Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.
Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

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

**CAUTION**
Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

**NOTICE**
Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth’s naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

---

**WARNING**

**Proper Field Wiring and Grounding Required!**
Failure to follow code could result in death or serious injury.
All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

**WARNING**

**Personal Protective Equipment (PPE) Required!**
Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.

- When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.

- If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.
Factory Warranty Information

Compliance with the following is required to preserve the factory warranty:

All Unit Installations
Startup MUST be performed by Trane, or an authorized agent of Trane, to VALIDATE this WARRANTY. Contractor must provide a two-week startup notification to Trane (or an agent of Trane specifically authorized to perform startup).

Additional Requirements for Units Requiring Disassembly and Reassembly
When a new chiller is shipped and received from our Trane manufacturing location and, for any reason, it requires disassembly or partial disassembly, and reassembly— which could include but is not limited to the evaporator, condenser, control panel, compressor/motor, economizer, factory-mounted starter or any other components originally attached to the fully assembled unit— compliance with the following is required to preserve the factory warranty:

- Trane, or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products, will perform or have direct on-site technical supervision of the disassembly and reassembly work.
- The installing contractor must notify Trane—or an agent of Trane specifically authorized to perform startup and warranty of Trane® products—two weeks in advance of the scheduled disassembly work to coordinate the disassembly and reassembly work.
- Start-up must be performed by Trane or an agent of Trane specifically authorized to perform startup and warranty of Trane® products.

Trane, or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products, will provide qualified personnel and standard hand tools to perform the disassembly and reassembly work at a location specified by the contractor. The contractor shall provide the rigging equipment such as chain falls, gantries, cranes, forklifts, etc. necessary for the disassembly and reassembly work and the required qualified personnel to operate the necessary rigging equipment.

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Revision History

Added information related to 300 psig (2068.4 kPaG) in Model Number Descriptions, Installation: Water Piping and in Maintenance chapter.
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Unit Nameplate

The unit nameplate is located on the right side of the control panel. A typical unit nameplate is illustrated in the following figure and contains the following information:

- Unit model and size descriptor
- Unit serial number
- Unit electrical requirements
- Correct operating charge and refrigerant type
- Unit test pressures and maximum operating pressures
- Unit literature
- Drawing numbers for unit wiring diagrams

Serial Number. The unit serial number provides the specific chiller identity. Always provide this serial number when calling for service or during parts identification.

Service Model Number. The service model represents the unit as built for service purposes. It identifies the selections of variable unit features required when ordering replacements parts or requesting service.

Note: Unit-mounted Adaptive Frequency™ Drives (AFDs) are identified by a separate number; refer to “Model Number Descriptions,” p. 8.

Product Description Block. The Agility™ chiller models are defined and built using the Product Definition and Selection (PDS) system. This system describes the product offerings using a product coding block which is made up of feature categories and codes that identify all characteristics of a unit.

Figure 1. Typical unit nameplate

Model: HDWA400 Date of MFG (DD/MM/YY): 01-02-18
Model No:
HDWA400IHNAG0DCMBFENFOBN100A
Serial No: LI7050588 S.NO: MSH2D1
AFD Model: AFDT0176PAA000281
AFD Part No: 453693600007

Electrical Characteristics
Line Voltage: 460 Volts
NAME PLATE KW: 105 KW
Line Current: 160 Amps
Voltage Utilization Range: 414 - 506 Vac
MINIMUM CIRCUIT AMPLITUDE: 200 AMPS
Maximum Overcurrent Protective Device: 350 Amps
Short Circuit Current Rating: 65000 Amps

Compressor Motor
115 60 1 3000 VA Max

Refrigerant System
To be Field Charged
Factory Charged
With 800 lbs. of R-134A
With 150 lbs. of R-134A

Maximum Refrigerant Working Pressure
Hi Side 300 PSIG
Lo Side 200 PSIG

Factory Test Pressure
Hi Side 330 PSIG
Lo Side 260 PSIG

Patent Pending

Service Literature
Installation/Operation/Maintenance Guide:
HDWA-SVX001A-EN

For installation requirements, electrical characteristics not product description.

Product Description:
EFTN 200
NMRA 173 IND1 200 IMP2 174 TRPM 4500
MODL HDWA DSQG AA APTY STD TYPE SNGL
QOOG NO LPDP NO NTG0 400 IVPK 460
IKRS 60 VOLT 460 CPDK 424 FRAM T1
DSOP YES EVSD 040A ETSP NONE EVBS B
ETVMT NCMC EVTP 280 EVTH 25 EVPN 150
ETWQ WC EWK 3 EWVT NDSB EVMT KEE
ETVFC FILM FELD WAY EVTP TDFC NSSW 040A
TSTY STD CTSP NONE CDBS B CDMG TECU
CDUC 283 CDTM 28 CDDR 150 CDMC STD
CDMP 2 CDWT NMR CDMA LEELS CDMM FLNG
CEFD WAVE CDPP TDFC EXPV 30,6 AGLD UL
CNSL YES AH13 COMH AH16 COMH ACPL CERT
FST YES TLOCC FACT TEST NONE TTOL NA
FSPF YES ASST NO ASST NONE DENO YES
DPMN KMTN INSL STD OPST YES GRAS YES
EWF YES TRPM BLNT CWR YES TRIC TRIP
SPKG DOM WSPR WFC RFPG YES CWPG R134
NLIV SPUD TRM TME SFRM APDT SRTD UADF
SPR 440 RCPT YES

ASHRAE 90.1 - 2013 AND 2016 COMPLIANT
Compressor Nameplate

The compressor assembly has a separate model number which is required to identify internal and external compressor parts. The model number begins with “HDMA” and the nameplate is located on the interstage pipe; refer to “Model Number Descriptions,” p. 8.

**Note:** Do NOT cover compressor nameplate with wrap or insulation (leave a window).
### Model Number Descriptions

**Digit 1, 2 — Unit Function**
HD = Agility™ Centrifugal Water-cooled Chiller

**Digit 3 — Drive**
W = Direct Drive

**Digit 4 — Development Sequence**
A

**Digit 5, 6, 7 — Nominal Compressor Tonnage**
200 = 200 nominal tons
300 = 300 nominal tons
400 = 400 Nominal Tons
SSS = Special

**Digit 8 — Incoming Line Voltage/Unit Drive Voltage**
B = 208V Incoming Line/460V-60Hz—3Ph
D = 380V Incoming Line/400V-60Hz—3Ph
F = 460V Incoming Line/400V-60Hz—3Ph
G = 480V Incoming Line/400V-60Hz—3Ph
H = 575V Incoming Line/400V-60Hz—3Ph
J = 600V Incoming Line/400V-60Hz—3Ph
R = 380V Incoming Line/400V-50Hz—3Ph
S = Special
T = 400V Incoming Line/400V-50Hz—3Ph
U = 415V Incoming Line/400V-50Hz—3Ph

**Digit 9 — Unit Type**
A = Cooling Condenser
S = Special

**Digit 10, 11 — Design Sequence**
AA = Original Design

**Digit 12 — Manufacturing Location**
L = La Crosse, Wisconsin

**Digit 13 — Hot Gas Bypass**
0 = Without HGB
S = Special

**Digit 14 — Control Enclosure**
C = Standard Control Enclosure
D = Standard Control Enclosure with Tracer® SC
S = Special

**Digit 15 — Evaporator Shell Size**
A = 020A Evaporator Shell
C = 040A Evaporator Shell
S = Special

**Digit 16 — Evaporator Tube Bundle**
A = Evaporator Tube Bundle A
B = Evaporator Tube Bundle B
C = Evaporator Tube Bundle C
D = Evaporator Tube Bundle D
E = Evaporator Tube Bundle E
S = Special

**Digit 17 — Evaporator Tubes**
C = 0.025 Wall Thickness—0.75 Diameter Internally Enhanced Copper Evaporator Tube
M = 0.025 Wall Thickness—0.75 Diameter High Performance Internal Surface Evaporator Tube
S = Special

**Digit 18 — Evaporator Waterbox**
B = 150 marine—2 pass
D = 300 psi Marine, 2-Pass Standard
F = 150 psi Non-marine, 2-Pass Standard
H = 300 psi Non-marine, 2-Pass Standard
S = Special

**Digit 19 — Condenser Shell Size**
A = 020A Condenser Shell
C = 040A Condenser Shell
S = Special

**Digit 20 — Condenser Tube Bundle**
A = Condenser Tube Bundle A
B = Condenser Tube Bundle B
C = Condenser Tube Bundle C
S = Special

**Digit 21 — Condenser Tubes**
C = 0.025 Condenser Tube Wall—0.75 Internal Enhanced Copper Tube
J = 0.028 Condenser Tube Wall—0.75 Internal Enhanced Copper Tube
S = Special

**Digit 22 — Condenser Waterbox**
B = 150 PDI marine—2 pass
D = 300 psi Marine, 2-Pass Standard
F = 150 psi Non-marine, 2-Pass Standard
H = 300 psi Non-marine, 2-Pass Standard
S = Special

**Digit 23 — Evaporator Expansion Valve**
A = 400
B = 200
S = Special

**Digit 24 — Unit Option**
B = Insulation Package and Spring Loaded Pressure Relief Valve
D = Spring Loaded Pressure Relief Valve Only

**Digit 25 — Control: Generic Building Automation System (BAS)**
0 = None
G = Generic BAS

**Digit 26 — Control: Extended Operation**
0 = None
1 = Extended Operation

**Digit 27 — Tracer® Communication Interface**
0 = None
2 = Tracer® Comm S
3 = Tracer® MODBUS®
4 = Tracer® BACnet®

**Digit 28 — Special Options**
0 = None
S = Special Option

**Digit 29 — Control: Water Flow Control**
0 = None
W = Water Flow Control

**Digit 30 — Control: Chilled Water Reset**
0 = None
1 = Chilled Water Reset

**Digit 31 — Control: Operating Status**
0 = None
1 = Operating Status

**Digit 32 — Industrial Chiller Package (INDP)**
0 = Without INDP

**Digit 33 — Control Power Transformer (CPTR)**
0 = Without CPTR
S = Special

**Digit 34 — Thermal Dispersion Water Flow Proving**
0 = None, Customer to Provide Device for Condenser and Evaporator
A = Thermal Dispersion Water Flow Proving Selected for Condenser and Evaporator
HDMA Centrifugal Compressor

Description

The compressor assembly has a separate model number which is required to identify internal and external compressor parts. The model number begins with "HDMA" and the nameplate is located on the foot of the volute.

Digit 1 — Higher-speed Centrifugal

Digit 2 — Direct Drive

Digit 3 — Medium Pressure

Digit 4 — Development Sequence

Digit 5, 6, 7 — Nominal Total Compressor Tonnage

Digit 8 — Compressor AFD Input Design Voltage

Digit 9 — Motor Type

Digit 10, 11 — Design Sequence

Digit 12, 13, 14 — First Stage Impeller Designation

Digit 15, 16, 17 — Second Stage Impeller Designation

Digit 18 — Bearing Type

Digit 19 — Discharge Port Orientation

Digit 20 — Motor Cooling

AFDT Adaptive Frequency Drive

Description

The Adaptive Frequency™ Drive (AFD) has a separate model number which is required to identify the drive and its components. The model number begins with "AFDT".

Digit 1, 2, 3 — Adaptive Frequency™ Drive

AFD

Digit 4 — Development Sequence

Digit 5, 6, 7, 8 — Starter Size

Use Rated Load Amps (RLA) Value

Digit 9 — Incoming Line Voltage/Unit Drive Voltage

B = 208V Incoming Line/460V-60Hz—3Ph
D = 380V Incoming Line/400V-60Hz-Ph
F = 460V Incoming Line/400V-60Hz-3Ph
G = 480V Incoming Line/400V-60Hz-3Ph
H = 575V Incoming Line/400V-60Hz-3Ph
J = 600V Incoming Line/400V-60Hz-3Ph
R = 380V incoming Line/400V-50Hz-3Ph
S = Special

T = 400V Incoming Line/400V-50Hz-Ph
U = 415V Incoming Line/400V-50Hz-3Ph

Digit 10, 11 — Design Sequence

AA = Original Design of Tracer® AdaptiView™ Controls with TR200 Drive
AB

Digit 12 — Starter Type

A = Unit-mounted

Digit 13 — Agency Listing

0 = UL- and CUL-Listed (Standard on All Units)

Digit 14 — Special Options

0 = None
S = Special Options (See Sales Order)

Digit 15 — VFD Frame Size (SRRL)

D = 362
E = 440
F = 533
G = 676
H = 243

Digit 16 — Connection Type Short Circuit Current Rating (SCCR)

2 = Standard Circuit Breaker
S = Special

Digit 17 — Control Power Option

B = Control Power Transformer 3kVA

Digit 18 — Panel Option

0 = None
1 = Input Harmonic Filter
2 = 575V/60 Hz Autotransformer
3 = 208V/60 Hz Autotransformer
S = Special Option

M Moodel l N Nu um mb be er r D De es cr rri ip pt ti io on ns s
General Information

Unit Description

Agility™ chillers are centrifugal, water-cooled liquid chillers designed for indoor installation. Each unit is a completely assembled, hermetic package that is factory-piped, wired, leak-tested, dehydrated, charged, and tested for proper control operation before shipment. The following figures show typical Agility™ chillers and their components. Water inlet and outlet openings are covered before shipment. The unit ships charged with refrigerant.

Component Locations

Chiller

Figure 3. Typical Agility chiller component location (front view)
Figure 4. Typical Agility chiller component location (back view)

Adaptive Frequency Drive

Figure 5. Assembly transformer options

Figure 6. Assembly harmonic filter options
Unit Clearances

Figure 7. Clearance requirements, in. (cm)

Right-hand tube pull shown; apply tube pull clearances dimension to the left end for left-hand tube pull.

This dimension per NEC Article 110.

---

<table>
<thead>
<tr>
<th>Shells</th>
<th>Dim. A inches (cm)</th>
<th>Dim. B inches (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>020A Shells</td>
<td>67.5 (171)</td>
<td>72-3/16 (183)</td>
</tr>
<tr>
<td>040A Shells</td>
<td>70.7 (179)</td>
<td>77-11/16 (197)</td>
</tr>
</tbody>
</table>

Note that hinges increase the overall size of Dim A by 6.6 inches (16.76 cm).
Dimensions and Weights

Dimensions
Refer to unit submittals for specific chiller dimensions and water connection locations.

Unit Specifications—Imperial (I-P) Units

Weights (lb)
Important: The weight information provided here should be used for general information only. For specific weights for your chiller, refer to your submittal package.

<table>
<thead>
<tr>
<th>Shell</th>
<th>Shipping Weight</th>
<th>Operating Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With Refrigerant</td>
<td>Without Refrigerant</td>
</tr>
<tr>
<td>020</td>
<td>Minimum</td>
<td>10100</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>12302</td>
</tr>
<tr>
<td>040</td>
<td>Minimum</td>
<td>12706</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>15058</td>
</tr>
</tbody>
</table>

Notes:
1. All weights ±5 percent.
2. Shipping weights include standard 150 psig waterboxes.
3. Operating weights include refrigerant, glycol, and water charges.
4. Optional waterbox hinges each weigh 44 lb (19.94 kg).

Center of Gravity (in.)

<table>
<thead>
<tr>
<th>Shell</th>
<th>Shipping</th>
<th>Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>020</td>
<td>Minimum</td>
<td>29.2</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>31.7</td>
</tr>
</tbody>
</table>

Notes:
1. All weights ±5 percent.
2. Shipping weights include standard waterboxes.
3. Operating weights include refrigerant, glycol, and water charges.

Figure 8. Zero point location for center of gravity data

Right Front Mounting Hole
The bottom of this hole is the (0,0,0) point for center of gravity dimensions.
Weights (kg)

*Important:* The weight information provided here should be used for general information only. For specific weights for your chiller, refer to your submittal package.

Table 3. Agility chiller weights (kg)

<table>
<thead>
<tr>
<th>Shell</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>020</td>
<td>4591</td>
<td>5592</td>
</tr>
<tr>
<td></td>
<td>4352</td>
<td>5353</td>
</tr>
<tr>
<td>040</td>
<td>5775</td>
<td>6845</td>
</tr>
<tr>
<td></td>
<td>5412</td>
<td>6481</td>
</tr>
</tbody>
</table>

**Notes:**
1. All weights ±5 percent.
2. Shipping weights include standard waterboxes.
3. Operating weights include refrigerant, glycol, and water charges.
4. Optional waterbox hinges: each waterbox hinge weights 44 lb (19.94 kg).

Center of Gravity (mm)

Table 4. Agility chiller center of gravity (mm)

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>742</td>
<td>793</td>
<td>1007</td>
<td>752</td>
<td>743</td>
<td>1011</td>
</tr>
<tr>
<td>Maximum</td>
<td>804</td>
<td>826</td>
<td>1190</td>
<td>816</td>
<td>781</td>
<td>1178</td>
</tr>
</tbody>
</table>

**Notes:**
1. All weights ±5 percent.
2. Shipping weights include standard waterboxes.
3. Operating weights include refrigerant, glycol, and water charges.
Pre-installation

ASHRAE Standard 15 Compliance

Trane recommends that indoor Agility™ chiller installations fully meet or exceed the guidelines of the current version of ASHRAE Standard 15, in addition to any applicable national, state, or local requirements. This typically includes:

- A refrigerant monitor or detector that is capable of monitoring and alarming within the acceptable exposure level of the refrigerant, and that can actuate mechanical ventilation.
- Audible and visual alarms, activated by the refrigerant monitor, inside the equipment room and outside of every entrance.
- The equipment room should be properly vented to the outdoors, using mechanical ventilation that can be actuated by the refrigerant monitor.
- If required by local or other codes, a self-contained breathing apparatus should be available in close proximity to the equipment room.

Refer to the latest copy of ASHRAE Standard 15 for specific guidelines. Trane assumes no responsibility for any economic, health, or environmental issues that may result from an equipment room’s design or function.

Inspection Checklist

To protect against loss due to damage incurred in transit, complete the following checklist upon receipt of the unit.

- Inspect the individual pieces of the shipment before accepting the unit. Check for obvious damage to the unit or packing material.
- Inspect the unit for concealed damage as soon as possible after delivery and before it is stored. Concealed damage must be reported within 10 days after receipt.
- If concealed damage is discovered, stop unpacking the shipment. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
- Notify the carrier’s terminal of the damage immediately, by phone and by mail. Request an immediate, joint inspection of the damage with the carrier and the consignee.
- Notify the Trane sales representative and arrange for repair. Do not repair the unit, however, until damage is inspected by the transportation representative.

Loose Parts Inventory

Check all items against the shipping list. Display, display arm and mounting, water vessel drain plugs, isolation pads, and other optional components are shipped loose in the parts box. If the chiller is to be disassembled for installation, ensure that the disassembly kit is included with the chiller. Electrical diagrams and service literature are located inside the Adaptive Frequency™ Drive (AFD) panel.

Storage

Note: If the chiller is stored outdoors for any amount of time, do NOT remove ANY shipping coverings. Protect the chiller from the elements and protect against freezing, especially if any shipping materials have been removed.

If the chiller is to be stored more than one month prior to installation, observe the following precautions:

- Do NOT store the chiller in areas in which the temperature exceeds 122°F (50.0°C) or the refrigerant will relieve.
- Do NOT remove the protective coverings from the electrical panel.
- Store the chiller in a dry, secure area.
- Upon receipt and every three months thereafter, attach a gauge and manually check the pressure in the refrigerant circuit. Call a qualified service organization and the appropriate Trane sales office if:
  - for R-134a, if the refrigerant pressure is below 71 psig at 70°F (489.5 kPaG at 21.1°C) or 46 psig at 50°F (317.2 kPaG at 10.0°C).
  - for R-513A, if the refrigerant pressure is below 77 psig (530.9 kPaG at 21.1°C) at 70°F or 50 psig at 50°F (344.7 kPaG at 10.0°C).

Note: Pressure will be approximately 5 psig (34.5 kPaG) if shipped with the optional nitrogen charge.

Installation Requirements and Contractor Responsibilities

A list of the contractor responsibilities typically associated with the unit installation process is provided in the following table.

**WARNING**

Combustible Material!

Failure to follow instructions below could result in death or serious injury or equipment damage. Shrink-wrap is a combustible material. Avoid open flames and hot sparks.
### Note: The chiller should remain within its protective shrink-wrap covering during storage.

<table>
<thead>
<tr>
<th>Type of Requirement</th>
<th>Trane Supplied Trane Installed</th>
<th>Trane Supplied Field Installed</th>
<th>Field Supplied Field Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td></td>
<td>• Meet foundation requirements</td>
<td></td>
</tr>
<tr>
<td>Rigging</td>
<td></td>
<td>• Safety chains</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rigging shackles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lifting beam</td>
<td></td>
</tr>
<tr>
<td>Disassembly/Reassembly (as required)</td>
<td>• Trane will perform or have direct on-site supervision of the disassembly and reassembly work (contact your local Trane office for pricing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation</td>
<td>• Isolation pads</td>
<td></td>
<td>• Isolation pads</td>
</tr>
<tr>
<td></td>
<td>• Optional spring isolators, when required, are installed by others; do NOT overload springs and do NOT install isolation springs if they block serviceable parts such as service valves, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td>• Circuit breakers</td>
<td>• Temperature sensor (optional outdoor air)</td>
<td>• Electrical connections to unit-mounted AFD</td>
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<tr>
<td></td>
<td>• Unit-mounted Adaptive Frequency™ Drive (AFD)</td>
<td>• Flow switches (may be field supplied)</td>
<td>• Wiring sizes per submittal and National Electric Code (NEC)</td>
</tr>
<tr>
<td></td>
<td>• Harmonic filter (optional)</td>
<td>• Tracer® AdaptiView™ display and mounting arm</td>
<td>• Ground connection(s)</td>
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<tr>
<td></td>
<td>• Autotransformer (optional)</td>
<td></td>
<td>• BAS wiring (optional)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Inter-processor communication (IPC) wiring</td>
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<td></td>
<td></td>
<td></td>
<td>• Control voltage wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• High condenser pressure interlock wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Chilled water pump controller and wiring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Condenser water pump controller and wiring</td>
</tr>
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<td></td>
<td></td>
<td>• Option relays and wiring</td>
</tr>
<tr>
<td>Water piping</td>
<td>• Flow switches (may be field supplied)</td>
<td>• Condenser water regulating valve controller (optional; may be field-supplied)</td>
<td>• Thermometers</td>
</tr>
<tr>
<td></td>
<td>• Condenser water regulating valve controller (optional; may be field-supplied)</td>
<td></td>
<td>• Water flow pressure gauges</td>
</tr>
<tr>
<td></td>
<td>• Isolation and balancing valves in water piping</td>
<td></td>
<td>• Isolation and balancing valves in water piping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vents and drain valves</td>
<td>• Vents and drain valves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Pressure relief valves (for waterboxes as required)</td>
<td>• Pressure relief valves (for waterboxes as required)</td>
</tr>
<tr>
<td>Pressure Relief</td>
<td>• Relief valves</td>
<td></td>
<td>• Vent line and flexible connector</td>
</tr>
<tr>
<td>Insulation</td>
<td>• Insulation (optional)</td>
<td></td>
<td>• Vent line and flexible connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Insulation</td>
</tr>
<tr>
<td></td>
<td>Appendix B: Agility™ Chiller Installation Completion and Request for Trane Service, “p. 69 (HDWA-ADF001*-EN; refer to Appendix A: Forms and Check Sheets,” p. 68)</td>
<td>• To be completed by installing contractor prior to contacting Trane for start-up</td>
<td></td>
</tr>
<tr>
<td>Chiller start-up commissioning(a)</td>
<td>• Trane, or an agent of Trane specifically authorized to perform start-up of Trane® products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-commissioning transport of empty refrigerant containers for return or recycling</td>
<td>• Move empty refrigerant containers to an easily accessible point of loading</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Start-up must be performed by Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products. Contractor shall provide Trane (or an agent of Trane specifically authorized to perform start-up) with notice of the scheduled start-up at least two weeks prior to the scheduled start-up.
Installation: Mechanical

Location Requirements

Sound Considerations

- Install rubber vibration isolators in all water piping.
- Isolate all pipe hangers and be sure they are not supported by main structure beams that could introduce vibration into occupied spaces.
- Make sure that the piping does not put additional stress on the unit.

*Note:* Do not use metal braided type eliminators on the water piping. Metal braided eliminators are not effective at the frequencies at which the unit will operate.

- Use flexible electrical conduit.
- Seal all wall penetrations.

*Note:* Consult an acoustical engineer for critical applications.

Foundation Requirements

Chiller mounting surface must be:

- rigid non-warping mounting pads or a concrete foundation, and
- able to support the chiller at its full operating weight (including completed piping and full operating charges of refrigerant and water).

For proper unit operation, the chiller must be level within 1/4 in. (6.35 mm) over its length and width when set into place on the mounting surface. Refer to “Leveling the Unit,” p. 20 for more information. For minimum and maximum chiller weights/dimensions in pounds/inches and kilograms/millimeters, refer to “Weights (lb),” p. 13 and “Weights (kg),” p. 14, respectively.

*Note:* For specific weight information, refer to the unit submittal package.

**Important:** Trane will not assume responsibility for equipment problems resulting from an improperly designed or constructed foundation.

Clearances

Provide enough space around the unit to allow the installation and maintenance personnel unrestricted access to all service points. Refer to submittal drawings for the unit dimensions.

Refer to “Unit Clearances,” p. 12 for minimum clearances required for service. In all cases, local codes will take precedence over these recommendations.

Ventilation

The unit produces heat even though the compressor is cooled by the refrigerant. Make provisions to remove heat generated by unit operation from the equipment room. Ventilation must be adequate to maintain an ambient temperature lower than 104°F (40°C).

Vent the evaporator, condenser, and compressor pressure relief valves in accordance with all local and national codes. Refer to “Refrigerant Pressure Relief Valve Venting,” p. 20.

Make provisions in the equipment room to keep the chiller from being exposed to freezing temperatures (32°F [0°C]).

Water Drainage

Locate the unit near a large capacity drain for water vessel drain-down during shutdown or repair. Condensers and evaporators are provided with drain connections. Refer to “Overview,” p. 24. All local and national codes apply.

Access Restrictions

Door clearances are provided in “Unit Clearances,” p. 12. See unit submittals for specific “per unit” dimensional information.

Operating Environment

**Important:**

- The standard chiller is designed for INDOOR USE ONLY and as such has NEMA Type 1 enclosures.
- The warranty requires an equipment room/chiller environment surrounding the NEMA 1 chiller to be maintained in the temperature range of 34°F to 104°F (1.1°C to 40°C) AND at less than 95% relative humidity (non-condensing conditions). If your equipment room/chiller environment does not meet these conditions, contact your local Trane Service Agency immediately.

**NOTICE**

**Equipment Damage!**

Failure to protect the unit from freezing could result in equipment damage.

If fluid has been added to the piping, the unit must be protected from freezing. Freeze damage from an unheated equipment room is not the Trane company’s responsibility. These are indoor units.
NOTICE

AFD Component Damage!

Operating unit at ambient temperatures below 34°F (1.1°C) or in excess of 104°F (40°C), or in excess of 95% relative humidity (non-condensing conditions), could result in AFD component damage due to the panel’s inability to dissipate heat adequately.

If any of these adverse operating conditions are present, take necessary action to improve the equipment room environment.

To ensure that electrical components operate properly, do NOT locate the chiller in an area exposed to dust, dirt, corrosive fumes, or excessive heat and humidity. The ambient temperature range for chiller operation is 34°F to 104°F (1.1°C to 40°C).

Adaptive Frequency Drive Enclosure Rating

The Adaptive Frequency™ Drive (AFD) cabinet has a NEMA 1 enclosure rating:

NEMA 1: Vented. Intended for general-purpose indoor applications.

Environmental Conditions

**Important:** Location of the Adaptive Frequency™ Drive (AFD) is important if proper performance and normal operating life is to be expected. Therefore, unless designed for special environments, the controller should be installed in an area where the following conditions exist

- Verify that NEMA 1 enclosure drives can be kept clean and dry.
- The area chosen should allow the space required for proper air flow. Adequate clearance for air circulation around the enclosure is a 6 in. (16 cm) minimum clearance required wherever vents are located in the cabinet.
- Be sure that the NEMA 1 enclosure is installed away from oil, coolants, or other airborne contaminants.
- Do NOT install the drive above 3300 ft (1005.8 m) without derating output power. For every 300 ft (91.4 m) above 3300 ft (1005.8 m), derate the output current 1 percent.
- Line frequency is 50 or 60 Hz.
- Non-corrosive location.
- Verify that the drive location will meet the environmental conditions specified in the following table.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Temperature (outside NEMA 1 enclosure)</td>
<td>32°F to 104°F (0°C to 40°C)</td>
</tr>
<tr>
<td>Storage Temperature (ambient)</td>
<td>-20°F to 122°F (-28.9°C to 50.0°C)</td>
</tr>
<tr>
<td>Humidity</td>
<td>5% to 95% (non-condensing)</td>
</tr>
</tbody>
</table>

Rigging

Lifting is the recommended method for moving chillers. Suggested lifting arrangements for standard units are described in “Standard Chiller Lift,” p. 19.

**Note:** The lifting beam used for HDWA Agility™ chillers must be at least 12.5 ft (3.8 m) long.

**Important:** If unit must be disassembled for installation, refer to Installation Instructions: Agility Chiller Disassembly/Reassembly Units (HDWA-SVN001*-EN) for instructions, including weights and rigging instruction for components.

Agility™ chillers should be moved ONLY by lifting at designated lift points. Refer to the following instructions in this manual for typical rigging arrangements.

**WARNING**

Heavy Object!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

**WARNING**

Improper Unit Lift!

Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage.

Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.
### Standard Chiller Lift

1. Insert rigging shackles at the points indicated in the following figure. A 1.25 in. (31.8 mm) diameter lifting hole is provided at each of these points.

2. Attach the lifting chains or cables.

3. After the lifting cables are in place, attach a safety chain or cable between the first-stage of the compressor and the lifting beam.

   **Important:** There should NOT be tension on this safety cable; the cable is used only to prevent the unit from rolling during the lift.

4. Position isolator pads beneath the chiller feet (refer to “Unit Isolation,” p. 19 for instructions).

5. Once the isolators are in place, lower the chiller — working from end to end — in small increments to maintain stability.

6. When lift is complete, detach the rigging shackles and safety chain.

---

### Special Lift Requirements

If the chiller cannot be moved using a standard chiller lift, consider the following:

- When job site conditions require rigging of the chiller at an angle greater than 45° from horizontal (end-to-end), the unit may require removal of the compressor. Contact Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products regarding the disassembly and reassembly work. For more information, refer to “Factory Warranty Information,” p. 3.

   **Note:** Disassembly and reassembly work includes removing the compressor from the unit. Contact Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products for specific rigging instructions. Do NOT attempt to rotate the chiller onto its side.

- When lifting the chiller is either impractical or undesirable, machinery dollies should be placed under the supports; then push or pull the unit across a smooth surface. Should the chiller be on blocks, it is not necessary to remove the blocks from the chiller before moving it into place.

- Use care on uneven surfaces. Piping in the center of the unit is within 1/2 in. (12.7 mm) of the ground.

---

### Unit Isolation

To minimize sound and vibration transmission through the building structure and to ensure proper weight distribution over the mounting surface, Trane recommends installing isolation padding under the chiller feet. For seismic installations, refer to the specific installation details provided by the foundation designer.

**Note:** Isolation pads are provided with each chiller.

Specific isolator loading data is provided in the unit submittal package. If necessary, contact your local Trane sales office for further information.

**Important:** When determining placement of isolation pads, remember that the control panel side of the unit is always designated as the front side of the unit.

### Isolation Pads

When isolation pads are used, place them under each of the eight individual mounting points. The pads may...
be cut to suit the application, but should cover the entire face of the support.

**Leveling the Unit**

*Note:* The chiller MUST be set level within 1/4 in. (6.35 mm) over its length and width.

1. Use a water level to align the tube sheet tooling holes or bottom edge of the tube sheet axially along both the condenser and evaporator; refer to the following figures.

2. Use a water level to align the tooling holes across the condenser tube sheet; refer to the following figures.

*Important:* Do NOT level the tooling holes from the evaporator to the condenser as they may be at different heights.

---

**Refrigerant Pressure Relief Valve Venting**

**WARNING**

**Confined Space Hazards!**

Failure to follow instructions below could result in death or serious injury.

Do not work in confined spaces where refrigerant or other hazardous, toxic or flammable gas may be leaking. Refrigerant or other gases could displace available oxygen to breathe, causing possible asphyxiation or other serious health risks. Some gases may be flammable and or explosive. If a leak in such spaces is detected, evacuate the area immediately and contact the proper rescue or response authority.

*Note:* Vent pipe size must conform to the ANSI/ASHRAE Standard 15 for vent pipe sizing. All federal, state, and local codes take precedence over any suggestions stated in this manual.

All relief valve venting is the responsibility of the installing contractor.

All HDWA chillers use evaporator and condenser pressure relief valves (refer to the following figure) that must be vented to the outside of the building.
Figure 12. Location of relief valves

Relief valve connection sizes and locations are shown in unit submittals. Refer to local codes for relief valve vent line sizing information.

Table 6. Pressure relief valve data

<table>
<thead>
<tr>
<th>Valve Location</th>
<th>Discharge Setpoint</th>
<th>Rated Capacity</th>
<th>Field Connection Pipe Size</th>
<th>Factory Shell Side Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>psi</td>
<td>kPa</td>
<td>lb air/ min.</td>
<td>kg air/ min.</td>
</tr>
<tr>
<td>Evaporator—Compressor Low Side Pipe (Suction)</td>
<td>200</td>
<td>1379.0</td>
<td>78.8</td>
<td>35.7</td>
</tr>
<tr>
<td>Condenser</td>
<td>300</td>
<td>2068.4</td>
<td>49.2</td>
<td>22.3</td>
</tr>
</tbody>
</table>

NOTICE

Equipment Damage!

Failure to comply with specifications may result in capacity reduction, unit damage and/or relief valve damage.

Do NOT exceed vent piping code specifications!

Relief valve discharge setpoints and capacities rates are provided in the following table. After the relief valve has opened, it will re-close when pressure is reduced to a safe level.

**Note:** After they are opened, relief valves may have tendency to leak and must be replaced.

Pressure relief valve discharge capacities varies with shell diameter and length and also compressor displacement. Discharge venting capacity should be calculated as required by ASHRAE Standard 15-94. Do NOT adjust relief valve setting in the field.
Freeze Protection

For unit operation in a low temperature environment, adequate protection measures must be taken against freezing. Refer to the following tables for adjusted settings and recommended ethylene glycol and propylene glycol solution strengths.

Table 7. Agility chiller control settings based on ethylene glycol percentage

<table>
<thead>
<tr>
<th>Ethylene Glycol Percentage, %</th>
<th>Solution Freeze Point</th>
<th>Minimum Recommended LRTC</th>
<th>Minimum Recommended LWTC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°F</td>
<td>°C</td>
<td>°F</td>
</tr>
<tr>
<td>0</td>
<td>32.0</td>
<td>0.0</td>
<td>28.6</td>
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<tr>
<td>2</td>
<td>31.0</td>
<td>-0.6</td>
<td>27.6</td>
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<tr>
<td>4</td>
<td>29.7</td>
<td>-1.3</td>
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<td>5</td>
<td>29.0</td>
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<td>6</td>
<td>28.3</td>
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<td>24.9</td>
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<td>8</td>
<td>26.9</td>
<td>-2.8</td>
<td>23.5</td>
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<td>10</td>
<td>25.5</td>
<td>-3.6</td>
<td>22.1</td>
</tr>
<tr>
<td>12</td>
<td>23.9</td>
<td>-4.5</td>
<td>20.5</td>
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<tr>
<td>14</td>
<td>22.3</td>
<td>-5.4</td>
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<td>15</td>
<td>21.5</td>
<td>-5.9</td>
<td>18.1</td>
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</table>

Table 8. Agility chiller control settings based on propylene glycol percentage

<table>
<thead>
<tr>
<th>Propylene Glycol Percentage, %</th>
<th>Solution Freeze Point</th>
<th>Minimum Recommended LRTC</th>
<th>Minimum Recommended LWTC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°F</td>
<td>°C</td>
<td>°F</td>
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<td>22.4</td>
<td>-5.4</td>
<td>19.0</td>
</tr>
<tr>
<td>18</td>
<td>20.9</td>
<td>-6.2</td>
<td>17.5</td>
</tr>
<tr>
<td>20</td>
<td>19.3</td>
<td>-7.1</td>
<td>15.9</td>
</tr>
<tr>
<td>Propylene Glycol Percentage, %</td>
<td>Solution Freeze Point</td>
<td>Minimum Recommended LRTC</td>
<td>Minimum Recommended LWTC</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td>°F</td>
<td>°C</td>
<td>°F</td>
</tr>
<tr>
<td>22</td>
<td>17.6</td>
<td>-8.0</td>
<td>14.2</td>
</tr>
<tr>
<td>24</td>
<td>15.7</td>
<td>-9.0</td>
<td>12.3</td>
</tr>
<tr>
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<td>14.8</td>
<td>-9.6</td>
<td>11.4</td>
</tr>
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<td>26</td>
<td>13.8</td>
<td>-10.1</td>
<td>10.4</td>
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<tr>
<td>28</td>
<td>11.6</td>
<td>-11.3</td>
<td>8.2</td>
</tr>
<tr>
<td>30</td>
<td>9.3</td>
<td>-12.6</td>
<td>5.9</td>
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<td>32</td>
<td>6.8</td>
<td>-14.0</td>
<td>3.4</td>
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<td>4.1</td>
<td>-15.5</td>
<td>0.7</td>
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<tr>
<td>35</td>
<td>2.7</td>
<td>-16.3</td>
<td>-0.7</td>
</tr>
<tr>
<td>36</td>
<td>1.3</td>
<td>-17.1</td>
<td>-2.1</td>
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<tr>
<td>38</td>
<td>-1.8</td>
<td>-18.8</td>
<td>-5.2</td>
</tr>
<tr>
<td>40</td>
<td>-5.2</td>
<td>-20.7</td>
<td>-8.6</td>
</tr>
</tbody>
</table>
Installation: Water Piping

Overview

The following water piping circuits must be installed and connected to the chiller:

- Pipe the evaporator into the chilled water circuit.
- Pipe the condenser into the cooling tower water circuit.

*Note:* Piping must be arranged and supported to avoid stress on the equipment. It is strongly recommended that the piping contractor does not run pipe closer than 3 ft (0.9 m) minimum to the equipment. This will allow for proper fit upon arrival of the unit at the job site. Any adjustment that is necessary can be made to the piping at that time. Expenses that result from a failure to follow this recommendation will NOT be paid by Trane.

Piping suggestions for each of the water circuits listed above are outlined in “Evaporator and Condenser Water Piping,” p. 27. General recommendations for the installation of field-supplied piping components (e.g., valves, flow switches, etc.) common to most chiller water circuits are listed in the following sections.

Water Treatment

The use of untreated or improperly treated water in a Agility™ chiller may result in inefficient operation and possible tube damage.

*Important:* Trane strongly recommends using the services of a qualified water treatment specialist to determine necessary water treatment. A label with a customer disclaimer note is affixed to each unit.

*Notice*

Proper Water Treatment Required!
The use of untreated or improperly treated water could result in scaling, erosion, corrosion, algae or slime.

Use the services of a qualified water treatment specialist to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

Water Pressure Gauges

Locate pressure gauge taps in a straight length of pipe. Place each tap a minimum of one pipe diameter downstream of any elbow, orifice, etc. For example, for a 6 in. (16 cm) pipe, the tap would be at least 6 in. (16 cm) from any elbow, orifice, etc.

Valves—Drains and Vents

*Notice*

**Waterbox Damage!**
Failure to follow instructions could result in damage to the waterbox.
Do not over-tighten or use excessive Teflon® pipe tape when installing valves, drains, plugs and vents on waterboxes.

1. Install field-supplied air vents and drain valves on the waterboxes. Each waterbox is provided with a National Pipe Thread Female (NPTF) vent and drain connection; depending on the waterbox types ordered, the openings may be 1/4 in. (6.35 mm), 1/2 in. (12.7 mm), or 3/4 in. (19.05 mm).

*Notice*

**Waterbox Damage!**
Failure to follow instructions could result in damage to the waterbox due to hydrostatic expansion.
Install pressure-relief valves in the condenser and evaporator water circuits.

*Notice*

**Equipment Damage!**
Failure to follow instructions could result in equipment damage.
Do NOT allow chiller to freeze! Bundles must be drained and air-blown dry if chiller is stored in an unheated equipment room.

2. If necessary for the application, install pressure-relief valves at the drain connections on the evaporator and condenser waterboxes. To do so, add a tee with the relief valve attached to the drain valve.

To determine whether or not pressure relief valves are needed for a specific application, keep in mind that:

a. Vessels with close-coupled shutoff valves may cause high potentially damaging hydrostatic pressures as fluid temperature rises.

b. Relief valves are required by American Society of Mechanical Engineers (ASME) codes when the shell waterside is ASME. Follow ASME guidelines or other applicable codes to ensure proper relief valve installation.
Strainers

**NOTICE**

Water Born Debris!

To prevent components damage, pipe strainers must be installed in the water supplies to protect components from water born debris. Trane is not responsible for equipment-only-damage caused by water born debris.

Install a strainer in the entering side of each piping circuit to avoid possible tube plugging in the chiller with debris.

**Required Flow-Sensing Devices**

The ifm efector® flow detection controller and sensor (refer to “Water Flow Detection Controller and Sensor,” p. 25) is used to verify evaporator and condenser water flows.

If a customer-supplied flow sensing device is used to ensure adequate chiller flow protection, refer to the wiring diagrams that shipped with the unit for specific electrical connections.

Be sure to follow the manufacturer’s recommendations for device selection and installation.

**Water Flow Detection Controller and Sensor**

*Important:* Before installing the ifm efector® flow detection controller and sensor, use a marker to draw a line on the probe at 3.5 in. (8.9 cm) from the end of the probe. Do NOT insert more than 3.5 in. (8.9 cm) of the probe length into the pipe. Refer to the following figure.

*Note:* In Agility™ chillers, the ifm efector® flow detection controller and sensor is mounted in the waterbox nozzle, as shown in the preceding figure.
1. Mount the 1/2-in. NPT adapter in a horizontal or vertical section of pipe. The maximum distance from the control panel must not exceed 29.5 ft (9 m) (see item labeled “1” in the preceding figure). Allow at least five pipe diameters straight run of pipe upstream of the sensor location, and three pipe diameters straight run of pipe downstream of the sensor location.

**Notes:**
- In Agility™ chillers, the ifm efector® flow detection controller and sensor is mounted in the waterbox nozzle, as shown in the preceding figure.
- If the ifm efector® flow detection controller and sensor is mounted in an alternate location on a horizontal pipe, mounting the sensor in the side of the pipe is preferred; in the case of a vertical pipe, mounting the sensor in a place where the water flows upwards is preferred.

**NOTICE**

Overtightening!

Do not exceed torque specifications as it could result in equipment damage.

2. Insert the flow sensor probe (see item labeled “2” in the preceding figure) through the 1/2-in. NPT adapter so that 3 to 3.5 in. (7.6 to 8.9 cm) of the probe’s length extends into the pipe. Tighten the 1/2-in. NPT adapter as needed to prevent leakage and keep the probe from backing out under pressure. **Do NOT exceed 40 ft·lb (54.2 N·m) of torque on the fitting. Sensor damage can occur if it is overtightened.**

**Note:** When installed, the tip of the ifm efector® sensor probe must be at least 1 in. (2.54 cm) away from any pipe wall. Do NOT insert more than 3.5 in. (8.9 cm) of the probe length into the pipe.

3. Install the Micro DC Cable by inserting it through the wire openings on the back side of the control panel (see item labeled “3” in the preceding figure). Install the supplied Micro DC Cable (29.5 ft [9 m] in length) to the Flow Probe and hand-tighten the connector nut.

4. Plug the other end of the Micro DC Cable into the Flow Control Monitor with the Combicon connector (see item labeled “4” in the preceding figure). Refer to the following figure for cable wiring.

**NOTICE**

Do Not Apply Electrical Power to a Unit in a Vacuum!

Failure to follow instructions below could result in motor and compressor damage.

Do not apply electrical power to a motor in a vacuum.

5. Apply power to the chiller control panel to verify the Flow Control Monitor has power and the Low Volt Broken Wire Relay light is NOT lit.

6. Remove all air from the piping circuit prior to adjusting the low water flow setpoint.

7. Reduce the water flow to the minimum allowable flow and adjust the Flow setting on the Flow Control Monitor (see item labeled “7” in the following figure). Adjusting the “Flow” potentiometer clockwise (+) reduces the flow setting cutout and adjusting counterclockwise (-) increases the flow setting cutout.

**Note:** The “Temp” potentiometer on the ifm efector® control module has no effect in Trane application. It is NOT necessary to make adjustments to the “Temp” potentiometer.

8. After the cutout setting is adjusted, the cutout setpoint will be indicated with a yellow light on the Flow Control Monitor LED bar graph display. When the water flows are higher than the cutout, a green light will indicate proper flow status. If the flows fall below the cutout setpoint, a red light will indicate low/no flow status.

Figure 15. ifm efector® flow sensing device terminal connection
Evaporator and condenser proof of flow switches are required. These switches are used with control logic to confirm flow prior to starting a unit and to stop a running unit if flow is lost. For troubleshooting, a viewable diagnostic is generated if a proof of flow switch does not close when flow is required.

Evaporator and Condenser Water Piping

The following two figures illustrate the recommended (typical) water piping arrangements for the evaporator and condenser.

![Figure 16. Typical evaporator water piping circuit](image)

1. Balancing valve.
2. Gate (Isolation) valve or ball valve.
3. Thermometer (if field supplied).
4. Waterbox nozzle connection.
5. Drain, vent, and anode.
7. Chilled water flow switch (5S1). Flow switch 5S1 may be installed in either the entering or leaving leg of the chilled water circuit.
8. Pump.
9. Pressure gauge. It is recommended to pipe the gauge between entering and leaving pipes. A shutoff valve on each side of the gauge allows the operator to read either entering or leaving water pressure.

![Figure 17. Typical condenser water piping circuits](image)

1. Balancing valve.
2. Gate (isolation) valve or ball valve.
3. Thermometer (if field supplied).
4. Waterbox nozzle connection.
5. Drain, vent, and anode.
7. Condenser water flow switch (5S2). Flow switch 5S2 may be installed in either the entering or leaving leg of the chilled water circuit.
8. Three-way valve (optional).
9. Condenser water pump.
10. Pressure gauge. It is recommended to pipe a single gauge between entering and leaving pipes.
Installation: Water Piping

Piping must be arranged and supported to avoid stress on the equipment. It is strongly recommended that the piping contractor does not run pipe closer than 3 ft (0.9 m) minimum to the equipment. This will allow for proper fit upon arrival of the unit at the job site. Any adjustment that is necessary can be made to the piping at that time. Expenses that result from a failure to follow this recommendation will NOT be paid by Trane.

Water piping connection sizes and components are identified in the tables in “Water Piping Connections,” p. 28 and “Grooved Pipe Coupling,” p. 29. Remember that with many waterboxes, the entering and leaving evaporator water can be piped to either waterbox connection when the tube bundles are split vertically. However, large evaporator waterboxes with entering and leaving connections not at the same level must be connected with the entering water at the bottom and the leaving water at the top.

Waterboxes with multiple pass arrangements utilize a baffle to separate the passes. These baffles are designed for a maximum pressure of 20 psid (137.9 kPaD). If larger pressure drops are expected in the application, contact your local Trane representative to discuss special waterbox options.

Important: Water flows must be piped in accordance with nameplate designation.

Field-provided isolation valves for the evaporator and condenser water lines should be installed upstream and downstream of the heat exchangers, and be installed far enough away from the chiller to also provide practical service isolation for flow sensing devices, field thermometers, flexible connectors, and any removable pipe spools.

Ensure that the evaporator water piping is clear; check it after the chilled water pump is operated but before initial chiller start-up. If any partial blockages exist, they can be detected and removed to prevent possible tube damage resulting from evaporator freeze-up or erosion.

For condenser and evaporator connections, arrange the water piping so that the water supply enters the shell at the lower connection and exits from the top connection. Operational problems may result if this piping is not correct.

For applications that include an “infinite source” or “multiple-use” cooling condenser water supply, install a valved bypass “leg” (optional) between the supply and return pipes. This valved bypass allows the operator to short-circuit water flow through the cooling condenser when the supply water temperature is too low.

Water Piping Connections

All standard units use grooved-pipe connections. These are grooved-end NSP (Victaulic® style) pipe connections. Flanged connections are optional.

Piping joined using grooved type couplings, like all types of piping systems, requires proper support to carry the weight of pipes and equipment. The support methods used must eliminate undue stresses on joints, piping, and other components, allow movement where required, and provide for any other special requirements (i.e., drainage, etc.).

Note: If needed, plug-type sensor extension cables are available for purchase from Trane Parts Service. These sensor extension cables may be necessary if the waterboxes are changed or if the temperature sensors are moved out into the unit piping for better mixed temperature readings.

Table 9. Water connection pipe sizes

<table>
<thead>
<tr>
<th>EVSZ/CDSZ</th>
<th>Nominal Pipe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 Pass</td>
</tr>
<tr>
<td>020</td>
<td>6 mm</td>
</tr>
<tr>
<td>040</td>
<td>8 mm</td>
</tr>
</tbody>
</table>

Figure 18. Typical grooved pipe connection

Waterbox Locations

Note: Do NOT interchange evaporator and condenser waterboxes. Supply evaporator waterbox and tubesheet contain match marks to aid in identifying matching shells and waterboxes.

If removal of waterboxes is necessary, refer to “Waterbox Removal,” p. 64.

If the waterboxes on any of the shells are exchanged end-for-end, be sure to reinstall them right-side up to
maintain the correct baffle arrangements. Use a new gasket with each waterbox cover.

**Reversing Waterboxes**

All waterboxes can be reversed end-for-end. Refer to “Waterbox Removal,” p. 64 for detailed waterbox removal instructions.

Remove sensors from wells before removing waterbox.

Do NOT rotate waterboxes.

Complete the waterbox switch and replace sensors.

**Notes:**

- If waterboxes are reversed, be sure to properly rewire water temperature sensors in the control panel.
- Be sure to replace waterboxes right-side-up to maintain proper baffle orientation. Use new O-rings.
- If the waterbox is reversed, be sure to match mark on the baffle and the waterbox to ensure they are aligned.

**Grooved Pipe Coupling**

A customer-supplied, standard flexible grooved pipe coupling (Victaulic® Style 77 or equivalent) should be used to complete the Victaulic® connection for both 150 psig (1034.2 kPaG) and 300 psig (2068.4 kPaG) waterboxes.

When a flexible coupling such as this is installed at the waterbox connections, other flexible piping connectors (i.e., braided-steel, elastomeric arch, etc.) are not usually required to attenuate vibration and/or prevent stress on the connections.

**Flange-connection Adapters**

**NOTICE**

**Never Weld to Cast Boxes!**
Welding to cast boxes will result in equipment damage.
Adapters must be used to convert flanges.

When flat-face flange connections are specified, flange-to-groove adapters are provided (Victaulic® Style 741 for 150 psig [1034.2 kPaG] systems; Style 743 for 300 psig [2068.4 kPaG] systems). The adapters are shipped in spare parts box included with the unit. Adapter descriptions are given in the tables in “Victaulic Gasket Installation,” p. 30. The flange adapters provide a direct, rigid connection of flanged components to the grooved-pipe chiller waterbox connections.

In this case, the use of flexible type connectors (i.e., braided steel, elastomeric arch, etc.) are recommended to attenuate vibration and prevent stress at the waterbox connections.

All flange-to-flange assembly screws must be provided by the installer. Hex head screw sizes and number required are included in the tables in “Victaulic Gasket Installation,” p. 30. The Style 741 (150 psig [1034.2 kPaG]) flange adapter requires a smooth, hard surface for a good seal.

Connection to other type flange faces (i.e., raised, serrated, rubber, etc.) requires the use of a flange.
washer between the faces. Refer to the flange adapter manufacturer’s guidelines for specific information.

The Style 743 (300 psig [2068.4 kPaG]) flange adapters are designed to mate with raised-face flanges. They can be used with flat-faced flanges, but only if the raised projections on the outside face of the adapter are removed; refer to the following figure. The flange-adapter gasket must be placed with the color-coded lip on the pipe and the other lip facing the mating flange.

### Notice

**Piping Connection Leaks!**

Failure to provide effective seal could result in equipment or property-only damage. To provide effective seal, gasket contact surfaces of adapter must be free of gouges, undulations or deformities.

Figure 20. Modifying 300 psig (2068.4 kPaG) flange adaptors for flat-faced flange application

---

**Victaulic Gasket Installation**

1. Inspect supplied gasket to be certain it is suited for intended service (code identifies gasket grade). Apply a thin coat of silicone lubricant to gasket tips and outside of gasket.

2. Install gasket, placing gasket over pipe end and making sure gasket lip does not overhang pipe end. Refer to the following figure for gasket configuration.

3. Align and bring two pipe ends together and slide gasket into position centered between the grooves on each pipe. No portion of the gasket should extend into the groove on either pipe.

4. Open fully and place hinged Victaulic® flange around the grooved pipe end with the circular key section locating into the groove.

5. Insert a standard hex head screw through the mating holes of the Victaulic® flange to secure the flange firmly in the groove.

6. Tighten fasteners alternately and equally until housing screw pads are firmly together (metal-to-metal); refer to “Screw-Tightening Sequence for Water Piping Connections,” p. 31. Do NOT excessively tighten fasteners.

   **Note:** Uneven tightening may cause the gasket to pinch.

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**Figure 21. Typical Victaulic® flange gasket configuration**

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**Table 10. Installation data for 150 psig (1034.2 kPaG) flange adapters (Style 741)**

<table>
<thead>
<tr>
<th>Nominal Pipe Size</th>
<th>Assembly Screw Size(a)</th>
<th>Number of Assembly Screws Required</th>
<th>Screw Pattern Diameter</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>mm</td>
<td>in.</td>
<td>in.</td>
<td>lb</td>
</tr>
<tr>
<td>6</td>
<td>168.3</td>
<td>3/4 x 3-1/2</td>
<td>8</td>
<td>9.5</td>
</tr>
<tr>
<td>8</td>
<td>219.1</td>
<td>3/4 x 3-1/2</td>
<td>8</td>
<td>11.75</td>
</tr>
</tbody>
</table>

(a) Screw size for conventional flange-to-flange connection. Longer screws are required when flange washer must be used. Grade 5 screws are recommended.

**Table 11. Installation data for 300 psig (2068.4 kPaG) flange adapters (Style 743)**

<table>
<thead>
<tr>
<th>Nominal Pipe Size</th>
<th>Assembly Screw Size(a)</th>
<th>Number of Assembly Screws Required</th>
<th>Screw Pattern Diameter</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>in.</td>
<td>mm</td>
<td>in.</td>
<td>in.</td>
<td>lb</td>
</tr>
<tr>
<td>6</td>
<td>168.3</td>
<td>3/4 x 4-1/2</td>
<td>12</td>
<td>10.63</td>
</tr>
<tr>
<td>8</td>
<td>219.1</td>
<td>3/4 x 4-3/4</td>
<td>12</td>
<td>13.3</td>
</tr>
</tbody>
</table>

(a) Screw size for conventional flange-to-flange connection. Longer screws are required when flange washer must be used.
Screw-Tightening Sequence for Water Piping Connections

This section describes a screw-tightening sequence for flanges with flat gaskets or O-rings. Remember that improperly tightened flanges may leak.

**Note:** Before tightening any of the screws, align the flanges.

Flanges with 8 or 12 Screws

Tighten all screws to a snug tightness, following the numerical sequence for the appropriate pattern as shown in the following figure. Repeat this sequence to apply the final torque to each screw.

**Figure 22. Flange screw tightening sequence (8 or 12 screws)**

Pressure Testing Waterside Piping

**NOTICE**

**Equipment Damage!**
Failure to follow these instructions could result in equipment damage.
Do not over pressurize the system or exceed design pressure. Always perform a hydro pressure test with water present in piping and waterboxes.

Waterside design pressure is 150 psig (1034.2 kPaG) or 300 psig (2068.4 kPaG); refer to unit nameplate or to submittal documentation.

Eddy Current Testing

Trane recommends conducting an eddy current inspection of the condenser and evaporator tubes in water-cooled chillers every three years. Eddy current tests are intended to identify defects on or within the walls of heat exchanger tubing that could lead to in-service tube failures. Eddy current tests conducted before a chiller is put into service are considered “baseline” eddy current tests, and are intended to establish a reference point to aid in the interpretation of future eddy current test reports. Many of the anomalies that can be found through eddy current testing have no impact on tube life or performance, while others are severe enough to justify removing the affected tube from service. Ask your sales account manager for a copy of the engineering bulletin (CTV-PRB024*-EN) for clarification of the role of eddy current testing in chiller maintenance by providing information about eddy current technology and heat exchanger tubing.
Insulation

Unit Insulation Requirements

Factory-installed insulation is available as an option for all units. Factory installation does NOT include insulation of the chiller feet. In applications where the chiller is not factory-insulated, install insulation over all surfaces shown in the figure in “Factory-applied Insulation,” p. 32 (i.e., compressor, condenser, economizer, and drive [not shown]).

The quantity of insulation required is listed in the following table. Insulation thickness is determined at normal design conditions which are:

- Standard comfort-cooling leaving chilled water temperature
- 85°F (29.4°C) dry bulb ambient temperature
- 75 percent relative humidity

Operation outside of normal design conditions as defined in this section may require additional insulation; contact Trane for further review.

**Note:** If the unit is not factory-insulated, install insulation around the evaporator bulbwells and ensure that the bulbwells and connections for the waterbox drains and vents are still accessible after insulation is applied. The sensor modules (Low Level Intelligent Devices [LLIDs]) and interconnecting four-wire cable inter-processor communication (IPC) bus must be raised up above the field-installed insulation. Secure the IPC bus to the insulation top/outer surface after insulation is completed.

**Important:** Do NOT insulate the compressor, motor housing, unit wiring, or sensor modules.

<table>
<thead>
<tr>
<th>Location</th>
<th>3/4 in. (19.05 mm) Insulation, Square Feet (Square Meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>020A Evaporator, suction elbow, pipe</td>
<td>105 (9.8)</td>
</tr>
<tr>
<td>040A Evaporator, suction elbow, pipe</td>
<td>120 (11.1)</td>
</tr>
</tbody>
</table>

Insulation Thickness Requirements

Factory-applied Insulation

All low-temperature surfaces are covered with 3/4 in. (19.05 mm) Armaflex® II or equal.

The insulation is Armaflex® or equivalent closed cell elastomeric insulation to prevent the formation of condensation. Chillers in high humidity areas or ice storage, low leaving water temperature (less than 36°F [2.2°C] chilled water temperature/glycol) units, may require double thickness to prevent formation of condensation.

**NOTICE**

**Insulation Damage!**

Failure to follow these instructions could result in insulation damage.

To prevent damage to factory installed insulation:

- Do not allow the insulation to be exposed to excessive sunlight. Store indoors or cover with canvas to prevent exposure.
- Do not use thinners and solvents or other types of paint. Use only water base latex.
Figure 23. Recommended area for unit insulation

Notes:

- Bulbwells, drain, and vent connections must be accessible after insulating.
- All units with evaporator marine waterboxes: wrap waterbox shell insulation with strapping and secure strapping with seal.
- Evaporators with ASME nameplates must have insulation cut out around the nameplate. Do NOT glue insulation to the nameplate.
- Apply 2-in. (50.8-mm) wide black tape on overlap joints. Where possible, apply 3-in. (76.2-mm) wide strip of 0.38-in. (9.652-mm) thick insulation over butt joint seams.
Electrical Requirements

Installation Requirements

**WARNING**

**Proper Field Wiring and Grounding Required!**

Failure to follow code could result in death or serious injury.

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

**NOTICE**

**Use Copper Conductors Only!**

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

Unit-mounted Adaptive Frequency™ Drives (AFDs) are standard on all units. While this option eliminates most field-installed wiring requirements, the electrical contractor must still complete the electrical connection for the following:

- power supply wiring to the AFD
- other unit control options present
- any field-supplied control devices

As you review this manual along with the wiring instructions presented in this section, keep in mind that:

- All field-installed wiring must conform to National Electric Code (NEC) guidelines, and any applicable local, state, and national codes. Be sure to satisfy proper equipment grounding requirements per NEC.
- Compressor motor and unit electrical data (including motor kW, voltage utilization range, rated load amps, and locked rotor amps) is listed on the chiller nameplate.
- Use copper conductors to connect the three-phase power supply to the AFD’s Line Potential Main Circuit Breaker.
- All field-installed wiring must be checked for proper terminations, and for possible shorts or grounds.

*Note: Always refer to the actual wiring diagrams that shipped with the chiller or the unit submittal for specific as-built electrical schematic and connection information.*

**NOTICE**

**Adaptive Frequency Drive (AFD)/Starter Component Damage!**

Failure to remove debris from inside the AFD/starter panel could result in an electrical short and could cause serious AFD/starter component damage.

Do NOT modify or cut enclosure to provide electrical access. Removable panels have been provided, and any modification should be done away from the enclosure. If the AFD enclosure must be cut to provide electrical access, exercise care to prevent debris from falling inside the enclosure. Refer to submittal drawings.

**Electrical Requirements**

Before wiring begins, observe the following electrical requirements:

- Follow all lockout/tagout procedures prior to performing installation and/or service on the unit.
- Always wear appropriate personal protective equipment.
- Wait the required time to allow the capacitor(s) to discharge; this could be up to 30 minutes.
- Verify that all capacitors are discharged prior to service using a properly rated volt meter.
- Use appropriate capacitor discharge tool when necessary.
- Comply with the safety practices recommended in PROD-SVB06*-EN.

**WARNING**

**Hazardous Voltage w/Capacitors!**

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer’s literature for allowable waiting periods for discharge of capacitors. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

*For additional information regarding the safe discharge of capacitors, see PROD-SVB06*-EN.*
### Adaptive Frequency Drive

**Table 13. Adaptive Frequency Drive (AFD) electrical data**

<table>
<thead>
<tr>
<th>Maximum RLA</th>
<th>Breaker AIC Amps</th>
<th>Short Circuit Withstand Rating</th>
<th>Line Connection Lugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>240</td>
<td>65,000</td>
<td>65,500</td>
<td>(2) 3/0 - 250 MCM</td>
</tr>
<tr>
<td>361</td>
<td>65000</td>
<td>65000</td>
<td>(2) 3/0 - 250 MCM</td>
</tr>
<tr>
<td>443</td>
<td>65000</td>
<td>65000</td>
<td>(2) 3/0 - 250 MCM</td>
</tr>
<tr>
<td>535</td>
<td>65000</td>
<td>65000</td>
<td>(3) 2/0 - 400 MCM</td>
</tr>
<tr>
<td>678</td>
<td>65000</td>
<td>65000</td>
<td>(4) 4/0 - 500 MCM</td>
</tr>
</tbody>
</table>

---

**WARNING**

**Personal Protective Equipment (PPE) Required!**

Failure to wear PPE and follow proper handling guidelines could result in death or serious injury. Always wear appropriate personal protective equipment in accordance with applicable regulations and/or standards to guard against potential electrical shock and flash hazards.

**WARNING**

**Live Electrical Components!**

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.
System Control Circuit Wiring
(Field Wiring)

Figure 24. HDWA Agility chiller field wiring

Electrical Requirements
### Table 14. Unit control panel wiring 120 Vac

<table>
<thead>
<tr>
<th>Standard Control Circuits: Unit Control Panel Control Wiring (120 Vac)</th>
<th>Unit Control Terminations</th>
<th>Input or Output Type</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporator Water Flow Switch</td>
<td>1K11-J3-1 to 2</td>
<td>Binary Input</td>
<td>Normally Open, Closure with Flow</td>
</tr>
<tr>
<td>Condenser Water Flow Switch</td>
<td>1K11-J2-1 to 2</td>
<td>Binary Input</td>
<td>Normally Open, Closure with Flow</td>
</tr>
<tr>
<td>Evaporator Water Pump Control</td>
<td>1K12-J2-4 to 6</td>
<td>Binary Output</td>
<td>Normally Open</td>
</tr>
<tr>
<td>Condenser Water Pump Control</td>
<td>1K12-J2-1 to 3</td>
<td>Binary Output</td>
<td>Normally Open</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional Control Circuits (120 Vac)</th>
<th>Note: Defaults are factory programmed; alternates can be selected at start-up using the service tool.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Capacity Relay Output</td>
<td>1K14-J2-4</td>
</tr>
<tr>
<td>Head Relief Request Relay Output</td>
<td>J11-J2-4 to 6</td>
</tr>
<tr>
<td>Ice Building Indicator</td>
<td>1K15-J2-1 to 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Low Voltage Circuits (Less than 30 Vac)</th>
<th>Unit Control Panel Terminations</th>
<th>Input or Output Type</th>
<th>Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Auto Stop Input</td>
<td>1K4-J2-1 to 2</td>
<td>Binary Input</td>
<td>Closure Required for Normal Operation</td>
</tr>
<tr>
<td>Emergency Stop Input</td>
<td>1K4-J2-3 to 4</td>
<td>Binary Input</td>
<td>Closure Required for Normal Operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional Low Voltage Circuits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>External Base Loading Enable Input</td>
<td>1K8-J2-2 to 3</td>
</tr>
<tr>
<td>External Hot Water Control Enable Input</td>
<td>1K9-J2-3 to 4</td>
</tr>
<tr>
<td>External Ice Machine Control Enable Input</td>
<td>1K3-J2-1 to 2</td>
</tr>
<tr>
<td>Condenser Refrigerant Pressure</td>
<td>1K7-J2-4 to 6</td>
</tr>
<tr>
<td>Chiller % Capacity Output</td>
<td>1K7-J2-1 to 3</td>
</tr>
<tr>
<td>Evaporator/Condenser Differential Pressure Output</td>
<td>1K7-J2-4 to 6</td>
</tr>
<tr>
<td>External Current Limit Setpoint Input</td>
<td>1K6-J2-2 to 3</td>
</tr>
<tr>
<td>External Chilled Water Setpoint Input</td>
<td>1K6-J2-5 to 6</td>
</tr>
<tr>
<td>External Base Loading Setpoint Input</td>
<td>1K8-J2-2 to 3</td>
</tr>
<tr>
<td>Generic Refrigerant Monitor Input</td>
<td>1K8-J2-5 to 6</td>
</tr>
<tr>
<td>Outdoor Air Temperature Sensor</td>
<td>Inter-processor Communication (IPC) Bus Connection and Sensor—4BT9</td>
</tr>
<tr>
<td>Trace Comm Interface or LonTalk</td>
<td>1K5-J2-1(+ to 2(-)</td>
</tr>
<tr>
<td>BACnet or MODBUS</td>
<td>1K20 5(+ to 6(-)</td>
</tr>
<tr>
<td>Tracer SC Module</td>
<td>1K21</td>
</tr>
</tbody>
</table>

**Note:** All wiring to be in accordance with National Electrical Code (NEC) and any local codes.

- Standard low-voltage circuits (less than 30 Vac) must be separated from 120 Vac or higher wiring.

### Sensor Circuits

All sensors are factory-installed except the optional outdoor air temperature sensor (refer to the following figure for sensor locations). This sensor is required for the outdoor air temperature type of chilled water reset.

Use the following guidelines to locate and mount the outdoor air temperature sensor. Mount the sensor probe where needed; however, mount the sensor module in the control panel.
Figure 25. Agility chiller sensor locations

1. 4P1, Tracer® AdaptiView™ display
2. 4BT3, Condenser entering water temperature
3. 4BT6, Condenser leaving water temperature
4. 4BT2, Evaporator entering water temperature
5. 4BT5, Evaporator leaving water temperature
6. 4BP7, Condenser leaving water pressure transducer (Low)
7. 4BP6, Condenser entering water pressure transducer (High)
8. 4BP5, Evaporator leaving water pressure transducer (Low)
9. 4BP4, Evaporator entering water pressure transducer (High)
10. 4R18, Condenser water flow detector
11. 4R17, Evaporator water flow detector
12. 4BP3, Economizer leaving pressure

200 and 300T Compressors Only
13. 4BP2, Condenser pressure
14. 4BT7, Compressor discharge temperature
15. 4BT8, Economizer leaving refrigerant temperature
16. 4M2, Evaporator EXV
17. 4M4, Economizer EXV
18. 4M6, Drive cooling EXV
19. 4BT4, Drive cooling supply temperature
20. 4M5, Inlet guide vane second stage actuator
21. 4B1, Condenser liquid level
22. 4M3, Motor bearing control cooling EXV
23. 4M8, Motor cooling EXV

Optional Control and Output Circuits
Install various optional wiring as required by the owner’s specifications (refer to “System Control Circuit Wiring (Field Wiring),” p. 36).

Schematic Wiring Drawings
Please refer to the submittals and drawings that shipped with the unit. Additional wiring drawings for Agility™ chillers are available from your local Trane office.

Adaptive Frequency Drive
The Trane TR200 Adaptive Frequency™ Drive (AFD) is an electronic motor controller that converts alternating current (AC) mains input into a variable AC waveform output. The frequency and voltage of the output are regulated to control the motor speed or torque. The TR200 drive includes the following features:

- Soft start to minimize inrush current
- Improved harmonic mitigation with direct current (DC) link reactor
- Integrated power fuse
- Graphical liquid-crystal display (LCD) keypad
- Unit-mounted with factory pre-wiring
- “Trane Drive Utility” for configuration and tracking

Field replacement drives must be programmed via the keypad interface. Contact your local Trane Service Agency for assistance.

Communications Interface

LonTalk Interface (LCI-C)
UC800 provides an optional LonTalk® Communication Interface (LCI-C) between the chiller and a Building Automation System (BAS). An LCI-C LLID shall be used to provide “gateway” functionality between a LonTalk® compatible device and the Chiller. The inputs/outputs include both mandatory and optional network variables as established by the LONMARK® Functional Chiller Profile 8040.

Note: For more information, refer to Hardware and Software Installation Guide: LonTalk Communication Interface for Trane Chillers with Tracer AdaptiView Control (ACC-SVN100*-EN).

BACnet Interface (BCI-C)
Optional BACnet® Communication Interface for Chillers (BCI-C) is comprised of a Tracer® UC800 controller with interface software. It is a non-programmable communications module that allows units to communicate on a BACnet® communications network.

MODBUS Remote Terminal Unit Interface
Modicon Communication Bus (MODBUS®) enables the chiller controller to communicate as a slave device on a MODBUS® network. Chiller setpoints, operating modes, alarms and status can be monitored and controlled by a MODBUS® master device.
Installation: Controls

This section covers information pertaining to the UC800 controller hardware. For information about the Tracer® AdaptiView™ display, which is used to interface with the internal chiller data and functions provided by the UC800, refer to Tracer AdaptiView Display for Water-cooled Agility Chillers Operations Guide (HDWA-SVU001*-EN).

UC800 Specifications

Power Supply

The UC800 (1K20) receives 24 Vac (210 mA) power from the 1T2 power supply located in the chiller control panel.

Wiring and Port Descriptions

The following figure illustrates the UC800 controller ports, LEDs, rotary switches, and wiring terminals. The numbered list following the figure corresponds to the numbered callouts in the illustration.
Communication Interfaces

There are four connections on the UC800 that support the communication interfaces listed. Refer to the figure in “Wiring and Port Descriptions,” p. 40 for the locations of each of these ports.

- BACnet® MS/TP
- MODBUS® Slave
- LonTalk® using LCI-C (from the IPC3 bus)

Rotary Switches

There are three rotary switches on the front of the UC800 controller. Use these switches to define a three-digit address when the UC800 is installed in a BACnet® or MODBUS® system (e.g., 107, 127, etc.).

**Note:** Valid addresses are 001 to 127 for BACnet® and 001 to 247 for MODBUS®.

LED Description and Operation

There are ten LEDs on the front of the UC800. The following figure shows the locations of each LED and the following table describes their behavior in specific instances.
**Figure 27. LED locations**

**Table 15. LED behavior**

<table>
<thead>
<tr>
<th>LED</th>
<th>UC800 Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marquee LED</td>
<td><strong>Powered.</strong> If the Marquee LED is green solid, the UC800 is powered and no problems exist. <strong>Low power or malfunction.</strong> If the Marquee LED is red solid, the UC800 is powered but there are problems present. <strong>Alarm.</strong> The Marquee LED blinks red when an alarm exists.</td>
</tr>
<tr>
<td>TX</td>
<td>The <strong>TX</strong> LED blinks green at the data transfer rate when the UC800 transfers data to other devices on the link.</td>
</tr>
<tr>
<td>RX</td>
<td>The <strong>RX</strong> LED blinks yellow at the data transfer rate when the UC800 receives data from other devices on the link.</td>
</tr>
<tr>
<td>LINK, MBUS, IMC</td>
<td>The <strong>LINK</strong> LED is solid green if the Ethernet link is connected and communicating. The <strong>ACT</strong> LED blinks yellow at the data transfer rate when data flow is active on the link.</td>
</tr>
<tr>
<td>Service</td>
<td>The <strong>Service</strong> LED is solid green when pressed. For qualified service technicians only. Do NOT use.</td>
</tr>
</tbody>
</table>

**Important:** Maintain at least 6 in. (16 cm) between low-voltage (less than 30V) and high voltage circuits. Failure to do so could result in electrical noise that could distort the signals carried by the low-voltage wiring, including inter-processor communication (IPC).
Figure 28. Control panel: Tracer AdaptiView main unit assembly (showing low voltage and higher voltage areas for proper routing of field wiring)
Installing the Tracer AdaptiView Display

During shipment, the Tracer® AdaptiView™ and support arm are boxed, shrink-wrapped, and shipped with unit. The display and support arm must be installed at the site.

*Important*: For best results, Trane, or an agent of Trane, must install the Tracer® AdaptiView™ display and support arm.

1. Unwrap the chiller. Locate the box containing the Tracer® AdaptiView™ display and support arm strapped to the shear plate between the condenser and the evaporator (see the following figure).

2. Remove the display and support arm from the box.

   *Note*: Display to support arm screws are M4 (metric size 4), 6 to 8 mm long, and are shipped with the display. Display arm screws are M6 (metric size 6), 16 mm long, washers, and nuts used to secure arm to unit bracket are shipped in the parts box.

3. Using the M6 hardware shipped in the parts box, attach the display support arm to the mounting bracket on the side of the control panel (labeled A and B in the following figure).

4. Plug the power cable (labeled C in the following figure) and the Ethernet cable (labeled D in the following figure) into the bottom of the display. Plug other ends of the cables into the ports on the side of the control panel.

5. Adjust the Tracer® AdaptiView™ display support arm so the base plate that attaches to the display is horizontal.

   **CAUTION**

   **Tension in Display Support Arm!**

   Failure to follow instructions below could result in unexpected movement of the spring-loaded support arm which could result in minor to moderate injury.

   Ensure that the support arm is in the full upright position when removing the Tracer AdaptiView display from the support arm.

   *Note*: Review “Adjusting the Tracer AdaptiView Display Arm,” p. 45 before attaching the display as some adjustments may be required prior to attaching the display to the support arm base.

6. Position the Tracer® AdaptiView™ display—with the LCD screen facing up—on top of the display support arm base plate.

   *Note*: Ensure the Trane logo is positioned so that it will be at the top when the display is attached to the display support arm.

7. Align the four holes in the display with the screw holes in the display support arm base plate.

8. Attach the Tracer® AdaptiView™ display to the display support arm base plate (labeled E in the following figure) using the M4 (metric size 4) screws referenced in step 3.

   **Figure 29. Display arm installation**

   **Figure 30. Power cable and Ethernet cable connections**
Adjusting the Tracer AdaptiView Display Arm

The Tracer® AdaptiView™ display arm may become too loose or too tight and may need adjustment. There are three joints on the display arm that allow the display to be positioned at a variety of heights and angles (refer to items labeled 1, 2, and 3 in the following figure).

To adjust the tension on the display arm:
- At each joint in the display arm, there is either a hex bolt (1 and 2) or hex screw (3). Turn the hex bolt or screw in the proper direction to increase or decrease tension.
- Joint 3 has a 6 mm hex screw controlling the tension on a gas spring, which allows the Tracer® AdaptiView™ display to tilt up and down.
- Joints 1 and 2 are covered by a plastic cap. Remove the plastic cap to access the screw. Adjust using a 13 mm wrench as necessary.
- To adjust the swivel rotation tension of the Tracer® AdaptiView™ display, adjust the screw located in the support arm base plate, as described in the final step in “Installing the Tracer AdaptiView Display,” p. 44. This adjustment must be done prior to attaching the display to the support arm base. Use a 14 mm wrench to adjust the tension.
- To adjust the left/right swivel of the entire display arm, use a 13 mm wrench to adjust the screw labeled 4 in the preceding figure.
Operating Principles

General Requirements

Operation and maintenance information for HDWA Agility™ chillers are covered in this section. By carefully reviewing this information and following the instructions given, the owner or operator can successfully operate and maintain a Agility™ chiller. If mechanical problems do occur, however, contact a Trane service technician to ensure proper diagnosis and repair of the unit.

Important:

- Although Agility™ chillers can operate through surge, it is NOT recommended to operate them through repeated surges over long durations. If repeated surges of long durations occur, contact your Trane Service Agency to resolve the issue.
- Agility™ are selected, designed, and built for a particular set of design conditions. Operation outside of design conditions may result in improper operation. Refer to chiller selection for minimum unloading.

Cooling Cycle

When in the cooling mode, liquid refrigerant is distributed along the length of the evaporator and sprayed through small holes in a distributor (i.e., running the entire length of the shell) to uniformly coat each evaporator tube. Here, the liquid refrigerant absorbs enough heat from the system water circulating through the evaporator tubes to vaporize. The gaseous refrigerant is then drawn through the suction connection and the first-stage variable inlet guide vanes, and into the first-stage impeller.

HDWA Compressor

The unit is equipped with a semi-hermetic, direct-drive, two-stage, centrifugal compressor that includes inlet guide vanes for capacity control. The Adaptive Frequency™ Drive (AFD) provides capacity control with lower speeds. Compressed gas from the first-stage impeller is discharged through the interstage pipe to the second-stage impeller. Here, the refrigerant gas is again compressed, and then discharged into the condenser. Baffles within the condenser shell distribute the compressed refrigerant gas evenly across the condenser tube bundle. Cooling tower water circulated through the condenser tubes absorbs heat from the refrigerant, causing it to condense. The subcooled liquid refrigerant then flows out of the bottom of the condenser.

The liquid refrigerant is then split such that the primary flow is directed through one side of the brazed plate heat exchanger economizer, while a significantly smaller portion of the flow passes through an expansion valve, lowering refrigerant pressure and temperature before entering the secondary side of the BPHE as two-phase refrigerant. The heat transfer between the primary and secondary channels in the BPHE results in further subcooling of the primary liquid as it rejects heat to, and consequently superheats, the secondary flow. The additional subcooling of the liquid prior to expansion through the main electronically-controlled valve effectively increases the overall capacity of the evaporator. In addition, the superheated vapor bypasses the evaporator and first stage of compression (the secondary BPHE flow is added prior to the second stage of compression).

Figure 33. Refrigerant flow

Compressor Motor

Two magnetic bearing modules levitate and align the rotating assembly. The motor is permanent magnet type and is cooled by refrigerant gas sourced from the interstage pipe, metered through an orifice or electronic expansion valve, and routed through the bearing modules and motor windings.

Adaptive Frequency Drive

An Adaptive Frequency™ Drive (AFD) and control panel is provided on every chiller. Microprocessor-based unit control modules (Tracer® UC800) provide for accurate chilled water control as well as monitoring, protection, and adaptive limit functions. The "adaptive" nature of the controls intelligently prevents the chiller from operating outside of its limits, or compensates for unusual operating conditions, while keeping the chiller running rather than simply tripping due to a safety concern. When problems do occur, diagnostic messages assist the operator in troubleshooting.
Uninterruptible Power Supply

Agility™ chillers contain an on-line double-conversion Uninterruptible Power Supply (UPS) to ensure that the compressor’s magnetic bearing system continues to function in the event of a power failure. The UPS (2T5) provides power to the UC800 controls for 90 seconds while the compressor coasts to a stop. When line power fails, power is supplied to the UPS with an internal battery.

When power is removed, or if the chiller’s disconnect switch is turned off, the UPS will supply power to the UC800 controls for 90 seconds and then the UPS will de-activate. The UPS’s internal battery is not completely discharged so that when power is restored, the battery can provide enough power for additional shutdowns.

The UPS has a fault indicator that is wired to a UC800 controls Low Level Intelligent Device (LLID; 1K3). If the UPS indicates a fault, an immediate shutdown diagnostic will be announced on the UC800 controls. The following UPS issues could cause this diagnostic:

- EPO Protection
- Busbar Voltage Fault
- IGBT Over-Temperature
- Fan Fault
- Battery Fault
- Output Fault
- Multiple Inverting Fault

Evaporator and Condenser

Heat exchangers are shell and tube design. Standard tubes are externally finned, internally enhanced seamless copper with lands at all tube sheets. All tube sheets are made of carbon steel. Tubes are mechanically expanded into tube sheets and mechanically fastened to tube supports. Evaporator and condenser tubes are 0.75-in. (19.05-mm) diameter. All tubes can be individually replaced.

Shells are carbon steel plate. The evaporator is designed, tested, and stamped in accordance with ASME Code for refrigerant-side/working-side pressure of 200 psig (1379.0 kPaG). The condenser is designed, tested, and stamped in accordance with ASME Code for refrigerant-side/working-side pressure of 300 psig (2068.4 kPaG).

All water pass arrangements are available with grooved connections (150 psig [1034.2 kPaG] waterside working pressure). All connections may be either right- or left-handed. Waterside shall be hydrostatically tested at 1.5X design working pressure.

Drive Cooling System

The drive cooling system rejects heat through a hybrid air and fluid heat sink. The Adaptive Frequency™ Drive (AFD) controls the fan speed to reject some of the heat while the refrigerant expansion valve modulates to maintain a fluid supply temperature to reject the remaining heat.

Drive cooling circuit includes a wet rotor circulation pump that circulates a secondary heat transfer fluid in a closed system through the AFD heat sinks, output load inductor and a brazed plate heat exchanger. The pump is fed from a thermal expansion tank with a vented-pressure cap which is also used as the circuit pressure relief. The circuit also includes a particulate strainer and a drain valve for servicing.

Tracer AdaptiView Display

Information is tailored to operators, service technicians, and owners.

When operating a chiller, there is specific information you need on a day-to-day basis—setpoints, limits, diagnostic information, and reports.

Day-to-day operational information is presented at the display. Logically organized groups of information—chiller modes of operation, active diagnostics, settings, graphs, and reports put information conveniently at your fingertips. For more information, refer to Tracer AdaptiView Display for Water-cooled Agility Chillers Operations Guide (HDWA-SVU001*-EN).
Start-up and Shut-down

**Important:** Initial unit commissioning start-up must be performed by Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane products. Contractor shall provide Trane (or an agent of Trane specifically authorized to perform start-up) with notice of the scheduled start-up at least two weeks prior to the scheduled start-up.

Sequence of Operation
Adaptive control algorithms are used on Agility™ chillers. This section illustrates common control sequences.

Software Operation Overview Diagram
The following figure is a diagram of the five possible software states. This diagram can be thought of as a state chart, with the arrows and arrow text, depicting the transitions between states:
- The text in the circles is the internal software designations for each state.
- The first line of text in the circles is the visible top level operating modes that can be displayed in Tracer® AdaptiView™.
- The shading of each software state circle corresponds to the shading on the time lines that show the chiller’s state.

There are five generic states that the software can be in:
- Power Up
- Stopped
- Starting
- Running
- Stopping

Figure 34. Software operation overview
Figure 35. Sequence of operation: Tracer AdaptiView power up

In the following diagrams:

- The time line indicates the upper level operating mode, as it would be viewed in the Tracer® AdaptiView™.
- The shading color of the cylinder indicates the software state.
- Text in parentheses indicates sub-mode text as viewed in the Tracer® AdaptiView™.
- Text above the time line cylinder is used to illustrate inputs to the UC800. This may include user input to the Tracer® AdaptiView™ touch screen, control inputs from sensors, or control inputs from a generic BAS.
- Boxes indicate control actions such as turning on relays, or moving the inlet guide vanes.
- Smaller cylinders under the main cylinder indicate diagnostic checks.
- Text outside a box or cylinder indicates time-based functions.
- Dashed double arrows indicate variable timers.

**Power Up**

“Software Operation Overview Diagram,” p. 48 includes an illustration of Tracer® AdaptiView™ during a power up of the UC800. This process takes from 30 to 50 seconds depending on the number of installed options.
Power Up to Starting

The following figure shows the timing from a power up event to energizing the compressor. The shortest allowable time would be under the following conditions:

- All temperatures below their starting limits
- Evaporator and condenser water flowing
- Power up start delay setpoint set to 0 minutes
- Need to cool

The above conditions would allow for a minimum power up to starting compressor time of 45 seconds.

Figure 36. Sequence of events: power up to starting
**Stopped to Starting**

The stopped to starting diagram shows the timing from a stopped mode to energizing the compressor. The shortest allowable time would be under the following conditions:

- All temperatures below their starting limits
- Evaporator and condenser water flowing

The above conditions would allow the compressor to start in 45 seconds.

---

**Figure 37. Sequence of events: stopped to starting**

- **Chiller Mode Set to Auto**
- **Need to Cool (Satisfied Differential to Start)**
- **Waiting to Start**
- **Starting**

**Stopped or Run Inhibit**

- **Confirm Evaporator Water Flow (6 Second Filter)**
- **Energize Evaporator Water Pump Relay**
- **Confirm Evaporator Water Flow in 20 Minutes (6 Second Filter)**

**Restart Inhibit Temperature Checks:**
- Motor Winding Temp < 90% of the Motor Winding Temp Cutout
- AFD Heatsink Temp < 90% of the AFD Heatsink Temp Cutout
- MFC PCB Temp < 90% of the PCB Temp Cutout
- MBC Bearing Temps < 90% of Cutout

**Confirm Condenser Water Flow (6 Second Filter)**

**MBC Clearance Check and Levitate Bearings (~10 Seconds)**

**AFD Parking (~8 Seconds)**

**MBC Cooling Valve Closed**

**Economizer Valve Closed**

**Drive Cooling Valve Closed**

**Motor Cooling Valve Closed**

**IGV Closed (Except for Rapid Restart)**

**Evaporator EXV Pre-position**
Running

The following figure shows a typical running sequence.

Figure 38. Sequence of events: running
Satisfied Setpoint

The following figure shows the normal transition from running to shutting down due to the evaporator leaving water temperature falling below the differential to stop setpoint.

Figure 39. Sequence of events: satisfied setpoint
Normal Shutdown to Stopped or Run Inhibit

The following figure shows the transition from running through a normal (friendly) shutdown. The dashed lines on the top indicate the final mode if the stop is entered via various inputs.

Figure 40. Sequence of events: normal shutdown to stopped or run inhibit
Immediate Shutdown to Stopped or Run Inhibit

The following figure shows the transition from running through an immediate shutdown. The dashed lines on the top indicate the final mode if the stop is entered via various inputs.

**Figure 41. Sequence of events: immediate shutdown to stopped or run inhibit**

- Immediate Shut-down Non-Latching Diagnostic
- Immediate Shut-down Latching Diagnostic
- Immediate Stop
- Running Shutting Down
- Stopped

- Close IGV (0 to 50 Seconds)
- MBC Levitation Will Stop When RPM < 1200 for 60 Seconds
- De-Energize Compressor
- De-Energize Evap Water Pump Relay
- No Evap Pump Off Delay for Immediate Shutdown
- De-Energize Cond Water Pump
- Close Economizer EXV
- Close Motor Cooling Valve
- Close Drive Cooling Valve
- De-Levitate Magnetic Bearings
- Close MBC Valve
- Close Evaporator EXV

Run Inhibit
Run Inhibit or Stopped
AFD Mains Phase Loss

The following figure shows how the controls act in a power interruption event that the Adaptive Frequency™ Drive (AFD) diagnoses as a AFD Mains Phase Loss (MPL) diagnostic.

**Figure 42. Sequence of events: AFD mains phase loss**

- **Running**
- **Shutting Down**
- **Waiting to Start**
- **Starting Compressor**

- **“AFD Mains Phase Loss” From Drive (Controls Remain Powered)**
  - De-Energize Compressor
  - De-Energize Condenser Water Pump
  - Close Economizer EXV
  - Close Motor Cooling Valve (200 and 300 Ton Only)
  - Close Drive Cooling Valve
  - Close IGV

- **“AFD Mains Phase Loss” Cleared and Need to Cool**
  - Establish Condenser and Evaporator Water Flow (6 Second Filter)
  - Energize Condenser Water Pump Relay
  - Energize Evaporator Water Pump Relay
  - Evaporator EXV Pre-position

- **No Evap Pump Off Delay for Immediate Shutdown**
Ice Making (Running to Ice Making to Running)

The following figure shows the transition from normal cooling to ice making, and back to normal cooling.

Figure 43. Sequence of events: ice making (running to ice making to running)
Ice Making (Auto to Ice Making to Ice Making Complete)

The following figure shows the transition from auto to ice making, to ice making complete.

**Figure 44. Sequence of events: ice making (auto to ice making to ice making complete)**
Limit Conditions

The UC800 will automatically limit certain operating parameters during startup and run modes to maintain optimum chiller performance and prevent nuisance diagnostic trips. These limit conditions are noted in the following table.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running - Limit</td>
<td>The chiller, circuit, and compressor are currently running, but the operation of the chiller/compressor is being actively limited by the controls. Further information is provided by the sub-mode.</td>
</tr>
<tr>
<td>Condenser Pressure Limit</td>
<td>The circuit is experiencing condenser pressures at or near the condenser limit setting. The compressor will be unloaded to prevent exceeding the limits.</td>
</tr>
<tr>
<td>Evaporator Refrigerant Temperature Limit</td>
<td>The circuit is experiencing saturated evaporator temperatures at or near the Low Refrigerant Temperature Cutout setting. The compressors will be unloaded to prevent tripping.</td>
</tr>
<tr>
<td>Current Limit</td>
<td>The compressor is running and its capacity is being limited by high currents. The current limit setting is 100% RLA (to avoid overcurrent trips).</td>
</tr>
<tr>
<td>AFD Heat Sink Temperature Limit</td>
<td>This limit will unload the chiller if the communicated heat sink temperature approaches cutout.</td>
</tr>
<tr>
<td>Demand Limit</td>
<td>This limit allows the customer to control the maximum power into the chiller.</td>
</tr>
</tbody>
</table>

Control Panel Devices and Unit-Mounted Devices

Unit Control Panel

Safety and operating controls are housed in the unit control panel and the starter panel. The control panel operator interface is called Tracer® AdaptiView™ and is located on an adjustable arm connected to the side of the control panel. For more information about operating Tracer® AdaptiView™, refer to Tracer AdaptiView Display for Water-cooled Agility Chillers Operations Guide (HDWA-SVU001*-EN).

The control panel houses several other controls modules called panel-mounted Low Level Intelligent Devices (LLIDs), power supply, terminal block, fuse, circuit breakers, and transformer. The inter-processor communication (IPC) bus allows the communications between LLIDs and the UC800. Unit-mounted devices are called frame-mounted LLIDs and can be temperature sensors or pressure transducers. The MODBUS® master connection on the UC800 provides communication to the TR200 AFD and to the Magnetic Bearing Controller (MBC). These and other functional switches provide analog and binary inputs to the control system.

User-defined Language Support

Tracer® AdaptiView™ is capable of displaying English text or any of 26 other languages (27 total languages). Switching languages is simply accomplished from a Language Settings menu. The following languages are available:

- Arabic (Gulf Regions)
- Chinese—China
- Chinese—Taiwan
- Czech
- Dutch
- English
- French
- French (Canada)
- German
- Greek
- Hebrew
- Hungarian
- Indonesian
- Italian
- Japanese
- Korean
- Norwegian
- Polish
- Portuguese (Portugal)
- Portuguese (Brazil)
- Russian
- Romanian
- Spanish (Europe)
- Spanish (Latin America)
- Swedish
- Thai
- Turkish
Unit Start-up and Shut-down Procedures

**WARNING**
Live Electrical Components!
Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.
When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

**WARNING**
Asphyxiation Hazard!
A significant release of refrigerant into a confined space could displace available oxygen to breathe and cause possible asphyxiation. Failure to follow instructions below could result in death or serious injury.
Should a refrigerant release occur, evacuate the area immediately and contact the appropriate rescue or response authority.
- Do not run evaporator water pump longer than 30 minutes after the chiller is shut down.
- Ensure that the evaporator is isolated from the hot water loop before changeover to heating mode.
The relief device is designed to relieve and discharge the refrigerant from the unit if the pressure in the evaporator exceeds 200 psig (1379.0 kPaG) on the evaporator or 300 psig (2068.4 kPaG) on the condenser.

Unit Start-up

**NOTICE**
Equipment Damage!
Failure to follow instructions could result in equipment damage.
Ensure that the Uninterruptible Power Supply (UPS) has been operating properly for a minimum of 10 hours before starting.

If required, after the system has been operating for approximately 30 minutes and has become stabilized, complete the remaining start-up procedure, as follows:
1. Check evaporator and condenser refrigerant pressures under Condenser and Evaporator Reports on the Tracer® AdaptiView™. The pressures are referenced to sea level (14.6960 psia [101.3254 kPaA]).

Temporary Shut-down and Restart
To shut down for a short time, use the following procedure:
1. Press the STOP key on the Tracer® AdaptiView™.
2. UC800 pump control will turn off the pump (after a optional water pump delay time) when the STOP key is pressed and automatically restart the pump when the “Auto” key is pressed.
3. The unit will start normally, provided the following conditions exist:
   a. The UC800 receives a call for cooling and the differential-to-start is above the setpoint.
   b. All system operating interlocks and safety circuits are satisfied.

Extended Unit Shut-down
1. Perform the normal unit stop sequence using the STOP key.

   **Note:** Unless the water bundles are valved off and drained, chiller power should remain ON at all times to allow the magnetic bearings to levitate the rotor in case water flow-driven rotation should occur. Trane recommends leaving the power on to maintain the Uninterruptible Power Supply (UPS) battery.

2. Verify the chilled water and condenser water pumps are cycled off. If desired, open disconnect switches to the pumps.
3. Drain the condenser piping and cooling tower.
4. Remove the drain and vent plugs from the condenser headers to drain the condenser.
5. After the unit is secured, perform the maintenance identified in the following sections.

Seasonal Unit Start-up
1. Close all drain valves and reinstall the drain plugs in the evaporator and condenser headers.
2. Service the auxiliary equipment according to the start-up and maintenance instructions provided by the respective equipment manufacturers.
3. Vent and fill the cooling tower, if used, as well as the condenser and piping. At this point, all air must be removed from the system (including each pass). Then, close the vents in the condenser chilled water circuits.
4. Open all of the valves in the evaporator chilled water circuit.
5. If the evaporator was previously drained, vent and fill the evaporator and chilled water circuit. After all air is removed from the system (including each pass), install the vent plugs in the evaporator waterboxes.
**NOTICE**

Equipment Damage!
Failure to follow instructions could result in equipment damage.
Ensure that the Uninterruptible Power Supply (UPS) has been operating properly for a minimum of 10 hours before starting.

6. Check the adjustment and operation of each safety and operating control.
7. Close all disconnect switches.
8. Perform instructions listed in “Unit Start-up,” p. 60.
Maintenance

⚠️ WARNING
Hazardous Voltage w/Capacitors!
Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer’s literature for allowable waiting periods for discharge of capacitors. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.
For additional information regarding the safe discharge of capacitors, see PROD-SVB06*-EN.

Recommended Maintenance

Weekly
While the unit is running in stable conditions:
☐ Log the chiller.
☐ Check evaporator and condenser pressures with gauges and compare to the reading on the Tracer® AdaptiView™ or Tracer® TU service tool. Pressure readings should fall within operating ranges specified in the following tables. If chiller measurements vary significantly from values listed in the following tables, problems may exist with refrigerant charge levels. Contact your local Trane Service Agency.

Note: Optimum condenser pressure is dependent on condenser water temperature, and should equal saturation pressure of refrigerant at a temperature 2°F to 5°F (1.1°C to 2.8°C) above that of leaving condenser water at full load.

Monthly
☐ Review operating log.
☐ Clean all water strainers in both the chilled and condensing water piping systems.

Annual
Contact your local Trane Service Agency to shut down the chiller once each year and perform the following:
☐ Perform all weekly and monthly maintenance procedures.
☐ Leak check the chiller, inspect safety controls, and inspect electrical components, such as magnetic bearing controller and Uninterruptible Power Supply (UPS).
☐ Inspect all piping components for leakage and/or damage. Clean out any in-line strainers.
☐ Clean and repaint any areas that show signs of corrosion.
☐ Inspect vent piping of all relief valves for presence of refrigerant to detect improperly sealed relief valves.
☐ Inspect the condenser tubes for fouling. Clean if necessary; refer to “Cleaning the Condenser,” p. 63.
☐ Visually inspect waterbox hinges to ensure that hinges have not been damaged or altered.

Note: If, after 10 years, the battery has not been replaced, Trane recommends replacing the battery.

Other
☐ Use a nondestructive tube test to inspect the condenser and evaporator tubes at 3-year intervals.

Note: It may be desirable to perform tube tests on these components at more frequent intervals, depending upon chiller application. This is especially true of critical process equipment.

Ask your Sales account manager for a copy of engineering bulletin (CTV-PRB024*-EN) for clarification of the role of eddy current testing in chiller maintenance by providing information about eddy current technology and heat exchanger tubing.

☐ Depending on chiller duty, contact your local Trane Service Agency to determine when to conduct a complete examination of the unit to determine the condition of the compressor and internal components.

Maintenance Procedures

Drive Cooling System

NOTICE
Equipment Damage!
Use of unapproved fluids, or dilution of approved fluid, could result in catastrophic equipment damage.
Use only Trane Heat Transfer Fluid P/N CHM01023. This fluid is a direct use concentration and is not to be diluted. Do not top off with water or any other fluid.
Service Intervals

<table>
<thead>
<tr>
<th>Interval</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 years</td>
<td>Drain and replace the drive cooling fluid</td>
</tr>
<tr>
<td>5 years</td>
<td>Replace the fluid strainer when servicing the fluid</td>
</tr>
<tr>
<td>Yearly</td>
<td>Perform a fluid pH test.</td>
</tr>
</tbody>
</table>

Unit Diagnostics

An improperly filled drive cooling system (either low fluid level or entrapped air in the circuit) can result in the AFD or output filter overheating. This condition may result in the following diagnostics:

- AFD Fault
- Loss of Drive Cooling Control

If chiller diagnostics indicate a drive cooling system problem, contact your local Trane Service Agency.

pH Test

Obtain a sample of fluid from the drive cooling loop via the loop drain located near the discharge of the pump. Test for pH level using litmus paper with a 0.5 resolution.

- pH < 8 indicates fluid to be changed

Pressure Relief Cap

The pressure relief cap is an automotive style pressure-vent radiator cap; refer to the following figure. The setting for the relief spring is 16 lb (7.3 kg). The function of the relief cap can be verified with a standard automotive radiator cap tester.

Drive Cooling Expansion Tank

Proper fluid level is important to the operation of the unit. To verify proper level, inspect the liquid level in the fluid reservoir (located on the left side of the electrical panel); refer to the following figure for fluid levels under various temperature conditions.

Cleaning the Condenser

Condenser tube fouling is suspect when the “approach” temperature (i.e., the difference between
the refrigerant condensing temperature and the leaving condenser water temperature) is higher than predicted.

Condenser tube fouling is indicated when the approach temperature (the difference between the condensing refrigerant temperature and the leaving condenser water temperature) is higher than predicted. Refer to sales order selection data for approach temperatures.

*Note:* Glycol in the water system typically doubles the standard approach.

If the annual condenser tube inspection indicates that the tubes are fouled, two cleaning methods (mechanical or chemical) can be used to rid the tubes of contaminants. The methods are described in the following sections.

**Mechanical Cleaning**

Mechanical tube cleaning is used to remove sludge and loose material from smooth-bore condenser tubes.

### **WARNING**

#### Heavy Objects!

**Failure to properly lift waterbox could result in death or serious injury.**

Each of the individual cables (chains or slings) used to lift the waterbox must be capable of supporting the entire weight of the waterbox. The cables (chains or slings) must be rated for overhead lifting applications with an acceptable working load limit. Refer to the table for waterbox weights.

**Waterbox Removal**

Review mechanical room limitations and determine the safest method or methods of rigging and lifting the waterboxes.

**Important:**

- Do NOT rotate waterboxes.
- Be sure to replace water boxes right-side-up to maintain proper baffle orientation. Use new O-rings.
- If the waterbox is reversed, be sure to match mark on the baffle and waterbox to ensure that they are aligned.

1. Determine the size of chiller being serviced. See unit nameplate located on chiller control panel.
2. Use a 3/8-in. (9.5-mm) rigging shackle for waterbox removal as shown in the following figure. The rated lifting capacity of the selected lift connection device must meet or exceed the published weight of the waterbox. Refer to the tables in “Waterbox Reassembly,” p. 65.
3. Install rigging shackle onto the lifting connection on the waterbox.
4. Disconnect water pipes, if connected.
5. Match mark on the waterbox and the baffle to ensure that they are aligned.
6. Remove waterbox bolts.

### **WARNING**

#### Overhead Hazard!

**Failure to follow instructions could result in death or serious injuries.**

Never stand below or in close proximity to heavy objects while they are suspended from, or being lifted by, a lifting device in case the object drops.

7. Lift the waterbox away from the shell.
8. Store the waterbox in a safe and secure location and position.
9. Work a round nylon or brass bristled brush (attached to a rod) in and out of each of the condenser water tubes to loosen the sludge.
10. Thoroughly flush the condenser water tubes with clean water.

*Note:* To clean internally enhanced tubes, use a bi-directional brush or consult a qualified service organization for recommendations.
Waterbox Reassembly

After service is complete, the waterbox should be reinstalled on the shell following removal procedures in reverse (refer to “Waterbox Removal,” p. 64). After thoroughly cleaning each joint, use new O-rings on ALL joints. Torque waterbox bolts in a star pattern to 163 ft-lb (221.0 N·m) dry.

Table 17. Waterbox weights

<table>
<thead>
<tr>
<th>Shell Size</th>
<th>Description</th>
<th>Fabricated Non-marine Waterbox Welded Dome</th>
<th>Marine Waterbox Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>lb</td>
<td>kg</td>
</tr>
<tr>
<td>020</td>
<td>Condenser Supply</td>
<td>145</td>
<td>65.8</td>
</tr>
<tr>
<td></td>
<td>Evaporator Supply</td>
<td>170</td>
<td>77.1</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>100</td>
<td>45.4</td>
</tr>
<tr>
<td>040</td>
<td>Condenser Supply</td>
<td>210</td>
<td>95.3</td>
</tr>
<tr>
<td></td>
<td>Evaporator Supply</td>
<td>245</td>
<td>111.1</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>145</td>
<td>65.8</td>
</tr>
</tbody>
</table>

*Note:* Each optional waterbox hinge weighs 44 lb (19.94 kg)

Obtain the required parts from your local Trane Parts Center.

Chemical Cleaning

Scale deposits are best removed by chemical means. Consult a qualified water treatment specialist (i.e., one that knows the local water supply chemical/mineral content) for a recommended cleaning solution suitable for the job. (A standard condenser water circuit is composed solely of copper, cast iron and steel.) Improper chemical cleaning can damage tube walls.

All of the materials used in the external circulation system, the quantity of the solution, the duration of the cleaning period, and any required safety precautions should be approved by the company furnishing the materials or performing the cleaning.

*Note:* Chemical tube cleaning should ALWAYS be followed by mechanical tube cleaning.

Cleaning the Evaporator

Because the evaporator is typically part of a closed circuit, it does not accumulate appreciable amounts of scale or sludge. However, if cleaning is deemed necessary, use the same cleaning methods described in “Cleaning the Condenser,” p. 63.

Waterbox Hinges

The hinged waterbox option is available for the evaporator, the condenser, or both. This option can be ordered with the hinge only on the evaporator and/or only on the condenser; however, the hinges MUST be ordered for both ends of the evaporator and/or the condenser.

The hinged waterbox option does NOT require annual maintenance or lubrication, although a visual inspection is recommended to ensure that the hinges have not been damaged or altered. For assembly and disassembly of hinges, please refer to HDWA-SVN001*-EN.

Adaptive Frequency Drive Periodic Maintenance and Inspection

Adaptive Frequency™ Drive (AFD) periodic maintenance and inspections should be performed every 1–12 months, depending on operating environment.
Visual Inspection—Power Removed

**WARNING**

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer’s literature for allowable waiting periods for discharge of capacitors. Verify with a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

*For additional information regarding the safe discharge of capacitors, see PROD-SVB06*-EN.*

1. Ensure the door interlocks are present and working.
2. Verify the safety ground connections to the door panels are securely connected.
3. Inspect power wire cables and devices to assure no abrasion is occurring from vibrations against chassis of cabinets, or other edges.
4. Ensure the drive interior and exterior is clear of any dust or debris. Fans, vents, etc. must be clean.
   
   **Important:** Only use a vacuum for cleaning. Do NOT use compressed air.
5. Inspect the interior of the drive for any signs of moisture entry or leakage.
6. Visually inspect all drive components and wiring. Look for signs of heat or failure (look for swelled or leaking capacitors, discolored reactors or inductors, broken pre-charge resistors, smoke or arc trails on MOVs and capacitors, etc.).
7. Closely inspect the motor terminal board for any signs of leakage, arcing, etc..
8. Check ALL cable/lug/terminal connections inside the drive enclosure. Ensure all are clean and tight, and not rubbing against each other anywhere.
9. Test pH levels annually. Replace fluid as necessary, or every 5 years.
10. Remove and clean electrical panel air filters.

Operational Inspection—Power Applied

**WARNING**

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

1. Verify the drive cabinet cooling fans are operating. This should be done from outside the enclosure, by looking into the cabinet at door and cabinet vents, to avoid electrical hazards.
   
   **Note:** The power module fan comes on with power. Other fans cycle with drive operation.
2. Check historic fault codes using Adaptive Frequency™ Drive (AFD) control panel (LCP).
   
   **Note:** The AFD control panel is used ONLY for service and should never be used for machine operation.
3. Check configuration settings and confirm all proper settings are still present in the controls.
4. Review the diagnostic history.
5. Make Chiller Service report to document all setpoints.
6. Check the UC800 alarm histories for any indications of operational problems.
Wiring

The following tables provide lists of field wiring diagrams, electrical schematics, and connection diagrams for Agility™ chillers. To determine the specific electrical characteristics of a particular chiller, refer to the nameplates mounted on the units.

Table 18. Wiring drawings

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2311-4987</td>
<td>Diagram—Schematic Wiring; Standard</td>
</tr>
<tr>
<td>2311-4988</td>
<td>Diagram—Field Wiring; Harmonic Filter</td>
</tr>
<tr>
<td>2311–4989</td>
<td>Diagram — Schematic Wiring; Autotransformer</td>
</tr>
<tr>
<td>2311–4919</td>
<td>Diagram — Field Wiring; Unit-mounted Low Voltage AFD (240–678A Range)</td>
</tr>
</tbody>
</table>
Appendix A: Forms and Check Sheets

The following forms and check sheets are included for use with Trane start-up of HDWA Agility™ chillers. Forms and check sheets are used, as appropriate, for installation completion verification before Trane start-up is scheduled, and for reference during the Trane start-up.

Where the form or check sheet also exists outside of this publication as standalone literature, the literature order number is also listed.

- “Appendix B: Agility™ Chiller Installation Completion and Request for Trane Service,” p. 69 (HDWA-ADF001*-EN)
- “Appendix C: Settings,” p. 71
- “Appendix D: Operator Log,” p. 73

Unit Start-up/Commissioning

Important: Start-up must be performed by Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products. Contractor shall provide Trane (or an agent of Trane specifically authorized to perform start-up) with notice of the scheduled start-up at least two weeks prior to the scheduled start-up.
Appendix B: Agility™ Chiller Installation Completion and Request for Trane Service

**Important:** A copy of this completed form must be submitted to the Trane Service Agency that will be responsible for the start-up of the chiller. Start-up will NOT proceed unless applicable items listed in this form have been satisfactorily completed.

**TO:**
**TRANE SERVICE OFFICE:**
**S.O. NUMBER:**
**SERIAL NUMBERS:**
**JOB/PROJECT NAME:**
**ADDRESS:**

The following items are being installed and will be completed by:

**Important:** Start-up must be performed by Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products. Contractor shall provide Trane (or an agent of Trane specifically authorized to perform start-up) with notice of the scheduled start-up at least two weeks prior to the scheduled start-up. *Equipment not started by Trane is not warranted by Trane.*

Check box if the task is complete or if the answer is “yes”.

1. **Agility™ Chiller**
   - Installation meets foundation requirements.
   - In place and piped.
   - Isolation pads installed.
   **Note:** Do not insulate the Agility™ chiller or adjacent piping prior to the chiller commissioning by Trane service personnel. The contractor is responsible for any foreign material left in the unit.

2. **Piping**
   - Chilled water piping connected to:
     - Evaporator
     - Air handling units
     - Pumps
     - Flow switch or flow proving device installed (if not factory-provided)
   - Condenser piping connected to:
     - Condenser
     - Pumps
     - Flow switch or flow proving device installed (if not factory-provided)

3. **Flow balancing valves installed**
   - Leaving chilled water
   - Leaving condenser water
   - Proper porting to measure flow and balance

4. **Gauges, thermometers, and air vents**
   - Installed on both sides of evaporator
   - Installed on both sides of condenser

5. **Wiring**
   - Wire size per submittal and NEC 310-16
   - Full power available
   - External interlocks (flow switch, pumps auxiliary, etc.)
   - Chilled water pump (connected and tested)
   - Condenser water pump (connected and tested)
   - Cooling tower fan rotation checked
   - 115 Vac power available for service tools (as required)
   - All controls installed and connected
   - If unit was disassembled for installation, all interconnecting wiring reinstalled
   - For CVHS and CVHM chillers, indicate type of power distribution grounding:
     - Solidly Grounded (Center Ground Wye)
     - Non-Solidly Grounded (Any Delta, High
6. Testing
☐ Dry nitrogen available for pressure testing
☐ Trace gas amounts of R-134a available for leak testing (if necessary)

7. Refrigerant
☐ Refrigerant on job site and in close proximity to chiller (if shipped separately)

   Total amount in cylinders/drums:
   __________ (specify lb or kg) and fill in specifics below:
   Number of cylinders/drums _____ of size _____ (specify lb or kg)
   Number of cylinders/drums _____ of size _____ (specify lb or kg)

   Note: After commissioning is complete, it is the installer’s responsibility to transport empty refrigerant containers to an easily accessible point of loading to facilitate container return or recycling.

8. System
☐ Systems can be operated under all design selection points to verify proper operation.

9. Equipment room
☐ Does the equipment room have a refrigerant monitor/sensor capable of monitoring and alarming within the allowable exposure level of the refrigerant?
☐ Does the installation have properly placed and operating audible and visual refrigerant alarms?
☐ Does the equipment room have proper mechanical ventilation?
☐ If it is required by local code, is a self-contained breathing apparatus available?
☐ Does the equipment room meet environmental condition requirements specified in the chiller Installation, Operation, and Maintenance manual?

10. Owner awareness
☐ Has the owner been fully instructed on the proper use and handling of refrigerant?
☐ Does the owner have a copy of the MSDS for refrigerant?

   Note: Additional time required to properly complete the start-up and commissioning, due to any incompleteness of the installation, will be invoiced at prevailing rates.

This is to certify that the Trane equipment has been properly and completely installed, and that the applicable items listed above have been satisfactorily completed.

Checklist Completed by
(Print Name):
SIGNATURE:
DATE:

In accordance with your quotation and our purchase order number ______________, we therefore require the presence of Trane service on this site, for the purpose of start-up and commissioning, by ______________ (date).

   Note: Minimum of two week advance notification is required to allow for scheduling of the chiller start-up.

   ADDITIONAL COMMENTS/INSTRUCTIONS

   Note: A copy of this completed form must be submitted to the Trane Service Agency that will be responsible for start-up of chiller.
## Appendix C: Settings

<table>
<thead>
<tr>
<th>Chiller Settings</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setpoint Source</td>
<td></td>
</tr>
<tr>
<td>Front Panel Hot Water Command</td>
<td></td>
</tr>
<tr>
<td>Front Panel Chilled Water Setpoint</td>
<td></td>
</tr>
<tr>
<td>Front Panel Hot Water Setpoint</td>
<td></td>
</tr>
<tr>
<td>Front Panel Ice Building Command</td>
<td></td>
</tr>
<tr>
<td>Front Panel Ice Termination Setpoint</td>
<td></td>
</tr>
<tr>
<td>Ice to Normal Cooling Timer Setpoint</td>
<td></td>
</tr>
<tr>
<td>Front Panel Demand Limit Setpoint</td>
<td></td>
</tr>
<tr>
<td>Front Panel Base Loading Setpoint</td>
<td></td>
</tr>
<tr>
<td>Front Panel Base Loading Command</td>
<td></td>
</tr>
<tr>
<td>Differential to Start</td>
<td></td>
</tr>
<tr>
<td>Differential to Stop</td>
<td></td>
</tr>
<tr>
<td>Condenser Water Pump Off Delay</td>
<td></td>
</tr>
<tr>
<td>Evaporator Water Pump Off Delay</td>
<td></td>
</tr>
<tr>
<td>Evap Low Water Flow Warning Setpoint</td>
<td></td>
</tr>
<tr>
<td>Power-Up Start Delay</td>
<td></td>
</tr>
<tr>
<td>Chiller Power Demand Time Period</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service Settings</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Evaporator Water Temp Cutout</td>
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<td>Low Refrigerant Temperature Cutout</td>
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<td>Local Atmospheric Pressure</td>
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<td>BAS Setpoint Power Loss Store Enable</td>
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<td>Capacity Control Softload Time</td>
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<td>Demand Limit Softload Time</td>
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<td>Demand Limit Startup Target</td>
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<td>Condenser Pressure Limit Setpoint</td>
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<th>Feature Settings</th>
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<td>External Demand Limit Setpoint Enable</td>
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<td>Ice Building Feature Enable</td>
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<td>Security</td>
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<td>Return Water Maximum Reset</td>
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<td>Outdoor Air Reset Ratio</td>
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<td>Outdoor Air Start Reset</td>
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<td>Outdoor Air Maximum Reset</td>
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## Appendix C: Settings

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<td>Condenser Water Pump Override</td>
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<td>Manual Capacity Control</td>
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<td>Clear Energy Consumption</td>
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<tr>
<td>Time</td>
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<td>UTC Offset</td>
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<td>Summer Time</td>
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Appendix D: Operator Log

Note: An Operator Log can be captured by using the “Logsheat Report” found on the Tracer® AdaptiView™ display; refer to the following figures.

Figure 48. Reports, Log Sheet button highlighted

Figure 49. Sample Agility chiller Log Sheet
# Appendix D: Operator Log

<table>
<thead>
<tr>
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<tr>
<td>Evaporator Saturated Refrigerant Temp</td>
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<td>Evaporator Refrigerant Pressure</td>
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<td>Evaporator Approach Temperature</td>
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<tr>
<td>Evaporator Water Flow Status</td>
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<td>Approx Evap Water Flow</td>
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<tr>
<td>Evap Differential Wtr Press</td>
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<td>Evaporator EXV Percent Open</td>
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<tr>
<td><strong>Condenser</strong></td>
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<td>Condenser Entering Water Temperature</td>
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<tr>
<td>Condenser Leaving Water Temperature</td>
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</tr>
<tr>
<td>Condenser Saturated Refrigerant Temp</td>
<td></td>
</tr>
<tr>
<td>Condenser Refrigerant Pressure</td>
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<td>Condenser Approach Temperature</td>
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<tr>
<td>Condenser Water Flow Status</td>
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<td>Approx Cond Water Flow</td>
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<td>Cond Differential Wtr Press</td>
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<td>Condenser Refrigerant Liquid Level</td>
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<td><strong>Compressor</strong></td>
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<td>Compressor Starts</td>
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<td>Chiller Load Command</td>
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<tr>
<td>Compressor Bearing Temperature 1</td>
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<td>Compressor Bearing Temperature 2</td>
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<tr>
<td>AFD Motor Current U % RLA</td>
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<tr>
<td>AFD Motor Current V % RLA</td>
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<tr>
<td>AFD Motor Current W % RLA</td>
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<td>AFD Motor Current U</td>
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<td>AFD Motor Current V</td>
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<td>Motor Winding Temp #2</td>
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<td>Motor Temperature</td>
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<td>AFD Percent Speed</td>
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<td>AFD Heatsink Temperature</td>
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