



One University Place
8801 J.M. Keynes Drive, Suite 240
Charlotte, North Carolina 28262
Phone 704-376-7072
www.cmta.com

PROJECT: Mooresville Selma Burke MS (Louisville VMGS20)
PROJECT NO: 221.083
SUBMITTAL: 238146-1.0 Water Source Unitary Heat Pumps PD
DATE RECEIVED: January 12, 2022

Engineer's review is for conformance with the general design concept and for general arrangement only. Review and approval shall not be construed to mean that the engineer accepts the detail calculations and dimensions shown in the submittal or any deviation from the requirements of the contract documents. Contractor is responsible for errors or omissions in the submittal; for meeting all requirements of the contract documents; for confirming and correlating job site dimensions; for information that pertains solely to fabrication processes or to techniques of construction; and for the coordination of his work with all other trades.

DISPOSITION LEGEND

R&R RETURNED FOR CORRECTIONS – RESUBMISSION REQUIRED
Fabrication may not proceed. Resubmit corrected items.

Reviewer: Nick Rogers

Date: 02/07/2022

ITEM - DISPOSITION; COMMENT(S):

1. *Submit standard size TS model VHP for single stage units size 006/009/012/018 in lieu of compact TC model. TS model will provide greater capacity and efficiency to more closely match contract documents.*
2. *Submittal indicates left returns for all units under 240. Coordinate right and left-hand requirements for all heat pumps prior to ordering.*
3. *Submittal includes 2' Autoflow Hose kit. Hose kits shall include 36 in hose length per specifications.*
4. *Provide all units with IAQ stainless steel drain pans per specifications.*
5. *Provide all heat pumps with external filter rack per Vertical Heat Pump Installation Detail as indicated in drawings.*

END OF SHOP DRAWING REVIEW



Submittal Transmittal

LS3P | 227 West Trade Street Suite 700 Charlotte NC 28202 United States

PROJECT: MGSD Middle School 9201-201600 DATE SENT: 1/12/2022
 RETURN BY: 1/19/2022
 SUBJECT: WATER SOURCE UNITARY HEAT PUMPS - PD SUBMITTAL ID: 238146-1-0
 TYPE: Submittal TRANSMITTAL ID: 00336
 PURPOSE: For Review and Comment VIA: Info Exchange
 SPEC SECTION: 238146

FROM

NAME	COMPANY	EMAIL	PHONE
Jacquelyn Satterwhite	LS3P	JacquelynSatterwhite@ls3p.com	704-333-6686

TO

NAME	COMPANY	EMAIL	PHONE
Heather Maness	CMTA	cltsupport@cmta.com	704-376-7072
Scott Willard	CMTA	Swillard@cmta.com	502-326-3085

REMARKS:

NOTE: Received 2 files from Procore at 12:49 PM EST on 01/11/2022. Any changes made to the Submittal in Procore after this time are not shown in Newforma.

Procore Due Date:
01/26/2022

General Description:

A. Product Data: For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each water-source unitary heat pump.

b. Include rated capacities, operating characteristics, furnished specialties, and accessories.

Workflow Comments:

DESCRIPTION OF CONTENTS

QTY	DATED	TITLE	NUMBER	NOTES
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Submittal Transmittal

DATE: 1/12/2022

ID: 00336

1	1/11/2022	23 81 46 - Water Source Unitary Heat Pump-PD- REV.pdf		
1	1/11/2022	238146-1-0 - Submittal Form.pdf		



Submittal #238146-1.0 238146 - WATER SOURCE UNITARY HEAT PUMPS

Barnhill Contracting Company
706 Main Ave. NW
Hickory, North Carolina 28601
Phone: (828) 330-7126

Project: 15000420 - SELMA BURKE MIDDLE SCHOOL
235 Rinehardt Road
Mooresville, North Carolina 28115

238146 : WATER SOURCE UNITARY HEAT PUMPS - Product Data

SPEC SECTION:	238146 - WATER SOURCE UNITARY HEAT PUMPS	SUBMITTAL MANAGER:	Logan Ridenhour (BARNHILL CONTRACTING COMPANY)
STATUS:	Open	DATE CREATED:	11/10/2021
ISSUE DATE:		REVISION:	0
RESPONSIBLE CONTRACTOR:	ACTION MECHANICAL CONTRACTORS	RECEIVED FROM:	
RECEIVED DATE:		SUBMIT BY:	01/11/2022
FINAL DUE DATE:	01/26/2022	LOCATION:	
SUB JOB:		COST CODE:	
APPROVERS:	Logan Ridenhour (BARNHILL CONTRACTING COMPANY), Michael Gaffney (LS3P ASSOCIATES, LTD), Jacquelyn Satterwhite (LS3P ASSOCIATES, LTD)		

BALL IN COURT:
Michael Gaffney (LS3P ASSOCIATES, LTD), Jacquelyn Satterwhite (LS3P ASSOCIATES, LTD)

DISTRIBUTION:
Michael Royal (MOORESVILLE GRADED SCHOOL DISTRICT), Kevin Richey (CMTA), Commie Pendergrass (ACTION MECHANICAL CONTRACTORS), David Martin (MOORESVILLE GRADED SCHOOL DISTRICT), Trevor Holmes (LS3P ASSOCIATES, LTD), Support CMTA (CMTA), Tim Ignasiak (BARNHILL CONTRACTING COMPANY), Kyle Novak (LS3P ASSOCIATES, LTD), Logan Ridenhour (BARNHILL CONTRACTING COMPANY), Jacquelyn Satterwhite (LS3P ASSOCIATES, LTD), Michael Gaffney (LS3P ASSOCIATES, LTD), Reiland Funderburk (BARNHILL CONTRACTING COMPANY), Craig Davis (BARNHILL CONTRACTING COMPANY)

DESCRIPTION:
A. Product Data: For each type of product.

- a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each water-source unitary heat pump.
- b. Include rated capacities, operating characteristics, furnished specialties, and accessories.

ATTACHMENTS:

Subcontractor warrants the following:

- a. We have personally investigated the proposed product and determined that it is equal in all respects to that specified and/or performance specification requirements.
- b. We will provide the specified guarantee for this product.
- c. We will coordinate installation of this product into the work, making such changes as may be required for the work to be complete in all aspects.
- d. We have clearly indicated by marking as "Non-Complying Feature" each and every requirement of the specifications that this product does not meet.
- e. And, we waive all claims for additional costs related to this product which subsequently become apparent.

SUBMITTAL WORKFLOW

NAME	SUBMITTER/ APPROVER	SENT DATE	DUE DATE	RETURNED DATE	RESPONSE	ATTACHMENTS	COMMENTS
Commie Pendergrass	Submitter		1/11/2022	1/10/2022	Submitted	23 81 46 - Water Source Unitary Heat Pump Submittal.pdf	
Logan Ridenhour	Approver	1/10/2022	1/11/2022	1/11/2022	Approved	23 81 46 - Water Source Unitary Heat Pump-PD-REV.pdf	

**Submittal #238146-1.0
238146 - WATER SOURCE
UNITARY HEAT PUMPS**

NAME	SUBMITTER/ APPROVER	SENT DATE	DUE DATE	RETURNED DATE	RESPONSE	ATTACHMENTS	COMMENTS
Michael Gaffney	Approver	1/11/2022	1/26/2022		Pending		
Jacquelyn Satterwhite	Approver	1/11/2022	1/26/2022		Pending		

BY _____ DATE _____ COPIES TO _____

SUBMITTAL COVER SHEET

RESPONSIBLE SUBCONTRACTOR:			
DATE SENT:		JOB NUMBER:	
DUE DATE:		LOCATION:	
SPEC SECTION	NO.	SUBMITTAL DESCRIPTION	TYPE
			PRODUCT DATA SHOP DRAWINGS SAMPLES

BARNHILL CONTRACTING COMPANY REVIEW

This review is for general conformance with the contract documents only. Any deviations from same not clearly noted by the Trade Contractor have not been reviewed. The Trade Contractor is responsible for confirming and correlating all dimensions at job site for tolerances, clearances, quantities, fabrication process and techniques of construction. This review does not relieve the Trade Contractor of contractual responsibility for any error or deviation from the Contract Documents.

RESPONSIBLE PARTIES			
	LS3P - ARCHITECTURAL		CMTA - FIRE PROTECTION
	CMTA - PLUMBING		ARP - STRUCTURAL ENGINEERS
	CMTA - ELECTRICAL		
	CMTA - MECHANICAL		

MARKUP COLOR	MARKUP COLOR	MARKUP COLOR
RED		



APPROVED REVISE AND RESUBMIT
 APPROVED AS NOTED REJECTED
 FOR INFORMATION ONLY REVIEWED

REVIEWED BY: Logan Ridenhour

 DATE: 1/11/2022

Barnhill Contracting Company is not responsible for any discrepancy between this submittal and the Contract Documents, nor for any dimension or quantity errors. Review of this submittal does not relieve the Subcontractor or Material Suppliers of their responsibility to comply with the Contract Documents.

CONTRACTOR COMMENTS

ARCHITECT COMMENTS

ENGINEER COMMENTS

Selma Burke Middle School

SUBMITTAL DATA

Date: January 10, 2022

Item: Water Source Unitary Heat Pumps

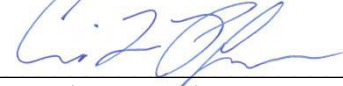
Specification #: 23 81 46

AMCI Submittal#: _____ M-01

Contractor:

Action Mechanical Contractors, Inc.
3228 Nevada Blvd
Charlotte, NC 28273
Phone: (704) 587-4450
Fax: (704) 587-4451

This submittal has been reviewed and appears to be in compliance with the specifications, unless otherwise noted.

Signed: 

Commie L. Pendergrass
Project Manager

Owner: Mooresville Graded School District
Mooresville, NC

Architect: LS3P Associates
227 W. Trade St; Suite 700
Charlotte, NC 28202

Construction Mgr: Barnhill Contracting Co.
706 Main Ave NW
Hickory, NC 28601

Subcontractor/Supplier: James M. Pleasants Co.

Manufacturer: ClimateMaster

Comments/Notes:



JMP Equipment Company

Heating, Cooling and Plumbing Representatives
since 1958

SUBMITTAL DATA

Action Mechanical

December 21, 2021

Project: Selma Burke Middle School
Location: Mooresville, NC
Engineer: CMTA Consulting Engineering

Quote No: QUO-148879-G7M5P3-R3
Project No: JMP-11103-2

WSHPS

- 1 CLIMATE MASTER -
 - (3) VHP-006 - TCV009AESC0CPKS
 - (4) VHP-009 - TCV009AESC0CPKS
 - (9) VHP-012 - TCV012AESC0CPKS
 - (3) VHP-018 - TCV018AESC0CPKS
 - (11) VHP-024 - TEV026BESC0ALTS
 - (5) VHP-036 - TEV038BFSC0ALTS
 - (21) VHP-048 - TEV049BFSC0ALTS
 - (1) VHP-064 - TEV064BFSC0ALTS
 - (2) VHP-072 - TEV072BFSC0ALTS
 - (2) VHP-240 - TCV240AFPCFCFBS
- DXM2 w/ MPC Controls w/ disconnect
- Extended Range, Ultra-quiet, 2" filter frame
- **TCV240 has PSC motors in lieu of ECM**
- 2' Autoflow Hose kit with strainer
- 10 CLIMATE MASTER - Hot Gas Reheat - as required
- 5 CLIMATE MASTER - Spare motors - as required
- 10 CLIMATE MASTER - Spare motors - as required

WSHPS ADD

- 48 CLIMATE MASTER - ASW008STC Sensor with Setpoint Adjustment & Override
- 10 CLIMATE MASTER - ASW0180HUC Sensor with Setpoint Adjustment, Override, and Humidity



Water-Source Heat Pump Submittal

Selma Burke

Project number

Architect:

Engineer:

Contractor:

Representative:

Project Notes:

Product Summary

Qty	Model	Tag
19	TC	VHP-006, VHP-009, VHP-012, VHP-018
40	TE	VHP-024, VHP-036, VHP-048, VHP-064, VHP-072, VHP-036 , VHP-048
2	TL	VHP-240

ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-60000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products. The latest version of this document is available at ClimateMaster.com.



Performance Data

Model: TC-006
Tag/Reference #: VHP-006 /
Qty: 3

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	103	lbs.	
Unit Length/Width/Height:	19.1/19.1/22.0	inches	

Systems Information

Fluid Flow:	1.50	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Unit Performance

	<u>Cooling</u>		<u>Heating</u>	
Air Flow:	200	CFM	200	CFM
Total Capacity:	5.6	MBH	7.0	MBH
Sensible Capacity:	4.2	MBH		
Heat of Rejection:	7.1	MBH		
Heat of Absorption:			5.4	MBH
Leaving Air Dry Bulb:	55.4	°F	100.6	°F
Leaving Air Wet Bulb:	50.4	°F		
Leaving Fluid Temp:	94.5	°F	42.8	°F
Fluid Pressure Drop:	1.4	ft. H2O	2.1	ft. H2O
Input Power:	0.5	kW	0.5	kW
Efficiency:	12.6	EER	4.4	COP

Selected Options

- Top Discharge, ECM Constant Volume Motor
- Left Return, Polymer Drain Pan
- DXM2 w/ MPC Controls w/ Disconnect
- Extended Range, Ultra Quiet, 2" Filter Frame
- Uncoated Air Coil, Copper Water Coil

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
265/60/1	4	4.65	15

Fan Performance

External Duct Static:	0.70	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	1.4		
Compressor	1		2.6	13.5



Performance Data

Model: TC-009
Tag/Reference #: VHP-009 /
Qty: 4

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	105	lbs.	
Unit Length/Width/Height:	19.1/19.1/22.0	inches	

Systems Information

Fluid Flow:	2.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Unit Performance

	<u>Cooling</u>		<u>Heating</u>	
Air Flow:	300	CFM	300	CFM
Total Capacity:	8.4	MBH	9.9	MBH
Sensible Capacity:	6.1	MBH		
Heat of Rejection:	10.6	MBH		
Heat of Absorption:			7.2	MBH
Leaving Air Dry Bulb:	56.1	°F	98.4	°F
Leaving Air Wet Bulb:	51.1	°F		
Leaving Fluid Temp:	95.6	°F	42.8	°F
Fluid Pressure Drop:	8.8	ft. H2O	9.7	ft. H2O
Input Power:	0.7	kW	0.8	kW
Efficiency:	12.8	EER	3.7	COP

Selected Options

- Top Discharge, ECM Constant Volume Motor
- Left Return, Polymer Drain Pan
- DXM2 w/ MPC Controls w/ Disconnect
- Extended Range, Ultra Quiet, 2" Filter Frame
- Uncoated Air Coil, Copper Water Coil

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
265/60/1	4.8	5.65	15

Fan Performance

External Duct Static:	0.70	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	1.4		
Compressor	1		3.4	17.5



Performance Data

Model: TC-012
Tag/Reference #: VHP-012 /
Qty: 9

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	114	lbs.	
Unit Length/Width/Height:	19.1/19.1/22.0	inches	

Systems Information

Fluid Flow:	3.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Unit Performance

	<u>Cooling</u>		<u>Heating</u>	
Air Flow:	400	CFM	400	CFM
Total Capacity:	11.4	MBH	13.2	MBH
Sensible Capacity:	8.0	MBH		
Heat of Rejection:	14.4	MBH		
Heat of Absorption:			10.0	MBH
Leaving Air Dry Bulb:	56.4	°F	98.5	°F
Leaving Air Wet Bulb:	51.4	°F		
Leaving Fluid Temp:	94.6	°F	43.3	°F
Fluid Pressure Drop:	8.5	ft. H2O	11.6	ft. H2O
Input Power:	0.9	kW	0.9	kW
Efficiency:	12.9	EER	4.2	COP

Selected Options

- Top Discharge, ECM Constant Volume Motor
- Left Return, Polymer Drain Pan
- DXM2 w/ MPC Controls w/ Disconnect
- Extended Range, Ultra Quiet, 2" Filter Frame
- Uncoated Air Coil, Copper Water Coil

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
265/60/1	6.7	7.75	15

Fan Performance

External Duct Static:	0.40	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	2.5		
Compressor	1		4.2	31.5



Performance Data

Model: TC-018
Tag/Reference #: VHP-018 /
Qty: 3

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	158	lbs.	
Unit Length/Width/Height:	21.5/21.5/39.0	inches	

Systems Information

Fluid Flow:	4.50	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Unit Performance

	<u>Cooling</u>		<u>Heating</u>	
Air Flow:	600	CFM	600	CFM
Total Capacity:	17.7	MBH	18.4	MBH
Sensible Capacity:	13.7	MBH		
Heat of Rejection:	22.2	MBH		
Heat of Absorption:			14.1	MBH
Leaving Air Dry Bulb:	53.9	°F	96.4	°F
Leaving Air Wet Bulb:	48.7	°F		
Leaving Fluid Temp:	94.9	°F	43.7	°F
Fluid Pressure Drop:	9.7	ft. H2O	12.7	ft. H2O
Input Power:	1.3	kW	1.3	kW
Efficiency:	13.6	EER	4.3	COP

Selected Options

- Top Discharge, ECM Constant Volume Motor
- Left Return, Polymer Drain Pan
- DXM2 w/ MPC Controls w/ Disconnect
- Extended Range, Ultra Quiet, 2" Filter Frame
- Uncoated Air Coil, Copper Water Coil

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
265/60/1	8.4	9.9	15

Fan Performance

External Duct Static:	0.40	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Compressor	1		6	28
Fan Motor	1	2.4		



Performance Data

Model: TE-026
Tag/Reference #: VHP-024 /
Qty: 11

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	298	lbs.	
Unit Length/Width/Height:	25.6/25.4/48.5	inches	

Systems Information

Fluid Flow:	6.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%
Unit Load:	Full Load				

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Selected Options

- None
- Top Discharge, ECM Motor
- Left Return
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range Ins, UltraQuiet, 2" Frame
- Tin Plated/Microchannel Air Coil, Copper Water Coil

Unit Performance

	<u>Full Cooling</u>		<u>Full Heating</u>	
Air Flow:	800	CFM	800	CFM
Total Capacity:	24.7	MBH	25.8	MBH
Sensible Capacity:	16.7	MBH		
Heat of Rejection:	29.9	MBH		
Heat of Absorption:			20.2	MBH
Leaving Air Dry Bulb:	55.7	°F	97.8	°F
Leaving Air Wet Bulb:	50.6	°F		
Leaving Fluid Temp:	95.0	°F	43.3	°F
Fluid Pressure Drop:	3.3	ft. H2O	3.6	ft. H2O
Input Power:	1.5	kW	1.6	kW
Efficiency:	16.5	EER	4.6	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
265/60/1	12.3	14.6	20

Fan Performance

External Duct Static:	0.60	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	3.2		
Compressor	1		9.1	54



Performance Data

Model: TE-038
Tag/Reference #: VHP-036 /
Qty: 4

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	359	lbs.	
Unit Length/Width/Height:	30.6/28.4/50.5	inches	

Systems Information

Fluid Flow:	9.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%
Unit Load:	Full Load				

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Selected Options

- None
- Top Discharge, ECM Motor
- Left Return
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range Ins, UltraQuiet, 2" Frame
- Tin Plated/Microchannel Air Coil, Copper Water Coil

Unit Performance

	<u>Full Cooling</u>		<u>Full Heating</u>	
Air Flow:	1200	CFM	1200	CFM
Total Capacity:	38.0	MBH	39.1	MBH
Sensible Capacity:	25.4	MBH		
Heat of Rejection:	45.6	MBH		
Heat of Absorption:			31.4	MBH
Leaving Air Dry Bulb:	55.4	°F	98.2	°F
Leaving Air Wet Bulb:	50.4	°F		
Leaving Fluid Temp:	95.1	°F	43.0	°F
Fluid Pressure Drop:	7.0	ft. H2O	6.5	ft. H2O
Input Power:	2.2	kW	2.3	kW
Efficiency:	17.3	EER	5.0	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	8.9	10.3	15

Fan Performance

External Duct Static:	0.60	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	3.2		
Compressor	1		5.7	38



Performance Data

Model: TE-049
Tag/Reference #: VHP-048 /
Qty: 17

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	448	lbs.	
Unit Length/Width/Height:	30.6/28.4/54.5	inches	

Systems Information

Fluid Flow:	12.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%
Unit Load:	Full Load				

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Selected Options

- None
- Top Discharge, ECM Motor
- Left Return
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range Ins, UltraQuiet, 2" Frame
- Tin Plated/Microchannel Air Coil, Copper Water Coil

Unit Performance

	<u>Full Cooling</u>		<u>Full Heating</u>	
Air Flow:	1600	CFM	1600	CFM
Total Capacity:	48.3	MBH	49.1	MBH
Sensible Capacity:	34.1	MBH		
Heat of Rejection:	58.6	MBH		
Heat of Absorption:			38.2	MBH
Leaving Air Dry Bulb:	55.3	°F	96.4	°F
Leaving Air Wet Bulb:	50.2	°F		
Leaving Fluid Temp:	94.8	°F	43.6	°F
Fluid Pressure Drop:	7.5	ft. H2O	6.5	ft. H2O
Input Power:	3.0	kW	3.2	kW
Efficiency:	16.0	EER	4.5	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	12.4	14	20

Fan Performance

External Duct Static:	0.60	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	6		
Compressor	1		6.4	41



Performance Data

Model: TE-064
Tag/Reference #: VHP-064 /
Qty: 1

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	475	lbs.	
Unit Length/Width/Height:	30.6/28.4/58.5	inches	

Systems Information

Fluid Flow:	15.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%
Unit Load:	Full Load				

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Selected Options

- Top Discharge, ECM Motor
- Left Return
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range Ins, UltraQuiet, 2" Frame
- Tin Plated/Microchannel Air Coil, Copper Water Coil w/ Reheat

Unit Performance

	<u>Full Cooling</u>		<u>Full Heating</u>	
Air Flow:	2000	CFM	2000	CFM
Total Capacity:	63.1	MBH	67.4	MBH
Sensible Capacity:	48.4	MBH		
Heat of Rejection:	76.9	MBH		
Heat of Absorption:			53.3	MBH
Leaving Air Dry Bulb:	52.6	°F	99.2	°F
Leaving Air Wet Bulb:	47.2	°F		
Leaving Fluid Temp:	95.3	°F	42.9	°F
Fluid Pressure Drop:	7.7	ft. H2O	10.8	ft. H2O
Input Power:	4.0	kW	4.1	kW
Efficiency:	15.7	EER	4.8	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	13.2	15	20

Fan Performance

External Duct Static:	0.60	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	6		
Compressor	1		7.2	52



Performance Data

Model: TE-072
Tag/Reference #: VHP-072 /
Qty: 2

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	475	lbs.	
Unit Length/Width/Height:	30.6/28.4/58.5	inches	

Systems Information

Fluid Flow:	17.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%
Unit Load:	Full Load				

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Selected Options

- Top Discharge, ECM Motor
- Left Return
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range Ins, UltraQuiet, 2" Frame
- Tin Plated/Microchannel Air Coil, Copper Water Coil w/ Reheat

Unit Performance

	<u>Full Cooling</u>		<u>Full Heating</u>	
Air Flow:	2300	CFM	2300	CFM
Total Capacity:	69.6	MBH	74.1	MBH
Sensible Capacity:	52.5	MBH		
Heat of Rejection:	86.7	MBH		
Heat of Absorption:			57.1	MBH
Leaving Air Dry Bulb:	53.9	°F	97.8	°F
Leaving Air Wet Bulb:	48.6	°F		
Leaving Fluid Temp:	95.2	°F	43.3	°F
Fluid Pressure Drop:	12.1	ft. H2O	13.9	ft. H2O
Input Power:	5.0	kW	4.9	kW
Efficiency:	14.0	EER	4.4	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	14.5	16.6	25

Fan Performance

External Duct Static:	0.60	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	6		
Compressor	1		8.5	66.1



Performance Data

Model: TE-038
Tag/Reference #: VHP-036 /
Qty: 1

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	359	lbs.	
Unit Length/Width/Height:	30.6/28.4/50.5	inches	

Systems Information

Fluid Flow:	9.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%
Unit Load:	Full Load				

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Selected Options

- Top Discharge, ECM Motor
- Left Return
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range Ins, UltraQuiet, 2" Frame
- Tin Plated/Microchannel Air Coil, Copper Water Coil w/ Reheat

Unit Performance

	<u>Full Cooling</u>		<u>Full Heating</u>	
Air Flow:	1200	CFM	1200	CFM
Total Capacity:	38.0	MBH	39.1	MBH
Sensible Capacity:	25.4	MBH		
Heat of Rejection:	45.6	MBH		
Heat of Absorption:			31.4	MBH
Leaving Air Dry Bulb:	55.4	°F	98.2	°F
Leaving Air Wet Bulb:	50.4	°F		
Leaving Fluid Temp:	95.1	°F	43.0	°F
Fluid Pressure Drop:	7.0	ft. H2O	6.5	ft. H2O
Input Power:	2.2	kW	2.3	kW
Efficiency:	17.3	EER	5.0	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	8.9	10.3	15

Fan Performance

External Duct Static:	0.60	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Compressor	1		5.7	38
Fan Motor	1	3.2		



Performance Data

Model: TE-049
Tag/Reference #: VHP-048 /
Qty: 4

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	448	lbs.	
Unit Length/Width/Height:	30.6/28.4/54.5	inches	

Systems Information

Fluid Flow:	12.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%
Unit Load:	Full Load				

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Selected Options

- Top Discharge, ECM Motor
- Left Return
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range Ins, UltraQuiet, 2" Frame
- Tin Plated/Microchannel Air Coil, Copper Water Coil w/ Reheat

Unit Performance

	<u>Full Cooling</u>		<u>Full Heating</u>	
Air Flow:	1600	CFM	1600	CFM
Total Capacity:	48.3	MBH	49.1	MBH
Sensible Capacity:	34.1	MBH		
Heat of Rejection:	58.6	MBH		
Heat of Absorption:			38.2	MBH
Leaving Air Dry Bulb:	55.3	°F	96.4	°F
Leaving Air Wet Bulb:	50.2	°F		
Leaving Fluid Temp:	94.8	°F	43.6	°F
Fluid Pressure Drop:	7.5	ft. H2O	6.5	ft. H2O
Input Power:	3.0	kW	3.2	kW
Efficiency:	16.0	EER	4.5	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	12.4	14	20

Fan Performance

External Duct Static:	0.60	in. H2O
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Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Compressor	1		6.4	41
Fan Motor	1	6		



Performance Data

Model: TL-240
Tag/Reference #: VHP-240 /
Qty: 2

General Information

Unit Configuration:	Vertical Upflow		
Operating Weight:	1346	lbs.	
Unit Length/Width/Height:	34.0/106.7/79.0	inches	

Systems Information

Fluid Flow:	60.00	GPM	Altitude:	0	Feet
Fluid Type:	Water		Antifreeze Percent:	0	%

Entering Conditions

	<u>Cooling</u>		<u>Heating</u>	
Entering Air Dry Bulb:	75.0	°F	68.0	°F
Entering Air Wet Bulb:	63.0	°F		
Entering Water/Fluid:	85.0	°F	50.0	°F

Unit Performance

	<u>Cooling</u>		<u>Heating</u>	
Air Flow:	8000	CFM	8000	CFM
Total Capacity:	228.7	MBH	247.2	MBH
Sensible Capacity:	165.0	MBH		
Heat of Rejection:	287.2	MBH		
Heat of Absorption:			189.3	MBH
Leaving Air Dry Bulb:	55.9	°F	96.6	°F
Leaving Air Wet Bulb:	50.9	°F		
Leaving Fluid Temp:	94.6	°F	43.7	°F
Fluid Pressure Drop:	16.3	ft. H2O	21.1	ft. H2O
Input Power:	17.1	kW	17.0	kW
Efficiency:	13.4	EER	4.3	COP

Unit Electrical Data

	<u>Unit Amps - FLA</u>	<u>Min. Cir. Amps - MCA</u>	<u>Max. Fuse Size - MFS</u>
460/60/3	42.7	46.8	60

Fan Performance

Fan Motor BHP:	3.98	BHP
Fan Motor RPM:	894	RPM
Sheave:	C	
Turns:	4.50	
External Duct Static:	1.25	in. H2O

Motor / Compressor Data

	<u>Qty</u>	<u>FLA (ea.)</u>	<u>RLA (ea.)</u>	<u>LRA (ea.)</u>
Fan Motor	1	7		
Compressor	2		16.7	114



Selected Options

- Front Return
- High RPM & Standard Motor
- DXM2 w/ MPC Controls w/ Disconnect
- Ext Range, 2" Filter Frame, UltraQuiet
- Uncoated Air Coil, Copper Water Coil w/ Reheat

Unit Features

THE TRANQUILITY® 16 COMPACT (TC) SERIES

The award winning Tranquility® 16 Series raises the bar for water-source heat pump efficiencies, features and application flexibility. Not only does the Tranquility 16 exceed ASHRAE 90.1 efficiencies, but it also uses EarthPure® HFC-410A zero ozone depletion refrigerant, making it an extremely environmentally-friendly option. Tranquility 16 is eligible for LEED® (Leadership in Energy and Environmental Design) points because of the “green” technology design. With one of the smallest cabinets in the industry, the Tranquility 16 will easily fit into tight spaces. Designed to be backward compatible with thousands of older water-source heat pumps, the Tranquility 16 Compact Series heat pump is packed full of the innovation you have come to expect from the experts at ClimateMaster.

Available in sizes from 1/2 ton (1.76 kW) through 5 tons (17.6 kW) with multiple cabinet options (vertical upflow and horizontal) the Tranquility 16 offers a wide range of units for most any application.

ClimateMaster’s exclusive double isolation compressor mounting system makes the Tranquility 16 one of the quietest units on the market. Compressors are mounted on specially engineered sound-tested EPDM grommets to a heavy gauge mounting plate, which is further isolated from the cabinet base with rubber grommets for maximized vibration/sound attenuation. The easy access control box and large access panels make installing and maintaining the unit easier than other water-source heat pumps currently in production, proving that a small unit can be easy to service.

Options such as tin-plated air coil, DDC controls, and high efficiency pleated MERV rated air filters allow customized design solutions. Optional high static fan motor expands the operating range and helps overcome some of the challenges associated with ductwork for retrofit installations. ECM constant CFM or constant torque motors available for all sizes. A cupro-nickel water-coil and sound absorbing UltraQuiet package are options that make a great unit even better. [Optional factory installed Waterside Economizer \(WSE\) uses cool loop water for “free” cooling. WSE option meets IECC section C403.3.1 and is a requirement in many states.](#)

The Tranquility 16 (TC) Series Water-Source Heat Pumps are designed to meet the challenges of today’s HVAC demands with one of the most innovative products available on the market.

UNIT FEATURES

- Sizes 006 (1/2 ton, 1.76 kW) through 060 (5 tons, 17.6 kW)
- EarthPure HFC-410A refrigerant
- Exceeds ASHRAE 90.1 efficiencies
- Galvanized steel construction
- Sound absorbing glass fiber insulation
- Unique double isolation compressor mounting via vibration isolating rubber grommets for quiet operation
- Insulated divider and separate compressor/air handler compartments
- Copeland scroll compressors (rotary for size 018 and below)
- TXV metering device
- Microprocessor controls standard
- Field convertible discharge air arrangement for horizontal units
- PSC three-speed fan motor
- Unit Performance Sentinel performance monitoring system
- Eight Safeties Standard
- Extended range (20 to 120°F, -6.7 to 48.9°C) capable
- Polymer drain pan

AVAILABLE OPTIONS

- Advanced DXM2 controls
- High static blowers
- LonWorks, BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Cupro-nickel water-coil
- Sound absorbing UltraQuiet package
- Constant CFM ECM variable speed communicating motor
- Constant torque ECM 4 or 5 speed TAP motor
- Waterside Economizer (WSE)
- Stainless steel condensate drain pan
- Electrical service disconnect

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iGate® Communicating Controls

iGate® - Information gateway to monitor, control, and diagnose your system

Tranquility® 30 Digital is equipped with industry-first, iGate® – Information Gateway – 2-way communicating system. iGate allows users to interact with their geothermal system in plain English. It delivers improved reliability and efficiency by precisely controlling smart variable speed components. iGate makes Tranquility 30 Digital series the easiest geothermal products to install and service.

Monitor/Configure – Installers can configure Tranquility® 30 Digital units from the iGate® communicating thermostat or configuration/ diagnostic tool. This includes: Air flow, loop, water-flow option configuration, unit configuration, accessory configuration, and demand reduction (optional - to limit unit operation during peak times). Users can look up the current system status: temperature sensor readings and operational status of the blower and pump.

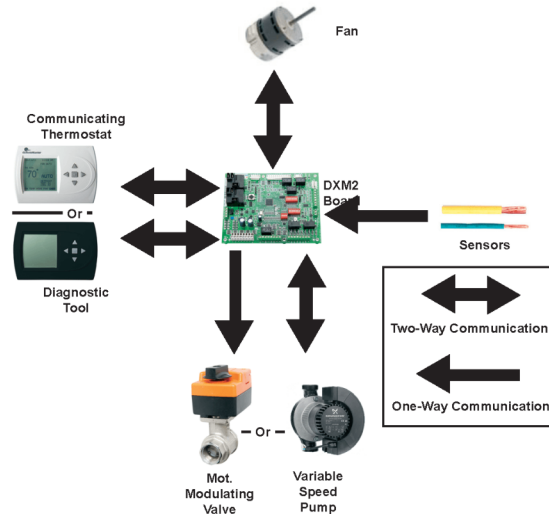
Precise Control – The new DXM2 board enables intelligent, 2-way communication between the DXM2 board and smart components like the communicating thermostat, fan motor, and water pump. The DXM2 board can also directly control the modulating valve and accepts various feedback/input (see figure). The Intelligent DXM2 board uses information received from the smart components/sensors to precisely control operation of the variable speed fan and variable speed water pump (or modulating valve) to deliver higher efficiency, reliability and increased comfort.

Diagnostics – iGate takes diagnosing geothermal units to the next level of simplicity, by providing a dashboard of system and fault information, in plain English, on the iGate thermostat/ service tool.

iGate Service Warning will alert the occupant of a fault and display dealer information (if programmed), fault description, possible causes, and current system status (temperature readings, fan RPM, and water flow status) which may be reported to service personnel.

In iGate Service Mode, the service personnel can access fault description, possible causes, and most importantly, the conditions (temp, flow, i/o conditions, configuration) at the time of the fault. Manual Operation mode allows the service personnel to manually command operation for any of the thermostat outputs, blower speed, pump speed, or valve position from the thermostat to help troubleshoot specific components.

With the iGate communicating system, users and contractors have a gateway to system information that's never been available before now.



AIRFLOW SELECTION	
	CFM
HEAT STAGE 1	600
HEAT STAGE 2	750
AUXILIARY HEAT	850
EMERGENCY HEAT	850
COOL STAGE 1	525
COOL STAGE 2	700
COOL DEHUMID 1	425
COOL DEHUMID 2	550
CONTINUOUS FAN	350
HEAT OFF DELAY	60
COOL OFF DELAY	30
◀ PREVIOUS	NEXT ▶

POSSIBLE FAULT CAUSES	
LOW WATER COIL TEMP	
LOW WATER TEMP - HTG	
LOW WATER FLOW - HTG	
LOW REFRIG CHARGE - HTG	
INCORRECT LT1 SETTING	
BAD LT1 THERMISTOR	
◀ PREVIOUS	

FAULT TEMPERATURE CONDITIONS	
LT1 LOW WATER TEMP	
HEAT 1 11:11 AM 11/14	
LT1 TEMP	28.1
LT2 TEMP	97.3
HOT WATER EWT	121.5
COMP DISCHARGE	157.7
LEAVING AIR	92.7
LEAVING WATER	34.9
ENTERING WATER	42.1
CONTROL VOLTAGE	26.4
◀ PREVIOUS	

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Physical Data

TC Series	006	009	012	015	018	024	030	036	041	042	048	060
Compressor (1 Each)	Rotary						Scroll					
Factory Charge HFC-410A (oz)	19	20	23	35	43	40	48	50	70	70	74	82
ECM Fan Motor & Blower												
Blower Wheel Size (Dia x w)	6x5	6x5	6x5	9x7	9x7	9x7	9x7	9x8	N/A	9x8	10x10	12x10
PSC Fan Motor & Blower												
Fan Motor Type/Speeds	PSC/3	PSC/3	PSC-3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3
Blower Wheel Size (Dia x w)	5x5	5x5	6x5	8x7	8x7	9x7	9x7	9x8	9x8	9x8	10x10	12x10
Water Connection Size												
FPT	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"
Coax Volume (gallons)	0.123	0.143	0.167	0.286	0.450	0.286	0.323	0.323	0.890	0.890	0.738	0.939
Vertical												
Air Coil Dimensions (H x W)	10x15	10x15	10x15	20x17.25	20x17.25	20x17.25	20x17.25	24x21.75	20x17.25	24x21.76	24x28.25	24x28.25
Filter Standard - 1" Throwaway	10x18	10x18	10x18	20x20	20x20	20x20	20x20	24x24	20x20	24x24	1-14x24, 1-18x24	1-14x24, 1-18x24
Weight - Operating (lbs.)	103	105	114	153	158	189	197	203	210	218	263	278
Weight - Packaged (lbs.)	113	115	124	158	163	194	202	209	217	224	270	285
Horizontal												
Air Coil Dimensions (H x W)	10x15	10x15	10x15	16x22	16x22	16x22	16x22	20x25	N/A	20x25	20x35	20x35
Filter Standard - 1" Throwaway	10x18	10x18	10x18	16x25	16x25	18x25	18x25	20x28 or 2-20x14	N/A	20x28 or 2-20x14	1-20x24, 1-20x14	1-20x24, 1-20x14
Weight - Operating (lbs.)	103	105	114	153	158	174	182	203	N/A	218	263	278
Weight - Packaged (lbs.)	113	115	124	158	163	179	187	209	N/A	224	270	285

Notes:
 All units have TXV expansion device, and 1/2" & 3/4" electrical knockouts.
 FPT = Female Pipe Thread
 Condensate Drain Connection is rubber coupling that couples to 3/4" schedule 40/80 PVC.
 575 volt fan motors are two speed.

Unit Maximum Water Working Pressure	Max Pressure PSIG [kPa]
Base Unit	500 [3447]
WSE Option	300 [2068]

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TC - Vertical Upflow – Dimensional Data

Vertical Upflow Model		Overall Cabinet		
		A Width	B Depth	C Height
006 - 012	in cm	19.1 48.5	19.1 48.5	22.0 55.9
015 - 030, 041	in cm	21.5 54.6	21.5 54.6	40.0 101.6
036 - 042	in cm	21.5 54.6	26.0 66.0	45.0 114.3
048 - 060	in cm	24.0 61.0	32.5 82.6	46.0 116.8

Vertical Model		Electrical Knockouts	
		J 1/2"	K 3/4"
		Low Voltage	Power Supply
006 - 012	in cm	5.9 14.9	8.9 22.5
015 - 060	in cm	7.1 18.1	10.1 25.7
041	in cm	7.1 18.0	11.1 28.2

Vertical Upflow Model		Water Connections - Standard Units						
		①		②		③		Loop In/Out FPT
		Loop In D	Loop In E	Loop Out F	Loop Out G	H	I	
006 - 012	in cm	1.5 3.8	1.5 3.8	9.5 24.1	1.5 3.8	11.7 29.7	1.4 3.6	1/2"
015	in cm	1.9 4.8	1.4 3.6	13.8 35.1	1.4 3.6	19.7 50.0	1.4 3.6	1/2"
018	in cm	1.9 4.8	1.4 3.6	13.8 35.1	1.4 3.6	19.7 50.0	1.4 3.6	1/2"
024	in cm	1.9 4.8	1.4 3.6	13.8 35.1	1.4 3.6	19.7 50.0	1.4 3.6	3/4"
030	in cm	1.9 4.8	1.4 3.6	15.2 38.6	1.4 3.6	19.7 50.0	1.4 3.6	3/4"
036	in cm	1.9 4.8	1.4 3.6	15.2 38.6	1.4 3.6	20.6 52.3	1.4 3.6	3/4"
041	in cm	3.6 4.8	2.3 5.8	14.0 35.6	2.3 5.8	18.3 46.5	2.3 5.8	3/4"
042	in cm	1.9 4.8	1.4 3.6	16.6 42.0	1.4 3.6	20.6 52.3	1.4 3.6	3/4"
048	in cm	2.0 5.1	1.4 3.6	16.9 42.9	1.4 3.6	21.6 54.9	1.4 3.6	1"
060	in cm	2.0 5.1	1.4 3.6	17.4 44.2	1.4 3.6	21.6 54.9	1.4 3.6	1"

Notes:

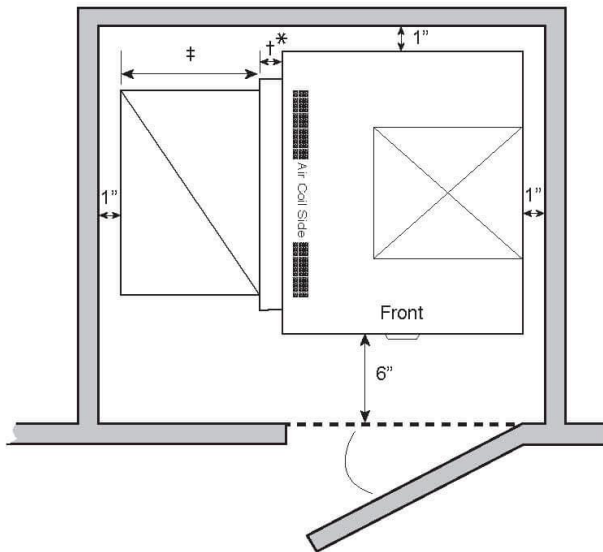
1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Front & Side access is preferred for service access. However, all components may be serviced from the front access panel if side access is not available. (Except on TCV 009-030 and 041 with front return) Units with the front return require left side access for the fan.
3. Discharge flange is field installed.
4. Condensate fitting on Polymer drain pan is rubber coupling that couples to 3/4" schedule 40/80 PVC, S.S. drain pan is 3/4" MPT.
5. Units are shipped with air filter rails that are not suitable for supporting return air ductwork. An air filter frame with duct mounting collar is available as an accessory, see the ClimateMaster Accessory Submittal set for further information on this frame.

Legend:

- CCP = Control/Compressor Access Panel
- BSP = Blower Service Panel
- ASP = Alternative Service Panel

Recommended Minimum Installation Clearances for Vertical Units*	
1"	Back of unit
	Side opposite return air
6"	Front if hard piped
Return Air Side	
1"	Ducted return
	- ± *Add for duct width
	- † Add 2" for 1" filter frame/rail or 3" for 2" filter frame/rail
	Free (open) return - calculate required dimension for a maximum velocity of 600 fpm

*Field installed accessories (hoses, air cleaners, etc.) and factory WSE option will require additional space. Top supply air is shown, the same clearances apply to bottom supply air units.

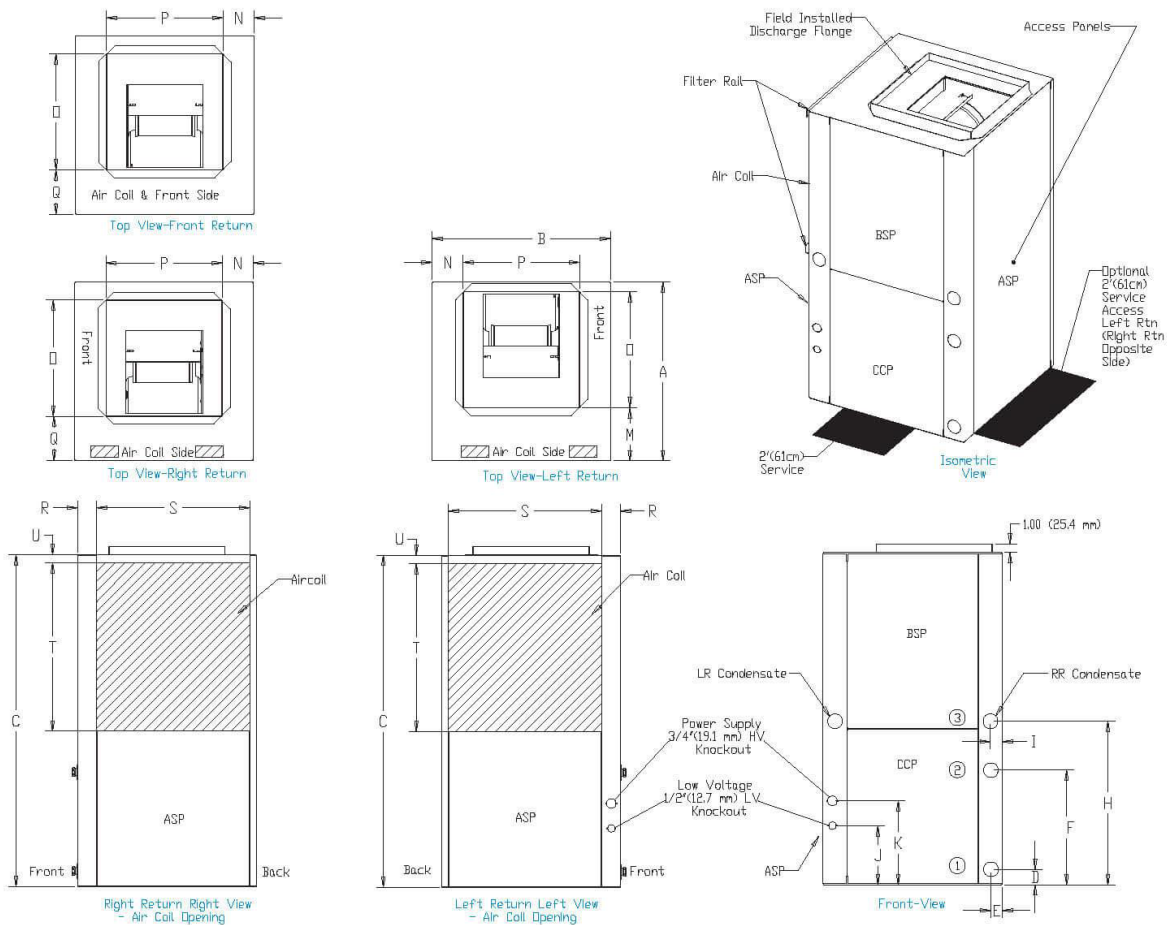


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TC - Vertical Upflow – Dimensional Data

Vertical Model		Discharge Connection Duct Flange Installed (+/- 0.10 in, +/- 2.5mm)					Return Connection Using Return Air Opening				
		M	N	O Supply Width	P Supply Depth	Q	R	S Return Depth	T Return Height	U	
006 - 012	in	8.9	5.1	9.0	9.0	5.5	2.1	16.2	9.9	0.7	
	cm	22.7	12.9	22.9	22.9	14.0	5.3	41.1	25.1	1.9	
015 - 018	in	6.4	3.8	14.0	14.0	5.3	2.3	18.3	20.9	0.7	
	cm	16.1	9.5	35.6	35.6	13.6	5.8	46.5	53.1	1.9	
024 - 030, *041	in	6.4	5.0	14.0	14.0	5.8	2.0	18.5	19.3	0.9	
	cm	16.3	12.7	35.6	35.6	14.7	5.1	47.0	49.0	2.3	
036 - 042	in	6.4	3.8	14.0	14.0	5.1	2.3	22.8	23.9	0.7	
	cm	16.1	9.5	35.6	35.6	13.1	5.8	57.9	60.7	1.9	
048 - 060	in	6.9	7.3	16.0	18.0	5.1	2.3	29.3	22.5	0.7	
	cm	17.4	18.4	40.6	45.7	13.1	5.8	74.4	57.0	1.9	

* Size 041 units have unique M, N, Q dimensions due to the position of the blower assembly.
 Front Return - N = 4.8 in (12.2 cm), Q = 6.4 in (16.3 cm).
 Right Return - N = 3.8 in (9.7 cm), Q = 5.5 in (14.0 cm).
 Left Return - M = 6.4 in (16.3 cm), N = 2.8 in (7.1 cm).



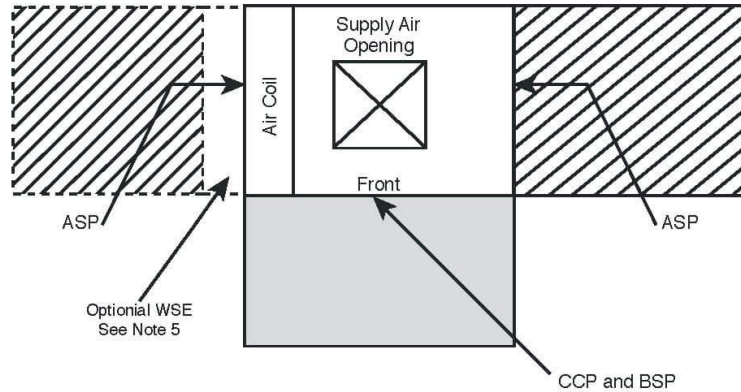
Units are shipped with air filter rails that are not suitable for supporting return air ductwork. A air filter frame with duct mounting collar is available as an accessory, see the ClimateMaster Accessory Submittal set for further information on this frame.

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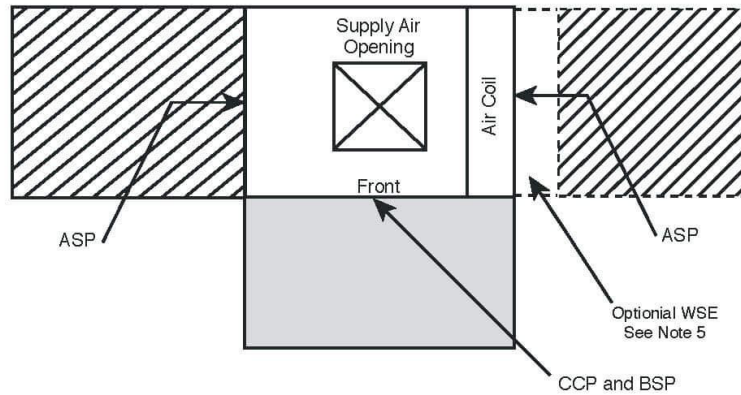
TC - Vertical Service Access

Vertical Units

Left Return



Right Return



Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Front & Side access is preferred for service access. However, units without WSE option may be serviced from the front access panel if side access is not available.
3. ASP are removable panels that provide additional access to the units interior. Clear access to ASP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.
4. Front return units (not shown) require front access for controls/compressor and left side access for blower.
5. Units with WSE Must have access to water valve through side access panel.

- = mandatory 2' service access
- = (optional) additional 2' service access

Legend:

- CCP = Control/Compressor Access Panel
- BSP = Blower Service Panel
- ASP = Additional Service Panel (not required)
- WSE = Waterside Economizer

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TC Series Wiring Diagram Matrix

All current diagrams can be located online at climatemaster.com. Click 'Commercial Professional' (go to 'Resources/literature/wiring diagrams' in the upper right), use part numbers below to lookup wiring diagrams

Unit Controller	Fan Motor	Water Side Economizer	208v/1 - 265v/1		208v/3	460v/3	575v/3
			006-012	015-060	024-060	024-060	041-060
CXM	PSC	None	96B0500N11		96B0500N21	96B0500N31	
		WSE	96B0452N15		96B0452N20	96B0452N30	
	CT ECM	None	96B0506N11		96B0506N21	96B0506N31	
		WSE	96B0455N11		96B0455N21	96B0455N31	
DXM2	PSC	None	96B0521N11		96B0521N21	96B0521N31	
		WSE	96B0476N11		96B0476N21	96B0476N31	
	CT ECM	None	96B0527N11		96B0527N21	96B0527N31	
		WSE	96B0478N11		96B0478N21	96B0478N31	
	CV ECM	None	96B0523N01	96B0523N11	96B0523N21	96B0523N31	
		WSE	96B0477N01	96B0477N11	96B0477N21	96B0477N31	
Auxiliary WD for MPC			96B0147N14				
Control Box Layouts			96B0500N00				

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Tranquility® 16 (TC) Series 60 Hz Engineering Specifications – Page 1

General:

Furnish and install ClimateMaster Tranquility® "TC" Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 20° to 120°F (-6.7° to 48.9°C) as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI/ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI/ISO and ETL-US-C labels.

All units shall pass a factory acceptance test. The quality control system shall automatically perform the factory acceptance test via computer. A detailed report card from the factory acceptance test shall ship with each unit. **Note: If unit fails the factory acceptance test it shall not be allowed to ship. Unit serial number will be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.**

Basic Construction:

Horizontal units shall have one of the following air flow arrangements: Left Inlet/Straight (Right) Discharge; Right Inlet/Straight (Left) Discharge; Left Inlet/Back Discharge; or Right Inlet/Back Discharge as shown on the plans. Units must have the ability to be field convertible from straight to back or back to straight discharge with no additional parts or unit structure modification. Horizontal units will have factory installed hanger brackets with rubber isolation grommets packaged separately.

Vertical units shall have one of the following airflow arrangements: Left Return/Top Discharge, Right Return/Top Discharge, as shown on the plans.

If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All units (horizontal and vertical) must have a minimum of two access panels for serviceability of compressor compartment. **Units having only one access panel to compressor/heat exchangers/expansion device/refrigerant piping shall not be acceptable.**

Compressor section interior surfaces shall be lined with 1/2 inch (12.7mm) thick, 1-1/2 lb/ft³ (24 kg/m³) acoustic type glass fiber insulation. Air handling section interior surfaces shall be lined with 1/2 in (12.7mm) thick, 1-1/2 lb/ft³ (24 kg/m³) **foil-faced** fiber insulation for ease of cleaning. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the air stream. **Units without foil-faced insulation in the air handling section will not be accepted.**

The heat pumps shall be fabricated from heavy gauge galvanized steel.

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and NFPA 90A requirements; air erosion and mold growth limits of UL-181; stringent fungal resistance test per ASTM-C1071 and ASTM G21; and shall meet zero level bacteria growth per ASTM G22. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

All horizontal units to have factory installed 1 inch (25.4 mm) discharge air duct collars, 1 inch (25.4 mm) filter rails with 1 inch (25.4 mm) filters factory installed, and factory installed unit-mounting brackets. Vertical units to have field installed discharge air duct collar, shipped loose and 1 inch (25.4 mm) filter rails with 1 inch (25.4 mm) filters factory installed. **If units with these factory installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for their sub-contractor to install these provisions.**

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All units must have an insulated panel separating the fan compartment from the compressor compartment. **Units with the compressor in the air stream are not acceptable.** Units shall have factory installed 1 inch (25.4 mm) wide filter rails for filter removal from either side. Units shall have a 1 inch (25.4 mm) thick throwaway type glass fiber filter. The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper FPT fittings. All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature. Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: Contractor shall install 2 inch (50.8 mm) filter frame with removable access door and 2 inch (50.8 mm) Glass Fiber throwaway filters on all units.

Option: UltraQuiet package shall consist of additional sound insulation applied to the base pan, removable panels and blower housing. A discharge muffler is included on sizes 015 through 060.

Option: The unit shall be supplied with extended range insulation option, which adds closed cell insulation to internal water lines, and provides insulation on suction side refrigeration tubing including refrigerant to water heat exchanger.

Option: The unit shall be supplied with Waterside Economizer (WSE). The WSE will consist of hydronic coil, 3 way valve, and aquastat. Aquastat will be adjustable type and factory set at 45° F (72° C). Units with WSE will require heat pump thermostat with 2 stages of cooling and S.S. drain pan.

Fan and Motor Assembly:

Blower shall have inlet rings to allow removal of wheel and motor from one side without removing housing. Units shall have a direct-drive centrifugal fan. The fan motor shall be 3-speed (2-speed for 575V), permanently lubricated, PSC type, with internal thermal overload protection. Units supplied without permanently lubricated motors must provide external oilers for easy service. The fan motor on small and medium size units (006-042) shall be isolated from the fan housing by a torsionally flexible motor mounting system with rubber type grommets to inhibit vibration induced high noise levels associated with "hard wire belly band" motor mounting. The fan motor on larger units (048 & 060) shall be isolated with flexible rubber type isolation grommets only. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. Airflow/Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. **Ratings based on a dry coil, and/or no air filter shall NOT be acceptable.**

Option: High static motors (Sizes 015-060)

Option: Constant torque ECM motors (sizes 006 to 060 except 041): ECM variable speed ball bearing type motor. The ECM fan maximize motor efficiency over its static operating range, and provide airflow adjustment with 4 or 5 speed taps. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection. A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode may be constant or automatic (humidistat controlled).

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Option: Constant CFM ECM motors (sizes 006 to 060 except 041): ECM variable speed ball bearing type motor. The ECM fan motor shall provide a soft low noise fan start by ramping fan up to full selected speed over a 30 second period, and slowly ramp down fan at the end of each blower cycle, maintain constant CFM, maximize motor efficiency over its static operating range, and provide airflow adjustment in multiple CFM increments. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection. A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode may be constant or automatic (humidistat controlled). Constant CFM ECM motors without controlled ramp up and ramp down features, with constant CFM speed taps, or with no microprocessor controller are not acceptable.

Refrigerant Circuit:

All units shall contain an EarthPure® (HFC-410A) sealed refrigerant circuit including a high efficiency scroll or rotary compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, low pressure (loss of charge) switch, water coil low temperature sensor, and air coil low temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

The compressor shall have a dual level vibration isolation system. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets or springs to a large heavy gauge compressor mounting plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration attenuation. Compressor shall have thermal overload protection. Compressor shall be located in an insulated compartment away from air stream to minimize sound transmission.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 500 PSIG (3445 kPa) working water pressure. The refrigerant to water heat exchanger shall be "electro-coated" with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces. The black colored coating shall provide a minimum of 1000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced type with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120°F (-6.7° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

Option: The unit will be supplied with cupro-nickel coaxial water to refrigerant heat exchanger.

Drain Pan:

The drain pan shall be constructed of a polymer material that inhibits corrosion. If galvanized steel drain pan is used, it must meet the stringent 1,000 hour salt spray test per ASTM B117. Drain outlet shall be located at pan as to allow unobstructed drainage of

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Drain Pan:

The drain pan shall be constructed of galvanized steel and have a powder coat paint application to further inhibit corrosion. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. Drain pan shall be fully insulated. Drain outlet shall be located at pan as to allow unobstructed drainage of condensate. Drain outlet for horizontal units shall be connected from pan directly to FPT fitting. **No hidden internal tubing extensions from pan outlet extending to unit casing (that can create drainage problems) will be accepted.** The unit as standard will be supplied with solid-state electronic condensate overflow protection. **Mechanical float switches will NOT be accepted.**

Vertical units shall be furnished with a PVC FPT condensate drain connection and an internal factory installed condensate trap. **If units without an internal trap are used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for their sub-contractor to install these provisions.**

Option: The unit shall be supplied with stainless steel drain pan.

Electrical:

A control box shall be located within the unit compressor compartment and shall contain a 50VA transformer, 24 volt activated, 2 or 3 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Reversing valve and fan motor wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote thermostat/sensor.

Option: The unit shall be supplied with factory installed, non-fused, electrical service disconnect switch.

Solid State Control System (CXM):

Units shall have a solid-state control system. **Units utilizing electro-mechanical control shall not be acceptable.** The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall interface with a heat pump type thermostat. The control system shall have the following features:

- a. Anti-short cycle time delay on compressor operation.
- b. Random start on power up mode.
- c. Low voltage protection.
- d. High voltage protection.
- e. Unit shutdown on high or low refrigerant pressures.
- f. Unit shutdown on low water temperature.
- g. Condensate overflow electronic protection.
- h. Option to reset unit at thermostat or disconnect.
- i. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
- j. Ability to defeat time delays for servicing.
- k. Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.
- l. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- m. 24V output to cycle a motorized water valve or other device with compressor contactor.
- n. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.

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- o. Water coil low temperature sensing (selectable for water or anti-freeze).
- p. Air coil low temperature sensing.

NOTE: Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protections will not be accepted.

Option: Enhanced Solid State Control System (DXM2)

This control system is a communicating controller

Control shall have the above-mentioned features of the CXM control system along with the following expanded features:

- a. Removable thermostat connector.
- b. Night setback control.
- c. Random start on return from night setback.
- d. Minimized reversing valve operation (Unit control logic shall only switch the reversing valve when cooling is demanded for the first time. The reversing valve shall be held in this position until the first call for heating, ensuring quiet operation and increased valve life).
- e. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
- f. Dry contact night setback output for digital night setback thermostats.
- g. Ability to work with heat pump or heat/cool (Y, W) type thermostats.
- h. Ability to work with heat pump thermostats using O or B reversing valve control.
- i. Emergency shutdown contacts.
- j. Boilerless system heat control at low loop water temperature.
- k. Ability to allow up to 3 units to be controlled by one thermostat.
- l. Relay to operate an external damper.
- m. Relay to start system pump.
- n. 75 VA control transformer. Control transformer shall have load side short circuit and overload protection via a built-in circuit breaker.

NOTE: Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protection for both drain pans will not be accepted.

When DXM2 is connected to either ACUD service tool or ATC32U thermostat, the installer/service technician can; check and set CFM and check DIP switch S1, S2, and S3 settings; run operation modes manually; check all physical inputs from thermostat and refrigerant pressure switches status, (Y1, Y2, W, O, G, H, ESD, NSB, OR, HP switch, and LOC switch); current or at time of fault the following temperatures -LT1, LT2, compressor discharge, leaving air, leaving water, entering water and control voltage; record last five faults, list possible reasons, and clear faults.

Digital Night Setback with Pump Restart (DXM2 w/ ATP32U03C/04C, ATC32U03C):

The unit will be provided with a Digital Night Setback feature using an accessory relay on the DXM2 controller with an ATP32U03C/04C or ATC32U03C thermostat and an external, field-provided time clock. The external time clock will initiate and terminate the night setback period. The thermostat will have a night setback override feature with a programmable override time period. An additional accessory relay on the unit DXM2 controller will energize the building loop pump control for the duration of the override period. **(Note: This feature requires additional low voltage wiring. Consult Application Drawings for details.)**

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Remote Service Sentinel (CXM/DXM2)

Solid state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat fault light, indicating a lockout. Upon cycling the G (fan) input 3 times within a 60 second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc. **Units that do not provide this remote service sentinel shall not be acceptable.**

Option: MPC (Multiple Protocol Control) interface system

Units shall have all the features listed above (either CXM or DXM2) and the control board will be supplied with a Multiple Protocol interface board. Available protocols are BACnet MS/TP, Modbus, or Johnson Controls N2. The choice of protocol shall be field selectable/changeable via the use of a simple selector switch. **Protocol selection shall not require any additional programming or special external hardware or software tools.** This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate overflow alarm
- k. Hi/low voltage alarm
- l. Fan "ON/AUTO" position of space thermostat as specified above
- m. Unoccupied/occupied command
- n. Cooling command
- o. Heating command
- p. Fan "ON/AUTO" command
- q. Fault reset command
- r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Option: Lonworks interface system

Units shall have all the features listed above (either CXM or DXM2) and the control board will be supplied with a LONWORKS interface board, which is LONMark certified. This will permit all units to be daisy chained via a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

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Tranquility® 16 (TC) Series 60 Hz Engineering Specifications – Page 7

- a. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate sensor alarm
- k. Hi/low voltage alarm
- l. Fan "ON/AUTO" position of space thermostat as specified above
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- q. Fault reset command
- r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Warranty:

ClimateMaster shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the CXM/DXM2 control board for a total of 5 years.

FIELD INSTALLED OPTIONS

Hose Kits:

All units shall be connected with hoses. The hoses shall be braided stainless steel; fire rated hoses complete with adapters. Only fire rated hoses will be accepted.

Valves:

The following valves are available and will be shipped loose:

- a. Ball valve; bronze material, standard port full flow design, FPT connections.
- b. Ball valve with memory stop and PT port.
- c. "Y" strainer with blowdown valve; bronze material, FPT connections.
- d. Motorized water valve; slow acting, 24v, FPT connections.

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Tranquility® 16 (TC) Series 60 Hz Engineering Specifications – Page 8

Hose Kit Assemblies:

The following assemblies ship with the valves already assembled to the hose described:

- a. Supply and return hoses having ball valve with PT port.
- b. Supply hose having ball valve with PT port; return hose having automatic flow regulator valve with PT ports, and ball valve.
- c. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having automatic flow regulator with PT ports, and ball valve.
- d. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having ball valve with PT port.

Thermostats:

The thermostat shall be a ClimateMaster mechanical or electronic type thermostat as selected below with the described features:

- a. Single Stage Digital Auto or Manual Changeover (ATA11U01)
Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and setpoint(s) in °F or °C. The Thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to display specific fault condition. Thermostat shall provide temperature display offset for custom applications.
- b. Single-Stage Digital Automatic or Manual Changeover with Two-Speed Fan Control (ATA11C04) – DXM2 required
Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch, fan ON-AUTO switch, and fan LO-HI switch. Thermostat shall have an LCD display with temperature and setpoint(s) in °F or °C. A fault LED shall be provided to display specific fault condition. Thermostat shall allow use of an accessory remote temperature sensor (AST009), but may be operated with internal sensor via orientation of a jumper.
- c. Multi-stage Digital Automatic Changeover (ATA22U01)
Thermostat shall be multi-stage (2H/2C), manual or automatic changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to indicate specific fault condition(s). Thermostat shall provide temperature display offset for custom applications. Thermostat shall allow unit to provide better dehumidification with optional DXM2 controller by automatically using lower fan speed on stage 1 cooling (higher latent cooling) as main cooling mode, and automatically shifting to high speed fan on stage 2 cooling.
- d. Multi-stage Manual Changeover Programmable 5/2 Day (ATP21U01)
Thermostat shall be 5 day/2 day programmable (with up to 4 setpoints per day), multi-stage (2H/1C), manual changeover with HEAT-OFF-COOL-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of setpoint(s) without batteries. Thermostat shall provide convenient override feature to temporarily change setpoint.
- e. Multi-stage Automatic or Manual Changeover Programmable 7 Day (ATP32U03C)
Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable

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for °F or °C. Time display shall be selectable for 12 or 24-hour clock. Fault identification shall be provided (when used with ClimateMaster CXM or DXM2 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

- f. Multi-stage Automatic or Manual Changeover Programmable 7 Day with Humidity Control (ATP32U04C)
Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. Installer configuration mode shall allow thermostat dehumidification mode to operate with ClimaDry® reheat or with ECM fan dehumidification mode via settings changes. Thermostat shall have a blue backlit dot matrix LCD display with temperature, relative humidity, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided (when used with ClimateMaster CXM or DXM2 controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

- g. CM100 - Multi-stage Automatic or Manual Changeover digital thermostat (ATA32V01)
Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a green backlit LED display with temperature, setpoints, mode, and status indication via a green (cooling) or red(heating) LED. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring. Thermostat navigation shall be accomplished via four buttons (Mode/fan/down/up) with menu-driven selections for ease of use and programming.

- h. CM300 – Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V02C)
Residential version shall be 7 day programmable with up to 4 setpoints per day. Commercial version shall be 7 day programmable with 4 occupied/unoccupied periods per day with up to 4-hour override. Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings, Wi-Fi, pre-occupancy purge fan option, night time control of display backlight, bi-color LED indicates a heating or cooling demand, keypad lock, title 24 compliant, openADR2.0b certified with Skyport web portal. Compatible with condensate overflow warning systems – lockout compressor with message on

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- i. CM500 – Color Touchscreen Display, Multi-stage, Automatic or Manual Changeover, 7-day Programmable with Wi-Fi and Humidity Control (AVB32V03C)

Thermostat shall have color resistive touchscreen display with space temperature, relative humidity, setpoints, mode, status indication and local weather (if connected to Wi-Fi). Residential version shall be 7 day programmable with up to 4 setpoints per day. Commercial version shall be 7 day programmable with 4 occupied/unoccupied periods per day with up to 4-hour override. Multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings, Wi-Fi, pre-occupancy purge fan option, customizable screen saver and background displays, indicator on display indicates a heating or cooling demand, set-point lock, title 24 compliant, openADR2.0b certified with Skyport web portal. Compatible with condensate overflow warning systems – lockout compressor with message on the display. Capable of being monitored by 3rd party software. Compatible with AST014 Wi-Fi remote sensor. Configurator mobile app or web portal for easy setup. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12- or 24-hour clock. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide access to a web portal and mobile app for installer setup for configuring options. Thermostat shall have menu-driven selections for ease of use and programming.

DDC Sensors:

ClimateMaster wall mounted DDC sensor to monitor room temperature and interfaces with optional interface system described above. Several types as described below:

- a. Sensor only with no display (LON and MPC).
- b. Sensor with override (LON only).
- c. Sensor with setpoint adjustment and override (MPC only).
- d. Sensor with setpoint adjustment and override, LCD display, status/fault indication (LON and MPC).

NOTICE! This product specification document is furnished as a means to copy and paste ClimateMaster product information into project specification. It is not intended to be a complete list of product requirements. This document is an excerpt from the product submittal and must not be used without consulting the complete product submittal. For complete product installation and application requirements, please consult the complete product submittal. ClimateMaster is not responsible for misuse of this document or a failure to adequately review specific requirements in the product submittal.

Unit Features

THE TRANQUILITY® 30 DIGITAL (TE) SERIES

As one of the highest efficiency water-source heat pumps on the planet, the Tranquility® 30 Digital Series raises the bar for water-source heat pump efficiencies, features and application flexibility. Not only does the Tranquility 30 Digital Series far exceed ASHRAE 90.1 efficiencies, but it also uses EarthPure® (HFC-410A) zero ozone depletion refrigerant, making it an extremely environmentally-friendly option. Tranquility 30 Digital is eligible for additional LEED® (Leadership in Energy and Environmental Design) points because of its "green" technology design.

Available in sizes 2 tons (7.0 kW) through 6 tons (19.3 kW) with multiple cabinet options (vertical upflow, vertical downflow and horizontal) the Tranquility 30 Digital offers a wide range of units for most installations. The Tranquility 30 Digital has an extended range refrigerant circuit, capable of ground loop (geothermal) applications as well as water loop (boiler-tower) applications. Some of the features of the innovative Tranquility 30 Digital include: Copeland UltraTech™ two-stage unloading scroll compressor, ECM variable communicating fan motor, communicating microprocessor controls, galvanized steel cabinet, polyester powder coat paint, stainless steel drain pan and foil-backed air handler insulation.

ClimateMaster's exclusive double isolation compressor mounting system makes the Tranquility 30 Digital one of the quietest units on the market. Compressors are mounted on specially engineered sound tested EPDM grommets to a heavy gauge mounting plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration/sound attenuation. Multiple removable access panels and an easily accessible control box make installation and maintenance user friendly. Options such as DDC controls, internal variable speed pumps, modulating water valves, and high efficiency MERV rated air filters allow for customizable design solutions.

iGate® technology is the next generation in intelligent control by using two-way communication to provide a gateway into the system. The iGate control system allows end-users and contractors to monitor the performance of the unit, custom tailor its operation, and diagnose any issues, right from the thermostat.

The iGate communications hub is the DXM2 intelligent controller, which analyzes the status of sensors and smart components (which are also two-way communicating) to determine how best to operate the system for optimal comfort, efficiency and long-term reliability. All of this information is passed to the iGate thermostat (or diagnostic tool), where it can be displayed in plain English. And since communication is both ways, the iGate thermostat can also be used to configure and tailor the system without even touching the unit.

vFlow® is ClimateMaster's variable water flow technology. It represents a major advancement in geothermal system performance - made possible through the iGate system. vFlow not only builds the major water circulation components into the unit for a clean installation, it also intelligently varies the water flow to minimize pump energy consumption and improve system reliability.

The heart of vFlow is either a variable-speed pump (for ground loops) or modulating water valve (for ground water or central variable speed pumps) directly linked into the iGate system. Water flow is automatically varied based on changes in unit capacity level (stage) and source water temperature to maintain optimum system performance. vFlow® allows the use of direct return piping, while eliminating external two-way valves and automatic flow regulators - making vFlow® systems inherently self-balancing.

vFlow systems provide reduced water pumping power compared to traditional fixed-speed pumping systems. They also protect the unit against extreme operating conditions, thus extending the life of the compressor and air coil. Since vFlow is built inside the unit, it also saves on installation time and makes for a very clean and compact installation. The Tranquility 30 Digital Series water-source heat pumps are designed to meet the challenges of today's HVAC demands with one of the most innovative products available on the market.

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Unit Features

UNIT FEATURES

- Sizes 026 (2 ton, 7.0 kW) through 072 (6 tons, 19.3 kW)
- EarthPure® (HFC-410A) refrigerant
- Copeland UltraTech™ two-stage unloading scroll compressors
- ECM variable speed communicating fan motor with soft start
- Exceeds ASHRAE 90.1 efficiencies
- Part load operation significantly lowers annual operating costs
- Galvanized steel construction with attractive black matte polyester powder coat paint
- Stainless steel drain pan
- Foil-backed insulation in air handler section
- Unique double isolation compressor mounting with vibration isolation for quiet operation
- Insulated divider and separate compressor/air handler compartments
- TXV metering device
- Available extended range (20°F to 120°F, -6.7°C to 48.9°C) operation
- Advanced Controls - iGate® communicating control provides advanced unit functionality and comprehensive configuration, monitoring and diagnostic capabilities through digital communication links with the variable-speed fan motor, variable-speed source pump (or modulating valve) and communicating thermostat or configuration/diagnostic tool.
 - 7 temperature sensor inputs for system protection and control
 - Anti-short cycle and over/under voltage protection
 - High pressure, loss of charge, and condensate overflow protection
 - LED fault and status indication at controller
 - Service tool port for optional setup and diagnostics at unit
- LonWorks, BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Field convertible discharge air arrangement for horizontal units
- Easy access control box
- Flush securely-mounted corner post water connections (no backup wrench required)
- Unit Performance Sentinel (UPS) monitoring system
- Eight Safeties Standard
- Wide variety of options including ultra quiet sound insulation, extended range insulation, return air filter frames, variable and fixed speed circulating pumps, modulating motorized valves, hot water generator, and cupro-nickel water coil

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iGate® Communicating Controls

iGate® - Information gateway to monitor, control, and diagnose your system

Tranquility® 30 Digital is equipped with industry-first, iGate® – Information Gateway – 2-way communicating system. iGate allows users to interact with their geothermal system in plain English. It delivers improved reliability and efficiency by precisely controlling smart variable speed components. iGate makes Tranquility 30 Digital series the easiest geothermal products to install and service.

Monitor/Configure – Installers can configure Tranquility® 30 Digital units from the iGate® communicating thermostat or configuration/ diagnostic tool. This includes: Air flow, loop, water-flow option configuration, unit configuration, accessory configuration, and demand reduction (optional - to limit unit operation during peak times). Users can look up the current system status: temperature sensor readings and operational status of the blower and pump.

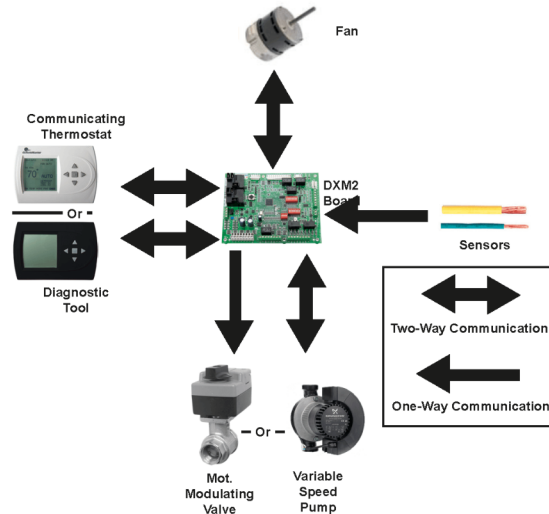
Precise Control – The new DXM2 board enables intelligent, 2-way communication between the DXM2 board and smart components like the communicating thermostat, fan motor, and water pump. The DXM2 board can also directly control the modulating valve and accepts various feedback/input (see figure). The Intelligent DXM2 board uses information received from the smart components/sensors to precisely control operation of the variable speed fan and variable speed water pump (or modulating valve) to deliver higher efficiency, reliability and increased comfort.

Diagnostics – iGate takes diagnosing geothermal units to the next level of simplicity, by providing a dashboard of system and fault information, in plain English, on the iGate thermostat/ service tool.

iGate Service Warning will alert the occupant of a fault and display dealer information (if programmed), fault description, possible causes, and current system status (temperature readings, fan RPM, and water flow status) which may be reported to service personnel.

In iGate Service Mode, the service personnel can access fault description, possible causes, and most importantly, the conditions (temp, flow, i/o conditions, configuration) at the time of the fault. Manual Operation mode allows the service personnel to manually command operation for any of the thermostat outputs, blower speed, pump speed, or valve position from the thermostat to help troubleshoot specific components.

With the iGate communicating system, users and contractors have a gateway to system information that's never been available before now.



AIRFLOW SELECTION	
	CFM
HEAT STAGE 1	600
HEAT STAGE 2	750
AUXILIARY HEAT	850
EMERGENCY HEAT	850
COOL STAGE 1	525
COOL STAGE 2	700
COOL DEHUMID 1	425
COOL DEHUMID 2	550
CONTINUOUS FAN	350
HEAT OFF DELAY	60
COOL OFF DELAY	30
◀ PREVIOUS	NEXT ▶

POSSIBLE FAULT CAUSES	
LOW WATER COIL TEMP	
LOW WATER TEMP - HTG	
LOW WATER FLOW - HTG	
LOW REFRIG CHARGE - HTG	
INCORRECT LT1 SETTING	
BAD LT1 THERMISTOR	
◀ PREVIOUS	

FAULT TEMPERATURE CONDITIONS	
LT1 LOW WATER TEMP	
HEAT 1 11:11 AM 11/14	
LT1 TEMP	28.1
LT2 TEMP	97.3
HOT WATER EWT	121.5
COMP DISCHARGE	157.7
LEAVING AIR	92.7
LEAVING WATER	34.9
ENTERING WATER	42.1
CONTROL VOLTAGE	26.4
◀ PREVIOUS	

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ECM Blower Control

The ECM fan is controlled directly the DXM2 control board. It converts thermostat inputs and CFM settings to signals used by the ECM motor controller. To take full advantage of the ECM motor features, a communicating multi-stage thermostat should be used (ATC32U**).

The DXM2 control maintains a selectable operating airflow [CFM] for each heat pump operating mode. For each operating mode there are maximum and minimum airflow limits. See the ECM Blower Performance tables for the maximum, minimum, and default operating airflows.

Airflow levels are selected using the configuration menus of a communicating thermostat (ATC32U**) or diagnostic tool (ACDU**). The configuration menus allow the installer to independently select and adjust the operating airflow for each of the operating modes. Airflow can be selected in 25 CFM increments within the minimum and maximum limits shown in the ECM Blower Performance Table. The blower operating modes include:

- First Stage Cooling (Y1 & O)
- Second Stage Cooling (Y1, Y2, & O)
- First Stage Cooling in Dehumidification Mode (Y1, O, & Dehumid)
- Second Stage Cooling in Dehumidification Mode (Y1, Y2, O, & Dehumid)
- First Stage Heating (Y1)
- Second Stage Heating (Y1 & Y2)
- Third Stage (Auxiliary) Heating (Y1, Y2, & W)
- Emergency Heating (W with no Y1 or Y2)
- Fan (G with no Y1, Y2, or W)

It is highly recommended that ATC32U** or ACDU** be used to set dehumidification mode electronically. Dehumidification can NOT be selected when using a non-communicating thermostat with a vFlow® unit with Internal Flow Controller (pump). For dehumidification settings on other units using the non-communicating stat, refer to DXM2 AOM (part #97B0003N15).

The ECM motor includes “soft start” and “ramp down” features. The soft start feature is a gentle increase of motor rpm at blower start up. This creates a much quieter blower start cycle.

The ramp down feature allows the blower to slowly decrease rpm to a full stop at the end of each blower cycle. This creates a much quieter end to each blower cycle and adds overall unit efficiency.

The ramp down feature is eliminated during an ESD (Emergency Shut Down) situation. When the DXM2 ESD input is activated, the blower and all other control outputs are immediately de-activated.

The ramp down feature (also known as the heating or cooling “Off Delay”) is field selectable by the installer. The allowable range is 0 to 255 seconds.

Airflow Configuration Screen on Communicating Thermostat

AIRFLOW SELECTION	
	CFM
HEAT STAGE 1	600
HEAT STAGE 2	750
AUXILIARY HEAT	850
EMERGENCY HEAT	850
COOL STAGE 1	525
COOL STAGE 2	700
COOL DEHUMID 1	425
COOL DEHUMID 2	550
CONTINUOUS FAN	350
HEAT OFF DELAY	60
COOL OFF DELAY	30
◀ PREVIOUS	NEXT ▶

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Physical Data

Model	026	038	049	064	072
Compressor (1 Each)					
Two-Stage Scroll					
Factory Charge (HFC-410A) (oz) [kg]	44 [1.25]	52 [1.47]	69 [1.96]	142 [4.03]	140 [3.97]
ECM Fan Motor & Blower					
Fan Motor (hp) [W]	1/2 [373]	1/2 [373]	1 [746]	1 [746]	1 [746]
Blower Wheel Size (dia x w) - (in) [mm]	9 x 7 [229 x 178]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]	11 x 10 [279 x 254]
Water Connection Size					
FPT (in)	3/4	3/4	1	1	1
HWG Connection Size					
FPT (in)	1/2	1/2	1/2	1/2	1/2
Coax Volume					
Volume (US Gallons) [liters]	0.76 [2.88]	0.92 [3.48]	1.24 [4.69]	1.56 [5.91]	1.56 [5.91]
Vertical Upflow/Downflow					
Air Coil Dimensions (h x w) - (in) [mm]	28 x 20 [711 x 508]	28 x 25 [711 x 635]	32 x 25 [813 x 635]	36 x 25 [914 x 635]	36 x 25 [914 x 635]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	1 - 28 x 24 [711 x 610]	1 - 28 x 30 [712 x 762]	2 - 16 x 30 [406 x 762]	1 - 16 x 30 [406 x 762] 1 - 20 x 30 [508 x 762]	1 - 16 x 30 [406 x 762] 1 - 20 x 30 [508 x 762]
Weight - Operating, (lbs) [kg]	298 [135]	359 [163]	448 [203]	475 [215]	475 [215]
Weight - Packaged, (lbs) [kg]	308 [140]	369 [167]	458 [208]	485 [220]	485 [220]
Weight - ClimaDry, (lbs) [kg]	38 [17]	41 [19]	44 [20]	49 [22]	49 [22]
Horizontal					
Air Coil Dimensions (h x w) - (in) [mm]	18 x 31 [457 x 787]	20 x 35 [508 x 889]	20 x 40 [508 x 1016]	20 x 45 [508 x 1143]	20 x 45 [508 x 1143]
Standard Filter - 1" [25.4mm] Throwaway, qty (in) [mm]	2 - 18 x 18 [457 x 457]	1 - 12 x 20 [305 x 508] 1 - 20 x 25 [508 x 635]	1 - 18 x 20 [457 x 508] 1 - 20 x 24 [508 x 610]	2 - 20 x 24 [508 x 610]	2 - 20 x 24 [508 x 610]
Weight - Operating, (lbs) [kg]	298 [135]	359 [163]	448 [203]	475 [215]	475 [215]
Weight - Packaged, (lbs) [kg]	308 [140]	369 [167]	458 [208]	485 [220]	485 [220]
Weight - ClimaDry (lbs) [kg]	38 [17]	41 [19]	44 [20]	49 [22]	49 [22]

Notes: All units have TXV expansion device and 1/2" & 3/4" electrical knockouts.

Unit Maximum Working Water Pressure	
Options	Max Pressure PSIG [kPa]
Base Unit	500 [3447]
Unit with Internal Modulation Water Valve Option	300 [2,068]
Unit with Internal Water Pump Option	145 [999]
Unit with ClimaDry	145 [999]

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TE Vertical Upflow – Dimensional Data

Vertical Upflow Model		Overall Cabinet		
		*A Width	B Depth	C Height
026	in cm	22.4 56.8	25.6 65.1	48.5 123.2
038	in cm	25.4 64.5	30.6 77.8	50.5 128.3
049	in cm	25.4 64.5	30.6 77.8	54.5 138.4
064 & 072	in cm	25.4 64.5	30.6 77.8	58.5 148.6

*Does not include air filter supports. Add 2" (5.1cm) when a 1" (25.4mm) filter is used, add 3" (7.6cm) when a 2" (50.8mm) filter is used.

Vertical Upflow Model		Electrical Knockouts		
		J 1/2"	K 1/2"	L 3/4"
		Low Voltage	External Pump	Power Supply
026	in cm	3.6 9.2	6.1 15.6	8.6 21.9
038	in cm	3.6 9.2	6.1 15.6	8.6 21.9
049	in cm	3.6 9.2	6.1 15.6	8.6 21.9
064 & 072	in cm	3.6 9.2	6.1 15.6	8.6 21.9

Vertical Upflow Model		Water Connections						
		1	2	3	4	5	Water Loop FPT	HWG FPT
		Loop In D	Loop Out E	HWG In F	HWG Out G	Cond. H		
026	in cm	3.9 9.9	8.4 21.3	13.9 35.2	16.9 42.9	6.3 16.0	3/4"	1/2"
038	in cm	3.9 9.9	8.4 21.3	15.6 39.7	18.9 47.9	6.3 16.0	3/4"	1/2"
049	in cm	3.9 9.9	8.4 21.3	15.6 39.7	18.9 47.9	6.3 16.0	1"	1/2"
064 & 072	in cm	3.9 9.9	8.4 21.3	15.6 39.7	18.9 47.9	6.3 16.0	1"	1/2"

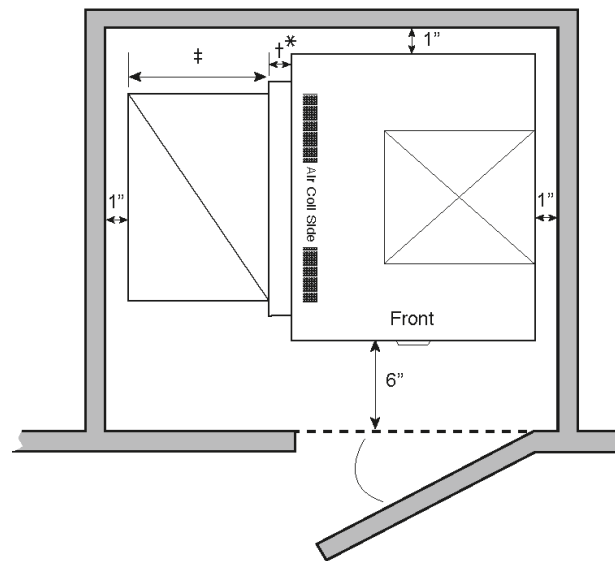
Water Connections - Units with ClimaDry®	
1	2
Loop In D	Loop Out E
2.1 5.2	10.0 25.4
6.0 15.1	13.1 33.4
6.0 15.1	13.1 33.4
6.0 15.1	13.1 33.4

Recommended Minimum Installation Clearances for Vertical Units*	
1"	Back of unit
	Side opposite return air
6"	Front if hard piped
Return Air Side	
1"	Ducted return
	- ‡ *Add for duct width
	- † Add 2" for 1" filter frame/rail or 3" for 2" filter frame/rail
Free (open) return - calculate required dimension for a maximum velocity of 600 fpm	

*Field installed accessories (hoses, air cleaners, etc.) and factory WSE option will require additional space. Top supply air is shown, the same clearances apply to bottom supply air units.

Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Front & Side access is preferred for service access. However, all components may be serviced from the front access panel if side access is not available.
3. Discharge flange is field installed.
4. Condensate is 3/4" FPT PVC and is switchable from front to side.



Legend:

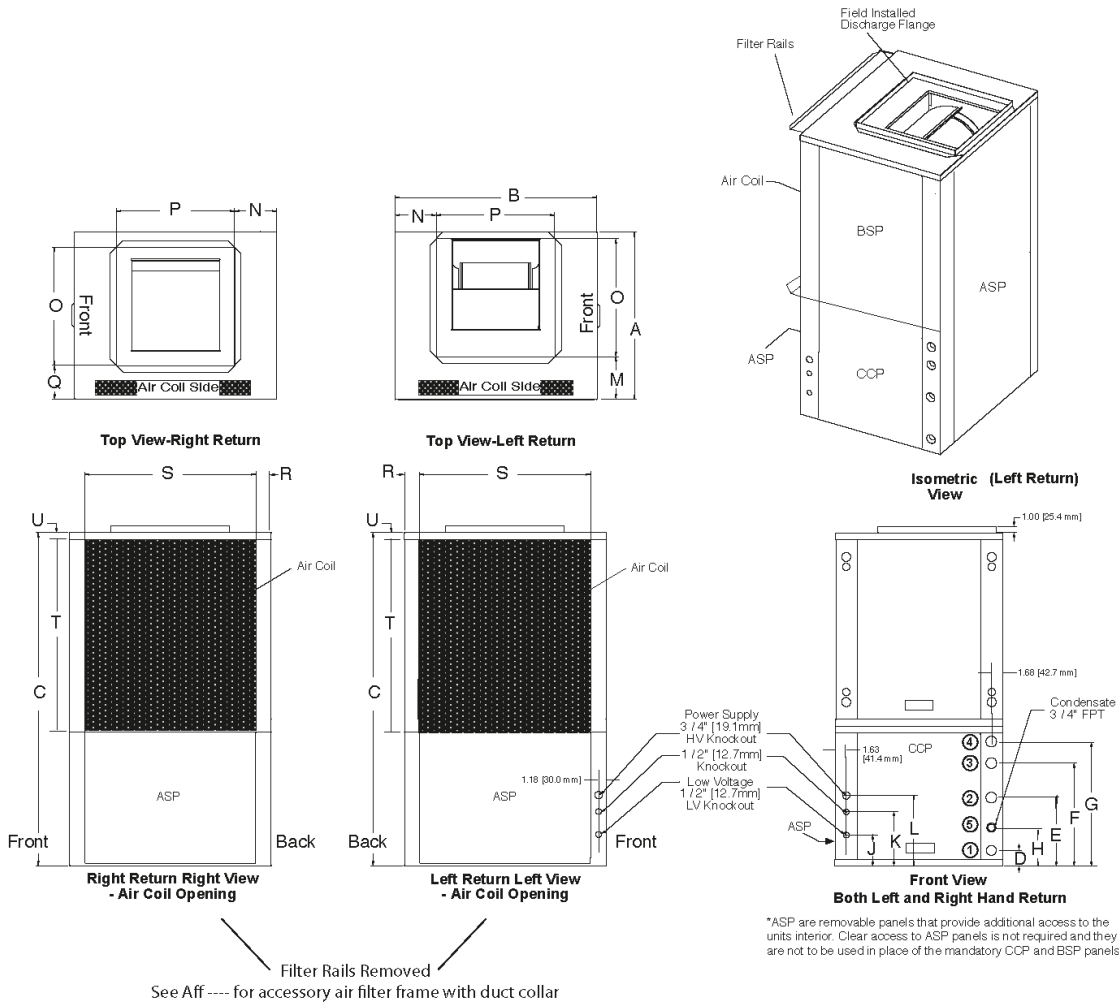
- CCP = Control/Compressor Access Panel
- BSP = Blower Service Panel
- ASP = (optional) Additional Service Panel

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TE Vertical Upflow – Dimensional Data

Vertical Upflow Model	Discharge Connection Duct Flange Installed						Return Connection Using Return Air Opening				Return Connection Using Optional Air Filter Frame			
	M	N	O Supply Width	P Supply Depth	Q	R	S Return Depth	T Return Height	U	R	S Return Depth	T Return Height	U	
026	in	7.2	5.8	14.0	14.0	4.9	2.3	21.1	27.7	1.0	1.7	22.2	26.2	1.7
	cm	18.3	14.8	35.6	35.6	12.4	5.8	53.6	70.4	2.5	4.3	56.4	66.5	4.3
038	in	6.4	6.3	18.0	18.0	5.3	2.3	26.1	27.7	1.0	1.7	27.2	26.2	1.7
	cm	16.1	16.0	45.7	45.7	13.5	5.8	66.3	70.4	2.5	4.3	69.1	66.5	4.3
049	in	6.4	6.3	18.0	18.0	5.3	2.3	26.1	31.7	1.0	1.7	27.2	30.2	1.7
	cm	16.1	16.0	45.7	45.7	13.5	5.8	66.3	80.5	2.5	4.3	69.1	76.7	4.3
064 & 072	in	6.4	6.3	18.0	18.0	5.3	2.3	26.1	35.7	1.0	1.7	27.2	34.2	1.7
	cm	16.1	16.0	45.7	45.7	13.5	5.8	66.3	90.7	2.5	4.3	69.1	86.9	4.3

All dimensions are +/- 0.20 in. (+/- 5.1 mm).

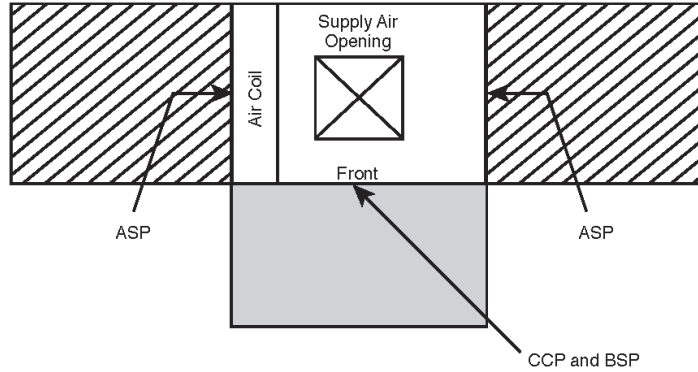


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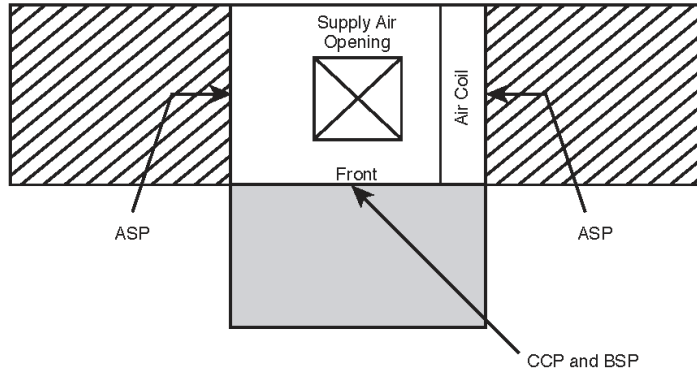
TE Vertical – Service Access

Vertical Units

Left Return



Right Return



- = mandatory 2' service access
- = (optional) additional 2' service access

Notes:

1. While clear access to all removable panels is not required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
2. Front & Side access is preferred for service access. However, all components may be serviced from the front access panel if side access is not available.
3. ASP are removable panels that provide additional access to the units interior. Clear access to ASP panels is not required and they are not to be used in place of the mandatory CCP and BSP panels.
4. Top supply air is shown, the same clearances apply to bottom supply air units.

Legend:

- CCP = Control/Compressor Access Panel
- BSP = Blower Service Panel
- ASP = (optional) Additional Service Panel

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TE Series Wiring Diagram Matrix

All current diagrams can be located online at climatemaster.com. Click 'Commercial Professional' (go to 'Resources/literature/wiring diagrams' in the upper right), use part numbers below to lookup wiring diagrams

Model	Refrigerant	Wiring Diagram Part Number	Electrical (Voltage Code)	Control	DDC	Unit Options
TE Series	EarthPure® HFC-410A	96B0242N01	(G) 208-230/60/1 (E) 265/60/1	DXM2	-	MOD VALVE
		96B0242N03			MPC	MOD VALVE
		96B0242N05*			-	INTERNAL SECONDARY PUMP*
		96B0242N07*			MPC	INTERNAL SECONDARY PUMP*
		96B0242N08			-	CLIMADRY®
		96B0242N20			MPC	CLIMADRY®
		96B0242N09			-	VARIABLE PUMP (265 Volt)
		96B0242N12			-	VARIABLE PUMP (208-230 Volt)
TE Series	EarthPure® HFC-410A	96B0243N01	(H) 208-230/60/3	DXM2	-	MOD VALVE
		96B0243N03			MPC	MOD VALVE
		96B0243N05*			-	INTERNAL SECONDARY PUMP*
		96B0243N07*			MPC	INTERNAL SECONDARY PUMP*
		96B0243N08			-	CLIMADRY®
		96B0243N12			MPC	CLIMADRY®
		96B0243N09			-	VARIABLE PUMP
		96B0244N01			-	MOD VALVE
96B0244N03	MPC	MOD VALVE				
96B0244N05*	-	INTERNAL SECONDARY PUMP*				
96B0244N07*	MPC	INTERNAL SECONDARY PUMP*				
96B0244N08	-	CLIMADRY®				
96B0244N11	MPC	CLIMADRY®				
96B0244N09	-	VARIABLE PUMP				

* A base unit utilizes the same WD as a unit with an Internal Secondary Pump.

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 1

General:

Furnish and install ClimateMaster Tranquility® "TE" Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped, and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 20° to 120° F (-6.7° to 48.9° C) as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI/ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI/ISO and ETL-US-C labels.

All units shall pass a factory acceptance test. The quality control system shall automatically perform the factory acceptance test via computer. A detailed report card from the factory acceptance test shall ship with each unit. **(Note: If unit fails the factory acceptance test it shall not be allowed to ship. Unit serial number will be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.)**

Basic Construction:

Horizontal units shall have one of the following air flow arrangements: Left Inlet/Straight (Right) Discharge; Right Inlet/Straight (Left) Discharge; Left Inlet/Back Discharge; or Right Inlet/Back Discharge as shown on the plans. Units must have the ability to be field convertible from straight to back or back to straight discharge with no additional parts or unit structure modification. Horizontal units will have factory installed hanger brackets with rubber isolation grommets packaged separately.

Vertical Units shall have one of the following air flow arrangements: Left Return/Top Discharge, Right Return/Top Discharge, Left Return/Bottom Discharge, Right Return/Bottom Discharge as shown on the plans.

If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All units (horizontal and vertical) must have a minimum of three access panels for serviceability of compressor compartment. **Units having only one access panel to compressor/heat exchangers/expansion device/refrigerant piping shall not be acceptable.**

Compressor section interior surfaces shall be lined with 1/2 inch (12.7 mm) thick, 1-1/2 lb/ft³ (24 kg/m³) acoustic type glass fiber insulation. Air handling section interior surfaces shall be lined with 1/2 inch (12.7 mm) thick, 1-1/2 lb/ft³ (24 kg/m³) foil-faced fiber insulation for ease of cleaning. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the air stream. Units without foil-faced insulation in the air handling section will not be accepted.

The heat pumps shall be fabricated from heavy gauge galvanized steel with powder coat paint finish. Both sides of the steel shall be painted for added protection.

Standard cabinet panel insulation must meet NFPA 90A requirements, air erosion and mold growth limits of UL-181, stringent fungal resistance test per ASTM-C1071 and ASTM G21, and shall meet zero level bacteria growth per ASTM G22. **Unit insulation must meet these stringent requirements or unit(s) will not be accepted.**

All horizontal units to have factory installed 1 inch (25.4 mm) discharge air duct collars, 1 inch (25.4 mm) filter rails with 1 inch (25.4 mm) filters factory installed, and factory installed unit-mounting brackets. Vertical units to have field installed discharge air duct collar, shipped loose and 1 inch (25.4 mm) filter rails with 1 inch (25.4 mm) filters factory installed. **If units with these factory-installed**

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 2

provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for his sub-contractor to install these provisions.

All units must have an insulated panel separating the fan compartment from the compressor compartment. Units with the compressor in the air stream are not acceptable. Units shall have a factory installed 1 inch (25.4 mm) wide filter bracket for filter removal from either side. Units shall have a 1 inch (25.4 mm) thick throwaway type glass fiber filter. The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

Cabinets shall have separate holes and knockouts for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper FPT fittings, and shall be securely mounted flush to the cabinet corner post allowing for connection to a flexible hose without the use of a back-up wrench. **Water connections that protrude through the cabinet or require the use of a backup wrench shall not be allowed.** All water connections and electrical knockouts must be in the compressor compartment corner post as to not interfere with the serviceability of unit. **Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature.** Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: The unit will be supplied with optional field or factory installed 2 inch air filter rails (typically used for free return installation) or 1 inch or 2 inch air filter frames with filter access door and return air duct flanges (typically used for ducted return installation). A corresponding 1 inch or 2 inch throwaway type glass fiber filter will ship with the factory installed filter rails or frame.

Option: The contractor shall install 1 inch MERV 8, 2 inch MERV 11, or 2 inch MERV 13 rated pleated media disposable air filters on all units.

Option: UltraQuiet package shall consist of high technology sound attenuating material that is strategically applied to the compressor and air handling compartment casings and fan scroll in addition to the standard ClimaQuiet system design, to further dampen and attenuate sound transmissions.

Option: The unit will be supplied with internally factory mounted modulating water valve with ΔT control. The factory built-in valve shall modulate water flow through unit based on a field adjustable water temperature difference between the entering and leaving water. For two-stage units, the modulating valve will automatically reduce the water flow through the unit during part load operation to maintain the configured temperature difference. The valve shall automatically adjust for operating mode, stage of capacity, source water temperature and variations in external head pressure. The valve will also act as a shut-off valve to prevent water flow through the unit when the unit is not activated and will have a minimum position capability.

Option: The unit will be supplied with internally factory mounted variable speed water circulating pump with internal check valve. The variable speed pump shall modulate water flow through the unit based on a field adjustable temperature difference between the entering and leaving water. For two-stage units, the modulating valve will automatically reduce the water flow through the unit during part load operation to maintain the configured temperature difference. The variable speed

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 3

pump shall automatically adjust for operating mode, stage of capacity, source water temperature, and variations in external head pressure.

Option: The unit will be supplied with internally mounted secondary pump for primary/secondary applications, including one-pipe systems.

Option: The unit shall be supplied with extended range insulation option, which adds closed cell insulation to internal water lines, and provides insulation on suction side refrigeration tubing including refrigerant to water heat exchanger.

Option: Unit shall include ClimaDry® reheat option. Only modulating reheat that will adjust capacity based upon supply air temperature to provide “neutral” (72° F, 22.2° C) constant air temperature will be accepted. “Neutral” supply air temperature shall be provided regardless of entering loop water temperatures (above 55° F, 12.8° C) or refrigerant condensing pressures. Control of reheat must be accomplished via a humidistat or dehumidistat contact closure. Refrigerant circuit must be AHRI certified. Approved equal manufacturers may provide pre-engineered integrated modulating hot gas reheat within the unit cabinet, or the installing contractor in conjunction with the “approved equal” unit manufacturer can provide for approval (during the submittal phase) an engineered system consisting of: a duct mounted hot water coil, small circulating pump, modulating control valve, and associated piping using the discharge condenser water off of the unit as the heating medium. All design costs and costs of field installed items including additional power wiring to pump, and control wiring to and from pump and control valve to unit shall be borne by mechanical contractor. Refrigerant circuits that are not AHRI certified when the reheat option is applied will not be accepted.

Fan and Motor Assembly:

Blower shall have inlet rings to allow removal of wheel and motor from one side without removing housing. Units shall have a direct-drive centrifugal fan. The fan motor shall be an ECM variable speed ball bearing type motor. The ECM fan motor shall provide soft starting, maintain constant CFM over its static operating range and provide airflow adjustment in 25 CFM increments via its control board. The fan motor shall be isolated from the housing by rubber grommets. The motor shall be permanently lubricated and have thermal overload protection. A special dehumidification mode shall be provided to allow lower airflows in cooling for better dehumidification. The dehumidification mode may be constant or automatic (humidistat controlled). Airflow/Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. **Ratings based on a dry coil, and/or no air filter, shall NOT be acceptable.**

Refrigerant Circuit:

All units shall contain an EarthPure® (HFC-410A) sealed refrigerant circuit including a high efficiency two-stage scroll compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube or all aluminum micro channel refrigerant to air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the contractor supplied disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

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Hermetic compressors shall be internally sprung. The compressor shall have a dual level vibration isolation system. The compressor will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to a large heavy gauge compressor mounting plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration attenuation. All units shall include a discharge muffler to further enhance sound attenuation. Compressor shall have thermal overload protection. Compressor shall be located in an insulated compartment away from air stream to minimize sound transmission.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube or all aluminum microchannel construction rated to withstand 625 PSIG (4309 kPa) refrigerant working pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure and 500 PSIG (3445 kPa) working water pressure. The refrigerant to water heat exchanger shall be "electro-coated" with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces. The black colored coating shall provide a minimum of 1,000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120° F (-6.7° to 48.9° C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

Option: The unit will be supplied with a cupro-nickel coaxial water to refrigerant heat exchanger.

Option: The unit shall be supplied with a hot water generator (desuperheater).

Drain Pan:

The drain pan shall be constructed of Stainless Steel to inhibit corrosion. This corrosion protection system shall meet the stringent 1,000 hour salt spray test per ASTM B117. If plastic type material is used, it must be HDPE (High Density Polyethylene) to avoid thermal cycling shock stress failure over the lifetime of the unit. Drain pan shall be fully insulated. Drain outlet shall be located at pan as to allow unobstructed drainage of condensate. Drain outlet for horizontal units shall be connected from pan directly to MPT fitting. **No hidden internal tubing extensions from pan outlet extending to unit casing (that can create drainage problems) will be accepted.** The unit as standard will be supplied with solid-state electronic condensate overflow protection. **Mechanical float switches will NOT be accepted.**

Vertical units shall be furnished with a PVC FPT condensate drain connection and an internal factory installed condensate trap. If units without an internal trap are used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for his sub-contractor to install these provisions.

Electrical:

A control box shall be located within the unit compressor compartment and shall contain a 75 VA transformer, 24 Volt activated, 2 or 3 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Reversing valve and fan motor wiring shall be routed through this electronic controller. Units shall be name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote thermostat/sensor.

Option: Units shall be supplied with factory installed non-fused electrical service disconnect switch.

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 5

Solid State Control System (DXM2):

Units shall have a solid-state control system. **Units utilizing electro-mechanical control shall not be acceptable.** The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall have the following features:

- Anti-short cycle time delay on compressor operation.
- Random start on power up mode.
- Low voltage protection.
- High voltage protection.
- Unit shutdown on high or low refrigerant pressures (loss of charge).
- Unit shutdown on low water temperature.
- Condensate overflow electronic protection.
- Option to reset unit at thermostat or disconnect.
- Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
- Ability to defeat time delays for servicing.
- Light emitting diode (LED) on circuit board to indicate high pressure, low pressure (loss of charge), low voltage, high voltage, low water/air temperature cut-out, condensate overflow, and control voltage status.
- The low-pressure (loss of charge) switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- 24 V output to cycle a motorized water valve or other device with compressor contactor.
- Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
- Water coil low temperature sensing (selectable for water or antifreeze).
- Air coil low temperature sensing.
- Removable thermostat connector.
- Night setback control.
- Random start on return from night setback.
- Minimized reversing valve operation (Unit control logic shall only switch the reversing valve when cooling is demanded for the first time. The reversing valve shall be held in this position until the first call for heating, ensuring quiet operation and increased valve life.).
- Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
- Dry contact night setback output for digital night setback thermostats.
- Ability to work with heat pump (Y, O) or heat/cool (Y, W) type thermostats.
- Ability to work with heat pump thermostats using O or B reversing valve control.
- Emergency shutdown contacts.
- Boilerless system heat control at low loop water temperature.
- Ability to allow up to 3 units to be controlled by one thermostat.
- Relay to operate an external damper.
- Ability to automatically change fan speed from multistage thermostat.
- Relay to start system pump.
- 75 VA control transformer. Control transformer shall have load side short circuit and overload protection via a built in circuit breaker.

NOTE: Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protections will not be accepted.

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 6

NOTE: To achieve full benefit of the two-stage compressor and ECM fan, a 2 Heat/2 Cool thermostat (or a 3 Heat/2 Cool thermostat when electric backup heat is required) should be employed.

Digital Night Setback with Pump Restart (with ATP32U03C, ATP32U04C, and ACT32U03C):

The unit will be provided with a Digital Night Setback feature using an accessory relay on the DXM2 controller and an external, field-provided time clock. The external time clock will initiate and terminate the night setback period. The thermostat will have a night setback override feature with a programmable override time period.

An additional accessory relay on the unit DXM2 controller will energize the building loop pump control for the duration of the override period. **(Note: This feature requires additional low voltage wiring. Consult Application Drawings for details.)**

Remote Service Sentinel:

Solid state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat fault light, indicating a lockout. Upon cycling the G (fan) input 3 times within a 60 second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc. **Units that do not provide this remote service sentinel shall not be acceptable.**

Option: Lonworks Interface System

Units shall have all the features listed above and the control board will be supplied with a LONWORKS interface board, which is LONMark certified. This will permit all units to be daisy chained via a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. space temperature
- b. leaving water temperature
- c. discharge air temperature
- d. command of space temperature setpoint
- e. cooling status
- f. heating status
- g. low temperature sensor alarm
- h. low pressure sensor alarm
- i. high pressure switch alarm
- j. condensate sensor alarm
- k. hi/low voltage alarm
- l. fan "ON/AUTO" position of space thermostat as specified above
- m. unoccupied/occupied command
- n. cooling command
- o. heating command
- p. fan "ON/AUTO" command
- q. fault reset command
- r. itemized fault code revealing reason for specific shutdown fault (any one of 7)

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 7

Option: MPC (Multiple Protocol Control) Interface System

Units shall have all the features listed above and the control board will be supplied with a Multiple Protocol interface board. Available protocols are BACnet MS/TP, Modbus, or Johnson Controls N2. The choice of protocol shall be field selectable/changeable via the use of a simple selector switch. **Protocol selection shall not require any additional programming or special external hardware or software tools.** This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. space temperature
- b. leaving water temperature
- c. discharge air temperature
- d. command of space temperature setpoint
- e. cooling status
- f. heating status
- g. low temperature sensor alarm
- h. low pressure sensor alarm
- i. high pressure switch alarm
- j. condensate overflow alarm
- k. hi/low voltage alarm
- l. fan "ON/AUTO" position of space thermostat as specified above
- m. unoccupied/occupied command
- n. cooling command
- o. heating command
- p. fan "ON/AUTO" command
- q. fault reset command
- r. itemized fault code revealing reason for specific shutdown fault (any one of 7)

Warranty:

ClimateMaster shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the DXM2 control board for a total of 5 years.

FIELD INSTALLED OPTIONS

Hose Kits:

All units shall be connected with hoses. The hoses shall be 2 feet (61 cm) long, braided stainless steel; fire rated hoses complete with adapters. Only fire rated hoses will be accepted.

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 8

Valves:

The following valves are available and will be shipped loose:

- a. Ball valve; bronze material, standard port full flow design, FPT connections.
- b. Ball valve with memory stop and PT port.
- c. "Y" strainer with blowdown valve; bronze material, FPT connections.
- d. Motorized water valve; slow acting, 24 V, FPT connections.

Hose Kit Assemblies:

The following assemblies ship with the valves already assembled to the hose described:

- a. Supply and return hoses having ball valve with PT port.
- b. Supply hose having ball valve with PT port; return hose having automatic flow regulator valve with PT ports, and ball valve.
- c. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having automatic flow regulator with PT ports, and ball valve.
- d. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having ball valve with PT port.

Thermostats:

The thermostat shall be a ClimateMaster mechanical or electronic type thermostat as selected below with the described features:

- a. Thermostat (communicating) (ATC32U03C)

An electronic communicating LCD thermostat shall be provided. The thermostat shall offer three stages of heating and two stages of cooling with precise temperature control and have a four-wire connection to the unit. The thermostat shall be capable of manual or automatic change-over operation and shall operate in standard or programmable mode. An integrated humidity control feature shall be included to control a humidifier and/or a dehumidifier. The thermostat shall include a utility demand reduction feature to be initiated by an independent time program or an external input.

The thermostat shall have a comprehensive installation setup menu to include configuration of the unit CFM for each mode of operation and configuration of the water flow rate through the unit, including variation of the water flow rate based on the stage of unit operation.

The thermostat shall display system faults with probable cause and troubleshooting guidance. Comprehensive service diagnostics menus shall display, system inputs, system outputs, configuration settings, Geo source inlet and outlet temperatures, compressor discharge line temperature, liquid line temperature, leaving air temperature, and entering potable water temperature (on units equipped with a Hot Water Generator). The thermostat shall allow for immediate manual control of all DXM2 outputs at the thermostat for rapid troubleshooting.

- b. Multi-stage Digital Automatic Changeover (ATA22U01)

Thermostat shall be multi-stage (2H/2C), manual or automatic changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of setpoint(s) without batteries. A fault LED shall be provided to indicate specific fault condition(s). Thermostat shall provide temperature display offset for custom applications. Thermostat shall allow unit to provide better dehumidification by automatically using lower fan speed on stage 1 cooling (higher latent cooling) as main cooling mode, and automatically shifting to high speed fan on stage 2 cooling.

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 9

- c. Multi-stage Automatic or Manual Changeover Programmable 7-Day (ATP32U03C)
Thermostat shall be 7-day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008C). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.
- d. Multi-stage Automatic or Manual Changeover Programmable 7-Day with Humidity Control (ATP32U04C)
Thermostat shall be 7-day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Separate dehumidification and humidification setpoints shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. Installer configuration mode shall allow thermostat to operate with ECM fan dehumidification mode via settings changes. Thermostat shall have a blue backlit dot matrix LCD display with temperature, relative humidity, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating setpoint range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008C). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

DDC Sensors:

ClimateMaster wall mounted DDC sensor to monitor room temperature and interfaces with optional interface system described above. Several types as described below:

- a. Sensor only with no display (LON and MPC).
- b. Sensor with override (LON only).
- c. Sensor with setpoint adjustment and override (MPC only).
- d. Sensor with setpoint adjustment and override, LCD display, status/fault indication (LON and MPC).

Accessory: Hand Held Communication/Diagnostic Service Tool ACDU03C

- Allows installation and service personnel to access the configuration and service modes of the DXM2 control board without installing the ATC32U03C communicating thermostat.
- Configure the airflow, pump, or modulating valve operation etc.
- Diagnose by viewing fault history and operating conditions at the time of fault and manually operating the unit.

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Tranquility® 30 (TE) Series 60 Hz Engineering Specifications – Page 10

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Unit Features

THE TRANQUILITY® LARGE (TL) SERIES

The award winning Tranquility® Large (TL) Series raises the bar for Water-Source Heat Pump efficiencies, features, and application flexibility. Not only does the Tranquility (TL) exceed ASHRAE 90.1 efficiencies, but it also uses EarthPure® HFC-410A zero ozone depletion refrigerant, making it an extremely environmentally-friendly option. Tranquility (TL) Series is eligible for additional LEED® (Leadership in Energy and Environmental Design) points because of the “green” technology design.

Available in sizes 7 tons (24.6 kW) through 25 tons (87.9 kW) with multiple cabinet configurations, the Tranquility Large (TL) Series offers a wide range of units for most any installation. The Tranquility Large Series has an extended range refrigerant circuit, capable of ground loop (geothermal) applications (may require optional extended range insulation), ground water (geothermal) applications, as well as water loop (boiler-tower) applications. Standard features are many. Microprocessor controls, galvanized steel cabinet, galvanized steel with epoxy powder coat painted drain pan and TXV refrigerant metering device are just some of the features of the flexible Tranquility Large Series.

ClimateMaster's exclusive double isolation compressor mounting system makes the Tranquility Large Series one of the quietest units on the market. Compressors are mounted on specially engineered sound-tested EPDM grommets to a heavy gauge mounting plate, which is further isolated from the cabinet base with rubber grommets for maximized vibration and sound attenuation. The easy access control box and large access panels make installing and maintaining the unit easier than other water-source heat pumps currently in production.

Options such as coated air coil, DDC controls, and dual point power allow customized design solutions. Optional blower motor/sheave drive packages expand the operating range and help overcome some of the challenges associated with ductwork for retrofit installations. A cupro-nickel water-coil and sound absorbing UltraQuiet package are options that make a great unit even better.

The Tranquility Large (TL) Series Water-Source Heat Pumps are designed to meet the challenges of today's HVAC demands with one of the most innovative products available on the market.

iGate® technology is the next generation in intelligent control by using two-way communication to provide a gateway into the system. The iGate control system allows end-users and contractors to monitor the performance of the unit, custom tailor its operation, and diagnose any issues, right from the thermostat.

UNIT FEATURES

- Vertical sizes 084 (7 tons, 24.6 kW), 096 (8 tons), 120 (10 tons), 150 (12.5 tons), 168 (14 tons), 192 (16 tons), 240 (20 tons), 300 (25 tons, 87.9 kW)
- Unit configuration can be ordered with, or converted to front or back return and top, front, or back discharge. Field conversion uses all existing parts including panels and belts
- Electrical box can be field converted to be on front or back of unit
- Electric power can enter from any side of unit
- Water and drain can be connected to either side
- Dual refrigeration circuits (TLV168, 192, 240, 300)
- Exceeds ASHRAE 90.1 efficiencies
- TXV metering device
- Extended range 20 to 120°F (-6.7 to 48.9°C operation)
- Microprocessor controls standard (optional DXM2 or DDC controls)
- LonWorks, BACnet, Modbus and Johnson N2 compatibility options for DDC controls
- Unit Performance Sentinel performance monitoring system
- Belt drive blowers with high efficiency motors and multiple pulley adjustment
- 1", 2", or 4" (25, 50, or 100 mm) Full Filter Frame with bottom access

OPTIONS INCLUDE

- Hot gas bypass
- Dual point power
- Coated air coil
- Internal motorized valve
- Internal secondary pump
- UltraQuiet
- Extended range insulation
- Cupro-nickel water coil
- Stainless steel drain pan
- ClimaDry® II
- Electrical disconnect
- DXM2 Control

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TL Physical Data

Model	084	096	120	150	168	192	240	300
Compressor Quantity	Scroll (1)				Scroll (2)			
Factory Charge HFC-410a (oz) [kg] per circuit	140 [3.97]	156 [4.42]	224 [6.35]	248 [7.03]	140 [3.97]	156 [4.42]	224 [6.35]	248 [7.03]
Blower Motor								
Blower Motor Quantity	1							
Standard Motor (hp) [kW]	1.0 [.75]	1.5 [1.12]	2 [1.49]	3 [2.24]	2 [1.49]	3 [2.24]	5 [3.73]	5 [3.73]
Large Motor (hp) [kW]	1.5 [1.12]	2.0 [1.49]	3 [2.24]	5 [3.73]	3 [2.24]	5 [3.73]	7.5 [5.60]	7.5 [5.60]
Blower								
No. of Blowers	1				2			
Blower Wheel Size D x W (in) [cm]	15 x 11 [38.1 x 38.1]			15 x 15 [38.1 x 38.1]	15 x 11 [38.1 x 38.1]		15 x 15 [38.1 x 38.1]	
Water Connection Size								
FPT (in) [mm]	1-1/2" [38.1]			2" [50.8]			2-1/2" [63.5]	
Coax Volume								
Volume (US Gallons) [liters]	2.19 [8.28]	2.48 [9.37]	3.46 [13.11]	4.83 [18.29]	6.36 [24.08]	7.39 [27.98]		
Condensate Connection Size								
FPT (in) [mm]	1" [25.4]							
Air Coil Data								
Air Coil Dimensions H x W (in) [cm]	36 x 48 [91.4 x 121.9]				2 - 36 x 48 [91.4 x 121.9]			
Air Coil Total Face Area (ft²) [m²]	12 [1.11]				24 [2.22]			
Miscellaneous Data								
Filter Standard - 1" [25.4mm] Throwaway (qty) (in) [cm]	(QTY.4) 18 x 25 [45.74 x 63.5]				(QTY.8) 18 x 25 [45.74 x 63.5]			
Weight - Operating (lbs) [kg]	880 [399]	930 [422]	960 [435]	1600 [725]	1665 [755]	1695 [769]		
Weight - Packaged (lbs) [kg]	895 [406]	945 [429]	975 [442]	1630 [739]	1695 [769]	1725 [782]		

All units have grommet compressor mountings, and 1/2" & 1-3/4" electrical knockouts.
 For ClimaDry® option, add 125 lbs [57 kg] for 084-150 and 250 lbs [114 kg] for 168-300.

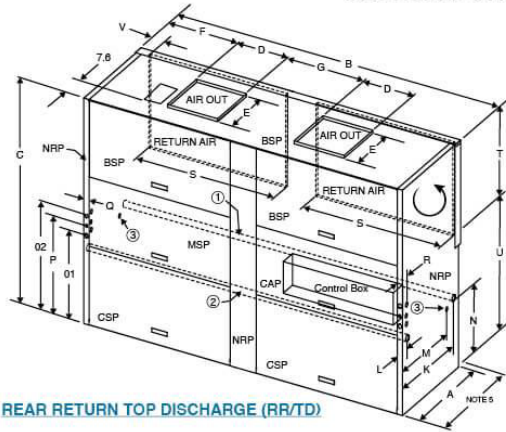
Unit Maximum Water Working Pressure	
Options	Max Pressure PSIG [kPa]
Base Unit	300 [2,068]
Motorized Water Valve	300 [2,068]
Internal Secondary Pump or ClimaDry®	145 [999]

Use the lowest maximum pressure rating when multiple options are combined.

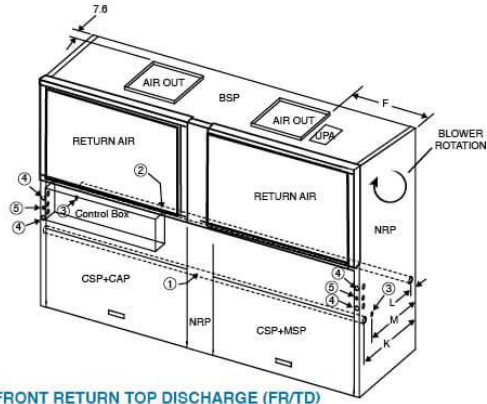
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TLV168-300 Dimensional Data

ALL CONFIGURATIONS REQUIRE SERVICE ACCESS AREA DESCRIBED IN NOTES 7, 8, 9, AND 10.



REAR RETURN TOP DISCHARGE (RR/TD)

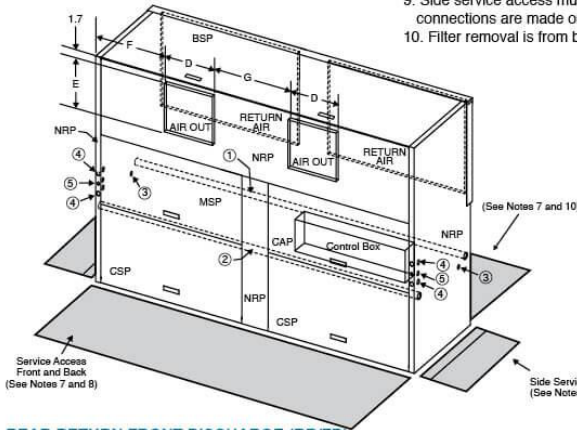


FRONT RETURN TOP DISCHARGE (FR/TD)

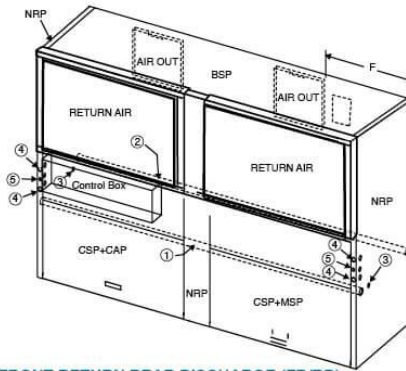
LEGEND	168-240	300
1. Water inlet (see note 2)	2" FPT	2 1/2" FPT
2. Water outlet (see note 2)	2" FPT	2 1/2" FPT
3. Condensate drain (see note 3)	1" FPT	
4. High voltage access (see note 4)	1 3/8" (3.49 cm)	
5. Low voltage access (see note 4)	7/8" (2.2 cm)	
BSP - Blower Service Panel CAP - Control Access Panel CSP - Compressor Access Panel MSP - Motor Service Panel NRP - Non Removable Panel UPA - Upper Pulley Access		

NOTES:

- All dimensions in inches (cm)
- Water inlet and water outlet connections are available on either side (left or right) of the unit. Installer must plug water inlet/outlet not being connected to.
- Condensate drain is available on either side (left or right) of unit. Drain hose and drain connection will be tied inside the unit. Installer will untie the drain hose, form trap, and connect to the condensate drain hole of installer's choice.
- Electrical access is available on either side (left or right) of unit and is also available in the front on the left or right side of the unit.
- Overall Depth - Add 3.12"(8 cm) for 1"(2.5 cm) or 2"(5 cm) Filter Frame; 5.12" for 4" Filter Frame and for FD, RD additional 1.06"(2.7cm) for supply air duct flange.
- Overall cabinet height dimension does not include duct flange when in top discharge configuration.
- While access to all removable panels may not be required, installer should take care to comply with all building codes and allow adequate clearance for future field service.
- Units require 3 feet(91 cm) clearance for water connections, CAP, CSP, MSP and BSP service access.
- Side service access must be 2 feet(9.4 cm) on any side that connections are made. If no connections are made on a side then service access can be 6 inches(1.5 cm) minimum.
- Filter removal is from bottom of frame, allow 2 feet(9.4 cm) access for servicing.



REAR RETURN FRONT DISCHARGE (RR/FD)



FRONT RETURN REAR DISCHARGE (FR/RD)

Model	Overall Cabinet			Discharge Connections Duct Flange				Water Connections			Electrical Knockouts					Return Air Connections Using Return Air Opening					
	A	B	C	D	E	F	G	K	L	M	N	O1	O2	P	Q	R	S	T	U	V	
	Depth Note 5	Width	Height	Supply Depth	Supply Depth			1 Water Inlet	2 Water Outlet	3 Condensate							Return Depth	Return Height			
168-240	in.	34.0	106.7	79.0	17.5	17.6	17.8	31.3	31.0	3.0	27.0	25.6	31.0	38.0	34.6	1.0	3.0	48.0	32.4	44.6	2.7
	cm.	86.4	270.9	200.7	44.5	44.6	45.1	79.4	78.7	7.6	68.6	65.1	78.7	96.4	87.8	2.5	7.6	121.9	82.2	113.3	6.9
300	in.	34.0	106.7	79.0	21.4	17.6	17.8	23.4	31.0	3.0	27.0	25.6	31.0	38.0	34.6	1.0	3.0	48.0	32.4	44.6	2.7
	cm.	86.4	270.9	200.7	54.4	44.6	45.1	59.4	78.7	7.6	68.6	65.1	78.7	96.4	87.8	2.5	7.6	121.9	82.2	113.3	6.9

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TL Series Wiring Diagram Matrix

All current diagrams can be located online at climatemaster.com. Click 'Commercial Professional' (go to 'Resources/literature/wiring diagrams' in the upper right), use part numbers below to lookup wiring diagrams

Model	Wiring Diagram Part Number	Electrical	Control	Agency
TLV084-150	96B0113N01	208-230/60/3, 460/60/3, 575/60/3	CXM	ETL
	96B0113N02		DXM	
TLV084-150 with ClimaDry®	96B0113N03		DXM	
TLV168-300	96B0113N07		CXM	
	96B0113N08		DXM	
TLV186-300 with ClimaDry®	96B0128N02		DXM	
TLV - All Auxillary Diagrams	96B0149N01		CXM & LON	
	96B0149N02		DXM & LON	
	96B0149N03		CXM & MPC	
	96B0149N04		DXM & MPC	

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Tranquility® Large (TL) Series 60Hz Engineering Specifications – Page 1

General:

Furnish and install ClimateMaster Tranquility® Large (TL) Water Source Heat Pumps, as indicated on the plans. Equipment shall be completely assembled, piped, and internally wired. Capacities and characteristics as listed in the schedule and the specifications that follow.

Units shall be supplied completely factory built capable of operating over an entering water temperature range from 20° to 120°F (-6.7° to 48.9°C) as standard. Equivalent units from other manufacturers may be proposed provided approval to bid is given 10 days prior to bid closing. All equipment listed in this section must be rated and certified in accordance with Air-Conditioning, Heating and Refrigeration Institute/International Standards Organization (AHRI / ISO 13256-1). All equipment must be tested, investigated, and determined to comply with the requirements of the standards for Heating and Cooling Equipment UL-1995 for the United States and CAN/CSA-C22.2 NO.236 for Canada, by Intertek Testing Laboratories (ETL). The units shall have AHRI / ISO and ETL-US-C labels.

All units shall pass a factory acceptance test. The quality control system shall automatically perform the factory acceptance test via computer. A detailed report card from the factory acceptance test shall ship with each unit. **(Note: If unit fails the factory acceptance test it shall not be allowed to ship. Unit serial number will be recorded by factory acceptance test and furnished on report card for ease of unit warranty status.)**

Basic Construction:

Vertical Units shall have one of the following air flow arrangements: Back Return/Top Discharge, Front Return/Top Discharge, Back Return/Front Discharge, Front Return/Back Discharge as shown on the plans. Units can be field converted without requiring new panels or belts. Units that cannot be field converted shall not be acceptable.

If units with these arrangements are not used, the contractor is responsible for any extra costs incurred by other trades. All units must have a minimum of two access panels for serviceability of compressor compartment. Units having only one access panel to compressor/heat exchangers/expansion device/refrigerant piping shall not be acceptable.

Compressor section interior surfaces shall be lined with 1/2 inch (12.7mm) thick, 1-1/2 lb/ft3 (24 kg/m3) acoustic type glass fiber insulation. Air handling section interior surfaces shall be lined with 1/2 in (12.7mm) thick, 1-1/2 lb/ft3 (24 kg/m3) foil backed fiber insulation for ease of cleaning. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the air stream. Units without foil-faced insulation in the air handling section will not be accepted.

Vertical heat pumps shall be fabricated from heavy gauge galvanized steel.

Standard insulation must meet NFPA Fire Hazard Classification requirements 25/50 per ASTM E84, UL 723, CAN/ULC S102-M88 and NFPA 90A requirements; air erosion and mold growth limits of UL-181; stringent fungal resistance test per ASTM-C1071 and ASTM G21; and shall meet zero level bacteria growth per ASTM G22. Unit insulation must meet these stringent requirements or unit(s) will not be accepted.

Vertical units to have discharge air duct collar and 1" (25.4mm) full filter frame with 1" (25.4mm) filters factory installed. If units with these factory installed provisions are not used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for his sub-contractor to install these provisions.

All units must have an insulated panel separating the fan compartment from the compressor compartment. Units with the compressor in the air stream are not acceptable. Units shall have a factory installed 1 inch (25.4mm) wide filter frame with filter removal from bottom side. Units shall have a 1 inch (25.4mm) thick throwaway type glass fiber filter. The contractor shall purchase one spare set of filters and replace factory shipped filters on completion of start-up. Filters shall be standard sizes. If units utilize non-standard filter sizes then the contractor shall provide 12 spare filters for each unit.

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Cabinets shall have separate knockouts on front and sides for entrance of line voltage and low voltage control wiring. All factory-installed wiring passing through factory knockouts and openings shall be protected from sheet metal edges at openings by plastic ferrules. Supply and return water connections shall be copper FPT fittings, connections on both sides (installer to choose side and plug opposite) and shall be securely mounted flush to the cabinet side allowing for connection of a flexible hose without the use of a back-up wrench. Water connections that protrude through the cabinet or require the use of a backup wrench shall not be allowed. Water connections on only one side will not be accepted. All water connections and electrical knockouts must not interfere with the serviceability of unit. Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature. Contractor must ensure that units can be easily removed for servicing and coordinate locations of electrical conduit and lights with the electrical contractor.

Option: 2-inch (50.8mm) full filter frame with glass fiber throwaway filters on units.

Option: 4-inch (101.6 mm) full filter frame with Merv 8 Filter on units.

Option: UltraQuiet package shall consist of high technology sound attenuating material that is strategically applied to the compressor and air handling compartment casings and fan scroll in addition to the standard ClimaQuiet system design, to further dampen and attenuate sound transmissions. Compressor is mounted on specially engineered sound-tested isolators.

Option: The unit shall be supplied with extended range Insulation option, which adds closed cell insulation to internal water lines, and provides insulation on suction side refrigeration tubing including refrigerant to water heat exchanger.

Option: The unit shall be supplied with internally factory mounted two-way water valve for variable speed pumping requirements. A factory-mounted or field-installed high pressure switch shall be installed in the water piping to disable compressor operation in the event water pressures build due to water freezing in the piping system.

Option: The unit shall be supplied with internally mounted secondary pump for primary/secondary applications.

Fan and Motor Assembly:

All units shall have belt-driven single or dual centrifugal fans. Fan motor shall be permanently lubricated with thermal overload protection. Units supplied without a permanently lubricated motor must provide external oilers for easy service. The fan and motor assembly must be capable of overcoming the external static pressures as shown on the schedule. Airflow / Static pressure rating of the unit shall be based on a wet coil and a clean filter in place. **Ratings based on a dry coil and/or no air filter shall NOT be acceptable.**

Option: Various blower drive packages for selectable static pressure/airflow.

Refrigerant Circuit:

All units shall contain an EarthPure® (HFC-410A) sealed refrigerant circuit including a high efficiency scroll compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube in tube) refrigerant to water heat exchanger, and safety controls including a high pressure switch, low pressure switch (loss of charge), water coil low temperature sensor, and air coil low temperature sensor. Access fittings shall be factory installed on high and low pressure refrigerant lines to facilitate field

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service. Activation of any safety device shall prevent compressor operation via a microprocessor lockout circuit. The lockout circuit shall be reset at the thermostat or at the optional disconnect switch. **Units that cannot be reset at the thermostat shall not be acceptable.**

Hermetic compressors shall be internally sprung. The scroll compressors shall have a dual level vibration isolation system. The compressor(s) will be mounted on specially engineered sound-tested EPDM vibration isolation grommets to a large heavy gauge compressor mounting plate, which is then isolated from the cabinet base with grommets for maximized vibration attenuation. Compressor shall have thermal overload protection. Compressor shall be located in an insulated compartment isolated from air stream to minimize sound transmission.

Refrigerant to air heat exchangers shall utilize enhanced corrugated lanced aluminum fins and rifled copper tube construction rated to withstand 625 PSIG (4309 kPa) refrigerant working pressure. Refrigerant to water heat exchangers shall be of copper inner water tube and steel refrigerant outer tube design, rated to withstand 625 PSIG (4309 kPa) working refrigerant pressure. The refrigerant to water heat exchanger shall be “electro-coated” with a low cure cathodic epoxy material a minimum of 0.4 mils thick (0.4 – 1.5 mils range) on all surfaces. The black colored coating shall provide a minimum of 1000 hours salt spray protection per ASTM B117-97 on all external steel and copper tubing. The material shall be formulated without the inclusion of any heavy metals and shall exhibit a pencil hardness of 2H (ASTM D3363-92A), crosshatch adhesion of 4B-5B (ASTM D3359-95), and impact resistance of 160 in-lbs (184 kg-cm) direct (ASTM D2794-93).

Refrigerant metering shall be accomplished by thermostatic expansion valve only. Expansion valves shall be a dual port balanced type with external equalizer for optimum refrigerant metering. Units shall be designed and tested for operating ranges of entering water temperatures from 20° to 120°F (-6.7° to 48.9°C). Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

Option: The unit shall be supplied with cupro-nickel coaxial water to refrigerant heat exchanger.

Option: The refrigerant to air heat exchanger shall be coated.

Option: Unit shall include ClimaDry® II reheat option. Only modulating reheat that will adjust capacity based upon supply air temperature to provide “neutral” (72°F, 22.2°C) constant air temperature will be accepted. “Neutral” supply air temperature shall be provided regardless of entering loop water temperatures or refrigerant condensing pressures. Control of reheat must be accomplished via a humidistat or dehumidistat contact closure. Refrigerant circuit must be AHRI certified. Approved equal manufacturers may provide pre-engineered integrated modulating hot gas reheat within the unit cabinet. Any design costs and costs of field installed items shall be borne by mechanical contractor. Refrigerant circuits that are not AHRI certified when the reheat option is applied will not be accepted. (See ClimaDry® II submittal for application details and unit availability.)

Drain Pan:

The drain pan shall be constructed of galvanized steel and have a powder coat paint application to further inhibit corrosion. This corrosion protection system shall meet the stringent 1000 hour salt spray test per ASTM B117. If plastic type material is used, it must be HDPE (High Density Polyethylene) to avoid thermal cycling shock stress failure over the lifetime of the unit. Drain pan shall be fully insulated. Drain outlet shall be located at pan as to allow complete and unobstructed drainage of condensate. Drain pan hose assembly can be connected to either side, drain outlet to be 1” FPT fitting. Choice of drain connection to only one side will not be accepted. The unit as standard will be supplied with solid-state electronic condensate overflow protection. Mechanical float switches will NOT be accepted.

Option: The unit shall be supplied with stainless steel drain pan.

Electrical:

A control box shall be located within the unit compressor compartment and shall contain a 75VA transformer with load side circuit breaker protection, 24 volt activated, 2 or 3 pole compressor contactor, terminal block for thermostat wiring and solid-state controller for complete unit operation. Reversing valve and fan motor wiring shall be routed through this electronic controller. Units shall be

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name-plated for use with time delay fuses or HACR circuit breakers. Unit controls shall be 24 Volt and provide heating or cooling as required by the remote thermostat/sensor. Two compressor units shall have a solid-state time delay relay and random start to prevent both compressors from starting simultaneously.

Option: The unit shall be supplied with electrical disconnect.

Solid State Control System (CXM):

Units shall have a solid-state control system. Units utilizing electro-mechanical control shall not be acceptable. The control system microprocessor board shall be specifically designed to protect against building electrical system noise contamination, EMI, and RFI interference. The control system shall interface with a heat pump type thermostat. The control system shall have the following features:

- a. Anti-short cycle time delay on compressor operation.
- b. Random start on power up mode.
- c. Low voltage protection.
- d. High voltage protection.
- e. Unit shutdown on high or low refrigerant pressures.
- f. Unit shutdown on low water temperature.
- g. Condensate overflow electronic protection.
- h. Option to reset unit at thermostat or disconnect.
- i. Automatic intelligent reset. Unit shall automatically reset the unit 5 minutes after trip if the fault has cleared. If a fault occurs 3 times sequentially without thermostat meeting temperature, then lockout requiring manual reset will occur.
- j. Ability to defeat time delays for servicing.
- k. Light emitting diode (LED) on circuit board to indicate high pressure, low pressure, low voltage, high voltage, low water/air temperature cut out, condensate overflow, and control voltage status.
- l. The low-pressure switch shall not be monitored for the first 120 seconds after a compressor start command to prevent nuisance safety trips.
- m. 24V output to cycle a motorized water valve or other device with compressor contactor.
- n. Unit Performance Sentinel (UPS). The UPS warns when the heat pump is running inefficiently.
- o. Water coil low temperature sensing (selectable for water or anti-freeze).
- p. Air coil low temperature sensing.

NOTE: Units not providing the 8 safety protections of anti-short cycle, low voltage, high voltage, high refrigerant pressure, low pressure (loss of charge), air coil low temperature cut-out, water coil low temperature cut-out, and condensate overflow protections will not be accepted.

Option: Enhanced solid state control system (DXM)

This control system features two-stage control of cooling and two-stage control of heating modes for exacting temperature and dehumidification purposes.

Control shall have all of the above-mentioned features of the CXM control system along with the following expanded features:

- a. Removable thermostat connector.
- b. Night setback control.
- c. Random start on return from night setback.
- d. Minimized reversing valve operation (Unit control logic shall only switch the reversing valve when cooling is demanded for the

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first time. The reversing valve shall be held in this position until the first call for heating, ensuring quiet operation and increased valve life.)

- e. Override temperature control with 2-hour timer for room occupant to override setback temperature at the thermostat.
- f. Dry contact night setback output for digital night setback thermostats.
- g. Ability to work with heat pump or heat/cool (Y, W) type thermostats.
- h. Ability to work with heat pump thermostats using O or B reversing valve control.
- i. Emergency shutdown contacts.
- j. Boilerless system heat control at low loop water temperature.
- k. Ability to allow up to 3 units to be controlled by one thermostat.
- l. Relay to operate an external damper.
- m. Ability to automatically change fan speed from multistage thermostat.
- n. Relay to start system pump.
- o. 75 VA control transformer. Control transformer shall have load side short circuit and overload protection via a built in circuit breaker.

Digital Night Setback with Pump Restart (DXM w/ ATP32U03/04)

The unit will be provided with a Digital Night Setback feature using an accessory relay on the DXM controller with an ATP32U03/04 thermostat and an external, field-provided time clock. The external time clock will initiate and terminate the night setback period. The thermostat will have a night setback override feature with a programmable override time period.

An additional accessory relay on the unit DXM controller will energize the building loop pump control for the duration of the override period. **(Note: this feature requires additional low voltage wiring. Consult Application Drawings for details.)**

Remote Service Sentinel (CXM/DXM):

Solid state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown. The Remote Service Sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat. The control board shall provide a signal to the thermostat fault light, indicating a lockout. Upon cycling the G (fan) input 3 times within a 60 second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc. **Units that do not provide this remote service sentinel shall not be acceptable.**

Option: Lonworks interface system

Units shall have all the features listed above (either CXM or DXM) and the control board will be supplied with a LONWORKS interface board, which is LONMark certified. This will permit all units to be daisy chained via a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate sensor alarm
- k. Hi/low voltage alarm

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- l. Fan "ON/AUTO" position of space thermostat as specified above
- m. Unoccupied / occupied command
- n. Cooling command
- o. Heating command
- p. Fan "ON/AUTO" command
- q. Fault reset command
- r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Option: MPC (Multiple Protocol Control) interface system

Units shall have all the features listed above (either CXM or DXM) and the control board will be supplied with a Multiple Protocol interface board. Available protocols are BACnet MS/TP, Modbus, or Johnson Controls N2. The choice of protocol shall be field selectable/changeable via the use of a simple selector switch. Protocol selection shall not require any additional programming or special external hardware or software tools. This will permit all units to be daisy chain connected by a 2-wire twisted pair shielded cable. The following points must be available at a central or remote computer location:

- a. Space temperature
- b. Leaving water temperature
- c. Discharge air temperature
- d. Command of space temperature setpoint
- e. Cooling status
- f. Heating status
- g. Low temperature sensor alarm
- h. Low pressure sensor alarm
- i. High pressure switch alarm
- j. Condensate overflow alarm
- k. Hi/low voltage alarm
- l. Fan "ON/AUTO" position of space thermostat as specified above
- m. Unoccupied / occupied command
- n. Cooling command
- o. Heating command
- p. Fan "ON/AUTO" command
- q. Fault reset command
- r. Itemized fault code revealing reason for specific shutdown fault (any one of 7)

This option also provides the upgraded 75VA control transformer with load side short circuit and overload protection via a built in circuit breaker.

Warranty:

ClimateMaster shall warranty equipment for a period of 12 months from start up or 18 months from shipping (which ever occurs first).

Option: Extended 4-year compressor warranty covers compressor for a total of 5 years.

Option: Extended 4-year refrigeration circuit warranty covers coils, reversing valve, expansion valve and compressor for a total of 5 years.

Option: Extended 4-year control board warranty covers the CXM/DXM control board for a total of 5 years.

FIELD INSTALLED OPTIONS

Hose Kits:

All units 120,000 BTUH (35 kW) and below shall be connected with hoses. The hoses shall be 2 feet (61cm) long, braided stainless
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steel; fire rated hoses complete with adapters. Only fire rated hoses will be accepted.

Valves:

The following valves are available and will be shipped loose:

- a. Ball valve; bronze material, standard port full flow design, FPT connections.
- b. Ball valve with memory stop and PT port.
- c. "Y" strainer with blowdown valve; bronze material, FPT connections.
- d. Motorized water valve; slow acting, 24v, FPT connections.

Hose Kit Assemblies:

The following assemblies ship with the valves already assembled to the hose described:

- a. Supply and return hoses having ball valve with PT port.
- b. Supply hose having ball valve with PT port; return hose having automatic flow regulator valve with PT ports, and ball valve.
- c. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having automatic flow regulator with PT ports, and ball valve.
- d. Supply hose having "Y" strainer with blowdown valve, and ball valve with PT port; return hose having ball valve with PT port.

Thermostats:

The thermostat shall be a ClimateMaster mechanical or electronic type thermostat as selected below with the described features:

a. Single Stage Digital Auto or Manual Changeover (ATA11U01)

Thermostat shall be a single-stage, digital, auto or manual changeover with HEAT-OFF-COOL-AUTO system switch and fan ON-AUTO switch. Thermostat shall have an LCD display with temperature and set-point(s) in °F or °C. The Thermostat shall provide permanent memory of set-point(s) without batteries. A fault LED shall be provided to display specific fault condition. Thermostat shall provide temperature display offset for custom applications.

b. Multistage Digital Automatic Changeover (ATA22U01)

Thermostat shall be multi-stage (2H/2C), manual or automatic changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, set-point(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of set-point(s) without batteries. A fault LED shall be provided to indicate specific fault condition(s). Thermostat shall provide temperature display offset for custom applications. Thermostat shall allow unit to provide better dehumidification with optional DXM controller by automatically using lower fan speed on stage 1 cooling (higher latent cooling) as main cooling mode, and automatically shifting to high speed fan on stage 2 cooling.

c. Multistage Manual Changeover Programmable 5/2 Day (ATP21U01)

Thermostat shall be 5 day/2 day programmable (with up to 4 setpoints per day), multi-stage (2H/1C), manual changeover with HEAT-OFF-COOL-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have an LCD display with temperature, setpoint(s), mode, and status indication. The temperature indication shall be selectable for °F or °C. The thermostat shall provide permanent memory of setpoint(s) without batteries. Thermostat shall provide convenient override feature to temporarily change setpoint.

d. Multistage Automatic or Manual Changeover Programmable 7 Day (ATP32U03C)

Thermostat shall be 7 day programmable (with up to 4 setpoints per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Thermostat shall have a blue backlit dot matrix LCD display with temperature, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided (when used with ClimateMaster

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CXM or DXM controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating set-point range limit, cooling setpoint range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

e. Multistage Automatic or Manual Changeover Programmable 7 Day with Humidity Control (ATP32U04C)

Thermostat shall be 7 day programmable (with up to 4 set points per day), multi-stage (3H/2C), automatic or manual changeover with HEAT-OFF-COOL-AUTO-EM HEAT system settings and fan ON-AUTO settings. Separate dehumidification and humidification set points shall be configurable for discreet outputs to a dehumidification option and/or an external humidifier. Installer configuration mode shall allow thermostat dehumidification mode to operate with ClimaDry® reheat or with ECM fan dehumidification mode via settings changes. Thermostat shall have a blue backlit dot matrix LCD display with temperature, relative humidity, setpoints, mode, and status indication. The temperature indication shall be selectable for °F or °C. Time display shall be selectable for 12 or 24 hour clock. Fault identification shall be provided (when used with ClimateMaster CXM or DXM controls) to simplify troubleshooting by providing specific unit fault at the thermostat with red backlit LCD during unit lockout. The thermostat shall provide permanent memory of setpoints without batteries. Thermostat shall provide heating set-point range limit, cooling set-point range limit, temperature display offset, keypad lockout, dead-band range setting, and inter-stage differential settings. Thermostat shall provide progressive recovery to anticipate time required to bring space temperature to the next programmed event. Thermostat shall provide an installer setup for configuring options and for setup of servicing contractor name and contact information. Thermostat shall allow the use of an accessory remote and/or outdoor temperature sensor (AST008). Thermostat navigation shall be accomplished via five buttons (up/down/right/left/select) with menu-driven selections for ease of use and programming.

DDC Sensors:

ClimateMaster wall mounted DDC sensor to monitor room temperature and interfaces with optional interface system described above. Several types as described below:

- a. Sensor only with no display (LON and MPC).
- b. Sensor with override (LON only).
- c. Sensor with setpoint adjustment and override (MPC only).
- d. Sensor with setpoint adjustment and override, LCD display, status/fault indication (LON and MPC)

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