

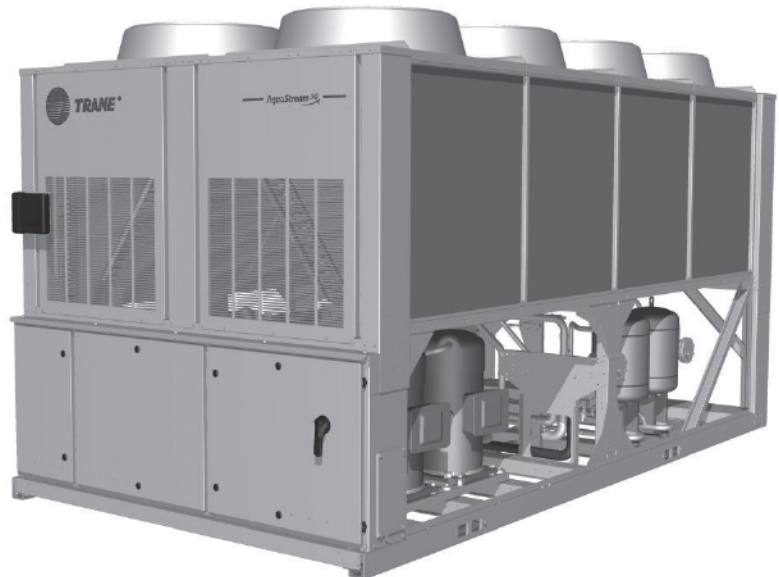


TRANE®

*Cooling and Heating
Systems and Services*

Installation Operation Maintenance

**AquaStream™ 3G air-cooled liquid
chillers
Models CXAM**



CG-SVX24B-E4

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General information

Foreword

These instructions are given as a guide to good practice in the installation, start-up, operation, and maintenance by the user, of Trane CXAM chillers. They do not contain full service procedures necessary for the continued successful operation of this equipment. The services of a qualified technician should be employed through the medium of a maintenance contract with a reputable service company. Read this manual thoroughly before unit start-up.

Units are assembled, pressure tested, dehydrated, charged and run tested before shipment.

Warnings and cautions

Warnings and Cautions appear at appropriate sections throughout this manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The constructor assumes no liability for installations or servicing performed by unqualified personnel.

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, may result in minor or moderate injury. It may also be used to alert against unsafe practices or for equipment or property-damage-only accidents.

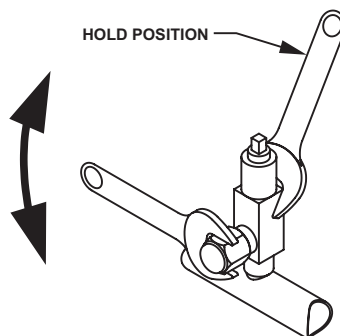
Safety recommendations

To avoid death, injury, equipment or property damage, the following recommendations should be observed during maintenance and service visits:

1. The maximum allowable pressures for system leak testing on low and high pressure side are given in the chapter "Installation". Always provide a pressure regulator.
2. Disconnect the main power supply before any servicing on the unit.
3. Service work on the refrigeration system and the electrical system should be carried out only by qualified and experienced personnel.

Proper servicing of the service valves is required. Use a backup wrench as shown in Figure 1 when loosening or tightening the service valve cap.

Figure 1 - Servicing of service valves



Reception

On arrival, inspect the unit before signing the delivery note.

Reception in France only:

In case of visible damage: The consignee (or the site representative) must specify any damage on the delivery note, legibly sign and date the delivery note, and the truck driver must countersign it. The consignee (or the site representative) must notify Trane Epinal Operations - Claims team and send a copy of the delivery note. The customer (or the site representative) should send a registered letter to the last carrier within 3 days of delivery.

Note: for deliveries in France, even concealed damage must be looked for at delivery and immediately treated as visible damage.

Reception in all countries except France:

In case of concealed damage: The consignee (or the site representative) must send a registered letter to the last carrier within 7 days of delivery, claiming for the described damage. A copy of this letter must be sent to Trane Epinal Operations - Claims team.

Warranty

Warranty is based on the general terms and conditions of the manufacturer. The warranty is void if the equipment is repaired or modified without the written approval of the manufacturer, if the operating limits are exceeded or if the control system or the electrical wiring is modified. Damage due to misuse, lack of maintenance or failure to comply with the manufacturer's instructions or recommendations is not covered by the warranty obligation. If the user does not conform to the rules of this manual, it may entail cancellation of warranty and liabilities by the manufacturer.

General information

The following pictograms can be found on the unit. Take necessary precautions to avoid damage and injury.

Figure 2 - Warning pictograms



- 1 = Risk that unit is powered up
- 2 = Risk hazard due to fan rotation
- 3 = Risk hazard of burns on compressors or refrigeration piping
- 4 = Unit contains refrigerant gas. See specific warnings.
- 5 = Risk of residual voltage when speed drive or softstarter options are present
- 6 = Unit under pressure
- 7 = Risk to cut, particularly on heat exchanger fins
- 8 = Read instructions before installation
- 9 = Disconnect all electric power before servicing
- 10 = Read technical instructions

Refrigerant

The refrigerant provided by the manufacturer meets all the requirements of our units. When using recycled or reprocessed refrigerant, it is advisable to ensure its quality is equivalent to that of a new refrigerant. For this, it is necessary to have a precise analysis made by a specialized laboratory. If this condition is not respected, the manufacturer warranty could be cancelled.

Environmental Protection / Compliance with F-Gas regulation

This equipment contains a fluorinated gas covered by the Kyoto Protocol [or an ozone depleting substance covered by Montreal Protocol]. The type and quantity of refrigerant per circuit is indicated on the product nameplate. The Global Warming Potential of the refrigerant implemented in Trane Air Conditioning and Refrigeration Equipment is presented in the table by type of refrigerant.

Refrigerant type	GWP (1) value
R134a	1 300
R407C	1 653
R410A	1 975
R404A	3 784
R22 (2)	1 780

The operator (contractor or end user) must check local environmental regulations impacting installation, operation and disposal of the equipment; in particular need to recover environmentally harmful substances (refrigerant, oil, antifreeze agents, etc.) Do not vent into the atmosphere any refrigerant. The handling of refrigerant shall be fulfilled by a qualified service engineer.

(1) GWP = global warming potential
(2) Covered by Montreal Protocol

Maintenance contract

It is strongly recommended that you sign a maintenance contract with your local Service Agency. This contract provides regular maintenance of your installation by a specialist in our equipment. Regular maintenance ensures that any malfunction is detected and corrected in good time and minimizes the possibility that serious damage will occur. Finally, regular maintenance ensures the maximum operating life of your equipment. We would remind you that failure to respect these installation and maintenance instructions may result in immediate cancellation of the warranty.

Training

To assist you in obtaining the best use of it and maintaining it in perfect operating condition over a long period of time, the manufacturer has at your disposal a refrigeration and air conditioning service school. The principal aim of this is to give operators and technicians a better knowledge of the equipment they are using, or that is under their charge. Emphasis is particularly given to the importance of periodic checks on the unit operating parameters as well as on preventive maintenance, which reduces the cost of owning the unit by avoiding serious and costly breakdown.

Model number

Unit nameplate

The unit nameplates are applied to the exterior surface of the control panel door. A compressor nameplate is located on each compressor.

The unit nameplate provides the following information:

- Unit model and size descriptor.
- Unit serial number
- Identifies unit electrical requirements.
- Lists correct operating charges of R410A and refrigerant oil.
- Lists unit test pressures

Figure 3 - Unit nameplate

TYPE	[]		
①	CRC	N° SERIE ②	CCYY
	[]	[]	[]
	N° ORGANISME NOTIFIE ③		
	[]		[]
	QTE-QTY	V / Hz / Ph	A max / FLA
	C1 []	[]	[]
	C2 []		[]
	[]		[]
	[]		[]
CONTROLE – CONTROL		[]	VA
INTENSITE DEMARRAGE – STARTING AMPS		[]	
FLUIDE ④	[]	kg	+
	[]	kg	
	[]	C1/C2 []	l
PS	BP-LP []	bar	HP-HP []
		bar	

EN / DE / IT / ES / DA / FI / NL / NO / PT / SV / CZ / PO / HU / EL / HR / SK / SL / TR / ET / LT / LV / BG / RO / RU / UK

① Type / Тип / Tipo / Type / Τυπός / Type / Type / Tipo / Typ / Typ / Typ / Típus / Τύπου / Tip / Tytu / Tip / Tüüp / Típas / Típs / тина / тип / тип

② Serial nb / Serienummer / Numero di serie / Numero de serie / Serienummer / Sarjanumero / Serienummer / Serienummer / Numero di serie / Tillverkningsnummer / Sérvjové číslo / Number fabryczny / Sorozat szám / Αριθμός σειράς / Serijski broj / výrobné číslo / Serijska številka / Seri no / Seeria number / Serijinis numeris / Sérijas Nr. / заводски номер, / numărul de fabricație / серийный номер / серийний номер

③ Notified body / Benannte Stelle / Organismo notificato / Organismo notificado / Bemyndiget organ / Ilmottettujen laitosten / Aangemelde Instantie / Ramme nr. / Organismo notificado / Anmält organ / Autorizovaná osoba / Organizacja notyfikowana / Regisztráció száma / Σώμα γνωστοποίησης / Ovlaštена osoba / Oboznámený orgán / Pooblaščena oseba / Kurum Onay No / Katsetav osa / Notifikuota organizacija / pilnvarotā iestāde / нотифицирования орган / organismului notificat / уполномоченный орган / уповноважена особа

④ Fluid / Fluide / Fluido / Fluido / Fluidum / Fluidi / Stof / Kuldemedium / Fluido / Fluid / Kapalina / Czynniki / Közeg / ρευστό / Medij / tekutin / Tekočina / Akiskan / Vedelik / Šaldymo agentas / Šķidrums / флуиди / Fluid / жидкость / рідина

88130 CHARMES – FRANCE
For TRANE BVBA

CE

X39001421-001 / A5

Model number

Digit 1-4 — Chiller Model

CXAM = Air-Cooled Scroll
Packaged Chiller

Digit 5-7 — Unit Nominal Tonnage

020 = 20 Tons
023 = 23 Tons
026 = 26 Tons
030 = 30 Tons
035 = 35 Tons
039 = 39 Tons
040 = 40 Tons
045 = 45 Tons
046 = 46 Tons
050 = 50 Tons
052 = 52 Tons
060 = 60 Tons
070 = 70 Tons
080 = 80 Tons
090 = 90 Tons
100 = 100 Tons
110 = 110 Tons
120 = 120 Tons
140 = 140 Tons
150 = 150 Tons
160 = 160 Tons
170 = 170 Tons

Digit 8 — Unit Voltage

E = 400 Volt 50 Hz 3 Phase

Digit 9 — Manufacturing Plant

1 = Epinal, France

Digit 10-11 — Design Sequence

A-Z = Factory/ABU Assigned

Digit 12 — Unit Type

1 = Standard Efficiency/
Performance
2 = High Efficiency/Performance

Digit 13 — Agency Listing

B = CE Certification (EUR)

Digit 14 — Pressure Vessel Code

4 = Europe Standard

Digit 15 — Unit Application

E = Standard Ambient heat pump
cooling mode (7-46 °C)

F = Low ambient heat pump
cooling mode (-10 to 46 °C)

Digit 16 — Refrigerant Isolation Valves

1 = No Isolation Valves

Digit 17

A

Digit 18 — Freeze Protection (Factory-Installed Only)

X = Without Freeze Protection

2 = With Freeze Protection
(CH530 Control)

Digit 19 — Insulation

A = Factory Insulation - All Cold
Parts

Digit 20 — Factory Charge

1 = Full Factory Refrigerant
Charge (HFC-410A)

Digit 21 — Evaporator Application

A = Standard Cooling
(5.5 to 18°C)

B = Low Temperature Processing
(lower than 5.5°C)

C = Ice-Making - hardwired
interface (-7 to 18°C)

Digit 22 — Water Connection (Evap)

1 = Grooved Pipe Connection

2 = Grooved Pipe with Flange
Adapter

Digit 23 — Condenser Fin Material

E = Non-Lanced Aluminum Fins
w/ Pre-Coat (Black Epoxy)

F = Non-Lanced Aluminum Fins
w/ Pre-Coat (Blue Fin)

Digit 24 — Condenser Heat Recovery

X = No Heat Recovery

2 = Partial Heat Recovery w/o Fan
Control

Digit 25

X

Digit 26 — Starter Type

A = Across the Line Starter/Direct
on Line

B = Solid State Soft Starter

C = Across the Line Starter/Power
Factor Correction

Digit 27 — Incoming Power Line Connection

1 = Single Point Power
Connection

Digit 28 — Power Line Connection Type

B = Disconnect Switch

Digit 29 — Enclosure Type

2 = IP54 Protection

Digit 30 — Unit Operator Interface

A = Dyna-View/English

B = Dyna-View/Spanish-Spain

D = Dyna-View/French

E = Dyna-View/German

F = Dyna-View/Dutch

G = Dyna-View/Italian

J = Dyna-View/Portuguese-
Portugal

R = Dyna-View/Russian

T = Dyna-View/Polish

U = Dyna-View/Czech

V = Dyna-View/Hungarian

W = Dyna-View/Greek

Y = Dyna-View/Romanian

Z = Dyna-View/Swedish

Model number

Digit 31 — Remote Interface (digital comm)

- X = No Remote Digital Communication
- 1 = LonTalk LCI-C Interface with Modbus Interface
- 2 = LonTalk/Tracer Summit Interface
- 3 = Time of Day Scheduling
- 4 = BACNet Interface

Digit 32 — Ext. Chilled/Hot Water and Curr. Demand Limit Setpoint

- X = No Ext. Chilled Water Setpoint
- A = Ext Chilled Water and Demand Limit Setpoint - 4-20mA
- B = Ext Chilled Water and Demand Limit Setpoint - 2-10Vdc
- C = Auxiliary setpoint

Digit 33 — % Capacity

- X = Without % Capacity
- 1 = With % Capacity

Digit 34 — Programmable Relays

- X = No Programmable Relays
- A = Programmable Relays

Digit 35 — Pump Type

- X = No Pumps and no Contactors
- 1 = No Pumps w/ Single Contactors
- 2 = No Pumps w/ Dual Contactors
- 3 = No Pumps w/ Single Contactors Single High Head Pump
- 4 = No Pumps w/ Dual Contactors Dual High Head Pump
- 5 = Single Standard Head Pump
- 6 = Single High Head Pump
- 7 = Dual Standard Head Pump
- 8 = Dual High Head Pump

Digit 36 — Pump Flow Control

- X = No Pump Flow Control

- A = Pump Flow Controlled by Triple Duty Valve

- B = Pump Flow Controlled by Variable Speed Drive

Digit 37 — Buffer Tank

- X = No Tank
- 1 = With Tank

Digit 38 — Short Circuit Rating

- A = Default A Short Circuit Rating

Digit 39 — Installation Accessories

- 1 = Elastomeric Isolators
- 4 = Neoprene Pads

Digit 40 — Water Strainer

- X = No Strainer
- A = With Water Strainer Factory-Installed

Digit 41 — Sound Attenuator Package

- 1 = Compact
- 3 = Super Quiet
- 4 = Super Quiet with Night Noise Setback
- 5 = Comprehensive Acoustic Package

Digit 42 — Appearance Options

- X = No Appearance Options
- A = Architectural Louvered Panels
- B = Half Louvers
- C = Access Guards
- D = Access Guards and Half Louvers

Digit 43

- X

Digit 44 — Label and Literature Language

- A = Bulgarian
- B = Spanish and English
- C = German
- D = English
- E = French
- H = Dutch SI (Hollandais)

- J = Italian

- L = Danish

- M = Swedish

- N = Norwegian

- P = Polish

- R = Russian

- T = Czech

- U = Greek

- V = Portuguese

- Y = Romanian

- Z = Serbian

- 1 = Slovak

- 2 = Croatian

- 3 = Hungarian

Digit 45 — Phase order + over/under voltage

- X = Not installed

- 1 = Installed

Digit 46 — Shipping Package

- X = No Skid (Standard)

- A = Unit Containerization Package

Digit 47

- X

Digit 48 — Flow switch setpoint

- C = Setpoint 15

- F = Setpoint 35

- H = Setpoint 45

- L = Setpoint 60

Digit 49

- X

Digit 50 — Specials

- X = None

- S = Special

Notes:

1. If a digit is not defined it may be held for future use.

Model number

The compressor nameplate provides the following information:

- Compressor model number.
- Compressor serial number.
- Compressor electrical characteristics.
- Utilization range.
- Recommended refrigerant.

Digit 8 – Voltage

J - 200-230/3/60

K - 460/3/60-400/3/50

F - 230/3/50

D - 575/3/60

X - 380/3/60

Y - 200/3/50 (CSHD 125 only)

Model Number Coding System

The model numbers for the unit and the compressors are comprised of numbers and letter which represent features of the equipment. Each position, or group of positions, in the number is used to represent a feature. For example, Unit Voltage, contains the letter "E". From the chart, it can be seen that an "E" in this position means that the unit voltage is 400/50/3.

Digit 9 – Unloading

(0 – no unloading)

Digit 10 – Design Sequence

Digit 11 – Protection Module Voltage

0 - Int Line Break- CSHD

A - 115 VAC

B - 230 VAC

H - 24 VAC

K - 115/230 VAC – CSHN

Compressor Model Number (located on compressor nameplate)

Digit 1,2,3,4

CSHD - Light Commercial

CSHN - Commercial

Digit 12 – Basic Compressor Variation

M - Suction & Discharge Tube, oil equalizer with seal nut, Grade 32 POE oil

Digit 5,6,7 – Capacity- 60 Hz ARI
KBtu/Hr (approximate)

125 - CSHD

161 - CSHD

184 - CSHN

250 - CSHN

315 - CSHN

374 - CSHN

Unit description

Unit description

Units are scroll type, air-cooled, heat pump models, designed for installation outdoors. The units are reversible and can work in cooling mode or in heating mode.

The units have one or two independent refrigerant circuits, two or three compressors per circuit. Units are packaged with an evaporator and condenser.

Note: Each unit is a completely assembled, hermetic package that is factory-piped, wired, leak-tested, dehydrated, charged and tested for proper control operations prior to shipment. The water inlet and outlet openings are covered for shipment.

Units feature Trane's exclusive Adaptive Control logic with CH530 controls. It monitors the control variables that govern the operation of the unit. Adaptive Control logic can correct these variables, when necessary, to optimize operational efficiencies, avoid unit shutdown, and keep producing chilled or hot water.

Each refrigerant circuit is provided with liquid receiver, filter, sight glass, electronic expansion valve, check valve, and charging valves.

In cooling mode, the evaporator is a brazed plate and frame heat exchanger which is equipped with water drain and vent connections. The condenser is an air-cooled fin coil. The condensers are available in three configurations depending on the tonnage of the unit. Units may be referred to the size by the condenser configuration. The three configurations are slant, V and W.

Accessory/options information

Check all the accessories and loose parts which are shipped with the unit against the original order. Included in these items will be rigging diagrams, electrical diagrams, and service literature, which are placed inside the control panel and/or starter panel for shipment. Also check for optional components, such as flange adapters and isolators.

The unit isolators and the flange adapter ship on brackets attached to the frame of the unit.

Pre-installation

Inspection checklist

When the unit is delivered, verify that it is the correct unit and that it is properly equipped. Compare the information which appears on the unit nameplate with the ordering and submittal information.

Inspect all exterior components for visible damage. Report any apparent damage or material shortage to the carrier and make a "unit damage" notation on the carrier's delivery receipt. Specify the extent and type of damage found and notify the appropriate Trane Sales Office. Do not proceed with installation of a damaged unit without sales office approval.

Mandatory Start-up Checklist

***This checklist is not intended to be a substitution for the contractors installation instruction. This checklist is intended to be a guide for the Trane technician just prior to unit 'start-up'. Many of the recommended checks and actions could expose the technician to electrical and mechanical hazards. Refer to the appropriate sections in the unit manual for appropriate procedures, component specifications and safety instructions.

Except where noted; it is implied that the technician is to use this checklist for inspection / verification of prior task completed by the general contractor at installation.

1. Unit clearances adequate for service and to avoid air recirculation, etc.
2. Unit exterior inspected
3. Crankcase heaters working for 24 hours prior to arrival of Trane technician performing start up
4. Correct voltage supplied to unit and electric heaters (imbalance not to exceed 2%)
5. Unit power phasing (A-B-C sequence) proper for compressor rotation

6. Copper power wiring meets sizing requirement in job submittal
7. Unit properly grounded
8. All automation and remote controls installed/wired
9. All wiring connections tight
10. Prove chilled water side Interlock and Interconnecting Wiring Interlock and externals (chilled water pump)
11. Field installed control wiring landed on correct terminals (external start/stop, emergency stop, chilled water reset...)
12. Verify all refrigerant valves are open/back seated
13. Compressor oil levels (1/2 -3/4 high in glass) proper
14. Verify chilled water strainer is clean and free of debris and evaporator chilled water circuits are filled
15. Close the fused-disconnect switch(es) that supplies power to the chilled water pump starter
16. Start the chilled water pump to begin circulation of the water. Inspect piping for leaks and repair as necessary
17. With water circulating through the system, adjust water flow and check water pressure drop through evaporator
18. Adjust the chilled water flow switch for proper operation
19. Return chilled water pump to auto
20. Verify all CH530 Menu Items on DynaView and KestrelView
21. Fan amperages within nameplate specs
22. All panels/doors secured prior to start-up
23. All coil fins inspected and straightened
24. Rotate fans before starting unit to inspect for potential audible and visual signs of rubbing. Start unit
25. Press AUTO key. The unit will start if the chiller control calls for cooling and the safety interlocks are closed
26. Check the EXV sight glasses after sufficient time has elapsed allowing entering and leaving water to stabilize
27. Check the evaporator and the condenser refrigerant pressure under Refrigerant Report on CH530 TechView
28. Confirm Superheat and subcooling values are normal
29. Compressor operation normal and within amperage rating
30. Operating log completed
31. Press stop key
32. Inspect fans again after being under load to ensure no signs or rubbing exist
33. Verify the chilled water pump runs for at least 1 minute after the chiller is commanded to stop (for normal chilled water systems)

Unit storage

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

- Store the chiller in a dry, vibration-free, secure area.
- Units charged with refrigerant should not be stored where temperatures exceed 68°C.
- At least every three months, attach a gauge and manually check the pressure in the refrigerant circuit. If the refrigerant pressure is below 13 bar at 20°C (or 10 bar at 10°C), call a qualified service organization and the appropriate Trane sales office.

Installation requirements and contractor responsibilities

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

Pre-installation

Type of requirement	Trane-supplied Trane-installed	Trane-supplied Field-installed	Field-supplied Field-installed
Foundation			Meet foundation requirements
Rigging			<ul style="list-style-type: none"> • Safety chains • Clevis connectors • Lifting beams
Isolation		Isolation pads or neoprene isolators (optional)	Isolation pads or neoprene isolators (optional)
Electrical	<ul style="list-style-type: none"> • Disconnect switch • Unit mounted starter 		<ul style="list-style-type: none"> • Wiring sizes per submittal and local codes and regulations • Terminal lugs • Ground connection(s) • BAS wiring (optional) • Control voltage wiring <ul style="list-style-type: none"> • Chilled water pump contactor and wiring including interlock • Option relays and wiring
Water piping	<ul style="list-style-type: none"> • Flow switch • Water strainer (option) 		<ul style="list-style-type: none"> • Taps for thermometers and gauges • Thermometers • Water flow pressure gauges • Isolation and balancing valves in water piping • Vents and drain • Pressure relief valves
Insulation	<ul style="list-style-type: none"> • Insulation 		<ul style="list-style-type: none"> • Insulation
Water piping connection components	<ul style="list-style-type: none"> • Grooved pipe 	<ul style="list-style-type: none"> • Flange adapters 	

General Data

Table 1 - General Data CXAM - Standard Efficiency & Compact - Simplex units

Size		20	23	26	30	35	39	45	50
Eurovent Performances (1)									
Net Cooling Capacity	(kW)	55.5	61.3	69.2	77.5	94.7	109.9	121.0	130.7
Total Power Input in Cooling	(kW)	19.5	22.1	24.1	28.2	32.8	38.3	43.9	49.8
EER		9.7	9.4	9.8	9.4	9.8	9.8	9.4	8.9
Net Heating Capacity	(kW)	61.9	69.1	77.9	87.5	100.8	112.4	124.5	133.6
Total Power Input in Heating	(kW)	21.2	23.7	26.2	29.6	35.5	39.3	43.6	48.1
Heating COP		10.0	9.9	10.1	10.1	9.7	9.7	9.7	9.5
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	88	88	88	89	92	93	92	91
System Data									
Refrigerant Circuit	#	1	1	1	1	1	1	1	1
Capacity Steps	%	50-100	43-100	50-100	50-100	43-100	50-100	44-100	50-100
Units Amps									
Nominal Amps (2)	(A)	55	59	63	65	83	93	103	113
Start-up Amps (2)									
Standard Unit	(A)	176	192	196	199	261	272	317	327
With Soft Starter Option	(A)	119	129	133	135	175	186	213	223
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	95	95	95	95	150	150	150	150
Compressor									
Compressor Number per Circuit	#	2	2	2	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250	CSHN250 & CSHN250	CSHN250 & CSHN315	CSHN315 & CSHN315
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4	36.4 & 36.4	36.4 & 46.4	46.4 & 46.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215	215 & 215	215 & 260	260 & 260
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	90&90	90&90	90&90	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	4.0	4.0	4.0	5.3	8.2	10.6	13.3	13.3
Heater Power	(W)	200	200	200	200	200	300	300	300
Min. Flow	(L/Sec)	1.3	1.4	1.6	1.8	2.2	2.6	2.8	3.0
Max. Flow	(L/Sec)	3.9	4.3	4.8	5.4	6.6	7.7	8.5	9.1
Pump Package (Option Standard Head)									
Evaporator Head Pressure Available Single Pump	(kPa)	92.2	64.0	49.7	77.8	68.7	101.9	97.5	84.1
Evaporator Head Pressure Available Dual Pump	(kPa)	92.2	64.0	49.7	77.8	68.7	101.9	97.5	84.1
Power (3)	(kW)	1.5	1.5	1.5	1.5	1.5	3	3	3
Rated Amps (3)	(A)	3.25	3.25	3.25	3.25	3.25	6.1	6.1	6.1
Pump Package (Option High Head)									
Evaporator Head Pressure Available Single Pump	(kPa)	269.0	240.1	219.0	249.5	234.7	225.9	218.5	200.0
Evaporator Head Pressure Available Dual Pump	(kPa)	269.0	240.1	219.0	249.5	234.7	225.9	218.5	200.0
Power (2)	(kW)	4	4	4	4	5.5	5.5	5.5	5.5
Rated Amps (2)	(A)	7.59	7.59	7.59	7.59	10.6	10.6	10.6	10.6
Hydraulic Module components									
Expansion Tank Volume	(L)	25	25	25	25	25	25	25	0
User Volume Expansion Capacity	(L)	50	50	50	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)					120			
Antifreeze Heater without pump package and with strainer	(W)					180			
Pump package antifreeze Heater	(W)					530			

General Data

Table 1 - Continued

Size		20	23	26	30	35	39	45	50
Buffer tank antifreeze Heater	(W)	800							
VFD Weight	(kg)	10	10	10	10	10	10	10	10
Water tank Volume	(L)	506	506	506	506	506	506	506	0
Condenser									
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192	192
Fan									
Quantity	#	2	2	2	2	3	3	3	3
Diameter	(mm)	732	732	732	732	732	732	732	732
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	15317	15323	17022	17027	16515	16522	16528	16533
Static Pressure	(Pa)	0	0	0	0	0	0	0	0
Power per Motor	(kW)	1.7	1.7	1.6	1.6	1.7	1.7	1.7	1.7
Rated Amps per Motor	(A)	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36
Motor RPM	(rpm)	920	920	920	920	920	920	920	920
PHR									
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38	38	38	38
Water Storage Capacity	(L)	0.0671	0.0671	0.0671	0.0915	0.0915	0.1098	0.1220	0.1220
Unit Water Connection									
Chilled Water	(mm)	50	50	50	65	65	65	65	65
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions									
Unit Length with Buffer Tank	(mm)	3418	3418	3418	3418	4332	4332	4332	4332
Unit Length with VFD	(mm)	2908	2908	2908	2908	3822	3822	3822	3822
Unit Length with Buffer Tank and VFD	(mm)	3418	3418	3418	3418	4332	4332	4332	4332
Unit Length without Buffer Tank or VFD	(mm)	2908	2908	2908	2908	3822	3822	3822	3822
Unit Width	(mm)	1301	1301	1301	1301	1301	1301	1301	1301
Unit Height	(mm)	2153	2153	2153	2153	2153	2153	2153	2153
Weight (Aluminium Fins without louver or VFD)									
Shipping Weight (5)	(kg)	910	914	938	1032	1260	1268	1325	1372
Operating Weight (5)	(kg)	917	921	946	1042	1272	1283	1342	1389
Additional weight (dual pump high head)	(kg)	199	199	200	200	255	256	255	255
Additional weight (dual pump standard head)	(kg)	183	183	183	184	225	232	231	250
Additional weight (single pump high head)	(kg)	162	162	163	163	208	209	208	208
Additional weight (single pump standard head)	(kg)	153	153	154	154	195	199	198	207
Additional weight (Buffer tank)	(kg)	188	188	188	188	189	188	188	188
Louver Weight	(kg)	19	19	19	19	25	25	25	25
Min. Starting/Oper. Ambient									
Std Unit	(°C)	7	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit									
Refrigerant charge	(Kg)	19.1	19.1	22.7	22.7	32.7	32.7	32.7	33.6
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4	13.4	13.4	6.6

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 2 - General Data - CXAM Standard Efficiency & Compact - Duplex V units

Size		40	46	52	60	70	80	90
Eurovent Performances (1)								
Net Cooling Capacity	(kW)	111.9	126.2	143.8	161.1	191.4	223.6	247.7
Total Power Input in Cooling	(kW)	39.0	44.6	48.9	56.8	67.7	76.8	88.1
EER		9.8	9.7	10.0	9.7	9.6	9.9	9.6
Net Heating Capacity	(kW)	125.7	141.4	159.8	177.2	203.1	227.5	251.4
Total Power Input in Heating	(kW)	42.6	46.6	51.5	58.7	71.0	79.1	87.7
Heating COP		10.0	10.3	10.6	10.3	9.8	9.8	9.8
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	91	91	91	92	95	96	95
System Data								
Refrigerant Circuit	#	2	2	2	2	2	2	2
Capacity Steps	%	25-50-75-100	21-43-71-100	25-50-75-100	25-50-75-100	21-43-71-100	25-50-75-100	22-44-72-100
Units Amps								
Nominal Amps (2)	(A)	96	105	113	117	145	166	186
Start-up Amps (2)								
Standard Unit	(A)	218	238	246	251	324	344	399
With Soft Starter Option	(A)	161	175	183	187	238	258	295
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	150	150	150	240	240	240	240
Compressor								
Compressor Number per Circuit	#	2	2	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250	CSHN250 & CSHN250	CSHN250 & CSHN315
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4	36.4 & 36.4	36.4 & 46.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215	215 & 215	215 & 260
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator								
Quantity	#	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	9.1	14.3	14.3	15.6	21.5	24.0	28.2
Heater Power	(W)	200	300	300	300	400	400	400
Min. Flow	(L/Sec)	2.6	2.9	3.3	3.7	4.4	5.2	5.7
Max. Flow	(L/Sec)	7.7	8.6	9.9	11.1	13.3	15.5	17.1
Pump Package (Option Standard Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	68.1	99.9	74.6	100.7	126.4	105.5	124.3
Evaporator Head Pressure Available Dual Pump	(kPa)	68.1	99.9	74.6	100.7	126.4	105.5	124.3
Power (3)	(kW)	3	4	4	4	5.5	5.5	5.5
Rated Amps (3)	(A)	6.1	7.59	7.59	7.59	10.6	10.6	10.6
Pump Package (Option High Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	221.9	219.3	185.3	212.2	203.2	182.2	202.6
Evaporator Head Pressure Available Dual Pump	(kPa)	221.9	219.3	185.3	212.2	203.2	182.2	202.6
Power (2)	(kW)	5.5	5.5	5.5	7.5	7.5	7.5	7.5
Rated Amps (2)	(A)	10.6	10.6	10.6	13.8	13.8	13.8	13.8
Hydraulic Module components								
Expansion Tank Volume	(L)	25	25	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)				120			
Antifreeze Heater without pump package and with strainer	(W)				120			
Pump package antifreeze Heater	(W)				860			
Buffer tank antifreeze Heater	(W)				800			
VFD Weight	(kg)	15	15	15	15	15	15	15
Water tank Volume	(L)	500	500	500	500	500	500	500

General Data

Table 2 - Continued

Size		40	46	52	60	70	80	90
Condenser								
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192
Fan								
Quantity	#	4	4	4	4	6	6	6
Diameter	(mm)	732	732	732	732	732	732	732
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	15317	15324	17023	17028	15284	16523	16529
Static Pressure	(Pa)	0	0	0	0	0	0	0
Power per Motor	(kW)	1.7	1.7	1.6	1.6	1.7	1.7	1.7
Rated Amps per Motor	(A)	3.36	3.36	3.36	3.36	3.36	3.36	3.36
Motor RPM	(rpm)	920	920	920	920	920	920	920
PHR								
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38	38	38
Water Storage Capacity	(L)	0.0671*2	0.0671*2	0.0671*2	0.0915*2	0.0915*2	0.1098*2	0.122*2
Unit Water Connection								
Chilled Water	(mm)	65	65	65	80	80	80	80
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions								
Unit Length with Buffer Tank	(mm)	3416	3416	3416	3416	4330	4330	4330
Unit Length with VFD	(mm)	3193	3193	3193	3193	4107	4107	4107
Unit Length with Buffer Tank and VFD	(mm)	3704	3704	3704	3704	4618	4618	4618
Unit Length without Buffer Tank or VFD	(mm)	2905	2905	2905	2905	3819	3819	3819
Unit Width	(mm)	2266	2266	2266	2266	2266	2266	2266
Unit Height	(mm)	2150	2150	2150	2150	2150	2150	2150
Weight (Aluminium Fins without louver or VFD)								
Shipping Weight (5)	(kg)	1652	1679	1728	1910	2171	2220	2327
Operating Weight (5)	(kg)	1665	1697	1746	1928	2196	2247	2358
Additional weight (dual pump high head)	(kg)	226	225	226	316	319	319	319
Additional weight (dual pump standard head)	(kg)	209	221	221	221	237	237	237
Additional weight (single pump high head)	(kg)	179	178	179	220	222	222	222
Additional weight (single pump standard head)	(kg)	171	177	177	177	186	186	186
Additional weight (Buffer tank)	(kg)	189	188	188	188	189	189	189
Louver Weight	(kg)	32	32	32	32	37	37	37
Min. Starting/Oper. Ambient								
Std Unit	(°C)	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit								
Refrigerant charge	(Kg)	19.1	19.1	22.7	22.7	29	31.8	33.6
Oil Charge	(L)	13.4	6.6	6.6	13.4	13.4	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 3 - General Data - CXAM Standard Efficiency & Compact - Duplex W units

Size		100	110	120	140	150	160	170
Eurovent Performances (1)								
Net Cooling Capacity	(kW)	276.3	295.0	317.4	376.5	399.7	432.6	450.6
Total Power Input in Cooling	(kW)	95.2	104.2	114.6	138.1	150.2	155.8	165.3
EER		9.9	9.7	9.4	9.3	9.1	9.5	9.3
Net Heating Capacity	(kW)	271.1	287.0	301.7	360.7	375.0	427.7	442.7
Total Power Input in Heating	(kW)	95.5	102.8	109.4	136.6	144.7	157.4	165.1
Heating COP		9.7	9.5	9.4	9.0	8.8	9.3	9.1
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	92	93	93	95	94	95	95
System Data								
Refrigerant Circuit	#	2	2	2	2	2	2	2
Capacity Steps	%	25-50-75-100	23-45-73-100	25-50-75-100	14-29-46-64-82-100	17-33-50-67-83-100	16-31-47-63-81-100	15-29-47-65-82-100
Units Amps								
Nominal Amps (2)	(A)	206	226	246	292	312	339	359
Start-up Amps (2)								
Standard Unit	(A)	419	489	509	506	526	602	622
With Soft Starter Option	(A)	315	361	381	402	422	474	494
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	240	240	240	2 x 300	2 x 300	2 x 300	2 x 300
Compressor								
Compressor Number per Circuit	#	2	2	2	3	3	3	3
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHN315 & CSHN315	CSHN315 & CSHN374	CSHN374 & CSHN374	CSHN250 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN374	CSHN315 & CSHN374 & CSHN374
Rated Amps per Circuit	(A)	46.4 & 46.4	46.4 & 56.4	56.4 & 56.4	36.4 & 46.4 & 46.4	46.4 & 46.4 & 46.4	46.4 & 46.4 & 56.4	46.4 & 56.4 & 56.4
Locked Rotor Amps per Circuit	(A)	260 & 260	260 & 320	320 & 320	215 & 260 & 260	260 & 260 & 260	320 & 320 & 320	260 & 320 & 320
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator								
Quantity	#	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	32.4	32.4	39.2	40.8	46.7	46.7	46.7
Heater Power	(W)	400	400	500	500	500	500	500
Min. Flow	(L/Sec)	6.4	6.8	7.3	8.7	9.2	10.0	10.4
Max. Flow	(L/Sec)	19.1	20.4	22.0	26.1	27.7	30.0	31.3
Pump Package (Option Standard Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	119.8	122.3	124.5	146.2	132.9	113.5	102.2
Evaporator Head Pressure Available Dual Pump	(kPa)	119.8	122.3	124.5	146.2	132.9	113.5	102.2
Power (3)	(kW)	5.5	7.5	7.5	11	11	11	11
Rated Amps (3)	(A)	10.6	13.8	13.8	19.6	19.6	19.6	19.6
Pump Package (Option High Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	203.2	190.4	232.2	204.1	190.4	226.5	215.1
Evaporator Head Pressure Available Dual Pump	(kPa)	203.2	190.4	232.2	204.1	190.4	226.5	215.1
Power (2)	(kW)	7.5	7.5	11	11	11	15	15
Rated Amps (2)	(A)	13.8	13.8	19.6	19.6	19.6	26.5	26.5
Hydraulic Module components								
Expansion Tank Volume	(L)	60	60	60	60	60	60	60
User Volume Expansion Capacity	(L)	900	900	900	900	900	900	900
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)	120	120	120	240	240	240	240
Antifreeze Heater without pump package and with strainer	(W)	240	240	240	300	300	300	300

General Data

Table 3 - Continued

Size		100	110	120	140	150	160	170
Pump package antifreeze Heater	(W)	980	980	980	1100	1100	1100	1100
Buffer tank antifreeze Heater	(W)	1200	1200	1200	1200	1200	1200	1200
VFD Weight	(kg)	21	21	21	21	21	21	21
Water tank Volume	(L)	725	725	725	725	725	725	725
Condenser								
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192
Fan								
Quantity	#	6	6	6	10	10	12	12
Diameter	(mm)	732	732	732	732	732	732	732
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 2xS	1xD + 2xS	1xD + 2xS	5xS	5xS	6xS	6xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 4xS	1xVFD + 4xS	1xVFD + 5xS	1xVFD + 5xS
Airflow per Fan	(m ³ /h)	18498	18950	18951	17594	17596	17593	17594
Static Pressure	(Pa)	0	0	0	0	0	0	0
Power per Motor	(kW)	1.6	1.5	1.5	1.6	1.6	1.6	1.6
Rated Amps per Motor	(A)	3.36	3.36	3.36	3.36	3.36	3.36	3.36
Motor RPM	(rpm)	920	920	920	920	920	920	920
PHR								
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	64	64	64	64	64	64	64
Water Storage Capacity	(L)	0.122*2	0.1647*2	0.1647*2	0.2135*2	0.2135*2	0.2135*2	0.2135*2
Unit Water Connection								
Chilled Water	(mm)	100	100	100	100	100	100	100
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions								
Unit Length with Buffer Tank	(mm)	4230	4230	4230	5145	5145	6062	6062
Unit Length with VFD	(mm)	4558	4558	4558	5473	5473	6388	6388
Unit Length with Buffer Tank and VFD	(mm)	4558	4558	4558	5473	5473	6388	6388
Unit Length without Buffer Tank or VFD	(mm)	4230	4230	4230	5145	5145	6062	6062
Unit Width	(mm)	2273	2273	2273	2273	2273	2273	2273
Unit Height	(mm)	2344	2344	2344	2344	2344	2344	2344
Weight (Aluminium Fins without louver or VFD)								
Shipping Weight (5)	(kg)	2773	2773	2794	3457	3570	3956	3956
Operating Weight (5)	(kg)	2808	2808	2835	3500	3618	4005	4005
Additional weight (dual pump high head)	(kg)	406	406	488	511	510	583	583
Additional weight (dual pump standard head)	(kg)	325	405	405	510	510	556	556
Additional weight (single pump high head)	(kg)	310	310	355	377	377	436	436
Additional weight (single pump standard head)	(kg)	274	314	314	377	376	423	423
Additional weight (Buffer tank)	(kg)	188	188	188	188	188	188	188
Louver Weight	(kg)	47	47	47	51	51	56	56
Min. Starting/Oper. Ambient								
Std Unit	(°C)	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit								
Refrigerant charge	(Kg)	46.3	48.1	46.3	57.2	57.2	68.9	67.1
Oil Charge	(L)	13.4	13.9	14.4	22.5	23	23.5	24

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 4 - General Data - CXAM Standard Efficiency & Super Quiet - Simplex units

Size		20	23	26	30	35	39	45	50
Eurovent Performances (1)									
Net Cooling Capacity	(kW)	54.5	60.0	68.3	76.1	93.4	107.8	118.5	127.3
Total Power Input in Cooling	(kW)	18.9	21.9	23.9	28.2	32.2	38.0	44.1	50.3
EER		9.8	9.4	9.7	9.2	9.9	9.7	9.2	8.6
Net Heating Capacity	(kW)	60.8	67.8	76.9	86.1	99.4	110.7	122.2	131.2
Total Power Input in Heating	(kW)	19.6	22.2	25.0	28.2	33.5	37.3	41.5	46.1
Heating COP		10.6	10.4	10.5	10.4	10.1	10.1	10.0	9.7
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	83	83	83	83	86	87	86	85
System Data									
Refrigerant Circuit	#	1	1	1	1	1	1	1	1
Capacity Steps	%	50-100	43-100	50-100	50-100	43-100	50-100	44-100	50-100
Units Amps									
Nominal Amps (2)	(A)	54	58	62	64	81	92	102	112
Start-up Amps (2)									
Standard Unit	(A)	175	191	195	198	260	270	315	325
With Soft Starter Option	(A)	118	128	132	134	174	184	211	221
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	95	95	95	95	150	150	150	150
Compressor									
Compressor Number per Circuit	#	2	2	2	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250	CSHN250 & CSHN250	CSHN250 & CSHN315	CSHN315 & CSHN315
Number of Speeds	#	1	1	1	1	1	1	1	1
Motor Number per Circuit	#	2	2	2	2	2	2	2	2
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4	36.4 & 36.4	36.4 & 46.4	46.4 & 46.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215	215 & 215	215 & 260	260 & 260
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	90&90	90&90	90&90	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator									
Quantity	#	1	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Model		P80	P80	P80	P80	P120T	P120T	P120T	P120T
Water Volume/Storage (Total)	(L)	4.0	4.0	4.0	5.3	8.2	10.6	13.3	13.3
Heater Power	(W)	200	200	200	200	200	300	300	300
Min. Flow	(L/Sec)	1.3	1.4	1.6	1.8	2.2	2.5	2.8	3.0
Max. Flow	(L/Sec)	3.8	4.2	4.8	5.3	6.5	7.5	8.3	8.9
Pump Package (Option Standard Head)									
Evaporator Head Pressure Available Single Pump	(kPa)	93.8	66.9	47.1	79.8	70.6	104.6	101.0	88.9
Evaporator Head Pressure Available Dual Pump	(kPa)	93.8	66.9	47.1	79.8	70.6	104.6	101.0	88.9
Pump Type (Single)		Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump
Model (Single)		IPL50/120-1.5/2-N66-TRANE	IPL50/120-1.5/2-N66-TRANE	IPL50/120-1.5/2-N66-TRANE	IPL50/120-1.5/2-N66-TRANE	IPL50/120-1.5/2-N66-TRANE	IPL50/130-3/2-N31-N66-TRANE	IPL50/130-3/2-N31-N66-TRANE	IPL50/130-3/2-N31-N66-TRANE
Pump Type (Dual)		Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump
Model (Dual)		DPL50/120-1.5/2-N66-TRANE	DPL50/120-1.5/2-N66-TRANE	DPL50/120-1.5/2-N66-TRANE	DPL50/120-1.5/2-N66-TRANE	DPL50/120-1.5/2-N66-TRANE	DPL50/130-3/2-N31-N66-TRANE	DPL50/130-3/2-N31-N66-TRANE	DPL50/130-3/2-N31-N66-TRANE
Pump Set Number	#	1	1	1	1	1	1	1	1
Power (3)	(kW)	1.5	1.5	1.5	1.5	1.5	3	3	3
Rated Amps (3)	(A)	3.25	3.25	3.25	3.25	3.25	6.1	6.1	6.1
Start-up Amps (3)	(A)	19.1	19.1	19.1	19.1	19.1	38.0	38.0	38.0
Motor RPM	(rpm)	2860	2860	2860	2860	2860	2890	2890	2890
Pump Package (Option High Head)									
Evaporator Head Pressure Available Single Pump	(kPa)	270.6	243.4	221.6	251.9	237.0	229.1	223.2	206.3
Evaporator Head Pressure Available Dual Pump	(kPa)	270.6	243.4	221.6	251.9	237.0	229.1	223.2	206.3
Pump Type (Single)		Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump
Model (Single)		IPL40/160-4/2-N66-TRANE	IPL40/160-4/2-N66-TRANE	IPL40/160-4/2-N66-TRANE	IPL40/160-4/2-N66-TRANE	IPL40/160-5.5/2-N31-N66-TRANE	IPL40/160-5.5/2-N31-N66-TRANE	IPL40/160-5.5/2-N31-N66-TRANE	IPL40/160-5.5/2-N31-N66-TRANE
Pump Type (Dual)		Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump	Vertical Pump
Model (Dual)		DPL40/160-4/2-N66-TRANE	DPL40/160-4/2-N66-TRANE	DPL40/160-4/2-N66-TRANE	DPL40/160-4/2-N66-TRANE	DPL40/160-5.5/2-N31-N66-TRANE	DPL40/160-5.5/2-N31-N66-TRANE	DPL40/160-5.5/2-N31-N66-TRANE	DPL40/160-5.5/2-N31-N66-TRANE
Pump Set Number	#	1	1	1	1	1	1	1	1
Power (3)	(kW)	4	4	4	4	5.5	5.5	5.5	5.5
Rated Amps (3)	(A)	7.59	7.59	7.59	7.59	10.6	10.6	10.6	10.6
Start-up Amps (3)	(A)	49.7	49.7	49.7	49.7	85	85	85	85
Motor RPM	(rpm)	2890	2890	2890	2890	2890	2890	2890	2890
Hydraulic Module components									
Water strainer Ø	(mm)	50	50	50	65	65	65	65	65
Expansion Tank Volume	(L)	25	25	25	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50	50	50	50

General Data

Table 4 - Continued

Size		20	23	26	30	35	39	45	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)					120			
Antifreeze Heater without pump package and with strainer	(W)					180			
Pump package antifreeze Heater	(W)					530			
Buffer tank antifreeze Heater	(W)					800			
VFD Weight	(kg)	10	10	10	10	10	10	10	10
Water tank Volume	(L)	506	506	506	506	506	506	506	506
Condenser									
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube Type		IF	IF	IF	IF	IF	IF	IF	IF
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Qty of Coils	#	1	1	1	1	1	1	1	1
Coil Length	(mm)	1854	1854	2311	2311	3226	3226	3226	3226
Coil Height per Circuit	(mm)	1727	1727	1727	1727	1727	1727	1727	1727
Number of Rows	#	3	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192	192
Fan									
Type		Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
Quantity	#	2	2	2	2	3	3	3	3
Diameter	(mm)	762	762	762	762	762	762	762	762
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	12074	12084	14443	14452	13753	13766	13776	13786
Static Pressure	(Pa)	0	0	0	0	0	0	0	0
Motor Number	#	2	2	2	2	3	3	3	3
Power per Motor	(kW)	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.1
Rated Amps per Motor	(A)	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12
Motor RPM	(rpm)	700	700	700	700	700	700	700	700
Tip Speed	(m/s)	28	28	28	28	28	28	28	28
PHR									
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38	38	38	38
Water Storage Capacity	(L)	0.0671	0.0671	0.0671	0.0915	0.0915	0.1098	0.1220	0.1220
Unit Water Connection									
Chilled Water	(mm)	50	50	50	65	65	65	65	65
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Type (Option)		Flange	Flange	Flange	Flange	Flange	Flange	Flange	Flange
Dimensions									
Unit Length with Buffer Tank	(mm)	3418	3418	3418	3418	4332	4332	4332	4332
Unit Length with VFD	(mm)	2908	2908	2908	2908	3822	3822	3822	3822
Unit Length with Buffer Tank and VFD	(mm)	3418	3418	3418	3418	4332	4332	4332	4332
Unit Length without Buffer Tank or VFD	(mm)	2908	2908	2908	2908	3822	3822	3822	3822
Unit Width	(mm)	1301	1301	1301	1301	1301	1301	1301	1301
Unit Height	(mm)	2153	2153	2153	2153	2153	2153	2153	2153
Weight (Aluminium Fins without louver or VFD)									
Shipping Weight (5)	(kg)	910	914	938	1032	1260	1268	1325	1372
Operating Weight (5)	(kg)	917	921	946	1042	1272	1283	1342	1389
Additional weight (dual pump high head)	(kg)	199	199	200	200	255	256	255	255
Additional weight (dual pump standard head)	(kg)	183	183	183	184	225	232	231	250
Additional weight (single pump high head)	(kg)	162	162	163	163	208	209	208	208
Additional weight (single pump standard head)	(kg)	153	153	154	154	195	199	198	207
Additional weight (Buffer tank)	(kg)	188	188	188	188	189	188	188	188
Louver Weight	(kg)	19	19	19	19	25	25	25	25
Min. Starting/Oper. Ambient									
Std Unit	(°C)	7	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18	-18
Extreme Low Ambient (Option)	(°C)	-29	-29	-29	-29	-29	-29	-29	-29
Refrigerant and Oil charge per circuit									
Refrigerant charge	(Kg)	19.1	19.1	22.7	22.7	32.7	32.7	33.6	33.6
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4	13.4	13.4	6.6

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 5 - General Data - CXAM Standard Efficiency & Super Quiet - Duplex V units

Size		40	46	52	60	70	80	90
Eurovent Performances (1)								
Net Cooling Capacity	(kW)	109.8	123.4	141.7	158.2	187.1	219.5	242.0
Total Power Input in Cooling	(kW)	37.9	44.0	48.3	56.8	67.0	76.5	88.5
EER		9.9	9.6	10.0	9.5	9.5	9.8	9.3
Net Heating Capacity	(kW)	123.3	138.5	157.5	174.7	198.9	223.9	246.8
Total Power Input in Heating	(kW)	39.5	43.6	49.0	56.2	66.4	74.9	83.6
Heating COP		10.6	10.8	10.9	10.6	10.2	10.2	10.1
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	85	85	86	86	89	90	89
System Data								
Refrigerant Circuit	#	2	2	2	2	2	2	2
Capacity Steps	%	25-50-75-100	21-43-71-100	25-50-75-100	25-50-75-100	21-43-71-100	25-50-75-100	22-44-72-100
Units Amps								
Nominal Amps (2)	(A)	95	104	112	116	144	164	184
Start-up Amps (2)								
Standard Unit	(A)	217	237	245	250	322	343	398
With Soft Starter Option	(A)	160	174	182	186	236	257	294
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	150	150	150	240	240	240	240
Compressor								
Compressor Number per Circuit	#	2	2	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250	CSHN250 & CSHN250	CSHN250 & CSHN315
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4	36.4 & 36.4	36.4 & 46.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215	215 & 215	215 & 260
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator								
Quantity	#	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	9.1	14.3	14.3	15.6	21.5	24.0	28.2
Heater Power	(W)	200	300	300	300	400	400	400
Min. Flow	(L/Sec)	2.5	2.8	3.3	3.6	4.3	5.1	5.6
Max. Flow	(L/Sec)	7.5	8.5	9.8	10.9	12.9	15.2	16.8
Pump Package (Option Standard Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	71.0	103.5	77.6	103.6	130.1	109.1	129.6
Evaporator Head Pressure Available Dual Pump	(kPa)	71.0	103.5	77.6	103.6	130.1	109.1	129.6
Power (3)	(kW)	3	4	4	4	5.5	5.5	5.5
Rated Amps (3)	(A)	6.1	7.59	7.59	7.59	10.6	10.6	10.6
Pump Package (Option High Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	225.2	224.1	189.3	214.2	206.7	186.0	206.4
Evaporator Head Pressure Available Dual Pump	(kPa)	225.2	224.1	189.3	214.2	206.7	186.0	206.4
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5	7.5	7.5
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8	13.8	13.8
Hydraulic Module components								
Expansion Tank Volume	(L)	25	25	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)				120			
Antifreeze Heater without pump package and with strainer	(W)				120			
Pump package antifreeze Heater	(W)				860			

General Data

Table 5 - Continued

Size		40	46	52	60	70	80	90
Buffer tank antifreeze Heater	(W)				800			
VFD Weight	(kg)	15	15	15	15	15	15	15
Water tank Volume	(L)	500	500	500	500	500	500	500
Condenser								
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192
Fan								
Quantity	#	4	4	4	4	6	6	6
Diameter	(mm)	762	762	762	762	762	762	762
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	12073	12085	14444	14453	12032	13766	13777
Static Pressure	(Pa)	0	0	0	0	0	0	0
Power per Motor	(kW)	1.1	1.1	1.2	1.2	1.1	1.2	1.2
Rated Amps per Motor	(A)	3.12	3.12	3.12	3.12	3.12	3.12	3.12
Motor RPM	(rpm)	700	700	700	700	700	700	700
PHR								
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38	38	38
Water Storage Capacity	(L)	0.0671*2	0.0671*2	0.0671*2	0.0915*2	0.0915*2	0.1098*2	0.122*2
Unit Water Connection								
Chilled Water	(mm)	65	65	65	80	80	80	80
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions								
Unit Length with Buffer Tank	(mm)	3416	3416	3416	3416	4330	4330	4330
Unit Length with VFD	(mm)	3193	3193	3193	3193	4107	4107	4107
Unit Length with Buffer Tank and VFD	(mm)	3704	3704	3704	3704	4618	4618	4618
Unit Length without Buffer Tank or VFD	(mm)	2905	2905	2905	2905	3819	3819	3819
Unit Width	(mm)	2266	2266	2266	2266	2266	2266	2266
Unit Height	(mm)	2150	2150	2150	2150	2150	2150	2150
Weight (Aluminium Fins without louver or VFD)								
Shipping Weight (5)	(kg)	1652	1679	1728	1910	2171	2220	2327
Operating Weight (5)	(kg)	1665	1697	1746	1928	2196	2247	2358
Additional weight (dual pump high head)	(kg)	226	225	226	316	319	319	319
Additional weight (dual pump standard head)	(kg)	209	221	221	221	237	237	237
Additional weight (single pump high head)	(kg)	179	178	179	220	222	222	222
Additional weight (single pump standard head)	(kg)	171	177	177	177	186	186	186
Additional weight (Buffer tank)	(kg)	189	188	188	188	189	189	189
Louver Weight	(kg)	32	32	32	32	37	37	37
Min. Starting/Oper. Ambient								
Std Unit	(°C)	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit								
Refrigerant charge	(Kg)	19.1	19.1	22.7	22.7	29.9	33.6	33.6
Oil Charge	(L)	13.4	6.6	6.6	13.4	13.4	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)
 (2) Rated Condition without Pump Package
 (3) Single Pump Option
 (4) S: Single Speed, D: Two Speed, VFD: Inverter.
 (5) Base unit

General Data

Table 6 - General Data - CXAM Standard Efficiency & Super Quiet - Duplex W units

Size		100	110	120	140	150	160	170
Eurovent Performances (1)								
Net Cooling Capacity	(kW)	272.2	289.5	317.0	370.6	391.7	426.2	443.0
Total Power Input in Cooling	(kW)	95.3	105.3	114.6	139.5	152.5	156.5	166.7
EER		9.7	9.4	9.4	9.1	8.8	9.3	9.1
Net Heating Capacity	(kW)	267.8	282.9	300.5	351.2	366.1	416.0	431.2
Total Power Input in Heating	(kW)	92.3	99.8	109.1	130.6	138.7	150.0	157.7
Heating COP		9.9	9.7	9.4	9.2	9.0	9.5	9.3
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	87	87	89	89	89	90	90
System Data								
Refrigerant Circuit	#	2	2	2	2	2	2	2
Capacity Steps	%	25-50-75-100	23-45-73-100	25-50-75-100	14-29-46-64-82-100	17-33-50-67-83-100	16-31-47-63-81-100	15-29-47-65-82-100
Units Amps								
Nominal Amps (2)	(A)	204	224	251	290	310	336	356
Start-up Amps (2)								
Standard Unit	(A)	418	488	514	503	523	599	619
With Soft Starter Option	(A)	314	360	386	399	419	471	491
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	240	240	240	2 x 300	2 x 300	2 x 300	2 x 300
Compressor								
Compressor Number per Circuit	#	2	2	2	3	3	3	3
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHN315 & CSHN315	CSHN315 & CSHN374	CSHN374 & CSHN374	CSHN250 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN374	CSHN315 & CSHN374 & CSHN374
Rated Amps per Circuit	(A)	46.4 & 46.4	46.4 & 56.4	56.4 & 56.4	36.4 & 46.4 & 46.4	46.4 & 46.4 & 46.4	46.4 & 46.4 & 56.4	46.4 & 56.4 & 56.4
Locked Rotor Amps per Circuit	(A)	260 & 260	260 & 320	320 & 320	215 & 260 & 260	260 & 260 & 260	320 & 320 & 320	260 & 320 & 320
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator								
Quantity	#	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	32.4	32.4	39.2	40.8	46.7	46.7	46.7
Heater Power	(W)	400	400	500	500	500	500	500
Min. Flow	(L/Sec)	6.3	6.7	7.3	8.6	9.1	9.9	10.3
Max. Flow	(L/Sec)	18.9	20.0	22.0	25.7	27.2	29.6	30.8
Pump Package (Option Standard Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	123.2	124.8	124.4	149.5	137.2	117.3	106.9
Evaporator Head Pressure Available Dual Pump	(kPa)	123.2	124.8	124.4	149.5	137.2	117.3	106.9
Power (3)	(kW)	5.5	7.5	7.5	11	11	11	11
Rated Amps (3)	(A)	10.6	13.8	13.8	19.6	19.6	19.6	19.6
Pump Package (Option High Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	205.9	194.4	232.1	207.5	194.8	230.4	219.8
Evaporator Head Pressure Available Dual Pump	(kPa)	205.9	194.4	232.1	207.5	194.8	230.4	219.8
Power (3)	(kW)	7.5	7.5	11	11	11	15	15
Rated Amps (3)	(A)	13.8	13.8	19.6	19.6	19.6	26.5	26.5
Hydraulic Module components								
Expansion Tank Volume	(L)	60	60	60	60	60	60	60
User Volume Expansion Capacity	(L)	900	900	900	900	900	900	900
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)	120	120	120	240	240	240	240
Antifreeze Heater without pump package and with strainer	(W)	240	240	240	300	300	300	300

General Data

Table 6 - Continued

Size		100	110	120	140	150	160	170
Pump package antifreeze Heater	(W)	980	980	980	1100	1100	1100	1100
Buffer tank antifreeze Heater	(W)	1200	1200	1200	1200	1200	1200	1200
VFD Weight	(kg)	21	21	21	21	21	21	21
Water tank Volume	(L)	725	725	725	725	725	725	725
Condenser								
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192
Fan								
Quantity	#	6	6	8	10	10	12	12
Diameter	(mm)	762	762	762	762	762	762	762
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 2xS	1xD + 2xS	4xS	5xS	5xS	6xS	6xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 2xS	1xVFD + 2xS	1xVFD + 3xS	1xVFD + 4xS	1xVFD + 4xS	1xVFD + 5xS	1xVFD + 5xS
Airflow per Fan	(m ³ /h)	16237	16241	14249	14244	14250	14240	14244
Static Pressure	(Pa)	0	0	0	0	0	0	0
Power per Motor	(kW)	1.1	1.1	1.2	1.2	1.2	1.2	1.2
Rated Amps per Motor	(A)	3.12	3.12	3.12	3.12	3.12	3.12	3.12
Motor RPM	(rpm)	700	700	700	700	700	700	700
PHR								
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	64	64	64	64	64	64	64
Water Storage Capacity	(L)	0.122*2	0.1647*2	0.1647*2	0.2135*2	0.2135*2	0.2135*2	0.2135*2
Unit Water Connection								
Chilled Water	(mm)	100	100	100	100	100	100	100
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions								
Unit Length with Buffer Tank	(mm)	4230	4230	4230	5145	5145	6062	6062
Unit Length with VFD	(mm)	4558	4558	4558	5473	5473	6388	6388
Unit Length with Buffer Tank and VFD	(mm)	4558	4558	4558	5473	5473	6388	6388
Unit Length without Buffer Tank or VFD	(mm)	4230	4230	4230	5145	5145	6062	6062
Unit Width	(mm)	2273	2273	2273	2273	2273	2273	2273
Unit Height	(mm)	2344	2344	2344	2344	2344	2344	2344
Weight (Aluminium Fins without louver or VFD)								
Shipping Weight (5)	(kg)	2773	2773	2884	3457	3570	3956	3956
Operating Weight (5)	(kg)	2808	2808	2925	3500	3618	4005	4005
Additional weight (dual pump high head)	(kg)	406	406	488	511	510	583	583
Additional weight (dual pump standard head)	(kg)	325	405	405	510	510	556	556
Additional weight (single pump high head)	(kg)	310	310	355	377	377	436	436
Additional weight (single pump standard head)	(kg)	274	314	314	377	376	423	423
Additional weight (Buffer tank)	(kg)	188	188	188	188	188	188	188
Louver Weight	(kg)	47	47	47	51	51	56	56
Min. Starting/Oper. Ambient								
Std Unit	(°C)	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit								
Refrigerant charge	(Kg)	46.3	46.3	47.2	57.2	57.2	66.2	67.1
Oil Charge	(L)	13.4	13.9	14.4	22.5	23	23.5	24

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)
 (2) Rated Condition without Pump Package
 (3) Single Pump Option
 (4) S: Single Speed, D: Two Speed, VFD: Inverter.
 (5) Base unit

General Data

Table 7 - General Data - CXAM Standard Efficiency & Comprehensive Acoustic Package - Simplex units

Size		20	23	26	30	35	39
Eurovent Performances (1)							
Net Cooling Capacity	(kW)	53.0	59.3	68.6	76.1	89.7	102.4
Total Power Input in Cooling	(kW)	18.5	21.1	25.1	28.1	32.5	39.5
EER		9.8	9.6	9.3	9.2	9.4	8.8
Heating net Capacity	(kW)	60.0	67.7	75.3	84.9	97.2	108.1
Total Power Input in Heating	(kW)	18.0	20.5	22.5	27.0	30.9	34.7
Heating COP		11.3	11.2	11.4	10.7	10.7	10.6
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	77	77	77	79	82	84
System Data							
Refrigerant Circuit	#	1	1	1	1	1	1
Capacity Steps	%	50-100	43-100	50-100	50-100	43-100	50-100
Units Amps							
Nominal Amps (2)	(A)	47	51	55	60	71	81
Start-up Amps (2)							
Standard Unit	(A)	168	184	188	194	249	260
With Soft Starter Option	(A)	111	121	125	130	163	174
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	95	95	95	95	150	150
Compressor							
Compressor Number per Circuit	#	2	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250	CSHN250 & CSHN250
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4	36.4 & 36.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215	215 & 215
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	90&90	90&90	90&90	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	4.0	4.0	6.7	6.3	8.2	10.6
Heater Power	(W)	200	200	200	200	300	300
Min. Flow	(L/Sec)	1.2	1.4	1.6	1.8	2.1	2.4
Max. Flow	(L/Sec)	3.7	4.1	4.8	5.3	6.3	7.1
Pump Package (Option Standard Head)							
Evaporator Head Pressure Available Single Pump	(kPa)	96.2	68.8	80.2	77.5	75.9	111.9
Evaporator Head Pressure Available Dual Pump	(kPa)	96.2	68.8	80.2	77.5	75.9	111.9
Power (3)	(kW)	1.5	1.5	1.5	1.5	1.5	3
Rated Amps (3)	(A)	3.25	3.25	3.25	3.25	3.25	6.1
Pump Package (Option High Head)							
Evaporator Head Pressure Available Single Pump	(kPa)	273.1	245.3	254.7	249.7	243.3	237.7
Evaporator Head Pressure Available Dual Pump	(kPa)	273.1	245.3	254.7	249.7	243.3	237.7
Power (3)	(kW)	4	4	4	4	5.5	5.5
Rated Amps (3)	(A)	7.59	7.59	7.59	7.59	10.6	10.6
Hydraulic Module components							
Water strainer Ø	(mm)	50	50	50	65	65	65
Expansion Tank Volume	(L)	25	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)				120		
Antifreeze Heater without pump package and with strainer					180		
Pump package antifreeze Heater	(W)				530		
Buffer tank antifreeze Heater	(W)				800		
VFD Weight	(kg)	10	10	10	10	10	10
Water tank Volume	(L)	506	506	506	506	506	506

General Data

Table 7 - Continued

Size		20	23	26	30	35	39
Condenser							
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192
Fan							
Quantity	#	2	2	2	3	3	3
Diameter	(mm)	757	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	9222	9847	9851	8568	9661	9665
Static Pressure	(Pa)	0	0	0	0	0	0
Power per Motor	(kW)	0.4	0.4	0.4	0.4	0.4	0.4
Rated Amps per Motor	(A)	1.35	1.35	1.35	1.35	1.35	1.35
Motor RPM	(rpm)	700	700	700	700	700	700
PHR							
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38	38
Water Storage Capacity	(L)	0.0671	0.0671	0.0671	0.0915	0.0915	0.1098
Unit Water Connection							
Chilled Water	(mm)	50	50	50	65	65	65
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions							
Unit Length with Buffer Tank	(mm)	3418	3418	3418	4332	4332	4332
Unit Length with VFD	(mm)	2908	2908	2908	3822	3822	3822
Unit Length with Buffer Tank and VFD	(mm)	3418	3418	3418	4332	4332	4332
Unit Length without Buffer Tank or VFD	(mm)	2908	2908	2908	3822	3822	3822
Unit Width	(mm)	1301	1301	1301	1301	1301	1301
Unit Height	(mm)	2153	2153	2153	2153	2153	2153
Weight (Aluminium Fins without louver or VFD)							
Shipping Weight (5)	(kg)	944	968	981	1257	1305	1313
Operating Weight (5)	(kg)	951	976	992	1267	1317	1328
Additional weight (dual pump high head)	(kg)	199	200	200	241	255	256
Additional weight (dual pump standard head)	(kg)	183	183	183	225	225	232
Additional weight (single pump high head)	(kg)	162	163	163	204	208	209
Additional weight (single pump standard head)	(kg)	153	154	154	195	195	199
Additional weight (Buffer tank)	(kg)	188	188	188	189	189	188
Louver Weight	(kg)	19	19	19	25	25	25
Min. Starting/Oper. Ambient							
Std Unit	(°C)	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit							
Refrigerant charge	(Kg)	20	22.7	22.7	26.3	34.5	34.5
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 8 - General Data - CXAM Standard Efficiency & Comprehensive Acoustic Package - Duplex V units

Size		40	46	52	60	70	80
Eurovent Performances (1)							
Net Cooling Capacity	(kW)	106.6	119.0	134.5	154.4	180.3	207.8
Total Power Input in Cooling	(kW)	37.0	44.0	49.8	56.3	67.2	79.3
EER		9.8	9.2	9.2	9.3	9.2	8.9
Heating net Capacity	(kW)	121.7	136.3	153.1	171.6	195.8	218.4
Total Power Input in Heating	(kW)	36.4	40.4	45.4	54.1	61.8	69.8
Heating COP		11.4	11.5	11.5	10.8	10.8	10.7
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	80	80	80	82	85	87
System Data							
Refrigerant Circuit	#	2	2	2	2	2	2
Capacity Steps	%	25-50-75-100	21-43-71-100	25-50-75-100	25-50-75-100	21-43-71-100	25-50-75-100
Units Amps							
Nominal Amps (2)	(A)	88	97	105	112	133	154
Start-up Amps (2)							
Standard Unit	(A)	210	230	238	246	312	332
With Soft Starter Option	(A)	153	167	175	182	226	246
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	150	150	150	240	240	240
Compressor							
Compressor Number per Circuit	#	2	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250	CSHN250 & CSHN250
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4	36.4 & 36.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215	215 & 215
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator							
Quantity	#	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	9.1	14.3	14.3	15.6	21.5	24.0
Heater Power	(W)	200	300	300	300	400	400
Min. Flow	(L/Sec)	2.4	2.7	3.1	3.6	4.2	4.8
Max. Flow	(L/Sec)	7.3	8.1	9.3	10.7	12.5	14.4
Pump Package (Option Standard Head)							
Evaporator Head Pressure Available Single Pump	(kPa)	75.5	108.9	88.0	105.9	135.8	119.1
Evaporator Head Pressure Available Dual Pump	(kPa)	75.5	108.9	88.0	105.9	135.8	119.1
Power (3)	(kW)	3	4	4	4	5.5	5.5
Rated Amps (3)	(A)	6.1	7.59	7.59	7.59	10.6	10.6
Pump Package (Option High Head)							
Evaporator Head Pressure Available Single Pump	(kPa)	230.3	231.1	203.1	216.0	211.9	196.3
Evaporator Head Pressure Available Dual Pump	(kPa)	230.3	231.1	203.1	216.0	211.9	196.3
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5	7.5
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8	13.8
Hydraulic Module components							
Water strainer Ø	(mm)	65	65	65	80	80	80
Expansion Tank Volume	(L)	25	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)				120		
Antifreeze Heater without pump package and with strainer	(W)				120		
Pump package antifreeze Heater	(W)				860		
Buffer tank antifreeze Heater	(W)				800		
VFD Weight	(kg)	15	15	15	15	15	15
Water tank Volume	(L)	500	500	500	500	500	500

General Data

Table 8 - Continued

Size		40	46	52	60	70	80
Condenser							
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192
Fan							
Quantity	#	4	4	4	6	6	6
Diameter	(mm)	757	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	9222	9225	9850	8568	9211	9666
Static Pressure	(Pa)	0	0	0	0	0	0
Power per Motor	(kW)	0.4	0.4	0.4	0.4	0.4	0.4
Rated Amps per Motor	(A)	1.35	1.35	1.35	1.35	1.35	1.35
Motor RPM	(rpm)	700	700	700	700	700	700
PHR							
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38	38
Water Storage Capacity	(L)	0.0671*2	0.0671*2	0.0671*2	0.0915*2	0.0915*2	0.1098*2
Unit Water Connection							
Chilled Water	(mm)	65	65	65	80	80	80
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions							
Unit Length with Buffer Tank	(mm)	3416	3416	3416	4330	4330	4330
Unit Length with VFD	(mm)	3193	3193	3193	4107	4107	4107
Unit Length with Buffer Tank and VFD	(mm)	3704	3704	3704	4618	4618	4618
Unit Length without Buffer Tank or VFD	(mm)	2905	2905	2905	3819	3819	3819
Unit Width	(mm)	2266	2266	2266	2266	2266	2266
Unit Height	(mm)	2150	2150	2150	2150	2150	2150
Weight (Aluminium Fins without louver or VFD)							
Shipping Weight (5)	(kg)	1720	1747	1796	2202	2261	2310
Operating Weight (5)	(kg)	1733	1765	1814	2221	2286	2337
Additional weight (dual pump high head)	(kg)	226	225	226	319	319	319
Additional weight (dual pump standard head)	(kg)	209	221	221	223	237	237
Additional weight (single pump high head)	(kg)	179	178	179	222	222	222
Additional weight (single pump standard head)	(kg)	171	177	177	179	186	186
Additional weight (Buffer tank)	(kg)	189	188	188	188	189	189
Louver Weight	(kg)	32	32	32	37	37	37
Min. Starting/Oper. Ambient							
Std Unit	(°C)	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit							
Refrigerant charge	(Kg)	20	22.7	22.7	26.3	29	31.8
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 9 - General Data - CXAM Standard Efficiency & Comprehensive Acoustic Package - Duplex W units

Size		90	100	110	120	140	150	160
Eurovent Performances (1)								
Net Cooling Capacity	(kW)	239.3	263.6	283.9	308.5	363.2	392.3	407.0
Total Power Input in Cooling	(kW)	83.3	96.5	105.4	112.0	136.9	151.0	163.0
EER		9.8	9.3	9.2	9.4	9.0	8.9	8.5
Heating net Capacity	(kW)	244.1	262.7	278.9	296.3	352.3	388.0	402.3
Total Power Input in Heating	(kW)	79.8	87.9	95.1	104.0	123.0	131.7	139.4
Heating COP		10.4	10.2	10.0	9.7	9.8	10.0	9.8
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	85	83	83	85	86	84	85
System Data								
Refrigerant Circuit	#	2	2	2	2	2	2	2
Capacity Steps	%	22-44-72-100	25-50-75-100	23-45-73-100	25-50-75-100	14-29-46-64-82-100	17-33-50-67-83-100	16-31-47-63-81-100
Units Amps								
Nominal Amps (2)	(A)	176	196	216	239	275	295	315
Start-up Amps (2)								
Standard Unit	(A)	390	410	480	503	488	508	578
With Soft Starter Option	(A)	286	306	352	375	384	404	450
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	240	240	240	240	2 x 300	2 x 300	2 x 300
Compressor								
Compressor Number per Circuit	#	2	2	2	2	3	3	3
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHN250 & CSHN315	CSHN315 & CSHN315	CSHN315 & CSHN374	CSHN374 & CSHN374	CSHN250 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN374
Rated Amps per Circuit	(A)	36.4 & 46.4	46.4 & 46.4	46.4 & 56.4	56.4 & 56.4	36.4 & 46.4 & 46.4	46.4 & 46.4 & 46.4	46.4 & 46.4 & 56.4
Locked Rotor Amps per Circuit	(A)	215 & 260	260 & 260	260 & 320	320 & 320	215 & 260 & 260	260 & 260 & 260	320 & 320 & 320
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator								
Quantity	#	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	24.0	32.4	32.4	32.4	39.2	46.7	46.7
Heater Power	(W)	400	400	400	400	500	500	500
Min. Flow	(L/Sec)	5.5	6.1	6.6	7.1	8.4	9.1	9.4
Max. Flow	(L/Sec)	16.6	18.2	19.7	21.4	25.2	27.2	28.2
Pump Package (Option Standard Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	133.1	130.5	127.0	115.7	150.8	137.0	128.6
Evaporator Head Pressure Available Dual Pump	(kPa)	133.1	130.5	127.0	115.7	150.8	137.0	128.6
Power (3)	(kW)	5.5	5.5	7.5	7.5	11	11	11
Rated Amps (3)	(A)	10.6	10.6	13.8	13.8	19.6	19.6	19.6
Pump Package (Option High Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	209.3	211.6	197.8	223.8	208.9	194.7	241.9
Evaporator Head Pressure Available Dual Pump	(kPa)	209.3	211.6	197.8	223.8	208.9	194.7	241.9
Power (3)	(kW)	7.5	7.5	7.5	11	11	11	15
Rated Amps (3)	(A)	13.8	13.8	13.8	19.6	19.6	19.6	26.5
Hydraulic Module components								
Water strainer Ø	(mm)	100	100	100	100	100	100	100
Expansion Tank Volume	(L)	60	60	60	60	60	60	60
User Volume Expansion Capacity	(L)	900	900	900	900	900	900	900
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500

General Data

Table 9 - Continued

Size		90	100	110	120	140	150	160
Antifreeze Heater without pump package and without strainer	(W)	120	120	120	240	240	240	240
Antifreeze Heater without pump package and with strainer	(W)	240	240	240	300	300	300	300
Pump package antifreeze Heater	(W)	980	980	980	1100	1100	1100	1100
Buffer tank antifreeze Heater	(W)	1200	1200	1200	1200	1200	1200	1200
VFD Weight	(kg)	21	21	21	21	21	21	21
Water tank Volume	(L)	725	725	725	725	725	725	725
Condenser								
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192
Fan								
Quantity	#	8	8	8	10	12	12	12
Diameter	(mm)	757	757	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		4xS	4xS	4xS	5xS	6xS	6xS	6xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 3xS	1xVFD + 3xS	1xVFD + 3xS	1xVFD + 4xS	1xVFD + 5xS	1xVFD + 5xS	1xVFD + 5xS
Airflow per Fan	(m ³ /h)	9809	9811	10304	9810	9809	9811	9813
Static Pressure	(Pa)	0	0	0	0	0	0	0
Power per Motor	(kW)	0.4	0.4	0.3	0.4	0.4	0.4	0.4
Rated Amps per Motor	(A)	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Motor RPM	(rpm)	700	700	700	700	700	700	700
PHR								
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	64	64	64	64	64	64	64
Water Storage Capacity	(L)	0.122*2	0.122*2	0.1647*2	0.1647*2	0.2135*2	0.2135*2	0.2135*2
Unit Water Connection								
Chilled Water	(mm)	100	100	100	100	100	100	100
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions								
Unit Length with Buffer Tank	(mm)	4230	4230	5145	5145	6062	6062	6062
Unit Length with VFD	(mm)	4558	4558	5473	5473	6388	6388	6388
Unit Length with Buffer Tank and VFD	(mm)	4558	4558	5473	5473	6388	6388	6388
Unit Length without Buffer Tank or VFD	(mm)	4230	4230	5145	5145	6062	6062	6062
Unit Width	(mm)	2273	2273	2273	2273	2273	2273	2273
Unit Height	(mm)	2344	2344	2344	2344	2344	2344	2344
Weight (Aluminium Fins without louver or VFD)								
Shipping Weight (5)	(kg)	2857	2977	3231	3321	3993	4110	4110
Operating Weight (5)	(kg)	2884	3012	3266	3356	4034	4159	4159
Additional weight (dual pump high head)	(kg)	406	406	428	510	556	557	583
Additional weight (dual pump standard head)	(kg)	325	325	427	427	556	556	556
Additional weight (single pump high head)	(kg)	310	310	332	377	423	423	436
Additional weight (single pump standard head)	(kg)	274	274	336	336	422	423	423
Additional weight (Buffer tank)	(kg)	188	188	188	188	189	188	188
Louver Weight	(kg)	47	47	51	51	56	56	56
Min. Starting/Oper. Ambient								
Std Unit	(°C)	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit								
Refrigerant charge	(Kg)	46.3	46.3	57.2	57.2	68.9	68.9	68
Oil Charge	(L)	13.4	13.4	13.9	14.4	22.5	23	23.5

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)
 (2) Rated Condition without Pump Package
 (3) Single Pump Option
 (4) S: Single Speed, D: Two Speed, VFD: Inverter.
 (5) Base unit

General Data

Table 10 - General Data - CXAM High Efficiency & Compact - Simplex units

Size		20	23	26	30	35
Eurovent Performances (1)						
Net Cooling Capacity	(kW)	57.9	64.3	75.3	80.4	94.2
Total Power Input in Cooling	(kW)	18.2	20.8	23.6	26.6	31.7
EER		10.9	10.5	10.9	10.3	10.1
Net Heating Capacity	(kW)	62.4	69.6	77.8	87.9	99.6
Total Power Input in Heating	(kW)	18.6	21.0	24.5	28.4	32.0
Heating COP		11.4	11.3	10.8	10.6	10.6
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	85	85	87	88	90
System Data						
Refrigerant Circuit	#	1	1	1	1	1
Capacity Steps	%	50-100	43-100	50-100	50-100	43-100
Units Amps						
Maximum Amps (2)	(A)	49	54	62	64	74
Start-up Amps (2)						
Standard Unit	(A)	171	187	195	198	253
With Soft Starter Option	(A)	114	124	132	134	167
Short Circuit Unit Capacity	(kA)	15	15	15	15	15
Max Supply Cable Size	(mm ²)	95	95	95	95	150
Compressor						
Compressor Number per Circuit	#	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125&CSHD125	CSHD125&CSHD161	CSHD161&CSHD161	CSHN184&CSHN184	CSHN184&CSHN250
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215
Motor RPM	(rpm)	2900	2900	2900	2900	2900
Sump heater per circuit	kW	90&90	90&90	90&90	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85
Evaporator						
Quantity	#	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	6.7	6.7	8.2	6.3	10.6
Antifreeze Heater	(W)	200	200	200	200	300
Min. Flow	(L/Sec)	1.3	1.5	1.7	1.9	2.2
Max. Flow	(L/Sec)	4.0	4.5	5.2	5.6	6.6
Pump Package (Option Standard Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	112.9	86.7	76.2	68.2	83.2
Evaporator Head Pressure Available Dual Pump	(kPa)	112.9	86.7	76.2	68.2	83.2
Power (3)	(kW)	1.5	1.5	1.5	1.5	1.5
Rated Amps (3)	(A)	3.25	3.25	3.25	3.25	3.25
Pump Package (Option High Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	289.5	262.2	248.8	238.5	249.3
Evaporator Head Pressure Available Dual Pump	(kPa)	289.5	262.2	248.8	238.5	249.3
Power (3)	(kW)	4	4	4	4	5.5
Rated Amps (3)	(A)	7.59	7.59	7.59	7.59	10.6
Hydraulic Module Components						
Expansion Tank Volume	(L)	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)			120		
Antifreeze Heater without pump package and with strainer	(W)			180		
Pump package antifreeze Heater	(W)			530		
Buffer tank antifreeze Heater	(W)			800		
VFD Weight	(kg)	10	10	10	10	10
Water tank Volume	(L)	506	506	506	506	506

General Data

Table 10 - Continued

Size		20	23	26	30	35
Condenser						
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192
Fan						
Quantity	#	2	2	3	3	3
Diameter	(mm)	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	13060	13062	12250	12823	12827
Static Pressure	(Pa)	0	0	0	0	0
Power per Motor	(kW)	0.8	0.8	0.9	0.8	0.8
Rated Amps per Motor	(A)	1.95	1.95	1.95	1.95	1.95
Motor RPM	(rpm)	920	920	920	920	920
PHR						
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38
Water Storage Capacity	(L)	0.0671	0.0671	0.0671	0.0915	0.0915
Unit Water Connection						
Chilled Water	(mm)	50	50	65	65	65
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions						
Unit Length with Buffer Tank	(mm)	3418	3418	4332	4332	4332
Unit Length with VFD	(mm)	2908	2908	3822	3822	3822
Unit Length with Buffer Tank and VFD	(mm)	3418	3418	4332	4332	4332
Unit Length without Buffer Tank or VFD	(mm)	2908	2908	3822	3822	3822
Unit Width	(mm)	1301	1301	1301	1301	1301
Unit Height	(mm)	2153	2153	2153	2153	2153
Weight (Aluminium Fins without louver or VFD)						
Shipping Weight (5)	(kg)	939	943	1149	1253	1268
Operating Weight (5)	(kg)	950	954	1161	1263	1283
Additional weight (dual pump high head)	(kg)	200	200	242	241	256
Additional weight (dual pump standard head)	(kg)	183	183	226	225	226
Additional weight (single pump high head)	(kg)	163	163	205	204	209
Additional weight (single pump standard head)	(kg)	154	154	196	195	196
Louver Weight	(kg)	19	19	25	25	25
Min. Starting/Oper. Ambient						
Std Unit	(°C)	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit						
Refrigerant charge	(Kg)	22.7	22.7	29	33.6	33.6
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 11 - General Data - CXAM High Efficiency & Compact - Duplex V units

Size		40	46	52	60	70
Eurovent Performances (1)						
Net Cooling Capacity	(kW)	112.5	125.9	149.2	163.5	193.3
Total Power Input in Cooling	(kW)	36.1	41.4	47.3	53.4	63.8
EER		10.6	10.4	10.8	10.4	10.3
Net Heating Capacity	(kW)	126.7	141.8	157.3	177.5	192.5
Total Power Input in Heating	(kW)	37.5	42.4	49.9	56.9	61.5
Heating COP		11.5	11.4	10.7	10.6	10.7
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	88	88	90	91	93
System Data						
Refrigerant Circuit	#	2	2	2	2	2
Capacity Steps	%	25-50-75-100	21-43-71-100	25-50-75-100	25-50-75-100	21-43-71-100
Units Amps						
Maximum Amps (2)	(A)	91	99	112	116	137
Start-up Amps (2)						
Standard Unit	(A)	212	232	245	250	315
With Soft Starter Option	(A)	155	169	182	186	229
Short Circuit Unit Capacity	(kA)	15	15	15	15	15
Max Supply Cable Size	(mm ²)	150	150	150	240	240
Compressor						
Compressor Number per Circuit	#	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125&CSHD125	CSHD125&CSHD161	CSHD161&CSHD161	CSHN184&CSHN184	CSHN184&CSHN250
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215
Motor RPM	(rpm)	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85
Evaporator						
Quantity	#	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	14.3	14.3	15.6	15.6	28.2
Antifreeze Heater	(W)	300	300	300	300	400
Min. Flow	(L/Sec)	2.6	2.9	3.4	3.8	4.5
Max. Flow	(L/Sec)	7.7	8.6	10.3	11.3	13.4
Pump Package (Option Standard Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	81.4	95.0	76.2	94.3	138.5
Evaporator Head Pressure Available Dual Pump	(kPa)	81.4	95.0	76.2	94.3	138.5
Power (3)	(kW)	3	4	4	4	5.5
Rated Amps (3)	(A)	6.1	7.59	7.59	7.59	10.6
Pump Package (Option High Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	234.4	212.6	183.3	207.4	215.5
Evaporator Head Pressure Available Dual Pump	(kPa)	234.4	212.6	183.3	207.4	215.5
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8
Hydraulic Module Components						
Expansion Tank Volume	(L)	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)			120		
Antifreeze Heater without pump package and with strainer	(W)			120		
Pump package antifreeze Heater	(W)			860		

General Data

Table 11 - Continued

Size		40	46	52	60	70
Buffer tank antifreeze Heater	(W)			800		
VFD Weight	(kg)	15	15	15	15	15
Water tank Volume	(L)	500	500	500	500	500
Condenser						
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192
Fan						
Quantity	#	4	4	6	6	6
Diameter	(mm)	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	13059	13061	12250	12823	12827
Static Pressure	(Pa)	0	0	0	0	0
Power per Motor	(kW)	0.8	0.8	0.9	0.8	0.8
Rated Amps per Motor	(A)	1.95	1.95	1.95	1.95	1.95
Motor RPM	(rpm)	920	920	920	920	920
PHR						
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38
Water Storage Capacity	(L)	0.0671*2	0.0671*2	0.0671*2	0.0915*2	0.0915*2
Unit Water Connection						
Chilled Water	(mm)	65	65	80	80	80
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions						
Unit Length with Buffer Tank	(mm)	3416	3416	4330	4330	4330
Unit Length with VFD	(mm)	3193	3193	4107	4107	4107
Unit Length with Buffer Tank and VFD	(mm)	3704	3704	4618	4618	4618
Unit Length without Buffer Tank or VFD	(mm)	2905	2905	3819	3819	3819
Unit Width	(mm)	2266	2266	2266	2266	2266
Unit Height	(mm)	2150	2150	2150	2150	2150
Weight (Aluminium Fins without louver or VFD)						
Shipping Weight (5)	(kg)	1712	1720	1974	2194	2233
Operating Weight (5)	(kg)	1730	1738	1992	2213	2264
Additional weight (dual pump high head)	(kg)	226	226	227	319	319
Additional weight (dual pump standard head)	(kg)	209	221	222	223	237
Additional weight (single pump high head)	(kg)	179	179	180	222	222
Additional weight (single pump standard head)	(kg)	171	177	179	179	186
Louver Weight	(kg)	32	32	37	37	37
Min. Starting/Oper. Ambient						
Std Unit	(°C)	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit						
Refrigerant charge	(Kg)	22.7	22.7	29	32.7	32.7
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 12 - General Data - CXAM High Efficiency & Compact - Duplex W units

Size		80	90	100	110	120	140	150
Eurovent Performances (1)								
Net Cooling Capacity	(kW)	231.0	257.0	293.7	311.1	332.5	378.9	402.5
Total Power Input in Cooling	(kW)	70.7	82.1	93.7	103.1	113.3	132.8	144.5
EER		11.1	10.7	10.7	10.3	10.0	9.7	9.5
Net Heating Capacity	(kW)	229.7	250.5	283.8	300.5	316.9	362.2	398.9
Total Power Input in Heating	(kW)	73.4	81.9	92.8	100.7	107.9	127.9	138.3
Heating COP		10.7	10.4	10.4	10.2	10.0	9.7	9.8
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	94	93	92	92	93	94	93
System Data								
Refrigerant Circuit	#	2	2	2	2	2	2	2
Capacity Steps	%	25-50-75-100	22-44-72-100	25-50-75-100	23-45-73-100	25-50-75-100	14-29-46-64-82-100	17-33-50-67-83-100
Units Amps								
Maximum Amps (2)	(A)	161	181	205	225	245	282	302
Start-up Amps (2)								
Standard Unit	(A)	340	395	419	489	509	495	515
With Soft Starter Option	(A)	254	291	315	361	381	391	411
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	240	240	240	240	240	2 x 300	2 x 300
Compressor								
Compressor Number per Circuit	#	2	2	2	2	2	3	3
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHN250 & CSHN250	CSHN250 & CSHN315	CSHN315 & CSHN315	CSHN315 & CSHN374	CSHN374 & CSHN374	CSHN250 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN315
Rated Amps per Circuit	(A)	36.4 & 36.4	36.4 & 46.4	46.4 & 46.4	46.4 & 56.4	56.4 & 56.4	36.4 & 46.4 & 46.4	46.4 & 46.4 & 46.4
Locked Rotor Amps per Circuit	(A)	215 & 215	215 & 260	260 & 260	260 & 320	320 & 320	215 & 260 & 260	260 & 260 & 260
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator								
Quantity	#	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	32.4	40.8	46.7	40.8	43.4	46.7	46.7
Antifreeze Heater	(W)	400	500	500	400	500	500	500
Min. Flow	(L/Sec)	5.3	5.9	6.8	7.2	7.7	8.8	9.3
Max. Flow	(L/Sec)	16.0	17.8	20.3	21.6	23.0	26.3	27.9
Pump Package (Option Standard Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	152.5	145.7	117.2	128.9	121.9	143.9	131.1
Evaporator Head Pressure Available Dual Pump	(kPa)	152.5	145.7	117.2	128.9	121.9	143.9	131.1
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5	11	11
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8	19.6	19.6
Pump Package (Option High Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	229.0	225.6	203.6	193.2	228.8	201.8	188.6
Evaporator Head Pressure Available Dual Pump	(kPa)	229.0	225.6	203.6	193.2	228.8	201.8	188.6
Power (3)	(kW)	7.5	7.5	7.5	7.5	11	11	11
Rated Amps (3)	(A)	13.8	13.8	13.8	13.8	19.6	19.6	19.6
Hydraulic Module Components								
Expansion Tank Volume	(L)	60	60	60	60	60	60	60
User Volume Expansion Capacity	(L)	900	900	900	900	900	900	900
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)	120	120	240	240	240	240	240

General Data

Table 12 - Continued

Size		80	90	100	110	120	140	150
Antifreeze Heater without pump package and with strainer	(W)	240	240	300	300	300	300	300
Pump package antifreeze Heater	(W)	980	980	1100	1100	1100	1100	1100
Buffer tank antifreeze Heater	(W)	1200	1200	1200	1200	1200	1200	1200
VFD Weight	(kg)	21	21	21	21	21	21	21
Water tank Volume	(L)	725	725	725	725	725	725	725
Condenser								
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192
Fan								
Quantity	#	8	8	10	10	10	12	12
Diameter	(mm)	757	757	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		4xS	4xS	5xS	5xS	5xS	6xS	6xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 3xS	1xVFD + 3xS	1xVFD + 4xS	1xVFD + 4xS	1xVFD + 4xS	1xVFD + 5xS	1xVFD + 5xS
Airflow per Fan	(m ³ /h)	13012	13015	13013	13014	13016	13015	13017
Static Pressure	(Pa)	0	0	0	0	0	0	0
Power per Motor	(kW)	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Rated Amps per Motor	(A)	1.95	1.95	1.95	1.95	1.95	1.95	1.95
Motor RPM	(rpm)	920	920	920	920	920	920	920
PHR								
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	64	64	64	64	64	64	64
Water Storage Capacity	(L)	0.122*2	0.122*2	0.122*2	0.1647*2	0.1647*2	0.2135*2	0.2135*2
Unit Water Connection								
Chilled Water	(mm)	100	100	100	100	100	100	100
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions								
Unit Length with Buffer Tank	(mm)	4230	4230	5145	5145	5145	6062	6062
Unit Length with VFD	(mm)	4558	4558	5473	5473	5473	6388	6388
Unit Length with Buffer Tank and VFD	(mm)	4558	4558	5473	5473	5473	6388	6388
Unit Length without Buffer Tank or VFD	(mm)	4230	4230	5145	5145	5145	6062	6062
Unit Width	(mm)	2273	2273	2273	2273	2273	2273	2273
Unit Height	(mm)	2344	2344	2344	2344	2344	2344	2344
Weight (Aluminium Fins without louver or VFD)								
Shipping Weight (5)	(kg)	2675	2795	3251	3233	3241	3862	3956
Operating Weight (5)	(kg)	2710	2838	3300	3276	3286	3911	4005
Additional weight (dual pump high head)	(kg)	406	406	429	428	510	557	557
Additional weight (dual pump standard head)	(kg)	325	325	347	427	427	556	556
Additional weight (single pump high head)	(kg)	310	310	332	332	377	423	423
Additional weight (single pump standard head)	(kg)	274	274	296	336	336	423	423
Louver Weight	(kg)	47	47	51	51	51	56	56
Min. Starting/Oper. Ambient								
Std Unit	(°C)	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit								
Refrigerant charge	(Kg)	45.4	49	59.2	57.2	59	68.9	72
Oil Charge	(L)	13.4	13.4	13.4	13.9	14.4	22.5	23

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)
 (2) Single Pump Option
 (3) Rated Condition without Pump Package
 (4) S: Single Speed, D: Two Speed, VFD: Inverter.
 (5) With pump and antifreeze protection

General Data

Table 13 - General Data - CXAM High Efficiency & Super Quiet - Simplex units

Size		20	23	26	30	35
Eurovent Performances (1)						
Net Cooling Capacity	(kW)	57.8	64.2	74.9	80.2	93.9
Total Power Input in Cooling	(kW)	18.3	20.9	23.8	26.8	31.9
EER		10.8	10.5	10.7	10.2	10.0
Net Heating Capacity	(kW)	62.2	69.3	77.1	87.5	99.1
Total Power Input in Heating	(kW)	18.5	21.0	24.3	28.3	31.9
Heating COP		11.5	11.3	10.8	10.6	10.6
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	79	80	81	82	84
System Data						
Refrigerant Circuit	#	1	1	1	1	1
Capacity Steps	%	50-100	43-100	50-100	50-100	43-100
Units Amps						
Maximum Amps (2)	(A)	49	53	61	63	73
Start-up Amps (2)						
Standard Unit	(A)	170	186	194	197	252
With Soft Starter Option	(A)	113	123	131	133	166
Short Circuit Unit Capacity	(kA)	15	15	15	15	15
Max Supply Cable Size	(mm ²)	95	95	95	95	150
Compressor						
Compressor Number per Circuit	#	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215
Motor RPM	(rpm)	2900	2900	2900	2900	2900
Sump heater per circuit	kW	90&90	90&90	90&90	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85
Evaporator						
Quantity	#	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	6.7	6.7	8.2	6.3	10.6
Antifreeze Heater	(W)	200	200	200	200	300
Min. Flow	(L/Sec)	1.3	1.5	1.7	1.9	2.2
Max. Flow	(L/Sec)	4.0	4.5	5.2	5.6	6.6
Pump Package (Option Standard Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	113.3	86.9	77.8	69.2	83.6
Evaporator Head Pressure Available Dual Pump	(kPa)	113.3	86.9	77.8	69.2	83.6
Power (3)	(kW)	1.5	1.5	1.5	1.5	1.5
Rated Amps (3)	(A)	3.25	3.25	3.25	3.25	3.25
Pump Package (Option High Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	290.0	262.5	250.7	239.6	249.8
Evaporator Head Pressure Available Dual Pump	(kPa)	290.0	262.5	250.7	239.6	249.8
Power (3)	(kW)	4	4	4	4	5.5
Rated Amps (3)	(A)	7.59	7.59	7.59	7.59	10.6
Hydraulic Module components						
Expansion Tank Volume	(L)	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)			120		
Antifreeze Heater without pump package and with strainer	(W)			180		

General Data

Table 13 - Continued

Size		20	23	26	30	35
Pump package antifreeze Heater	(W)			530		
Buffer tank antifreeze Heater	(W)			800		
VFD Weight	(kg)	10	10	10	10	10
Water tank Volume	(L)	506	506	506	506	506
Condenser						
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192
Fan						
Quantity	#	2	2	3	3	3
Diameter	(mm)	732	732	732	732	732
Drive Type		Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	12747	12751	11360	12343	12350
Static Pressure	(Pa)	0	0	0	0	0
Power per Motor	(kW)	0.8	0.8	0.8	0.8	0.8
Rated Amps per Motor	(A)	1.80	1.80	1.80	1.80	1.80
Motor RPM	(rpm)	700	700	700	700	700
PHR						
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38
Water Storage Capacity	(L)	0.0671	0.0671	0.0671	0.0915	0.0915
Unit Water Connection						
Chilled Water	(mm)	50	50	65	65	65
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions						
Unit Length with Buffer Tank	(mm)	3418	3418	4332	4332	4332
Unit Length with VFD	(mm)	2908	2908	3822	3822	3822
Unit Length with Buffer Tank and VFD	(mm)	3418	3418	4332	4332	4332
Unit Length without Buffer Tank or VFD	(mm)	2908	2908	3822	3822	3822
Unit Width	(mm)	1301	1301	1301	1301	1301
Unit Height	(mm)	2153	2153	2153	2153	2153
Weight (Aluminium Fins without louver or VFD)						
Shipping Weight (5)	(kg)	939	943	1149	1253	1268
Operating Weight (5)	(kg)	950	954	1161	1263	1283
Additional weight (dual pump high head)	(kg)	200	200	242	241	256
Additional weight (dual pump standard head)	(kg)	183	183	226	225	226
Additional weight (single pump high head)	(kg)	163	163	205	204	209
Additional weight (single pump standard head)	(kg)	154	154	196	195	196
Additional weight (Buffer tank)	(kg)	188	188	188	189	188
Louver Weight	(kg)	19	19	25	25	25
Min. Starting/Oper. Ambient						
Std Unit	(°C)	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit						
Refrigerant charge	(Kg)	22.7	22.7	29	33.6	33.6
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)
 (2) Rated Condition without Pump Package
 (3) Single Pump Option
 (4) S: Single Speed, D: Two Speed, VFD: Inverter.
 (5) Base unit

General Data

Table 14 - General Data - CXAM High Efficiency & Super Quiet - Duplex V

Size		40	46	52	60	70
Eurovent Performances (1)						
Net Cooling Capacity	(kW)	112.4	125.7	148.1	162.9	192.5
Total Power Input in Cooling	(kW)	36.2	41.6	47.6	53.7	64.2
EER		10.6	10.3	10.6	10.4	10.2
Net Heating Capacity	(kW)	126.4	141.2	156.2	176.8	200.5
Total Power Input in Heating	(kW)	37.3	42.3	49.4	56.6	63.6
Heating COP		11.5	11.4	10.8	10.6	10.8
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	82	83	84	85	87
System Data						
Refrigerant Circuit	#	2	2	2	2	2
Capacity Steps	%	25-50-75-100	21-43-71-100	25-50-75-100	25-50-75-100	21-43-71-100
Units Amps						
Maximum Amps (2)	(A)	90	99	111	115	136
Start-up Amps (2)						
Standard Unit	(A)	211	232	244	249	314
With Soft Starter Option	(A)	154	169	181	185	228
Short Circuit Unit Capacity	(kA)	15	15	15	15	15
Max Supply Cable Size	(mm ²)	150	150	150	240	240
Compressor						
Compressor Number per Circuit	#	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215
Motor RPM	(rpm)	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85
Evaporator						
Quantity	#	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	14.3	14.3	15.6	15.6	28.2
Antifreeze Heater	(W)	300	300	300	300	400
Min. Flow	(L/Sec)	2.6	2.9	3.4	3.8	4.4
Max. Flow	(L/Sec)	7.7	8.6	10.3	11.3	13.3
Pump Package (Option Standard Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	82.5	95.4	78.8	95.5	139.1
Evaporator Head Pressure Available Dual Pump	(kPa)	82.5	95.4	78.8	95.5	139.1
Power (3)	(kW)	3	4	4	4	5.5
Rated Amps (3)	(A)	6.1	7.59	7.59	7.59	10.6
Pump Package (Option High Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	235.6	213.2	186.9	208.3	216.0
Evaporator Head Pressure Available Dual Pump	(kPa)	235.6	213.2	186.9	208.3	216.0
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8
Hydraulic Module components						
Expansion Tank Volume	(L)	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)			120		
Antifreeze Heater without pump package and with strainer	(W)			120		
Pump package antifreeze Heater	(W)			860		

General Data

Table 14 - Continued

Size		40	46	52	60	70
Buffer tank antifreeze Heater	(W)			800		
VFD Weight	(kg)	15	15	15	15	15
Water tank Volume	(L)	500	500	500	500	500
Condenser						
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192
Fan						
Quantity	#	4	4	6	6	6
Diameter	(mm)	732	732	732	732	732
Drive Type		Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	12746	12750	11359	12344	12350
Static Pressure	(Pa)	0	0	0	0	0
Power per Motor	(kW)	0.8	0.8	0.8	0.8	0.8
Rated Amps per Motor	(A)	1.80	1.80	1.80	1.80	1.80
Motor RPM	(rpm)	700	700	700	700	700
PHR						
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38
Water Storage Capacity	(L)	0.0671*2	0.0671*2	0.0671*2	0.0915*2	0.0915*2
Unit Water Connection						
Chilled Water	(mm)	65	65	80	80	80
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions						
Unit Length with Buffer Tank	(mm)	3416	3416	4330	4330	4330
Unit Length with VFD	(mm)	3193	3193	4107	4107	4107
Unit Length with Buffer Tank and VFD	(mm)	3704	3704	4618	4618	4618
Unit Length without Buffer Tank or VFD	(mm)	2905	2905	3819	3819	3819
Unit Width	(mm)	2266	2266	2266	2266	2266
Unit Height	(mm)	2150	2150	2150	2150	2150
Weight (Aluminium Fins without louver or VFD)						
Shipping Weight (5)	(kg)	1712	1720	1974	2194	2233
Operating Weight (5)	(kg)	1730	1738	1992	2213	2264
Additional weight (dual pump high head)	(kg)	226	226	227	319	319
Additional weight (dual pump standard head)	(kg)	209	221	222	223	237
Additional weight (single pump high head)	(kg)	179	179	180	222	222
Additional weight (single pump standard head)	(kg)	171	177	179	179	186
Additional weight (Buffer tank)	(kg)	188	188	188	189	189
Shipping Weight (7)	(kg)	1938	1946	2201	2513	2552
Louver Weight	(kg)	32	32	37	37	37
Min. Starting/Oper. Ambient						
Std Unit	(°C)	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit						
Refrigerant charge	(Kg)	22.7	22.7	29	33.6	34
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Single Pump Option

(3) Rated Condition without Pump Package

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) With pump and antifreeze protection

General Data

Table 15 - General Data - CXAM High Efficiency & Super Quiet - Duplex W

Size		80	90	100	110	120	140	150
Eurovent Performances (1)								
Net Cooling Capacity	(kW)	231.0	257.2	293.9	311.4	332.9	379.2	403.2
Total Power Input in Cooling	(kW)	70.3	81.7	93.2	102.6	112.8	132.2	143.9
EER		11.2	10.7	10.8	10.3	10.1	9.8	9.6
Net Heating Capacity	(kW)	229.5	250.4	282.9	300.1	317.2	362.2	397.2
Total Power Input in Heating	(kW)	73.1	81.5	92.3	100.2	107.4	127.7	137.2
Heating COP		10.7	10.5	10.5	10.2	10.1	9.7	9.9
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	88	87	86	87	88	88	87
System Data								
Refrigerant Circuit	#	2	2	2	2	2	2	2
Capacity Steps	%	25-50-75-100	22-44-72-100	25-50-75-100	23-45-73-100	25-50-75-100	14-29-46-64-82-100	17-33-50-67-83-100
Units Amps								
Maximum Amps (2)	(A)	160	180	204	224	244	280	300
Start-up Amps (2)								
Standard Unit	(A)	339	394	417	487	507	494	514
With Soft Starter Option	(A)	253	290	313	359	379	390	410
Short Circuit Unit Capacity	(kA)	15	15	15	15	15	15	15
Max Supply Cable Size	(mm ²)	240	240	240	240	240	2 x 300	2 x 300
Compressor								
Compressor Number per Circuit	#	2	2	2	2	2	3	3
Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHN250 & CSHN250	CSHN250 & CSHN315	CSHN315 & CSHN315	CSHN315 & CSHN374	CSHN374 & CSHN374	CSHN250 & CSHN315 & CSHN315	CSHN315 & CSHN315 & CSHN315
Rated Amps per Circuit	(A)	36.4 & 36.4	36.4 & 46.4	46.4 & 46.4	46.4 & 56.4	56.4 & 56.4	36.4 & 46.4 & 46.4	46.4 & 46.4 & 46.4
Locked Rotor Amps per Circuit	(A)	215 & 215	215 & 260	260 & 260	260 & 320	320 & 320	215 & 260 & 260	260 & 260 & 260
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Evaporator								
Quantity	#	1	1	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	32.4	40.8	46.7	40.8	43.4	46.7	46.7
Antifreeze Heater	(W)	400	500	500	400	500	500	500
Min. Flow	(L/Sec)	5.3	5.9	6.8	7.2	7.7	8.8	9.3
Max. Flow	(L/Sec)	16.0	17.8	20.4	21.6	23.1	26.3	27.9
Pump Package (Option Standard Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	152.4	145.5	117.0	128.8	121.8	143.7	130.9
Evaporator Head Pressure Available Dual Pump	(kPa)	152.4	145.5	117.0	128.8	121.8	143.7	130.9
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5	11	11
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8	19.6	19.6
Pump Package (Option High Head)								
Evaporator Head Pressure Available Single Pump	(kPa)	228.9	225.5	203.4	193.1	228.6	201.6	188.3
Evaporator Head Pressure Available Dual Pump	(kPa)	228.9	225.5	203.4	193.1	228.6	201.6	188.3
Power (3)	(kW)	7.5	7.5	7.5	7.5	11	11	11
Rated Amps (3)	(A)	13.8	13.8	13.8	13.8	19.6	19.6	19.6
Hydraulic Module components								
Expansion Tank Volume	(L)	60	60	60	60	60	60	60
User Volume Expansion Capacity	(L)	900	900	900	900	900	900	900
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500	500	500

General Data

Table 15 - Continued

Size		80	90	100	110	120	140	150
Antifreeze Heater without pump package and without strainer	(W)	120	120	240	240	240	240	240
Antifreeze Heater without pump package and with strainer	(W)	240	240	300	300	300	300	300
Pump package antifreeze Heater	(W)	980	980	1100	1100	1100	1100	1100
Buffer tank antifreeze Heater	(W)	1200	1200	1200	1200	1200	1200	1200
VFD Weight	(kg)	21	21	21	21	21	21	21
Water tank Volume	(L)	725	725	725	725	725	725	725
Condenser								
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192	192	192
Fan								
Quantity	#	8	8	10	10	10	12	12
Diameter	(mm)	732	732	732	732	732	732	732
Drive Type		Direct	Direct	Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		4xS	4xS	5xS	5xS	5xS	6xS	6xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 3xS	1xVFD + 3xS	1xVFD + 4xS	1xVFD + 4xS	1xVFD + 4xS	1xVFD + 5xS	1xVFD + 5xS
Airflow per Fan	(m ³ /h)	13162	13165	13163	13164	13166	13165	13167
Static Pressure	(Pa)	0	0	0	0	0	0	0
Power per Motor	(kW)	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Rated Amps per Motor	(A)	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Motor RPM	(rpm)	700	700	700	700	700	700	700
PHR								
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	64	64	64	64	64	64	64
Water Storage Capacity	(L)	0.122*2	0.122*2	0.122*2	0.1647*2	0.1647*2	0.2135*2	0.2135*2
Unit Water Connection								
Chilled Water	(mm)	100	100	100	100	100	100	100
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions								
Unit Length with Buffer Tank	(mm)	4230	4230	5145	5145	5145	6062	6062
Unit Length with VFD	(mm)	4558	4558	5473	5473	5473	6388	6388
Unit Length with Buffer Tank and VFD	(mm)	4558	4558	5473	5473	5473	6388	6388
Unit Length without Buffer Tank or VFD	(mm)	4230	4230	5145	5145	5145	6062	6062
Unit Width	(mm)	2273	2273	2273	2273	2273	2273	2273
Unit Height	(mm)	2344	2344	2344	2344	2344	2344	2344
Weight (Aluminium Fins without louver or VFD)								
Shipping Weight (5)	(kg)	2675	2795	3251	3233	3241	3862	3956
Operating Weight (5)	(kg)	2710	2838	3300	3276	3286	3911	4005
Additional weight (dual pump high head)	(kg)	406	406	429	428	510	557	557
Additional weight (dual pump standard head)	(kg)	325	325	347	427	427	556	556
Additional weight (single pump high head)	(kg)	310	310	332	332	377	423	423
Additional weight (single pump standard head)	(kg)	274	274	296	336	336	423	423
Additional weight (Buffer tank)	(kg)	188	188	188	188	188	188	188
Louver Weight	(kg)	47	47	51	51	51	56	56
Min. Starting/Oper. Ambient								
Std Unit	(°C)	7	7	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit								
Refrigerant charge	(Kg)	45.4	46.3	57.2	57.2	56.2	67.1	66.2
Oil Charge	(L)	13.4	13.4	13.4	13.9	14.4	22.5	23

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)
 (2) Rated Condition without Pump Package
 (3) Single Pump Option
 (4) S: Single Speed, D: Two Speed, VFD: Inverter.
 (5) Base unit

General Data

Table 16 - General Data - CXAM High Efficiency & Comprehensive Acoustic Package - Simplex units

Size		20	23	26	30
Eurovent Performances (1)					
Net Cooling Capacity	(kW)	56.4	64.5	72.8	80.4
Total Power Input in Cooling	(kW)	18.2	20.3	22.9	26.7
EER		10.6	10.8	10.8	10.3
Net Heating Capacity	(kW)	61.2	68.9	76.5	86.5
Total Power Input in Heating	(kW)	17.5	20.7	23.1	26.4
Heating COP		11.9	11.4	11.3	11.2
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	77	78	78	79
System Data					
Refrigerant Circuit	#	1	1	1	1
Capacity Steps	%	50-100	43-100	50-100	50-100
Units Amps					
Nominal Amps (2)	(A)	47	54	58	60
Start-up Amps (2)					
Standard Unit	(A)	168	187	191	194
With Soft Starter Option	(A)	111	124	128	130
Short Circuit Unit Capacity	(kA)	15	15	15	15
Max Supply Cable Size	(mm ²)	95	95	95	95
Compressor					
Compressor Number per Circuit	#	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160
Motor RPM	(rpm)	2900	2900	2900	2900
Sump heater per circuit	kW	90&90	90&90	90&90	160&160
Power Factor	#	0.85	0.85	0.85	0.85
Evaporator					
Quantity	#	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	6.7	6.3	6.3	8.2
Heater Power	(W)	200	200	200	200
Min. Flow	(L/Sec)	1.3	1.5	1.7	1.9
Max. Flow	(L/Sec)	3.9	4.5	5.1	5.6
Pump Package (Option Standard Head)					
Evaporator Head Pressure Available Single Pump	(kPa)	114.3	82.8	64.5	88.1
Evaporator Head Pressure Available Dual Pump	(kPa)	114.3	82.8	64.5	88.1
Power (3)	(kW)	1.5	1.5	1.5	1.5
Rated Amps (3)	(A)	3.25	3.25	3.25	3.25
Pump Package (Option High Head)					
Evaporator Head Pressure Available Single Pump	(kPa)	291.0	258.4	237.7	258.9
Evaporator Head Pressure Available Dual Pump	(kPa)	291.0	258.4	237.7	258.9
Power (3)	(kW)	4	4	4	4
Rated Amps (3)	(A)	7.59	7.59	7.59	7.59
Hydraulic Module components					
Expansion Tank Volume	(L)	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)			120	
Antifreeze Heater without pump package and with strainer	(W)			180	
Pump package antifreeze Heater	(W)			530	
Buffer tank antifreeze Heater	(W)			800	
VFD Weight	(kg)	10	10	10	10
Water tank Volume	(L)	506	506	506	506

General Data

Table 16 - Continued

Size		20	23	26	30
Condenser					
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192
Fan					
Quantity	#	2	3	3	3
Diameter	(mm)	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	9846	9201	9656	9658
Static Pressure	(Pa)	0	0	0	0
Power per Motor	(kW)	0.4	0.4	0.4	0.4
Rated Amps per Motor	(A)	1.35	1.35	1.35	1.35
Motor RPM	(rpm)	700	700	700	700
PHR					
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38
Water Storage Capacity	(L)	0.0671	0.0671	0.0671	0.0915
Unit Water Connection					
Chilled Water	(mm)	50	65	65	65
Type (Standard)		Grooved	Grooved	Grooved	Grooved
Dimensions					
Unit Length with Buffer Tank	(mm)	3418	4332	4332	4332
Unit Length with VFD	(mm)	2908	3822	3822	3822
Unit Length with Buffer Tank and VFD	(mm)	3418	4332	4332	4332
Unit Length without Buffer Tank or VFD	(mm)	2908	3822	3822	3822
Unit Width	(mm)	1301	1301	1301	1301
Unit Height	(mm)	2153	2153	2153	2153
Weight (Aluminium Fins without louver or VFD)					
Shipping Weight (5)	(kg)	973	1173	1197	1305
Operating Weight (5)	(kg)	984	1183	1207	1317
Additional weight (dual pump high head)	(kg)	200	241	242	241
Additional weight (dual pump standard head)	(kg)	183	225	225	225
Additional weight (single pump high head)	(kg)	163	204	205	204
Additional weight (single pump standard head)	(kg)	154	195	196	195
Additional weight (Buffer tank)	(kg)	188	188	188	189
Louver Weight	(kg)	19	25	25	25
Min. Starting/Oper. Ambient					
Std Unit	(°C)	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18
Refrigerant and Oil charge per circuit					
Refrigerant charge	(Kg)	22.7	29.9	33.6	33.6
Oil Charge	(L)	6.6	6.6	6.6	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 17 - General Data - CXAM High Efficiency & Comprehensive Acoustic Package - Duplex V units

Size		40	46	52	60	70
Eurovent Performances (1)						
Net Cooling Capacity	(kW)	109.9	130.0	147.1	159.6	186.3
Total Power Input in Cooling	(kW)	36.0	40.8	46.1	53.3	65.8
EER		10.4	10.9	10.9	10.2	9.7
Net Heating Capacity	(kW)	124.3	139.6	155.2	174.2	197.0
Total Power Input in Heating	(kW)	35.3	41.5	46.5	53.9	60.7
Heating COP		12.0	11.5	11.4	11.0	11.1
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	80	81	82	82	85
System Data						
Refrigerant Circuit	#	2	2	2	2	2
Capacity Steps	%	25-50-75-100	21-43-71-100	25-50-75-100	25-50-75-100	21-43-71-100
Units Amps						
Nominal Amps (2)	(A)	88	100	108	112	133
Start-up Amps (2)						
Standard Unit	(A)	210	233	241	246	312
With Soft Starter Option	(A)	153	170	178	182	226
Short Circuit Unit Capacity	(kA)	15	15	15	15	15
Max Supply Cable Size	(mm ²)	150	150	150	240	240
Compressor						
Compressor Number per Circuit	#	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHD125 & CSHD125	CSHD125 & CSHD161	CSHD161 & CSHD161	CSHN184 & CSHN184	CSHN184 & CSHN250
Rated Amps per Circuit	(A)	20.7 & 20.7	20.7 & 25	25 & 25	26 & 26	26 & 36.4
Locked Rotor Amps per Circuit	(A)	142 & 142	142 & 158	158 & 158	160 & 160	160 & 215
Motor RPM	(rpm)	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85
Evaporator						
Quantity	#	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	14.3	15.6	15.6	15.6	28.2
Heater Power	(W)	300	300	300	300	400
Min. Flow	(L/Sec)	2.5	3.0	3.4	3.7	4.3
Max. Flow	(L/Sec)	7.5	9.0	10.2	11.0	12.9
Pump Package (Option Standard Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	83.3	102.8	78.8	99.5	143.6
Evaporator Head Pressure Available Dual Pump	(kPa)	83.3	102.8	78.8	99.5	143.6
Power (3)	(kW)	3	4	4	4	5.5
Rated Amps (3)	(A)	6.1	7.59	7.59	7.59	10.6
Pump Package (Option High Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	236.5	219.7	186.8	211.3	220.1
Evaporator Head Pressure Available Dual Pump	(kPa)	236.5	219.7	186.8	211.3	220.1
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8
Hydraulic Module components						
Expansion Tank Volume	(L)	25	25	25	25	25
User Volume Expansion Capacity	(L)	50	50	50	50	50
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)			120		
Antifreeze Heater without pump package and with strainer	(W)			120		
Pump package antifreeze Heater	(W)			860		

General Data

Table 17 - Continued

Size		40	46	52	60	70
Buffer tank antifreeze Heater	(W)			800		
VFD Weight	(kg)	15	15	15	15	15
Water tank Volume	(L)	500	500	500	500	500
Condenser						
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192
Fan						
Quantity	#	4	6	6	6	6
Diameter	(mm)	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		1xD + 1xS	1xD + 2xS	1xD + 2xS	1xD + 2xS	1xD + 2xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 1xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS	1xVFD + 2xS
Airflow per Fan	(m ³ /h)	9845	9201	9656	9658	9662
Static Pressure	(Pa)	0	0	0	0	0
Power per Motor	(kW)	0.4	0.4	0.4	0.4	0.4
Rated Amps per Motor	(A)	1.35	1.35	1.35	1.35	1.35
Motor RPM	(rpm)	700	700	700	700	700
PHR						
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	38	38	38	38	38
Water Storage Capacity	(L)	0.0671*2	0.0671*2	0.0671*2	0.0915*2	0.0915*2
Unit Water Connection						
Chilled Water	(mm)	65	80	80	80	80
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions						
Unit Length with Buffer Tank	(mm)	3416	4330	4330	4330	4330
Unit Length with VFD	(mm)	3193	4107	4107	4107	4107
Unit Length with Buffer Tank and VFD	(mm)	3704	4618	4618	4618	4618
Unit Length without Buffer Tank or VFD	(mm)	2905	3819	3819	3819	3819
Unit Width	(mm)	2266	2266	2266	2266	2266
Unit Height	(mm)	2150	2150	2150	2150	2150
Weight (Aluminium Fins without louver or VFD)						
Shipping Weight (5)	(kg)	1780	2034	2083	2284	2323
Operating Weight (5)	(kg)	1798	2052	2102	2303	2354
Additional weight (dual pump high head)	(kg)	226	227	227	319	319
Additional weight (dual pump standard head)	(kg)	209	222	223	223	237
Additional weight (single pump high head)	(kg)	179	180	180	222	222
Additional weight (single pump standard head)	(kg)	171	179	179	179	186
Additional weight (Buffer tank)	(kg)	188	188	188	189	189
Louver Weight	(kg)	32	37	37	37	37
Min. Starting/Oper. Ambient						
Std Unit	(°C)	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit						
Refrigerant charge	(Kg)	22.7	29.9	33.6	34.5	34.5
Oil Charge	(L)	6.6	6.6	6.6	13.4	13.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

General Data

Table 18 - General Data - CXAM High Efficiency & Comprehensive Acoustic Package - Duplex W units

Size		80	90	100	110	120
Eurovent Performances (1)						
Net Cooling Capacity	(kW)	227.0	250.8	286.8	311.1	332.7
Total Power Input in Cooling	(kW)	71.9	82.5	95.4	100.8	111.3
EER		10.8	10.4	10.3	10.5	10.2
Net Heating Capacity	(kW)	224.4	245.9	276.2	301.5	320.1
Total Power Input in Heating	(kW)	68.9	77.8	87.8	96.5	103.8
Heating COP		11.1	10.8	10.7	10.6	10.5
Main Power Supply		400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Sound Power Level	(dBA)	86	85	83	84	85
System Data						
Refrigerant Circuit	#	2	2	2	2	2
Capacity Steps	%	25-50-75-100	22-44-72-100	25-50-75-100	23-45-73-100	25-50-75-100
Units Amps						
Nominal Amps (2)	(A)	156	176	199	222	242
Start-up Amps (2)						
Standard Unit	(A)	335	390	413	485	505
With Soft Starter Option	(A)	249	286	309	357	377
Short Circuit Unit Capacity	(kA)	15	15	15	15	15
Max Supply Cable Size	(mm ²)	240	240	240	240	240
Compressor						
Compressor Number per Circuit	#	2	2	2	2	2
Type		Scroll	Scroll	Scroll	Scroll	Scroll
Model		CSHN250 & CSHN250	CSHN250 & CSHN315	CSHN315 & CSHN315	CSHN315 & CSHN374	CSHN374 & CSHN374
Rated Amps per Circuit	(A)	36.4 & 36.4	36.4 & 46.4	46.4 & 46.4	46.4 & 56.4	56.4 & 56.4
Locked Rotor Amps per Circuit	(A)	215 & 215	215 & 260	260 & 260	260 & 320	320 & 320
Motor RPM	(rpm)	2900	2900	2900	2900	2900
Sump heater per circuit	kW	160&160	160&160	160&160	160&160	160&160
Power Factor	#	0.85	0.85	0.85	0.85	0.85
Evaporator						
Quantity	#	1	1	1	1	1
Type		BPHE	BPHE	BPHE	BPHE	BPHE
Water Volume/Storage (Total)	(L)	39.2	39.2	46.7	43.4	46.7
Heater Power	(W)	400	400	500	500	500
Min. Flow	(L/Sec)	5.2	5.8	6.6	7.2	7.7
Max. Flow	(L/Sec)	15.7	17.4	19.9	21.6	23.0
Pump Package (Option Standard Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	161.0	148.7	122.8	131.2	119.3
Evaporator Head Pressure Available Dual Pump	(kPa)	161.0	148.7	122.8	131.2	119.3
Power (3)	(kW)	5.5	5.5	5.5	7.5	7.5
Rated Amps (3)	(A)	10.6	10.6	10.6	13.8	13.8
Pump Package (Option High Head)						
Evaporator Head Pressure Available Single Pump	(kPa)	237.7	227.6	208.0	195.8	226.1
Evaporator Head Pressure Available Dual Pump	(kPa)	237.7	227.6	208.0	195.8	226.1
Power (3)	(kW)	7.5	7.5	7.5	7.5	11
Rated Amps (3)	(A)	13.8	13.8	13.8	13.8	19.6
Hydraulic Module components						
Expansion Tank Volume	(L)	60	60	60	60	60
User Volume Expansion Capacity	(L)	900	900	900	900	900
Max. Water-side Operating Pressure without Hydraulic Module	(kPa)	1000	1000	1000	1000	1000
Max. Water-side Operating Pressure with Hydraulic Module	(kPa)	500	500	500	500	500
Antifreeze Heater without pump package and without strainer	(W)	120	240	240	240	240
Antifreeze Heater without pump package and with strainer	(W)	240	300	300	300	300
Pump package antifreeze Heater	(W)	980	1100	1100	1100	1100
Buffer tank antifreeze Heater	(W)	1200	1200	1200	1200	1200
VFD Weight	(kg)	21	21	21	21	21
Water tank Volume	(L)	725	725	725	725	725

General Data

Table 18 - Continued

Size		80	90	100	110	120
Condenser						
Type		Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube	Fin and Tube
Tube diameter	(mm)	9.52	9.52	9.52	9.52	9.52
Number of Rows	#	3	3	3	3	3
Fins per Foot	(fpf)	192	192	192	192	192
Fan						
Quantity	#	8	8	10	12	12
Diameter	(mm)	757	757	757	757	757
Drive Type		Direct	Direct	Direct	Direct	Direct
Std Amb. Speeds per Circuit (4)		4xS	4xS	5xS	6xS	6xS
Low Amb. Speeds per Circuit (Option) (4)		1xVFD + 3xS	1xVFD + 3xS	1xVFD + 4xS	1xVFD + 5xS	1xVFD + 5xS
Airflow per Fan	(m ³ /h)	9807	10301	9807	9805	9807
Static Pressure	(Pa)	0	0	0	0	0
Power per Motor	(kW)	0.4	0.3	0.4	0.4	0.4
Rated Amps per Motor	(A)	1.35	1.35	1.35	1.35	1.35
Motor RPM	(rpm)	700	700	700	700	700
PHR						
Heat-Exchanger Type		Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates	Brazed Plates
Victaulic Connection	(mm)	64	64	64	64	64
Water Storage Capacity	(L)	0.122*2	0.122*2	0.122*2	0.1647*2	0.1647*2
Unit Water Connection						
Chilled Water	(mm)	100	100	100	100	100
Type (Standard)		Grooved	Grooved	Grooved	Grooved	Grooved
Dimensions						
Unit Length with Buffer Tank	(mm)	4230	5145	5145	6062	6062
Unit Length with VFD	(mm)	4558	5473	5473	6388	6388
Unit Length with Buffer Tank and VFD	(mm)	4558	5473	5473	6388	6388
Unit Length without Buffer Tank or VFD	(mm)	4230	5145	5145	6062	6062
Unit Width	(mm)	2273	2273	2273	2273	2273
Unit Height	(mm)	2344	2344	2344	2344	2344
Weight (Aluminium Fins without louver or VFD)						
Shipping Weight (5)	(kg)	2810	3158	3365	3741	3752
Operating Weight (5)	(kg)	2851	3199	3414	3787	3800
Additional weight (dual pump high head)	(kg)	406	428	429	475	556
Additional weight (dual pump standard head)	(kg)	324	347	347	473	473
Additional weight (single pump high head)	(kg)	310	332	332	378	423
Additional weight (single pump standard head)	(kg)	274	296	296	382	382
Additional weight (Buffer tank)	(kg)	188	188	188	189	188
Louver Weight	(kg)	47	51	51	56	56
Min. Starting/Oper. Ambient						
Std Unit	(°C)	7	7	7	7	7
Low Ambient (Option)	(°C)	-18	-18	-18	-18	-18
Refrigerant and Oil charge per circuit						
Refrigerant charge	(Kg)	45.4	54.4	56.2	66.2	66.2
Oil Charge	(L)	13.4	13.4	13.4	13.9	14.4

(1) Eurovent Cooling Mode Conditions (Evap. 12°C/7°C - Air. 35°C); Eurovent Heating Mode Condition (Evap. 40°C/45°C-Air. DB/WB 7°C/6°C)

(2) Rated Condition without Pump Package

(3) Single Pump Option

(4) S: Single Speed, D: Two Speed, VFD: Inverter.

(5) Base unit

Dimensions

Figure 4 - Standard unit - S coil configuration

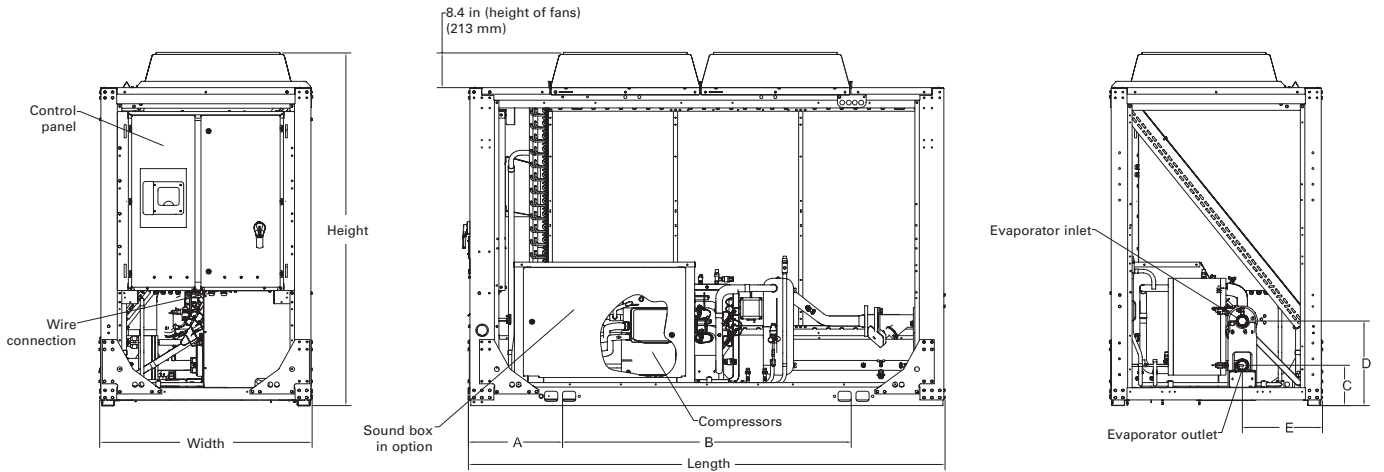


Figure 5 - Units with Pump Package - S coil configuration

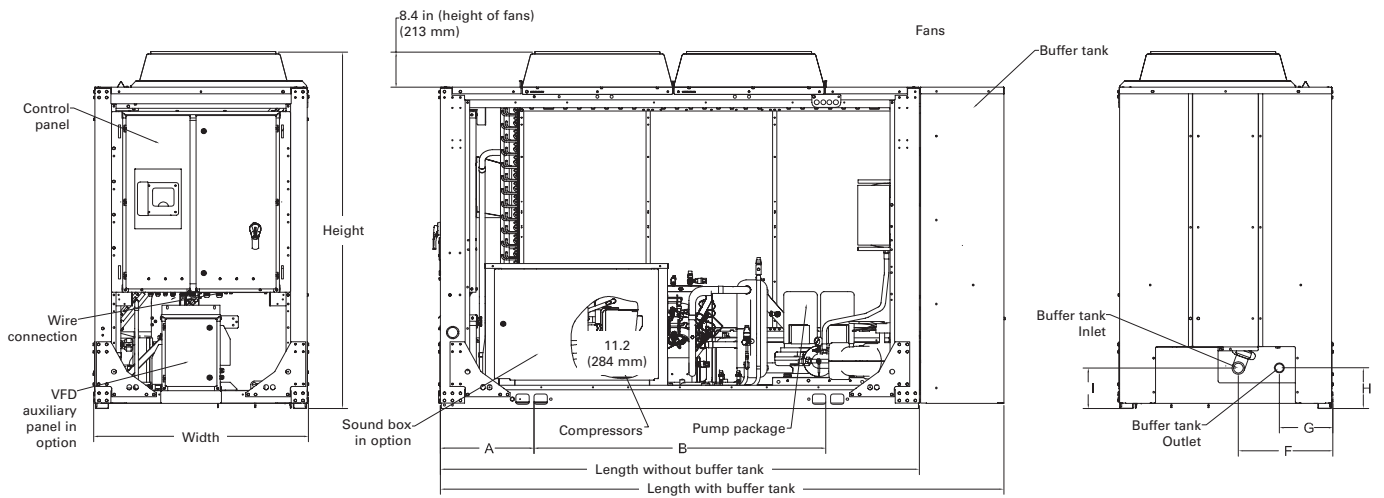
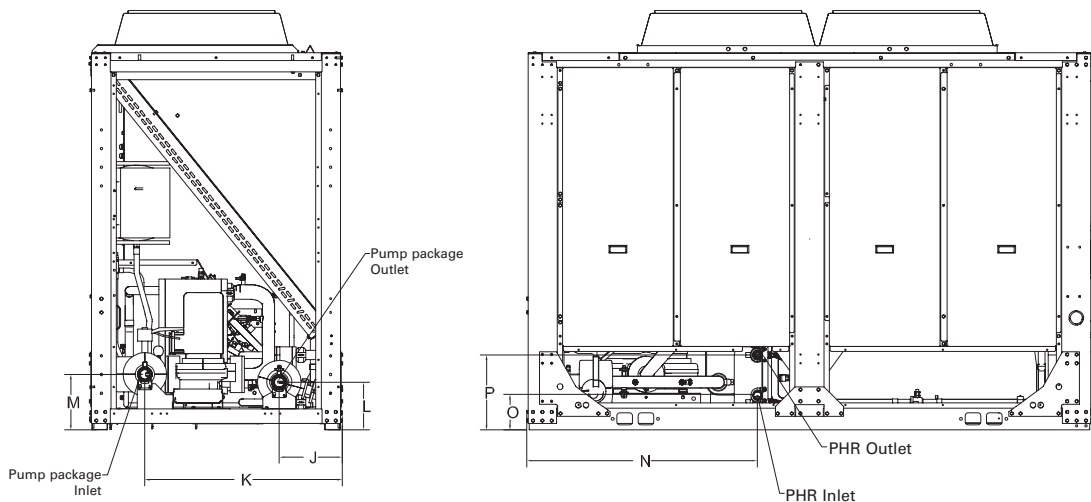


Figure 6 - Pump Package Water Connections - S coil configuration



Dimensions

Figure 7 - S coil configuration

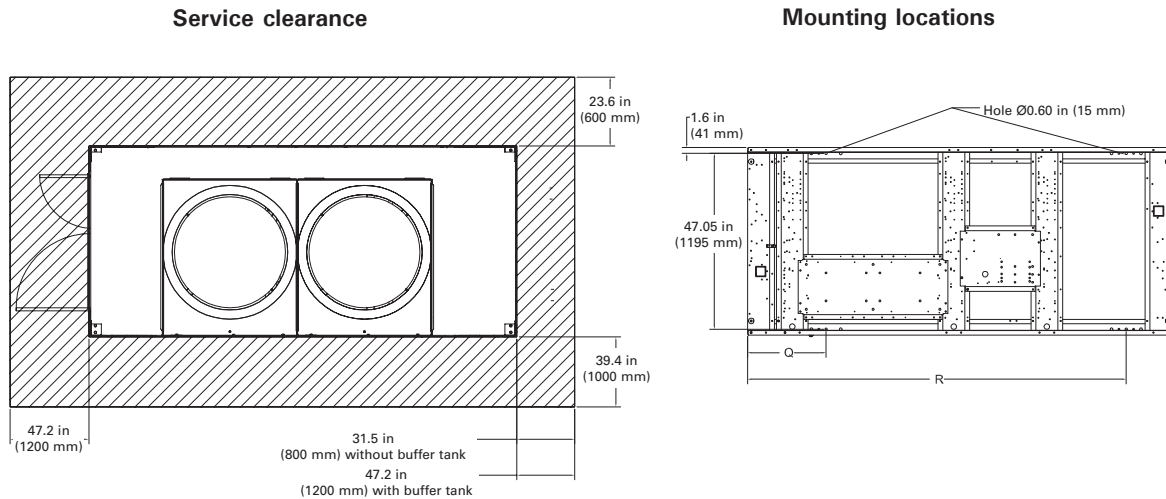


Figure 8 - Standard unit - V coil configuration

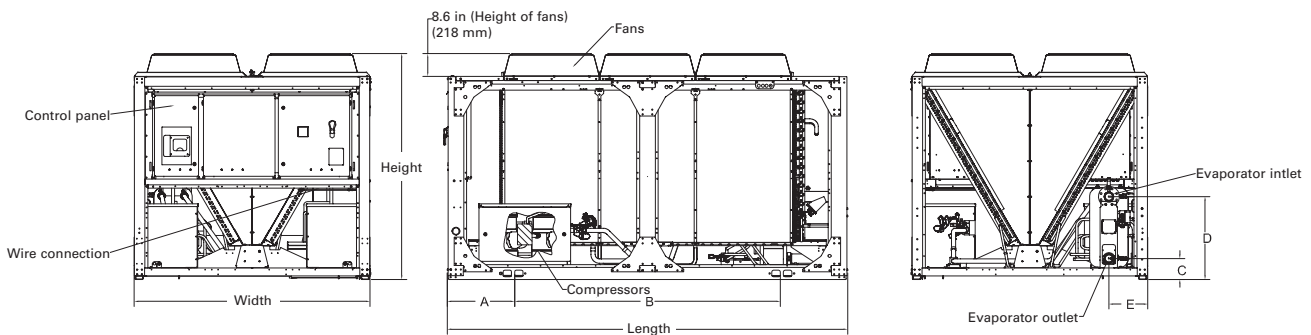
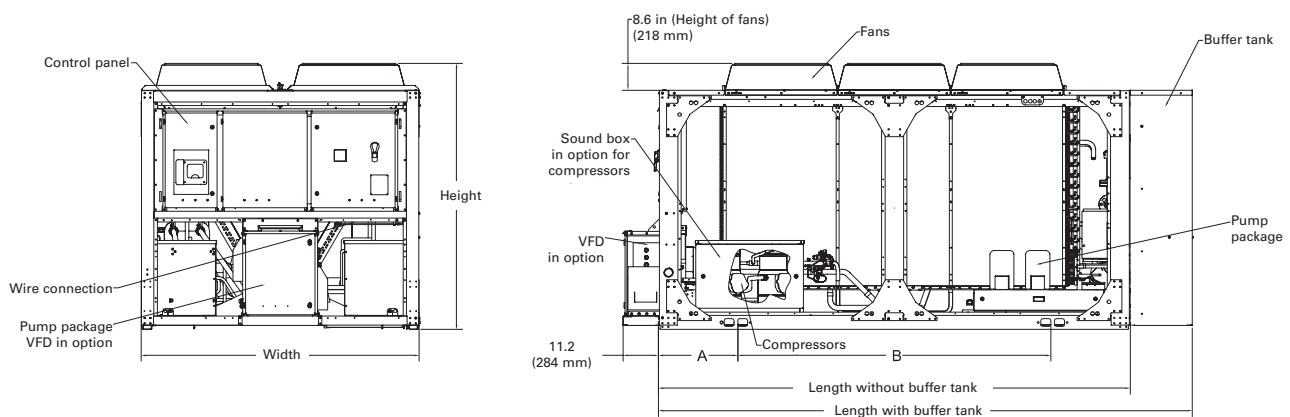


Figure 9 - Units with Pump Package - V coil configuration



Dimensions

Figure 10 - Pump Package Water Connections - V coil configuration

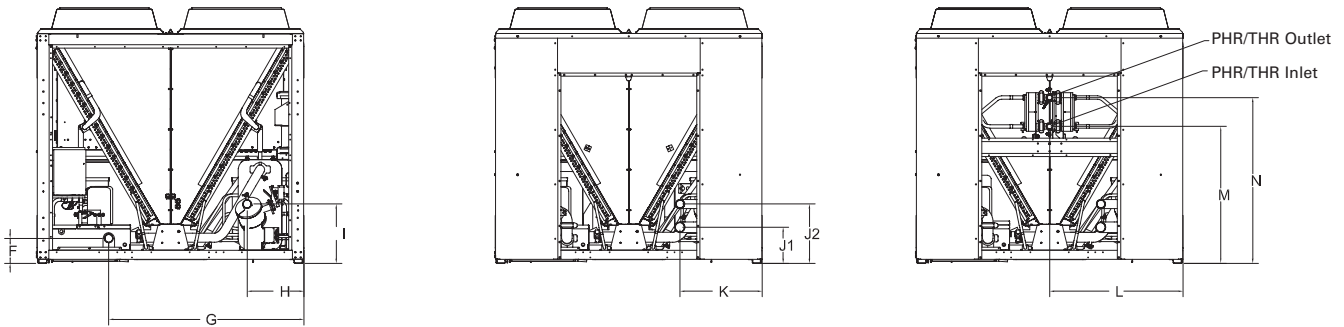


Figure 11 - V coil configuration

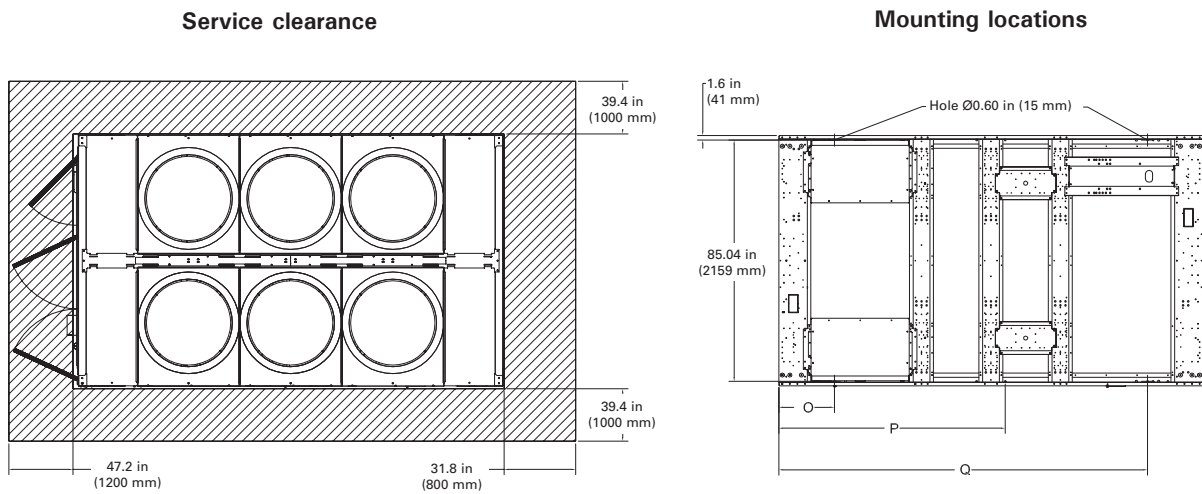
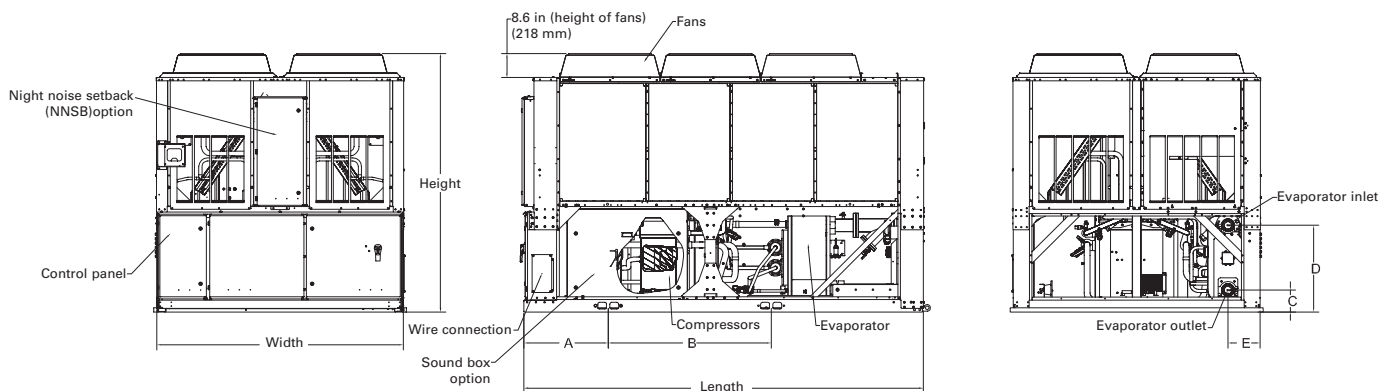


Figure 12 - Standard Unit - W coil configuration



Dimensions

Figure 13 - Units with Pump Package - W coil configuration

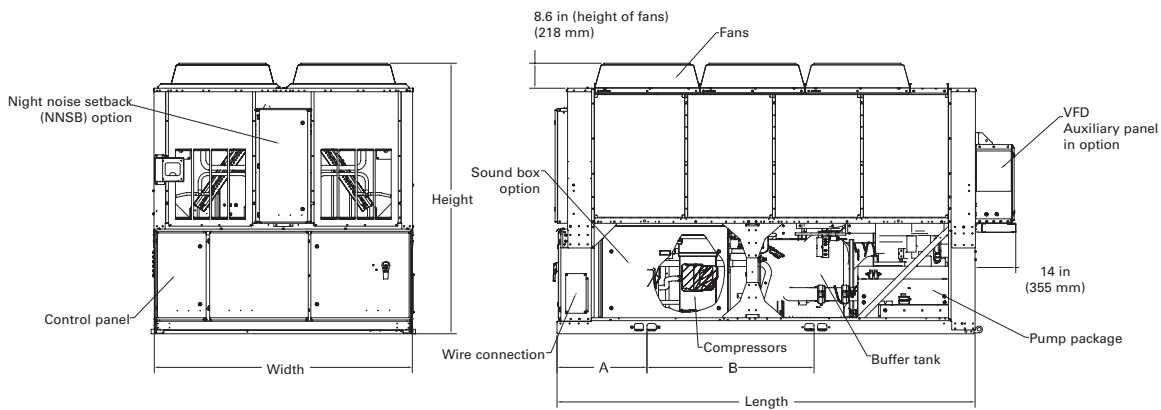


Figure 14 - Pump Package Water Connections - W coil configuration

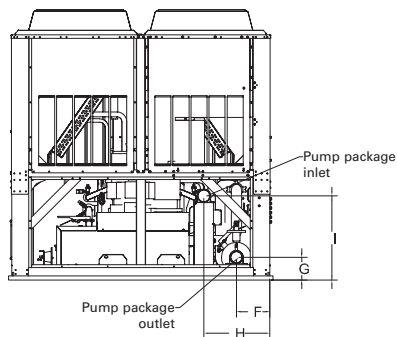
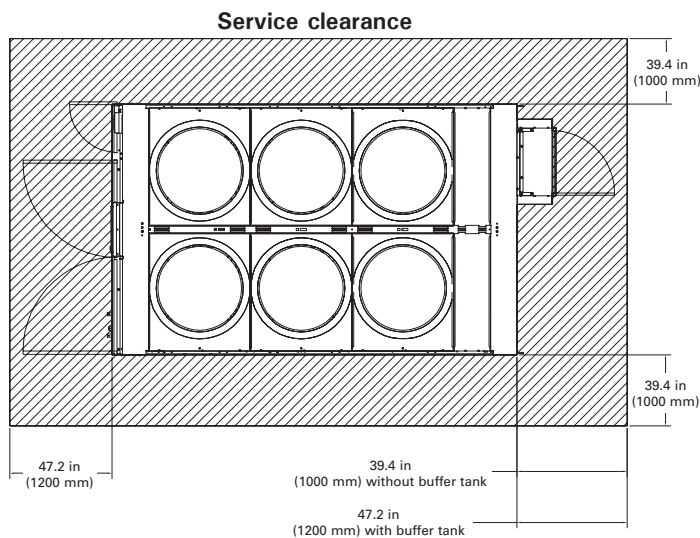
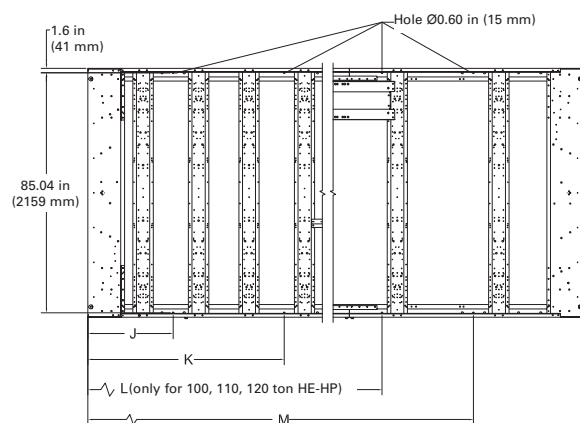


Figure 15 - W coil configuration



Mounting locations



Dimensions

of Circuits

	Comp. Manifold		Size	High Efficiency			Standard Efficiency		
				CXAM			CXAM		
			Compact	Super Quiet	Comprehensive acoustic package	Compact	Super Quiet	Comprehensive acoustic package	
1	10	10	020	Simplex Frame 1			Simplex Frame 1		
1	10	13	023	Simplex Frame 1			Simplex Frame 1		
1	13	13	026	Simplex Frame 2			Simplex Frame 1		
1	15	15	030	Simplex Frame 2			Simplex Frame 2		
1	15	20	035	Simplex Frame 2			Simplex Frame 2		
1	20	20	039	Simplex Frame 2			Simplex Frame 2		
1	20	25	045	Simplex Frame 2			Simplex Frame 2		
1	25	25	050	Simplex Frame 2			Simplex Frame 2		
2	10	10	040	V Frame 1			V Frame 1		
2	10	13	046	V Frame 1			V Frame 1		
2	13	13	052	V Frame 2			V Frame 1		
2	15	15	060	V Frame 2			V Frame 2		
2	15	20	070	V Frame 2			V Frame 2		
2	20	20	080	W Frame 2			V Frame 2		
2	20	25	090	W Frame 2			W Frame 2		
2	25	25	100	W Frame 3			W Frame 2		
2	25	30	110	W Frame 3			W Frame 2		
2	30	30	120	W Frame 3			W Frame 2		
2	20	20	25	W Frame 3			W Frame 2		
2	20	25	25	W Frame 4			W Frame 3		
2	25	25	25	W Frame 4			W Frame 4		
2	25	25	30	W Frame 4			W Frame 4		
2	25	30	30	W Frame 4			W Frame 4		

		length (mm)	length w/ buffer	width (mm)	height (mm)
S1	Simplex frame1	2908	3418	1301	2153
S2	Simplex frame2	3822	4332	1301	2153
V1	V frame 1	2905	3416	2266	2150
V2	V frame 2	3819	4330	2266	2150
W2	W frame 2	4230		2273	2344
W3	W frame 3	5145		2273	2344
W4	W frame 4	6062		2273	2344

Dimensions

Table 19 - Dimensions DUPLEX W

		FRAME 2	FRAME 3	FRAME 4
	Unit	mm	mm	mm
Lifting holes	A	767	767	767
	B	2155	3023	3810
EVP water connections (base unit)	C	198	198	198
	D	790	790	790
	E	292	292	292
EVP water connections (unit with pump package, without buffer tank)	F	292	292	292
	G	198	198	198
	H	574	574	574
Isolators position	I	734	734	734
	J	767	767	767
	K	2267	1767	1767
	L	2267	3317	4139
	M	3731	4139	5566

Table 20 - Dimensions DUPLEX V

		FRAME 1	FRAME 2
	Unit	Without buffer tank With buffer tank	Without buffer tank With buffer tank
	Unit	mm	mm
Lifting holes	A	615	615
	B	1650	2564
EVP water connections (base unit)	C	198	198
	D	655	790
	E	371	371
EVP water connections (unit with pump package, without buffer tank)	F	211	211
	G	1646	1646
	H	480	480
	I	500	500
EVP water connections (unit with buffer tank)	J1	303	303
	J2	695	695
	K	1796	1796
Partial Heat Recovery water connections	L	1125	1125
	M	1158	1158
	N	1392	1392
Isolators position	O	494	494
	P	494	2027
	Q	2388	3299

Dimensions

Table 21 - Dimensions SIMPLEX

	Unit	FRAME 1	FRAME 2
		Without buffer tank With buffer tank	Without buffer tank With buffer tank
		mm	mm
Lifting holes	A	534	556
	B	1867	2720
EVP water connections (base unit)	C	246	246
	D	516	516
	E	488	488
EVP water connections (unit with buffer tank)	F	572	572
	G	325	325
	H	249	249
	I	244	244
EVP water connections (unit with pump package, without buffer tank)	J	323	323
	K	1016	1016
	L	246	246
	M	287	287
Partial Heat Recovery water connections	N	1176	2091
	O	182	182
	P	385	385
Isolators position	Q	534	558
	R	2571	3358

Installation – Mechanical

Location Requirements

Sound Considerations

- Refer to Trane Engineering Bulletin Chiller Sound Ratings and Installation Guide for sound consideration applications.
- Locate the unit away from sound-sensitive areas.
- Install the isolation pads under the unit. Refer to “Unit Isolation.”
- Install rubber vibration isolators in all water piping.
- Seal all wall penetrations.

Note: Consult an acoustical engineer for critical applications.

Foundation

Provide rigid, non-warping mounting pads or a concrete foundation of sufficient strength and mass to support the applicable operating weight (i.e., including completed piping, and full operating charges of refrigerant, oil and water). Refer to the General Data tables. Once in place, the unit must be level within 1/4” (6.4 mm) over its length and width. Trane is not responsible 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, to provide sufficient clearance for the opening of control panel doors and unit service. Refer to the chapter on “Dimensions” for minimum clearances. In all cases, local codes which require additional clearances will take precedence over these recommendations.

Rigging

Refer to the General Data tables for typical unit lifting weights. Refer to the rigging label attached to the unit for further details.

Lifting Procedure

Refer to the lifting label affixed to the unit. Lifting beam crossbars MUST be positioned so lifting cables do not contact the sides of the unit. Adjust as necessary for even level lift.

Installation – Mechanical

Unit isolation and leveling

Mounting

Construct an isolated concrete pad for the unit or provide concrete footings at each of the four unit mounting points. Mount the unit directly to the concrete pads or footings.

Level the unit using the base rail as a reference. The unit must be level within 6 mm over the entire length. Use shims as necessary to level the unit.

Neoprene Isolator Installation (optional)

Install the optional neoprene isolators at each mounting location. Isolators are identified by part number and color. Refer to unit submittals for further details on selection and location.

1. Secure the isolators to the mounting surface, using the mounting slots in the isolator base plate. Do not fully tighten the isolator mounting bolts at this time.
2. Align the mounting holes in the base of the unit, with the threaded positioning pins on the top of the isolators.
3. Lower the unit on to the isolators and secure the isolator to the unit with a nut. Maximum isolator deflection should be approximately 6 mm.
4. Level the unit carefully. Refer to "Leveling". Fully tighten the isolator mounting bolts.

Note: Consult a vibration engineer for critical applications.

Evaporator piping

Evaporator water connections are grooved. Thoroughly flush all water piping to the unit before making the final piping connections to the unit.

Components and layout will vary slightly, depending on the location of connections and the water source.

CAUTION Equipment Damage!

If using an acidic commercial flushing solution, construct a temporary bypass around the unit to prevent damage to internal components of the evaporator.

CAUTION Proper Water Treatment!

The use of untreated or improperly treated water in a chiller may result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged 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.

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 "Water Piping." All local and national codes apply.

Piping

A vent is provided on the top of the evaporator at the return end. Be sure to provide additional vents at high points in the piping to bleed air from the chilled water system. Install necessary pressure gauges to monitor the entering and leaving chilled water pressures.

Provide shutoff valves in lines to the gauges to isolate them from the system when they are not in use. Use rubber vibration eliminators to prevent vibration transmission through the water lines.

If desired, install thermometers in the lines to monitor entering and leaving water temperatures.

Install a balancing valve in the leaving water line to control water flow balance. Install shutoff valves on both the entering and leaving water lines so that the evaporator can be isolated for service. These valves are factory supplied with pump package option.

Make sure the water circuit includes all devices and controls used to provide proper water system operation and unit operating safety.

Entering Chilled/Hot Water Piping

- Water strainer (hole size 1.6 mm or smaller) (1)
- Air vents (to bleed air from system) (1)
- Water pressure gage with shutoff valves (1)
- Vibration eliminators
- Shutoff (isolation) valves (1)
- Thermometers (if desired)
- Relief valve (1)

Leaving Chilled/Hot Water Piping

- Air vents (to bleed air from system) (1)
- Water pressure tab with shutoff valves (1)
- Vibration eliminators
- Shutoff (isolation) valves (1)
- Thermometers
- Balancing valve (1)

(1) Can be factory mounted (option)

Installation – Mechanical

Minimal installation water content

The water volume is an important parameter because it allows as table chilled water temperature and avoids short cycle operation of the compressors.

Parameters which influence the water temperature stability

- Water loop volume.
- Load fluctuation.
- Number of capacity steps.
- Compressors rotation.
- Dead band (adjusted by control CH530).
- Minimum time between 2 starts of a compressor.

Minimum water volume for a comfort application

For comfort application we can allow water temperature fluctuation at part load. The parameter to take into account is the minimum operating time of the compressor. In order to avoid lubrication problem on a scroll compressor it must run at least 2 minutes (120seconds) before it stops.

The minimum volume can be determined by using the following formula:

$$\text{Volume} = \text{Cooling capacity} \times \text{Time} \times \frac{\text{highest capacity step (\%)} / \text{Specific heat}}{\text{Dead band}}$$

Minimum operating time = 120 seconds

Specific heat = 4.18 kJ / kg

Average Dead band = 3°C (or 2°C)

Note: To estimate the biggest step, it is usually more reliable to make a selection at lower ambient temperature where efficiency is higher and compressors steps bigger. It is also essential to take into account the brine specific heat, in case of the use of glycol.

Process applications will need more water volume to minimize the water temperature fluctuation at part load.

Table 10 - Minimum water volumes for comfort applications

Unit size	Capacity (kW)	Biggest step (%)	Minimum water volume (l)
20	55	50	263
23	63	57	344
26	70	50	335
30	80	50	383
35	95	57	518
39	110	50	526
45	122	56	654
50	135	50	646
40	110	25	263
46	125	29	347
52	140	25	335
60	160	25	383
70	190	29	527
80	220	25	526
90	250	28	670
100	280	25	670
110	310	27	801
120	330	25	789
140	390	18	672
150	420	17	683
160	440	19	800
170	460	18	792

Installation – Mechanical

Expansion tank (option)

The factory-installed expansion tank initial pressure should be adjusted about 0.2 bar lower than the static pressure of the circuit at the pump inlet.

The expansion tank volume has been selected for typical loop volume. It is recommended to check the expansion tank volume with the installation information.

The following data is required:

- C = Water capacity of the circuit
- e = Expansion coefficient difference between max and min water temperature, in operation or not.
- Pi = Initial pressure of the expansion tank
- Pf = Final pressure: Max is given by the pressure relief valve

Minimum Volume of expansion tank
= $(C \times e) / (1 - P_i / P_f)$

Expansion coefficient of water at various temperatures

°C	e
0	0.00013
10	0.00027
20	0.00177
30	0.00435
40	0.00782
50	0.01210

Freeze Protection

If the unit is exposed to ambient temperatures between 0°C and -18°C, the chilled water system must be protected from freezing following one of the options shown below:

1. Heaters
 - a. Heaters can be factory-installed (option) on the evaporator and water piping and will protect it from freezing in ambient temperatures down to -18°C.

AND

- b. Install heat tape on all water piping, pumps, and other components that may be damaged if exposed to freezing temperatures. Heat tape must be designed for low ambient temperature applications. Heat tape selection should be based on the lowest expected ambient temperature.

OR

2. Freeze inhibitor
 - a. Add a freeze inhibitor fluid to the chilled water system. The solution must be strong enough to provide protection against ice formation at the lowest anticipated ambient temperature.

Note: Use of a freeze inhibitor fluid reduces the cooling capacity of the unit and must be considered in the design of the system specifications.

3. Water pump

- a: Dynaview controller can start the pump to prevent freezing. This function needs to be validated, pump has to be controlled by the unit and water circuit valves need to stay open at all times.

If ambient temperatures below -18°C, the water circuit must be protected against freezing.

Add a freeze inhibitor fluid and activate the heat tape on the unit; do not shut the unit down.

Note: It is not recommended to drain the water circuit for the following reasons.

1. The water circuit will rust and its lifetime could be reduced.
2. Water will remain in the bottom of the plate heat exchangers and freeze damage could occur.

Note: If CH530 water pump control is enabled the CH530 will request start of customer pump during ambient air temperatures below freezing.

CAUTION! When using freeze inhibitor, never fill the system with pure glycol.

Always fill the system with diluted solution. Maximum concentration of glycol is 40%. Higher glycol concentration will damage pump seal.

Installation – Mechanical

Low refrigeration temperature setpoint and antifreeze setpoint on CH530

CAUTION! The chiller is provided with standard factory settings. It can be necessary to modify the Low Pressure saturation Temperature and the Antifreeze Setpoint on the unit control. Based on the following examples, it is necessary to modify on the CH530 the following settings:

- The LP saturation temperature
- The antifreeze setpoint

Examples

For:

- 7°C, the LP setting must be -4°C where the antifreeze setting shall be 2°C
- 2°C, the LP setting must be -9°C where the antifreeze setting shall be -4°C
- -12°C, the LP setting must be -23°C where the antifreeze setting shall be -17°C

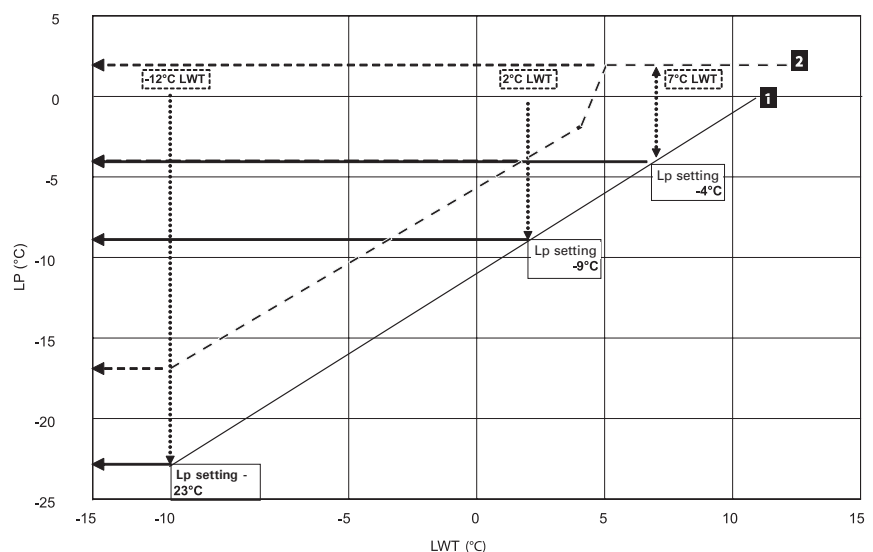
Freeze protection with glycol

It is mandatory to use a freeze inhibitor for leaving water setpoint less or equal to 5°C. On the glycol recommended concentration figure, you must select concentration on or above the curve. For example, for -4°C brine temperature, a concentration of 25% ethylene glycol is not sufficient. The concentration must be 28% ethylene glycol or 33% propylene glycol.

Using glycol with hydraulic module

If the glycol brine percentage is not at the recommended percentage (greyed area), corrosion inhibitor present in the glycol may not be efficient enough. For instance, a glycol concentration of 15% will provide freeze protection to the unit down to -5°C, but it might generate additional corrosion.

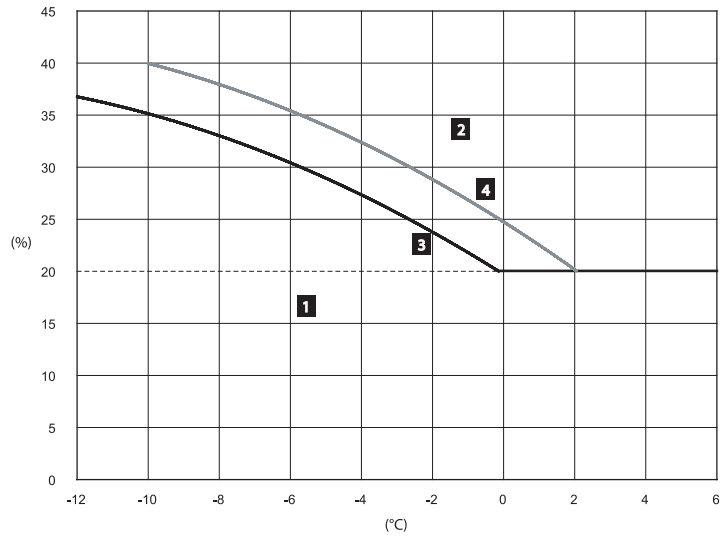
Figure 16 - LP setting Vs. Leaving Water Temperature setpoint



1. Low ref TEMP setpoint (SAT Temp) CH530
2. Antifreeze setpoint Vs. LWT

Installation – Mechanical

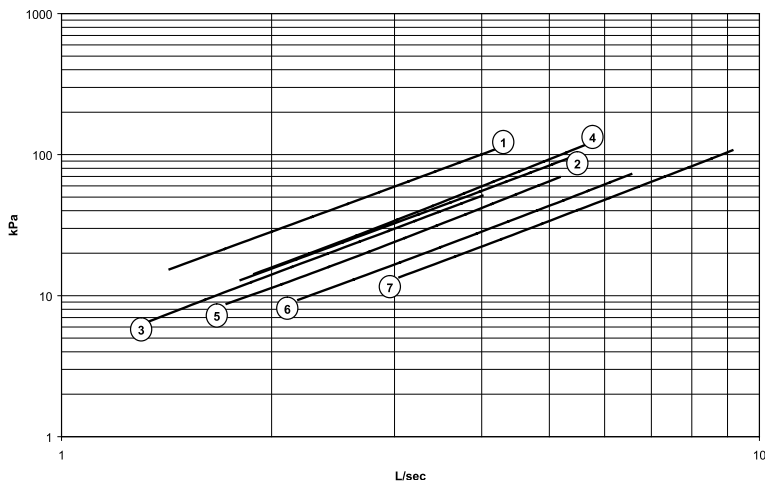
Figure 17 - Glycol percentage recommendation curve



- 1 = Critical risks of freezing
- 2 = Efficient freeze protection
- 3 = Ethylene glycol
- 4 = Propylene glycol
- % = Glycol percentage (mass concentration)
- °C = Glycol or water temperature

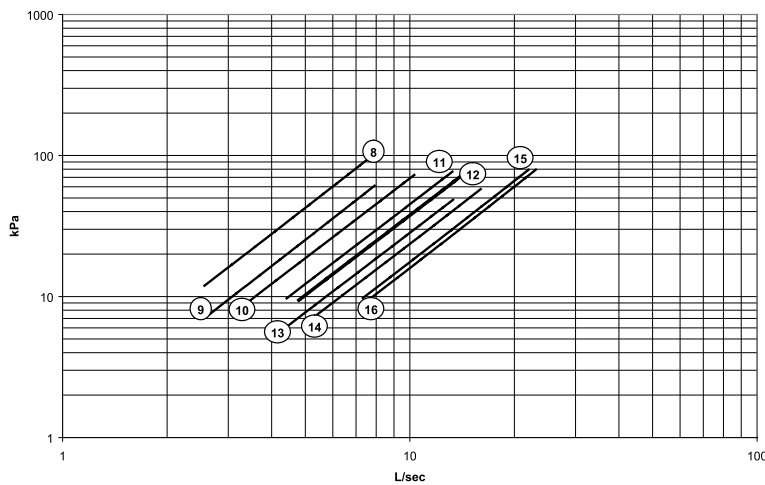
Water pressure drops

Figure 18 - Pressure drops (through the evaporator - S configuration)



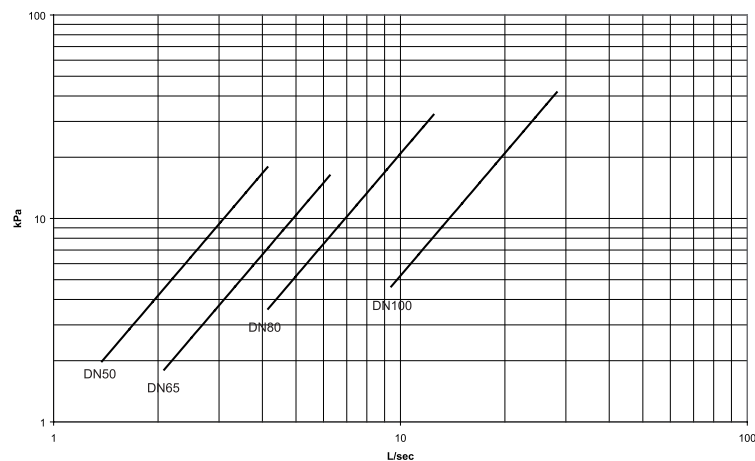
- 1 20 SE - 23SE - 26 SE SQ - 26 SE CP
- 2 30 SE SQ - 30 SE CP
- 3 20 HE - 23 HE SQ - 23 HE CP
- 4 23 HE CAP - 26 HE CAP - 30 HE SQ - 30 HE CP - 30 SE CAP
- 5 26 HE SQ - 26 HE CP - 30 HE CAP - 35 SE
- 6 35 HE - 39 SE
- 7 45 SE - 50 SE

Figure 19 - Pressure drops (through the evaporator - V and W configurations)



- 8 40 SE
- 9 40 HE - 46 HE SQ - 46 HE CP - 46 SE - 52 SE
- 10 52 HE - 46 HE CAP - 60 HE - 60 SE
- 11 70 SE
- 12 80 SE - 90 SE CAP
- 13 70 HE - 90 SE SQ - 90 SE CP
- 14 80 HE SQ - 80 HE CP - 100 SE - 110 SE - 120 SE CAP
- 15 80 HE CAP - 90 HE - 110 HE SQ - 110 HE CP - 120 SE SQ - 120 SE CP - 140 SE
- 16 100 HE - 110 HE CAP - 120 HE - 140 HE - 150 HE - 150 SE - 160 HE - 160 SE - 170 SE

Figure 20 - Pressure drops through the strainer



Water pressure drops

Figure 21 - Available pressure - S coil configuration - Standard head

- A 20 HE - 23 HE SQ - 23 HE CP - 26 SE CAP
- B 20 SE - 23 SE - 26 SE SQ - 26 SE CP
- C 23 HE CAP - 26 HE CAP
- D 26 HE SQ - 26 HE CP - 30 HE SQ - 30 HE CP - 30 SE CAP
- E 30 SE SQ - 30 SE CP
- F 30 HE CAP - 35 SE
- G 45 SE - 50 SE
- H 35 HE
- I 39 SE

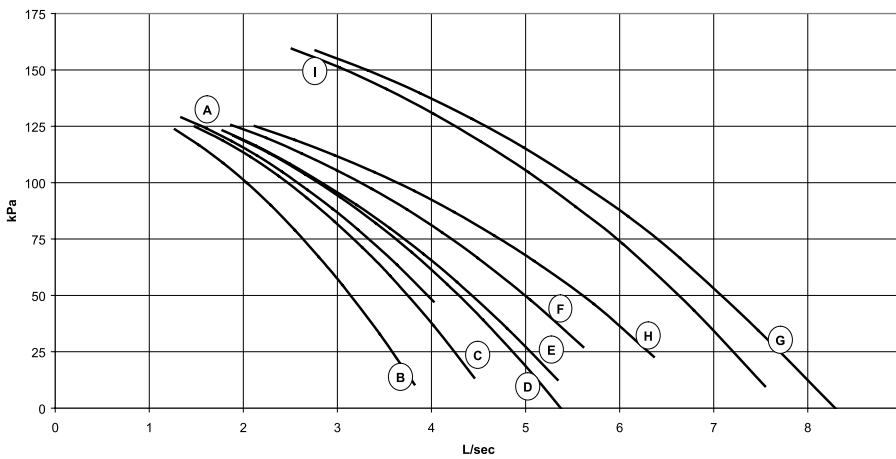
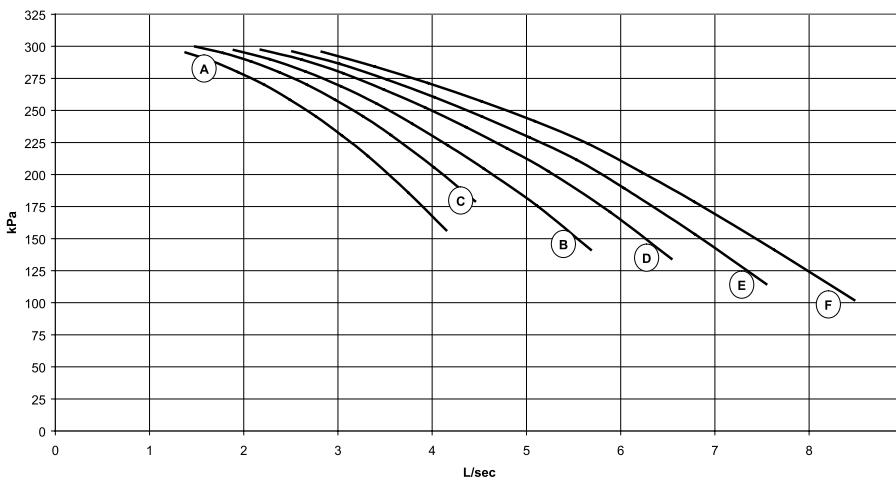


Figure 22 - Available pressure - S coil configuration - High head

- A 20 HE - 20 SE - 23 SE - 23 HE SQ - 23 HE CP - 26 SE
- B 26 HE SQ - 26 HE CP - 30 HE SQ - 30 HE CP - 30 SE
- C 23 HE CAP - 26 HE CAP - 46 HE CAP - 52 HE
- D 30 HE CAP - 35 SE
- E 35 HE - 39 SE
- F 45 SE - 50 SE



Water pressure drops

Figure 23 - Available pressure - V and W coil configurations - Standard head

- J 40 HE - 46 HE SQ - 46 HE CP - 46 SE - 52 SE
- K 40 SE
- L 46 HE CAP - 52 HE
- M 60 HE - 60 SE
- O 70 HE - 90 SE SQ - 90 SE CP
- P 70 SE
- Q 80 HE SQ - 80 HE CP - 100 SE
- R 80 SE
- S 80 HE CAP - 90 HE - 100 HE
- T 90 SE CAP
- U 110 HE - 120 HE - 120 SE SQ - 120 SE CP
- V 110 SE - 120 SE CAP
- W 140 HE - 140 SE - 150 HE - 150 SE - 160 HE - 160 SE - 170 SE

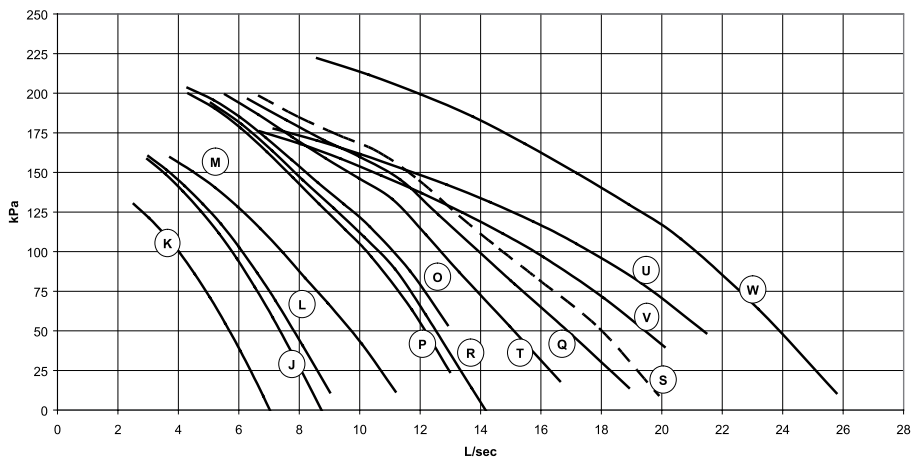
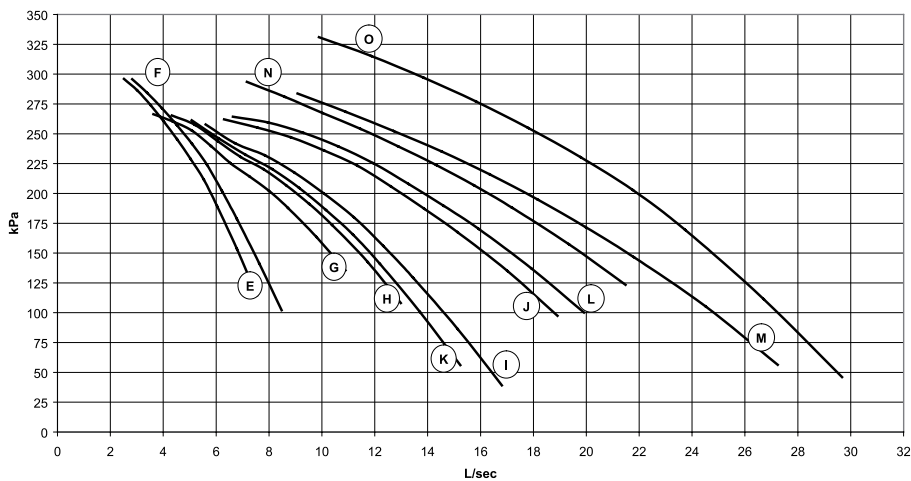


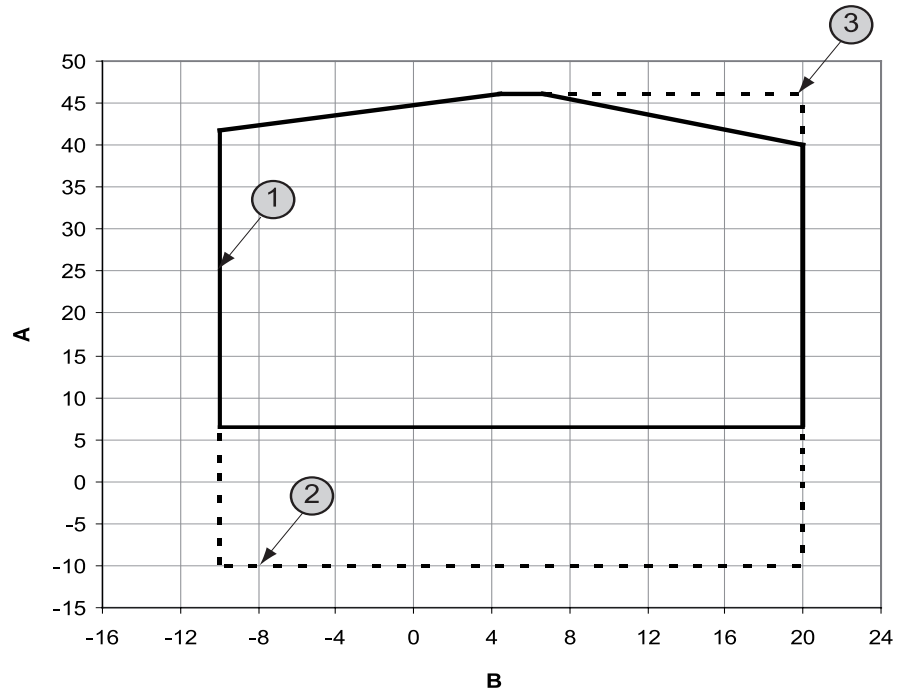
Figure 24 - Available pressure - V and W coil configurations - High head

- E 40 SE
- F 40 HE - 46 HE SQ - 46 HE CP - 46 SE - 52 SE
- G 60 SE - 60 HE
- H 70 SE
- I 70 HE - 90 SE SQ - 90 SE CP
- J 80 HE SQ - 80 HE CP - 100 SE - 110 SE
- K 80 SE
- L 80 HE CAP - 90 HE - 100 HE - 110 HE
- M 120 HE - 140 HE - 150 HE - 150 SE - 120 SE SQ - 120 SE CP
- N 120 SE CAP
- O 160 HE - 160 SE - 170 SE



Operating map

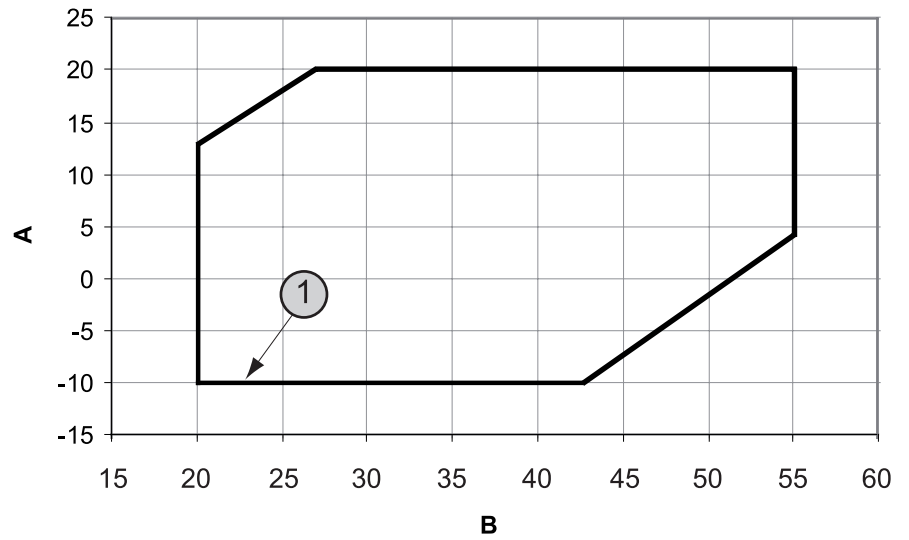
Figure 25 - Operating map - cooling mode



A = Entering air temperature (°C)
 B = Leaving water temperature (°C)
 1 = Standard operating map
 2 = Low ambient operating map (requires inverter)
 3 = Part load operating map

Operating map

Figure 26 - Operating map - heating mode



A = Leaving water temperature (°C)
B = Entering air temperature (°C)
1 = Standard operating map

Installation – Electrical

General Recommendations

All wiring must comply with local codes and regulations. Typical field wiring diagrams are included at the end of the manual. Minimum circuit ampacities and other unit electrical data are on the unit nameplate. See the unit order specifications for actual electrical data. Specific electrical schematics and connection diagrams are shipped with the unit.

WARNING Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

CAUTION Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors may result in equipment damage.

Important!

Do not allow conduit to interfere with other components, structural members or equipment. Control voltage (115V) wiring in conduit must be separate from conduit carrying low voltage (<30V) wiring. To prevent control malfunctions, do not run low voltage wiring (<30V) in conduit with conductors carrying more than 30 volts.

Soft starter recommended settings

Acceleration time: 0.5 second speed

Start-up torque: 50%

Deceleration time: 0 second

CAUTION!

Inverters are equipped with integrated filters. They are not compatible with insulated neutral load earthing arrangements.

WARNING! High voltage!

Any contact with electric components, even after the unit has been switched off, can cause serious injury or death.

Wait at least 4 minutes after switching off the unit, until the current dissipates.

Grounding

Note the fan speed inverter has a high leakage current. Be sure to ground the unit and take this into account when installing the differential protection device.

When running, this unit generates leakage current of over 100 mA.

Installer-Supplied Components

Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit:

- Power supply wiring (in conduit) for all field-wired connections.
- All control (interconnecting) wiring (in conduit) for field supplied devices.
- Circuit breakers.

Power Supply Wiring

WARNING Ground Wire!

All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with local codes and regulations. Failure to follow this instruction could result in death or serious injuries.

All power supply wiring must be sized and selected accordingly by the project engineer in accordance with local codes and regulations.

WARNING Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect

power before servicing could result in death or serious injury.

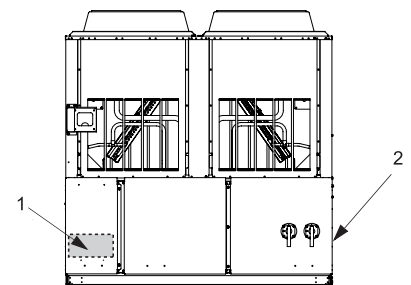
All wiring must comply with local codes and regulations. The installing (or electrical) contractor must provide and install the system interconnecting wiring, as well as the power supply wiring. It must be properly sized and equipped with the appropriate fused disconnect switches. The type and installation location(s) of the fused disconnects must comply with all applicable codes.

Knock-outs for wiring are located on the bottom left side (when you are in front of control panel) of the control panel. The wiring is passed through these conduits and connected to the terminal blocks.

To provide proper phasing of 3-phase input, make connections as shown in field wiring diagrams and as stated on the WARNING label in the starter panel. For additional information on proper phasing, refer to "Unit Voltage Phasing." Proper equipment ground must be provided to each ground connection in the panel (one for each customer-supplied conductor per phase).

High voltage field-provided connections (are made through knockouts on the right side of the panel.

Figure 27 - Power Entrance



1 = Low voltage power
2 = Incoming power

Installation – Electrical

Control Power Supply

The unit is equipped with a control power transformer; it is not necessary to provide additional control power voltage to the unit. No other loads should be connected to the control power transformer.

All units are factory-connected for appropriate labeled voltages.

Interconnecting Wiring

Chilled Water Pump Control

An evaporator water pump output relay closes when the chiller is given a signal to go into the Auto mode of operation from any source. The contact is opened to turn off the pump in the event of most machine level diagnostics to prevent the build up of pump heat.

The relay output from 1A26 is required to operate the Evaporator Water Pump (EWP) contactor. Contacts should be compatible with 115/240 VAC control circuit. Normally, the EWP relay follows the AUTO mode of the chiller. Whenever the chiller has no diagnostics and is in the AUTO mode, regardless of where the auto command is coming from, the normally open relay is energized. When the chiller exits the AUTO mode, the relay is timed open for an adjustable (using TechView) 0 to 30 minutes. The non- AUTO modes in which the pump is stopped, include Reset, Stop, External Stop, Remote Display Stop, Stopped by Tracer, Start Inhibited by Low Ambient Temp, and Ice Building complete .

Regardless of whether the chiller is allowed to control the pump on a full-time basis, if the MP calls for a pump to start and water does not flow, the evaporator may be damaged catastrophically. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls.

Table 11 - Pump relay operation

Chiller mode	Relay operation
Auto	Instant close
Ice building	Instant close
Tracer override	Close
Stop	Timed open
Ice complete	Instant open
Diagnostics	Instant open

When going from Stop to Auto, the EWP relay is energized immediately. If evaporator water flow is not established, the CH530 de-energizes the EWP relay and generates a non-latching diagnostic. If flow returns (e.g. someone else is controlling the pump), the diagnostic is cleared, the EWP is re-energized, and normal control resumed.

If evaporator water flow is lost once it had been established, the EWP relay remains energized and a nonlatching diagnostic is generated. If flow returns, the diagnostic is cleared and the chiller returns to normal operation.

After 4 flow loss events occurred in the last 4 days, a latching immediate evaporator water flow lost lockout diagnostic is generated.

In general, when there is either a non-latching or latching diagnostic, the EWP relay is turned off as though there was a zero time delay. Exceptions (see above table) whereby the relay continues to be energized occur with:

A Low Chilled Water Temp. diagnostic (non-latching) (unless also accompanied by an Evap Leaving Water Temperature Sensor Diagnostic)

or

A starter contactor interrupt failure diagnostic, in which a compressor continues to draw current even after commanded to have shutdown

or

A Loss of Evaporator Water Flow diagnostic (non-latching) and the unit is in the AUTO mode, after initially having proven evaporator water flow.

Alarm and Status Relay Outputs (Programmable Relays)

A programmable relay concept provides for enunciation of certain events or states of the chiller, selected from a list of likely needs, while only using four physical output relays, as shown in the field wiring diagram. The four relays are provided (generally with a Quad Relay Output LLID) as part of the Alarm

Relay Output Option. The relay's contacts are isolated Form C (SPDT), suitable for use with 120 VAC circuits drawing up to 2.8 amps inductive, 7.2 amps resistive, or 1/3 HP and for 240 VAC circuits drawing up to 0.5 amp resistive.

The list of events/states that can be assigned to the programmable relays can be found in the following table. The relay will be energized when the event/state occurs.

Installation – Electrical

Table 12 - Alarm and Status Relay Output Configuration Table

	Description
Alarm - Latching	This output is true whenever there is any active diagnostic that requires a manual reset to clear, that affects the Chiller, the Circuit, or any of the Compressors on a circuit. This classification does not include informational diagnostics.
Alarm - Auto Reset	This output is true whenever there is any active diagnostic that could automatically clear, that affects the Chiller, the Circuit, or any of the Compressors on a circuit. This classification does not include informational diagnostics.
Alarm	This output is true whenever there is any diagnostic affecting any component, whether latching or automatically clearing. This classification does not include informational diagnostics
Alarm Ckt 1	This output is true whenever there is any diagnostic effecting Refrigerant Circuit 1, whether latching or automatically clearing, including diagnostics affecting the entire chiller. This classification does not include informational diagnostics.
Alarm Ckt 2	This output is true whenever there is any diagnostic affecting Refrigerant Circuit 2 whether latching or automatically clearing, including diagnostics affecting the entire chiller. This classification does not include informational diagnostics.
Chiller Limit Mode (with a 20 minute filter)	This output is true whenever the chiller has been running in one of the Unloading types of limit modes (Condenser, Evaporator, Current Limit or Phase Imbalance Limit) continuously for the last 20 minutes.
Circuit 1 Running	This output is true whenever any compressors are running (or commanded to be running) on Refrigerant Circuit 1, and false when no compressors are commanded to be running on that circuit.
Circuit 2 Running	This output is true whenever any compressors are running (or commanded to be running) on Refrigerant Circuit 2, and false when no compressors are commanded to be running on that circuit.
Chiller Running	This output is true whenever any compressors are running (or commanded to be running) on the chiller and false when no compressors are commanded to be running on the chiller.
Maximum Capacity	This output is true whenever the chiller has all compressors on. The output is false once one compressor is shut off.
Ice Building Status	The output is true if the unit is configured for ice building, the ice building feature is enabled, there are no ice building diagnostics, and ice building has been commanded. If the unit is not running and is then commanded into ice mode, the output should turn on <u>before</u> the first compressor starts. The output should false when the ice building cycle is complete. This output may be used to interlock with valves, etc. that need to be switched over to do the ice building cycle.
Heat/Cool	The output is true if capacity control is in Hot Water Control mode (the water temperature is being controlled to the Active Hot Water Setpoint). The output is false in any other capacity control mode (Chilled Water Control, Ice Building, etc.).

Installation – Electrical

Relay Assignments Using TechView

CH530 Service Tool (TechView) is used to install the Alarm and Status Relay Option package and assign any of the above list of events or status to each of the four relays provided with the option. The relays to be programmed are referred to by the relay's terminal numbers on the LLID board 1A18.

The default assignments for the four available relays of the CXAM Alarm and Status Package Option are:

Table 13 - Default assignments

Relay	
Relay 1 Terminals J2 – 12,11,10:	Compressor running
Relay 2 Terminals J2 – 9,8,7:	Latching alarm
Relay 3 Terminals J2 – 6,5,4:	Chiller limit
Relay 4 Terminals J2 – 3,2,1:	Alarm

If any of the Alarm/Status relays are used, provide electrical power, 115 VAC with fused-disconnect to the panel and wire through the appropriate relays (terminals on 1A18. Provide wiring (switched hot, neutral, and ground connections) to the remote annunciation devices. Do not use power from the chiller's control panel transformer to power these remote devices. Refer to the field diagrams which are shipped with the unit.

Low Voltage Wiring

WARNING Ground Wire!

All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with local codes and regulations. Failure to follow this instruction could result in death or serious injuries.

The remote devices described below require low voltage wiring. All wiring to and from these remote input devices to the Control Panel must be made with shielded, twisted pair conductors. Be sure to ground the shielding only at the panel.

Note: To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

Emergency Stop

CH530 provides auxiliary control for a customer specified/installed latching trip out. When this customer-supplied remote contact 6S2 is provided, the chiller will run normally when the contact is closed. When the contact opens, the unit will trip on a manually resettable diagnostic. This condition requires manual reset at the chiller switch on the front of the control panel.

Connect low voltage leads to terminal strip locations on 1A13, J2-3 and 4. Refer to the field diagrams that are shipped with the unit. Silver or gold-plated contacts are recommended. These customer-supplied contacts must be compatible with 24 VDC, 12 mA resistive load.

External Auto/Stop

If the unit requires the external Auto/Stop function, the installer must provide leads from the remote contacts 6S1 to the proper terminals on 1A13 J2-1 and 2.

The chiller will run normally when the contacts are closed. When the contact opens, the compressor(s), if operating, will go to the RUN:UNLOAD operating mode and cycle off. Unit operation will be inhibited. Closure of the contacts will permit the unit to return to normal operation. Field-supplied contacts for all low voltage connections must be compatible with dry circuit 24 VDC for a 12 mA resistive load. Refer to the field diagrams that are shipped with the unit.

Installation – Electrical

Heat pump control

A setpoint, contact closure, or communicated command can select the unit heat/cool mode to be heat or cool. The contact closure or communicated command allows the user to remotely change the Heat/Cool operating mode. The Setpoint can be changed from TechView or the Front Panel.

By changing this setpoint to 'Heat' the unit will then switch to heating mode and control the leaving water temperature to the hot water setpoint. By changing this setpoint to 'Cool' the unit will switch to the cooling mode, and control the leaving water temperature to the Chilled water setpoint.

The operation of the unit is controlled by the Heat/Cool command. Switching from cooling to heating will stop all running compressors. After a 10 second delay the 4-way reversing valve will be switched into the heating mode direction and the unit will run based on the evaporator leaving water temperature compared to the hot water setpoint.

Switching from heating to cooling will stop all running compressors. After a 10 second delay the 4-way reversing valve will be switched into the cooling mode direction and the unit will run based on the evaporator leaving water temperature compared to the chilled water setpoint.

When the unit is stopped and there is a command to switch from cooling to heating or heating to cooling the 10 second delay will be enforced when switching the 4-way reversing valve.

Ice Building Option

CH530 provides auxiliary control for a customer specified/installed contact closure for ice building if so configured and enabled. This output is known as the Ice Building Status Relay. The normally open contact will be closed when ice building is in progress and open when ice building has been normally terminated either through Ice Termination setpoint being reached or removal of the Ice Building command. This output is for use with the ice storage system equipment or controls (provided by others) to signal the system changes required as the chiller mode changes from "ice building" to "ice complete".

When contact 6S3 is provided, the chiller will run normally when the contact is open.

CH530 will accept either an isolated contact closure (External Ice Building command) or a Remote Communicated input (Tracer) to initiate and command the Ice Building mode.

CH530 also provides a "Front Panel Ice Termination Setpoint", settable through TechView, and adjustable from -6.7 to -0.5°C in at least 1°C increments.

When in the Ice Building mode, and the evaporator entering water temperature drops below the ice termination setpoint, the chiller terminates the Ice Building mode and changes to the Ice Building Complete Mode.

Installation – Electrical

CAUTION Evaporator Damage!

Freeze inhibitor must be adequate for the leaving water temperature. Failure to do so may result in damage to system components.

Techview must also be used to enable or disable Ice Machine Control. This setting does not prevent the Tracer from commanding Ice Building mode.

Upon contact closure, the CH530 will initiate an ice building mode, in which the unit runs fully loaded at all times. Ice building shall be terminated either by opening the contact or based on the entering evaporator water temperature. CH530 will not permit the ice building mode to be reentered until the unit has been switched out of ice building mode (open 6S3 contacts) and then switched back into ice building mode (close 6S3 contacts.)

In ice building, all limits (freeze avoidance, evaporator, condenser, current) will be ignored. All safeties will be enforced. If, while in ice building mode, the unit gets down to the freeze stat setting (water or refrigerant), the unit will shut down on a manually resettable diagnostic, just as in normal operation.

Connect leads from 6S3 to the proper terminals of 1A16. Refer to the field diagrams which are shipped with the unit. Silver or gold-plated contacts are recommended. These customer-supplied contacts must be compatible with 24 VDC, 12 mA resistive load.

Percent Capacity Output

CH530 provides an analog voltage output (2-10 VDC) to communicate active unit capacity [%].

The software provides a “comm loss: percent capacity output” diagnostic to provide annunciation if there is a communication failure.

The active unit capacity is calculated using the following equation

$$\text{Active_Unit_Capacity} = 100 * (\text{output_voltage [V]} - 2.0\text{V}) / (10.0\text{V} - 2.0\text{V})$$

This calculation is not adjusted for operating conditions. It does not adjust for heat pump compressors operating in a defrost cycle. It does not adjust for heat pumps with supplemental heat. Therefore, it cannot be used as an accurate measure of total unit current, power, or cooling/heating capacity.

External Chilled/hot Water Setpoint (ECWS/EHWS) Option

The CH530 provides inputs that accept either 4-20 mA or 2-10 VDC signals to set the external chilled/hot water setpoint (ECWS/EHWS). This is not a reset function. The input defines the setpoint. This input is primarily used with generic BAS (building automation systems). The chilled/hot water setpoint set via the DynaView or through digital communication with Tracer (Comm3). The arbitration of the various chilled/hot water setpoint sources is described in the flow charts at the end of the section.

The chilled/hot water setpoint may be changed from a remote location by sending either a 2-10 VDC or 4- 20 mA signal to the 1A14, J2-2 and 3. The 2-10 VDC and 4-20 mA each correspond to a to an EWS range with both min-EWS and max-EWS configurable in the service tool.

The following equations apply:

Voltage Signal Current Signal

As generated from external source
 $\text{VDC} = 0.1455 * (\text{ECWS/EHWS}) + 0.5454$
 $\text{mA} = 0.2909(\text{ECWS/EHWS}) + 1.0909$

As processed by CH530
 $(\text{ECWS/EHWS}) = 6.875 * (\text{VDC}) - 3.75$
 $(\text{ECWS/EHWS}) = 3.4375(\text{mA}) - 3.75$

If the (ECWS/EHWS) input develops an open or short, the LLID will report either a very high or very low value back to the main processor. This will generate an informational diagnostic and the unit will default to using the Front Panel (DynaView) Chilled/hot Water Setpoint.

TechView Service Tool is used to set the input signal type from the factory default of 2-10 VDC to that of 4-20 mA. TechView is also used to install or remove the External Chilled/hot Water Setpoint option as well as a means to enable and disable ECWS.

Installation – Electrical

External Demand Limit Setpoint (EDLS) Option

CH530 provide a means to limit the capacity of the chiller by limiting the number of compressors or stages that are allowed to run. The maximum number of compressor or stages allowed to run can vary from one to the number of stages on the unit. The staging algorithm is free to decide which compressor or stage shall be turned off or prevented from running to meet this requirement.

CH530 shall accept either a 2-10 VDC or 4-20 mA analog input suitable for customer connection to set the unit external demand limit setpoint (EDLS).

2-10 VDC and 4-20 mA shall each correspond to an EDLS range with a minimum of 0% and a maximum of 100%. The following equations exist:

The minimum EDLS will be clamped at the front panel based on 100% / Total number of compressors. For input signals beyond the 2-10VDC or 4-20mA range, the end of range value shall be used. For example, if the customer inputs 21 mA, the EDLS shall limit itself to the corresponding 20 mA EDLS.

EWS and EDLS Analog Input Signal Wiring Details:

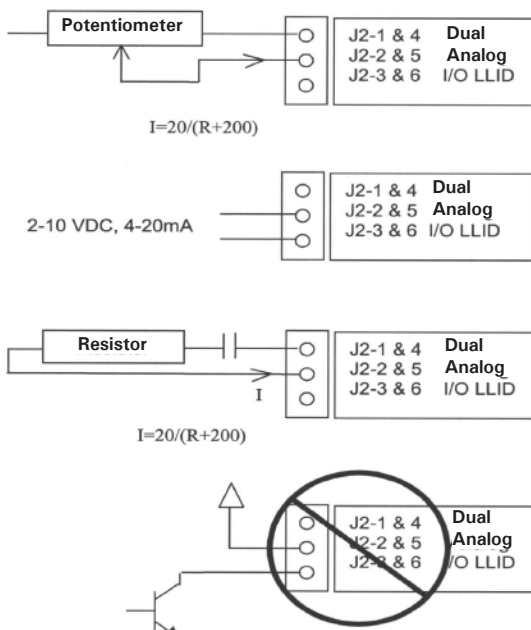
Both the ECWS and EDLS can be connected and setup as either a 2-10 VDC (factory default), 4-20 mA, or resistance input (also a form of 4-20mA) as indicated below. Depending on the type to be used, the TechView Service Tool must be used to configure the LLID and the MP for the proper input type that is being used. This is accomplished by a setting change on the Custom Tab of the Configuration View within TechView.

The J2-3 and J2-6 terminal is chassis grounded and terminal J2-1 and J2-4 can be used to source 12 VDC.

The EWS uses terminals J2-2 and J2-3. EDLS uses terminals J2-5 and J2-6. Both inputs are only compatible with high-side current sources.

	Voltage signal	Current signal
As generated from external source	$V_{dc} = 8 * (EDLS) + 2$	$mA = 16 * (EDLS) + 4$
As processed by CH530	$EDLS = (V_{ds} - 2) / 8$	$EDLS = (mA - 4) / 16$

Figure 28 - Wiring Examples for ECLS and EDLS



Installation – Electrical

Chilled Water Reset (CWR)

CH530 resets the chilled water temperature setpoint based on either return water temperature, or outdoor air temperature. Return Reset is standard, Outdoor Reset is optional.

The following shall be selectable:

- One of three Reset Types: None, Return Water Temperature Reset, Outdoor Air Temperature Reset, or Constant Return Water Temperature Reset.
- Reset Ratio Setpoints.
- For outdoor air temperature reset there shall be both positive and negative reset ratios.
- Start Reset Setpoints.
- Maximum Reset Setpoints.

The equations for each type of reset are as follows:

Return

$$CWS' = CWS + \text{RATIO} (\text{START RESET} - (\text{TWE} - \text{TWL}))$$

$$\text{and } CWS' > \text{ or } = CWS$$

$$\text{and } CWS' - CWS < \text{ or } = \text{Maximum Reset}$$

Outdoor

$$CWS' = CWS + \text{RATIO} * (\text{START RESET} - \text{TOD})$$

$$\text{and } CWS' > \text{ or } = CWS$$

$$\text{and } CWS' - CWS < \text{ or } = \text{Maximum Reset}$$

where

CWS' is the new chilled water setpoint or the «reset CWS»

CWS is the active chilled water setpoint before any reset has occurred, e.g. normally Front Panel, Tracer,

or ECWS

RESET RATIO is a user adjustable gain

START RESET is a user adjustable reference

TOD is the outdoor temperature

TWE is entering evaporator water temperature

TWL is leaving evaporator water temperature

MAXIMUM RESET is a user adjustable limit providing the maximum amount of reset. For all types of reset, $CWS' - CWS < \text{ or } = \text{Maximum Reset}$.

In addition to Return and Outdoor Reset, the MP provides a menu item for the operator to select a Constant Return Reset. Constant Return Reset will reset the leaving water temperature setpoint so as to provide a constant entering water temperature. The Constant Return Reset equation is the same as the Return Reset equation except on selection of Constant Return Reset, the MP will automatically set Ratio, Start Reset, and Maximum Reset to the following.

$$\text{RATIO} = 100\%$$

$$\text{START RESET} = \text{Design Delta Temp.}$$

$$\text{MAXIMUM RESET} = \text{Design Delta Temp.}$$

The equation for Constant Return is then as follows:

$$CWS' = CWS + 100\% (\text{Design Delta Temp.} - (\text{TWE} - \text{TWL}))$$

$$\text{and } CWS' > \text{ or } = CWS$$

$$\text{and } CWS' - CWS < \text{ or } = \text{Maximum Reset}$$

When any type of CWR is enabled, the MP will step the Active CWS toward the desired CWS' (based on the above equations and setup parameters) at a rate of 1 degree C every 5 minutes until the Active CWS equals the desired CWS'. This applies when the chiller is running.

When the chiller is not running the CWS is reset immediately (within one minute) for Return Reset and at a rate of 1 degree C every 5 minutes for Outdoor Reset. The chiller will start at the Differential to Start value above a fully reset CWS or CWS' for both Return and Outdoor Reset.

Reset type	Reset ratio range	Start reset range	Maximum reset range	Increment SI units	Factory default value
Return	10 – 120%	2.2-16.7°C	0.0-11.1 C	1%	50%
Outdoor	80 to -80%	10-54.4°C	0.0 to 11.1°C	1%	10%

Installation – Electrical

Hot Water Reset (HWR)

The active hot water setpoint is reset lower based on return hot water temperature or outside air temperature. Outdoor Air Reset reduces the active hot water setpoint if the outdoor air temperature gets above a starting threshold value.

Reduction of the hot water setpoint reduces compressor discharge pressure, which reduces compressor power consumption, leading to improved unit efficiency.

Hot water reset can provide energy savings and/or better critical zone control and/or better indoor air quality when applied to the right system type. It also allows customers to more precisely match their controls to their system.

The hot water reset settings are as follows:

1. Reset Type – The following options are selectable: No Hot Water Reset, Outdoor Air Temperature Reset, Return Water Temperature Reset, or Constant Return Water Temperature Reset.
2. Reset Ratio – For Outdoor Air Temperature Reset, both positive and negative reset ratios will be allowed.
3. Start Reset
4. Maximum Reset – The maximum resets shall be with respect to the hot water setpoint.

All parameters shall be factory set to a pre determined set of values. Field adjustment of two, three and four above is expected to be very infrequent. Pre determined factory settings shall be set for all Reset Types.

Variable definitions:

HWS – Arbitrated hot water setpoint, before any reset has occurred

HWS' – Active hot water setpoint, includes the effect of hot water reset

HWR – Amount of hot water reset (also called Degrees of Reset).

The above quantities are related by the equation:

$$HWS' = HWS - HWR$$

or

$$HWR = HWS - HWS'$$

With the unit running and any type of hot water reset enabled, HWR is allowed to change at a maximum rate of 1°F every 5 minutes until the actual HWR equals the desired HWR. When the unit is not running, actual HWR shall be set equal to the desired HWR within one minute (no maximum rate is in effect).

If Hot Water Reset is disabled, desired HWR is 0.

Additional variable definitions:

RESET RATIO – User adjustable gain

START RESET – User adjustable reference

TOD – Outdoor air temperature

TWE – entering water temperature

TWL – leaving water temperature

MAXIMUM RESET – User adjustable limit providing the maximum amount of reset.

The equations for each type of reset:

Outdoor Air Temperature Reset

$$HWR = \text{RESET RATIO} * (\text{TOD} - \text{START RESET})$$

With limits:

$$HWR \geq 0$$

$$HWR \leq \text{Maximum Reset}$$

Return Water Temperature Reset

$$HWR = \text{RESET RATIO} * (\text{START RESET} - \text{TWE})$$

With limits:

$$HWR \geq 0$$

$$HWR \leq \text{Maximum Reset}$$

Constant Return Water Temperature Reset

$$HWR = 100\% * (\text{Heating Design Delta Temperature} - (\text{TWL} - \text{TWE}))$$

With limits:

$$HWR \geq 0$$

$$HWR \leq \text{Design Delta Temperature}$$

As stated previously, if any type of Hot Water Reset is turned on while the unit is running, Degrees of Reset will step up at a rate of 1 degree F every 5 minutes. It is worth noting that this stepping will also happen in the other direction (as a -1 degree F every 5 minutes) if Hot Water Reset is disabled while the unit is running.

The HWS' shall never be below the minimum for the Hot Water Setpoint.

Communications Interface options

Optional Tracer Communications Interface

This option allows the Tracer CH530 controller to exchange information (e.g. operating setpoints and Auto/Standby commands) with a higher-level control device, such as a Tracer Summit or a multiple machine controller. A shielded, twisted pair connection establishes the bi-directional communications link between the Tracer CH530 and the building automation system.

Note: To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

WARNING Ground Wire!

All field-installed wiring must be completed by qualified personnel. All field-installed wiring must comply with local codes and regulations. Failure to follow this instruction could result in death or serious injuries.

Field wiring for the communication link must meet the following requirements:

- All wiring must be in accordance with local codes and regulations.
- Communication link wiring must be shielded, twisted pair wiring (Belden 8760 or equivalent). See the table below for wire size selection:

Table 14 - Wire Size

	Wire Size Maximum Length of Communication Wire
2.5 mm ²	1525 m
1.5 mm ²	610 m
1.0 mm ²	305 m

- The communication link cannot pass between buildings.
- All units on the communication link can be connected in a "daisy chain" configuration.

LonTalk Communications Interface for Chillers (LCI-C)

CH530 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.

Installation Recommendations

- 22 AWG Level 4 unshielded communication wire recommended for most LCI-C installations
- LCI-C link limits: 1300m, 60 devices
- Termination resistors are required
- 105 ohms at each end for Level 4 wire
- 82 ohms at each end for Trane «purple» wire
- LCI-C topology should be daisy chain
- Zone sensor communication stubs limited to 8 per link, 15m each (maximum)
- One repeater can be used for an additional 1300m, 60 devices, 8 communication stubs

Communications Interface options

BACnet™ Communication Interface for Chillers (BCI-C)

The Building Automation and Control Network (BACnet and ANSI/ASHRAE Standard 135-2004) protocol is a standard that allows building automation systems or components from different manufacturers to share information and control functions. BACnet provides building owners the capability to connect various types of building control systems or subsystems together for a variety of reasons. In addition, multiple vendors can use this protocol to share information for monitoring and supervisory control between systems and devices in a multi-vendor interconnected system.

The BACnet protocol identifies standard objects (data points) called BACnet objects. Each object has a defined list of properties that provide information about that object. BACnet also defines a number of standard application services that are used to access data and manipulate these objects and provides a client/server communication between devices. For more information on BACnet protocol contact Trane.

Modbus Communication Interface for Chillers

The PIC is the gateway to allow communication between a TRANE equipment and a BMS (Building Management Systems) vendor through the Modbus protocol over a RS232 or a RS-485 link.

Jbus is an extension of Modbus.

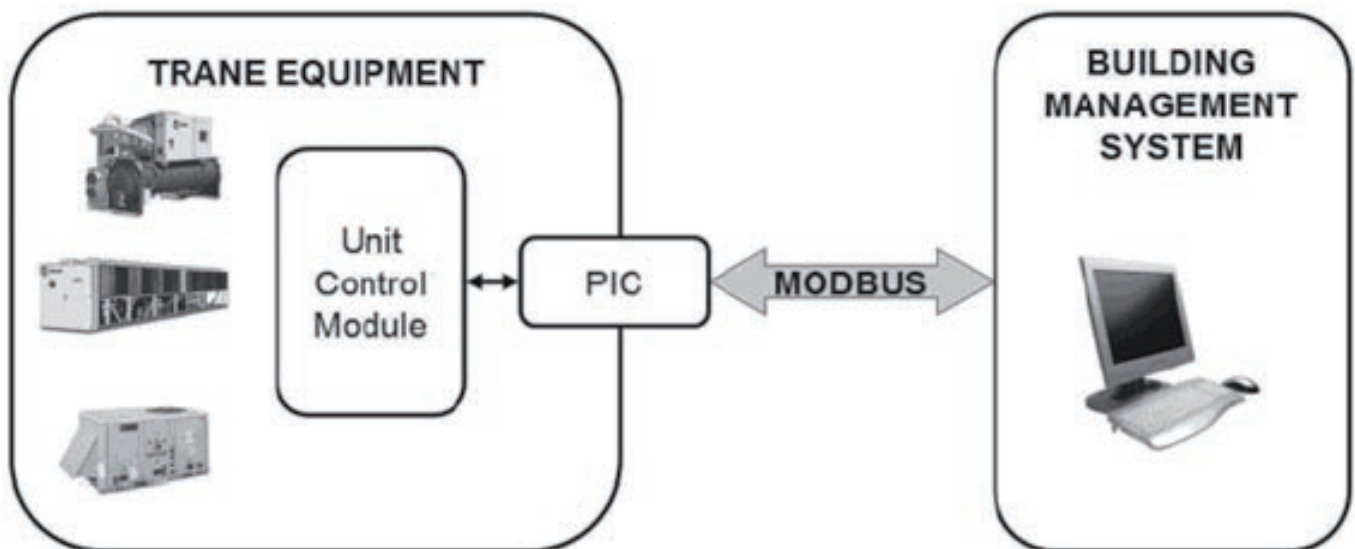
Jbus supports more functions than Modbus.

- Functions supported by both Modbus and Jbus:

1, 2, 3, 4, 5, 6, 15 and 16

- Functions supported by Jbus but not supported by Modbus:

7, 8, 11, 12 and 13



PIC = Protocol Interface Controller

Operating principles

This section contains an overview of the operation of CXAM air-cooled liquid chiller equipped with microcomputer-based control systems. It describes the overall operating principles of the CXAM water chiller.

Note: To ensure proper diagnosis and repair, contact a qualified service organization if a problem should occur.

General

The Model CXAM units are scroll compressor(s), single or dual circuit, air-cooled liquid chillers. These units are equipped with unit-mounted starter/control panels and operate with R410A refrigerant.

The basic components of a CXAM unit are:

- Unit-mounted panel containing starter and Tracer CH530 controller and Input/Output LLIDS
- Scroll compressors
- Braze plate evaporator
- Air-cooled condenser with subcooler
- Electronic expansion valve
- Related interconnecting piping.

Refrigerant Cycle

CXAM units operate in cooling or in heating mode.

In cooling mode, the refrigerant cycle in conceptually closed to other Trane air-cooled chiller products. In cooling mode CXAM unit uses a brazed plate as evaporator and an aircooled coil as condenser. The compressors use suction gas cooled motors and an oil management system to provide almost oil-free refrigerant to the condenser and evaporator for maximum heat transfer while lubricating and sealing compressor rotors and bearings. The lubrication system helps to assure long compressor life and contributes to quiet operation.

The aircooled heat exchanger is available in three configurations—slant, V and W—based on the CXAM nominal tonnage cooling capacity.

Liquid refrigerant is metered into the brazed plate evaporator using the cooling mode electronic expansion valve to maximize unit efficiency at full and part load operation.

The CXAM chiller is equipped with a unit-mounted starter and control panel. Microprocessor based unit control modules (Trane Tracer™ CH530) provide accurate water control and providing monitoring, protection and adaptive limit functions. The adaptive nature of the controls intelligently prevent the chiller from operating outside of its limits, or compensates for unusual operating conditions while keeping the chiller running rather than simply shutting off the chiller. If problems do occur, the CH530 controls provide diagnostic messages to help the operator in troubleshooting.

Two electronic expansions valves are used per circuit: cooling mode expansion valve and heating mode expansion vale.

In heating mode the braze plate heat exchanger is the condenser and the coil is the evaporator. Heating mode EXV is used to expanse the refrigerant after condensation in the

braze plates heat exchanger. The electronic expansion valve has the advantage to control the refrigerant flow through the heat exchangers which ensures an optimal operation of the unit.

A liquid receiver is used in heating mode to stock a part of the liquid refrigerant. The receiver is designed to ensure unit operation in the entire operating map. The receiver is not design to stock all the refrigerant charge contained in the unit during maintenance. The flow of refrigerant through the receiver is managed using the two expansion valves, a solenoid valve and a check valve.

CXAM unit with a “W” air cooled heat exchanger is available with or without dedicated subcooler base on the unit size. When a CXAM unit has a dedicated subcooler, this subcooler is by-passed in heating mode. To allow this bypass, a valve called subcooler shut off valve is used. This valve is controlled by Trane Tracer™ CH530 and by the system discharge and suction pressure.

In heating mode, when the ambient temperature is low the coil will freeze. To defrost, the unit will return temporary in cooling mode using the reversing valve. Once in cooling mode, hot gas will go through the coil to ensure coil defrost.

The electronic expansions valves are controlled during defrost cycle to avoid liquid floodback. Liquid floodback can reduce the compressor life and damage the compressor.

Warm up cycle

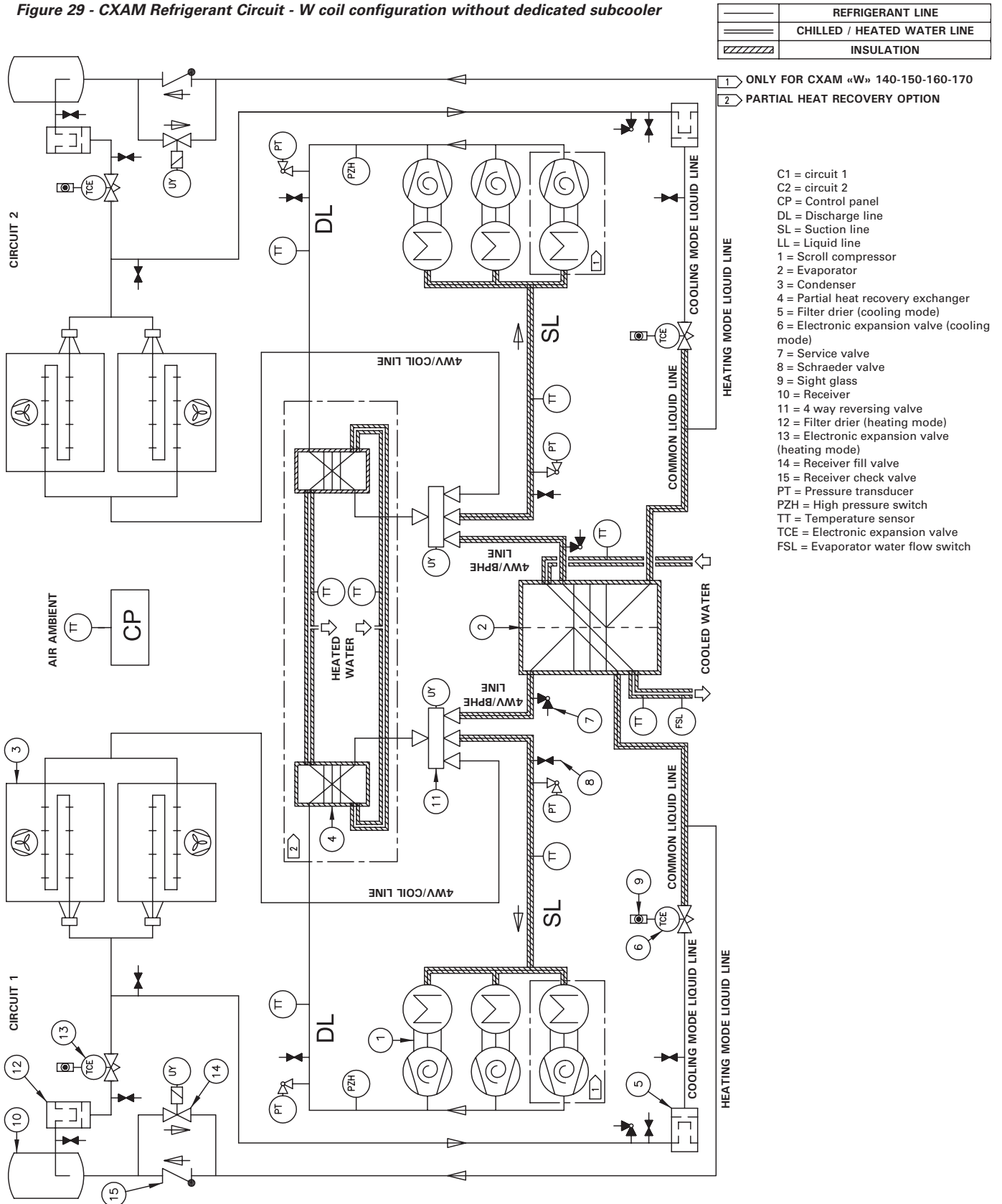
When a circuit is commanded to start in heating mode, a warm-up cycle is initiated if the unit has been stopped for more than 30 minutes (shutdown of the last compressor on a circuit).

The warm up cycle is a brief start up of the unit in cooling mode before to return in heating mode.

The Warm-Up Cycle improves compressor reliability by improving sump conditions for Heating Mode starts.

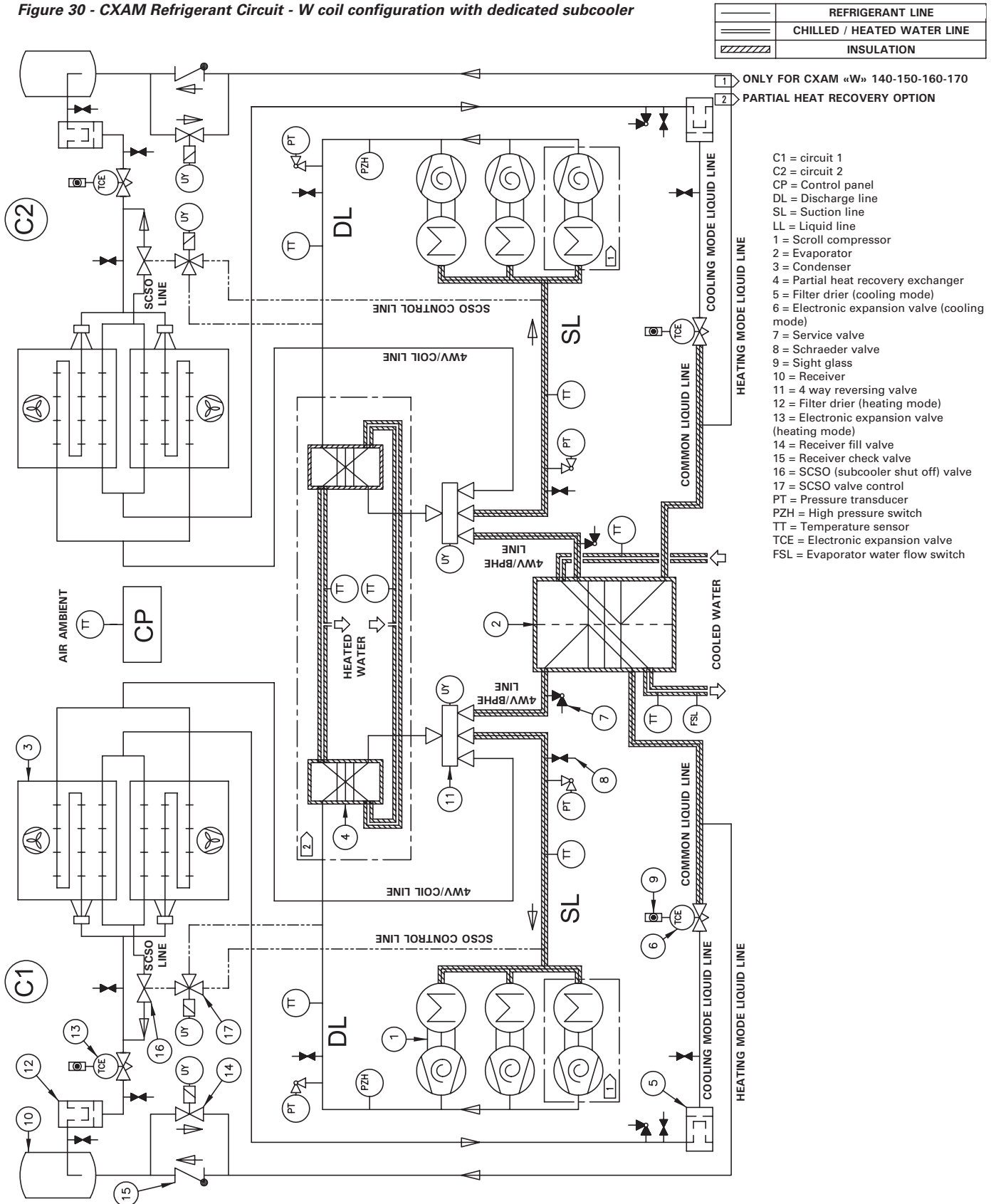
Operating principles

Figure 29 - CXAM Refrigerant Circuit - W coil configuration without dedicated subcooler



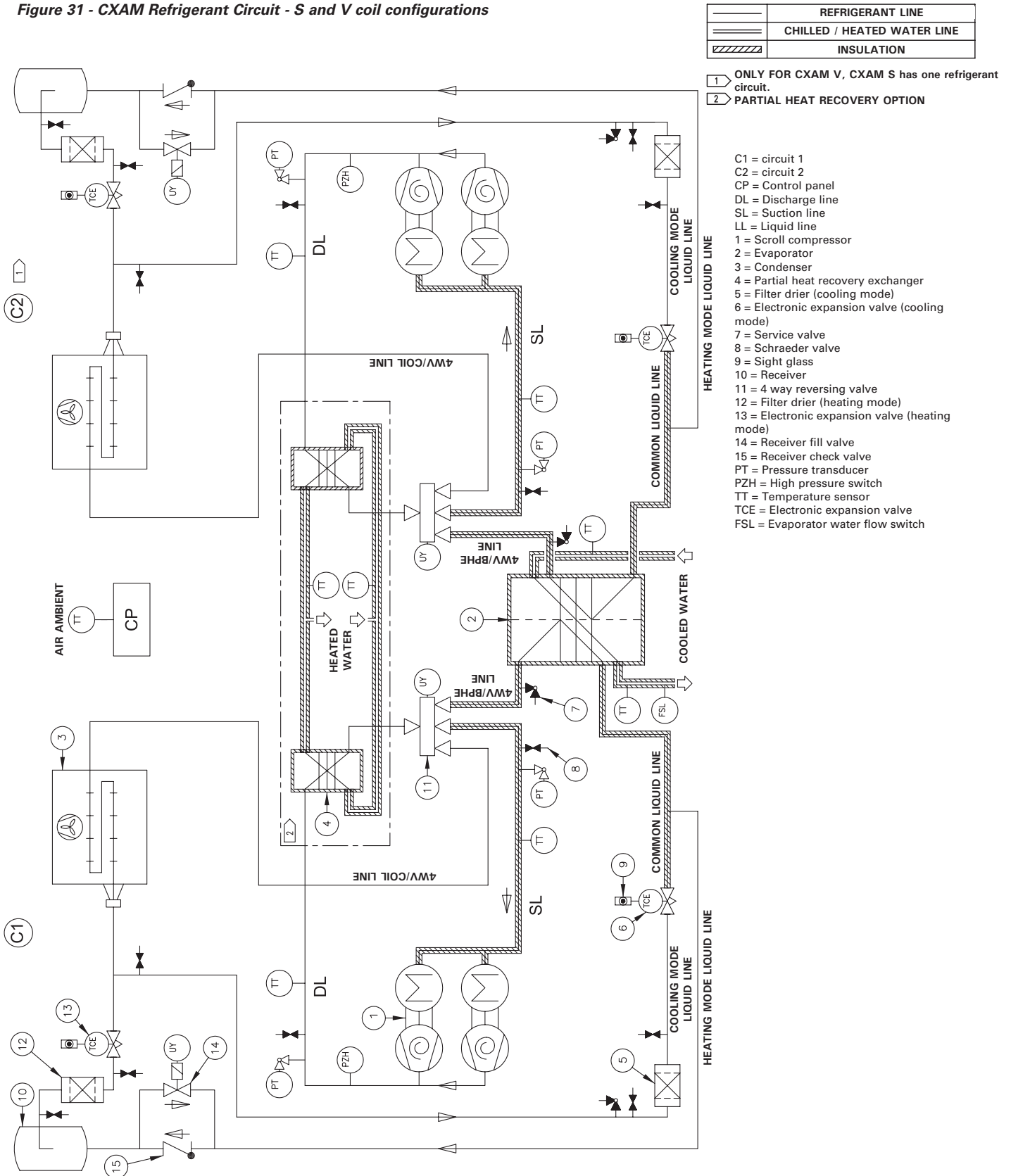
Operating principles

Figure 30 - CXAM Refrigerant Circuit - W coil configuration with dedicated subcooler



Operating principles

Figure 31 - CXAM Refrigerant Circuit - S and V coil configurations



Operating principles

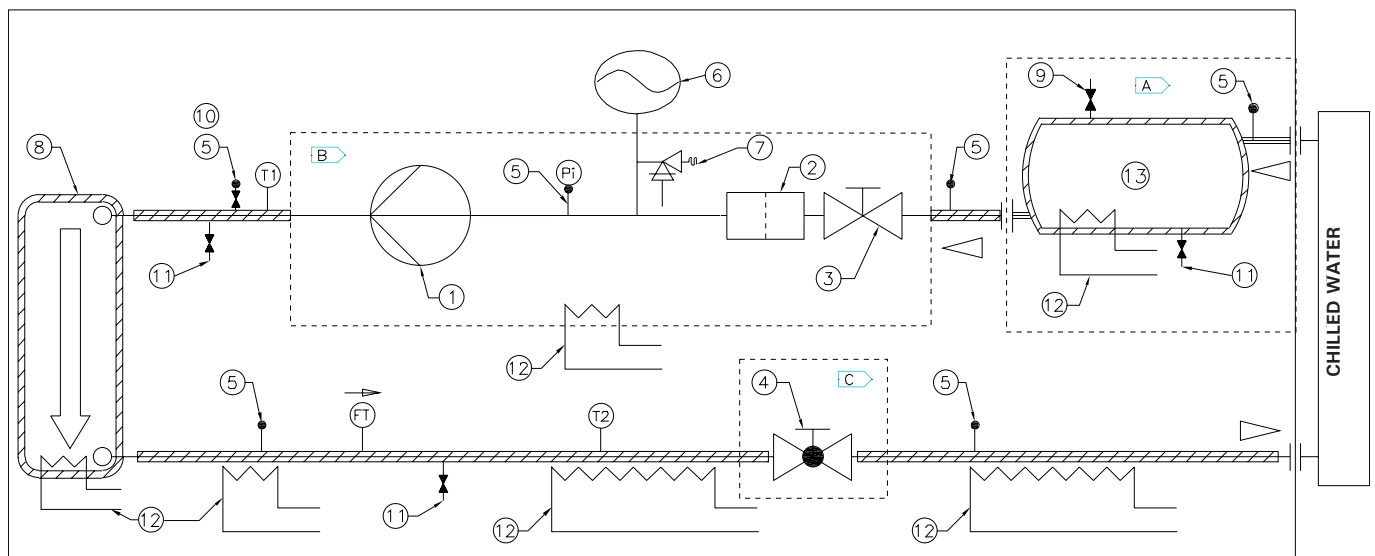
Oil System

The oil is efficiently separated inside the scroll compressor and will remain in the scroll compressor during all run cycles. Between 1-2% of the oil circulates around with the refrigerant.

See compressor section for oil level information.

Hydraulic module water chart (option)

Figure 32 - Hydraulic module water chart



- 1 Single or Dual Pump
 - 2 Optional Water Strainer
 - 3 Shut Off Valve
 - 4 Stop and Balancing Valve
 - 5 Valve for Pressure Point
 - 6 Expansion Tank
 - 7 Water Pressure Point
 - 8 Exchanger
 - 9 Automatic Air Bleed
 - 10 Manual Air Bleed
 - 11 Drain Valve
 - 12 Antifreeze Protection
 - 13 Buffer Tank
- Pi Gauge
 FT Water Flow Switch
 A Optional buffer tank
 B Pump box
 C Optional balancing valve
 T1 Evap Water Inlet Temp Sensor
 T2 Evap Water Outlet Temp Sensor

— Water Line — Insulated Water Line

Partial Heat Recovery

The partial heat recovery is comprised of an auxiliary heat exchanger installed in the discharge line between the compressor and the reversing valve. The heat exchanger cools compressor discharge gas and rejects the energy to a separate water loop for hot water applications. The chiller can simultaneously produce chilled water and hot water.

PHR is used only in the cooling mode.

The heating capacity is driven by the cooling demand on the chiller, the ambient temperature and the temperature of the heat recovery loop.

The partial heat recovery includes:

- One brazed plate heat exchanger per refrigerant circuit
- Insulation of the heat exchanger(s) and water pipe

- Two temperature sensors to read the inlet/outlet hot water temperature information on the unit control display
- Freeze protection heater (option)
- Manual air vent
- Drain valve

Water circulating inside the heat recovery heat exchanger should never be used for food process or drinking water. It must be used through a direct loop to heat or preheat water.

Note: If the partial heat recovery heat exchanger is drained, the heater must be turned off to avoid damaging the partial heat recovery heat exchanger. The heater should only be on when the heat recovery heat exchanger has water in it.

CAUTION! Discharge gas temperature can reach 130°C, resulting in overheating of the heat recovery water.

Partial heat recovery piping

A field-installed safety or relief valve on the water side is required with the partial heat recovery to prevent risks resulting from a failure of the thermostat.

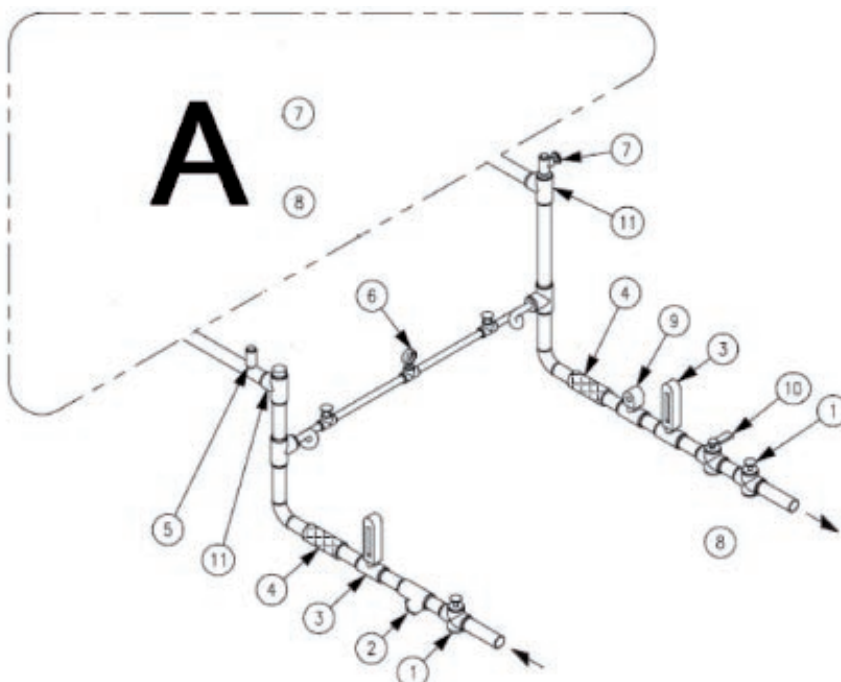
A 1 to 1.6 mm strainer must be installed close to the partial heat recovery heat exchanger entering water line to protect the heat exchanger.

The partial heat recovery water temperature entering the unit should be at least 40°C.

Insulate water lines and other portions of the heat recovery water loop to prevent heat loss and potential injury due to exposure to a hot surface.

For recommended partial heat recovery piping, see below.

Figure 33 - Partial heat recovery piping recommendations



- A = Trane supplied
- 1 = Gate valve
- 2 = Water strainer
- 3 = Thermometer (user option)
- 4 = Vibration eliminator
- 5 = Relief valve
- 6 = Valved pressure gauge
- 7 = Vent (one factory-installed)
- 8 = Drain (at lowest position)
- 9 = Flow switch (warm water flow)
- 10 = Balancing valve
- 11 = Clean out tee

Partial Heat Recovery

Do not use untreated or improperly treated water in the heat recovery water loop since it will cause inefficient operation and potential damage to the unit such as: reduced heat transfer between water and refrigerant, increased water pressure drop and reduced water flow.

CAUTION: Proper Water Treatment!

The use of untreated or improperly treated water in a chiller may result in scaling, erosion, corrosion, algae, or slime. It is recommended that the services of a qualified water treatment specialist be engaged 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.

Partial heat recovery freeze protection (option)

The heat recovery condenser is insulated and a factory-installed heater is installed and will protect the heat exchanger from freezing in ambient temperatures down to -18°C. When the ambient temperature drops to approximately 5°C, the main controller energizes the heaters.

Note: The inlet and outlet piping should be protected against freezing by one of the following methods:

- Install heat tape on all field-installed water piping.
- Add freeze inhibit fluid to the partial heat recovery water loop.

Controls Interface

CH530 Communications Overview

The Trane CH530 control system that runs the chiller consists of several elements:

- The main processor collects data, status, and diagnostic information and communicates commands to the starter module and the LLID (for Low Level Intelligent Device) bus. The main processor has an integral display (DynaView).
- Low level intelligent device (LLID) bus. The main processor communicates to each input and output device (e.g. temperature and pressure sensors, low voltage binary inputs, analog input/output) all connected to a four-wire bus, rather than the conventional control architecture of signal wires for each device.
- The communication interface to a building automation system (BAS).
- A service tool to provide all service/maintenance capabilities.

Main processor and service tool (TechView) software is downloadable from www.trane.com.

The process is discussed later in this section under TechView Interface. DynaView provides bus management. It has the task of restarting the link, or filling in for what it sees as “missing” devices when normal communications has been degraded. Use of TechView may be required.

The CH530 uses the IPC3 protocol based on RS485 signal technology and communicating at 19.2 Kbaud to allow 3 rounds of data per second on a 64-device network. A typical four-compressor CXAM will have around 30 devices. Most diagnostics are handled by the DynaView. If a temperature or pressure is reported out of range by a LLID, the DynaView processes this information and calls out the diagnostic. The individual LLIDs are not responsible for any diagnostic functions.

Note: It is imperative that the CH530 Service Tool (TechView) be used to facilitate the replacement of any LLID or reconfigure any chiller component. TechView is discussed later in this section.

Controls Interface

Each chiller is equipped with a DynaView interface. The DynaView has the capability to display information to the operator including the ability to adjust settings. Multiple screens are available and text is presented in multiple languages as factory-ordered or can be easily downloaded from www.trane.com.

TechView can be connected to either the DynaView module and provides further data, adjustment capabilities, diagnostics information using downloadable software.

More information on Dynaview and Techview is available in the CXAM control user guide.

Pre-Start Checkout

When installation is complete, but prior to putting the unit into service, the following pre-start procedures must be reviewed and verified correct:

WARNING Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury

- Inspect all wiring connections to be sure they are clean and tight.
- Verify that all refrigerant valves are "OPEN"
- Check the power supply voltage to the unit at the main power fused-disconnect switch. Voltage must be within the voltage utilization range stamped on the unit nameplate. Voltage imbalance must not exceed 2 percent.

Min voltage – Average / Average
< 2%

And

Max Voltage – Average / Average
< 2%

- Check the unit power phasing to be sure that it has been installed in an "ABC" sequence.

WARNING Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be 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. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

- Fill the evaporator chilled water circuit. Vent the system while it is being filled. Open the vents on the top of the evaporator during filling and close when filling is completed.
- Vent the pump (option): It is recommended to vent the pump to make sure the seal is wet before pump start.
- Pump motors (option) are totally enclosed. In high humidity environments, condensation can occur in the motor, so it is recommended to remove plastic drain plug located at the bottom of the motor frame.

CAUTION! When using freeze inhibitor, never fill the system with pure glycol.

Always fill the system with diluted solution. Maximum concentration of Glycol is 40%. Higher glycol concentration will damage pump seal.

CAUTION! The pump must not run dry. Dry-running will damage the mechanical seal.

CAUTION Proper Water Treatment!

The use of untreated or improperly treated water in the CXAM may result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged 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.

- Close the fused-disconnect switch(es) that supplies power to the chilled water pump starter.
- Start the chilled water pump to begin circulation of the water. Inspect all piping for leakage and make any necessary repairs.
- With water circulating through the system, adjust water flow and check water pressure drop through the evaporator.
- Prove all Interlock and Interconnecting Wiring Interlock and External.
- Check and set, as required, all CH530 Menu Items.
- Stop the chilled water pump.

Water System Flow Rates

Establish a balanced chilled water flow through the evaporator. The flow rates must fall between the minimum and maximum values. Chilled water flow rates below the minimum values will result in laminar flow, which reduces heat transfer and causes either loss of EXV control or repeated nuisance, low temperature cutouts.

Water System Pressure Drop

Measure water pressure drop through the evaporator at the field-installed pressure taps on the system water piping. Use the same gauge for each measurement. Measure flow at the field-installed supply and return. This will include valves, strainers, and fittings in the pressure drop readings. Pressure drop readings should be approximately those shown in the Pressure Drop Charts in the Installation-Mechanical section.

Caution! Strainer should be cleaned after water flow has been established for the first time, as it is likely that it collects all the particles left after field installation.

Unit Start-Up Procedures

Power Up

The Power up chart shows the respective DynaView screens during a power up of the main processor. This process takes from 30 to 45 seconds depending on the number of installed Options. On all power ups, the software model will always transition through the 'Stopped' Software state independent of the last mode. If the last mode before power down was 'Auto', the transition from 'Stopped' to 'Starting' occurs, but it is not apparent to the user.

Power Up to Starting

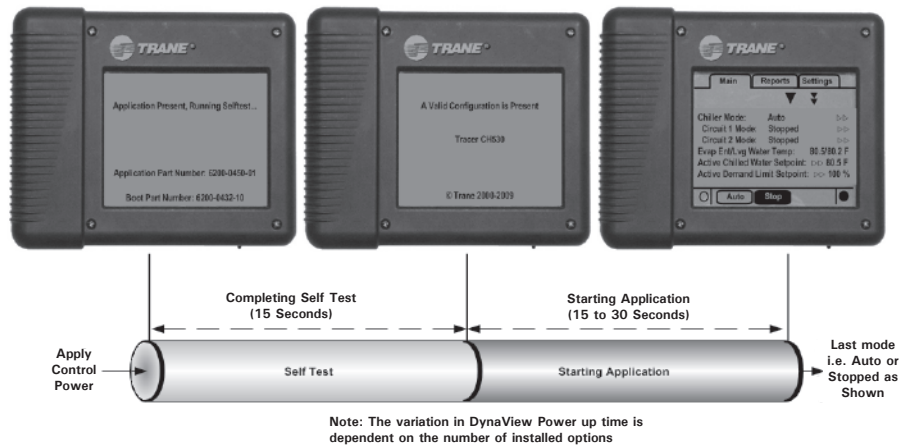
The Power up to starting diagram shows the timing from a power up event to energizing the compressor. The shortest allowable time would be under the following conditions:

1. No motor restart inhibit
2. Evaporator Water flowing
3. Power up Start Delay setpoint set to 0 minutes
4. Adjustable Stop to Start Timer set to 5 seconds
5. Need to cool

The above conditions would allow for a minimum power up to starting compressor time of 95 seconds.

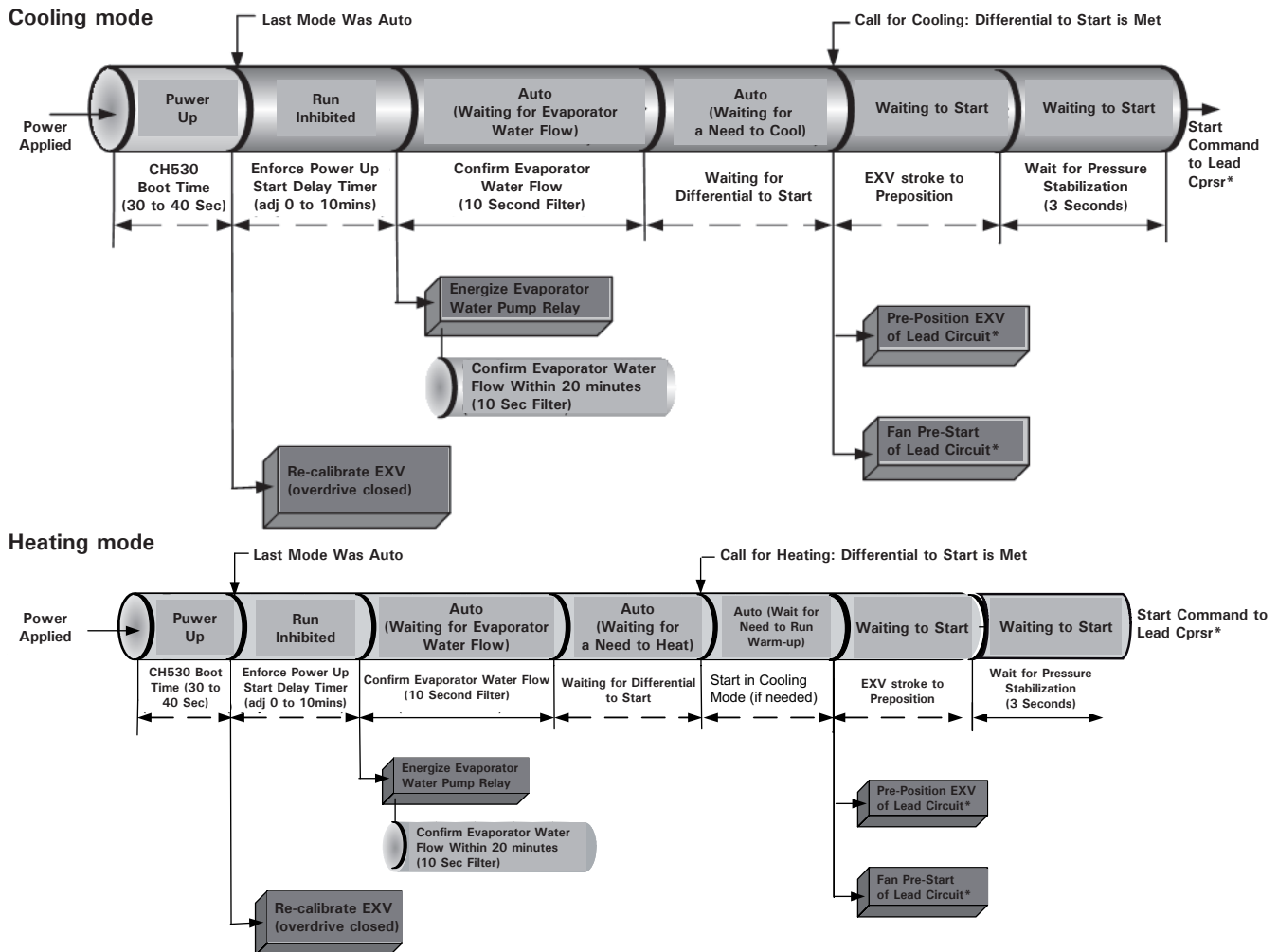
Figure 34 - Power Up

CXAM Sequence of Operation:
Power Up



Unit Start-Up Procedures

Figure 35 - Power Up to Starting
CXAM Sequence of Operation
Power Up to Starting Compressor



* Lead Circuit/Compressor is determined by:
 - Circuit Staging Option: Balanced Wear, Circuit 1 Lead, Circuit 2 Lead
 - Compressor Staging Option: Balanced Wear, Fixed Sequence (Follows per circuit configuration)
 - also influenced by lockouts, restart inhibit and diagnostics present

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:

1. No motor restart inhibit
 2. Evaporator Water flowing
 3. Power up Start Delay Timer has expired
 4. Adjustable Stop to Start Timer has expired
 5. Need to cool
- The above conditions would allow the compressor to start in 60 seconds.

CAUTION Refrigerant!

If both suction and discharge pressures are low but sub-cooling is normal, a problem other than refrigerant shortage exists. Do not add refrigerant, as this may result in overcharging the circuit. Use only refrigerants specified on the unit nameplate (R410A) and Trane OIL0057E or OIL0058E. Failure to do so may cause compressor damage and improper unit operation.

CAUTION Equipment Damage!

Ensure that the oil sump heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.

Unit Start-Up Procedures

Start-up

CAUTION Equipment Damage!

Ensure that the oil sump heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage. If the pre-start checkout, has been completed, the unit is ready to start.

1. Press the STOP key on the CH530.
2. As necessary, adjust the setpoint values in the CH530 menus using TechView.
3. Close the fused-disconnect switch for the chilled water pump. Energize the pump(s) to start water circulation.
4. Press the AUTO key. If the chiller control calls for cooling and all safety interlocks are closed, the unit will start. The compressor(s) will load and unload in response to the leaving chilled water temperature.
5. Verify that the chilled water pump runs for at least one minute after the chiller is commanded to stop (for normal chilled water systems).

Note: Once the system has been operating for approximately 30 minutes and has become stabilized, complete the remaining start-up procedures, as follows:

6. Check the evaporator refrigerant pressure and the condenser refrigerant pressure under Refrigerant Report on the CH530 TechView. The pressures are referenced to sea level.
7. Check the EXV sight glasses after sufficient time has elapsed to stabilize the chiller. The refrigerant flow past the sight glasses should be clear. Bubbles in the refrigerant indicate either low refrigerant charge or excessive pressure drop in the liquid line or a stuck open expansion valve. A restriction in the line can sometimes be identified by a noticeable temperature differential between the two sides of the restriction. Frost will often form on the line at this point. Proper refrigerant charges are shown in the General Data tables.

Note: Important!

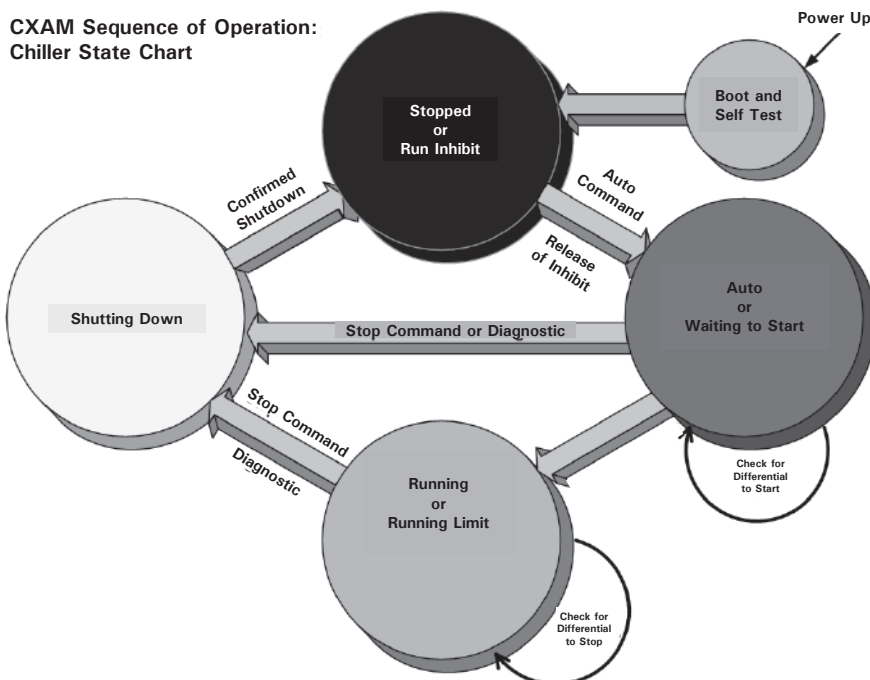
A clear sight glass alone does not mean that the system is properly charged. Also check system subcooling, liquid level control and unit operating pressures.

8. Measure the system subcooling.
9. A shortage of refrigerant is indicated if operating pressures are low and subcooling is also low. If the operating pressures, sight glass, superheat and subcooling readings indicate a refrigerant shortage, gas-charge refrigerant into each circuit, as required. With the unit running, add refrigerant vapor by connecting the charging line to the suction service valve and charging through the backseat port until operating conditions become normal.

Print out a Chiller Service Report from TechView to file a start-up claim and to keep for reference with the chiller.

Figure 36 - Chiller State Chart

CXAM Sequence of Operation:
Chiller State Chart



Unit Start-Up Procedures

Seasonal start-up

- Check water flows and interlocks.
- Check Ethylene glycol % in the chilled water circuit if glycol presence is required
- Check operational setpoints and performance.
- Check operation of all safety devices.
- Inspect contacts and tighten terminals.
- Megger the motor compressor windings.
- Record operating pressures, temperatures, amperages and voltage.
- Carry out leak test.
- Check configuration of unit control module.
- Change the oil as required based upon results of the oil analysis made during seasonal shutdown

CAUTION Equipment Damage!

Ensure that the oil sump heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.

Limit Conditions

CH530 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 below.

Get the 8 condition measurements at the same time, on each circuit.

- HP
- LP
- Suction temperature
- Discharge temperature
- Liquid temperature
- Water entering temperature
- Water leaving temperature
- Outdoor ambient temperature

Then calculate the sub-cooling and superheat. No diagnosis can be accurate with one of these records missing.

- Check operation of machines/ compare conditions of operation against original commissioning data.
- Fill out the visit log sheet and review with the operator

Table 16 - Limit conditions

Running - Limited	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.
Capacity Limited by High Cond Press	The circuit is experiencing condenser pressures at or near the condenser limit setting. The compressor will be unloaded to prevent exceeding the limits.
Capacity Limited by Low Evap Rfgt Temp	The circuit is experiencing saturated evaporator temperatures at or near the Low Refrigerant Temperature Cutout setting. The compressors will be unloaded to prevent tripping.

Unit Shut-Down Procedures

Normal Shutdown to Stopped

The Normal Shutdown diagram shows the Transition from Running through a Normal (friendly) Shutdown. The Dashed lines on the top attempt to show the final mode if you enter the stop via various inputs.

Seasonal Unit Shutdown

1. Carry out leak test
2. Carry out oil analysis
3. Record operating pressures
4. Check operation of machines and compare conditions of operation against original commissioning data.
5. Perform the normal unit stop sequence using the <Stop> key.

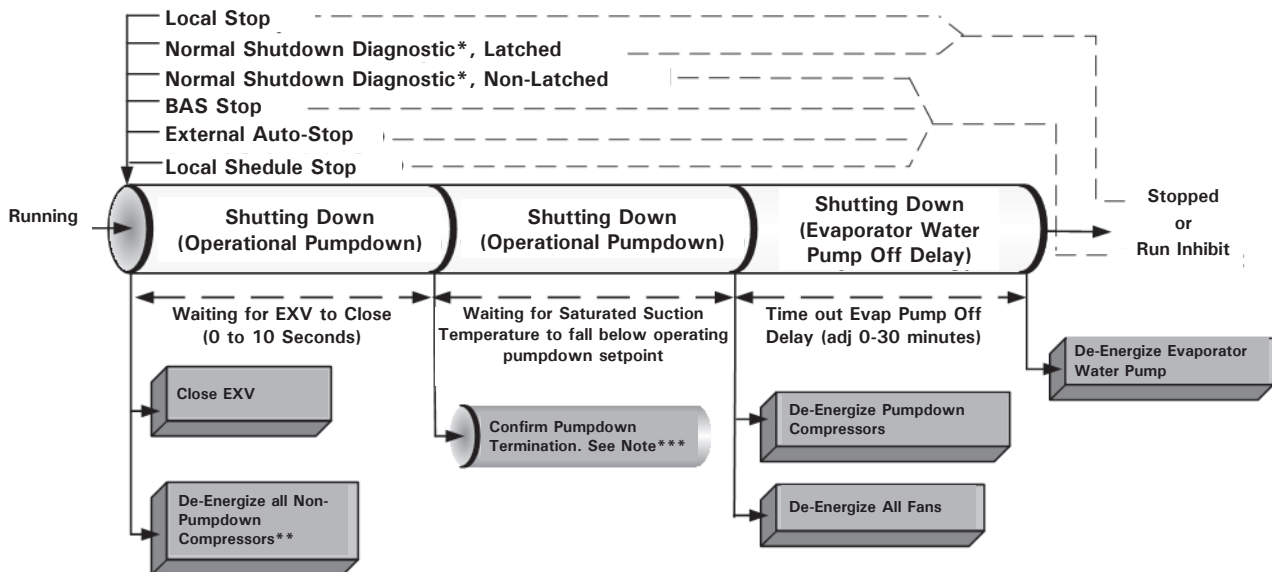
Note: Do not open the starter disconnect switch. This must remain closed to provide control power from the control power transformer to the oil heaters.

Ensure that all safeties are taken to prevent frost damages during negative ambient temperatures.

- Fill out the visit log sheet and review with the operator.
- Do not put the general disconnect switch to off, except if the unit is drained. Trane does not recommend draining the unit, due to the fact that it increases tube corrosion.

Figure 37 - Normal shutdown

CXAM Sequence of Operation Normal Shutdown to Stopped or Run Inhibit



* Normal Shutdown Diagnostic:
 - Chiller Level Diagnostic
 - Circuit Level Diagnostic on only running circuit
 - Compressor Level Diagnostic on only running compressor

** Pumpdown Compressor is:
 - One compressor on each circuit running during Operational Pumpdown

*** If normal pumpdown termination does not occur within the Pumpdown Timeout

Maintenance

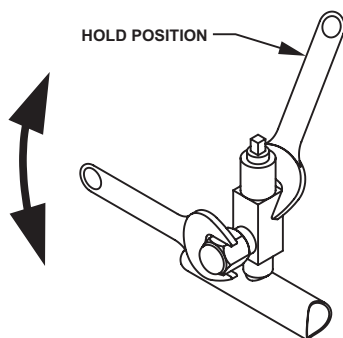
General

Perform all maintenance procedures and inspection at the recommended intervals. This will prolong the life of the chiller and minimize the possibility of malfunctions.

Use an "Operator's Log" to record the unit's operating history. The log serves as a valuable diagnostic tool for service personnel. By observing trends in operating conditions, an operator can anticipate and prevent problem situations before they occur. If the unit is not operating properly during maintenance inspections, consult the "Diagnostic and Troubleshooting" section of this manual.

Proper servicing of the service valves is required. Use a backup wrench as shown in Figure 38 when loosening or tightening the service valve cap.

Figure 38 - Servicing of service valves



Weekly Maintenance

After the chiller has been operating for approximately 30 minutes and the system has stabilized, check the operating pressures and temperatures and complete the following checks:

Check the evaporator and condenser refrigerant pressures in the Refrigerant Report menu of the CH530 display.

Pressures are referenced at sea level.

Check the electronic expansion valve sight glasses. (Note: The electronic expansion valve is commanded closed at unit shutdown and if the unit is off, there will be no refrigerant flow through the sight glasses. Only when a circuit is running will refrigerant flow be present.) The refrigerant flow through the sight glasses should be clear. Bubbles in the refrigerant indicate either low refrigerant charge or excessive pressure drop in the liquid line. A restriction in the line can sometimes be identified by a noticeable temperature differential between the two sides of the restriction. Frost may often form on the liquid line at this point. Correct refrigerant charges are shown in the General Data tables.

NOTICE: A clear sight glass alone does not mean that the system is properly charged. Also check the system superheat, subcooling and unit operating pressures.

NOTICE: Use only manifold gauge sets designed for use with R410A refrigerant.

Use only recovery units and cylinders designed for the higher pressure of R410A refrigerant and POE oil.

NOTICE: R410A must be charged in a liquid state.

Check the system superheat, subcooling, evaporator temperature drop (Delta-T), evaporator water flow, evaporator approach temperature, compressor discharge superheat, and compressor RLA.

Normal operating conditions at ISO conditions are:

Evaporator pressure: 8 bars

Evaporator Approach: 3-5°C

Evaporator Superheat: 6-7°C

Note: If the superheat is unstable, check the suction temperature sensor. The suction temperature sensor should be well inserted into the well and thermal grease should be used to ensure a good contact between the sensor and the well.

Electronic Expansion Valve: 30-50 percent open

Evaporator Temperature Temperature Drop (Delta-T): 5°C

Condensing Pressure: 28-32 bars

Condensing Approach Temperature: 14-18°C

System Subcooling: 8-12°C

If operating pressures and sight glass conditions seem to indicate a refrigerant shortage, measure the system superheat and subcooling. Refer to "System Superheat" and "System Subcooling."

If operating conditions indicate a refrigerant overcharge, remove refrigerant at the liquid line service valve. Allow refrigerant to escape slowly to minimize oil loss. Use a refrigerant recovery cylinder and do not discharge refrigerant into the atmosphere.

WARNING!

Do not allow refrigerant to directly contact skin as injury from frostbite may result.

Inspect the entire system for unusual conditions and inspect the condenser coils for dirt and debris. If the coils are dirty, refer to "Coil Cleaning" in this manual.

Maintenance

Monthly Maintenance

Complete all weekly maintenance procedures.

Measure and record the evaporator superheat. Refer to “Evaporator Superheat.”

Measure and record the system subcooling. Refer to “System Subcooling.”

Check coil cleanliness and clean them if required.

Manually rotate the condenser fans to ensure that there is proper clearance on the fan shroud openings.

Check water pump (option):
Manually rotate the pump. Remove plastic plug located at the bottom of the motor frame to drain any condensation which can occur in the motor.

Check and clean air filter of the control panel (option)

In case of Twin-pump, make sure there is no pump motor fault.

Note: pump operation will be alternated at each new request of water flow or when a pump fault is detected.

WARNING! Position all electrical disconnects in the “OPEN” position and lock them to prevent injury or death due to electrical shock or moving parts.

When electrical panels are ventilated, you need to change the fan filter

Annual Maintenance

Complete all weekly and monthly maintenance checks.

Check the oil level and refrigerant charge. Routine changing of oil is not required.

Have a qualified laboratory perform a compressor oil analysis to determine system moisture content and acid level.

This analysis is a valuable diagnostic tool. Trane laboratory is specifically dedicated to oil analysis for Trane equipment.

Contact a qualified service provider to leak test the chiller, check operating and safety controls, and to inspect electrical components for proper operation. Leak testing may be accomplished using soap solution or with electronic or ultrasonic leak detectors. Inspect all piping components for leaks and damage.

Clean all water strainers.

NOTICE: If the CXAM chiller evaporator is drained of water, the freeze protection heater must be de-energized. Failure to de-energize the heater might cause it to burn out.

Clean and repaint any components that show corrosion. Clean the condenser coils. Refer to “Condenser coil Cleaning” in this manual.

WARNING!

Position all electrical disconnects in the “OPEN” position and lock them to prevent injury or death due to electrical shock or moving parts.

Clean the condenser fans. Check the fan assemblies for proper clearance in the fan shroud openings and for motor shaft misalignment or abnormal end-play, vibration and noise.

Compressor Service Information

Compressor Electrical Connections

It is very important that CSHD compressors used in Trane Model CXAM chillers are wired correctly for proper rotation. These compressors will not tolerate reverse rotation. Verify correct rotation/phasing using a rotation meter.

Proper phasing is clockwise, A-B-C. If wired incorrectly a CSHD compressor will make excessive noise, will not pump and will draw about half the normal current. It will also become very hot if allowed to run for an extended period.

NOTICE: Do not “bump” the compressor to check rotation as incorrect rotation could cause compressor motor failure in as little as 4 to 5 seconds!

Correct rotation of CSHN compressors is also clockwise, with A-B-C phasing. Improper rotation of the CSHN compressors is indicated by a compressor module trip, noisy operation, no pressure difference on manifold gauges and low amp draw.

Oil Level

To check compressor oil level, refer to the label near the compressor sight glass. The compressor(s) must be off. Wait three minutes. With tandem or triple compressors the oil level will equalize after shutdown. Compressor oil level should be no lower than the bottom of the sight glass and no more than a full sight glass. When operating, each compressor in a tandem or trio set may have a different oil level. The oil level may not be in the sight glass, but it must be visible through the sight glass.

Oil Fill, Removal and Capacity

The Model CSHN compressors have an oil charging valve with a dip tube that goes to the bottom of the compressor. This can be used to add or remove oil from the compressor.

Model CSHD compressors have a Schrader valve in the middle of the compressor which is used to add oil. To remove oil from these compressors, the system refrigerant charge must be removed and then the oil can be removed using a suction style hand pump and tube in the oil equalizer tube fitting. Oil can also be added to these compressors through the oil equalizer tube fitting. Care must be taken to prevent moisture from entering the systems when adding oil. Note that the POE oil used in this product is very hygroscopic and easily absorbs and retains moisture. Moisture is very difficult to remove from oil using vacuum. Also note that once the seal on a container of POE oil is opened, the oil must be used.

Compressor Capacity

CSHD 120, 161 — 3.3 l

CSHN 184, 250, 315 — 6.7 l

CSHN 374 — 7.2 l

Use only Trane OIL0057 (3.8 l) or OIL00058E (18.9 l). These are the same oil but different container size. Do not use any other POE oil.

NOTE: Never reuse oil.

Oil Testing

We recommend performing a complete oil analysis at least once a year with the Trane laboratory specifically dedicated to oil analysis for Trane equipment. It provides an in-depth view of both compressor and refrigerant circuit conditions including presence of water, wear particles, viscosity, acidity or dielectric data. If unacceptable wear conditions develop, a change in the characteristics of the oil will be evident. Minor problems can be detected and repaired before they become major problems.

Single circuit units: order reference ANL0008E

Dual circuit units: order reference ANL0006E

Compressor Service Information

Oil Equalizer Line

CSHN Compressors

The oil equalizer line is equipped with a Rotolock fitting for easy removal. Torque value for tightening these fitting is 120 N.m Drain the oil to a level below the oil equalizer tube fitting before removing the oil equalizer line. This must be done on both compressors. Use the oil drain valve on the compressor. If the oil is drained below the level of the oil level sight glass, it will be below the oil equalizer line level. Pressurize the low side of the compressor using nitrogen to help drain the oil. No more than 70 kPa of pressure will be needed.

CSHD Compressors

CSHD compressors do not have an oil drain valve. Therefore, before removing the oil equalizer line, the system refrigerant charge must be recovered before draining the oil. Use a catch pan to catch the oil when the compressor oil equalizer line is loosened to ensure that oil does not spill out of the compressor when the equalizer line is removed. The torque value for the Rotolock fitting on CSHD compressors is 90 N.m

Tandem and Triple Compressor Suction Restrictors

Since most tandem and triple compressor sets use unequal size compressors, these combinations require the use of a restrictor in the suction line of one or more compressors in order to provide correct oil level balance between compressors when they are operating.

Compressor Replacement

If the CXAM chiller suffers a failed compressor, use these steps for replacement:

Each compressor has lifting eyes. Both lifting eyes must be used to lift the failed compressor. **DO NOT LIFT A COMPRESSOR USING A SINGLE LIFTING EYE.** Use proper lifting techniques, a spreader bar and rigging as for lifting both compressors simultaneously.

Compressor weights by compressor model are:

- CSHD 120 – 69 kg.
- CSHD 161 – 69 kg.
- CSHN 184 – 106 kg.
- CSHN 250 – 108 kg.
- CSHN 315 – 153 kg.
- CSHN 374 – 164 kg.

After a mechanical failure of a compressor, it is necessary to change the oil in the remaining compressor and also replace the liquid line filter drier. After an electrical failure of a compressor, it will also be necessary to change the oil in the remaining compressor, replace the filters driers and add a suction filter drier with clean-up cores.

Make sure that a heater and a thermostat are correctly installed on top of the compressor. The heater helps prevent dry starts. The thermostat is used to control the compressor bearing temperature.

Note: Do not alter the refrigerant piping in any way as this can affect compressor lubrication.

Note: Do not add a suction filter drier within 250mm of the elbow for CSHD compressors, or within 400mm of the elbow for CSHN compressors.

Refrigerant System Open Time

Model CXAM chillers use POE oil and therefore refrigerant system open time must be kept to a minimum. The following procedure is recommended:

Leave a new compressor sealed until it is ready to be installed in the unit. Maximum system open time is dependent upon ambient conditions, but do not exceed one hour open time.

Plug the open refrigerant line to minimize moisture absorption. Always change the liquid line filter drier.

Evacuate the system to 500 microns or below.

Do not leave POE oil containers open to the atmosphere. Always keep them sealed.

Mechanical Compressor Failure

Replace the failed compressor(s) and change the oil in the remaining compressor(s) along with the refrigerant system liquid line filter drier.

Compressor Service Information

Electrical Compressor Failure

Replace the failed compressor and change the oil in the other compressor(s). Also add a suction filter with cleanup cores and change the liquid line filter drier. Change filters and oil until the oil no longer test acidic. See "Oil Testing."

Compressor Motor Megging

Motor megging determines the electrical integrity of the compressor motor winding insulation. Use a 500 volt megger. A less than 1 meg-ohm reading is acceptable and 1000 ohms per nameplate volts is required to safely start the compressor.

Compressor Current Imbalance

Normal current imbalance could be 4 to 15 percent with balanced voltage due to motor design. Each phase should register .3 to 1.0 ohms and each phase should be within 7 percent of the other two phases. Phase to ground resistance must be infinity.

NOTICE: Maximum allowable voltage imbalance is 2 percent.

Refrigerant Piping

The compressor suction and discharge connections and piping are copper clad steel for easy brazing. In most instances, piping may be reused. If piping is not reusable, order the correct service parts. Cut all tubing with a tubing cutter to prevent copper filings from entering the system. Cut the tubing in a straight length of pipe after the compressor connection has been unsweated. The line can then be reinstalled using a slip coupling and brazing.

NOTICE: The compressor suction line configuration must not be changed in any way. Changing compressor suction line configuration will compromise proper oil return to the compressor(s).

Compressor Electrical Terminal Box

Be sure to protect the terminal box when unbrazing or brazing compressor refrigerant piping connections

Compressor Crankcase Heaters

Compressor crankcase heaters must be energized at least eight hours before starting the CXAM chiller. This is required to boil refrigerant out of the oil before startup. Ambient temperature is not a factor and the crankcase heaters must always be energized prior to startup.

Condenser Maintenance

Condenser Coil Cleaning

Clean the condenser coils at least once a year or more frequently if the unit is in a "dirty" environment. A clean condenser coil will help to maintain chiller operating efficiency. Follow the detergent manufacturer's instructions to avoid damaging the condenser coils.

Black epoxy coil protection (option)

It is recommended to clean the coils at unit start-up and regularly to obtain optimum protection and life span of the condenser coils.

To clean the condenser coils use a soft brush and a sprayer such as a garden pump type or a high-pressure type. A high quality detergent such as Trane Coil Cleaner is recommended.

Note: If detergent mixture is strongly alkaline (pH value greater than 8.5), an inhibitor must be added.

Compressor Service Information

Evaporator Maintenance

The Trane Model CXAM liquid chiller uses a brazed plate heat exchanger (BPHE) evaporator with factory-installed electronic flow switch that is positioned in the evaporator water pipe. The evaporator inlet also includes an optional water strainer that must be kept in place to keep debris out of the evaporator.

Note: *Strainer maintenance is critical to proper operation and reliability. Any particles larger than 1.6 mm entering the BPHE evaporator may cause the evaporator to fail, requiring replacement.*

Acceptable BPHE evaporator water flow rate is 1.4 to 4.2 l/min per nominal unit kW capacity. To maintain 12-7°C in/out chilled water temperatures, the nominal water flow rate is 2.8 l/min per cooling kW.

Minimum water flow rate must be maintained to avoid laminar flow, potential evaporator freezing, scaling and poor temperature control.

Maximum water flow is 6 m/s. Flow rates greater than this will cause excessive erosion.

The BPHE evaporator is difficult to clean should it become plugged with debris. Indications of a plugged BPHE evaporator include "wet" suction due to lack of heat exchange, loss of superheat control, discharge superheat less than 35°C, compressor oil dilution and/or starvation and premature compressor failure.

Evaporator replacement

If the CXAM evaporator requires replacement, it is very important that the new evaporator be replaced correctly and with the correct refrigerant and water piping connections. The refrigerant inlet/liquid connection is at the bottom of the evaporator and the refrigerant outlet/suction connection is at the top of the evaporator and both are on the same side. Pay particular attention to evaporators with dual circuits. Avoid cross-circuiting when installing the new evaporator.

Water pump maintenance

CAUTION! The lifting eyebolts of the motor are suitable for the weight of the motor. It is not allowed to carry the complete pump on the lifting eyebolts of the motor

The motor bearing does not require any maintenance. Increasing bearing noise and undue vibration indicate a worn bearing. The bearing or the complete motor then needs replacing.

The mechanical seal does not require any special maintenance. Visual leakage check are however required. Distinctly visible leakage will require an exchange of the seal.

Follow instruction included in the seal kit.

Notes



Notes

Notes



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Date 0111

New

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice. Only qualified technicians should perform the installation and servicing of equipment referred to in this publication.

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