

## AIR-SOURCE MODULAR CHILLERS

# INSTALLATION, OPERATION & MAINTENANCE MANUAL

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**Chillers, Heat Pumps, SHC Heat Pumps, & Free Cooling**

UA Models: 20-60 Tons

60Hz – R-454B



**SHC** on  
**DEMAND®**  
SIMULTANEOUS HEATING AND COOLING

**CoolLOGIC** Touch™

## Table of Contents

<b>3</b>	Introduction	<b>49</b>	Power Distribution Drawing
<b>4</b>	Attentions, Cautions, and Warnings	<b>50</b>	Electrical Data
<b>6</b>	Model Nomenclature	<b>51</b>	Wiring Diagram Matrix
<b>8</b>	Physical Data	<b>55</b>	Example Wiring Diagrams
<b>12</b>	Operating Limits	<b>59</b>	Heat Trace Installation
<b>15</b>	Dimensional Data and Drawings	<b>61</b>	Pre-Startup
<b>19</b>	Pre-Installation	<b>63</b>	Pre-Startup Checklist Form
<b>20</b>	Rigging and Lifting Procedures	<b>64</b>	Mechanical Startup
<b>21</b>	Recommended Service Clearances	<b>65</b>	Controller Startup
<b>23</b>	Mounting Rails and Vibration Isolation	<b>66</b>	Electronic Expansion Valves Startup
<b>25</b>	Unit Installation	<b>68</b>	Startup and Warranty Registration Form
<b>27</b>	Water Piping	<b>70</b>	Operation and Maintenance
<b>29</b>	Stainless Steel Strainer Option	<b>72</b>	Heat Exchangers
<b>34</b>	WYE Strainer Option	<b>73</b>	Cleaning Arrangements
<b>37</b>	Basket Strainer Option	<b>74</b>	Troubleshooting Guide
<b>39</b>	Chiller Header Bypass Kits	<b>77</b>	General Information - Servicing
<b>41</b>	Water Piping Configurations	<b>78</b>	Refrigerant Recovery, Evacuation, and Charging
<b>42</b>	Filling the Water System	<b>80</b>	Refrigeration Circuit Diagrams
<b>44</b>	Water Treatment & Temperature Requirements	<b>84</b>	Warranty
<b>45</b>	Electrical Connections	<b>88</b>	Revision History
<b>47</b>	Communications Wiring		

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## Introduction

UA Models

### GENERAL DESCRIPTION

ClimaCool's Air-Source Modular Chillers, models UAC, UAT, UAU, and UAF are available in capacities from 20 to 60 tons. They can be configured in banks of (one) 1 to (twelve) 12 units (20-720 tons), and can satisfy future incremental growth needs by simply adding modules. These models are quiet, serviceable and extremely efficient systems that will provide years of reliable operation.

### SAFETY

Throughout this manual warning, danger, caution and attention notices appear. Read these items carefully before attempting any installation, service or troubleshooting of the equipment. All labels on unit access panels must be observed.

**DANGER:** Indicates an immediate hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING:** Indicates potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION:** Indicates a potentially hazardous situation or an unsafe practice which, if not avoided, could result in minor or moderate injury or product or property damage.

**ATTENTION:** Notification of installed, operation or maintenance information which is important, but not hazard related.

## Attentions, Cautions, and Warnings

### ⚠ WARNING



Disconnect power supply(ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!

### ⚠ WARNING

All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state, and federal statutes for the recovery and disposal of refrigerants. If a compressor is removed from this unit, refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, refrigerant lines of the compressor must be sealed after it is removed.

### ⚠ WARNING

#### WATER AND REFRIGERANT SYSTEMS UNDER PRESSURE



- Isolate/Lockout source and relieve pressure BEFORE servicing equipment.
- Failure to relieve pressure may result in property damage, serious bodily injury or death!

### ⚠ WARNING

#### VERY HOT WATER!



Disconnect power supply(ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!

### ⚠ WARNING

This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

### ⚠ WARNING

Children being supervised are NOT to play with the appliance.

### ⚠ WARNING

Do not pierce or burn.

### ⚠ WARNING

Be aware that refrigerants may not contain odor.

### ⚠ CAUTION



Unit to be serviced by qualified personnel only. Refrigerant system under pressure. Relieve pressure before using torch. Recover refrigerant and store or dispose of properly.

### ⚠ CAUTION

Single wall heat exchanger, not suitable for potable water connection.

### ⚠ CAUTION

Excessive chlorine, undissolved solids and other improper water conditions **WILL DAMAGE** the internal heat exchanger and **WILL VOID YOUR WARRANTY!**

### ⚠ CAUTION

Use only copper conductors for field installed wiring. Unit terminals are not designed to accept other types of conductors.

### ⚠ CAUTION

#### 3-PHASE SCROLL COMPRESSOR UNIT

If this unit uses a 3-Phase Scroll Compressor, the following instructions must be followed:

- Unit power supply must be wired in the proper sequence to avoid damage to the 3-Phase Scroll Compressor;
- Scroll Compressors with incorrect rotation show the following characteristics:
  - High sound level;
  - High suction pressure and low discharge pressure;
  - Low current draw.

If any of the three above characteristics exist, swap two of the three supply wires at the disconnect and recheck compressor for incorrect rotation.

### ⚠ CAUTION

DO NOT store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g., attics, garages, rooftops, etc.). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life. Always move and store units in an upright position. Tilting units on their sides will cause equipment damage.

### ⚠ CAUTION

CUT HAZARD - Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing heat pumps.

### ⚠ CAUTION

To avoid equipment damage, DO NOT use these units as a source of heating or cooling during the construction process. The mechanical components and filters can quickly become clogged with construction dirt and debris, which may cause system damage and void product warranty.



## Attentions, Cautions, and Warnings

UA Models

### ATTENTION

To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must be serviced only by technicians who meet local, state and federal proficiency requirements.

All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state and federal statutes for the recovery and disposal of refrigerants.

If a compressor is removed from the unit, system refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, the refrigerant lines of the compressor must be sealed after it is removed.

### ATTENTION

This chiller is configured for brine duty with a minimum LWT of 20°F (6.7 °C).

It is the facility's responsibility to maintain the brine freeze-point adequately below the lowest water and ambient temperatures that the chiller will see.

### ATTENTION

Confirm all panels and electrical covers are properly installed/sealed, including the condenser fan motor cover.

### ATTENTION

Do not tamper with, modify, or defeat the functionality of the pressure relief valve in any way.

### ATTENTION

Installations where direct sun may cause the module and bank control panels to reach temperatures above 104°F require a sunshade.

### ATTENTION

Servicing shall be performed only as recommended by the manufacturer.

UA Models

## Model Nomenclature Digits 1-15

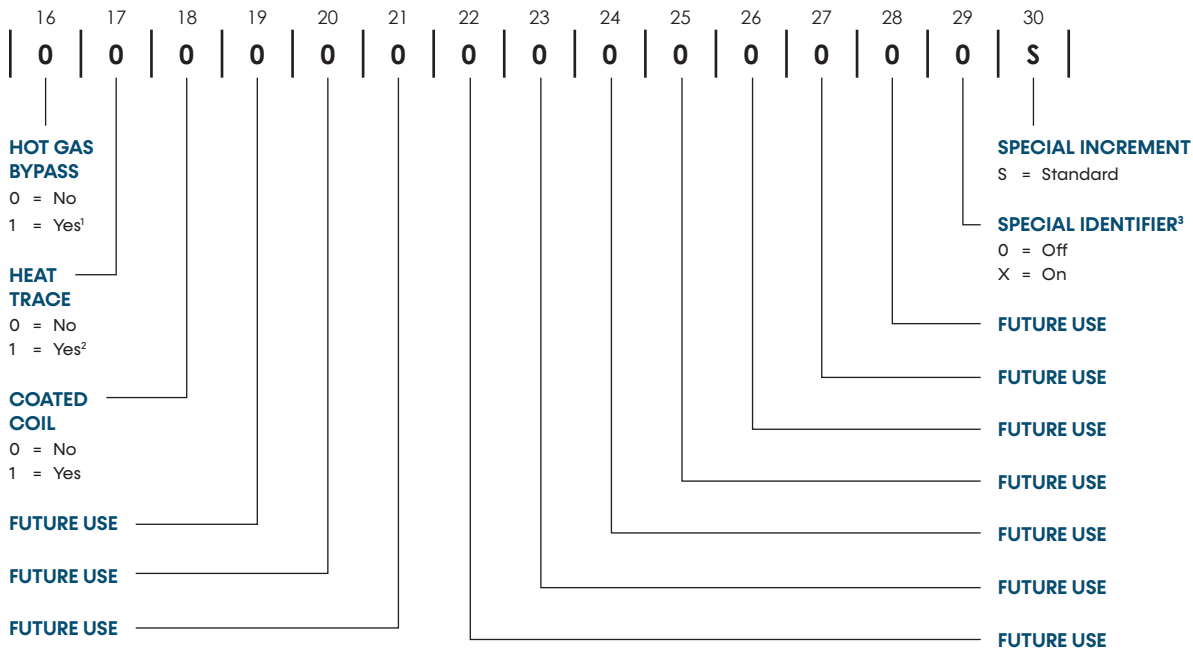
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
U	A	T	S	2	0	A	H	S	0	0	0	S	0	0
<b>PRODUCT LINE</b> U = Ultimate Chiller			<b>SOURCE</b> A = Air			<b>APPLICATION</b> C = Cooling Only T = Heat Pump U = SHC Heat Pump F = Free Cooling			<b>OPTIONS</b> S = Standard <sup>1</sup> M = Module Free Cooling for UAF <sup>2</sup>			<b>TONNAGE</b> 20 = 20 Tons 30 = 30 Tons 50 = 50 Tons 60 = 60 Tons		
<b>REV LEVEL</b> A = Standard			<b>VOLTAGE</b> H = 208/230-3-60 <sup>3</sup> F = 460-3-60 N = 575-3-60			<b>COMPRESSOR</b> S = Standard <sup>1</sup> T = VFD Lead <sup>1</sup> N = No Compressor for UAF <sup>2</sup>			<b>COMPRESSOR SOUND BLANKETS</b> 0 = No 1 = Yes <sup>1</sup>			<b>SCCR</b> 0 = 5 kAIC 1 = 65 kAIC <sup>6</sup>		
<b>CONTROLS OPTIONS</b> S = Standard 1 = Single Module Controls <sup>5</sup> 2 = Auto Stand Alone <sup>1</sup> 3 = Module HMI Only			<b>FUTURE USE</b>			<b>MODULE PASS THROUGH HEADERS</b> 0 = No			<b>WATER HEADER PIPE DIAMETER</b> 0 = Headerless <sup>3</sup> 6 = 6-inch 8 = 8-inch <sup>4</sup>					

1. Option not available for Free Cooling applications  
2. Option required on Free Cooling applications  
3. Option not available for 50 or 60 Ton modules  
4. Option not available for 20 or 30 Ton modules  
5. Option only available for Cooling Only and Heat Pump applications  
6. Option not available for 575V-3Ph-60Hz

Continued on next page.

# Model Nomenclature Digits 16-30

UA Models



1. Option only available for Cooling Only applications

2. Option not available for Free Cooling applications

3. Digit 29 is used to indicate a unit special that does not fall into any other model key digits, e.g. paint color

# Physical Data

## Small Cabinet – IP

Table 1: UA Series (Imperial Units)

Model UA	Chillers UAC		Heat Pumps UAT		SHC <sup>1</sup> Heat Pumps UAU		Free Cooling UAF
	20	30	20	30	20	30	30
Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Compressor Type	scroll		scroll		scroll		-
Compressor Quantity	2	2	2	2	2	2	-
Refrigerant Charge 454B (lb)	54	55	54	55	54	55	-
Module Operating Weight w/Water (lb) <sup>2</sup>	2,849	2,849	2,657	2,849	3,014	3,014	2,318
Module Shipping Weight (lb) <sup>3</sup>	2,634	2,634	2,442	2,634	2,634	2,634	1,908
<b>Air-side Heat Exchanger Fans</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>30</b>
Motor Type	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.
Quantity	2	2	2	2	2	2	2
Fan Type	Axial	Axial	Axial	Axial	Axial	Axial	Axial
Diameter (in.)	31.5	31.5	31.5	31.5	31.5	31.5	31.5
Nominal Airflow (CFM per fan)	10,500	10,500	10,500	10,500	10,500	10,500	10,500
Nominal Airflow (total CFM)	21,000	21,000	21,000	21,000	21,000	21,000	21,000
RPM	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Maximum Design Working Pressure - refrigerant (psi)	650	650	650	650	650	650	-
<b>Air-side Heat Exchanger</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>30</b>
Fin Material	Aluminum		Aluminum		Aluminum		Aluminum
Tube Material	Copper		Copper		Copper		Copper
Dimensions – in. (quantity)	36.00 x 44.00 (4)		36.00 x 44.00 (4)		36.00 x 44.00 (4)		42.50 x 32.25 (4)
<b>Water-side Heat Exchanger</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>30</b>
Heat Exchanger (type)	Brazen Plate		Brazen Plate		Brazen Plate		Tube & Fin Hydraulic Coil
Independent Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Water Storage Volume HX Only (gal)	2.54	2.54	2.54	2.54	2.54	2.54	22.20 <sup>5</sup>
Water Storage Volume HX and Module Piping & Headers (gal)	26.2	26.2	26.2	26.2	48.2	48.2	47.1
Maximum Design Working Pressure - Water Side (psi)	300	300	300	300	300	300	300
Header Water Connections - Inlet/Outlet (in.) <sup>4</sup>	6	6	6	6	6	6	6

**NOTES:**

1. SHC - Simultaneous Heating and Cooling.
2. Module operational weight includes water, compressor oil, and refrigerant charge. Multiply times the number of modules for a total system operational weight.
3. Unit shipping weight includes refrigerant charge, compressor oil and packaging; based on transportation.
4. Main header water/fluid connections are ASME, 6-inch scheduled 40 pipe with grooved couplings, 300 psig maximum working pressure.
5. Free Cool volume includes all four hydronic coils

Table Continued on Next Page

# Physical Data

## Large Cabinet – IP

UA Models

Table Continued from Previous Page

Model UA	Chillers UAC		Heat Pumps UAT		SHC <sup>1</sup> Heat Pumps UAU		Free Cooling UAF
	50	60	50	60	50	60	60
Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Compressor Type	scroll		scroll		scroll		-
Compressor Quantity	2	2	2	2	2	2	-
Refrigerant Charge 454B (lb)	114	120	114	120	114	120	-
Module Operating Weight w/Water (lb) <sup>2</sup>	4,921	5,130	4,921	5,130	5,647	5,856	4,636
Module Shipping Weight (lb) <sup>3</sup>	4,626	4,806	4,626	4,806	5,106	5,286	3,810
<b>Air-side Heat Exchanger Fans</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>60</b>
Motor Type	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.
Quantity	4	4	4	4	4	4	4
Fan Type	Axial	Axial	Axial	Axial	Axial	Axial	Axial
Diameter (in.)	31.5	31.5	31.5	31.5	31.5	31.5	31.5
Nominal Airflow (CFM per fan)	10,500	10,500	10,500	10,500	10,500	10,500	10,500
Nominal Airflow (total CFM)	42,000	42,000	42,000	42,000	42,000	42,000	21,000
RPM	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Maximum Design Working Pressure - refrigerant (psi)	650	650	650	650	650	650	-
<b>Air-side Heat Exchanger</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>60</b>
Fin Material	Aluminum		Aluminum		Aluminum		Aluminum
Tube Material	Copper		Copper		Copper		Copper
Dimensions – in. (quantity)	44.00 x 76.88 (4)		44.00 x 76.88 (4)		44.00 x 76.88 (4)		42.50 x 32.25 (8)
<b>Water-side Heat Exchanger</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>60</b>
Heat Exchanger (type)	Brazen Plate		Brazen Plate		Brazen Plate		Tube & Fin Hydraulic Coil
Independent Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Water Storage Volume HX Only (gal)	4.80	4.80	4.80	4.80	4.80	4.80	44.44 <sup>5</sup>
Water Storage Volume HX and Module Piping & Headers (gal)	39.6	39.6	39.6	39.6	76.6	76.6	69.3
Maximum Design Working Pressure - Water Side (psi)	300	300	300	300	300	300	300
Header Water Connections - Inlet/Outlet (in.) <sup>4</sup>	6 or 8	6 or 8	6 or 8	6 or 8	6 or 8	6 or 8	6 or 8

**NOTES:**

1. SHC - Simultaneous Heating and Cooling.
2. Module operational weight includes water, compressor oil, and refrigerant charge. Multiply times the number of modules for a total system operational weight.
3. Unit shipping weight includes refrigerant charge, compressor oil and packaging; based on transportation.
4. Main header water/fluid connections are ASME, 6-inch scheduled 40 pipe with grooved couplings, 300 psig maximum working pressure.
5. Free Cool volume includes all four hydronic coils

# Physical Data

## Small Cabinet – SI

Table 2: UA Series (Imperial Units)

Model UA	Chillers UAC		Heat Pumps UAT		SHC <sup>1</sup> Heat Pumps UAU		Free Cooling UAF
	20	30	20	30	20	30	30
Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Compressor Type	scroll	scroll	scroll	scroll	scroll	scroll	-
Compressor Quantity	2	2	2	2	2	2	-
Refrigerant Charge 454B (kg)	24.49	24.95	22.68	24.49	22.68	24.49	-
Module Operating Weight w/Water (kg) <sup>2</sup>	1,292.3	1,292.3	1,205.2	1,292.3	1,367.1	1,367.1	1,051.40
Module Shipping Weight (kg) <sup>3</sup>	1,194.8	1,194.8	1,107.7	1,194.8	1,194.8	1,194.8	865.5
<b>Air-side Heat Exchanger Fans</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>30</b>
Motor Type	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.
Quantity	2	2	2	2	2	2	2
Fan Type	Axial	Axial	Axial	Axial	Axial	Axial	Axial
Diameter (cm)	80.01	80.01	80.01	80.01	80.01	80.01	80.01
Nominal Airflow (m <sup>3</sup> s per fan)	4.96	4.96	4.96	4.96	4.96	4.96	4.96
Nominal Airflow (total m <sup>3</sup> s)	9.91	9.91	9.91	9.91	9.91	9.91	9.91
RPM	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Maximum Design Working Pressure - refrigerant (kPa)	4,481.59	4,481.59	4,481.59	4,481.59	4,481.59	4,481.59	-
<b>Air-side Heat Exchanger</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>30</b>
Fin Material	Aluminum		Aluminum		Aluminum		Aluminum
Tube Material	Copper		Copper		Copper		Copper
Dimensions – cm (quantity)	91.44 x 111.80 (4)		91.44 x 111.80 (4)		91.44 x 111.80 (4)		108.00 x 81.92 (4)
<b>Water-side Heat Exchanger</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>30</b>
Heat Exchanger (type)	Brazen Plate		Brazen Plate		Brazen Plate		Tube & Fin Hydraulic Coil
Independent Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Water Storage Volume HX Only (L)	9.08	9.08	9.08	9.08	9.08	9.08	84.1 <sup>5</sup>
Water Storage Volume HX and Module Piping & Headers (L)	53.75	53.75	53.75	53.75	94.26	94.26	178.20
Maximum Design Working Pressure - Water Side (kPa)	2,068.43	2,068.43	2,068.43	2,068.43	2,068.43	2,068.43	2,068.43
Header Water Connections - Inlet/Outlet (cm) <sup>4</sup>	15.24	15.24	15.24	15.24	15.24	15.24	15.24

**NOTES:**

1. SHC - Simultaneous Heating and Cooling.
2. Module operational weight includes water, compressor oil, and refrigerant charge. Multiply times the number of modules for a total system operational weight.
3. Unit shipping weight includes refrigerant charge, compressor oil and packaging; based on transportation.
4. Main header water/fluid connections are ASME, 15.24 cm scheduled 40 pipe with grooved couplings, 2068.43 kPa maximum working pressure.
5. Free Cool volume includes all four hydronic coils.

Table Continued on Next Page

# Physical Data

## Large Cabinet – SI

UA Models

Table Continued from Previous Page

Model UA	Chillers UAC		Heat Pumps UAT		SHC <sup>1</sup> Heat Pumps UAU		Free Cooling <sup>3</sup> UAF
	50	60	50	60	50	60	60
Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Compressor Type	scroll		scroll		scroll		-
Compressor Quantity	2	2	2	2	2	2	-
Refrigerant Charge 454B (kg)	51.71	54.43	51.71	54.43	51.71	54.43	-
Module Operating Weight w/Water (kg) <sup>2</sup>	2,232.22	2,326.93	2,232.22	2,326.93	2,561.52	2,656.23	2,102.80
Module Shipping Weight (kg) <sup>3</sup>	2,098.32	2,179.96	2,098.32	2,179.96	2,316.04	2,394.69	1,731.00
<b>Air-side Heat Exchanger Fans</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>60</b>
Motor Type	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.	T.E.
Quantity	4	4	4	4	4	4	4
Fan Type	Axial	Axial	Axial	Axial	Axial	Axial	Axial
Diameter (cm)	80.01	80.01	80.01	80.01	80.01	80.01	80.01
Nominal Airflow (m <sup>3</sup> s per fan)	4.96	4.96	4.96	4.96	4.96	4.96	4.96
Nominal Airflow (total m <sup>3</sup> s)	19.82	19.82	19.82	19.82	19.82	19.82	19.82
RPM	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Maximum Design Working Pressure - refrigerant (kPa)	4,481.59	4,481.59	4,481.59	4,481.59	4,481.59	4,481.59	4,481.59
<b>Air-side Heat Exchanger</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>60</b>
Fin Material	Aluminum		Aluminum		Aluminum		Aluminum
Tube Material	Copper		Copper		Copper		Copper
Dimensions – cm (quantity)	91.44 x 111.80 (4)		91.44 x 111.80 (4)		91.44 x 111.80 (4)		108.00 x 81.92 (4)
<b>Water-side Heat Exchanger</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>50</b>	<b>60</b>	<b>60</b>
Heat Exchanger (type)	Brazen Plate		Brazen Plate		Brazen Plate		Tube & Fin Hydraulic Coil
Independent Refrigerant Circuits (quantity)	2	2	2	2	2	2	-
Water Storage Volume HX Only (L)	18.17	18.17	18.17	18.17	18.17	18.17	84.1 <sup>5</sup>
Water Storage Volume HX and Module Piping & Headers (L)	149.90	149.90	149.90	149.90	289.96	289.96	178.20
Maximum Design Working Pressure - Water Side (kPa)	2,068.43	2,068.43	2,068.43	2,068.43	2,068.43	2,068.43	2,068.43
Header Water Connections - Inlet/Outlet (cm) <sup>4</sup>	15.24 or 20.32	15.24 or 20.32	15.24 or 20.32	15.24 or 20.32	15.24 or 20.32	15.24 or 20.32	15.24

**NOTES:**

1. SHC - Simultaneous Heating and Cooling.
2. Module operational weight includes water, compressor oil, and refrigerant charge. Multiply times the number of modules for a total system operational weight.
3. Unit shipping weight includes refrigerant charge, compressor oil and packaging; based on transportation.
4. Main header water/fluid connections are ASME, 15.24 cm scheduled 40 pipe with grooved couplings, 2068.43 kPa maximum working pressure.
5. Free Cool volume includes all 4 hydronic coils.

## Operating Limits

**Table 3: Flow and Air Temperature Data**

UA Heat Pumps				
Cooling Mode	20	30	50	60
Minimum Load Water Flow – gpm [m3/min] <sup>1</sup>	25 [0.09]	38 [0.14]	45 [0.17]	57 [0.22]
Maximum Load Water Flow – gpm [m3/min] <sup>1</sup>	112 [0.42]	160 [0.61]	190 [0.72]	242 [0.92]
Minimum Entering Chilled Water Temperature – °F [°C]	45 [7.22]	45 [7.22]	45 [7.22]	45 [7.22]
Maximum Entering Evaporator Water Temperature – °F [°C]	85 [29.44]	85 [29.44]	85 [29.44]	85 [29.44]
Minimum Leaving Chilled Water Temperature (No Glycol) – °F [°C] <sup>5</sup>	40 [4.44]	40 [4.44]	40 [4.44]	40 [4.44]
Minimum Leaving Chilled Water Temperature (with Glycol) – °F [°C]	20 [-6.67]	20 [-6.67]	20 [-6.67]	20 [-6.67]
Maximum Leaving Chilled Water Temperature – °F [°C]	65 [18.33]	65 [18.33]	65 [18.33]	65 [18.33]
Minimum Chilled Water Differential Temperature – °F [°C]	5 [2.78]	5 [2.78]	5 [2.78]	5 [2.78]
Maximum Chilled Water Differential Temperature – °F [°C]	23 [12.78]	23 [12.78]	23 [12.78]	23 [12.78]
Minimum Entering Condenser Air Temperature – °F [°C] <sup>6</sup>	20 [-6.67]	20 [-6.67]	20 [-6.67]	20 [-6.67]
Maximum Entering Condenser Air Temperature – °F [°C] <sup>3</sup>	120 [48.89]	120 [48.89]	120 [48.89]	120 [48.89]
Heating Mode	20	30	50	60
Minimum Load Water Flow – gpm [m3/min] <sup>1</sup>	22 [0.08]	23 [0.09]	48 [0.18]	47 [0.18]
Maximum Load Water Flow – gpm [m3/min] <sup>1</sup>	97 [0.37]	140 [0.53]	218 [0.83]	280 [1.06]
Minimum Entering Hot Water Temperature – °F [°C]	45 [7.22]	45 [7.22]	45 [7.22]	45 [7.22]
Maximum Entering Hot Water Temperature – °F [°C]	130 [54.44]	130 [54.44]	130 [54.44]	130 [54.44]
Minimum Leaving Hot Water Temperature – °F [°C]	65 [18.33]	65 [18.33]	65 [18.33]	65 [18.33]
Maximum Leaving Hot Water Temperature – °F [°C]	140 [60.00]	140 [60.00]	140 [60.00]	140 [60.00]
Minimum Hot Water Differential Temperature – °F [°C]	10 [5.56]	10 [5.56]	10 [5.56]	10 [5.56]
Maximum Hot Water Differential Temperature – °F [°C]	30 [16.67]	30 [16.67]	30 [16.67]	30 [16.67]
Minimum Entering Source Air Temperature – °F [°C]	17 [-8.33]	17 [-8.33]	17 [-8.33]	17 [-8.33]
Maximum Entering Source Air Temperature – °F [°C]	100 [37.78]	100 [37.78]	100 [37.78]	100 [37.78]
UA Chillers				
Cooling Mode	20	30	50	60
Minimum Load Water Flow – gpm [m3/min] <sup>1</sup>	25 [0.09]	38 [0.14]	45 [0.17]	57 [0.22]
Maximum Load Water Flow – gpm [m3/min] <sup>1</sup>	83 [0.32]	124 [0.47]	190 [0.72]	242 [0.92]
Minimum Entering Chilled Water Temperature – °F [°C]	45 [7.22]	45 [7.22]	45 [7.22]	45 [7.22]
Maximum Entering Chilled Water Temperature – °F [°C]	85 [29.44]	85 [29.44]	85 [29.44]	85 [29.44]
Minimum Leaving Chilled Water Temperature (No Glycol) – °F [°C] <sup>5</sup>	40 [4.44]	40 [4.44]	40 [4.44]	40 [4.44]
Minimum Leaving Chilled Water Temperature (with Glycol) – °F [°C]	20 [-6.67]	20 [-6.67]	20 [-6.67]	20 [-6.67]
Maximum Leaving Chilled Water Temperature – °F [°C]	65 [18.33]	65 [18.33]	65 [18.33]	65 [18.33]
Minimum Chilled Water Differential Temperature – °F [°C]	5 [2.78]	5 [2.78]	5 [2.78]	5 [2.78]
Maximum Chilled Water Differential Temperature – °F [°C]	23 [12.78]	23 [12.78]	23 [12.78]	23 [12.78]
Minimum Condenser Air Temperature – °F [°C]	20 [-6.67]	20 [-6.67]	20 [-6.67]	20 [-6.67]
Maximum Entering Air Temperature – °F [°C] <sup>3</sup>	120 [48.89]	120 [48.89]	120 [48.89]	120 [48.89]

**NOTES:**

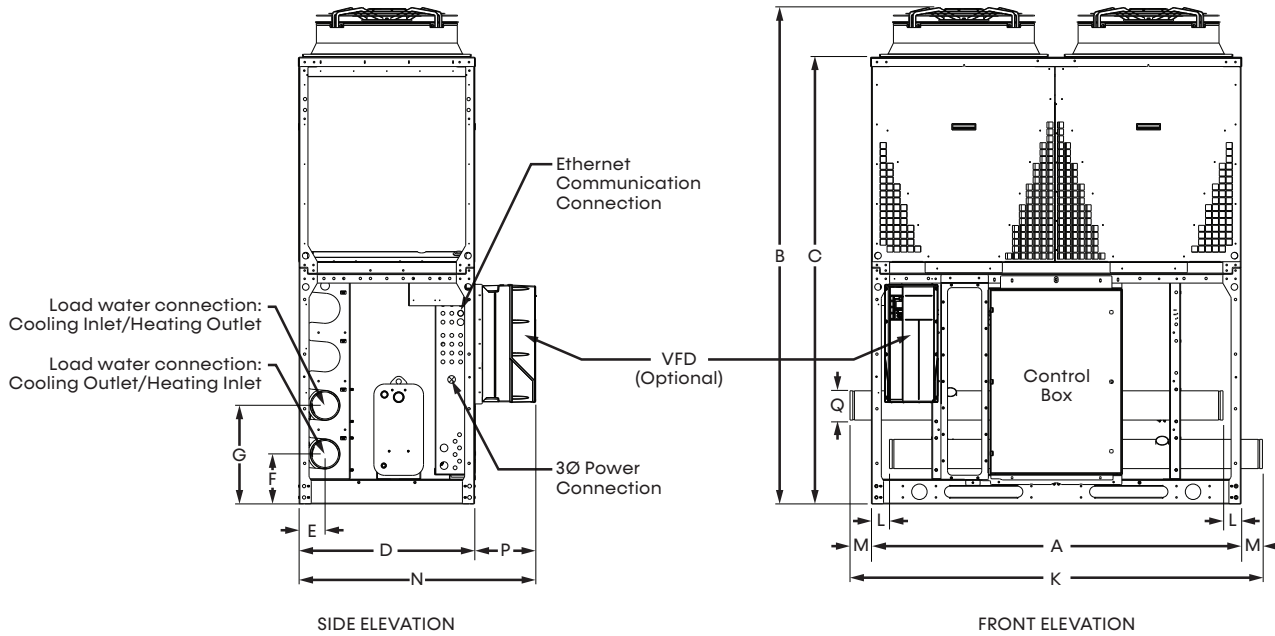
1. Minimum flows are based on maximum  $\Delta T$ 's and Maximum flows are based on minimum  $\Delta T$ 's.
2. Operating in ambient temperatures below 36°F (2.22°C) requires a suitable antifreeze solution.
3. Operating in ambient temperatures above 115°F (46.11°C) requires a suitable sunshade.
4. If project operating parameters are needed outside of the above values, please contact your local sales representative.
5. Each refrigerant circuit is capable of providing reliable operation down to 20°F (-6.67°C) ambient with proper freeze protection.
6. Contact factory for performance down to 0°F ambient



# Dimensional Data and Drawings

UA Models

## 2-Pipe, 20-30 Ton, Chillers UAC & Heat Pumps UAT



Model UAT & UAC	Voltages	A Frame Width	B Unit Height	C Frame Height	D Unit Depth	E Header Location	F Header Location	G Header Location	K Unit Width	L Header Inset	M Header Extrusion	N <sup>1</sup> Depth with VFD	P <sup>1</sup> VFD Depth	Q Header Connection
20	208-3-60	83.75	112.46	101.22	39.75	5.88	11.31	22.31	93.44	4.09	4.84	55.65	15.90	6.00
	460-3-60	[212.73]	[285.65]	[257.10]	[100.97]	[14.94]	[28.73]	[56.68]	[237.34]	[10.39]	[12.29]	[141.35]	[40.39]	[15.24]
30	575-3-60													

**NOTES:**

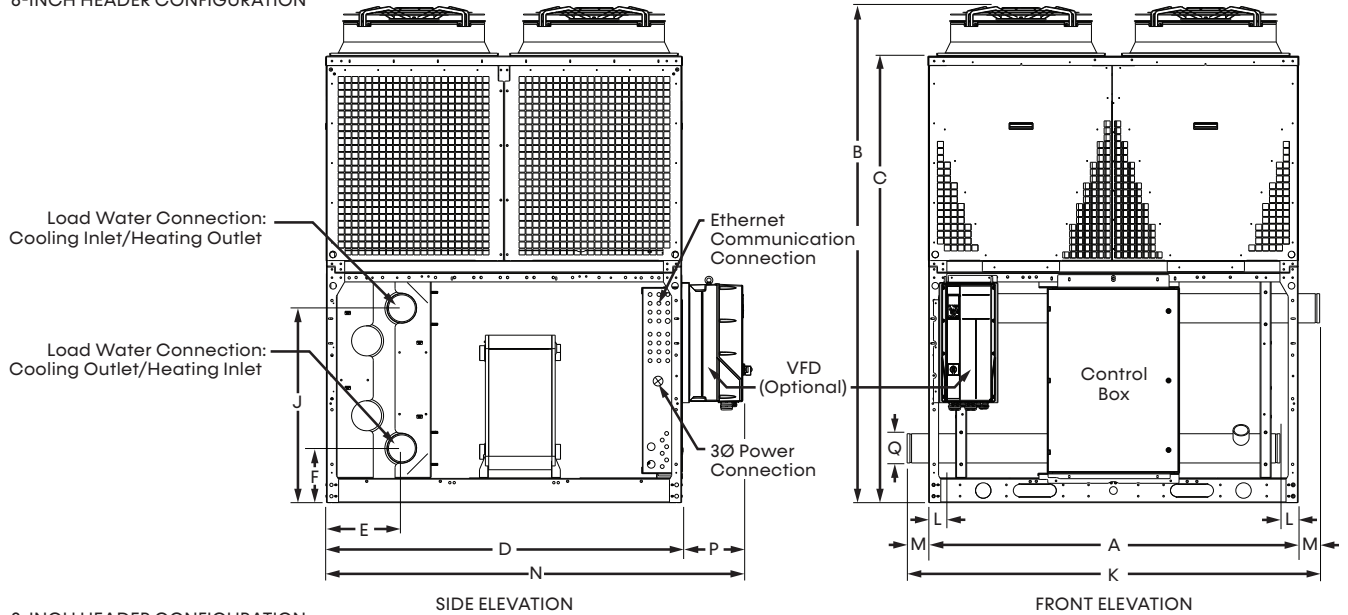
1. Measurement only applies to units with VFD

- Dimensions shown in inches [centimeters].
- Kick guard removed for clarity.

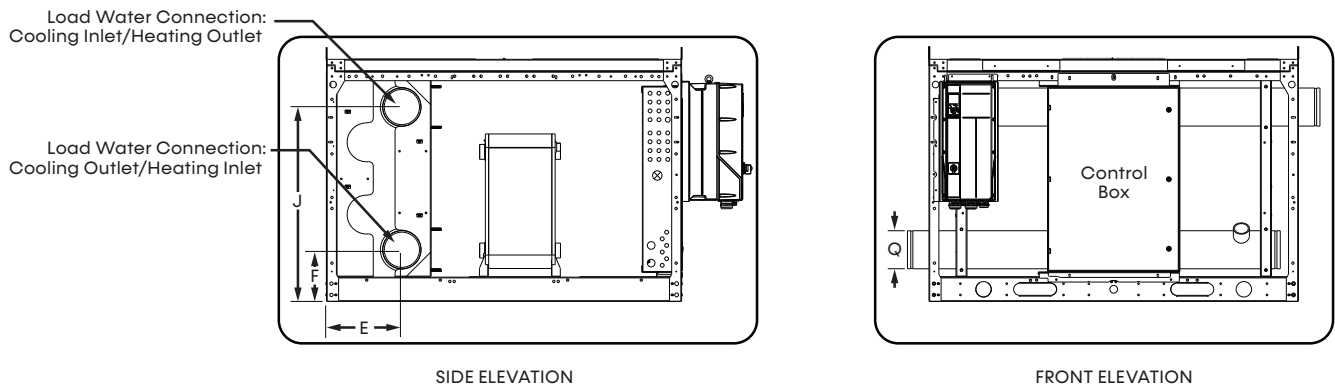
## Dimensional Data and Drawings

### 2-Pipe, 50-60 Ton, Chillers UAC & Heat Pumps UAT

6-INCH HEADER CONFIGURATION



8-INCH HEADER CONFIGURATION



Model UAT & UAC	Voltages	A Frame Width	B Unit Height	C Frame Height	D Unit Depth	E Header Location	F Header Location	J Header Location	K Unit Width	L Header Inset	M Header Extrusion	N <sup>1</sup> Depth with VFD	P <sup>1</sup> VFD Depth	Q Header Connection
50	208-3-60	83.75	112.46	101.22	80.50	17.09	12.31	44.06	93.44	4.09	4.84	96.45	15.95	6.00
460-3-60	[212.73]	[285.65]	[257.10]	[204.47]	[43.41]	[31.27]	[111.91]	[237.34]	[10.39]	[12.29]	[244.98]	[40.51]	[15.24]	
60	208-3-60	83.75	112.46	101.22	80.50	17.09	11.71	44.06	93.44	4.09	4.84	96.45	15.95	8.00
460-3-60	[212.73]	[285.65]	[257.10]	[204.47]	[43.41]	[29.74]	[111.91]	[237.34]	[10.39]	[12.29]	[244.98]	[40.51]	[20.32]	
575-3-60														

**NOTES:**

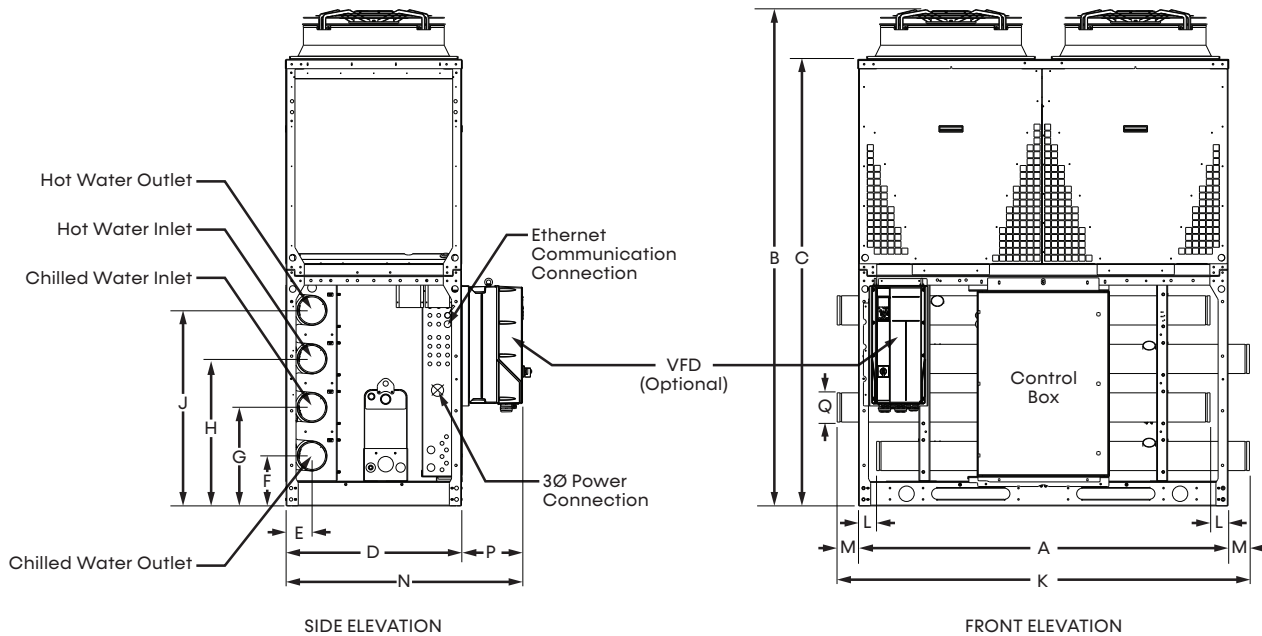
1. Measurement only applies to units with VFD

- Dimensions shown in inches [centimeters].
- Kick guard removed for clarity.

# Dimensional Data and Drawings

UA Models

## 4-Pipe, 20 & 30 Ton, SHC Heat Pumps UAU



Model UAU	Voltages	A Frame Width	B Unit Height	C Frame Height	D Unit Depth	E Header Location	F Header Location	G Header Location	H Header Location	J Header Location	K Unit Width	L Header Inset	M Header Extrusion	N <sup>1</sup> Depth with VFD	P <sup>1</sup> VFD Depth	Q Header Connection
20	208-3-60	83.75	112.46	101.22	39.75	5.88	11.31	22.31	33.31	44.31	93.44	4.09	4.84	55.65	15.90	6.00
30	460-3-60	[212.73]	[285.65]	[257.10]	[100.97]	[14.94]	[28.73]	[56.68]	[84.61]	[112.55]	[237.34]	[10.39]	[12.29]	[141.35]	[40.39]	[15.24]
	575-3-60															

### NOTES:

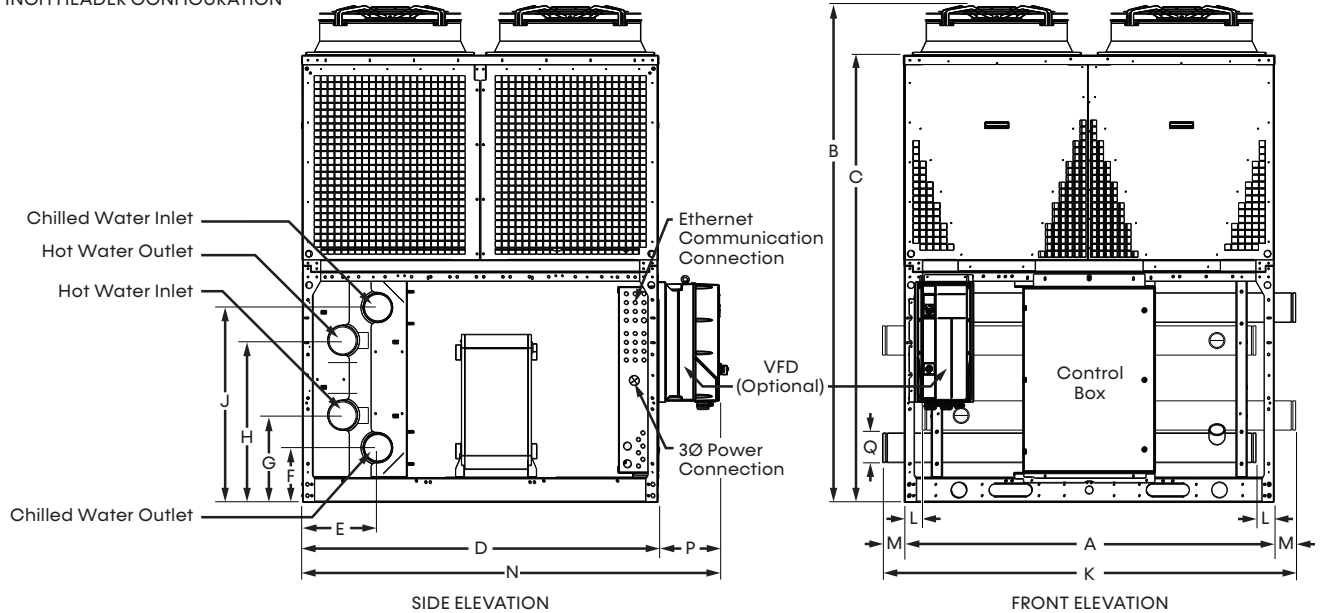
1. Measurement only applies to units with VFD

- Dimensions shown in inches [centimeters].
- Kick guard removed for clarity.

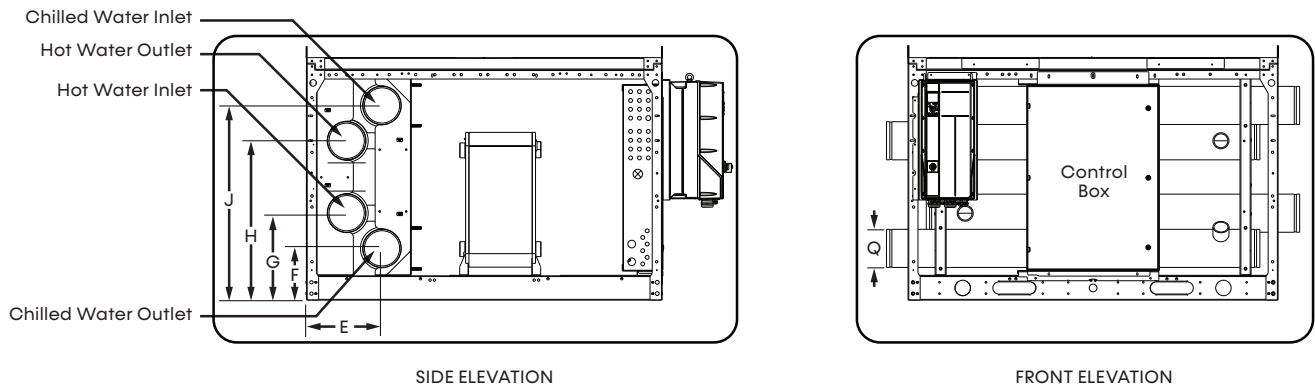
## Dimensional Data and Drawings

### 4-Pipe, 50 & 60 Ton, SHC Heat Pumps UAU

6-INCH HEADER CONFIGURATION



8-INCH HEADER CONFIGURATION



Model UAU	Voltages	A Frame Width	B Unit Height	C Frame Height	D Unit Depth	E Header Location	F Header Location	G Header Location	H Header Location	J Header Location	K Unit Width	L Header Inset	M Header Extrusion	N <sup>1</sup> Depth with VFD	P <sup>1</sup> VFD Depth	Q Header Connection
50	208-3-60	83.75	112.46	101.22	80.50	17.09	12.31	19.70	36.67	44.06	93.44	4.09	4.84	96.45	15.95	6.00
60	460-3-60	[212.73]	[285.65]	[257.10]	[204.47]	[43.41]	[31.27]	[50.04]	[93.14]	[111.91]	[237.34]	[10.39]	[12.29]	[244.98]	[40.51]	[15.24]
50	208-3-60	83.75	112.46	101.22	80.50	17.09	11.71	19.67	36.06	44.06	93.44	4.09	4.84	96.45	15.95	8.00
60	460-3-60	[212.73]	[285.65]	[257.10]	[204.47]	[43.41]	[29.74]	[49.96]	[91.59]	[111.91]	[237.34]	[10.39]	[12.29]	[244.98]	[40.51]	[20.32]

**NOTES:**

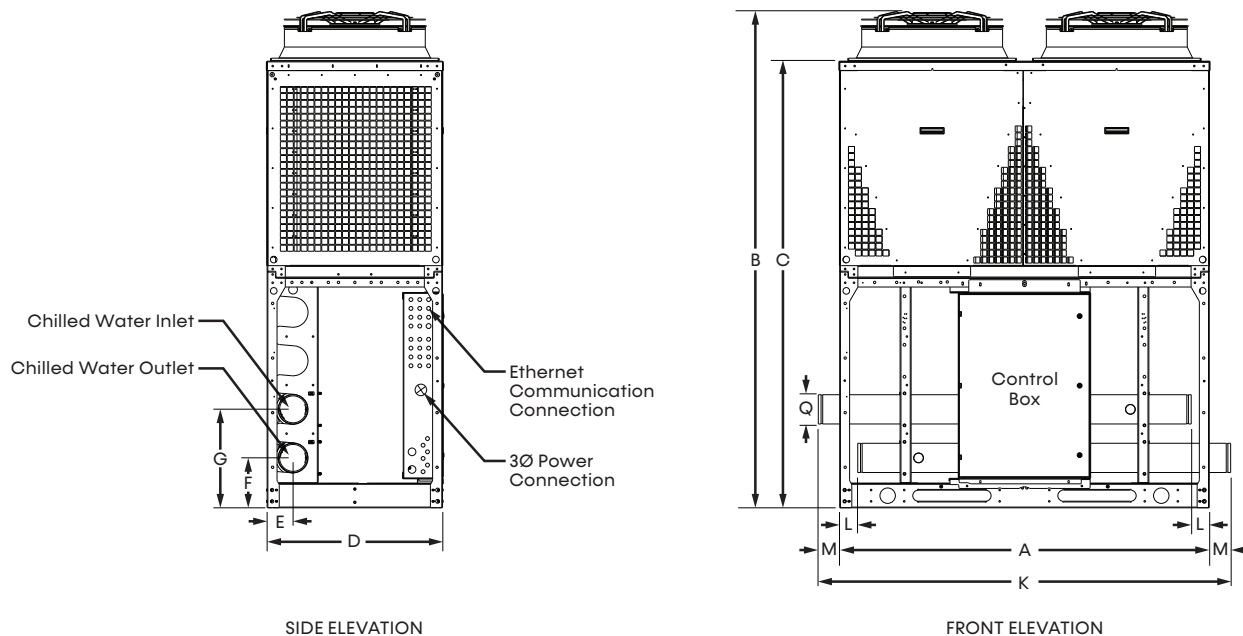
1. Measurement only applies to units with VFD

- Dimensions shown in inches [centimeters].
- Kick guard removed for clarity.

# Dimensional Data and Drawings

UA Models

## 2-Pipe, 30 Ton, Free Cooling UAF



Model UAF	Voltages	A Frame Width	B Unit Height	C Frame Height	D Unit Depth	E Header Location	F Header Location	G Header Location	K Unit Width	L Header Inset	M Header Extrusion	Q Header Connection
30	208-3-60 460-3-60 575-3-60	83.75 [212.73]	112.46 [285.65]	101.22 [257.10]	39.75 [100.97]	5.87 [14.91]	11.31 [28.73]	22.31 [56.68]	93.44 [237.34]	4.09 [10.39]	4.84 [12.29]	6.00 [15.24]

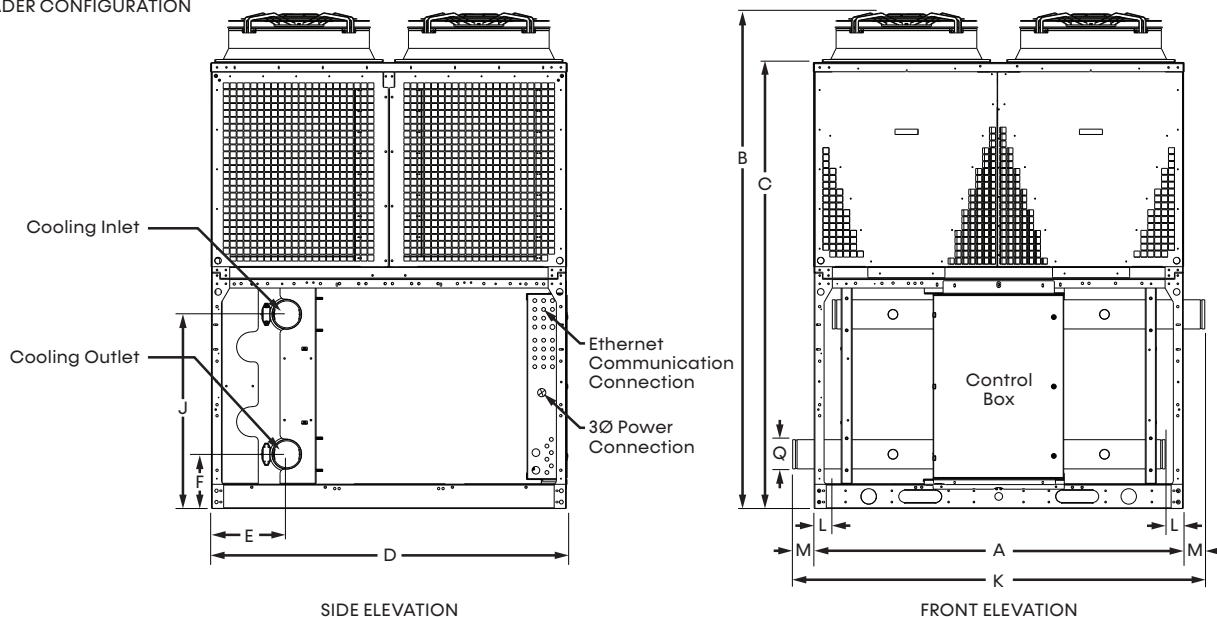
**NOTES:**

- Dimensions shown in inches [centimeters].
- Kick guard removed for clarity.

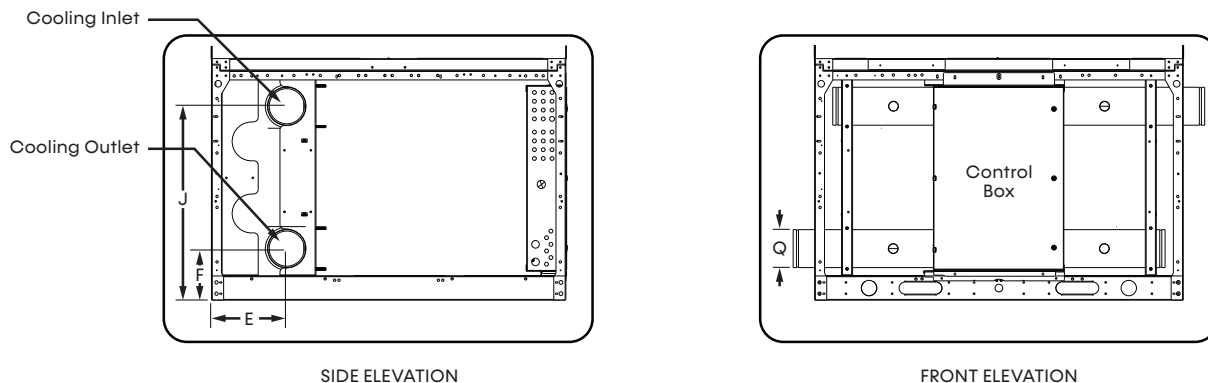
## Dimensional Data and Drawings

### 2-Pipe, 60 Ton, Free Cooling UAF

6-INCH HEADER CONFIGURATION



8-INCH HEADER CONFIGURATION



Model UAF	Voltages	A Frame Width	B Unit Height	C Frame Height	D Unit Depth	E Header Location	F Header Location	J Header Location	K Unit Width	L Header Inset	M Header Extrusion	Q Header Connection
60	460-3-60 575-3-60	83.75 [212.73]	112.46 [285.65]	101.22 [257.10]	80.50 [204.47]	17.09 [43.41]	12.31 [31.27]	44.06 [111.91]	93.50 [237.49]	4.13 [10.39]	4.88 [12.40]	6.00 [15.24]
60	460-3-60 575-3-60	83.75 [212.73]	112.46 [285.65]	101.22 [257.10]	80.50 [204.47]	17.09 [43.41]	11.71 [29.74]	44.06 [111.91]	93.50 [237.49]	4.13 [10.39]	4.88 [12.40]	8.00 [20.32]

**NOTES:**

- Dimensions shown in inches [centimeters].
- Kick guard removed for clarity.

## Pre-Installation

UA Models

### INSPECTION

Upon receipt of equipment, carefully check the shipment against the bill of lading and inspect each chiller for any damage incurred during shipment. Verify all components and loose parts immediately upon receipt. Note any damage on the bill of lading immediately and in the presence of the freight carrier's delivering agent. Report the damage to the freight carrier and file appropriate claim documents in accordance with International Chamber of Commerce (ICC) regulations. It is the responsibility of the recipient to contact ClimaCool Corp.

Thoroughly check for any visible damage of control panels, electrical and/or refrigeration components or broken copper lines. Be sure the nameplate voltage agrees with the site voltage. The carrier must make proper notation of any damages or shortages on all copies of the bill of lading and complete a common carrier inspection report prior to your final acceptance of the shipment.

**NOTE: It is the responsibility of the purchaser to file all necessary claims with the carrier.** In addition, please notify the ClimaCool Customer Service Department of all damage immediately at 1-800-299-9747, Option 1, or customersupport@climacoolcorp.com.

### STORAGE

A suitable antifreeze solution will be required to store Modular Air-Cooled chillers in locations with ambient temperatures below 36°F (2.22°C).

Fill the chiller with at least 2 (two) gallons (7.6 L) of inhibited propylene glycol or other suitable inhibited antifreeze solution to prevent any residual water in the chiller from freezing.

### HANDLING OF MODULES

Carefully remove the module's packaging. The chiller's steel base cutouts provide maneuverability by forklift or pallet jack into its final position. Verify that all header grooved couplings and mounting hardware kits are on site prior to connecting the modules.

### RIGGING AND LIFTING

Each module should be lifted by using a fork lift. If it is necessary to utilize a crane for rigging or lifting each module shall be lifted by using lifting straps and spreader bars using rigging points. Refer to Rigging and Lifting Procedures on next page.

### WARRANTY

To ensure proper equipment longevity, design, performance, and reliability, all ClimaCool chillers must be installed, operated, and maintained per ClimaCool IO&M manuals. Water quality is of the utmost importance for the proper care and maintenance of your modular chiller system, and regular water treatment will increase your system's longevity. Failure to provide adequate filtration or treatment of evaporator water will void the ClimaCool module's warranty.

A factory-authorized technician is required to start up your ClimaCool chiller. Please contact the ClimaCool Technical Service Department to schedule startup at 1-800-299-9747, Option 3, or technicalsupport@climacoolcorp.com. A minimum of (two) 2-weeks' notice is required to schedule your factory startup.

#### WARNING

Equipment not accessible to General public.

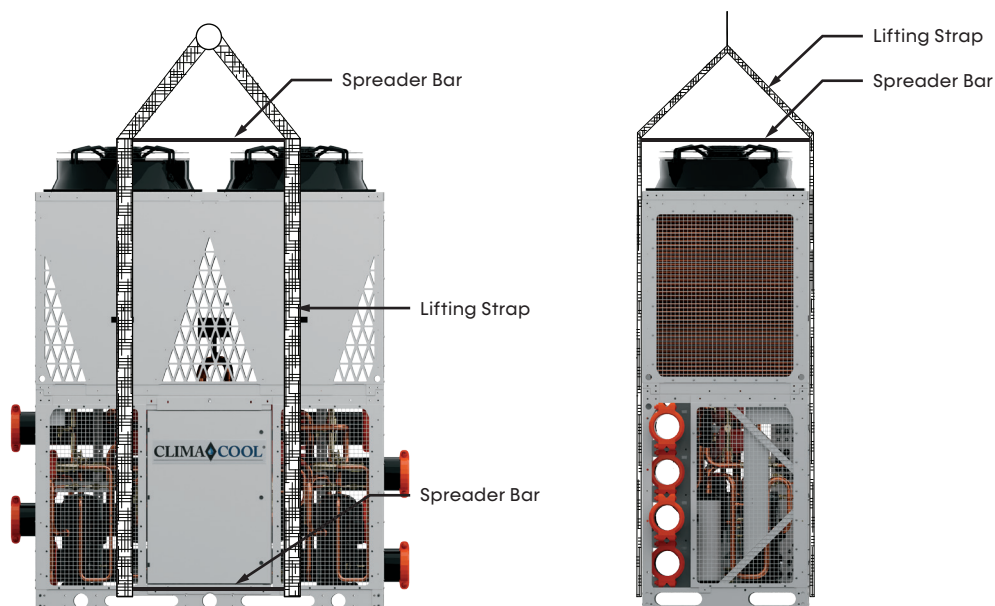
#### ATTENTION

This chiller is configured for brine duty with a minimum LWT of 20°F (6.7°C). It is the facility's responsibility to maintain the brine freeze-point adequately below the lowest water and ambient temperatures that the chiller will see.

## Rigging and Lifting Procedures

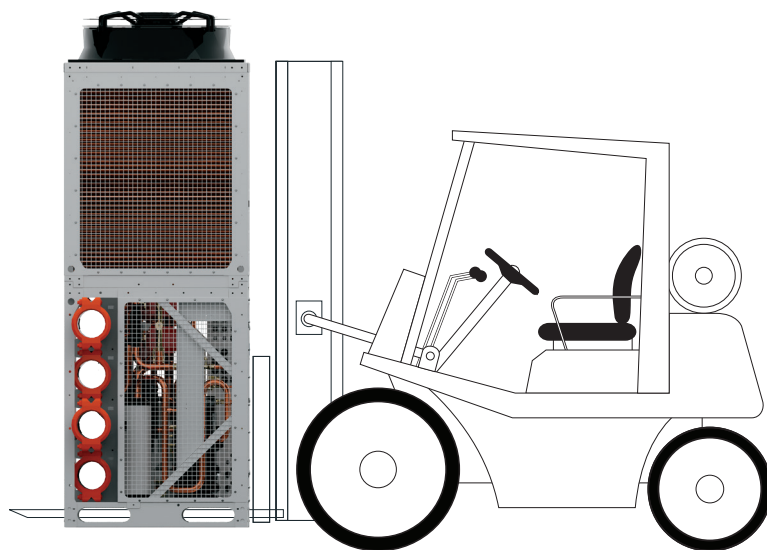
### RIGGING

Each module should be lifted by using lift straps threaded through the steel base cutouts and the use of a spreader bar. **NOTE: If no spreader bar is used, damage to the unit may occur.**



### LIFTING AND TRANSPORTING MODULES

Forklifts are required for lifting and transporting the module. Each module has base cutouts provided for ease of maneuverability.

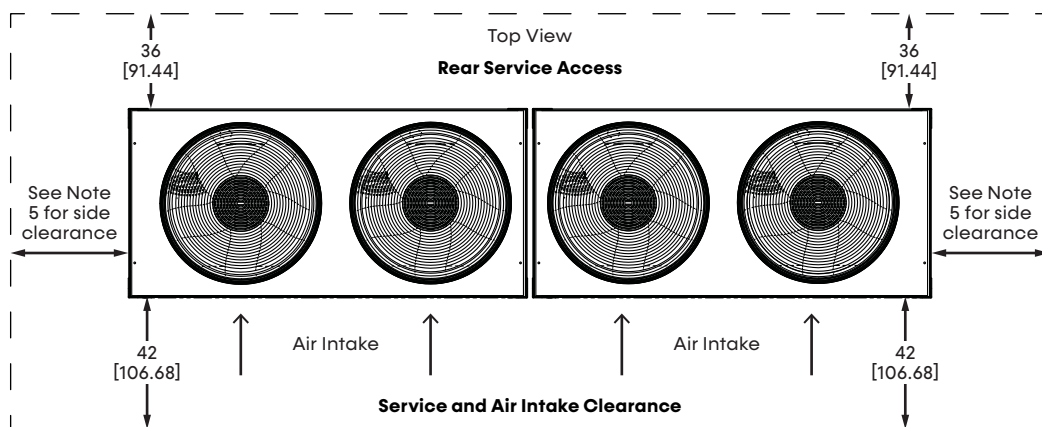




## Recommended Service Clearances

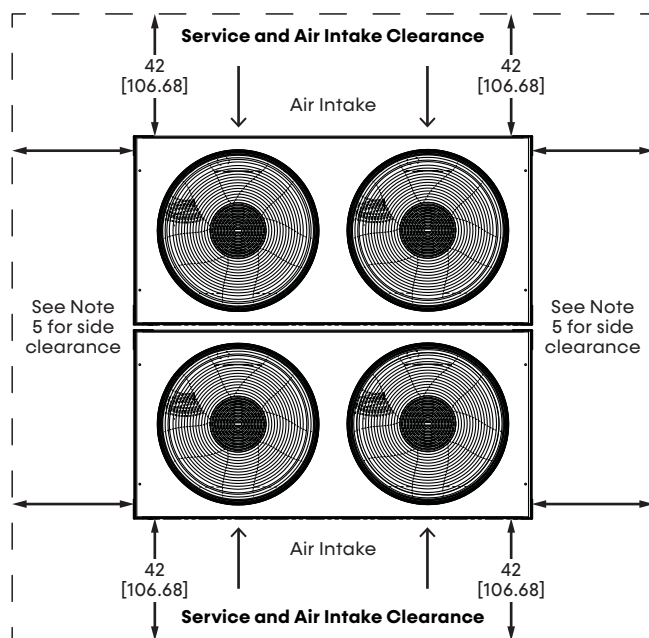
UA Models

**Figure 1: End-to-End Configuration for 20 & 30 Ton**



**NOTE:** Measurements are shown in inches and [centimeters].

**Figure 2: Back-to-Back Configuration for 20 & 30 Ton**



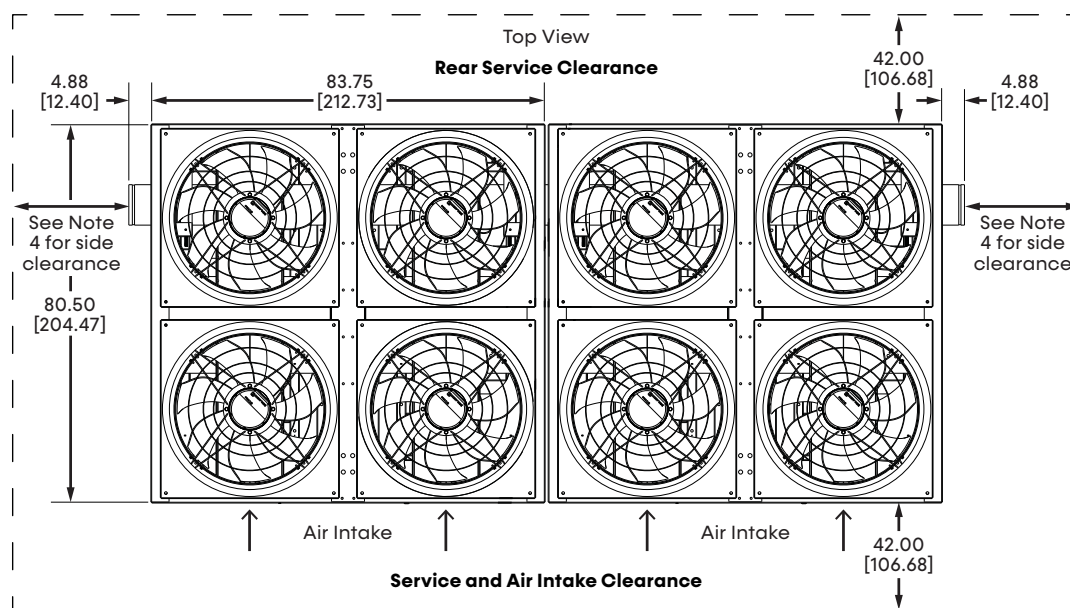
**NOTE:** Measurements are shown in inches and [centimeters].

**NOTES:**

1. 20 & 30 ton modules, end-to-end configuration require 42 inches (106.68 cm) of clearance for electrical panels and 36 inches (91.44 cm) of clearance for rear service access.
2. 20 & 30 ton modules, back-to-back configuration require 42 inches (106.68 cm) of clearance for all service and air intake sides.
3. Allow an unobstructed height clearance for airflow.
4. Local building or electrical codes may require additional clearance. Consult applicable codes.
5. Provide side clearance as required for field-piping connections and components.
6. In applications where direct sunlight may cause the module and bank control panels to reach 115°F (46.11°C), installing a sun shade is recommended.

## Recommended Service Clearances

**Figure 3: End-to-End Configuration for 50 & 60 Ton**



**NOTE:** Measurements are shown in inches and [centimeters].

**NOTES:**

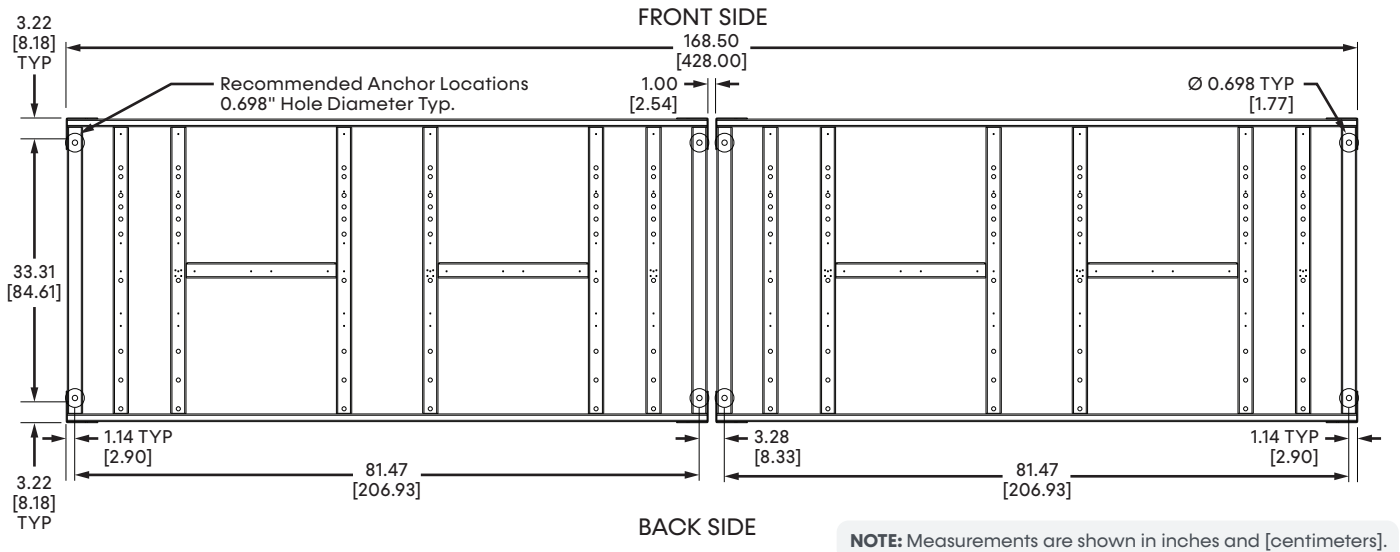
1. 50 & 60 ton modules require 42 inches (106.68 cm) of clearance for all service and air intake sides.
2. Allow an unobstructed height clearance for airflow.
3. Local building or electrical codes may require additional clearance. Consult applicable codes.
4. Provide side clearance as required for field-piping connections and components.
5. In applications where direct sunlight may cause the module and bank control panels to reach 115°F (46.11°C), installing a sun shade is recommended.

# Mounting Rails and Vibration Isolation

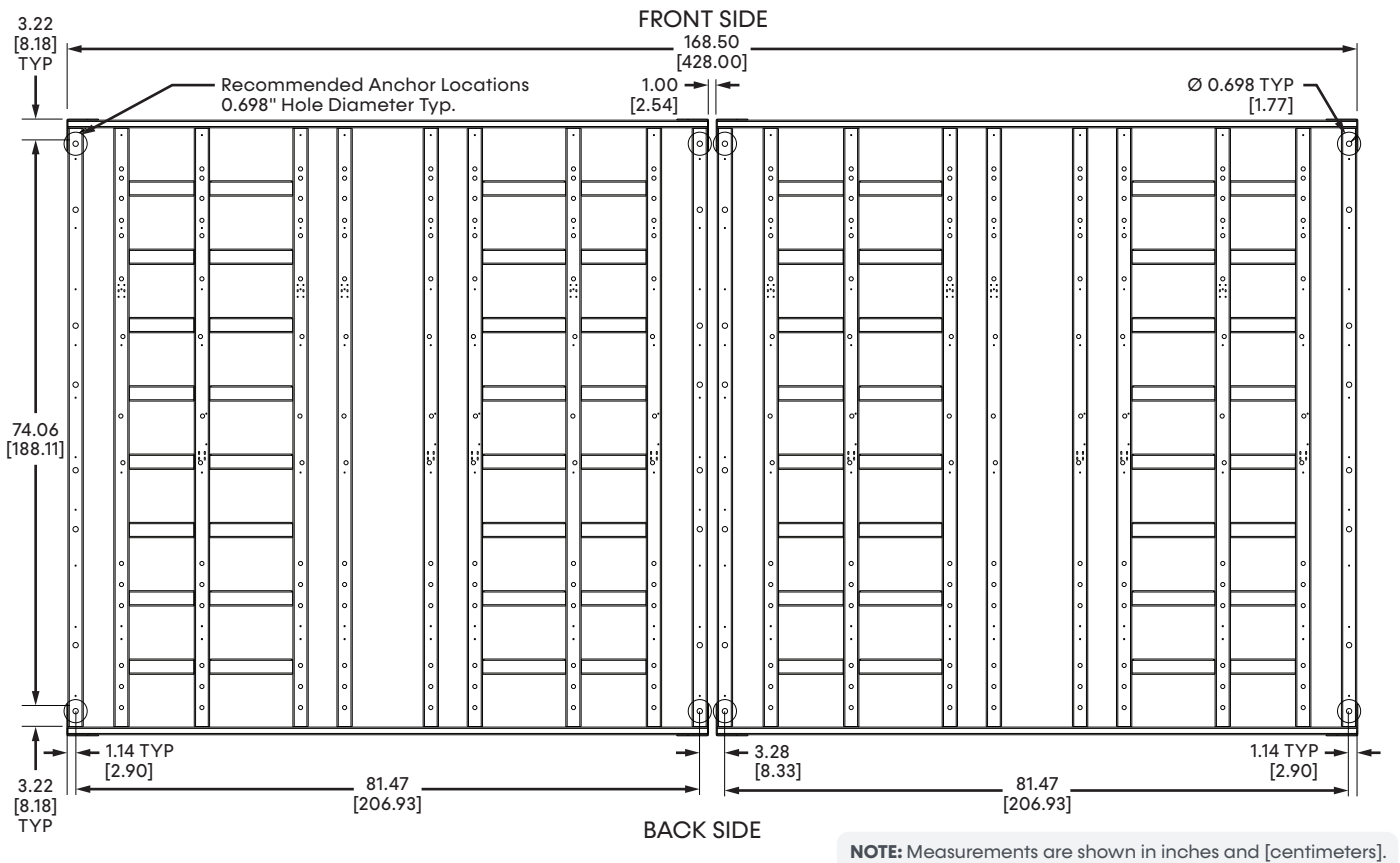
UA Models

ClimaCool recommends bolting the chiller to a concrete base or two (2) 4-inch (10.16 cm) base mounting rails using the six bolt holes in each base pan. Due to the modules' low vibration, ClimaCool does not require the application of spring isolators or pads. Should isolators or pads be desired, install them in accordance with the images below.

**Figure 4: 20 & 30 ton Support Rails and Anchor Locations**

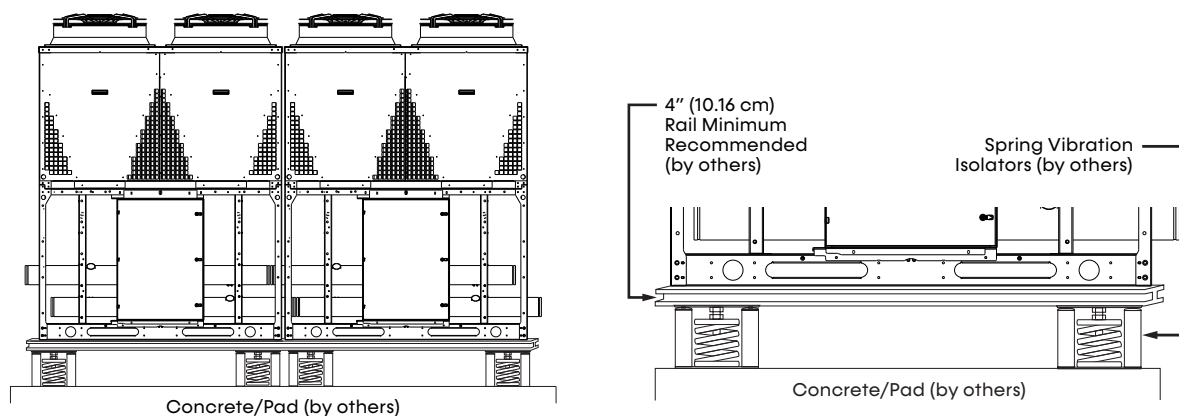


**Figure 5: 50 & 60 ton Support Rails and Anchor Locations**

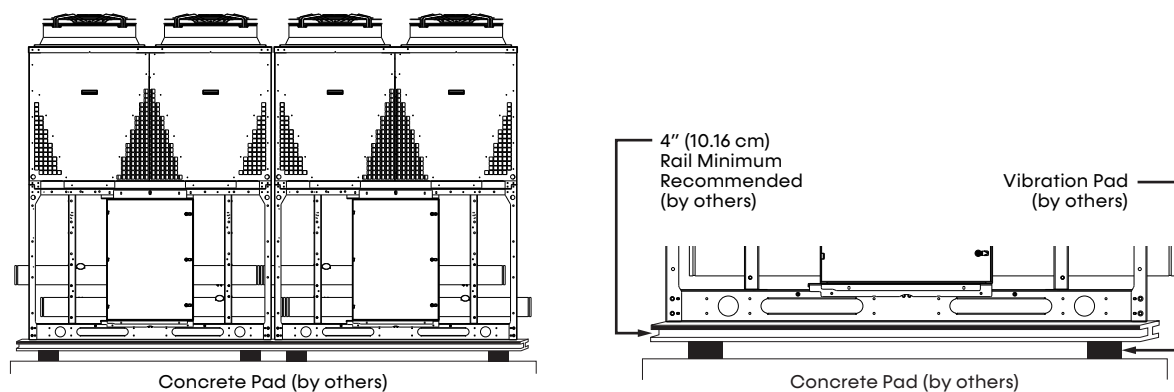


## Mounting Rails and Vibration Isolation

**Figure 6: Spring Vibration Isolators Option**



**Figure 7: Vibration Isolation Pads Option**



**NOTE:** Size and weight distribution is to be determined by a qualified structural engineer per individual job requirements.

## Unit Installation

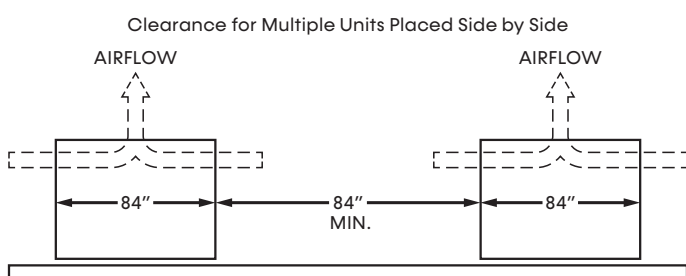
UA Models

### FOUNDATION FOR UNIT PLACEMENT

The minimum foundation requirement for the ClimaCool chiller is a level surface capable of bearing the combined operating weight of the modules.

### MULTIPLE BANKS

Multiple banks can be placed next to each other, side by side, as long as there is at least 84 inches (213.36 cm) between them.



### DRAINING

ClimaCool recommends against pit installations. If banks need to be installed in pits or near solid walls, a 72-inch (183 mm) minimum clearance should be met and the wall should not be taller than the top of the units. If walls exceed the top of the unit, consider installation on a platform to raise the fans and at least 75% of the coil portion above the walls. ClimaCool Air Source models are designed to be installed outdoors without any ductwork.

### DRAINING

When performing standard maintenance procedures such as flushing a heat exchanger, it is necessary to close off any relevant module sections. Each ClimaCool chiller module includes standard motorized water isolation valves for this purpose.

### ASSEMBLING MODULES

ClimaCool recommends bolting the chiller to a concrete base or two (2) 4-inch (10.16 cm) base mounting rails using the bolt holes in the unit base. Although the compressors are installed on anti-vibration mountings, vibration-eliminating springs or pads under the base rails on which the chiller will

rest can further isolate the chiller from the structure. One end of the modules should be chosen as the reference module and carefully located.

Field installed mounting accessories are provided for adjoining each module.

- **Header grooved coupling kits** contain two (2) mechanical grooved couplings per module for standard applications and four (4) for simultaneous heat pump applications.
- **Mounting hardware kit** contains necessary bolts, spacers, nuts and washers.
- **Header bank end cap kit** contains two (2) header bank end caps each for standard applications and four (4) each for simultaneous heat pump applications.

Field installing the mounting hardware kit will assist in aligning the modules in a bank and eliminate offset inconsistencies. The spacers will allow for a 1-inch (2.54 cm) separation between modules in both the end-to-end and back-to-back configurations.

Once the spacers are installed, the distance from the outside corner post upright to the adjacent outside corner post upright will be 1 inch (2.54 cm). Using the appropriate tools, tighten the hardware assembly until seated.

1. Inspect the pipe ends to ensure they are free from indentations, projections, roll marks, or other harmful surface defects such as loose paint, scale, dirt, chips, grease, and rust.
2. Inspect the grooved coupling gasket for defects.
3. Install gaskets on the pipe ends of one of the two modules to be mated. **Be sure the gasket is completely on the pipe so damage will not occur in the next step.**
4. Move the second module into position and line up the piping. Be sure to maintain piping alignment for any additional modules that may be added. When pipe ends are aligned, slide the gasket over the ends and center it between the grooves. No part of the gasket should protrude into the groove of either pipe end.

## Unit Installation

5. Place the coupling halves over the gasket and ensure that the coupling keys (the part that goes into the groove) are engaged in the grooves.
6. Insert the bolts and install nuts to hand tight. Ensure that the oval neck of the bolt engages into the bolt hole of the housing. **Tighten nuts alternately and equally until the bolt pads meet and make metal-to-metal contact.**
7. Tighten nuts by another  $\frac{1}{4}$  to  $\frac{1}{2}$  turn to ensure the nuts and bolts are snug and secure; using a torque wrench is usually not required. **Uneven tightening of bolts may cause the gasket to be pinched resulting in immediate or delayed leaks.**

### ASSEMBLING MODULES BACK TO BACK

To assemble module in a back-to-back configuration:

1. Remove the zip ties holding the flex hoses in place. Support each flex hose during removal of the zip tie to prevent any damage to the hose or the unit while the hose straightens out and comes to rest.
2. Each header has a 2-inch grooved coupling holding a cap facing towards the rear of the unit. For the couplings that will have a flex hose connected to them from the adjacent headerless unit (see Right Side Connections and Left Side Connections to identify those couplings), loosen the two nuts on the 2-inch grooved couplings and remove the end caps that are being held by the couplings.
3. Lubricate the coupling gasket with a thin coat of silicone lubricant. Apply only to the sealing lips of the gasket.
4. For each coupling that had its end cap removed in step 2, insert the end of the corresponding flex hose into the grooved coupling where the end cap was previously, and then equally tighten the coupling bolts so that there is no gap between the two halves of the coupling. The proper tightening of the coupling bolts is only achieved when the bolt pads have full metal-to-metal contact at all points.

Figure 8: Left Side Connections

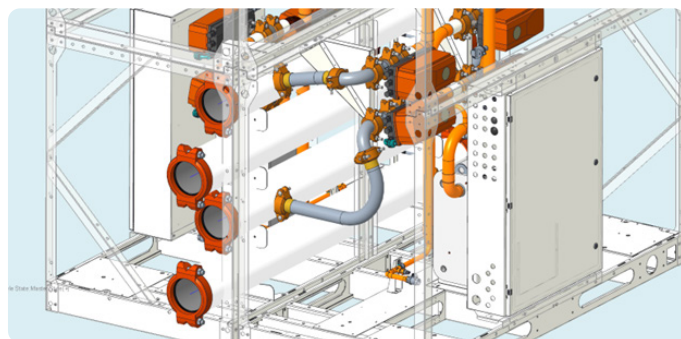
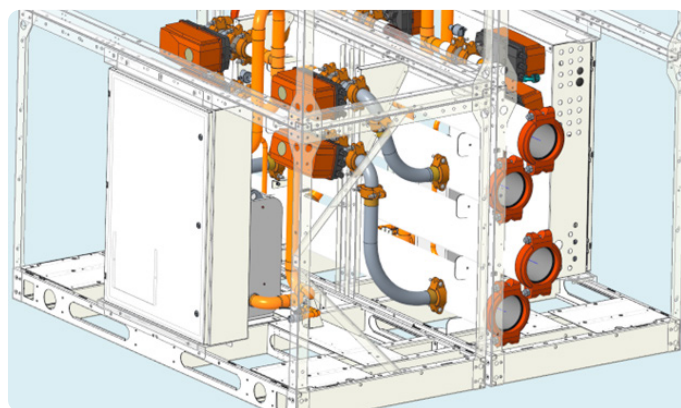


Figure 9: Right Side Connections



### HEADER INSULATION

Chilled water piping is pre-insulated on each module at the factory with  $\frac{3}{4}$ -inch (1.91 cm) closed cell insulation. **After bolting all modules together and leak testing, the entire coupling connection will need to be insulated by the installing contractor.**

### KICK PANELS

Front kick panels are provided to protect compressors, refrigerant piping, and HX's. The plates must be removed and re-attached after startup and servicing.

#### **⚠ WARNING**

Equipment not accessible to General public.



## Water Piping

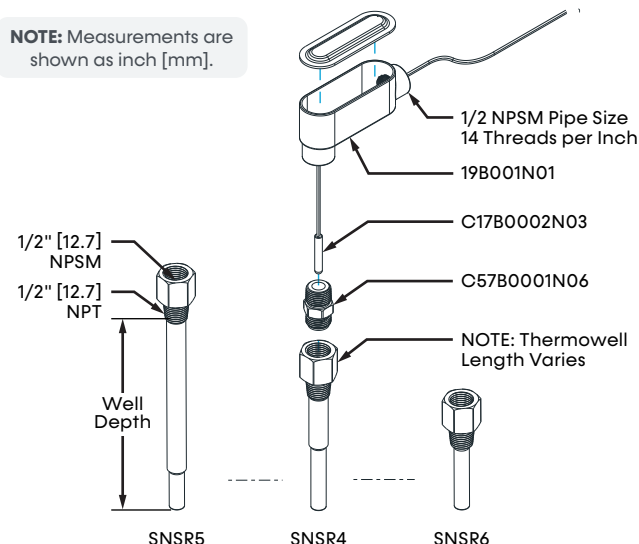
UA Models

As with any water system, it is important that the system be clean. The pipe work installer must remove weld scale, rust and contamination during pipe work fabrication. The system water piping must be flushed thoroughly with recommended alkaline flush or other chemicals that are compatible with 316 stainless steel prior to making connections to the ClimaCool chiller. There are certain necessary components that should always be installed in the chilled water system. All water piping must be installed in accordance with applicable codes and standards.

### TEMPERATURE SENSOR AND WELLS

ClimaCool provides two (2) temperature sensors and wells with each two-pipe chiller system and four (4) with simultaneous heating and cooling four-pipe chiller systems configured by the CoolLogic Touch Control System. They must be field installed at least 36 inches (91.44 cm) but no more than 60 inches (152.40 cm) away from the bank and before the strainer on the chilled water inlet and chilled water outlet. 2.5-inch (6.35 cm), 4.5-inch (11.43 cm), and 7.5-inch (19.05 cm) options are available based on the line size provided by contractor; please specify at the time of order. **Note: Sensors must be fully inserted into the well to obtain proper readings, and the well must be installed such that it is fully immersed into the flowing water of the field piping. Use a slender, blunt instrument to gently push the sensor to the bottom of the sensor well. Double check that sensors are properly installed after all wiring runs have been completed.**

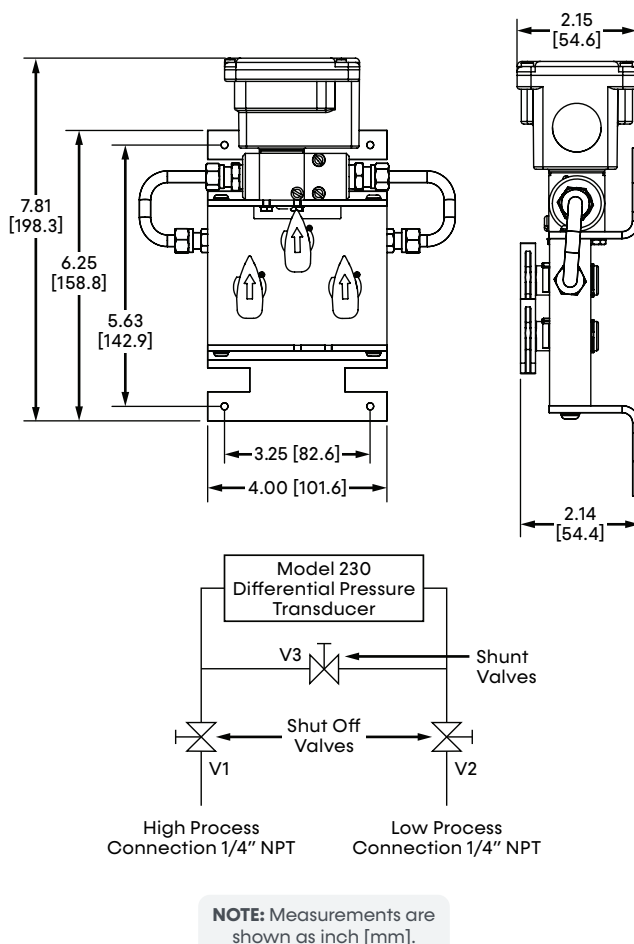
**Figure 10: Temperature Sensor and Wells**



### DIFFERENTIAL PRESSURE TRANSDUCER

It is imperative that minimum and maximum water flow rates, as defined in the Operating Limits, are not exceeded. A pressure differential flow sensor must be installed in the chilled water circuit to prevent the chiller from operating without sufficient water flow to the heat exchanger. Place downstream of the strainer on the outlet of a straight pipe, as close to the module as possible. Do not put in an elbow. When connecting the tubing to the differential pressure sensor, bleed any air from the tubing before tightening.

**Figure 11: True Wet-to-Wet Differential Pressure Transducer: With 3-Valve Manifold Assembly**



**NOTE:**

For differential pressure measurements at high line pressure (350 PSIG (2413.17 kPa) max), it is recommended that the pressure sensor be installed with a valve in each line, plus a shunt valve across the high and low (reference) pressure ports as shown.

## Water Piping

### PRESSURE TAPS

The installing contractor must provide access ports for the ship loose DP and Temperature sensors. UA 2-pipe models require 4¼-inch (10.80 cm) pressure taps and 4-pipe models require 6¼-inch (15.88 cm) taps. If a port is shared by the pressure differential flow sensor and the pressure gauge it will require two (2) ½-inch (1.27 cm) taps.

### BANK WATER ISOLATION VALVES

It is recommended to provide bank water isolation valves for proper isolation and maintenance of the chiller, pump and strainer.

### STRAINERS – MINIMUM 40 MESH SCREEN REQUIRED

ClimaCool chillers utilize brazed plate heat exchangers which are extremely sensitive to debris. **Therefore, it is mandatory that all chilled water systems include a strainer with a minimum of 40 mesh screen for proper filtration.** The strainer must be installed as shown in the Water Piping Configurations and be in place at all times when the chiller is operating.

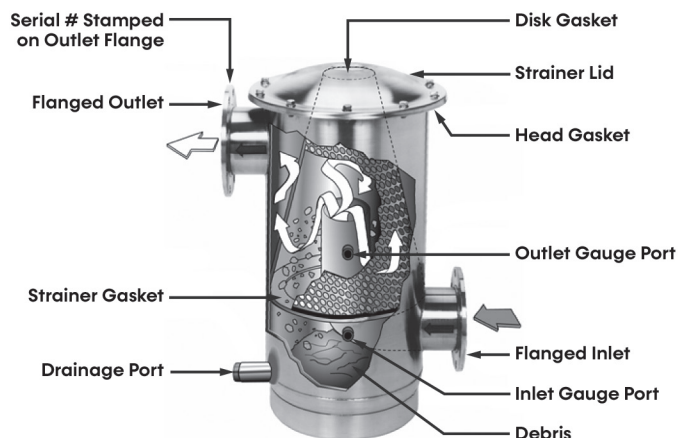
**ClimaCool's warranty does not cover and does not apply to products which have defects or damages due to freezing of the water supply, an inadequate or interrupted water supply, corrosives or abrasives in the water supply, or improper or inadequate filtration or treatment of the water supply.**



## Stainless Steel Strainer Option

UA Models

**Figure 12: Stainless Steel Strainer**



### STRAINER INSTALLATION RECOMMENDATIONS

Follow the recommended guidelines below for strainer installation:

1. The Carbon Steel strainer should be placed on a firm, supporting surface. Failure to do so can cause stress on the weld joints. It is recommended that a concrete pad be poured under the base of the strainer. The weight of the CS strainer should not be supported by the main water lines connecting it.
2. The inlet and outlet connections should be securely fastened. The arrows depict flow direction (see figure to the left).
3. The back-mount pressure gauges should be installed in the gauge ports located on the front of the strainer body. These gauges will allow you to monitor the pressure differential across the strainer screen providing an indication when the strainer element is clogged and requires cleaning.
4. The CS strainer lid must be securely fastened according to the following torque specifications to ensure product safety and an adequate seal.

### TORQUE SPECIFICATIONS

**Clamped Lid Models:** CS strainer models 3CS and 4CS have “over-center latch clamp” lid designs. The over-center clamp does not require adjustment when installing or removing the lid. The lock washer is set at the factory for proper clamp compression and normally requires no field adjustment. Minor tightening may be necessary over time. The lids are installed as follows:

1. Place the clamp around the strainer lid.
2. Latch the T-bolt with the receiver and push the latch handle towards the strainer body until the safety catch engages.

**Bolted Lid Models:** CS strainer models 6CS, 8CS and 10CS have “bolted” lid designs. Grade 5 zinc-plated bolts, nuts and washers are used to attach the lids to these strainers. See the table on the next page for proper lid bolt size and torque rating for each strainer. (Exercise care when tightening the lid bolts so as not to damage the strainer lid or housing).

It is important to follow the torque specifications as over-tightening may result in premature failure of the bolts. It is equally important to follow a star wheel torque pattern when tightening the lid bolts (see figure on the next page). The strainer lid may not be seated down completely after the first torque sequence. A second torque sequence should be adequate to seat the lid securely to the body.

**Table 4: Bolt Size and Recommended Torque**

Strainer	Bolt Size (inches)	Recommended Torque (ft. lbs.)
3 CS	5/16 - 18	60 - 80
4 CS	3/8 - 16	15 - 25
6 CS	1/2 - 13	45 - 55
8 CS	1/2 - 13	45 - 55
10 CS	5/8 - 11	80 - 100

## Stainless Steel Strainer Option

### STRAINER OPERATION

Periodically, it will be necessary to flush out the debris that is collected and settled at the bottom of the strainer reservoir. CS-3 strainers must have a valve installed on the drainage port. The larger CS strainers (4CS, 6CS, 8CS and 10CS) are equipped with a flush port (or drainage port) extending inside the strainer. When it becomes time to clean the strainer, the flush port valve should be opened while the strainer is in operation (while pressurized and with water flowing). A thorough flushing of the strainer reservoir will depend upon the length of time the flush valve remains opened. This flush time will typically range from 15 to 60 seconds depending on the flow, inlet water pressure and the amount of debris collected by the strainer. As a general rule, the larger strainers will require higher inlet water pressures in order to achieve a complete flushing. For example, the 4CS model can be flushed with inlet water pressures as low as 15-20 psi, while the 6CS can be flushed with 30-35 psi. The 8CS and 10CS models should be flushed with inlet water pressures greater than 40 psi.

**NOTE: When shutting down the chiller for extended periods of time, the strainer should be isolated and completely drained.**

### STRAINER ELEMENT CLEANING

If your strainer assembly is equipped with optional pressure gauges, you will be able to monitor the pressure differential between the inlet and outlet sides of the strainer. When this pressure differential reaches 5-10 psi the strainer element may require cleaning.

**CAUTION: Prior to dismantling the strainer for cleaning, it is imperative that the strainer assembly is isolated and completely de-pressurized.**

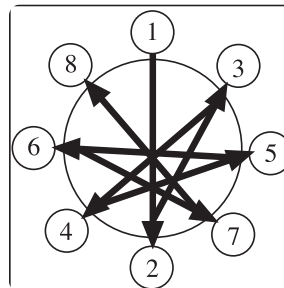
Follow the steps below when cleaning the CS strainer element:

**Step 1. For Bolted Lid Models:** Remove the top of the strainer by removing the Grade 5 Zinc plated bolts from the lid.

**For Clamped Lid Models:** Remove the top of the strainer by taking off the band-clamp assembly.\*

**Step 2.** Lift the strainer element (conical screen) out of the strainer body.

**Figure 13: Recommended Torquing Sequence**



**Step 3.** Carefully scrub down the strainer element with a rigid nylon brush until all matter is loosened.

**Do not use a steel brush.**

**Step 4.** Wash the strainer element off with clean water. It is preferable to use a hose with a significant amount of water pressure.

**Do not use a pressure washer.**

**Step 5.** Wash all matter from the strainer gaskets and clean the inner-ring where the bottom of the strainer element rests.

**Step 6.** Make sure the U-shaped gasket is fitted securely to the bottom of the strainer element. Reposition the strainer element into the body of the strainer.

**Step 7.** Make sure the strainer head gasket is secure on top of the strainer body. On V-band models, O-rings should be seated completely in the body flange. Reposition the strainer lid back on the strainer body.  
**Tighten the lid securely either with the bolts or with the band-clamp.**

\* For clamped models, opening and closing is achieved without adjusting the lock nut. It is tightened at the factory to the correct compression. (Minor tightening may be necessary if the gasket loses memory over time.) To open the clamp, depress the safety latch and pull the over-center lever outward. To close the clamp, make sure the T-bolt is seated in its receiver and push the over-center lever back toward the strainer housing. Be sure that the safety latch is engaged before putting the unit to use.

## Stainless Steel Strainer Option

UA Models

Figure 14: Timer Based Valve Controller

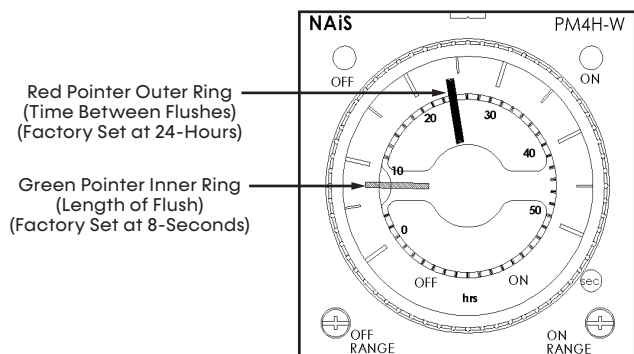


Figure 15: Electric Ball Valve

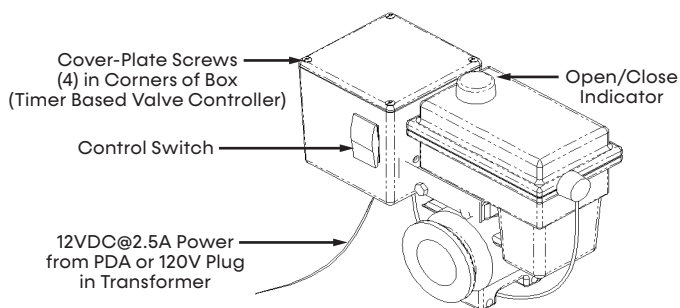
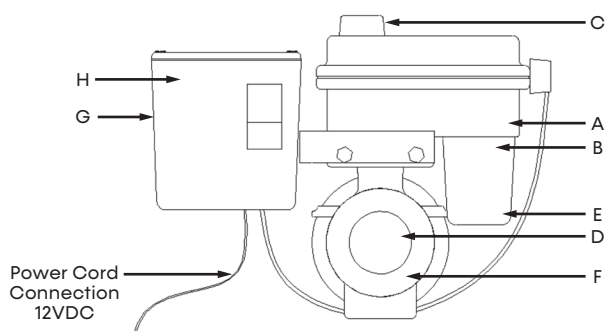


Figure 16: Valve Specifications



### LEGEND

- |   |  |
|---|--|
| A. Water-resistant polypropylene motor case | D. Stainless steel ball valve and hardware |
| B. High torque motors with perma-lub gears  | E. Auto reset circuit breaker              |
| C. Open and close indicator                 | F. 90° bi-directional rotation             |
|   | G. Controller case                         |

### ATF OPERATION INSTRUCTIONS

Flush valve line must be piped to atmospheric pressure such as an open floor drain. The flush line should not undergo any changes in elevation and should be sloped downward in the direction of drainage. **Do not pipe the flush or drain line into a pressurized line.**

**NOTE: The Automatic Timer Flush Package needs to be programmed when it is received by the end-user. The programming is simple and takes only a few moments. However, because every application has different parameters that affect the required frequency between flushes and the duration of the flush, the end-user must choose the controller's settings (refer to your specific strainer manual).**

### PROGRAMMING THE ATF CONTROLLER

1. Plug the transformer into a 120-VAC outlet.
2. Insert the 12-VDC plug coming from the transformer into the jack on the underside of the ATF box.
3. Test for power by pressing the manual flush side of the control switch (lower switch light should come on then the valve will start to open).
4. Adjust the "ON TIME" (Valve Open) by turning the inner timer ring with the GREEN POINTER clockwise to increase duration. The ON TIME RANGE is factory set at eight seconds (see *Timer Based Valve Controller* on previous page).
5. Adjust the "OFF TIME" (Valve Close) by turning the outer ring with the RED POINTER clockwise to increase duration. The OFF TIME RANGE is factory set at twenty-four (24) hours (see *Timer Based Valve Controller* on previous page).
6. Set the control switch to auto flush. The red off light on the timer will come on and the upper light on the switch will come on and stay on. During the flush cycle the on light on the timer and the lower switch light will come on.

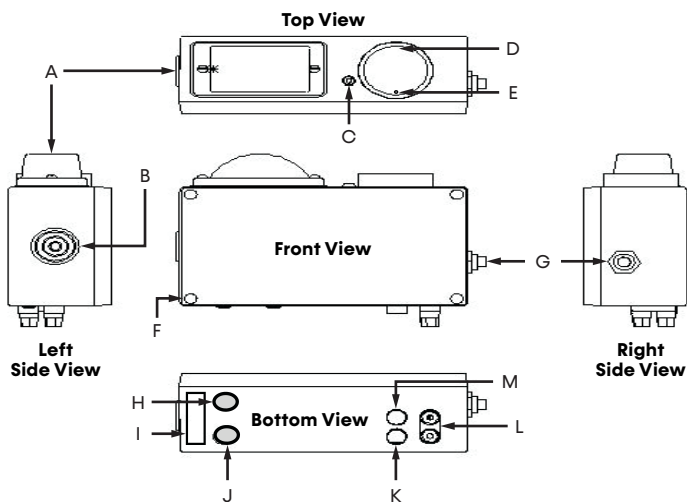
## Stainless Steel Strainer Option

### CONTROL SWITCH

Control switch flushing is initiated by pressing and holding down the manual control switch located on the front of the controller (see *Electric Ball Valve* on previous page). The manual flush control switch can also be used to conveniently drain the water out of the strainer before removing the conical screen element from the strainer housing. A yellow indicator arrow on top of the ATF valve will rotate in sync with the ball valve to show the valve position (open or closed). When the manual flush control switch is released, the valve will automatically close.

**SAFETY FIRST! Keep fingers away from valve opening to avoid getting caught in the moving parts. The electric motor supplies a sufficient amount of power to cause personal injury. Take precaution when handling.**

**Figure 17: Pressure Differential Alarm (PDA) Option**



#### LEGEND

- |  |  |
|--|--|
| A. Visual Alarm                                      | H. Power to ATF                                    |
| B. Audible Alarm                                     | I. Cable Retainer                                  |
| C. LED Power Indicator                               | J. 110 Volt/12 Vold DC Wall Transformer            |
| D. Pressure Differential Switch-Gauge                | K. PSID Low  |
| E. Differential Setpoint Contact                     | L. AUX Contacts (On or Off with Alarm Red & Black) |
| F. Cover-Plate (4) in Corners of Box (DO NOT REMOVE) | M. PSID High                                       |
| G. Alarm Reset Button                                |  |

### ATF WATER RESISTANCE

The valve and controller are water-resistant, not water-proof. Do not install below ground level where the component can be submerged in water. Only remove the cover plate from the valve controller when setting or changing the flush settings. Keep the cover tightly sealed on the unit during normal operation.

### PDA OPERATION INSTRUCTIONS

Remove the power supply and insert the connector end into the socket on the bottom of the PDA housing (see figure above) and plug the transformer into the power source. Standard systems are supplied with a 120V power supply to the primary of the transformer, with an output secondary of 12VDC. The pressure differential switch-gauge is factory set to 7-8 psi. The CS strainer operates at a pressure differential slightly less than 1 psi during maximum flow when the strainer screen is clean. By the time the differential pressure reaches 7-8 psi, the strainer element will be significantly clogged and require immediate removal and cleaning. To adjust the pressure differential switch-gauge setting, insert a 1/16-inch Allen wrench and rotate the differential set point contact to the desired location (see figure above). **NOTE: It is not recommended to set the differential switch-gauge higher than 10 psi. Disabling the alarm or increasing the alarm set point could result in damage to the strainer element and allow debris to pass into the system.**

When the differential set point is reached, both the audible and visual alarms will be triggered and will remain engaged until both the alarm condition is corrected and the alarm-reset button is pressed (if the alarm-reset button is pressed but the differential pressure is beyond the set point, the alarms will re-engage immediately). After the strainer is cleaned and put back in service, the differential pressure should return to 1 psi Electric Ball Valve.

## Stainless Steel Strainer Option

UA Models

### PDA WATER RESISTANCE

The Pressure Differential Alarm Controller is water-resistant, not water proof. Do not install below ground level where the box can be submerged in water. **Do not remove** the cover plate from the PDA controller. Keep the cover tightly sealed on the module during normal operation.

### AUXILIARY CONTACTS

The PDA option is equipped with a remote alarm feature. The remote alarm contacts are located at the two black and red banana clip posts (see *Pressure Differential Alarm* on previous page). The alarm can be set up in one of two ways:

1. A remote alarm signal of 12VDC can be sent to a central monitoring station.
2. A set of auxiliary contacts will indicate a “closed” condition when the alarm activates (Locate the “Auxiliary Contact Schematic” inside the PDA box by removing the four screws on the cover plate).

**Table 5: Troubleshooting for ATF Package**

Problem	Description	Solution
Valve is leaking past ball	Seals damaged or worn out	Install repair kit
	Valve is not stopping at proper closed position	Adjust limit switches
Valve stem leaks	Worn stem seals	On metal valves: tighten stem packing nut 1/2 turn. CAUTION! Over tightening stem nut could cause drag on motor and trip internal circuit breaker. May require repair kit or new valve.
Valve body leaks	Loose body bolts or excessive operation pressure	Check bolts and observe recommended pressure ratings
	Defective seals	Install repair kits or new valve
Valve hard to turn	Swollen seals or product buildup in valve chamber	Check valve for compatibility with product, may require valve cleaning or new valve
	Valve bolts too tight	Loosen bolts slightly
	Stem nut too tight	Loosen stem nut slightly



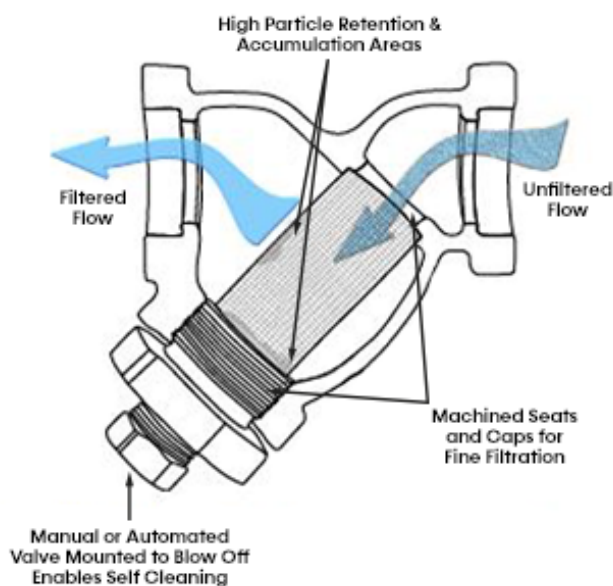
## WYE Strainer Option

The correct size of the WYE Strainer is determined by its job function, not by the size of the pipeline.

### PRE INSTALLATION CHECKLIST

1. Ensure working conditions (pressure/temperature) are within the specified capacity of the product being installed. Please refer to the certified drawings to assist in determining these values.
2. Inspect all sealing surfaces to ensure gasket surfaces are free of defects (no nicks or cuts). The pipeline should also be checked for proper alignment. WYE strainers should never be utilized to realign an existing piping system.
3. Ensure that the pipeline's mating flanges are the same type as the WYE strainer being installed. Raised face flange ends cannot be mated to flat face flange ends.
4. Ensure strainer end-to-end length and installation gap are within a ¼-inch (0.64 cm) gap for gasket, and have sufficient clearance for easy opening of cover and screen removal.
5. If the WYE strainer is to be located on the discharge side of a pump, then a safety release valve must be installed between the WYE strainer and the pump.

**Figure 18: WYE Strainer Straining Illustration**



**Figure 19: WYE Strainer - Flanged Ends**



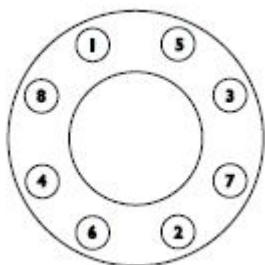
### INSTALLATION PROCEDURE

1. Also, for maximum efficiency, install a differential pressure gauge at inlet and outlet connections or at the strainer gauge tap (if provided).
2. WYE strainers must be positioned in the pipeline ahead of the equipment requiring protection.
3. To provide for easier maintenance, the WYE strainer should be located where the drain plug can be removed. Additionally, ensure the drain is located at the lowest position when installed. **If installed in the vertical position, the WYE side of the strainer must be pointing downward.**
4. Ensure there is ample space at the WYE side of the strainer for screen removal.
5. Before placing the WYE strainer into place, support the existing pipeline with pipe supports near the inlet and outlet connections.
6. Place the WYE strainer into the pipeline ensuring that the flow arrow on the body of the WYE strainer is pointing in the direction of the pipeline flow. For large or heavy strainers, appropriate material handling equipment must be used.
7. Install a standard ANSI (⅛-inch-thick) flange gasket between the WYE strainer and pipeline flanges, on both sides. Install lubricated flange bolts and hand tighten. Flange bolts should then be tightened, using a star or crisscross pattern to evenly load the bolts, in accordance with established piping standards. This is illustrated below.

## WYE Strainer Option

UA Models

Figure 20: Bolting Sequence Pattern



**NOTE: Excessive bolt torque may damage flanges. Please refer to established flange bolt torques for guidelines.**

### OPERATION

Once proper installation has been successfully completed, start the system gradually, at start up as well as after shut down. This eliminates sudden shock to the strainer and other equipment in the line. This is extremely important for steam service.

### STARTUP PROCEDURE

1. To remove all fluid from the strainer belly, a drip-leg can be installed or the piping can be placed at a ¼-inch (0.64 cm) slope. **NOTE: With piping systems that contain fluids other than water or when the working temperature is above 120°F (48.89°C), fluid must be drained to safe area, away from the operator.** Operators should always be fitted with appropriate equipment (goggles, gloves, vests etc.) when venting or servicing is performed.
2. Start the piping system by opening the outlet valve nearest the WYE strainer's outlet first. Then gradually open the inlet valve nearest the WYE strainer's inlet, approximately 25% of normal operational flow. It is important to start the system gradually to avoid displacing or damaging the WYE strainer.
3. Continue to open the inlet valve until the desired service flow has been reached.

### MAINTENANCE

WYE strainers require little monitoring once they are properly installed. The pressure differential across the strainer should be checked periodically to determine if the screen needs to be cleaned or replaced. If the pressure differential goes unchecked and the screen becomes completely clogged, the screen will break and require replacing. Note: Strainer screens are not designed to withstand the same pressure ratings as the housings. If the screen becomes completely clogged, it will be exposed to the same pressure as the housing. In most cases, this will cause the screen to fail and potentially damage downstream equipment.

Regular maintenance involves:

- Timely cleaning or replacement of screen
- Periodically checking for leaks

During normal use, the screen will become clogged with foreign matter, causing the differential pressure to increase. Once the differential pressure has increased to an unacceptable value, typically by 5 psi to 10 psi, it is time to clean or replace the screen. It is not advisable to let the differential pressure increase by 20 psi. This may cause the screen to fail and possibly damage downstream equipment.

A convenient and safe way to determine when the screen needs to be replaced is to install pressure gauges on the inlet and outlet sides of the strainer. The maximum acceptable pressure drop across the strainer will indicate when the screen needs to be replaced. Screen size and construction determine the maximum pressure drop that a strainer screen can withstand.

## WYE Strainer Option

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### SCREEN REMOVAL/ CLEANING/REPLACEMENT

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1. Isolate the strainer by closing the inlet and outlet valve connections on either side of the WYE strainer. Make sure valves are bubble tight.
2. Open vent to relieve pressure inside and drain fluid from the strainer.
3. Once pressure is relieved, remove the WYE side cap or cover.
4. Remove screen and clean. Do not permit screen to dry as it will be difficult to remove debris after it has hardened. Avoid banging or hitting the screen to remove stubborn debris.
5. Inspect screen and cover gasket for damage. If either is damaged, replace. Always ensure there is a spare gasket and screen on hand prior to maintenance.
6. Remove any debris or sludge from within the strainer.
7. Replace cleaned or new screen into its original position, ensuring it is squarely positioned on the screen.
8. Replace cover gasket and cap or cover. Tighten cap or cover to specified torque rating.

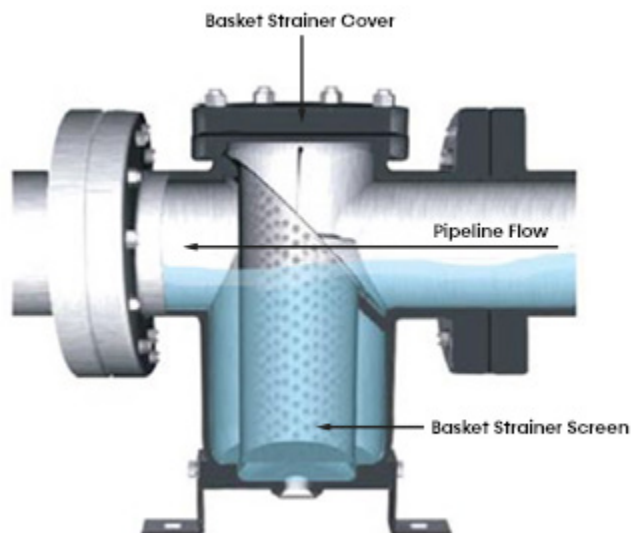


## Basket Strainer Option

UA Models

The correct size of Basket Strainer is determined by its job function, not by the size of the pipeline.

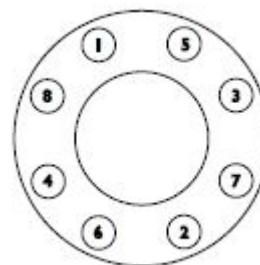
**Figure 21: Installed Basket Strainer with Bolted Cover**



### INSTALLATION PROCEDURE

1. To provide for easier maintenance, the basket strainer should be located where the drain plug can be removed and where there is ample space above the basket strainer for screen removal.
2. Before placing the basket strainer into place, support the existing pipeline with pipe supports near the inlet and outlet connections of the basket strainer.
3. Place the basket strainer into the pipeline ensuring that the flow arrow on the body of the basket strainer is pointing in the direction of the pipeline flow. For large or heavy strainers, lift the basket strainer into place using slings positioned underneath the inlet and outlet connections.
4. Install a standard ANSI (1/8-inch-thick (0.3175 cm)) flange gasket between the basket strainer and pipeline flanges, on both sides. Install lubricated flange bolts and hand tighten. Flange bolts should then be tightened, using a star or crisscross pattern to evenly load the bolts, in accordance with established piping standards. This is illustrated in the figure below.

**Figure 22: Bolting Sequence Pattern**



**NOTE: Excessive bolt torque may damage flanges. Please refer to established flange bolt torques for guidelines.**

### OPERATION

Once proper installation has been successfully completed, start the system gradually, at start up as well as after shut down. This eliminates sudden shock to the strainer and other equipment in the line. This is extremely important for steam service.

### START-UP PROCEDURE

1. Remove air from the pipeline by opening the vent near the basket strainer. **NOTE: With piping systems that contain fluids other than water or when the working temperature is above 120°F (48.89°C), fluid must be drained to safe area, away from the operator.** Operators should always be fitted with appropriate equipment (goggles, gloves, vests etc.) when venting or servicing is performed.
2. Start the piping system by opening the outlet valve nearest the basket strainer's outlet first. Then gradually open the inlet valve nearest the basket strainer's inlet, approximately 25% of normal operational flow. It is important to start the system gradually to avoid displacing or damaging the basket strainer.
3. Continue to open the inlet valve until the desired service flow has been reached.

## Basket Strainer Option

### MAINTENANCE

Basket strainers require little monitoring once they are properly installed. The pressure differential across the strainer should be checked periodically to determine if the screen needs to be cleaned or replaced. If the pressure differential goes unchecked and the screen becomes completely clogged, the screen will break and require replacing. **NOTE: Strainer screens are not designed to withstand the same pressure ratings as the housings.** If the basket becomes completely clogged, it will be exposed to the same pressure as the housing. In most cases, this will cause the basket to fail and potentially damage downstream equipment.

Regular maintenance involves:

- Periodically checking for leaks
- Timely cleaning or replacement of screen

During normal use, the basket will become clogged with foreign matter, causing the differential pressure to increase. Once the differential pressure has increased to an unacceptable value, typically by 5 psi to 10 psi, it is time to clean or replace the screen. It is not advisable to let the differential pressure increase by 20 psi. This may cause the screen to fail and possibly damage downstream equipment.

A convenient and safe way to determine when the screen needs to be replaced is to install pressure gauges on the inlet and outlet sides of the strainer. The maximum acceptable pressure drop across the strainer will indicate when the screen needs to be replaced. Screen size and construction determine the maximum pressure drop that a strainer screen can withstand. Please consult factory for exact pressure ratings.

### STRAINER ELEMENT CLEANING

Before removing the cover of the basket strainer, the pressure inside the vessel must be reduced to atmospheric via suction or venting. Failure to do so may result in serious bodily injury.

1. Isolate the basket strainer by closing the inlet and outlet valve connections on either side of the basket strainer.
2. Open vent or drain plug to relieve pressure inside the basket strainer. Drain fluid up to screen seat level.
3. Once pressure is relieved, remove the cover.
4. Remove baskets and clean. Avoid banging or hitting the screen to remove stubborn debris.
5. Inspect basket and cover gasket for damage. If either is damaged, replace. Always ensure there is a spare gasket and basket on hand prior to maintenance.
6. Remove any debris or sludge from within the basket strainer.
7. Replace clean basket into its original position, ensuring it is squarely positioned on the screen seat.
8. Replace cover gasket and replace and tighten cover.

## Chiller Header Bypass Kits

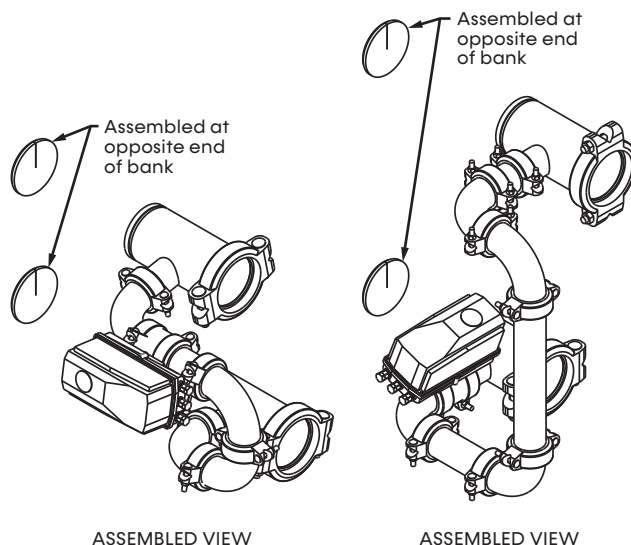
UA Models

### CHILLER/HEATER SYSTEM WATER HEADER BYPASS

A bypass is required for any load cooling, cooling only and load cooling and load heating, simultaneous heating and cooling heat pump with variable pumping. The chiller bank bypass must be piped in such a way that the temperature and pressure differential flow sensors are still sensing active flow. The purpose of the chiller/heater system bypass is to prevent deadheading of the pumps when all of the internal unit valves go closed as well as allow temperature and differential pressure sensors to sense active flow. The bypass should be sized for an absolute minimum of one module's worth of design flow. (Please refer to selection submittals for design flow rates).

Modules can be designated for fixed bypass for heating, cooling, however, this limits the number of modules remaining for that duty. Also, with a module acting as a bypass increased wear of heat exchangers may be caused by abrasion from bypass flow.

**Figure 23: Water Header Bypass**



#### Pipes for UA 20 & 30:

1. Connect the water tube (C21B0039S48) to a 90° elbow fitting (C29B0003N04) using a 3-inch grooved coupling (C29B0015N03).
2. Connect another 90° elbow fitting (C29B0003N04) using a 3-inch grooved coupling (C29B0015N03) to the end of the first elbow. The end of this elbow should be parallel to the original water tube.
3. Repeat Step 2 to add one more 90° elbow fitting to the assembly. Hold the assembly so that the elbow bends are on the right side, and rotate the last elbow fitting 90° so that the end is pointing away from you.
4. Attach the reducing tee (C29B0006N05) to the last elbow piece using a 3-inch grooved coupling (C29B0015N03). The tee should be oriented parallel to the original water pipe.
5. Attach the motorized water valve (C23B0004N60) to the other end of the created assembly with a 3-inch grooved coupling (C29B0015N03).
6. Use a 3-inch grooved coupling (C29B0015N03) to connect the last 90° elbow fitting (C29B0003N04). Hold the assembly so that the completed portion is on the right side. Rotate this elbow 90° so the end points away from you. It should match the rotated elbow from the other end of the assembly.
7. Attach the last reducing tee (C29B0006N05) to the last elbow piece using a 3-inch grooved coupling (C29B0015N03). The tee should be oriented parallel to the original water pipe.
8. Connect the assembly to the bottom two headers using the two 6-inch grooved couplings (C29B0015N02). (These are the only pipes on a 2-pipe application)
9. Attach the end caps (29B0047N02) using two 6-inch grooved couplings (C29B0015N02). If the bypass is used as a same-end direct return, then the end caps attach to the opposite ends of the headers. If it is used as an opposite-end direct return or a reverse return, then the end caps attach to the open ends of the tees at either end of the bypass kit.
10. For a 4-pipe (SHC) application, repeat Steps 1-8 to assemble another header bypass to connect the top two pipes.

## Chiller Header Bypass Kits

### Pipes for UA 50 & 60:

1. Connect the water tube (C21B0039S48) to a 90° elbow fitting (C29B0003N04) using a 3-inch grooved coupling (C29B0015N03).
2. Connect another 90° elbow fitting (C29B0003N04) using a 3-inch grooved coupling (C29B0015N03) to the end of the first elbow. The end of this elbow should be parallel to the original water tube.
3. Repeat Step 2 to add one more 90° elbow fitting to the assembly. Hold the assembly so that the elbow bends are on the right side, and rotate the last elbow fitting 90° so that the end is pointing away from you.
4. Attach the reducing tee (6 inch: C29B0006N05; 8 inch: 29B046N05) to the last elbow piece using a 3-inch grooved coupling (C29B0015N03). The tee should be oriented parallel to the original water pipe.
5. Attach the motorized water valve (C23B0004N60) to the other end of the created assembly with a 3-inch grooved coupling (C29B0015N03).
6. Use a 3-inch grooved coupling (C29B0015N03) to connect the last 90° elbow fitting (C29B0003N04). Hold the assembly so that the completed portion is on the right side. Rotate this elbow 90° so the end points away from you. It should match the rotated elbow from the other end of the assembly.
7. Attach the last reducing tee (6 inch: C29B0006N05; 8 inch: 29B046N05) to the last elbow piece using a 3-inch grooved coupling (C29B0015N03). The tee should be oriented parallel to the original water pipe.
8. Connect the assembly to the two headers on the right using two grooved couplings (6 inch: C29B0015N02; 8 inch: C29B0015N01). (These are the only pipes on a 2-pipe application)
9. Attach the end caps (6 inch: 29B0047N02; 8 inch: 29B041N01) using two grooved couplings (6 inch: C29B0015N02; 8 inch: C29B0015N01). If the bypass is used as a same-end direct return, then the end caps attach to the opposite ends of the headers. If it is used as an opposite-end direct return or a reverse return, then the end caps attach to the open ends of the tees at either end of the bypass kit.

### For a 4-pipe (SHC) application, follow the steps below to assemble another header bypass to connect the left two pipes:

1. Connect 90° elbow fittings (C29B0003N04) using 3-inch grooved couplings (C29B0015N03) on both ends of the longest water tube (C21B0161S48). Position the water tube vertically; the open end of the 90° elbow should point away from you.
2. Attach the mid-length water tube (C21B0071S48) to the open end of the bottom 90° elbow using a 3-inch grooved coupling (C29B0015N03).
3. Using another 3-inch grooved coupling (C29B0015N03), attach another 90° elbow fitting (C29B0003N04) to the water tube that was just attached. The elbow should point to the right when holding the longest tube vertically.
4. At the other end of this elbow, attach the motorized water valve (C23B0004N60).
5. Move to the elbow at the top of the assembly and attach another 90° elbow fitting (C29B0003N04) using a 3-inch grooved coupling (C29B0015N03). This elbow should point to the right when holding the longest water tube vertically.
6. Attach the shortest water tube (C21B0030S48) to the open end of this elbow using a 3-inch grooved coupling (C29B0015N03).
7. Connect each end of the assembly (top and bottom) to the grooved reducing tees (C29B0006N05) using 3-inch grooved couplings (C29B0015N03).
8. Connect the assembly to the two headers on the left using two grooved couplings (6 inch: C29B0015N02; 8 inch: C29B0015N01).
9. Attach the end caps (6 inch: 29B0047N02; 8 inch: 29B041N01) using two grooved couplings (6 inch: C29B0015N02; 8 inch: C29B0015N01). If the bypass is used as a same-end direct return, then the end caps attach to the opposite ends of the headers. If it is used as an opposite-end direct return or a reverse return, then the end caps attach to the open ends of the tees at either end of the bypass kit.

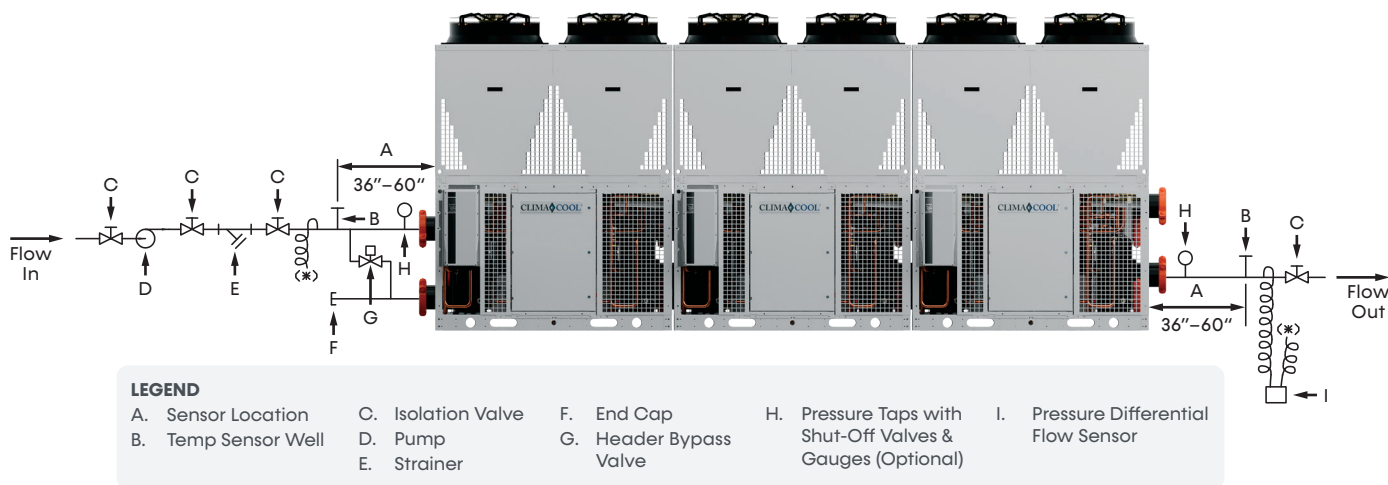
# Water Piping Configurations

UA Models

**Figure 24: Field Piping Direct Return – 1 to 5 Modules**



**Figure 25: Field Piping Reverse Return – Preferred Piping Arrangement**



## NOTES:

1. The above are required piping for proper water regulation and distribution through Climacool modular chillers.
2. Climacool Standard Bank Package includes shipped loose items to be installed in the field: strainer, temp sensors and wells, DP proof of flow sensors, bypass header kit, end caps and couplings for all water loops. The shown pump, isolation valves, and pressure taps with shut off valves and gauges are provided by others/NOT included.
3. Module order and incoming/outgoing water flow, as shown above, can be set up as either a left-to-right or right-to-left configuration.
4. Refer to Dimensional Data and Drawings for water header inlet/outlet dimensions.
5. Chilled water hydronic circuit shown. Piping configurations are identical for the hot water hydronic circuit for SHC HP model.
6. The differential flow sensor provided as part of the Climacool Bank Package is a required proof of flow safety device on all water loops. Install the DP Sensor between the strainer and the entering side of the chiller as well as before the first water take off on the leaving side of the chiller. **This sensor is NOT for pump control. The BAS should provide their own DP for VFD/pump control.**
7. A minimum first pass, 40-mesh strainer is required on each water loop. The 40-mesh strainer must be installed at time of start-up for valid warranty commencement. Installing dual strainers per water loop avoids bank shut down and is recommended for better redundancy.
8. Maximum water flow rates per bank with 6-inch (15.24 cm) headers is 1,100 gpm and 2,400 gpm per bank with 8-inch (20.32 cm) headers.
9. Bank-level bypass header kits are provided and controlled for each water loop for all applications with motorized valves. System bypasses are provided and controlled by others.
10. Header bypass valve may be installed at either end of the bank.
11. For more than twelve (12) modules, two (2) CoolLogic Touch control systems are required. Please consult the factory.



## Filling the Water System

It is imperative that the water systems are free from debris prior to initial operation. See *Water Quality Parameters* for a comprehensive list of precautions.

### FILLING, PURGING AND LEAK TESTING THE SYSTEM

After the water systems have been properly installed, visually inspect all joints for tightness. If the chiller is to be installed in an existing system, the cleanliness of the existing system can be judged from the operating conditions of the present machines. It is good practice to flush and, ideally, to acid wash the existing system **before** connecting a new chiller.

The following method is recommended to fill and leak check the water system for modules **WITH** Water Isolation Valves:

1. Close all water isolation valves inside each module which isolate the individual heat exchangers.
2. Ensure that all drain valves are closed and that all water main isolation valves are opened.
3. The system should be filled with clean water sent through the strainers and the system checked for leaks.
4. Once the main water lines and the chiller headers are filled with clean water, purge and repeat the filling process at least three times.
5. All modules are equipped with ¾-inch fill and flush valves with lines that tee into the inlet and outlet connections into and out of each heat exchanger. Ensure these ¾-inch valves are **CLOSED**.
6. Open the water isolation valves inside each modular chiller and repeat the filling process, this time also checking for leaks inside each module.
7. Following the final filling and leak checking procedure, air should be purged from the system.

### CLEANING THE SYSTEM

The following method is recommended to properly clean the water systems:

1. Before cleaning the system, install a temporary bypass line between the main supply and return water headers of both chilled and condenser water systems when possible. Open the main header bypass lines to divert the initial water flow around the module heat exchangers until you are confident the circulating water is mostly pure.
2. Provided main header bypass lines are installed, close all water isolation valves inside all modular chillers equipped with manual or automatic water isolation valves. If the modules are **NOT** equipped with water isolation valves, we recommend installing 3-way main header bypass valves so the initial water flow bypasses all module heat exchangers.
3. It is mandatory to run the pumps with the strainers in place (see Starting the Pumps section below for proper pump startup). All external hydronic branches should be open to all devices in the system.
4. Pressure drop across the strainer must be observed and as pressure change reaches 50% of the initial read, strainers must be isolated and cleaned.
5. Open all water isolation valves inside each module equipped with manual or automatic water isolation valves (see step 6 for modules **NOT** equipped with water valves). If bypass lines are not installed (described in step 1) it is recommended to drain out the initial fill of water to help flush out debris. Close off the main header bypass lines referred to in step 1 and open the flow to the main water headers. Repeat steps 3 and 4 until there is no more debris being collected by the strainers.
6. If bypass lines are not installed (described in step 1) and the modules are **NOT** equipped with water isolation valves, it is recommended to drain out the initial fill of water to help flush out debris. Remove and clean the strainers before refilling and purging the system again. Repeat steps 3 and 4 until there is no more debris being collected by the strainers.

## Filling the Water System

UA Models

### STARTING THE PUMPS

Follow the manufacturer's recommendations when starting the pumps for the first time. The system should be checked for leaks and air purged with the pumps in operation. The pressure drop across the heat exchangers will give a good indication of flow through the system (see project selection print-out or contact local representative). This should be immediately checked against the expected pressure drop for the flow rate required. **If the pressure drop begins to fall and the flow rate is falling, this could indicate the need to clean the strainers.**

## Water Treatment & Temperature Requirements

**Water quality is of the utmost importance for the proper care and maintenance of the modular chiller system.** Proper water treatment is a specialized industry and it is recommended to consult an expert in this field to analyze the water for compliance with the water quality parameters listed. The materials used in the ClimaCool chiller exposed to the water are type 316 stainless steel, pure copper and carbon steel. Other materials may exist external to the ClimaCool chiller. It is the user's responsibility to ensure these materials are compatible with the treated water. Regular treatment of the water will increase longevity of your system. **Failure to provide adequate filtration or treatment of brazed-plate heat exchanger water will void the ClimaCool module's warranty.**

### HEAVILY CONTAMINATED WATER

In such instances whereby the particulates in the water are excessive, it is recommended to install an intermediate plate and frame heat exchanger to isolate the ClimaCool chiller from the building water system.

**Table 6: Water Quality Parameters**

Water Containing	Concentration
Ammonia	Less than 2.0 mg/l
CaCO <sub>3</sub> Alkalinity	30 - 500 mg/l
CaCO <sub>3</sub> Hardness	30 - 500 mg/l
Chlorides	Less than 200 mg/l
Chlorine (free)	Less than 0.5 mg/l
Dissolved Solids	Less than 1000 mg/l
Iron	Less than 5.0 mg/l
Manganese	Less than 0.4 mg/l
Nitrate	Less than 100 mg/l
pH	7.0 - 9.0
Sulphate	Less than 200 mg/l

#### CAUTION

Excessive chlorine, undissolved solids and other improper water conditions **WILL DAMAGE** the internal heat exchanger and **WILL VOID YOUR WARRANTY!**

**Table 7: Water Temperature Requirements**

Load Loops	Minimum LWT <sup>4</sup>	Maximum LWT <sup>4</sup>
Chilled Water	20°F [-6.67°C] <sup>1</sup>	65°F [18.33°C]
Hot Water	65°F [18.33°C]	140°F [60.00°C]

#### NOTES:

1. Operating in ambient temperatures below 36°F (2.2°F) requires suitable freeze protection.
2. All modules can operate in this range without the need of special controls.
3. A glycol solution additive is required at lower operating suction temperatures (water temperatures below 40°F [4.44°C]) in order to protect the heat exchanger from freeze-ups.
4. LWT: Leaving Water Temperature.
5. When the chiller is exposed to ambient temperatures of 36°F (2.2 °C) or below, freeze protection is required using heat trace or an inhibited ethylene or propylene glycol solution. Defects or damages due to freezing of the water supply, an inadequate or interrupted water supply, corrosives or abrasives in the water supply, or improper or inadequate filtration or treatment of the water or air supply are not covered by ClimaCool warranty.

#### ATTENTION

If chilled water is to be maintained at a temperature below 40°F (4.4°C) or outdoor temperatures are expected to be below 36°F (2.22°C), an antifreeze of sufficient concentration must be used to prevent freeze-up at anticipated suction temperatures.



## Electrical Connections

UA Models

The power for all modules is taken from a suitable circuit breaker/fused disconnect power supply within the main panel. Proper grounding of the module is mandatory. **Before carrying out any electrical work, confirm that the main supply is isolated.** Knockout drawings are provided. **Do not drill into cabinet;** shavings can damage electronic components. The power for all individual modules shall be in compliance with all local and national codes. All wiring should be run in flexible conduit to support the opening of the control box to service equipment.

### COOLLOGIC TOUCH™ CONTROL SYSTEM WIRING

A separate 115 volt power supply is required to power the CoolLogic Touch Control System. Communication between the CoolLogic Touch Control System and chiller modules requires a shielded, twisted pair (STP) Cat 6 or higher Ethernet cable home run connection. **Control wiring cannot be installed in the same conduit as line voltage wiring or with wires that switch highly inductive loads such as contactor and relay coils.** All wiring shall be in compliance with all local and national codes.

### FIELD CONNECTIONS BETWEEN COOLLOGIC TOUCH CONTROL SYSTEM AND MODULE CONTROLLER

- STP Cat 6 or higher Ethernet cable.
- Over 50 feet (15.24 meters), contact factory.

**NOTE: Use the same polarity throughout the network segment.**

#### CAUTION

Use only copper conductors for field installed wiring. Unit terminals are not designed to accept other types of conductors.

#### WARNING



Disconnect power supply(ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!

#### ATTENTION

Installations where direct sun may cause the module and bank control panels to reach temperatures above 115°F require a sunshade.

### FIELD CONNECTIONS TO THE COOLLOGIC TOUCH CONTROL SYSTEM

Field integration with CoolLogic Touch Control System is simplified by the use of the following minimum input devices:

- A remote start/stop input for scheduling.
- Differential pressure flow sensors for heating and cooling water flows.
- Chilled water inlet and outlet temperature sensors and wells.
- Heating water inlet and outlet temperature sensors and wells.

### COOLLOGIC TOUCH™ CONTROL SYSTEM

Refer to separate CoolLogic Touch IOM for more details.



### FIELD CONNECTIONS TO THE MODULES

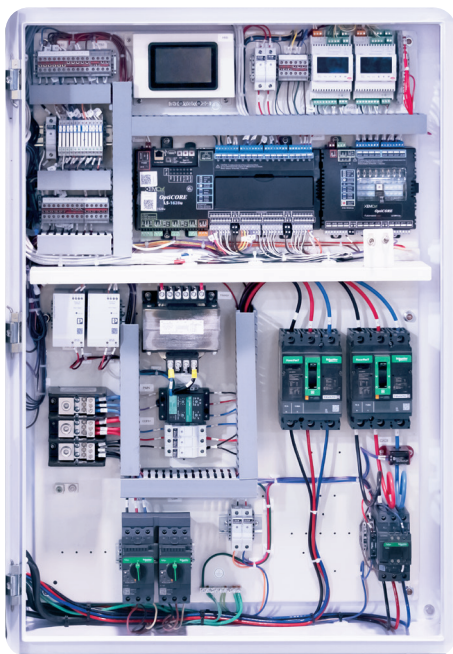
The CoolLogic Touch Control System connects to the modules using STP Cat 6 or higher Ethernet cable. Refer to the Power Distribution drawing. All wiring shall be in compliance with all local and national codes.

### MODULE CONTROLLER

The module controller LS1628 directly senses the control parameters that govern the specific module's operation, such as evaporator and condenser leaving temperatures, suction and discharge temperatures and pressures.

## Electrical Connections

**Figure 26: Module Control Panel**



### ELECTRICAL PHASE SEQUENCING

Proper clockwise rotation for scroll compressor motors is important to prevent damage to the compressors. Climacool recommends the use of a phase sequence indicating instrument following the manufacturers directions. An alternative is to “bump test” the compressors one at a time with pressure gauges attached to the high and low gauge ports of the compressors to check for proper rotation. Energize the compressor for a few seconds to ensure the discharge pressure gauge increases significantly. If the discharge pressure does not increase, proper rotation is reversed. Compressor rotation can be reversed by opening the main electrical disconnect and switching any two of the main power supply leads feeding that compressor’s contactor.

### PROPER VOLTAGE BALANCE

Occasionally, in three phase circuits, a voltage imbalance occurs between phases. It is not recommended to operate equipment when an imbalance greater than 2% occurs. This causes motors to run at high temperatures and may affect their longevity. The following example describes how to calculate the average voltage of the three phases to see if the imbalance is greater than 2%.

Example: Line 1 = 226V, Line 2 = 230V, Line 3 = 228V  
 The average is:  $(226+230+228)/3 = 228V$   
 Next,  $[100(228-226)]/228 = 0.9\%$

The voltage imbalance of the three phase circuit is 0.9%. This is well under the 2% range.

#### CAUTION



Unit to be serviced by qualified personnel only. Refrigerant system under pressure. Relieve pressure before using torch. Recover refrigerant and store or dispose of properly.

#### CAUTION

##### 3-PHASE SCROLL COMPRESSOR UNIT

If this unit uses a 3-Phase Scroll Compressor, the following instructions must be followed:

- Unit power supply must be wired in the proper sequence to avoid damage to the 3-Phase Scroll Compressor;
- Scroll Compressors with incorrect rotation show the following characteristics:
  - High sound level;
  - High suction pressure and low discharge pressure;
  - Low current draw.

If any of the three above characteristics exist, swap two of the three supply wires at the disconnect and recheck compressor for incorrect rotation.

#### ATTENTION

Installations where direct sun may cause the module and bank control panels to reach temperatures above 115°F require a sunshade.

## Communications Wiring

UA Models

### AVOIDING NOISE

Avoid running communication wires or sensor input wires next to AC power wires or the controller's relay output wires. These can be sources of noise that can affect signal quality. Common sources of noise are:

- Spark igniters
- Radio transmitters
- Variable speed drives
- Electric motors (> 1hp)
- Transformers
- Large contactors, (i.e., motor starters)
- Relays
- Video display devices
- Lamp dimmers
- Fluorescent lights
- Induction heaters
- Generators
- Parallel runs with power lines
- Other electronic modules

### STP CAT 6 ETHERNET CABLE

Shielded, twisted pair category 6 (STP Cat 6) Ethernet cable is a twisted-pair cable comprised of eight copper wires twisted into four pairs. Each pair is then shielded with aluminum foil or braided wire strands before being jacketed. The cable standard provides performance of up to 250 MHz and runs at 1 Gbps up to 328 ft. (100 m) in length. If the length of the cable is 121 ft. (37 m) or less, then the speed increases to 10 Gbps.

This cable is commonly connected using punch-down blocks and modular connectors. Cable shielding reduces interference (both electromagnetic and radio frequency) and improves signal quality.

Category 6 is currently defined in ISO/IEC 11801, IEC 61156, and EN 50173. These documents specify performance characteristics and test requirements for frequencies up to 250 MHz.

The cable is available in both stranded- and solid-conductor forms. The stranded form is more flexible and withstands more bending without breaking. In situations where a cable is repeatedly flexed or connected and disconnected, choose a stranded cable. For horizontal cable runs not subject to repeated movement, or for outdoor applications, use STP Cat 6 CMP solid-copper conductor cable with individual shielding applied to each of the four wired pairs. The category and type of cable can be identified by the printing on the jacket.

The Category 6 specification requires conductors to be pure copper.

### CHARACTERISTICS OF STP CAT 6

The use of balanced lines helps preserve a high signal-to-noise ratio despite interference from both external sources and crosstalk from other pairs.

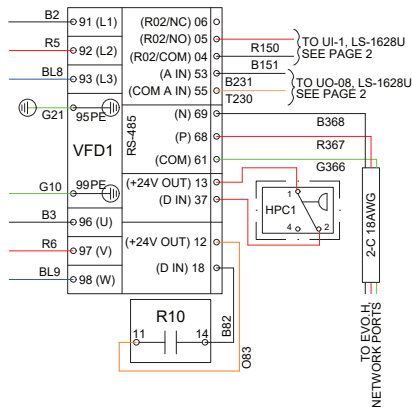
**Table 8: Electrical Characteristics for a Commercially Available Cat 6 UTP Cable Product**

Property	Nominal	Tolerance	Unit
Characteristic Impedance, 1-250 MHz	100	± 15	Ω
Characteristic Impedance @ 250 MHz	100	± 5	Ω
DC Loop Resistance	≤ 0.05		Ω/m
Propagation Speed Relative to the Speed of Light	0.69		1
Propagation Delay	4.60		ns/m
Delay Skew < 100 MHz	< 0.45		ns/m
Capacitance @ 100 Hz	56		pF/m
Max Tensile Load, During Installation	110		N
Wire Diameter (24 AWG; 0.205 mm <sup>2</sup> )	0.51		mm
Operating Temperature	-20 to +70		°C
Maximum DC Operating Voltage (PoE uses max 57 V)	90		V

## Electrical: VFD STO Function

### OPTIONAL VFD INSTALLATION WITH STO FUNCTION

The optional VFD installation on the lead compressor circuit has wiring details as shown below:

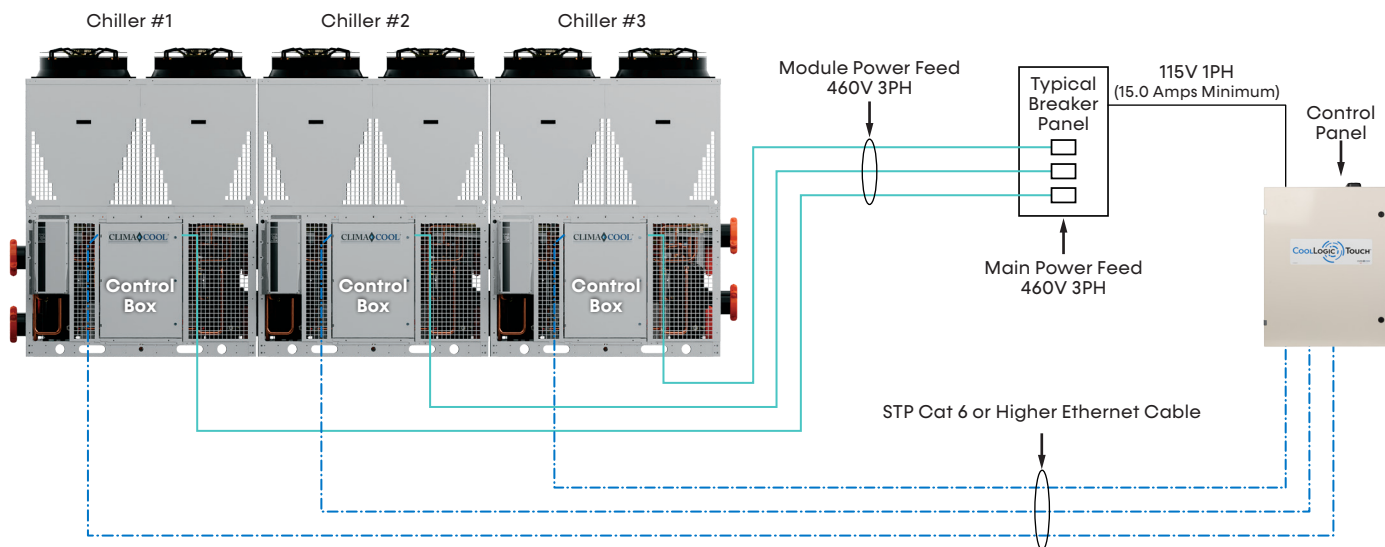


In the unlikely event that the HPC1 (head pressure control out-out switch, manual reset) is tripped, the VFD is temporarily placed in a lock-out state (STO, "Safe Torque Off"). To recover from such an STO event, it is necessary that the HPC1 control is reset by depressing the red button switch on the control, and you will need to clear the VFD alarm using the VFD user keypad.

## Power Distribution Drawing

UA Models

**Figure 27: Power Distribution Drawing**



### NOTES:

1. Communication wiring is home run set up with STP Cat 6 or higher Ethernet cable.
2. ClimaCool Standard Bank Package includes ship-loose items: 1–CoolLogic Touch Control System, 1–DP Flow Sensor, 2–temperature sensors and wells, and 1–bypass header kit for each water loop. These items are to be installed, powered, and control wired in the field by others.
3. Control wiring is by others using Ethernet cables and home run connections between the control system and the modules.
4. Disconnects NOT included.
5. All voltages available, 460V used as example only.

## Electrical Data

### Electrical Data: No Lead VFD

ClimaCool Base Model	Voltage Code	Rated Voltage	Voltage Min./Max	Compressor			Fan		Other Load Amp	Standard Compressor		
				QTY	RLA	LRA	QTY	RLA		Total Unit FLA	Min. Circuit Ampacity (MCA)	Max Overcurrent Protection (MOP)
UACS20	H	208/230V-3PH-60Hz	187/252	2	33.3	255.0	2	9.1	2.4	87.2	95.5	125
UATS20	F	460V-3PH-60Hz	432/504	2	15.4	140.0	2	4.0	1.1	39.9	43.7	50
UAUS20	N	575V-3PH-60Hz	540/630	2	12.9	107.6	2	3.3	0.9	33.3	36.5	45
UACS30	H	208/230V-3PH-60Hz	187/252	2	49.0	386.3	2	9.1	2.4	118.6	130.9	175
UATS30	F	460V-3PH-60Hz	432/504	2	24.0	182.0	2	4.0	1.1	57.1	63.1	80
UAUS30	N	575V-3PH-60Hz	540/630	2	19.2	131.0	2	3.3	0.9	45.9	50.7	60
UACS50	F	460V-3PH-60Hz	432/504	2	38.8	280.7	4	4.0	1.1	94.7	104.4	125
UATS50	N	575V-3PH-60Hz	540/630	2	28.4	250.0	4	3.3	0.9	70.9	78.0	100
UACS60	F	460V-3PH-60Hz	432/504	2	48.0	310.0	4	4.0	1.1	113.1	125.1	150
UATS60	N	575V-3PH-60Hz	540/630	2	43.1	239.0	4	3.3	0.9	100.3	111.0	150
UAFS30	H	208/230V-3PH-60Hz	187/252	N/A			2	9.1	2.4	20.6	22.9	30
	F	460V-3PH-60Hz	432/504				2	4.0	1.1	9.1	10.1	15
	N	575V-3PH-60Hz	540/630				2	3.3	0.9	7.5	8.3	15
UAFS60	F	460V-3PH-60Hz	432/504	N/A			4	4.0	1.1	17.1	18.1	20
	N	575V-3PH-60Hz	540/630				4	3.3	0.9	14.1	14.9	15

### Electrical Data: With Lead VFD

ClimaCool Base Model	Voltage Code	Rated Voltage	Voltage Min./Max	Compressor <sub>1</sub>			Fan		Other Load Amp	Lead VFD		
				QTY	RLA	LRA	QTY	RLA		Total Unit FLA	Min. Circuit Ampacity (MCA)	Max Overcurrent Protection (MOP)
UACS20	H	208/230V-3PH-60Hz	187/252	2	54.0 / 33.3	54.0 / 255.0	2	9.1	2.4	107.9	121.4	175
UATS20	F	460V-3PH-60Hz	432/504	2	25.0 / 15.4	25.0 / 140.0	2	4.0	1.1	49.5	55.7	80
UAUS20	N	575V-3PH-60Hz	540/630	2	20.9 / 12.9	20.9 / 107.6	2	3.3	0.9	41.3	46.5	60
UACS30	H	208/230V-3PH-60Hz	187/252	2	80.0 / 49.0	80.0 / 386.3	2	9.1	2.4	149.6	169.6	225
UATS30	F	460V-3PH-60Hz	432/504	2	36.0 / 24.0	36.0 / 182.0	2	4.0	1.1	69.1	78.1	110
UAUS30	N	575V-3PH-60Hz	540/630	2	32.7 / 19.2	32.7 / 131.0	2	3.3	0.9	59.4	67.5	90
UACS50	F	460V-3PH-60Hz	432/504	2	59.0 / 38.8	59.0 / 280.7	4	4.0	1.1	114.9	129.6	175
UATS50	N	575V-3PH-60Hz	540/630	2	49.0 / 28.4	49.0 / 250.0	4	3.3	0.9	91.5	103.7	150
UACS60	F	460V-3PH-60Hz	432/504	2	73.0 / 48.0	73.0 / 310.0	4	4.0	1.1	138.1	156.3	225
UATS60	N	575V-3PH-60Hz	540/630	2	59.0 / 43.1	59.0 / 239.0	4	3.3	0.9	116.2	130.9	175

#### NOTES:

1. Lead compressor RLA and LRA values based upon rated VFD input current.

# Wiring Diagram Matrix Including All Electrical Options

UA Models

## Chiller (UAC)

Voltage	VFD	Single Module Controls	Auto Stand Alone or HMI	kAIC Rating	Wire Diagram Number			
					20 Tons	30 Tons	50 Tons	60 Tons
208/230	Off	Off	Off	5 kAIC	C96B3111N01	C96B3121N01		
				65 kAIC	C96B3111N02	C96B3121N02		
		On	On	5 kAIC	C96B3111N03	C96B3121N03		
				65 kAIC	C96B3111N04	C96B3121N04		
		On	Off	5 kAIC	C96B3111N05	C96B3121N05		
				65 kAIC	C96B3111N06	C96B3121N06		
	On	Off	Off	5 kAIC	C96B3111N07	C96B3121N07		
				65 kAIC	C96B3111N08	C96B3121N08		
		On	On	5 kAIC	C96B3111N09	C96B3121N09		
				65 kAIC	C96B3111N10	C96B3121N10		
		On	Off	5 kAIC	C96B3111N11	C96B3121N11		
				65 kAIC	C96B3111N12	C96B3121N12		
460	Off	Off	Off	5 kAIC	C96B3112N01	C96B3122N01	C96B3132N01	C96B3142N01
				65 kAIC	C96B3112N02	C96B3122N02	C96B3132N02	C96B3142N02
		On	On	5 kAIC	C96B3112N03	C96B3122N03	C96B3132N03	C96B3142N03
				65 kAIC	C96B3112N04	C96B3122N04	C96B3132N04	C96B3142N04
		On	Off	5 kAIC	C96B3112N05	C96B3122N05	C96B3132N05	C96B3142N05
				65 kAIC	C96B3112N06	C96B3122N06	C96B3132N06	C96B3142N06
	On	Off	Off	5 kAIC	C96B3112N07	C96B3122N07	C96B3132N07	C96B3142N07
				65 kAIC	C96B3112N08	C96B3122N08	C96B3132N08	C96B3142N08
		On	On	5 kAIC	C96B3112N09	C96B3122N09	C96B3132N09	C96B3142N09
				65 kAIC	C96B3112N10	C96B3122N10	C96B3132N10	C96B3142N10
		On	Off	5 kAIC	C96B3112N11	C96B3122N11	C96B3132N11	C96B3142N11
				65 kAIC	C96B3112N12	C96B3122N12	C96B3132N12	C96B3142N12
575	Off	Off	Off	5 kAIC	C96B3113N01	C96B3123N01	C96B3133N01	C96B3143N01
			On	5 kAIC	C96B3113N02	C96B3123N02	C96B3133N02	C96B3143N02
		On	Off	5 kAIC	C96B3113N03	C96B3123N03	C96B3133N03	C96B3143N03
	On	Off	Off	5 kAIC	C96B3113N04	C96B3123N04	C96B3133N04	C96B3143N04
			On	5 kAIC	C96B3113N05	C96B3123N05	C96B3133N05	C96B3143N05
		On	Off	5 kAIC	C96B3113N06	C96B3123N06	C96B3133N06	C96B3143N06

UA Models

# Wiring Diagram Matrix Including All Electrical Options

## Heat Pump (UAT)

Voltage	VFD	Single Module Controls	Auto Stand Alone or HMI	kAIC Rating	Wire Diagram Number			
					20 Tons	30 Tons	50 Tons	60 Tons
208/230	Off	Off	Off	5 kAIC	C96B3211N01	C96B3221N01		
				65 kAIC	C96B3211N02	C96B3221N02		
		On	On	5 kAIC	C96B3211N03	C96B3221N03		
				65 kAIC	C96B3211N04	C96B3221N04		
		On	Off	5 kAIC	C96B3211N05	C96B3221N05		
				65 kAIC	C96B3211N06	C96B3221N06		
	On	Off	Off	5 kAIC	C96B3211N07	C96B3221N07		
				65 kAIC	C96B3211N08	C96B3221N08		
		On	On	5 kAIC	C96B3211N09	C96B3221N09		
				65 kAIC	C96B3211N10	C96B3221N10		
		On	Off	5 kAIC	C96B3211N11	C96B3221N11		
				65 kAIC	C96B3211N12	C96B3221N12		
460	Off	Off	Off	5 kAIC	C96B3212N01	C96B3222N01	C96B3232N01	C96B3242N01
				65 kAIC	C96B3212N02	C96B3222N02	C96B3232N02	C96B3242N02
		On	On	5 kAIC	C96B3212N03	C96B3222N03	C96B3232N03	C96B3242N03
				65 kAIC	C96B3212N04	C96B3222N04	C96B3232N04	C96B3242N04
		On	Off	5 kAIC	C96B3212N05	C96B3222N05	C96B3232N05	C96B3242N05
				65 kAIC	C96B3212N06	C96B3222N06	C96B3232N06	C96B3242N06
	On	Off	Off	5 kAIC	C96B3212N07	C96B3222N07	C96B3232N07	C96B3242N07
				65 kAIC	C96B3212N08	C96B3222N08	C96B3232N08	C96B3242N08
		On	On	5 kAIC	C96B3212N09	C96B3222N09	C96B3232N09	C96B3242N09
				65 kAIC	C96B3212N10	C96B3222N10	C96B3232N10	C96B3242N10
		On	Off	5 kAIC	C96B3212N11	C96B3222N11	C96B3232N11	C96B3242N11
				65 kAIC	C96B3212N12	C96B3222N12	C96B3232N12	C96B3242N12
575	Off	Off	Off	5 kAIC	C96B3213N01	C96B3223N01	C96B3233N01	C96B3243N01
			On	5 kAIC	C96B3213N02	C96B3223N02	C96B3233N02	C96B3243N02
		On	Off	5 kAIC	C96B3213N03	C96B3223N03	C96B3233N03	C96B3243N03
	On	Off	Off	5 kAIC	C96B3213N04	C96B3223N04	C96B3233N04	C96B3243N04
			On	5 kAIC	C96B3213N05	C96B3223N05	C96B3233N05	C96B3243N05
		On	Off	5 kAIC	C96B3213N06	C96B3223N06	C96B3233N06	C96B3243N06



# Wiring Diagram Matrix Including All Electrical Options

UA Models

## SHC Heat Pump (UAU)

Voltage	VFD	Single Module Controls	Auto Stand Alone or HMI	kAIC Rating	Wire Diagram Number			
					20 Tons	30 Tons	50 Tons	60 Tons
208/230	Off	Off	Off	5 kAIC	C96B3311N01	C96B3321N01		
				65 kAIC	C96B3311N02	C96B3321N02		
		On	On	5 kAIC	C96B3311N03	C96B3321N03		
				65 kAIC	C96B3311N04	C96B3321N04		
		On	Off	5 kAIC	C96B3311N05	C96B3321N05		
				65 kAIC	C96B3311N06	C96B3321N06		
	On	Off	Off	5 kAIC	C96B3311N07	C96B3321N07		
				65 kAIC	C96B3311N08	C96B3321N08		
		On	On	5 kAIC	C96B3311N09	C96B3321N09		
				65 kAIC	C96B3311N10	C96B3321N10		
		On	Off	5 kAIC	C96B3311N11	C96B3321N11		
				65 kAIC	C96B3311N12	C96B3321N12		
460	Off	Off	Off	5 kAIC	C96B3312N01	C96B3322N01	C96B3332N01	C96B3342N01
				65 kAIC	C96B3312N02	C96B3322N02	C96B3332N02	C96B3342N02
		On	On	5 kAIC	C96B3312N03	C96B3322N03	C96B3332N03	C96B3342N03
				65 kAIC	C96B3312N04	C96B3322N04	C96B3332N04	C96B3342N04
		On	Off	5 kAIC	C96B3312N05	C96B3322N05	C96B3332N05	C96B3342N05
				65 kAIC	C96B3312N06	C96B3322N06	C96B3332N06	C96B3342N06
	On	Off	Off	5 kAIC	C96B3312N07	C96B3322N07	C96B3332N07	C96B3342N07
				65 kAIC	C96B3312N08	C96B3322N08	C96B3332N08	C96B3342N08
		On	On	5 kAIC	C96B3312N09	C96B3322N09	C96B3332N09	C96B3342N09
				65 kAIC	C96B3312N10	C96B3322N10	C96B3332N10	C96B3342N10
		On	Off	5 kAIC	C96B3312N11	C96B3322N11	C96B3332N11	C96B3342N11
				65 kAIC	C96B3312N12	C96B3322N12	C96B3332N12	C96B3342N12
575	Off	Off	Off	5 kAIC	C96B3313N01	C96B3323N01	C96B3333N01	C96B3343N01
			On	5 kAIC	C96B3313N02	C96B3323N02	C96B3333N02	C96B3343N02
		On	Off	5 kAIC	C96B3313N03	C96B3323N03	C96B3333N03	C96B3343N03
	On	Off	Off	5 kAIC	C96B3313N04	C96B3323N04	C96B3333N04	C96B3343N04
			On	5 kAIC	C96B3313N05	C96B3323N05	C96B3333N05	C96B3343N05
		On	Off	5 kAIC	C96B3313N06	C96B3323N06	C96B3333N06	C96B3343N06

UA Models

## Wiring Diagram Matrix Including All Electrical Options

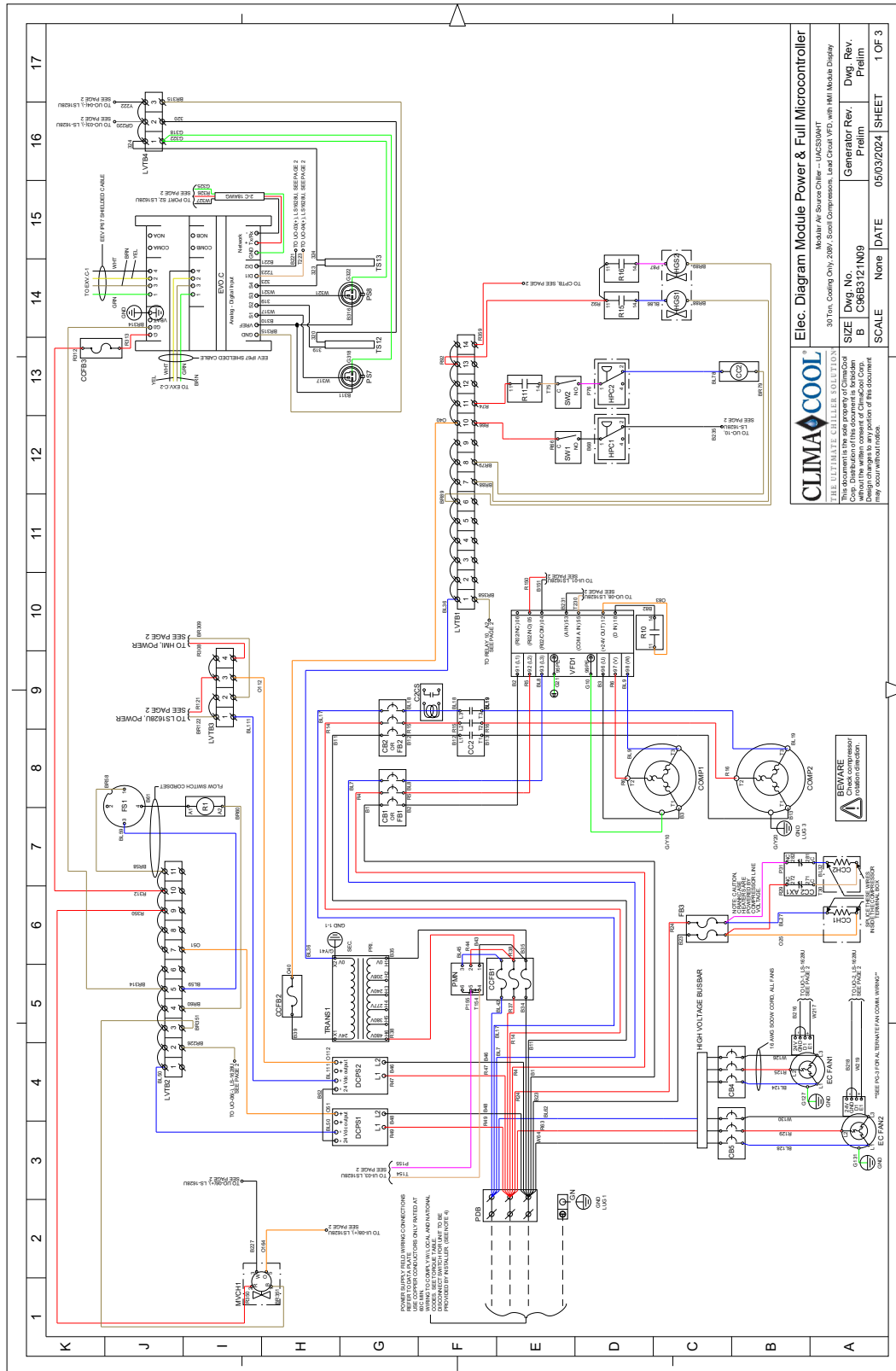
### Free Cooling (UAF)

Voltage	VFD	Single Module Controls	Auto Stand Alone or HMI	kAIC Rating	Wire Diagram Number	
					30 Tons	60 Tons
208/230	Off	Off	Off	5 kAIC	C96B3921N01	
				65 kAIC	C96B3921N02	
			On	5 kAIC	C96B3921N03	
				65 kAIC	C96B3921N04	
		On	Off	5 kAIC	C96B3921N05	
				65 kAIC	C96B3921N06	
460	Off	Off	Off	5 kAIC	C96B3922N01	C96B3942N01
				65 kAIC	C96B3922N02	C96B3942N02
			On	5 kAIC	C96B3922N03	C96B3942N03
				65 kAIC	C96B3922N04	C96B3942N04
		On	Off	5 kAIC	C96B3922N05	C96B3942N05
				65 kAIC	C96B3922N06	C96B3942N06
575	Off	Off	Off	5 kAIC	C96B3923N01	C96B3943N01
			On	5 kAIC	C96B3923N02	C96B3943N02
		On	Off	5 kAIC	C96B3923N03	C96B3943N03



## Example Wiring Diagrams

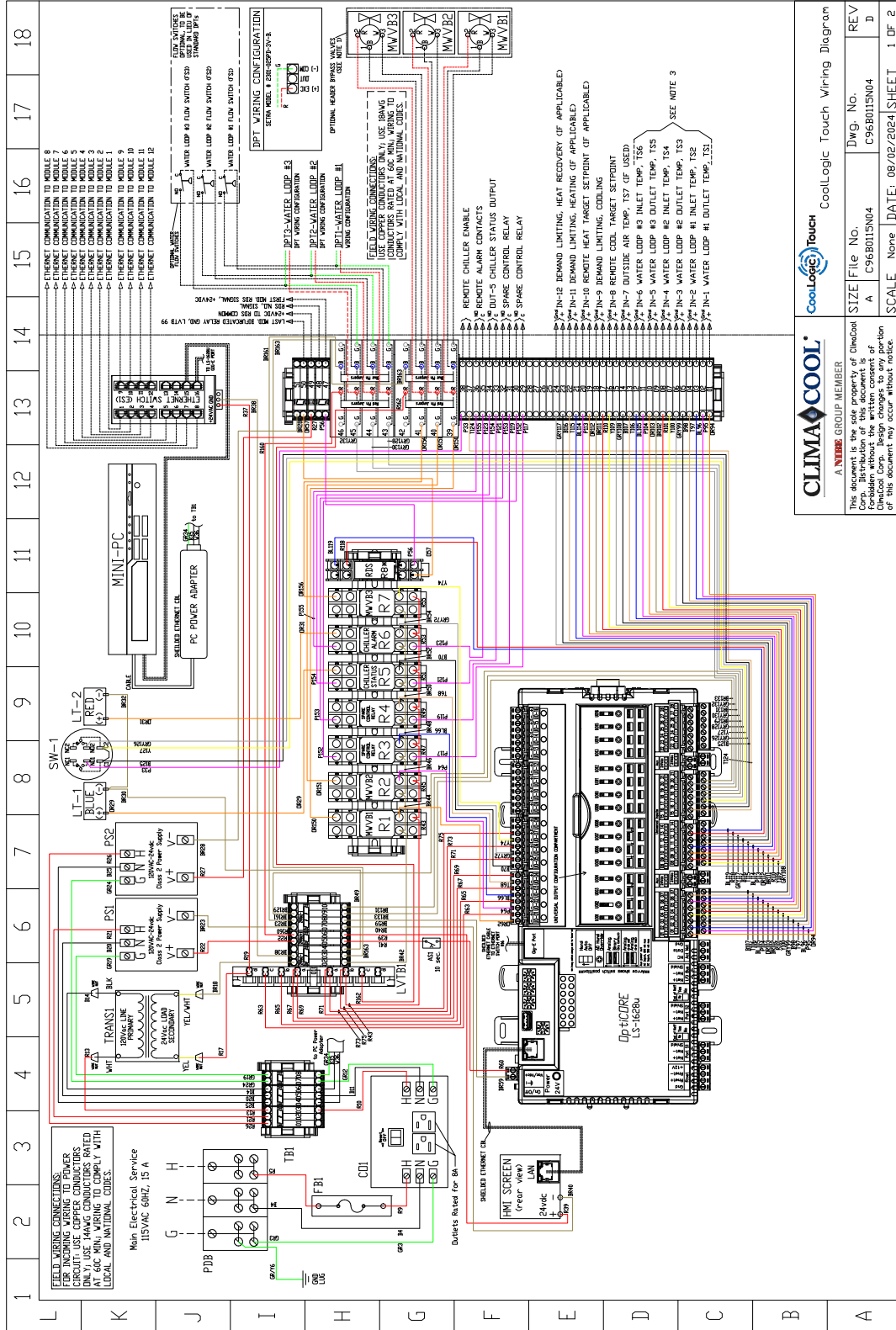
### UAC, Chiller, 208/230V-3PH with Lead VFD





# Example Wiring Diagrams

## CoolLogic Touch



## Heat Trace Installation

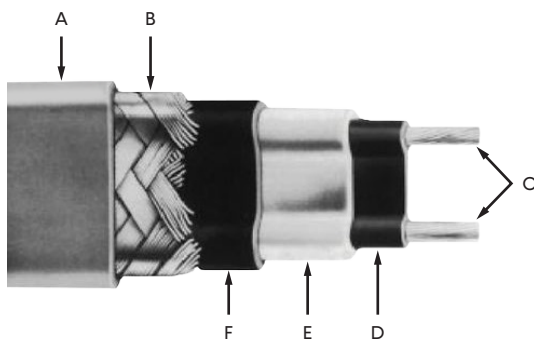
UA Models

### SELF-REGULATING HEATER CABLE

Ideal for use in maintaining fluid flow under low ambient conditions.

- As the core material temperature increases, the number of conductive paths in the core material decrease, automatically decreasing the heat output.
- As the temperature decreases, the number of conductive paths increase, causing the heat output to increase.

**Figure 28: Self-Regulating Heater Cable**



#### LEGEND

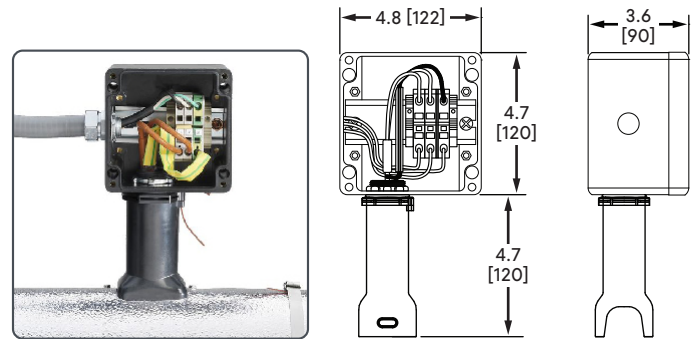
- |                                      |   |
|--------------------------------------|---|
| A. Optional Over Jacket              | E. Bonded Inner Thermoplastic Jacket    |
| B. Standard Metal Braid              | F. Outer Thermoplastic Elastomer Jacket |
| C. Stranded Plated Copper Conductors |   |
| D. Self-Regulating Conductive Core   |   |

### POWER CONNECTION KITS

Designed per NEC requirements and provide entries compatible with ¾-inch (19.05 mm) NPT conduit entry. Standard terminal blocks are sized for a maximum of 8 AWG power supply wiring.

- Incorporate rugged, non-metallic construction rated for IP66/NEMA 4X.
- Designed with corrosion resistant, anti-static enclosures and components.

**Figure 29: Power Connection Kit**



**NOTE:** Measurements are shown in inches and [millimeters].

## Heat Trace Installation

**POWER CONNECTION**

**WIRING CONNECTION**

Ensure that all wiring and connections are in accordance with applicable wiring codes. Enclosure grounding is in accordance with applicable wiring codes for non-metallic devices.

Phantom number	ft. of wire per module	No of circuits	120v heat trace wire, 10 watts/ft
UCA020-030 NO HEADERS	35	1	150 watts
C18P0001N03	35	1	350 watts
UCA020-030 2-PIPE	78	1	780 watts
C18P0001N01	44	1	440 watts
UCA050 2-PIPE	49	1	490 watts
C18P0001N10	78	1	780 watts
UCA050-070 4-PIPE SHC-HP	28	2	280 watts
C18P0001N07	72	2	720 watts
UCA050-070 SHC-HP/HR			
BPHX ONLY			
UCA050-070 SHC-HP/HR			
BPHX + HEADERS			

**CLIMACOOL**  
THE ULTIMATE CHILLER SOLUTION

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**Field Wiring Diagram**  
Field Wiring Connections for Nelson Heat Trace Components

SIZE	File No.	Dwg. No.	REV
B	C18P0001N09	C18P0001N09-Heat Trace Field Wiring Diagram	B

SCALE: None    DATE: 03/17/2021    SHEET: 1 OF 1

Hard Copies of this Drawing are for REFERENCE ONLY. For CURRENT INFO, refer to the DWG DATABASE.

**\*C18P0001N09\_ROUTING\***

**\*C18P0001N09\_ROUTING\***

SCALE 17/320

SCALE 17/320

REV	DESCRIPTION	BY	PCN	DATE	ENG
1	INITIAL RELEASE	-	-	Apr-27-21	-

**CLIMACOOL**  
THE ULTIMATE CHILLER SOLUTION

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES AS FOLLOWS  
DECIMALS ± .01  
ANGLES ± 1°

TITLE: UCA050-Cooling Heat Trace

DRAWING NO: C18P0001N09\_ROUTING

SCALE: 3/64

SHEET: 1 OF 1

Hard Copies of this Drawing are for REFERENCE ONLY. For CURRENT INFO, refer to the DWG DATABASE.

**\*C18P0001N09\_ROUTING\***



## Pre-Startup

UA Models

**All startups must be performed by ClimaCool factory trained personnel.** Prior to chiller startup, there are certain essential checks which must be completed. Failure to carry out these checks could result in damage to the chiller voiding the modules warranty.

## ELECTRICAL

It is imperative to turn off the main electrical power supply and follow proper lock-out/tag-out procedures prior to servicing any of the chiller's electrical components. The following procedures can be performed only after the electrical power is confirmed to be off:

1. The installation must be inspected and approved by the respective agent and be in compliance with all local and national electrical codes.
2. Check and tighten as required all electrical terminal connections on each module. Utilize any lock-out/tag-out procedures required for your project location when performing this operation. If no procedure exists take all precautions necessary to prevent the power from being turned on. A systematic tightening of all terminals inside the electrical control panel on each module should be carried out. This will include the compressor motor terminals, which would require removal of the compressor terminal cover. Check connections at each safety and every termination in the panel.
3. Verify that a separate 115 volt power supply is used to power the CoolLogic Touch Control System. Field connections are a home run STP Cat 6 or higher Ethernet cable connection.
4. All field connections should be checked for tightness.
5. Check all fuses for proper sizing as indicated on the chiller data plate and/or the electrical diagram on the inside door of the electrical panel.
6. Verify proper operation of the **mandatory** field installed pressure differential flow sensor.
7. Verify proper installation of the mandatory factory provided field installed voltage/phase monitor.
8. **Confirm all panels and electrical covers are properly installed/sealed, including the condenser fan motor cover.**
9. **Check that all cabling (inside and outside of electrical panel) is not subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. These effects should also consider continual vibration from such sources as the compressors.**

## REFRIGERATION

1. Refrigerant piping and components should be inspected for damage.
2. Place refrigerant gauges on the discharge and suction access ports of each refrigerant circuit to ensure a refrigerant charge is present. Leave the gauges on for compressor rotation check.
3. Confirm the settings on all pressure switches.

## Pre-Startup

### WATER SYSTEM

1. Confirm installation of the mandatory field installed chilled water strainer with minimum of 40-mesh screen.
2. Confirm that leak testing has been carried out.
3. Confirm that the system is clean.
4. Confirm that necessary water treatment systems are in place with the heat exchanger water systems.
5. Confirm the chilled water circulating pumps are operational and water is flowing through the exchanger.
6. Shut the entering water valve and blow out some water from the lower flush port to check for particles or coloration from suspended particles. Record the pressure differential across the chiller heat exchanger measured at the pete's ports at each module.
7. Confirm correct water flow rates through the heat exchanger. Acquire the design parameters for the chiller bank from the ClimaCool Selection Program data (available from your local representative). Compare the measured differential pressures from step 5 above with the predicted flow rates to ensure proper correlation to the flow results.
8. Verify proper installation of the mandatory factory provided field installed pressure differential flow sensor, temperature sensors and wells (sensors should be fully inserted in the well and the well must be installed such that it is fully immersed into the flowing water of the field piping) and verify calibration of sensors read through CoolLogic Touch Control System.

#### **WARNING**



Disconnect power supply(ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!

#### **WARNING**

Polyolester Oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems including those with R-454B refrigerant. POE oil, if it ever comes in contact with PVC or CPVC piping, may cause failure of the PVC/CPVC. PVC/CPVC piping should never be used as supply or return water piping with water source heat pump products containing R-454B as system failures and property damage may result.

#### **CAUTION**



Unit to be serviced by qualified personnel only. Refrigerant system under pressure. Relieve pressure before using torch. Recover refrigerant and store or dispose of properly.

#### **CAUTION**

##### **3-PHASE SCROLL COMPRESSOR UNIT**

If this unit uses a 3-Phase Scroll Compressor, the following instructions must be followed:

- Unit power supply must be wired in the proper sequence to avoid damage to the 3-Phase Scroll Compressor;
- Scroll Compressors with incorrect rotation show the following characteristics:
  - High sound level;
  - High suction pressure and low discharge pressure;
  - Low current draw.

If any of the three above characteristics exist, swap two of the three supply wires at the disconnect and recheck compressor for incorrect rotation.

E-mail: [technicalsupport@climacoolcorp.com](mailto:technicalsupport@climacoolcorp.com) • Phone: 800.299.9747, Option 2, then Option 3

Project Name: \_\_\_\_\_

Date: \_\_\_\_\_

Address/Phone: \_\_\_\_\_

	YES	NO
1. Are modules connected properly per Codes and Installation Manual? (Installation, Operation & Maintenance (IOM) Manual is available at <a href="http://www.climacoolcorp.com">www.climacoolcorp.com</a> .)	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there a 40 mesh strainer on the inlet water of each loop? (two (2) for SHC units, one (1) for all others) (Fill water to chiller being sure to pass through a minimum of 40 mesh strainer.)	<input type="checkbox"/>	<input type="checkbox"/>
3. Is chilled water system filled, flushed and all air purged from system? (All air must be purged from system prior to startup. See "Filling the Water System" in IOM).	<input type="checkbox"/>	<input type="checkbox"/>
4. Is hot water system (4-pipe only) filled, flushed, and all air purged from system? (All air must be purged from system prior to startup. See "Filling the Water System" in IOM).	<input type="checkbox"/>	<input type="checkbox"/>
5. Are all pumps tested and operational?	<input type="checkbox"/>	<input type="checkbox"/>
6. Is required GPM/Pressure Differential supplied to the chilled water side? (See project specifications or selection and performance sheets available from ClimaCool Sales Rep.)	<input type="checkbox"/>	<input type="checkbox"/>
7. Is required GPM/Pressure Differential supplied to the source water side (4-pipe only)? (See project specifications or selection and performance sheets available from ClimaCool Sales Rep.)	<input type="checkbox"/>	<input type="checkbox"/>
8. Are the pressure-differential flow sensors properly installed and wired to the CoolLogic Touch™ Control System?	<input type="checkbox"/>	<input type="checkbox"/>
9. Have all chiller coupling connections been leak tested?	<input type="checkbox"/>	<input type="checkbox"/>
10. Is water presently circulating through chiller?	<input type="checkbox"/>	<input type="checkbox"/>
11. Have temperature sensors been installed?	<input type="checkbox"/>	<input type="checkbox"/>
12. Does the power supply match the chiller nameplate?	<input type="checkbox"/>	<input type="checkbox"/>
13. Are power and communication wiring complete to each module?	<input type="checkbox"/>	<input type="checkbox"/>
14. Do wiring and devices match the approved electrical submittal drawings?	<input type="checkbox"/>	<input type="checkbox"/>
a. If Heat Trace is provided, verify E-power wiring complete.	<input type="checkbox"/>	<input type="checkbox"/>
15. Is required load available to run multiple compressors at start-up?	<input type="checkbox"/>	<input type="checkbox"/>
16. Is a water header bypass installed at the chiller? (Check One)		
<input type="checkbox"/> ClimaCool provided? <input type="checkbox"/> Field Provided? <input type="checkbox"/> Smart Bypass (2-pipe only)?		
17. Are all panels and electrical covers properly installed/sealed, including condenser fan motor covers?	<input type="checkbox"/>	<input type="checkbox"/>
18. Glycol Added? If Yes, Glycol % _____	<input type="checkbox"/>	<input type="checkbox"/>

If you checked "No" to any question above, provide the line reference number and the date of scheduled completion below. Please note **all conditions must be complete prior to the start-up date.**

\* This form must be completed and submitted to ClimaCool Corp. **three (3) weeks** prior to final scheduling of any Startup.  
**NOTE:** If any of the above items are not complete at time of startup, back charges will be assessed for additional costs.

Contractor Name: \_\_\_\_\_

Address: \_\_\_\_\_

(Authorized Signature) \_\_\_\_\_

Phone: \_\_\_\_\_

Date: \_\_\_\_\_

## Mechanical Startup

**All startups must be performed by ClimaCool factory trained personnel.**

### STARTUP DOCUMENTATION

All startup paperwork and documentation must be submitted to ClimaCool. Future warranty claims cannot be processed without a completed Startup and Warranty Registration form on file.

### WATER TESTING

Extract three (3) water samples from each water loop using the bottles provided in the Water Sample test kit. Each test kit contains one (1) bag with three (3) bottles. Use one bag (all three bottles) for each water loop. Heat Pumps and Straight Cool applications will have three (3) total samples. SHC applications will have six (6) total samples. **Confirm that the sample bottles are filled to the top leaving no air in the bottles.** All the sample bottles must have labels completed per instructions included with the bottles. Ship the bottles immediately to the appropriate water testing laboratory per the instructions.

### MECHANICAL STARTUP

1. Review all items are complete from the Pre-Startup Checklist.
2. Cross reference model number with submittal sheet to verify that the units are the correct model type and voltage requirements.
3. Confirm all panels and electrical covers are properly installed/sealed.
4. Inspect all refrigerant piping for oil leaks which may have occurred during shipment which might indicate a refrigerant leak. Check the high-pressure cutout setting of the pressure controls. The setting should be 585 psig for all UA models.
5. Use refrigerant gauge set suitable for the high pressure R-454B, and hook up to the suction and discharge ports of each module's compressor stages separately. Bump start the compressors by depressing the contactor manually. Bump the compressor only for 1-2 seconds to ensure the correct rotation of the scroll compressors (indicated by a rising highside pressure and a falling suction pressure).
6. Check for proper line- or high-voltage values at each module-input power block, and the 24VAC low-voltage values for correctness ( $\pm 10\%$  of nominal values).
7. Tighten every screw and lug connection inside the *CoolLogic Touch* Control System and inside each module control panel high-voltage section. Check auxiliary contacts on contactors and ensure #1 auxiliary is wired on the #1 contactor. Open up the compressor junction box located on the front of each compressor and verify main electrical terminal lug tightness and the low-voltage wires on protection module.
8. Confirm the jumper locations for all control systems and module controllers as shown on the wiring diagrams provided on the inside electrical door panels.
9. Verify that EXV controller is wired to the LS1628.
10. Verify motorized water-isolation valves auxiliary-switch dial settings, to ensure they close near:
  - 30% for evaporator/chilled water valves for cooling-only units and hot-water/condenser valves for Simultaneous Heating and Cooling units.
11. Power up each module control panel, turn OFF the two toggle switches located on the inside bottom of the low-voltage side of the module electrical panel. Refer to separate CoolLogic Touch IOM for more details.
12. Verify that evaporator header inlets (hot-water side if simultaneous application) include strainer assemblies equipped with 40-mesh screens.

## Controller Startup

UA Models

### CONTROL SYSTEM STARTUP

1. Verify the communication with the STP Cat 6 or higher Ethernet home run cabling is wired to each unit to and from the *CoolLogic Touch* Control System. Verify the cable's outer jacket is not stripped more than one inch. If so, the wires may have become untwisted, causing signal reflections.
2. Verify Controller hand/off/auto switches and I/O dip switches per wiring diagram.
3. Verify the location and wiring connections of all main header temperature sensors (should be a minimum of 36 inches but no more than 60 inches from the chiller bank). Confirm that all sensors are **fully inserted** into their sensor wells and wired back to the correct terminals in the bank control panel.
4. Verify the location and ports for all water differential pressure sensors used for flow detection (+) port piped to the inlet headers and the (–) ports piped to the outlet headers.
  - Verify the correct wiring using the +5VDC power supply to the differential sensor inputs.
  - Verify the correct output wiring from the differential sensors back to the control system universal input (UI) channels 8 and 11. Confirm inputs 8 and 11 jumpers are set to 'volts'.

**Note: The differential sensor ports should not be piped to a location which includes strainer pressure drops.**
5. For Variable Flow applications, confirm that the main water pumps are driven by VFD's, and that all VFD's are controlling the pump speeds to produce a nominal differential pressure drop across the chiller bank headers, per project design temperatures and approved submittal. precisely at the differential pressure sensor locations in step 6.
6. For Constant Flow Cooling applications, set modules to CV Cooling and confirm that valves travel to 100% open. Confirm that the main water pumps produce a nominal differential pressure drop across the chiller bank headers, per project design temperatures and approved submittal.
7. To activate Auto Stand Alone mode,
  - a. On the Home page select *Service*
  - b. Enter the provided unlock code to the Unlock Code field of the service page then select *Auto Stand Alone Mode*
  - c. In the *Enable Auto Stand Alone Mode Function* dropdown list, select *ON*.

**Note: Auto Stand Alone mode and setpoints are automatically derived from the CoolLogic Touch Control System.**

During Auto Stand Alone mode, active mode and setpoints can be temporarily overridden at the module level. These selections transition to Bank settings when the Bank exits Auto Stand Alone mode.
8. Verify proper communications from each module back to the control system using the "status" menu, then indexing down to the desired compressor data screen.
9. Verify that module-status parameters such as temperatures and pressures coincide with actual readings.
10. Power-up the bank control panel and verify settings per the Controls Quick-start guide.

Nominal differential pressure ranges are from 1 to 8 psid.

### COOLLOGIC TOUCH CONTROL SYSTEM

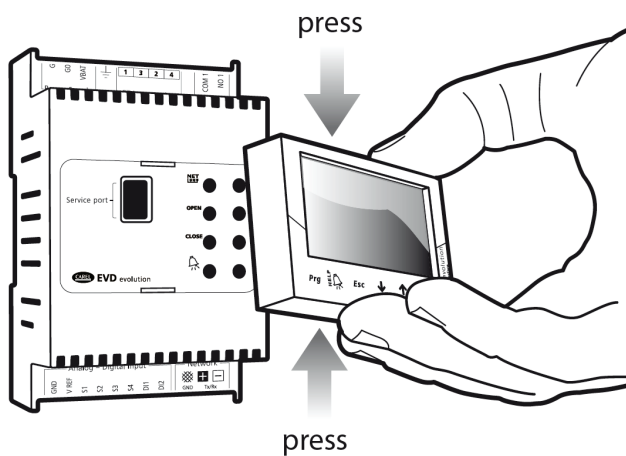
Refer to separate CoolLogic Touch IOM for Quick Start Guide and more details.



# Electronic Expansion Valves Startup

## INSTALLATION

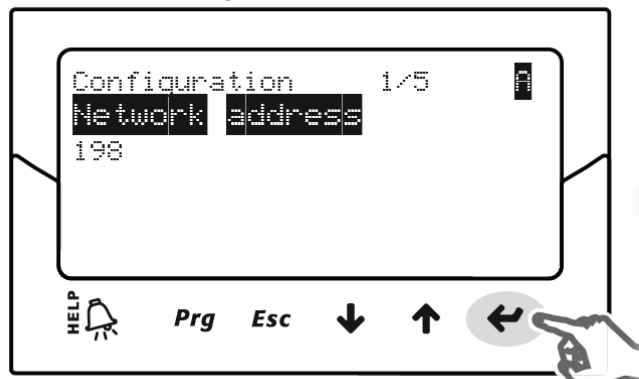
1. Remove EXV controller face plate.
2. Install EVO display.
  - a. Remove the cover, pressing on the fastening points.
  - b. Fit the display board, as shown.
  - c. The display will come on, and if the controller is being commissioned, the guided configuration procedure will start.



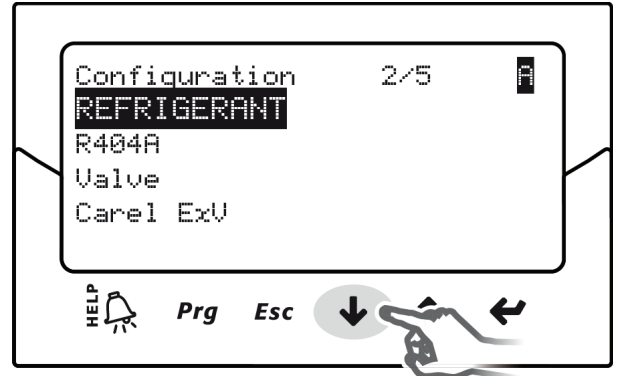
3. Power EXV controller with 24VDC.

## COMMISSIONING

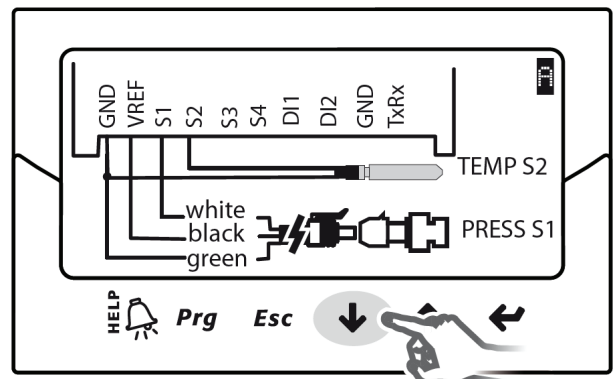
1. After fitting the display, Navigate to *CONFIGURATION 1/5* screen, enter Network Address as 198
  - a. Press *ENTER* to move to the value of the parameter.
  - b. Use the *UP/DOWN* arrows to modify the value.
  - c. Press Enter again to confirm the value.



2. Press *UP/DOWN* to move to the between parameters for Driver A, indicated by the letter at the top right.



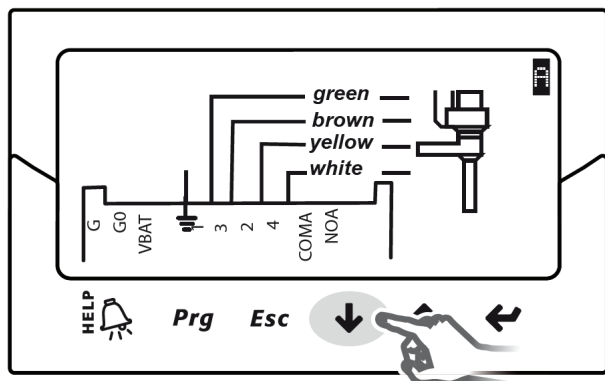
3. Navigate to *CONFIGURATION 2/5* screen, change Refrigerant Type to R454B
  - a. The type of refrigerant is essential for calculating the superheat. In addition, it is used to calculate the evaporation and condensing temperature based on the reading of the pressure probe.
4. Navigate to *CONFIGURATION 3/5* screen, change Probe S1 Sensor Type to 0 to 17.3 Barg.
5. Continue in the *CONFIGURATION 3/5* screen, change Main Regulation to Air conditioner/chiller with variable cooling capacity.
6. Repeat steps 2, 3, 4, 5 to modify the values of the parameters for Driver A: refrigerant, valve, pressure probe S1, main control;
7. Check that the probe electrical connections are correct for Driver A;



## Electronic Expansion Valves Startup

UA Models

8. Check that the electrical connections are correct for Valve A

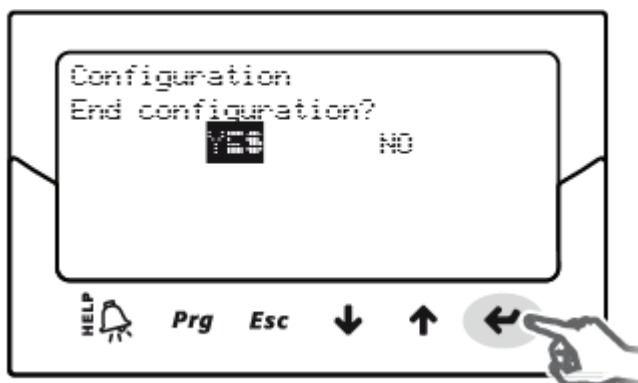


9. Repeat steps for Driver B;

- a. Press the **HELP** and **ENTER** buttons together. Switching when programming the parameters displays the parameters for driver A and driver B on the same screen.

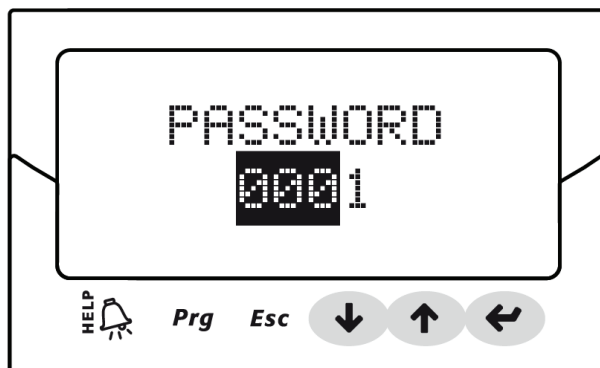


10. When prompted to **END CONFIGURATION**, Enter YES



This completes the initial setup (required for new controllers never powered up); further setup is required.

11. Using the navigation arrows, complete the detailed setup as follows:
- Hit the **PROGRAM** key
  - When prompted, enter the default password of 0066



12. Set Power Supply Mode to 24VDC

Parameter/Description	Def.	Min.	Max.	UOM
SPECIAL				
Power supply mode	0	0	1	-

0 = 24VAC  
1 = 24VDC

13. Select network settings and set protocol configuration to **NONE**, 2 STOP BITS, 19200 bps (option 2)

Parameter	Description	Def.
SPECIAL		
Set Configuration	Parity	Bit Stop
0	none	2
1	none	2
2	none	2
4	none	1
5	none	1
6	none	1
16	even	2
17	even	2
18	even	2
20	even	1
21	even	1
22	even	1
24	odd	2
25	odd	2
26	odd	2
28	odd	1
29	odd	1
30	odd	1



# Startup and Warranty Registration

## Air-Source Modular Chillers

Sign date and E-mail to: [technicalsupport@climacoolcorp.com](mailto:technicalsupport@climacoolcorp.com) • For any questions, call 800.299.9747, Option 2, Option 3

**NOTE: Please fill out this form and include the required screenshots for each module in the bank.**

Project Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Startup Date: \_\_\_\_\_

### Module

Model No.: \_\_\_\_\_  
 Serial No.: \_\_\_\_\_  
 Chiller No.: \_\_\_\_\_ Bank No.: \_\_\_\_\_

### Water Samples Taken: (Mark "X")

Load/Chilled Water Loop: ☐ Yes  
 Hot Water Loop (SHC Application): ☐ Yes ☐ N/A  
 Glycol Added: ☐ Yes ☐ No If Yes: Glycol %: \_\_\_\_\_

"Flow devices" shut off chiller below 40% of flow for Cool Loop & 25% for Heat Loop: (if used) ☐ Yes

**NOTE: Failure to collect and send water samples from each loop will void any promise of warranty.**  
**For initial MANDATORY water samples, bottles are provided. Follow instructions on label and mail the same day sample is taken.**

- All wiring terminations in module panel, safeties, and compressors tightened: ☐ Yes  
 ► Rotation of scroll compressor is correct: ☐ Yes

### Voltage/Ground

Phase-Phase:	L1-L2:	L2-L3:	L1-L3:	Transformer:	L1:	L2:	L3:	24V:
Fan Amps:	L1:	L2:	L3:	Fan Amps:	L1:	L2:	L3:	
Fan Amps:	L1:	L2:	L3:	Fan Amps:	L1:	L2:	L3:	

### Compressor Circuit #1

Amperage: L1: \_\_\_\_\_ L2: \_\_\_\_\_ L3: \_\_\_\_\_  
 Sight Glass Oil Level: \_\_\_\_\_

► Verify Safety Setting Limits:

☐ High Pressure: ☐ Low Pressure:

### Compressor Circuit #2

Amperage: L1: \_\_\_\_\_ L2: \_\_\_\_\_ L3: \_\_\_\_\_  
 Sight Glass Oil Level: \_\_\_\_\_

► Verify Safety Setting Limits:

☐ High Pressure: ☐ Low Pressure:

**Insert a USB drive into the USB port on the back of the touchscreen.**  
**Go to the screens noted on this page and press the camera icon to take screenshots of each screen.**  
**Submit the screenshots with your startup form.**

### System Screenshots<sup>1</sup>

Home: ☐  
 System Setup: ☐  
 Cool & Heat Setpoints: ☐  
 Controller Configuration: ☐  
 Module Configuration: ☐

**NOTES:** 1. All System Screenshots are required.  
 2. Provide screenshots from each module in the bank.

### Module Screenshots<sup>2</sup>

Module 1	<input type="checkbox"/>	Module 2	<input type="checkbox"/>
Module 3	<input type="checkbox"/>	Module 4	<input type="checkbox"/>
Module 5	<input type="checkbox"/>	Module 6	<input type="checkbox"/>
Module 7	<input type="checkbox"/>	Module 8	<input type="checkbox"/>
Module 9	<input type="checkbox"/>	Module 10	<input type="checkbox"/>
Module 11	<input type="checkbox"/>	Module 12	<input type="checkbox"/>

**Are all panels and electrical covers properly installed/sealed, including condenser fan motor covers?** ☐


Rep Signature: \_\_\_\_\_ Print Name: \_\_\_\_\_  
 E-Signature: ☐ Check Box (Authorized Signature)



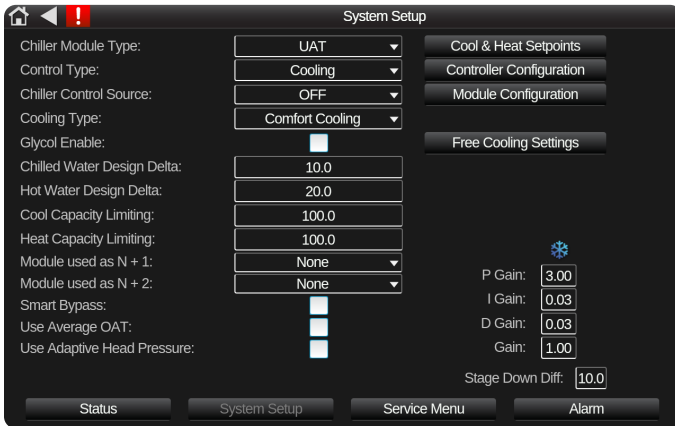
# Startup and Warranty Registration

UA Models

## TAKING SCREENSHOTS ON THE COOLLOGIC TOUCH

Insert a USB drive into the USB port on the back of the touchscreen. Go to the screens displayed on this page and press the Camera icon  to take screenshots of each screen. Submit the screenshots with your startup form.

### System Setup



System Setup

Chiller Module Type: UAT

Control Type: Cooling

Chiller Control Source: OFF

Cooling Type: Comfort Cooling

Glycol Enable: ☐

Chilled Water Design Delta: 10.0

Hot Water Design Delta: 20.0

Cool Capacity Limiting: 100.0

Heat Capacity Limiting: 100.0

Module used as N + 1: None

Module used as N + 2: None

Smart Bypass: ☐

Use Average OAT: ☐

Use Adaptive Head Pressure: ☐

Cool & Heat Setpoints

Controller Configuration

Module Configuration

Free Cooling Settings

P Gain: 3.00

I Gain: 0.03

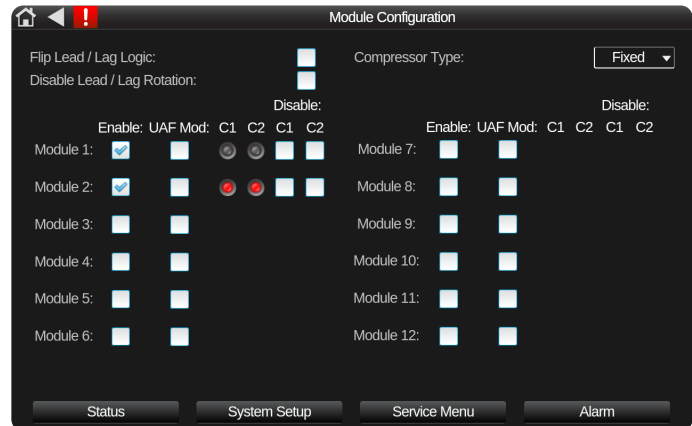
D Gain: 0.03

Gain: 1.00

Stage Down Diff: 10.0

Status System Setup Service Menu Alarm

### Module Configuration



Module Configuration

Flip Lead / Lag Logic: ☐

Disable Lead / Lag Rotation: ☐

Compressor Type: Fixed

Enable: UAF Mod: C1 C2 C1 C2

Module 1: ☒ ☐ ☐ ☐ ☐ ☐

Module 2: ☒ ☐ ☐ ☐ ☐ ☐

Module 3: ☐ ☐ ☐ ☐ ☐ ☐

Module 4: ☐ ☐ ☐ ☐ ☐ ☐

Module 5: ☐ ☐ ☐ ☐ ☐ ☐

Module 6: ☐ ☐ ☐ ☐ ☐ ☐

Module 7: ☐ ☐ ☐ ☐ ☐ ☐

Module 8: ☐ ☐ ☐ ☐ ☐ ☐

Module 9: ☐ ☐ ☐ ☐ ☐ ☐

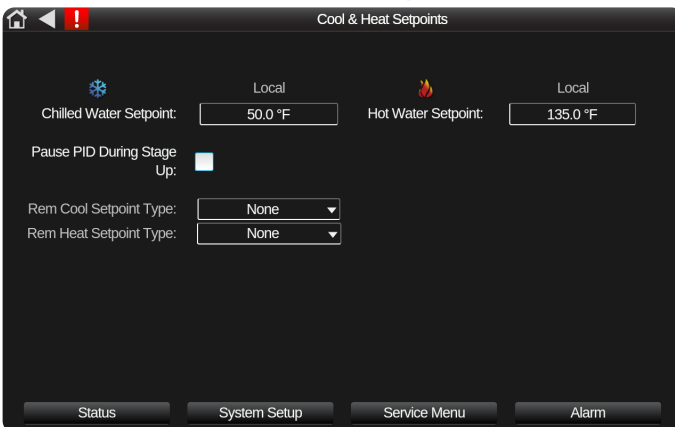
Module 10: ☐ ☐ ☐ ☐ ☐ ☐

Module 11: ☐ ☐ ☐ ☐ ☐ ☐

Module 12: ☐ ☐ ☐ ☐ ☐ ☐

Status System Setup Service Menu Alarm

### Cool & Heat Setpoints



Cool & Heat Setpoints

Chilled Water Setpoint: 50.0 °F

Hot Water Setpoint: 135.0 °F

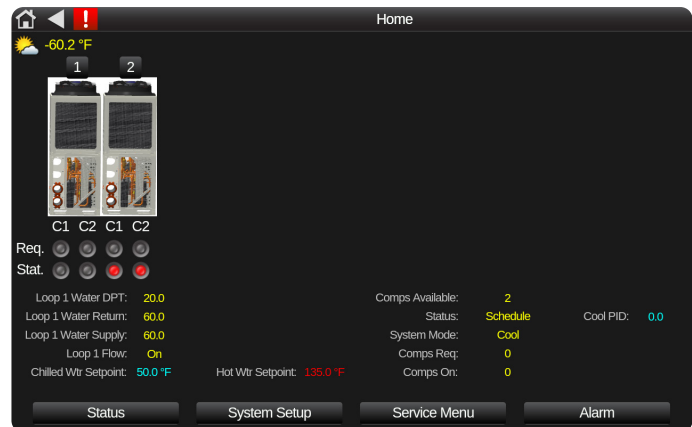
Pause PID During Stage Up: ☐

Rem Cool Setpoint Type: None

Rem Heat Setpoint Type: None

Status System Setup Service Menu Alarm

### Home Screen



Home

-60.2 °F

1 2

C1 C2 C1 C2

Req. Stat.

Loop 1 Water DPT: 20.0

Loop 1 Water Return: 60.0

Loop 1 Water Supply: 60.0

Loop 1 Flow: On

Chilled Wtr Setpoint: 50.0 °F

Hot Wtr Setpoint: 135.0 °F

Comps Available: 2

Status: Schedule

System Mode: Cool

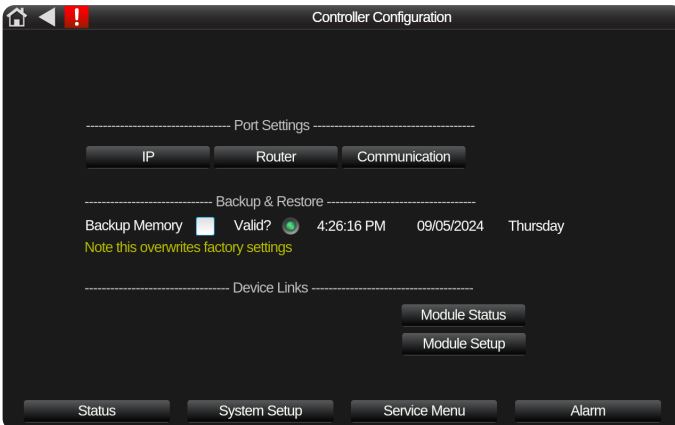
Comps Req: 0

Comps On: 0

Cool PID: 0.0

Status System Setup Service Menu Alarm

### Controller Configuration



Controller Configuration

Port Settings

IP Router Communication

Backup & Restore

Backup Memory ☐ Valid? ☒ 4:26:16 PM 09/05/2024 Thursday

Note this overwrites factory settings

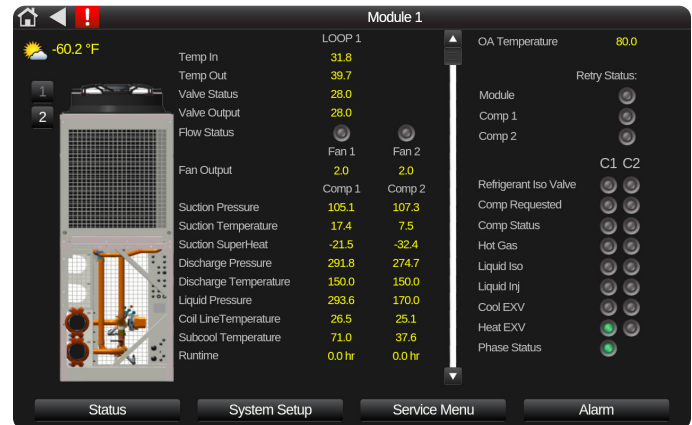
Device Links

Module Status

Module Setup

Status System Setup Service Menu Alarm

### Module Screen



Module 1

-60.2 °F

1 2

Temp In 31.8

Temp Out 39.7

Valve Status 28.0

Valve Output 28.0

Flow Status

Fan Output 2.0

Fan 1 2.0

Fan 2 2.0

Comp 1 106.1

Comp 2 107.3

Suction Pressure 17.4

Suction Temperature 7.5

Suction Super-Heat -21.5

Discharge Pressure 291.8

Discharge Temperature 150.0

Liquid Pressure 293.6

Liquid Temperature 170.0

Coil Line Temperature 26.5

Subcool Temperature 71.0

Runtime 0.0 hr

0.0 hr

OA Temperature 80.0

Retry Status:

Module

Comp 1

Comp 2

Refrigerant Iso Valve

Comp Requested

Comp Status

Hot Gas

Liquid Iso

Liquid Inj

Cool EXV

Heat EXV

Phase Status

Status System Setup Service Menu Alarm

**NOTE: Provide a screenshot of each module in the bank.**

## Operation and Maintenance

### PRESSURE AND TEMPERATURE LOG

A log of temperatures and pressures should be taken regularly. Periodically conduct a visual inspection of the chiller to identify problems before they reach the point of failure. As with any mechanical system, it is necessary to conduct a series of checks to the ClimaCool chiller to confirm correct operation.

#### MAINTAINING A DAILY LOG

Date							
Chilled No.							
Technician							
	Sun.	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.
Chilled Water Entering Temperature							
Chilled Water Leaving Temperature							
Chilled Water Pressure Drop							
Faults: Note by Module Number							

#### DAILY

- A daily operational log should be kept.
- Perform visual inspection.
- Record entering and leaving chilled water temperatures and pressures.
- Note any problems that may exist and immediately plan for further investigation. If repair is necessary, schedule for earliest possible date.
- Properly document all data taken.

#### WEEKLY

- Review daily log from previous week.
- Perform visual inspection.
- Properly document all data taken.
- Note any problems that may exist. Immediately plan for further investigation. If repair is necessary, schedule for earliest possible date.

### QUARTERLY

Check controller operating parameters and setpoints.

- Check temperature drop/rise on heat exchanger.\*
- Check compressor oil level.
- Check compressor oil color.
- Check water flow rates and pressure drops across heat exchanger.
- Clean condenser coil with vacuum and soft brush (to protect coil fins) and to prevent dirt accumulation.
- Check all electrical connections for tightness.
- Properly document all data taken.

\* The temperature drop/rise on a fully loaded (both compressors) heat exchanger is generally 10°F (-12.22°C). If only one compressor is running the temperature drop/rise will be approximately 5°F (-15°C). Some projects are designed to have a higher or lower temperature drop on the heat exchanger depending on application. Consult the bank performance sheet for your specific project for these values. If the temperature drop/rise is greater than the design, your heat exchanger may need to be back flushed or the strainer may need to be cleaned.

Visually inspect inner and outer condenser coil slab and remove surface loaded fibers as needed. Use a vacuum cleaner. If a vacuum cleaner is not available, a soft non metallic brush may be used. In either case, brush in the direct of the fin as they can be easily bent over and damaged.

A periodic clean water rinse is very beneficial for coils applied in coastal or industrial environments. It is very important the water rinse is made with a low velocity stream to avoid damage to the coil fins.

**Use only environmentally sound coil cleaners. Avoid the use of: coil brighteners, high pressure washers and poor water quality for cleaning.**

#### WARNING

##### WATER AND REFRIGERANT SYSTEMS UNDER PRESSURE



- Isolate/Lockout source and relieve pressure BEFORE servicing equipment.
- Failure to relieve pressure may result in property damage, serious bodily injury or death!

#### WARNING

##### VERY HOT WATER!

## Operation and Maintenance

UA Models

### WINTER SHUTDOWN: AT THE END OF THE COOLING SEASON

Drain the fluid from the cooler, hydronic package (if installed) and internal piping.

Fill the cooler and hydronic package with a sufficient amount of antifreeze solution to prevent any residual water in the cooler and hydronic package/piping from freezing. It is the facility's responsibility to maintain the working-fluid freeze-point adequately below the lowest OAT for freeze protection during off-state.

At the beginning of the next cooling season, refill the cooler and add the recommended inhibitor.

### ANNUAL

- Back flush all heat exchangers. If fouling is suspected, use only ClimaCool recommended de-scalers (see *Chemical Clean In Place Washing* section).
- Remove and clean all waterside strainers.
- Manually operate all waterside isolation valves, if provided, on each module.
- Check all electrical connections for tightness.
- Perform leak check on all refrigerant circuits.
- Check all header piping couplings for tightness.
- Check oil level and color on each compressor.
- Check and test all refrigerant safeties for proper operation.
- Check all peripheral systems for proper operation.
- Check and test CoolLogic Touch Control System.
- Verify setpoints, sensors and general control configuration.
- Properly document all data taken.

#### WARNING

##### WATER AND REFRIGERANT SYSTEMS UNDER PRESSURE



- Isolate/Lockout source and relieve pressure BEFORE servicing equipment.
- Failure to relieve pressure may result in property damage, serious bodily injury or death!

#### WARNING

##### VERY HOT WATER!

## Heat Exchangers

### DRAINING

When performing standard maintenance procedures such as flushing a heat exchanger, it will be necessary to close off a section of a module. This can easily be done if factory mounted water isolation valves are provided. Access to a floor drain is helpful when performing standard maintenance procedures.

### BACK FLUSHING

It may become evident from the recorded weekly log data that the performance of the chiller is gradually degrading. This could be due to a buildup of debris or sludge obstructing the free passage of flow through the heat exchangers. This debris can be removed by a back washing process which involves the introduction of a forced violent backwards flow through the heat exchanger using a carefully formulated flushing solution. To be effective, this back flow should be slightly higher than the normal flow, and in the opposite direction. The difficulties and practicality of this method depends on the back wash pumping system itself. Another method is to back flush each heat exchanger using city water as opposed to system water. The back washing procedure is accomplished by isolating each individual heat exchanger and introducing the city water using a connection hose to the ¾-inch (1.91 cm) service port to flow in an opposite direction from the normal heat exchanger flow direction. On the opposite ¾-inch service port, connect a drain hose continuing back flow until all debris is removed.

**WARNING: Water valves must be re-opened after flushing is complete.**

**WARNING**

**WATER VALVES MUST BE REOPENED AFTER FLUSHING IS COMPLETE**

### CHEMICAL CLEAN IN PLACE WASHING WITH WATER ISOLATION VALVES

Chemical Clean in place washing will typically provide the best debris removal, even from severely clogged heat exchangers. It is only necessary to mechanically and electrically isolate one chiller module at a time. The rest of the chiller modules can continue to operate to satisfy the cooling load required. The cleaning tank, pump and pump strainer should be arranged in the manner shown on the next page. The flow of the cleaning is arranged in the opposite flow to the normal operational direction. Connection points are provided using the ¾-inch (1.91 cm) service ports at each heat exchanger. The cleaning solution used can be either a detergent or hot water to remove particles and simple cleaning. If correct water treatment has been implemented, this should provide adequate cleaning for most situations. The solution can be pumped through the heat exchangers and allowed to “soak” for a time and then pumped again.

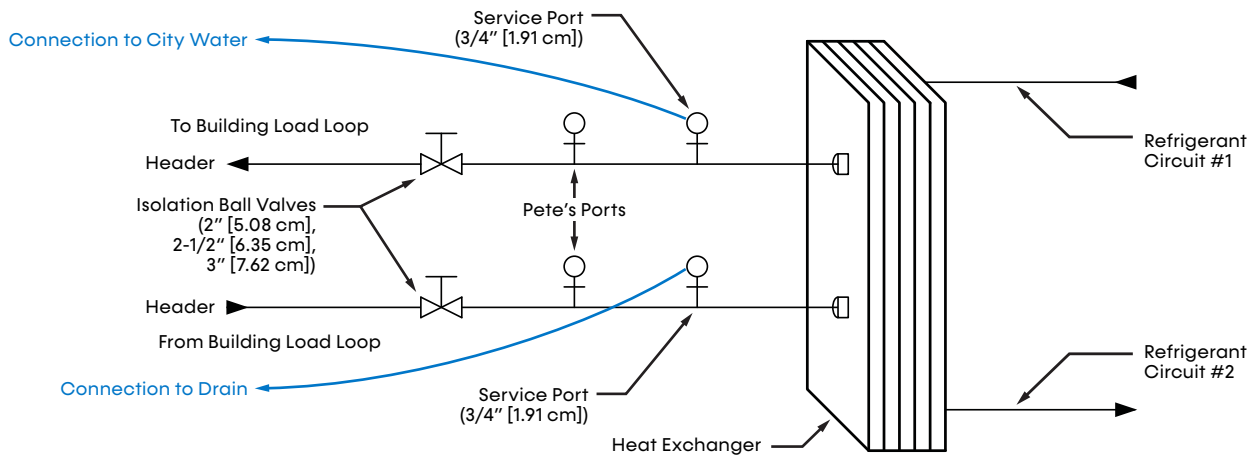
If it is required to remove carbonates, then an acidic wash is recommended. A 2% solution of phosphoric or sulfamic acids in pure water are generally acceptable. These acid solutions should only be allowed to circulate within the heat exchanger for 10 to 15 minutes, followed by a thorough pure water flush for 10 to 15 minutes. Hydrochloric or sulfuric acids must not be used. In any case, consult the chemical supplier to establish the correct formulation and handling process. The materials, which will be exposed to the wash, are stated in the *Water Treatment* section and *Water Parameter* chart.

Once the washing is complete, the solution should be flushed out completely by pumping clean, fresh water through the chiller. To achieve a reasonable level of dilution, it may be required to change the water several times. After cleaning, the water quality and water treatment should be confirmed.

## Cleaning Arrangements

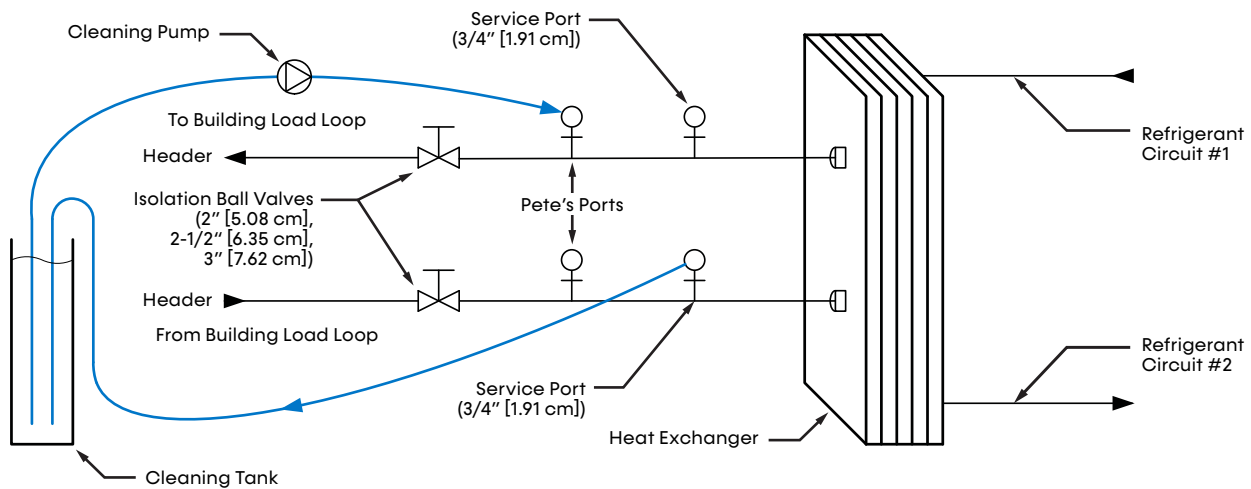
UA Models

**Figure 30: City Water Cleaning Arrangement**



**NOTE:** Measurements are shown in inches and [millimeters].

**Figure 31: In Place Cleaning Arrangement**



**NOTE:** Measurements are shown in inches and [millimeters].

**NOTES:**

1. When backflushing, be sure to flush in opposite direction of flow.
2. Be sure to open all manual valves before unit is put back into operation.

## Troubleshooting Guide

### WARNING!

The troubleshooting guidelines recommended in this section could result in exposure to electrical safety hazards. Please refer to the safety warnings provided in this manual. Failure to follow all of the recommended safety warnings provided could result in death or serious injury. When possible, disconnect all electrical power including remote disconnects before servicing. Follow proper lockout/tagout procedures. Only a qualified, licensed electrician or persons trained to handle live electrical components should be allowed to work with energized electrical components.

**⚠ WARNING**

Disconnect power supply(ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!

**⚠ CAUTION**

Unit to be serviced by qualified personnel only. Refrigerant system under pressure. Relieve pressure before using torch. Recover refrigerant and store or dispose of properly.

Issue	Possible Cause
Compressor high discharge temperature alarm	Discharge Temp > 250 psi and compressor output is ON
Local flow alarm	Both valves fully open, module flow is OFF and a compressor has been requested
Load high leaving water temperature alarm	In heat mode if leaving temp > 90°F, otherwise if temp > 144°F
High suction pressure software shutdown	Suction pressure > 185 psi, Motorized Water Valve is > minimum position , and compressor output is ON
Low discharge pressure software shutdown	Discharge pressure < 200 psi and compressor output is ON
Compressor no-run alarm	Compressor input status is OFF and compressor output status is ON

Issue	
Compressor Low Suction Pressure Alarm: Suction Pressure < 89 psi	
Possible Cause	Solution
Main chilled water valve closed or restricted	Open valve to full open position.
Module chilled water isolation valves, if provided, closed or restricted	Open valves to full open position.
Low refrigerant volume	Check for leaks – add refrigerant.
No load on water chiller	Check water pump operation.
Restriction in liquid line	Plugged liquid line drier – replace liquid line drier.
Inoperable EEV	Repair the expansion valve.
Low water flow through the cooler	Check water flow through the cooler.
Chilled water temperature too cold	Raise water temperature setpoint.
Fouled brazed plate heat exchanger	Clean-in-place heat exchanger as described in IOM.
Faulty suction pressure transducer	Verify transducer calibration using a calibrated manifold gauge and replace if defective.
Wrong suction pressure cutout setpoint	Verify suction pressure cutout setpoint to be set equal to the corresponding leaving chilled solution freeze temperature equivalent pressure on a PT chart. (i.e. If the solution freeze point is 32°F, the equivalent pressure setpoint will be 101 psig).
Improper chilled water circulation	Use an ample sized cleanable strainer in the chilled water circuit; make certain the strainer is clean to ensure full flow of chilled water (strainer screen must be 40-mesh minimum).
Faulty suction pressure transducer	Verify transducer calibration using a calibrated manifold gauge and replace if defective.
Wrong suction pressure cutout setpoint	Verify suction pressure cutout setpoint to be set equal to the corresponding leaving chilled solution freeze temperature equivalent pressure on a PT chart. (i.e. If the solution freeze point is 32°F, the equivalent pressure setpoint will be 101 psig.).

Table continued on next page.

# Troubleshooting Guide

UA Models

Table continued from previous page.

Low discharge pressure	Raise and control discharge pressure within design limits.
<b>Issue</b>	
Compressor High Discharge Pressure Alarm: Discharge pressure > 575 psi	
<b>Possible Cause</b>	<b>Solution</b>
Improper condenser water circulation	Use an ample sized cleanable strainer in the condenser water circuit; make certain the strainer is clean to ensure full flow of condenser water (strainer must be 60 mesh minimum). It may sometimes be necessary to treat water to prevent formation of deposits.
Insufficient water flow through the condenser	Check water flow through condenser against design requirements.
Fouled brazed plate heat exchanger	Clean-in-place heat exchanger as described in IOM.
Main condenser water valve closed or restricted	Open valves to full open position.
Module condenser water isolation valves closed or restricted	Open valves to full open position.
Water regulating valve incorrectly set or defective	Reset or replace valve.
Defective high pressure switch	Replace high pressure switch.
Compressor discharge valve partially closed	Open valve to full open position.
Non-condensable gases in hydronic system	Recover non-condensable gases from bleed valve on condenser or at bleed valve of the building condenser water system.
Condenser water temperature high	Check water supply temperature against requirements; if cooling tower is used, check spray nozzles on cooling tower.
Overcharge of refrigeration	Recover refrigerant from system while in operation until the first sign of bubbles are shown in the sight glass. Add back refrigerant just until bubbles clear.
<b>Issue</b>	
Module Lockout: Unlock code does not match factory lock code	
<b>Possible Cause</b>	<b>Solution</b>
Incorrect unlock code	Contact factory to verify unlock code
<b>Issue</b>	
Phase Loss Alarm: Chiller Requested and Phase Status is OFF	
<b>Possible Cause</b>	<b>Solution</b>
No signal from phase loss monitor	Check power wiring and fuses.
Phase loss monitor not operational	Replace Phase loss monitor.
<b>Issue</b>	
Communication Loss Alarm: Module Communication Lost from CoolLogic for > 2 minutes and 30 seconds	
<b>Possible Cause</b>	<b>Solution</b>
Incorrect network configuration	Verify device instance, home network selected, and network number used on both CoolLogic Touch and module controllers.
No power to the CoolLogic Touch controller	Verify power and power wiring to the CoolLogic Touch controller.
Incorrect wiring	Verify ethernet connection between Gig-E port on both module and CoolLogic Touch controllers.
Bad ethernet switch	Replace ethernet switch.
No power to the ethernet switch	Verify power and power wiring to the ethernet switch.
<b>Issue</b>	
EEV Communication Loss Alarm: EEV Communication Status is OFF	
<b>Possible Cause</b>	<b>Solution</b>
No power to the controller	Verify power and power wiring to the controller.
Incorrect wiring	Verify ethernet connection between the S2 port on the module and network on the Controller.
Incorrect network configuration	Verify and update network address
<b>Issue</b>	
Invalid OAT Out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>

Table continued on next page.



## Troubleshooting Guide

Table continued from previous page.

Bad OAT Sensor	Replace sensor.
Incorrect wiring to OAT sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Compressor Discharge Temperature Out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad discharge temp sensor	Replace sensor.
Incorrect wiring to discharge temp sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Compressor Suction Temperature Out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad suction temp sensor	Replace sensor.
Incorrect wiring to the suction temp sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Air Coil Line Temperature out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad air coil line temp sensor	Replace sensor.
Incorrect wiring to the air coil line temp sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Liquid Line Temperature out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad air coil line temp sensor	Replace sensor.
Incorrect wiring to the air coil line temp sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Loop Entering Water Temperature out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad loop entering water temp sensor	Replace Sensor
Incorrect wiring to the loop entering water temp sensor	Verify sensor wiring
<b>Issue</b>	
Invalid Compressor Suction Pressure out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad suction pressure sensor	Replace sensor.
Incorrect wiring to suction pressure sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Loop Leaving Water Temperature out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad loop leaving water temp sensor	Replace sensor.
Incorrect wiring to the loop leaving water temp sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Compressor Discharge Pressure out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad discharge pressure sensor	Replace sensor.
Incorrect wiring to discharge pressure sensor	Verify sensor wiring.
<b>Issue</b>	
Invalid Compressor Liquid Pressure out of Range Alarm: Sensor is reading a value outside of its operating range, while operating inside range	
<b>Possible Cause</b>	<b>Solution</b>
Bad liquid pressure sensor	Replace sensor.
Incorrect wiring to liquid pressure sensor	Verify sensor wiring.

## General Information - Servicing

UA Models

### WORK PROCEDURE

Work shall be undertaken under a controlled procedure to minimize the risk of a flammable gas or vapor being present while the work is being performed.

### GENERAL WORK AREA

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

**Check for presence of refrigerant** - The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

**Presence of fire extinguisher** - If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO<sub>2</sub> fire extinguisher adjacent to the charging area.

**No ignition sources** - No person carrying out work in relation to a REFRIGERATION SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing, and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.

**Ventilated area** - Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

### CHECK REFRIGERATION EQUIPMENT

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

- The ventilation machinery and outlets are operating adequately and are not obstructed;
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- Refrigerant piping or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

### CHECK ELECTRICAL DEVICES

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- That no live electrical components and wiring are exposed while charging, recovering, or purging the system;
- That there is continuity of earth bonding.

## Refrigerant Recovery, Evacuation, and Charging

### RECOVERY AND EVACUATION

When breaking into the refrigerant circuit to make repairs - or for any other purpose - conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations;
- Recover;
- Purge the circuit with Nitrogen;
- Evacuate;
- Continuously flush or purge with inert gas when using flame to open circuit; and
- Open the circuit.

The refrigerant charge shall be recovered into the proper recovery cylinders. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

### CHARGING PROCEDURES

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.

- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigerating system.

Prior to recharging the system, it shall be pressure-tested with Nitrogen to 300 psi. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

### LEAK DETECTION

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine may react with the refrigerant and corrode the copper pipe-work. **NOTE: Examples of leak detection fluids are: bubble method or fluorescent method agents.**

If a leak is suspected, all naked flames shall be removed/extinguished. If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut-off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to the section, "Recovery and Evacuation" above.

# Refrigerant Recovery, Evacuation, and Charging

UA Models

## DECOMMISSIONING

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

- a. Become familiar with the equipment and its operation.
- b. Isolate system electrically.
- c. Before attempting the procedure, ensure that:
  - Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
  - All personal protective equipment is available and being used correctly;
  - The recovery process is supervised at all times by a competent person;
- d. Pump down refrigerant system, if possible.
- e. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- f. Make sure that cylinder is situated on the scales before recovery takes place.
- g. Start the recovery machine and operate in accordance with instructions.
- h. Do not overfill cylinders (no more than 80% volume liquid charge).
- i. Do not exceed the maximum working pressure of the cylinder, even temporarily.
- j. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- k. Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

## Labeling

Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating that the equipment contains FLAMMABLE REFRIGERANTS.

## RECOVERY

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

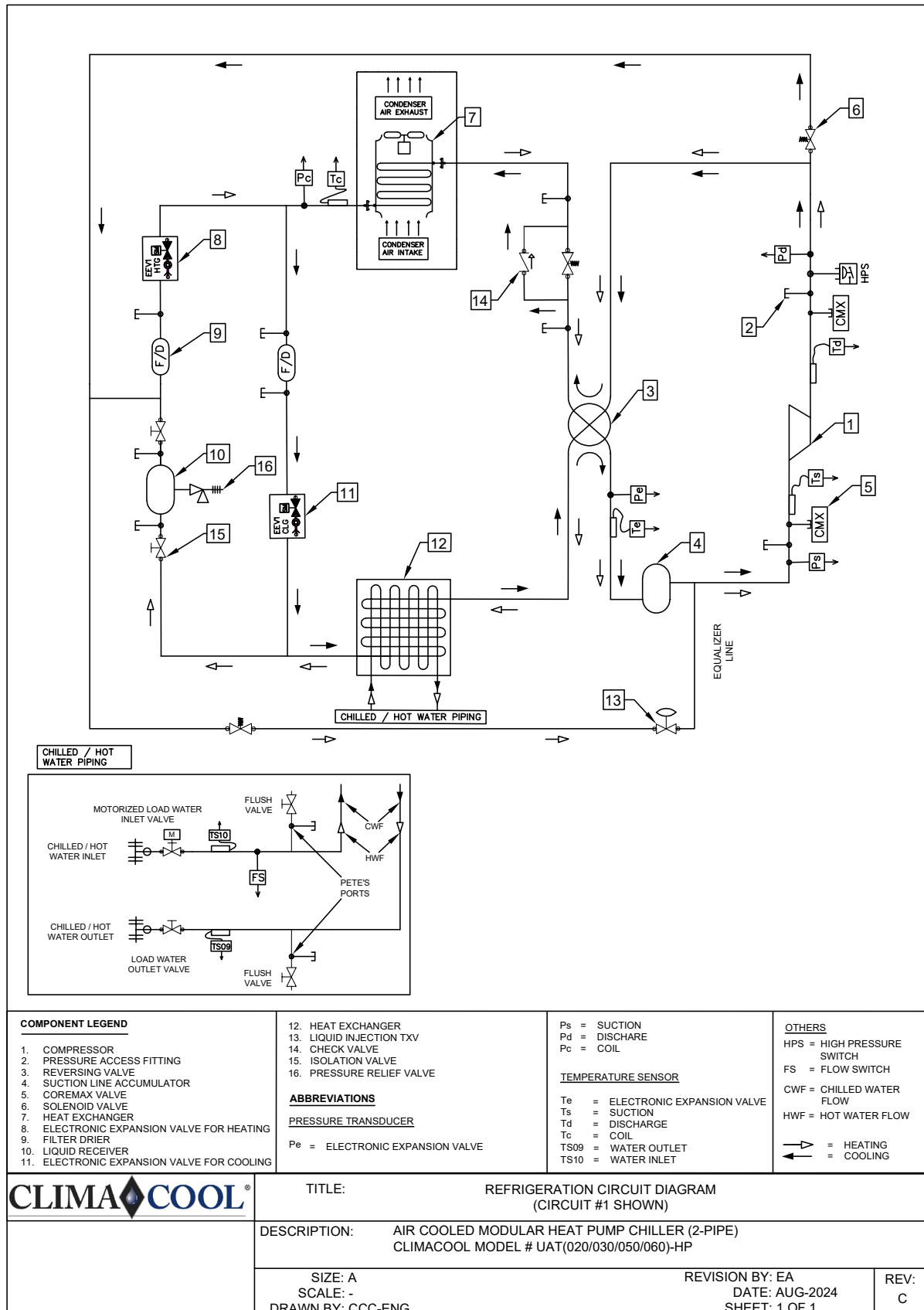
If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

<p><b><u>COMPONENT LEGEND</u></b></p> <ol style="list-style-type: none"> <li>COMPRESSOR</li> <li>CHECK VALVE</li> <li>SOLENOID VALVE</li> <li>HOT GAS BYPASS VALVE</li> <li>EVAPORATOR HX</li> <li>COREMAX VALVE</li> <li>CONDENSER HX</li> <li>FILTER DRIER</li> <li>ELECTRONIC EXPANSION VALVE</li> <li>PRESSURE ACCESS FITTING</li> </ol>	<p><b><u>ABBREVIATIONS</u></b></p> <p><u>PRESSURE TRANSDUCER</u></p> <p>Pe = ELECTRONIC EXPANSION VALVE Ps = SUCTION Pd = DISCHARGE Pc = COIL</p>	<p><b><u>TEMPERATURE SENSOR</u></b></p> <p>Te = ELECTRONIC EXPANSION VALVE Ts = SUCTION Td = DISCHARGE Tc = COIL TS09 = OUTLET TS10 = INLET</p>	<p><b><u>OTHERS</u></b></p> <p>HPS = HIGH PRESSURE SWITCH FS = FLOW SWITCH</p> <p>← = COOLING</p>
<p>\\c:\p&amp;id\Backup\New-folde\cTimeCook-Logo-Lugger.tif</p>	<p><b>TITLE:</b> REFRIGERATION CIRCUIT DIAGRAM (CIRCUIT #1 SHOWN)</p>		
	<p><b>DESCRIPTION:</b> AIR - COOLED MODULAR COOLING ONLY CHILLER CLIMACOOOL MODEL # UAC (020/030/050/060)</p>		
	<p>SIZE: A SCALE: - DRAWN BY: CCC-ENG</p>	<p>REVISION BY: EA DATE: AUG-2024 SHEET: 1 OF 1</p>	<p>REV: C</p>

# Refrigeration Circuit Diagram

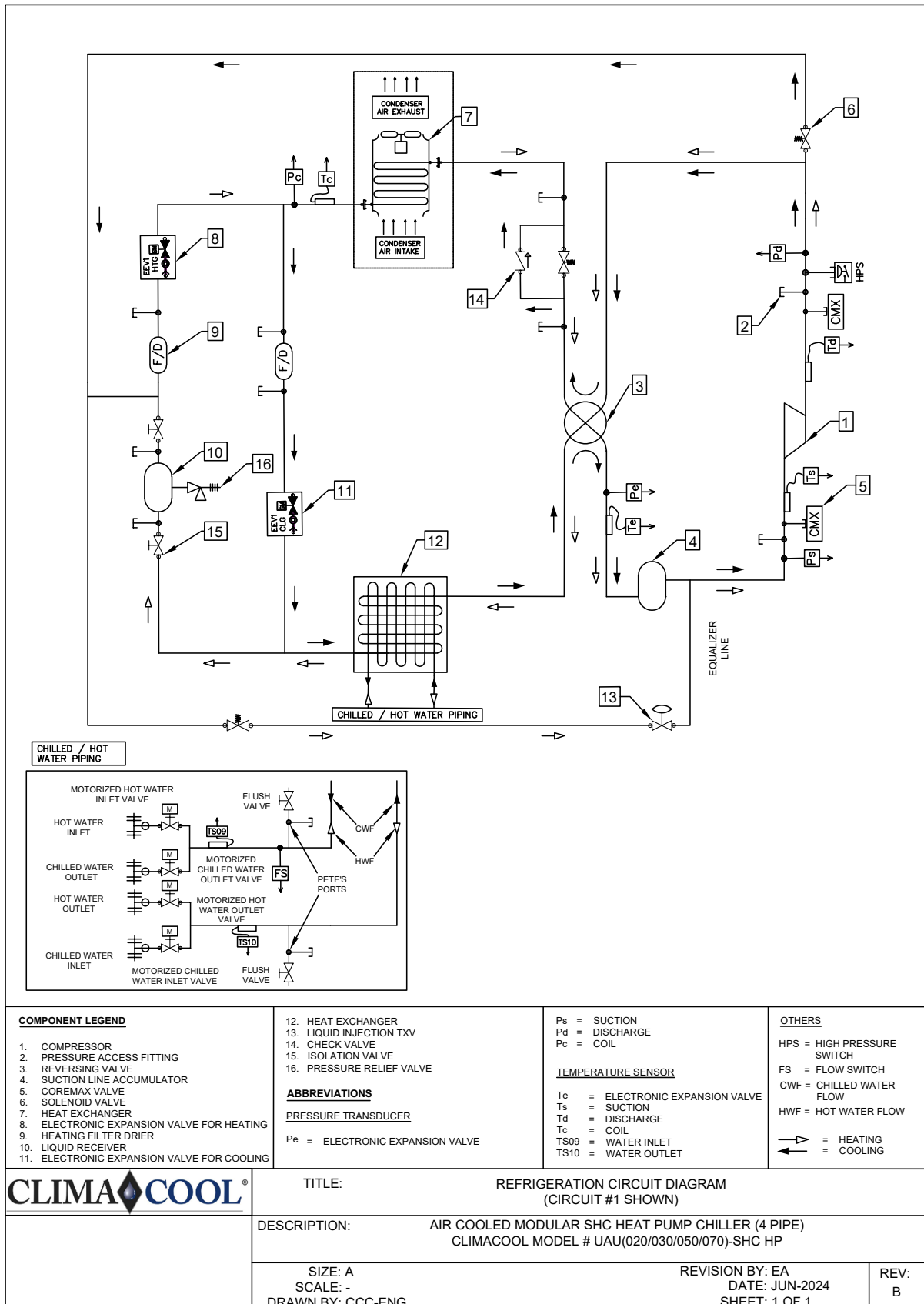
## Heat Pumps UAT

UA Models



# Refrigeration Circuit Diagrams

## SHC Heat Pumps UAU

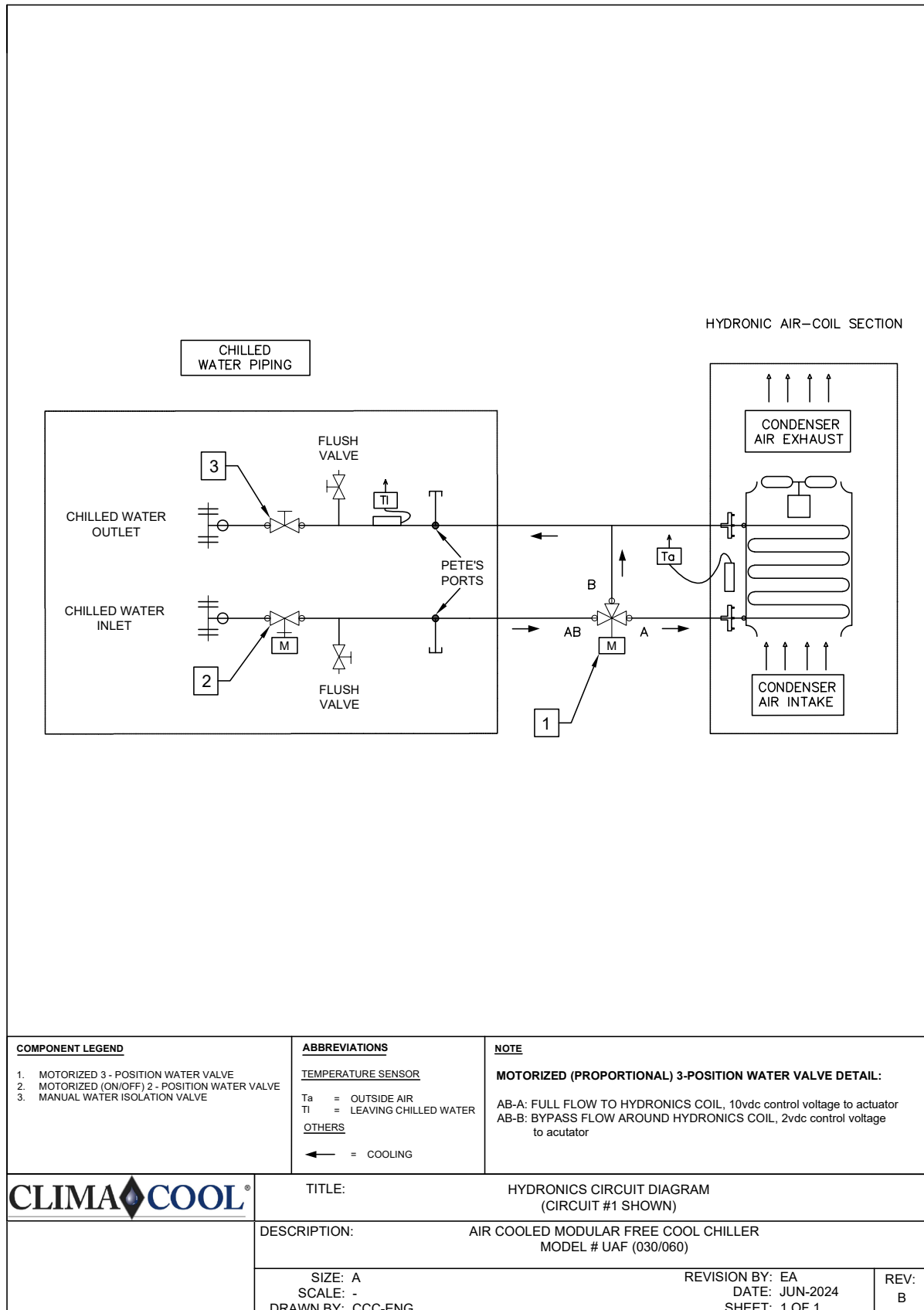




# Refrigeration Circuit Diagrams

## Free Cooling UAF

UA Models





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## CLIMACOOL CORPORATION LIMITED EXPRESS WARRANTY/LIMITATION OF REMEDIES AND LIABILITY WITH EXTENDED COMPRESSOR WARRANTY

### WARRANTY DISCLAIMER

It is expressly understood that unless a statement is specifically identified as a warranty, statements made by Climacool Corp., an Oklahoma corporation ("CC"), or its representatives, relating to CC's products, whether oral, written or contained in any quote, sales literature, catalog or any agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely CC's opinion or commendation of CC's products. **EXCEPT AS SPECIFICALLY SET FORTH HEREIN, THERE IS NO EXPRESS WARRANTY AS TO ANY OF CC'S PRODUCTS. CC MAKES NO WARRANTY AGAINST LATENT DEFECTS. CC MAKES NO WARRANTY OF MERCHANTABILITY OF THE GOODS OR OF THE FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE.**

### GRANT OF LIMITED EXPRESS WARRANTY

CC warrants CC's products purchased and retained in the United States of America and Canada to be free from defects in material and workmanship under normal use and maintenance only as follows:

**FOR MODULAR CHILLERS:** (a) All modular chillers built or sold by CC for twelve (12) months from the date of unit start-up or eighteen (18) months from date of shipment (from CC's warehouse), whichever comes first; and (b) Any repair and replacement parts, which are not supplied under warranty, for ninety (90) days from date of shipment (from CC's warehouse) and (c) If such extended warranty is purchased, the compressors in all modular chillers built or sold by CC shall extend for sixty (60) months from the date of shipment (from CC's warehouse).

All parts must be returned to CC's warehouse in Oklahoma City, Oklahoma, freight prepaid, no later than sixty (60) days after the date of the failure of the part. If CC determines the part to be defective and within CC's Limited Express Warranty, CC shall, when such part has been either replaced or repaired, return such to a CC recognized dealer, contractor or service organization, F.O.B. CC's warehouse, Oklahoma City, Oklahoma, freight prepaid. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty period.

This warranty does not cover and does not apply to: (1) Fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) Any portion or component of the system that is not supplied by CC, regardless of the cause of the failure of such portion or component; (4) Products on which the units identification tags or labels have been removed or defaced; (5) Products on which payment to CC is or has been in default; (6) Products which have defects or damages which result from improper installation, wiring, electrical imbalance characteristics or maintenance (including, without limitation, defects or damages caused by voltage surges, inadequate voltage conditions, phase imbalance, any form of electrical disturbances, inadequate or improper electrical circuit installation or protection, failure to perform common maintenance, etc.); or are caused by accident, misuse or abuse, fire, flood, alteration or misapplication of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Products subjected to corrosion or abrasion or chemicals; (9) Mold, fungus or bacteria damage; (10) Products manufactured or supplied by others; (11) Products which have been subjected to misuse, negligence or accidents; (12) Products which have been operated in a manner contrary to CC's printed instructions; (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of CC's products; (14) Products which have defects or damages due to freezing of the water supply, an inadequate or interrupted water supply, corrosives or abrasives in the water supply, or improper or inadequate filtration or treatment of the water or air supply; (15) Products which are defects caused by overfiring, use of incorrect fuel, or improper burn or control adjustments; or (16) Products which have incomplete or inadequate combustion.

CC is not responsible for: (1) The costs of any fluids, refrigerant or other system components, or the associated labor to repair or replace the same, which is incurred as a result of a defective part covered by CC's Limited Express Warranty; (2) The costs of labor, refrigerant, materials or service incurred in removal of the defective part, or in obtaining and replacing the new or repaired part; or, (3) Transportation costs of the defective part from the installation site to CC or the return of any part not covered by CC's Limited Express Warranty.

**LIMITATION:** This Limited Express Warranty is given in lieu of all other warranties. If, notwithstanding the disclaimers contained herein, it is determined that other warranties exist, any such warranty, including without limitation, any express warranties or any implied warranties of fitness for any particular purpose and merchantability, shall be limited to the duration of the Limited Express Warranty.

### LIMITATION OF REMEDIES

In the event of a breach of this Limited Express Warranty, CC will only be obligated at CC's option to repair the failed part or module or to furnish a new or rebuilt part or module in exchange for the part or module which has failed. If, after written notice to CC's Head Office in Oklahoma City, Oklahoma of each defect, malfunction or other failure and a reasonable number of attempts by CC to correct the defect, malfunction or other failure and the remedy fails of its essential purpose, CC shall refund the purchase price paid to CC in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CC. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY AGAINST CC FOR BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR CC'S OWN NEGLIGENCE OR IN STRICT LIABILITY.**

### LIMITATION OF LIABILITY

CC shall have no liability for any damages if CC's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to any war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, allocation, shortages of transportation, fuel, material or labor, acts of God or any other reason beyond the sole control of CC. **CC EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CC'S OWN NEGLIGENCE OR AS STRICT LIABILITY.**

### OBTAINING WARRANTY PERFORMANCE

Normally, the contractor or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CC recognized contractor or service organization. If assistance is required in obtaining warranty performance, write:

Climacool Corp. • 15 South Virginia Ave. • Oklahoma City, Oklahoma 73106 • (405) 815-3000 • e-mail: customersupport@climacoolcorp.com

NOTE: Some states or Canadian provinces do not allow limitations on how long an implied warranty lasts, or the limitation or exclusion of consequential or incidental damages, so the foregoing exclusion and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province.

Please refer to the CC Installation, Operation and Maintenance Manual for operating and maintenance instructions.

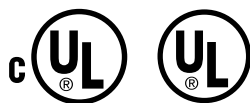






## Revision History

Date	Section	Action
02/10/25	All	Added VFD STO Function, Servicing, and Refrigeration Circuit Diagrams pages. Updated requirements for Cat 5e to shielded, twisted pair (STP) Cat 6. Updated requirement for 60-mesh strainers to 40-mesh strainers. Added warning in applicable sections concerning no public access to equipment.
	Model Nomenclature	Updated options and notes
	Physical Data	Updated data for sizes 30 and 60 tons. Updated Notes. Removed Capacity, EER, and COP data. Corrected Large Cabinet Fan Quantity.
	Dimensional Data and Drawings	Removed incompatible voltages for Free Cooling UAF size 60.
	Unit Installation	Updated language used for clearance between multiple banks Added "Pit Installation" section
	Water Piping Configurations	Updated applicability of Field Piping Reverse Return configuration
	Water Temperature Requirements	Updated maximum and minimum leaving water temperatures
	Electrical Connections	Added direction for use of flexible conduit.
	Communications Wiring	Updated communication requirements and supplemental information from Cat 5e to STP Cat 6.
	Power Distribution Drawing	Added note clarifying use of sample voltage
	Wiring Diagram Matrix	Updated Diagram numbers
	Example Wiring Diagrams	Updated UAU 460V Diagram
	Pre-start up	Added step 9 to Electrical Pre-Startup procedures. Added Polyolester Warning.
	Heat Exchangers	Added Warning concerning flushing procedure.
	Refrigerant Recovery, Evacuation, and Charging	Added Leak detection and Labeling sections.
10/07/24	Pre-startup Checklist	Updated checklist items
09/23/24	All	Updated naming conventions for units and the CoolLogic Touch Control System
	Dimensional Data	Corrected UAF Size offerings
	Chiller Header Bypass Kit	Updated Return Graphics; Added Header Bypass Kit instructions
	Water Piping Configurations	Noted some components optional
	Pre-startup Checklist	Updated checklist items
	Startup and Warranty Registration	Updated Startup form and provided supplemental instructions
08/14/24	First Published	



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