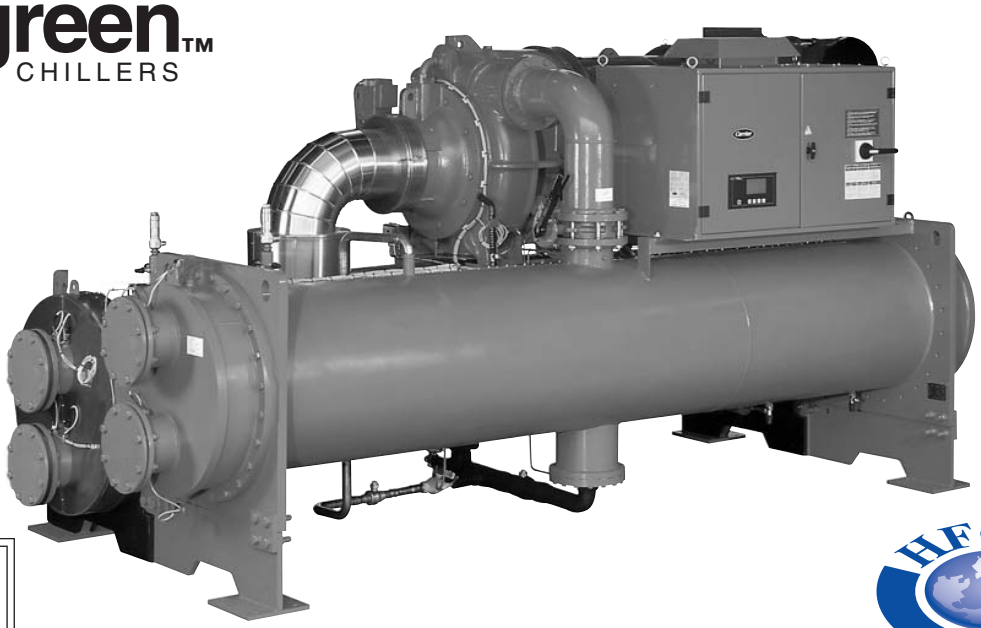
Carrier

High-Efficiency Hermetic Centrifugal Liquid Chillers

Evergreen™ CHILLERS



Quality Management System Approval

19XR

Nominal cooling capacity 1000-5300 kW

Carrier's Evergreen centrifugal chillers provide exceptional value by achieving energy efficiency levels as high as 6.8 (COP) utilizing proven technology designed specifically for chlorine-free refrigerant:

- Unique concept of the hermetic compressor:
  - Single-stage aerodynamic impeller
  - Tunnel diffusers, based on aircraft engine technology
  - Motor cooled by refrigerant gas injection
- Use of high-efficiency evaporator and condenser tubes
- Expansion sub-cooler integrated into the condenser
- Patented float valve technology for optimised sub-cooling and refrigerant level in the evaporator

These advantages, together with the modularity of the units and their efficiency, economical operation and dimensional constraints allow the use of the Carrier Evergreen centrifugal chillers in any high-capacity water cooling applications.

Features

- **Environmentally-preferred HFC-134a refrigerant**
  The Evergreen chillers use chlorine-free HFC-134a refrigerant with zero ozone-depletion potential, the refrigerant of choice for automotive and appliance manufacturers.

- **Mix-match capabilities**
  The chillers provide a complete line of compressors and heat exchangers, ensuring the optimal combination of machine components regardless of capacity, lift, and efficiency specifications.

- **Heat exchangers feature:**
  European pressure vessel code certified construction, ensuring maximum heat exchanger safety, reliability and long life.

- **Single-stage hermetic compressor**
  This design:
  - increases product reliability by eliminating the additional moving parts associated with multiple stage machines, such as additional guide vanes and complex economizers.
  - eliminates refrigerant leaks from the compressor/motor transmission joints in open-drive compressors

- **Aerodynamically-contoured impellers**
  Impellers that utilize high back sweep main blades with low-profile intermediate splitter blades are aerodynamically contoured to improve compressor full-load and part-load operating efficiency.

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Easy installation

■ **Modular construction**
The cooler, condenser, and compressor assemblies are completely bolted together, making the Evergreen chillers ideally suited for replacement projects where ease of disassembly and reassembly at the jobsite are essential.

■ **Water piping**
The unit has quick and easy piping: the standard unit includes nozzle-in head water boxes with Victaulic grooves to allow for use of Victaulic couplings. Flanges are available as an option.

■ **Optional unit-mounted starter**
Carrier's unit-mounted starter is available as a low-voltage version and provides a single point power connection, reducing machine installation time and expense.

■ **Quick start-up**
Quick start-up is assured once installation is complete, as each 19XR unit is manufactured at an ISO 9001 listed manufacturing facility to guarantee quality. All units are factory-tested to allow easy and reliable start-up at job site. Compressors are run-tested to ensure proper operation of all compressor systems, including oil management, vibration, electrical, power transmission, and compression.

Power supply and controls

1-Electrical cabinets:

■ Serviceability and convenience have been "designed-in", for example:
- Control transformer is fitted as standard
- Single-point mains power connection if unit-mounted starter is supplied
- All components are mounted using connectors to facilitate fast servicing and replacement
- Components are labelled and numbered according to wiring diagrams
- IP 23C protection on the whole unit

2 - Microprocessor controls features:

■ **Numerical product-integrated control (PIC II)**
The Carrier numerical control integrated into the second-generation products (PIC II Product Integrated Controls) provides unmatched flexibility and functionality. Each unit integrates directly with the Carrier Comfort Network (CCN), providing a system solution to controls applications.

■ **Human Interface (CVC)**
The CVC (Cooler Visual Control) interface, which can be configured to display units in Imperial or metric, provides unparalleled ease of operation. A 16-line by 40-character LCD (Liquid Crystal Display) features 4 menu-specific soft keys. Default display offers easy, quick review of key chiller operation data, simplifying the interaction between machine and user.
Local languages are available upon request.

■ **Chilled water reset**
Reset can be accomplished manually or automatically from the building management system. Reset saves energy when warmer chilled water can be utilized.

- **Demand limiting**
  This feature limits the power draw of the chiller during peak loading conditions. When incorporated into the Carrier Comfort Network building automation system, a red line command will hold chillers at their present capacity and prevent any other chillers from starting. If a load shed signal is received, the compressors are unloaded to avoid high demand charges whenever possible.

- **Ramp loading**
  Ramp loading ensures a smooth pulldown of water loop temperature and prevents a rapid increase in compressor power consumption during the pulldown period.

- **Automated controls test**
  The test can be easily executed prior to start-up to verify that the entire control system is functioning properly.

- **365-day real time clock**
  This feature allows for the operator to programme a yearly schedule for each week, weekends, and holidays.

- **Occupancy schedules**
  Schedules can be programmed into the controller to ensure that the chiller only operates when cooling is required.

- **Extensive service menu**
  Unauthorized access to the service menu can be password-protected. Built-in diagnostic capabilities assist in trouble-shooting and recommend proper corrective action for preset alarms, resulting in less down time.

- **Battery backup**
  Battery backup provides protection during power failures and eliminates time consuming control reconfiguration. Encapsulated circuit boards are designed, built and tested in-house. Each board meets Carrier's stringent quality standards for superior reliability compared to open board designs.

- **Other control features include:**
  Display of over 125 operating, status, and diagnostic messages for improved user interface
  - Monitoring of over 100 functions and conditions to protect the chiller from abnormal conditions
  - Modular pull-out/plug-in design, reducing wiring requirements and providing easy installation
  - Low-voltage (24 V ac) design, providing the ultimate assurance of personal safety and control integrity.

- **Microprocessor-controlled oil heater**
  The heater prevents excessive absorption of refrigerant into the oil during compressor shutdown, ensuring a plentiful supply of undiluted lubrication oil in the oil sump.

- **Safeties**
  Unit is automatically shut down when any of the following conditions occur: (each of these protective limits shall require manual reset and cause an alarm message display on the LCD screen, informing the operator of the shutdown cause.)
  - Motor overcurrent
  - Over voltage*
  - Under voltage*
  - Single cycle dropout*
  - Bearing oil high temperature
  - Low evaporator refrigerant temperature
  - High condenser pressure
  - High motor temperature
  - High compressor discharge temperature
  - Low oil pressure
  - Prolonged surge
  - Loss of cooler water flow
  - Loss of condenser water flow
  - Starter fault

* Do not require manual reset or cause an alarm if auto-restart after power failure is enabled.

- **Alarm file**
  This file maintains the last 25 time- and date-stamped alarm and alter messages in memory; this function reduces troubleshooting time and cost.

- **Overrides**
  The control system detects conditions which approach protective limits and takes self-corrective action prior to an alarm occurring.
  The system automatically reduces chiller capacity when any of the following parameters are outside their normal operating range:
  - High condenser pressure
  - High motor temperature
  - Low evaporator refrigerant temperature
  - High motor current

  During the capacity override period, a pre-alarm (alert) message is displayed, informing the operator which condition is causing the capacity override. Once the condition is again within acceptable limits, the override condition is terminated and the chiller reverts to normal chiller water control. During either condition, if the protective limit is reached, the chiller shuts down and a message is displayed informing the operator which condition has caused the shut down and alarm. This function increases unit life.

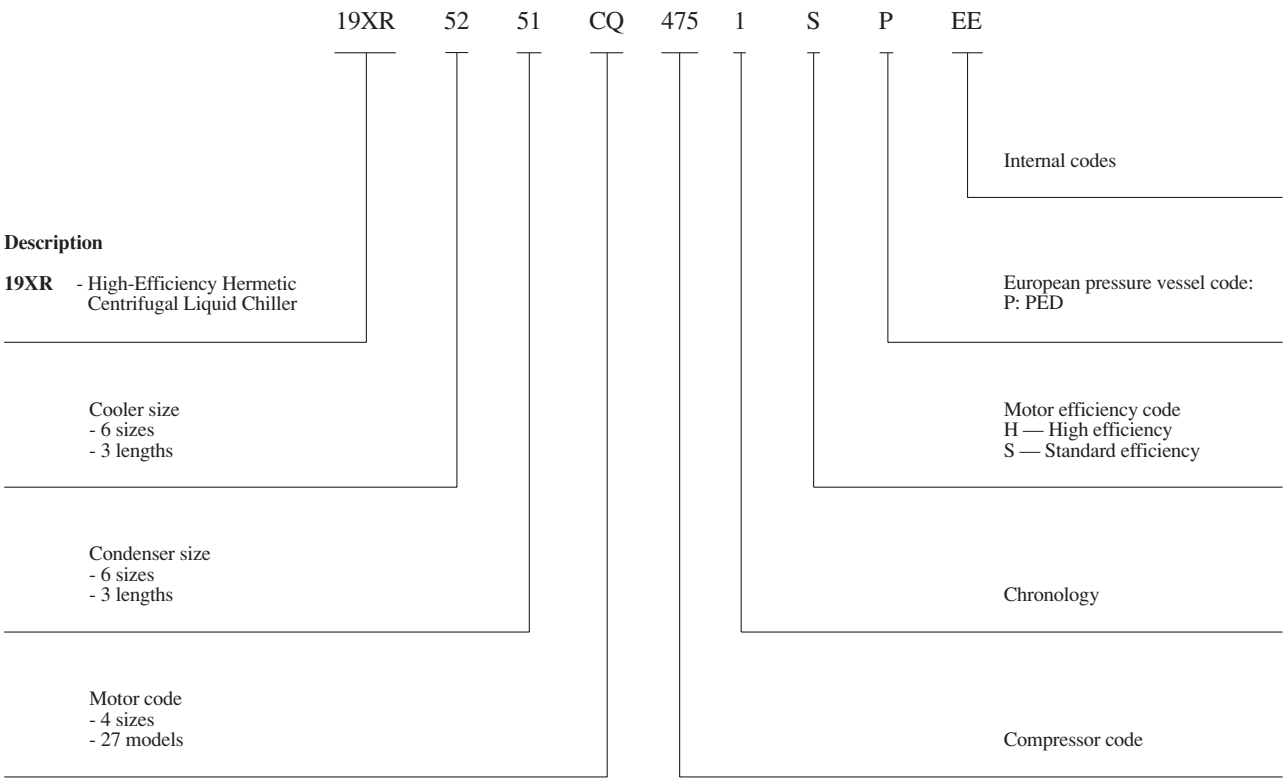
Variable inlet guide vanes

- Capacity control is by means of variable inlet guide vanes located at the impeller inlet. Load modulation is from 100% to 15% of compressor full load under nominal ARI conditions without the use of hot gas bypass. The guide vanes are precisely positioned by a PID (proportional-integral-derivative) control algorithm to ensure precise control of desired chilled water temperature without hunting or overshooting the set point.

Simple to service

- Mechanically cleanable cooler and condenser.
- The machine concept allows the refrigerant to be stored inside the chiller during servicing, reducing refrigerant loss and eliminating time-consuming transfer procedures. As a self-contained unit, the Evergreen chillers can be applied to applications that incorporate more than one type of refrigerant without the costly penalty of requiring additional remote storage systems.
- Easy-access suction and discharge pressure and temperature information using enhanced display module.

Model number nomenclature



Options and accessories

ITEM	Option *	Accessory **
Marine codes (L.R.-B.V.-A.B.S.-G.L.-D.N.V.-R.I.N.A. – see legend)	Special	
Shipped factory charged with refrigerant	X	
One, two or three-pass cooler or condenser water-side construction	X	
Hot gas bypass	X	
Protective aluminium insulation on the evaporator and compressor motor insulation	X	
Nozzle-in-head waterbox (2068 kPa)	X	
Marine waterboxes (1034 kPa or 2068 kPa)***	X	
CCN/JBus Interface (BMS application)	X	
Cupronickel pipes for condenser (1034 kPa) with cupronickel tube sheets, division plate, nozzles and couplings***	Special	
Flanged cooler and condenser waterbox nozzles****	X	
IP 44C (unit)	X	
Unit-mounted low-voltage electronic starters	X	
Export crating	X	
Customer factory performance testing (depending on unit size)	X	
Mounted pumpout unit	X	
Delivery in four sections	X	
Stand-alone pumpout unit		X
Separate storage tank and pumpout unit		X
Soleplate package		X
Spring isolator kit		X

* Factory installed.
** Field Installed.
*** Optional marine waterboxes. Standard waterboxes are nozzle-in-head type (1034 kPa).
**** Standard waterbox nozzles are victaulic type. Flanged nozzles are available as an option with either nozzle-in-head type waterboxes or marine waterboxes.

L.R. Lloyd's Register
B.V. Bureau Veritas
A.B.S. American Bureau of Shipping
G.L. Germanischer Llloyd
D.N.V. Det Norsk Veritas
R.I.N.A. Registro Italiano Navale

Starter features and options

ITEM	Electronic starter
IP 44D	S
Carrier starter management module (I.S.M.)	S
Branch oil pump circuit breaker	S
Controls/oil heater transformer with branch circuit breaker	S
Microprocessor based overload trip protection	S
High interrupt oil pump/heater circuit breaker	S
High interrupt capacity main circuit breaker (40 kA)	S
Phase loss/reversal imbalance protection*	S
Ground fault protection	O
Three phase digital ammeter*	S
Three phase voltmeter*	S
Three phase over/under voltage protection*	S
Digital watt meter*	S
Digital power factor meter*	S

LEGEND
S - Standard
O - Optional

* Values shown on the display (CVC) and measured with unit current transformers and power supply.

Physical data

Nominal capacity kW	Heat exchanger size	Dimensions, mm				Average operating weight, kg
		Length * Standard	Length * Extended	Width	Height	
19XR	3	4172	4693	1670	2073	8000
1000-5300	4	4242	4763	1880	2153	10204
	5	4370	4769	1994	2207	12698
	6	4261	4782	2096	2257	15420
	7	4978	5588	2426	2985	17765
	8	5118	5607	2711	3029	25712

* Two-pass heat exchangers with nozzles on the same end

Maximum outside temperatures

- For transport and storage of the 19XR units the minimum and maximum allowable temperatures are –20°C and +48°C.

Unit operating range

Evaporator		Minimum	Maximum
Evaporator entering water temperature*	°C	7	29
Evaporator leaving water temperature*	°C	3.3	12
Condenser (water-cooled)		**Minimum**	**Maximum**
Condenser entering water temperature*	°C	10	35
Condenser leaving water temperature*	°C	29	46

* The operating range of the selected unit must always be verified at full load and part load by the selection programme for the chosen configuration. The values from the selection programme apply. Applications at temperatures below zero at the evaporator are possible, depending on the temperatures at the condenser.
Unit selections are obtained from the Carrier sales force.

General electrical data

Standard voltages:

50 Hz

Volt	For use on supply voltages
230	220 to 240 V systems
346	320 to 360 V systems
400	380 to 415 V systems
3000	2900 to 3100 V systems
3300	3200 to 3400 V systems
6300	6000 to 6600 V systems

Notes:
Motor nameplates can be stamped for any voltage within the listed supply/ voltage range. Chillers shall not be selected at voltages above or below the listed supply voltage range.

Auxiliary ratings (3 Phase, 50 Hz)

Item	Average kW	Design centre voltage V-Ph-Hz	Min./max. motor voltage V	Inrush kVA	Sealed kVA
Oil pump	1.50	230-3-50	220/240	11.15	1.93
	1.50	393-3-50	346/440	8.30	1.76

IkW = Compressor motor power input (kW)
RLA = (rated load amperes) = Sealed kVA x 1000/√3 x volts
LRA = (locked rotor amperes) = Inrush kVA x 1000/√3 x volts

Auxiliary ratings (115/230 V, 1 phase, 50 Hz)

Item	Voltage	Sealed kVA	Average W
Controls	24 V a.c.	0.16	160
Oil sump heater	115/1/50	—	1800

Notes:
1. Oil sump heater only operates when the compressor is off.
2. Power to oil heater/controls must be on circuits that can provide continuous service when the compressor is disconnected.

Notes:
- 19XR units have a single power connection point.
- The control box includes the following standard features:
  - Starter and compressor motor protection devices, or
  - protection and control elements only

- Field connections:
  All connections to the system and the electrical installations must be in full accordance with all applicable codes.
- The Carrier 19XR units are designed and built to ensure conformance with local codes. The recommendations of European standard EN 60204-1 (corresponds to IEC 60201-1) (machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment.

Notes:
- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60204-1 is the best means of ensuring compliance with the Machines Directive and § 1.5.1.
- Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.

1. The operating environment for the 19XR units is specified below:
   Environment* - Environment as classified in IEC 60364 § 3:
   - ambient temperature range: +5°C to +40°C, class AA4*
   - humidity range (non-condensing)*:
     50% relative humidity at 40°C
     90% relative humidity at 20°C
   - altitude: ≤ 2000 m
   - indoor installation
   - presence of water: class AD2* (possibility of water droplets)
   - presence of hard solids, class AE2* (no significant dust present)
   - presence of corrosive and polluting substances, class AF1 (negligible)
   - vibration and shock, class AG2, AH2
   Competence of personnel, class BA4* (trained personnel - IEC 60364)
2. Power supply frequency variation: ± 2 Hz.
3. The neutral (N) conductor must not be connected directly to the unit (if necessary use a transformer).
4. Overcurrent protection of the power supply conductors is not provided with the unit.
5. The factory-installed disconnect switch(es)/circuit breaker(s) is (are) disconnect devices of a type suitable for power interruption in accordance with EN 60947-3 (corresponds to IEC 60947-3).
6. The units are designed for connection to TN networks (IEC 60364). For IT networks the earth connection must not be at the network earth. Provide a local earth, consult competent local organisations to complete the electrical installation.

Note:
If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.

* The protection level required to conform to this class is IP21B (according to reference document IEC 60529). All 19XR units are protected to IP23C and fulfil this protection condition.

Electrical characteristics of the motors

50 Hz - Standard efficiency motors

Size B

Low voltage

Motor size	Motor electrical data	Max. lkW	Low voltage 230 V	346 V	400 V
BDS	RLA per lkW	100	2.85	1.87	1.62
	LRA Star		546	339	300
	LRA Delta		1763	1093	966
BES	RLA per lkW	135	2.80	1.86	1.61
	LRA Star		655	438	372
	LRA Delta		2114	1414	1200
BFS	RLA per lkW	170	2.78	1.85	1.60
	LRA Star		801	534	475
	LRA Delta		2585	1723	1533
BGS	RLA per lkW	204	2.79	1.84	1.59
	LRA Star		1033	615	532
	LRA Delta		3333	1983	1715
BHS	RLA per lkW	247	2.72	1.81	1.56
	LRA Star		1192	784	627
	LRA Delta		4133	2729	2191

50 Hz - Standard efficiency motors

Size C

Low and medium voltage

Motor size	Motor electrical data	Max. lkW	Low voltage 230 V	346 V	400 V	Medium voltage 3000 V	3300 V
CDS	RLA per lkW	199	2.92	1.95	1.63	0.22	0.20
	LRA Star		1432	959	653	-	-
	LRA Delta		4495	3008	2055	194	194
CES	RLA per lkW	219	2.86	1.86	1.62	0.22	0.2
	LRA Star		1523	921	653	-	-
	LRA Delta		4784	2904	2055	214	212
CLS	RLA per lkW	243	2.93	1.92	1.65	0.21	0.2
	LRA Star		1727	1082	825	-	-
	LRA Delta		5404	3394	2591	241	236
CMS	RLA per lkW	267	2.79	1.83	1.60	0.22	0.2
	LRA Star		1542	833	730	-	-
	LRA Delta		4820	2603	2281	258	254
CNS	RLA per lkW	295	2.79	1.83	1.68	0.22	0.19
	LRA Star		1446	2670	896	-	-
	LRA Delta		4518	854	2800	291	285
CPS	RLA per lkW	323	2.76	1.83	1.62	0.21	0.2
	LRA Star		1534	1020	952	-	-
	LRA Delta		4795	3187	2973	325	292
CQS	RLA per lkW	360	2.76	1.94	1.6	0.21	0.19
	LRA Star		1542	1303	952	-	-
	LRA Delta		4820	4072	2973	346	343

To establish electrical data for your selected voltage, if other than listed voltage, use the following formula:

$$\text{RLA} = \text{listed RLA} \times \frac{\text{Listed voltage}}{\text{Selected voltage}}$$

$$\text{OLTA} = \text{listed OLTA} \times \frac{\text{Listed voltage}}{\text{Selected voltage}}$$

$$\text{LRA} = \text{listed LRA} \times \frac{\text{Listed voltage}}{\text{Selected voltage}}$$

EXAMPLE: Find the rated load amperage for a motor listed at 1.14 amps per kW input and 550 volts.

$$\text{RLA} = 1.14 \times \frac{575}{550} = 1.19$$

50 Hz - Standard efficiency motors

Size D

Low, medium and high voltage

Motor size	Motor electrical data	Low voltage Max. lkW	230 V	346 V	400 V	Medium voltage Max. lkW	3000 V	3300 V	High voltage Max. lkW	6300 V
DBS	RLA per lkW	340	2.70	1.79	1.55	339	0.218	0.197	-	-
	LRA Star		1679	1160	963		-	-	-	-
	LRA Delta		5468	3776	3142		332	301	-	-
DCS	RLA per lkW	366	2.70	1.79	1.55	370	0.216	0.197	-	-
	LRA Star		1681	1163	965		-	-	-	-
	LRA Delta		5483	3794	3147		373	344	-	-
DDS	RLA per lkW	394	2.70	1.79	1.55	395	0.217	0.197	391	0.103
	LRA Star		1821	1184	1025		-	-		-
	LRA Delta		5926	3865	2248		439	378		252
DES	RLA per lkW	416	2.68	1.78	1.54	419	0.217	0.197	415	0.103
	LRA Star		2185	1418	1260		-	-		-
	LRA Delta		7083	4609	4096		439	378		256
DFS	RLA per lkW	449	2.68	1.78	1.54	453	0.216	0.196	447	0.103
	LRA Star		2189	1421	1262		-	-		-
	LRA Delta		7110	4626	4108		419	427		256
DGS	RLA per lkW	485	2.68	1.78	1.54	499	0.215	0.196	492	0.103
	LRA Star		2644	1581	1402		-	-		-
	LRA Delta		8593	5150	4563		480	422		312
DHS	RLA per lkW	528	2.74	1.78	1.54	525	0.213	0.192	527	0.103
	LRA Star		2397	1837	1561		-	-		-
	LRA Delta		7490	5972	5075		513	563		309
DJS	RLA per lkW	597	-	1.78	1.54	565	0.214	0.193	563	0.103
	LRA Star		-	1727	1437		-	-		-
	LRA Delta		-	5640	4692		513	565		313

50 Hz - Standard efficiency motors

Size E

Low and medium voltage

Motor size	Motor electrical data	Low voltage Max. lkW	400 V	Medium voltage Max. lkW	3000 V	3300 V
EHS	RLA per lkW	603	1.62	607	0.214	0.194
	LRA Star		1.988		-	-
	LRA Delta		6.308		675	578
EJS	RLA per lkW	646	1.62	648	0.213	0.192
	LRA Star		2.289		-	-
	LRA Delta		7.266		753	631
EKS	RLA per lkW	692	1.58	701	0.211	0.192
	LRA Star		2.192		-	-
	LRA Delta		6.984		767	749
ELS	RLA per lkW	746	1.60	756	0.210	0.191
	LRA Star		2.493		-	-
	LRA Delta		7.927		940	838
EMS	RLA per lkW	809	1.59	819	0.210	0.191
	LRA Star		2.493		-	-
	LRA Delta		7.927		937	841
ENS	RLA per lkW	876	1.64	886	0.209	0.190
	LRA Star		3.394		-	-
	LRA Delta		10.498		1058	963
EPS	RLA per lkW	931	1.62	943	0.210	0.191
	LRA Star		3.466		-	-
	LRA Delta		11.004		1061	965

Legend

lkW	- Compressor motor power input (kW)
LRA Star	- Locked rotor amperes, star configuration
LRA Delta	- Locked rotor amperes, delta configuration
OLTA	- Overload current (= RLA x 1.08)
RLA	- Rated load amperes

Electrical characteristics of the motors (cont.)

50 Hz - High-efficiency motors

Size B

Low voltage

Motor size	Motor electrical data	Max. lkW	Low voltage 230 V	346 V	400 V
BDH	RLA per lkW	99	2.87	1.91	1.67
	LRA Star		801	534	475
	LRA Delta		2585	1723	1533
BEH	RLA per lkW	134	2.87	1.86	1.61
	LRA Star		1033	615	532
	LRA Delta		3333	1983	1715
BFH	RLA per lkW	171	2.72	1.83	1.58
	LRA Star		1040	791	656
	LRA Delta		3598	2739	2282
BGH	RLA per lkW	206	2.75	1.80	1.58
	LRA Star		1455	787	821
	LRA Delta		5023	2742	2842
BHH	RLA per lkW	241	2.73	1.79	1.56
	LRA Star		1453	786	819
	LRA Delta		5047	2745	2846

50 Hz - High-efficiency motors

Size C

Low and medium voltage

Motor size	Motor electrical data	Max. lkW	Low voltage 230 V	346 V	400 V	Medium voltage 3000 V	3300 V
CDH	RLA per lkW	196	2.86	1.90	1.64	0.22	0.20
	LRA Star		1586	1061	902	-	-
	LRA Delta		5002	3345	2848	236	229
CEH	RLA per lkW	214	2.77	1.88	1.63	0.22	0.20
	LRA Star		1577	1142	1013	-	-
	LRA Delta		5087	3685	3266	288	242
CLH	RLA per lkW	239	2.76	1.83	1.59	0.22	0.20
	LRA Star		1768	1165	1032	-	-
	LRA Delta		5703	3758	3328	331	287
CMH	RLA per lkW	263	2.92	1.93	1.63	0.22	0.20
	LRA Star		1959	1253	928	-	-
	LRA Delta		6765	4343	3227	333	291
CNH	RLA per lkW	292	2.87	1.90	1.70	0.22	0.20
	LRA Star		1922	1233	1278	-	-
	LRA Delta		6663	4278	4417	393	364
CPH	RLA per lkW	320	2.83	1.91	1.67	0.22	0.20
	LRA Star		1897	1385	1263	-	-
	LRA Delta		6592	4801	4370	395	369
CQH	RLA per lkW	358	2.88	1.89	1.65	0.22	0.20
	LRA Star		2243	1384	1263	-	-
	LRA Delta		7751	4812	4389	460	389

To establish electrical data for your selected voltage, if other than listed voltage, use the following formula:

$$\text{RLA} = \text{listed RLA} \times \frac{\text{Listed voltage}}{\text{Selected voltage}}$$

$$\text{OLTA} = \text{listed OLTA} \times \frac{\text{Listed voltage}}{\text{Selected voltage}}$$

$$\text{LRA} = \text{listed LRA} \times \frac{\text{Listed voltage}}{\text{Selected voltage}}$$

EXAMPLE: Find the rated load amperage for a motor listed at 1.14 amps per kW input and 550 volts.

$$\text{RLA} = 1.14 \times \frac{575}{550} = 1.19$$

50 Hz - High-efficiency motors

Size D

Low, medium and high voltage

Motor size	Motor electrical data	Low voltage Max. lkW	230 V	346 V	400 V	Medium voltage Max. lkW	3000 V	3300 V	High voltage Max. lkW	6300 V
DBH	RLA per lkW	337	2.68	1.78	1.54	333	0.218	0.197		
	LRA Star		1831	1228	1027		-	-	-	-
	LRA Delta		5966	4008	3350		440	395		
DCH	RLA per lkW	361	2.69	1.78	1.54	365	0.216	0.197		
	LRA Star		2064	1297	1097		-	-	-	-
	LRA Delta		6707	4230	3574		468	423		
DDH	RLA per lkW	390	2.68	1.78	1.54	391	0.217	0.197	391	0.103
	LRA Star		2016	1401	1161		-	-		-
	LRA Delta		6567	4561	3790		506	450		278
DEH	RLA per lkW	413	2.68	1.78	1.55	414	0.216	0.197	414	0.104
	LRA Star		2017	1399	1240		-	-		-
	LRA Delta		6564	4570	4038		546	523		304
DFH	RLA per lkW	438	2.69	1.78	1.54	442	0.215	0.195	446	0.103
	LRA Star		2544	1648	1292		-	-		-
	LRA Delta		8288	5366	4217		580	510		302
DGH	RLA per lkW	480	-	1.78	1.54	488	0.215	0.197	489	0.102
	LRA Star		-	1740	1478		-	-		-
	LRA Delta		-	5673	4817		624	615		321
DHH	RLA per lkW	513	-	1.78	1.54	516	0.213	0.193	523	0.103
	LRA Star		-	1740	1478		-	-		-
	LRA Delta		-	5679	4823		894	832		367
DJH	RLA per lkW	552	-	1.78	1.54	550	0.21	0.194	556	0.103
	LRA Star		-	1741	1480		-	-		-
	LRA Delta		-	5689	4837		851	928		403

50 Hz - High-efficiency motors

Size E

Low, medium and high voltage

Motor size	Motor electrical data	Low voltage Max. lkW	400 V	Medium voltage Max. lkW	3000 V	3300 V	High voltage Max. lkW	6300 V
EHH	RLA per lkW	602	1.60	604	0.210	0.193	608	0.100
	LRA Star		2.075		-	-		-
	LRA Delta		6.600		672	697		338
EJH	RLA per lkW	645	1.58	646	0.210	0.190	651	0.100
	LRA Star		2.192		-	-		-
	LRA Delta		6.984		807	707		397
EKH	RLA per lkW	689	1.57	692	0.210	0.192	696	0.100
	LRA Star		2.347		-	-		-
	LRA Delta		7.505		872	827		426
ELH	RLA per lkW	744	1.57	750	0.210	0.191	754	0.100
	LRA Star		2.347		-	-		-
	LRA Delta		7.505		1055	901		467
EMH	RLA per lkW	808	1.58	811	0.210	0.191	817	0.100
	LRA Star		2.738		-	-		-
	LRA Delta		8.720		1047	901		465
ENH	RLA per lkW	875	1.61	879	0.210	0.191	883	0.100
	LRA Star		3.541		-	-		-
	LRA Delta		11.257		1154	1137		586
EPH	RLA per lkW	930	1.60	937	0.210	0.191	941	0.100
	LRA Star		3.499		-	-		-
	LRA Delta		11.124		1151	1130		586

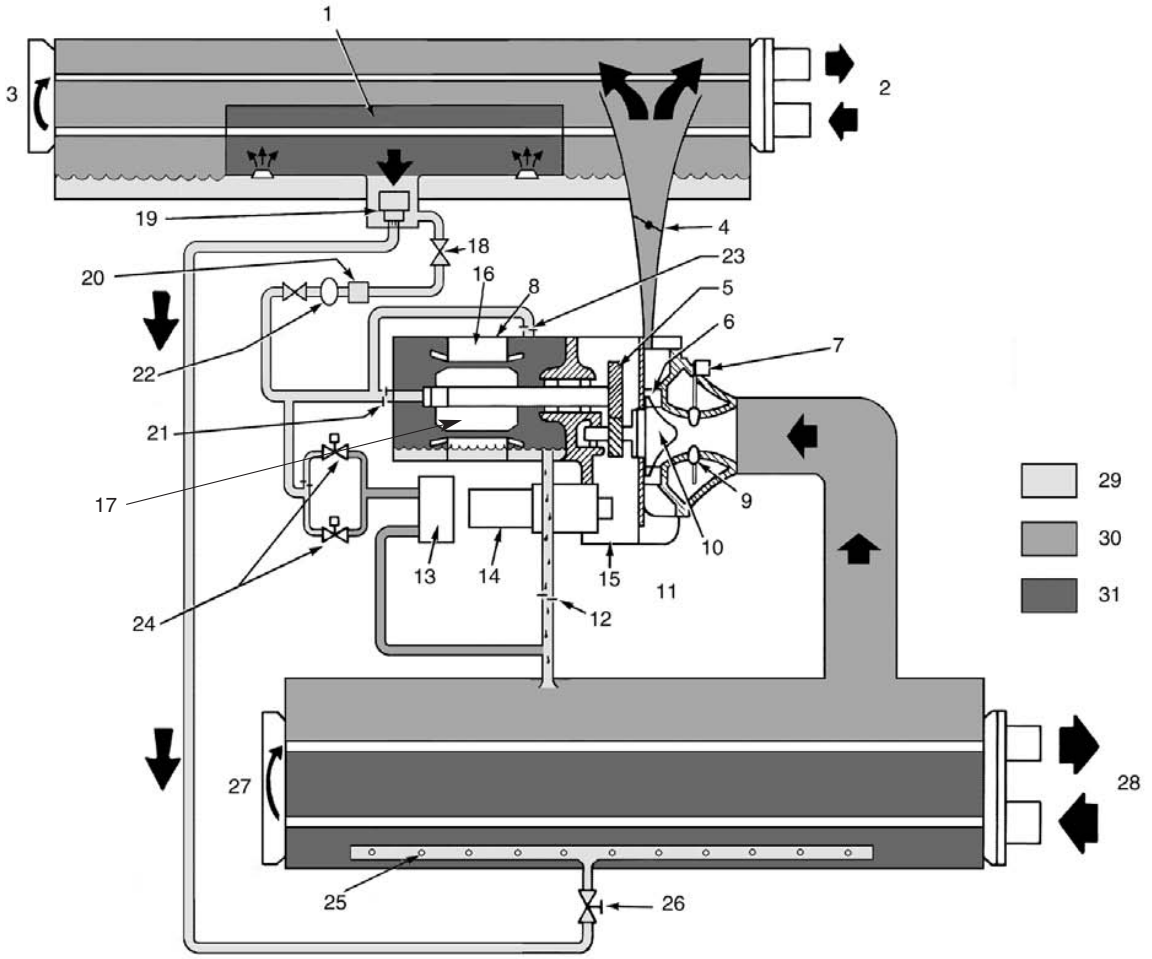
Legend

lkW - Compressor motor power input (kW)
LRA Star - Locked rotor amperes, star configuration
LRA Delta - Locked rotor amperes, delta configuration
OLTA - Overload current (= RLA x 1.08)
RLA - Rated load amperes

19XR Refrigeration cycle (centrifugal chiller)

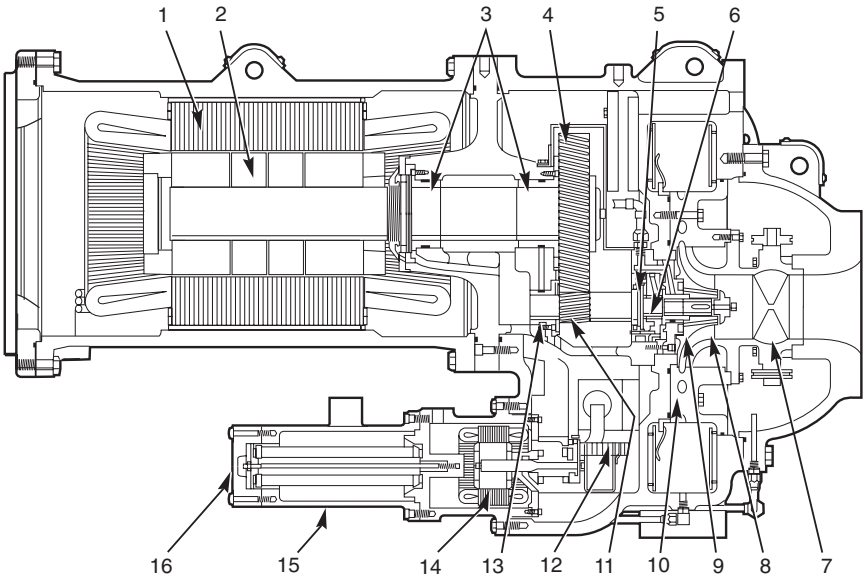
- The compressor continuously draws refrigerant vapour from the cooler, at a rate set by the amount of guide vane opening. As the compressor suction reduces the pressure in the cooler, the remaining refrigerant boils at a fairly low temperature (typically 3 to 6°C). The energy required for boiling is obtained from the water flowing through the cooler tubes. With heat energy removed, the water becomes cold enough for use in an air-conditioning circuit or process liquid cooling.
- After taking heat from the water, the refrigerant vapour is compressed. Compression adds still more heat energy and the refrigerant is quite warm (typically 37 to 40°C) when it is discharged from compressor into condenser.
- Relatively cool (typically 18 to 32°C) water flowing into the condenser tubes removes heat from the refrigerant and the vapour condenses to liquid.
- The liquid refrigerant passes through orifices into the FLASC (Flash Subcooler) chamber. Since the FLASC chamber is at a lower pressure, part of the liquid refrigerant flashes to vapour, thereby cooling the remaining liquid. The FLASC vapour is recondensed on the tubes which are cooled by entering condenser water. The liquid drains into a float valve chamber between the FLASC chamber and cooler. Here a float valve forms a liquid seal to keep FLASC chamber vapour from entering the cooler. When liquid refrigerant passes through the valve, some of it flashes to vapour in the reduced pressure on the cooler side. In flashing, it removes heat from the remaining liquid. The refrigerant is now at a temperature and pressure at which the cycle began.

19XR REFRIGERANT CYCLE



1. FLASC chamber
2. Condenser water
3. Condenser
4. Condenser isolation valve
5. Transmission
6. Diffuser
7. Guide vane motor
8. Motor
9. Guide vanes
10. Impeller
11. Compressor
12. Back pressure orifice
13. Oil cooling
14. Oil filter
15. Oil pump
16. Stator
17. Rotor
18. Refrigerant cooling isolation valve
19. Float valve chamber
20. Filter drier
21. Orificed fitting
22. Moisture/flow indicator
23. Orificed fitting
24. Thermostatic expansion valves (TXV)
25. Distribution pipe
26. Cooler isolation valve
27. Evaporator
28. Chilled water
29. Refrigerant liquid
30. Refrigerant vapour
31. Refrigerant liquid/vapour

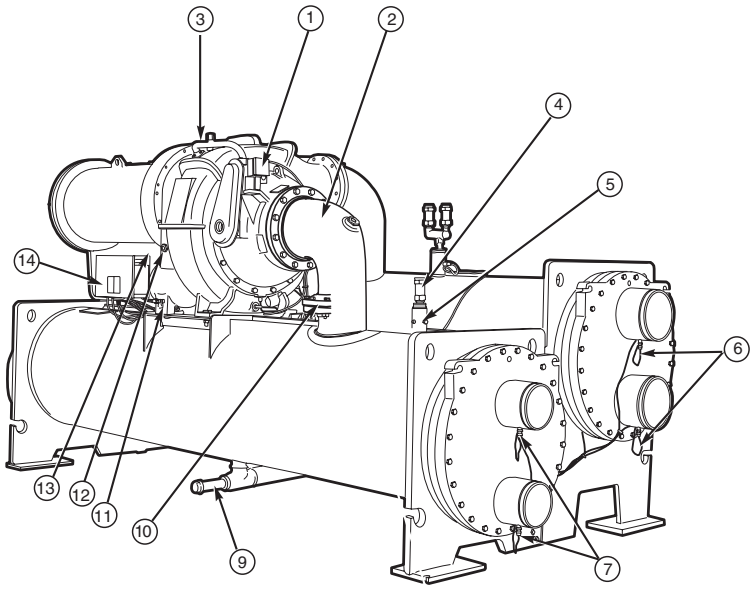
Compressor components



1. Motor stator
2. Motor rotor
3. Motor shaft journal bearings
4. Low speed bull gear
5. High speed shaft thrust bearing
6. High speed shaft journal bearing
7. Variable inlet guide vanes
8. Impeller shroud
9. Impeller
10. Pipe diffuser
11. High speed pinion gear
12. Oil heater
13. High speed shaft journal bearing
14. Oil pump motor
15. Oil filter
16. Oil filter cover

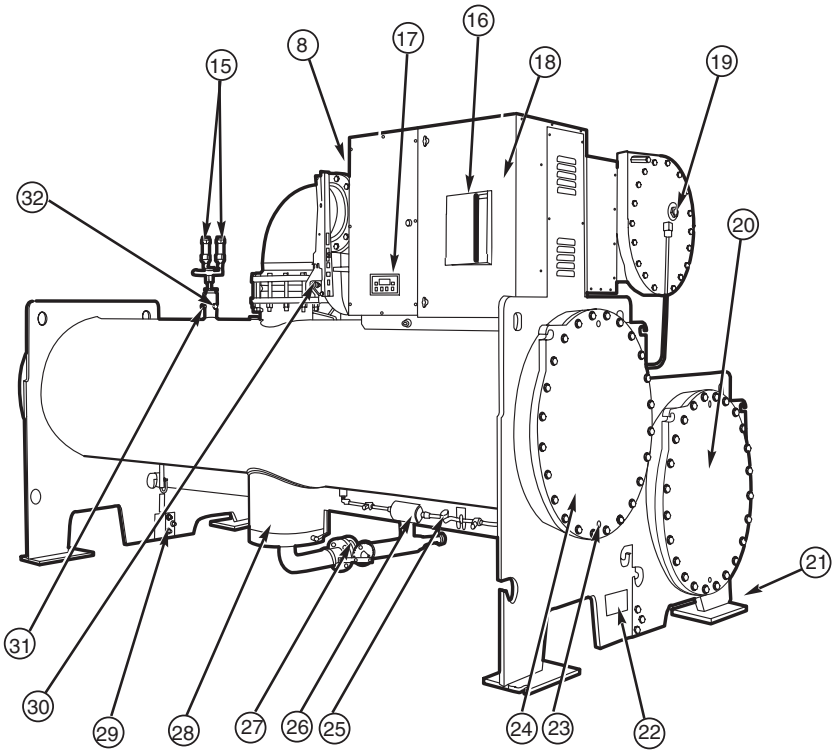
Machine components

Front view



1. Guide vane actuator
2. Suction elbow
3. Compressor
4. Cooler, auto reset relief valve*
5. Cooler pressure transducer
6. Condenser in/out temperature thermistors
7. Cooler in/out temperature thermistors
8. Machine identification nameplate (situated on the starter cabinet side) - see figure 'Rear view' below
9. Refrigerant charging valve
10. Typical flange connections
11. Oil drain valve
12. Oil level sight glass
13. Refrigerant oil cooler (hidden)
14. Branch circuit control box

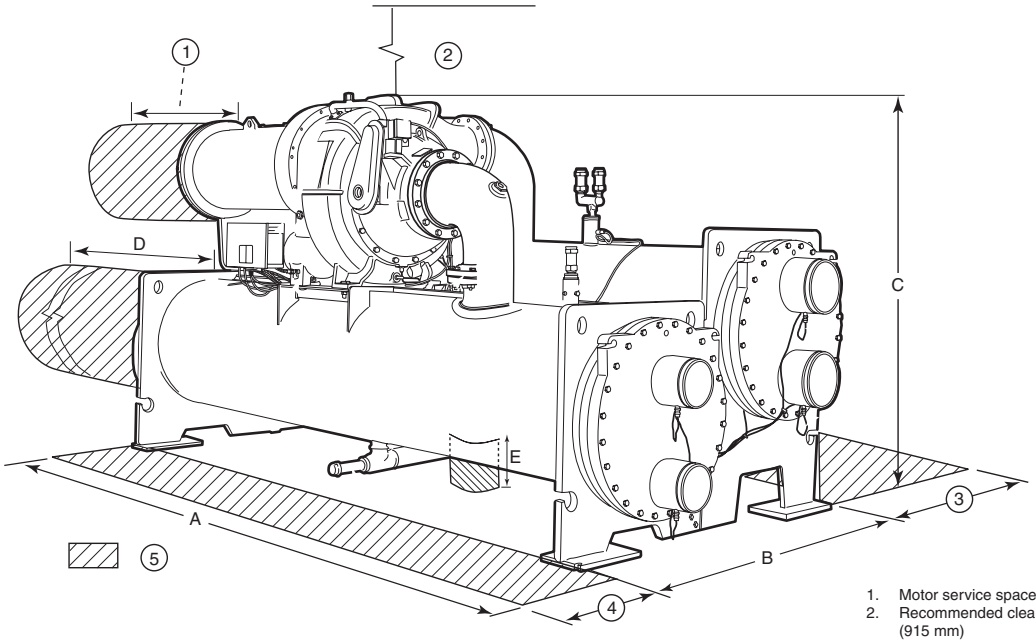
Rear view



15. Condenser auto reset relief valves*
16. Circuit breaker
17. CVC
18. Unit-mounted starter (optional)
19. Motor sight glass
20. Cooler return-end waterbox cover
21. Cooler nameplate
22. Condenser nameplate
23. Typical waterbox drain port
24. Condenser return-end waterbox cover
25. Refrigerant moisture/flow indicator
26. Refrigerant filter/drier
27. Liquid line isolation valve (optional)
28. Linear float valve chamber
29. Vessel take-apart connector
30. Discharge isolation valve (optional)
31. Pumpout valve
32. Condenser pressure transducer

* One relief valve is standard. The valve option consists of two valves plus a changeover per heat exchanger.

Dimensions



1. Motor service space (1219 mm)
2. Recommended clearance above the machine (915 mm)
3. 610 mm
4. 362 mm
5. Tube removal space

E. Float valve removal space - variable, depending on the unit height - see rear view on the previous page, item 28

Heat exchanger size	A (length, with nozzle-in-head waterbox)		B (width)	C (height) - not shown)	A (length, marine waterbox		D	E
	2-pass*	1 or 3 pass**			2-pass*	1 or 3 pass**		
	mm	mm	mm	mm	mm	mm	mm	mm
30 to 32	4172	4350	1670	2073	4496	4997	3747	250
35 to 37	4693	4870	1670	2073	5017	5518	4343	250
40 to 42	4242	4426	1880	2153	4591	5099	3757	250
45 to 47	4763	4947	1880	2153	5099	5620	4343	250
50 to 52	4248	4439	1994	2207	4591	5099	3747	250
55 to 57	4769	4959	1994	2207	5099	5620	4343	250
60 to 62	4261	4451	2096	2257	4591	5111	3747	250
65 to 67	4782	4972	2096	2257	5112	5632	4343	250
70 to 72	4978	5194	2426	2985	5385	6058	4267	460
75 to 77	5588	5804	2426	2985	5994	6668	4877	460
80 to 82	4997	5220	2711	3029	5398	6121	4267	460
85 to 87	5607	5829	2711	3029	6007	6731	4877	460

* Assumes both cooler and condenser nozzles on same end of chiller.
** 1 or 3 pass length applies if either (or both) cooler or condenser is a 1 or 3 pass design.

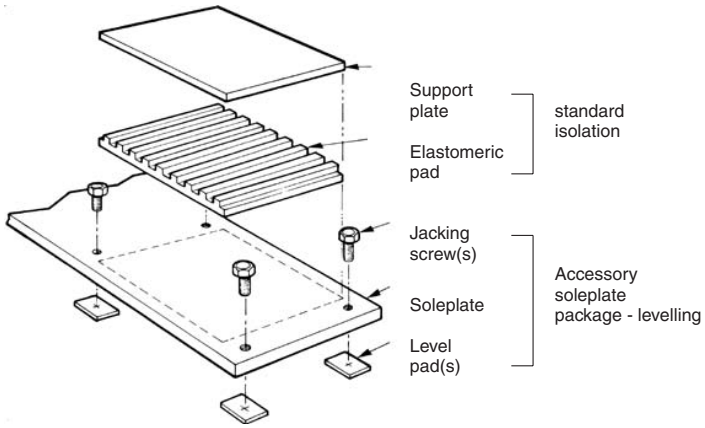
Frame size	Nozzle inlet/outlet size (in.) (nominal pipe size)					
	Cooler			Condenser		
	1-Pass	2-Pass	3-Pass	1-Pass	2-Pass	3-Pass
3	10	8	6	10	8	6
4	10	8	6	10	8	6
5	10	8	6	10	10	8
6	10	10	8	10	10	8
7	14	12	10	14	12	12
8	14	14	12	14	14	12

Notes:
1. Service clearance must comply with local regulations.
2. Certified drawings available upon request.

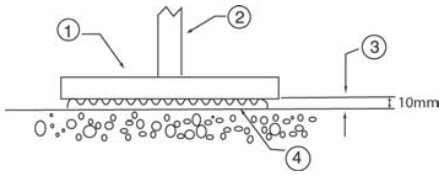
Application data, mounting arrangement

Unit levelling

Typical isolation



Standard isolation

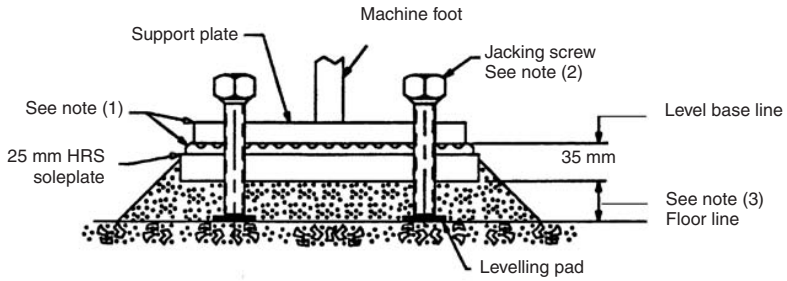


Isolation with isolation package only (standard)

1. Support plate
2. Machine foot
3. 10 mm level base line
4. Shear flex pad (10 mm)

Note: Isolation package includes 4 shear flex pads.

Accessory soleplate detail - levelling



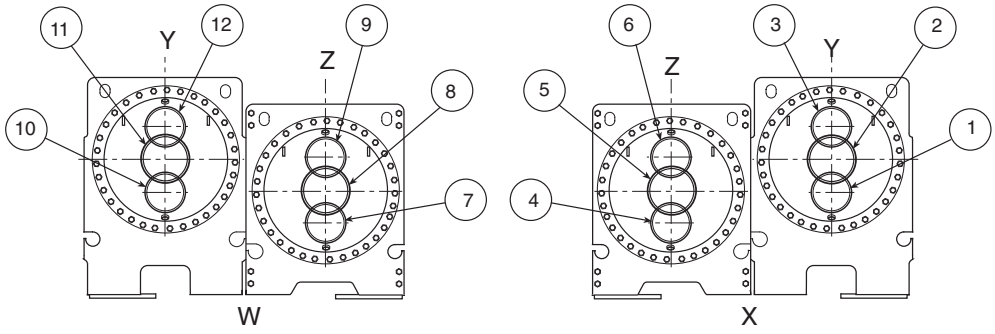
Notes:

1. Accessory soleplate package includes 4 soleplates, 16 jacking screws, leveling pads and shear flex pads.
2. Jacking screws to be removed after grout has set.
3. Thickness of grout will vary, depending on the amount necessary to level chiller. Use only pre-mixed non-shrinking grout, Celcote HT-648 or Master Builders 636, 38 to 57 mm thick, or equivalent.

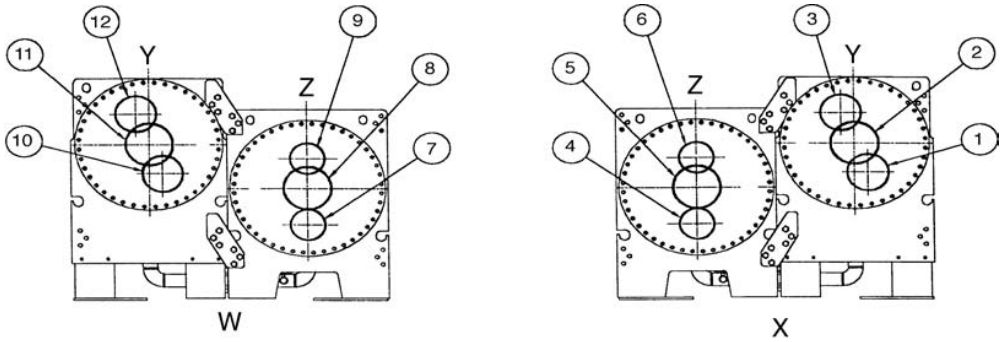
Waterboxes - nozzle arrangements

A - Nozzle-in-head arrangement codes

Sizes 4-5-6



Sizes 7 and 8



W Motor end
X Compressor end
Y Condenser
Z Evaporator

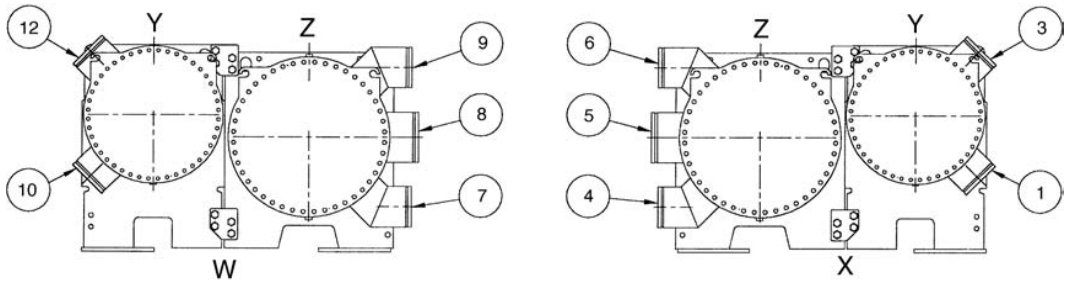
Standard waterbox arrangement codes

Pass	Cooler waterboxes			Condenser waterboxes		
	In	Out	Arrangement code*	In	Out	Arrangement code*
1	8	5	A	11	2	P
	5	8	B	2	11	Q
2	7	9	C	10	12	R
	4	6	D	1	3	S
3	7	6	E	10	3	T
	4	9	F	1	12	U

* See certified drawings

B - Marine nozzle arrangement codes

Size 3

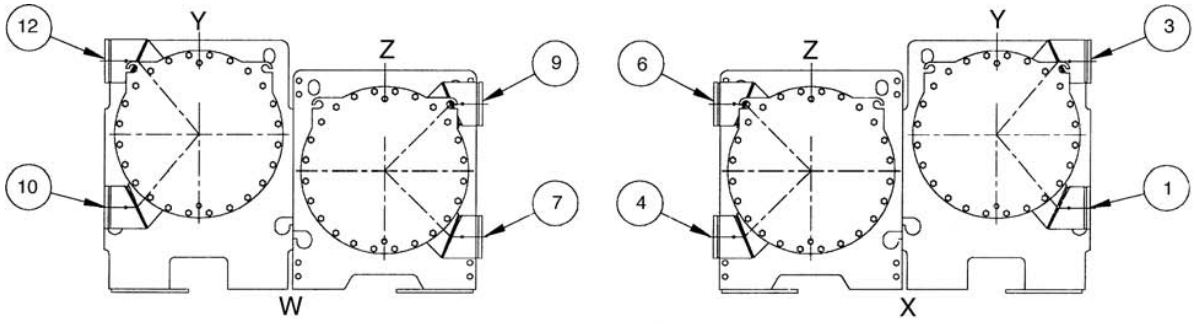


Waterbox arrangement codes

Pass	Cooler waterboxes			Condenser waterboxes		
	In	Out	Arrangement code	In	Out	Arrangement code*
1	8	5	A	-	-	-
	5	8	B	-	-	-
2	7	9	C	10	12	R
	4	6	D	1	3	S
3	7	6	E	-	-	-
	4	9	F	-	-	-

* See certified drawings

Sizes 4-5-6



Waterbox arrangement codes

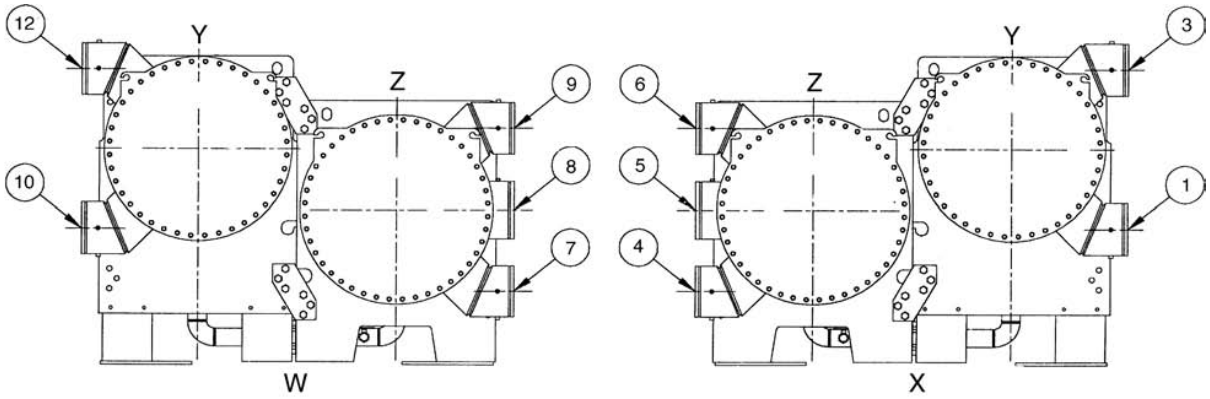
Pass	Cooler waterboxes			Condenser waterboxes		
	In	Out	Arrangement code	In	Out	Arrangement code*
1	9	6	A	-	-	-
	6	9	B	-	-	-
2	7	9	C	10	12	R
	4	6	D	1	3	S
3	7	6	E	-	-	-
	4	9	F	-	-	-

* See certified drawings

W Motor end
X Compressor end
Y Condenser
Z Evaporator

B - Marine nozzle arrangement codes (cont.)

Sizes 7 and 8



Waterbox arrangement codes

Pass	Cooler waterboxes			Condenser waterboxes		
	In	Out	Arrangement code*	In	Out	Arrangement code*
1	8	5	A	-	-	-
	5	8	B	-	-	-
2	7	9	C	10	12	R
	4	6	D	1	3	S
3	7	6	E	-	-	-
	4	9	F	-	-	-

* See certified drawings

W Motor end
X Compressor end
Y Condenser
Z Evaporator

Technical description

- Water-cooled packaged liquid chiller for indoor installation, equipped with numerical control, and operating with chlorine-free refrigerant HFC-134a.

- **Regulations**
  - The unit characteristics must be published in accordance with ARI standards.
  - The machines with CE marking must comply with the following European directives:
    - Pressurised equipment directive (PED) 97/23/EC
    - Machinery directive 98/37/EC, modified
    - Low voltage directive 73/23/EEC, modified
    - Electromagnetic compatibility directive 89/336/EEC, modified and the applicable recommendations of European standards:
    - Machine safety: electrical equipment in machines, general regulations, EN 60204-1
    - Electromagnetic emission EN 50081-2
    - Electromagnetic immunity EN 50082-2.

- **Quality assurance**
  - The unit shall be designed, manufactured and tested at a facility with a quality assurance system certified ISO 9001.
  - The unit shall be manufactured at a facility with an environment management system certified ISO 14001.
  - The unit must satisfy the quality control tests in the factory (pressure and electrical tests).

- Designed to ensure maximum compliance with European standard EN 60 204-1 (electrical safety), EN 50082-2 (EMC immunity), EN 50081-2 (EMC emissions) and with EN 378 (safety).

Compressor

- One centrifugal compressor of the high-performance, single-stage type. Connections to the compressor casing use O rings instead of gaskets to reduce the occurrance of refrigerant leakage.

- The open type impeller with machined shroud contours and impeller diameter optimize compressor efficiency for each specified application.

Cooler and condenser

- Tubing is copper, high-efficiency type, with integral internal and external enhancement. Tubes are nominal 3/4-in. OD with nominal wall thickness of 0.635 mm measured at the root of the fin. Tubes are rolled into tube sheets and are individually replaceable. Tube sheet holes are double grooved for joint structural integrity. Intermediate support sheet spacing does not exceed 914 mm.

- Waterboxes and nozzle connections are designed for 1034 kPa maximum working pressure unless otherwise noted. Nozzles have grooves to allow use of Victaulic couplings.

- The tube sheets of the cooler and condenser are bolted together to allow for field disassembly and reassembly.

- Waterboxes have vents, drains, and covers to permit tube cleaning within the space shown on the drawings. A thermistor type temperature sensor is factory installed in each water nozzle.

- The heat exchangers display a European code nameplate which shows the pressure-temperature data. A pressure relief valve is installed on each heat exchanger. A pressure relief valve device is installed on each heat exchanger which permits verification of the set point without transfer of the charge.

- Cooler is designed to prevent liquid refrigerant from entering the compressor.

- Tubes are individually replaceable from either end of the heat exchanger without affecting the strength and durability of the tube sheet and without causing leakage in adjacent tubes.

- The condenser shell includes a FLASC (flash subcooler) which cools the condensed liquid refrigerant to a reduced temperature, thereby increasing the refrigeration cycle efficiency.

Starter, auxiliary box and control box

- Galvanized sheet steel, polyester paint finish, colour light grey, with hinged access doors, containing:

  - Starter (option)
  - Auxiliary box includes control transformer for the CVC, and the oil heater.
  - Control box includes the processor board and the Human Interface (CVC).

Control functions

- **Set point function**
  The control provides the capability to view and change the leaving chilled water set point, entering chilled water set point, and demand limit set point at any time during chiller operating or shutdown periods. The controls allow for the specification of capacity control by either leaving chilled water or entering chilled water.

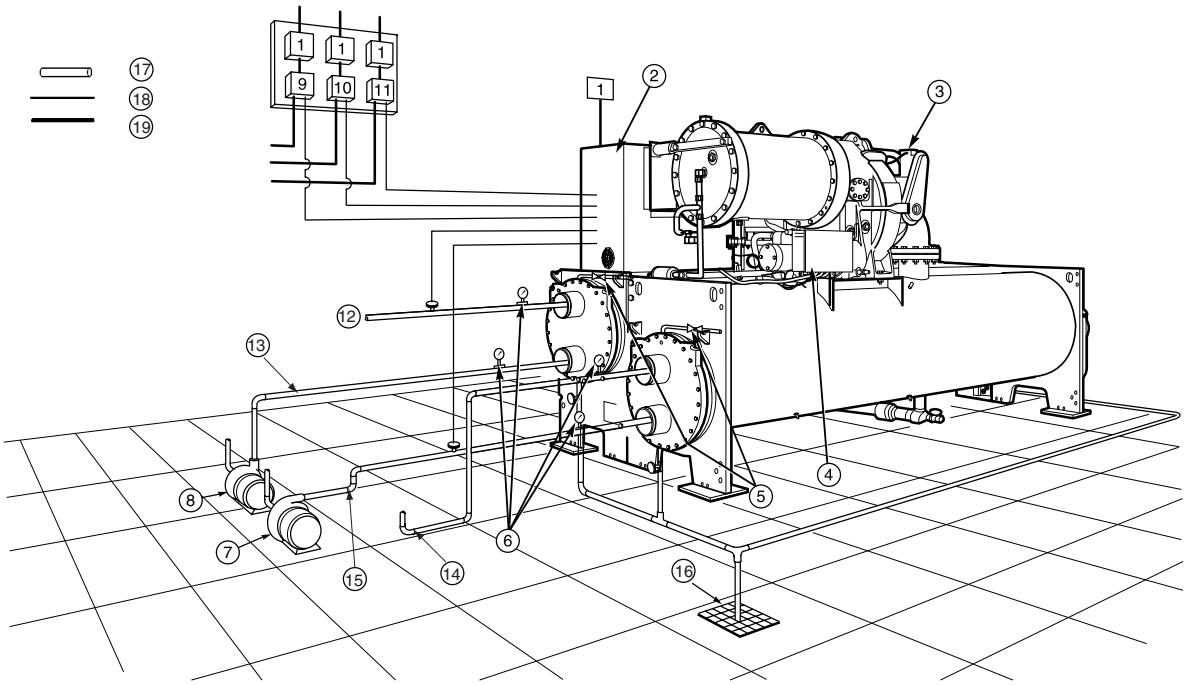
- **Service function**
  The control provides a password protected service function which allows authorized individuals to:
  - View an alarm history file which contains the last 25 alarm/alert messages with time and date stamp. These messages are displayed in text form, not codes.
  - Execute a chiller controls test function for quick identification of malfunctioning components
  - View/modify chiller configuration
  - View/modify chiller occupancy periods
  - View/modify schedule holiday periods
  - View/modify schedule override periods
  - View/modify system time and date

- **Lead/lag function**
  Lead/lag function automatically controls two chillers, including the reversing sequence.
  A third chiller can be added to the lead lag system as a standby chiller.

- **Communication**
  Interface with other CCN devices is available as standard. A CCN/JBus (Carrier Comfort Network) interface facilitates communication with other BMS systems.

Typical piping and wiring

19XR Chiller with optional unit-mounted starter



1. Disconnect
2. Unit mounted starter with control (factory-installed)
3. Guide vane motor
4. Oil pump terminal box
5. Vents
6. Pressure gauges
7. Chilled water pump
8. Condenser water pump
9. Chilled water pump starter
10. Condenser water pump starter
11. Cooling tower fan starter
12. To cooling tower
13. From cooling tower
14. To load
15. From load
16. Drain
17. Piping
18. Control wiring
19. Power wiring

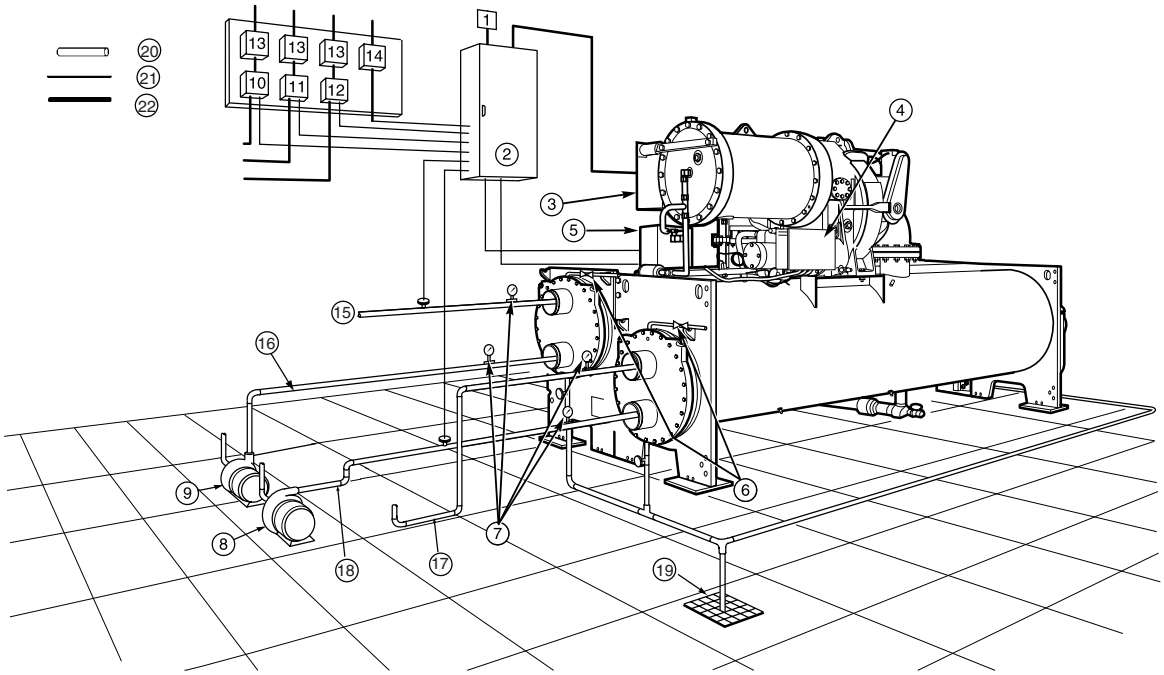
Important: Ensure correct phasing is followed for proper motor rotation.

Notes:

1. Wiring and piping shown are for general point-of-connection only and are not intended to show details for a specific installation. Certified field wiring and dimensional diagrams are available on request.
2. All wiring must comply with applicable codes.
3. Refer to Carrier System Design Manual for details regarding piping techniques.
4. Wiring not shown for optional devices such as:
   - remote start-stop
   - remote alarm
   - optional safety device
   - 4 to 20 mA resets
   - optional remote sensors

Typical piping and wiring (cont.)

19XR Chiller with free-standing starter



1. Disconnect
2. Freestanding compressor motor starter
3. Compressor motor terminal box
4. Oil pump terminal box
5. Control cabinet
6. Vents
7. Pressure gauges
8. Chilled water pump
9. Condenser water pump
10. Chilled water pump starter
11. Condensing water pump starter
12. Cooling tower fan starter
13. Disconnect
14. Oil pump disconnect (see note 5)
15. To cooling tower
16. From cooling tower
17. To load
18. From load
19. Drain
20. Piping
21. Control wiring
22. Power wiring

Notes:

1. Wiring and piping shown are for general point-of-connection only and are not intended to show details for a specific installation. Certified field wiring and dimensional diagrams are available on request.
2. All wiring must comply with applicable codes.
3. Refer to Carrier System Design Manual for details regarding piping techniques.
4. Wiring not shown for optional devices such as:
   - remote start-stop
   - remote alarm
   - optional safety device
   - 4 to 20 mA resets
   - optional remote sensors
5. Oil pump disconnect may be located within the enclosure of item 2 - free-standing compressor motor starter.

Order No. 11995-20, 05.2004. Supersedes order No: 11995-20, 01.1998.
Manufacturer reserves the right to change any product specifications without notice.
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