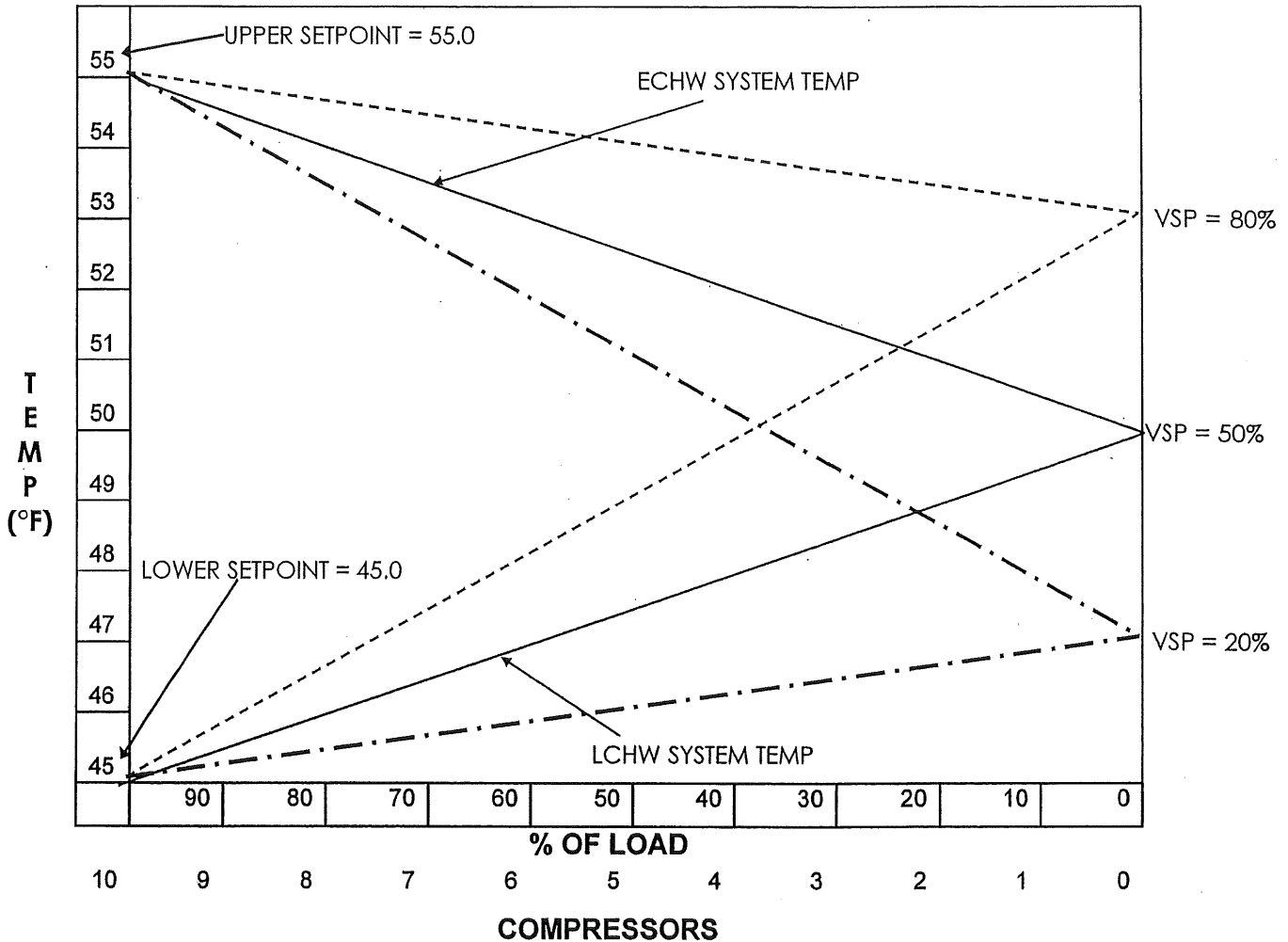
Standard Module Cutouts and Reset Points

Low Suction Temp	Cutout → 25°F	Reset @ 30°F
Low Leaving CHW	Cutout → 36°F	Reset @ 40°F
Low Pressure	Cutout → 15 psig	Reset @ 25 psig

** Special low temperature applications are available under supervision of Multistack. For Low Temp Application Ranges and Defaults see Appendix B on page 18.

Mechanical Cooling (Auto Mode)

The following chart defines how the chiller works in *auto mode*. It is based on a 10 compressor system (5 modules) with a 10°F ΔT, and operation between 55°F and 45°F. It shows the system relationship between ECHWT, LCHWT, and VSP at various load conditions.



System Conditions: Full Load ΔT = 10 °F UPPER SETPOINT - 55 °F
10 Compressors LOWER SETPOINT - 45 °F

The data below shows some operating conditions that could occur based on the information from the chart

VSP = 20 %			VSP = 50 %			VSP = 80 %		
% LOAD	ECHWT	LCHWT	% LOAD	ECHWT	LCHWT	% LOAD	ECHWT	LCHWT
0	47	47	0	50	50	0	53	53
.50	51	46	50	52.5	47.5	50	54	49
100	55	45	100	55	45	100	55	45

Mechanical Cooling – Manual Mode

In *manual mode* operation, each module acts independently, depending on the sensor inputs to that module. The staging of the compressors is done by its module board. The control is based on the LCHW temperature of that module. The following are *SYSTEM VARIABLES* that are used in *manual mode* operation:

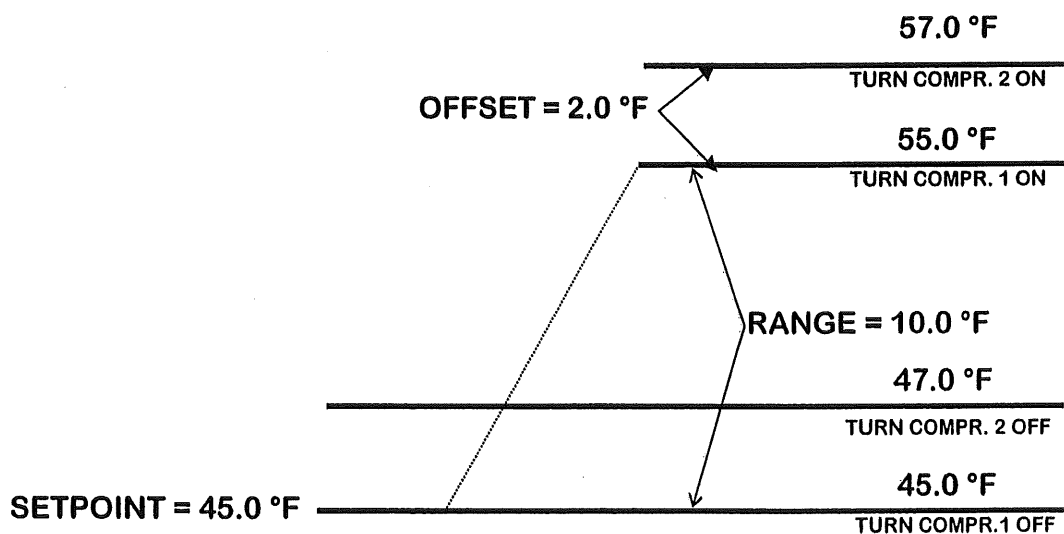
1. **MAN. SETPOINT:** The LCHW temperature where the last compressor will turn off.
2. **MAN. RANGE:** A value, when added to the MAN. SETPOINT where the first compressor will turn on.
3. **MAN. OFFSET:** A value, when added to the MAN. RANGE point where the second compressor will turn on.



Caution: Operation of chiller in manual mode bypasses the flow protection and power phase monitor safeties. Operation of the chiller in this mode is not recommended for extended periods. Proper precautions must be made to prevent freezing of the heat exchangers.

Manual Mode Ranges and Default Settings

System Variable	Range	Default Value
MAN. SETPOINT	40°F to 70°F	45°F
MAN. RANGE	2°F to 20°F	10°F
MAN. OFFSET	0°F to 5°F	2°F



Master Controller Status Screens

System Screens

The main status screen displays information about the chiller system.

1. **CAPACITY:** A percentage of how many compressors are turned on, compared to the total installed. An asterisk (*) displayed next to capacity indicates that it is being controlled by an external source, either LOAD LIMIT or CHILL WATER RESET.
2. **DEMAND:** A percentage of current load needed compared to the maximum design load. This value is determined by the system ECHW temperature and the settings of the *SYSTEM VARIABLES*.
3. **DELAY:** A time in seconds between start up of compressors. A compressor should only turn on or off if the delay time counter is at zero. This is determined by the *mechanical cooling* module's system variable T-DIFF.
4. **FAULTS:** A value showing how many current faults are in the system.
5. **ECHW:** The Entering Chilled Water temperature in the system.
6. **LCHW:** The Leaving Chilled Water temperature in the system.

Press the **DOWN** arrow button once to display the next main status screen with system information.

1. **LEAD COMP:** The compressor shown is the first on and the last off. Displayed as M1-1, M1-2, M2-1, etc. format. (M1-1 represents Module #1, Compressor #1)
2. **LOAD LIMIT:** A percentage value to limit the max number of compressors available at any given time. An asterisk (*) indicates the external LOAD LIMIT RESET signal is enabled.
3. **CHW OFFSET:** Shows value of customer CHW RESET signal. Range 0 to 10°F. An asterisk (*) indicates the external CHW RESET signal is enabled.

Mechanical Cooling Screens

Press the **DOWN** arrow button again to display information for the first *mechanical cooling* module. The following information is available:

1. **LCHW:** The Leaving Chill Water temperature in the module measured leaving the evaporator coil.
2. **SUCT:** The Suction temperature in the module measured on the compressor suction line.
3. **COMP 1 and COMP 2:** This displays the status of the compressors, ON or OFF.
4. **Status Line:** The status line can be the mode in which the module is operating or it can be a current fault in the module. If nothing appears in the status portion of the screen, then the module is in *auto mode* and there are no faults. If **MANUAL MODE** or **DISABLED** appears on the status line, then the module is in *manual mode* or *disabled mode*. The faults that occur on the modular level will also be displayed on the status line when the fault is current.

Press the **DOWN** arrow button a third time to display screen #2 for the first module.

1. **FANS:** Displays the status of the fans, ON or OFF.
2. **VFD %:** The fans operate from 15 to 60 Hz. This is a percentage of the actual speed of the fans. The fans increase in speed with an increase in the condenser pressure.
3. **RUN HOURS: COMP1 and COMP2:** This displays the total number of hours that each compressor has run. To reset the run hours of compressor 1, press and hold the **ALARM** and **DOWN** arrow buttons simultaneously on the screen of the module whose hours need to be reset. To reset the run hours of compressor 2, press and hold the **PRG** and **UP** arrow buttons simultaneously on the screen of the module whose hours need to be reset. The *SYSTEM VARIABLES* must be unlocked to clear compressor run hours.
4. **HP and LP:** This displays the amount of pressure in psig for the high side and low side pressures in each module.

Press the **DOWN** arrow button now to display screen #1 for module 2. From there, screen #2 for module 2 and then screen #1 for module 3 and so on.

Inputs and Outputs

Master Controller Inputs

1. **Customer Chilled Water Reset Signal:** A 0-10Volt, 0-20 mA, or 4-20 mA, customer supplied, external signal that shifts the UPPER and LOWER SETPOINTS from 0 to 10°F.
2. **Customer Load Limit Reset Signal:** A 0-10Volt, 0-20 mA, or 4-20 mA, customer supplied, external signal that allows the customer to change the LOAD LIMIT from 0 to 100%.
3. **Entering Chill Water Sensor:** A NTC type sensor that measures the temperature of the system ECHW going to the *mechanical cooling* modules.
4. **Leaving Chill Water Sensor:** A NTC type sensor that measures the temperature of the system LCHW coming from the *mechanical cooling* modules.
5. **EX1:** A customer supplied input that is a closed circuit to operate; open to stop operation. Requires manual reset to resume operation. This input will create a fault.
6. **Remote Start/Stop:** An input that is a closed circuit to operate; open to stop operation. Automatic restart of the chiller. This input does NOT create a fault.
7. **Power Phase Monitor:** An input that is a closed circuit to operate; open to stop operation. Automatic restart returns the chiller to the previous on/off state of the chiller. This input will create a fault.
8. **CHW Flow Switch:** An input that is a closed circuit to operate; open to stop operation. Circuit opens when there is NO FLOW in the system. After 4 seconds, the chiller shuts down. When the flow switch closes, the chiller will automatically restart. This input will create a fault.

Master Controller Outputs

1. **Customer Alarm Relay:** This is a 24V AC, 5VA max signal that can power a relay to trigger an alarm. The output is controlled by the failure indicator setting in the *SYSTEM VARIABLES* for *mechanical cooling*.
2. **Full Load Indicator Relay:** This is a 24V AC, 5VA max signal that can power a relay to show that the chiller system is at *full load* (all available compressors on).
3. **Run Status Relay:** This is a 24V AC, 5VA max signal that can power a relay to show that at least one compressor is running in the chiller.
4. **Remote Pump Enable:** This is a contact closure, 5VA max signal that can be used to remotely enable the pump. The contact will be closed anytime the chiller is on. When the chiller is turned off, the pump will continue to run for two times the amount of time of TDIFF. The exception is when the Power Phase Monitor is tripped; the contact will open with no time delay.

Module Board Inputs

1. **High Pressure Transducer:** A 4-20 mA input sensor that measures the high side pressure of the refrigerant in each module.
2. **Low Pressure Transducer:** A 4-20 mA input sensor that measures the low side pressure of the refrigerant in each module.
3. **Suction Sensor:** A NTC type sensor that measures the temperature of the suction line.
4. **Leaving Chilled Water Sensor:** A NTC type sensor that measures the temperature of the LCHW in the module.
5. **Manual Mode/Auto Mode:** Inputs that identify whether the module is in *manual*, *auto*, or *disabled mode*.
6. **High Pressure Switch:** An input that indicates when the switch for the high side pressure of the refrigerant circuit has tripped.
7. **Circuit Faults:** An input that monitors the control circuit of each compressor for abnormal operating conditions. A 1 or 2 would be displayed to show which compressor circuit has a fault.

Module Board Outputs

1. **Compressor Start Signal:** A 24V output to start the compressors.
2. **Liquid Line Solenoid Valve:** A 24V output to energize the liquid line solenoid valve.
3. **Fan Start Signal:** A 24V output to start the fans.
4. **Alarm Light:** A 24V output to a light on the module that would indicate a fault has occurred within the module.

Analog Board Outputs

1. **VFD Output for Fan Control:** 0-10V output sent to the fans based on the high pressure in that module.

Faults

If a fault has occurred, the **ALARM** button will illuminate. To view the current fault(s), press the **ALARM** button. Use the **UP** and **DOWN** arrow and **ENTER** buttons to view and clear the fault(s). If the fault returns, then it will need to be reset elsewhere first.

System Faults

If any of the following faults occur, all compressors in the system will be turned off, unless the individual module is in the *manual mode*. **

1. **EX1:** Customer Input – EX1 requires a reset and restart command at the *master controller*.
2. **Remote Start/Stop:** Customer Input – EX2 is NOT a fault. This circuit operates like an on/off switch. If closed, the chiller is on, if the chiller has been commanded on. If open, chiller is disabled and the compressors will not run.
3. **Power Phase Monitor:** Customer Input – EX4 does create a fault. There is no reset required at the *master controller*. If the chiller is on when fault occurs, it will default back to *on* after the fault clears. This fault also turns off the fan inputs to reset the VFD's.
4. **CHW Flow:** This alerts the *master controller* of NO FLOW in the system and disables all modules in *auto mode*. There is an automatic restart after the flow switch closes. If the flow switch opens and the chiller has not been commanded ON, a warning will appear at the bottom of the *start/stop screen*, however, no fault will occur.
5. **LOCHW Temp:** Low Leaving Chill Water temperature. If the system LCHW falls below 36°F, all compressors will turn off. The water temperature must rise to 40°F before the fault can change from current to reset. This requires resetting the fault and restarting the chiller at the *master controller*.
6. **ECHW Sensor Failure:** The sensor for the system ECHW has either opened or shorted to the *master controller*. This fault requires resetting at the *master controller*.
7. **LCHW Sensor Failure:** The sensor for the system LCHW has either opened or shorted to the *master controller*. This fault requires resetting at the *master controller*.

Mechanical Cooling Module Faults

The following faults will only affect the module that they are associated with.

1. **High Pressure:** High Pressure Cutout. This high pressure fault can come from either the transducer reading or the HP switch being tripped. If the HP transducer reaches the pressure of the **HP Cutout** variable the alarm goes off, shutting down that module. In this case, the fault only needs to be reset at the *master controller* after the high side pressure drops below 300 psig. If the HP switch trips, a reset at the module HP switch and at the *master controller* is required to resume operation. The fault will remain current until the HP switch is manually reset.
2. **HP Sensor Failure:** The High Pressure Transducer has either opened or shorted to the *master controller*. This fault requires resetting at the *master controller*.
3. **Low Pressure:** Low Pressure Cutout. If the reading from the LP transducer falls below 15 psig, then that module will be shut down and in an alarm state. This fault will remain current until the low side pressure rises above 25 psig. The fault can then be reset at the *master controller*. (Typically indicates loss of refrigerant charge.)
4. **LP Sensor Failure:** The Low Pressure Transducer has either opened or shorted to the *master controller*. This fault requires resetting at the *master controller*.

5. **Low Pressure Delay:** A Low Pressure Delay occurs when the low side pressure drops to below 25 psig, disabling the compressors in that module for 5 minutes. This fault automatically resets after the 5 minutes, as long as the low side pressure reading is above 30 psig.
6. **Circuit Fault:** A CIRCUIT FAULT will occur if the compressor contactor is not operating normally. Four conditions could potentially create a CIRCUIT FAULT. One would be, if the program signals for a contactor to be closed and it does not close within 5 seconds. Once the contactor has been closed for 5 seconds, if the contactor ever opens for 1 second while under normal operating conditions (indicating a chattering contactor), a fault will occur. The third condition would be if the program turns a contactor off and the contactor remains closed for an additional 10 seconds, this fault would occur (indicating a welded contactor). The last condition that could create a circuit fault is if the difference between the high pressure and the low pressure is not greater than 50 psig after the compressor starts within 60 seconds. This fault requires resetting at the *master controller* to resume normal operation.
7. **LOSUCT:** Low Suction Temperature: This is measured by the module suction sensor and would affect the entire module. If during operation this temperature should drop below 25°F, the module's compressors will shut down. This requires resetting at the *master controller*, but only after the temperature has risen above 30°F. The system has to be on for this fault to occur.
8. **SUCT SENSOR FAILURE:** Suction Sensor Failure. This would occur if the suction line sensor opened or shorted to the *module board*. This fault requires resetting at the *master controller*.
9. **LOCHW TEMP:** Low Leaving Chilled Water Temperature: This is measured by the module LCHW temperature sensor. In a standard application if the temperature falls below 36°F, the module compressors turn off. The temperature must rise to 40°F before the fault can be reset at the *master controller*.
10. **LCHW SENSOR FAILURE:** Leaving Chilled Water Sensor Failure: This would occur if the sensor opened or shorted to the *module board*. This fault requires resetting at the *master controller*.
11. **COMMUN:** Communication Error. This would occur if more than one module is addressed the same, or if there is a problem with communications of that individual module to the *master controller*. This fault only occurs in *auto mode*.

Fault Review

The **FAULT REVIEW** is a history of the faults that have occurred in the chiller system. The review holds up to 25 faults and is found in the *MAIN MENU*. The faults are in order from the most recent to the oldest. Pushing the **UP** and **DOWN** arrow buttons allows scrolling through the faults. Pushing the **ENTER** button on a particular fault allows for viewing of a second screen of information. Pushing **ENTER** again returns to the first screen of the fault.

FAULT 01	CURRENT
COMMUNICATION ERROR	
MOD1	9/17 12:35
PRESS ENTER FOR MORE	

Screen #1

FAULT 01	SUCT 00.0
*SYSTEM	LCHW 00.0
*ECHW 00.0	HP = 000
*LCHW 00.0	LP = 000

Screen #2

Screen one displays information about the fault. The status of the fault will be displayed as **CURRENT**, **RESET**, or **RECORD**. **CURRENT** means that the fault is still present, **RESET** means that the fault can be reset at the *master controller*, and **RECORD** means that the fault is part of the history for future reference. The date and time of the fault, the fault that occurred and where the fault occurred are also displayed on the first screen. On screen two, the system temperatures at the time the fault occurred will be displayed on the left side of the screen and are starred with an asterisk (*). Module temperatures and pressures are displayed on the right side of the screen. If the fault is a system fault, the module information will display all zeros.

Clearing the faults from the **FAULT REVIEW** removes all the faults at once. Hold down the **Prg** and **UP** arrow buttons simultaneously for all faults to be removed from the **FAULT REVIEW**. When a message of **NO MORE ALARMS** appears on the screen, release the buttons.

Load Profile

The **LOAD PROFILE** displays the operating history of the *mechanical cooling* modules. It relates the total operating hours to the load percent and is subdivided into 10% segments. This screen is located in the *MAIN MENU* of the *master controller*. There are three screens used to display the information. Pressing the **DOWN** arrow button will allow all screens to be viewed. To reset the hours in the **LOAD PROFILE**, hold down the **DOWN** arrow and the **ALARM** buttons simultaneously while viewing the **LOAD PROFILE**. The *SYSTEM VARIABLES* must be **unlocked** to clear the **LOAD PROFILE**.

Flow Bypass

The **FLOW BYPASS** is located in the *SYSTEM VARIABLES' MENU*. Flow Bypass should be **ENABLED** when the Normally Open Water Solenoid Valves (N.O. WSLV) installed in the Lead Module is required to remain open or de-energized at all times. Press **ENTER** on **FLOW BYPASS** to **ENABLE** or **DISABLE**. When **ENABLED**, the N.O. WSLV will always remain open on the Lead Module. On the modules that are not currently the Lead Module or when **DISABLED**, the N.O. WSLV will be energized and close the valve after 60 seconds of no compressors running in that module. The LCHW temperature in that module must also remain above the 36°F cutout in the Standard and Low Ambient applications. If the LCHW temperature drops below 36°F, the valve in that module will be de-energized and open. The valve will remain open until the LCHW temperature rises above 40°F when the N.O. WSLV will again be energized and close if no compressors are running in that module.

Temperature Readings

The temperature readings default to Fahrenheit (°F). The readings may be set to display in Celsius (°C), by going to the *SYSTEM VARIABLES' MENU*. Press **ENTER** on **TEMP. READINGS** option. Press **ENTER** again to move the cursor into the field. Use the **UP** or **DOWN** arrow button to change the field from Fahrenheit to Celsius. Press **ENTER** again to accept the change.

Time and Date

The TIME AND DATE option is located in the *SYSTEM VARIABLES' MENU*. Press **ENTER** on the TIME AND DATE option. The time appears first and is displayed in military time. To change the time, press the **ENTER** button, putting the program into *edit mode*. The cursor is now in the *hour* field, use the **UP** and **DOWN** arrow buttons to change the *hour* to the correct time. Press the **ENTER** button again to move the cursor to the *minute* field to change it. Press the **ENTER** button one more time to set the TIME. Press the **Esc** button, at anytime, to abort the time change.

After setting the TIME, use the **DOWN** arrow button to move to the DATE screen. Press **ENTER** to move the cursor into the *month* field. Using the **UP** and **DOWN** arrow buttons, change the value to the current *month*. Press **ENTER** again to move the cursor to the *day* field, adjust the *day* accordingly. Press **ENTER** again to move to the *year* field, adjust the *year* accordingly. Press **ENTER** one more time to accept the DATE. Press the **Esc** button, at anytime, to abort the date change.

Customer Resets

CHILL WATER RESET (CHW) and LOAD LIMIT RESET are external inputs that are program selectable as 0-10Volt, 0-20 mA, or 4-20 mA. The customer can send a signal to change these values remotely. The CHW RESET will increase the UPPER and LOWER SETPOINTS in the *mechanical cooling* modules anywhere from 0 to 10 °F. The LOAD LIMIT RESET will allow the LOAD LIMIT of the *mechanical cooling* modules to be changed. There will be an asterisk (*) by the CHW OFFSET and the LOAD LIMIT values on the second system status screen, if they are enabled. The *CUSTOMER RESET* options are located in the *SYSTEM VARIABLES' MENU*. An asterisk (*) also appears next to CAPACITY on the *main status screen* when either reset is enabled. Press **ENTER** and use the **UP** and **DOWN** arrow buttons to change the value. Both default to OFF, but when enabling the user must select the type of input being used. (0-10 Volt, 0-20 mA, or 4-20 mA)

Security

The security option in the *MAIN MENU* is used to lock the *SYSTEM VARIABLES*. The first screen tells whether the variables are **locked** or **unlocked**. Initially the screen will say 'SYSTEM VARIABLES UNLOCKED'. Press **ENTER** to change the status of the security. The cursor will be on the first letter of the password code. Enter a five letter password, using the **UP** and **DOWN** arrow buttons to change the letter and press **ENTER** to move to the next letter. After entering the last letter, the next screen is to accept the password or clear the password. Press **ENTER** again to set the password or **Esc** to clear the password. The screen will then display the status of the *SYSTEM VARIABLES* as LOCKED. An asterisk (*) is displayed within the *SYSTEM VARIABLES' MENU* in place of the greater than sign (>) as a cursor for the menu. If the asterisk is seen, the *SYSTEM VARIABLES* need to be **unlocked** before trying to make any changes to them.

If the password is forgotten, please call your Multistack Service Representative at 608-786-3400.

Program Version

The program version is found by going to the *Main Menu* and pressing the **PRG** and **UP** arrow buttons simultaneously. A screen will appear that displays the version of the program in the controllers and the month and year the program was developed. The version will appear in a format similar to MCAS_A01. When looking at the version, the fourth position could vary between S, L, and B. The S stands for a Standard application, the L for a Low Ambient application, and the B for a Brine or Low Temperature application. This each of these programs may have different cutouts or temperature ranges available to the customer. The standard application *system variables* and cutouts are located on page 6. The system variables and cutouts for the low ambient and low temperature applications are found in Appendix B on page 18.

Board LED's

Five LED's are present on each board, master and module. Two LED's are located at the bottom of the board, one yellow and one red. The yellow one indicates that the board is receiving power. The red one is an alarm LED that would indicate that something maybe wrong with the board internally. Three more LED's are located at the top of the board next to the DIP switches. These LED's indicate that the connection, address definition and pLan (network of the modules) are working correctly. The green and yellow LED's should be lit for the network to be working properly.

BAS Interface

The *master controller* is capable of tying into a building automation system. This is an optional feature to the chiller system. Modbus, BACnet, and LonWorks are currently available. First, the *BAS INTERFACE* needs to be enabled. This is accomplished by going to the *SYSTEM VARIABLES Menu* and changing the enable point, under *BAS INTERFACE*, to *yes*. The enable defaults to *no*. This menu also has a variable to select which *Protocol* will be used. Select the appropriate *Protocol* for the job. BACnet is the default for this variable.

Modbus

Modbus requires that a RS485 card is installed into the pCO2 *Master Controller*. This card plugs into the serial port and communicates Modicon Modbus Protocol Rev. D. The Modbus protocol used is RTU type. The configuration is multipoint for RS-485. The data communication is asynchronous serial, 8 data bits, 2 stop bits, and no parity across an EIA-485 two-wire half-duplex connection. The cable size recommended is an AWG20/22 two-wire twisted shielded cable. The pin wiring is GND, RX+/TX+, RX-/TX- and is stamped on the terminal connector. The customer can adjust the *Baud Rate* and the *Network Number*. These settings are found in the *SYSTEM VARIABLES Menu* under *BAS INTERFACE*. The *Baud Rate* defaults to 9600 bps and can be adjusted to 1200, 2400, 4800, 9600, or 19200 bps. The *ID Number* is the same as a slave address and defaults to 1. This number must be unique to the Modbus network. The range for the *ID Number* is from 1-200. For more information on the Modbus configuration, please see the Technical Manual for Modbus.

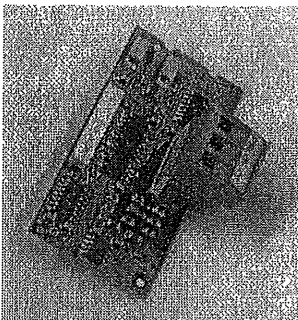


Figure 1 - RS485 Card

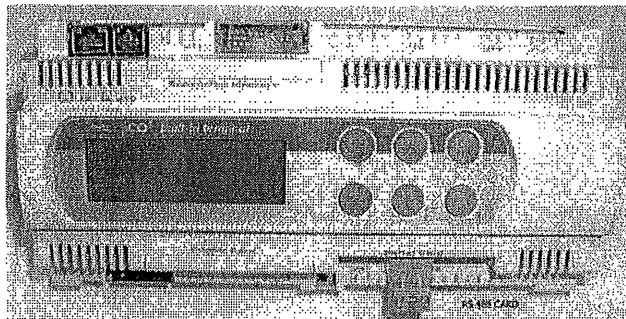


Figure 2 - pCO² with RS485 Card

BACnet

BACnet over TCP/IP or Ethernet requires a pCO Web Card (Figure 3) to be installed into the pCO² Master Controller. This card plugs into the serial port and communicates BACnet over Ethernet (ISO8802-2 over 8802-3) or BACnet over TCP/IP (Addenda A/Annex J). The recommended cable is shielded class 5, max 100mt. The *Baud Rate* is selectable and defaults to 19200. The *ID Number* is also selectable and defaults to 1. This variable can remain at 1 for the TCP/IP and Ethernet connections. For more information on the BACnet over TCP/IP or Ethernet configuration, please see the Technical Manual for BACnet over TCP/IP or Ethernet.

BACnet over MS/TP (Master Slave Token Passing) requires a pCOnet Card (Figure 5) to be installed into the pCO² Master Controller. This card plugs into the serial port and communicates BACnet over an RS-485 2-wire connection. The *Baud Rate* is selectable and defaults to 19200. The *ID Number* is also selectable and defaults to 1. For more information on the BACnet over MS/TP configuration, please see the Technical Manual for BACnet over MS/TP.

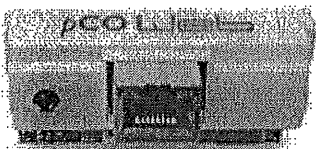


Figure 3 – pCO Web Card

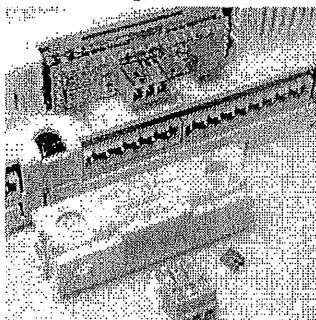


Figure 5 – pCOnet Card

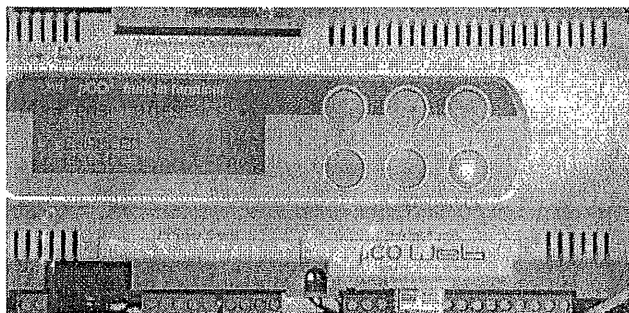


Figure 4 - pCO² with pCO Web Card

LonWorks Bridge

LonWorks communication is achieved by using a Modbus RS-485 Card (Figure 1) plugged into the pCO² Master Controller to a FieldServer Bridge (Figure 6). The FieldServer Bridge is a device that translates Modbus to LonWorks. Using this device allows all the points available in the controller to be passed to the Lon Network. For more information on the LonWorks configuration, please see the Technical Manual for LonWorks.

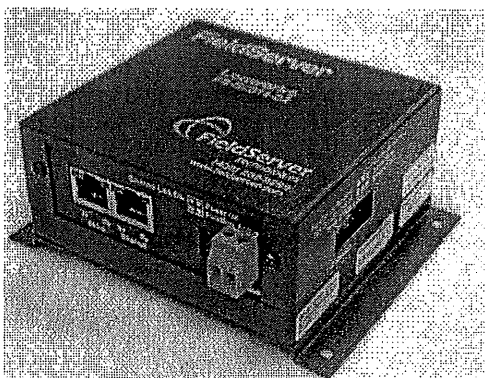


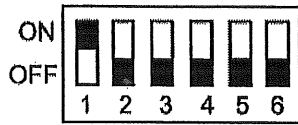
Figure 6 – FieldServer Bridge

APPENDIX A

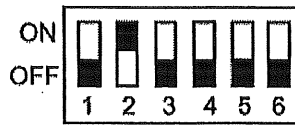
DIPSWTICH SETUP

The following are the positions of the DIP switches to setup the network of ASP's. The black square represents the location of the switch.

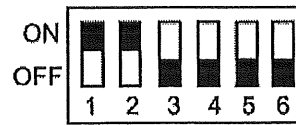
Mechanical Cooling Modules



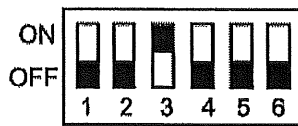
Module 1



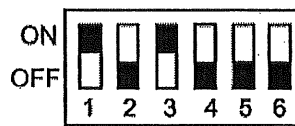
Module 2



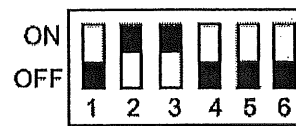
Module 3



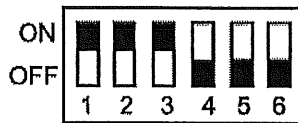
Module 4



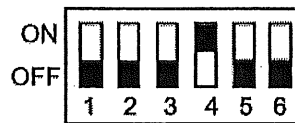
Module 5



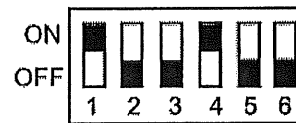
Module 6



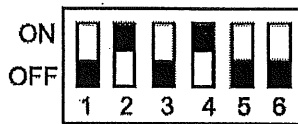
Module 7



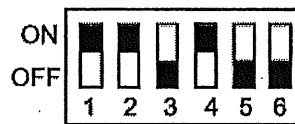
Module 8



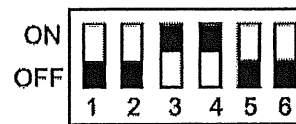
Module 9



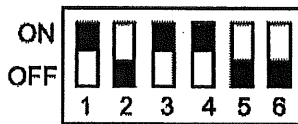
Module 10



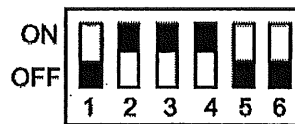
Module 11



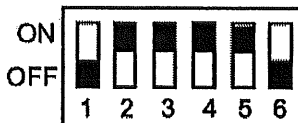
Module 12



Module 13



Module 14



Master Controller

APPENDIX B
SYSTEM VARIABLE RANGES & DEFAULTS
FOR
LOW TEMPERATURE APPLICATIONS
&
LOW AMBIENT APPLICATIONS

LOW AMBIENT APPLICATION (Special Program Required)

Program Version Format MCALV_H01

System Variable Ranges & Default Settings

Mechanical Cooling Modules

The following table defines all of the *SYSTEM VARIABLE* ranges and default values for *mechanical cooling* modules with a low temperature program.

System Variable	Range	Default Value
UPPER SETPOINT	45°F to 80°F	55°F
LOWER SETPOINT	40°F to 70°F	45°F
VSP VALUE	0% to 80%	50%
LOAD LIMIT	0% to 100%	100%
T-DIFF	15 to 200 sec	90 sec
FAIL INDIC	0% to 90%	0%
LEAD COMP	M1-1 to M14-2	M1-1
NUM OF MODULES	1 to 14	1
MAN. SETPOINT	40°F to 70°F	45°F
MAN. RANGE	2°F to 20°F	10°F
MAN. OFFSET	0°F to 5°F	2°F
FAN SETPT	170 to 350 psig	235 psig
FAN OFFSET	20 to 60 psig	30 psig
HP CUTOUT	300 to 425 psig	365 psig
SEQUENCE	STANDARD or ODD/EVEN	STANDARD
INDEXING	OFF or ON	ON

Module Cutouts and Reset Points

Low Suction Temp	Cutout → 20°F	Reset @ 25°F
Low Leaving CHW	Cutout → 36°F	Reset @ 40°F
Low Pressure	Cutout → 15 psig	Reset @ 25 psig

NOTE: LOW SUCTION FAULT

The low suction fault in this application works differently than in the standard program. One compressor in the module must be on for at least 30 seconds before a low suction fault can occur. This delay should allow enough time for the suction gas line to warm up to normal operating conditions when starting in a low ambient environment. The chiller system must include glycol to prevent freezing of the evaporators in an off condition.

LOW TEMPERATURE APPLICATION (Special Program Required)
 Program Version Format MCABV_H01

System Variable Ranges & Default Settings

Mechanical Cooling Modules

The following table defines all of the *SYSTEM VARIABLE* ranges and default values for *mechanical cooling* modules with a low temperature program.

System Variable	Range	Default Value
UPPER SETPOINT	25°F to 80°F	40°F
LOWER SETPOINT	20°F to 70°F	30°F
VSP VALUE	0% to 80%	50%
LOAD LIMIT	0% to 100%	100%
T-DIFF	15 to 200 sec	90 sec
FAIL INDIC	0% to 90%	0%
LEAD COMP	M1-1 to M14-2	M1-1
NUM OF MODULES	1 to 14	1
MAN. SETPOINT	25°F to 70°F	45°F
MAN. RANGE	2°F to 20°F	10°F
MAN. OFFSET	0°F to 5°F	2°F
FAN SETPT	170 to 350 psig	235 psig
FAN OFFSET	20 to 60 psig	30 psig
HP CUTOUT	300 to 425 psig	365 psig
SEQUENCE	STANDARD or ODD/EVEN	STANDARD
INDEXING	OFF or ON	ON

Module Cutouts and Reset Points

Low Suction Temp	Cutout → 15°F	Reset @ 20°F
Low Leaving CHW	Cutout → 20°F	Reset @ 25°F
Low Pressure	Cutout → 15 psig	Reset @ 25 psig

NOTE: LOW SUCTION FAULT

The low suction fault in this application works differently than in the standard program. One compressor in the module must be on for at least 30 seconds before a low suction fault can occur. This delay should allow enough time for the suction gas line to warm up to normal operating conditions when starting in a low ambient environment. The chiller system must include at least 25% of glycol to prevent freezing of the evaporators in an off condition.

NOTE: LOW LEAVING CHW FAULT

The low leaving CHW fault in this application works differently than in the standard program. The chiller must be commanded on for this fault to occur in the low temperature program.

APPENDIX C

INPUTS AND OUTPUTS

MASTER CONTROLLER

Tandem Compressors w/VFDs

ANALOG INPUTS

- B1 CUSTOMER CHILLED WATER RESET SIGNAL
- B2 CUSTOMER LOAD LIMIT RESET SIGNAL
- B3 OUTDOOR AMBIENT TEMPERATURE
- B4 ECHW TO MECHANICAL COOLING MODULES
- B5 LCHW FROM MECHANICAL COOLING MODULES

DIGITAL INPUTS

- ID1 EX1 INPUT
- ID2 EX2 INPUT
- ID3
- ID4 EX4 INPUT (POWER PHASE MONITOR-VERY FAST)
- ID5 CHILLED WATER FLOW SWITCH INPUT
- ID6
- ID7
- ID8

ANALOG OUTPUTS

- Y1
- Y2
- Y3
- Y4

DIGITAL OUTPUTS (RELAY TYPE)

- NO1 CUSTOMER ALARM RELAY
- NO2 FULL LOAD INDICATOR RELAY
- NO3 RUN STATUS RELAY
- NO4
- NO5
- NO6
- NO7 REMOTE PUMP ENABLE
- NO8
- NC8

MODULE BOARDS

Tandem Compressors w/VFDs

ANALOG INPUTS

B1 HIGH PRESSURE TRANSDUCER (HP)
B2 LOW PRESSURE TRANSDUCER (LP)
B3
B4 SUCTION TEMPERATURE (SUCT.)
B5 LEAVING CHILLED WATER TEMP. (LOCHW)

DIGITAL INPUTS

ID1 MANUAL MODE
ID2 AUTO MODE
ID3 HIGH PRESSURE SWITCH
ID4
ID5 CIRCUIT 1 FAULT
ID6 CIRCUIT 2 FAULT
ID7
ID8

ANALOG OUTPUTS

Y1 VFD OUTPUT FOR FAN CONTROL
Y2 VFD OUTPUT FOR FAN CONTROL
Y3
Y4

DIGITAL OUTPUTS (RELAY TYPE)

NO1 COMPRESSOR #1 START SIGNAL
NO2 COMPRESSOR #2 START SIGNAL
NO3 LIQUID LINE SOLENOID VALVE
NO4
NO5
NO6 ALARM LIGHT
NO7 FANS START SIGNAL
NO8 N.O. WATER SOLENOID VALVE
NC8

APPENDIX D
COMPRESSOR ROTATIONS

Compressor Rotations

Based on the settings in the *SYSTEM VARIABLES* of SEQUENCE and INDEXING, the LEAD COMPRESSOR can change from day to day. This would also change the order that the compressors would turn on or off. The following are some common configurations and how the compressors would stage in that particular configuration.

Non-indexing and Standard Sequencing

The LEAD COMPRESSOR would be the first on and the last off. The LEAD COMPRESSOR would always be M1-1, unless changed in the *SYSTEM VARIABLES*. The compressors would then come on in numerical order.

M1-1, M1-2, M2-1, M2-2, M3-1, M3-2, M4-1, M4-2

Non-indexing and Odd/Even Sequencing

The LEAD COMPRESSOR would always be M1-1, unless changed in the *SYSTEM VARIABLES*. The compressors would come on all odd first and then all even or all even first, if the LEAD COMPRESSOR was even, and then all odd.

Odd lead compressor M1-1, M2-1, M3-1, M4-1, M1-2, M2-2, M3-2, M4-2

Even lead compressor M1-2, M2-2, M3-2, M4-2, M1-1, M2-1, M3-1, M4-1

Indexing and Standard Sequencing

The LEAD COMPRESSOR would rotate by one at midnight each night. There would be an eight day rotation schedule for a four module chiller.

Day 1	M1-1, M1-2, M2-1, M2-2, M3-1, M3-2, M4-1, M4-2
Day 2	M1-2, M2-1, M2-2, M3-1, M3-2, M4-1, M4-2, M1-1
Day 3	M2-1, M2-2, M3-1, M3-2, M4-1, M4-2, M1-1, M1-2
Day 4	M2-2, M3-1, M3-2, M4-1, M4-2, M1-1, M1-2, M2-1
Day 5	M3-1, M3-2, M4-1, M4-2, M1-1, M1-2, M2-1, M2-2
Day 6	M3-2, M4-1, M4-2, M1-1, M1-2, M2-1, M2-2, M3-1
Day 7	M4-1, M4-2, M1-1, M1-2, M2-1, M2-2, M3-1, M3-2
Day 8	M4-2, M1-1, M1-2, M2-1, M2-2, M3-1, M3-2, M4-1

Indexing and Odd/Even Sequencing

The LEAD COMPRESSOR would rotate at midnight following the odd/even pattern. There would be an eight day schedule for a four module chiller.

Day 1	M1-1, M2-1, M3-1, M4-1, M1-2, M2-2, M3-2, M4-2
Day 2	M2-1, M3-1, M4-1, M1-1, M2-2, M3-2, M4-2, M1-2
Day 3	M3-1, M4-1, M1-1, M2-1, M3-2, M4-2, M1-2, M2-2
Day 4	M4-1, M1-1, M2-1, M3-1, M4-2, M1-2, M2-2, M3-2
Day 5	M1-2, M2-2, M3-2, M4-2, M1-1, M2-1, M3-1, M4-1
Day 6	M2-2, M3-2, M4-2, M1-2, M2-1, M3-1, M4-1, M1-1
Day 7	M3-2, M4-2, M1-2, M2-2, M3-1, M4-1, M1-1, M2-1
Day 8	M4-2, M1-2, M2-2, M3-2, M4-1, M1-1, M2-1, M3-1

APPENDIX E
FREE COOL MODULES

Free Cool Modules

A *Free Cool Module* is designed to take advantage of the outdoor ambient temperature to pre-cool the chilled water before it enters the *mechanical cooling modules*. This process will reduce the number of *mechanical cooling modules* operating based on outdoor ambient temperature. The cooler the ambient temperature, the fewer requirements there will be for *mechanical cooling modules*. Therefore saving the customer money, since the power requirements to operate a fan motor are far less than the requirements to operate a compressor.

There are three main controls in a *free cool module* (See Fig. 3 below): Change Over Control (1), Low Temp. Lockout (2), and Fan Cycling Control (3). By manipulating these three mechanical thermostats, the module will cycle the fans *on* or *off*, as well as control a diverting valve to either force the fluid through the coils or bypass around the coils.

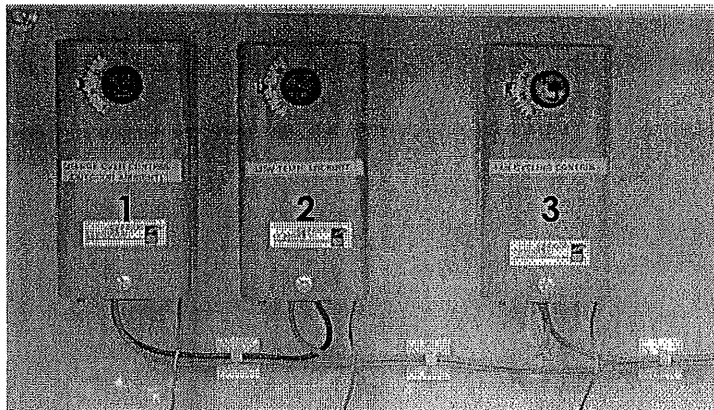


Figure 3 - Free Cool Thermostats

Variables Set by Thermostats

1. **CHANGE OVER CONTROL:** This thermostat controls the point where the *free cool module* is enabled or disabled, and is based on the outdoor ambient temperature. If the ambient temperature is below the thermostat setting, the *free cool module* is enabled. The fluid diverting valve will move to the right, and force the fluid to flow through the coils above.
2. **LOW TEMP LOCKOUT:** The minimum desired fluid temperature leaving the *free cool modules* and entering the *mechanical cooling modules*. If the fluid temperature gets this low, then the *free cool modules* will be disabled and the fluid diverting valve will move to the left and force the fluid to bypass the coils above.
3. **FAN CYCLING CONTROL:** This thermostat monitors the fluid temperature leaving the diverting valve. If the temperature of the fluid is above the setting on the thermostat, the fans will cycle *on*, as long as the module is enabled from 1 and 2 above. This thermostat is a two stage thermostat and has a built in 2°F differential between stages. This is a non-adjustable differential.

Remote Start/Stop

The user can control the *free cool module* from a remote location by providing a dry contact closure between terminals 1 and 4 of TS2. If the contact is open, the *free cool module* would be disabled. If the contact is closed, then the control of the module would be based on the setting of the three thermostats. There should be a jumper between terminals 1 and 4 of TS2 when received from the factory. This jumper needs to be removed in order to utilize the Remote Start/Stop.

**LIMITED FIVE YEAR COMPRESSOR
REPLACEMENT AGREEMENT**

MODULE AND COMPRESSOR SERIAL NUMBER IDENTIFICATION

Module Serial Number

Compressor Serial Numbers

1.	_____	A.	_____	B.	_____
2.	_____	A.	_____	B.	_____
3.	_____	A.	_____	B.	_____
4.	_____	A.	_____	B.	_____
5.	_____	A.	_____	B.	_____
6.	_____	A.	_____	B.	_____
7.	_____	A.	_____	B.	_____
	_____	A.	_____	B.	_____
	_____	A.	_____	B.	_____
	_____	A.	_____	B.	_____
	_____	A.	_____	B.	_____
	_____	A.	_____	B.	_____

JOB NAME: _____ **JOB NUMBER:** _____

MULTISTACK INC.

BY: _____

CUSTOMER NAME : _____

JOB NAME : _____ JOB NUMBER : _____

LOCATION : _____

SHIPMENT DATE : _____ START-UP DATE : _____

WARRANTY EXPIRATION DATE : _____

CHILLER CONSISTS OF _____ MODULES.

LIMITED FIVE YEAR COMPRESSOR REPLACEMENT AGREEMENT

In addition to the one-year Limited Parts Warranty made by Multistack Inc., we agree to repair or supply a replacement for any compressor, incorporated in a Multistack product which proves to be defective in its material or workmanship within FIVE (5) years of the original start-up of the Multistack equipment.

CONDITIONS AND EXCLUSIONS

This agreement does not apply if equipment has been moved from its original location at time of start-up.

Replacement or repair of a defective compressor shall be at the option of Multistack Inc.

This agreement does not include labor or transportation charges in connection with compressor replacements, nor charges to remove the replaced compressor or install the replacement compressor.

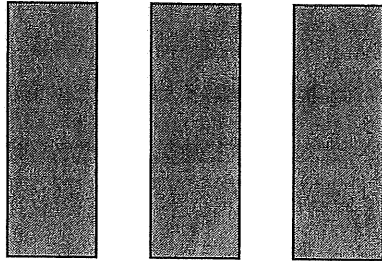
This agreement further does not cover any equipment other than the compressor, whether connected to the compressor or not, such as cooling coils, temperature controls, refrigerant metering devices, refrigerant, electrical controls, contactors, relays, electronic components or controls, or any other part or component.

Coverage under this agreement extends only to the original user and does not include failures of compressor resulting from misuse, negligence, accident in transit, corrosion or if the compressor has been installed or operated contrary to any recommendations made by us or the compressor manufacturer. In addition, the coverage shall not apply if said compressor has been subjected to abnormal operating or electrical conditions or if serial number has been altered, effaced, or removed.

We shall not be liable for any default or delay in performance hereunder caused by any contingency beyond our control including war, governmental restrictions or restraint, strikes, fire, floods or short or reduced supply of raw material or finished product.

We shall not be liable for any consequential, incidental or special damages and/or expenses.

THIS AGREEMENT IS EXPRESSLY IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES, AND WE NEITHER ASSUME NOR AUTHORIZE ANY OTHER PERSON TO ASSUME FOR US ANY OTHER OBLIGATIONS OR LIABILITIES IN CONNECTION WITH THE SALE OF MULTISTACK EQUIPMENT, OR ANY PART OR PARTS THEREOF.



MULTISTACK®

Wiring Information

ASP30X with VFD Fan Control 460 Volt

Drawing #'s

2000-2875

2000-2876

2000-2877

2000-2878

2000-2879

III MULTISTACK®

1065 Maple Ave.

Phone #: (608) 366-2400 Fax #: (608) 366-2450

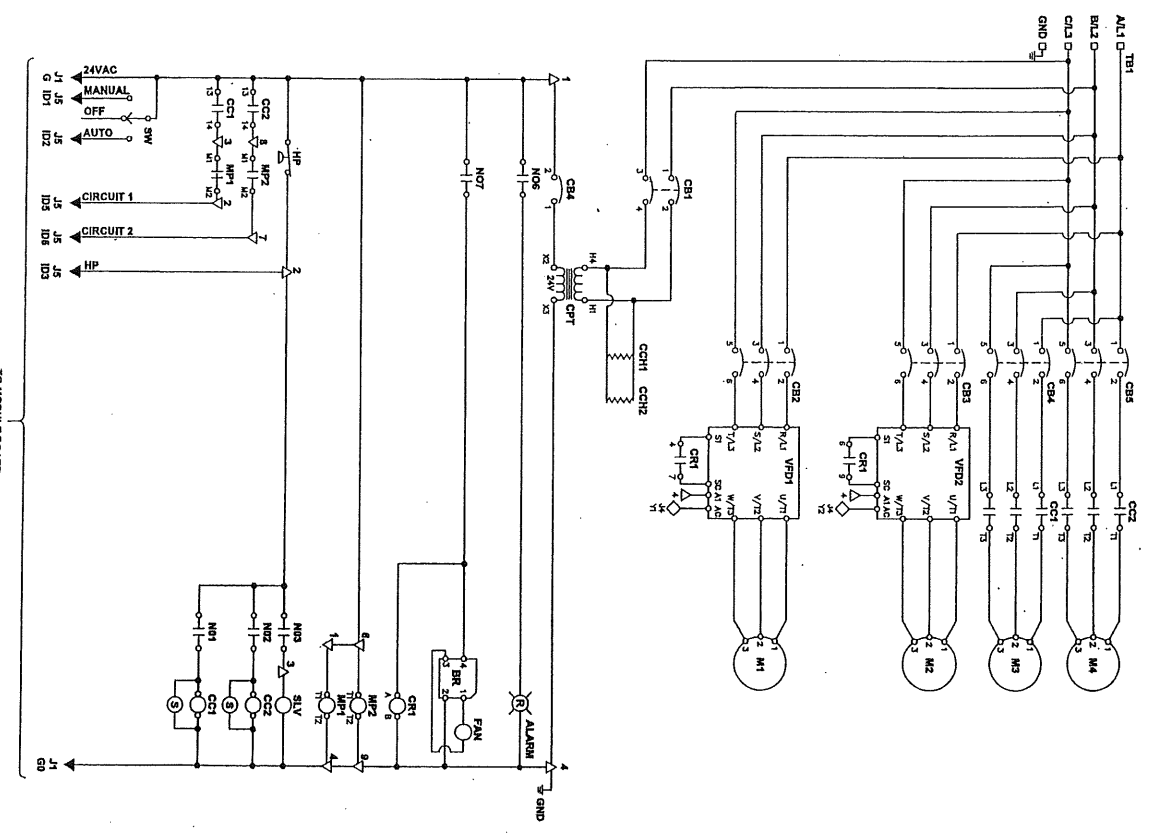
E-mail: info@multistack.com

Web Site: www.multistack.com

REVISION

NO.	DATE	DESCRIPTION
1		
2		
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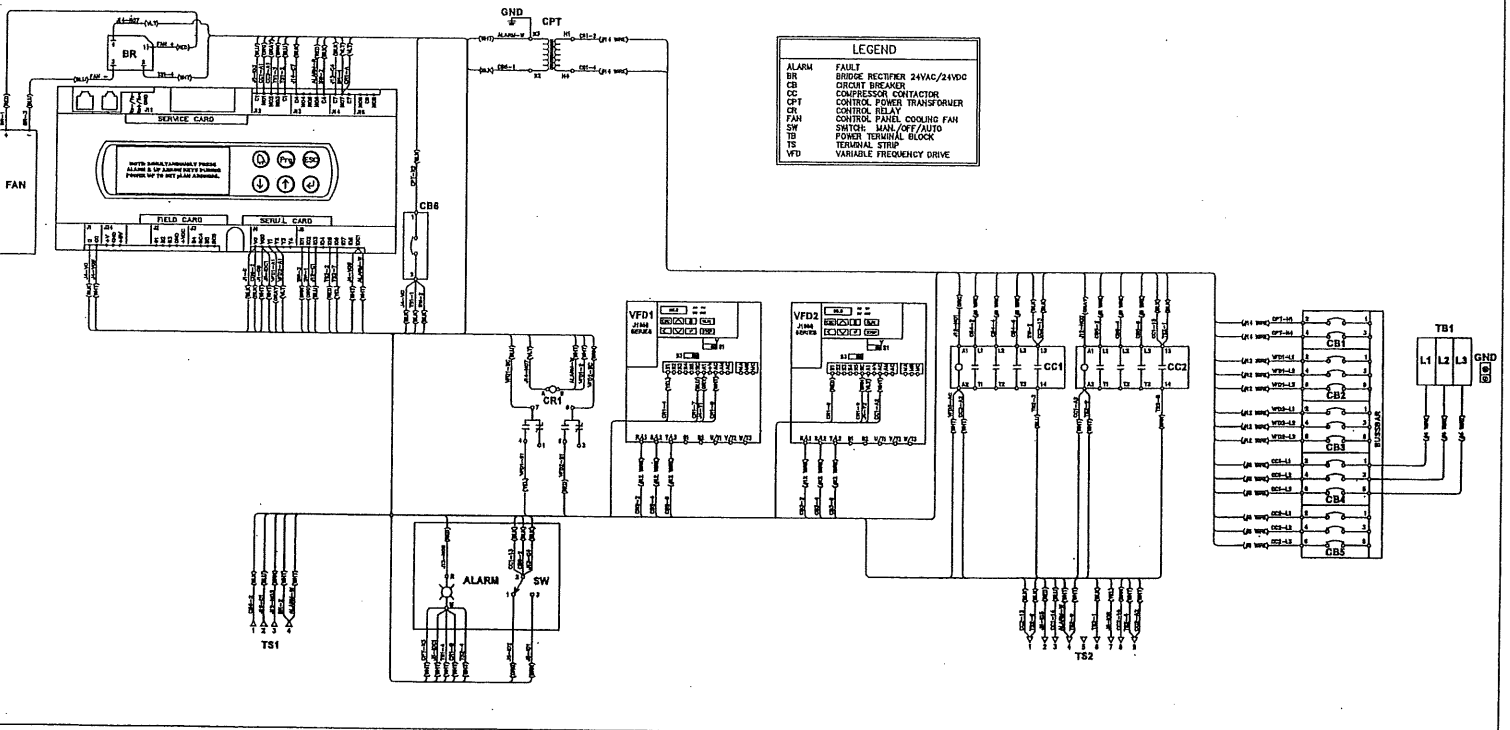
MULTISTACK		B	2000-2875
Scots, Wacoah 54856		SCHEMATIC DIAGRAM	
YASKAWA J1000 SERIES		ASPROX (460 VOLT)	
FREQUENCY DRIVES		TANDEM COPPLAND SCROLL	
REVISED BY		COMPRESSORS w/ VFD FAN CONTROL	
DATE		NONE	



LEGEND	
ALARM	ALARM
AS	AS
CC1	CONTACTOR
CC2	CONTACTOR
CC3	CONTACTOR
CC4	CONTACTOR
CCH1	CONTACTOR
CCH2	CONTACTOR
CM	CONTACTOR
CR1	CONTACTOR
CR2	CONTACTOR
CR3	CONTACTOR
CR4	CONTACTOR
CR5	CONTACTOR
CR6	CONTACTOR
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CR100	CONTACTOR

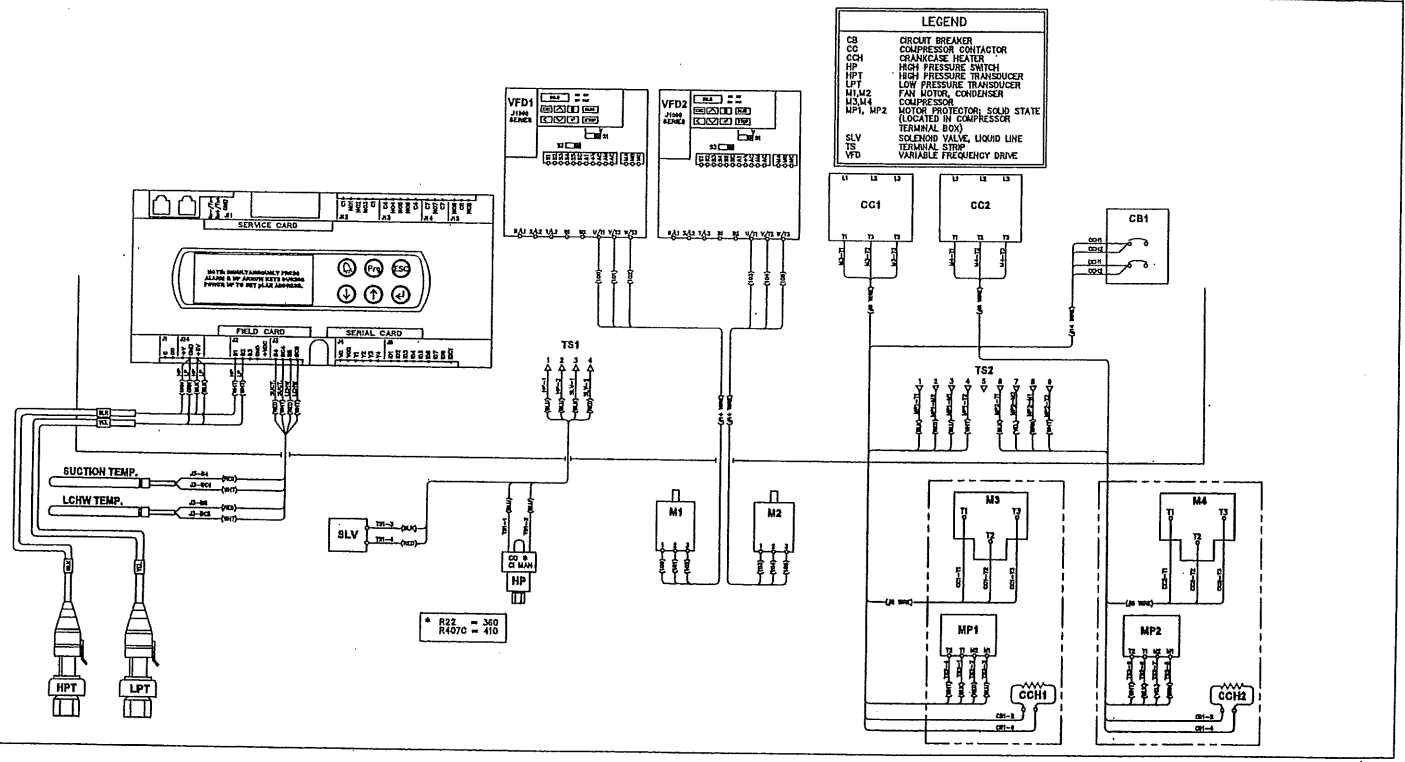
B 2000-2875

REVISION BY	DATE	REFERENCE DWGS:	MULTISTACK Sparta, Wisconsin 54656 <small>ALL DIMENSIONS IN INCHES / DO NOT SCALE DRAWINGS</small>	B	2000-2876
		SIMILAR TO:	YASKAWA J1000 SERIES FREQUENCY DRIVES	WIRING DIAGRAM CONTROL PANEL w/ VFD FAN CONTROL ASP30X (460 VOLT) TANDEM COPELAND SCROLL COMP.	
DRAWN BY: KRO DATE: 4/22/09		CHECKED BY:	DKR: APPR: DATE:	SCALE: NONE	



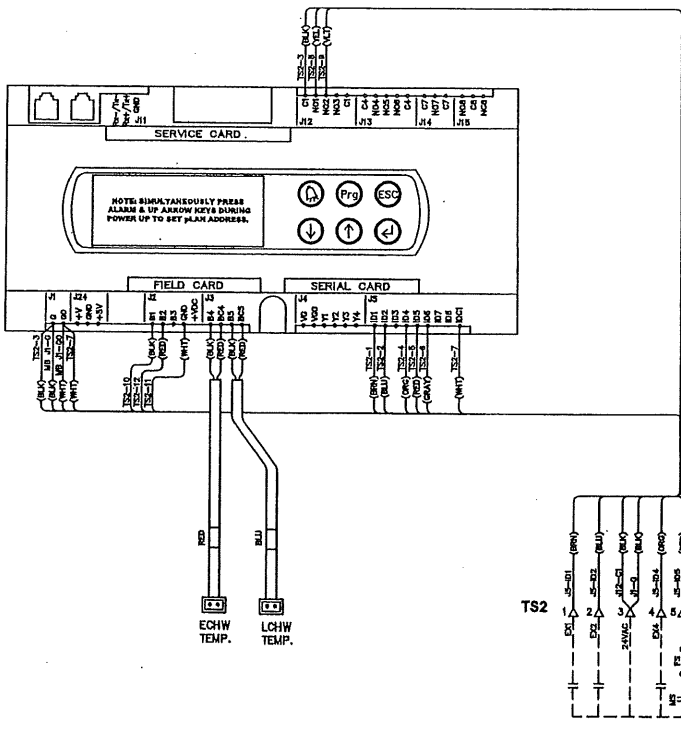
REV. BY DATE

REFERENCE DWGS:	III MULTISTACK Sparta, Wisconsin 54656 ALL DIMENSIONS IN INCHES / DO NOT SCALE DRAWINGS	B	2000-2877
SIMILAR TO:	YASKAWA J1000 SERIES FREQUENCY DRIVES	INTERCONNECT DIAGRAM ASP30X (460 VOLT) TANDEM COPELAND SCROLL COMP. w/ VFD FAN CONTROL	
DRAWN BY: KRO DATE: 4/22/09	CHECKED BY:	DATE:	SCALE: NONE



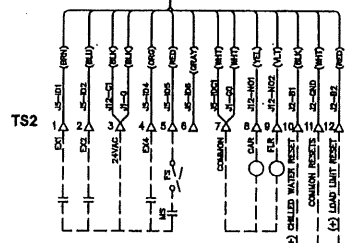
REV. BY DATE

REFERENCED DWGS:	MULTISTACK		B	2000-2878
SIMILAR TO:	Sparta, Wisconsin 54656	ALL DIMENSIONS IN INCHES / DO NOT SCALE DRAWINGS		
DRAWN BY: KRO	CHECKED BY:	DNCR	SYSTEM INTERCONNECT	
DATE: 4/22/09	DATE:	DATE:	DIAGRAM	
			ASP X	
			TANDEM SCROLL COMPRESSORS	
			SCALE: NONE	



- NOTES**
- COMPONENTS & WIRING BY OTHERS. (#16 MIN. WIRE)
 - INPUTS TO TERMINALS 1 THRU 6 OF TS2 MUST BE WIRED CLOSED IF NOT USED.
 - EXTERNAL INPUTS: (CLOSED TO OPERATE)
 - EX1 - REQUIRES MANUAL RESET
 - EX2 - AUTO RESET: REMOTE START/STOP
 - EX4 - AUTO RESET: POWER/PHASE MONITOR
 - EXTERNAL OUTPUTS:
 - FS - FLOW SWITCH (CHILLED WATER)
 - MS - AUX. INTERLOCK (CHILLED WATER PUMP STARTER)
 - CHILLED WATER RESET - SELECTABLE 0-10V OR 4-20 mA
 - LOAD LIMIT RESET - SELECTABLE 0-10V OR 4-20 mA

MBL 4-5 1-50
13 16 VDC CONNECTS
OF NEAREST MODULE BOARD



REV		REFERENCE DWGS:	MULTISTACK	B	2000-2879
BY			Sparta, Wisconsin 54656	COMMUNICATIONS INTERCONNECT DIAGRAM	
DATE		SIMILAR TO:	ALL DIMENSIONS IN INCHES / DO NOT SCALE DRAWINGS	ASP X TANDEM SCROLL COMPRESSORS	
		DRAWN BY: KRO	FIRST USED ON ASSY NO:	STD ENGR SPEC	
		DATE: 4/22/09	CHECKED BY:	DATE:	SCALE: NONE

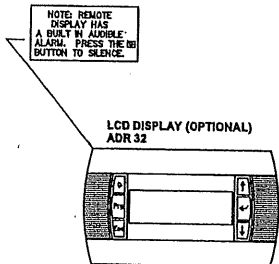
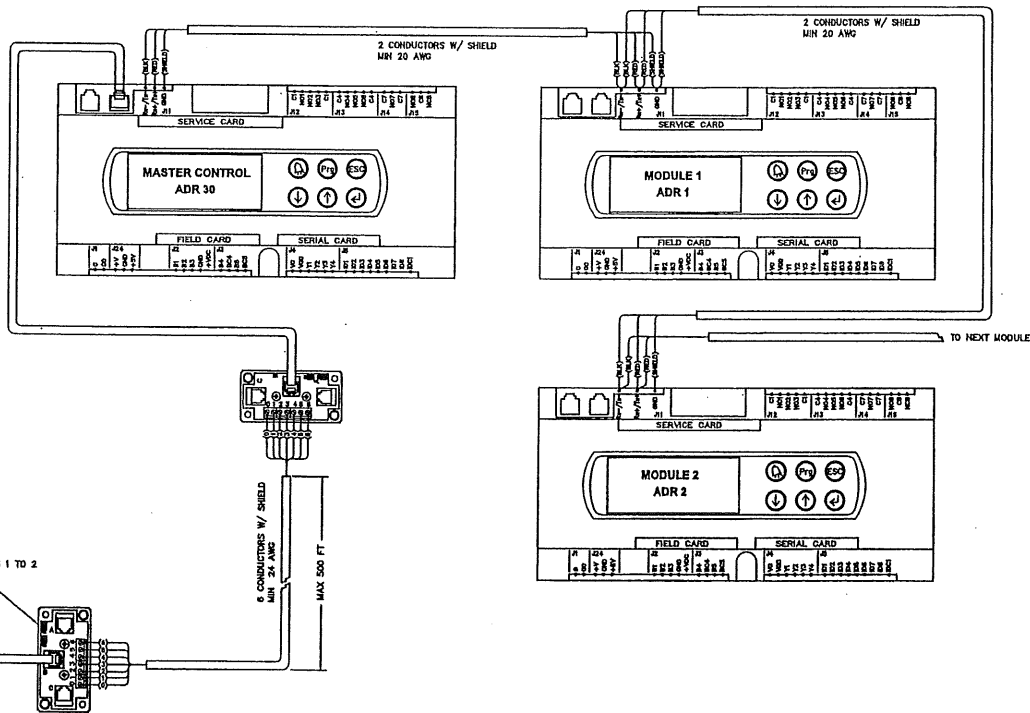
NETWORK ADDRESSING

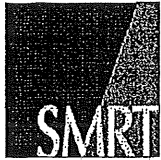
EACH CONTROL BOARD IN THE NETWORK MUST HAVE A UNIQUE PLAN ADDRESS. TO SET THE ADDRESS OF EACH CONTROLLER PRESS AND HOLD THE ALARM AND UP ARROW KEYS SIMULTANEOUSLY DURING THE POWER UP OF EACH BOARD. USE THE UP AND DOWN ARROW KEYS TO SELECT THE PLAN ADDRESS.

VALID MODULE NUMBERS ARE 1 THRU 15
 MASTER CONTROL ADDRESS = 30
 REMOTE DISPLAY (OPTIONAL) = 32

SCREEN DISPLAY

PLAN ADDRESS: 30
 UP: INCREASE
 DOWN: DECREASE
 ENTER: SAVE AND EXIT





Roof Top.

GAS FIBER
HUMIDIFIERS

Weight (2) @ 1000 lbs ea

**Submittal
Review Memo**

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 85-238413-1

Portland, ME 04103

Submittal Title: Humidifiers

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site: information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction: coordination of the work of all trades: and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 9/22/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 #85

Remarks:

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Emerson Swan
222 Saint John Street
Portland, Maine 04102
Ted Edwards
P: 207-774-5578
F: 207-772-8253

SPECIFICATION SECTION: 238413

PARAGRAPH: Part 2 Products
DRAWINGS: M-601 Humidifier Schedule

ITEM: HUMIDIFIERS

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed X _____

Subject to Architects Approval X _____

Date 8-24-09 By JJK _____

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

HUMIDIFIERS

MANUFACTURER: DRI-STEEM HUMIDIFIER CO.

SUPPLIER: Emerson Swan
222 Saint John Street
Portland, Maine 04102
Ted Edwards
P: 207-774-5578
F: 207-772-8253

INSTALLER: Johnson & Jordan Mechanical Contractors (office)
18 Mussey road
Scarborough, Maine 04074
Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619

**PLEASE NOTE: FIELD WIRING NOT SHOWN
FIELD POWER WIRING BY ELECTRICAL CONTRACTOR
FIELD CONTROL WIRING BY CONTROL CONTRACTOR**



A SUBSIDIARY OF RESEARCH PRODUCTS CORPORATION

AUGUST 21, 2009

PROJECT: Martin's Point Healthcare

ADDRESS: Portland, ME

Specification Section:

Consulting Engineer: SMRT, Inc.

Contractor: Johnson & Jordan

Representative: Emerson Swan, Inc.

Representative Phone: 207-774-5578

Project Name: Martin's Point

Quote Date: 08.21.2009

Unit of Measure: Inch-Pound

Humidifier Tag: H-1

System Quantity:	1	Calculation Method:	Mechanical	Airflow (CFM)	27500.00
Elevation (feet)	0.0	Desired Dry Bulb (°F)	70.0	Entering Outside Air (%)	100
Entering Dry Bulb (°F)	52.0	Desired RH (%)	35	Load (lbs/hr)	205.16
Entering RH (%)	45	Actual RH (%)	35	Load Plus Loss (lbs/hr)	219.87

(All Values are per unit, unless otherwise noted)

Energy Source	Natural Gas
Water Type	Potable
Total Humidifier Capacity (lbs/hr)	225.0

Model	Qty.	Volts/Phase/Amp (Each)	Humidifier Outlet			Size (inches) W x H x L	Input (Mbh)	Recommended Vent Size (inches)
			Type	Diameter (inches)	Qty.			
GTS-300	1	230/Single/18.0	Flange	3	1	32.38 x 52.00 x 54.35	300	7

Selected Humidifier Options:

- Type of Water: Potable
- Enclosure, Outdoor
- Enclosure, Outdoor Roof Curb
- Removable Keypad
- Keypad Cable Length, 5 (feet)
- Keypad, Language, English
- Keypad, Unit Of Measure, Inch-Pound

Selected Control Options:

- VAPOR-LOGIC 4
- Type of Control, Modulating
- Modulating, DRI-STEEM
- Humidity Transmitter, Duct
- Duct High Limit Transmitter, Modulating (VAV Pkg.)
- Airflow Proving Switch, Sail

Humidifier Notes:

Minimum water conductivity of 2 grains/gallon (100 µS/cm)
 Power block maximum wire connection size of 6 gauge.

Dispersion Inlet			Face Dimensions (inches)		Overall Dimensions (inches)	
Type	Diameter (inches)	Position	Width	Height	Width	Height
Flange	3	B3	116	48	119	57

Model	Qty.	Header Size (inches)	Tube Center (inches)	Condensate Position	
				Position #1	Position #2
ULTRA-SORB LV	1	3	12	NA	C7

AHU Conditions

Absorption Dist. (inches)	16	Airflow	Horizontal
Mounting Location	Coil	Air Velocity (ft/min)	711
Coil Width (inches)	116	Airflow Pressure Drop (in.)	0.0
Coil Height (inches)	48	Entering RH (%)	46
Entering Duct Temp (°F)	51.3	Leaving RH (%)	65
Leaving Duct Temp (°F)	52.0	Heat Gain: Assembly (°F)	0.21
Header Location	Inside AHU	Heat Gain: Steam (°F)	0.5
Water Seal Location	Inside AHU	Ins. Load + Loss (lbs/hr)	219.87

Selected Dispersion Options:

- Casing, Galvanized Steel
- Insulated Tube(s)

Dispersion Notes:

The minimum interconnecting piping diameter is 3 (inches) for the developed length of 20 (feet) that you entered.

Project Name: Martin's Point

Quote Date: 08.21.2009

Unit of Measure: Inch-Pound

Humidifier Tag: H-2

System Quantity:	1	Calculation Method:	Mechanical	Airflow (CFM)	27500.00
Elevation (feet)	0.0	Desired Dry Bulb (°F)	70.0	Entering Outside Air (%)	100
Entering Dry Bulb (°F)	52.0	Desired RH (%)	35	Load (lbs/hr)	205.16
Entering RH (%)	45	Actual RH (%)	35	Load Plus Loss (lbs/hr)	219.87

(All Values are per unit, unless otherwise noted)

Energy Source	Natural Gas
Water Type	Potable
Total Humidifier Capacity (lbs/hr)	225.0

Model	Qty.	Volts/Phase/Amp (Each)	Humidifier Outlet			Size (inches) W x H x L	Input (Mbh)	Recommended Vent Size (inches)
			Type	Diameter (inches)	Qty.			
GTS-300	1	230/Single/18.0	Flange	3	1	32.38 x 52.00 x 54.35	300	7

Selected Humidifier Options:

- Type of Water: Potable
- Enclosure, Outdoor
- Enclosure, Outdoor Roof Curb
- Removable Keypad
- Keypad Cable Length, 5 (feet)
- Keypad, Language, English
- Keypad, Unit Of Measure, Inch-Pound

Selected Control Options:

- VAPOR-LOGIC 4
- Type of Control, Modulating
- Modulating, DRI-STEEM
- Humidity Transmitter, Duct
- Duct High Limit Transmitter, Modulating (VAV Pkg.)
- Airflow Proving Switch, Sail

Humidifier Notes:

Minimum water conductivity of 2 grains/gallon (100 µS/cm)
 Power block maximum wire connection size of 6 gauge.

Dispersion Inlet			Face Dimensions (inches)		Overall Dimensions (inches)	
Type	Diameter (inches)	Position	Width	Height	Width	Height
Flange	3	B3	116	48	119	57

Model	Qty.	Header Size (inches)	Tube Center (inches)	Condensate Position	
				Position #1	Position #2
ULTRA-SORB LV	1	3	12	NA	C7

AHU Conditions

Absorption Dist. (inches)	16	Airflow	Horizontal
Mounting Location	Coil	Air Velocity (ft/min)	711
Coil Width (inches)	116	Airflow Pressure Drop (in.)	0.0
Coil Height (inches)	48	Entering RH (%)	46
Entering Duct Temp (°F)	51.3	Leaving RH (%)	65
Leaving Duct Temp (°F)	52.0	Heat Gain: Assembly (°F)	0.21
Header Location	Inside AHU	Heat Gain: Steam (°F)	0.5
Water Seal Location	Inside AHU	Ins. Load + Loss (lbs/hr)	219.87

Selected Dispersion Options:

- Casing, Galvanized Steel
- Insulated Tube(s)

Dispersion Notes:

The minimum interconnecting piping diameter is 3 (inches) for the developed length of 20 (feet) that you entered.

DRI-STEEM GTS Humidifier Schedule and Features

GTS® Standard Water Models

The following is a description of the GTS (Gas-to-Steam) Humidifier proposed for use on the subject project.

Tag	Qty.	Model	Gas type		Venting		Capacity	Dispersion method	Duct dim. (w x h)
			Nat.	LP	Vert.	Horiz.			
H-1	1	GTS-300	Nat		VERT		300	Ultrasorb LV	116 x 4i
H-2	1	GTS-300	Nat		VERT		300	Ultrasorb LV	116 x 4i

The above GTS humidifier is furnished with:

1. Evaporating chamber constructed of type 304 stainless steel
2. Stainless steel heat exchanger with flue gas connection
3. Infrared burner(s) with all associated hardware including blower, gas valve, ignition devices, wiring, flame sensing, blower proving switches and sight glass
4. Electric solenoid brass fill valve
5. Motorized brass body drain valve
6. Conductivity probe system with back up low water cutout and temperature sensor protection
7. Interoperability with building automation system using Modbus®
8. Control using a Vapor-logic®4 keypad and/or a Web interface
9. Factory mounted and wired subpanel containing:
 - a. Vapor-logic4 main board with USB port
 - b. Keypad
 - c. Stepdown transformer: 120V primary/24V secondary
 - d. Ignition controller for each burner
 - e. Redundant low water control
 - f. Blower/burner relays or control relays
10. Tank temperature sensor
11. Blocked flue safety switch
12. Cleanout plate
13. Water tempering device (maximum drain temperature 140 °F)

DRI-STEEM GTS Humidifier Schedule and Features

Models GTS® and [REDACTED] Optional Equipment

Optional items marked below are included with equipment submitted.

1. Multiple humidifier tank control
2. Interoperability
 LonTalk®
 BACnet®
3. Signal by others (specify input signal)
 0-10 VDC 6-9 VDC 4-20 mA
Control signal by: Modbus LonTalk BACnet
4. Removable keypad (included with outdoor enclosure)
 Additional cable length
 10 feet 25 feet 50 feet
 100 feet 500 feet
5. VAV anticipating system w/duct transmitter
6. Cold snap offset transmitter (window temperature transmitter)
7. Humidity transmitter, room
8. Humidity transmitter, duct
9. Humidistat, on-off high limit, duct (HC-201)
10. Airflow proving switch, pressure (RH-3)
11. Airflow proving switch, sail
12. Outdoor Enclosure
 Internal steam piping Roof curb Less heater package
13. Sealed combustion
14. Door interlock switch
15. Area-type steam dispersion system (available on GTS models 100-400)
16. Rapid-sorb® steam dispersion system
 Insulated tube option
17. Ultra-sorb® steam dispersion system
 Insulated tube option

GTS® humidifier specifications, capacities, and weights

(2) at 1000#

**Table 1-1:
GTS specifications, capacities, and weights**

GTS model	Maximum steam capacity		Input			Water usage at maximum capacity**		Tank volume		GTS				GTS with outdoor enclosure				Full load amps*	
	lbs/hr	kg/h	MBh	kW	m³/h	gals/hr	litres/hr	gals	litres	Operating weight		Shipping weight		Operating weight		Shipping weight		120 V 60 Hz	230 V 50 Hz
										lbs	kg	lbs	kg	lbs	kg	lbs	kg		
GTS-100	75	34	100	29	2.76	9	34.1	48	181.7	700	320	375	170	800	365	500	230	1.8	2.8
GTS-200	150	68	200	59	5.52	18	68.1	96	367.7	1400	640	750	340	1700	660	900	460	2.8	4.0
GTS-300	225	102	300	88	8.28	27	102.2	52	196.8	850	385	450	205	1000	455	600	270	3.0	4.0
GTS-400	300	136	400	117	11.04	36	136.3	52	196.8	1400	640	750	340	1700	660	900	460	2.8	4.0
GTS-500	375	170	500	147	13.80	45	170.3	76	287.7	1100	500	600	270	1450	660	950	430	4.5	5.5
GTS-600	450	204	600	176	16.56	54	204.4	76	287.7	1100	500	600	270	1450	660	950	430	4.5	5.5
GTS-700	525	238	700	205	19.32	63	238.5	89	336.9	1400	635	700	320	1750	795	1050	475	6.0	7.0
GTS-800	600	272	800	234	22.08	72	272.5	89	336.9	1400	635	700	320	1750	795	1050	475	6.0	7.0

Note:

- * Add 15 full load amps for heater load for all GTS models with outdoor enclosures
- ** Add 10% to account for skim and automatic drain/flush features if utilized (standard water units only).

Capacity notes

- At sea level, approximately 152 Btu are required to raise one pound of water from 60 °F to 212 °F. (At sea level, approximately 352 kJ are required to raise one kilogram of water from 16 °C to 100 °C.)
- An additional 970 Btu are required to change the state of one pound of 212 °F water to vapor. (An additional 2257 kJ are required to change the state of one kilogram of 100 °C water to vapor.)
- Another factor to consider is condensation steam loss from piping. Use the following general steam loss guidelines:
 - Vapor hose: 0.15 lbs/hr/ft (0.22 kg/h/m)
 - Insulated pipe: 0.05 lbs/hr/ft (0.07 kg/h/m)
 - Hard pipe and dispersion tubes: 0.50 lbs/hr/ft (0.7 kg/h/m)
 - High-efficiency dispersion tubes: 0.20 lbs/hr/ft (0.298 kg/h/m)

For more detailed information about condensation steam loss, see the DRI-STEEM Design Guide or our software program, Dri-calc.

LP gas

All models operate at rated input.

High altitude

An input derate exists when operating units at a high altitude. See Table 1-2 for high altitude derate information.

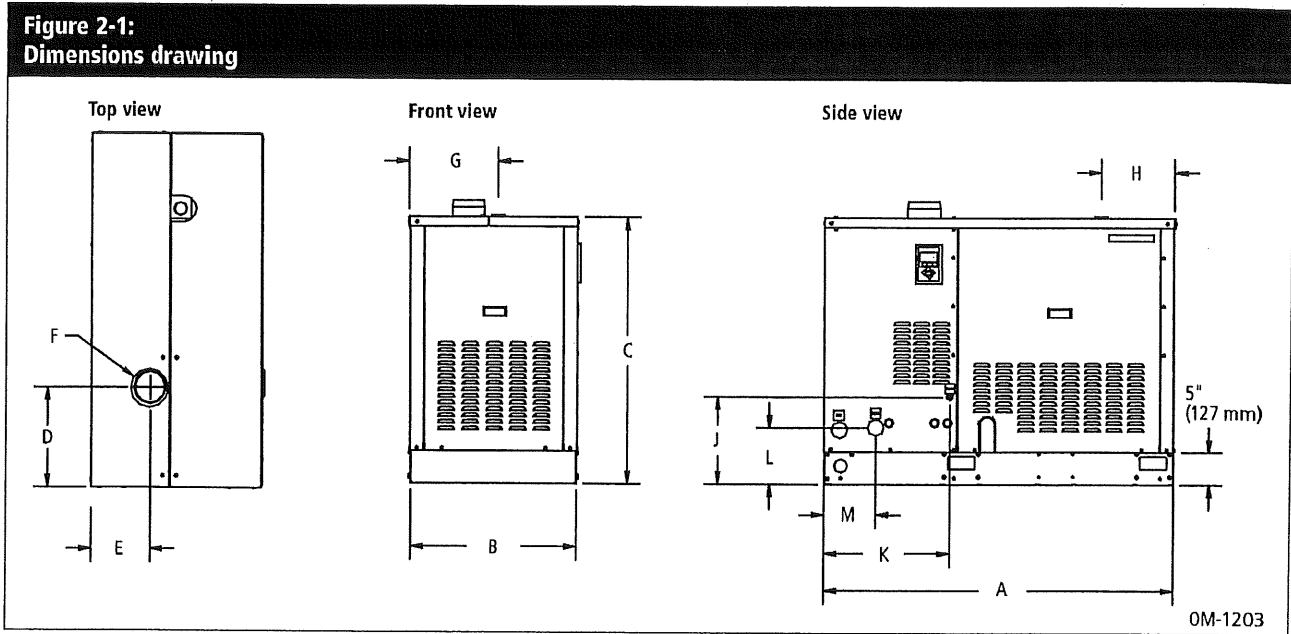
**Table 1-2:
High altitude derate**

Altitude		Input derate %
feet	meters	
0-2000	0-610	0
2001-2500	610-765	2*
2501-3000	765-915	4*
3001-3500	915-1065	6*
3501-4000	1065-1220	8*
4001-4500	1220-1370	10
4501-5000	1370-1525	12
5001-5500	1525-1675	14
5501-6000	1675-1830	16
6001-6500	1830-1980	18
6501-7000	1980-2135	20
7001-7500	2135-2285	22
7501-8000	2285-2440	24

Note:

- * Model GTS-400 is derated 10% for installations in Canada at altitudes of 2201-4500 ft (671-1370 m).

GTS humidifier dimensions



**Table 2-1:
Dimensions table**

Description	GTS-100 GTS-200		GTS-300 GTS-400		GTS-500 GTS-600		GTS-700 GTS-800	
	inches	mm	inches	mm	inches	mm	inches	mm
A Overall length	54.35	1380	54.35	1380	54.35	1380	54.35	1380
B Overall width	26.38	670	32.38	822	42.38	1076	48.38	1229
C Shroud height	41.00	1040	41.00	1040	41.00	1040	41.00	1040
D Flue position	18.00	457	17.00	432	17.00	432	17.25	413
	E	13.00	330	15.63	397	18.63	475	21.00
F Flue diameter	5.00	127	7.00	178	8.00	203	10.00	254
G Steam outlet position	14.00	356	20.50	521	29.25	743	37.25	895
	H	11.63	295	11.63	295	11.63	295	11.63
J Fill valve connection position	13.00	330	13.00	330	13.00	330	13.00	330
	K	13.00	330	13.00	330	13.00	330	13.00
L Drain position	8.75	222	8.75	222	8.75	222	8.75	222
	M	8.00	203	8.00	203	8.00	203	8.00

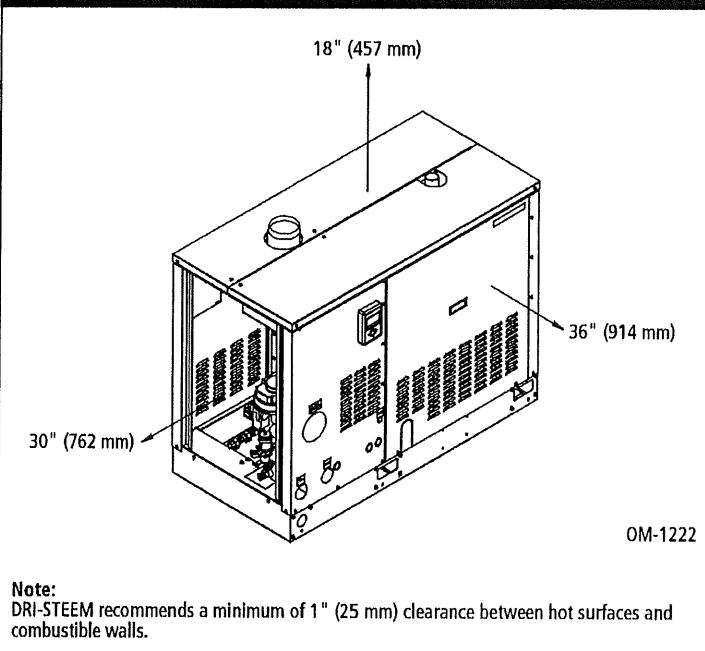
GTS humidifier connection sizes and clearances

**Table 3-1:
Connection sizes**

Description	GTS-100 GTS-200		GTS-300 GTS-400		GTS-500 GTS-600		GTS-700 GTS-800	
	inches	DN	inches	DN	inches	DN	inches	DN
Gas supply	1/2 (pipe thread)	15	1 (pipe thread)	25	1 (pipe thread)	25	1 1/4 (pipe thread)	32
Sealed combustion piping (optional)	4	100	4	100	4	100	4	100
Flue vent	5	125	7	180	8	200	10	250
Water supply to fill valve and tempering device ¹	3/8 (pipe thread)	10	3/8 (pipe thread)	10	3/8 (pipe thread)	10	3/8 (pipe thread)	10
Drain	1 1/2 (pipe thread)	40	1 1/2 (pipe thread)	40	1 1/2 (pipe thread)	40	1 1/2 (pipe thread)	40
Steam outlet	(pipe thread or nose)	50	3 (flange)	80	4 (flange)	100	4 (flange)	100
Condensate return (recommended)	3/4 (pipe thread)	20	3/4 (pipe thread)	20	3/4 (pipe thread)	20	3/4 (pipe thread)	20

Notes:
 1 In order to minimize DI/RO water use, disconnect factory piping to the water tempering device and pipe directly to tap water.
 If planning to use heated supply water, disconnect the water line to the water tempering device at the fill manifold, and reconnect it to a cold water supply. This will ensure that the water tempering device operates properly.

**Figure 3-1:
GTS clearance recommendations**

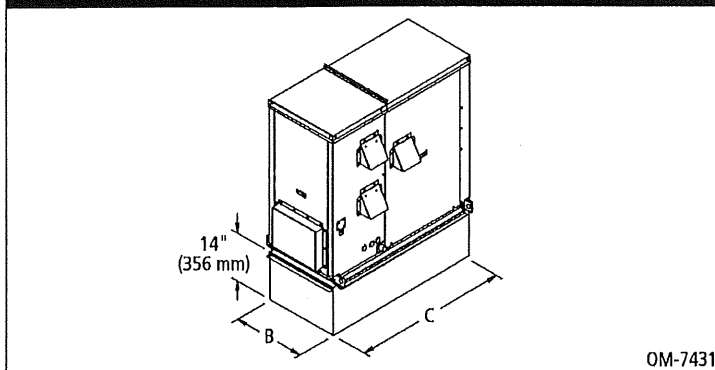


GTS humidifier outdoor enclosure

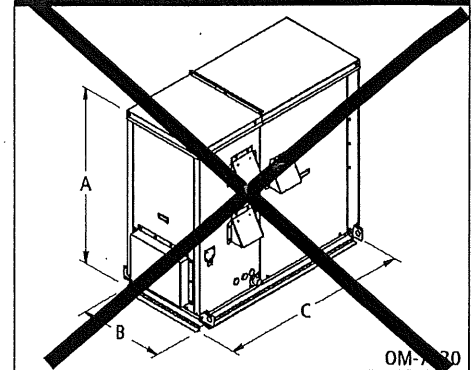
**Table 4-1:
Outdoor enclosure dimensions**

Description	GTS-100 GTS-200		GTS-300 GTS-400		GTS-500 GTS-600		GTS-700 GTS-800	
	inches	mm	inches	mm	inches	mm	inches	mm
A Enclosure height	54.63	1388	54.63	1388	54.63	1388	54.63	1388
B Enclosure width	26.00	660	32.00	813	42.00	1067	48.00	1219
C Enclosure length	57.25	1454	57.25	1454	57.25	1454	57.25	1454

**Figure 4-1:
Outdoor enclosure mounted on a curb**



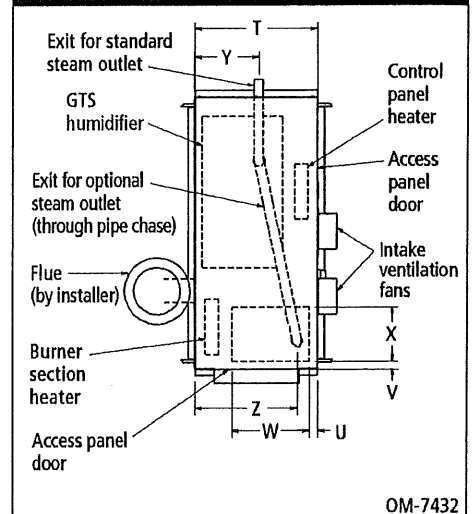
**Figure 4-2:
Outdoor enclosure mounted flush**



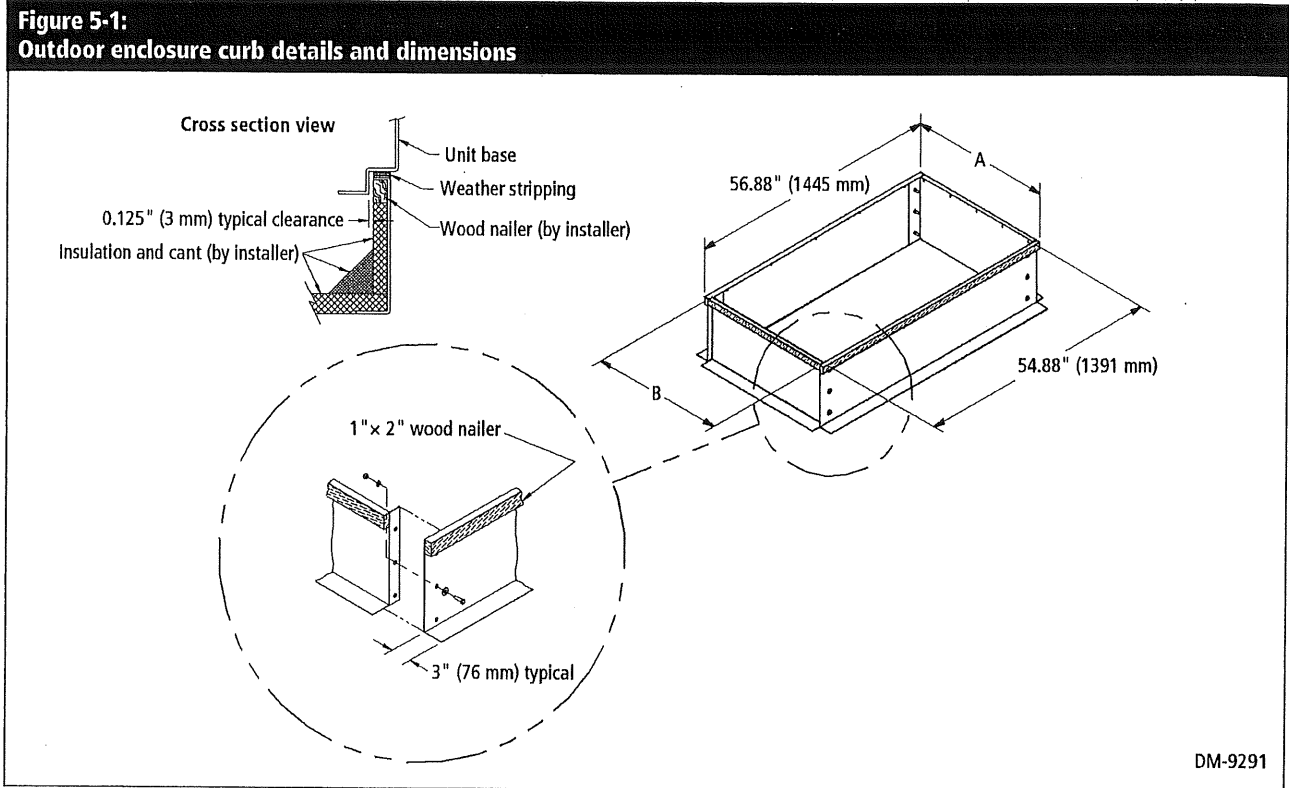
**Table 4-2:
Outdoor enclosure top view dimensions**

Description	GTS-100 GTS-200		GTS-300 GTS-400		GTS-500 GTS-600		GTS-700 GTS-800	
	inches	mm	inches	mm	inches	mm	inches	mm
T Enclosure width	26.00	660	32.00	813	42.00	1067	48.00	1219
U Pipe chase position	3.00	76	3.00	76	3.00	76	3.00	76
V Pipe chase position	3.00	76	3.00	76	3.00	76	3.00	76
W Pipe chase size	16.00	406	16.00	406	16.00	406	16.00	406
X Pipe chase size	11.00	279	11.00	279	11.00	279	11.00	279
Y Steam pipe position	36.12	917	20.12	511	30.12	765	36.12	917
Z Steam pipe position	21.00	533	27.00	686	43.00	1092	43.00	1092

**Figure 4-3:
Outdoor enclosure top view**



GTS humidifier outdoor enclosure curb details and dimensions



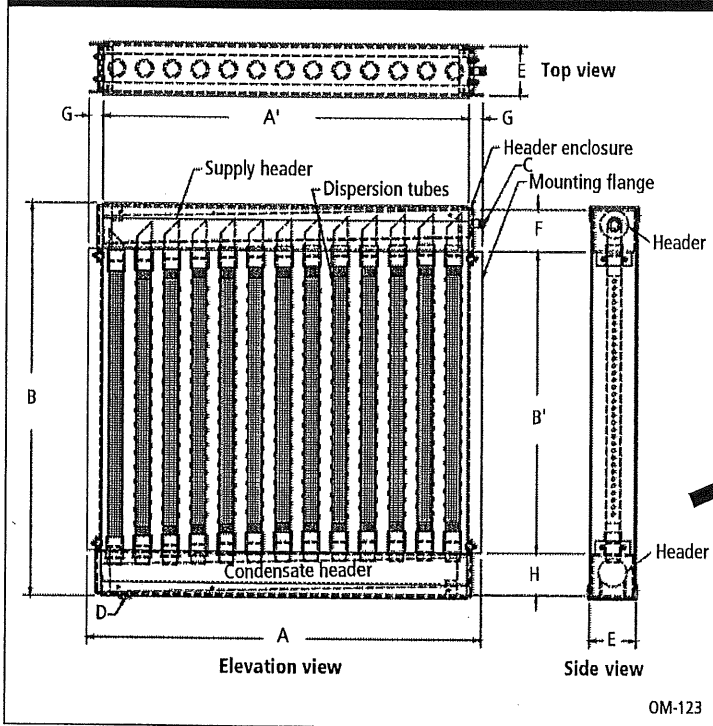
**Table 5-1:
Outdoor enclosure curb dimensions**

Outdoor enclosure model	A		B	
	inches	mm	inches	mm
Model	31.31	795	29.63	752
GTS 300, 400	31.31	795	29.63	752
Model	41.51	1045	39.63	1000
Model	47.51	1202	45.63	1150



Ultra-sorb LV mechanical specifications

**Figure 1-1:
US-LV dimensions**



Model LV

Vertical tube model for large ducts and air handlers when duct height is greater than duct width. Model LV may be used with pressurized or evaporative steam (horizontal airflow only).

**Table 1-1:
Header capacities**

Header capacity				Header diameter	
Evaporative steam		Boiler steam		inches	DN
lbs/hr	kg/h	lbs/hr	kg/h		
300	135	980	445	3	80
600	270	1750	793	4	100
1100	500	2750	1245	5	125
1850	820	4000	1815	6	150

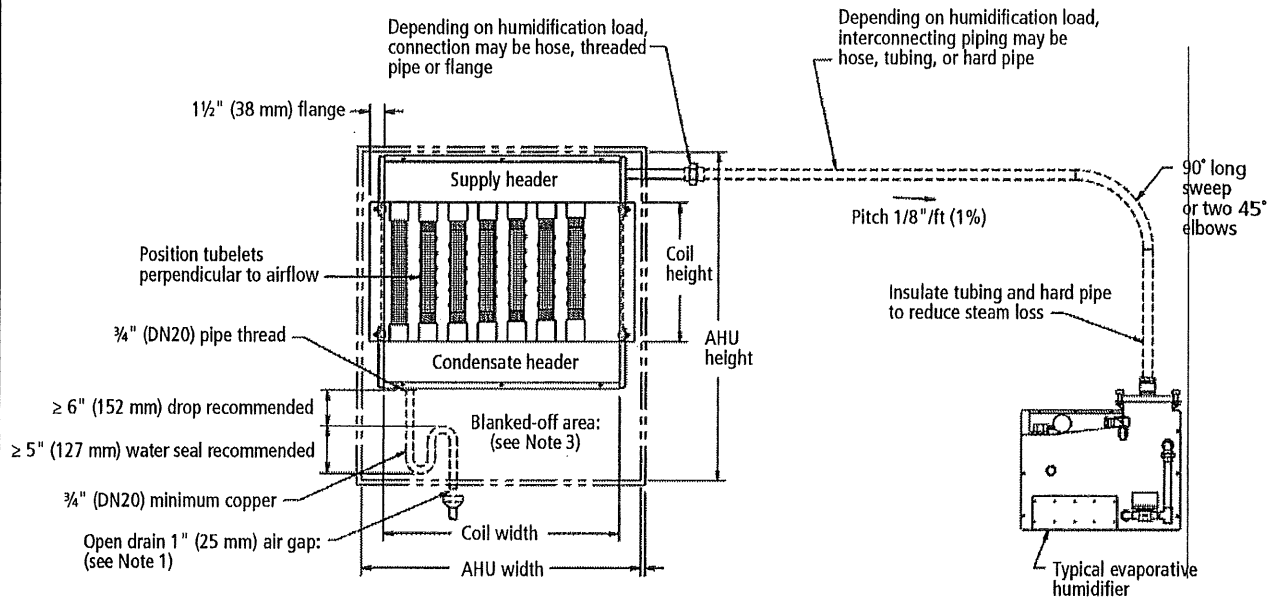
**Table 1-2:
US-LV dimensions**

Dimension	Inches (mm)
A Overall width	15" (380) min, 147" (3735) max, in 1" (25) increments
A' Face width	12" (305) min, 144" (3660) max, in 1" (25) increments
B Overall height	21" (530) min, 156" (3960) max, in 1" (25) increments Panels with overall height more than 98" (2490 mm) are shipped unassembled.
B Face height	12" (305) min, 144" (3660) max, in 1" (25) increments
C Steam inlet diameter	Determined by maximum steam capacity
D Condensate drain	¾" pipe thread (DN20)
E Header enclosure (front to back)	For 3" (DN80) and 4" (DN100) headers, E = 5" (127); for 5" (DN125) header, E = 6" (152); for 6" (DN150) header, E = 7" (178)
F Header enclosure (top to bottom)	For 3" (DN80) header F = 4.5" (114); for 4" (DN100) header, F = 5.5" (140); for 5" (DN125) header, F = 6.5" (165); for 6" (DN150) header F = 7.5" (191)
G Flange	1.5" (38)
H Condensate header enclosure	4.5" (114)

Note: Header dimensions are determined by capacity. See Tables 1-1.

Ultra-sorb LV steam dispersion panel

**Figure 3-1:
Mounting Model LV in a horizontal airflow (evaporative steam application shown)**



DC-1098

Notes:

1. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
2. When mounting an Ultra-sorb in a duct, headers and flanges are mounted outside the duct.
3. 100% of the airflow must pass through the Ultra-sorb, which means that any openings surrounding it must be sealed. The blanked-off area below the Ultra-sorb provides clearance height for water seals and condensate piping connections.
4. Model LV recommended when steam supply pressure is less than 2 PSI, specifically with steam generating humidifiers. For vertical airflow, see Ultra-sorb LH submittal.
5. Due to the pressure drop across the valve, the steam pressure at the header traps is minimal, therefore you cannot lift condensate or return condensate to a pressurized return through header traps.
6. Dispersion tubes are available at: 3" (76 mm), 6" (152 mm), 9" (228 mm), 12" (305 mm) centers.
7. Ultra-sorb humidifiers will be assembled, crated, and shipped intact in all sizes up to 98" (2490 mm) wide. Ultra-sorb can be shipped unassembled, by request, requiring field assembly.
8. Standard sizes are 12" to 144" (305 mm to 3658 mm) x 12" to 144" (305 mm to 3658 mm) in 1" (25 mm) increments. Larger sizes are available.

Each Ultra-sorb humidifier is furnished with:

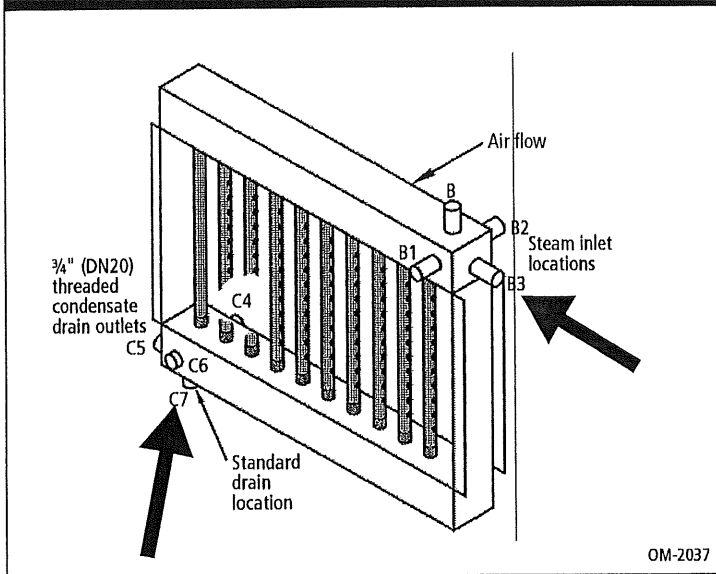
1. Type 304 stainless steel header/separator and dispersion tubes.
2. Tube adapters for connection of dispersion tubes to header (two per tube).

Each Ultra-sorb humidifier used with boiler steam is also furnished with:

1. One 3/4" NPT float and thermostatic header traps on Model LV.
2. Inlet "Y" strainer.
3. Normally closed steam valve with stainless steel parabolic plug.

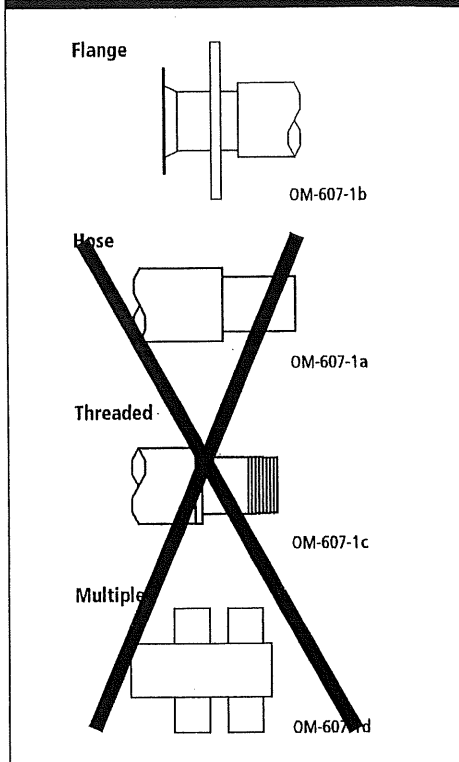
Ultra-sorb LV steam dispersion panel

**Figure 4-1:
Model LV steam inlet and condensate outlet positions**

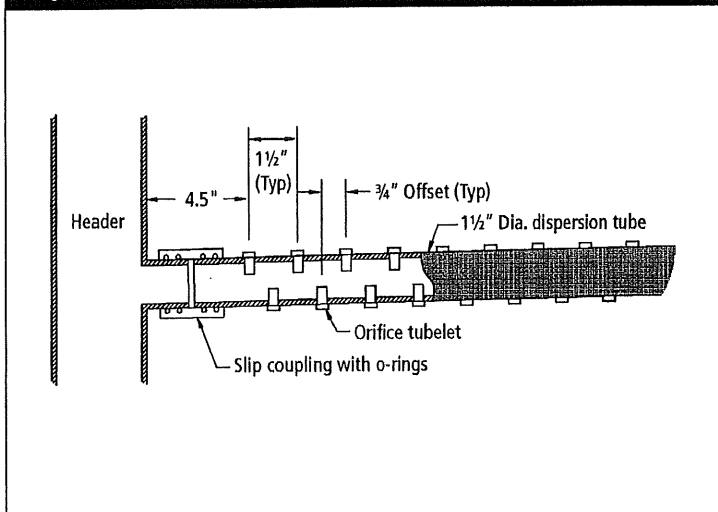


OM-2037

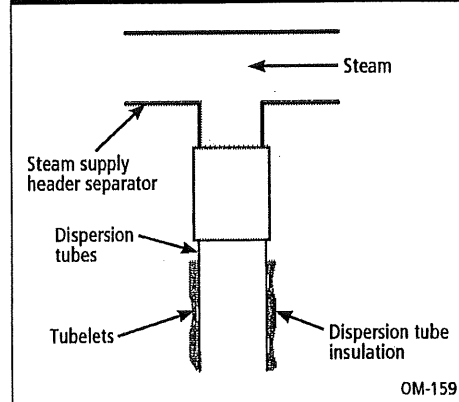
**Figure 4-3:
Model LV steam inlet types**



**Figure 4-2:
Dispersion tube detail**



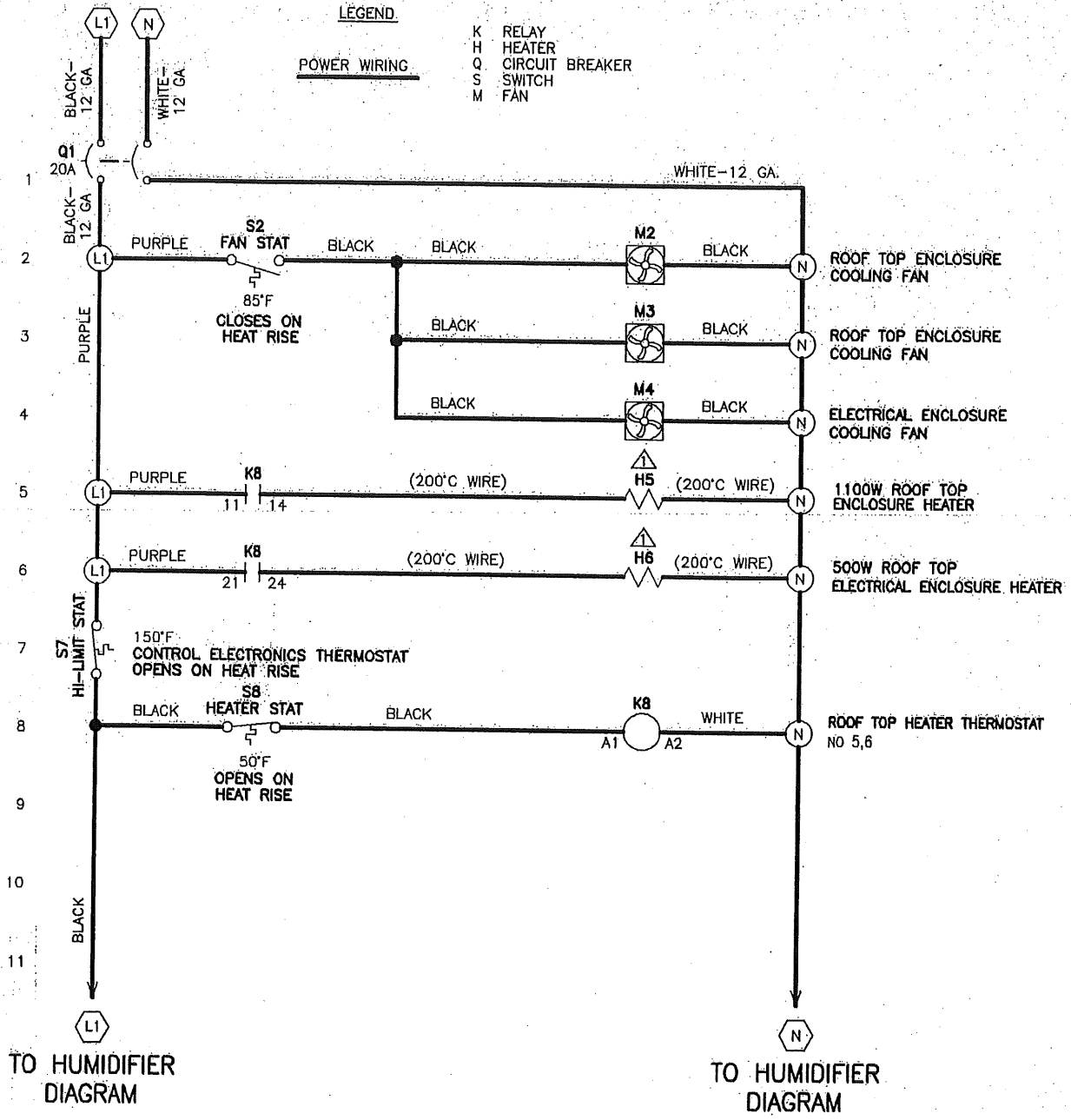
**Figure 4-4:
Insulated tube detail (High-efficiency
Tube Option)**



OM-159

DATE	REV	RECORD	DR
2/08	A	E.C.# 4604	JK
10/08	B	E.C.# 4724	JK

GTS[®] 04 WITH VL4 OUTDOOR ENCLOSURE WIRING DIAGRAM



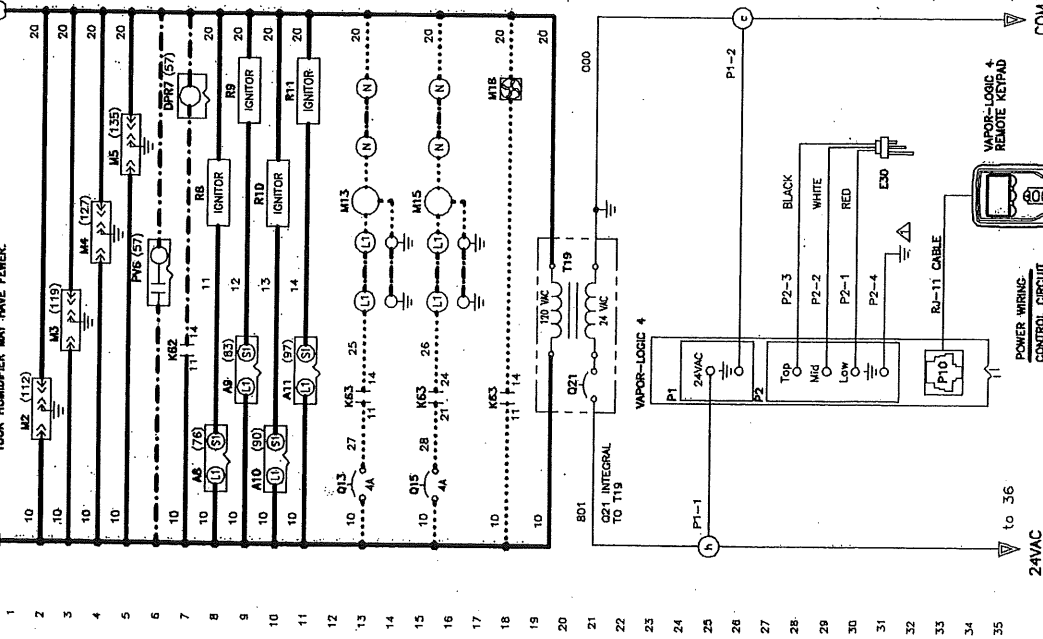
NOTES:

1. USE UNINSULATED RING TERMINALS FOR TERMINATIONS AT HEATER LUGS.
2. ALL WIRING IS 14 GAUGE UNLESS NOTED OTHERWISE.

GTS04 WITH VL4 OUTDOOR ENCLOSURE WIRING DIAGRAM	
DRISTEEM	P/N GTS04-VL4-3
SCALE:	DATE: 1/3/08
DRAWN BY: KROG	

GTS® EVAPORATIVE HUMIDIFIER FACTORY WIRING DIAGRAM W/ VL4®

WIRING DIAGRAM SHOWS MAXIMUM NUMBER OF BURNERS.
YOUR HUMIDIFIER MAY HAVE FEWER.



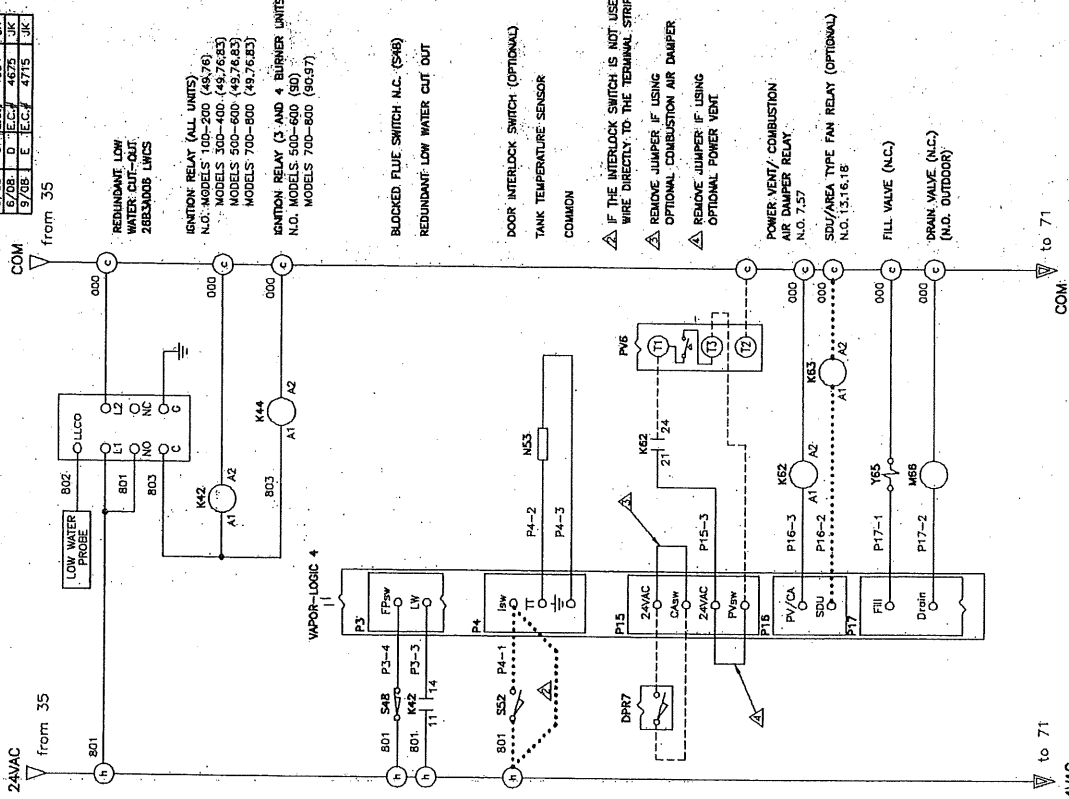
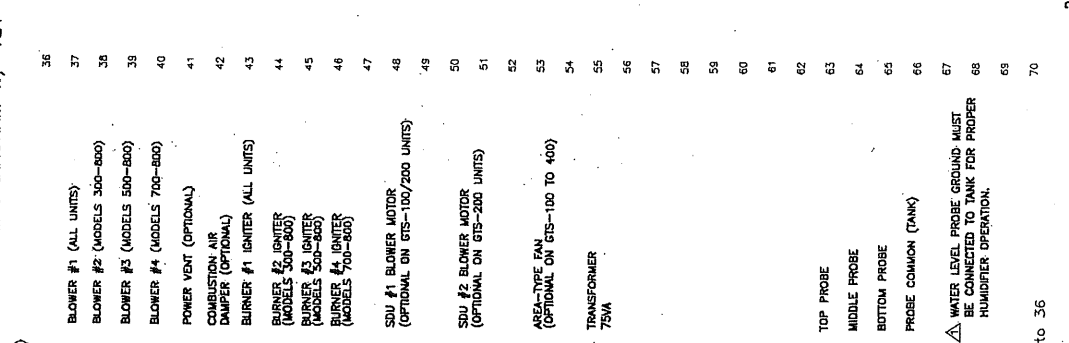
POWER WIRING
CONTROL CIRCUIT
FIELD WIRING
OPTIONAL FACTORY
CIRCUITS

VAPOR-LOGIC 4
REMOTE KEYPAD

LEGEND:
K RELAY/CONTACTOR
T TRANSFORMER
S SWITCH
A IGNITION MODULE
Y SOLENOID
N SENSOR
E JUMPER
M MOTOR/FAN

WATER LEVEL PROBE GROUND MUST
BE CONNECTED TO TANK FOR PROPER
HUMIDIFIER OPERATION.

BREAK TO EXTERNAL
CONNECTIONS DIAGRAM



DATE	REV.	RECORD	DR
5/7/08	C	E.C.F.	4604 JK
9/7/08	D	E.C.F.	4678 JK
9/7/08	E	E.C.F.	4715 JK

DOMESTIC GTS4 STANDARD
WATER WIRING DIAGRAM

SCALE: 1" = 1'-0"

PROJECT: KROG

DATE: 5/24/07

CTSD4-VL4-1
SHEET 1 OF 2

DATE	REV.	RECORD	DR
5/7/08	C	E.C.F.	4604 JK
9/7/08	D	E.C.F.	4678 JK
9/7/08	E	E.C.F.	4715 JK

LOW WATER PROBE

REDUNDANT LOW WATER CUT-OUT, 2883400D LINES

IGNITION RELAY (ALL UNITS)
N.O. MODELS 100-200 (48,78)
MODELS 300-400 (48,78,83)
MODELS 500-600 (48,78,83)
MODELS 700-800 (48,78,83)

IGNITION RELAY (3 AND 4 BURNER UNITS)
N.O. MODELS 500-600 (80)
MODELS 700-800 (90,97)

BLOCKED FLUE SWITCH N.C. (SAB)
REDUNDANT LOW WATER CUT OUT

DOOR INTERLOCK SWITCH (OPTIONAL)
TANK TEMPERATURE SENSOR
COMMON

IF THE INTERLOCK SWITCH IS NOT USED,
WIRE DIRECTLY TO THE TERMINAL STRIP

REMOVE JUMPER IF USING
OPTIONAL COMBUSTION AIR DAMPER

REMOVE JUMPER IF USING
OPTIONAL POWER VENT

POWER VENT / COMBUSTION
AIR DAMPER RELAY
N.O. 7.57

SOU/AREA TYPE FAN RELAY (OPTIONAL)
N.O. 13,18,18

FILL VALVE (N.C.)
DRAIN VALVE (N.C.)
(N.O. OUTDOOR)

LOW WATER PROBE

BOE L1 L2 L3 L4 L5 L6 L7 L8 L9 L10 L11 L12 L13 L14 L15 L16 L17 L18 L19 L20 L21 L22 L23 L24 L25 L26 L27 L28 L29 L30 L31 L32 L33 L34 L35 L36 L37 L38 L39 L40 L41 L42 L43 L44 L45 L46 L47 L48 L49 L50 L51 L52 L53 L54 L55 L56 L57 L58 L59 L60 L61 L62 L63 L64 L65 L66 L67 L68 L69 L70

LOW WATER PROBE

BOE L1 L2 L3 L4 L5 L6 L7 L8 L9 L10 L11 L12 L13 L14 L15 L16 L17 L18 L19 L20 L21 L22 L23 L24 L25 L26 L27 L28 L29 L30 L31 L32 L33 L34 L35 L36 L37 L38 L39 L40 L41 L42 L43 L44 L45 L46 L47 L48 L49 L50 L51 L52 L53 L54 L55 L56 L57 L58 L59 L60 L61 L62 L63 L64 L65 L66 L67 L68 L69 L70

GIS® EVAPORATIVE HUMIDIFIER FACTORY WIRING DIAGRAM W/ VL4®

DATE	REV.	RECORD NO.	DR.
5/7/85	A	4874	JK
5/7/85	D	4874	JK
5/7/85	E	4874	JK

WIRING DIAGRAM SHOWS MAXIMUM NUMBER OF BURNERS.
YOUR HUMIDIFIER MAY HAVE FEWER.

24VAC from 105

24VAC from 105

COM from 70

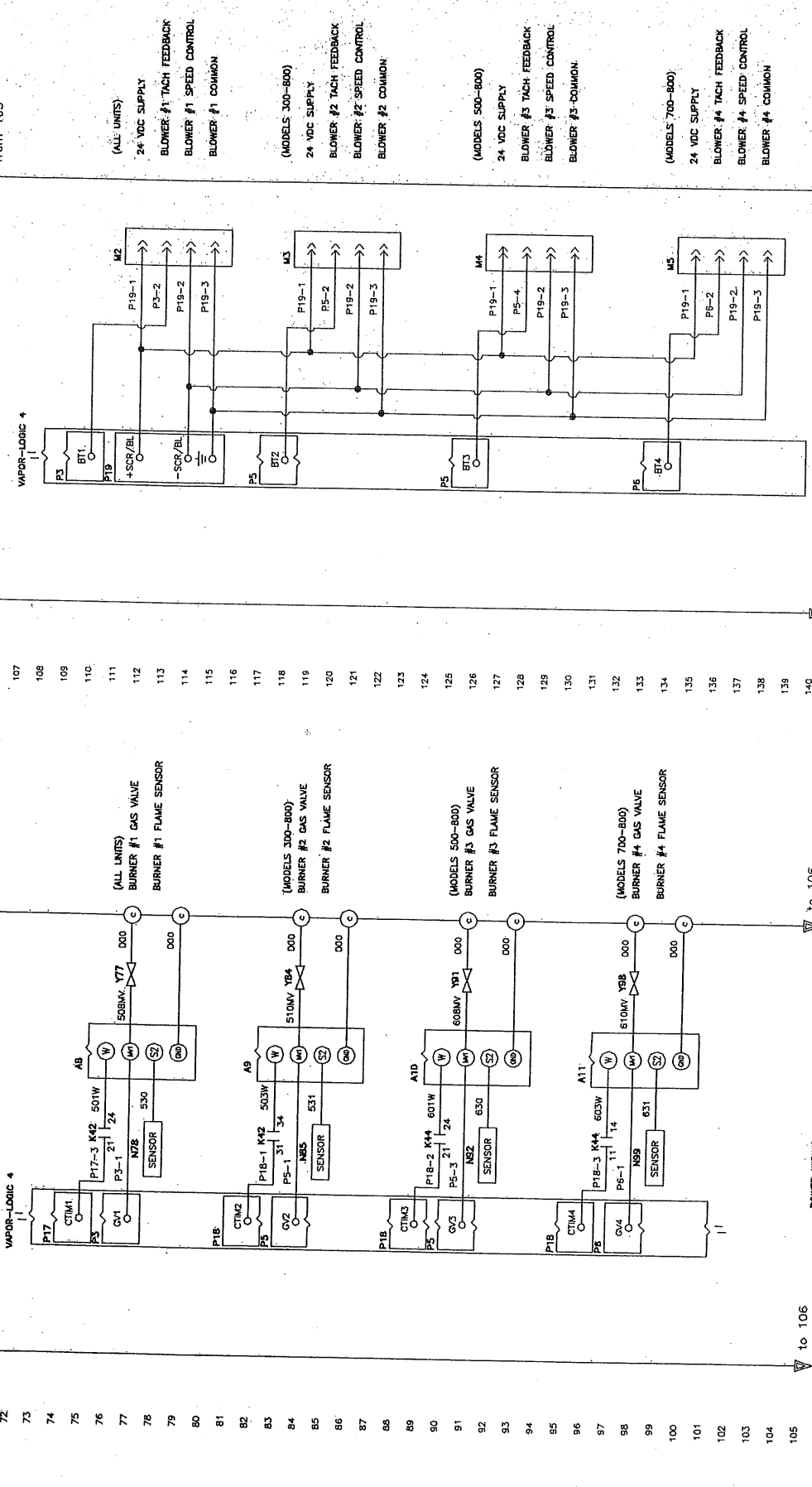
24VAC from 70

24VAC from 70

24VAC from 70

24VAC from 70

24VAC from 70



(ALL UNITS)
24 VDC SUPPLY
BLOWER #1 TACH FEEDBACK
BLOWER #1 SPEED CONTROL
BLOWER #1 COMMON

(MODELS 300-800)
24 VDC SUPPLY
BLOWER #2 TACH FEEDBACK
BLOWER #2 SPEED CONTROL
BLOWER #2 COMMON

(MODELS 500-800)
24 VDC SUPPLY
BLOWER #3 TACH FEEDBACK
BLOWER #3 SPEED CONTROL
BLOWER #3 COMMON

(MODELS 700-800)
24 VDC SUPPLY
BLOWER #4 TACH FEEDBACK
BLOWER #4 SPEED CONTROL
BLOWER #4 COMMON

(MODELS 300-800)
BURNER #2 GAS VALVE
BURNER #2 FLAME SENSOR

(MODELS 500-800)
BURNER #3 GAS VALVE
BURNER #3 FLAME SENSOR

(MODELS 700-800)
BURNER #4 GAS VALVE
BURNER #4 FLAME SENSOR

COM from 105

COM from 105

COM from 105

COM from 105

COM from 105

COM from 105

COM from 105

DOMESTIC GTS04 STANDARD WATER WIRING DIAGRAM
SCALE: 1" = 1'-0"
DATE: 5/21/07
DRAWN BY: KROOS
GTS04-VL4-1
SHT. 2 OF 2

- LEGEND:
- K RELAY/CONTACTOR
 - N SLENOID
 - O SENSOR
 - S CIRCUIT BREAKER
 - E WATER PROBE
 - A IGNITION MODULE
 - M MOTOR/FAN

POWER WIRING CONTROL CIRCUIT
FIELD WIRING
OPTIONAL FACTORY CONNECTIONS DIAGRAM
BREAK TO EXTERNAL CONNECTIONS DIAGRAM

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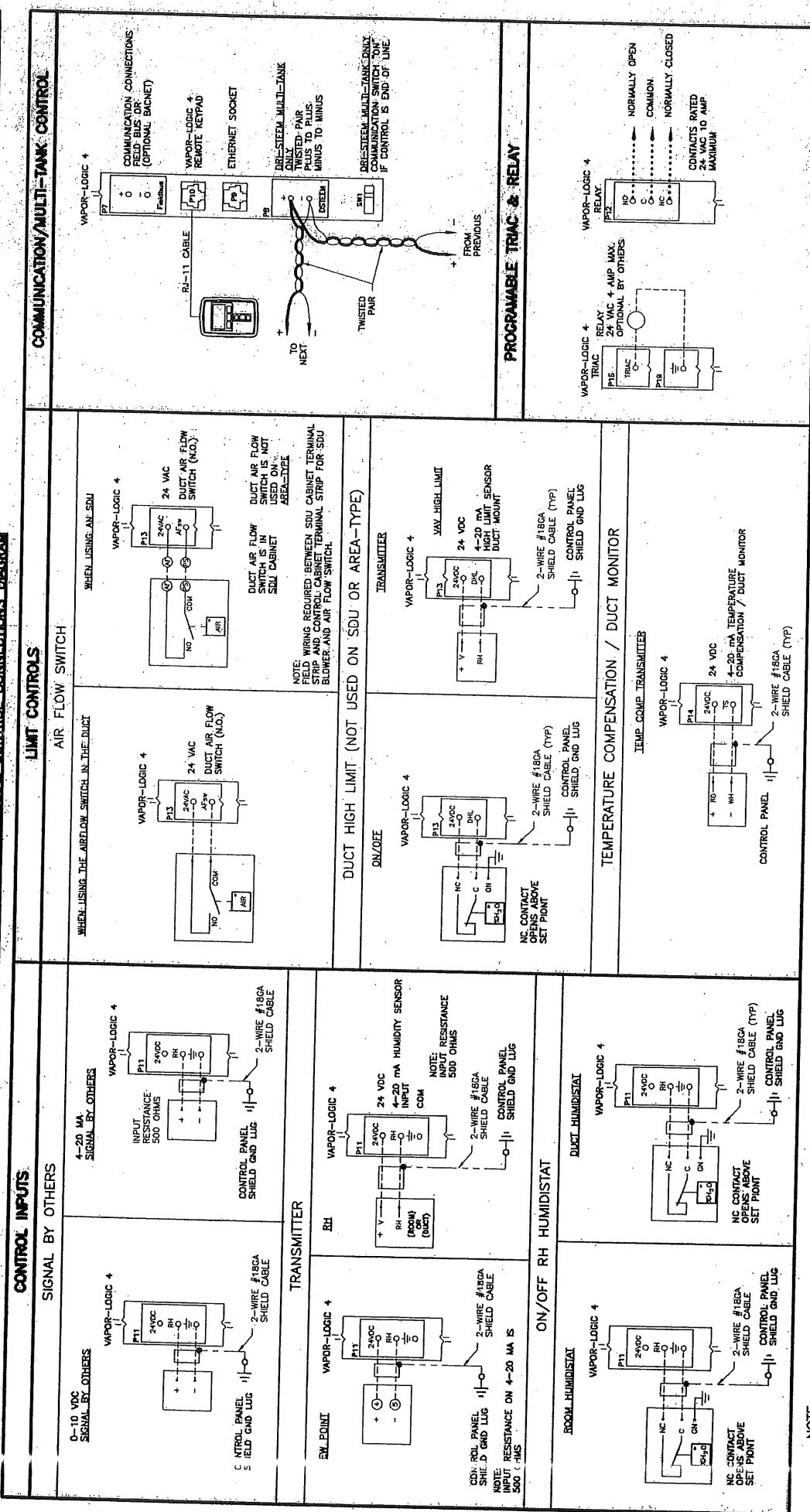
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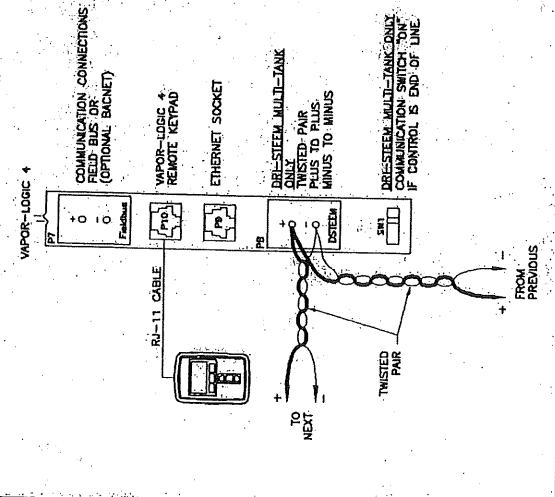
VAPOR-LOGIC 4 EXTERNAL CONTROL CONNECTIONS DIAGRAM



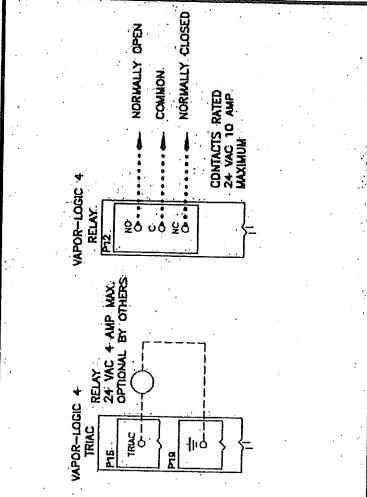
NOTE:

CHANGING CONTROL INPUT SIGNAL MAY REQUIRE WIRING CHANGE AND PROGRAM CHANGE. REFER TO VAPOR-LOGIC 4 INSTALLATION AND OPERATION MANUAL (IOM), KEYPAD INPUT SELECTION SUB-MENU.

COMMUNICATION/MULTI-TANK CONTROL



PROGRAMMABLE TRAC & RELAY



DRISTEEM

VAPOR-LOGIC 4 EXTERNAL CONNECTIONS DIAGRAM

SCALE: 1/8" = 1"

DATE: 1/20/07

REV: 7A

VL4-1

CONTROL CIRCUIT WIRING

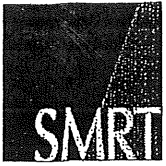
FIELD WIRING

OPTIONAL FACTORY OPTIONAL FIELD

BREAK TO EXTERNAL CONNECTIONS DIAGRAM

HVAC Boilers (2)
NATURAL GAS

Submittal
Review Memo



Project Name: MPHC MOB - Constr Administration Job #: 0813912
To: Jared Ballard Submittal #: 129-235216-1
Pizzagalli Construction
131 Presumpscot Street
Portland, ME 04103
Submittal Title: Condensing Boilers Pre-Construction Submittal

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

SMRT, Inc.
REVIEW DATE: 10/26/2009
BY: TAC

08139-12 #129

Remarks:
Design intent was to control secondary HW pumps with DDC controls. Secondary pump control not required on boiler control system.

Closest Combustible
(7 feet)

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Northeast Mechanical Corporation
139 Cash Street
South Portland, Maine 04106
Contact: Chuck Cyr
Phone: 207-799-8533
Fax: 207-799-5642

SPECIFICATION SECTION: 235216

PARAGRAPH: Part 2 Products

DRAWINGS: M-601 Boiler Schedule

ITEM: CONDENSING BOILERS

JOHNSON & JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed

Subject to Architects Approval

Date 9/24/09 By JMA

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

CONDENSING BOILERS

MANUFACTURER: CLEAVER BROOKS

SUPPLIER: Northeast Mechanical Corporation
139 Cash Street
South Portland, Maine 04106
Contact: Dan Burnell Cell: 207-939-6329
Phone: 207-799-8533
Fax: 207-799-5642

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey road
Scarborough, Maine 04074
Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619

INCLUDES:

1. BOILER & CONTROLS DATA SHEET
2. BOILER SHOP DRAWING (with ASME stamp indication)
3. BOILER WIRING DIAGRAM
4. BOILER PRODUCT INFORMATION
5. BOILER SYSTEM CONTROLLER
6. BOILER SAMPLE WARRANTY (Actual warranty will be provided when boilers are manufactured)
 - a. Standard Cleaver Brooks Warranty
 - b. Extended Warranty 10 years fire side corrosion
 - c. Extended Warranty 20 years pressure vessel / heat exchanger

*****PLEASE NOTE*****

Submittal of source quality control testing will be supplied after boilers are constructed and tested.

Field start-up reports will be provided after units are started in place.

Installation, operation & maintenance information will be provided with manuals at close

Warranty included is a sample warranty the actual warranty is product specific and will be produced after the product is built.

1.

1. BOILER & CONTROLS DATA SHEET

NORTHEAST



MECHANICAL
CORPORATION

1-800-883-7661
www.nemech.com

Solutions for Peak Performance

CLEAVER  **BROOKS**

The power of commitment.

Boiler/Controls Data Sheet

Quantity: Two (2) – Tag; B-1, B-2
 Project: Martins Point Healthcare
 Boiler Model #: CFC700-1000-60HW
 Burner Type: PreMix Natural Gas Full Modulation
 Boiler Input: 1,000,000 BTUH
 Boiler HW Output: 940,000 BTUH @ 104° F
 Natural Gas Requirements: 1,000 CFH @ 7" WC

The boilers shall be designed and constructed in accordance with ASME Section IV, GE-Gap, CSD-1 for 60# design. The burners shall be capable of operation firing natural gas with full modulation type control. The boilers shall include the following:

Item #	Qty.	Description
# 1	2	Model CFC-700-1000 Clearfire Condensing Hot Water Boiler, 120/1/60V, Natural gas fired. Supply gas pressure - 2 PSI, Required gas pressure 0.25 PSI, Altitude 100 ASL (1 cor. factor) 7" WC Gas Regulator included Yes- Include with order Max. setpoint temperature - 180 Deg. F, Operating pressure - 30 psig, Safety valve - 60 psig. Configuration Check: Standard Selections
# 2	2	Sealed Combustion Kit: 500 - 1000
# 3	2	Falcon Boiler Control (Standard): Includes ModBus communications, remote alarm contact, remote firing rate 4-20 Ma input.
# 4	2	SystemMAX CFC Boiler Kit - Includes Wireless Boiler I/O Module, (2) Water Temp Sensor w/thermowells, Boiler interface Cable, Sensor Cable. Each kit can control Boiler plus one Boiler Pump, Isolation Valve, or Damper.
# 5	1	SystemMAX System Kit - Shipped loose (supports up to 16 boilers) - Includes Master Display Touchscreen, Wireless System I/O module w/ModBus communication, (2) Water Temp Sensors w/thermowells, Outdoor Temp Sensor, Flow Meter kit, Sensor Cable.
# 6	1	SystemMAX Submittals: Wiring Diagram and Typical System Piping/Installation Drawing
# 7	1	SystemMAX Auxilliary Pump Kit (Shipped loose) - Includes Wireless I/O Module. (Can control up to 2 System or Zone Pumps)
# 8	2	Gas Pressure Regulator: Equimeter 122-6 3/4" x 3/4" with a Spring Range: 6" - 14" w. c.
# 9	2	Gas Pressure Relief Valve: Fisher 289H, 1"
# 10	1	SystemMAX DHW Kit (Shipped loose) - Includes Wireless I/O Module. (Can control up to 2 Input / Outputs)
# 11	2	Aux Low Water Cutoff (Shipped Loose)

470 Riverside Street, Unit #6, Portland, ME 04103 * 207-799-8533 – FAX 207-799-5642
 Portland, ME * Brewer, ME * Hooksett, NH

NORTHEAST



MECHANICAL
CORPORATION

1-800-883-7661
www.nemech.com

Solutions for Peak Performance

# 12	2	Condensate Treatment Package (Tank, Lid, Trap)
------	---	--

The "Systemax" Boiler Plant System shall include:

- Master Display Touchscreen
- Wireless SID "System Intelligence Device", I/O module with Mod-Bus Communications.
- Wireless AIM "Auxillary Input Module", System Pump Control
- Wireless SPOT "Set Point Override Terminal", Domestic Hot Water Control
- (2) Wireless BIM "Boiler I/O Module", Boiler and Boiler Pump Control.
- Outdoor Air Temperature Sensor
- Flow Meter
- (6) Temperature Sensors.

Regards,

Chuck Cyr
Sales Engineer
Northeast Mechanical
(800)-883-7661
VP Blake Group Commercial Sales

470 Riverside Street, Unit #6, Portland, ME 04103 * 207-799-8533 – FAX 207-799-5642
Portland, ME * Brewer, ME * Hooksett, NH

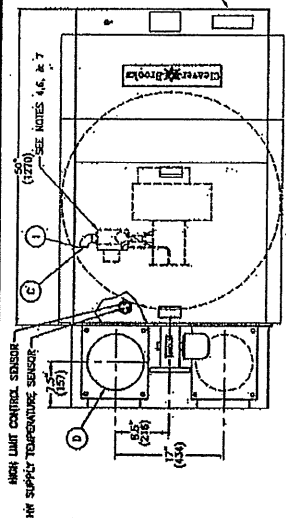
2.

2. BOILER SHOP DRAWING (with ASME stamp indication)

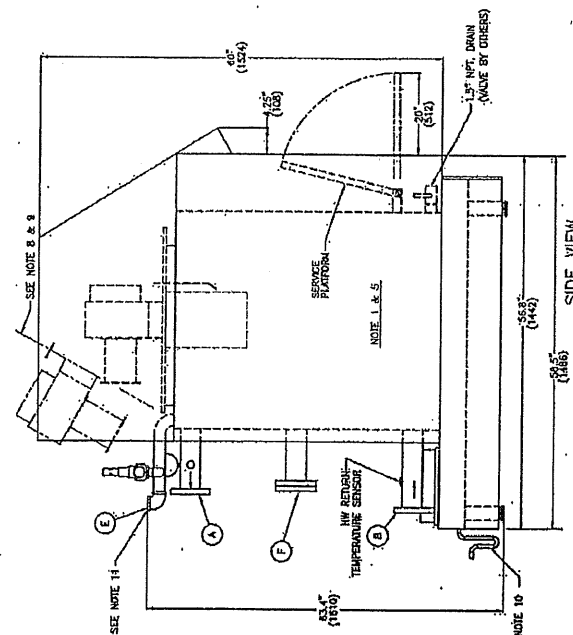
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- NOTES:**
1. - PRESSURE VESSEL IN ACCORDANCE WITH ASME SECTION IV WITH "H" STAMP FOR 60 PSI.
 2. - PACKAGED BOILER CERTIFIED PER CSA & CSA LABELED. TRIM & GAS TRAIN PER CSA/GSD-1.
 3. - BOILER LEGS ALLOW FOR ADJUSTMENT OF 2.5".
 4. - BURNER IS PREMIX WITH FULL MODULATION OF 5:1 TURNDOWN.
 5. - UNIT IS FACTORY FIRE TESTED.
 6. - GAS TRAIN EQUIPPED WITH HIGH AND LOW GAS PRESSURE SWITCHES, MANUAL RESET.
 7. - GAS PRESSURE ADJUSTOR IS NOT PROVIDED AND MUST BE PROVIDED BY USER.
 8. - ALLOW 1/4" ABOVE BOILER FOR BURNER OPENING ACROSS TOP OF BOILER.
 9. - BOILER TO BE FIELD PIPED WITH A 6" MINIMUM CONDENSATE DRAIN TRAP.
 10. - PIPE AIR VENT TO EXPANSION TANK OR USE AUTO AIR VENT TUBE.

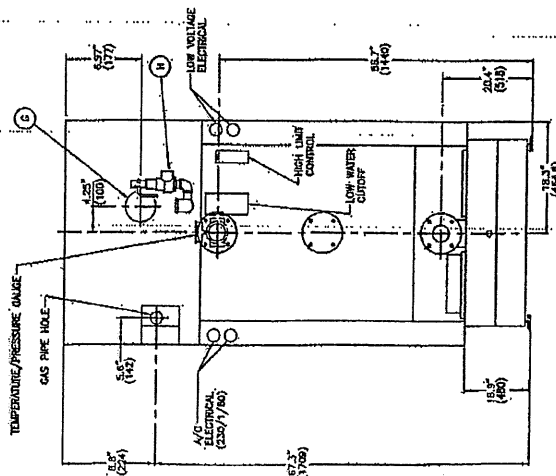
ASME REQUIREMENTS



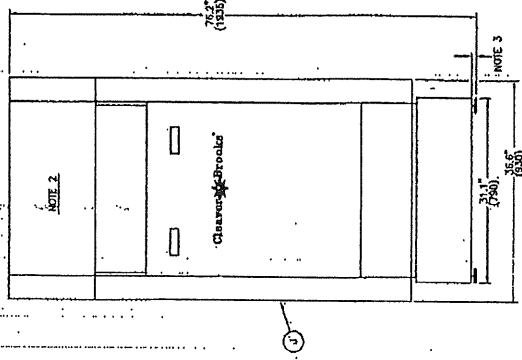
PLAN VIEW



SIDE VIEW



REAR VIEW



FRONT VIEW

- A. - HW SUPPLY 2.5" FLG
- B. - GAS CONNECTION 2" FLG
- C. - STACK CONNECTION 8" OD
- D. - VENT AIR 1" FLG
- E. - SEALED COMBUSTION 6" (OPTION)
- F. - RELIEF VALVE 1" 60 PSIG
- G. - INLET GAS PRESSURE 7" W.C.
- H. - SHIP WEIGHT 1,354 LB (705KG)

- I. - HIGH LIMIT CONTROL
- J. - LOW WATER CUTOFF
- K. - TEMPERATURE/PRESSURE GAUGE
- L. - GAS PIPE INLET
- M. - A/G ELECTRICAL
- N. - LOW WATER CUTOFF
- O. - HIGH LIMIT CONTROL
- P. - LOW WATER CUTOFF
- Q. - SERVICE PLATFORM
- R. - 1 1/2" NPT DRAIN (MADE BY OTHERS)

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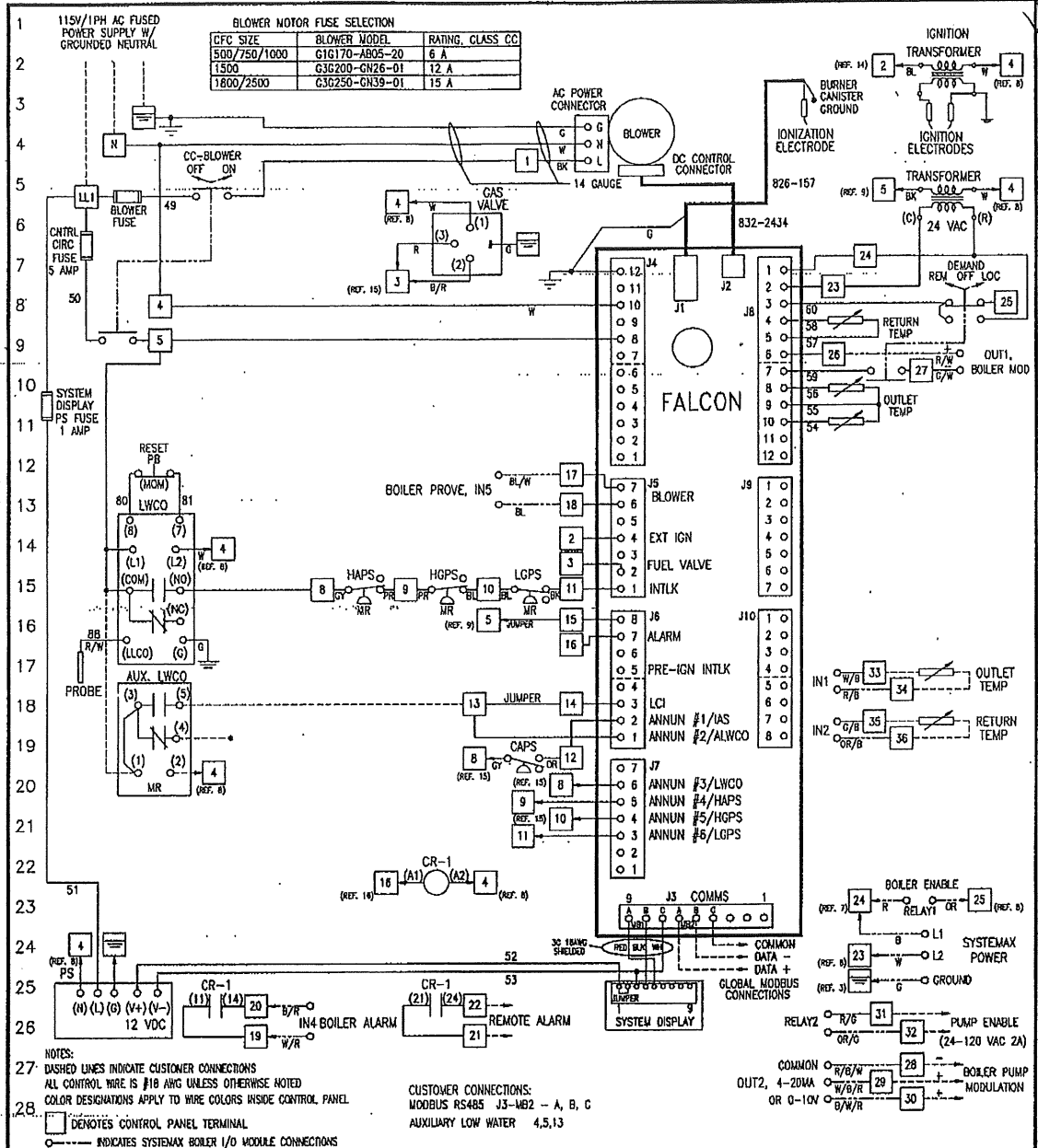
REVISIONS DRWG. NO. DD1000CFC 00	
WARNING: Changes, modifications or alterations are strictly prohibited. Changes to this drawing and subsequent modification of equipment could result in damage to the equipment and/or serious personal injury.	
Martins Point Healthcare DIMENSION DIAGRAM	
SHT 01 OF 01	
SCALE N.T.S.	DATE 12-15-05
DRAWN JAD	SIZE B
Cleaver-Brooks BOILER DIVISION	
CFC MODEL NO. 700-115	PUEL. SIZE 1 HERTZ 60 WIRE 2 INSURANCE CSD-1
1000 SIZE 60HW PRESSURE	

3.

3. BOILER WIRING DIAGRAM

Boiler Wiring

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SUGGESTIONS AND INFORMATION CONTAINED ON THIS DRAWING ARE NOT INTENDED TO SUPPLANT LOCAL CODES.



MARTINS POINT HEALTHCARE
 PORTLAND, ME
 SYSTEMAX ISD

TERMINALS: LL1, N, G, 1, 2, 3, 4-4-5-5-5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

SHT 01 OF 01

02077

REVISIONS	SCALE N.T.S.	CLEAVER-BROOKS The power of commitment™			
	DATE 08/27/09				
	DRAWN GG	CFC MODEL 700	FUEL SIZE 1000	60HW PRESSURE	INSURANCE
	SIZE A	120 VOLTS	1 PHASE	60 HERTZ	2 WIRE
DRWG. NO. 02077-1-1WD 00					

4.

4. BOILER PRODUCT INFORMATION



PREMIER CONDENSING HOT WATER BOILERS FROM CLEAVER-BROOKS



CLEARFIRE CONDENSING MODEL CFC

A BOILER IN TUNE WITH THE ENVIRONMENT AND TODAY'S MARKET NEEDS

Size Range from 500 - 2500 MBH • No Minimum Return Water Temperature
Low NOx Emissions < 20 PPM • Sealed Combustion Option • Whisper Quiet

B. STANDARD EQUIPMENT

1. The Boiler

The boiler is designed for a Maximum Allowable Working Pressure (MAWP) of 60 psig (4.1 Bar) in accordance with the ASME Code for Low Pressure Section IV Hot Water Boilers and is stamped accordingly. Operating pressure shall be less than 54 psig (3.72 Bar).

The vessel is mounted on a steel base with insulation & casing provided including trim and controls. Trim and controls include safety relief valve, pressure/temperature gauge, probe type low water control, and CB Falcon hydronic boiler control with associated sensors.

2. The Burner (See Figure 1-4)

Incorporating "premix" technology, the burner utilizes a venturi, dual safety shutoff-single body gas valve, variable speed blower, and Fecralloy metal fiber burner head.

With the integral variable speed combustion air fan, 5:1 turndown is provided.

Combustion canister of the burner is constructed of a Fecralloy-metal fiber for solid body radiation of the burner flame, which provides low emissions.

At maximum firing rate, the sound level of the burner is less than 70 dBA, measured in front of the boiler at a distance of 3 feet.

Provision for direct vent combustion is furnished.

Combustion Air Proving Switch and High Air Pressure Switch.

3. Burner Gas Train (See Figure 1-5 & Figure 1-6)

The gas train assembly is provided in accordance with CSA certification and ASME CSD-1. The gas train assembly is factory assembled and wired, consisting of the following components:

- A. Low Gas Pressure Switch - manual reset
- B. High Gas Pressure Switch - manual reset
- C. Single body, dual safety shutoff gas valve with integral trim regulator
- D. Integral Venturi
- E. Manual Shutoff Ball Valve
- F. CSD-1 Test Cocks

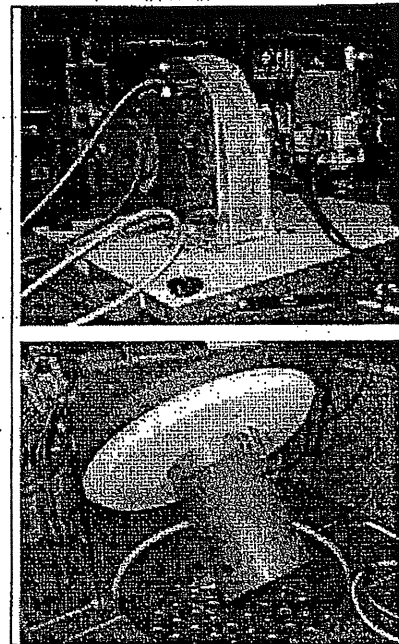


Figure 1-4

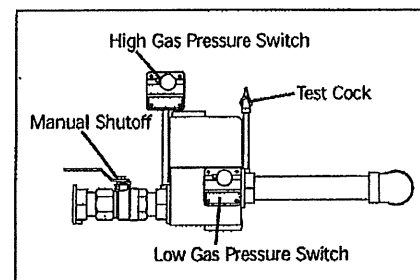


Figure 1-5 Standard Gas Train, CSA and ASME CSD-1

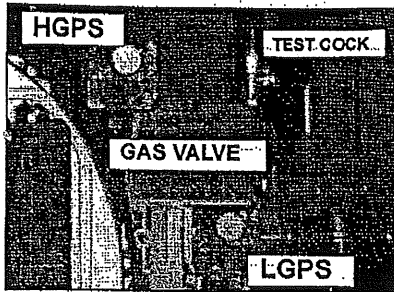


Figure 1-6 Standard Gas Train Components per CSA and ASME CSD-1

4. Control (See Figure 1-7)

The CB Falcon hydronic control is an integrated burner management and modulation control with a touch-screen display/operator interface.

The controller is capable of the following functions:

- Two (2) heating loops with PID load control.
- Burner sequencing with safe start check, pre-purge, direct spark ignition, and post purge.
- Electronic ignition.
- Flame Supervision.
- Safety shutdown with time-stamped display of lockout condition.
- Variable speed control of the combustion fan.
- Supervision of low and high gas pressure, air proving, stack back pressure, high limit, and low water.
- First-out annunciator.
- Real-time data trending.
- (3) pump/auxiliary relay outputs.
- Modbus communication capability.
- Outdoor temperature reset.

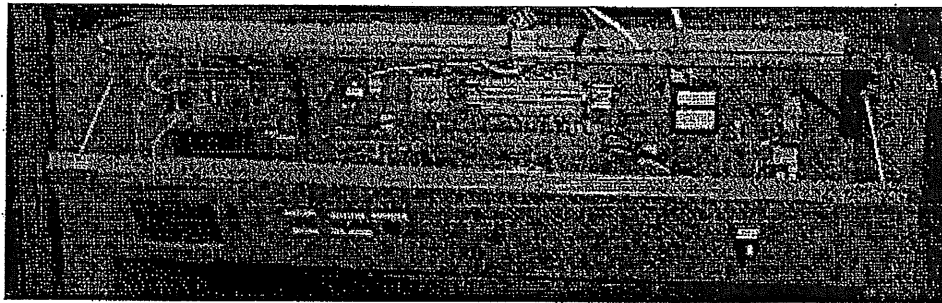


Figure 1-7 Control panel (hinged access panel open)

5. Component/Connection Locations

Figure 1-8 shows the CFC component orientation and heat flow path. Note the downfired design of the burner and the orientation of the hot water outlet and return connections. The return water connection is at the bottom of the vessel and the hot water outlet is near the top.

Figure 1-9 shows the locations of the safety valve and low water cutoff. **Figure 1-10** shows the supply and return connections and the location of the return water temperature sensor. Looking at the top of the boiler, near the rear, **Figure 1-11** shows the three hole sensor well for the outlet temperature sensor.

When standing at the back of the boiler, the stack can be connected on the right side of the boiler (**Figure 1-12**) or on the left side (**Figure 1-13**). Refer to Chapter 3 of this manual for recommended vent sizes and lengths for the specific boiler installation.

6. Optional Equipment

Certain options may have been supplied with the boiler that are relative to the project requirements if these options were specified with the boiler at the time of order entry. Also, some options may have been provided [by others] that are not part of Cleaver-Brooks scope of supply. In either case, the Cleaver-Brooks authorized representative should be consulted for project specifics.

These are the options that are available for the CFC boiler from Cleaver-Brooks:

- A. Reusable air filter.
- B. Condensate neutralization treatment tank assembly - consists of neutralizing media, filter, and PVC condensate holding tank. This assembly is mounted beneath the boiler and is further described in Chapter 2.
- C. Outside air intake for direct vent combustion.
- D. Outdoor temperature sensor for indoor/outdoor control.
- E. Shipped loose Auxiliary Low Water Control for field piping by others into the system piping.
- F. Alarm Horn for safety shutdown.
- G. Relays for output signal for burner on, fuel valve open.
- H. Stack Thermometer.
- I. Stack temperature limit-sensor.
- J. Common condensate drain trap.

Table 1-1 Model CFC Water Temperature Data

Minimum supply temp.	33°F
Maximum operating temp.	194°F
Maximum design temp.	210°F

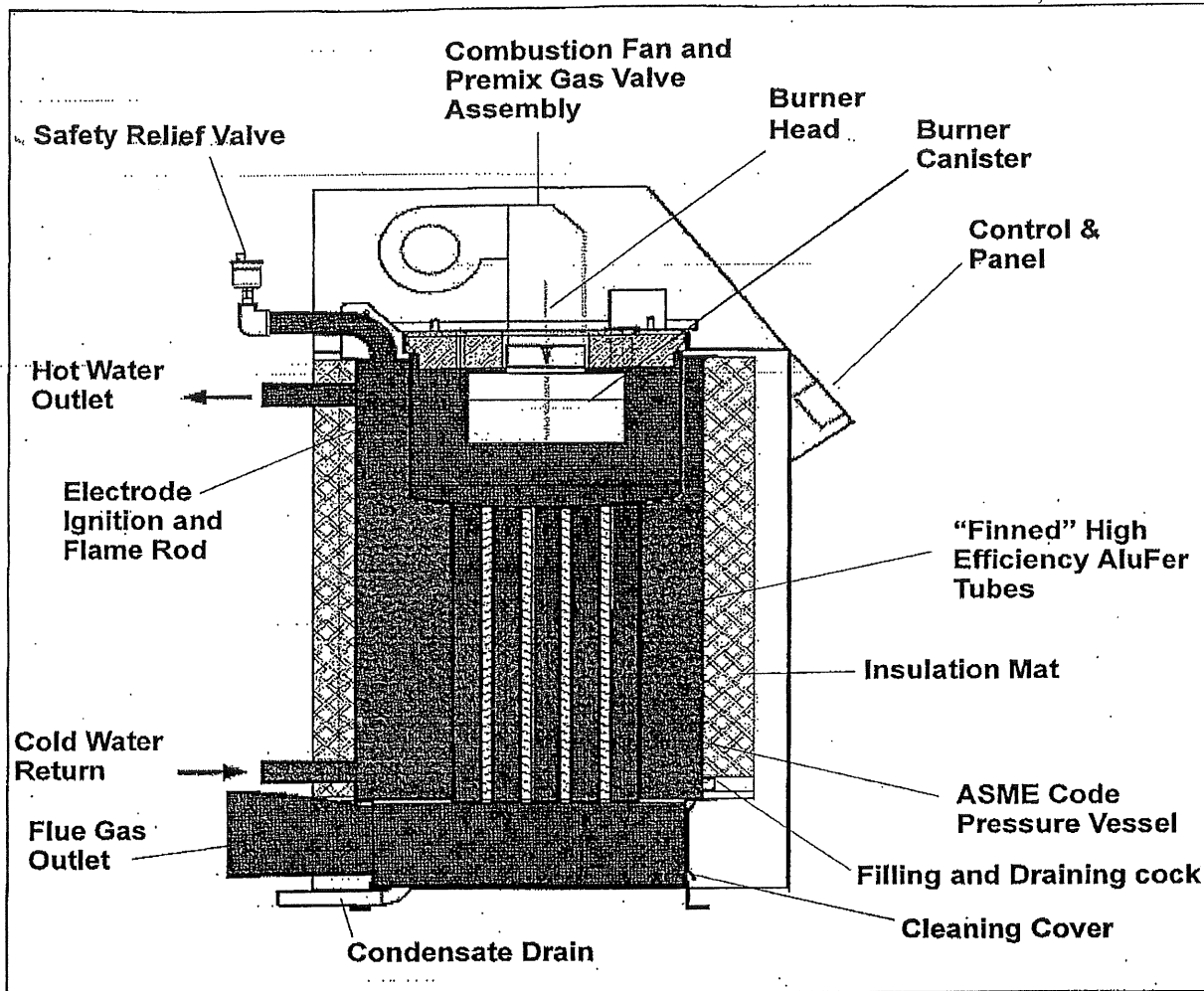


Figure 1-8 CFC Heat Flow and Component Orientation

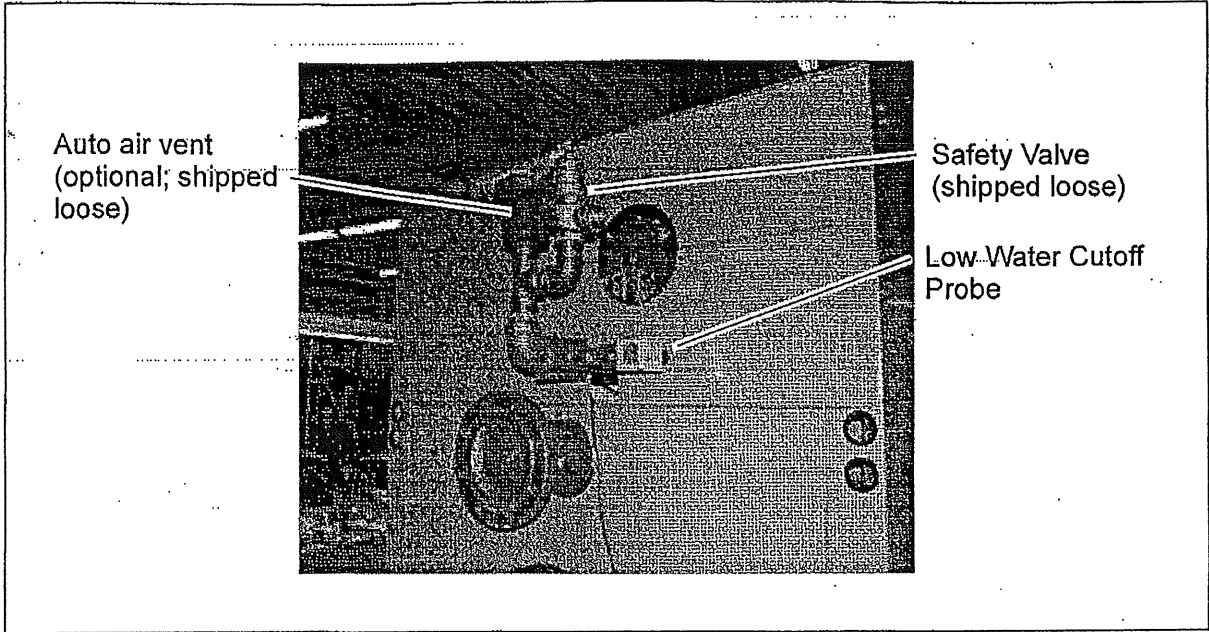


Figure 1-9 Boiler Controls

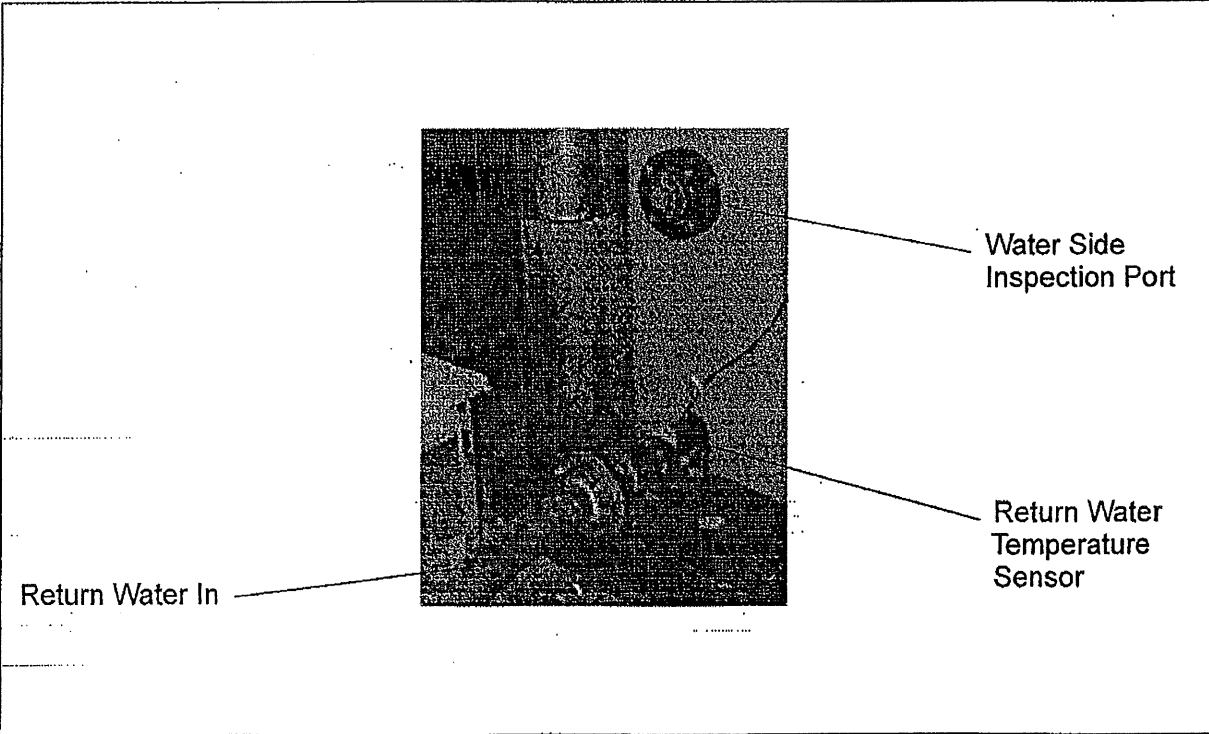


Figure 1-10 Return Temperature Mounting

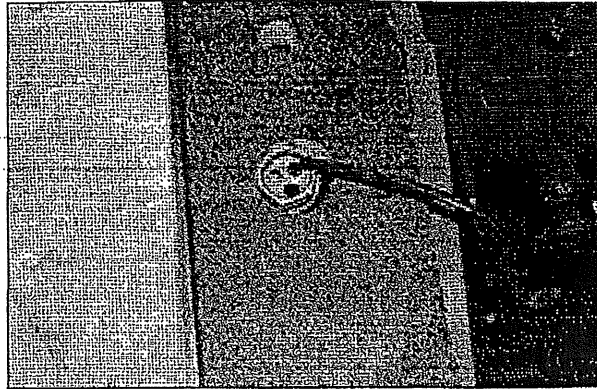


Figure 1-11 Temperature Sensor, Top of Pressure Vessel

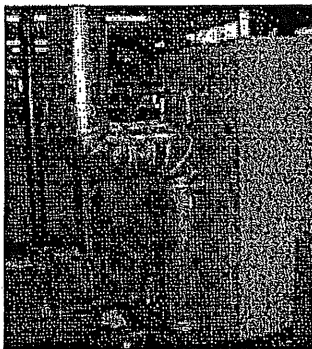


Figure 1-12 Stack Right Side (viewed from rear)

The stack can be mounted on the right (Figure 1-12) or left (Figure 1-13) side on the back of the boiler base.

The flue gas duct sizes may be reduced at the vent connection.
See also Chapter 4 - Stack and Intake Vent Sizing and Installation.

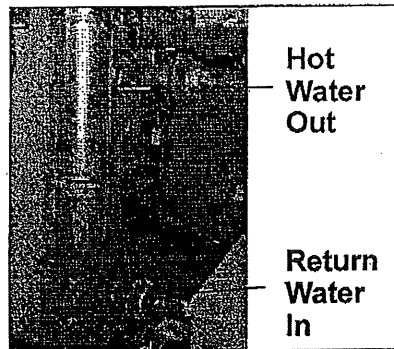
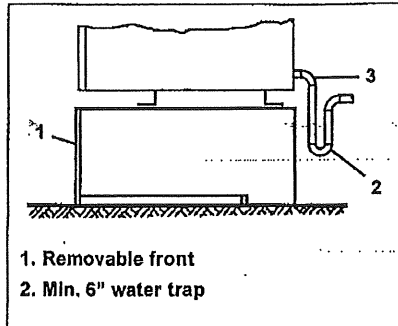


Figure 1-13 Stack Left Side (viewed from rear)



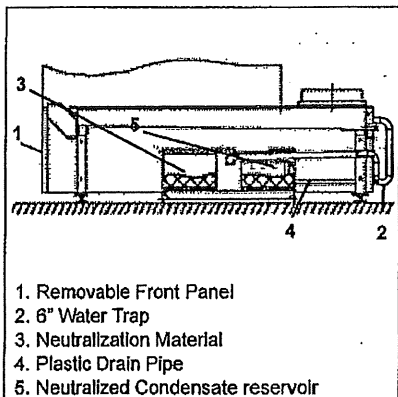
- 1. Removable front
- 2. Min. 6" water trap

Figure 2-29 Condensate Piped Direct to Drain

1. Condensate Tank Setup Options

The boiler is supplied with boiler legs (standard) which are sized to permit the installation of the condensate collection tank. There are two (2) condensate tank styles available:

- (1) The condensate is piped directly to a drain through the piping and water trap supplied during installation (see Figure 2-29).
- (2) The condensate is held in a condensate tank under the boiler. The condensate is neutralized as it passed through the granular bed. The neutralized condensate is then piped to the drain (see Figure 2-30).



- 1. Removable Front Panel
- 2. 6" Water Trap
- 3. Neutralization Material
- 4. Plastic Drain Pipe
- 5. Neutralized Condensate reservoir

Figure 2-30 Condensate Tank with neutralization material.

2. Condensate Take-off and Neutralization

To ensure compliance with regulations, it is important to contact the responsible authorities prior to the planning and execution of the boiler installation. Condensate flow of 5 to 12 GPH can be expected depending on boiler size and return water temperature.

3. Condensate discharge into local drain

For discharge into a local drain a water trap must be installed per Figure 2-31.

- 1. Piping is to be a minimum of 3/4" NPT.
- 2. Maximum discharge pipe height from floor to be 9".
- 3. Condensate water trap (6") required.

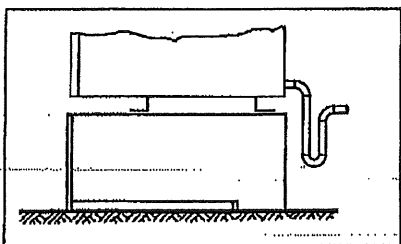


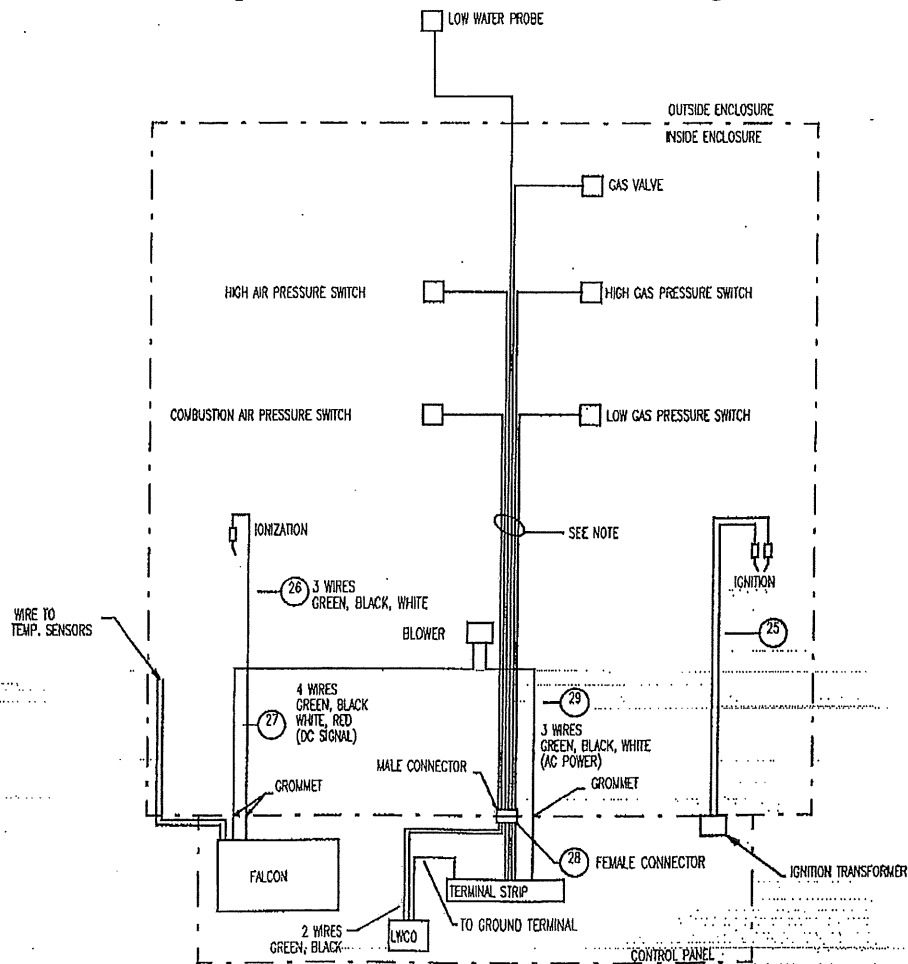
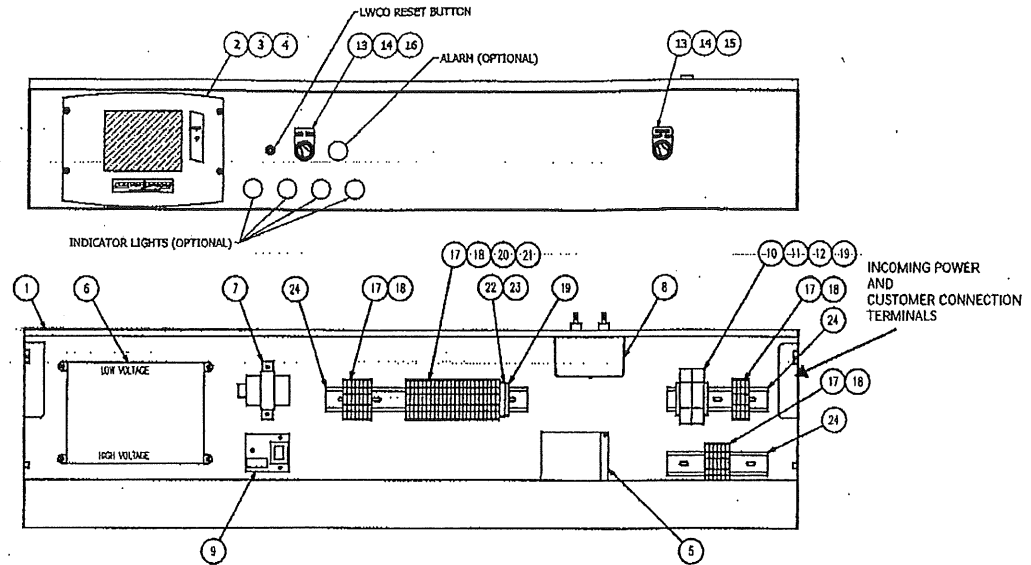
Figure 2-31 Condensate Discharge Piping

4. Piping treated condensate to drain

Figure 2-32 shows the gravity flow condensate treatment assembly.

- Item (1) is the bottom side casing of the boiler.
- Item (2) is the water trap 6" minimum.
- Item (3) is the condensate tank assembly
- Item (4) is the condensate drain line.
- Item (5) is the condensate reservoir tank.
- Item (6) is the piping from trap to the treatment tank.

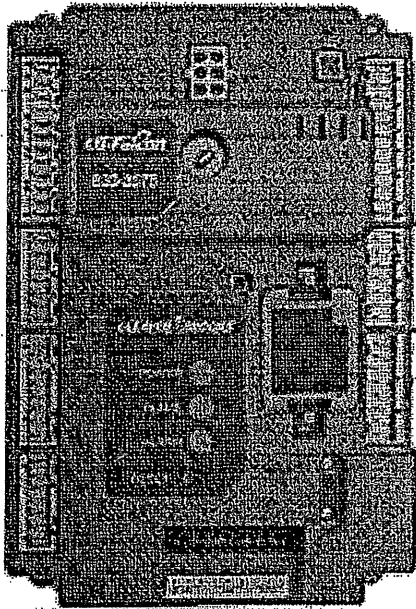
Figure 6-2. Electrical Assemblies





Hydronic Control

PRODUCT DATA



APPLICATION

The CB Falcon is a hydronic boiler control system that provides heat control, flame supervision, circulation pump control, fan control, boiler control, and electric ignition function. It will also provide boiler status and error reporting.

Multiple boilers can be joined together to heat a system instead of a single, larger burner or boiler. Using boilers in parallel is more efficient, costs less, reduces emissions, improves load control, and is more flexible than the traditional large boiler.

CB Falcon System Consists of:

CB Falcon Control Device
833-3577 Touchscreen Display—required for setup and ModBus communication but not required for the system to operate once the CB Falcon is programmed.
Flame Rod or UV flame detector
Temperature Sensor, NTC Type 10K Ω at 77°F (25°C) or 12K Ω at 77°F (25°C)
Limit Sensor, NTC Type 10K Ω at 77°F (25°C)
Local Keyboard Display Module
Fans (VFD)

FEATURES

Safety and Boiler Protection

- Frost Protection, Slow Start, Anti-condensate, Boiler Delta-T, Stack Limit, Boiler Limit, DHW Limit, Outlet T-Rise Limit

Integrated Control Functions:

- Primary Flame Safeguard Control
- Internal or external spark generator
- Analog Input using 10kohm NTC Sensor
 - Outlet Limit And Temperature
 - DHW (Domestic Hot Water) Limit and Temperature
 - Stack Temperature Limit and Temperature
 - Inlet Temperature
 - Outdoor Temperature
- Other Analog Inputs
 - PWM Feedback
 - Flame Signal from either a Flame Rod or Ultraviolet Detector
- PID Load Control
 - CH (Central Heat)
 - DHW (Domestic Hot Water)
- Digital Inputs
 - Pre Ignition Interlock
 - LCI (Load [or Limit]Control Input)
 - Airflow Interlock
 - Annunciation (8 Programmable) (6 Programmable plus High Fire and Low Fire Switch Interlocks)
 - Remote Reset
 - TOD (Time of Day)

CLEAVER BROOKS

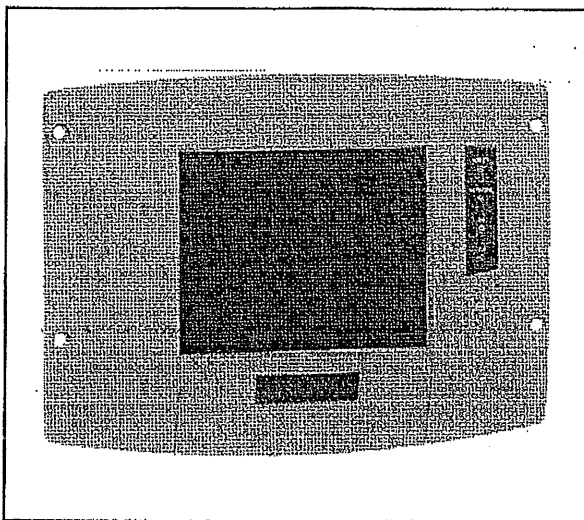
CB FALCON HYDRONIC CONTROL

- **Digital Outputs**
 - Pump Control (3 outputs, 5 different programmable features)
 - Combustion Blower
 - External Ignition
 - Pilot Valve
 - Main Valve
 - Alarm
- **Analog Outputs**
 - Modulation
 - 4-20mA
 - 0-10 Vdc
 - PWM for Variable Frequency Drives
- **Algorithm Prioritization**
 - Burner Demand
 - CH, DHW and Frost Protection
 - Firing Rate Limiting
 - Anti-Condensate, Stack Limit, Boiler Delta-T, Boiler Slow Start, Outlet Limit, On and Off Hysteresis
- **Two Temperature Loops of Control**
 - CH
 - DHW
- **High Limit Control (Meets UL 353)**
- **Fifteen Item Fault Code History Including equipment status at time of lockout**
- **Fifteen Item Alert Code Status including equipment status at time of internal alerts**
- **24Vac Device Power**
- **24 or 120Vac Digital I/O models available.**
- **Flame Signal test jacks (Vdc)**
- **Three Status LEDs**
 - Power
 - Flame
 - Alarm
- **Analog NTC Sensor Inputs (10kohm or 12kohm)**
NOTE: 12kohm sensors cannot be used for Limit Application functions.
- **Flame Sensing**
 - Ultraviolet
 - Flame Rod
 - Single Element (Internal spark generator and flame sense using the same element)
 - Dual Element (separate elements for ignition spark and flame sense)



833-3577 CB-Falcon System Operator Interface

USER GUIDE



FEATURES

- Individual and multiple boiler status, configuration, history, diagnostics, and trend analysis.
- Allows configuration and monitoring of the 833-3639 system.
- Allows monitoring of the 833-3639 burner control sequence, flame signal, diagnostics, historical files, and faults.
- Allows switching view between multiple boilers.
- Allows for lead/lag commissioning (future enhancement).
- Locates attached boilers.
- Allows boiler naming.
- System trend analysis.
- Color 3.5 in. x 4.625 in. (5.7 in. diagonal) user interface display.
- Touch screen.
- Three communication ports:
 - Two RS-485 Modbus™ ports
 - One Ethernet port
- LED indicators:
 - Power
 - Modbus™ (COM 1) communication
- Flush mounting.
- Touch screen disable for screen cleaning.
- 12 Vdc power supply (included).
- Screen saver.
- Contrast control.
- Volume control.
- Real-time data trending analysis.
- Graphic user interface.

APPLICATION

The 833-3577 is a microprocessor-based touch-screen display module that provides an operator interface for monitoring and configuring parameters in the 833-3639 CB-Falcon system.

The 833-3577 is flush mounted into a panel cutout (8-1/8 in. W x 5-7/8 in. H). Wiring connections to the 833-3577 are through a removable 9-pin wiring header.

Contents

Preface	2
Installation Instructions	3
Wiring	3
Quick Setup	4
Starting the Display	4
Configuration	15
Monitoring	28
833-3639 Diagnostics	40
Display Setup and Diagnostics	42
Advanced Setup	48
Table 42 Configuration Parameters	43
Table 43, 44 Other Tables	52

CB Manual Part Number 750-241



65-0296-01

PREFACE

This User Guide is intended to provide a general overview of the 833-3577 Operator Interface. The general overview goes to page 13 and the actual configuration begins on page 15.

It is intended to guide you through the features and operation of the 833-3577 as you interface with the 833-3639 CB-Falcon control and establish the Parameter points of the system.

Note that this sheet (like the 833-3650 CB-Falcon) shows all parameters. The actual product may have parameters made invisible or Read Only by the OEM as they may not apply for their product.

Use the Product Data Sheet for the 833-3639 CB-Falcon (form 750-241) as a guide and explanation of the parameters that are being programmed.

Included Power Supply:

Inputs: 85 to 264 Vac, 47-63 Hz; 120 to 370 Vdc

Output: 12 Vdc; 0 to 2.1 A.

Power: 25W

Operating Temperature: 32°F to 122°F (0°C to 50°C)

Storage/Shipping Temperature: -40°F to 158° (-40°C to 70°C).

Humidity:

85% maximum relative humidity.

Approvals:

FCC Part 15, Class A Digital Device

Underwriter Laboratories, Inc. (UL) (cUL) Component

Recognized (for non-continuous operation); File Number MH20613 (MCCZ)

Canada: ICES-003

Dimensions: See Fig. 1.

SPECIFICATIONS

Electrical Ratings:

833-3577:

+12 Vdc input, maximum of 500 mA current drain.

Replacement Parts

- 9-pin connector—50020034-001
- Power Supply—Manufactured by MeanWell

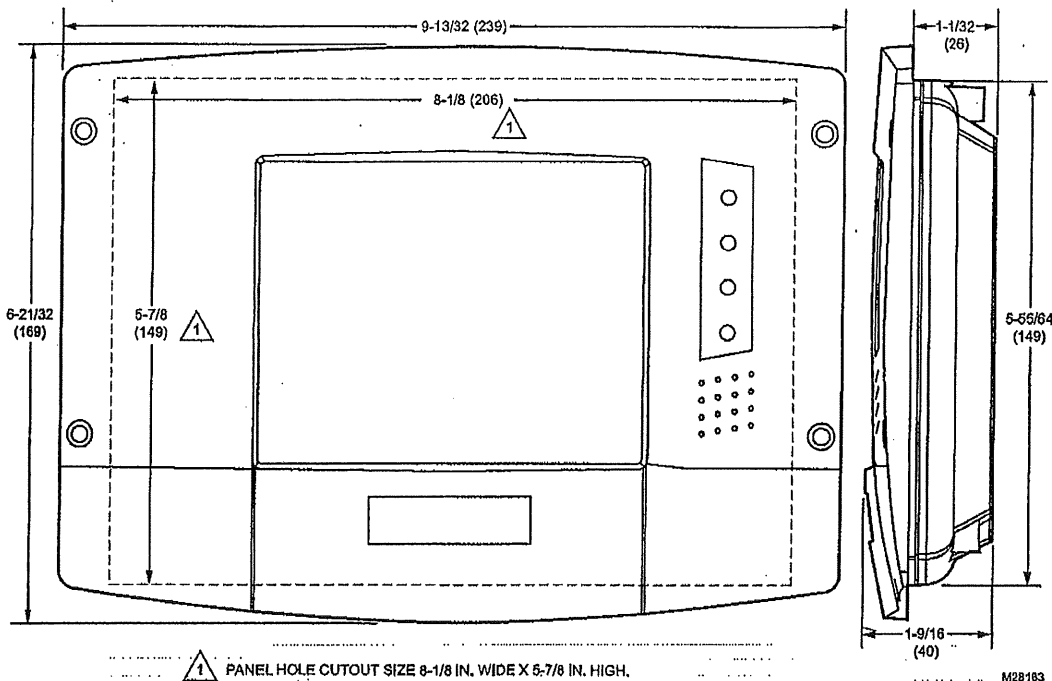


Fig. 1. 833-3577 dimensions in in. (mm).

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This Class A digital apparatus complies with Canadian ICES-003.

Cet Appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Figure 6-2. Gas train

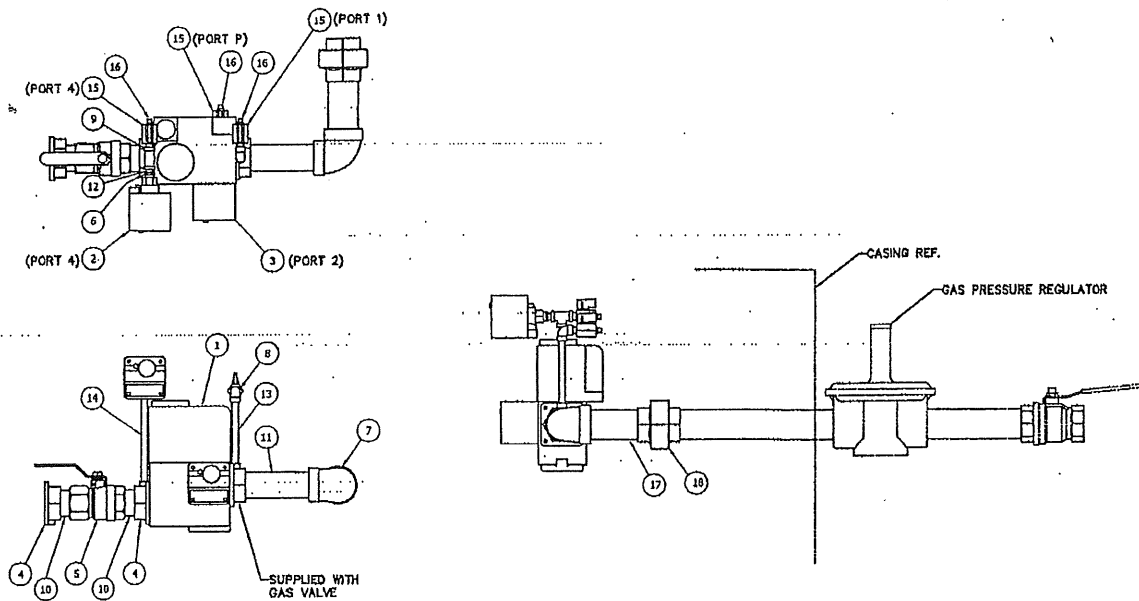


Table 6-4. Gas train parts list

ITEM	QTY	BOILER SIZE						DESCRIPTION
		500	750	1000	1500	1800	2500	
1	1	940 07162	940 07163	940 07164	940 07165	940 07235	940 07235	GAS VALVE, C/W ADAPTER
2	1	817 02420	817 02420	817 02420	817 02420	817 02420	817 02420	HIGH GAS PRESSURE SWITCH (HGPS)
3	1	817 02414	817 02414	817 02414	817 02414	817 02414	817 02414	LOW GAS PRESSURE SWITCH (LGPS)
4	2	800 00092	800 00092	800 00092	800 00093	800 00093	800 00093	ADAPTER, PIPE, GAS VALVE, C/W O-RING, BOLTS & NUTS
5	1	941 01944	941 01944	941 01944	941 01945	941 01945	941 01945	BUTTERBALL VALVE,
6	1	847 01172	847 01172	847 01172	847 01172	847 01172	847 01172	BUSHING, REDUCING, HEX HEAD
7	1	847 00551	847 00552	859 00082	847 00557	847 00557	847 00557	ELBOW, REDUCING, 90°
8	1	859 00077	859 00077	859 00077	859 00077	859 00077	859 00077	ELBOW, 90°
9	1	859 00021	859 00021	859 00021	859 00021	859 00021	859 00021	TEE
10	2	857 00673	857 00673	857 00673	857 00709	857 00709	857 00709	NIPPLE
11	1	857 00652	857 00708	857 00673	857 00757	857 00757	857 01607	NIPPLE
12	1	857 00719	857 00719	857 00719	857 00719	857 00719	857 00719	NIPPLE
13	1	857 02199	857 02199	857 02199	857 02199	857 02199	857 02199	NIPPLE
14	1	857 01642	857 01642	857 01642	857 01642	857 01642	857 01642	NIPPLE
15	3	825 00239	825 00239	825 00239	825 00239	825 00239	825 00239	LEAKAGE TEST COCK
16	3	858 00088	858 00088	858 00088	858 00088	858 00088	858 00088	PLUG PIPE, SQUARE HEAD
17	1	857 00644	857 00644	857 00644	857 00669	857 00669	857 00669	NIPPLE,
18	1	858 00166	858 00166	858 00166	858 00168	858 00168	858 00168	UNION, FEMALE, 150# M.I.

Table 6-5. MSOV Kit

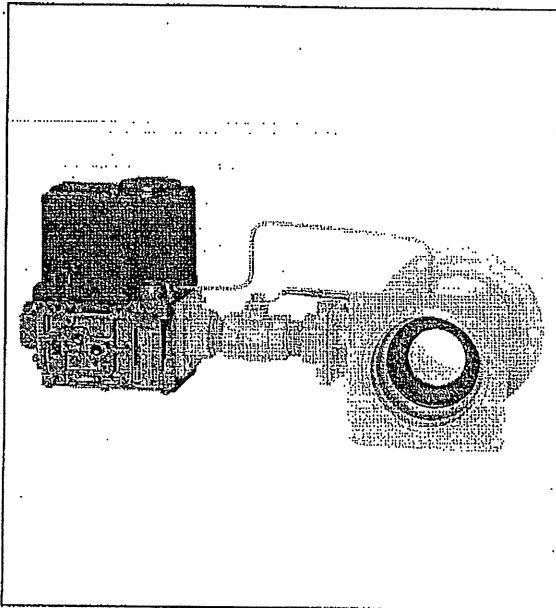
BOILER SIZE	500	750	1000	1500	1800	2500
	1" NPT KIT# 380-01046			1.25" NPT KIT# 380-1047		
BUTTERBALL VALVE	941-01944	941-01944	941-01944	941-01945	941-01945	941-01945
NIPPLE, CLOSED	857-00673	857-00673	857-00673	857-00709	857-00709	857-00709
ADAPTER, GAS VALVE	800-00092	800-00092	800-00092	800-00093	800-00093	800-00093
O-RING W/HARDWARE						
GASKET W/HARDWARE	800-98	800-98	800-98	800-99	800-99	800-99

Honeywell

V4730C/V8730C/V4734C

1:1 Gas/Air Servo Regulated Gas Valves

Product data



Note: Photo shows valve with manual safety shutoff valve and venturi installed.

CONTENTS

Application	1
Features	1
Specifications	2
Ordering Information.....	3
Installation	13
Electrical Connections	14
Adjustments and Final Checkout	14
Operation	15
Troubleshooting.....	16
Service Information	16

APPLICATION

The V4730C/V8730C/V4734C 1:1 Gas/Air Servo Regulated Gas Valves, with the addition of the Venturi Mixing Unit (VMU) and dc fan, are used for modulating premix appliances such as gas burners, gas boilers, rooftop units, makeup air units and process applications.

FEATURES

- Wide modulation range (14% to 100% of burner load).
- 24 Vac and 120 Vac models.
- Main valve body with two shutoff seats (double block valve).
- Closing time less than one second.
- Mesh screen (strainer) between inlet flange and main body.
- Various pressure tap points available at main body when no additional valves or pressure switches are used.
- DIN 43650 Plug Connector with 36-in. (914 mm) leadwires included.
- Flexible mounting positions of venturi manifold to fan.
- Replaceable pipe flange adapters available.
- Position indication lamp for each valve stage

SPECIFICATIONS

The specifications in this section are related to the Venturi Mixing Unit (VMU) and Combination Gas Valve.

Models: See Table 1

Table 1: Model Information

Model Number	Size (in.)	Voltage/Frequency	V1 - V2 Total Current	Capacity (Natural Gas @ 645 psig)
V4730C1006	1/2	120 Vac, 50/60 Hz	0.32 A	22-150 kW (73-512 kBtuh)
V4730C1014	3/4			43-300 kW (146-1024 kBtuh)
V4730C1022	1		0.5 A	55-382 kW (185-1300 kBtuh) ^{a/71} - 500 kW (245-1710 kBtuh)
V4730C1030	1-1/4			
V4734C1002	1-1/4	120 Vac, 50/60 Hz	2.6 A at start 1.04 A during operation	97-680 kW (326-2287 kBtuh) when used with VMU680 unit
V8730C1007	1/2	24 Vac, 50/60 Hz	1.56 A	22-150 kW (73-512 kBtuh)
V8730C1015	3/4			43-300 kW (146-1024 kBtuh)
V8730C1023	1		1.72 A	55-382 kW (185-1300 kBtuh) ^{a/71} - 500 kW (245-1710 kBtuh)
V8730C1031	1-1/4			

^a When used with VMU335 Venturi Unit Anwendung

Maximum Operating Pressure (UL):

1.45 psi (100 mBar), except for 1-1/4 in. size:

(24V): 1 psi (70 mBar).

(120V): 1.45 psi (100mBar)

CSA Approved: 0.5 psi (34 mBar).

Note: CSA Certification to 1/2 psi.

Connections:

1/8 in. (3 mm) NPT pressure taps at inlet and outlet flanges. Eight flange connections are provided at the main body to mount either a pressure switch (high or low) or a ValveProving System (VPS).

Torsion and Bending Stress:

Pipe connections meet EN151, Group 2, requirements.

Electrical Equipment:

Standard DIN plug connector with 36-in. (914 mm) leadwires.

Valve Position Indicator Lamps:

Inboard (closest to the valve body) - V1.

Outboard - V2.

Ambient Temperature Range:

5°F to 140°F (-15°C to +60°C).

Coil Insulation Solenoid Valves:

Class H insulation system.

Body Material:

Aluminum alloy, die-cast

Strainer:

Fine mesh screen (0.135 in. [0.34 mm] diameter), AISI 303 steel, serviceable after removing inlet flange screws. Meets EN161 requirements for strainers

Seals and Gaskets:

Hydrocarbon-resistant NBR and Viton rubber types.

Flange Kit:

Consists of one flange with sealing plug, one O-ring and four screws. See Table 2.

Note: Valve comes with one kit only.

Table 2: Flange Kits.

Part Number	Size NPT in. (mm)
32006652-001	1/2 (13)
32006652-002	3/4 (19)
32006652-003	1 (25)
32006652-004	1-1/4 (32)

Manual Shut-Off Valve Kits:

50002653-001 for use with 1 in. NPT or smaller valves.

50002653-002 for use with 1-1/4 in. NPT valves.

5.

5. BOILER SYSTEM CONTROLLER

Boiler Plant
Control

CB-SystemMAX ISD

An Intelligent System Device for Hydronic Heating

This ground breaking boiler room control offers wireless communications, and packed with 64 I/O points for controlling multiple boilers, pumps, and dampers while matching system load; Adjusting boiler sequencing and firing rate based on real time variances from outdoor temperature, supply/return temperatures and flow.

It is perfect for controlling a bank of condensing boilers based on outside air temperature, or varying zone temperatures, staging them while controlling firing and pumping rates for optimum condensing efficiency and maximum building heat satisfaction including domestic water. The CB-SystemMAX ISD manages multiple boiler sizes with on/off, 2 stage or modulating firing schemes, providing maximum system turndown while precisely matching load requirements.

The CB-SystemMAX ISD, has also been designed to compliment "hybrid" systems, the combination of condensing and non-condensing boilers into the same control scheme thereby economically meeting building load demand while protecting the non-condensing unit(s) from adverse affects due to improper flow and/or temperature.

Features

- Secure wireless connectivity from boiler devices to remote devices
- Modbus Communications
- 7" color high definition touch screen
- Robust data logger
- (3) Temp. resets (2) Winter and (1) Summer
- (16) boilers with modulation or fixed firing
- (16) secondary pumps
- (16) main system or zone pumps; on-off or lead/lag
- (16) combustion air dampers or mechanical draft control initiation
- System and/or Delta T control with VSD pumps
- 3-way control valve
- Real time heating load calculation used for intelligent load sharing
- Assign boiler operation based on real time load demand including Summer/Winter reheat
- Adjustable (7) day setback schedule
- Optimum start/stop based on occupancy
- Firing sequence; unison and lead/lag
- Building freeze protection
- Adaptable pre-configured boiler size and model parameter database
- Field upgradable
- Low fire hold

Benefits

- Flow intelligence maximizes boiler operating efficiency... This saves energy while reducing cycling; saving fuel costs by as much as 35-70% over conventionally controlled systems
- Saving energy translates directly into a reduction in the carbon footprint.
- Reduced cycling means a reduction in mechanical failures and significantly improved uptime
- The CB-SystemMAX ISD manages both condensing and non-condensing boilers, affording one system to control both designs... This SAVES capital and install costs.
- The CB-SystemMAX ISD's intelligence allows a single point of control for boilers, pumps, valves and dampers providing system optimization and simplicity.
- The field upgradable design assures optimum performance year after year.
- It's wireless which saves additional installation dollars!

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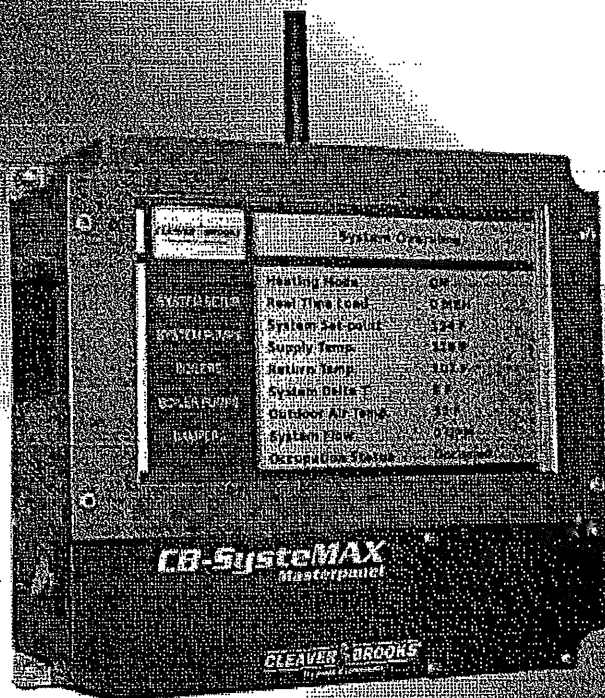
CLEAVER BROOKS
The power of commitment.

CB-8182
12/08

CB PACKAGE BOILER

Dramatically Reduce System Energy Costs, the Carbon Footprint and Mechanical Failure with CB-SystemMAX ISD.

The only control that utilizes system intelligence and delivers maximum system results.



- Intelligent load sharing for any hydronic system, regardless of size, type, or mix of boilers... Reduces boiler cycling and associated standby losses; Saves Energy while reducing the Carbon Footprint!
- It's easy to use with superior system flexibility, plus...
- It's wireless for easy setup and minimal installation cost!

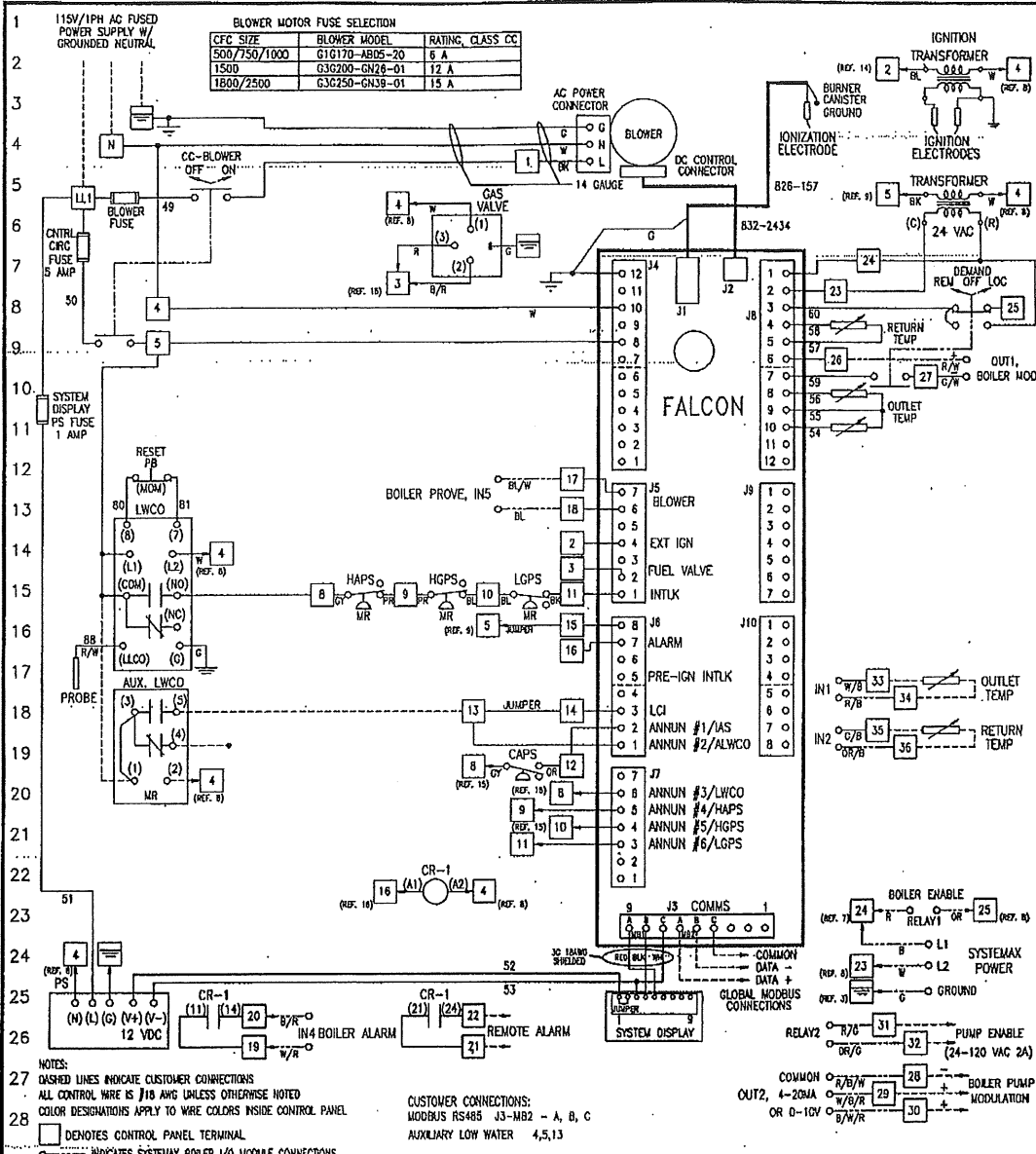
- The revolutionary CB-SystemMAX ISD (patent pending) is the only control which measures and calculates REAL-time load for REAL time system control and operation to precisely meet heating demands while maximizing fuel savings.
- Ideal control for systems with multiple pumps, valves, condensing boilers or, a mix of condensing and non-condensing boilers.
- It's one control for boilers, pumps, valves and dampers.



Cleaver-Brooks is YOUR Single Source Solution for Saving Energy and Reducing Emissions

CB-SystemMAX ISD
the **Intelligent System Device** for Efficient Hydronic Heating

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MARTINS POINT HEALTHCARE
PORTLAND, ME
SYSTEMAX-ISD

TERMINALS: LL1, N, 0, 1, 2, 3, 4-4, 5-5-5, ..., 8, 9, 10, 11, 12, 13, 14, 15, 16
17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

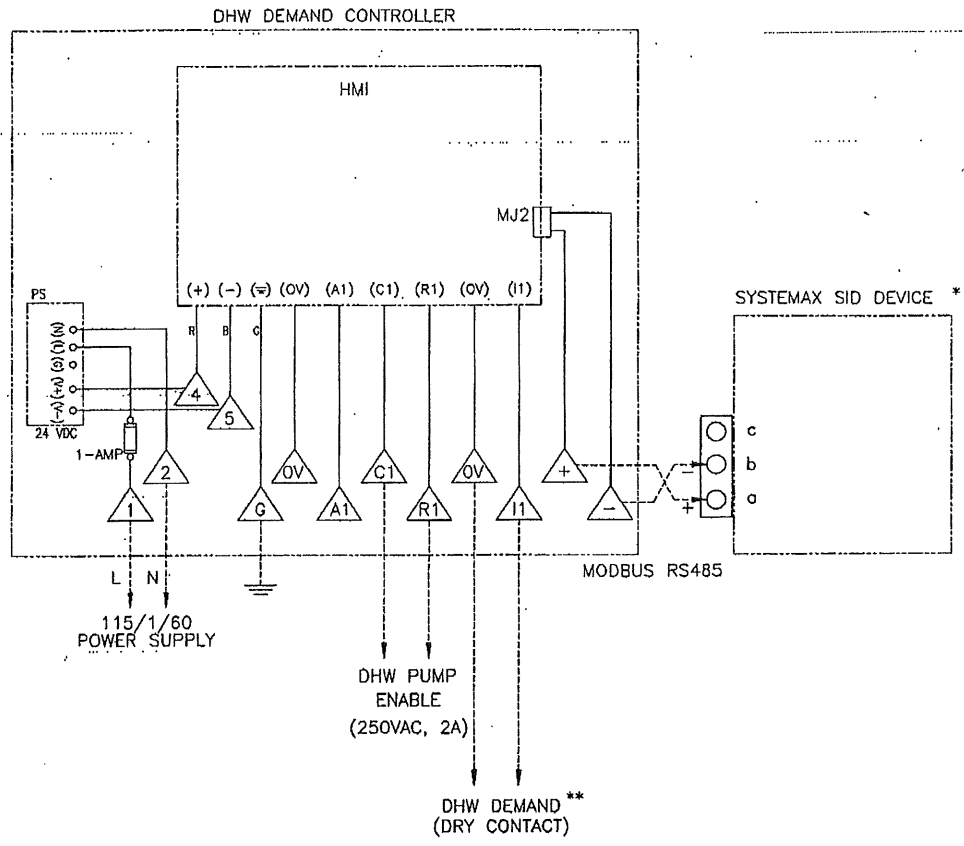
SHT. 01 OF 03

02077

REVISIONS 01 09/08/08 DKW ADDED SHEET 3 02 09/15/08 DKW ADDED AIM FOR PUMPS	SCALE N.T.S.	CLEAVER-BROOKS		
	DATE 08/27/09	STAFFORD, ONTARIO <i>The power of commitment.</i> MILWAUKEE, WISCONSIN		
	DRAWN GG	CFC MODEL 700 120 VOLTS	1000 FUEL SIZE 60 1 PHASE	60HW PRESSURE 2 10.0 INSURANCE AMPCACITY
	SIZE A	DRWG. NO. 02077-1-1WD02		

SYSTEMAX -- MODBUS INTERFACE DHW DEMAND WITH SET POINT OVERRIDE

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MARTINS POINT HEALTHCARE
PORTLAND, ME

* REFER TO SYSTEMAX MANUAL FOR CONNECTIONS TO SID
** DHW DEMAND FROM AQUASTAT OR TEMPERATURE CONTROLLER

SHT 02 OF 03

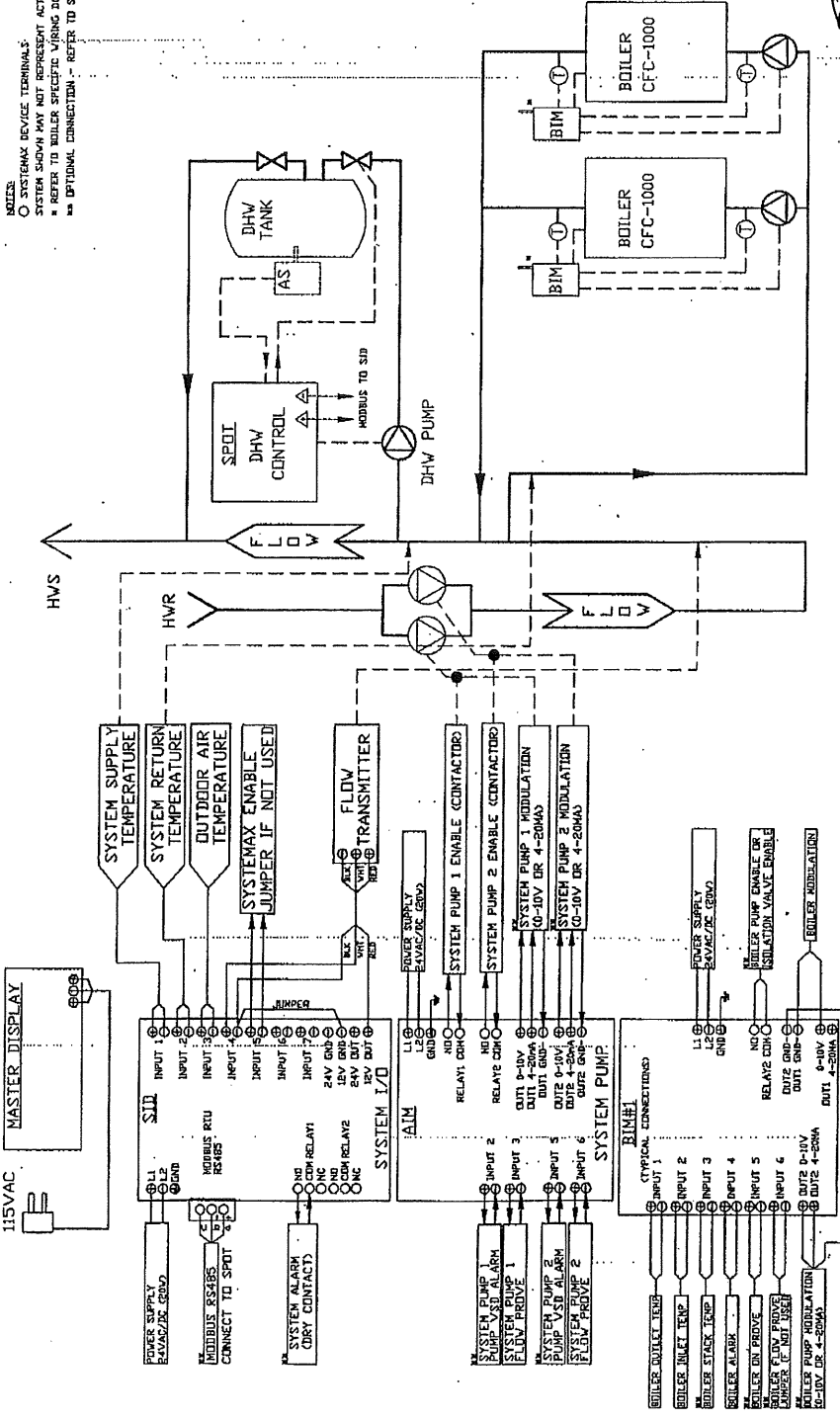
02077	REVISIONS	01 09/08/09 DKW ADDED SHEET 3	02 09/15/09 DKW ADDED AIM FOR PUMPS	SCALE N.T.S.	CLEAVER BROOKS <small>STRATFORD, ONTARIO The power of commitment. MILWAUKEE, WISCONSIN</small>	
	DATE 08/27/09			DRAWN GG		SYSTEMAX - DHW CONTROL
	SIZE A			115 1 60 2 VOLTS PHASE HERTZ WIRE AMPACITY		DRWG. NO. 02077-1-1WD
	DRAWING NO. 02077-1-1WD			SHEET NO. 02		TOTAL SHEETS 03

SYSTEMAX WIRING CONNECTIONS - TYPICAL PRIMARY/SECONDARY HYDRONIC SYSTEM WITH DHW PRIORITY CONTROL

1
2
3
4

NOTES:
 ○ SYSTEMAX DEVICE TERMINALS
 SYSTEM SHOWN MAY NOT REPRESENT ACTUAL INSTALLATION ARRANGEMENT
 ■ REFER TO BOILER SPECIFIC WIRING DIAGRAM FOR BOILER I/O MODULE INTERFACE CONNECTIONS
 ■ OPTIONAL CONNECTIONS - REFER TO SYSTEMAX MANUAL FOR DEVICE SPECIFIC WIRING DIAGRAM

DEFINITIONS:
 SID - SYSTEM INTELLIGENCE DEVICE (SYSTEM I/O
 BIM - BOILER I/O MODULE
 AS - AUXILIARY I/O MODULE (PUMPS, TANKERS...)
 HW - HOT WATER
 HWV - DOMESTIC HOT WATER
 AS - AQUA STAT
 HWS - HOT WATER SUPPLY
 HWR - HOT WATER RETURN



SHEET 3 of 3

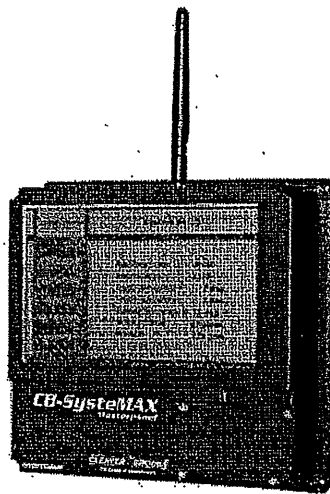
REVISIONS		01/08/08/09/DKW		ADDED SHEET 3		02/09/15/09/DKW		ADDED AIM FOR PUMPS	
MARTINS POINT HEALTHCARE PORTLAND, ME									
SHT 03 OF 03									
SCALE	N.T.S.	DATE	08/27/09	DRAWN	DKW	SIZE	B	SYSTEMAX ISD HW SYSTEM CONTROL DHW PRIORITY CONTROL	
CLEAVER BROOKS		STANFORD, ONTARIO		The power of commitment		SHEWATUCKE, WISCONSIN		DRAWG. NO. 02077-1-1WD 02	

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CB-SystemMAX

CB-SystemMAX

**Hydronic Control System
Installation and Operation**



750-274
03/09

1.1-Introduction

The Cleaver-Brooks SystemMAX is a complete hydronic boiler room control system capable of sequencing and modulating up to 16 boilers in addition to controlling pumps, dampers, or other ancillary equipment. Its features include:

- Flow intelligence with real time load control (patent pending)
- Intelligent load sharing to maximize total system efficiency
- Selects, stages, and modulates up to 16 boilers
- Modulates all equipment with acceleration modulation control (AMC)
- Controls main system pumps including lead/lag and modulation
- Controls secondary boiler pumps including Delta T control for boilers
- Controls combustion air make-up devices (dampers, mechanical air, mechanical draft)
- Wireless communication for reduced installation cost

The SystemMAX is ideal for hybrid systems that incorporate both condensing and non-condensing boilers.

The SystemMAX consists of the following components:

Master Panel

The SystemMAX Master Panel unit houses the touchscreen graphical user interface (GUI). The GUI allows the user to configure and monitor the system. Its functions include:

- Configure the wireless network by adding/removing devices.
- Enter Boiler I/O, Aux I/O, and system parameters.
- Monitor system data
- Data logging/retrieval

System Intelligence Device

The System Intelligence Device (SID) monitors network and external Modbus communications, and tracks variables critical to system operation:

- System Delta T (supply & return temp.)
- System flow
- Outdoor air temperature

Boiler I/O Modules

Each Boiler I/O Module (BIM) can control one boiler and one additional device (e.g. a boiler pump or a valve). In addition, the Boiler I/O Module has inputs for boiler inlet and outlet temperature.

Auxiliary I/O Modules

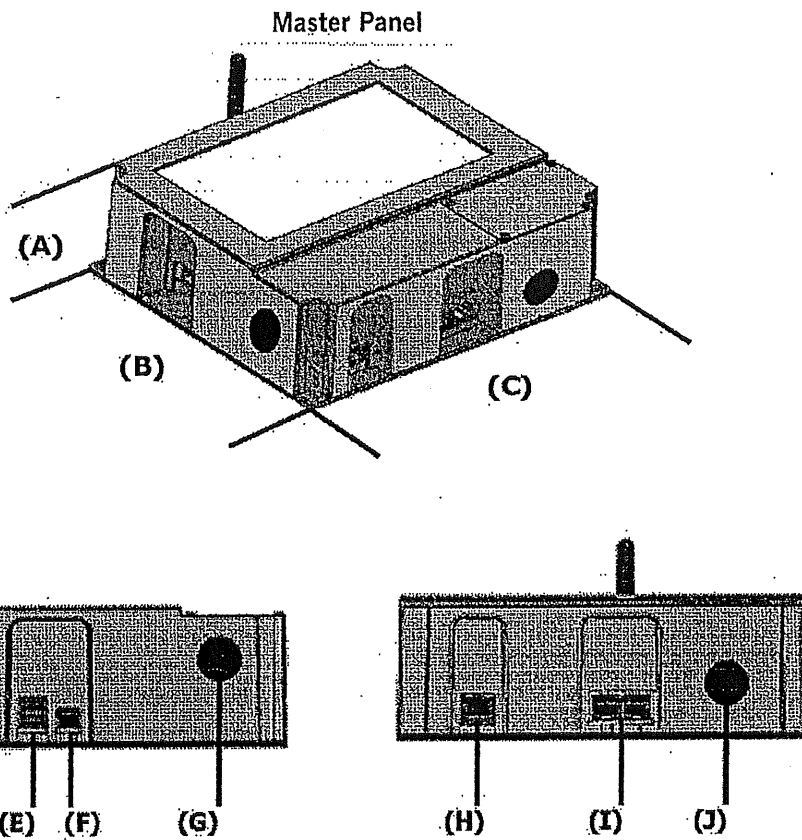
Each Auxiliary I/O Module (AIM) can control two appliances of the same type (e.g. pumps, valves, or dampers).

A minimum SystemMAX system consists of a Master Panel, SID, and at least one BIM. More complex systems may incorporate additional BIM and AIM modules as needed.

Accessories

- Supply & Return Thermistors
- Stack PT1000 RTDs
- Outdoor Air Thermistor
- Flow Device
- Thermowells
- Boiler interface cable

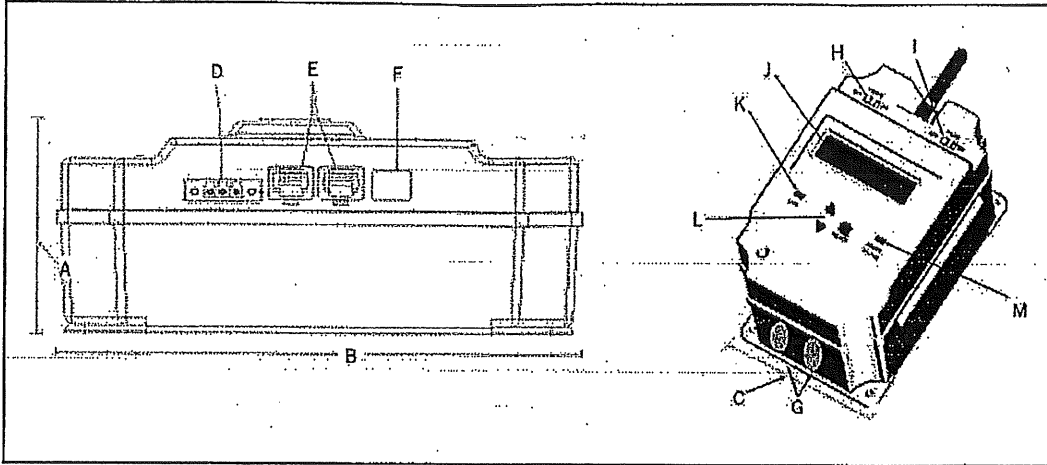
1.2-System Components



Dimensions: A=1.25", B=7.25", C=8.00"	D = Wireless antenna
E = USB for data logging and wireless upgrade*	F = USB B (not used)
G = Power On / Off switch	H = Ethernet (not used)
I = RJ-11/RJ-12 Port (6 wire) for hard wire LiveFire Connect communication protocol	J = 1/2" NPT opening for power wiring

*A USB mouse may be connected here for HMI screen navigation.

Input/Output Modules (SID, BIM, and AIM)



Dimensions: A = 2.2", B = 6.6" (9.5 w/ant.), C = 4.2"	D = External Modbus RS485 Connector (SID only)
E = RJ-11/RJ-12 Port (6 wire) for hard wire Live-Fire Connect communication protocol	F = USB-B for updating FD
G = Openings for power and control wiring	H = Radio on/off switch
I = Power On/Off switch	J = LCD HMI screen
K = Communication Link Light (Blinks w/ comm. rate)	L = HMI Selection Buttons
M=Power / Status indicator light Green, Red, Yellow.	

1.3-Specifications

Master Panel

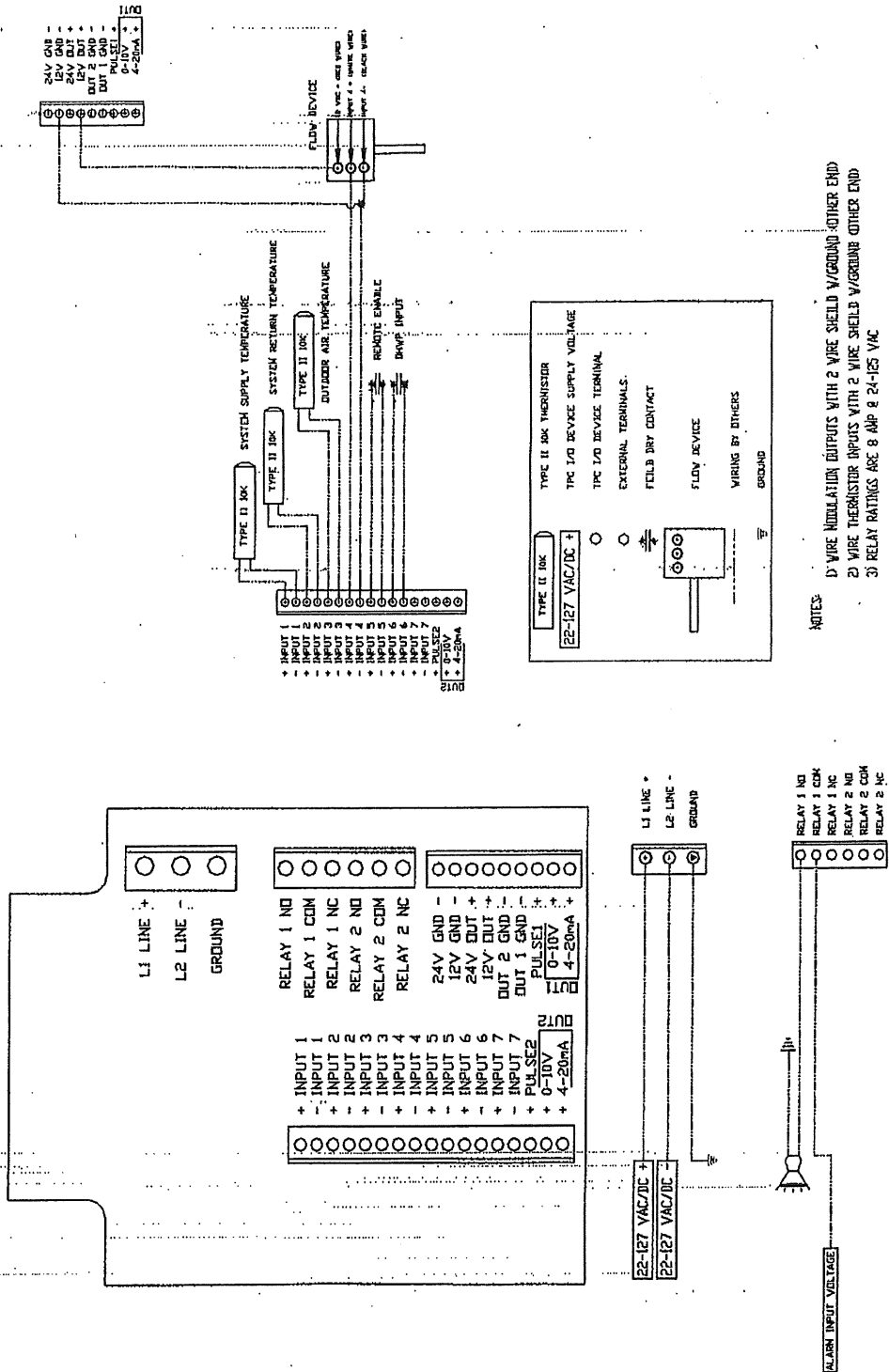
- Enclosure: ABS Plastic / Aluminum mounting flanges
- Power: ___ 24 Vdc ___ 120 Vac
- Screen: 7" full color high resolution LCD touchscreen
- Maximum Network Size: 64 appliances
- Environmental: Operation Temperature 0-70C (32-158F)
- Communication: LiveFire Connect™, Wireless- 802.15.4
- Wired communication: - 4wire RS485, Two (2) (6/2RJ-12) for LiveFire Connect protocol

SID and I/O Modules

- Power: 22-125Vac/dc
- Outputs - 2 analog (0-10Vdc, 4-20mA), 2 Relays (mechanical 8 Amp @120Vac)
- Inputs - 7 universal (0-10Vdc, 4-20mA, PT1000 RTD, Type II 10K Thermistor, Digital, PFM)
- Enclosure - ABS Plastic, Nema 1
- Max Network size - 64 I/O Devices
- Memory - 365 day hourly history downloadable from Master Panel
- Over power / Short circuit protection (non-fuse based) and 1 amp fuse
- Communication: LiveFire Connect™, Wireless- 802.15.4 Wired - 4wire RS485(6/2RJ-12) Modbus RTU- wired 2wire RS485
- Environmental: operating temp: 0-70 C (32-158F), 0-95% Non-condensing

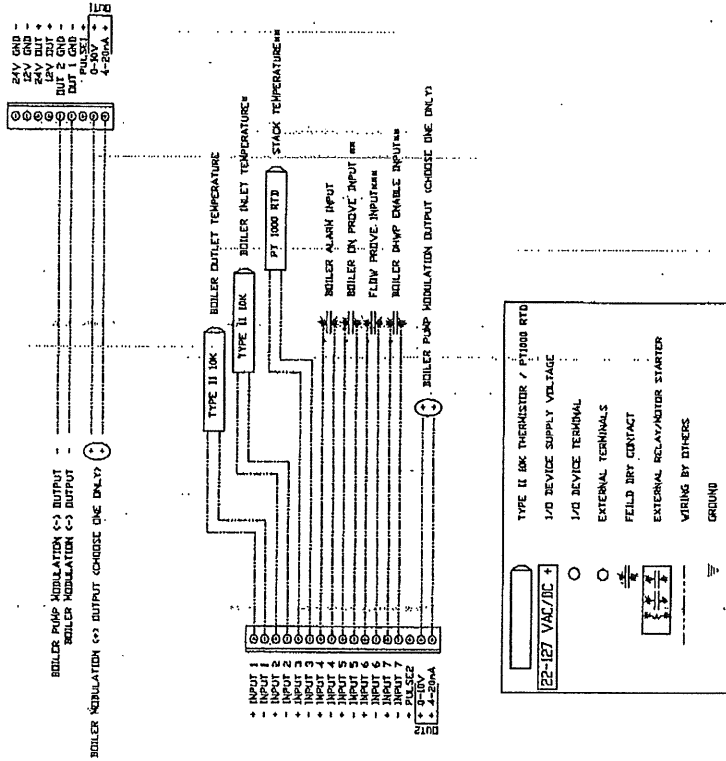
SID

SYSTEM INTELLIGENCE DEVICE

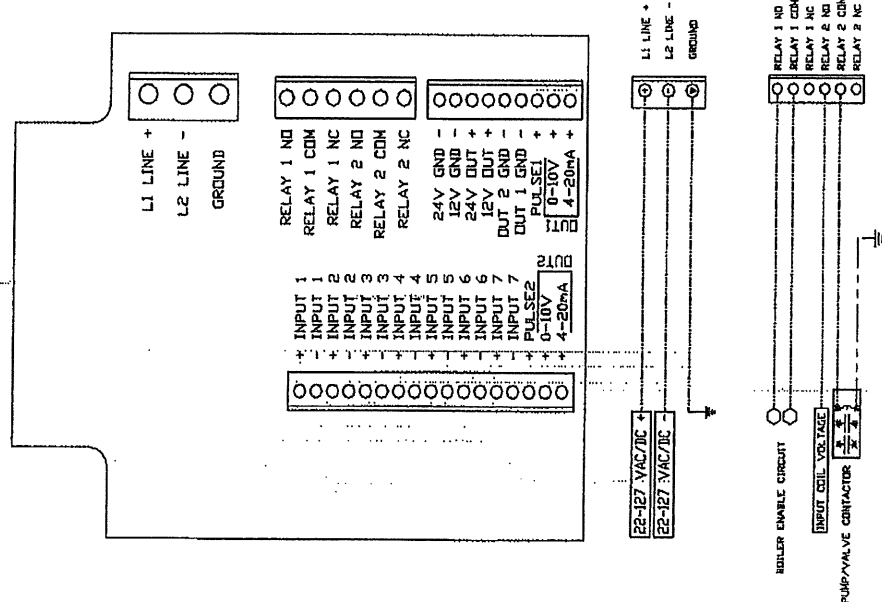


BIM (MODULATING CONTROL)

MODULATING BOILER I/O MODULE

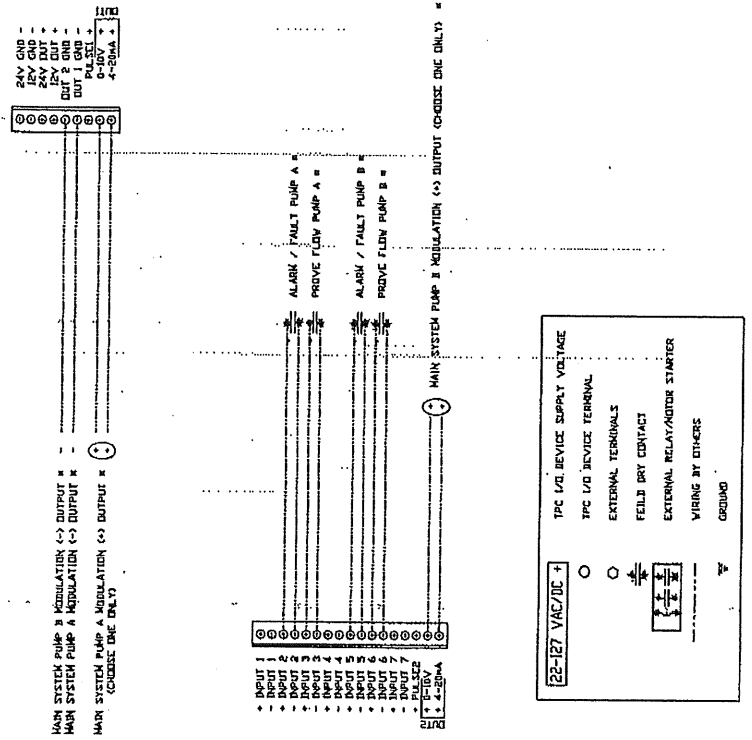


- NOTES:**
- 1) WIRE MODULATION OUTPUTS WITH 2 WIRE SHIELD W/GROUND ON OTHER END
 - 2) WIRE THERMISTOR INPUTS WITH 2 WIRE SHIELD W/GROUND ON OTHER END
 - 3) RELAY RATINGS ARE 8 AMP @ 24-125 VAC
 - 4) * OPTIONAL FUNCTIONALITY REQUIRED FOR BOILER DELTA T OPERATIONS
 - 5) ** NOT USED THEN JUMPER REQUIRED

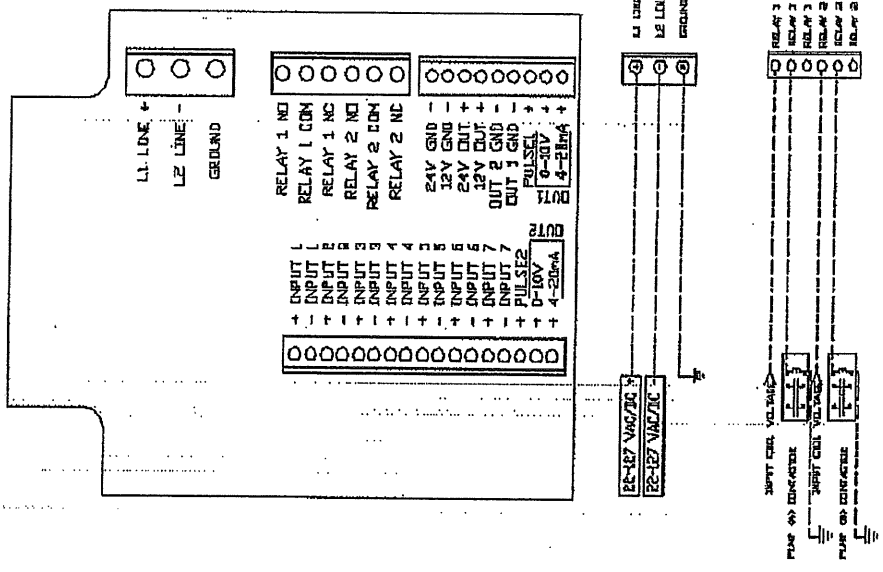


AIM (SYSTEM PUMP CONTROL)

SYSTEM PUMP I/O MODULE

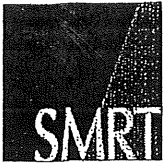


- NOTES
- 1) WIRE MODULATION OUTPUTS WITH 2 WIRE SHIELD W/GROUND
 - 2) RELAY RATINGS ARE 8 AMP @ 24-125 VAC
 - 3) * OPTIONAL FUNCTIONALITY



HVAC Boilers (2)
NATURAL GAS

Submittal
Review Memo



Project Name: MPHC MOB - Constr Administration **Job #:** 0813912
To: Jared Ballard
Pizzagalli Construction **Submittal #:** 129-235216-1
131 Presumpscot Street
Portland, ME 04103
Submittal Title: Condensing Boilers Pre-Construction Submittal [REDACTED]

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

SMRT, Inc.
REVIEW DATE: 10/26/2009
BY: TAC

08139-12 # 129

Remarks:
Design intent was to control secondary HW pumps with DDC controls. Secondary pump control not required on boiler control system.

Closest Combustible
(7 feet)

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Northeast Mechanical Corporation
139 Cash Street
South Portland, Maine 04106
Contact: Chuck Cyr
Phone: 207-799-8533
Fax: 207-799-5642

SPECIFICATION SECTION: 235216

PARAGRAPH: Part 2 Products

DRAWINGS: M-601 Boiler Schedule

ITEM: CONDENSING BOILERS

JOHNSON & JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed

Subject to Architects Approval

Date 9/24/09 By JMA

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

CONDENSING BOILERS

MANUFACTURER: CLEAVER BROOKS

SUPPLIER: Northeast Mechanical Corporation
139 Cash Street
South Portland, Maine 04106
Contact: Dan Burnell Cell: 207-939-6329
Phone: 207-799-8533
Fax: 207-799-5642

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey road
Scarborough, Maine 04074
Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619

INCLUDES:

1. BOILER & CONTROLS DATA SHEET
2. BOILER SHOP DRAWING (with ASME stamp indication)
3. BOILER WIRING DIAGRAM
4. BOILER PRODUCT INFORMATION
5. BOILER SYSTEM CONTROLLER
6. BOILER SAMPLE WARRANTY (Actual warranty will be provided when boilers are manufactured)
 - a. Standard Cleaver Brooks Warranty
 - b. Extended Warranty 10 years fire side corrosion
 - c. Extended Warranty 20 years pressure vessel / heat exchanger

*****PLEASE NOTE*****

Submittal of source quality control testing will be supplied after boilers are constructed and tested.

Field start-up reports will be provided after units are started in place.

Installation, operation & maintenance information will be provided with manuals at close

Warranty included is a sample warranty the actual warranty is product specific and will be produced after the product is built.

1.

1. BOILER & CONTROLS DATA SHEET

NORTHEAST



MECHANICAL
CORPORATION

1-800-883-7661
www.nemech.com

Solutions for Peak Performance

CLEAVER  **BROOKS**

The power of commitment.

Boiler/Controls Data Sheet

Quantity: Two (2) – Tag; B-1, B-2
 Project: Martins Point Healthcare
 Boiler Model #: CFC700-1000-60HW
 Burner Type: PreMix Natural Gas Full Modulation
 Boiler Input: 1,000,000 BTUH
 Boiler HW Output: 940,000 BTUH @ 104° F
 Natural Gas Requirements: 1,000 CFH @ 7" WC

The boilers shall be designed and constructed in accordance with ASME Section IV, GE-Gap, CSD-1 for 60# design. The burners shall be capable of operation firing natural gas with full modulation type control. The boilers shall include the following:

Item #	Qty.	Description
# 1	2	Model CFC-700-1000 Clearfire Condensing Hot Water Boiler, 120/1/60V, Natural gas fired. Supply gas pressure - 2 PSI, Required gas pressure 0.25 PSI, Altitude 100 ASL (1 cor. factor) 7" WC Gas Regulator included Yes- Include with order Max. setpoint temperature - 180 Deg. F, Operating pressure - 30 psig, Safety valve - 60 psig. Configuration Check: Standard Selections
# 2	2	Sealed Combustion Kit: 500 - 1000
# 3	2	Falcon Boiler Control (Standard): Includes ModBus communications, remote alarm contact, remote firing rate 4-20 Ma input.
# 4	2	SystemMAX CFC Boiler Kit - Includes Wireless Boiler I/O Module, (2) Water Temp Sensor w/thermowells, Boiler interface Cable, Sensor Cable. Each kit can control Boiler plus one Boiler Pump, Isolation Valve, or Damper.
# 5	1	SystemMAX System Kit - Shipped loose (supports up to 16 boilers) - Includes Master Display Touchscreen, Wireless System I/O module w/ModBus communication, (2) Water Temp Sensors w/thermowells, Outdoor Temp Sensor, Flow Meter kit, Sensor Cable.
# 6	1	SystemMAX Submittals: Wiring Diagram and Typical System Piping/Installation Drawing
# 7	1	SystemMAX Auxilliary Pump Kit (Shipped loose) - Includes Wireless I/O Module. (Can control up to 2 System or Zone Pumps)
# 8	2	Gas Pressure Regulator: Equimeter 122-6 3/4" x 3/4" with a Spring Range: 6" - 14" w. c.
# 9	2	Gas Pressure Relief Valve: Fisher 289H, 1"
# 10	1	SystemMAX DHW Kit (Shipped loose) - Includes Wireless I/O Module. (Can control up to 2 Input / Outputs)
# 11	2	Aux Low Water Cutoff (Shipped Loose)

470 Riverside Street, Unit #6, Portland, ME 04103 * 207-799-8533 – FAX 207-799-5642
 Portland, ME * Brewer, ME * Hooksett, NH

NORTHEAST



MECHANICAL
CORPORATION

1-800-883-7661
www.nemech.com

Solutions for Peak Performance

# 12	2	Condensate Treatment Package (Tank, Lid, Trap)
------	---	--

The "Systemax" Boiler Plant System shall include:

- Master Display Touchscreen
- Wireless SID "System Intelligence Device", I/O module with Mod-Bus Communications.
- Wireless AIM "Auxillary Input Module", System Pump Control
- Wireless SPOT "Set Point Override Terminal", Domestic Hot Water Control
- (2) Wireless BIM "Boiler I/O Module", Boiler and Boiler Pump Control.
- Outdoor Air Temperature Sensor
- Flow Meter
- (6) Temperature Sensors.

Regards,

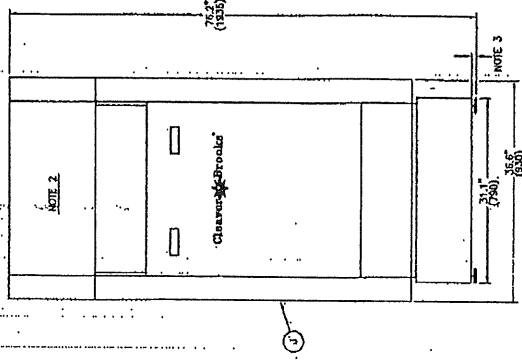
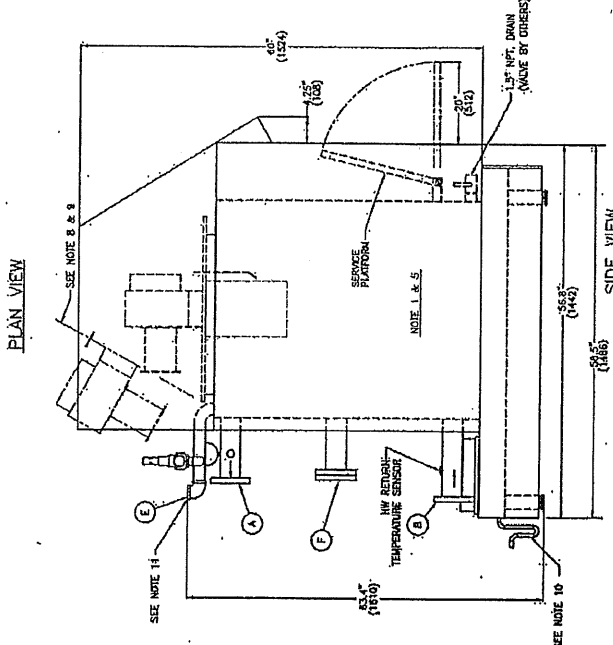
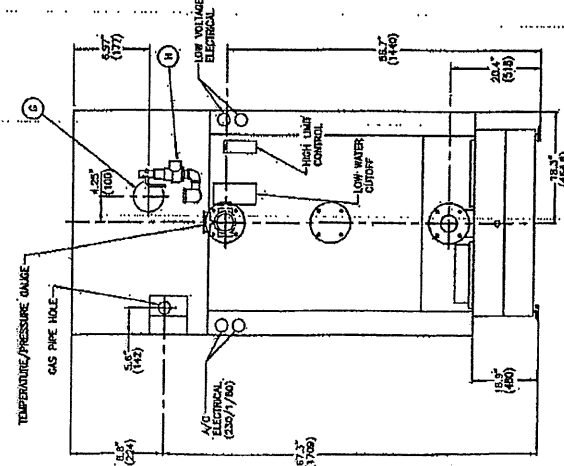
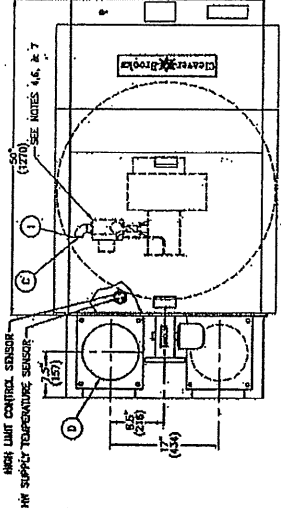
Chuck Cyr
Sales Engineer
Northeast Mechanical
(800)-883-7661
VP Blake Group Commercial Sales

470 Riverside Street, Unit #6, Portland, ME 04103 * 207-799-8533 – FAX 207-799-5642
Portland, ME * Brewer, ME * Hooksett, NH

2.

2. BOILER SHOP DRAWING (with ASME stamp indication)

- A. - HW SUPPLY @ 2.5" FLG.
- B. - GAS CONNECTION @ 8" O.D.
- C. - VENT AIR @ 1" FLG.
- D. - SEATED COMBUSTION @ 6" (OPTION)
- E. - RELIEF VALVE @ 1" @ 60 PSIG
- F. - INLET GAS PRESSURE @ 7" W.C.
- G. - SHIP WEIGHT @ 1,354 LB (705KG)



- NOTES:
1. - PRESSURE VESSEL IN ACCORDANCE WITH ASME SECTION IV WITH "H" STAMP FOR 60 PSI WMP.
 2. - PACKAGED BOILER CERTIFIED PER CSA & CSA LABELED.
 3. - TRIM & GAS TRAIN PER CSA/GSD-1.
 4. - BOILER LEGS ALLOW FOR ADJUSTMENT OF 2.5".
 5. - BURNER IS PREMIX WITH FULL MODULATION OF 5:1 TURNOVERN.
 6. - UNIT IS FACTORY FIRE TESTED.
 7. - SWITCHES, MANUAL RESET.
 8. - GAS PRESSURE ADJUSTOR IS NOT PROVIDED AND MUST BE PROVIDED BY THE USER.
 9. - ALLOW 1/4" ABOVE BOILER FOR BURNER OPENING.
 10. - BOILER TO BE FIELD PIPED WITH A 6" MINIMUM CONDENSATE DRAIN TRAP.
 11. - PIPE AIR VENT TO EXPANSION TANK OR USE AUTO AIR VENT TUBE.

ASME REQUIREMENT

WARNING:
Changes, modifications or alterations are strictly prohibited.
Changes to this drawing and subsequent modification of equipment could result in damage to the equipment and/or serious personal injury.

REV	DESCRIPTION

Martins Point Healthcare DIMENSION DIAGRAM		SCALE: N.T.S. DATE: 12-15-05 DRAWN: JAD SIZE: B
DRWG. NO. DD1000CFC	SHOT 01 OF 01	CFC MODEL: 700-115 FUEL: 1 PULSE: 1 SIZE: 1000 PRESSURE: 60HW INSURANCE: CSD-1 WIRE: 2 DRWG. NO. DD1000CFC

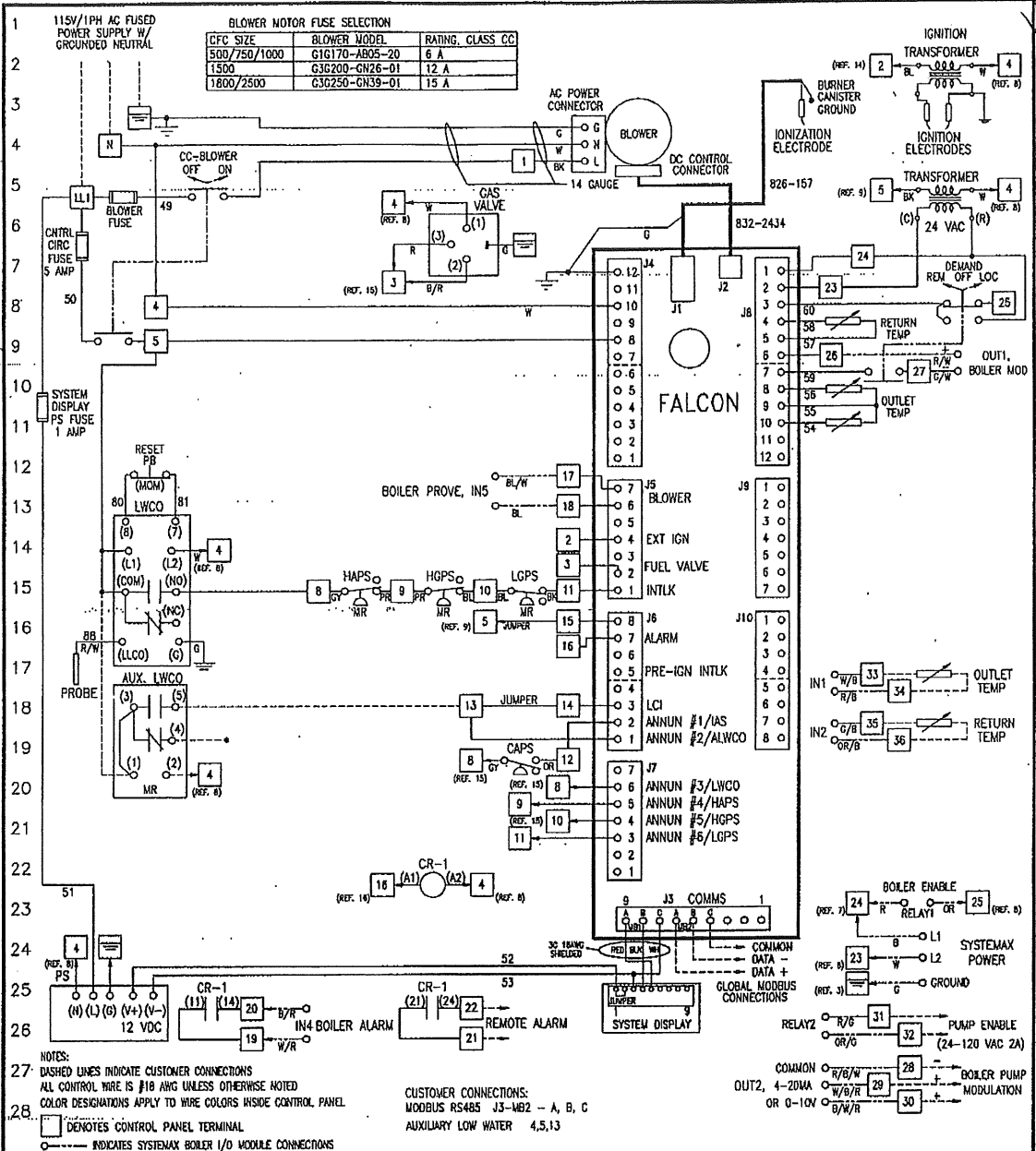
CleaverBrooks
INC.
1700 W. 10TH ST. ST. LOUIS, MO 63108
 PHONE: (314) 241-4300
 FAX: (314) 241-4301
 WWW.CLEAVEROVERBROS.COM

3.

3. BOILER WIRING DIAGRAM

Boiler Wiring

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IT IS SUBJECT TO CHANGE WITHOUT NOTICE, AND IS NOT TO BE COPIED OR USED IN ANY WAY DETRIMENTAL TO THE COMPANY.
SUGGESTIONS AND INFORMATION CONTAINED ON THIS DRAWING ARE NOT INTENDED TO SUPPLANT LOCAL CODES.



MARTINS POINT HEALTHCARE
PORTLAND, ME
SYSTEMAX ISD

TERMINALS: LL1, N, G, 1, 2, 3, 4-4-5-5-5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

SHT 01 OF 01

02077

REVISIONS

SCALE
N.T.S.
DATE
08/27/09
DRAWN
GG
SIZE
A

CLEAVER-BROOKS
STRATFORD, ONTARIO The power of commitment. MILWAUKEE, WISCONSIN

CFC MODEL	700	1000	60HW	INSURANCE
FUEL	1	60	2	10.0
VOLTS	1	HERTZ	WIRE	AMPACITY

DRWG. NO. 02077-1-1WD 00

4.

4. BOILER PRODUCT INFORMATION



PREMIER CONDENSING HOT WATER BOILERS FROM CLEAVER-BROOKS



CLEARFIRE CONDENSING MODEL CFC

A BOILER IN TUNE WITH THE ENVIRONMENT AND TODAY'S MARKET NEEDS

Size Range from 500 - 2500 MBH • No Minimum Return Water Temperature
Low NOx Emissions < 20 PPM • Sealed Combustion Option • Whisper Quiet

B. STANDARD EQUIPMENT

1. The Boiler

The boiler is designed for a Maximum Allowable Working Pressure (MAWP) of 60 psig (4.1 Bar) in accordance with the ASME Code for Low Pressure Section IV Hot Water Boilers and is stamped accordingly. Operating pressure shall be less than 54 psig (3.72 Bar).

The vessel is mounted on a steel base with insulation & casing provided including trim and controls. Trim and controls include safety relief valve, pressure/temperature gauge, probe type low water control, and CB Falcon hydronic boiler control with associated sensors.

2. The Burner (See Figure 1-4)

Incorporating "premix" technology, the burner utilizes a venturi, dual safety shutoff-single body gas valve, variable speed blower, and Fecralloy metal fiber burner head.

With the integral variable speed combustion air fan, 5:1 turndown is provided.

Combustion canister of the burner is constructed of a Fecralloy-metal fiber for solid body radiation of the burner flame, which provides low emissions.

At maximum firing rate, the sound level of the burner is less than 70 dBA, measured in front of the boiler at a distance of 3 feet.

Provision for direct vent combustion is furnished.

Combustion Air Proving Switch and High Air Pressure Switch.

3. Burner Gas Train (See Figure 1-5 & Figure 1-6)

The gas train assembly is provided in accordance with CSA certification and ASME CSD-1. The gas train assembly is factory assembled and wired, consisting of the following components:

- A. Low Gas Pressure Switch - manual reset
- B. High Gas Pressure Switch - manual reset
- C. Single body, dual safety shutoff gas valve with integral trim regulator
- D. Integral Venturi
- E. Manual Shutoff Ball Valve
- F. CSD-1 Test Cocks

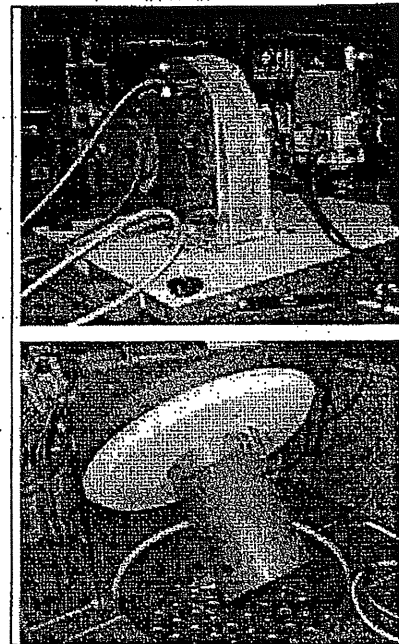


Figure 1-4

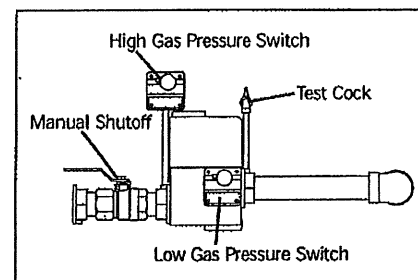


Figure 1-5 Standard Gas Train, CSA and ASME CSD-1

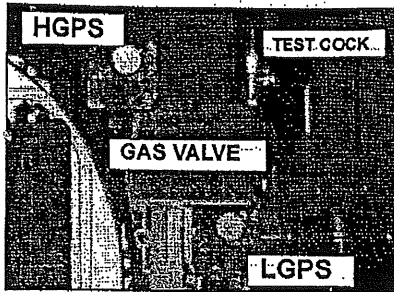


Figure 1-6 Standard Gas Train Components per CSA and ASME CSD-1

4. Control (See Figure 1-7)

The CB Falcon hydronic control is an integrated burner management and modulation control with a touch-screen display/operator interface.

The controller is capable of the following functions:

- Two (2) heating loops with PID load control.
- Burner sequencing with safe start check, pre-purge, direct spark ignition, and post purge.
- Electronic ignition.
- Flame Supervision.
- Safety shutdown with time-stamped display of lockout condition.
- Variable speed control of the combustion fan.
- Supervision of low and high gas pressure, air proving, stack back pressure, high limit, and low water.
- First-out annunciator.
- Real-time data trending.
- (3) pump/auxiliary relay outputs.
- Modbus communication capability.
- Outdoor temperature reset.

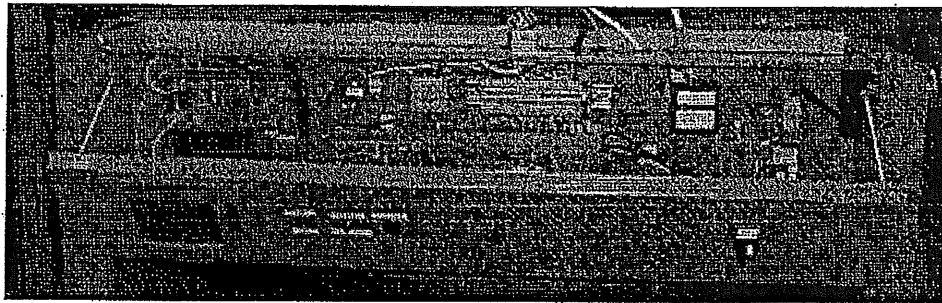


Figure 1-7 Control panel (hinged access panel open)

5. Component/Connection Locations

Figure 1-8 shows the CFC component orientation and heat flow path. Note the downfired design of the burner and the orientation of the hot water outlet and return connections. The return water connection is at the bottom of the vessel and the hot water outlet is near the top.

Figure 1-9 shows the locations of the safety valve and low water cutoff. **Figure 1-10** shows the supply and return connections and the location of the return water temperature sensor. Looking at the top of the boiler, near the rear, **Figure 1-11** shows the three hole sensor well for the outlet temperature sensor.

When standing at the back of the boiler, the stack can be connected on the right side of the boiler (**Figure 1-12**) or on the left side (**Figure 1-13**). Refer to Chapter 3 of this manual for recommended vent sizes and lengths for the specific boiler installation.

6. Optional Equipment

Certain options may have been supplied with the boiler that are relative to the project requirements if these options were specified with the boiler at the time of order entry. Also, some options may have been provided [by others] that are not part of Cleaver-Brooks scope of supply. In either case, the Cleaver-Brooks authorized representative should be consulted for project specifics.

These are the options that are available for the CFC boiler from Cleaver-Brooks:

- A. Reusable air filter.
- B. Condensate neutralization treatment tank assembly - consists of neutralizing media, filter, and PVC condensate holding tank. This assembly is mounted beneath the boiler and is further described in Chapter 2.
- C. Outside air intake for direct vent combustion.
- D. Outdoor temperature sensor for indoor/outdoor control.
- E. Shipped loose Auxiliary Low Water Control for field piping by others into the system piping.
- F. Alarm Horn for safety shutdown.
- G. Relays for output signal for burner on, fuel valve open.
- H. Stack Thermometer.
- I. Stack temperature limit-sensor.
- J. Common condensate drain trap.

Table 1-1 Model CFC Water Temperature Data

Minimum supply temp.	33°F
Maximum operating temp.	194°F
Maximum design temp.	210°F

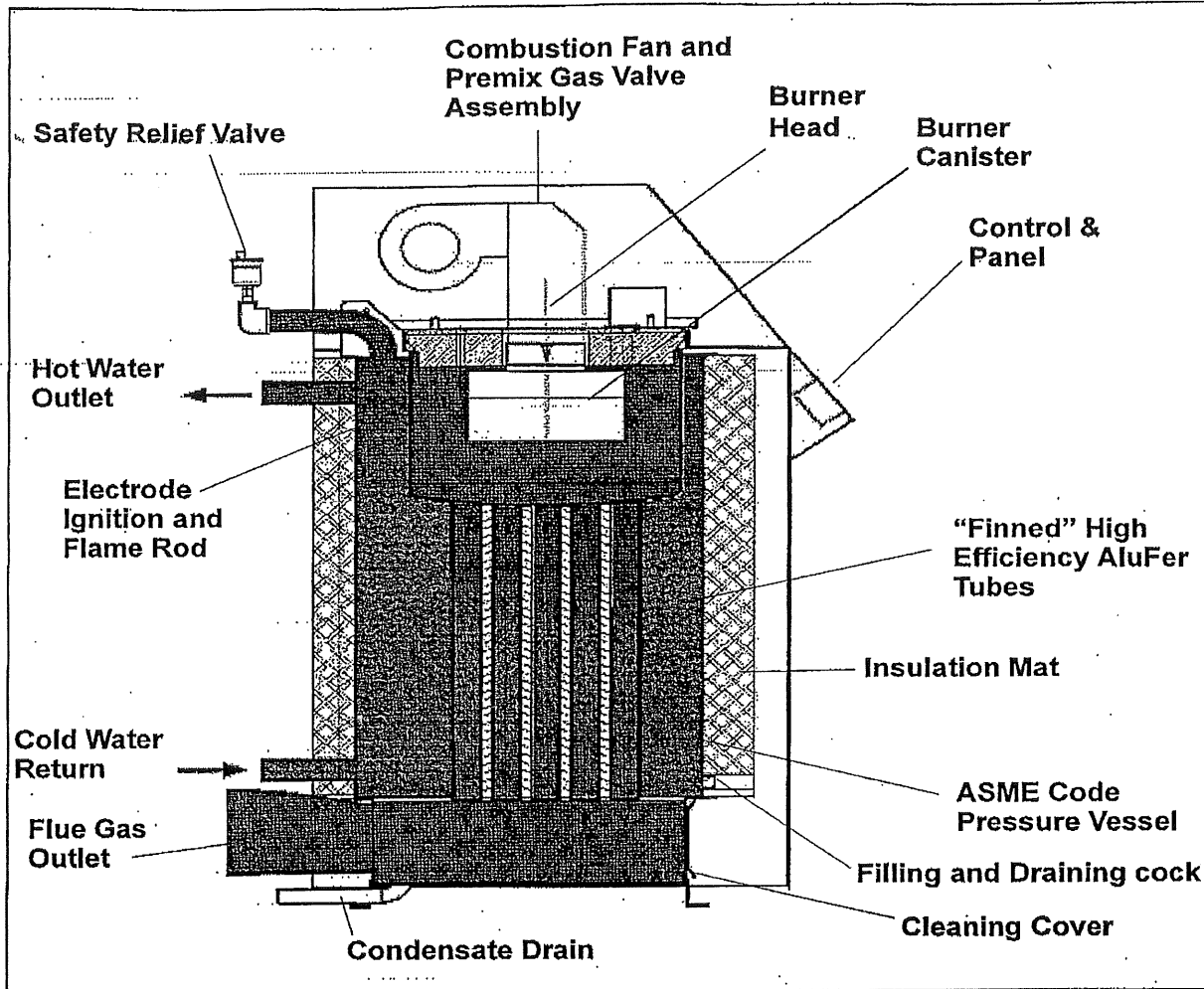


Figure 1-8 CFC Heat Flow and Component Orientation

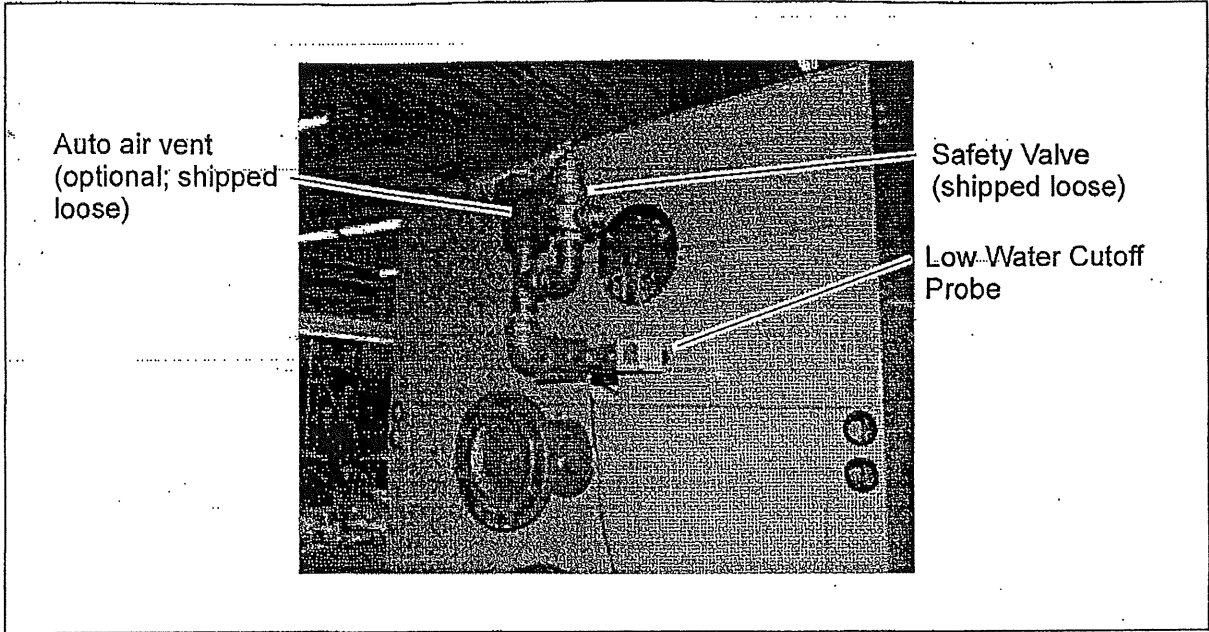


Figure 1-9 Boiler Controls

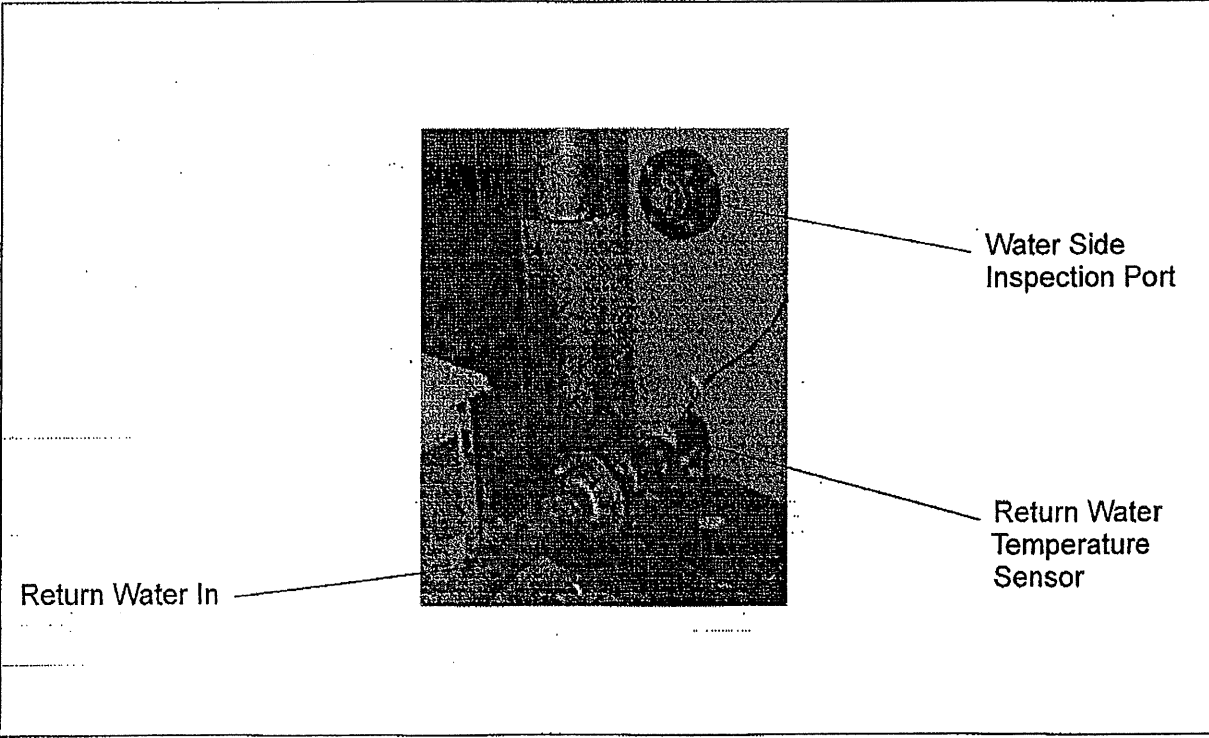


Figure 1-10 Return Temperature Mounting

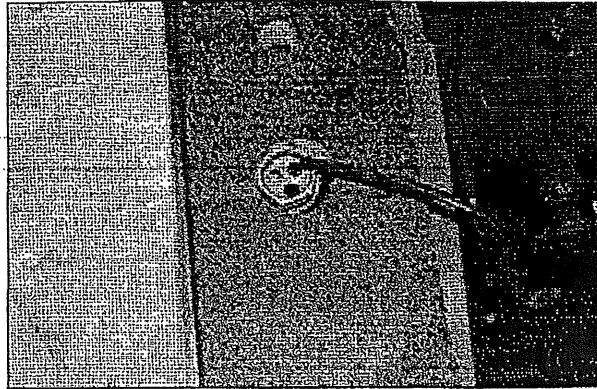


Figure 1-11 Temperature Sensor, Top of Pressure Vessel

The stack can be mounted on the right (Figure 1-12) or left (Figure 1-13) side on the back of the boiler base.

The flue gas duct sizes may be reduced at the vent connection.
See also Chapter 4 - Stack and Intake Vent Sizing and Installation.

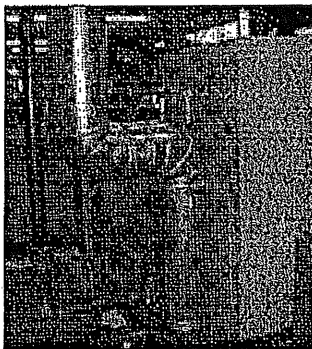


Figure 1-12 Stack Right Side (viewed from rear)

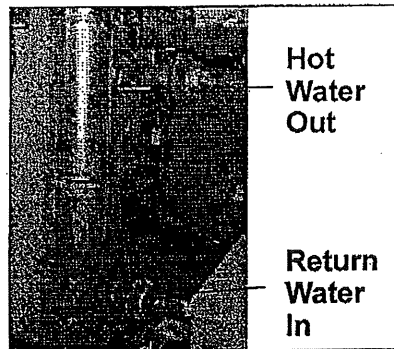
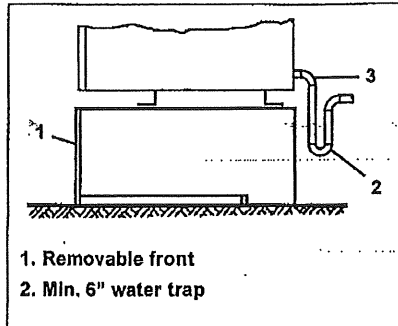


Figure 1-13 Stack Left Side (viewed from rear)



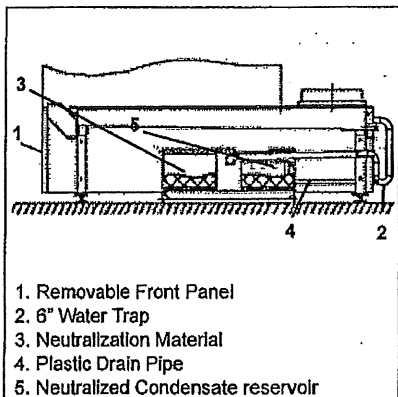
- 1. Removable front
- 2. Min. 6" water trap

Figure 2-29 Condensate Piped Direct to Drain

1. Condensate Tank Setup Options

The boiler is supplied with boiler legs (standard) which are sized to permit the installation of the condensate collection tank. There are two (2) condensate tank styles available:

- (1) The condensate is piped directly to a drain through the piping and water trap supplied during installation (see **Figure 2-29**).
- (2) The condensate is held in a condensate tank under the boiler. The condensate is neutralized as it passed through the granular bed. The neutralized condensate is then piped to the drain (see **Figure 2-30**).



- 1. Removable Front Panel
- 2. 6" Water Trap
- 3. Neutralization Material
- 4. Plastic Drain Pipe
- 5. Neutralized Condensate reservoir

Figure 2-30 Condensate Tank with neutralization material.

2. Condensate Take-off and Neutralization

To ensure compliance with regulations, it is important to contact the responsible authorities prior to the planning and execution of the boiler installation. Condensate flow of 5 to 12 GPH can be expected depending on boiler size and return water temperature.

3. Condensate discharge into local drain

For discharge into a local drain a water trap must be installed per **Figure 2-31**.

- 1. Piping is to be a minimum of 3/4" NPT.
- 2. Maximum discharge pipe height from floor to be 9".
- 3. Condensate water trap (6") required.

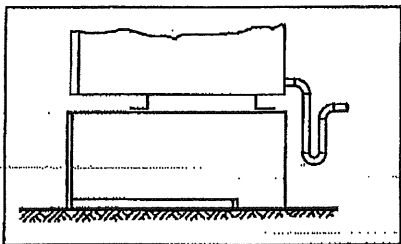


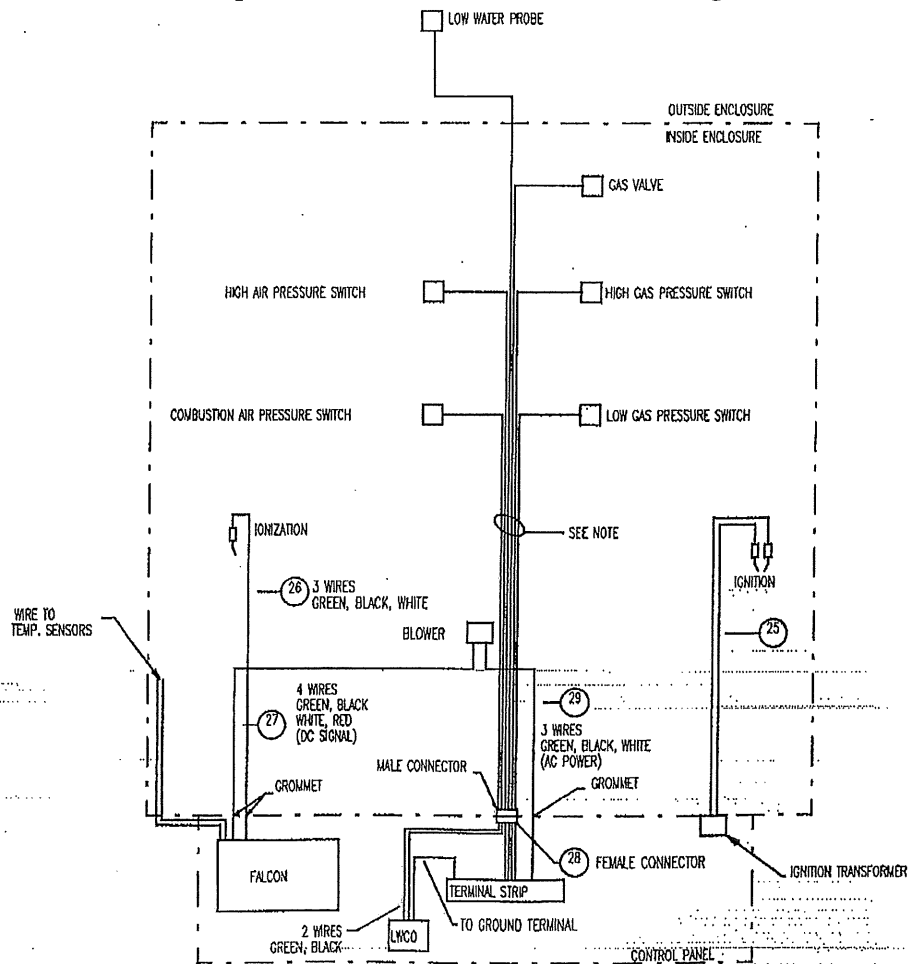
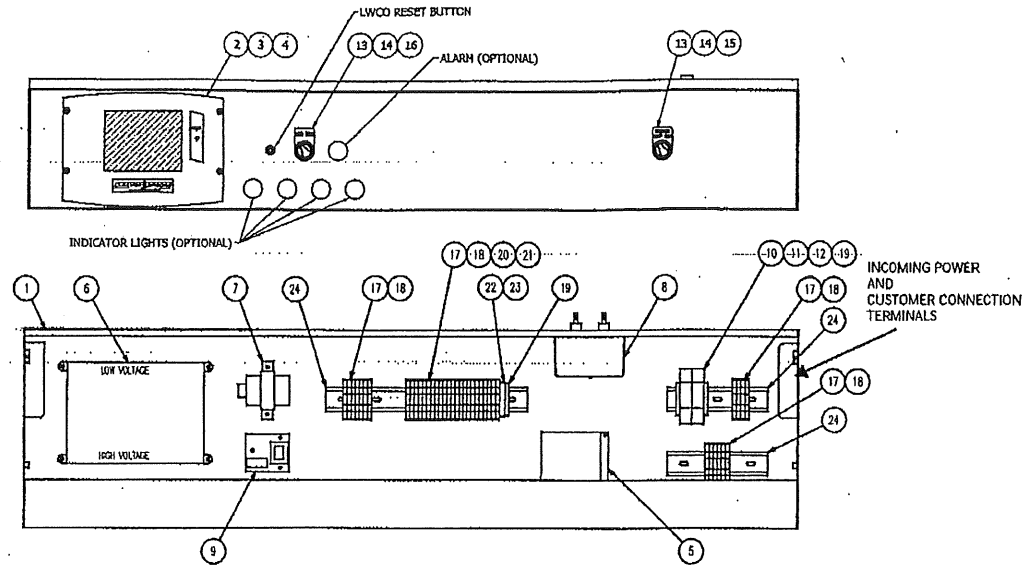
Figure 2-31 Condensate Discharge Piping

4. Piping treated condensate to drain

Figure 2-32 shows the gravity flow condensate treatment assembly.

- Item (1) is the bottom side casing of the boiler.
- Item (2) is the water trap 6" minimum.
- Item (3) is the condensate tank assembly
- Item (4) is the condensate drain line.
- Item (5) is the condensate reservoir tank.
- Item (6) is the piping from trap to the treatment tank.

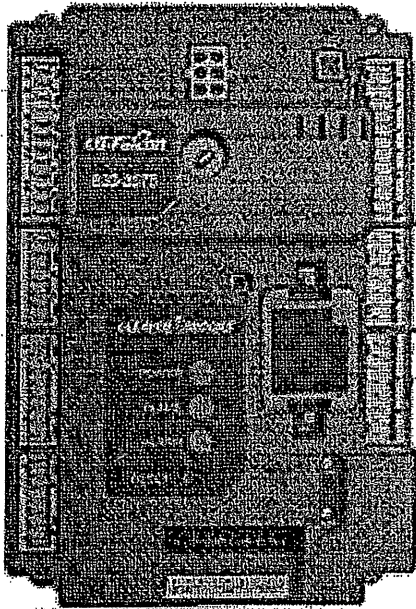
Figure 6-2. Electrical Assemblies





Hydronic Control

PRODUCT DATA



APPLICATION

The CB Falcon is a hydronic boiler control system that provides heat control, flame supervision, circulation pump control, fan control, boiler control, and electric ignition function. It will also provide boiler status and error reporting.

Multiple boilers can be joined together to heat a system instead of a single, larger burner or boiler. Using boilers in parallel is more efficient, costs less, reduces emissions, improves load control, and is more flexible than the traditional large boiler.

CB Falcon System Consists of:

CB Falcon Control Device
833-3577 Touchscreen Display—required for setup and ModBus communication but not required for the system to operate once the CB Falcon is programmed.
Flame Rod or UV flame detector
Temperature Sensor, NTC Type 10K Ω at 77°F (25°C) or 12K Ω at 77°F (25°C)
Limit Sensor, NTC Type 10K Ω at 77°F (25°C)
Local Keyboard Display Module
Fans (VFD)

FEATURES

Safety and Boiler Protection

- Frost Protection, Slow Start, Anti-condensate, Boiler Delta-T, Stack Limit, Boiler Limit, DHW Limit, Outlet T-Rise Limit

Integrated Control Functions:

- Primary Flame Safeguard Control
- Internal or external spark generator
- Analog Input using 10kohm NTC Sensor
 - Outlet Limit And Temperature
 - DHW (Domestic Hot Water) Limit and Temperature
 - Stack Temperature Limit and Temperature
 - Inlet Temperature
 - Outdoor Temperature
- Other Analog Inputs
 - PWM Feedback
 - Flame Signal from either a Flame Rod or Ultraviolet Detector
- PID Load Control
 - CH (Central Heat)
 - DHW (Domestic Hot Water)
- Digital Inputs
 - Pre Ignition Interlock
 - LCI (Load [or Limit]Control Input)
 - Airflow Interlock
 - Annunciation (8 Programmable) (6 Programmable plus High Fire and Low Fire Switch Interlocks)
 - Remote Reset
 - TOD (Time of Day)

CLEAVER BROOKS

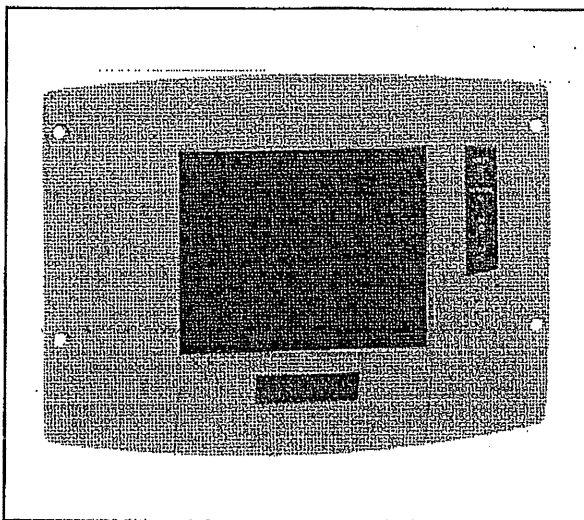
CB FALCON HYDRONIC CONTROL

- **Digital Outputs**
 - Pump Control (3 outputs, 5 different programmable features)
 - Combustion Blower
 - External Ignition
 - Pilot Valve
 - Main Valve
 - Alarm
- **Analog Outputs**
 - Modulation
 - 4-20mA
 - 0-10 Vdc
 - PWM for Variable Frequency Drives
- **Algorithm Prioritization**
 - Burner Demand
 - CH, DHW and Frost Protection
 - Firing Rate Limiting
 - Anti-Condensate, Stack Limit, Boiler Delta-T, Boiler Slow Start, Outlet Limit, On and Off Hysteresis
- **Two Temperature Loops of Control**
 - CH
 - DHW
- **High Limit Control (Meets UL 353)**
- **Fifteen Item Fault Code History Including equipment status at time of lockout**
- **Fifteen Item Alert Code Status including equipment status at time of internal alerts**
- **24Vac Device Power**
- **24 or 120Vac Digital I/O models available.**
- **Flame Signal test jacks (Vdc)**
- **Three Status LEDs**
 - Power
 - Flame
 - Alarm
- **Analog NTC Sensor Inputs (10kohm or 12kohm)**
NOTE: 12kohm sensors cannot be used for Limit Application functions.
- **Flame Sensing**
 - Ultraviolet
 - Flame Rod
 - Single Element (Internal spark generator and flame sense using the same element)
 - Dual Element (separate elements for ignition spark and flame sense)



833-3577 CB-Falcon System Operator Interface

USER GUIDE



FEATURES

- Individual and multiple boiler status, configuration, history, diagnostics, and trend analysis.
- Allows configuration and monitoring of the 833-3639 system.
- Allows monitoring of the 833-3639 burner control sequence, flame signal, diagnostics, historical files, and faults.
- Allows switching view between multiple boilers.
- Allows for lead/lag commissioning (future enhancement).
- Locates attached boilers.
- Allows boiler naming.
- System trend analysis.
- Color 3.5 in. x 4.625 in. (5.7 in. diagonal) user interface display.
- Touch screen.
- Three communication ports:
 - Two RS-485 Modbus™ ports
 - One Ethernet port
- LED indicators:
 - Power
 - Modbus™ (COM 1) communication
- Flush mounting.
- Touch screen disable for screen cleaning.
- 12 Vdc power supply (included).
- Screen saver.
- Contrast control.
- Volume control.
- Real-time data trending analysis.
- Graphic user interface.

APPLICATION

The 833-3577 is a microprocessor-based touch-screen display module that provides an operator interface for monitoring and configuring parameters in the 833-3639 CB-Falcon system.

The 833-3577 is flush mounted into a panel cutout (8-1/8 in. W x 5-7/8 in. H). Wiring connections to the 833-3577 are through a removable 9-pin wiring header.

Contents

Preface	2
Installation Instructions	3
Wiring	3
Quick Setup	4
Starting the Display	4
Configuration	15
Monitoring	28
833-3639 Diagnostics	40
Display Setup and Diagnostics	42
Advanced Setup	48
Table 42 Configuration Parameters	43
Table 43, 44 Other Tables	52

CB Manual Part Number 750-241



65-0296-01

PREFACE

This User Guide is intended to provide a general overview of the 833-3577 Operator Interface. The general overview goes to page 13 and the actual configuration begins on page 15.

It is intended to guide you through the features and operation of the 833-3577 as you interface with the 833-3639 CB-Falcon control and establish the Parameter points of the system.

Note that this sheet (like the 833-3650 CB-Falcon) shows all parameters. The actual product may have parameters made invisible or Read Only by the OEM as they may not apply for their product.

Use the Product Data Sheet for the 833-3639 CB-Falcon (form 750-241) as a guide and explanation of the parameters that are being programmed.

Included Power Supply:
 Inputs: 85 to 264 Vac, 47-63 Hz; 120 to 370 Vdc
 Output: 12 Vdc; 0 to 2.1 A.
 Power: 25W

Operating Temperature: 32°F to 122°F (0°C to 50°C)

Storage/Shipping Temperature: -40°F to 158° (-40°C to 70°C).

Humidity:
 85% maximum relative humidity.

Approvals:
 FCC Part 15, Class A Digital Device
 Underwriter Laboratories, Inc. (UL) (cUL) Component
 Recognized (for non-continuous operation); File Number MH20613 (MCCZ)
 Canada: ICES-003

Dimensions: See Fig. 1.

SPECIFICATIONS

Electrical Ratings:
 833-3577:

+12 Vdc input, maximum of 500 mA current drain.

Replacement Parts

- 9-pin connector—50020034-001
- Power Supply—Manufactured by MeanWell

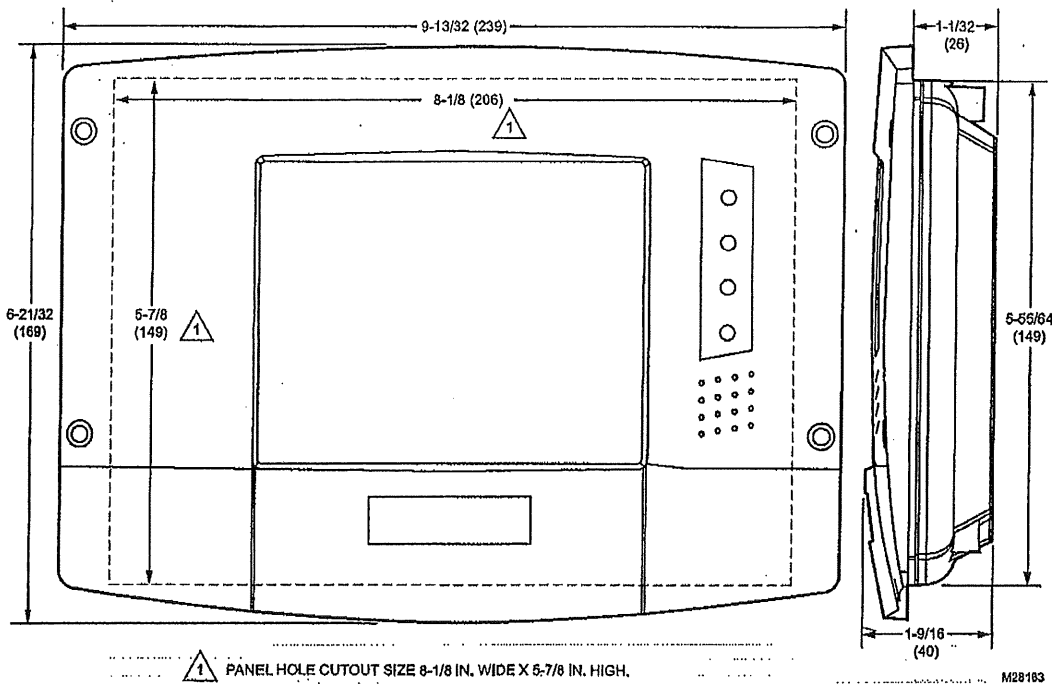


Fig. 1. 833-3577 dimensions in in. (mm).

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This Class A digital apparatus complies with Canadian ICES-003.
 Cet Appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Figure 6-2. Gas train

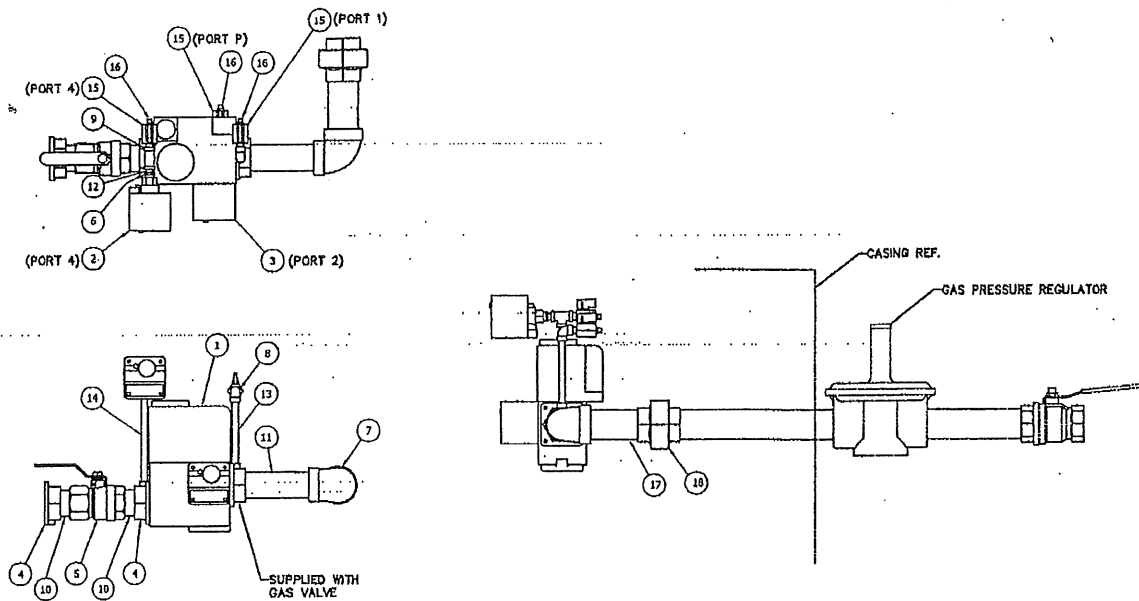


Table 6-4. Gas train parts list

ITEM	QTY	BOILER SIZE						DESCRIPTION
		500	750	1000	1500	1800	2500	
1	1	940 07162	940 07163	940 07164	940 07165	940 07235	940 07235	GAS VALVE, C/W ADAPTER
2	1	817 02420	817 02420	817 02420	817 02420	817 02420	817 02420	HIGH GAS PRESSURE SWITCH (HGPS)
3	1	817 02414	817 02414	817 02414	817 02414	817 02414	817 02414	LOW GAS PRESSURE SWITCH (LGPS)
4	2	800 00092	800 00092	800 00092	800 00093	800 00093	800 00093	ADAPTER, PIPE, GAS VALVE, C/W O-RING, BOLTS & NUTS
5	1	941 01944	941 01944	941 01944	941 01945	941 01945	941 01945	BUTTERBALL VALVE,
6	1	847 01172	847 01172	847 01172	847 01172	847 01172	847 01172	BUSHING, REDUCING, HEX HEAD
7	1	847 00551	847 00552	859 00082	847 00557	847 00557	847 00557	ELBOW, REDUCING, 90°
8	1	859 00077	859 00077	859 00077	859 00077	859 00077	859 00077	ELBOW, 90°
9	1	859 00021	859 00021	859 00021	859 00021	859 00021	859 00021	TEE
10	2	857 00673	857 00673	857 00673	857 00709	857 00709	857 00709	NIPPLE
11	1	857 00652	857 00708	857 00673	857 00757	857 00757	857 01607	NIPPLE
12	1	857 00719	857 00719	857 00719	857 00719	857 00719	857 00719	NIPPLE
13	1	857 02199	857 02199	857 02199	857 02199	857 02199	857 02199	NIPPLE
14	1	857 01642	857 01642	857 01642	857 01642	857 01642	857 01642	NIPPLE
15	3	825 00239	825 00239	825 00239	825 00239	825 00239	825 00239	LEAKAGE TEST COCK
16	3	858 00088	858 00088	858 00088	858 00088	858 00088	858 00088	PLUG PIPE, SQUARE HEAD
17	1	857 00644	857 00644	857 00644	857 00669	857 00669	857 00669	NIPPLE,
18	1	858 00166	858 00166	858 00166	858 00168	858 00168	858 00168	UNION, FEMALE, 150# M.I.

Table 6-5. MSOV Kit

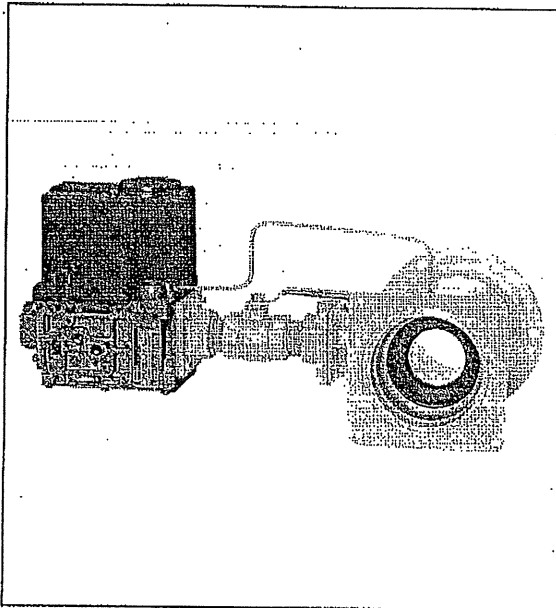
BOILER SIZE	500	750	1000	1500	1800	2500
	1" NPT KIT# 380-01046			1.25" NPT KIT# 380-1047		
BUTTERBALL VALVE	941-01944	941-01944	941-01944	941-01945	941-01945	941-01945
NIPPLE, CLOSED	857-00673	857-00673	857-00673	857-00709	857-00709	857-00709
ADAPTER, GAS VALVE	800-00092	800-00092	800-00092	800-00093	800-00093	800-00093
O-RING W/HARDWARE						
GASKET W/HARDWARE	800-98	800-98	800-98	800-99	800-99	800-99

Honeywell

V4730C/V8730C/V4734C

1:1 Gas/Air Servo Regulated Gas Valves

Product data



Note: Photo shows valve with manual safety shutoff valve and venturi installed.

CONTENTS

Application	1
Features	1
Specifications	2
Ordering Information.....	3
Installation	13
Electrical Connections	14
Adjustments and Final Checkout	14
Operation	15
Troubleshooting.....	16
Service Information	16

APPLICATION

The V4730C/V8730C/V4734C 1:1 Gas/Air Servo Regulated Gas Valves, with the addition of the Venturi Mixing Unit (VMU) and dc fan, are used for modulating premix appliances such as gas burners, gas boilers, rooftop units, makeup air units and process applications.

FEATURES

- Wide modulation range (14% to 100% of burner load).
- 24 Vac and 120 Vac models.
- Main valve body with two shutoff seats (double block valve).
- Closing time less than one second.
- Mesh screen (strainer) between inlet flange and main body.
- Various pressure tap points available at main body when no additional valves or pressure switches are used.
- DIN 43650 Plug Connector with 36-in. (914 mm) leadwires included.
- Flexible mounting positions of venturi manifold to fan.
- Replaceable pipe flange adapters available.
- Position indication lamp for each valve stage

SPECIFICATIONS

The specifications in this section are related to the Venturi Mixing Unit (VMU) and Combination Gas Valve.

Models: See Table 1

Table 1: Model Information

Model Number	Size (in.)	Voltage/Frequency	V1 - V2 Total Current	Capacity (Natural Gas @ 645 psig)
V4730C1006	1/2	120 Vac, 50/60 Hz	0.32 A	22-150 kW (73-512 kBtuh)
V4730C1014	3/4			43-300 kW (146-1024 kBtuh)
V4730C1022	1		0.5 A	55-382 kW (185-1300 kBtuh) ^{a/71} - 500 kW (245-1710 kBtuh)
V4730C1030	1-1/4			
V4734C1002	1-1/4	120 Vac, 50/60 Hz	2.6 A at start 1.04 A during operation	97-680 kW (326-2287 kBtuh) when used with VMU680 unit
V8730C1007	1/2	24 Vac, 50/60 Hz	1.56 A	22-150 kW (73-512 kBtuh)
V8730C1015	3/4			43-300 kW (146-1024 kBtuh)
V8730C1023	1		1.72 A	55-382 kW (185-1300 kBtuh) ^{a/71} - 500 kW (245-1710 kBtuh)
V8730C1031	1-1/4			

^a When used with VMU335 Venturi Unit Anwendung

Maximum Operating Pressure (UL):

1.45 psi (100 mBar), except for 1-1/4 in. size:

(24V): 1 psi (70 mBar).

(120V): 1.45 psi (100mBar)

CSA Approved: 0.5 psi (34 mBar).

Note: CSA Certification to 1/2 psi.

Connections:

1/8 in. (3 mm) NPT pressure taps at inlet and outlet flanges. Eight flange connections are provided at the main body to mount either a pressure switch (high or low) or a ValveProving System (VPS).

Torsion and Bending Stress:

Pipe connections meet EN151, Group 2, requirements.

Electrical Equipment:

Standard DIN plug connector with 36-in. (914 mm) leadwires.

Valve Position Indicator Lamps:

Inboard (closest to the valve body) - V1.

Outboard - V2.

Ambient Temperature Range:

5°F to 140°F (-15°C to +60°C).

Coil Insulation Solenoid Valves:

Class H insulation system.

Body Material:

Aluminum alloy, die-cast

Strainer:

Fine mesh screen (0.135 in. [0.34 mm] diameter), AISI 303 steel, serviceable after removing inlet flange screws. Meets EN161 requirements for strainers

Seals and Gaskets:

Hydrocarbon-resistant NBR and Viton rubber types.

Flange Kit:

Consists of one flange with sealing plug, one O-ring and four screws. See Table 2.

Note: Valve comes with one kit only.

Table 2: Flange Kits.

Part Number	Size NPT in. (mm)
32006652-001	1/2 (13)
32006652-002	3/4 (19)
32006652-003	1 (25)
32006652-004	1-1/4 (32)

Manual Shut-Off Valve Kits:

50002653-001 for use with 1 in. NPT or smaller valves.

50002653-002 for use with 1-1/4 in. NPT valves.

5.

5. BOILER SYSTEM CONTROLLER

Boiler Plant
Control

CB-SystemMAX ISD

An Intelligent System Device for Hydronic Heating

This ground breaking boiler room control offers wireless communications, and packed with 64 I/O points for controlling multiple boilers, pumps, and dampers while matching system load; Adjusting boiler sequencing and firing rate based on real time variances from outdoor temperature, supply/return temperatures and flow.

It is perfect for controlling a bank of condensing boilers based on outside air temperature, or varying zone temperatures, staging them while controlling firing and pumping rates for optimum condensing efficiency and maximum building heat satisfaction including domestic water. The CB-SystemMAX ISD manages multiple boiler sizes with on/off, 2 stage or modulating firing schemes, providing maximum system turndown while precisely matching load requirements.

The CB-SystemMAX ISD, has also been designed to compliment "hybrid" systems, the combination of condensing and non-condensing boilers into the same control scheme thereby economically meeting building load demand while protecting the non-condensing unit(s) from adverse affects due to improper flow and/or temperature.

Features

- Secure wireless connectivity from boiler devices to remote devices
- Modbus Communications
- 7" color high definition touch screen
- Robust data logger
- (3) Temp. resets (2) Winter and (1) Summer
- (16) boilers with modulation or fixed firing
- (16) secondary pumps
- (16) main system or zone pumps; on-off or lead/lag
- (16) combustion air dampers or mechanical draft control initiation
- System and/or Delta T control with VSD pumps
- 3-way control valve
- Real time heating load calculation used for intelligent load sharing
- Assign boiler operation based on real time load demand including Summer/Winter reheat
- Adjustable (7) day setback schedule
- Optimum start/stop based on occupancy
- Firing sequence; unison and lead/lag
- Building freeze protection
- Adaptable pre-configured boiler size and model parameter database
- Field upgradable
- Low fire hold

Benefits

- Flow intelligence maximizes boiler operating efficiency... This saves energy while reducing cycling; saving fuel costs by as much as 35-70% over conventionally controlled systems
- Saving energy translates directly into a reduction in the carbon footprint.
- Reduced cycling means a reduction in mechanical failures and significantly improved uptime
- The CB-SystemMAX ISD manages both condensing and non-condensing boilers, affording one system to control both designs... This SAVES capital and install costs.
- The CB-SystemMAX ISD's intelligence allows a single point of control for boilers, pumps, valves and dampers providing system optimization and simplicity.
- The field upgradable design assures optimum performance year after year.
- It's wireless which saves additional installation dollars!

800-250-5883 • info@cleaver-brooks.com • www.cleaver-brooks.com

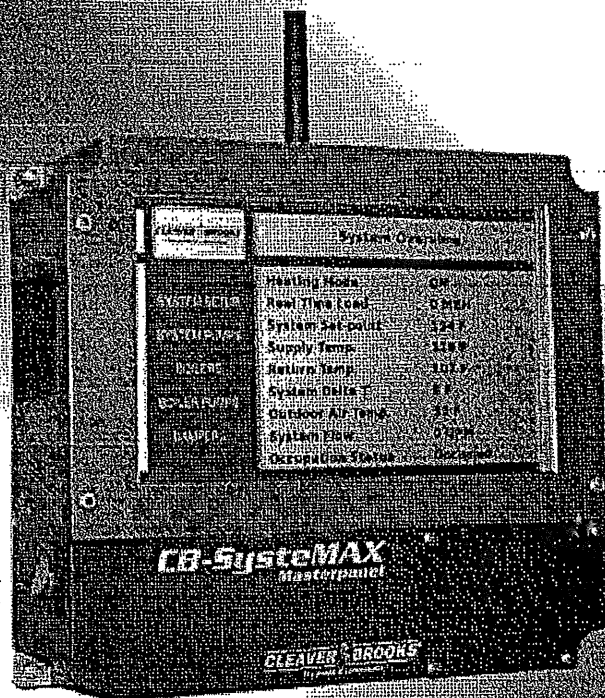
CLEAVER BROOKS
The power of commitment.

CB-8182
12/08

CB PACKAGE BOILER

Dramatically Reduce System Energy Costs, the Carbon Footprint and Mechanical Failure with CB-SystemMAX ISD.

The only control that utilizes system intelligence and delivers maximum system results.



- Intelligent load sharing for any hydronic system, regardless of size, type, or mix of boilers... Reduces boiler cycling and associated standby losses; Saves Energy while reducing the Carbon Footprint!
- It's easy to use with superior system flexibility, plus...
- It's wireless for easy setup and minimal installation cost!

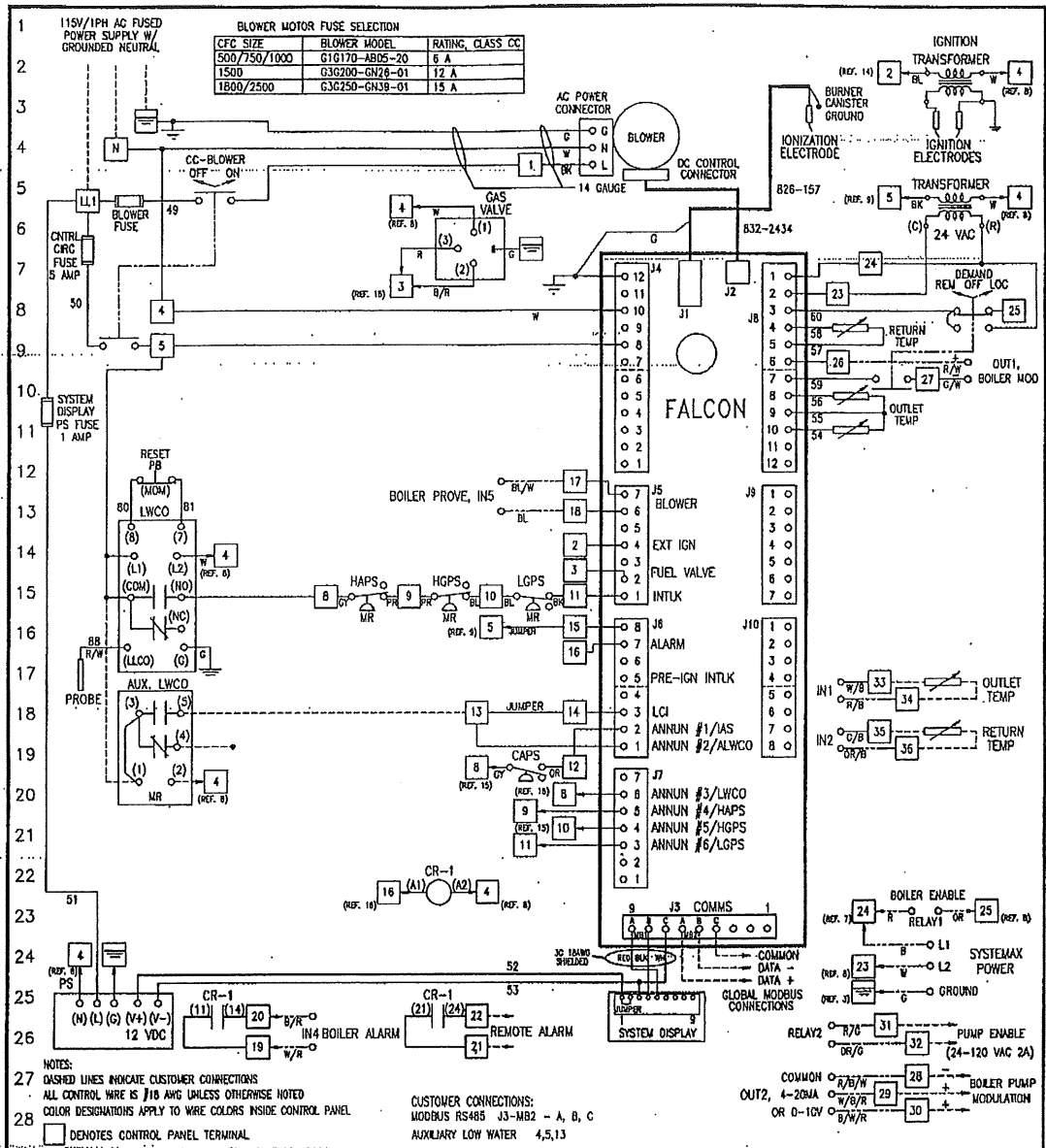
- The revolutionary *CB-SystemMAX ISD* (patent pending) is the only control which measures and calculates REAL-time load for REAL time system control and operation to precisely meet heating demands while maximizing fuel savings.
- Ideal control for systems with multiple pumps, valves, condensing boilers or, a mix of condensing and non-condensing boilers.
- It's one control for boilers, pumps, valves and dampers.



Cleaver-Brooks is YOUR Single Source Solution for Saving Energy and Reducing Emissions

CB-SystemMAX ISD
the **Intelligent System Device** for Efficient Hydronic Heating

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MARTINS POINT HEALTHCARE
PORTLAND, ME
SYSTEMAX-1SD

TERMINALS: LL1, N, 0, 1, 2, 3, 4-4, 4-5-5-5, ..., 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

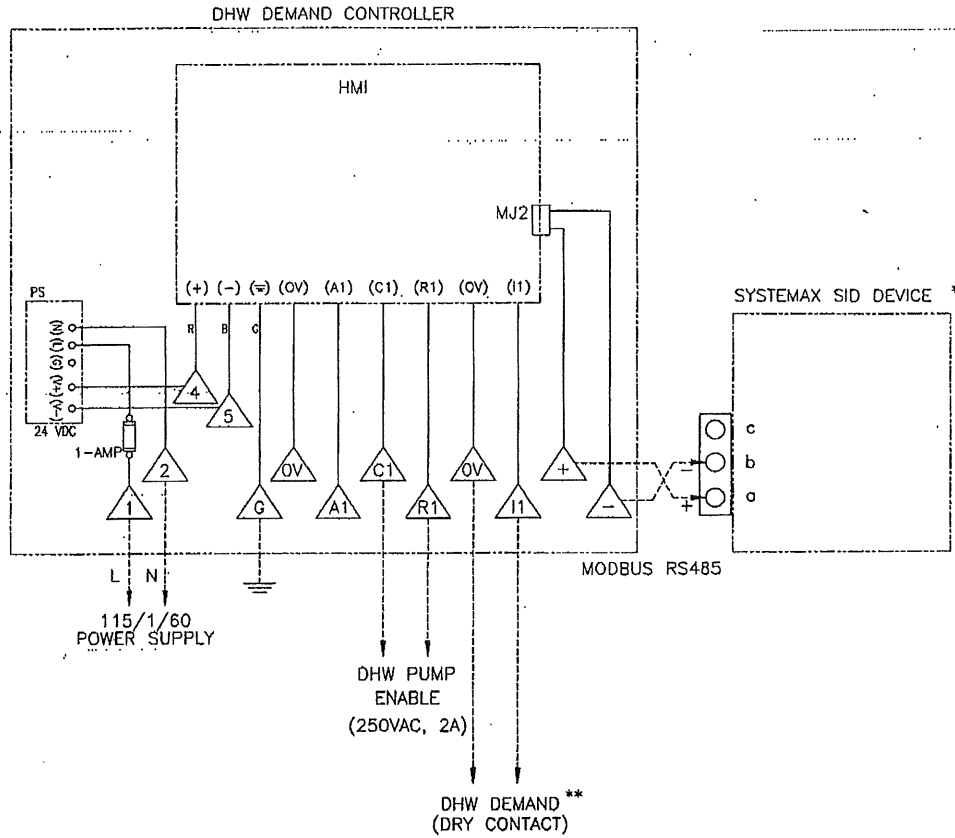
SHT. 01 OF 03

02077

REVISIONS	01 09/08/08 DKW ADDED SHEET 3	SCALE N.T.S.	CLEAVER-BROOKS STRAFORD, ONTARIO <i>The power of commitment.</i> MILWAUKEE, WISCONSIN		
	02 09/15/08 DKW ADDED AIM FOR PUMPS	DATE 08/27/09			
		DRAWN GG	CFC MODEL 700 1000 60HW	FUEL SIZE 1 60 2	INSURANCE 10.0
		SIZE A	VOLTS PHASE HERTZ 120 1 60	WIRE 2	AMPACITY 10.0
		DRWG. NO. 02077-1-1WD 02			

SYSTEMAX -- MODBUS INTERFACE DHW DEMAND WITH SET POINT OVERRIDE

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MARTINS POINT HEALTHCARE
PORTLAND, ME

* REFER TO SYSTEMAX MANUAL FOR CONNECTIONS TO SID
** DHW DEMAND FROM AQUASTAT OR TEMPERATURE CONTROLLER

SHT 02 OF 03

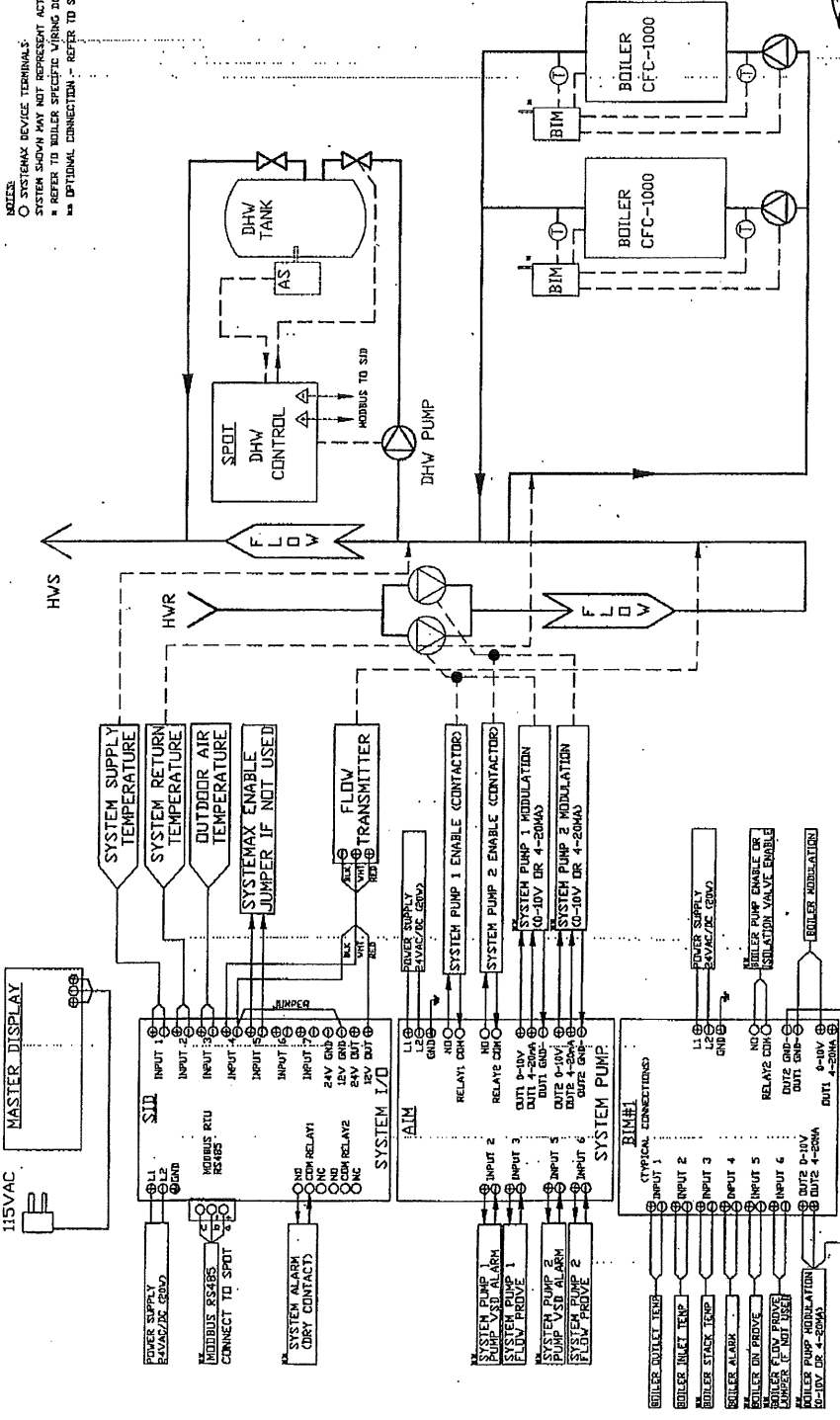
02077	REVISIONS	SCALE N.T.S.	CLEAVER BROOKS <small>STRATFORD, ONTARIO The power of commitment. MILWAUKEE, WISCONSIN</small>			
	01 09/08/09 DKW ADDED SHEET 3	DATE 08/27/09				
	02 09/15/09 DKW ADDED AIM FOR PUMPS	DRAWN GG	SYSTEMAX - DHW CONTROL			
		SIZE A	115 VOLTS	1 PHASE	60 HERTZ	2 WIRE
		DRWG. NO. 02077-1-1WD 02				

SYSTEMAX WIRING CONNECTIONS - TYPICAL PRIMARY/SECONDARY HYDRONIC SYSTEM WITH DHW PRIORITY CONTROL

1
2
3
4

NOTES:
 O SYSTEMAX DEVICE TERMINALS
 SYSTEM SHOWN MAY NOT REPRESENT ACTUAL INSTALLATION ARRANGEMENT
 REFER TO BOILER SPECIFIC WIRING DIAGRAM FOR BOILER I/O MODULE INTERFACE CONNECTIONS
 REFER TO SYSTEMAX MANUAL FOR DEVICE SPECIFIC WIRING DIAGRAM

DEFINITIONS:
 SID - SYSTEM INTELLIGENCE DEVICE (SYSTEM I/O
 BIM - BOILER I/O MODULE
 AS - AUXILIARY I/O MODULE (PUMPS, DAMPERS...)
 HW - HOT WATER
 HWV - DOMESTIC HOT WATER
 AS - AQUA STAT
 HWS - HOT WATER SUPPLY
 HWR - HOT WATER RETURN



SHEET 3 of 3

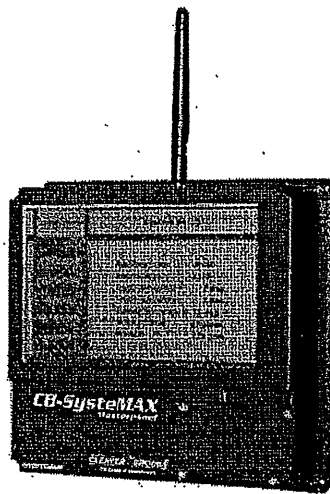
REVISIONS	01/08/08/09/DKW	ADDED SHEET 3	02/09/15/09/DKW	ADDED AIM FOR PUMPS
MARTINS POINT HEALTHCARE PORTLAND, ME				
SHT 03 OF 03		02077-1-1		
SCALE	N.T.S.	DATE	08/27/09	DRAWN
SIZE	B	DKW		
SYSTEMAX ISD HW SYSTEM CONTROL		DHW PRIORITY CONTROL		
CLEAVER BROOKS		STANFORD, ONTARIO The power of commitment. MILWAUKEE, WISCONSIN		
DRAWING NO. 02077-1-1WD 02				

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CB-SystemMAX

CB-SystemMAX

**Hydronic Control System
Installation and Operation**



750-274
03/09

1.1-Introduction

The Cleaver-Brooks SystemMAX is a complete hydronic boiler room control system capable of sequencing and modulating up to 16 boilers in addition to controlling pumps, dampers, or other ancillary equipment. Its features include:

- Flow intelligence with real time load control (patent pending)
- Intelligent load sharing to maximize total system efficiency
- Selects, stages, and modulates up to 16 boilers
- Modulates all equipment with acceleration modulation control (AMC)
- Controls main system pumps including lead/lag and modulation
- Controls secondary boiler pumps including Delta T control for boilers
- Controls combustion air make-up devices (dampers, mechanical air, mechanical draft)
- Wireless communication for reduced installation cost

The SystemMAX is ideal for hybrid systems that incorporate both condensing and non-condensing boilers.

The SystemMAX consists of the following components:

Master Panel

The SystemMAX Master Panel unit houses the touchscreen graphical user interface (GUI). The GUI allows the user to configure and monitor the system. Its functions include:

- Configure the wireless network by adding/removing devices.
- Enter Boiler I/O, Aux I/O, and system parameters.
- Monitor system data
- Data logging/retrieval

System Intelligence Device

The System Intelligence Device (SID) monitors network and external Modbus communications, and tracks variables critical to system operation:

- System Delta T (supply & return temp.)
- System flow
- Outdoor air temperature

Boiler I/O Modules

Each Boiler I/O Module (BIM) can control one boiler and one additional device (e.g. a boiler pump or a valve). In addition, the Boiler I/O Module has inputs for boiler inlet and outlet temperature.

Auxiliary I/O Modules

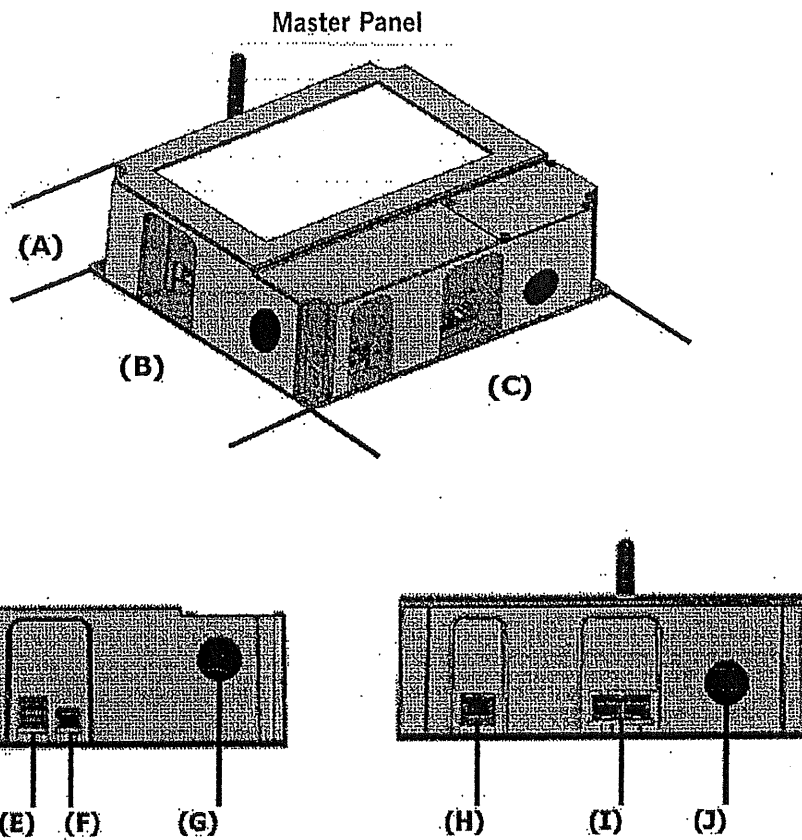
Each Auxiliary I/O Module (AIM) can control two appliances of the same type (e.g. pumps, valves, or dampers).

A minimum SystemMAX system consists of a Master Panel, SID, and at least one BIM. More complex systems may incorporate additional BIM and AIM modules as needed.

Accessories

- Supply & Return Thermistors
- Stack PT1000 RTDs
- Outdoor Air Thermistor
- Flow Device
- Thermowells
- Boiler interface cable

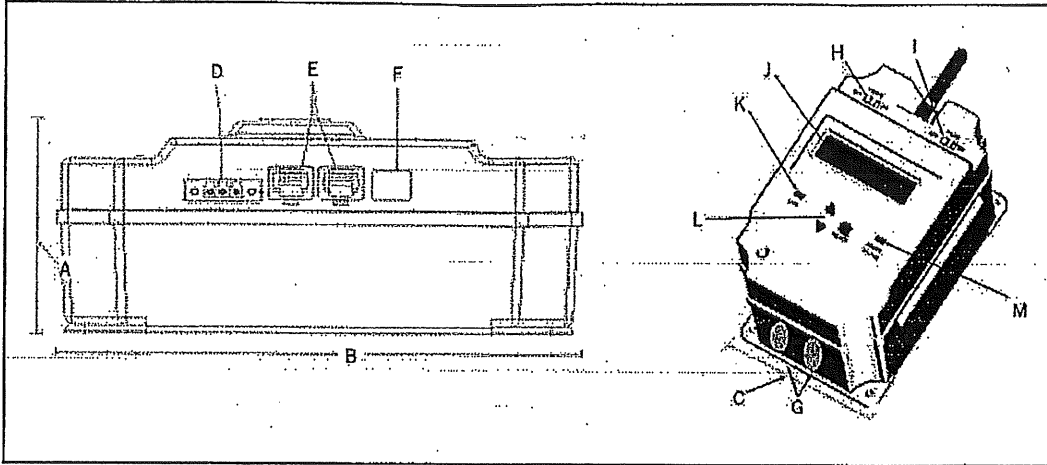
1.2-System Components



Dimensions: A=1.25", B=7.25", C=8.00"	D = Wireless antenna
E = USB for data logging and wireless upgrade*	F = USB B (not used)
G = Power On / Off switch	H = Ethernet (not used)
I = RJ-11/RJ-12 Port (6 wire) for hard wire LiveFire Connect communication protocol	J = 1/2" NPT opening for power wiring

*A USB mouse may be connected here for HMI screen navigation.

Input/Output Modules (SID, BIM, and AIM)



Dimensions: A = 2.2", B = 6.6" (9.5 w/ant.), C = 4.2"	D = External Modbus RS485 Connector (SID only)
E = RJ-11/RJ-12 Port (6 wire) for hard wire Live-Fire Connect communication protocol	F = USB-B for updating FD
G = Openings for power and control wiring	H = Radio on/off switch
I = Power On/Off switch	J = LCD HMI screen
K = Communication Link Light (Blinks w/ comm. rate)	L = HMI Selection Buttons
M=Power / Status indicator light Green, Red, Yellow.	

1.3-Specifications

Master Panel

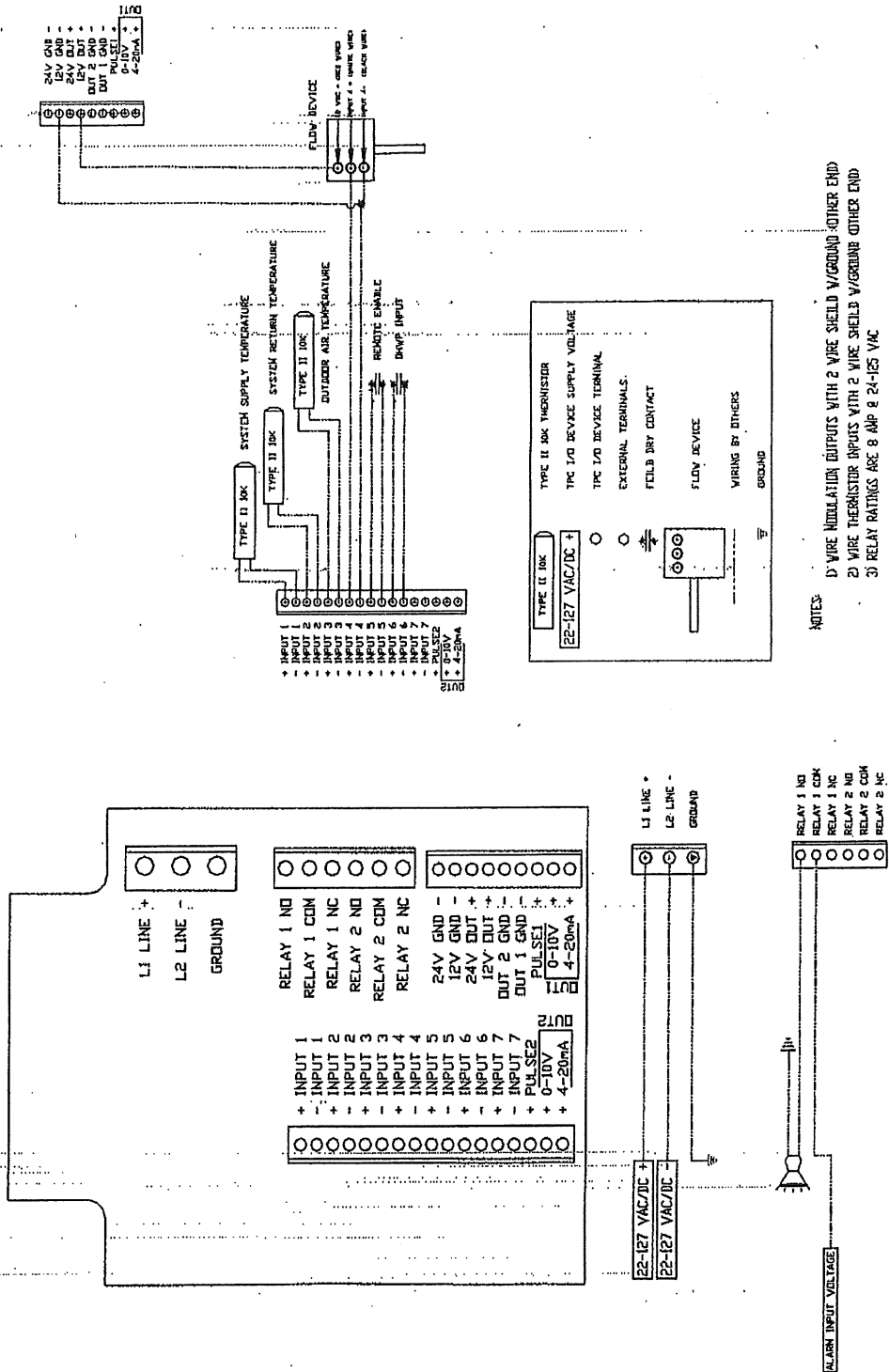
- Enclosure: ABS Plastic / Aluminum mounting flanges
- Power: ___ 24 Vdc ___ 120 Vac
- Screen: 7" full color high resolution LCD touchscreen
- Maximum Network Size: 64 appliances
- Environmental: Operation Temperature 0-70C (32-158F)
- Communication: LiveFire Connect™, Wireless- 802.15.4
- Wired communication: - 4wire RS485, Two (2) (6/2RJ-12) for LiveFire Connect protocol

SID and I/O Modules

- Power: 22-125Vac/dc
- Outputs - 2 analog (0-10Vdc, 4-20mA), 2 Relays (mechanical 8 Amp @120Vac)
- Inputs - 7 universal (0-10Vdc, 4-20mA, PT1000 RTD, Type II 10K Thermistor, Digital, PFM)
- Enclosure - ABS Plastic, Nema 1
- Max Network size - 64 I/O Devices
- Memory - 365 day hourly history downloadable from Master Panel
- Over power / Short circuit protection (non-fuse based) and 1 amp fuse
- Communication: LiveFire Connect™, Wireless- 802.15.4 Wired - 4wire RS485(6/2RJ-12) Modbus RTU- wired 2wire RS485
- Environmental: operating temp: 0-70 C (32-158F), 0-95% Non-condensing

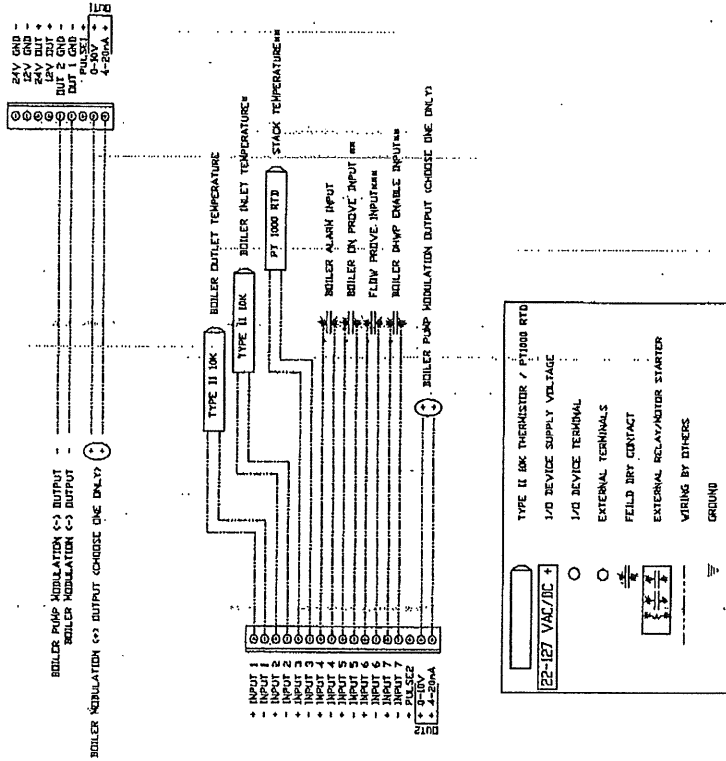
SID

SYSTEM INTELLIGENCE DEVICE

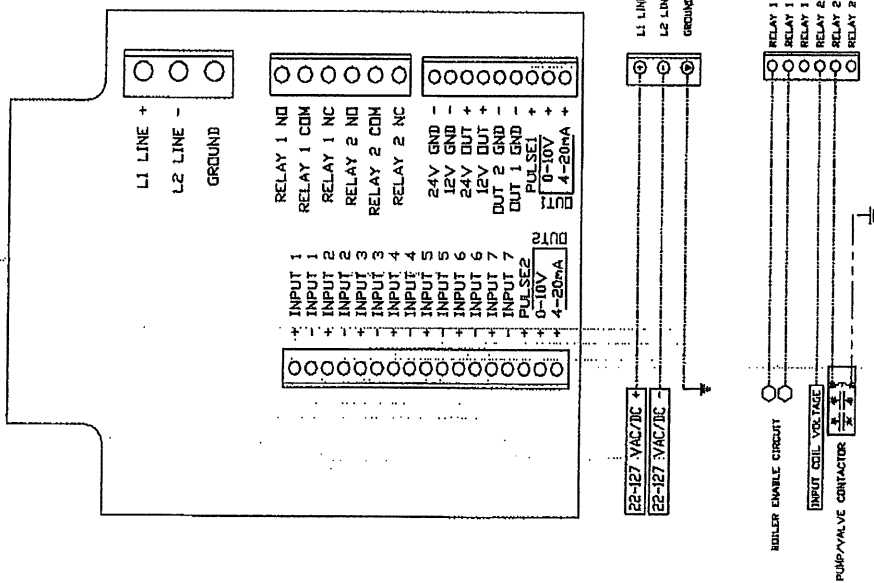


BIM (MODULATING CONTROL)

MODULATING BOILER I/O MODULE

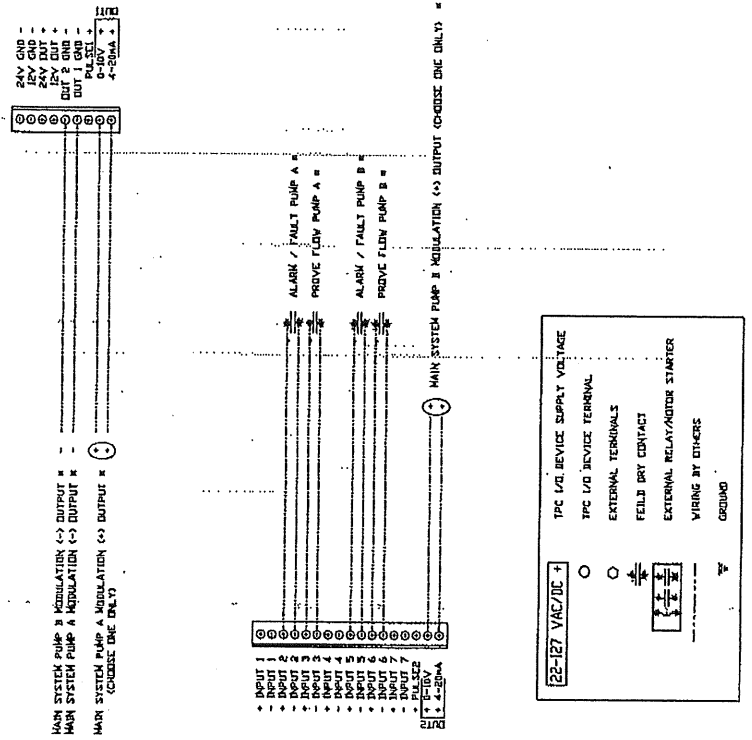


- NOTES:**
- 1) WIRE MODULATION OUTPUTS WITH 2 WIRE SHIELD W/GROUND ON OTHER END
 - 2) WIRE THERMISTOR INPUTS WITH 2 WIRE SHIELD W/GROUND ON OTHER END
 - 3) RELAY RATINGS ARE 8 AMP @ 24-125 VAC
 - 4) * OPTIONAL FUNCTIONALITY REQUIRED FOR BOILER DELTA T OPERATIONS
 - 5) ** IF NOT USED THEN JUMPER REQUIRED

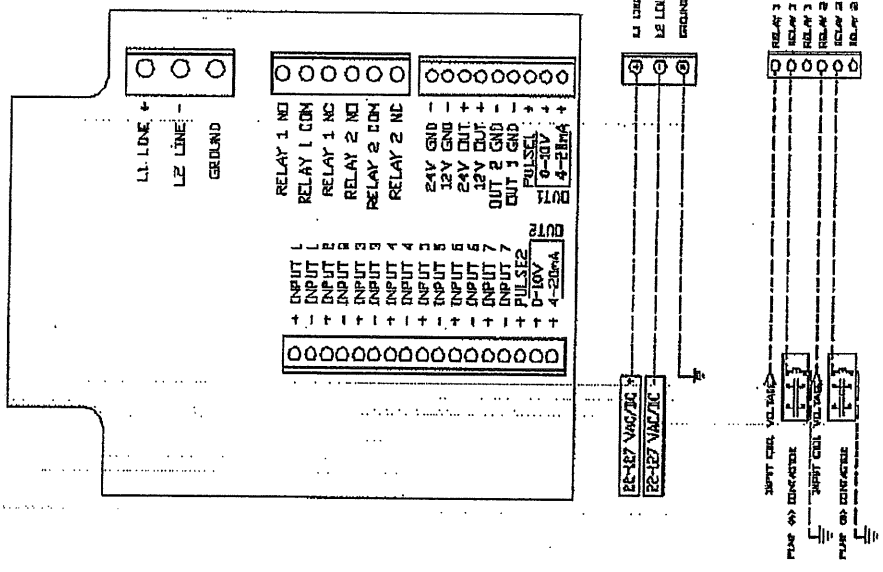


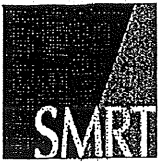
AIM (SYSTEM PUMP CONTROL)

SYSTEM PUMP I/O MODULE



- NOTES
- 1) WIRE MODULATION OUTPUTS WITH 2 WIRE SHIELD W/GROUND
 - 2) RELAY RATINGS ARE 8 AMP @ 24-HZ VAC
 - 3) * OPTIONAL FUNCTIONALITY





HVAC Hydronic
Unit Heaters

Submittal Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 153-238240-1

Portland, ME 04103

Submittal Title: Unit Heaters

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site: information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 11/11/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 # 153

Remarks:

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

SPECIFICATION SECTION: 238240

PARAGRAPH: PART 2 PRODUCTS

DRAWINGS: M-602
Cabinet Unit Heater / Unit Heater Schedule

ITEM: UNIT HEATERS

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed X

Subject to Architects Approval X

Date 8/4/09 By TKU

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

UNIT HEATERS

MANUFATURER: TRANE

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey road
Scarborough, Maine 04074
Contact: Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619



Submittal

Trane U.S. Inc.

Engineer: SMRT Inc

Date: July 30, 2009

Prepared For:

Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074

Job Name:

Martin's Point Health Care – Medical Office Building

Customer P.O. Number: 145426

Job Number: A2-21345

Customer Project Number:

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

<u>Qty</u>	<u>Description</u>	<u>Tag(s)</u>
3	Hot Water Unit Heaters Trane Model UHSB036 Horizontal Hot Water Unit Heaters <ul style="list-style-type: none"> • 115v/1ph/60hz • Totally enclosed motor • Copper Tubes • OSHA fan guard • 5.0 Amp speed control switch • Vertical louver 	UH-1,2,3

Dan Broderick
Trane
30 Thomas Drive
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

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

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Mechanical Specifications - UHSB036 Horizontal Hot Water Unit Heaters
Qty: 3 Tag(s): UH-1, UH-2, UH-3**Casing - Model S**

Casings shall be 20 gauge die-formed steel. Casing substrates shall be prepared for finishing with a hot wash, iron phosphatizing clear rinse, chromic acid rinse and oven drying. Paint finish shall be of lead-free, chromate free, alkyd melamine resin base and applied with an electrostatic two-pass system. Finish shall be baked at 350.0 F.

Header Coil Assembly - Model S

Coil elements and headers shall be of heavy wall drawn seamless copper tubing. Element tubes shall be brazed into extruded header junctions. Pipe connection saddles shall be of cast bronze. Aluminum fins shall have drawn collars to assure permanent bond with expanded element tubes and exact spacing. All element assemblies are submersion tested at factory at 250.00 psi and are rated at 150.0 lb of saturated steam pressure at 366.0 F under maximum load conditions. Operating pressure of 75.00 psi at 320.0 F is recommended for long life.

1 Phase Totally Enclosed Motors

Motors are 115 volt / 60 cycle / 1 phase, totally enclosed, with thermal overload protection and Class "B" insulated windings.

Copper Tubing - Model S [Header Coil]

Copper tubing is suitable for steam pressure up to 150.00 psi or 366.0 F water at 150.00 psi.

OSHA Fan Guard

Factory installed wire fan guard shall meet OSHA specifications to guard exposed fan blades when the periphery of the fan blades is less than 8 feet [2.4 meters] from the floor or working area.

Speed Control

Standard 115 volt / 60 cycle / 1 phase motors up to 1/12 horsepower can be operated at multiple speeds with the addition of a 5 amp speed control switch.

Vertical Louvers - Model S

Vertical louvers shall mount on face of unit over horizontal louvers for versatility in lateral air diffusion by providing four-way air direction control.

Performance Data - UHSB036 Horizontal Hot Water Unit Heaters

Qty: 3 Tag(s): UH-1, UH-2, UH-3

Hot Water Performance Data

Horizontal Unit Heaters

Performance based on 200° EWT, 60° E.A.T., 20° WTD (max working pressure 150 PSI, 366° F)

Table 13.

Model No.	Total MBh	GPM	LAT °F	WPD	Motor HP	RPM	Nominal CFM	Outlet Velocity FPM	Sound Rating
S-A08	8.0	0.80	91	.80	16 Watts	1550	245	250	II
	6.8		90			1350	210	215	I
S-A18	18.4	1.9	94	2.2	16 Watts	1550	500	500	II
	15.7		96			1350	420	420	I
S-A25	24.8	2.5	102	2.2	25 Watts	1550	580	590	II
	21.2		106			1350	460	450	I
S-A36	35.9	3.6	99	3.0	1/20	1000	850	550	II
	32.3		100			900	750	480	I
S-18	13.1	1.3	95	.005	16 Watts	1550	395	395	II
	11.7		99			1350	350	350	I
S-24	17.4	1.8	96	.014	16 Watts	1550	450	450	II
	15.6		98			1350	380	380	I
S-36	26.1	2.7	103	.09	25 Watts	1550	550	550	II
	23.5		103			1350	480	480	I
S-48	34.8	3.5	103	.12	1/20	1000	750	550	II
	31.3		111			900	630	460	I
S-60	43.6	4.4	105	.17	1/20	1000	900	650	II
	39.2		112			900	700	510	I
S-72	52.3	5.3	104	.23	1/20	1000	1100	800	II
	47.0		106			900	950	700	I
S-84	61.0	6.1	100	.24	1/12	1000	1400	900	III
	54.9		106			900	1100	750	II
S-96	69.7	7.0	106	.29	1/12	1000	1400	930	III
	62.7		113			900	1100	800	II
S-108	78.4	7.9	100	.36	1/12	1000	1800	1000	III
	70.5		103			900	1500	900	II
S-120	87.1	8.8	102	.39	1/3	1140	1900	900	III
S-132	95.8	9.6	104	.41	1/3	1140	2000	950	IV
S-144	104.0	10.4	104	.43	1/3	1140	2200	1000	IV
S-156	113.0	11.3	100	.53	1/3	1140	2600	1150	IV
S-180	118.0	11.8	110	.60	1/3	1140	2200	800	III
S-204	148.1	14.9	107	.79	1/3	1140	2900	1000	IV
S-240	174.0	17.4	106	1.06	1/3	1140	3500	900	IV
S-280	209.1	21.0	106	1.33	1/2	1100	4200	980	IV
S-300	230.0	23.0	102	2.1	1/2	1100	5000	700	IV
S-360	261.3	26.2	103	2.1	1/2	1100	5500	1000	IV

* For the lower output, an optional Speed Controller must be ordered.

Performance Data - UHSB036 Horizontal Hot Water Unit Heaters

Qty: 3 Tag(s): UH-1, UH-2, UH-3

Table 16. HOT WATER CALCULATIONS AND CORRECTION FACTORS

		EXAMPLE:
		UNIT: P-42
		Entering Water Temp. 160°F
		Entering Air Temp. 40°F
		Water Temperature Drop 10°F
I. CAPACITY @ 20° TD:	Read output directly from Table 14 & Table 15,	
A. For 200° EWT, 60° EAT	22,700 BTU/HR (Ref. Std. P-42, p. 22).	
B. For EWT and/or EAT above or below Standard	Multiply output from Table 14 & Table 15 by factor from Table 17.	22,700 x .878 = 19,931 BTU/HR.
II. CAPACITY AT OTHER TD's	Multiply output obtained in IA, or IB, (above) by appropriate factor from Table 18	IA - 22,700 x 1.15 = 26,105 BTU/HR. -OR- IB - 19,931 x 1.15 = 22,921 BTU/HR.
III. GPM AT OTHER TD's	Multiply GPM of unit for 20° TD, from Table 14 by appropriate factor from Table 18.	2.34 x 2.30 = 5.38 GPM (Applies only to units with Std. 200° EWT, 60° EAT.) For all others calculate using formula: GPM = BTU/500 x TD
IV. PRESSURE LOSS AT OTHER TD's	Multiply P.D. of unit for 20° TD, from Table 14 & Table 15 by appropriate factor from Table 18.	.05 x 5.00 = .30 Ft. H ₂ O.

Table 17. HOT WATER CONVERSION FACTORS BASED ON 200° ENTERING WATER 60° ENTERING AIR 20° TEMPERATURE DROP

ENTERING AIR TEMPERATURE	ENTERING WATER TEMPERATURE - 20° WATER TEMPERATURE DROP										
	100°	120°	140°	160°	180°	200°	220°	240°	260°	280°	300°
30°	0.518	0.656	0.814	0.963	1.120	1.268	1.408	1.555	1.702	1.850	1.997
40°	0.439	0.585	0.731	0.878	1.025	1.172	1.317	1.464	1.609	1.755	1.908
50°	0.361	0.506	0.651	0.796	0.941	1.085	1.231	1.375	1.518	1.663	1.824
60°	0.286	0.429	0.571	0.715	0.857	1.000	1.143	1.286	1.429	1.571	1.717
70°	0.212	0.353	0.494	0.636	0.777	0.918	1.060	1.201	1.342	1.483	1.630
80°	0.140	0.279	0.419	0.558	0.698	0.837	0.977	1.117	1.257	1.397	1.545
90°	0.069	0.207	0.345	0.483	0.621	0.759	0.897	1.035	1.173	1.311	1.462
100°	0	0.197	0.273	0.409	0.546	0.682	0.818	0.955	1.094	1.230	1.371

To obtain the BTU capacity for conditions other than those in the basic capacity tables, multiply the basic rating (200° entering water, 60° entering air) by the proper constant from Table 17.

Table 18. HOT WATER BTU, GPM AND PRESSURE LOSS FACTORS BASED ON STANDARD CONDITIONS OF 200°F ENTERING WATER 60°F ENTERING AIR & 20°F WATER DROP

USE FACTORS FROM THIS TABLE TO OBTAIN APPROXIMATE RESULTS	TEMPERATURE DROP °F									
	5	10	15	20	25	30	40	50	60	
To obtain BTU for other Water Temperature Drops, multiply basic BTU rating by applicable Factor.	1.25	1.15	1.08	1.00	.94	.90	.83	.76	.72	
To obtain GPM for other Water Temperature Drops, multiply basic GPM rating by applicable Factor.*	5.00	2.30	1.44	1.00	.74	.59	.40	.30	.24	
To obtain Pressure Loss Feet of Water for other temperature Drops, multiply Basic loss at 20° drop by Factor.	10.00	5.00	2.00	1.00	.60	.40	.20	.13	.07	

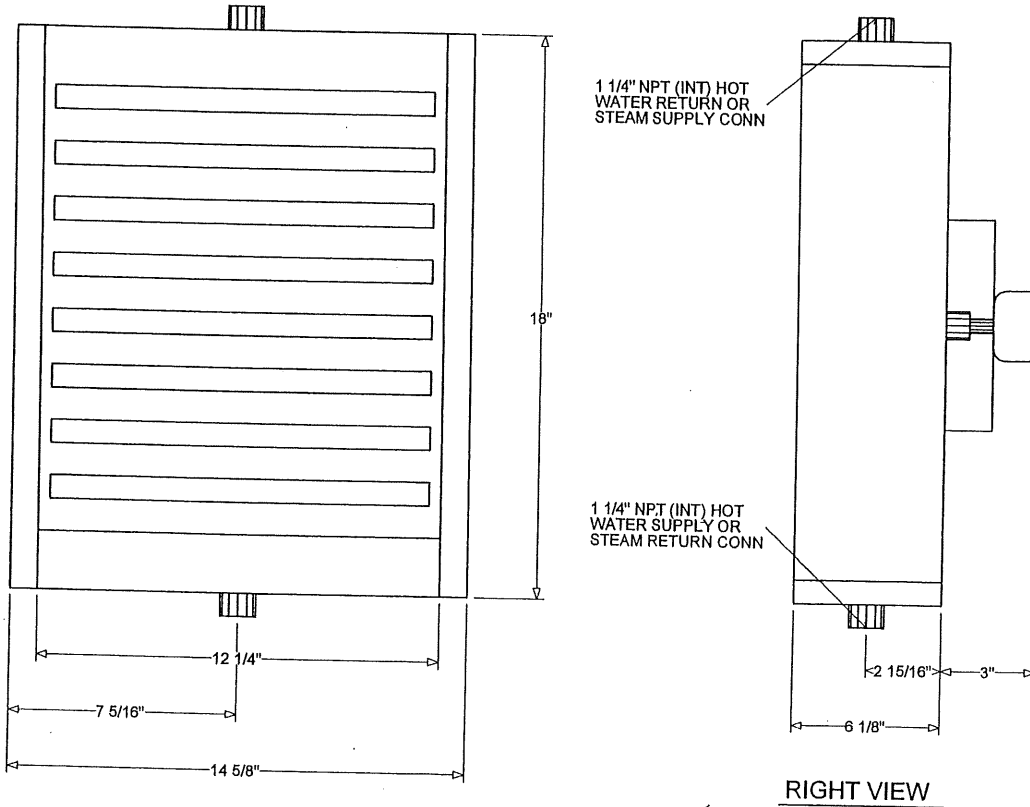
Table 19. *MINIMUM WATER FLOW - GPM

MODEL No.	42	64	80	102	146	166	202	252	336	384	500	600	700
MIN. GPM	.55	.55	.55	.55	.82	.82	1.10	1.10	1.10	1.10	1.0	1.4	1.6

Table 20. *HEATING CAPACITY FACTORS FOR VARIOUS RATES OF WATER FLOW

% of Rated Water Flow	25%	50%	75%	100%	125%	150%	175%
Btu/Hr Heating Capacity	.80	.89	.96	1.00	1.04	1.07	1.10

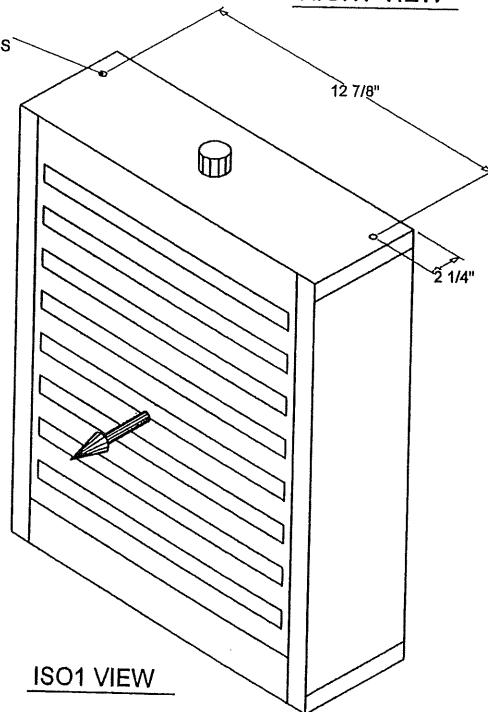
Unit Dimensions - UHSB036 Horizontal Hot Water Unit Heaters
Qty: 3 Tag(s): UH-1, UH-2, UH-3



FRONT VIEW

RIGHT VIEW

(2) 3/8" - 16 THREAD TAP MOUNTING HOLES



ISO1 VIEW

NUMBER OF LOUVERS	NOMINAL FAN DIA.	SHIPPING WEIGHT
5	10"	30.0 lb

NOTE:
 1. ARROW INDICATES THE DIRECTION OF AIRFLOW.

Field Wiring - UHSB036 Horizontal Hot Water Unit Heaters

Qty: 3 Tag(s): UH-1, UH-2, UH-3

FOR ALL WIRING CONNECTIONS, REFER TO THE WIRING DIAGRAM ON THE MOTOR NAMEPLATE OR REFER TO THE INSTALLATION AND OPERATIONS MANUAL FOR TYPICAL WIRING DIAGRAMS.

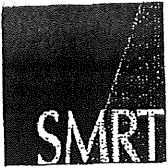
NOTE:
1. ALL EXTERNAL WIRING MUST CONFORM TO ANS/NFPA NO. 70-2002, NATIONAL ELECTRIC CODE (OR THE LATEST EDITION) AND APPLICABLE CURRENT LOCAL CODES; IN CANADA, TO THE CANADIAN ELECTRIC CODE, PART 1 CSA STANDARD C22.1.

 **WARNING**

HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING. FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

 **CAUTION**

DO NOT USE ANY TOOLS (I.E. SCREWDRIVER, PLIERS, ETC.) ACROSS THE TERMINALS TO CHECK FOR POWER. USE A VOLTMETER.



HVAC Hydronic
Cabinet Unit Heaters

Submittal
Review Memo

Project Name: MPHCB MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 52-238239-1

Portland, ME 04103

Submittal Title: Cabinet Unit Heaters Pre-Construction Submittals

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site: information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction: coordination of the work of all trades: and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 8/19/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 #52

Remarks:

CUH-6 should be a size 04.

Cabinet color selection to follow.

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

SPECIFICATION SECTION: 238239

PARAGRAPH: PART 2 PRODUCTS

DRAWINGS: M-602
Cabinet Unit Heater / Unit Heater Schedule

ITEM: CABINET UNIT HEATERS

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed ✓ _____

Subject to Architects Approval ✓ _____

Date 8/4/09 By JR _____

1.

1. 2.2 Hydronic Cabinet Unit Heaters



TRANE

Submittal

Trane U.S. Inc.

Engineer: SMRT Inc

Date: July 30, 2009

Prepared For:

Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074

Job Name:

Martin's Point Health Care – Medical Office Building

Customer P.O. Number: 145426

Job Number: A2-21345

Customer Project Number:

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

<u>Qty</u>	<u>Description</u>	<u>Tag(s)</u>
	Cabinet Unit Heaters	
2	Trane Model FFHB020 Semi-Recessed Vertical Cabinet Unit Heaters	CUH-1,4
2	Trane Model FFHB020 Fully Recessed Vertical Cabinet Unit Heaters	CUH-2,3
1	Trane Model FFFB020 Vertical Wall Hung Cabinet Unit Heater	CUH-5
1	Trane Model FFEB030 Horizontal Recessed Cabinet Unit Heater	CUH-6
	<ul style="list-style-type: none"> • 115v/60hz/1ph • 2 or 3 row hot water coil w/ right side coil connection – <i>verify right or left side at time of release.</i> • Manual coil air vent • Vertical units: Front stamped louver return & supply Horizontal unit: Back duct collar return, bottom stamped louver supply • CUH-1,4: 2" deep projection panel for semi-recessed installation – <i>verify panel depth at time of release</i> • CUH-2,3: 5/8" front panel for fully recessed installation – <i>verify units will fit in intended wall space</i> • Unit mounted fan speed switch - line voltage • Disconnect switch • 1" throwaway pleated media filter (2 sets) • Color to be selected by Architect from Trane standard colors (Color chart attached) 	

Dan Broderick
Trane
30 Thomas Drive
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

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

This page intentionally left blank.

Mechanical Specifications – Force-Flo™ Cabinet Unit Heaters

Qty: 6 Tag(s): CUH-1, CUH-4, CUH-2, CUH-3, CUH-5, CUH-6

Agency Certification

All standard units are UL and CUL labeled and approved.

Recessed Unit Basic Construction

The basic unit includes the coil, chassis, fan(s) and fan casing(s), fan board and motor(s). The fan board assembly includes a quick-disconnect motor plug. The chassis is the structural frame constructed of 18 gauge galvanized steel. The unit is acoustically insulated with closed cell insulation. Exposed recessed panel is fabricated from 16 gauge steel and ships separate with the unit. All panels are made rigid by channel forming.

Unit Finish

All cabinet parts are cleaned, bonderized, phosphatized, and painted with one of six decorator colors. Standard finish meets ASTM B117 specifications (salt spray test).

Fan

The galvanized steel fan wheels are centrifugal forward-curved and double-width. Fan wheels and housings are corrosion resistant. Fan housings are constructed of formed sheet metal.

Coil

All hot water coils are burst tested at 450 PSIG (air) and leak tested at 100 PSIG (air under water). Maximum main coil working pressure is 300 PSIG. Maximum entering water temperature is 200 degrees F (93 degrees C). Tubes and U-bends are 3/8" (10 mm) O.D. copper. Fins are aluminum and are mechanically bonded to the copper tubes. Coil connections are expanded to accept standard 5/8" (16 mm) O.D. copper tubing.

Coil Air Vents - Manual

A manual air vent shall be provided on the hydronic coil and is rated at 300 psig.

Motor

All permanent split capacitor motors are run tested in assembled units. All motors have integral thermal overload protection and are permanently lubricated. Motors are capable of starting at 78 percent of rated voltage and operating at 90 percent of rated voltage on all speed settings. Motors can operate at 10 percent over rated voltage.

Coil Connections - (RH)

Right hand coil connection with no interconnecting piping is provided.

Unit-mounted Line Voltage Fan Speed Switch

A unit-mounted fan speed switch (Off/High/Med/Low) is factory-mounted and wired with the Fan Coil unit. The unit requires only a single point power connection.

Disconnect Switch

A unit mounted, non-fused disconnect switch is available as a standard option on all hot water and steam units.

Pleated Media Filter

The filter is concealed from sight and easily removable. A 1" (25 mm) pleated media throwaway filter is provided in the unit. Filters are Farr 30/30.

Projection Panels

Projection panels are constructed of 18 gauge galvanized steel and are painted with a baked powder finish. There is a distance of 7/8" between the projection panel and the front of the unit.

Vertical Wall Hung Basic Construction

The basic unit includes a chassis, coil, fan(s) and fan casing(s), fan board and motor(s). The fan board assembly includes a quick disconnect motor plug. The chassis is the structural frame, constructed of 18 gauge galvanized steel. the unit is

acoustically insulated with closed cell insulation. The front panel is fabricated from 16 gauge galvanized steel. All other panels are fabricated from 18 gauge galvanized steel. All cabinets are made rigid by channel forming. Side panels are removable for piping access.

Unit Cabinet Heater (Force-Flo)

Job Information

Martin's Point MOB
 Portland ME
 (B16)Daniel Broderick



Unit Information

Tag	CUH-1, CUH-4
Model number	FFHB02
Quantity	2
Unit cabinet size	Size 020
Cabinet style	Vertical recessed
Inlet style	Front stamped louver inlet
Outlet style	Front stamped louver outlet
Coil type	2 row hot water
Filter type	1" throwaway pleated media
Elevation	
Fluid type	
Fluid concentration	
Fluid freeze pt	32.00 F
Max fluid PD	
* Unit length	36.000 in
* Unit height	30.000 in
Unit width	10.000 in
Shipping weight	58.0 lb
Operating weight	68.0 lb

* Dimensions do not include extended end pockets.

Motor/Electrical Information

Design airflow	180 cfm
ESP	0.09 in H2O
Unit voltage	115v/60hz/1ph
Operating voltage	
Motor type	Free discharge
Motor speed	High
Motor power	60.0 W
Motor rpm #1	1029 rpm
Motor rpm #2	0 rpm
Motor hp #1	0.030 hp
Motor hp #2	0.000 hp
Electric Heat	Without electric heat
Max fuse size	15.00 A
Min circuit ampacity	0.75 A

Coil Information

Total heating capacity	11.70 MBh	Heating fluid PD	3.26 ft H2O
Heating EAT		Heating delta T	29.27 F
Heating LAT	119.93 F	Heating flow rate	0.80 gpm
Heating ent fluid temp	160.00 F	Heating steam pressure	
Heating lvg fluid temp	130.73 F	htg condensate flow rate	

Unit Cabinet Heater (Force-Flo)

Job Information

Martin's Point MOB
 Portland ME
 (B16)Daniel Broderick



Unit Information

Tag	CUH-2, CUH-3
Model number	FFHB02
Quantity	2
Unit cabinet size	Size 020
Cabinet style	Vertical recessed
Inlet style	Front stamped louver inlet
Outlet style	Front stamped louver outlet
Coil type	2 row hot water
Filter type	1" throwaway pleated media
Elevation	
Fluid type	
Fluid concentration	
Fluid freeze pt	32.00 F
Max fluid PD	
* Unit length	36.000 in
* Unit height	30.000 in
Unit width	10.000 in
Shipping weight	58.0 lb
Operating weight	68.0 lb

* Dimensions do not include extended end pockets.

Motor/Electrical Information

Design airflow	180 cfm
ESP	0.09 in H2O
Unit voltage	115v/60hz/1ph
Operating voltage	
Motor type	Free discharge
Motor speed	High
Motor power	60.0 W
Motor rpm #1	1029 rpm
Motor rpm #2	0 rpm
Motor hp #1	0.030 hp
Motor hp #2	0.000 hp
Electric Heat	Without electric heat
Max fuse size	15.00 A
Min circuit ampacity	0.75 A

Coil Information

Total heating capacity	11.70 MBh	Heating fluid PD	3.26 ft H2O
Heating EAT		Heating delta T	29.27 F
Heating LAT	119.93 F	Heating flow rate	0.80 gpm
Heating ent fluid temp	160.00 F	Heating steam pressure	
Heating lvg fluid temp	130.73 F	htg condensate flow rate	

Unit Cabinet Heater (Force-Flo)

Job Information

Martin's Point MOB
 Portland ME
 (B16)Daniel Broderick



Unit Information

Tag	CUH-5
Model number	FFF02
Quantity	1
Unit cabinet size	Size 020
Cabinet style	Vertical wall hung cabinet
Inlet style	Front stamped louver inlet
Outlet style	Front stamped louver outlet
Coil type	2 row hot water
Filter type	1" throwaway pleated media
Elevation	
Fluid type	
Fluid concentration	
Fluid freeze pt	32.00 F
Max fluid PD	
* Unit length	
* Unit height	
Unit width	
Shipping weight	
Operating weight	

* Dimensions do not include extended end pockets.

Motor/Electrical Information

Design airflow	180 cfm
ESP	0.15 in H2O
Unit voltage	115v/60hz/1ph
Operating voltage	
Motor type	Free discharge
Motor speed	High
Motor power	60.0 W
Motor rpm #1	1029 rpm
Motor rpm #2	0 rpm
Motor hp #1	0.030 hp
Motor hp #2	0.000 hp
Electric Heat	Without electric heat
Max fuse size	15.00 A
Min circuit ampacity	0.75 A

Coil Information

Total heating capacity	11.70 MBh	Heating fluid PD	3.26 ft H2O
Heating EAT		Heating delta T	29.27 F
Heating LAT	119.93 F	Heating flow rate	0.80 gpm
Heating ent fluid temp	160.00 F	Heating steam pressure	
Heating lvg fluid temp	130.73 F	htg condensate flow rate	

Unit Cabinet Heater (Force-Flo)

Job Information

Martin's Point MOB
 Portland ME
 (B16)Daniel Broderick



Unit Information

Tag	CUH-6
Model number	FFEB03
Quantity	1
Unit cabinet size	Size 030
Cabinet style	Horizontal recessed
Inlet style	Back duct collar inlet
Outlet style	Bottom stamped louver outlet
Coil type	3 row hot water
Filter type	1" throwaway pleated media
Elevation	
Fluid type	
Fluid concentration	
Fluid freeze pt	32.00 F
Max fluid PD	
* Unit length	33.000 in
* Unit height	11.000 in
Unit width	30.000 in
Shipping weight	68.0 lb
Operating weight	78.0 lb

* Dimensions do not include extended end pockets.

Motor/Electrical Information

Design airflow	315 cfm
ESP	0.07 in H2O
Unit voltage	115v/60hz/1ph
Operating voltage	
Motor type	High static
Motor speed	High
Motor power	145.0 W
Motor rpm #1	1474 rpm
Motor rpm #2	0 rpm
Motor hp #1	0.080 hp
Motor hp #2	0.000 hp
Electric Heat	Without electric heat
Max fuse size	15.00 A
Min circuit ampacity	1.63 A

Coil Information

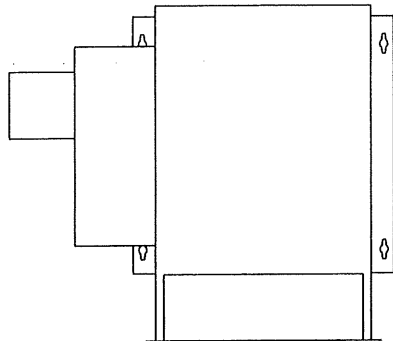
Total heating capacity	22.10 MBh	Heating fluid PD	3.31 ft H2O
Heating EAT		Heating delta T	27.65 F
Heating LAT	124.63 F	Heating flow rate	1.60 gpm
Heating ent fluid temp	160.00 F	Heating steam pressure	
Heating lvg fluid temp	132.35 F	htg condensate flow rate	

Unit Dimensions - FFHB020 Semi & Fully Recessed Cabinet Unit Heaters – right side coil connections shown
 Qty: 4 Tag(s): CUH-1, CUH-4, CUH-2, CUH-3

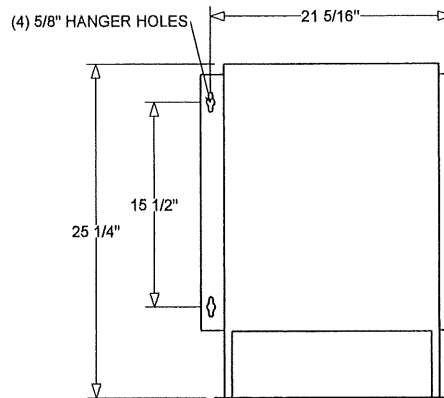
WEIGHT
78.0 lb

NOTES:

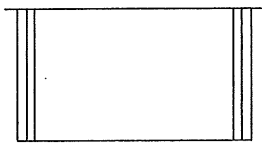
1. ARROW(S) INDICATE THE DIRECTION OF AIRFLOW.
2. FILTERS ARE ACCESSED THROUGH THE FRONT OF UNIT.
3. RECESSED UNIT WALL CUTOUT OPENING IS 42" X 26 1/2".
4. CONTROL WIRES SHOULD ENTER CONTROL BOX THROUGH TOP FRONT KNOCKOUT.
5. POWER WIRES ARE TO ENTER CONTROL BOX THROUGH FRONT BOTTOM CONDUIT ENTRANCE KNOCKOUTS.



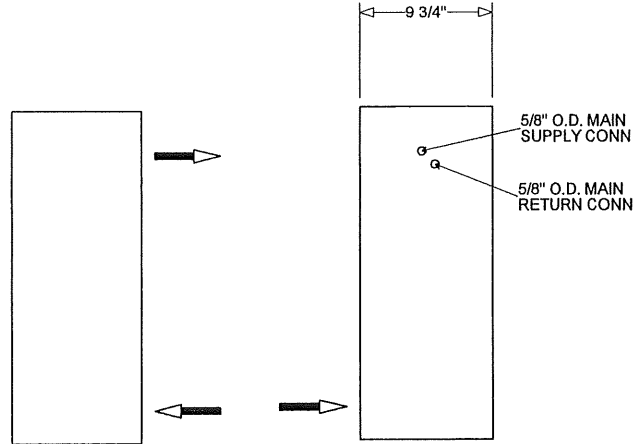
FRONT VIEW



BACK VIEW



BOTTOM VIEW

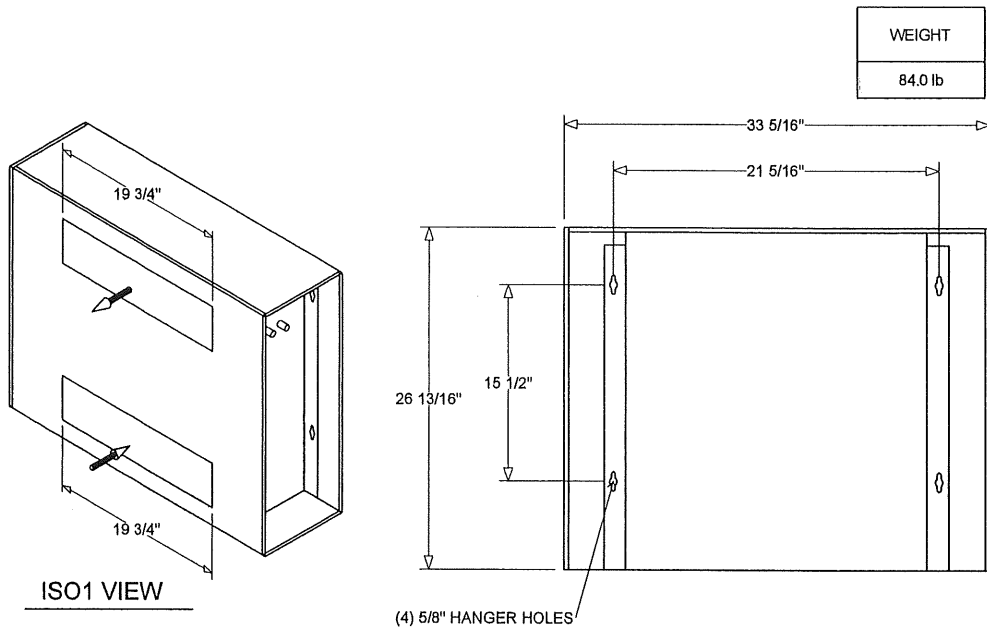


LEFT VIEW

RIGHT VIEW

Unit Dimensions - FFF020 Vertical Wall Hung Cabinet Unit Heater – right side coil connections shown

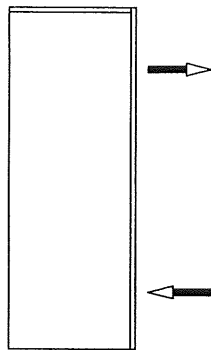
Qty: 1 Tag(s): CUH-5



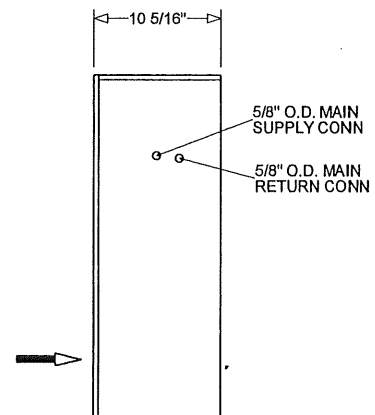
NOTES:

- 1. ARROW(S) INDICATE THE DIRECTION OF AIRFLOW.
- 2. FILTERS ARE ACCESSED THROUGH THE FRONT OF UNIT.
- 3. CONTROL WIRES SHOULD ENTER CONTROL BOX THROUGH TOP FRONT KNOCKOUT.
- 4. POWER WIRES ARE TO ENTER CONTROL BOX THROUGH FRONT BOTTOM CONDUIT ENTRANCE KNOCKOUTS.

BACK VIEW



LEFT VIEW



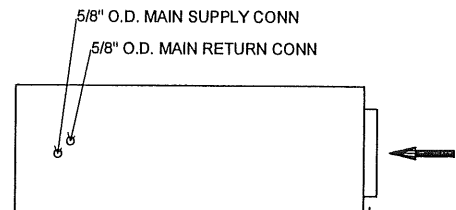
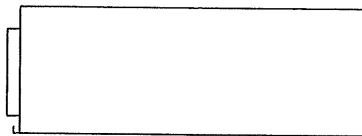
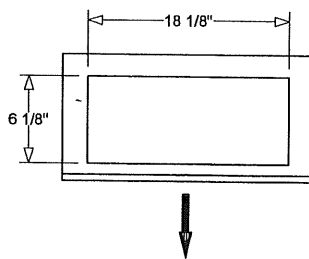
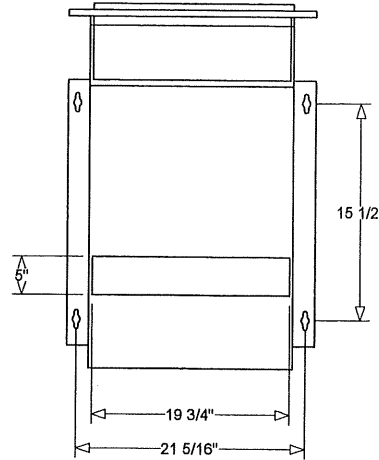
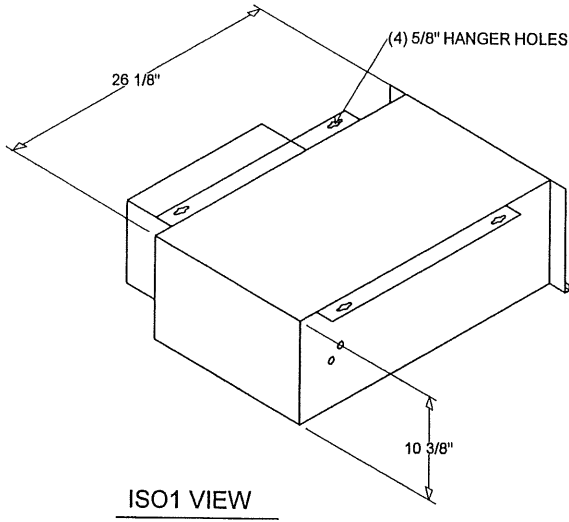
RIGHT VIEW

Unit Dimensions - FFEB030 Horizontal Recessed Cabinet Unit Heater – right side coil connections shown
 Qty: 1 Tag(s): CUH-6

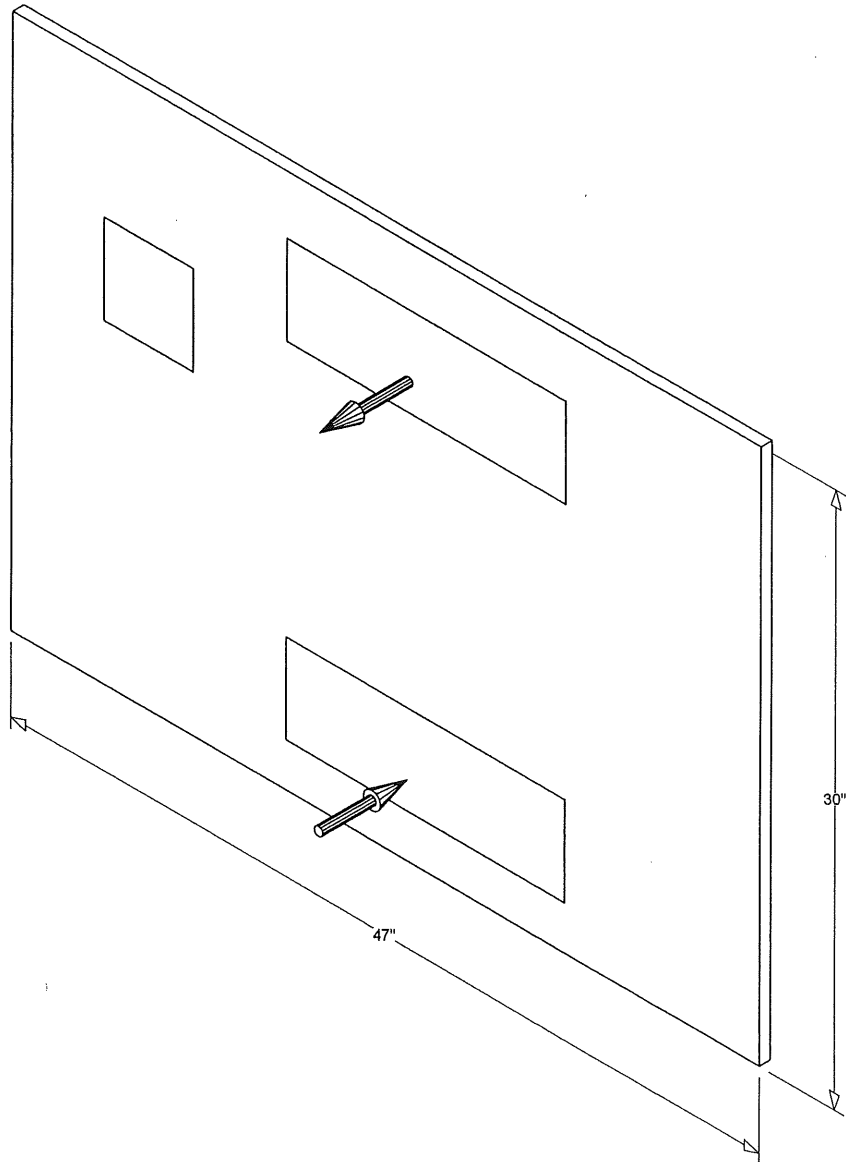
WEIGHT
78.0 lb

NOTES:

1. ARROW(S) INDICATE THE DIRECTION OF AIRFLOW.
2. FILTERS ARE ACCESSED THROUGH THE BOTTOM OF UNIT.
3. RECESSED UNIT CEILING CUTOUT OPENING IS 28 3/8" X 34 1/8". RECESSING TRIM RING IS CENTERED IN THE OPENING.
4. CONTROL WIRES SHOULD ENTER CONTROL BOX THROUGH TOP FRONT KNOCKOUT.
5. POWER WIRES ARE TO ENTER CONTROL BOX THROUGH FRONT BOTTOM CONDUIT ENTRANCE KNOCKOUTS.



Accessory - FFHB020 Semi-Recessed Cabinet Unit Heaters – 2" projection panel
Qty: 2 Tag(s): CUH-1, CUH-4



NOTES:

1. ARROWS INDICATE THE DIRECTION OF AIRFLOW.

2. PROJECTION PANEL DEPTH: 2" UNIT RECESS DEPTH: 8 5/8"

3. LOUVER OUTLET LOCATED AT BOTTOM OF PANEL WITH INVERTED RECESSED UNITS.



Accessory - FFHB020 Semi-Recessed Cabinet Unit Heaters – 2" projection panel
 Qty: 2 Tag(s): CUH-1, CUH-4

Projection Panel

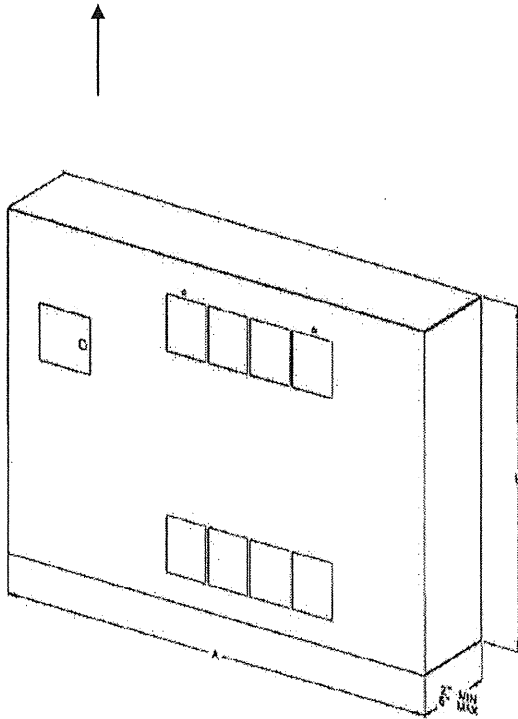
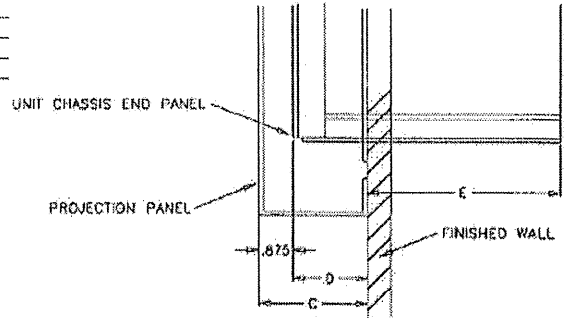
Projection Panel Dimensions

Unit Size	02 - 03	04	06	08	10 - 12
A	3'-11"	4'-3"	6'-3"	5'-5 1/2"	7'-5 1/2"
B	2'-6"	2'-6"	2'-6"	2'-9 1/2"	2'-9 1/2"

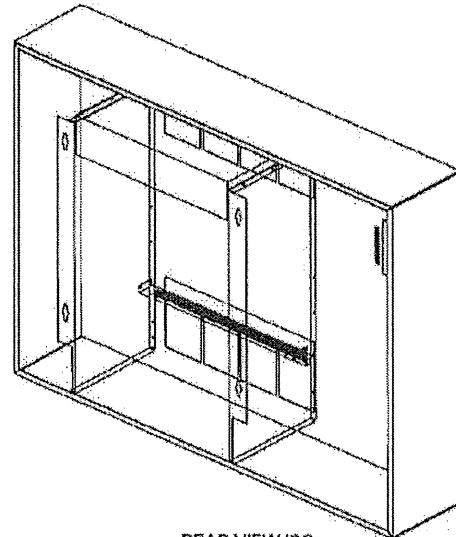
Projection Panel, All Unit Sizes

C	2"	2 1/2"	3"	3 1/2"	4"	4 1/2"	5"	5 1/2"	6"
D	1 1/2"	1 3/8"	2 1/8"	2 1/4"	3 1/8"	3 3/8"	4 1/8"	4 3/8"	5 1/8"
E	8 5/8"	8 1/2"	7 3/4"	7 1/2"	6 5/8"	6 1/2"	5 3/4"	5 1/2"	4 3/4"

UNIT TO WALL — TOP VIEW



FRONT VIEW ISO

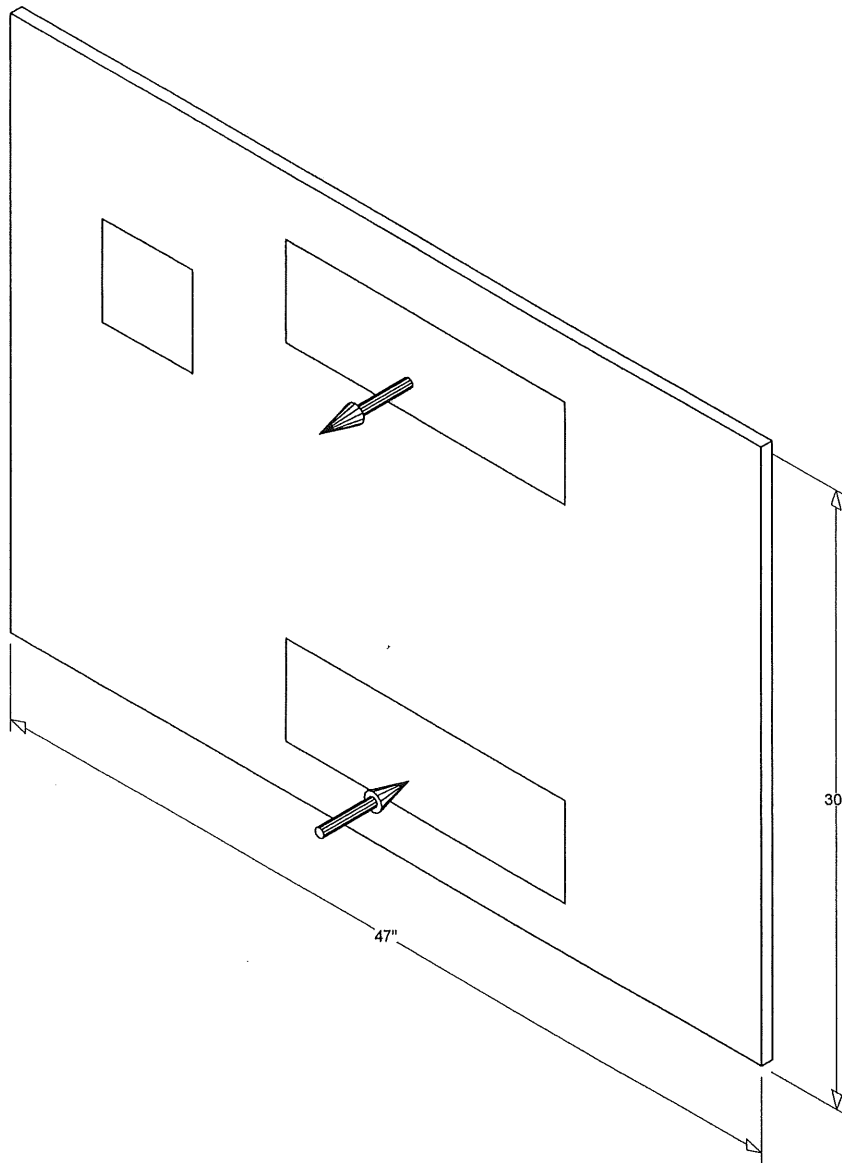


REAR VIEW ISO

Indicate on returned submittals if different depth panel is required.

Accessory - FFHB020 Fully Recessed Cabinet Unit Heaters – standard 5/8" front panel

Qty: 2 Tag(s): CUH-2, CUH-3



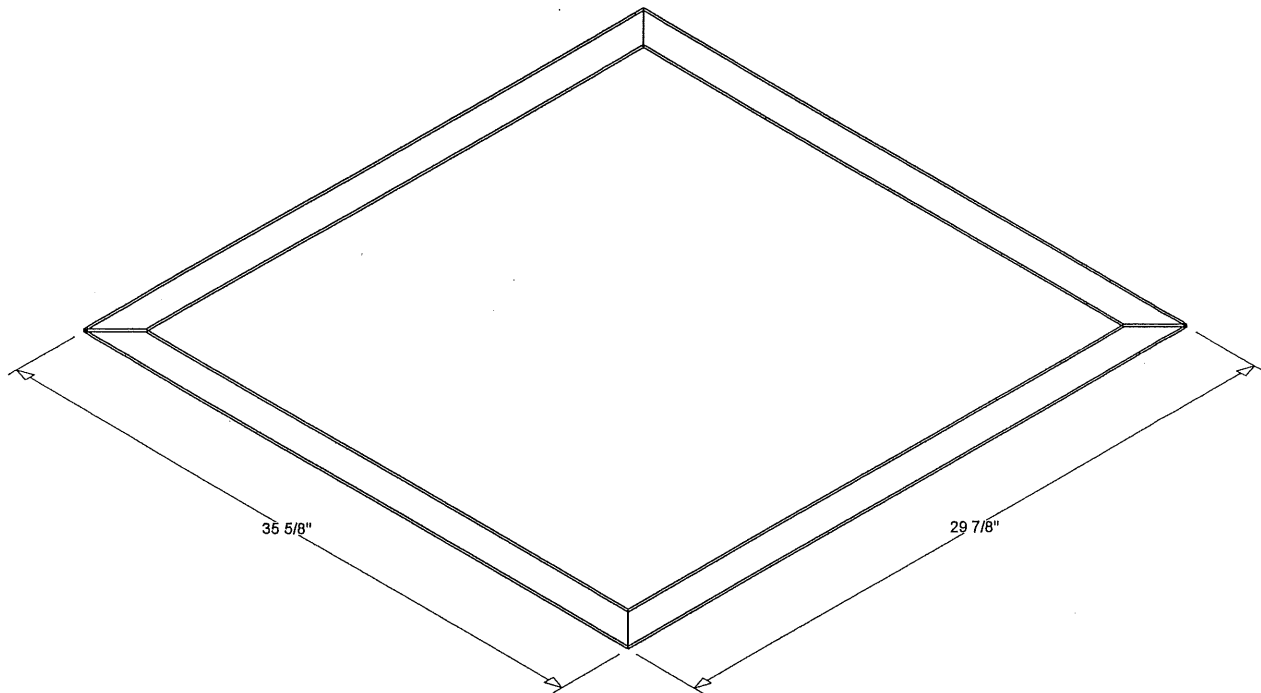
NOTES:

- 1. ARROWS INDICATE THE DIRECTION OF AIRFLOW.
- 2. RECESSED PANEL DEPTH: 5/8"
- 3. LOUVER OUTLET LOCATED AT BOTTOM OF PANEL WITH INVERTED RECESSED UNITS.



Accessory - FFEB030 Horizontal Recessed Cabinet Unit Heater – bottom panel dimensions

Qty: 1 Tag(s): CUH-6

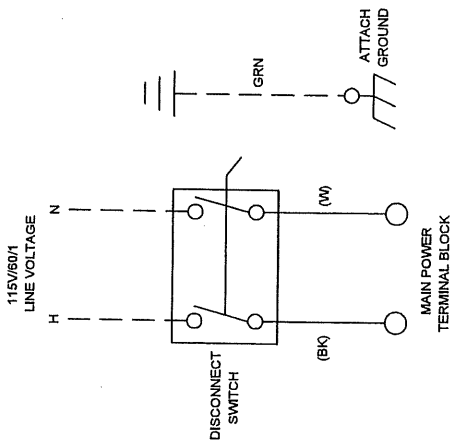


Field Wiring – Size 020 Cabinet Unit Heaters – free discharge fan motor
 Qty: 5 Tag(s): CUH-1, CUH-4, CUH-2, CUH-3, CUH-5

NOTES:

1. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE COMPANY.

POWER WIRING



CONTROL WIRING

MCA	MFS
1	15

NO LOW VOLTAGE CONTROL WIRING REQUIRED WITH UNIT MOUNTED CONTROLS

NOTICE
 USE COPPER CONDUCTORS ONLY!
 UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
 FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVIS
 N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
 LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
 FAIRE DÉFAUT À LA PROCÉDURE PEUT ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO
 ÚTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
 LOS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADOS PARA RECIBIR OTROS TIPOS DE CONDUCTORES.
 NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.

WARNING
 HAZARDOUS VOLTAGE!
 DISCONNECT ALL ELECTRIC POWER FROM THE UNIT BEFORE WORKING ON IT. FOLLOW LOCK OUT AND TAG OUT PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTORS AND CAPACITORS HAVE DISCHARGED COMPLETELY. REFER TO THE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE FAILURE TO DO THE ABOVE BEFORE SERVICING MAY RESULT IN DEATH OR SERIOUS INJURY.

AVERTISSEMENT
 TENSION DANGEREUSE!
 COUPER TOUTES LES TENSIONS ET DÉCONNECTER LA SOURCE D'ÉNERGIE AVANT DE TRAVAILLER SUR L'UNITÉ. SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT LE SERVICE. ASSŪREZ-VOUS QUE TOUS LES CONDENSATEURS DES MOTEURS AIENT DÉCHARGÉS. DANS LE CAS D'UN MOTEUR À VITESSE VARIABLE, RÉFÉRENCEZ-VOUS AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.

ADVERTENCIA
 ¡VOLTAJE PELIGROSO!
 DESCONECTE TODA LA ENERGÍA ELÉCTRICA ANTES DE TRABAJAR EN LA UNIDAD. SIGA LOS PROCEDIMIENTOS DE BLOQUEO Y ETIQUETADO ANTES DE SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN SIDO DESCARGADOS COMPLETAMENTE. PARA LAS UNIDADES CON ELE DE VELOCIDAD VARIABLE, REFERIRSE A LAS INSTRUCCIONES PARA LA DESCARGA DE LOS CONDENSADORES.

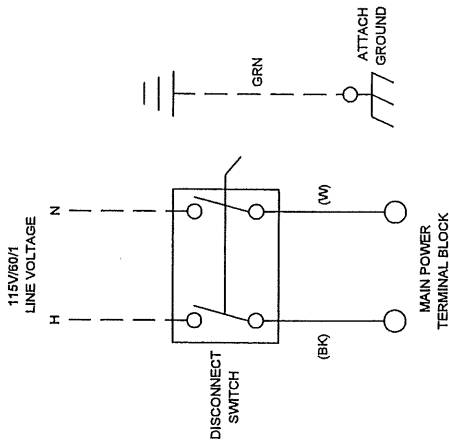
EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÁ CAUSAR LA MUERTE O SERIAS LESIONES PERSONALES.

Field Wiring - Size 030 Cabinet Unit Heater – high static fan motor
 Qty: 1 Tag(s): CUH-6

NOTES:

1. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE COMPANY.

POWER WIRING



CONTROL WIRING

MCA	MFS
2	15

NO LOW VOLTAGE CONTROL WIRING REQUIRED WITH UNIT MOUNTED CONTROLS

NOTICE
 USE COPPER CONDUCTORS ONLY!
 UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
 FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVIS
 N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
 LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.
 FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT ENTRAINER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO
 ÚTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
 LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.
 NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.

HAZARDOUS VOLTAGE!
 DISCONNECT ALL ELECTRIC POWER FROM THE UNIT BEFORE YOU ATTEMPT TO FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL POWER IS OFF AND THE UNIT IS STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE PROCEDURES. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN DEATH OR SERIOUS INJURY.

TENSION DANGEREUSE!
 COUPE LE COURANT ÉLECTRIQUE DE L'UNITÉ AVANT D'ESSAYER DE SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT LE SERVICE. ASSUREZ-VOUS QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNES UNITÉS À VITESSE VARIABLE, SE RÉFÉRER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS. LE NON RESPECT DE CES INSTRUCTIONS PEUT ENTRAINER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

ADVERTENCIA
 DESCONECTE TODA LA ENERGÍA ELÉCTRICA INCLUIDO LAS DESCONEXIONES REMOTAS Y EN LA UNIDAD ANTES DE SEGUIR LOS PROCEDIMIENTOS DE SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN SIDO DESCARGADOS. EN EL CASO DE UNIDADES DE VELOCIDAD VARIABLE, REVISAR LAS INSTRUCCIONES PARA LA DESCARGA DE LOS CONDENSADORES. EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÁ OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

3.

3. Color Selection chart

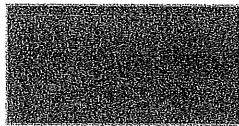


Attractive finishes by Trane...
 for cabinet heaters, fan-coils, unit ventilators,
 & water source heat pump consoles

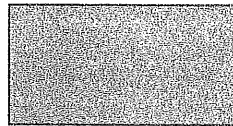
These Trane products are exclusively for in-the-room installation. Our contemporary design & styling, with our baked-powder finishes offer color coordination with any interior.

* Water-source heat pump consoles available in these colors only.

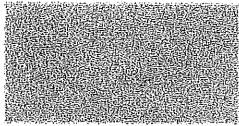
Color Selected →



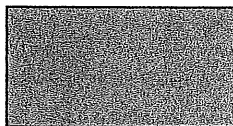
Deluxe Beige*



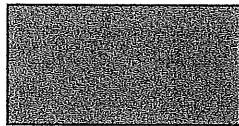
Soft Dove*



Cameo White*



Driftwood Grey



Stone Grey



Rose Mauve available only on fan-coils & cabinet heaters

Note: Actual paint finishes will vary slightly due to the different absorptivity of metal vs. paper.



TRANE

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www.trane.com

For more information contact
 your local Trane office or
 e-mail us at comfort@trane.com

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Supersedes	UNT-S-10 5/94
Stocking Location	La Crosse - Inland

Trane has a policy of continuous product improvement and reserves the right to change design and specifications without notice.





HVAC ~~HEATER~~ ELECTRIC
CABINET UNIT HTVS

Submittal Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 52-238239-1

Portland, ME 04103

Submittal Title: Cabinet Unit Heaters Pre-Costruction Submittals

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site: information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction: coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 8/19/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 #52

Remarks:

CUH-6 should be a size 04.

Cabinet color selection to follow.

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

SPECIFICATION SECTION: 238239

PARAGRAPH: PART 2 PRODUCTS

DRAWINGS: M-602
Cabinet Unit Heater / Unit Heater Schedule

ITEM: CABINET UNIT HEATERS

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed _____

Subject to Architects Approval _____

Date 8/4/09 By JLJ

2.

2. 2.3 Electrical Cabinet Unit Heaters



Submittal

Trane U.S. Inc.

Engineer: SMRT Inc

Date: July 30, 2009

Prepared For:

Johnson & Jordan Inc
18 Mussey Road
Scarborough, ME 04074

Job Name:

Martin's Point Health Care – Medical Office Building

Customer P.O. Number: 145426

Job Number: A2-21345

Customer Project Number:

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

<u>Qty</u>	<u>Description</u>	<u>Tag(s)</u>
3	Electric Unit Heaters Trane Model UHWA021C2A0 Surface Mounted Electric Wall Heaters <ul style="list-style-type: none">• 2 kW Unit Capacity• 277 Element and Motor Voltage• 1 Phase 60 cycle• Unit Series 20• Series 20 Wall Box• Wall Mounted Thermostat Double Pole Single Throw Tamper Resistant for 1 Phase (Fld)• Extension Sleeve 4-1/2" [114 mm] Deep for Full Surface Mounting (Fld) <i>Fld = Furnished by Trane / Installed by Others</i>	EUH-1,2,3

Dan Broderick
Trane
30 Thomas Drive
Westbrook, ME 04092-3824
Phone: (207) 828-1777
Fax: (207) 828-1511
E-Mail: djbroderick@trane.com

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

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Mechanical Specifications - UHWA021C2A0 Surface Mounted Electric Wall Heaters

Qty: 4 Tag(s): EUH-1, EUH-2, EUH-3, EUH-4

General

Heavy duty, wall mounted, forced air heater furnished to meet the specified size, wattage, voltage and phase. Unit is installed and wired in accordance with the manufacturer's recommendations and applicable national and local codes. The enclosure designed to provide an even distribution of heated air to the space by drawing return air in the periphery of the heater across the elements which is discharged from the center section of the heater. All steel parts other than those specified herein are 16 gauge zinc coated on both sides and finished in a high gloss bronze baked enamel. The combination return and supply grille assembly is constructed of 1/6" [1.6 mm] x 3/8" [9.5 mm] rounded edge horizontal steel louvers spaced for maximum opening of 1/4" [6.4 mm].

Louvers are welded at every intersection to three evenly spaced 1/16" [1.6 mm] diameter vertical members and completely framed in a heavy gauge natural anodized aluminum extrusion. The front assembly is attached to the chassis by hidden tamper-resistant Allen head machine screws. Motor is a permanently lubricated, unit bearing, totally enclosed, shaded pole type with impedance protection. A protective shield surrounds the motor to separate return air from heated supply air. The motor operates at no more than 1400 rpm [23.3 rps] and is the same voltage as the heater. Heaters have a rating of 245 cfm [116 L/s] at 660 fpm [3300 mm/s] with a maximum temperature rise of 73 F [41 C]. Element assemblies consist of two or three corrosion resistant steel sheathed elements mechanically bonded to common corrosion resistant steel fins.

Each sheathed element consist of helical coiled nickel chromium alloy resistance wire completely embedded in and surrounded by magnesium oxide, enclosed and swaged into corrosion resistant steel sheaths. Elements have 2" [50.8 mm] cold conductor pins extending into the sheath and have a density of no more than 60 watts per inch [2.4 watts/mm]. Heaters are equipped with a "zero voltage reset" thermal overload which disconnects the motor and elements should normal operating temperatures be exceeded. The thermal overload remains open until manually reset by turning the heater off for five minutes. Heaters warranted for 5 years. Heaters are Underwriter's Laboratories listed. Heaters conform to Underwriter's Laboratories Inc. standard 1025.

Surface Mount

Heater are mounted in the vertical position such that the unit shall extend from the finished wall no more than 5-13/16" [148mm] or 3-9/16" [90mm] for surface mount.

Thermostat - Wall Mounted

Heaters are operated from wall, line voltage, heavy duty thermostats.

Contactors - Line Voltage

Heaters with built in, pre-wired contactors are operated from wall mounted, line voltage, pilot duty thermostats.

Extension Sleeve

Extension sleeves are provided for semi-recessed and surface mounting of the wall heater.

Unit Dimensions - UHWA021C2A0 Surface Mounted Electric Wall Heaters
 Qty: 4 Tag(s): EUH-1, EUH-2, EUH-3, EUH-4

Model UHWA
Series 20 and 50

General Data

Table GD-12 — Electric Wall-Mounted Unit Heaters — Series 20

Watts	Model No. UHWA	Order No. 233	Element + Motor Voltage	Element Phase	Ship Wt. Lbs	Ship Wt. Kg	BTU	Degree F Air Rise	Degree C Air Rise
2000 Watts	021A2AT	-400	208	1	41	18.6	6,826	27	15
	021B2AT	-402	240	1					
	021C2AT	-404	277	1					
3000 Watts	031A2AT	-406	208	1	41	18.6	10,239	41	23
	031B2AT	-408	240	1					
	031C2AT	-410	277	1					
4000 Watts	041A2AT	-412	208	1	41	18.6	13,652	57	32
	041B2AT	-414	240	1					
	041C2AT	-416	277	1					
	043A2AT	-418	208	3					
	043B2AT	-420	240	3					
5000 Watts	051A2AT	-422	208	1	41	18.6	17,065	73	41
	051B2AT	-424	240	1					
	051C2AT	-426	277	1					
	053A2AT	-428	208	3					
	053B2AT	-430	240	3					

Note: ONLY thermostat and/or contactor may be built-in on Series 20 wall heaters.

Table GD-13 — Electric Wall-Mounted Unit Heaters — Series 50

Watts	Model No. UHWA	Order No. 233	Element + Motor Voltage	Element Phase	Ship Wt. Lbs	Ship Wt. Kg	BTU	Degree F Air Rise	Degree C Air Rise
2000 Watts	021A5AT	-431	208	1	54	24.5	6,826	27	15
	021B5AT	-433	240	1					
	021C5AT	-435	277	1					
3000 Watts	031A5AT	-437	208	1	55	24.9	10,239	41	23
	031B5AT	-439	240	1					
	031C5AT	-441	277	1					
4000 Watts	041A5AT	-443	208	1	55	24.9	13,652	57	32
	041B5AT	-445	240	1					
	041C5AT	-447	277	1					
	043A5AT	-449	208	3					
	043B5AT	-451	240	3					
5000 Watts	051A5AT	-453	208	1	55	24.9	17,065	73	41
	051B5AT	-455	240	1					
	051C5AT	-457	277	1					
	053A5AT	-459	208	3					
	053B5AT	-461	240	3					

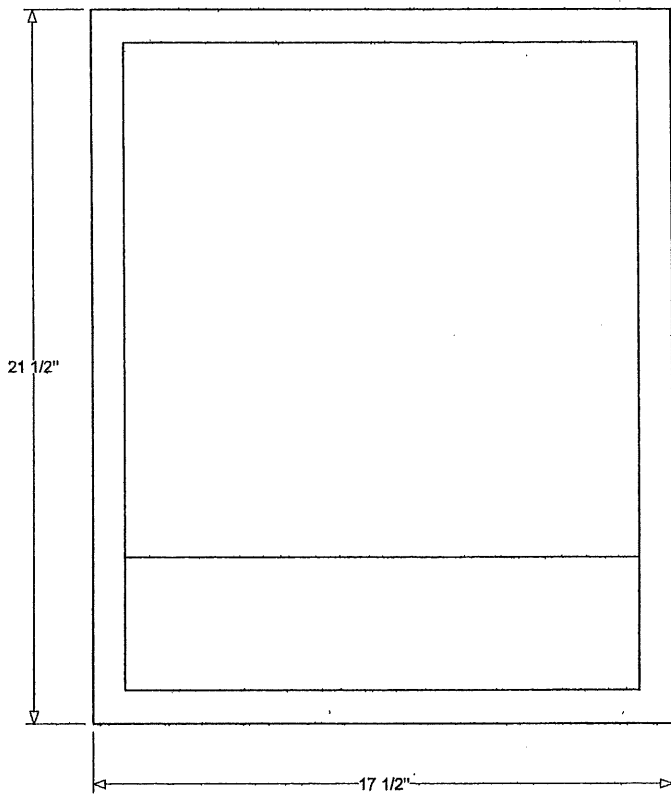
Note: If circuit breaker and/or transformers are required, the Series 50 wall heater must be ordered. 1 Watt Equals 3.413 Btu.

Unit Dimensions - UHWA021C2A0 Surface Mounted Electric Wall Heaters

Qty: 4 Tag(s): EUH-1, EUH-2, EUH-3, EUH-4

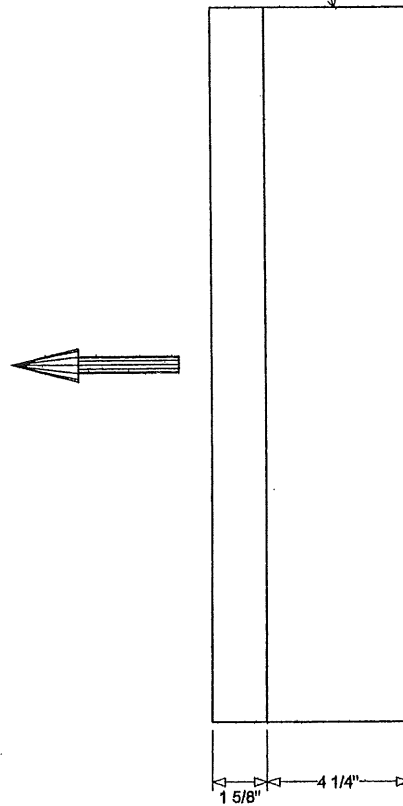
NOTE:
1. ARROW INDICATES THE DIRECTION OF AIRFLOW.

SHIPPING WEIGHT
41.0 lb



FRONT VIEW

OPENINGS FOR POWER SUPPLY AND CONTROL WIRING IN BOTTOM AND BACK OF UNIT



RIGHT VIEW

Field Wiring - UHWA021C2A0 Surface Mounted Electric Wall Heaters

Qty: 4 Tag(s): EUH-1, EUH-2, EUH-3, EUH-4

⚠ WARNING
HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE. FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

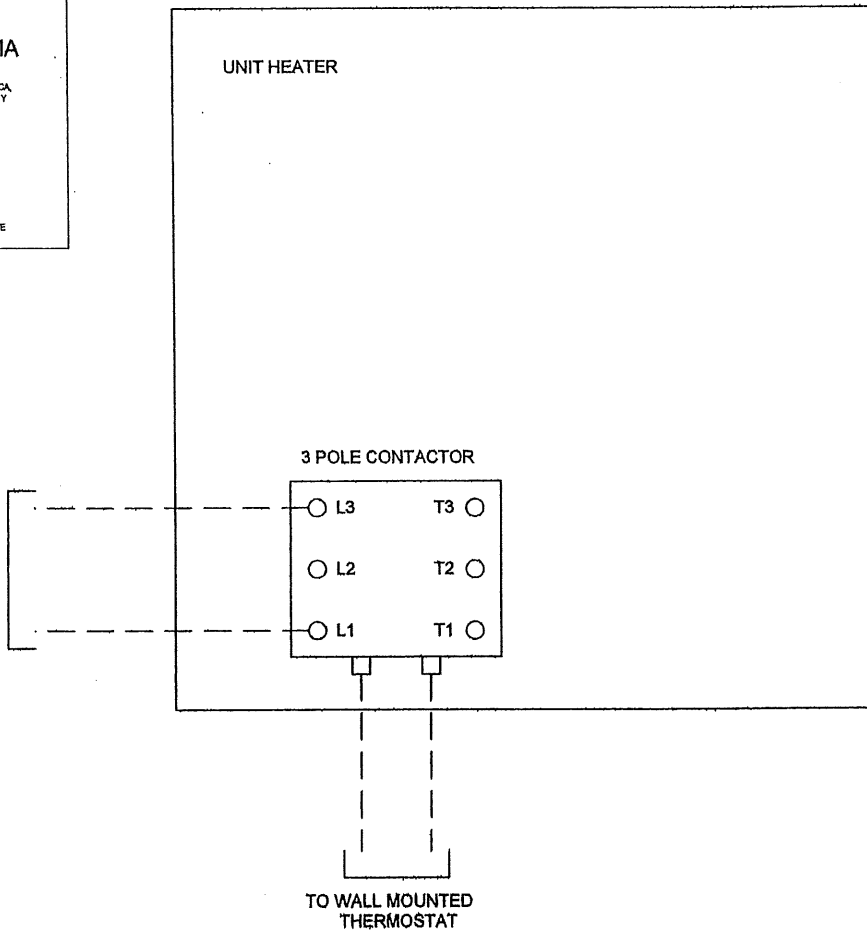
⚠ AVERTISSEMENT
TENSION DANGEREUSE!
COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUTS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS. NE PAS RESPECTER CES MESURES DE PRÉCAUTION PEUT ENTRAÎNER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

⚠ ADVERTENCIA
¡VOLTAJE PELIGROSO!
DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUSO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAGE ALMACENADO. PARA LAS UNIDADES CON EJE DE DIRECCIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR. EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

CAUTION
USE COPPER CONDUCTORS ONLY!
UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS. FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

ATTENTION
N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS. L'UTILISATION DE TOUT AUTRE CONDUCTEUR PEUT ENDOMMAGER L'ÉQUIPEMENT.

PRECAUCIÓN
¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES. SI NO LO HACE, PUEDE OCASIONAR DAÑO AL EQUIPO.



- NOTES:
1. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND / OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
 2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.

3.

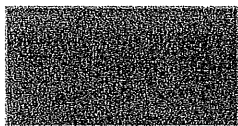
3. Color Selection chart



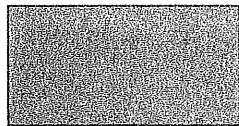
Attractive finishes by Trane...
 for cabinet heaters, fan-coils, unit ventilators,
 & water source heat pump consoles

These Trane products are exclusively for in-the-room installation. Our contemporary design & styling, with our baked-powder finishes offer color coordination with any interior.

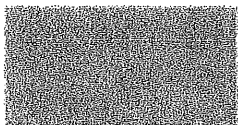
* Water-source heat pump consoles available in these colors only.



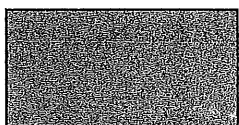
Deluxe Beige*



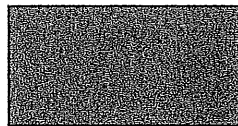
Soft Dove*



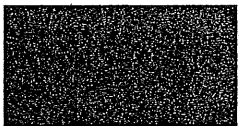
Cameo White*



Driftwood Grey



Stone Grey



Rose Mauve available only on fan-coils, & cabinet heaters

Color Selected →

Note: Actual paint finishes will vary slightly due to the different absorptivity of metal vs. paper.



TRANE

a business of American Standard Inc.
www.trane.com

For more information contact
 your local Trane office or
 e-mail us at comfort@trane.com

Literature Order Number	UNT-SLB-017
File Number	PL-TD-LJNT-SLB-017 08/05
Supersedes	UNT-S-10 5/94
Stocking Location	La Crosse - Inland

Trane has a policy of continuous product improvement and reserves the right to change design and specifications without notice.





Submittal Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 50-233600-1

Portland, ME 04103

Submittal Title: Air Terminal Unit Submittals

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 8/19/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 # 50

Remarks:

Size TU-124 for 600 CFM max.

Size TU-125 for 560 CFM max.

HVAC VAV'S

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

SPECIFICATION SECTION: 233600

PARAGRAPH: PART 2 PRODUCTS

DRAWINGS: M-601
CV/VAV Terminal Unit Schedule

ITEM: AIR TERMINAL UNITS

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed K

Subject to Architects Approval K

Date 8/3/07 By JMJ

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

AIR TERMINAL UNITS

MANUFATURER: TRANE

SUPPLIER: Trane Company
30 Thomas Drive
Westbrook, Maine 04092
Contact: Dan Broderick
Phone: 207-828-1777
Fax: 207-828-1511

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey road
Scarborough, Maine 04074
Contact: Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619



Submittal

Trane U.S. Inc.

Engineer: SMRT Inc

Date: July 30, 2009

Prepared For:

Johnson & Jordan Inc
 18 Mussey Road
 Scarborough, ME 04074
Customer P.O. Number: 145426
Customer Project Number:

Job Name:

Martin's Point Health Care – Medical Office Building

Job Number: A2-21345

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

<u>Qty</u>	<u>Description</u>	<u>Tag(s)</u>
	Variable Air Volume Terminal Units w/ Hot Water Reheat	
42	Trane Model VCWF05 5" Inlet VAV terminal Units w/ 1 row hot water row coil	A1
51	Trane Model VCWF06 6" Inlet VAV terminal Units w/ 1 row hot water row coil	A2
19	Trane Model VCWF08 8" Inlet VAV terminal Units w/ 1 row hot water row coil	A3
6	Trane Model VCWF08 8" Inlet VAV terminal Units w/ 2 row hot water row coil	A4
2	Trane Model VCWF10 10" Inlet VAV terminal Units w/ 1 row hot water row coil	A5
5	Trane Model VCWF10 10" Inlet VAV terminal Units w/ 2 row hot water row coil	A6
	<ul style="list-style-type: none"> • Single duct with hot water heat • 1 or 2 row hot water coil • 3/8" closed cell insulation • Lon VV550 DDC controller with proportional hot water valve control • Standard actuator • DDC zone sensor with occupied and set point (fld) – <i>except tags listed below</i> • Factory Mounted Wireless Receiver/Sensor w/ Wireless zone sensor deg F (fld) – <i>tags TU-1,31,35,57,75,84,87,107,123,124 & 125 ONLY</i> • Left side coil connections and control locations – <i>units can be rotated in the field for right side connections as required</i> 	

Tag Data - Variable Air Volume Single Duct Terminal Units (Qty: 125)

Item	Qty	Model Number	Tag(s)
A1	42	VCWF05 – 1 row	TU-3, TU-4, TU-8, TU-11, TU-12, TU-15, TU-17, TU-18, TU-19, TU-29, TU-30, TU-33, TU-34, TU-39, TU-44, TU-45, TU-50, TU-52, TU-55, TU-56, TU-58, TU-60, TU-62, TU-67, TU-70, TU-78, TU-83, TU-85, TU-86, TU-91, TU-92, TU-93, TU-9, TU-99, TU-102, TU-106, TU-108, TU-110, TU-113, TU-114, TU-121, TU-122
A2	51	VCWF06 – 1 row	TU-2, TU-5, TU-6, TU-7, TU-13, TU-14, TU-21, TU-22, TU-23, TU-24, TU-25, TU-26, TU-27, TU-28, TU-32, TU-40, TU-41, TU-42, TU-43, TU-47, TU-49, TU-51, TU-53, TU-54, TU-59, TU-61, TU-63, TU-64, TU-68, TU-71, TU-72, TU-77, TU-80, TU-81, TU-82, TU-88, TU-90, TU-94, TU-95, TU-96, TU-97, TU-100, TU-103, TU-104, TU-105, TU-109, TU-111, TU-116, TU-117, TU-119, TU-120
A3	19	VCWF08 – 1 row	TU-9, TU-10, TU-16, TU-20, TU-36, TU-37, TU-38, TU-46, TU-48, TU-65, TU-69, TU-73, TU-74, TU-79, TU-89, TU-101, TU-112, TU-115, TU-118
A4	6	VCWF08 – 2 row	TU-35, TU-57, TU-84, TU-123, TU-124, TU-125
A5	2	VCWF10 – 1 row	TU-66, TU-76
A6	5	VCWF10 – 2 row	TU-1, TU-31, TU-75, TU-87, TU-107

Dan Broderick
 Trane
 30 Thomas Drive
 Westbrook, ME 04092-3824
 Phone: (207) 828-1777
 Fax: (207) 828-1511
 E-Mail: djbroderick@trane.com

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

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Mechanical Specifications – VVCF Variable Air Volume Single Duct Terminal Units

Item: A1 to A6 Qty: 125 Tag(s): TU-1 to TU-125

General Unit Information

The unit casing is comprised of 22 gauge galvanized steel. Outlet connection is slip and drive.

Agency Listing - The unit is UL and Canadian UL listed as a room air terminal unit. UL Control # 9N65. All Trane terminal units are ARI 880 - 98 certified.

General Unit Clearance

Allow adequate clearance to meet NEC on control box side of unit to meet NEC. A minimum of one and one half duct diameters of straight duct work, upstream of the air inlet connection, should be present for optimum airflow measurement performance. Upstream duct work should be the same diameter as the primary inlet connection.

Closed Cell Insulation

The interior of the unit is lined with closed cell insulation which assures condensation control, energy conservation and a closed cell construction to reduce noise. The insulation is agency listed and meets NFPA-90A and UL 181 standards. This insulation is 3/8" density closed cell insulation. The insulation R-value is 1.4, 4.4 lb/cu. ft. [70 kgs/cu. m.] density. All cut edges of insulation are completely encapsulated in metal to prevent erosion.

Air Valve Round

The air inlet connection is an 18 gauge galvanized steel cylinder sized to fit standard round duct. A multiple point, averaging flow sensing ring is provided with balancing taps for measuring within +/- 5% of unit cataloged airflow. An airflow versus pressure differential calibration chart is provided. The damper blade is constructed of a closed cell foam seal mechanically locked between two 22 gauge galvanized steel disks. The damper blade assembly is connected to a cast zinc shaft supported by self lubricating bearings. The shaft is cast with a damper position indicator. The valve assembly

includes a mechanical stop to prevent over stroking. At 4.0" w.g. air valve leakage does not exceed 1% of cataloged airflow.

Air Valve Size - 05

Air Valve is 350.0 cfm 5" inlet.

Air Valve Size - 06

Air Valve is 500.0 cfm 6" inlet.

Air Valve Size - 08

Air Valve is 900.0 cfm 8" inlet.

Air Valve Size - 10

Air Valve is 1400.0 cfm 10" inlet.

1 Row Water Coil

Factory mounted on outlet. The coil has 144 fpf (fins per foot) [0.305 m.]. Full fin collars provided for accurate fin spacing and maximum fin-tube contact. The seamless copper tubes are mechanically expanded into the fin collars. Coils are proof tested at 450.00 psi and leak tested at 300.00 psi air pressure under water. Coil connections are sweat with left hand configuration. Right hand connections are optional. Coils are provided with an access for cleaning.

2 Row Water Coil

Factory mounted on outlet. The coil has 144 fpf plated (fins per foot) [0.305 m.]. Full fin collars provided for accurate fin spacing and maximum fin-tube contact. The seamless copper tubes are mechanically expanded into the fin collars. Coils are proof tested at 450.00 psi and leak tested at 300.00 psi air pressure under water. Coil connections are sweat with left hand configuration. Right hand coil connections are optional. Coils are provided with an access for cleaning.

Slip & Drive Connection

A slip and drive connection has two straight flanges on the top and bottom, and two drive connections on the left and right sides. This is a standard option on all VAV single duct terminal units.

DDC Controls Option DD03, DD13 & DD43

Basic Operation: Proportional Hot Water Valve (Normally Open Outputs) (DDC/UCM)

A voltage signal from the zone sensor indicates the zone temperature is used by the unit controller to determine an error from the set point. This error, as well as primary flow differential pressure, is used to determine damper position within minimum and maximum cooling airflow set points. As the zone temperature drops to the heating set point, primary airflow is controlled to minimum heating flow set point. A proportional hot water valve is energized and an additional heat output is available when heating is required.

DDC Zone Sensor w/Setpoint & Occupancy

This electronic device utilizes a thermistor to vary the voltage output in response to changes in the zone temperature. Wiring to the U.C.M. controls must be 18 to 22 awg. shielded twisted pair wiring. The setpoint adjustment range is 50.0 F - 88.0 F. This sensor is provided with an externally adjustable set point, a timed override button and a timed override cancel button. An optional communications jack is available which snaps into the enclosure backplate.

Wireless Zone Sensor/Receiver

Factory installed, wired and tested Receiver with field mounted Sensor accessory eliminates the need for the wiring between the zone sensor and unit level controller. The zone sensor houses the space temperature sensor, local setpoint adjustment, OCCUPIED/UNOCCUPIED button, signal strength and battery life indicators, and spread spectrum transmitter. The receiver functions as a communication translator between spread spectrum radio communications and the VAV analog inputs.

Martin's Point MOB

Duct Terminal Units Schedule Report

Unit model	Primary inlet	Main coil type	Design		Cooling airflow		Heating airflow		Primary EDB		Unit LAT		Coil heating capacity		Heating ant fluid temp		Coil fluid		Radiated valve		Discharge transfer function	
			cfm	cfm	cfm	in H2O	cfm	in H2O	cfm	cfm	gpm	F	F	F	MGH	F	F	PD	Max inlet	SP	NC	Discharge valve
TU-1	VCWF	10" (254mm)	700	0	0.21	350	55	103.45	18.39	1	160	36.82	0.19	0.5	25	ARI 885-98	0.5	0.5	25	ARI 885-98	15	ARI 885-98
TU-2	VCWF	8" (152mm)	425	125	0.33	215	55	83.81	6.72	0.5	160	26.69	0.53	0.5	26	ARI 885-98	0.5	0.5	26	ARI 885-98	26	ARI 885-98
TU-3	VCWF	5" (127mm)	175	50	0.04	90	55	103.27	4.71	0.5	160	18.85	0.52	0.5	21	ARI 885-98	0.5	0.5	21	ARI 885-98	24	ARI 885-98
TU-4	VCWF	5" (127mm)	160	50	0.03	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	0.5	0.5	20	ARI 885-98	22	ARI 885-98
TU-5	VCWF	6" (152mm)	370	100	0.25	185	55	86.56	6.33	0.5	160	25.35	0.52	0.5	26	ARI 885-98	0.5	0.5	26	ARI 885-98	25	ARI 885-98
TU-6	VCWF	6" (152mm)	245	60	0.11	125	55	94.89	5.41	0.5	160	21.64	0.52	0.5	24	ARI 885-98	0.5	0.5	24	ARI 885-98	24	ARI 885-98
TU-7	VCWF	6" (152mm)	240	60	0.1	120	55	95.86	5.32	0.5	160	21.28	0.52	0.5	24	ARI 885-98	0.5	0.5	24	ARI 885-98	24	ARI 885-98
TU-8	VCWF	5" (127mm)	150	50	0.03	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	0.5	0.5	20	ARI 885-98	22	ARI 885-98
TU-9	VCWF	8" (203mm)	480	300	0.14	245	55	89.08	9.06	0.75	160	24.17	1.41	0.5	26	ARI 885-98	0.5	0.5	26	ARI 885-98	16	ARI 885-98
TU-10	VCWF	8" (203mm)	575	575	0.16	290	55	85.9	9.72	0.75	160	25.35	1.41	0.5	26	ARI 885-98	0.5	0.5	26	ARI 885-98	17	ARI 885-98
TU-11	VCWF	5" (127mm)	185	50	0.04	95	55	101.8	4.82	0.5	160	19.3	0.52	0.5	21	ARI 885-98	0.5	0.5	21	ARI 885-98	24	ARI 885-98
TU-12	VCWF	5" (127mm)	220	70	0.05	110	55	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98	0.5	0.5	21	ARI 885-98	25	ARI 885-98
TU-13	VCWF	6" (152mm)	255	75	0.12	130	55	93.97	5.49	0.5	160	21.99	0.52	0.5	24	ARI 885-98	0.5	0.5	24	ARI 885-98	24	ARI 885-98
TU-14	VCWF	6" (152mm)	360	125	0.23	180	55	87.08	6.26	0.5	160	25.07	0.52	0.5	26	ARI 885-98	0.5	0.5	26	ARI 885-98	25	ARI 885-98
TU-15	VCWF	5" (127mm)	200	50	0.05	100	55	100.44	4.93	0.5	160	19.72	0.52	0.5	21	ARI 885-98	0.5	0.5	21	ARI 885-98	25	ARI 885-98
TU-16	VCWF	8" (203mm)	470	165	0.13	235	55	89.91	8.9	0.75	160	23.74	1.41	0.5	26	ARI 885-98	0.5	0.5	26	ARI 885-98	16	ARI 885-98
TU-17	VCWF	5" (127mm)	150	50	0.03	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	0.5	0.5	20	ARI 885-98	22	ARI 885-98
TU-18	VCWF	5" (127mm)	150	50	0.03	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	0.5	0.5	20	ARI 885-98	22	ARI 885-98
TU-19	VCWF	5" (127mm)	150	50	0.03	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	0.5	0.5	20	ARI 885-98	22	ARI 885-98
TU-20	VCWF	8" (203mm)	630	165	0.22	315	55	84.44	10.06	0.75	160	26.84	1.41	0.5	29	ARI 885-98	0.5	0.5	29	ARI 885-98	17	ARI 885-98
TU-21	VCWF	6" (152mm)	370	370	0.25	185	55	86.56	6.33	0.5	160	25.35	0.52	0.5	26	ARI 885-98	0.5	0.5	26	ARI 885-98	25	ARI 885-98

Martin's Point MOB

Unit Schedule Report

Unit model	Primary inlet	Main coil type	Design Min		AF-D @ Valve		Cooling		Heating		Coil		Heating		Coil fluid		Max inlet		Discharge		
			airflow	airflow	airflow	airflow	airflow	airflow	airflow	airflow	airflow	airflow	capacity	flow rate	temp	della T	PD	SP	valve -	valve -	function
			cfm	cfm	cfm	cfm	cfm	cfm	cfm	cfm	MBh	gpm	F	F	ftH2O	ftH2O	in H2O	NC	NC	ARI	ARI
TU-22	VCWF	6" (152mm)	1 row	245	220	0.11	125	55	94.89	5.41	0.5	160	21.84	0.52	0.5	24	ARI 885-98	24	ARI 885-98	24	ARI 885-98
TU-23	VCWF	6" (152mm)	1 row	280	110	0.14	140	55	92.3	5.66	0.5	160	22.87	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-24	VCWF	6" (152mm)	1 row	300	300	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-25	VCWF	6" (152mm)	1 row	300	300	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-26	VCWF	6" (152mm)	1 row	370	370	0.25	185	55	86.56	6.33	0.5	160	25.35	0.52	0.5	26	ARI 885-98	26	ARI 885-98	25	ARI 885-98
TU-27	VCWF	6" (152mm)	1 row	290	290	0.15	145	55	91.53	5.74	0.5	160	22.99	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-28	VCWF	6" (152mm)	1 row	300	400	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-29	VCWF	5" (127mm)	1 row	215	70	0.05	110	55	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98	21	ARI 885-98	25	ARI 885-98
TU-30	VCWF	5" (127mm)	1 row	190	70	0.04	95	55	101.8	4.82	0.5	160	19.3	0.52	0.5	21	ARI 885-98	21	ARI 885-98	25	ARI 885-98
TU-31	VCWF	10" (254mm)	2 row	700	0	0.21	350	55	103.45	18.39	1	160	36.82	0.19	0.5	25	ARI 885-98	25	ARI 885-98	15	ARI 885-98
TU-32	VCWF	6" (152mm)	1 row	300	100	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-33	VCWF	5" (127mm)	1 row	220	70	0.05	110	55	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98	21	ARI 885-98	25	ARI 885-98
TU-34	VCWF	5" (127mm)	1 row	190	70	0.04	95	55	101.8	4.82	0.5	160	19.3	0.52	0.5	21	ARI 885-98	21	ARI 885-98	25	ARI 885-98
TU-35	VCWF	8" (203mm)	2 row	560	0	0.3	280	55	100	13.66	1.03	160	25.3	0.11	0.5	28	ARI 885-98	28	ARI 885-98	16	ARI 885-98
TU-36	VCWF	8" (203mm)	1 row	620	0	0.21	310	55	84.72	9.99	0.75	160	26.63	1.41	0.5	29	ARI 885-98	29	ARI 885-98	17	ARI 885-98
TU-37	VCWF	8" (203mm)	1 row	570	0	0.18	285	55	88.22	9.65	0.75	160	25.75	1.41	0.5	28	ARI 885-98	28	ARI 885-98	17	ARI 885-98
TU-38	VCWF	8" (203mm)	1 row	630	105	0.22	315	55	84.44	10.06	0.75	160	26.94	1.41	0.5	29	ARI 885-98	29	ARI 885-98	17	ARI 885-98
TU-39	VCWF	5" (127mm)	1 row	205	205	0.05	105	55	96.17	5.03	0.5	160	20.13	0.52	0.5	21	ARI 885-98	21	ARI 885-98	25	ARI 885-98
TU-40	VCWF	6" (152mm)	1 row	300	300	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-41	VCWF	6" (152mm)	1 row	300	300	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98

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Unit Terminal Units: Schedule Report

Result Tags	Unit model	Primary inlet	Main coil type	Design		min	APU @		cooling airflow	cooling airflow in H2O	heating airflow	heating airflow in H2O	Primary EDE	Unit LAT	heating capacity	heating flow rate	Heating temp	Heating delta T		Coil fluid PD	Max inlet temp	Isolated valve		Radiated function	Discharge valve - NC	Discharge function	
				cooling airflow	heating airflow		F	F										SP	NC								
TU-42	VCWF	6" (152mm)	1 row	260	290	0.15	145	55	91.53	5.74	0.5	160	22.99	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-43	VCWF	6" (152mm)	1 row	300	100	0.16	150	55	90.8	5.62	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-44	VCWF	5" (127mm)	1 row	220	70	0.05	110	55	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98
TU-45	VCWF	5" (127mm)	1 row	190	70	0.04	85	55	104.86	4.6	0.5	160	18.39	0.52	0.5	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98
TU-46	VCWF	8" (203mm)	1 row	470	300	0.24	335	55	83.39	10.32	0.75	160	27.53	1.42	0.5	30	ARI 885-98	30	ARI 885-98	30	ARI 885-98	30	ARI 885-98	30	ARI 885-98	30	ARI 885-98
TU-47	VCWF	6" (152mm)	1 row	260	130	0.12	130	55	93.97	5.49	0.5	160	21.99	0.52	0.5	24	ARI 885-98	24	ARI 885-98	24	ARI 885-98	24	ARI 885-98	24	ARI 885-98	24	ARI 885-98
TU-48	VCWF	8" (203mm)	1 row	630	105	0.22	315	55	84.44	10.06	0.75	160	26.84	1.41	0.5	29	ARI 885-98	29	ARI 885-98	29	ARI 885-98	29	ARI 885-98	29	ARI 885-98	29	ARI 885-98
TU-49	VCWF	6" (152mm)	1 row	340	110	0.21	170	55	88.21	6.12	0.5	160	24.54	0.82	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-50	VCWF	5" (127mm)	1 row	200	60	0.05	100	55	100.44	4.98	0.5	160	19.72	0.52	0.5	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98
TU-51	VCWF	6" (152mm)	1 row	300	300	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-52	VCWF	5" (127mm)	1 row	250	200	0.05	100	55	100.44	4.93	0.5	160	19.72	0.52	0.5	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98
TU-53	VCWF	6" (152mm)	1 row	280	290	0.15	145	55	91.53	5.74	0.5	160	22.99	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-54	VCWF	6" (152mm)	1 row	300	100	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-55	VCWF	5" (127mm)	1 row	220	70	0.05	110	55	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98
TU-56	VCWF	5" (127mm)	1 row	210	70	0.05	105	55	99.17	5.03	0.5	160	20.13	0.52	0.5	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98	21	ARI 885-98
TU-57	VCWF	8" (203mm)	2 row	420	0	0.18	210	55	100.66	10.4	0.75	160	27.75	0.06	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-58	VCWF	5" (127mm)	1 row	150	50	0.03	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98
TU-59	VCWF	6" (152mm)	1 row	370	110	0.25	185	55	86.56	6.33	0.5	160	25.35	0.52	0.5	26	ARI 885-98	26	ARI 885-98	26	ARI 885-98	26	ARI 885-98	26	ARI 885-98	26	ARI 885-98
TU-60	VCWF	5" (127mm)	1 row	140	50	0.03	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98	20	ARI 885-98
TU-61	VCWF	6" (152mm)	1 row	340	110	0.21	170	55	88.21	6.12	0.5	160	24.54	0.52	0.5	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98	25	ARI 885-98

Martin's Point MOB

Unit tags	Unit model	Primary inlet type	Main coil type	Design Min.		APU @ valve		Primary EDB		Unit LAT		Coil heating capacity		Heating ent temp		Heating delta T		Coil fluid Max inlet		Radiated valve - NC		Discharge transfer function	
				cooling airflow cfm	cooling airflow cfm	cooling airflow cfm	cooling airflow cfm	heating airflow cfm	heating airflow cfm	F	F	F	F	MBh	gpm	F	F	SP	NC	F	F	ARI	ARI
TU-62	VCWF	5" (127mm)	1 row	225	70	0.06	115	55	96.89	5.22	0.5	160	20.91	0.52	0.5	20	ARI 885-98	glass fiber	20	ARI 885-98	20	ARI 885-98	
TU-63	VCWF	6" (152mm)	1 row	330	250	0.2	165	55	88.81	6.05	0.5	160	24.22	0.52	0.5	25	ARI 885-98	glass fiber	25	ARI 885-98	25	ARI 885-98	
TU-64	VCWF	6" (152mm)	1 row	330	250	0.2	165	55	88.81	6.05	0.5	160	24.22	0.52	0.5	25	ARI 885-98	glass fiber	25	ARI 885-98	25	ARI 885-98	
TU-65	VCWF	6" (203mm)	1 row	590	180	0.19	295	55	85.59	9.79	0.75	160	26.42	1.41	0.5	29	ARI 885-98	glass fiber	17	ARI 885-98	17	ARI 885-98	
TU-66	VCWF	10" (254mm)	1 row	930	165	0.21	465	55	85.22	15.24	1	160	30.51	3.23	0.5	28	ARI 885-98	glass fiber	17	ARI 885-98	17	ARI 885-98	
TU-67	VCWF	5" (127mm)	1 row	240	240	0.06	120	55	95.86	5.32	0.5	160	21.28	0.52	0.5	20	ARI 885-98	glass fiber	26	ARI 885-98	26	ARI 885-98	
TU-68	VCWF	6" (152mm)	1 row	345	110	0.21	175	55	87.64	6.19	0.5	160	24.79	0.52	0.5	25	ARI 885-98	glass fiber	25	ARI 885-98	25	ARI 885-98	
TU-69	VCWF	6" (203mm)	1 row	630	105	0.22	315	55	84.44	10.06	0.75	160	26.84	1.41	0.5	28	ARI 885-98	glass fiber	17	ARI 885-98	17	ARI 885-98	
TU-70	VCWF	5" (127mm)	1 row	165	70	0.09	85	55	104.86	4.6	0.5	160	10.30	0.52	0.5	20	ARI 885-98	glass fiber	24	ARI 885-98	24	ARI 885-98	
TU-71	VCWF	6" (152mm)	1 row	315	190	0.18	160	55	88.44	5.99	0.5	160	23.32	0.52	0.5	25	ARI 885-98	glass fiber	25	ARI 885-98	25	ARI 885-98	
TU-72	VCWF	6" (152mm)	1 row	290	150	0.09	115	55	96.89	5.22	0.5	160	20.91	0.52	0.5	24	ARI 885-98	glass fiber	24	ARI 885-98	24	ARI 885-98	
TU-73	VCWF	6" (203mm)	1 row	590	300	0.19	295	55	85.59	9.79	0.75	160	26.12	1.41	0.5	29	ARI 885-98	glass fiber	17	ARI 885-98	17	ARI 885-98	
TU-74	VCWF	6" (203mm)	1 row	440	130	0.12	220	55	91.27	8.85	0.75	160	23.09	1.41	0.5	26	ARI 885-98	glass fiber	16	ARI 885-98	16	ARI 885-98	
TU-75	VCWF	10" (254mm)	2 row	700	0	0.21	350	55	103.45	18.39	1	160	36.52	0.19	0.5	25	ARI 885-98	glass fiber	15	ARI 885-98	15	ARI 885-98	
TU-76	VCWF	10" (254mm)	1 row	825	410	0.17	415	55	87.28	14.53	1	160	29.08	3.23	0.5	25	ARI 885-98	glass fiber	15	ARI 885-98	15	ARI 885-98	
TU-77	VCWF	6" (152mm)	1 row	290	115	0.09	115	55	96.89	5.22	0.5	160	20.91	0.52	0.5	24	ARI 885-98	glass fiber	24	ARI 885-98	24	ARI 885-98	
TU-78	VCWF	5" (127mm)	1 row	90	50	0.01	81	55	109.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	glass fiber	21	ARI 885-98	21	ARI 885-98	
TU-79	VCWF	6" (203mm)	1 row	630	105	0.22	315	55	84.44	10.06	0.75	160	26.84	1.41	0.5	28	ARI 885-98	glass fiber	17	ARI 885-98	17	ARI 885-98	
TU-80	VCWF	6" (152mm)	1 row	260	75	0.11	125	55	94.89	5.41	0.5	160	21.64	0.52	0.5	24	ARI 885-98	glass fiber	24	ARI 885-98	24	ARI 885-98	
TU-81	VCWF	6" (152mm)	1 row	385	385	0.27	195	55	85.57	6.47	0.5	160	25.88	0.52	0.5	26	ARI 885-98	glass fiber	25	ARI 885-98	25	ARI 885-98	

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Result Tags	Base Unit										Radiated										Discharge									
	Unit model	Primary inlet type	Main coil type	Design cooling airflow cfm	Min cooling airflow cfm	APU @ cooling airflow cfm	Valve heating airflow cfm	Primary EDB	Unit LAT	Coil heating capacity MBH	Heating flow rate gpm	Heating ent fluid temp F	Heating delta T F	Coil fluid PD	Max inlet in H2O	SP in H2O	NC valve - NC	Radiated transfer function	Discharge valve-NC	transfer function										
TU-82	VCWF	6" (152mm)	1 row	380	380	560	0.28	180	87.09	6.26	0.5	160	25.07	0.52	0.5	26	ARI 885-98 glass fiber	25	ARI 885-98											
TU-83	VCWF	5" (127mm)	1 row	190	190	70	0.04	95	101.8	4.52	0.5	160	19.3	0.52	0.5	21	ARI 885-98 glass fiber	25	ARI 885-98											
TU-84	VCWF	8" (203mm)	2 row	560	0	0	0.3	280	13.66	1.08	160	25.3	0.11	0.5	28	ARI 885-98 glass fiber	16	ARI 885-98												
TU-85	VCWF	5" (127mm)	1 row	245	70	70	0.05	110	97.99	5.13	0.5	160	23.53	0.52	0.5	21	ARI 885-98 glass fiber	25	ARI 885-98											
TU-86	VCWF	5" (127mm)	1 row	300	100	100	0.09	150	90.8	5.82	0.5	160	23.31	0.52	0.5	22	ARI 885-98 glass fiber	29	ARI 885-98											
TU-87	VCWF	10" (254mm)	2 row	700	0	0	0.21	350	103.45	18.89	1	160	38.52	0.19	0.5	25	ARI 885-98 glass fiber	15	ARI 885-98											
TU-88	VCWF	6" (152mm)	1 row	385	300	300	0.27	195	85.57	6.47	0.5	160	25.88	0.52	0.5	28	ARI 885-98 glass fiber	25	ARI 885-98											
TU-89	VCWF	8" (203mm)	1 row	530	160	160	0.16	265	87.57	9.36	0.75	160	24.98	1.41	0.5	27	ARI 885-98 glass fiber	16	ARI 885-98											
TU-90	VCWF	6" (152mm)	1 row	430	130	130	0.33	215	93.61	6.72	0.5	160	26.89	0.53	0.5	26	ARI 885-98 glass fiber	26	ARI 885-98											
TU-91	VCWF	5" (127mm)	1 row	230	200	200	0.05	100	190.44	4.93	0.5	160	19.72	0.52	0.5	21	ARI 885-98 glass fiber	25	ARI 885-98											
TU-92	VCWF	5" (127mm)	1 row	175	50	50	0.04	90	193.27	4.71	0.5	160	18.85	0.52	0.5	21	ARI 885-98 glass fiber	24	ARI 885-98											
TU-93	VCWF	5" (127mm)	1 row	200	200	200	0.05	100	190.44	4.93	0.5	160	19.72	0.52	0.5	21	ARI 885-98 glass fiber	25	ARI 885-98											
TU-94	VCWF	6" (152mm)	1 row	190	150	150	0.04	81	108.24	4.5	0.5	160	18.01	0.52	0.5	22	ARI 885-98 glass fiber	22	ARI 885-98											
TU-95	VCWF	6" (152mm)	1 row	300	300	300	0.16	150	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98 glass fiber	25	ARI 885-98											
TU-96	VCWF	6" (152mm)	1 row	290	290	290	0.15	145	91.53	5.74	0.5	160	22.99	0.52	0.5	25	ARI 885-98 glass fiber	25	ARI 885-98											
TU-97	VCWF	6" (152mm)	1 row	300	300	300	0.16	150	90.8	5.92	0.5	160	23.31	0.52	0.5	25	ARI 885-98 glass fiber	25	ARI 885-98											
TU-9	VCWF	5" (127mm)	1 row	190	70	70	0.04	95	101.8	4.82	0.5	160	19.3	0.52	0.5	21	ARI 885-98 glass fiber	25	ARI 885-98											
TU-98	VCWF	5" (127mm)	1 row	220	70	70	0.05	110	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98 glass fiber	25	ARI 885-98											
TU-100	VCWF	6" (152mm)	1 row	290	90	90	0.15	145	91.53	5.74	0.5	160	22.99	0.52	0.5	25	ARI 885-98 glass fiber	25	ARI 885-98											
TU-101	VCWF	8" (203mm)	1 row	630	105	105	0.22	315	84.44	10.06	0.75	160	26.84	1.41	0.5	29	ARI 885-98 glass fiber	17	ARI 885-98											

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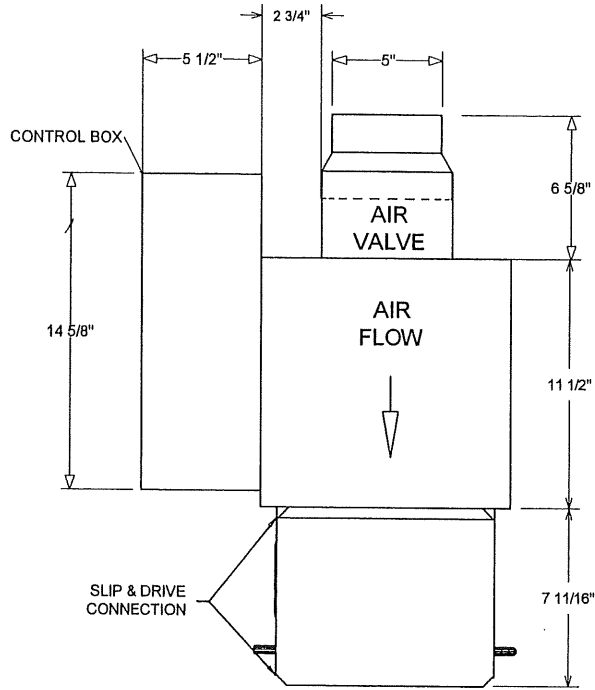
Unit Terminal Units - Schedule Report

Unit model	Primary inlet type	Main coil type	Design		Cooling		Heating		Primary EDB	Unit LAT	heating capacity	Flow rate	Heating temp	Heating delta T	Coil fluid PD	Max inlet SP	Radiated		Discharge transfer valve - NC	Discharge transfer function
			airflow cfm	airflow cfm	airflow cfm	airflow cfm	valve	NC												
TU-102	VCWF	5" (127mm)	1 row	150	0.08	81	55	106.24	4.5	0.5	160	18.01	0.52	0.5	20	ARI 885-98	22	ARI 885-98		
TU-103	VCWF	8" (152mm)	1 row	300	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98		
TU-104	VCWF	6" (152mm)	1 row	300	0.16	150	55	90.8	5.82	0.5	160	23.31	0.52	0.5	25	ARI 885-98	25	ARI 885-98		
TU-105	VCWF	6" (152mm)	1 row	450	0.37	225	55	83.02	6.84	0.5	160	27.37	0.52	0.5	26	ARI 885-98	27	ARI 885-98		
TU-106	VCWF	5" (127mm)	1 row	180	0.04	90	55	101.8	4.82	0.5	160	19.3	0.52	0.5	21	ARI 885-98	25	ARI 885-98		
TU-107	VCWF	10" (254mm)	2 row	700	0.21	350	55	102.45	18.38	1	160	36.82	0.52	0.5	25	ARI 885-98	15	ARI 885-98		
TU-108	VCWF	5" (127mm)	1 row	215	0.05	110	55	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98	25	ARI 885-98		
TU-109	VCWF	6" (152mm)	1 row	295	0.16	100	55	100.44	4.53	0.5	160	19.72	0.52	0.5	25	ARI 885-98	25	ARI 885-98		
TU-110	VCWF	5" (127mm)	1 row	150	0.03	81	55	106.24	4.5	0.5	160	19.01	0.52	0.5	20	ARI 885-98	22	ARI 885-98		
TU-111	VCWF	6" (152mm)	1 row	280	0.15	140	55	91.53	5.74	0.5	160	22.99	0.52	0.5	25	ARI 885-98	25	ARI 885-98		
TU-112	VCWF	8" (203mm)	1 row	330	0.07	165	55	97.75	7.85	0.75	160	23.44	1.4	0.5	24	ARI 885-98	15	ARI 885-98		
TU-113	VCWF	5" (127mm)	1 row	220	0.05	110	55	97.99	5.13	0.5	160	20.53	0.52	0.5	21	ARI 885-98	25	ARI 885-98		
TU-114	VCWF	5" (127mm)	1 row	185	0.04	95	55	101.8	4.82	0.5	160	19.3	0.52	0.5	21	ARI 885-98	24	ARI 885-98		
TU-115	VCWF	8" (203mm)	1 row	550	0.17	275	55	86.87	9.51	0.75	160	25.37	1.41	0.5	28	ARI 885-98	16	ARI 885-98		
TU-116	VCWF	6" (152mm)	1 row	370	0.25	185	55	86.56	6.33	0.5	160	25.35	0.52	0.5	26	ARI 885-98	25	ARI 885-98		
TU-117	VCWF	6" (152mm)	1 row	240	0.1	120	55	95.86	5.32	0.5	160	21.28	0.52	0.5	24	ARI 885-98	24	ARI 885-98		
TU-118	VCWF	8" (203mm)	1 row	705	0.26	355	55	82.46	10.57	0.75	160	28.21	1.42	0.5	31	ARI 885-98	19	ARI 885-98		
TU-119	VCWF	6" (152mm)	1 row	290	0.15	145	55	91.53	5.74	0.5	160	22.99	0.52	0.5	25	ARI 885-98	25	ARI 885-98		
TU-120	VCWF	6" (152mm)	1 row	245	0.11	125	55	94.89	5.41	0.5	160	21.64	0.52	0.5	24	ARI 885-98	24	ARI 885-98		
TU-121	VCWF	5" (127mm)	1 row	185	0.04	95	55	101.8	4.82	0.5	160	19.3	0.52	0.5	21	ARI 885-98	24	ARI 885-98		

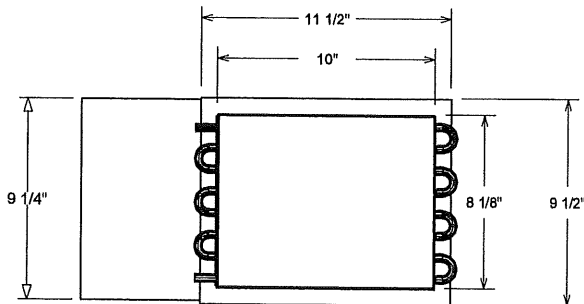
Martin's Point MOB

Unit Terminal Units - Schedule Report		Design		Min		AFU @		Valve		Primary		Coil		Heating		Regulated		Discharge			
Result	Tags	Unit model	Main coil type	cooling airflow cfm	cooling airflow cfm	cooling airflow cfm	cooling airflow in H2O	cooling airflow cfm	heating airflow cfm	EDB	Unit LAT	heating capacity MBh	heating flow rate gpm	ent fluid temp F	Heating delta T F	Coil fluid PO ftH2O	Max inlet SP in H2O	valve - NC	Radiated transfer function	Discharge valve - NC	transfer function
TU-122		VCWF	5" (127mm)	220	70	0.05	220	55	83.41	0.78	0.5	160	27.13	0.53	0.5	21	ARI 885-98	25	ARI 885-98	25	ARI 885-98
TU-123		VCWF	8" (203mm)	500	0	0.25	250	55	100	12.2	0.92	160	26.64	0.08	0.5	27	ARI 885-98	16	ARI 885-98	16	ARI 885-98
TU-124		VCWF	8" (203mm)	500	0	0.25	250	55	100	12.2	0.92	160	26.64	0.08	0.5	27	ARI 885-98	16	ARI 885-98	16	ARI 885-98
TU-125		VCWF	8" (203mm)	500	0	0.25	250	55	100	12.2	0.92	160	26.64	0.08	0.5	27	ARI 885-98	16	ARI 885-98	16	ARI 885-98

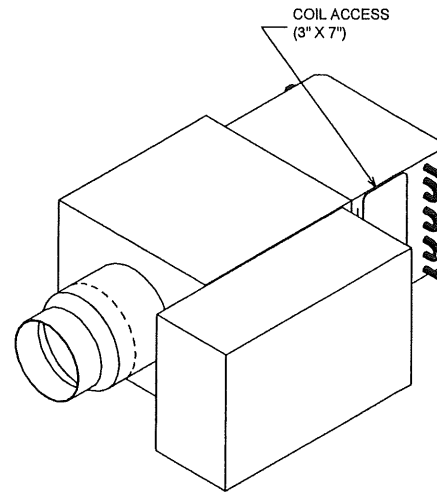
Unit Dimensions - VCWF05 5" Inlet VAV terminal Units w/ 1 row hot water row coil
 Item: A1 Qty: 42



TOP VIEW



BACK VIEW



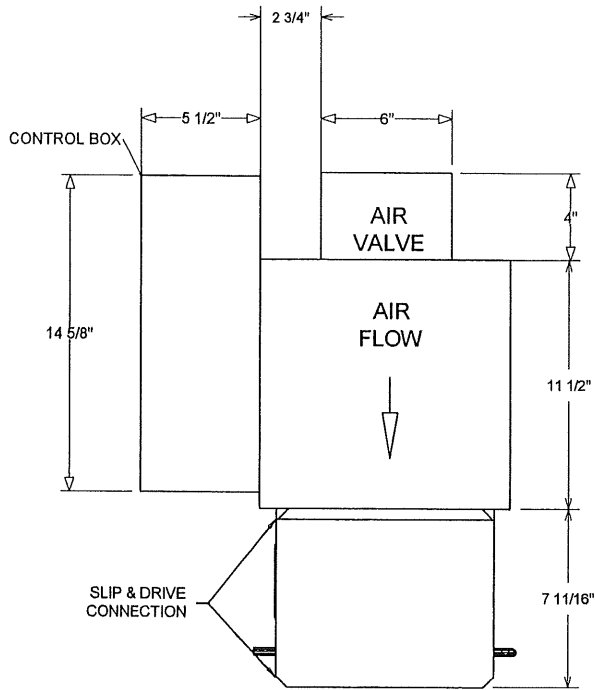
Customer Notes

1. Air Inlet is centered in unit front panel.
2. Minimum of 1.5 duct diameters of straight duct required at inlet for proper flow reading.
3. Allow 12" on control side for servicing.
4. Unit is field-convertable from a left-hand connection (shown) to right-hand by rotating unit. Water coil supply connection is at the bottom and return connection is at the top. Opposite side (coil and control) connections are available for VCWF only.
5. Coil furnished with stub sweat connections.
6. Coils are provided without internal insulation. If the unit is to be installed in a location with high humidity, external insulation around the heating coil should be installed as required.
7. Unit and hot water coil are standard slip & drive connection.
8. Detailed dimensions for the water coils can be found on the Accessory drawing.

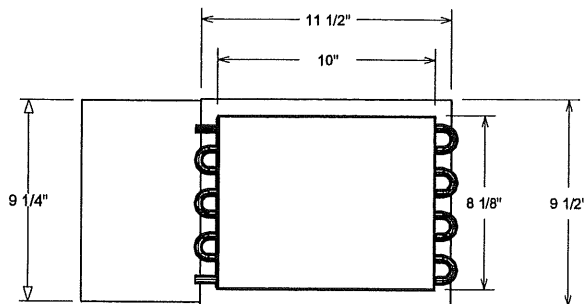
Approximate Dry Weight	21.0 lb
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Weights reflected may vary ±5.0 lb based upon options selected.

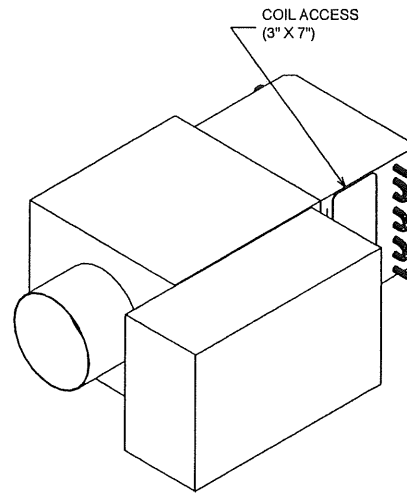
Unit Dimensions - VCWF06 6" Inlet VAV terminal Units w/ 1 row hot water row coil
Item: A2 Qty: 51



TOP VIEW



BACK VIEW



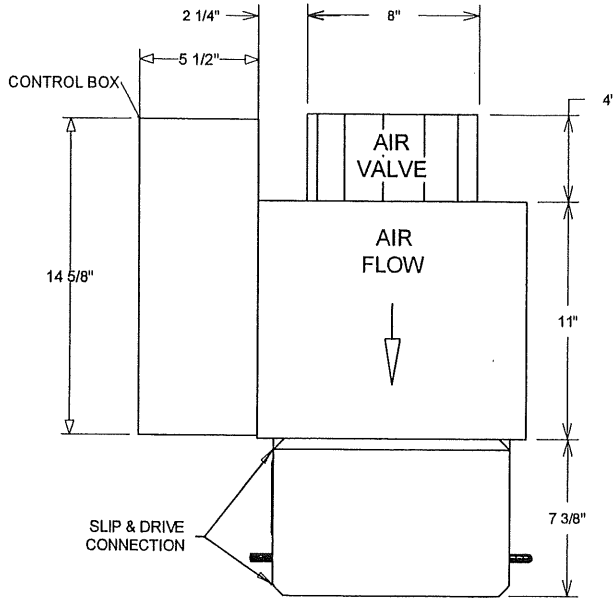
Customer Notes

1. Air Inlet is centered in unit front panel.
2. Minimum of 1.5 duct diameters of straight duct required at inlet for proper flow reading.
3. Allow 12" on control side for servicing.
4. Unit is field-convertable from a left-hand connection (shown) to right-hand by rotating unit. Water coil supply connection is at the bottom and return connection is at the top. Opposite side (coil and control) connections are available for VCWF only.
5. Coil furnished with stub sweat connectors.
6. Coils are provided without internal insulation. If the unit is to be installed in a location with high humidity, external insulation around the heating coil should be installed as required.
7. Unit and hot water coil are standard slip & drive connection.
8. Detailed dimensions for the water coils can be found on the Accessory drawing.

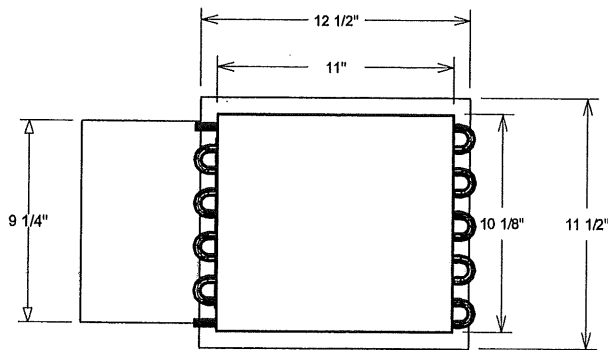
Approximate Dry Weight	21.0 lb
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Weights reflected may vary ±5.0 lb based upon options selected.

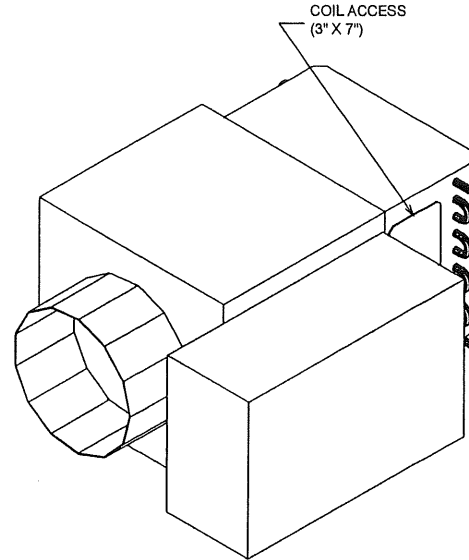
Unit Dimensions - VCWF08 8" Inlet VAV terminal Units w/ 1 row hot water row coil
 Item: A3 Qty: 19



TOP VIEW



BACK VIEW



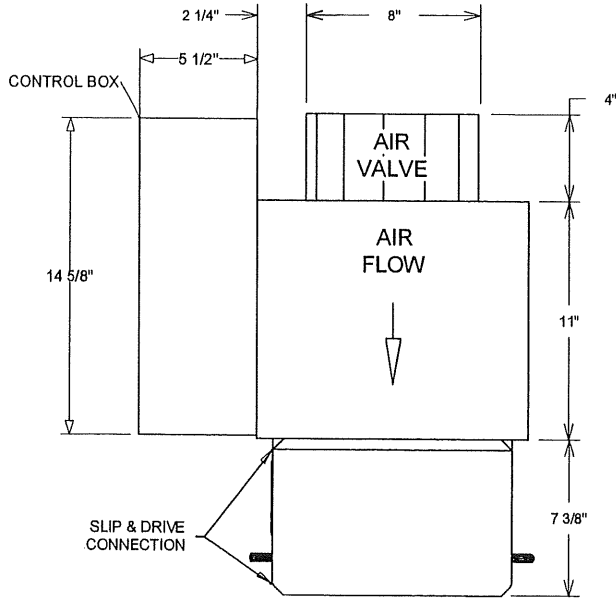
Customer Notes

1. Air Inlet is centered in unit front panel.
2. Minimum of 1.5 duct diameters of straight duct required at inlet for proper flow reading.
3. Allow 12" on control side for servicing.
4. Unit is field-convertable from a left-hand connection (shown) to right-hand by rotating unit. Water coil supply connection is at the bottom and return connection is at the top. Opposite side (coil and control) connections are available for VCWF only.
5. Coil furnished with stub sweat connections.
6. Coils are provided without internal insulation. If the unit is to be installed in a location with high humidity, external insulation around the heating coil should be installed as required.
7. Unit and hot water coil are standard slip & drive connection.
8. Detailed dimensions for the water coils can be found on the Accessory drawing.

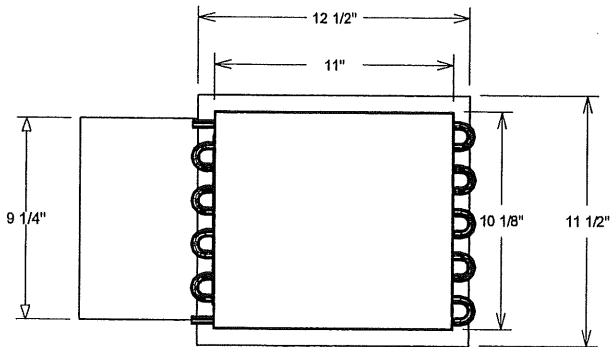
Approximate Dry Weight	21.0 lb
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Weights reflected may vary ± 5.0 lb based upon options selected.

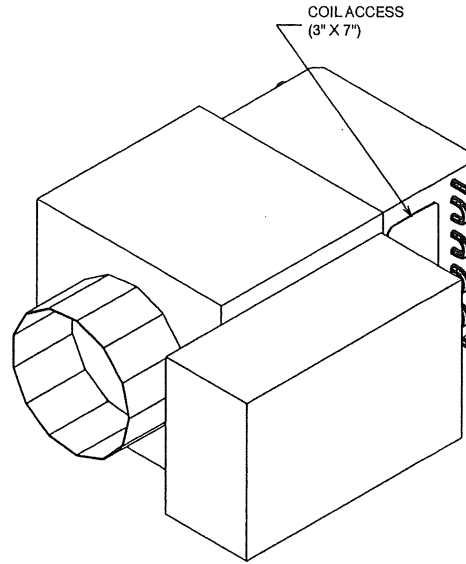
Unit Dimensions - VCWF08 8" Inlet VAV terminal Units w/ 2 row hot water row coil
Item: A4 Qty: 6



TOP VIEW



BACK VIEW



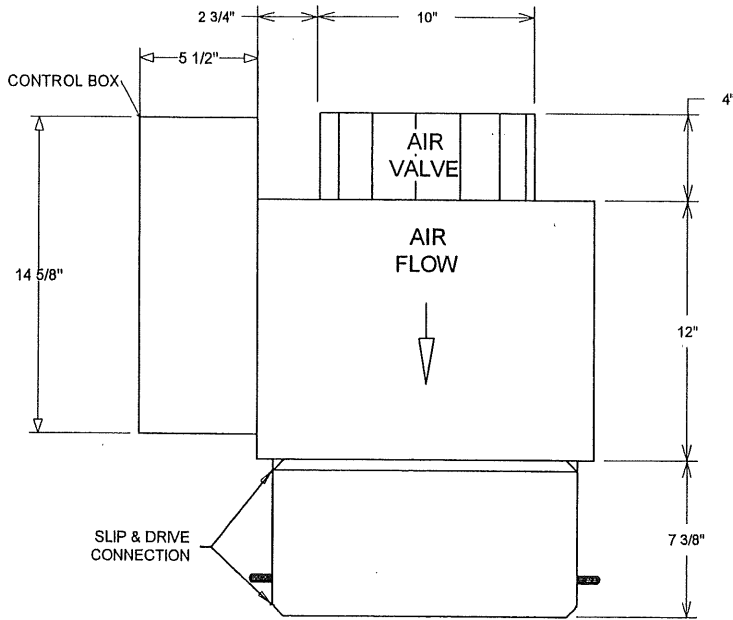
Customer Notes

1. Air Inlet is centered in unit front panel.
2. Minimum of 1.5 duct diameters of straight duct required at inlet for proper flow reading.
3. Allow 12" on control side for servicing.
4. Unit is field-convertable from a left-hand connection (shown) to right-hand by rotating unit. Water coil supply connection is at the bottom and return connection is at the top. Opposite side (coil and control) connections are available for VCWF only.
5. Coil furnished with stub sweat connections.
6. Coils are provided without internal insulation. If the unit is to be installed in a location with high humidity, external insulation around the heating coil should be installed as required.
7. Unit and hot water coil are standard slip & drive connection.
8. Detailed dimensions for the water coils can be found on the Accessory drawing.

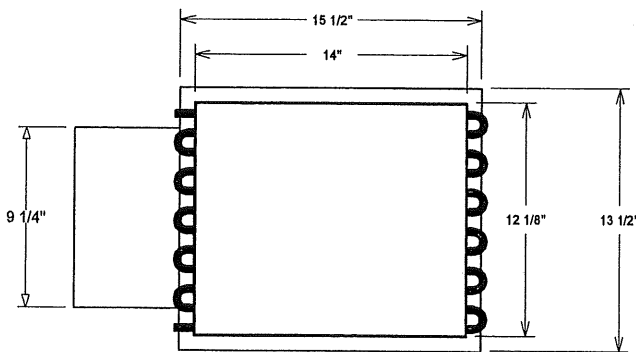
Approximate Dry Weight	24.0 lb
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Weights reflected may vary ± 5.0 lb based upon options selected.

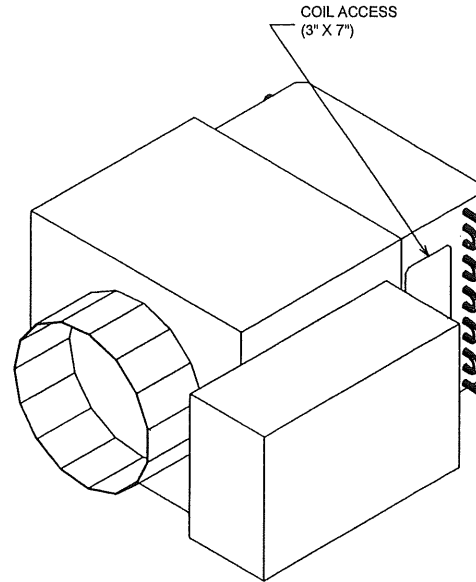
Unit Dimensions – VCWF10 10” Inlet VAV terminal Units w/ 1 row hot water row coil
Item: A5 Qty: 2



TOP VIEW



BACK VIEW



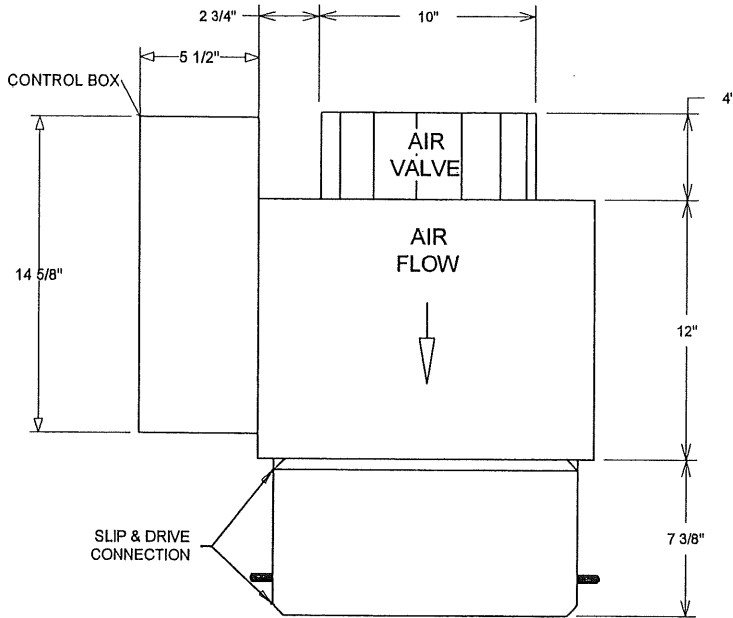
Customer Notes

1. Air Inlet is centered in unit front panel.
2. Minimum of 1.5 duct diameters of straight duct required at inlet for proper flow reading.
3. Allow 12" on control side for servicing.
4. Unit is field-convertable from a left-hand connection (shown) to right-hand by rotating unit. Water coil supply connection is at the bottom and return connection is at the top Opposite side (coil and control) connections are available for VCWF only.
5. Coil furnished with stub sweat connections.
6. Coils are provided without internal insulation. If the unit is to be installed in a location with high humidity, external insulation around the heating coil should be installed as required.
7. Unit and hot water coil are standard slip & drive connection
8. Detailed dimensions for the water coils can be found on the Accessory drawing.

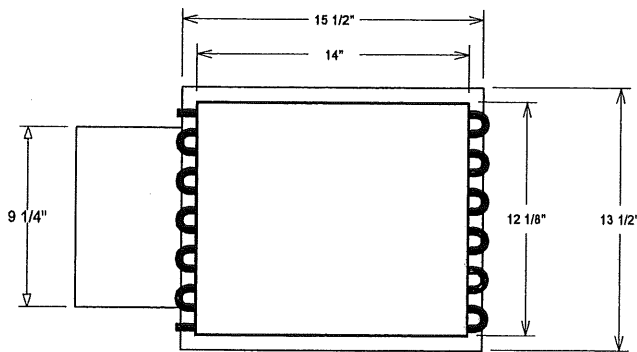
Approximate Dry Weight	29.0 lb
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Weights reflected may vary ±5.0 lb based upon options selected.

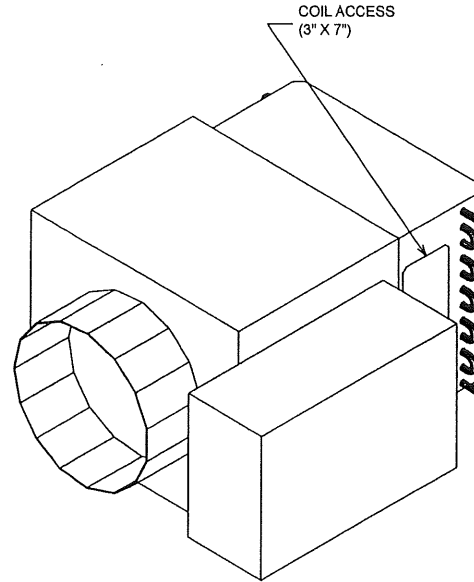
Unit Dimensions – VCWF10 10" Inlet VAV terminal Units w/ 2 row hot water row coil
Item: A6 Qty: 5



TOP VIEW



BACK VIEW



Customer Notes

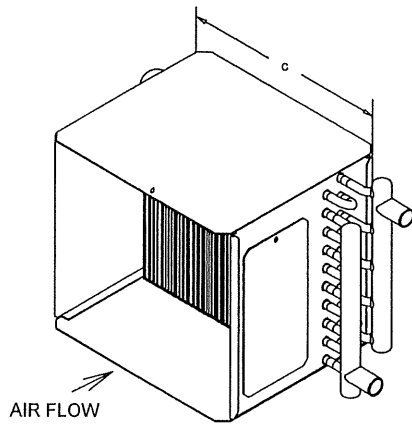
1. Air Inlet is centered in unit front panel.
2. Minimum of 1.5 duct diameters of straight duct required at inlet for proper flow reading.
3. Allow 12" on control side for servicing.
4. Unit is field-convertable from a left-hand connection (shown) to right-hand by rotating unit. Water coil supply connection is at the bottom and return connection is at the top Opposite side (coil and control) connections are available for VCWF only.
5. Coil furnished with stub sweat connections.
6. Coils are provided without internal insulation. If the unit is to be installed in a location with high humidity, external insulation around the heating coil should be installed as required.
7. Unit and hot water coil are standard slip & drive connection.
8. Detailed dimensions for the water coils can be found on the Accessory drawing.

Approximate Dry Weight	32.0 lb
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Weights reflected may vary ±5.0 lb based upon options selected.

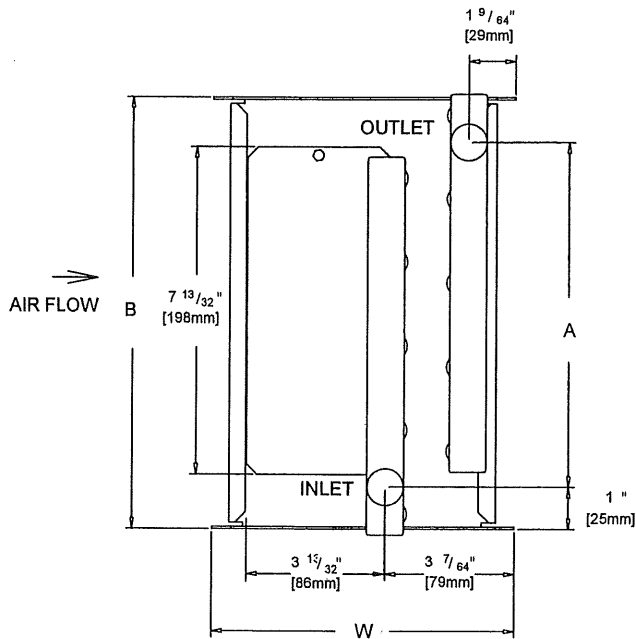
Accessory - VCWF VAV terminal Units w/ 2 row hot water row coil
 Item: A4, A6 Qty: 11

COIL INFORMATION FOR 2 ROW COIL ASSY							
VALV	CFM	LITERS per SECOND	COIL CONNECTION				
				A	B	C	W
04	225	106	7/8" [22mm] O.D.	6 1/4" [191mm]	8 1/8" [206mm]	10" [254mm]	8 1/4" [210mm]
05	350	165	7/8" [22mm] O.D.	6 1/4" [191mm]	8 1/8" [206mm]	10" [254mm]	8 1/4" [210mm]
06	500	236	7/8" [22mm] O.D.	6 1/4" [191mm]	8 1/8" [206mm]	10" [254mm]	8 1/4" [210mm]
08	900	425	7/8" [22mm] O.D.	8 1/4" [210mm]	10 1/8" [257mm]	11" [279mm]	8 1/4" [210mm]
10	1400	661	7/8" [22mm] O.D.	10 1/4" [260mm]	12 1/8" [308mm]	14" [356mm]	8 1/4" [210mm]
12	2000	994	7/8" [22mm] O.D.	12 1/4" [311mm]	14 1/8" [359mm]	17" [432mm]	8 1/4" [210mm]
14	3000	1416	7/8" [22mm] O.D.	16 1/4" [413mm]	18 1/8" [460mm]	19" [483mm]	8 1/4" [210mm]
16	4000	1888	7/8" [22mm] O.D.	16 1/4" [413mm]	18 1/8" [460mm]	23" [584mm]	8 1/4" [210mm]
16 x 24	8000	3776	7/8" [22mm] O.D.	16 1/4" [413mm]	18 1/8" [460mm]	27" [686mm]	8 1/4" [210mm]

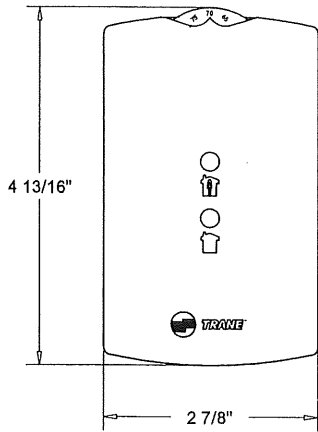


CUSTOMER NOTES:

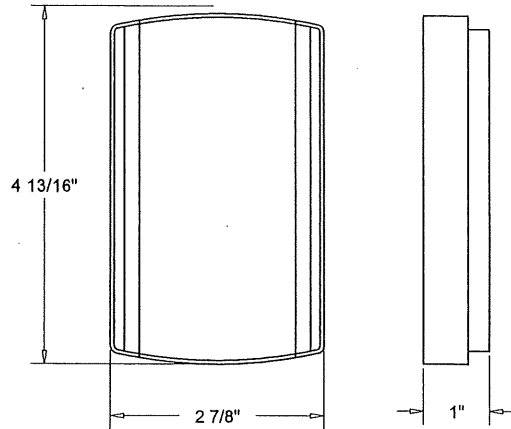
1. Location of coil connections is determined by facing air stream. L.H. Coil connections shown, R.H. opposite.
2. Coil furnished with stub sweat connections.
3. Coil is rotated to achieve opposite connection. Water inlet is always on the bottom & outlet on the top.
4. Coil height and width is dependent upon unit height and width.
5. Access Panel is standard.



Accessory - VCWF VAV terminal Units w/ 2 row hot water row coil
 Item: A4, A6 Qty: 11



WIRELESS ZONE SENSOR



WIRELESS RECEIVER
 (INSTALLED, WIRED & TESTED ON UNIT)

Wireless specifications

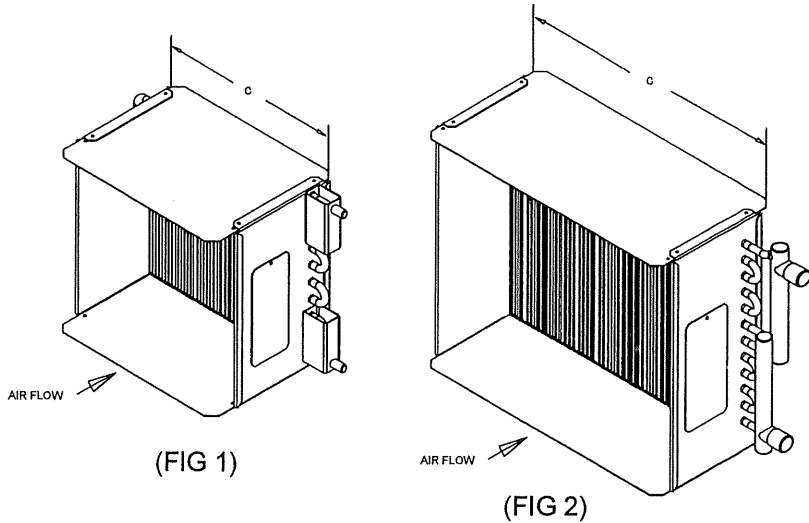
Sensor operating temperature	32 to 122°F (0 to 50°C)
Receiver operating temperature	-40 to 158°F (-40 to 70°C)
Storage temperature	-40 to 185°F (-40 to 85°C)
Storage and operating humidity range	5% to 95%, non-condensing
Accuracy	0.5 °F over a range of 55 to 85°F (12.8 to 29.4 °C)
Resolution	±0.125°F over a range of 60 to 80°F (15.56 to 26.67°C) ±0.25 °F when outside this range
Setpoint functional range	45 to 95°F (7.22 to 35°C)
Setpoint thumbwheel markings	50 to 85°F (stamped every 5°F) and *, ** 11 to 29°C (stamped every 3°C) and *, **
Receiver voltage	24 V nominal ac/dc ± 10%
Receiver power consumption	<1 VA
Housing	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	3.24 in (82.55 mm) for 2 mounting screws (supplied)
Sensor battery	(2) AA, 1.5 V, 2800 mAh, Lithium, 5-year life
Range(f)	Open range - 2,500 ft (packet error rate = 2) Usable - 200 ft (61 m) Typical - 75 ft (25 m)
Output power	100 mW - North America 10 mW - Outside North America
Radio frequency	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	000-999
Minimum time between transmissions	30 seconds
Maximum time between transmissions	15 minutes
RoHS compliance	Yes
Agency Listing	UL916 Energy Management Equipment CSA - C22.2 No. 205-M1983 Signal Equipment

(f) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.

Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper radio signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.

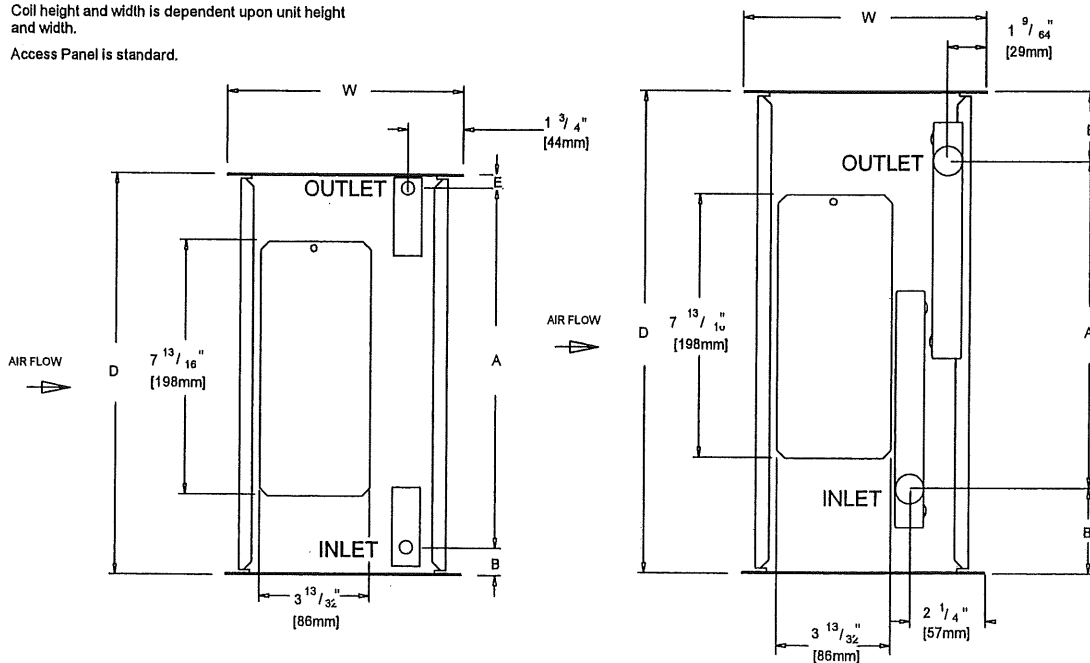
Accessory - VCWF VAV terminal Units w/ 1 row hot water row coil
 Item: A1, A2, A3, A5 Qty: 114

COIL INFORMATION FOR 1 ROW COIL ASSY										
VALV	CFM	LITERS per SECOND	COIL CONNECTION		A	B	C	D	E	W
04	225	106	3/8" [10mm] O.D.	SEE (FIG 1)	7" [178mm]	2 1/32" [17mm]	10" [254mm]	8 1/8" [206mm]	1/2" [13mm]	8 1/4" [210mm]
05	350	165	3/8" [10mm] O.D.		7" [178mm]	2 1/32" [17mm]	10" [254mm]	8 1/8" [206mm]	1/2" [13mm]	8 1/4" [210mm]
06	500	236	3/8" [10mm] O.D.		7" [178mm]	2 1/32" [17mm]	10" [254mm]	8 1/8" [206mm]	1/2" [13mm]	8 1/4" [210mm]
08	900	425	3/8" [10mm] O.D.		9" [229mm]	7/8" [22mm]	11" [279mm]	10 1/8" [257mm]	7/16" [11mm]	8 1/4" [210mm]
10	1400	661	3/8" [10mm] O.D.		11" [279mm]	7/8" [22mm]	14" [356mm]	12 1/8" [308mm]	7/16" [11mm]	8 1/4" [210mm]
12	2000	994	7/8" [22mm] O.D.	SEE (FIG 2)	9 3/4" [248mm]	2 1/2" [64mm]	17" [432mm]	14 1/8" [359mm]	2 1/16" [53mm]	8 1/4" [210mm]
14	3000	1416	7/8" [22mm] O.D.		15 3/4" [400mm]	1 1/2" [38mm]	19" [483mm]	18 1/8" [460mm]	1 1/16" [27mm]	8 1/4" [210mm]
16	4000	1888	7/8" [22mm] O.D.		15 3/4" [400mm]	1 1/2" [38mm]	23" [584mm]	18 1/8" [460mm]	1 1/16" [27mm]	8 1/4" [210mm]
16 x 24	8000	3776	7/8" [22mm] O.D.		15 3/4" [400mm]	1 1/2" [38mm]	27" [686mm]	18 1/8" [460mm]	1 1/16" [27mm]	8 1/4" [210mm]

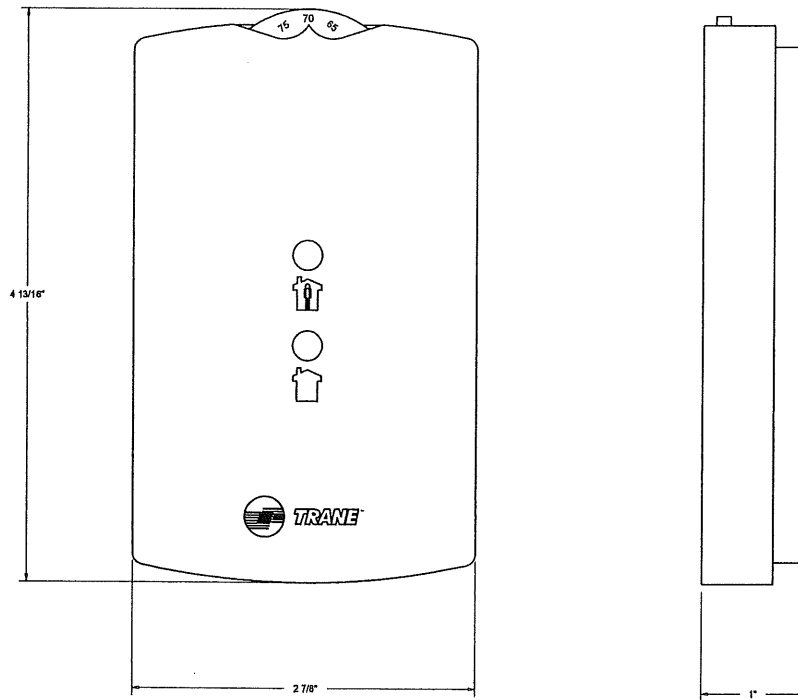


CUSTOMER NOTES:

1. Location of coil connections is determined by facing air stream. L.H. Coil connections shown, R.H. opposite.
2. Coil furnished with stub sweat connections.
3. Coil is rotated to achieve opposite hand connection. Water inlet is always on the bottom & outlet on the top.
4. Coil height and width is dependent upon unit height and width.
5. Access Panel is standard.



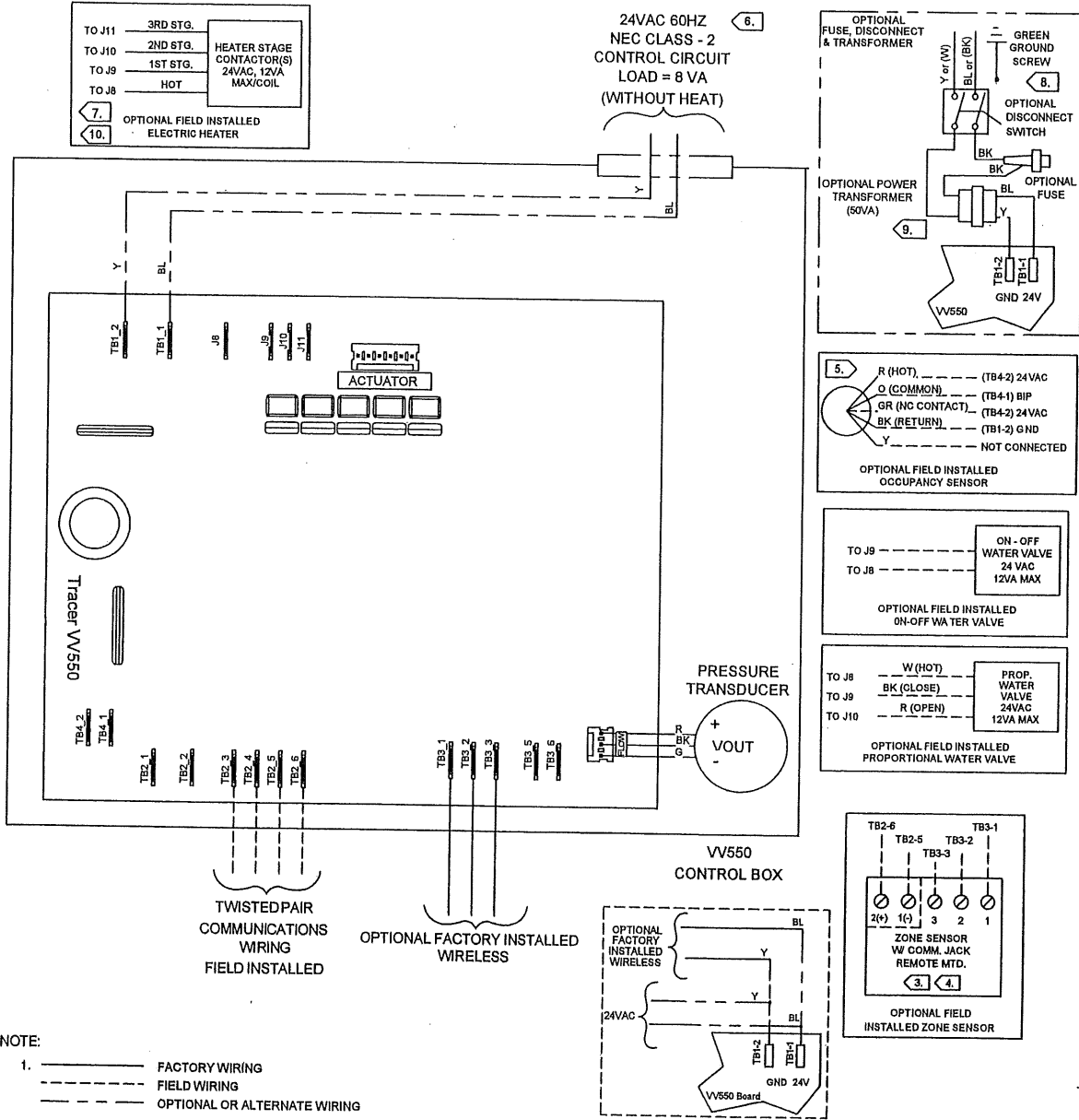
Accessory - VCWF VAV terminal Units w/ 1 row hot water row coil
Item: A1, A2, A3, A5 Qty: 114



Customer Notes:

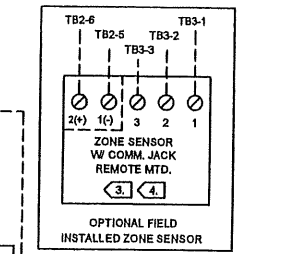
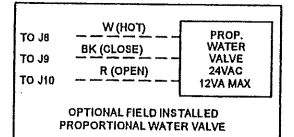
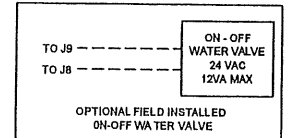
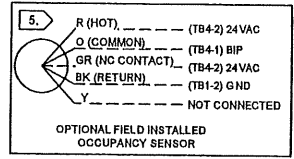
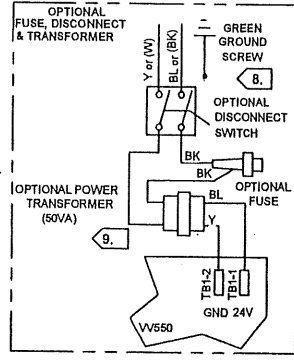
1. Zone Sensor with externally adjustable setpoint, a timed override button & a timed override cancel button.
2. Optional communications jack available.

Field Wiring - VCWF VAV terminal Units w/ hot water row coil
 Item: A1 - A6 Qty: 125



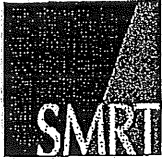
NOTE:

1. ——— FACTORY WIRING
 - - - - - FIELD WIRING
 - · - · - · OPTIONAL OR ALTERNATE WIRING
2. 1/4" QUICK CONNECT REQUIRED FOR ALL FIELD CONNECTIONS.
 3. ZONE SENSOR TERMINALS 4 AND 5 REQUIRE TWISTED PAIR WIRING FOR COMMUNICATIONS
 4. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
 5. THE OPTIONAL BINARY INPUT CONNECTS BETWEEN TB4-1 (BIP) AND 24VAC (HOT) FROM TRANSFORMER. THE BINARY INPUT CAN BE RECONFIGURED AS AN OCCUPANCY INPUT VIA THE COMMUNICATIONS INTERFACE.
 6. IF UNIT MOUNTED TRANSFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUNDED, THEN GROUND LEG MUST BE CONNECTED TO TB1-2.
 7. CONTACTORS ARE 24 VAC: 12VA MAX/COIL (MERCURY CONTACTORS). 10VA MAX/COIL (MAGNETIC CONTACTORS).
 8. OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER WIRING. WIRING GOES THRU TO NEXT COMPONENT WHEN OPTIONS ARE NOT CHOSEN.
 9. TRANSFORMER WIRE COLORS: 120V - W, 208V - R, 240V - O, 277V - BR, 480V - RBK, 575V - R, 190V - R, 220V - R, 347V - R
 10. UNITS WITH ELECTRIC HEAT HAVE OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER LOCATED IN HEATER.



WARNING
 HAZARDOUS VOLTAGE!
 DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
 FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

CAUTION
 USE COPPER CONDUCTORS ONLY!
 UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.
 FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.



HUAC
Hydronic HEAT Panels

Submittal Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 64-238323-1

Portland, ME 04103

Submittal Title: Radiant Heating Panels

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 8/27/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 #64

Remarks:

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: John C. Hare Co.
P. O. Box 2377
South Portland, Maine 04106
Contact: Mark Hare
Phone: 207-799-4851
Fax: 207-799-7184

SPECIFICATION SECTION: 238323

PARAGRAPH: PART 2 PRODUCTS

DRAWINGS: M-601
Radiant Ceiling Panel Schedule

ITEM: RADIANT HEATING PANELS

JOHNSON & JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed X

Subject to Architects Approval X

Date 8/6/09 By JJA

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

RADIANT HEATING PANELS

MANUFACTURER: STERLING

SUPPLIER: John C. Hare Co.
P. O. Box 2377
South Portland, Maine 04106
Contact: Mark Hare
Phone: 207-799-4851
Fax: 207-799-7184

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey road
Scarborough, Maine 04074
Contact: Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619

John C. Hare & Company

1230 Shore Rd
Cape Elizabeth, ME 04107
Phone: (207) 799-4851
Fax: (207) 799-7184

PO Box 2377
South Portland, ME 04116

Submittal

Project: Martin's Point Healthcare
Medical Office Bldg.
Portland, ME

Engineer:

Installer: Johnson & Jordan

Products/ Mfr. Sterling Radiant Ceiling Panels

Date: Aug 6, 2009

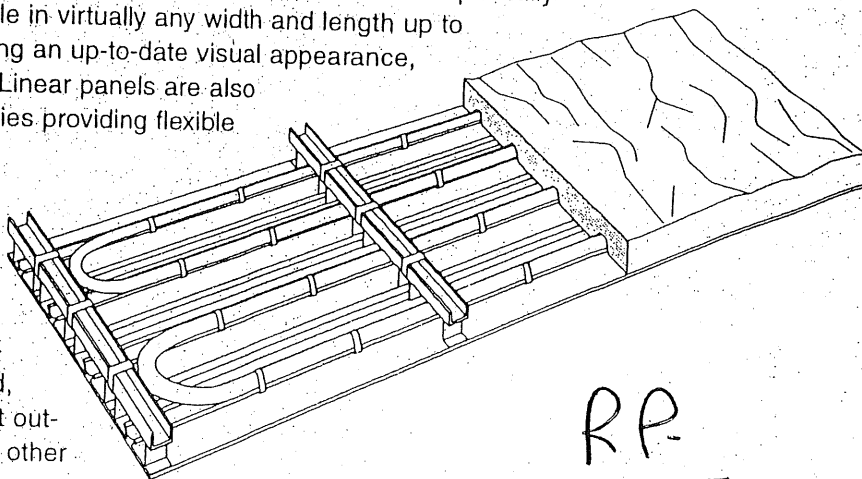
Delivery Information: 4-5 Weeks

Linear Radiant Panel



DESCRIPTION

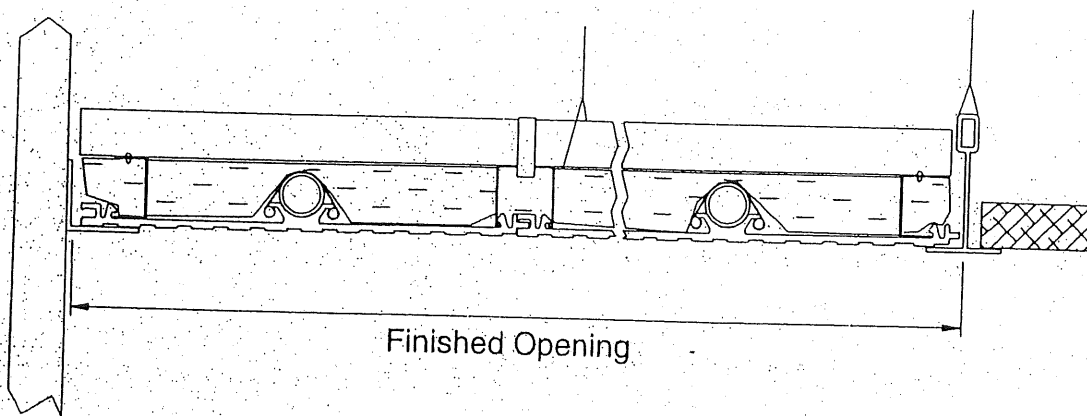
Linear panels are an extruded aluminum radiant heating strip that provides exceptionally high heat transfer. Linear panels are available in virtually any width and length up to a maximum of 16'. This product, while offering an up-to-date visual appearance, is suitable for both ceiling or wall mounting. Linear panels are also available with a range of mounting accessories providing flexible setup.



ADVANTAGES

The system being flexible is easily designed into any heating scheme with few constraints. Installation is straightforward and, as found through independent tests, the heat output of linear panels is equal to or better than other radiant heating products.

RADIANT PANEL WIDTHS & FINISHED OPENINGS



Panel Width	In.	6	8-1/4	10	12	15	16-1/8	17-3/4	19-7/8	23-3/4	29-5/8	35-1/2
	(mm)	(154)	(208)	(256)	(304)	(383)	(410)	(454)	(506)	(604)	(754)	(902)
Finished Opening	In.	6-1/4	8-1/2	10-1/4	12-1/4	15-1/4	16-3/8	18-1/8	20-1/8	24	29-7/8	35-3/4
	(mm)	(160)	(214)	(262)	(310)	(389)	(416)	(460)	(512)	(610)	(760)	(908)

NOTE: Finished openings do not include angle thickness.

Linear Radiant Panel



Panel Outputs

Mean Water Temp. °F (°C)	Passes										
	1	2	2	2	3	4	3	4	4	5	6
	Panel widths In. (mm)										
	6 (154)	8 (208)	10 (256)	12 (304)	15 (383)	16 (410)	18 (454)	20 (506)	24 (604)	30 (754)	36 (902)
120 (48.9)	54 (52)	63 (61)	—	78 (75)	—	94 (90)	109 (105)	—	163 (157)	196 (188)	224 (215)
125 (51.7)	62 (60)	73 (70)	—	93 (89)	—	111 (107)	128 (123)	—	188 (181)	226 (217)	258 (248)
130 (54.4)	71 (68)	85 (82)	—	106 (102)	—	129 (124)	148 (142)	—	213 (205)	256 (246)	292 (281)
135 (57.2)	79 (76)	94 (90)	—	121 (116)	—	147 (141)	166 (160)	—	238 (229)	285 (274)	327 (314)
140 (60.0)	87 (84)	104 (100)	125 (120)	134 (129)	160 (154)	165 (159)	186 (179)	227 (218)	263 (253)	315 (303)	361 (347)
145 (62.8)	96 (92)	114 (110)	137 (132)	149 (143)	178 (171)	185 (175)	205 (197)	245 (236)	288 (277)	345 (332)	394 (379)
150 (65.6)	104 (100)	124 (119)	151 (145)	162 (156)	196 (188)	202 (194)	225 (216)	264 (254)	313 (301)	375 (361)	428 (412)
155 (68.3)	112 (108)	134 (129)	163 (157)	177 (170)	212 (204)	219 (211)	246 (234)	282 (271)	338 (325)	406 (390)	463 (445)
160 (71.1)	121 (116)	145 (139)	177 (170)	190 (183)	230 (221)	238 (229)	263 (253)	301 (289)	363 (349)	436 (419)	497 (478)
165 (73.9)	129 (124)	154 (148)	189 (182)	205 (197)	248 (238)	255 (245)	282 (271)	320 (308)	389 (373)	466 (448)	531 (511)
170 (76.7)	137 (132)	164 (158)	203 (195)	218 (210)	265 (255)	276 (264)	302 (290)	340 (327)	413 (397)	495 (476)	565 (543)
175 (79.4)	146 (140)	175 (168)	215 (207)	233 (224)	281 (270)	292 (281)	320 (308)	360 (346)	438 (421)	525 (505)	599 (576)
180 (82.2)	154 (148)	186 (179)	229 (220)	246 (237)	301 (289)	312 (300)	340 (327)	380 (365)	463 (445)	555 (534)	633 (609)
185 (85.5)	162 (156)	197 (189)	241 (232)	261 (251)	316 (304)	329 (316)	359 (345)	404 (388)	488 (469)	586 (563)	668 (642)
190 (87.8)	171 (164)	207 (199)	255 (245)	275 (264)	334 (321)	348 (335)	379 (364)	427 (411)	513 (493)	615 (591)	702 (675)
195 (90.6)	179 (172)	216 (208)	267 (257)	289 (278)	353 (339)	365 (351)	397 (382)	452 (435)	538 (517)	645 (620)	736 (708)
200 (93.3)	187 (180)	226 (217)	281 (270)	303 (291)	369 (355)	384 (369)	417 (401)	471 (453)	563 (541)	675 (649)	771 (741)
205 (96.1)	195 (188)	236 (227)	293 (282)	317 (305)	387 (372)	401 (386)	436 (419)	490 (471)	588 (565)	705 (678)	805 (774)
210 (98.9)	204 (196)	248 (238)	307 (295)	330 (318)	405 (389)	420 (404)	456 (438)	509 (489)	613 (589)	735 (707)	839 (807)
215 (101.7)	212 (204)	258 (248)	319 (307)	345 (332)	422 (406)	439 (422)	474 (456)	527 (507)	638 (613)	764 (735)	874 (840)

NOTE: Outputs expressed in BTUH/Linear foot (watts/linear meter) of panel and are based on 70°F (21°C) room temperature. Any panel width can be constructed by combining 5", 6" and 8" extrusions up to 36" width. Consult Sterling for wider width requirements.
Table for ethylene and propylene 50/50 dvcol also available upon request.

Linear Radiant Panel

General Specifications

MATERIAL SPECIFICATION

Standard linear panels have a castellated face plate. The extrusions combine outstanding aesthetic quality with excellent design flexibility as individual sections can be fastened together to form panels of virtually any width. A smooth surface extrusion is available as an option in 6" wide increments only.

The aluminum sections incorporate a tube saddle channel as an integral part of the profile. The tubing is seated into this channel and held in direct thermal contact with the extrusion. A nonhardening heat paste between the tubing and the aluminum face plate ensures even heat distribution to the active face providing overall thermal efficiency.

The individual panel sections are tongue-and-groove to provide a clean joint longitudinally. They are held together using a special clipping system.

DIMENSIONS AND WEIGHT

Linear panel assemblies can be provided in multiple lengths of up to 16 feet and widths in multiples of 5", 6", 8" up to 36". For wider panels, consult Sterling. An operating weight of 2 lb/ft² should be used when calculating the requirements for clamping and suspension components.

MATERIALS OF CONSTRUCTION

Pipework:	5/8" O.D. tubing
Panels:	Extruded aluminum sections with castellated design
Panel joint clips:	Cadmium or zinc-plated steel springs
Panel suspension clips:	Cadmium or zinc-plated steel springs.
Pipework clips:	Cadmium or zinc-plated steel springs.
Support channel:	Extruded aluminum 1-1/2" x 3/4" x 1/8" thick.
Paint finish:	Electrostatic acrylic powder paint applied with a minimum of 2 to 2.5 mils. Tested to ASTM D3359 crosshatch adhesion test.
Suspension system:	Standard t-bar or drywall installation. The panels can be suspended with or without a frame for custom applications.
Insulation:	As per consultant's specifications, usually a minimum of 1" thick foil backed batt insulation.

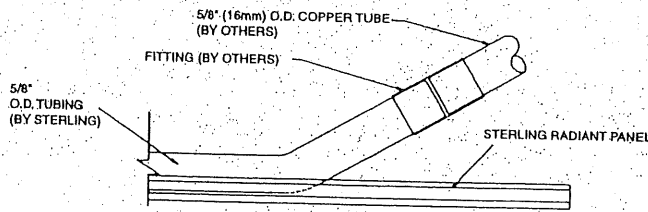
Factory Installed Insulation

Linear Radiant Panel

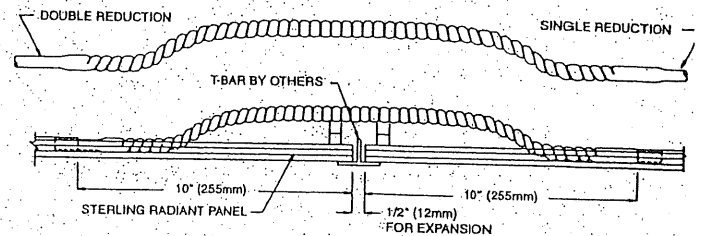


Piping & General Installation

COPPER CONNECTION DETAILS

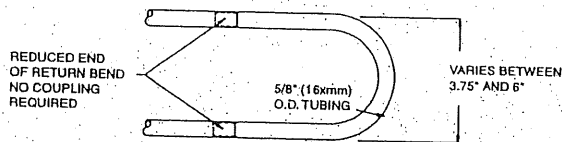


Typical Supply/Return Connection



Flexible Connection

Supplied by Sterling when panels are installed in series in the same room (field installed by others)

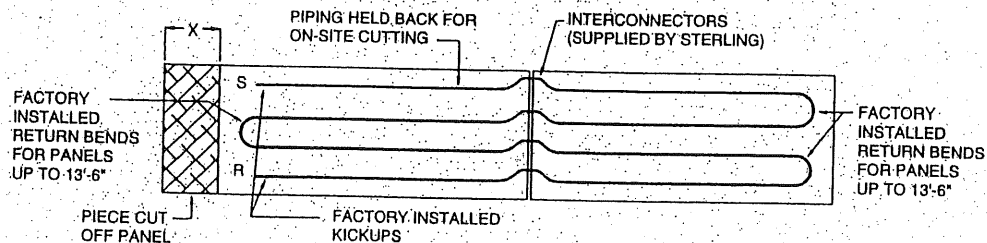


Sterling Return Bend

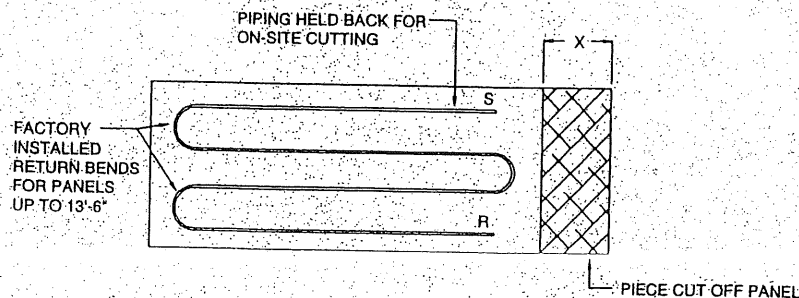
Supplied by Sterling (field installed by others)

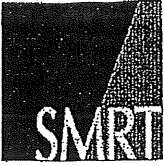
CUTTING INSTRUCTIONS

MULTI-PANEL INSTALLATION



SINGLE PANEL INSTALLATION





HVAC Hydronic
HEAT Exchanger

Submittal
Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 121-235700-1

Portland, ME 04103

Submittal Title: Heat Exchanger Resubmittal

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 10/13/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 # 121

Remarks:

RE-SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: N/A

SUPPLIER: Emerson Swan
222 Saint John Street
Portland, Maine 04102
Ted Edwards
Phone: 207-774-5578
Fax: 207-772-8253

SPECIFICATION SECTION: 235700

PARAGRAPH: Part 2 Products

DRAWINGS: M-602
Heat Exchanger Schedule

ITEM: HEAT EXCHANGERS

JOHNSON & JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed X

Subject to Architects Approval X

Date 10-5-09 By JLH

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

HEAT EXCHANGERS

MANUFACTURER: ALFA LAVAL

SUPPLIER: Emerson Swan
222 Saint John Street
Portland, Maine 04102
Contact: Ted Edwards
Phone: 207-774-5578
Fax: 207-772-8253

INSTALLER: Johnson & Jordan Mechanical Contractors
18 Mussey Road
Scarborough, Maine 04074
Lew Kershner
Phone: 207-883-8345
Fax: 207-883-8619

PLEASE NOTE***

Please find attached the completed substitution request form.

Please find attached a memo from Emerson Swan our supplier who was in contact with the Mechanical Engineer prior to bid day when the discussion was held regarding the performance, size and cost effectiveness of the specified heat exchanger. After that discussion Emerson Swan put their quote for the Alfa Laval plate & frame exchanger out to all contractors. The unit and price carried by Johnson & Jordan was for the Alfa Laval unit quoted as we understood it to be acceptable to the Engineer.

Please find attached the product submittal for the Alfa Laval heat exchanger.

MARTIN'S POINT HEALTH CARE
MEDICAL OFFICE BUILDING
PORTLAND, MAINE

ISSUED FOR CONSTRUCTION
MAY 8, 2009

SUBSTITUTION REQUEST FORM

Project: MARTIN'S POINT HEALTH CARE MOB Substitution Request Number: _____
To: SMART From: Johnson & Jordan Mechanical Contractors
Re: Martin's Point Health Care MOB Date: 9/28/09
heat exchanger

Specification Title: 23500 Description: HEAT EXCHANGERS
Section: 2.1 Page: 2 Article/Paragraph: Products

Proposed Substitution: ALFA LAVAL Plate & Frame for Taco shell & tube heat exchanger
Manufacturer: EMERSON SWAN Address: 222 St John St. Phone: 207-774-5578
Trade Name: ALFA LAVAL Model No. AQ2-MDFC TED EDWARDS

Attached data includes product description, specifications, drawings, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitutions will require for its proper installation.

The Undersigned certifies:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the Substitution as for the specified Product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waive claims for additional costs or time extension that may subsequently become apparent.
5. Will reimburse Owner and Architect/Engineer for review or redesign services associated with re-approval by authorities.

Submitted By: Lewis R. Kashner *In conjunction with supplier's mechanical Engineer.*
Signed By: James R. Wilson
Firm: Johnson & Jordan Mechanical Contractors
Address: 18 Mussel Rd. Scarborough, ME 04704
Telephone: 207-883-8345 Fax: 207-883-8619

A/Es REVIEW AND ACTION

- Submission approved - Make submittals in accordance with Specification Section 01330.
 Submission approved as noted - Make submittals in accordance with Specification Section 01330.
 Submission rejected - Use specified materials.
 Submission request received too late - Use specified materials.

Signed by: _____ Date: _____

Supporting Data Attached: Drawings Product Data Samples Tests Reports
 Other _____



October 1, 2009

Mr. Lew Kerschner
Johnson & Jordan
18 Mussey Road
Scarborough, ME 04074

RE: Martin's Point Healthcare- HX-1
Portland, ME

Dear Lew:

On April 10, 2009, I left Todd Chase a voicemail with my questions on the HX-1 heat exchanger. I indicated to Todd that the model specified was not large enough to do the conditions he had listed. I proposed quoting a more efficient Alfa Laval unit.

On April 13, 2009, I emailed to Todd Chase information on the HX-1 domestic water heat exchanger. This was again because the scheduled unit that was on the bid documents could not do the capacities listed. In the email I attached copies of a number of selections for the TACO shell and tube style showing the actual sizes required to do conditions and the Alfa Laval plate and frame style that would satisfy the capacities scheduled. All of the TACO selections were considerably larger than what was scheduled; they were so large in fact that I did not have pricing available and would have had to request special factory pricing. I noted that the suitable alternative was the Alfa Laval plate and frame heat exchanger. I also indicated budget pricing to Todd for the Alfa Laval unit.

It was my understanding that Todd was agreeable to the Alfa Laval plate and frame heat exchanger and indicated that the size listed on the bid documents

was likely to be revised after the bid. Therefore the Alfa Laval unit was the only pricing quoted to the bidding contractors.

Sincerely,

Kelly Sauberlich, P.E.
Emerson Swan
Engineered Products Division

Plate Heat Exchanger

Technical Specification

Customer : Johnson & Jordan
 Model : AQ2-MDFG
 Project: : Martins Point Healthcare
 Item : HX-1 500 MBH

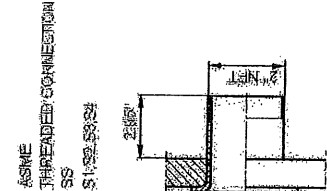
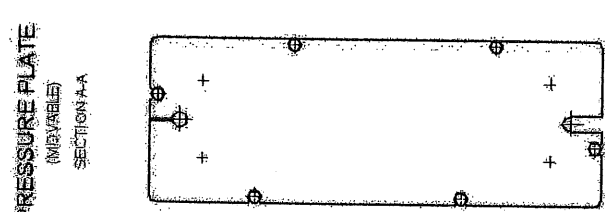
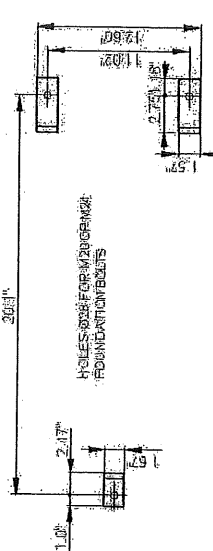
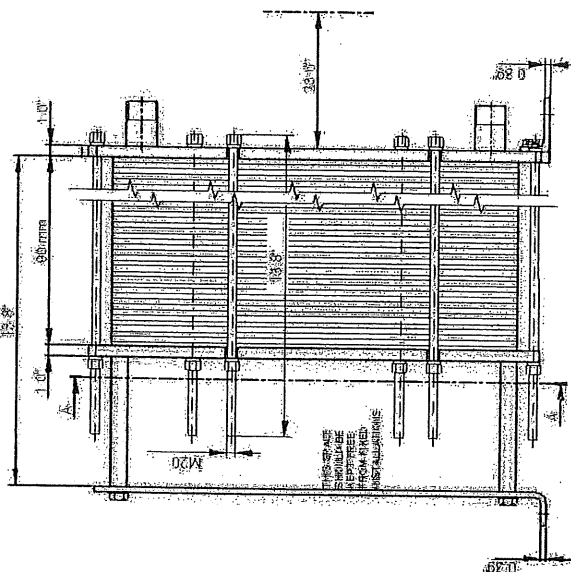
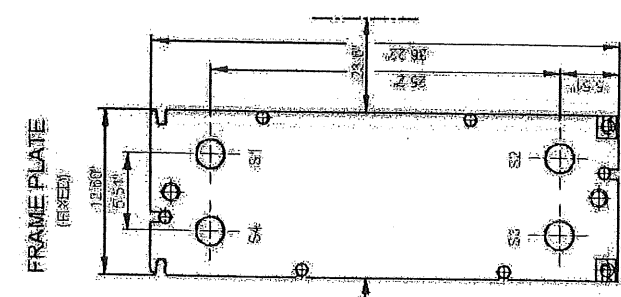
Date : 8/13/2009

		Hot Side	Cold side
Fluid		Water	Water
Density	lb/ft ³	61.98	62.37
Specific heat capacity	Btu/lb, °F	1.00	1.00
Thermal conductivity	Btu/ft, h, °F	0.360	0.343
Viscosity inlet	cP	0.614	0.981
Viscosity outlet	cP	0.860	1.42
Volume flow rate	GPM	34.0	40.0
Inlet temperature	°F	110.0	45.0
Outlet temperature	°F	80.1	70.0
Pressure drop	psi	0.971	1.62
Heat Exchanged	kBtu/h	502.4	
L.M.T.D.	°F	37.5	
O.H.T.C clean conditions	Btu/ft ² , h, °F	422.0	
O.H.T.C service	Btu/ft ² , h, °F	405.8	
Heat transfer area	ft ²	33.2	
Fouling resistance* 10000	ft ² , h, °F/Btu	0.94	
Duty margin	%	4.0	
Relative directions of fluids		Countercurrent	
Number of plates		24	
effective plates		22	
Number of passes		1	1
Extension capacity		2	
Plate material / thickness		ALLOY 316 / 0.75 mm	
Sealing material		NBRP CLIP-ON	NBRP CLIP-ON
Connection material		Stainless steel	Stainless steel
Connection diameter	in	2	2
Nozzle orientation		S1 -> S2	S4 <- S3
Pressure vessel code		ASME	
Flange rating		ASME	
Design pressure	psi	150.0	150.0
Test pressure	psi	195.0	195.0
Design temperature	°F	150.0	150.0
Overall length x width x height	in	23 x 13 x 36	
Liquid volume	ft ³	0.2	0.2
Net weight, empty / operating	lb	338 / 359	
Packed weight(BOX(OCEAN))	lb	382	
Internal volume	ft ³	9.7	
length x width x height	in	38 x 17 x 27	

Performance is conditioned on the accuracy of customers data and customers ability to supply equipment and products in conformity therewith.

Data, specifications, and other kind of information of technological nature set out in this document and submitted by Alfa Laval to you (Proprietary Information) are intellectual property rights of Alfa Laval. The Proprietary Information shall remain the exclusive property of Alfa Laval and shall only be used for the purpose of evaluating Alfa Laval's quotation. The Proprietary Information may not, without the written consent of Alfa Laval, be used or copied, reproduced, transmitted or communicated or disclosed in any other way to a third party.

Design constructed and stamped in accordance with 2007 ASME Code and Appendix 2-003.
 This is a general drawing. Additional parts, if required, like protection sheets, inspection covers, etc. are not displayed.



REMARKS:	SIDE 1	SIDE 2
DESIGN PRESSURE	150 psi	150 psi
TEST PRESSURE	195 psi	195 psi
MAX TEMPERATURE	150 °F	150 °F
MIN TEMPERATURE	32 °F	32 °F
MAWP	150 psi	150 psi
MDMT		

GASKET	NBRP CLIP-ON
PLATE MATERIAL	ALLOY 316
PLATE THICKNESS	0.75 mm
WEIGHT WITH WATER	369 lb
NETWEIGHT	338 lb

TOTAL LENGTH	23"
TOTAL WIDTH	12.6"
TOTAL HEIGHT	36.2"

INLET	TEMP.	OUTLET	TEMP.	FLOW RATE	PRESSURE DROP	LIQUID VOL.
S1	110.0 °F	S2	80.1 °F	34.0 GPM	0.9706 psi	0.1956 ft³
S3	45.0 °F	S4	70.0 °F	40.0 GPM	1.617 psi	0.1805 ft³

ALL DIMENSIONS IN INCHES

SIDE	MEDIA
1	Water
2	Water

SUPPLIER	REF.	ITEM NO.
AGENT / REF.		HX-1 500-MBH
CUSTOMER NAME / REF. NO.		
SIGN	RISK CATEGORY	
KELLY SAUBERLICH, P.E.	N/A	

PLATE HEAT EXCHANGER
AQ2-MDFG
 ASME

QUOTATION
 Martins Point Healthcare
 DATE 08/13/2009 REV NO. 0

HVAC Pumps



Submittal Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
Pizzagalli Construction
131 Presumpscot Street

Submittal #: 56-232123-1

Portland, ME 04103

Submittal Title: Hydronic Pumps

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site; information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

SMRT, Inc.

REVIEW DATE: 8/21/2009

BY: TAC

08139-12 #56

Remarks:

1. See attached re selections for HWP-7 and CHWP-1/CHWP-2.
2. Coordinate MPV's with change to HWP-7.

232123-4 2.4



Submittal Data Information

101-104

1400 Series High Capacity Circulators

Effective: July 23, 2007

Supersedes: October 13, 2005

Job: Martin's Point Engineer: SMRT, Inc. Contractor: Johnson & Jordan Rep: Emerson Swan

ITEM NO.	MODEL NO.	IMP. DIA.	G.P.M.	HEAD/FT.	H.P.	ELEC. CHAR.
HWP-1&2	1400-60		58	5	1/6	115/1/60

Materials of Construction

Casing: Cast Iron or Bronze
 Face Plate: Stainless Steel
 Motor Housing: Steel
 Impeller: 30% Glass-filled Noryl®
 Impeller Insert: Brass
 Shaft: Nu-tride® coated Solid Alloy Steel or Stainless Steel
 Mechanical Seal: Carbon/Silicon-Carbide
 Motor Bearings: Stainless Steel
 Permanently lubricated
 O-Ring/Flange Gaskets: EPDM

Pump Dimensions & Weights

Cast Iron Model	Bronze Model	A		B		C		D		E		F		Ship Wt.	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	Kg
1400-10	1400-10B	6-3/8	162	4-1/2	114	3-3/16	82	8-3/16	208	6-3/8	162	4	102	12	5.4
1400-20	1400-20B	6-3/8	162	4-1/2	114	3-3/16	82	8-5/8	220	6-7/8	175	4	102	12.5	5.7
1400-30	1400-30B	8-1/2	216	4-3/4	121	4-1/4	108	9-3/4	248	7-1/8	181	4	102	15	6.8
1400-40	1400-40B	8-1/2	216	4-3/4	121	4-1/4	108	9-3/4	248	7-1/8	181	4	102	15	6.8
1400-45	1400-45B	6-3/8	162	4-5/8	119	3-3/16	82	10-1/4	260	8-1/2	216	4	102	15.5	7
1400-50	1400-50B	6-3/8	162	4-5/8	119	3-3/16	82	10-1/4	260	8-1/2	216	4	102	16.5	7.5
1400-60	1400-60B	8-1/2	216	5-3/16	132	4-1/4	108	9-3/4	248	7-1/8	181	4	102	18.5	8.4
1400-70	1400-70B	8-1/2	216	5-1/2	140	4-1/4	108	11-1/4	285	8-3/4	222	4	102	23.5	10.7
1400-70/3	1400-70B/3	8-1/2	216	6-5/8	168	4-1/4	108	12	305	8-3/4	222	4	102	29.5	13.4

Model Nomenclature

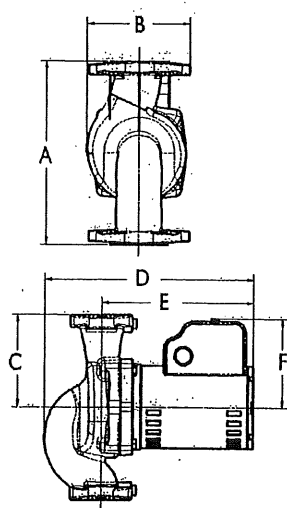
B - Bronze, Flanged
 Y - 230/60/1 Motor
 A - 220/50/1 Motor

Performance Data

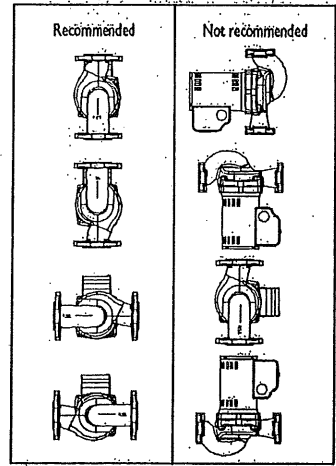
Flow Range: 0-147 GPM
 Head Range: 0-51 Feet
 Minimum Fluid Temp: 40°F (4°C)
 Maximum Fluid Temp: 225°F (107°C)
 Maximum Working Pressure: 150 psi



FOR INDOOR USE ONLY



Mounting Positions



Electrical Data

Model	Volts	Hz	Ph	Amps	RPM	HP
1400-10	115	60	1	1.5	3450	1/10
1400-20	115	60	1	2.0	3450	1/6
1400-30	115	60	1	2.0	3450	1/6
1400-40	115	60	1	2.0	3450	1/6
1400-45	115	60	1	3.2	3450	1/3
1400-60	115	60	1	2.0	3450	1/6
1400-70	115	60	1	5.0	3450	1/2

Motor Type: Open Drip Proof, Permanent Split Capacitor, Thermally Protected

Motor Options: 230/60/1, 220/50/1

1400 Series Companion Flange Sets

Models	Connection	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
1400-10/10B	Iron NPT	110-251F	110-252F	110-253F	110-254F	—	—	—
1400-20/20B	Bronze NPT	110-251BF	110-252BF	110-253BF	110-254BF	—	—	—
1400-45/45B	Bronze SWT	110-523BSF	110-524BSF	110-525BSF	110-526BSF	—	—	—
1400-50/50B	Shut-Off NPT	243-1	244-1	245-1	246-1	—	—	—
	Shut-Off SWT	243-2	244-2	245-2	246-2	—	—	—
1400-50/50B/2	Iron NPT	—	—	—	—	194-2124F	—	—
	Bronze NPT	—	—	—	—	194-2124BF	—	—
1400-30/30B	Iron NPT	—	—	194-1540F	194-1542F	—	—	—
1400-40/40B	Bronze NPT	—	—	194-1540BF	194-1542BF	—	—	—
	Shut-Off NPT	—	—	247-1	248-1	—	—	—
	Shut-Off SWT	—	—	247-2	248-2	—	—	—
1400-60/60B	Iron NPT	—	—	—	—	185-086B	—	—
1400-60/60B	Bronze NPT	—	—	—	—	185-086B	—	—
1400-70/70B	Iron NPT	—	—	—	—	—	185-112C	185-113C
1400-70/70B/3	Iron NPT	—	—	—	—	—	185-112B	185-113B
	Bronze NPT	—	—	—	—	—	185-112B	185-113B

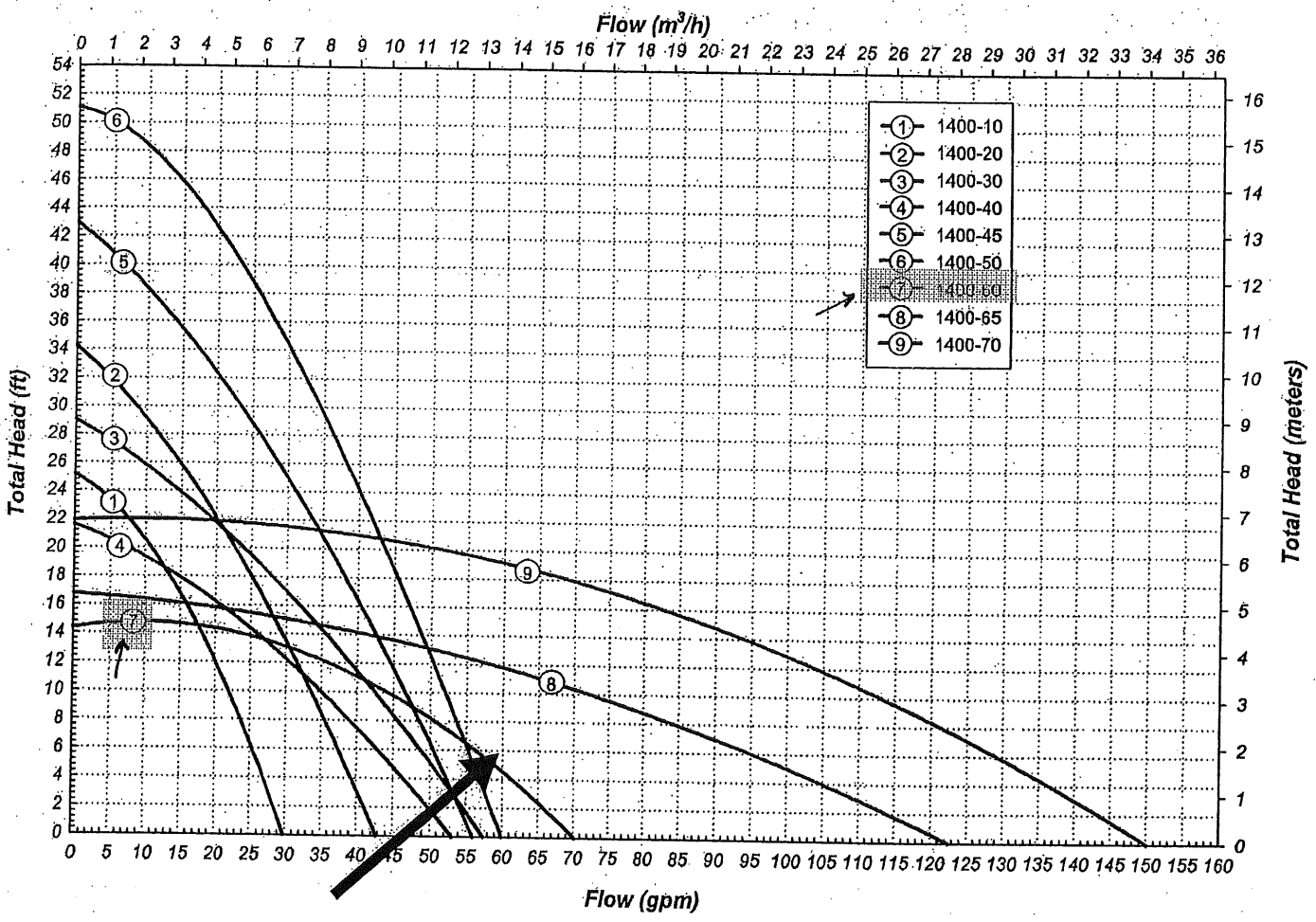
1 Noryl® is a registered trademark of General Electric Co.
 2 Nu-Tride® is a registered trademark of Kolese Corp.

Do it Once. Do it Right.®

TACO INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401) 942-8000 Fax: 942-2360
 TACO (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3 Telephone: (905) 564-9422 Fax: (905) 564-9436
 Visit our website at: www.taco-hvac.com

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 TACO, Inc.

Taco 1400 Series — High Capacity Circulators — 60Hz



87 # 35

SUPPLEMENTAL INSTRUCTION

AIA DOCUMENT G710

<input checked="" type="checkbox"/>	Owner: Ann Tucker, MPH	Email: ann.tucker@martinspoint.org
<input checked="" type="checkbox"/>	Owner's Rep: Paul Ureneck, Boulos Property Management	Email: pureneck@boulos.com
<input checked="" type="checkbox"/>	Architect: Scott L. Benson, SMRT	Email: sbenson@smrtinc.com
<input checked="" type="checkbox"/>	Consultant: Dwight Anderson, Deluca-Hoffman Assocs.	Email: danderson@delucahoffman.com
<input checked="" type="checkbox"/>	Contractor: Garret Bertolini, Pizzagalli Construction Co.	Email: gbertolini@pizzagalli.com
<input checked="" type="checkbox"/>	Other: JLH, MLE, LW, File 08139/44.1	

PROJECT:
Martin's Point Health Care
Medical Office Building

**SUPPLEMENTAL
INSTRUCTION NO: 035**

OWNER: Ann Tucker
Martin's Point Health Care
331 Veranda Street
Portland, ME 04104

DATE OF ISSUANCE: November 23, 2009

TO: Garret Bertolini
Pizzagalli Construction Co.
131 Presumpscot Street
Portland, ME 04103

ARCHITECT: SMRT, Inc.
144 Fore Street, PO Box 618
Portland, ME 04104-0618

CONTRACT FOR:
Construction

A/E PROJECT NO: 08139

CONTRACT DATED:

REFERENCES CONTRACTOR'S RFI NO.
(if applicable)

The work shall be carried out in accordance with the following information, which is issued as a clarification or interpretation of the contract documents. This is not a direction to proceed with work which modifies the Contract Sum or Contract Time. Proceeding with the Work in accordance with this supplemental instruction indicates your acknowledgement that there is no change in Contract Sum or Contract Time.

Description:


Relocate AHU branch take-offs from the main and upsize the piping upstream of the AHU branch piping from 2" to a 2-1/2", maintaining the 2" HWS/R for the rest of the loop.

Provide and install the maximum impeller size in hot water heating pumps HWP-3 and HWP-4. A motor change is not required.

Reason:

Attachments:
Sketches M-1, M-2, M-3, M-4

ISSUED BY:
SMRT, INC.


Architect/Engineer

11-25-09
Date

232123-3 2,2



Submittal Data Information

KV Series Vertical Close Coupled Pumps

301-1097T

MODEL 1507

1760 RPM

JOB: Martin's Point

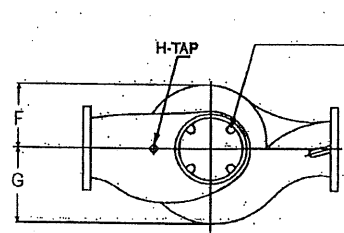
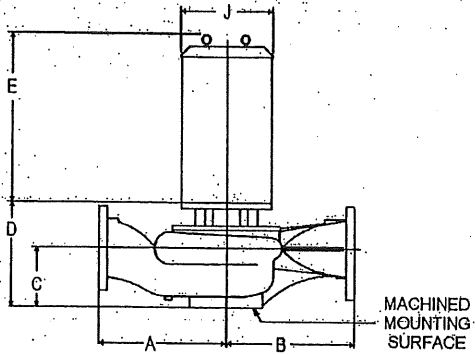
CONTRACTOR: Johnson & Jordan

ENGINEER: SMRT, Inc.

REP: Emerson Swan

COMMENTS: Prem Eff ODP

ITEM NO.	MODEL NO.	IMP. DIAM. / IN.	FLOW / GPM	HEAD / FT	POWER / HP	ELEC. CHARS
HWP-3&4	KV1507	6.7	58	40	2	460/3/60

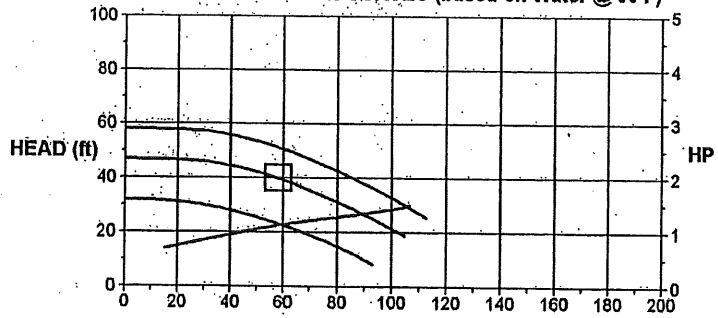


TWO 3/8 - 16 UNC
THREADED MOUNTING
HOLES ON A 1.75"
BOLT CIRCLE

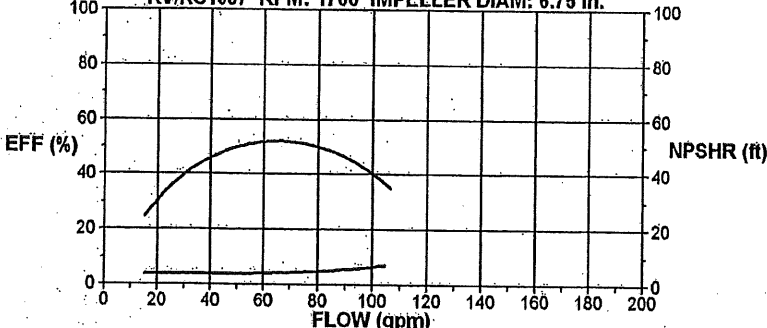
* Dimensions in inches. Do not use for construction purposes unless certified.

CONN.	HP	FRAME	Flange Size ASA	860 kPa Flange		C	D	E	F	G	H	J
				A	B							
1.5x1.5	2	145JM	1.50	8	8	4.13	8.42	13.43	4.88	5.16	.25	6.62

PUMP PERFORMANCE CURVES (based on Water @ 60 F)



KV/KS1507 RPM: 1760 IMPELLER DIAM: 6.75 in.



Item	BRONZE FITTED	
	Standard	Optional
Casing	Cast Iron ASTM A48 Class 30A	
Impeller	Bronze ASTM B584-836	CF
Wear Ring	None	
Shaft	Carbon Steel	
Shaft Sleeve	Bronze ASTM B584-932 SAE660	
Mech. Seal	Ceramic EPT	
Seal Flush Line	Copper	CF

	OPERATING SPECIFICATIONS		
	Standard	Optional	
Flange	125# 860K	250# 1720	
Pressure	175 PSIG	300 PSIG	CF
	1210 KPA	2070 KPA	CF
Temperature	250F 120C	250F 120C	CF

CF - Consult Factory

Do it once. Do it right.

TACO, INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401)942-8000 FAX: (401)942-2360.
TACO (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3. Telephone: 905/564-9422. FAX: 905/564-9436

HWP-384

8/17/2009

TACO, Inc.

TacoNet Pump Selection, version 7.03

Job Name: Martin's Point

Company:

Customer: Johnson & Jordan

Engineer: SMRT, Inc.

Representative: Emerson Swan

Salesman:

**** INPUT PARAMETERS ****

Single Pump System

Fluid Type: Water @ 60 F

Min. Pump Eff.: 0

Motor RPM: 1760

Pump Types: KV

Design Point:

System Flow Rate: 58(gpm)

Head: 40(ft)

**** SELECTION RESULTS ****

Pump 1

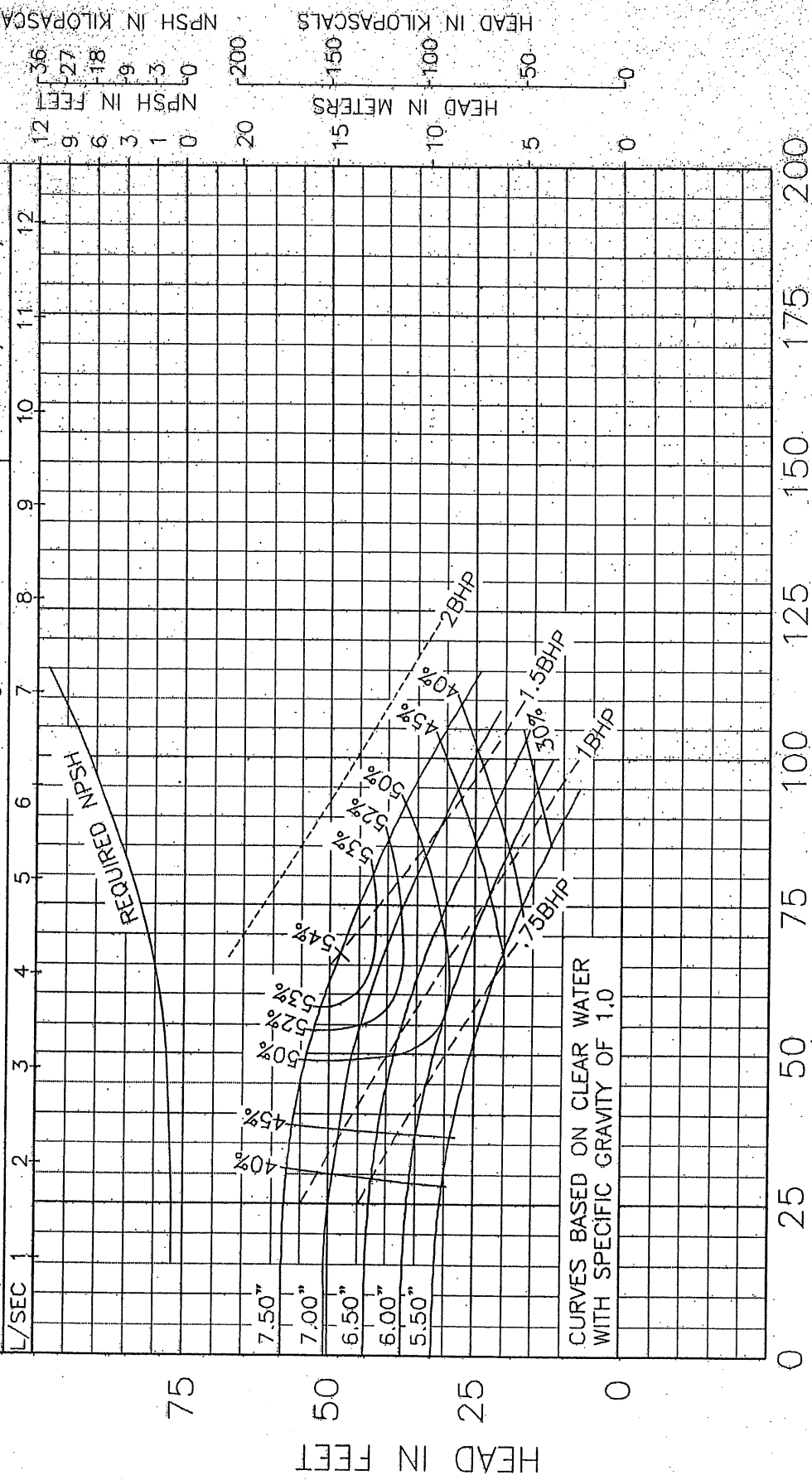
-Model	Imp.Dia.	NPSH(ft)	RPM	Eff%	HP	NOL HP	Suct/Disch
KV/KS1507	6.7	4	1760	52	1.14	1.58	1 1/2 x 1 1/2



Model 1507
KV & KS Series

1760 RPM
August 31, 2006

Curve no. 1973
Min. Imp. Dia. 5.50
Size 1 1/2 x 1 1/2 x 7



FLOW IN GALLONS PER MINUTE

CURVES BASED ON CLEAR WATER
WITH SPECIFIC GRAVITY OF 1.0

232123-4 2.5



Submittal Data Information

Plus Two Multi-Purpose Valve

301-235

SUPERSEDES: November 30, 2007

EFFECTIVE: September 1, 2008

JOB Martin's Point ENGINEER SMRT, Inc. CONTRACTOR Johnson & Jordan APP. Emerson Swan

ITEM	QUANTITY	MODEL NO.	SIZE
for HWP-3&4	2 3 2	MPV-015	1.5"
for HPW-5,6,7		MPV030	3"
for CHWP-1&2		MPV-030	3"

DIMENSIONS

Model Number	Size	Connection	A	B (Class 125*)	B (Class 250*)	C	D	E	F	Cv	Weight (125#)	Weight (250#)
MPV 015-4	1½ (38.1) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	69	12 (5.5)	12 (5.5)
MPV 020-4	2 (50.8) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	69	12 (5.5)	12 (5.5)
MPV 025-4	2½ (63.5) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	69	12 (5.5)	12 (5.5)
MPV 030-4*	3 (76.2)	Flanged	11.75 (298)	3.75 (095)	3.75 (095)	6.15 (156)	3.90 (099)	7.85 (199)	1.8 (45.7)	209	38 (17)	46 (21)
MPV 040-4	4 (101.6)	Flanged	11.75 (298)	3.75 (095)	3.75 (095)	6.15 (156)	3.90 (099)	7.85 (199)	1.8 (45.7)	209	38 (17)	46 (21)
MPV 050-4*	5 (127.0)	Flanged	17.63 (448)	5.00 (127)	5.50 (140)	11.26 (286)	5.25 (133)	12.28 (312)	2.4 (61.0)	459	105 (48)	126 (57)
MPV 060-4*	6 (152.4)	Flanged	20.35 (517)	5.50 (140)	6.25 (159)	11.28 (287)	6.07 (154)	14.23 (361)	2.7 (68.6)	701	134 (61)	176 (80)
MPV 080-4*	8 (203.2)	Flanged	25.88 (657)	6.75 (171)	7.50 (191)	13.58 (345)	6.75 (171)	19.13 (486)	3.9 (99.1)	1200	293 (133)	341 (155)
MPV 100-4*	10 (254.0)	Flanged	30.00 (762)	8.00 (203)	8.75 (222)	15.82 (402)	8.81 (224)	21.20 (538)	4.4 (111.8)	1826	466 (212)	536 (243)
MPV 120-4*	12 (304.8)	Flanged	36.70 (932)	9.50 (241)	10.25 (260)	17.54 (446)	9.98 (253)	26.64 (677)	4.9 (124.5)	2430	724 (329)	811 (368)
MPV 140-4*	14 (355.6)	Flanged	41.56 (1056)	10.50 (267)	11.50 (292)	22.80 (579)	12.09 (307)	29.47 (749)	5.4 (137.2)	3147	1105 (502)	1182 (537)

NOTE: Dimensions are in inches. Metric dimensions are in millimeters and are in parentheses (). Weights are in lb (kg). 'F' is the distance required to replace packing under pressure. 'A,C,D,E,F' applies to Class 250* flanged units also.

* Append 'A' for Class 250* working pressure flanged units (e.g. Model Number MPV 030-4A).

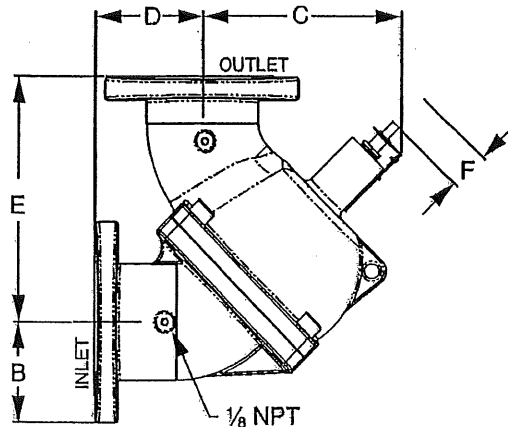
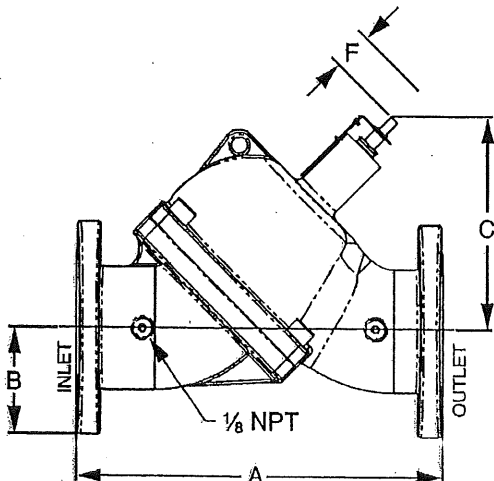
FEATURES

- Horizontal or Vertical Installation
- Field Convertible to a Right Angle Valve
- Stem Seal Packing (replaceable under pressure)
- Bronze Fitted Construction
- Memory Indicator, Pointer and Scale
- Shrader Valve Metering Connections
- "O" Ring Sealed Valve Body
- Replaceable "Soft Seal"
- Low Pressure Drop (equal to or better than any comparable valve on the market today)
- Five (5) Valves in One:
 - Shut Off Valve
 - Flow Control Valve (globe style)
 - Non Slam Check Valve
 - Flow Metering Valve
 - Straight Pattern Valve Convertible to a Right Angle Pattern Valve
- Available with Class 125* flanges or Class 250* flanges. Consult pressure/temperature chart on page 2 for operating limitations. (Flanged units are raised faced design.)
- Available with Flanged or Grooved End Connections

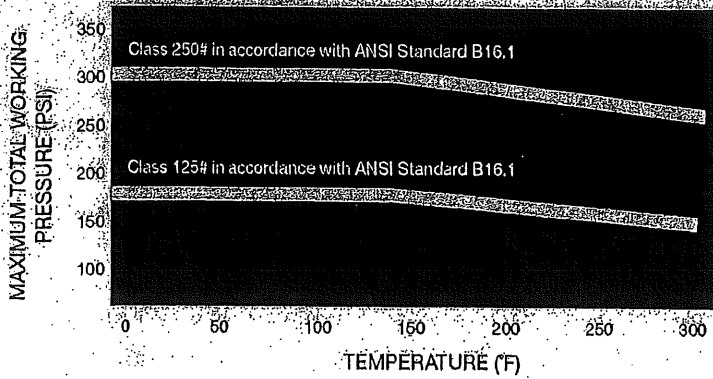
MATERIALS OF CONSTRUCTION

- Body - Ductile Iron
- Spring - Stainless Steel (302)
- Gland - Bronze
- Stem Packing - Teflon Impregnated Aramid Fiber (asbestos free)
- Stem - Bronze/Stainless Steel (416)
- Seat - EPDM
- Seat Disc - Bronze
- Body O-Ring - EPDM

(All sizes available with optional DIN flanges. Consult Factory for details.)



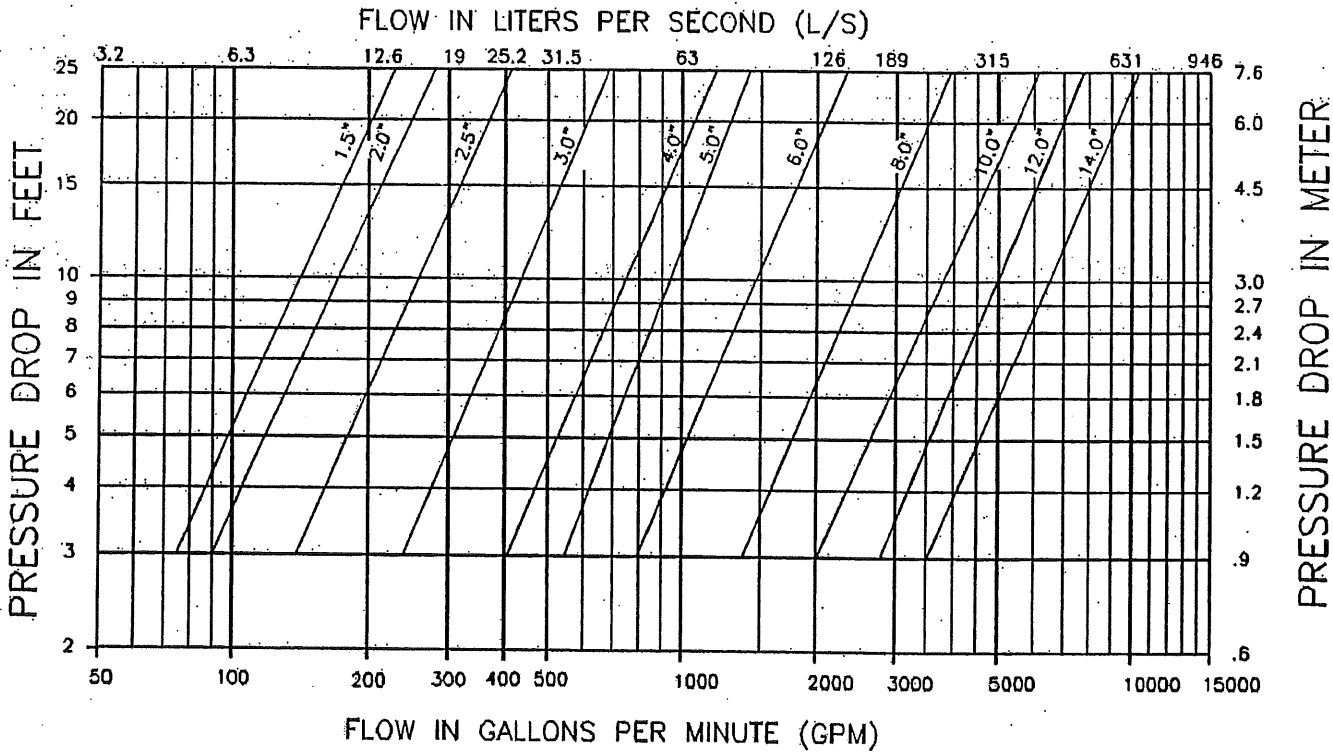
PRESSURE TEMPERATURE RATINGS



OPERATING SPECIFICATIONS

	Standard	Optional
Flange	Class 125*	Class 250*
Pressure	175 PSIG* (1210 KPA)	300 PSIG* (2070 KPA)
Temperature	250°F (120°C**)	250°F (120°C**)

* Per Pressure Temperature Ratings chart to left.



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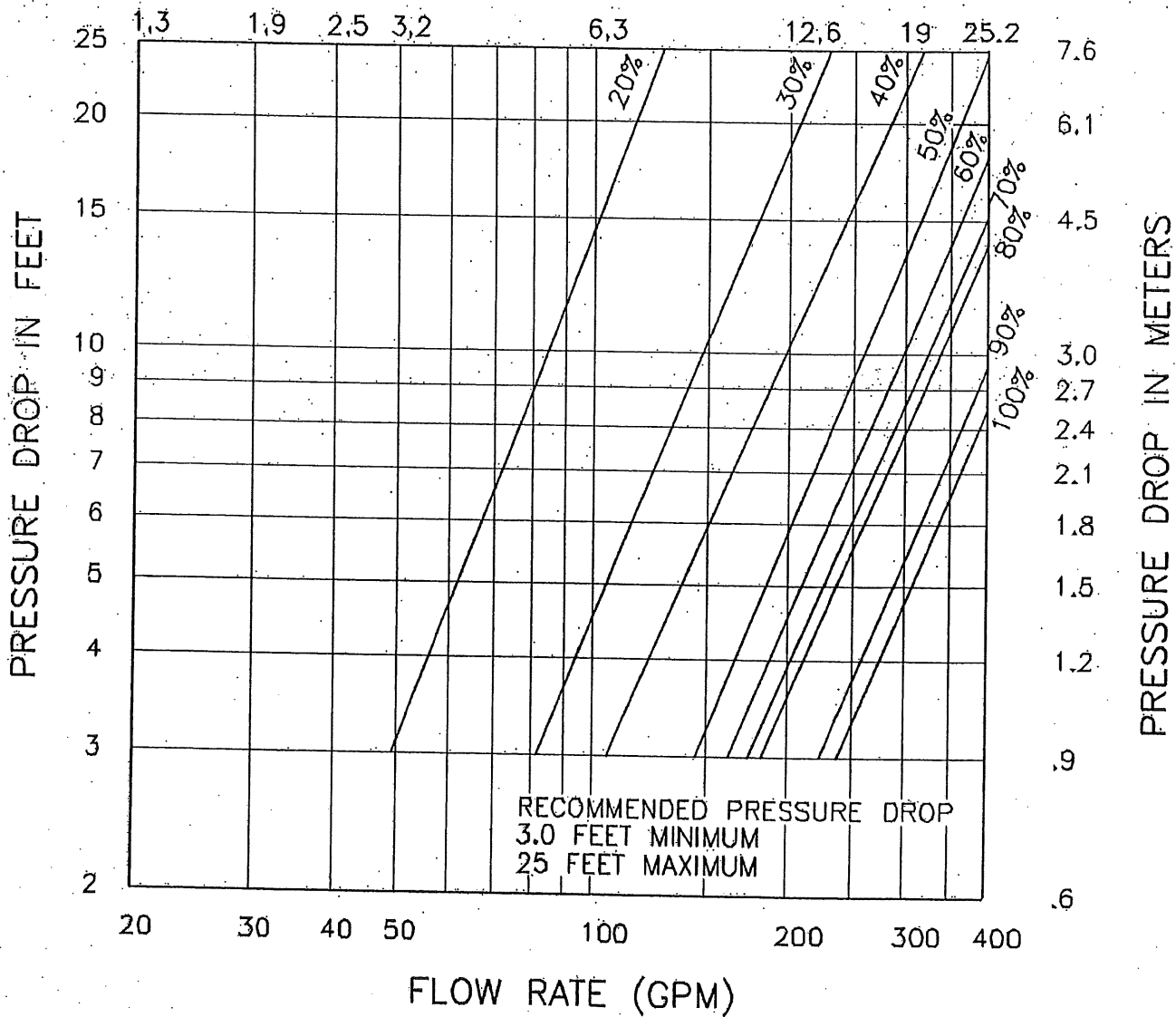
TACO, INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401) 942-8000 FAX: (401) 942-2360.
 TACO (Canada), Ltd., 6120 Ordan Drive, Mississauga, Ontario L5T 2B3. Telephone: 905/564-9422. FAX: 905/564-9436.

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3 INCH MPV STRAIGHT & RIGHT ANGLE
INDICATED DATA FOR SYSTEM BALANCING

FLOW RATE (L/S)



232123-4 2.4



Submittal Data Information

101-104

1400 Series High Capacity Circulators

Effective: July 23, 2007

Supersedes: October 13, 2005

Job: Martin's Point Engineer: SMRT, Inc. Contractor: Johnson & Jordan Rep: Emerson Swan

ITEM NO.	MODEL NO.	IMP. DIA.	G.P.M.	HEAD/FT.	H.P.	ELEC. CHAR.
HWP-5 & 6	1400-60		46/37	5	1/6	115/1/60

Materials of Construction

Casing: Cast Iron or Bronze
 Face Plate: Stainless Steel
 Motor Housing: Steel
 Impeller: 30% Glass-filled Noryl®
 Impeller Insert: Brass
 Shaft: Nu-tride® coated Solid Alloy Steel or Stainless Steel
 Mechanical Seal: Carbon/Silicon-Carbide
 Motor Bearings: Stainless Steel
 Permanently lubricated
 O-Ring/Flange Gaskets: EPDM

Pump Dimensions & Weights

Cast Iron Model	Bronze Model	A		B		C		D		E		F		Ship Wt.	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	Kg.
1400-10	1400-10B	6-3/8	162	4-1/2	114	3-3/16	82	8-3/16	208	6-3/8	162	4	102	12	5.4
1400-20	1400-20B	6-3/8	162	4-1/2	114	3-3/16	82	8-5/8	220	6-7/8	175	4	102	12.5	5.7
1400-30	1400-30B	8-1/2	216	4-3/4	121	4-1/4	108	9-3/4	248	7-1/8	181	4	102	15	6.8
1400-40	1400-40B	8-1/2	216	4-3/4	121	4-1/4	108	9-3/4	248	7-1/8	181	4	102	15	6.8
1400-45	1400-45B	6-3/8	162	4-5/8	119	3-3/16	82	10-1/4	260	8-1/2	216	4	102	15.5	7
1400-50	1400-50B	6-3/8	162	4-5/8	119	3-3/16	82	10-1/4	260	8-1/2	216	4	102	16.5	7.5
1400-60	1400-60B	8-1/2	216	5-3/16	132	4-1/4	108	9-3/4	248	7-1/8	181	4	102	18.5	8.4
1400-70	1400-70B	8-1/2	216	5-1/2	140	4-1/4	108	11-1/4	285	8-3/4	222	4	102	23.5	10.7
1400-70/3	1400-70B/3	8-1/2	216	6-5/8	168	4-1/4	108	12	305	8-3/4	222	4	102	29.5	13.4

Model Nomenclature

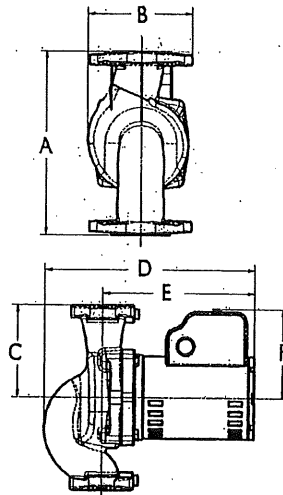
B - Bronze, Flanged
 Y - 230/60/1 Motor
 A - 220/50/1 Motor

Performance Data

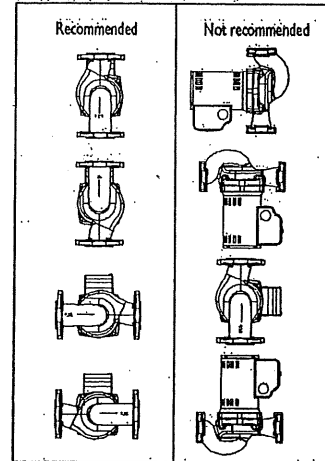
Flow Range: 0-147 GPM
 Head Range: 0-51 Feet
 Minimum Fluid Temp: 40°F (4°C)
 Maximum Fluid Temp: 225°F (107°C)
 Maximum Working Pressure: 150 psi



FOR INDOOR USE ONLY



Mounting Positions



Electrical Data

Model	Volts	Hz	Ph	Amps	RPM	HP
1400-10	115	60	1	1.5	3450	1/10
1400-20	115	60	1	2.0	3450	1/6
1400-30	115	60	1	2.0	3450	1/6
1400-40	115	60	1	2.0	3450	1/6
1400-45	115	60	1	3.2	3450	1/3
1400-60	115	60	1	2.0	3450	1/6
1400-70	115	60	1	5.0	3450	1/2
Motor Type	Open Drip Proof, Permanent Split Capacitor, Thermally Protected					
Motor Options	230/60/1, 220/50/1					

1400 Series Companion Flange Sets

Models	Connection	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
1400-10/10B	Iron NPT	110-251F	110-252F	110-253F	110-254F	—	—	—
1400-20/20B	Bronze NPT	110-251BF	110-252BF	110-253BF	110-254BF	—	—	—
1400-45/45B	Bronze SWT	110-523BSF	110-524BSF	110-525BSF	110-526BSF	—	—	—
1400-50/50B	Shut-Off NPT	243-1	244-1	245-1	246-1	—	—	—
	Shut-Off SWT	243-2	244-2	245-2	246-2	—	—	—
1400-50/50B/2	Iron NPT	—	—	—	—	194-2124F	—	—
2", 2 bolt	Bronze NPT	—	—	—	—	194-2124BF	—	—
1400-30/30B	Iron NPT	—	—	194-1540F	194-1542F	—	—	—
1400-40/40B	Bronze NPT	—	—	194-1540BF	194-1542BF	—	—	—
	Shut-Off NPT	—	—	247-1	248-1	—	—	—
	Shut-Off SWT	—	—	247-2	248-2	—	—	—
1400-60/60B	Iron NPT	—	—	—	—	185-086B	—	—
1400-65/65B	Bronze NPT	—	—	—	—	185-086B	—	—
1400-70/70B	Iron NPT	—	—	—	—	—	185-112C	185-113C
3", 4 bolt	Bronze NPT	—	—	—	—	—	185-112B	185-113B

1 Noryl® is a registered trademark of General Electric Co.

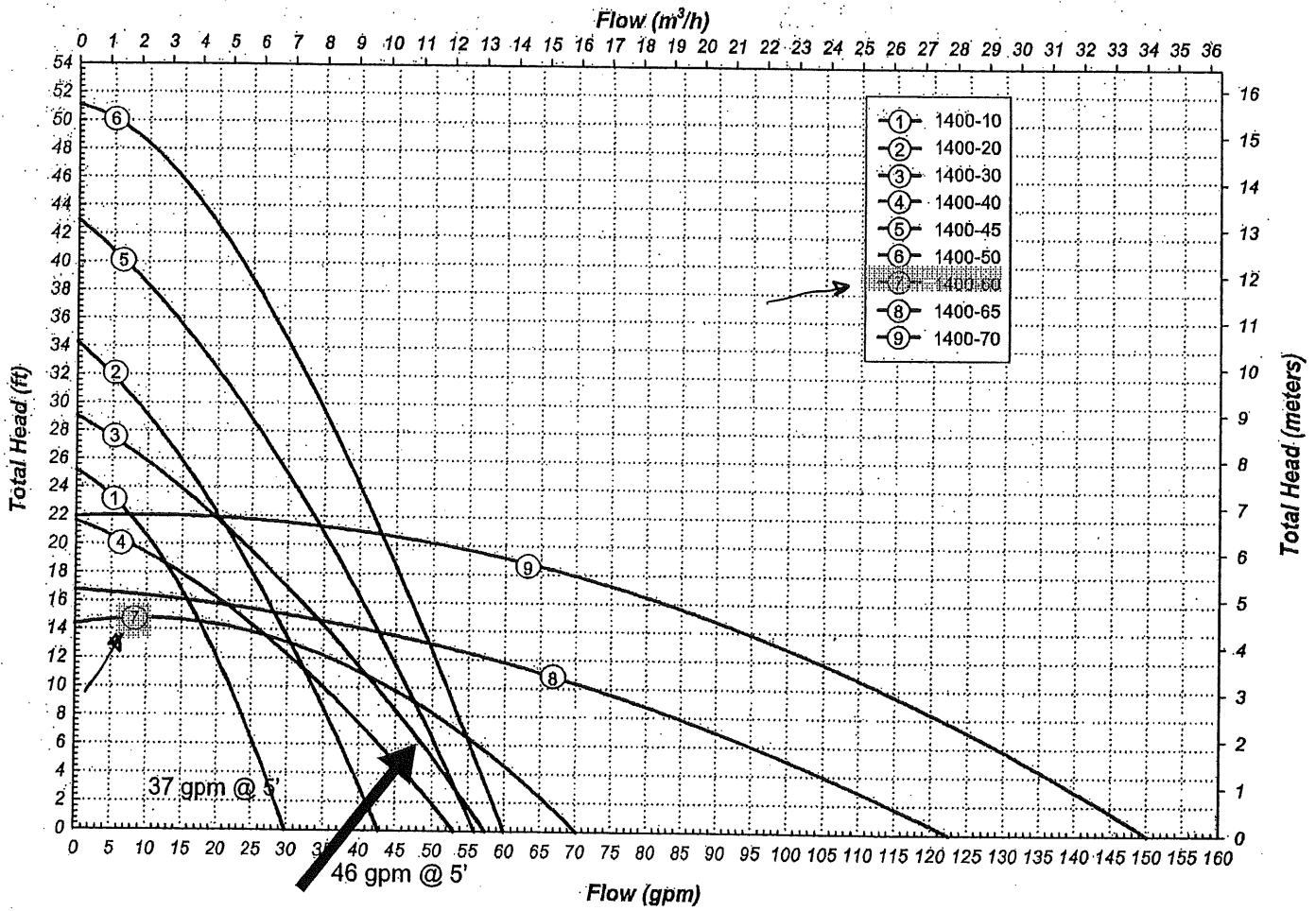
2 Nu-Tride® is a registered trademark of Koleria Corp.

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Taco 1400 Series — High Capacity Circulators — 60Hz



232123-4 2.5



Submittal Data Information

Plus Two Multi-Purpose Valve

301-235

SUPERSEDES: November 30, 2007

EFFECTIVE: September 1, 2008

JOB Martin's Point ENGINEER SMRT, Inc. CONTRACTOR Johnson & Jordan APP. Emerson Swan

ITEM	QUANTITY	MODEL NO.	SIZE
for HWP-3&4	2 3 2	MPV-015	1.5"
for HPW-5,6,7		MPV030	3"
for CHWP-1&2		MPV-030	3"

DIMENSIONS

Model Number	Size	Connection	A	B (Class 125*)	B (Class 250*)	C	D	E	F	Cv	Weight (125#)	Weight (250#)
MPV 015-4	1 1/2 (38.1) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	69	12 (5.5)	12 (5.5)
MPV 020-4	2 (50.8) NPT	Threaded	10.00 (254)	1.75 (044)	1.75 (044)	5.70 (145)	2.89 (073)	6.64 (168)	1.6 (40.6)	117	16 (7.2)	16 (7.2)
MPV 025-4	2 1/2 (63.5) NPT	Threaded	11.75 (298)	2.06 (052)	2.06 (052)	6.70 (170)	3.39 (086)	7.54 (191)	1.9 (48.3)	175	20 (9.1)	20 (9.1)
MPV 030-4*	3 (76.2)	Flanged	11.75 (298)	3.75 (095)	3.75 (095)	6.15 (156)	3.90 (099)	7.85 (199)	1.8 (45.7)	209	38 (17)	46 (21)
MPV 050-4*	5 (127.0)	Flanged	17.63 (448)	5.00 (127)	5.50 (140)	11.26 (286)	5.25 (133)	12.28 (312)	2.4 (61.0)	459	105 (48)	126 (57)
MPV 060-4*	6 (152.4)	Flanged	20.35 (517)	5.50 (140)	6.25 (159)	11.28 (287)	6.07 (154)	14.23 (361)	2.7 (68.6)	701	134 (61)	176 (80)
MPV 080-4*	8 (203.2)	Flanged	25.88 (657)	6.75 (171)	7.50 (191)	13.58 (345)	6.75 (171)	19.13 (486)	3.9 (99.1)	1200	293 (133)	341 (155)
MPV 100-4*	10 (254.0)	Flanged	30.00 (762)	8.00 (203)	8.75 (222)	15.82 (402)	8.81 (224)	21.20 (538)	4.4 (111.8)	1826	466 (212)	536 (243)
MPV 120-4*	12 (304.8)	Flanged	36.70 (932)	9.50 (241)	10.25 (260)	17.54 (446)	9.98 (253)	26.64 (677)	4.9 (124.5)	2430	724 (329)	811 (368)
MPV 140-4*	14 (355.6)	Flanged	41.56 (1056)	10.50 (267)	11.50 (292)	22.80 (579)	12.09 (307)	29.47 (749)	5.4 (137.2)	3147	1105 (502)	1182 (537)

NOTE: Dimensions are in inches. Metric dimensions are in millimeters and are in parentheses (). Weights are in lb (kg). 'F' is the distance required to replace packing under pressure. 'A,C,D,E,F' applies to Class 250* flanged units also.

* Append 'A' for Class 250* working pressure flanged units (e.g. Model Number MPV 030-4A).

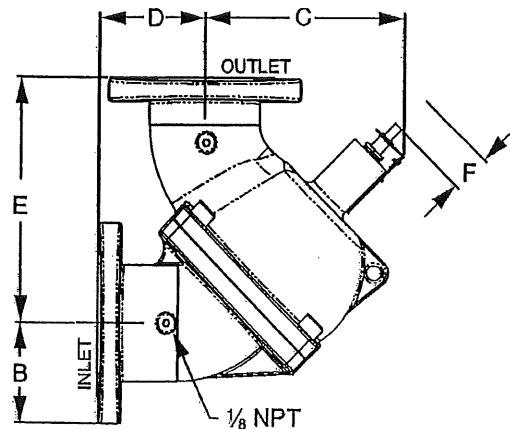
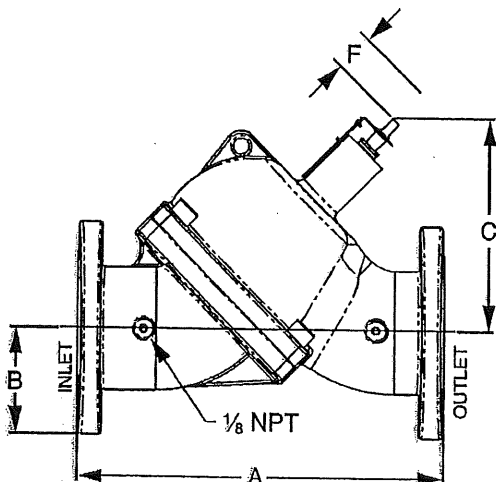
FEATURES

- Horizontal or Vertical Installation
- Field Convertible to a Right Angle Valve
- Stem Seal Packing (replaceable under pressure)
- Bronze Fitted Construction
- Memory Indicator, Pointer and Scale
- Shrader Valve Metering Connections
- "O" Ring Sealed Valve Body
- Replaceable "Soft Seal"
- Low Pressure Drop (equal to or better than any comparable valve on the market today)
- Five (5) Valves in One:
 - Shut Off Valve
 - Flow Control Valve (globe style)
 - Non Slam Check Valve
 - Flow Metering Valve
 - Straight Pattern Valve Convertible to a Right Angle Pattern Valve
- Available with Class 125* flanges or Class 250* flanges. Consult pressure/temperature chart on page 2 for operating limitations. (Flanged units are raised faced design.)
- Available with Flanged or Grooved End Connections

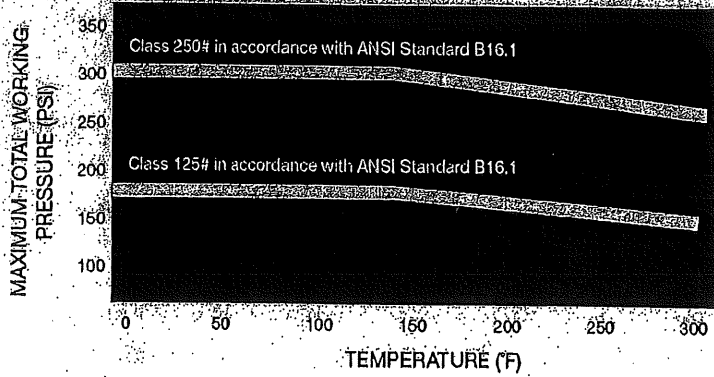
MATERIALS OF CONSTRUCTION

- Body - Ductile Iron
- Spring - Stainless Steel (302)
- Gland - Bronze
- Stem Packing - Teflon Impregnated Aramid Fiber (asbestos free)
- Stem - Bronze/Stainless Steel (416)
- Seat - EPDM
- Seat Disc - Bronze
- Body O-Ring - EPDM

(All sizes available with optional DIN flanges. Consult Factory for details.)



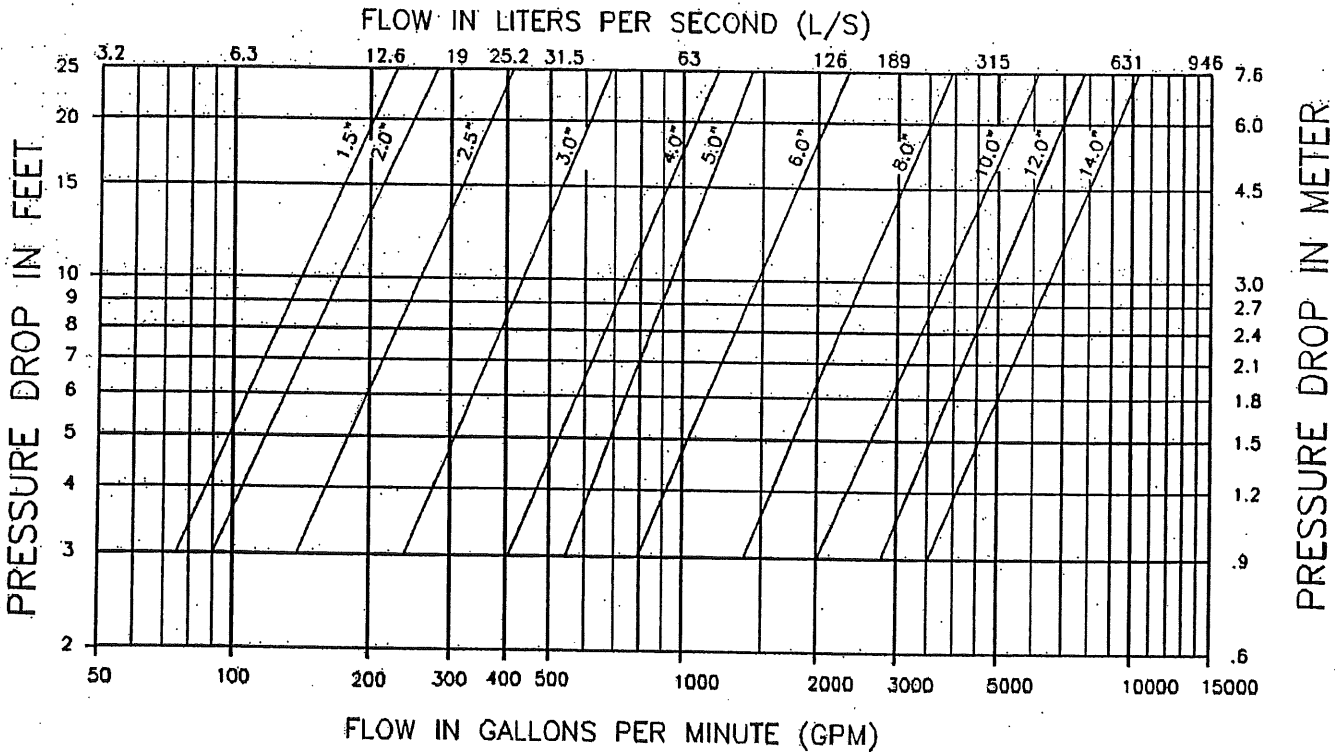
PRESSURE TEMPERATURE RATINGS



OPERATING SPECIFICATIONS

	Standard	Optional
Flange	Class 125*	Class 250*
Pressure	175 PSIG* (1210 KPA)	300 PSIG* (2070 KPA)
Temperature	250°F (120°C**)	250°F (120°C**)

* Per Pressure Temperature Ratings chart to left.



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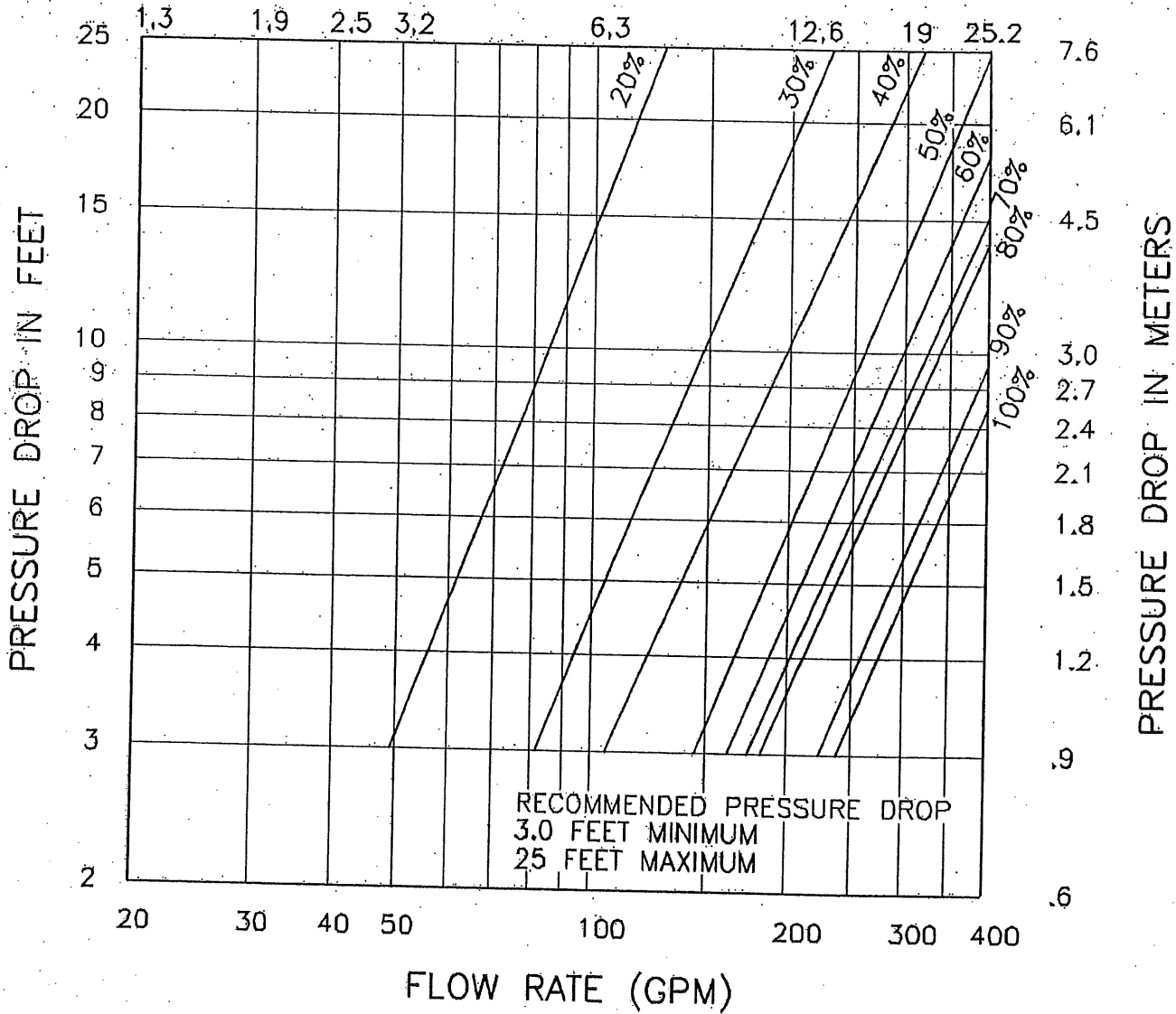
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3 INCH MPV STRAIGHT & RIGHT ANGLE
INDICATED DATA FOR SYSTEM BALANCING

FLOW RATE (L/S)



HWP-7 REVISED



Submittal Data Information

101-104

1400 Series High Capacity Circulators

Effective: July 23, 2007

Supersedes: October 13, 2005

Job: Marlin's Point Engineer: SMRT, Inc. Contractor: Johnson & Jordan Rep: Emerson Swan

ITEM NO.	MODEL NO.	IMP. DIA.	G.P.M.	HEAD/FT.	H.P.	ELEC. CHAR.
HWP-7 REVISED	1400-30		34	10	1/6	115/1/60

Materials of Construction

Casing: Cast Iron ~~or Bronze~~
 Face Plate: Stainless Steel
 Motor Housing: Steel
 Impeller: 30% Glass-filled Noryl®
 Impeller Insert: Brass
 Shaft: Nu-Tride® coated Solid Alloy Steel or Stainless Steel
 Mechanical Seal: Carbon/Silicon-Carbide
 Motor Bearings: Stainless Steel
 Permanently lubricated
 O-Ring/Flange Gaskets: EPDM

Pump Dimensions & Weights

Cast Iron Model	Bronze Model	A		B		C		D		E		F		Ship Wt.	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	Kg
1400-10	1400-10B	6-3/8	162	4-1/2	114	3-3/16	82	8-3/16	208	6-3/8	162	4	102	12	5.4
1400-30	1400-30B	8-1/2	216	4-3/4	121	4-1/8	108	9-3/4	248	7-1/8	181	4	102	15	6.8
1400-45	1400-45B	6-3/8	162	4-5/8	119	3-3/16	82	10-1/4	260	8-1/2	216	4	102	15.5	7
1400-50	1400-50B	6-3/8	162	4-5/8	119	3-3/16	82	10-1/4	260	8-1/2	216	4	102	16.5	7.5
1400-50/2	1400-50B/2	6-3/8	162	5-1/4	133	3-3/16	82	10-1/4	260	8-1/2	216	4	102	17	7.7
1400-60	1400-60B	8-1/2	216	5-3/16	132	4-1/8	108	9-3/4	248	7-1/8	181	4	102	18.5	8.4
1400-65	1400-65B	8-1/2	216	5-1/2	140	4-1/4	108	11-1/4	285	8-3/4	222	4	102	22.5	10.2
1400-70	1400-70B	8-1/2	216	5-1/2	140	4-1/4	108	11-1/4	285	8-3/4	222	4	102	23.5	10.7
1400-70/3	1400-70B/3	8-1/2	216	6-5/8	168	4-1/8	108	12	305	8-3/4	222	4	102	29.5	13.4

Model Nomenclature

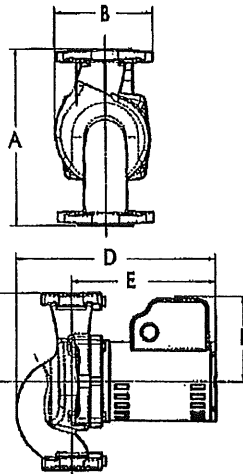
B - Bronze, Flanged
 Y - 230/60/1 Motor
 A - 220/50/1 Motor

Performance Data

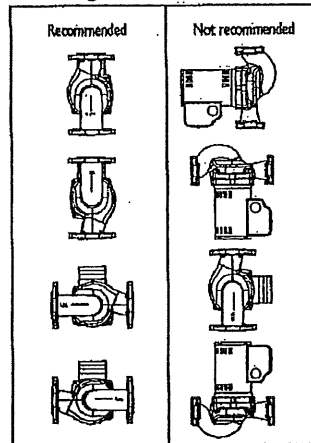
Flow Range: 0-147 GPM
 Head Range: 0-51 Feet
 Minimum Fluid Temp: 40°F (4°C)
 Maximum Fluid Temp: 225°F (107°C)
 Maximum Working Pressure: 150 psi



FOR INDOOR USE ONLY



Mounting Positions



Electrical Data

Model	Volts	Hz	Ph	Amps	RPM	HP
1400-10	115	60	1	1.5	3450	1/10
1400-30	115	60	1	2.0	3450	1/6
1400-45	115	60	1	3.2	3450	1/3
1400-50	115	60	1	5.0	3450	1/2
1400-60	115	60	1	2.0	3450	1/6
1400-65	115	60	1	3.2	3450	1/3
1400-70	115	60	1	5.0	3450	1/2
Motor Type	Open Drip Proof, Permanent Split Capacitor, Thermally Protected					
Motor Options	230/60/1, 220/50/1					

1400 Series Companion Flange Sets

Models	Connection	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
1400-10/10B	Iron NPT	110-251F	110-252F	110-253F	110-254F	---	---	---
1400-20/20B	Bronze NPT	110-251BF	110-252BF	110-253BF	110-254BF	---	---	---
1400-45/45B	Bronze SVWT	110-523BSF	110-524BSF	110-525BSF	110-526BSF	---	---	---
1400-50/50B	Shut-Off NPT	243-1	244-1	245-1	246-1	---	---	---
	Shut-Off SVWT	243-2	244-2	245-2	246-2	---	---	---
1400-50/50B/2	Iron NPT	---	---	---	---	194-2124F	---	---
2, 2 bolt	Bronze NPT	---	---	---	---	194-2124BF	---	---
1400-30/30B	Iron NPT	---	---	194-1540F	194-1542F	---	---	---
1400-40/40B	Bronze NPT	---	---	194-1540BF	194-1542BF	---	---	---
	Shut-Off NPT	---	---	247-1	248-1	---	---	---
	Shut-Off SVWT	---	---	247-2	248-2	---	---	---
1400-50/60B	Iron NPT	---	---	---	---	185-086C	---	---
1400-55/65B	Bronze NPT	---	---	---	---	185-086B	---	---
1400-70/70B	Iron NPT	---	---	---	---	---	185-112C	185-113C
3, 4 bolt	Bronze NPT	---	---	---	---	---	185-112B	185-113B

1 Noryl® is a registered trademark of General Electric Co.
 2 Nu-Tride® is a registered trademark of Kolene Corp.

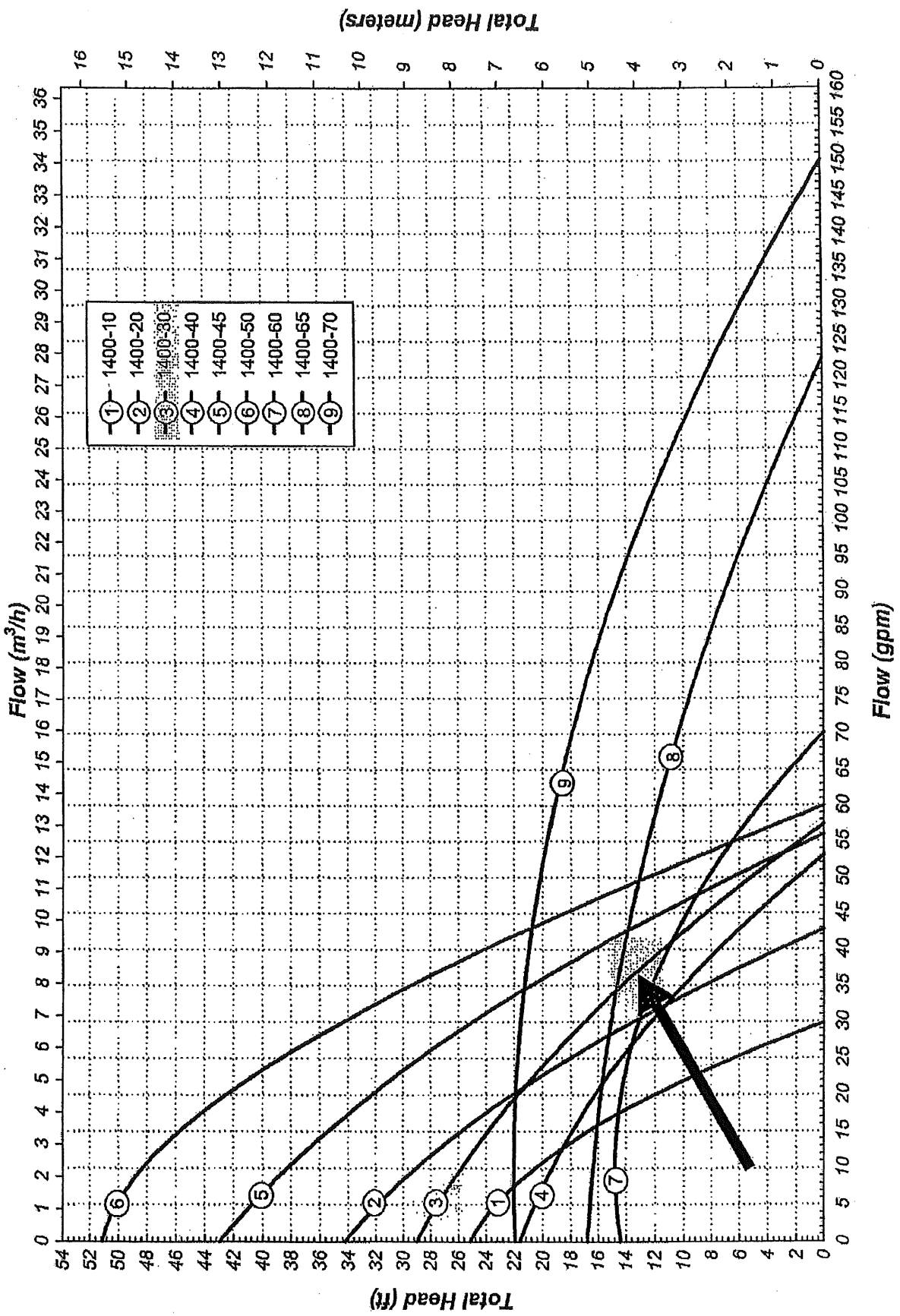
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TACO INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401) 942-8000 Fax: 942-2360
 TACO (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3 Telephone: (905) 564-9422 Fax: (905) 564-9436
 Visit our website at: www.taco-hvac.com

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 TACO, Inc.

Naco 1400 Series — High Capacity Circulators — 60Hz

HWP-7 REVISED



232123-4 2.5



Submittal Data Information

Plus Two Multi-Purpose Valve

301-235

SUPERSEDES: November 30, 2007

EFFECTIVE: September 1, 2008

JOB Martin's Point ENGINEER SMRT, Inc. CONTRACTOR Johnson & Jordan EP Emerson Swan

ITEM	QUANTITY	MODEL NO.	SIZE
for HWP-3&4	2	MPV-015	1.5"
for HPW-5,6,7	3	MPV030	3"
for CHWP-1&2	2	MPV-030	3"

DIMENSIONS

Model Number	Size	Connection	A	B (Class 125*)	B (Class 250*)	C	D	E	F	C _v	Weight (125#)	Weight (250#)
MPV 015-4	1½ (38.1) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	69	12 (5.5)	12 (5.5)
MPV 030-4	3 (76.2)	Flanged	11.75 (298)	3.75 (095)	3.75 (095)	6.15 (156)	3.90 (099)	7.85 (199)	1.8 (45.7)	209	38 (17)	46 (21)
MPV 050-4*	5 (127.0)	Flanged	17.63 (448)	5.00 (127)	5.50 (140)	11.26 (286)	5.25 (133)	12.28 (312)	2.4 (61.0)	459	105 (48)	126 (57)
MPV 060-4*	6 (152.4)	Flanged	20.35 (517)	5.50 (140)	6.25 (159)	11.28 (287)	6.07 (154)	14.23 (361)	2.7 (68.6)	701	134 (61)	176 (80)
MPV 080-4*	8 (203.2)	Flanged	25.88 (657)	6.75 (171)	7.50 (191)	13.58 (345)	6.75 (171)	19.13 (486)	3.9 (99.1)	1200	293 (133)	341 (155)
MPV 100-4*	10 (254.0)	Flanged	30.00 (762)	8.00 (203)	8.75 (222)	15.82 (402)	8.81 (224)	21.20 (538)	4.4 (111.8)	1826	466 (212)	536 (243)
MPV 120-4*	12 (304.8)	Flanged	36.70 (932)	9.50 (241)	10.25 (260)	17.54 (446)	9.98 (253)	26.64 (677)	4.9 (124.5)	2430	724 (329)	811 (368)
MPV 140-4*	14 (355.6)	Flanged	41.56 (1056)	10.50 (267)	11.50 (292)	22.80 (579)	12.09 (307)	29.47 (749)	5.4 (137.2)	3147	1105 (502)	1182 (537)

NOTE: Dimensions are in inches. Metric dimensions are in millimeters and are in parentheses (). Weights are in lb (kg). 'F' is the distance required to replace packing under pressure. 'A,C,D,E,F' applies to Class 250* flanged units also.

* Append 'A' for Class 250* working pressure flanged units (e.g. Model Number MPV 030-4A).

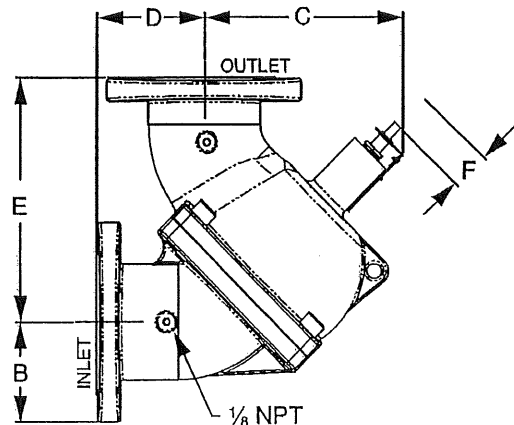
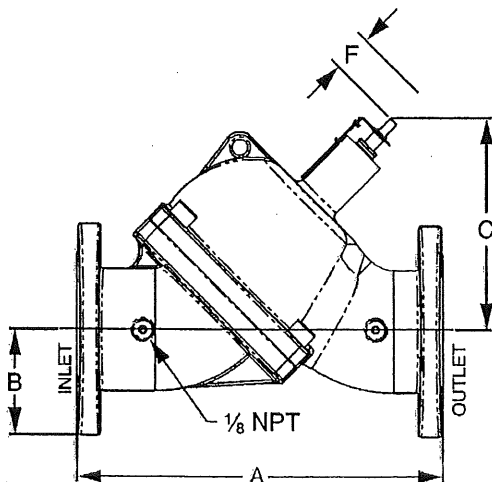
FEATURES

- Horizontal or Vertical Installation
- Field Convertible to a Right Angle Valve
- Stem Seal Packing (replaceable under pressure)
- Bronze Fitted Construction
- Memory Indicator, Pointer and Scale
- Shrader Valve Metering Connections
- "O" Ring Sealed Valve Body
- Replaceable "Soft Seal"
- Low Pressure Drop (equal to or better than any comparable valve on the market today)
- Five (5) Valves in One:
 - Shut Off Valve
 - Flow Control Valve (globe style)
 - Non Slam Check Valve
 - Flow Metering Valve
 - Straight Pattern Valve Convertible to a Right Angle Pattern Valve
- Available with Class 125* flanges or Class 250* flanges. Consult pressure/temperature chart on page 2 for operating limitations. (Flanged units are raised faced design.)
- Available with Flanged or Grooved End Connections

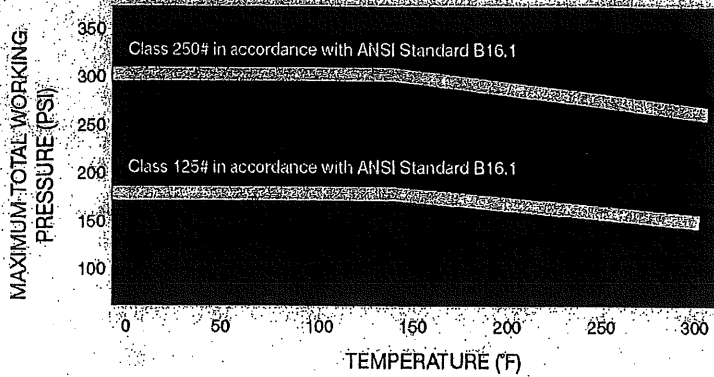
MATERIALS OF CONSTRUCTION

- Body - Ductile Iron
- Spring - Stainless Steel (302)
- Gland - Bronze
- Stem Packing - Teflon Impregnated Aramid Fiber (asbestos free)
- Stem - Bronze/Stainless Steel (416)
- Seat - EPDM
- Seat Disc - Bronze
- Body O-Ring - EPDM

(All sizes available with optional DIN flanges. Consult Factory for details.)



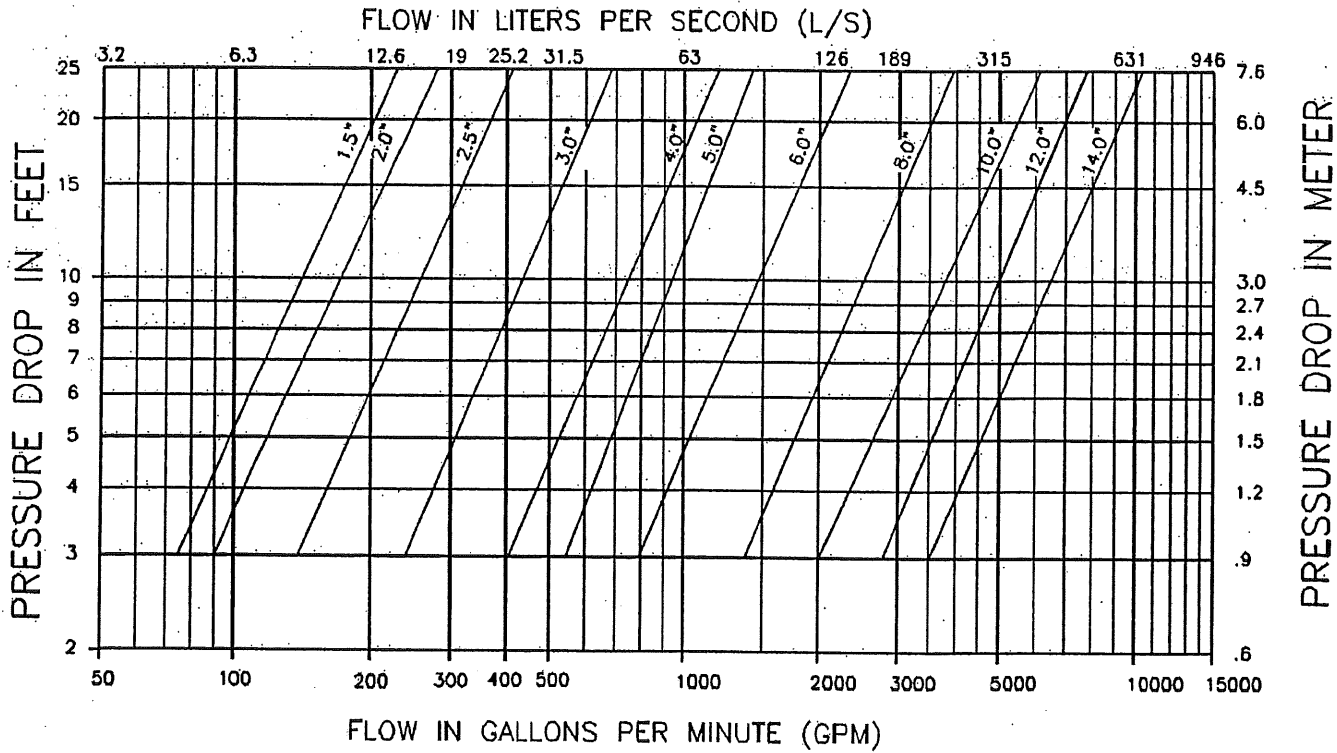
PRESSURE TEMPERATURE RATINGS



OPERATING SPECIFICATIONS

	Standard	Optional
Flange	Class 125*	Class 250*
Pressure	175 PSIG* (1210 KPA)	300 PSIG* (2070 KPA)
Temperature	250°F (120°C**)	250°F (120°C**)

* Per Pressure Temperature Ratings chart to left.



Do it Once. Do it Right.®

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TACO (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3. Telephone: 905/564-9422. FAX: 905/564-9436.

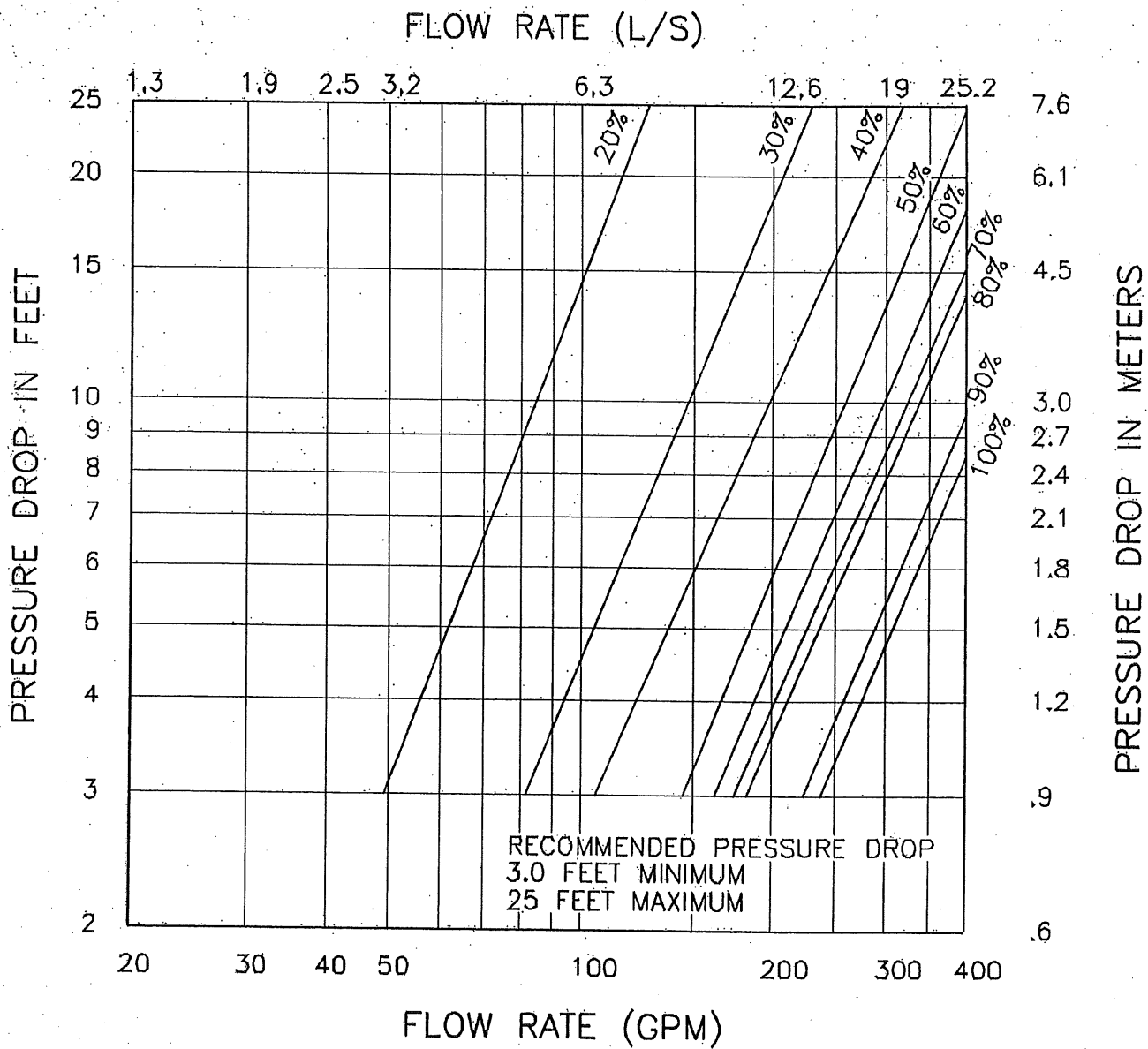
Visit our web site at: <http://www.taco-hvac.com>

Printed in USA

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TACO, Inc.

3 INCH MPV STRAIGHT & RIGHT ANGLE
INDICATED DATA FOR SYSTEM BALANCING



CHWP-1&2 ROUSEL



Submittal Data Information

KV Series Vertical Close Coupled Pumps

301-1099T

MODEL 3007

1760 RPM

JOB: Marlin's POINT

CONTRACTOR: Johnson & Jordan

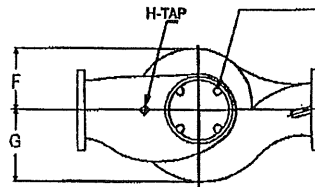
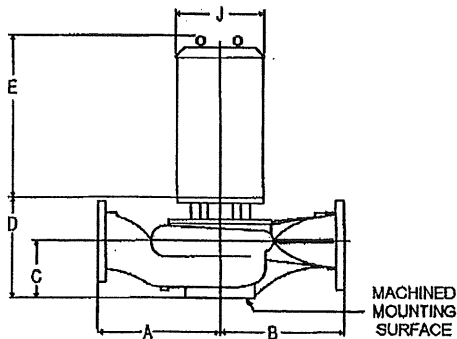
ENGINEER: SMRT, Inc.

RESELECTION

REP: Emerson Swan

COMMENTS: PREM Eff ODP Motors

ITEM NO.	MODEL NO.	IMP. DIAM. / IN.	FLOW / GPM	HEAD / FT	POWER / HP	ELEC. CHARS
CHWP-1&2	KV3007	7.4	255	50	5	460/3/60

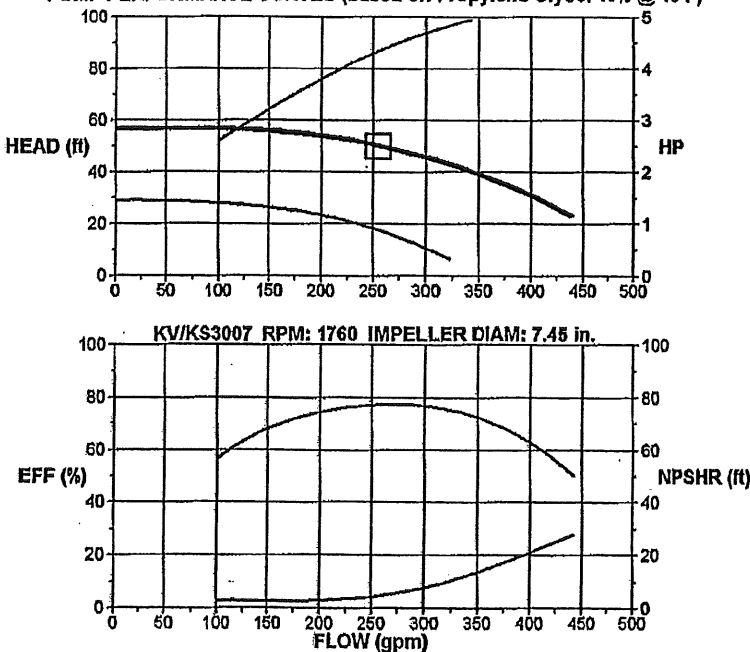


FOUR 3/8 - 16 UNC
THREADED MOUNTING
HOLES ON A 2.88"
BOLT CIRCLE

* Dimensions in Inches. Do not use for construction purposes unless certified.

CONN.	HP	FRAME	Flange Size ASA	860 kpa Flange		C	D	E	F	G	H	J
				A	B							
3x3	5	184JM	3	10	10	6.30	10.53	15.58	5.29	6.31	.25	7.88

PUMP PERFORMANCE CURVES (based on Propylene Glycol 40% @ 40 F)



Item	BRONZE FITTED	
	Standard	Optional
Casing	Cast Iron ASTM A48 Class 30A	
Impeller	Bronze ASTM B584-836	CF
Wear Ring	None	
Shaft	Carbon Steel	
Shaft Sleeve	Bronze ASTM B584-932 SAE660	
Mech. Seal	Ceramic EPT	
Seal Flush Line	Copper	CF

OPERATING SPECIFICATIONS			
	Standard		Optional
	125# 860K	250# 1720	
Flange			
Pressure	175 PSIG 1210 KPA	300 PSIG 2070 KPA	CF
Temperature	250F 120C	250F 120C	CF

CF - Consult Factory

Do it once. Do it right.

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TACO (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3. Telephone: 905/564-9422. FAX: 905/564-9436

CHWP-132 REVISION

RESELECTION

8/26/2009
TACO, Inc.
TacoNet Pump Selection, version 7.03

Job Name: Martin's POINT
Company:
Customer: Johnson & Jordan

Engineer: SMRT, Inc.
Representative: Emerson Swan
Salesman:

** INPUT PARAMETERS **

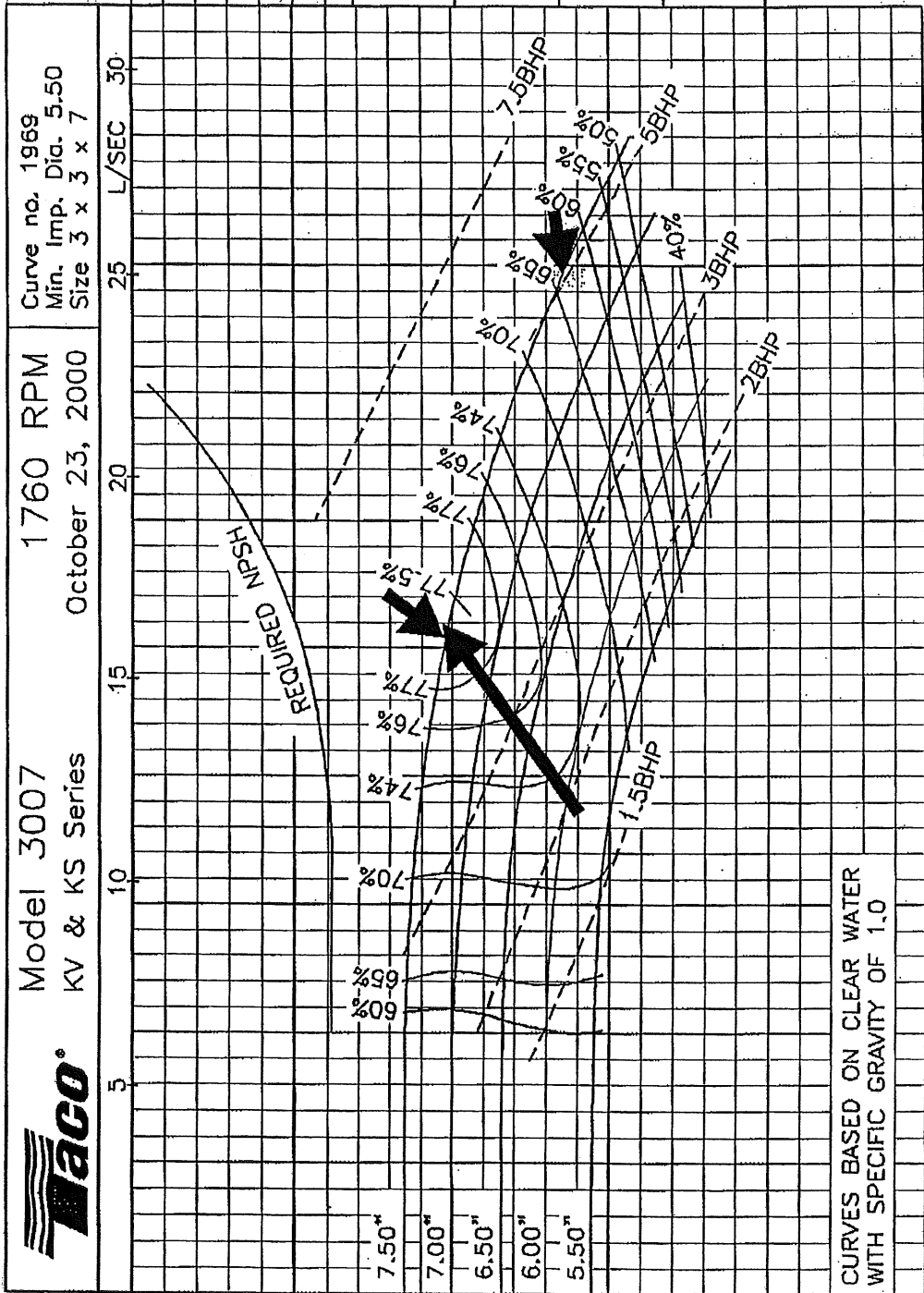
Single Pump System
Fluid Type: Propylene Glycol 40% @ 40 F
Min. Pump Eff.: 0
Motor RPM: 1760
Pump Types: KV

Design Point:
System Flow Rate: 255(gpm)
Head: 50(ft)

** SELECTION RESULTS **

Pump 1							
-Model	Imp.Dia.	NPSH(ft)	RPM	Eff%	HE	NOL HP	Suct/Disch
KV/KS3007	7.4	5	1760	77	4.35	5.28	3 x 3

CHWP-132 Revised




HEAD IN FEET HEAD IN METERS

NPSH IN FEET NPSH IN KILOPASCALS

CURVES BASED ON CLEAR WATER
WITH SPECIFIC GRAVITY OF 1.0

FLOW IN GALLONS PER MINUTE

232123-4 2.5



Submittal Data Information

Plus Two Multi-Purpose Valve

301-235

SUPERSEDES: November 30, 2007 EFFECTIVE: September 1, 2008

JOB Martin's Point ENGINEER SMRT, Inc. CONTRACTOR Johnson & Jordan APP. Emerson Swan

ITEM	QUANTITY	MODEL NO.	SIZE
for HWP-3&4	2 3 2	MPV-015	1.5"
for HPW-5,6,7		MPV030	3"
for CHWP-1&2		MPV-030	3"

DIMENSIONS

Model Number	Size	Connection	A	B (Class 125*)	B (Class 250*)	C	D	E	F	Cv	Weight (125#)	Weight (250#)
MPV 015-4	1½ (38.1) NPT	Threaded	8.00 (203)	1.44 (037)	1.44 (037)	4.70 (119)	2.39 (061)	5.64 (143)	1.3 (33.0)	69	12 (5.5)	12 (5.5)
MPV 030-4	3 (76.2)	Flanged	11.75 (298)	3.75 (095)	3.75 (095)	6.15 (156)	3.90 (099)	7.85 (199)	1.8 (45.7)	209	38 (17)	48 (21)
MPV 050-4	5 (127.0)	Flanged	17.63 (448)	5.00 (127)	5.50 (140)	11.26 (286)	5.25 (133)	12.28 (312)	2.4 (61.0)	459	105 (48)	126 (57)
MPV 060-4	6 (152.4)	Flanged	20.35 (517)	5.50 (140)	6.25 (159)	11.28 (287)	6.07 (154)	14.23 (361)	2.7 (68.6)	701	134 (61)	176 (80)
MPV 080-4	8 (203.2)	Flanged	25.88 (657)	6.75 (171)	7.50 (191)	13.58 (345)	6.75 (171)	19.13 (486)	3.9 (99.1)	1200	293 (133)	341 (155)
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MPV 120-4	12 (304.8)	Flanged	36.70 (932)	9.50 (241)	10.25 (260)	17.54 (446)	9.98 (253)	26.64 (677)	4.9 (124.5)	2430	724 (329)	811 (368)
MPV 140-4	14 (355.6)	Flanged	41.56 (1056)	10.50 (267)	11.50 (292)	22.80 (579)	12.09 (307)	29.47 (749)	5.4 (137.2)	3147	1105 (502)	1182 (537)

NOTE: Dimensions are in inches. Metric dimensions are in millimeters and are in parentheses (). Weights are in lb (kg). 'F' is the distance required to replace packing under pressure. 'A,C,D,E,F' applies to Class 250* flanged units also.

* Append 'A' for Class 250* working pressure flanged units (e.g. Model Number MPV 030-4A).

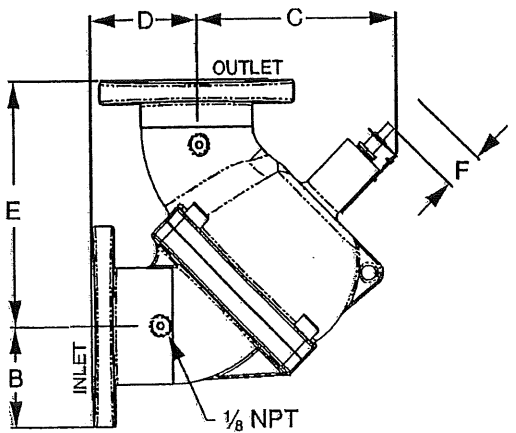
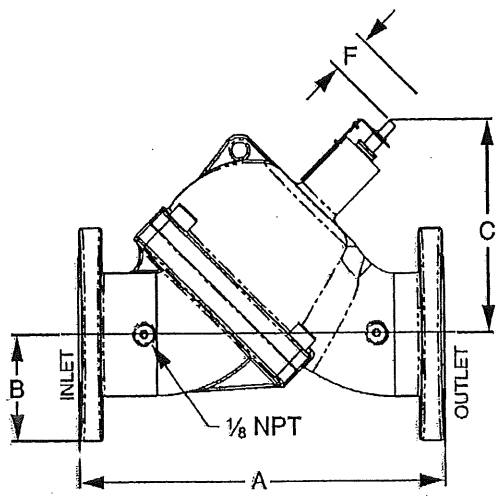
FEATURES

- Horizontal or Vertical Installation
- Field Convertible to a Right Angle Valve
- Stem Seal Packing (replaceable under pressure)
- Bronze Fitted Construction
- Memory Indicator, Pointer and Scale
- Shrader Valve Metering Connections
- "O" Ring Sealed Valve Body
- Replaceable "Soft Seal"
- Low Pressure Drop (equal to or better than any comparable valve on the market today)
- Five (5) Valves in One:
 - Shut Off Valve
 - Flow Control Valve (globe style)
 - Non Slam Check Valve
 - Flow Metering Valve
 - Straight Pattern Valve Convertible to a Right Angle Pattern Valve
- Available with Class 125* flanges or Class 250* flanges. Consult pressure/temperature chart on page 2 for operating limitations. (Flanged units are raised faced design.)
- Available with Flanged or Grooved End Connections

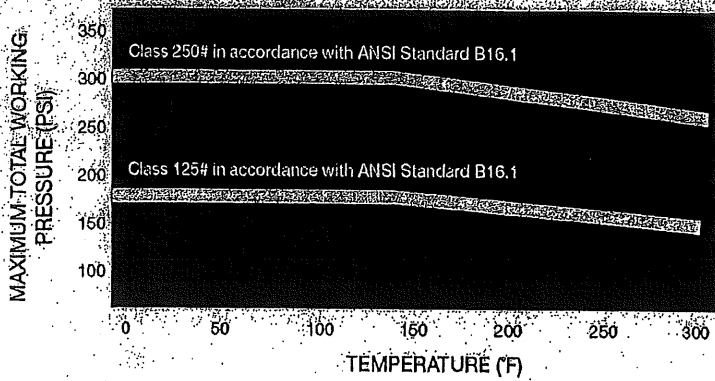
MATERIALS OF CONSTRUCTION

- Body - Ductile Iron
- Spring - Stainless Steel (302)
- Gland - Bronze
- Stem Packing - Teflon Impregnated Aramid Fiber (asbestos free)
- Stem - Bronze/Stainless Steel (416)
- Seat - EPDM
- Seat Disc - Bronze
- Body O-Ring - EPDM

(All sizes available with optional DIN flanges. Consult Factory for details.)



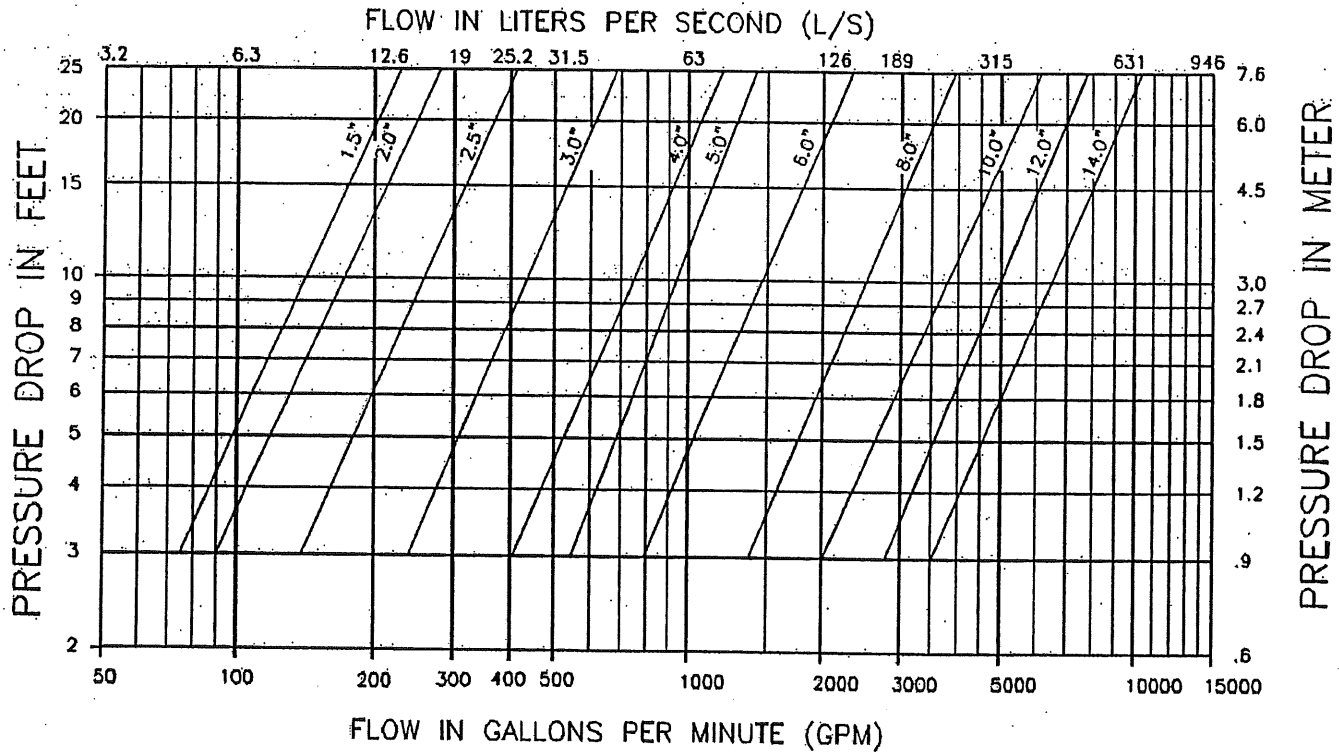
PRESSURE TEMPERATURE RATINGS



OPERATING SPECIFICATIONS

	Standard	Optional
Flange	Class 125*	Class 250*
Pressure	175 PSIG* (1210 KPA)	300 PSIG* (2070 KPA)
Temperature	250°F (120°C**)	250°F (120°C**)

* Per Pressure Temperature Ratings chart to left.



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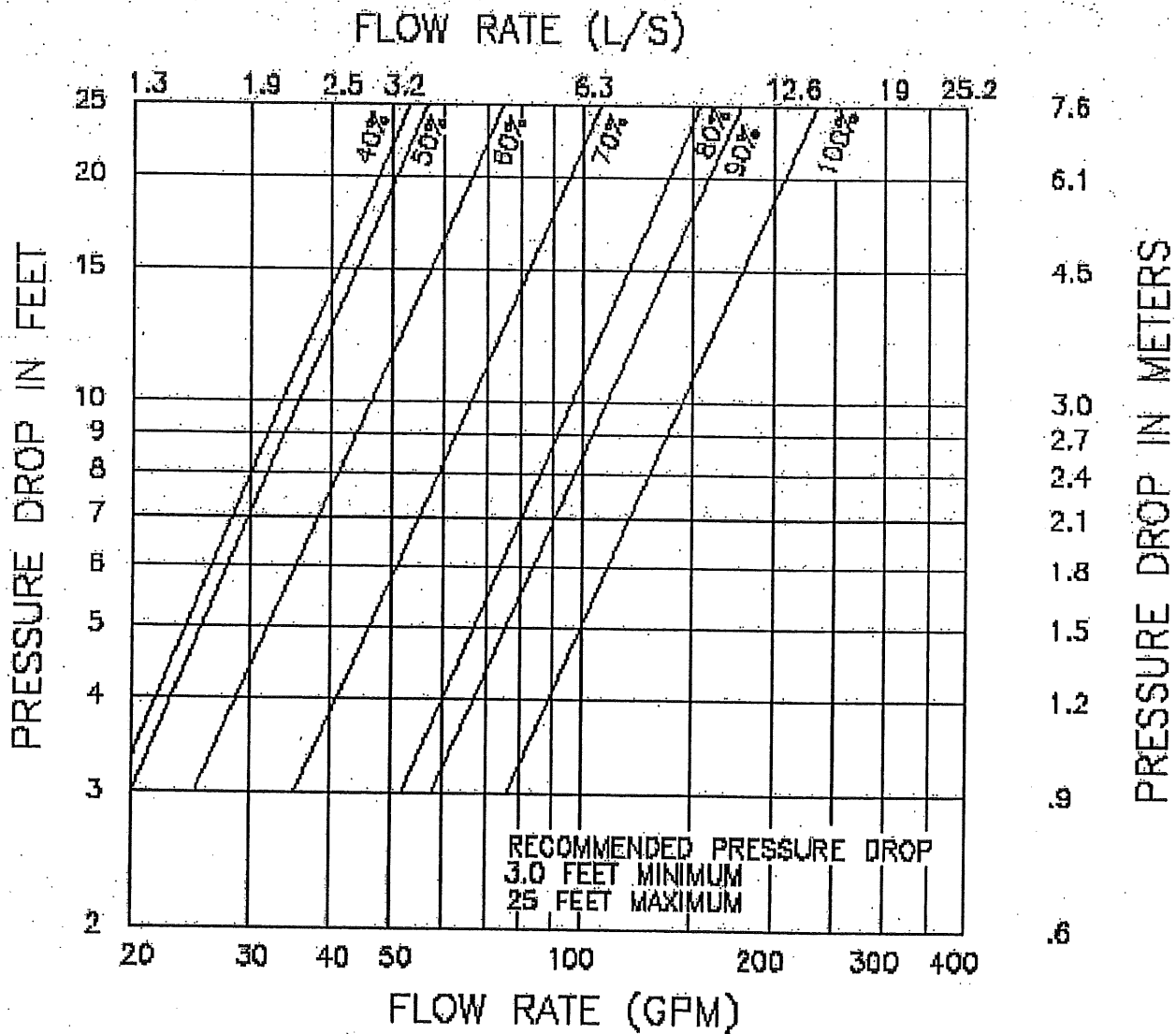
Visit our web site at: <http://www.taco-hvac.com>

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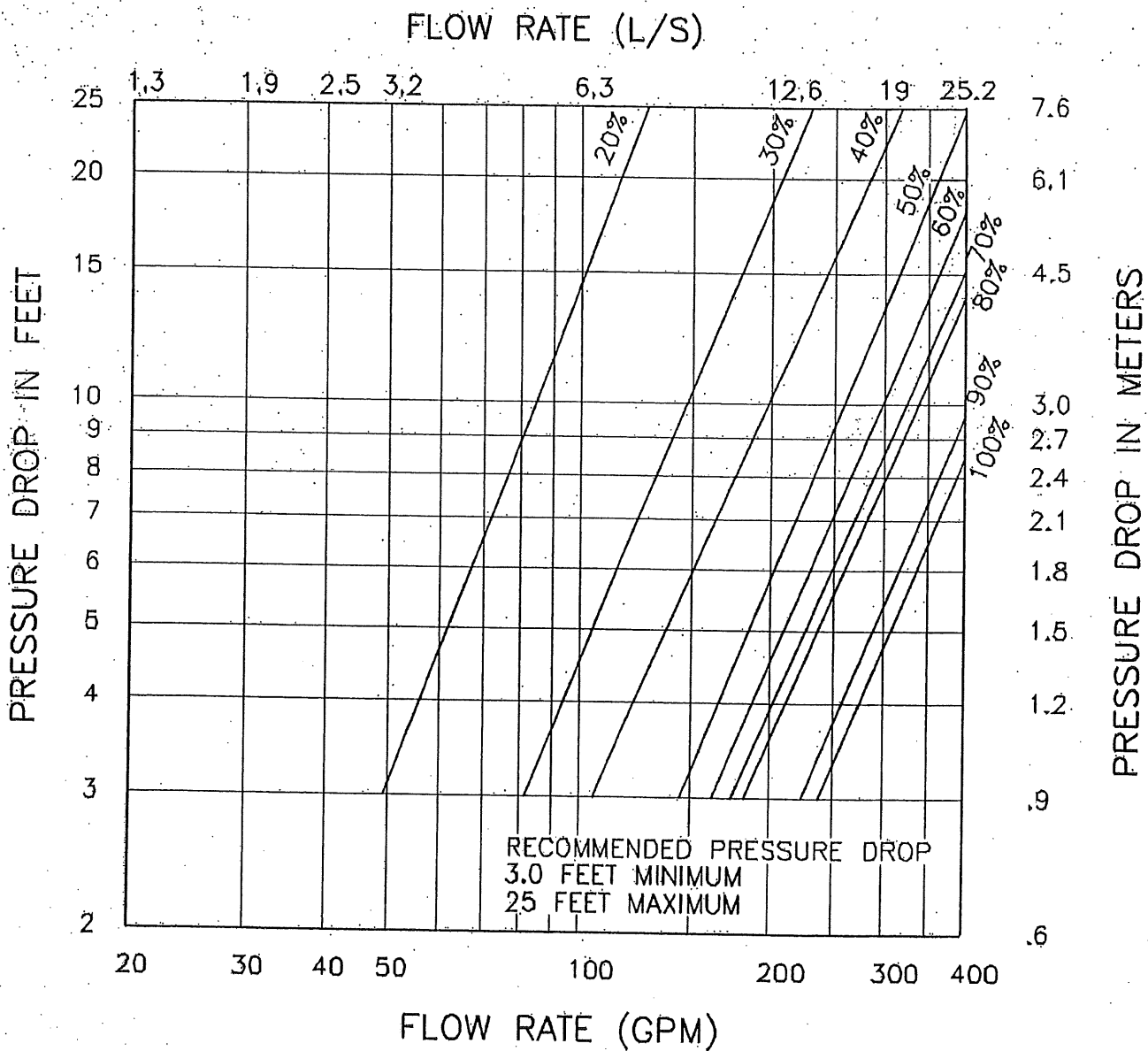
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TACO, Inc.

1.5 INCH MPV STRAIGHT & RIGHT ANGLE
INDICATED DATA FOR SYSTEM BALANCING



3 INCH MPV STRAIGHT & RIGHT ANGLE
INDICATED DATA FOR SYSTEM BALANCING





GAS HVAC Equip. Vents
 Boiler
 Hot wtr Heater
 Humidifiers

Submittal
 Review Memo

Project Name: MPHC MOB - Constr Administration

Job #: 0813912

To: Jared Ballard
 Pizzagalli Construction
 131 Presumpscot Street

Submittal #: 84-235100-1

Portland, ME 04103

Submittal Title: Breechings, Chimneys & Stacks

ACTION: Please take action below:

The review was performed for the limited purpose of determining general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Modifications or comments made on the submittal during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications. Approval of a specific item does not include approval of the assembly of which the item is a component. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site: information that pertains solely to the fabrication processes or to the means, methods, techniques sequences and procedures of construction: coordination of the work of all trades: and for performing all work in a safe and satisfactory manner.

SMRT, Inc.

REVIEW DATE: 9/22/2009

BY: TAC

- APPROVED
- PROVIDE AS NOTED
- REVISE AND RESUBMIT
- RESUBMIT SPECIFIC ITEM
- REJECTED:
 - Not a specified product
 - Incomplete
 - Other
- INFORMATIONAL SUBMITTAL FOR RECORD ONLY
- NOT A REQUIRED SUBMITTAL - NOT REVIEWED

08139-12 #84

Remarks:

SUBMITTAL

PROJECT: MARTINS POINT MEDICAL OFFICE BUILDING
MARTINS POINT HEALTH CARE
331 VERANDA STREET
PORTLAND, MAINE 04103

GENERAL CONTRACTOR: PIZZGALLI CONSTRUCTION COMPANY
131 PRESUMPCOT STREET
PORTLAND, MAINE 04103

ARCHITECT: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

ENGINEER: SMRT
144 FORE STREET
P. O. BOX 618
PORTLAND, MAINE 04104

SUBCONTRACTOR: Aero Heating & Ventilating
378 Presumpscot Street
Portland, Maine 04103
Contact: Clark Jarvis
Phone: 207-761-2092
Fax: 207-761-4471

SUPPLIER: H. V. A. C. Products
280 Gannett Drive
South Portland, Maine 04106
Contact: Ed Rowe
Phone: 207-874-6100
Fax: 207-874-1900

SPECIFICATION SECTION: 235100

PARAGRAPH: Part 2 Products
DRAWINGS: N/A

ITEM: BREECHINGS, CHIMNEYS & STACKS

JOHNSON&JORDAN, INC.

18 Mussey Rd. Scarborough, ME

Approved _____ Approved as Noted _____

Re-Submit _____ Reviewed X

Subject to Architects Approval X

Date 8/25/09 By JEM

**MARTINS POINT HEALTH CARE
MARTINS POINT MEDICAL OFFICE BUILDING
PORTLAND, MAINE**

BREECHINGS, CHIMNEYS & STACKS

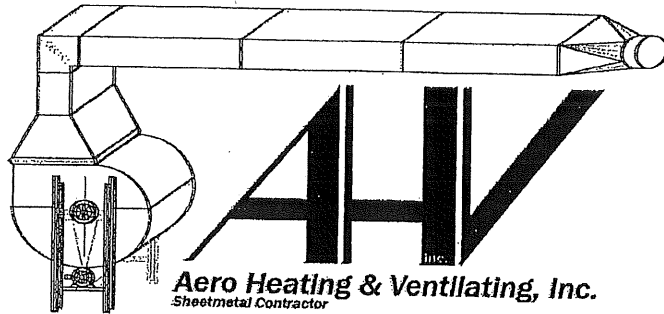
**MANUFACTURER: SIMPSON DURA VENT COMPANY
PRODUCT: PROTECH FASENSEAL W2**

SUPPLIER: H. V. A. C. Products
280 Gannett Drive
South Portland, Maine 04106
Contact: Ed Rowe
Phone: 207-874-6100
Fax: 207-874-1900

INSTALLER: Aero Heating & Ventilating
378 Presumpscot Street
Portland, Maine 04103
Contact: Clark Jarvis
Phone: 207-761-2092
Fax: 207-761-4471

PLEASE NOTE:

1. Shop drawings for breeching will be provided later as a supplement to this submittal after approval of boilers.
2. Welding certificates not included in submittal as no welding required.



Breechings, Chimneys, and Stacks

Section 235100

HVAC PRODUCTS, INC.

Air Moving Equipment for Commercial and Industrial Applications

PROJECT NAME: MARTINS POINT HEALTH CARE MEDICAL OFFICE BLDG.
LOCATION: PORTLAND, ME
CUSTOMER: AERO HEATING & VENTILATING INC. - PORTLAND, ME
ENGINEER: SMRT - PORTLAND, ME
ARCHITECT: SMRT - PORTLAND, ME
DATE: 8-3-09
CUSTOMER PO#: 09-0616
OUR ORDER #: H0908003
REVISION DATE:

Submitted For Review

ENCLOSED PLEASE FIND SUBMITTAL DATA CONSISTING OF THE FOLLOWING:

SPEC. SECTION: 235100: BREECHINGS, CHIMNEYS & STACKS

PROTECH BOILER FLUE SCHEDULE
PROTECH UL CLEARANCE TO COMBUSTIBLES CHART
PROTECH DESCRIPTION OF PRODUCT
PROTECH COMPONENT DRAWINGS PAGES 4-5; 7-9

HVAC Products Inc.
88 Second St., South Portland, ME 04106
Phone: (207)874-6100 Fax: (207)874-1900
Web address: www.hvaeproductsinc.com

PROTECH AL29-4C DOUBLE WALL BOILER FLUE SCHEDULE

HVAC PRODUCTS INC.
88 SECOND ST.
SO. PORTLAND, ME 04106

2 - PROTECH MODEL W2 8" ID X 1/2" DOUBLE WALL BOILER FLUES
2 - PROTECH MODEL W2 4" ID X 1/2" DOUBLE WALL BOILER FLUES

PLEASE PROVIDE:

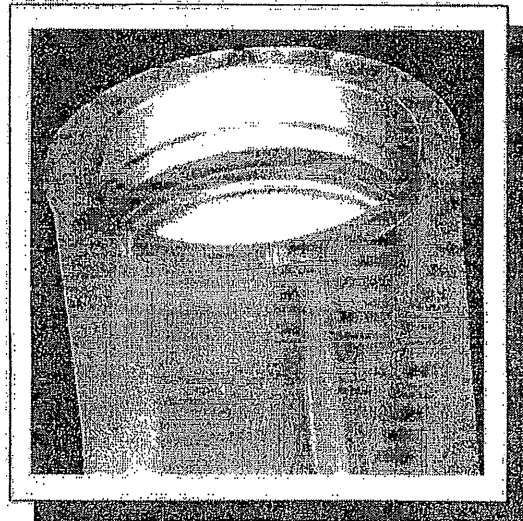
BOILER CUT SHEETS
HEIGHT OF WALL PENETRATION FOR A FACTORY DRAWING.

FasNSeal®W2

Material Selection and Design

The FasNSeal®W2 Double Wall Special Gas Vent System is manufactured under the most stringent quality control measures utilizing the latest production technology and know-how. FasNSeal®W2 is ideally suited for exhausting high efficiency, natural gas or propane fired heating equipment, where low flue gas temperatures can result in significant condensate formation within the vent system.

The flue gas conduit (inner tube) is made from AL29-4C or 29-4 (S44735), a super ferritic stainless steel designed for extreme resistance to chloride ion pitting, crevice corrosion and stress corrosion cracking, as well as general corrosion in oxidizing and moderately reducing environments. AL29-4C is an ideal choice for resisting deleterious effects of corrosive condensates created by partially or fully condensing natural gas and propane fired heating appliances. The Canadian Gas Research Institute confirmed that test results proved AL29-4C to be one of two "most corrosion resistant alloys of twenty candidate stainless steels evaluated for resistance to chloride-induced corrosion in condensing and partially condensing gas-fired appliances". AL29-4C is a registered trademark of Allegheny Ludlum Corp.



The Jacket (outer tube) is manufactured from type 304 or type 430 stainless steel to provide long lasting performance and stability inside a building or when exposed to the outdoors.

The air space between the flue gas conduit and jacket is .5 inches, providing close clearances to combustibles, reasonable outside dimensions and an additional heat shield or margin of safety where needed.

"The FasNSeal®W2 System is fully interchangeable with our FasNSeal® Single-wall System." See page 9 & 10 for adapter.

FasNSeal®W2 has been tested and is listed by Underwriters Laboratories, Inc. to UL 1738 and ULC-S636-95 safety standards. When installed according to ProTech Systems' installation instructions, FasNSeal®W2 meets all test requirements for horizontal and vertical, interior or exterior installations.

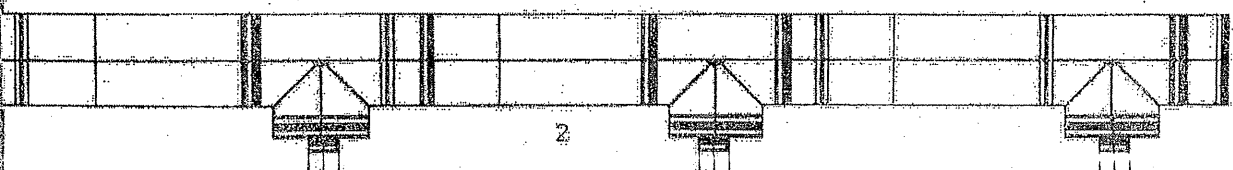
Clearance To Combustibles

Rated Operating Temperature, °F	Minimum Clearance Enclosed	Clearance Unenclosed	
		Horizontal	Vertical
3" & 4"	300°F	3"	1"
	400°F	6"	1"
	480°F	6"	4"
5" - 16"	300°F	3"	1"
	400°F	6"	5"
	480°F	6"	9"

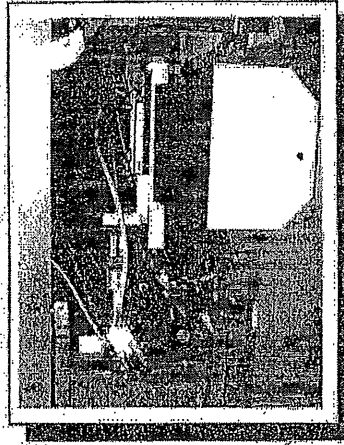
Rated Operating Temperature of 300°F = Max Flue Gas Temperature of 325°F
 Rated Operating Temperature of 480°F = Max Flue Gas Temperature of 550°F

Material Thickness

Inner Wall Material Thickness	
3" - 7" (76.2mm - 177.8)	.016" (.4mm)
8" - 12" (203.2mm - 304.8)	.019" (.5mm)
14" - 16" (355.6mm - 406.4)	.024" (.6mm)
Outer Wall Material Thickness	
3" - 6" (76.2mm - 152.4)	.016" (.4mm)
7" - 16" (177.8mm - 406.4)	.024" (.6mm)



FasNSeal®W2 Is a Heating Contractor's Dream Come True!



FasNSeal®W2 Is Built For Performance

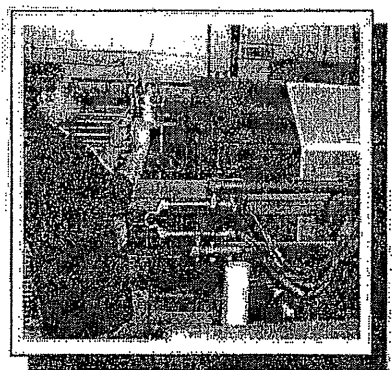
Proven in our single wall system since 1997, all FasNSeal® products feature a smooth weld seam inside and out that is completely shielded during the TIG welding process. Contamination or molecular changes in the weld seam are avoided; no fillers are used in the welding process. Tube ends are formed under the most stringent quality standards to guarantee a perfect fit every time and to avoid built-in stress points or weak areas.

FasNSeal®W2 Applications

FasNSeal®W2 is a Special Gas Vent and Gas Vent Connector, designed for use on natural gas or propane-fired appliances listed as Category II, III and IV or in Canada Type BH Gas Vent Systems having a maximum operating temperature of 480 degrees F and maximum rated positive pressure of 6" water column (tested at 15" water column!). FasNSeal®W2 provides venting for high efficiency gas boilers, furnaces, booster heaters, pool heaters, water heaters, unit heaters or tankless water heaters and is available in 3" -10", 12", 14" and 16" nominal flue gas conduit diameters. FasNSeal®W2 may also be used as a vent for Category I, natural gas or propane-fired heaters. (See Installation Instructions for details). FasNSeal®W2 must be sized according to the heating appliance manufacturer's instructions, NFPA 211, NFPA 54, The National Fuel Gas Code ANSI Z223.1 and any other relevant local building codes and regulations (see installation instructions for details!).

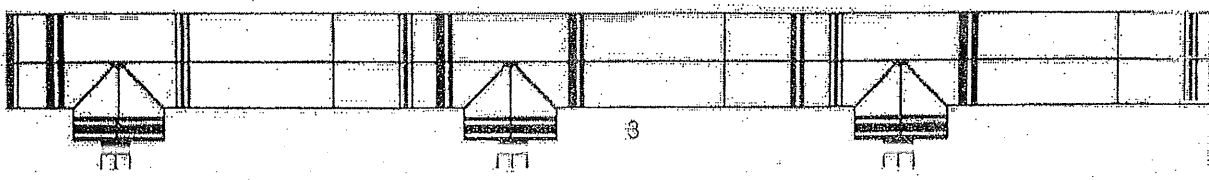
FasNSeal®W2 Features Built-in Gaskets And Mechanical Locking Bands

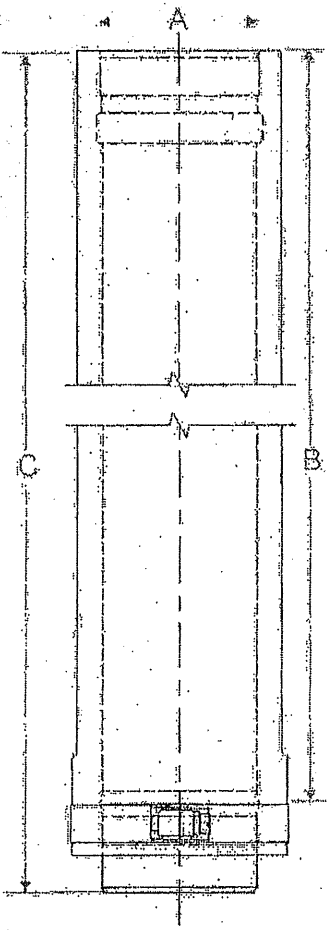
The flue gas conduit of every vent length and component (inner tube) features a built-in gasket in its female-end to seal each joint. An integrated mechanical locking band is factory-built into the jacket (outer tube) of each vent length and component (Pat #6,026,803 addtl. Patents pending). FasNSeal®W2 parts are simply pushed together until fully seated. This renders the joints air and water-tight. By tightening their integrated mechanical locking band, parts are fastened together in seconds. FasNSeal®W2 can be taken apart and reassembled in minutes, making inspection, maintenance or re-routing of FasNSeal®W2 systems a breeze. Adjustable vent lengths featured in our Wall Thimbles allow for built-in horizontal adjustability without the need for cutting pipe. Our standard Adjustable Vent Length allows 4" to 12" of vertical adjustment, making pitching FasNSeal®W2 to properly drain condensate simple. Connecting FasNSeal®W2 to a heater is done efficiently with one of our many Adaptors approved by heating appliance manufacturers. Heating equipment can be fired up immediately upon completing a FasNSeal®W2 installation, as no cure time or cleanup is required. **PTS listened to the installer and came up with the perfect way to join FasNSeal® parts.** No cutting, no exterior clamps, no joints to wipe with alcohol, no rings, no tabs, no mess to clean.



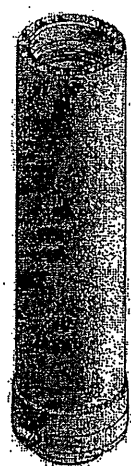
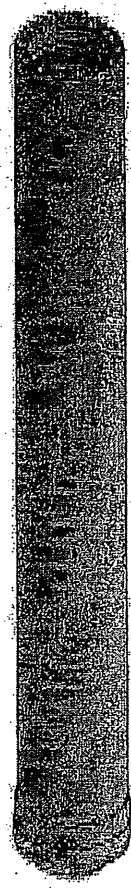
FasNSeal®W2 Technical Support Is Second To None

Submit your specifications on a submittal request form along with your layout and PTS will supply comprehensive submittal drawings and a complete bill of materials within 48 business hours. Unless your specs are changed more than once, this service is provided free of charge. For technical or marketing information visit our website at protechinfo.com. You can contact our technical department at support@protechinfo.com or call 1.800.766.3473 should you prefer personal technical support.

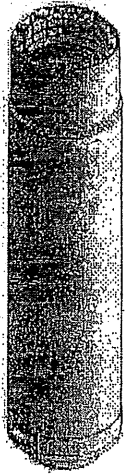




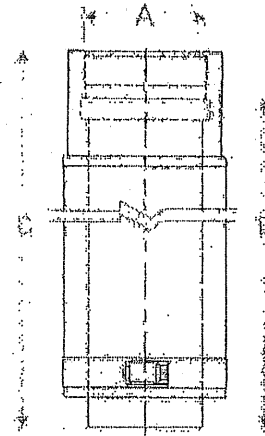
FasNSeal® W2 Vent Length					
A	B	C	D	Product	Part
Vent Dia.	Eff. Lgth			Number	Number
3	4.3	6.0		100001	W2-603
	10.3	12.0		100015	W2-1203
	16.3	18.0		100045	W2-1803
	22.3	24.0		100060	W2-2403
	34.3	36.0		100075	W2-3603
4	4.3	6.0		100002	W2-604
	10.3	12.0		100016	W2-1204
	16.3	18.0		100046	W2-1804
	22.3	24.0		100061	W2-2404
	34.3	36.0		100076	W2-3604
5	4.3	6.0		100003	W2-605
	10.3	12.0		100017	W2-1205
	16.3	18.0		100047	W2-1805
	22.3	24.0		100062	W2-2405
	34.3	36.0		100077	W2-3605
6	4.3	6.0		100004	W2-606
	10.3	12.0		100018	W2-1206
	16.3	18.0		100048	W2-1806
	22.3	24.0		100063	W2-2406
	34.3	36.0		100078	W2-3606
7	4.3	6.0		100005	W2-607
	10.3	12.0		100019	W2-1207
	16.3	18.0		100049	W2-1807
	22.3	24.0		100064	W2-2407
	34.3	36.0		100079	W2-3607
8	4.3	6.0		100006	W2-608
	10.3	12.0		100020	W2-1208
	16.3	18.0		100050	W2-1808
	22.3	24.0		100065	W2-2408
	34.3	36.0		100080	W2-3608
9	4.3	6.0		100007	W2-609
	10.3	12.0		100021	W2-1209
	16.3	18.0		100051	W2-1809
	22.3	24.0		100066	W2-2409
	34.3	36.0		100081	W2-3609
10	4.3	6.0		100008	W2-610
	10.3	12.0		100022	W2-1210
	16.3	18.0		100052	W2-1810
	22.3	24.0		100067	W2-2410
	34.3	36.0		100082	W2-3610
12	4.3	6.0		100009	W2-612
	10.3	12.0		100023	W2-1212
	16.3	18.0		100053	W2-1812
	22.3	24.0		100068	W2-2412
	34.3	36.0		100083	W2-3612
14	4.3	6.0		100010	W2-614
	10.3	12.0		100024	W2-1214
	16.3	18.0		100054	W2-1814
	22.3	24.0		100069	W2-2414
	34.3	36.0		100084	W2-3614
16	4.3	6.0		100011	W2-616
	10.3	12.0		100025	W2-1216
	16.3	18.0		100055	W2-1816
	22.3	24.0		100070	W2-2416
	34.3	36.0		100085	W2-3616



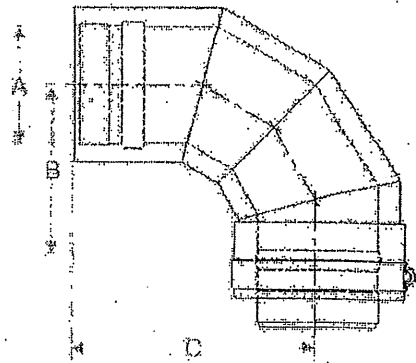
FasNSeal Single Wall & FasNSeal W2 Double Wall are interchangeable



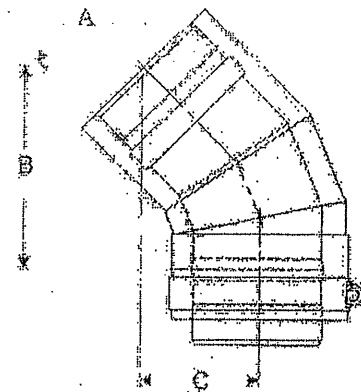
FasNSeal®W2 Adjustable Vent Length					
A	B	C	D	Product	Part
Vent Dia.	Eff. Lgth			Number	Number
3	2.0-14.0	18.0		100250	W2-AVL3
4	2.0-14.0	18.0		100251	W2-AVL4
5	2.0-14.0	18.0		100252	W2-AVL5
6	2.0-14.0	18.0		100253	W2-AVL6
7	2.0-14.0	18.0		100254	W2-AVL7
8	2.0-14.0	18.0		100255	W2-AVL8
9	2.0-14.0	18.0		100256	W2-AVL9
10	2.0-14.0	18.0		100257	W2-AVL10
12	2.0-14.0	18.0		100258	W2-AVL12
14	2.0-14.0	18.0		100259	W2-AVL14
16	2.0-14.0	18.0		100260	W2-AVL16



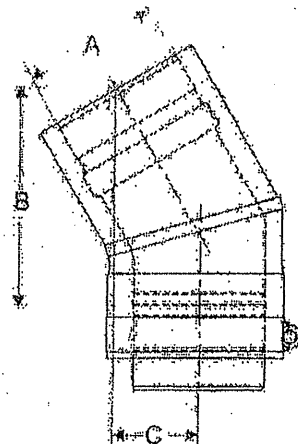
FasNSeal®W2 90 Degree Elbow					
A	B	C	D	Product	Part
Vent Dia.	Eff. Lgth			Number	Number
3	3.9	5.9		100160	W2-9003
4	4.4	6.4		100161	W2-9004
5	4.9	6.9		100162	W2-9005
6	5.4	7.4		100163	W2-9006
7	5.9	7.9		100164	W2-9007
8	6.4	8.4		100165	W2-9008
9	6.9	8.9		100166	W2-9009
10	7.4	9.4		100167	W2-9010
12	8.4	10.4		100168	W2-9012
14	9.4	11.4		100169	W2-9014
16	10.1	12.4		100170	W2-9016

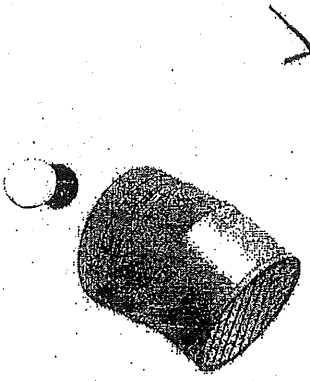


FasNSeal®W2 45 Degree Elbow					
A	B	C	D	Product	Part
Vent Dia.	Eff. Lgth			Number	Number
3	5.2	3.0		100130	W2-4503
4	5.6	3.1		100131	W2-4504
5	6.0	3.2		100132	W2-4505
6	6.3	3.4		100133	W2-4506
7	6.7	3.5		100134	W2-4507
8	7.0	3.7		100135	W2-4508
9	7.4	3.8		100136	W2-4509
10	7.7	4.0		100137	W2-4510
12	8.4	4.3		100138	W2-4512
14	9.1	4.7		100139	W2-4514
16	9.8	4.9		100140	W2-4516

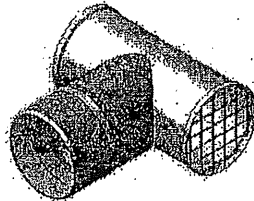
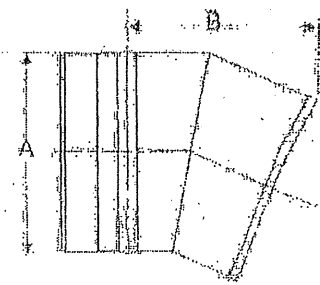


FasNSeal®W2 30 Degree Elbow					
A	B	C	D	Product	Part
Vent Dia.	Eff. Lgth			Number	Number
3	4.9	1.8		100650	W2-3003
4	5.2	1.9		100651	W2-3004
5	5.4	2.0		100652	W2-3005
6	5.7	2.0		100653	W2-3006
7	5.9	2.1		100654	W2-3007
8	6.1	2.2		100655	W2-3008
9	6.4	2.2		100656	W2-3009
10	6.7	2.3		100657	W2-3010
12	7.2	2.4		100658	W2-3012
14	7.7	2.6		100659	W2-3014
16	8.2	2.7		100660	W2-3016

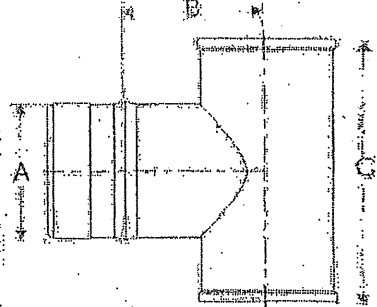




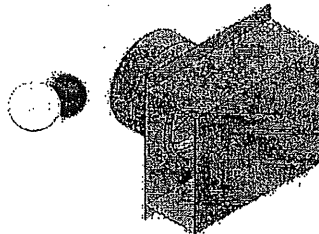
FasNSeal® 23 Degree Bird Screen					
A	B	C	D	Product Number	Part Number
5	4.8			300188	FSBS5
6	5.6			300189	FSBS6
7	6.4			300190	FSBS7
8	7.1			300191	FSBS8
9	7.9			300192	FSBS9
10	8.7			300193	FSBS10
12	10.2			300194	FSBS12
14	11.7			300195	FSBS14
16	13.2			300196	FSBS16



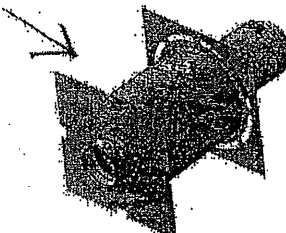
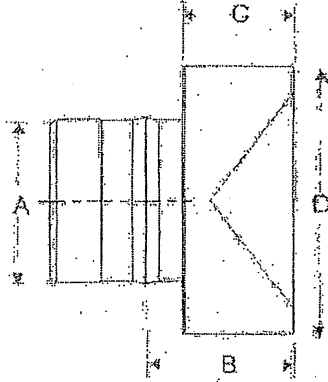
FasNSeal® Termination Tee					
A	B	C	D	Product Number	Part Number
3	3.0	6.0		300311	FSTT3
4	3.5	7.0		300312	FSTT4
5	4.0	8.0		300313	FSTT5
6	4.5	9.0		300314	FSTT6



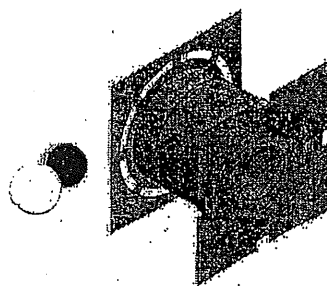
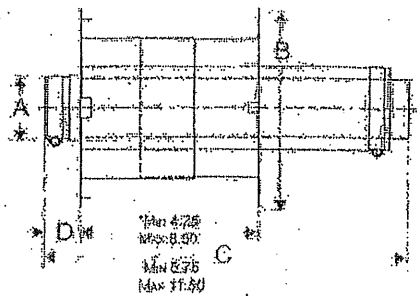
For technical or marketing information visit our website at www.protechinfo.com. You can contact our technical department at support@protechinfo.com or call 1.800.766.3473 should you prefer personal technical support.



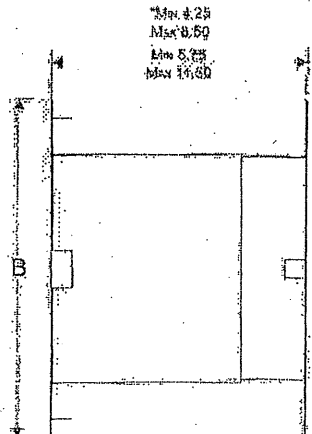
FasNSeal® Termination Box					
A	B	C	D	Product Number	Part Number
3	2.3	2.0	5.0	300500	FSTB3
4	2.3	2.0	6.0	300501	FSTB4



FasNSeal® W2 Wall Thimble with Adjustable Vent Length					
A	B	C	D	Product Number	Part Number
3*	10.0	18.0	1.8	100280	W2-WT3
4*	11.0	18.0	1.8	100281	W2-WT4
5*	12.0	18.0	1.8	100282	W2-WT5
6	13.0	18.0	1.8	100283	W2-WT6
7	14.0	18.0	1.8	100284	W2-WT7
8	15.0	18.0	1.8	100285	W2-WT8
9	16.0	18.0	1.8	100286	W2-WT9
10	17.0	18.0	1.8	100287	W2-WT10
12	19.0	18.0	1.8	100289	W2-WT12
14	21.0	18.0	1.8	100290	W2-WT14
16	23.0	18.0	1.8	100291	W2-WT16



FasNSeal® Wall Pass Through					
Vent Dia.	B	C	D	Product Number	Part Number
3*	10.0			300601	FSWPT4
4*	11.0			300602	FSWPT5
5*	12.0			300603	FSWPT6
6	13.0			300604	FSWPT7
7	14.0			300605	FSWPT8
8	15.0			300606	FSWPT9
9	16.0			300607	FSWPT10



FasNSeal® Firestop/Flat Flashing

A Vent Dia.	B	C	D	Product Number	Part Number
3	4.0	15.0		300296	FSFS4
4	5.0	17.0		300297	FSFS5
5	6.0	17.0		300298	FSFS6
6	7.0	19.0		300299	FSFS7
7	8.0	19.0		300300	FSFS8
8	9.0	22.0		300301	FSFS9
9	10.0	22.0		300302	FSFS10
10	11.0	23.0		300480	FSFS11
12	13.0	25.0		300481	FSFS13
14	15.0	27.0		300482	FSFS15
16	17.0	29.0		300483	FSFS17



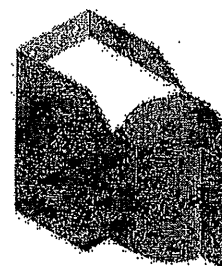
FasNSeal® Support Clamp

A Vent Dia.	B	C	D	Product Number	Part Number
3	4.0	1.5		300361	FSCL4
4	5.0	1.5		300362	FSCL5
5	6.0	1.5		300363	FSCL6
6	7.0	1.5		300364	FSCL7
7	8.0	1.5		300365	FSCL8
8	9.0	1.5		300366	FSCL9
9	10.0	1.5		300367	FSCL10
10	11.0	1.5		300484	FSCL11
12	13.0	1.5		300485	FSCL13
14	15.0	1.5		300486	FSCL15
16	17.0	1.5		300487	FSCL17



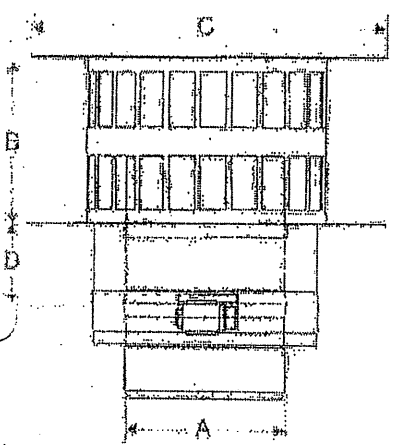
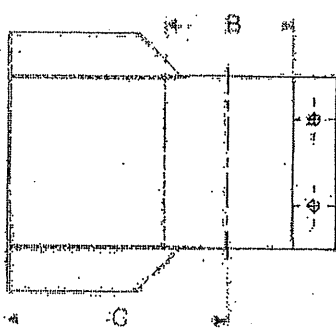
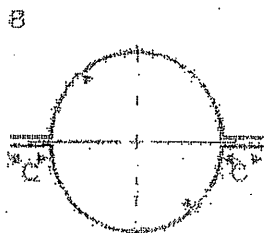
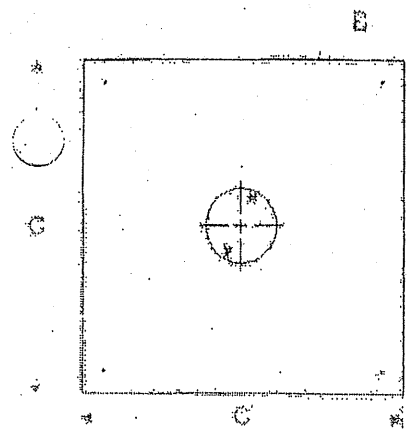
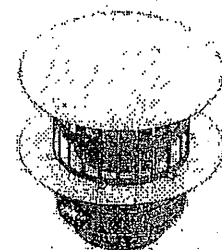
FasNSeal® Wall Bracket

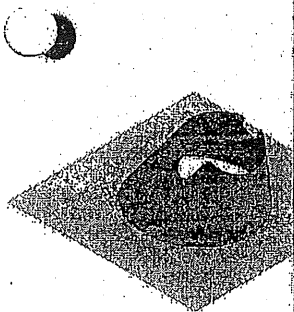
A Vent Dia.	B	C	D	Product Number	Part Number
3	4.0	4.0		300431	FSWB4
4	5.0	4.5		300432	FSWB5
5	6.0	5.0		300433	FSWB6
6	7.0	5.5		300434	FSWB7
7	8.0	6.0		300435	FSWB8
8	9.0	6.5		300436	FSWB9
9	10.0	7.0		300437	FSWB10
10	11.0	7.5		300492	FSWB11
12	13.0	8.5		300493	FSWB13
14	15.0	9.5		300494	FSWB15
16	17.0	10.5		300495	FSWB17



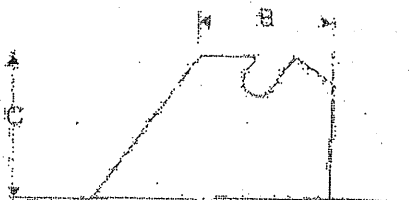
FasNSeal® W2 Ram Cap

A Vent Dia.	B	C	D	Product Number	Part Number
3	3.5	6.8	1.0	100325	W2-RC3
4	4.5	8.9	1.0	100326	W2-RC4
5	5.8	11.3	1.0	100327	W2-RC5
6	6.8	13.5	1.0	100328	W2-RC6
7	7.8	15.8	1.0	100329	W2-RC7
8	8.8	18.0	1.0	100330	W2-RC8
9	10.0	20.0	1.0	100331	W2-RC9
10	11.0	22.0	1.0	100332	W2-RC10
12	13.0	27.0	1.0	100333	W2-RC12
14	15.0	31.0	1.0	100334	W2-RC14
16	17.0	36.0	1.0	100335	W2-RC16

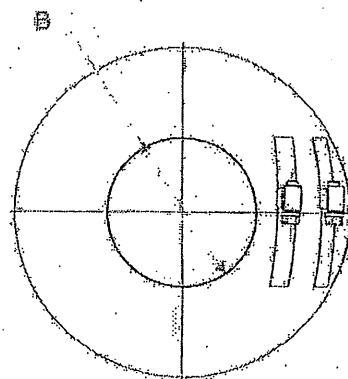




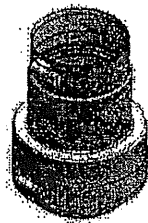
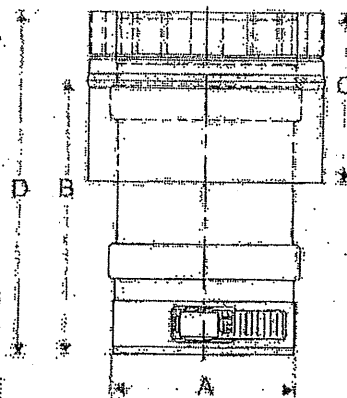
FasNSeal® Variable Pitch Roof Flashing					
Vent Dia.	B	C	D	Product Number	Part Number
3	5.2	7.0		300922	FSVPPF3
4	6.2	7.0		300923	FSVPPF4
5	7.2	7.0		300924	FSVPPF5
6	8.2	7.0		300925	FSVPPF6
7	9.2	7.0		300926	FSVPPF7
8	10.2	7.0		300927	FSVPPF8
9	11.2	7.0		300928	FSVPPF9
10	12.2	7.0		300929	FSVPPF10
12	14.2	7.0		300930	FSVPPF12
14	16.2	7.0		300931	FSVPPF14
16	18.2	7.0		300932	FSVPPF16



FasNSeal® Storm Collar					
Vent Dia.	B	C	D	Product Number	Part Number
3	4.0			300945	FSC4
4	5.0			300946	FSC5
5	6.0			300947	FSC6
6	7.0			300948	FSC7
7	8.0			300949	FSC8
8	9.0			300950	FSC9
9	10.0			300952	FSC10
10	11.0			300970	FSC11
12	13.0			300971	FSC13
14	15.0			300972	FSC15
16	17.0			300973	FSC17



FasNSeal® W2 Universal Appliance Adapter						
Vent Dia.	A	B	C	D	Product Number	Part Number
3	4.8	3.0	6.0		100340	W2-AA3
4	4.8	3.0	6.0		100341	W2-AA4
5	4.8	3.0	6.0		100597	W2-AA5
6	4.8	3.0	6.0		100412	W2-AA6
7	4.8	3.0	6.0		100413	W2-AA7
8	4.8	3.0	6.0		100414	W2-AA8
9	4.8	3.0	6.0		100415	W2-AA9
10	4.8	3.0	6.0		100416	W2-AA10
12	4.8	3.0	6.0		100417	W2-AA12
14	4.8	3.0	6.0		100418	W2-AA14
16	4.8	3.0	6.0		100419	W2-AA16



FasNSeal® W2 to FasNSeal® Single Wall Adapter						
Vent Dia.	A	B	C	D	Product Number	Part Number
3	4.0				100193	FSA-DWSW3
4	4.0				100194	FSA-DWSW4
5	4.0				100195	FSA-DWSW5
6	4.0				100196	FSA-DWSW6
7	4.0				100197	FSA-DWSW7
8	4.0				100198	FSA-DWSW8
9	4.0				100199	FSA-DWSW9
10	4.0				100200	FSA-DWSW10
12	4.0				100201	FSA-DWSW12
14	4.0				100202	FSA-DWSW14
16	4.0				100203	FSA-DWSW16

