Chillers

Commercial and Technical Data

Air cooled inverter chiller

- **Inverter technology**
- **Top seasonal efficiency (ESEER up to 5.8)**
- **Multiple sound level versions**
- **Wide capacity range (635 kW - 1,802 kW)**
- **Large operation range (-18°C up to +50°C ambient temperature)**
- **Water supply down to -8°C (as standard)**

ECDEN11-415

EWAD~CZ
635~1,802 kW

INVERTER

Daikin Europe N.V.

About Daikin

Daikin has a worldwide reputation based on over 85 years' experience in the successful manufacture of high quality air conditioning equipment for industrial, commercial and residential use. Daikin's much envied quality quite simply stems from the close attention paid to design, production and testing, as well as aftersales support. To this end, every component is carefully selected and rigorously tested to verify its contribution to product quality and reliability.

The innovative EWAD~CZ series conceived for minimal costs and maximum efficiency

The 'EWAD~CZ' inverter series is the culmination of Daikin's culture to manufacture state-of-the-art, energy efficient chillers and its close involvement to environmental issues.

The use of inverter driven screw compressors in the EWAD~CZ range allows the units to achieve the highest partial load efficiency scores in their class (ESEER up to 5.8), making it ideal for systems with variable load requirements such as comfort applications. The high partial load efficiency of these solutions allows substantially reduced CO_2 emissions and decreased annual operating costs, hence much quicker system payback times.

The use of inverter technology also contributes to quieter sound levels and precise chiller water temperatures, as well as lower starting current requirements, optimum power factors (always above 0.95), a reduction of water tanks for the hydraulic system and increased reliability thanks to fewer compressor start-ups and shut downs

The addition of the new range makes the Daikin Europe N.V. screw inverter chiller portfolio the largest in the market, with cooling capacities from 250 to 1,800 kW. The new EWAD~CZ range fills in the top of the segment with capacities from 635 kW to 1.802 kW, the highest cooling capacity available in this market today.

Table of Contents

The new air cooled inverter chiller features

High part load efficiencies for low operating cost

Daikin equipped the EWAD-CZ series with inverter-driven single screw compressors - that result in good full load efficiencies and the highest part load efficiency in its class (ESEER up to 5.8) - allowing considerable savings in a systems annual energy costs and ensuring a low total cost of ownership over the life of the chiller.

Large operation range

The new range is available for ambient operating temperatures of -18°C up to 50°C, with the ability to supply water down to -8°C, making the chiller models suitable for comfort and process cooling applications in all climates.

Extensive option list

The base model includes several standard factory mounted options, such as: electronic expansion valve, evaporator electric heater, double setpoint, etc. Moreover, the new range features an extensive option list, including heat recovery to produce hot water up to +55ºC and fan speed regulation (which can result in a further increase in ESEER up to 6).

Redundancy

The EWAD~CZ-chillers have two or three truly independant refrigerant circuits (depending on the size) in order to assure maximum safety for any maintenance.

Meets any acoustic need

The use of inverter technology also contributes to quieter sound levels and precise chiller water temperatures, as well as lower starting current requirements, optimum power factors (always above 0.95), a reduction of water tanks for the hydraulic system and increased reliability thanks to fewer compressor start-ups and shut downs.

Superior control logic

The new MicroTech III controller provides an easy to use control. The control logic is designed to provide maximum efficiency, to continue operation in unusual operating conditions and to provide a history of unit operation. One of the greatest benefits is the easy interface with LonWorks, BACnet, Ethernet TCP/IP or Modbus communications.

TABLE OF CONTENTS

EWAD-CZXS

1 Features

- ESEER up to 5.24
- Inverter stepless single-screw compressor
- High efficiency, standard sound levels
- Optimised for use with R-134a
- Wide operating range
- Extensive option list (heat recovery option available)
- Low starting current
- MicroTech III controller

2 Specifications

2-1 Technical Specifications					EWAD670CZXS	EWAD740CZXS	EWAD830CZXS	EWAD900CZXS	EWADC10CZXS	EWADC11CZXS	EWADC12CZXS
Cooling capacity	Nom.			kW	672 (1)	738 (1)	832 (1)	902 (1)	1,037 (1)	1,095 (1)	1,236 (1)
Capacity control	Method				Stepless						
	Minimum capacity			%	20						
Power input	Cooling	Nom.		kW	245 (1)	235 (1)	266 (1)	305 (1)	339 (1)	375 (1)	400 (1)
EER					2.74 (1)	3.14 (1)	3.13 (1)	2.96 (1)	3.06 (1)	2.92 (1)	3.09 (1)
ESEER					5.07	5.13	5.20	5.22	5.24	5.03	4.93
IPLV					5.47	5.68	5.72	5.79	5.73	5.56	5.58
Casing	Colour				Ivory white						
	Material				Galvanized and painted steel sheet						
Dimensions	Unit	Height		mm	2,540						
		Width		mm	2,285						
		Depth		mm	6,725		7,625		8,525		10,325
Weight	Unit			kg	5,880	6,000	6,620	6,870	7,440		8,570
	Operation weight			kg	6,140	6,250	6,860	7,110	7,880		8,960
Water heat exchanger	Type				Single pass shell & tube						
	Water volume			l	263	248	241		441		383
	Nominal water flow	Cooling		l/s	32.00	35.20	39.70	43.00	49.50	52.30	59.00
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	80	75	55	64	63	69	46
	Insulation material				Closed cell						
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler						
Fan	Quantity				10	12	14		16		20
	Type				Direct propeller						
	Diameter			mm	800						
	Air flow rate	Nom.		l/s	54,188	65,025	75,863		86,700		108,376
Fan motor	Drive				DOL						
	Speed	Cooling	Nom.	rpm	900						
	Input	Cooling		W	1.75						
Sound power level	Cooling	Nom.		dBA	102.1	102.2	102.5		102.9		103.5
Sound pressure level	Cooling	Nom.		dBA	81.0 (2)		81.1 (2)				81.2 (2)
Compressor	Type				Semi-hermetic single screw compressor						
	Quantity				2						
	Starting method				Inverter driven						
	Oil	Charged volume		l	32		35	38			44
Operation range	Water side	Cooling	Min.	ºCDB	-8						
			Max.	ºCDB	15						
	Air side	Cooling	Min.	ºCDB	-18						
			Max.	ºCDB	50						
Refrigerant	Type				R-134a						
	Circuits	Quantity			2						
Refrigerant circuit	Charge			kg	141	161	178		200		235
Piping connections	Evaporator water inlet/outlet (OD)				168.3mm				219.1mm		
Safety devices	Item	01			High discharge pressure (pressure switch)						
		02			High discharge pressure (pressure transducer)						
		03			Low suction pressure (pressure transducer)						
		04			Compressor motor protection						
		05			High discharge temperature						
		06			Low oil pressure						
		07			Low pressure ratio						
		08			High oil filter pressure drop						
		09			Phase monitor						
		10			Emergency stop button						
		11			Water freeze protection controller						

2 Specifications

2-1 Technical Specifications					EWADC13CZXS	EWADC14CZXS	EWADC15CZXS	EWADC16CZXS	EWADC17CZXS	EWADC18CZXS
Cooling capacity	Nom.			kW	1,308 (1)	1,450 (1)	1,545 (1)	1,622 (1)	1,709 (1)	1,802 (1)
Capacity control	Method				Stepless					
	Minimum capacity			%	20			13		
Power input	Cooling	Nom.		kW	442 (1)	488 (1)	531 (1)	558 (1)		611 (1)
EER					2.96 (1)	2.97 (1)	2.91 (1)		2.90 (1)	2.95 (1)
ESEER					4.74	5.02	5.17	5.03	5.76	4.85
IPLV					5.45	5.61	5.75	5.85	5.76	5.45
Casing	Colour				Ivory white					
	Material				Galvanized and painted steel sheet					
Dimensions	Unit	Height		mm	2,540					
		Width		mm	2,285					
		Depth		mm	10,325	11,625	12,525		13,425	14,325
Weight	Unit			kg	8,970	9,600	9,940	11,370	12,190	12,920
	Operation weight			kg	9,360	9,980	10,320	12,220	13,040	13,790
Water heat exchanger	Type				Single pass shell & tube					
	Water volume			l	383	374		850		871
	Nominal water flow	Cooling		l/s	62.40	69.20	73.70	77.40	81.50	86.00
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	51	61	71	62	68	64
	Insulation material				Closed cell					
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler					
Fan	Quantity				20	22	24		26	28
	Type				Direct propeller					
	Diameter			mm	800					
	Air flow rate	Nom.		l/s	108,376	119,213	130,051	129,454	140,143	151,129
Fan motor	Drive				DOL					
	Speed	Cooling	Nom.	rpm	900					
	Input	Cooling		W	1.75					
Sound power level	Cooling	Nom.		dBA	103.5	104.1		105.8	106.0	106.2
Sound pressure level	Cooling	Nom.		dBA	81.2 (2)			82.8 (2)	82.9 (2)	
Compressor	Type				Semi-hermetic single screw compressor					
	Quantity				2			3		
	Starting method				Inverter driven					
	Oil	Charged volume		l	50			75	63	69
Operation range	Water side	Cooling	Min.	ºCDB	-8					
			Max.	ºCDB	15					
	Air side	Cooling	Min.	ºCDB	-18					
			Max.	ºCDB	50					
Refrigerant	Type				R-134a					
	Circuits	Quantity			2			3		
Refrigerant circuit	Charge			kg	235	275	320	327	343	361
Piping connections	Evaporator water inlet/outlet (OD)				219.1mm			273mm		
Safety devices	Item	01			High discharge pressure (pressure switch)					
		02			High discharge pressure (pressure transducer)					
		03			Low suction pressure (pressure transducer)					
		04			Compressor motor protection					
		05			High discharge temperature					
		06			Low oil pressure					
		07			Low pressure ratio					
		08			High oil filter pressure drop					
		09			Phase monitor					
		10			Emergency stop button					
		11			Water freeze protection controller					

2 Specifications

2-2 Electrical Specifications				EWAD670CZXS	EWAD740CZXS	EWAD830CZXS	EWAD900CZXS	EWADC10CZXS	EWADC11CZXS	EWADC12CZXS
Compressor	Phase			3~						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
	Maximum running current		A	205	221		283		344	
	Starting method			VFD driven						
Compressor 2	Maximum running current		A	205	221	283		344		404
Power supply	Phase			3~						
	Frequency		Hz	50						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
Unit	Maximum starting current		A	322	349	402	444	496	537	594
	Nominal running current (RLA)	Cooling	A	362	351	398	453	504	555	597
	Maximum running current		A	451	490	560	622	691	751	828
	Max unit current for wires sizing		A	494	537	614	683	758	825	909
Fans	Nominal running current (RLA)		A	40	48	56		64		80

2-2 Electrical Specifications				EWADC13CZXS	EWADC14CZXS	EWADC15CZXS	EWADC16CZXS	EWADC17CZXS	EWADC18CZXS
Compressor	Phase			3~					
	Voltage		V	400					
	Voltage range	Min.	%	-10					
		Max.	%	10					
	Maximum running current		A	404		486	344		404
	Starting method			VFD driven					
Compressor 2	Maximum running current		A	404	486		344		404
Power supply	Phase			3~					
	Frequency		Hz	50					
	Voltage		V	400					
	Voltage range	Min.	%	-10					
		Max.	%	10					
Unit	Maximum starting current		A	635	708	762	844	901	957
	Nominal running current (RLA)	Cooling	A	656	724	789	826	873	908
	Maximum running current		A	889	978	1,068	1,127	1,196	1,265
	Max unit current for wires sizing		A	976	1,075	1,173	1,238	1,313	1,389
Fans	Nominal running current (RLA)		A	80	88	96		104	112

Notes

(1) Cooling: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC; full load operation.

(2) Sound pressure levels are measured at entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC; full load operation; Standard: ISO3744

(3) Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.

(4) Maximum starting current: starting current of biggest compressor + 75 % of maximum current of the other compressor + fans current for the circuit at 75 %

(5) Nominal current in cooling mode: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC. Compressor + fans current.

(6) Maximum running current is based on max compressor absorbed current in its envelope and max fans absorbed current

(7) Maximum unit current for wires sizing is based on minimum allowed voltage.

(8) Maximum current for wires sizing: (compressors full load ampere + fans current) x 1.1

3 Features and advantages

3 - 1 Features and Advantages

High part load efficiency
High efficiency at full load, but especially maximum efficiency at part load conditions - which is the majority of the operating time of a chiller - are the factors that allow considerable savings in a system's annual energy costs.
With the objective of bringing down these operating costs and improving a building's economical management, this inverter range has been designed to optimize the seasonal energy efficiency (ESEER).

Seasonal quietness
Very low sound levels in part load conditions are achieved by varying the fan speed, but especially thanks to the variation of compressor frequency, which ensure the minimum sound level at all the time.

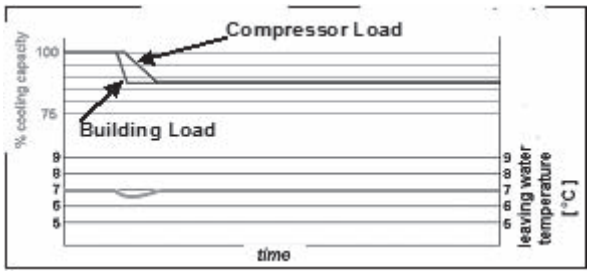
Quick comfort conditions
The ability to vary the output power in direct relation to the cooling requirements of the system, allow the possibility to achieve building comfort conditions much faster at start-up.

Low starting current
No current spikes at start-up. The starting current is always lower than current absorbed in the maximum operating conditions (FLA).

Power factor always > 0.95
This inverter range can operate always with a power factor > 0.95, which allows building owners to avoid power factor penalties and decrease electrical losses in cable and transformers.

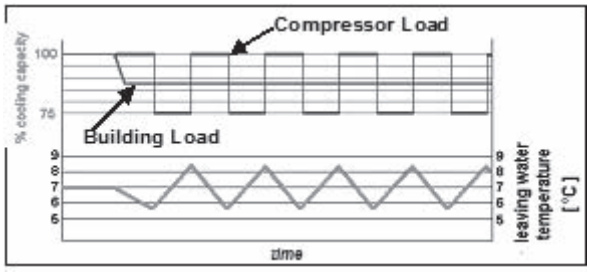
Redundancy
The range has two or three truly independent refrigerant circuits (depending on the size) guaranteeing (partial) cooling 'backup' even in case of maintenance activity

Infinitely capacity control
Cooling capacity control is infinitely variable by means of a Inverter driven screw compressor controlled by microprocessor system. Each unit has infinitely variable capacity control from 100% down to 13,5%. This modulation allows the compressor capacity to exactly match the building cooling load without any leaving evaporator water temperature fluctuation. This chilled water temperature fluctuation is avoided only with a stepless control.



ELWT fluctuation with steps capacity control

In the case that a compressor with load step control is used, the compressor capacity, at partial loads, will be too high or too low compared to the building cooling load. The result is an increase in chiller energy costs, particularly at the part-load conditions at which the chiller operates most of the time.



ELWT fluctuation with steps capacity control (4 steps)

Units with stepless regulation offer benefits that the units with step regulation are unable to match.
Only a chiller with step-less regulation, is able to follow the system cooling demand at any time and to deliver chilled water at set-point.

FTA_1-2_Rev.00_1

3 Features and advantages

3 - 1 Features and Advantages

Code requirements – Safety and observant of laws/directives

The range is designed and manufactured in accordance with applicable selections of the following:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Standards	UNI – EN ISO 9001:2004

Certifications

All units manufactured are CE marked, complying with European directives in force, concerning manufacturing and safety. On request units can be produced complying with laws in force in non European countries (ASME, GOST, etc.), and with other applications, such as naval (RINA, etc.).

Efficiency and sound configuration

The range is available in multiple sound versions:

	Sound level			
Efficiency level	Standard	Low	Reduced	Extra low
High efficiency	EWAD~CZXS	EWAD~CZXL	EWAD~CZXR	N.A.

Versions

The range is available as high efficiency version:

X: High efficiency
13 sizes to cover a range from 635 up to 1802 kW with an ESEER up to 5.8

The EER (Energy Efficiency Ratio) is the ratio of the Cooling Capacity to the Power Input of the unit. The Power Input includes: the power input for operation of the compressor, the power input of all control and safety devices, the power input for fans.

The ESEER (European Seasonal Energy Efficiency Ratio) is a weighed formula enabling to take into account the variation of EER with the load rate and the variation of air inlet condenser temperature.

ESEER = A x EER100% + B x EER75% + C x EER50% + D x EER25%

	A	B	C	D
Coefficient	0.03 (3%)	0.33 (33%)	0.41 (41%)	0.23 (23%)
Air inlet condenser temperature	35°C	30°C	25°C	20°C

Sound levels

The range is available in three different sound level configurations:

S: Standard sound
Condenser fan rotating at 900 rpm

L: Low sound
Condenser fan rotating at 900 rpm, compressor sound enclosure and flexible discharge piping.

R: Reduced sound
Condenser fan rotating at 700 rpm, compressor sound enclosure and flexible discharge piping.

FTA_1-2_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

Cabinet and structure
The cabinet is made of galvanized steel sheet and painted to provide a high resistance to corrosion. Colour Ivory White (Munsell code 5Y7.5/1) (±RAL7044).The base frame has an eye-hook to lift the unit with ropes for an easy installation. The weight is uniformly distributed along the profiles of the base and this facilitates the arrangement of the unit.

Inverter driven screw compressors with integrated oil separator
The compressor is semi-hermetic, single-screw type with gate-rotor made with the latest high-strength fibre reinforced star material. Each compressor has one inverter, which is managed by the unit microprocessor for infinitely modulating the capacity. An integrated high efficiency oil separator maximizes the oil separation and standard start is Inverter type.

Ecological R-134a refrigerant
The compressors have been designed to operate with R-134a, ecological refrigerant with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential), resulting in low TEWI (Total Equivalent Warming Impact).

Evaporator
The unit is equipped with a direct expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. The evaporator is single-pass on both the refrigerant and water side for pure counter-flow heat exchange and low refrigerant pressure drops. Both attributes contribute to the heat exchanger effectiveness and total unit's outstanding efficiency.
The external shell is covered with a 20mm closed cell insulation material and the evaporator water outlet connections are provided with victaulic kit (as standard). The evaporator has 2 or 3 circuits, one for each compressor and is manufactured in accordance to PED approval.

Condenser coils
The condenser is manufactured with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminium condenser fins with full fin collars. An integral sub-cooler circuit provides sub-cooling to effectively eliminate liquid flashing and increase cooling capacity without increasing the power input.

Condenser coil fans
The condenser fans are propeller type with high efficiency design blades to maximize performances. The material of the blades is glass reinforced resin and each fan is protected by a guard. Fan motors are protected by circuit breakers (installed inside the electrical panel as a standard) and are IP54.

Electronic expansion valve
The unit is equipped with the most advanced electronic expansion valves to achieve precise control of refrigerant mass flow. As today's system requires improved energy efficiency, tighter temperature control, wider range of operating conditions and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory.
Electronic expansion valves possess unique features: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.
Electronic expansion valves are typically working with lower ΔP between high and low pressure side, than a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (winter time) without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

Refrigerant circuit
Each unit has 2 or 3 independent refrigerant circuits and each circuit includes:
- Inverter driven screw compressor with integrated oil separator
- Air cooled condenser
- Electronic expansion valve
- Evaporator
- Discharge line shut off valve
- Liquid line shut off valve
- Suction line shut off valve (optional)
- Sight glass with moisture indicator
- Filter drier
- Charging valves
- High pressure switch
- High and low pressure transducers

GNC_1-2-3-4_Rev.00_1

4 General Characteristics

4 - 1 General characteristics

Electrical control panel
Power and control are located in the main panel that is manufactured to ensure protection against all weather conditions. The electrical panel is IP54 and (when opening the doors) internally protected with a plexiglas panel against possible accidental contact with electrical components (IP20). The main panel is fitted with a main switch interlocked door.

Power Section
The power section includes compressor inverter, fan circuit breaker, fan contactors and control circuit transformer.

MicroTech III controller
MicroTech III controller is installed as standard; it can be used to modify unit set-points and check control parameters. A built-in display shows chiller operating status plus temperatures and pressures of water, refrigerant and air, programmable values, set-points. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors, EEXV and condenser fans to keep stable operating conditions to maximise chiller energy efficiency and reliability.
MicroTech III is able to protect critical components based on external signs from its system (such as motor temperatures, refrigerant gas and oil pressures, correct phase sequence, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this is an additional security for the equipment.
Fast program cycle (200ms) for a precise monitoring of the system. Floating point calculations supported for increased accuracy in P/T conversions.

Control section - main features
• Management of the compressor capacity, inverter, and fans modulation
• Chiller enabled to work in partial failure condition
• Full routine operation at condition of:
  - high ambient temperature value
  - high thermal load
  - high evaporator entering water temperature (start-up)
• Display of evaporator entering/leaving water temperature
• Display of outdoor ambient temperature
• Display of condensing-evaporating temperature and pressure, suction and discharge superheat for each circuit
• Leaving water evaporator temperature regulation (temperature tolerance = 0,1°C)
• Compressor and evaporator pumps hours counter
• Display of Status Safety Devices
• Number of starts and compressor working hours
• Optimized management of compressor load
• Fan management according to condensing pressure
• Re-start in case of power failure (automatic / manual)
• Soft Load (optimized management of the compressor load during the start-up)
• Start at high evaporator water temperature
• Return Reset (Set point reset based on return water temperature)
• OAT (Outside ambient temperature) reset
• Set point reset (optional)
• Application and system upgrade with commercial SD cards
• Ethernet port for remote or local servicing using standard web browsers
• Two different sets of default parameters could be stored for easy restore

Safety device / logic for each refrigerant circuit
• High pressure (pressure switch)
• High pressure (transducer)
• Low pressure (transducer)
• Fans circuit breaker
• High compressor discharge temperature
• High motor winding temperature
• Phase monitor
• Low pressure ratio
• High oil pressure drop
• Low oil pressure
• No pressure change at start

System security
• Phase monitor
• Low ambient temperature lock-out
• Freeze protection

GNC_1-2-3-4_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

Regulation type
Proportional + integral + derivative regulation on the evaporator leaving water output probe.

MicroTech III
MicroTech III built-in terminal has the following features:
- 164x44 dots liquid crystal display with white back lighting. Supports Unicode fonts for multi-lingual
- Key-pad consisting of 3 keys
- Push'n'Roll control for an increased usability
- Memory to protect the data
- General faults alarm relays
- Password access to modify the setting
- Application security to prevent application tampering or hardware usability with third party applications
- Service report displaying all running hours and general conditions
- Alarm history memory to allow an easy fault analysis

Supervising systems (on request)
MicroTech III remote control
MicroTech III is able to communicate to BMS (Building Management System) based on the most common protocols such as:
- ModbusRTU
- LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology.
- BacNet BTP certifief over IP and MS/TP (class 4) (Native).
- Ethernet TCP/IP.

Standard accessories (supplied on basic unit)

Double setpoint – Dual leaving water temperature setpoints.

Compressor thermal relays – Safety devices against compressor motor overloading. This device together with internal motor protection (standard) guarantee the best safety system for compressor motor.

Phase monitor – The phase monitor controls that phases sequence is correct and controls phase loss.

Inverter compressor starter

Evaporator victaulic kit – Hydraulic joint with gasket for an easy and quick water connection.

20mm evaporator insulation – The external shell is covered with a 20mm closed cell insulation material.

Evaporator electric heater – Electric heater (controlled by a thermostat) to protect the evaporator from freezing down to -28°C ambient temperature, providing the power supply is on.

Electronic expansion valve

Discharge line shut off valves – Installed on the discharge port of the compressor to facilitate maintenance operation.

Ambient temperature sensor and setpoint reset of leaving water temperature

Hour run meter – available for compressor

General fault contactor – Alarm relay.

Set-point reset – The leaving water temperature set-point can be overwritten with the following options: 4-20mA from external source (by user); outside ambient temperature; evaporator water temperature Δt.

Demand limit – User can limit the load of the unit by 4-20mA signal or by network system

Alarm from external device – Microprocessor is able to receive an alarm signal from an external device (eg. pump, etc…). User can decide if this alarm signal will stop or not the unit.

Fan circuit breakers – Safety device against motor overloading and short circuit

Main switch interlock door

Emergency stop

GNC_1-2-3-4_Rev.00_3

4 General Characteristics

4 - 1 General characteristics

Options (on request)

Total heat recovery – Produced with plate to plate heat exchangers to produce hot water.

Partial heat recovery – Produced with plate to plate heat exchangers to produce hot water.

Brine version – Allows the unit to operate down to -8°C leaving liquid temperature (antifreeze required).

Under/Over voltage control – This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.

Ampere / Volt meter – Device installed inside the control box showing ampere and volt values

Current limit display – To limit maximum absorbed current of the unit whenever is required

Evaporator flange kit

Speedtrol – Continuous fan speed modulation on the first fan of each circuit. It allows the unit working with air temperature down to –18°C.

Condenser coil guards

Evaporator area guards

Cu-Cu condensing coils – To give better protection against corrosion by aggressive environments.

Cu-Cu-Sn condensing coils – To give better protection against corrosion in aggressive environments and by salty air.

Alucoat condensing coils – Fins are protected by a special acrylic paint with a high resistance to corrosion.

Evaporator flow switch – Supplied separately to be wired and installed on the evaporator water piping (by the customer).

Suction line shut off valves – Installed on the suction port of the compressor to facilitate maintenance operation.

High pressure side manometers

Container kit

Rubber type antivibration mounts – Supplied separately, these are positioned under the base of the unit during installation. Ideal to reduce the vibrations when the unit is floor mounted.

Spring type antivibration mounts – Supplied separately, these are positioned under the base of the unit during installation. Ideal for dampening vibrations for installation on roofs and metallic structures.

Hydronic Kit (single water pump) – Hydronic kit consists of: single direct driven centrifugal pump, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pump are protected from freezing with an additional electrical heater.

Hydronic Kit (twin water pumps) – Hydronic kit consists of: twin direct driven centrifugal pumps, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pumps are protected from freezing with an additional electrical heater.

Double pressure relief valve with diverter

Compressors circuit breakers

Fan speed regulation (includes fan silent mode) – To control the fan speed revolution for smooth operating control of the unit. This option improves the sound level of the unit during low ambient temperature operation.

Refrigerant recovery tank – This option allows to stock refrigerant charge of 1 circuit for maintenance operation. Liquid receiver includes in/out shut-off valve and reliefe valve.

Evaporator right water connections

Ground fault protection – To shut down the entire unit if a ground fault condition is detected.

Rapid restart – It allows the unit to start as fast as 30 seconds after power is restored (in case of power failure).

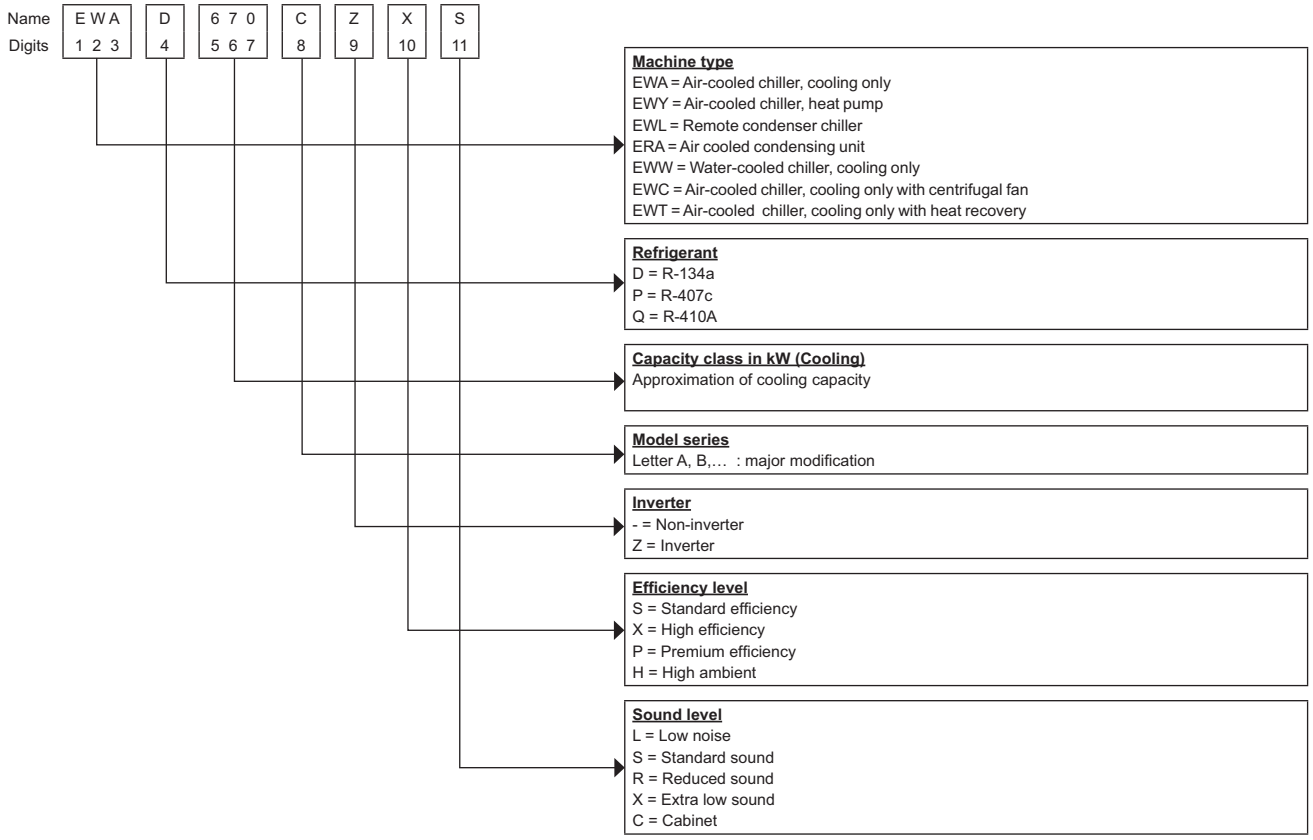
Witness test – Every unit is always tested at the test bench prior to the shipment. On request, a second test can be carried out, at customer's presence, in accordance with the procedures indicated on the test form. (Not available for units with glycol mixtures).

Acoustic test – On request, a test can be carried out, at customer's presence (Not available for units with glycol mixtures).

GNC_1-2-3-4_Rev.00_4

5 Nomenclature

5 - 1 Nomenclature



NMC_1_Rev.00_1

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD670-C13CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		4				5				6				7			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
670	25	686	189	32,70	82	706	191	33,70	87	726	193	34,60	92	745	195	35,50	96
	30	651	212	31,00	75	671	214	32,00	79	690	216	32,90	84	710	219	33,90	88
	35	614	239	29,20	68	633	241	30,10	71	652	243	31,10	75	672	245	32,00	80
	40	578	270	27,50	61	597	272	28,40	64	615	274	29,30	68	634	276	30,30	72
	46	545	316	25,90	54	562	317	26,80	58	581	318	27,70	61	599	320	28,60	65
	48	538	333	25,60	53	548	324	26,10	55	551	306	26,30	56	554	289	26,40	56
	50	481	283	22,90	44	482	266	23,00	44	491	258	23,40	45	500	251	23,80	47
740	25	749	183	35,70	77	774	186	36,90	81	799	188	38,10	86	826	191	39,40	91
	30	711	204	33,90	70	735	206	35,00	74	759	209	36,20	78	783	211	37,40	83
	35	669	228	31,90	62	692	230	33,00	66	715	233	34,10	70	738	235	35,20	75
	40	628	257	29,90	56	649	259	30,90	59	671	260	32,00	63	694	262	33,10	67
	46	586	297	27,90	49	606	299	28,90	52	626	300	29,90	56	647	301	30,90	59
	48	575	313	27,40	48	594	314	28,30	51	614	315	29,30	54	635	316	30,30	57
	50	567	329	27,00	46	586	330	27,90	49	589	312	28,10	50	601	305	28,70	52
830	25	842	210	40,10	56	870	213	41,50	60	904	216	43,10	64	939	220	44,80	68
	30	798	232	38,00	51	826	235	39,40	54	854	238	40,70	58	884	241	42,20	61
	35	753	257	35,90	46	778	260	37,10	49	804	263	38,30	52	832	266	39,70	55
	40	708	286	33,70	41	732	289	34,90	44	756	292	36,10	46	781	294	37,30	49
	46	661	326	31,50	36	684	329	32,60	39	707	331	33,70	41	730	334	34,80	43
	48	649	341	30,90	35	672	344	32,00	37	694	346	33,10	40	716	349	34,20	42
	50	641	357	30,50	34	652	349	31,10	35	663	340	31,60	37	675	332	32,20	38
900	25	917	241	43,70	65	948	245	45,20	69	984	249	46,90	74	1021	253	48,70	79
	30	868	266	41,30	59	898	270	42,80	63	927	273	44,20	67	960	277	45,80	71
	35	818	294	39,00	53	845	297	40,30	57	873	301	41,60	60	902	305	43,00	64
	40	770	325	36,70	48	796	328	37,90	51	821	332	39,20	54	847	336	40,40	57
	46	722	367	34,40	43	747	371	35,60	45	771	375	36,80	48	795	378	37,90	51
	48	712	383	33,90	41	736	386	35,10	44	760	390	36,20	47	783	394	37,30	49
	50	706	399	33,60	41	709	382	33,80	41	705	359	33,60	41	712	347	34,00	42
C10	25	1056	268	50,30	65	1094	273	52,10	69	1134	278	54,10	74	1174	282	56,00	78
	30	996	295	47,40	58	1032	300	49,20	62	1069	304	51,00	66	1107	309	52,80	71
	35	933	325	44,40	52	966	330	46,00	55	1001	334	47,70	59	1037	339	49,50	63
	40	871	358	41,50	46	902	363	43,00	49	935	367	44,60	52	968	372	46,20	55
	46	809	403	38,50	40	837	408	39,90	43	866	412	41,30	45	896	417	42,80	48
	48	794	420	37,80	39	821	424	39,10	41	849	429	40,50	44	866	420	41,30	45
	50	765	418	36,40	36	779	410	37,10	37	794	402	37,80	39	809	394	38,60	40
C11	25	1120	296	53,40	72	1155	301	55,10	76	1192	306	56,80	80	1229	311	58,70	85
	30	1058	327	50,40	65	1092	331	52,00	69	1127	336	53,80	73	1165	341	55,60	77
	35	992	360	47,30	58	1025	365	48,80	61	1060	370	50,50	65	1095	375	52,30	69
	40	929	397	44,20	51	960	402	45,80	54	993	407	47,40	58	1027	412	49,00	62
	46	864	448	41,20	45	894	453	42,60	48	924	458	44,00	51	955	463	45,60	54
	48	848	467	40,40	44	877	472	41,80	46	906	477	43,20	49	913	456	43,60	50
	50	802	448	38,20	39	805	427	38,40	40	809	407	38,60	40	813	388	38,80	40
C12	25	1255	317	59,80	48	1297	322	61,80	50	1340	327	63,90	54	1384	332	66,00	57
	30	1187	350	56,60	43	1228	355	58,50	46	1271	360	60,60	49	1313	365	62,70	52
	35	1116	385	53,20	38	1154	390	55,00	41	1194	395	56,90	44	1236	400	59,00	46
	40	1045	424	49,80	34	1082	429	51,60	36	1120	434	53,40	39	1159	439	55,30	41
	46	972	477	46,30	30	1005	482	47,90	32	1040	487	49,60	34	1076	492	51,40	36
	48	953	497	45,40	29	985	502	46,90	31	1018	506	48,60	33	1053	512	50,30	35
	50	938	517	44,70	28	954	507	45,50	29	965	489	46,00	30	991	487	47,30	31
C13	25	1334	350	63,50	53	1380	355	65,70	56	1425	360	67,90	60	1469	366	70,10	63
	30	1259	385	60,00	48	1303	391	62,10	51	1347	397	64,30	54	1393	402	66,40	57
	35	1185	425	56,40	43	1224	430	58,30	45	1265	436	60,30	48	1308	442	62,40	51
	40	1111	468	52,90	38	1149	474	54,80	41	1188	480	56,70	43	1228	485	58,60	46
	46	1038	527	49,40	34	1073	532	51,10	36	1109	538	52,90	38	1147	544	54,70	41
	48	1021	549	48,70	33	1054	554	50,30	35	1089	559	51,90	37	1125	565	53,70	39
	50	1011	572	48,10	32	1013	546	48,30	32	1003	507	47,80	32	1023	498	48,80	33

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_1

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD670-C13CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		8				9				10				11			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
670	25	764	198	36,50	101	784	200	37,40	105	804	203	38,40	110	824	205	39,40	115
	30	729	221	34,80	92	748	223	35,70	97	767	226	36,70	101	787	228	37,60	106
	35	691	248	33,00	84	711	250	34,00	88	730	252	34,90	93	749	255	35,80	97
	40	654	278	31,20	76	673	280	32,20	80	693	282	33,10	84	713	285	34,10	89
	46	618	321	29,50	69	629	314	30,10	71	641	306	30,60	73	645	290	30,80	74
	48	564	281	26,90	58	575	274	27,40	60	585	267	28,00	62	587	252	28,10	63
	50	508	244	24,30	48	517	237	24,70	50	517	223	24,70	50	519	230	24,80	50
740	25	854	193	40,80	97	880	196	42,00	103	904	199	43,20	108	930	201	44,50	114
	30	808	213	38,60	88	835	216	39,90	93	863	219	41,20	99	887	222	42,40	104
	35	762	237	36,40	79	787	240	37,60	84	812	242	38,80	89	838	245	40,10	94
	40	716	264	34,20	71	740	267	35,30	75	764	269	36,50	80	788	271	37,70	84
	46	668	303	31,90	63	690	305	33,00	66	713	307	34,10	70	736	309	35,20	75
	48	656	318	31,30	60	677	319	32,30	64	699	321	33,40	68	713	314	34,10	70
	50	613	297	29,20	53	624	290	29,80	55	628	274	30,00	56	640	268	30,60	58
830	25	975	224	46,50	73	1013	228	48,40	78	1051	233	50,20	84	1091	237	52,20	90
	30	917	245	43,80	66	951	249	45,40	70	987	253	47,20	75	1024	258	48,90	80
	35	858	269	41,00	58	889	273	42,50	62	922	277	44,00	66	956	281	45,70	71
	40	806	297	38,50	52	834	300	39,80	55	860	304	41,10	59	890	307	42,60	62
	46	753	336	35,90	46	777	339	37,10	49	801	342	38,30	52	828	345	39,60	55
	48	739	351	35,30	44	757	348	36,20	47	772	340	36,90	48	792	338	37,90	51
	50	692	330	33,00	40	710	327	33,90	41	723	320	34,60	43	743	318	35,50	45
900	25	1059	258	50,50	85	1098	263	52,50	91	1140	268	54,50	97	1182	274	56,50	104
	30	995	282	47,50	76	1031	287	49,20	81	1068	292	51,00	86	1107	297	52,90	92
	35	930	309	44,40	67	963	314	46,00	72	997	319	47,70	76	1033	324	49,40	81
	40	874	340	41,70	60	903	344	43,10	64	931	348	44,50	67	963	353	46,00	72
	46	819	382	39,10	54	844	386	40,30	57	869	390	41,50	60	897	394	42,90	63
	48	806	397	38,50	52	815	385	38,90	53	826	374	39,50	54	838	362	40,00	56
	50	724	340	34,60	43	732	329	34,90	44	741	318	35,40	45	752	308	35,90	46
C10	25	1216	287	58,10	84	1259	292	60,10	89	1302	297	62,20	95	1346	303	64,40	101
	30	1147	314	54,70	75	1187	319	56,70	80	1229	324	58,70	85	1271	330	60,70	91
	35	1074	344	51,30	67	1113	349	53,10	71	1152	354	55,00	76	1192	360	57,00	81
	40	1003	377	47,90	59	1039	382	49,60	63	1075	387	51,40	67	1113	393	53,20	71
	46	928	421	44,30	51	959	426	45,80	55	992	432	47,40	58	1014	424	48,50	60
	48	890	418	42,50	48	908	410	43,40	50	933	409	44,60	52	953	402	45,60	54
	50	824	387	39,40	42	836	375	39,90	43	846	363	40,40	44	859	352	41,00	45
C11	25	1269	315	60,60	90	1308	320	62,50	95	1349	325	64,40	101	1390	330	66,40	106
	30	1202	346	57,40	82	1240	351	59,20	87	1279	356	61,10	92	1318	361	63,00	97
	35	1132	380	54,00	73	1169	385	55,80	78	1206	390	57,60	82	1243	396	59,40	87
	40	1062	417	50,70	65	1097	423	52,40	69	1132	428	54,10	74	1167	434	55,80	78
	46	987	468	47,10	57	1018	474	48,60	61	1050	480	50,20	64	1059	460	50,60	65
	48	932	448	44,50	52	939	428	44,80	52	957	421	45,70	54	962	403	46,00	55
	50	829	380	39,60	42	844	373	40,30	43	846	356	40,40	44	861	349	41,10	45
C12	25	1430	337	68,30	60	1477	342	70,60	64	1524	347	72,80	68	1571	352	75,10	72
	30	1357	370	64,80	55	1402	375	66,90	58	1448	380	69,20	62	1494	386	71,40	65
	35	1279	406	61,00	49	1322	411	63,10	52	1365	416	65,20	56	1409	422	67,30	59
	40	1199	445	57,20	44	1240	450	59,20	47	1282	456	61,30	50	1324	462	63,30	53
	46	1113	498	53,20	38	1151	503	55,00	41	1189	509	56,80	43	1228	515	58,70	46
	48	1083	509	51,70	37	1112	507	53,10	38	1135	498	54,20	40	1165	497	55,70	42
	50	1010	478	48,20	32	1038	476	49,60	34	1059	468	50,60	35	1066	448	50,90	36
C13	25	1515	371	72,30	67	1562	377	74,60	71	1609	382	76,90	75	1657	388	79,20	79
	30	1437	408	68,60	61	1481	414	70,70	64	1527	420	72,90	68	1573	426	75,20	72
	35	1353	448	64,60	55	1398	454	66,80	58	1442	460	68,90	61	1485	467	71,00	65
	40	1268	491	60,50	49	1312	498	62,60	52	1356	505	64,80	55	1400	511	66,90	58
	46	1185	550	56,60	43	1224	556	58,40	46	1263	563	60,30	48	1305	570	62,40	51
	48	1149	556	54,90	41	1174	547	56,10	42	1184	524	56,60	43	1208	515	57,80	45
	50	1029	475	49,10	33	1050	467	50,10	35	1071	458	51,20	36	1077	437	51,50	36

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_3

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD670-C13CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		12				13				14				15			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
670	25	844	208	40,40	121	865	210	41,40	126	886	213	42,40	132	907	216	43,40	138
	30	807	231	38,60	111	826	233	39,50	116	847	236	40,50	121	867	239	41,50	127
	35	768	257	36,70	102	787	260	37,70	106	807	262	38,60	111	827	265	39,60	116
	40	732	287	35,00	93	750	290	35,90	98	769	292	36,80	102	788	295	37,70	107
	46	657	283	31,40	77	669	277	32,00	79	673	262	32,20	80	685	257	32,80	83
	48	598	246	28,60	65	608	240	29,10	67	619	234	29,60	69	620	221	29,70	69
	50	528	224	25,30	52	530	212	25,30	52	539	206	25,80	54	549	202	26,30	56
740	25	956	204	45,70	119	983	207	47,00	126	1010	210	48,30	132	1037	213	49,70	139
	30	911	225	43,60	110	937	227	44,80	115	963	230	46,10	121	989	233	47,30	127
	35	866	248	41,40	100	889	251	42,50	105	913	254	43,70	110	939	257	44,90	116
	40	813	274	38,90	89	839	277	40,20	95	867	280	41,50	100	890	283	42,60	105
	46	760	311	36,30	79	784	313	37,50	84	808	316	38,70	88	833	319	39,90	93
	48	728	307	34,80	73	734	292	35,10	74	748	286	35,80	77	754	272	36,10	78
	50	652	262	31,20	60	655	248	31,30	60	667	242	31,90	63	680	237	32,50	65
830	25	1133	242	54,20	96	1175	247	56,20	103	1219	253	58,30	110	1264	259	60,50	117
	30	1062	262	50,80	86	1102	268	52,70	92	1142	273	54,70	98	1185	279	56,70	104
	35	991	285	47,40	76	1028	290	49,20	81	1066	296	51,00	86	1106	301	52,90	92
	40	923	312	44,10	67	957	316	45,80	71	993	321	47,50	76	1030	326	49,30	81
	46	854	348	40,80	58	877	347	42,00	61	899	340	43,00	64	922	335	44,10	67
	48	809	331	38,70	53	831	330	39,70	55	850	323	40,70	57	870	318	41,60	60
	50	754	308	36,10	46	761	293	36,40	47	770	292	36,80	48	779	279	37,30	49
900	25	1227	279	58,70	111	1273	286	60,90	119	1320	292	63,20	127	1370	299	65,60	136
	30	1148	303	54,90	99	1191	309	57,00	105	1235	316	59,10	113	1281	323	61,30	120
	35	1071	329	51,20	87	1110	335	53,10	93	1151	342	55,10	99	1194	349	57,20	106
	40	998	359	47,70	77	1034	365	49,50	82	1072	371	51,30	87	1112	377	53,20	93
	46	925	399	44,20	67	946	393	45,30	70	961	378	46,00	72	978	363	46,80	74
	48	851	352	40,70	58	866	341	41,40	59	878	327	42,00	61	892	313	42,70	63
	50	764	299	36,50	47	772	285	36,90	48	773	288	37,00	48	786	276	37,60	50
C10	25	1391	308	66,50	107	1437	314	68,80	113	1484	320	71,00	120	1531	327	73,30	127
	30	1313	336	62,80	96	1356	342	64,90	102	1400	348	67,00	108	1444	355	69,20	114
	35	1232	366	58,90	86	1273	372	60,90	91	1314	379	62,90	96	1356	386	64,90	102
	40	1151	399	55,00	76	1190	406	56,90	81	1229	413	58,80	85	1268	420	60,70	90
	46	1043	424	49,90	64	1066	418	51,00	66	1096	418	52,40	70	1114	408	53,30	72
	48	974	397	46,60	56	984	381	47,10	57	1001	371	47,90	59	1018	362	48,80	61
	50	872	342	41,70	46	872	337	41,70	46	886	328	42,40	48	901	319	43,10	49
C11	25	1431	335	68,40	112	1473	341	70,50	118	1515	347	72,50	125	1557	353	74,50	131
	30	1357	367	64,90	102	1396	373	66,80	107	1435	379	68,70	113	1474	386	70,60	119
	35	1280	402	61,20	92	1316	408	63,00	97	1352	415	64,70	102	1388	423	66,50	106
	40	1201	441	57,50	82	1235	448	59,10	86	1269	455	60,70	91	1301	463	62,30	95
	46	1079	454	51,60	68	1085	436	51,90	68	1102	430	52,70	70	1105	413	52,90	71
	48	979	397	46,80	57	981	379	46,90	57	995	374	47,60	58	1008	370	48,30	60
	50	874	344	41,80	46	861	347	41,20	45	874	342	41,80	46	885	338	42,40	47
C12	25	1619	358	77,40	76	1668	363	79,80	80	1717	369	82,20	84	1766	375	84,50	89
	30	1539	391	73,60	69	1585	397	75,80	73	1631	403	78,10	77	1677	410	80,30	81
	35	1453	428	69,50	62	1497	435	71,60	66	1541	441	73,70	69	1584	448	75,90	73
	40	1366	468	65,30	56	1407	475	67,30	59	1450	482	69,40	62	1491	490	71,40	65
	46	1268	522	60,60	49	1292	514	61,80	50	1316	506	63,00	52	1347	507	64,50	54
	48	1187	489	56,80	43	1216	489	58,20	45	1236	482	59,10	47	1243	463	59,50	47
	50	1086	441	51,90	37	1091	422	52,20	37	1081	445	51,70	37	1085	428	51,90	37
C13	25	1706	394	81,60	83	1755	400	84,00	87	1805	407	86,40	92	1855	414	88,80	97
	30	1619	432	77,40	76	1666	439	79,70	80	1714	445	82,00	84	1762	452	84,30	88
	35	1530	473	73,10	68	1575	480	75,30	72	1620	487	77,50	76	1666	494	79,80	80
	40	1443	518	69,00	61	1486	525	71,10	65	1529	532	73,20	68	1573	540	75,30	72
	46	1348	577	64,40	54	1362	554	65,20	55	1375	531	65,80	56	1402	524	67,10	58
	48	1218	493	58,30	45	1242	485	59,40	47	1250	464	59,80	48	1257	444	60,20	48
	50	1098	430	52,50	38	1102	410	52,70	38	1066	461	51,00	36	1072	443	51,30	36

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m² °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_5

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC14-C18CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		4				5				6				7			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C14	25	1478	386	70,40	63	1527	392	72,80	67	1577	397	75,20	71	1628	403	77,70	75
	30	1398	426	66,60	57	1445	432	68,90	60	1492	438	71,20	64	1541	444	73,50	68
	35	1311	469	62,50	51	1357	475	64,70	54	1404	481	66,90	57	1450	488	69,20	61
	40	1227	516	58,40	45	1270	523	60,50	48	1315	529	62,70	51	1361	536	64,90	54
	46	1143	580	54,50	40	1183	587	56,40	42	1225	593	58,40	45	1268	600	60,50	48
	48	1124	604	53,50	38	1162	610	55,40	41	1203	616	57,40	43	1244	623	59,40	46
	50	1111	629	52,90	38	1110	594	52,90	38	1109	559	52,90	38	1124	541	53,60	39
C15	25	1575	420	75,00	73	1626	426	77,50	77	1678	432	80,00	82	1731	439	82,60	87
	30	1492	464	71,00	66	1540	470	73,40	70	1590	476	75,80	74	1640	483	78,20	79
	35	1399	511	66,60	59	1448	518	69,00	63	1497	525	71,40	67	1545	531	73,70	71
	40	1309	563	62,40	52	1356	570	64,60	56	1403	577	66,90	59	1452	584	69,30	63
	46	1219	633	58,10	46	1263	639	60,20	49	1308	647	62,40	52	1353	654	64,60	56
	48	1198	658	57,00	45	1240	665	59,10	48	1284	672	61,20	51	1329	679	63,40	54
	50	1183	685	56,40	44	1192	655	56,80	44	1186	610	56,60	44	1197	583	57,10	45
C16	25	1659	439	79,00	64	1707	446	81,30	68	1756	453	83,70	71	1808	460	86,30	75
	30	1571	486	74,80	58	1618	493	77,10	61	1667	500	79,50	65	1719	507	82,00	69
	35	1476	537	70,30	52	1523	544	72,60	55	1573	551	75,00	58	1622	558	77,40	62
	40	1384	593	65,90	46	1429	600	68,10	49	1477	607	70,40	52	1526	614	72,80	55
	46	1292	670	61,50	41	1333	676	63,50	43	1377	683	65,70	46	1422	691	67,80	49
	48	1268	698	60,40	40	1309	705	62,40	42	1351	712	64,40	44	1372	693	65,50	46
	50	1212	682	57,70	37	1212	645	57,80	37	1218	615	58,10	37	1241	603	59,20	38
C17	25	1743	463	83,00	70	1794	471	85,50	74	1847	477	88,10	78	1901	484	90,70	82
	30	1654	513	78,80	64	1703	520	81,20	67	1755	527	83,70	71	1808	534	86,30	75
	35	1558	567	74,20	57	1607	574	76,60	61	1657	581	79,00	64	1709	588	81,50	68
	40	1464	627	69,70	51	1511	634	72,00	54	1560	641	74,40	58	1610	648	76,80	61
	46	1370	708	65,20	45	1413	715	67,40	48	1458	722	69,50	51	1505	729	71,80	54
	48	1347	737	64,10	44	1389	744	66,20	47	1432	751	68,30	49	1455	733	69,40	51
	50	1297	730	61,80	41	1315	712	62,70	42	1320	679	63,00	43	1338	659	63,80	44
C18	25	1836	479	87,50	66	1886	486	89,90	69	1938	493	92,40	72	1992	500	95,00	76
	30	1748	533	83,30	60	1797	539	85,70	63	1848	546	88,10	66	1900	553	90,60	70
	35	1654	591	78,80	54	1702	598	81,10	57	1751	605	83,50	60	1802	611	86,00	64
	40	1564	655	74,50	49	1609	662	76,70	52	1656	669	79,00	55	1705	675	81,30	58
	46	1471	741	70,10	44	1514	748	72,20	46	1560	754	74,40	49	1605	761	76,60	52
	48	1450	772	69,00	43	1491	779	71,10	45	1535	786	73,20	48	1580	793	75,40	50
	50	1390	755	66,20	40	1459	793	69,50	43	1476	772	70,40	44	1468	722	70,00	44

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_2

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC14-C18CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		8				9				10				11			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C14	25	1678	410	80,10	79	1730	416	82,60	84	1782	422	85,10	88	1834	429	87,70	93
	30	1590	450	75,90	72	1640	457	78,30	76	1690	463	80,70	80	1741	470	83,20	85
	35	1497	494	71,50	65	1545	501	73,80	68	1594	508	76,20	72	1644	515	78,60	77
	40	1407	543	67,20	58	1454	550	69,40	61	1500	557	71,70	65	1548	564	74,00	69
	46	1312	607	62,60	51	1357	614	64,80	54	1402	621	67,00	57	1448	629	69,20	61
	48	1272	613	60,70	48	1285	587	61,40	49	1314	578	62,80	51	1328	553	63,50	52
	50	1141	524	54,50	40	1158	507	55,30	41	1175	492	56,10	42	1191	475	56,90	43
C15	25	1784	445	85,20	92	1838	452	87,80	97	1893	459	90,50	102	1949	466	93,10	108
	30	1691	490	80,70	83	1743	497	83,20	88	1796	504	85,80	93	1849	511	88,40	98
	35	1594	538	76,10	75	1644	546	78,50	79	1695	553	81,00	84	1746	561	83,50	88
	40	1500	591	71,60	67	1548	599	73,90	71	1597	606	76,30	75	1647	614	78,70	79
	46	1400	661	66,80	59	1448	669	69,10	63	1496	677	71,50	67	1544	685	73,80	71
	48	1359	669	64,90	56	1375	641	65,70	57	1406	631	67,20	60	1422	604	67,90	61
	50	1224	572	58,40	47	1235	547	59,00	47	1263	537	60,30	49	1273	512	60,80	50
C16	25	1862	467	88,90	79	1917	473	91,50	84	1973	480	94,30	88	2031	487	97,10	93
	30	1770	513	84,50	72	1823	520	87,10	76	1877	527	89,70	81	1932	534	92,30	85
	35	1673	565	79,90	65	1725	572	82,40	69	1776	579	84,90	73	1828	587	87,40	77
	40	1576	621	75,20	59	1625	629	77,60	62	1675	637	80,00	66	1724	645	82,40	69
	46	1468	698	70,10	52	1515	706	72,30	55	1561	715	74,60	58	1596	711	76,30	60
	48	1394	675	66,50	47	1421	663	67,90	49	1431	634	68,40	49	1457	624	69,60	51
	50	1246	575	59,50	39	1269	564	60,60	40	1291	553	61,70	41	1293	527	61,80	41
C17	25	1957	491	93,40	87	2015	498	96,20	91	2073	505	99,10	96	2133	512	102,00	101
	30	1862	541	88,90	79	1917	548	91,60	84	1974	555	94,30	88	2031	563	97,10	93
	35	1761	596	84,10	72	1815	603	86,70	76	1869	610	89,30	80	1923	618	91,90	84
	40	1661	656	79,30	65	1712	663	81,80	68	1764	671	84,30	72	1816	680	86,80	76
	46	1553	737	74,10	57	1601	745	76,50	60	1650	753	78,80	64	1687	749	80,60	66
	48	1490	728	71,10	53	1525	723	72,80	55	1542	699	73,70	57	1571	687	75,10	58
	50	1345	628	64,20	44	1369	617	65,40	46	1394	605	66,60	47	1398	577	66,80	47
C18	25	2047	506	97,70	80	2104	513	100,50	84	2162	519	103,30	88	2221	526	106,20	93
	30	1953	560	93,20	74	2008	566	95,90	77	2064	573	98,60	81	2120	580	101,40	85
	35	1854	618	88,50	67	1906	625	91,00	70	1960	632	93,60	74	2015	639	96,30	78
	40	1755	682	83,80	61	1806	690	86,30	64	1858	697	88,80	67	1910	704	91,30	71
	46	1652	768	78,90	54	1700	776	81,20	57	1748	783	83,50	60	1798	791	85,90	64
	48	1620	793	77,30	53	1661	794	79,30	55	1697	789	81,10	57	1715	761	82,00	58
	50	1481	695	70,70	45	1507	682	72,00	46	1528	664	73,00	47	1541	638	73,70	48

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_4

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC14-C18CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		12				13				14				15			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C14	25	1887	435	90,30	98	1941	442	92,90	103	1995	449	95,50	109	2050	456	98,20	114
	30	1792	477	85,70	89	1843	484	88,20	94	1895	491	90,70	99	1948	499	93,30	104
	35	1693	522	81,00	81	1743	530	83,40	85	1793	537	85,80	90	1844	545	88,30	94
	40	1596	572	76,30	73	1645	579	78,70	77	1694	587	81,00	81	1743	595	83,40	85
	46	1479	620	70,70	63	1503	603	71,90	65	1526	586	73,00	67	1541	562	73,80	68
	48	1348	537	64,50	54	1368	521	65,50	55	1379	498	66,00	56	1406	490	67,30	58
	50	1207	461	57,70	44	1213	459	58,00	44	1193	467	57,10	43	1216	460	58,20	45
C15	25	2005	473	95,90	113	2062	480	98,60	119	2119	488	101,40	125	2177	495	104,20	132
	30	1903	519	91,00	103	1958	526	93,70	109	2013	534	96,40	114	2069	542	99,10	120
	35	1799	568	86,00	93	1852	576	88,60	98	1905	584	91,20	103	1959	593	93,80	109
	40	1698	622	81,20	84	1749	630	83,70	89	1801	639	86,20	93	1853	647	88,70	99
	46	1577	675	75,40	74	1611	665	77,10	77	1629	638	78,00	78	1647	611	78,80	80
	48	1436	578	68,70	62	1467	568	70,20	65	1481	543	70,90	66	1510	534	72,30	68
	50	1300	503	62,20	52	1291	506	61,80	51	1301	484	62,30	52	1329	475	63,60	54
C16	25	2089	494	99,90	98	2148	502	102,80	103	2208	510	105,70	108	2268	518	108,60	113
	30	1987	542	95,00	89	2043	550	97,70	94	2099	558	100,50	99	2155	567	103,20	104
	35	1880	595	89,90	81	1933	603	92,40	85	1985	612	95,00	89	2036	622	97,50	94
	40	1773	654	84,80	73	1821	663	87,10	76	1869	673	89,40	80	1916	683	91,70	84
	46	1624	700	77,60	62	1634	672	78,20	63	1660	664	79,40	65	1666	637	79,80	65
	48	1464	597	70,00	52	1487	588	71,10	53	1509	580	72,20	54	1509	556	72,30	55
	50	1313	518	62,80	42	1307	519	62,50	42	1313	516	62,80	42	1329	509	63,60	43
C17	25	2194	520	104,90	107	2255	527	107,90	112	2317	535	110,90	118	2379	543	113,90	124
	30	2088	570	99,90	98	2146	578	102,70	103	2205	587	105,50	108	2264	596	108,40	113
	35	1978	626	94,60	89	2033	635	97,20	93	2088	644	99,90	98	2143	654	102,60	102
	40	1868	688	89,30	80	1919	697	91,80	84	1971	707	94,30	88	2022	717	96,80	92
	46	1723	745	82,40	69	1749	730	83,70	71	1784	727	85,40	74	1801	705	86,20	75
	48	1580	658	75,60	59	1607	647	76,90	61	1626	631	77,80	62	1637	611	78,40	63
	50	1421	567	68,00	49	1411	560	67,50	48	1433	551	68,60	50	1453	543	69,60	51
C18	25	2281	533	109,10	97	2341	540	112,00	102	2403	547	115,00	107	2465	555	118,00	112
	30	2178	587	104,20	90	2236	595	107,00	94	2295	602	109,90	99	2355	610	112,70	103
	35	2070	647	99,00	82	2126	654	101,70	86	2182	662	104,40	90	2239	671	107,20	94
	40	1963	712	93,90	74	2016	720	96,50	78	2070	729	99,10	82	2124	737	101,70	86
	46	1847	799	88,30	67	1892	801	90,50	70	1931	798	92,40	72	1976	801	94,60	75
	48	1739	742	83,20	60	1757	716	84,00	61	1786	704	85,50	63	1795	674	85,90	63
	50	1567	627	74,90	50	1586	610	75,90	51	1590	596	76,10	51	1614	586	77,30	52

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_6

6 Capacity tables

6 - 2 Partial Heat Recovery Capacity tables

Partial Heat Recovery Ratings

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

Evaporator Leaving Temperature 7°C - Δt 5°C Condenser Inlet Air 35°C"	Partial Heat Recovery Leaving Water Temperature (°C)			Partial Heat Recovery LWT 45°C	
	45 (Δt=5°C)	50 (Δt=5°C)	55 (Δt=5°C)	Water Flow	Pressure Drops
	Hc (kW)	Hc (kW)	Hc (kW)	l/s	kPa
	120	100	81,8	5,71	24
	127	106	86,6	6,05	26
	143	120	97,6	6,82	33
	157	132	108	7,52	40
	179	151	123	8,57	51
	192	161	131	9,16	39
	213	179	146	10,17	48
	228	192	156	10,90	33
	253	212	173	12,07	41
	271	227	185	12,92	46
	284	239	194	13,59	39
	300	252	205	14,31	42
	314	264	215	15,02	46

cappart_1_Rev.00_1

6 Capacity tables

6 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
40/45	606	217	700	85%	6,01
	668	203	740	85%	6,94
	754	230	836	85%	6,91
	817	267	922	85%	6,51
	935	295	1046	85%	6,71
	986	329	1118	85%	6,39
	1117	347	1244	85%	6,81
	1179	386	1331	85%	6,50
	1307	426	1473	85%	6,52
	1393	465	1580	85%	6,39
	1467	491	1664	85%	6,38
	1547	517	1755	85%	6,38
	1640	537	1850	85%	6,50

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
40/50	578	220	678	85%	5,72
	637	205	716	85%	6,59
	719	233	809	85%	6,56
	779	270	892	85%	6,19
	891	298	1011	85%	6,38
	940	333	1082	85%	6,07
	1064	351	1203	85%	6,47
	1124	391	1288	85%	6,17
	1246	431	1425	85%	6,20
	1328	471	1529	85%	6,07
	1398	497	1611	85%	6,06
	1475	523	1698	85%	6,06
	1563	543	1790	85%	6,18

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
45/55	578	222	480	60%	4,76
	637	208	507	60%	5,50
	719	236	573	60%	5,48
	779	274	632	60%	5,16
	891	302	716	60%	5,32
	940	337	767	60%	5,06
	1064	355	852	60%	5,40
	1124	396	912	60%	5,15
	1246	437	1009	60%	5,17
	1328	477	1083	60%	5,06
	1398	503	1141	60%	5,05
	1475	530	1203	60%	5,05
	1563	550	1268	60%	5,15

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
50/60	578	222	280	35%	3,86
	637	208	296	35%	4,48
	719	236	334	35%	4,47
	779	274	368	35%	4,20
	891	302	418	35%	4,33
	940	337	447	35%	4,11
	1064	355	497	35%	4,40
	1124	396	532	35%	4,19
	1246	437	589	35%	4,20
	1328	477	632	35%	4,11
	1398	503	666	35%	4,10
	1475	530	702	35%	4,11
	1563	550	739	35%	4,19

Notes:
Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)
%Hc (percentage heat recovered)
COP Hc (coefficent of performance during heat recovery = (cooling+ heating capacity) / power input)
EWC (Entering water heat recovery condenser)
LWC (Leaving water heat recovery condenser)

Data refers to:
LWE (Leaving water evaporator) = 7°C
Same evaporator flow as for nominal cooling operation
Condenser Inlet Air Temperature = 35°C
0,0176 m^2 °C/kW evaporator fouling factor

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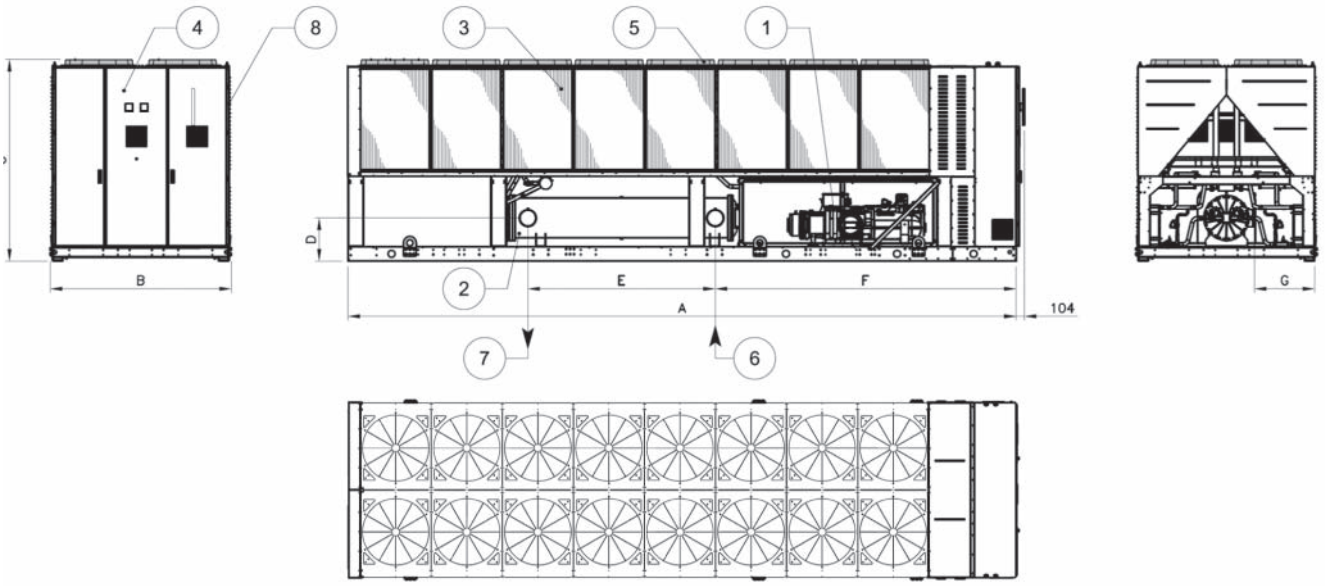
7 Dimensional drawings

7 - 1 Dimensional Drawings



The drawing is for illustration only. Please refer to the table below for unit dimensions.

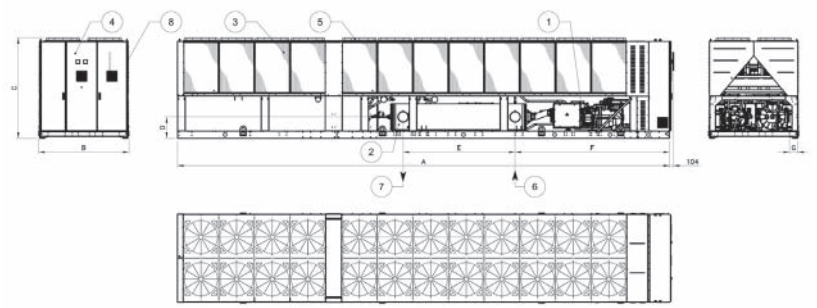
Models		Dimensions (mm)							
EWAD~CZXS/XL	EWAD~CZXR	A	B	C	D	E	F	G	Fans
670	640	6621	2285	2540	434	2412	3757	810	10
740	700	6621	2285	2540	434	2412	3757	810	12
830	790	7521	2285	2540	434	2412	3757	810	14
900	850	7521	2285	2540	434	2412	3757	810	14
C10	980	8421	2285	2540	542	2360	3794	758	16
C11	C10	8421	2285	2540	542	2360	3794	758	16
C12	C11	9321	2285	2540	542	2360	3794	758	20
C13	C12	9321	2285	2540	542	2360	3794	758	20

LEGEND
1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator water inlet
7. Evaporator water outlet
8. Power connections slot

DMN_1-2_Rev.00_1

7 Dimensional drawings

7 - 1 Dimensional Drawings



The drawing is for illustration only. Please refer to the table below for unit dimensions.

Models		Dimensions (mm)							
EWAD~CZXS/XL	EWAD~CZXR	A	B	C	D	E	F	G	Fans
C14	C13	11521	2285	2540	542	2360	3794	758	22
C15	C14	12421	2285	2540	542	2360	3794	758	24
C16	C15	12421	2285	2540	542	2830	3896	208	24
C17	C16	13321	2285	2540	542	2830	3896	208	26
C18	C17	14221	2285	2540	542	2830	3896	208	28

LEGEND
1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator water inlet
7. Evaporator water outlet
8. Power connections slot

DMN_1-2_Rev.00_2

8 Sound data

8 - 1 Sound Level Data

Sound Levels

EWAD~CZXS

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
670	64,1	65,4	72,2	76,8	78,5	72,3	68,1	59,0	**102,1**	**81,0**
740	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,0	**102,2**	**81,0**
830	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,1	**102,5**	**81,1**
900	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,1	**102,5**	**81,1**
C10	64,2	65,5	72,3	76,9	78,6	72,4	68,2	59,1	**102,9**	**81,1**
C11	64,2	65,5	72,3	76,9	78,6	72,4	68,2	59,1	**102,9**	**81,1**
C12	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**103,5**	**81,2**
C13	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**103,5**	**81,2**
C14	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**104,1**	**81,2**
C15	64,3	65,7	72,4	77,0	78,7	72,5	68,3	59,2	**104,1**	**81,2**
C16	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,8	**105,8**	**82,8**
C17	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,9	**106,0**	**82,9**
C18	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,9	**106,2**	**82,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

EWAD~CZXL

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
670	60,6	61,9	68,7	73,3	75,0	68,8	64,6	55,5	**98,6**	**77,5**
740	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,0	**99,2**	**78,0**
830	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,1	**99,5**	**78,1**
900	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,1	**99,5**	**78,1**
C10	61,2	62,5	69,3	73,9	75,6	69,4	65,2	56,1	**99,9**	**78,1**
C11	61,2	62,5	69,3	73,9	75,6	69,4	65,2	56,1	**99,9**	**78,1**
C12	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**100,5**	**78,2**
C13	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**100,5**	**78,2**
C14	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**101,1**	**78,2**
C15	61,3	62,7	69,4	74,0	75,7	69,5	65,3	56,2	**101,1**	**78,2**
C16	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,8	**102,8**	**79,8**
C17	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,9	**103,0**	**79,9**
C18	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,9	**103,2**	**79,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

EWAD~CZXR

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
640	56,6	57,9	64,7	69,3	71,0	64,8	60,6	51,5	**94,6**	**73,5**
700	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,0	**95,2**	**74,0**
790	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,1	**95,5**	**74,1**
850	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,1	**95,5**	**74,1**
980	57,2	58,5	65,3	69,9	71,6	65,4	61,2	52,1	**95,9**	**74,1**
C10	57,2	58,5	65,3	69,9	71,6	65,4	61,2	52,1	**95,9**	**74,1**
C11	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**96,5**	**74,2**
C12	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**96,5**	**74,2**
C13	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**97,1**	**74,2**
C14	57,3	58,7	65,4	70,0	71,7	65,5	61,3	52,2	**97,1**	**74,2**
C15	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,8	**98,8**	**75,8**
C16	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,9	**99,0**	**75,9**
C17	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,9	**99,2**	**75,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

NSL_1-2_Rev.00_1

8 Sound data

8 - 1 Sound Level Data

Sound pressure level correction factor for different distances

EWAD~CZXS / EWAD~CZXL / EWAD~CZXR

Unit size			Distance						
EWAD~CZ-XS	EWAD~CZ-XL	EWAD~CZ-XR	1m	5m	10m	15m	20m	25m	50m
670	670	640	0,0	7,0	11,5	14,4	16,6	18,4	24,0
740	740	700	0,0	7,0	11,5	14,4	16,6	18,4	24,0
830	830	790	0,0	6,8	11,3	14,2	16,4	18,1	23,7
900	900	850	0,0	6,8	11,3	14,2	16,4	18,1	23,7
C10	C10	980	0,0	6,6	11,0	13,9	16,1	17,9	23,4
C11	C11	C10	0,0	6,6	11,0	13,9	16,1	17,9	23,4
C12	C12	C11	0,0	6,4	10,7	13,5	15,7	17,4	22,9
C13	C13	C12	0,0	6,4	10,7	13,5	15,7	17,4	22,9
C14	C14	C13	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C15	C15	C14	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C16	C16	C15	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C17	C17	C16	0,0	6,0	10,2	12,9	15,0	16,7	22,2
C18	C18	C17	0,0	6,0	10,0	12,8	14,9	16,6	22,0

Values are dB(A) (pressure level)
Reduction to be applied to standard, low and reduced noise levels

NSL_1-2_Rev.00_2

9 Installation

9 - 1 Installation Method

Warning
Installation and maintenance of the unit must to be performed only by qualified personnel who have knowledge with local codes and regulations, and experience with this type of equipment. Must be avoided the unit installation in places that could be considered dangerous for all the maintenance operations.

Handling
Care should be taken to avoid rough handling or shock due to dropping the unit. Do not push or pull the unit from anything other than the base frame. Never allow the unit to fall during unloading or moving as this may result in serious damage. To lift the unit, rings are provided in the base frame of the unit. Spreader bar and cables should be arranged to prevent damage to the condenser coil or unit cabinet.

Location
The units are produced for outside installation on roofs, floors or below ground level on condition that the area is free from obstacles for the passage of the condenser air. The unit should be positioned on solid foundations and perfectly level; in the case of installation on roofs or floors, it may be advisable to arrange the use of suitable weight distribution beams. When the units are installed on the ground, a concrete base at least 250 mm wider and longer than the unit's footprint should be laid. Furthermore, this base should withstand the unit weight mentioned in the technical data table.

Space requirements
The units are air-cooled, then it is important to respect the minimum distances which guarantee the best ventilation of the condenser coils. Limitations of space reducing the air flow could cause significant reductions in cooling capacity and an increase in electricity consumption.
To determinate unit placement, careful consideration must be given to assure a sufficient air flow across the condenser heat transfer surface. Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation. Both these conditions cause an increase of condensing pressures that results in reductions in unit efficiency and capacity.
Moreover the unique microprocessor has the ability to calculate the operating environment of the air cooled chiller and the capacity to optimize its performance staying on-line during abnormal conditions.
Each side of the unit must be accessible after installation for periodic service. Fig.1 shows you minimum recommended clearance requirements.
Vertical condenser air discharge must be unobstructed because the unit would have its capacity and efficiency significantly reduced.
If the units are positioned in places surrounded by walls or obstacles of the same height as the units, the units should be at least 2500 mm from obstacles (fig.2). In the event the obstacles are higher than the units, the units should be at least 3000 mm from the obstacle (fig.4). Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. The microprocessor control is proactive in response "of design condition". In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.
When two or more units are positioned side by side it is recommended that the condenser coils are at least 3600 mm distance from one another (fig.3); strong wind could be the cause of air warm recirculation.
For other installation solutions, consult our technicians.

INN_1-2_Rev.00_1

9 Installation

9 - 1 Installation Method

The above recommended information are representative of general installation. A specific evaluation should be done by contractor depending on the case.

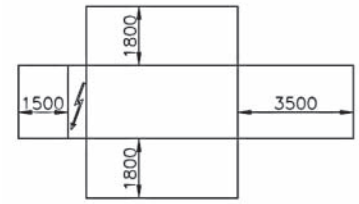


Fig. 1

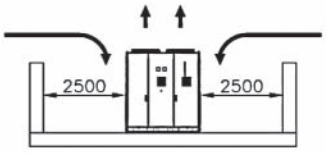


Fig. 2

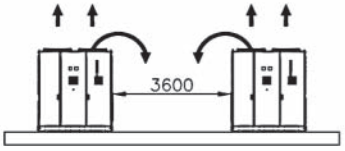


Fig. 3

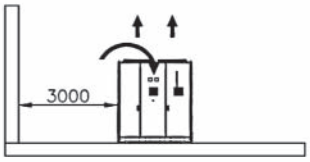


Fig. 4

Acoustic protection

When noise level must meet special requirements, it is necessary to pay the maximum attention to ensure the perfect insulation of the unit from the support base by applying appropriate vibration-dampening devices on the unit, on the water pipes and on the electrical connections.

Storage

The environment conditions have to be in the following limits:

Minimum ambient temperature: -20°C
Maximum ambient temperature: +57°C
Maximum R.H.: 95% not condensing

INN_1-2_Rev.00_2

9 Installation

9 - 2 Water Charge, Flow and Quality

Items (1) (5)			Cooling Water			Cooled Water		Heated water (2)				Tendency if out of criteria
			Circulating System		Once Flow			Low temperature		High temperature		
			Circulating water	Supply water (4)	Flowing water	Circulating water [Below 20°C]	Supply water (4)	Circulating water [20°C ~ 60°C]	Supply water (4)	Circulating water [60°C ~ 80°C]	Supply water (4)	
Items to be controlled:	pH	at 25°C	6.5 ~ 8.2	6.0 ~ 8.0	6.0 ~ 8.0	6.8 - 8.0	6.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	Corrosion + Scale
	Electrical conductivity	[mS/m] at 25°C	Below 80	Below 30	Below 40	Below 80	Below 80	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(µS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 800)	(Below 800)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl^-/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO^{2-}_4/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	M-alkalinity (pH4.8)	[mg$CaCO_3$/l]	Below 100	Below 50	Below 50	Below 100	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mg$CaCO_3$/l]	Below 200	Below 70	Below 70	Below 200	Below 70	Below 70	Below 70	Below 70	Below 70	Scale
	Calcium harness	[mg$CaCO_3$/l]	Below 150	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Silca ion	[mgSiO_2/l]	Below 50	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Scale
	Oxygen	(mg O2 /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Corrosion
	Particole size	(mm)	Below 0.5	Below 0.5	Below 0.5	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Erosion
	Total dissolved solids	(mg / l)	Below 1000	Below 1000	Below 1000	Below 1000	Below 1001	Below 1000	Below 1001	Below 1000	Below 1001	Erosion
	Ethykene, Propylene Glycol	(weight conc.)	Below 60%	Below 60%	---	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	---
Items to be referred to:	Nitrate ion	(mg NO3- /l)	Below 100	Below 100	Below 100	Below 100	Below 101	Below 100	Below 101	Below 100	Below 101	Corrosion
	TOC Total organic carbon	(mg /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Scale
	Iron	[mgFe/l]	Below 1.0	Below 0.3	Below 1.0	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Corrosion + Scale
	Copper	[mgCu/l]	Below 0.3	Below 0.1	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 0.1	Below 1.0	Below 0.1	Corrosion
	Sulfite ion	[mgS^{2-}/l]	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Corrosion
	Ammonium ion	[mgNH^+_4/l]	Below 1.0	Below 0.1	Below 1.0	Below 1.0	Below 0.1	Below 0.3	Below 0.1	Below 0.1	Below 0.1	Corrosion
	Remaining chloride	[mgCL/l]	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.25	Below 0.3	Below 0.1	Below 0.3	Corrosion
	Free carbide	[mgCO_2/l]	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 0.4	Below 4.0	Below 0.4	Below 4.0	Corrosion
	Stability index		6.0 ~ 7.0	---	---	---	---	---	---	---	---	Corrosion + Scale

1 Names, definitions and units are according to JIS K 0101. Units and figures between brackets are old units published as reference only.
2 In case of using heated water (more than 40°C), corrosion is generally noticeable. Especially when the iron materials is in direct contact with water without any protection shields, it is desireable to give the valid measure for corrosion. E.g. chemical measure
3 In the cooling water using hermetic cooling tower, close circuit water is according to heated water standard, and scattered water is according to cooling water standard.
4 Supply water is considered drink water, industrial water and ground water except for genuine water, neutral water and soft water.
5 The above mentioned items are representable items in corrosion and scale cases.
6 The limits above have to be considered as a general prescription and con not totallu assure the absence of corrossion and erosion. Some particular combinations of elements or the presence of components not listed in the table or factors not considered may trigger corrosion phenomena.

waflowqua_1-2_Rev.00_1

9 Installation

9 - 2 Water Charge, Flow and Quality

Water content in cooling circuits

The cooled water distribution circuits should have minimum water content to avoid excessive compressors start and stop.

In fact, each time the compressor starts up, an excessive quantity of oil goes from the compressor sump and simultaneously there is a rise in the temperature of the compressor motor's stator due to the inrush current during the start-up.

To prevent damage to the compressors, It has been envisaged the application of a device to limit frequent stops and restarts.

During the span of one hour there will be no more than 6 starts of the compressor. The plant side should therefore ensure that the overall water content allows a more constant functioning of the unit and consequently greater environmental comfort.

The minimum water content per unit should be calculated using this simplified formula:

For 2 compressors unit
M (liters) = (0.1595 x ΔT(°C) + 3.0825) x P(kW)

For 3 compressors unit
M (liters) = (0.0443 x ΔT(°C) + 1.6202) x P(kW)

where:

M	minimum water content per unit expressed in litres
P	Cooling Capacity of the unit expressed in kW
ΔT	evaporator entering / leaving water temperature difference expressed in °C

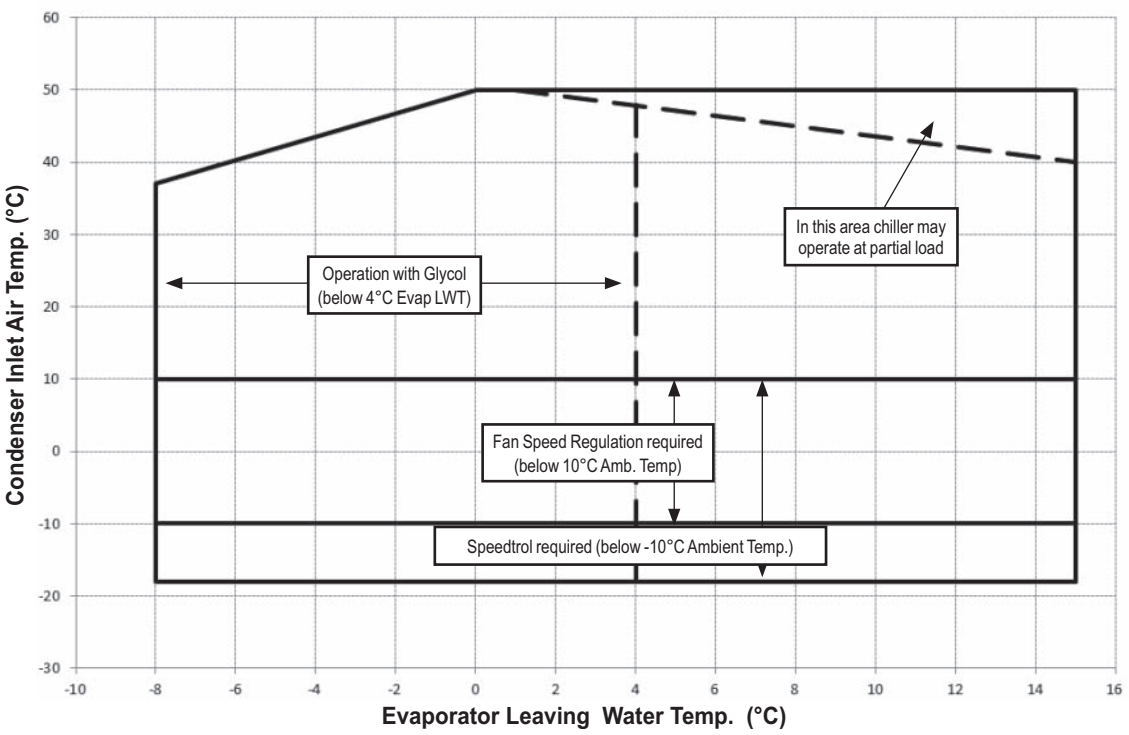
This formula is valid for:
- standard microprocessor parameters

For more accurate determination of quantity of water, it is advisable to contact the designer of the plant.

waflowqua_1-2_Rev.00_2

10 Operation range

10 - 1 Operation Range



operange_1_Rev.00_1

10 Operation range

10 - 2 Correction Factors

Table 1 - Evaporator minimum and maximum water Δt

Max evaporator water Δt	**°C**	**8**
Min evaporator water Δt	**°C**	**4**

Table 2 - Evaporator fouling factors

"Fouling factors m2 °C / kW"	"Cooling capacity correction factor"	"Power input correction factor"	"EER correction factor"
0,0176	1,000	1,000	1,000
0,0440	0,978	0,986	0,992
0,0880	0,957	0,974	0,983
0,1320	0,938	0,962	0,975

Table 3 - Altitude correction factors

Elevation above sea level (m)	**0**	**300**	**600**	**900**	**1200**	**1500**	**1800**
Barometric pressure (mbar)	1013	977	942	908	875	843	812
Cooling capacity correction factor	1,000	0,993	0,986	0,979	0,973	0,967	0,960
Power input correction factor	1,000	1,005	1,009	1,015	1,021	1,026	1,031
Maximum Ambient Temperature	1,000	1,000	1,000	1,000	0,992	0,980	0,968

Table 4.1 - Minimum glycol percentage for low water temperature

Evaporator Leaving Water Temperature (°C)	**2**	**0**	**-2**	**-4**	**-6**	**-8**
Ethylene glycol (%)	10	20	20	20	30	30
Propylene glycol (%)	10	20	20	30	30	30

Note: Minimum glycol percentage to be used with evaporator leaving water temperature below 4°C to prevent freezing of water circuit.

Table 4.2 - Minimum glycol percentage for low air temperature

Air Ambient Temperature (°C) (2)	**-3**	**-8**	**-15**	**-23**	**-35**
Ethylene glycol (%) (1)	10%	20%	30%	40%	50%
Air Ambient Temperature (°C) (2)	**-3**	**-7**	**-12**	**-20**	**-32**
Propylene glycol (%) (1)	10%	20%	30%	40%	50%

Note (1): Minimum glycol percentage to prevent freezing of water circuit at indicated air ambient temperature
Note (2): Air ambient temperature do exceed the operating limits of the unit, as protection of water circuit may be needed in winter season at non-working conditions

Table 5 - Correction factors for low evaporator leaving water temperature

Evaporator Leaving Water Temperature (°C)	**2**	**0**	**-2**	**-4**	**-6**	**-8**
Cooling Capacity	0,842	0,785	0,725	0,670	0,613	0,562
Compressor Power Input	0,950	0,940	0,920	0,890	0,870	0,840

Note: Correction factors have to be applied at working conditions: evaporator leaving water temperature 7°C

Table 6 - Correction factors for water and glycol mixture

	Ethylene Glycol (%)	**10%**	**20%**	**30%**	**40%**	**50%**
Ethylene Glycol	**Cooling Capacity**	0,991	0,982	0,972	0,961	0,946
	Compressor Power Input	0,996	0,992	0,986	0,976	0,966
	Flow Rate (Δt)	1,013	1,04	1,074	1,121	1,178
	Evaporator Pressure Drop	1,070	1,129	1,181	1,263	1,308
Propylene Glycol	**Cooling Capacity**	0,985	0,964	0,932	0,889	0,846
	Compressor Power Input	0,993	0,983	0,969	0,948	0,929
	Flow Rate (Δt)	1,017	1,032	1,056	1,092	1,139
	Evaporator Pressure Drop	1,120	1,272	1,496	1,792	2,128

operangecorr_1-2-3_Rev.00_1

10 Operation range

10 - 2 Correction Factors

How to use the correction factors proposed in the previous tables

A) Mixture Water and Glycol --- Evaporator leaving water temperature > 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.2 and 6)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	EWAD670CZXS
Mixture:	Water
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	672 kW
- Power input:	245 kW
- Flow rate (Δt 5°C):	32.00 l/s
- Evaporator pressure drop:	80 kPa
Mixture:	Water + Ethylene Glycol 30% (for a winter air temperature up to -15°C)
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	672 x 0.972 = 653 kW
- Power input:	245 x 0.986 = 242 kW
- Flow rate (Δt 5°C):	31.19 (referred to 653 kW) x 1.074 = 33.50 l/s
- Evaporator pressure drop:	76.25 (referred to 31.19 l/s) x 1.181 = 90.06 kPa

B) Mixture Water and Glycol --- Evaporator leaving water temperature < 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.1 and 4.2 and table 6)
- depending from the evaporator leaving water temperature (see table 5)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 5 and Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	EWAD670CZXS
Mixture:	Water
Standard working condition	ELWT 12/7°C – Condenser inlet air temperature 30°C
- Cooling capacity:	710 kW
- Power input:	219 kW
- Flow rate (Δt 5°C):	33.90 l/s
- Evaporator pressure drop:	88 kPa
Mixture:	Water + Glycol 30% (for a low evaporator leaving temperature of -1/-6°C)
Working condition:	ELWT -1/-6°C – Condenser inlet air temperature 30°C
- Cooling capacity:	710 x 0.613 x 0.972 = 423 kW
- Power input:	219 x 0.870 x 0.986 = 188 kW
- Flow rate (Δt 5°C):	20.22 l/s (referred to 423 kW) x 1.074 = 21.72 l/s
- Evaporator pressure drop:	38.28 kPa (referred to 20.00 l/s) x 1.181 = 45.21 kPa

operangecorr_1-2-3_Rev.00_2

10 Operation range

10 - 2 Correction Factors

Table 7 - Available fan static pressure correction factors

External Static Pressure (Pa)	0	10	20	30	40	50	60	70	80	90	100
Cooling Capacity (kW) Correction factor	1,000	0,998	0,996	0,995	0,993	0,992	0,991	0,989	0,986	0,985	0,982
Compr. Power Input (kW) Correction factor	1,000	1,004	1,009	1,012	1,018	1,021	1,024	1,027	1,034	1,039	1,045
Reduction of Max CIAT (°C)	1,000	-0,3	-0,5	-0,7	-1,0	-1,1	-1,3	-1,6	-1,8	2,1	-2,4

CIAT: Condenser Inlet Air Temperature

External Static Pressure (Pa)	0	10	20	30	40	50	60	70
Cooling Capacity (kW) Correction factor	1,000	0,996	0,991	0,985	0,978	0,97	0,954	0,927
Compr. Power Input (kW) Correction factor	1,000	1,005	1,012	1,02	1,028	1,039	1,058	1,092
Reduction of Max CIAT (°C)	1,000	-0,3	-0,7	-1,1	-1,6	-2,2	-3,3	-5,1

CIAT: Condenser Inlet Air Temperature

How to use the Correction factors proposed in the previous tables

Example
Unit Size: EWAD670CZXS

- External static pressure **0 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 672 kW
- Power input: 245 kW
- Maximum CIAT: 50°C (see graphic operating limit)

- External static pressure **40 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 672 x 0.978 = 657 kW
- Power input: 245 x 1.028= 252 kW
- Maximum CIAT 50 - 1.6 = 48.4°C

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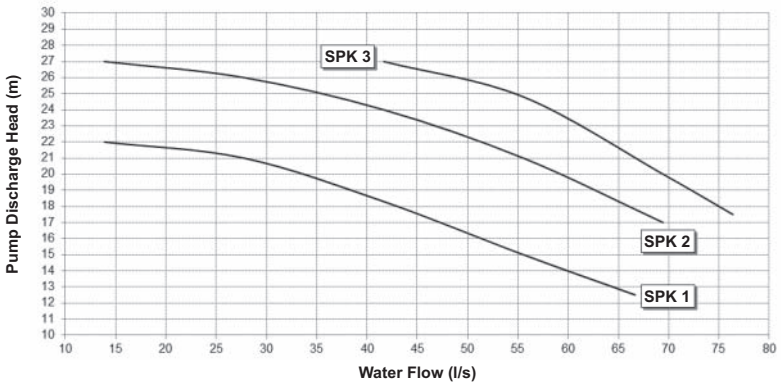
11 Hydraulic performance

11 - 1 Pump Characteristics

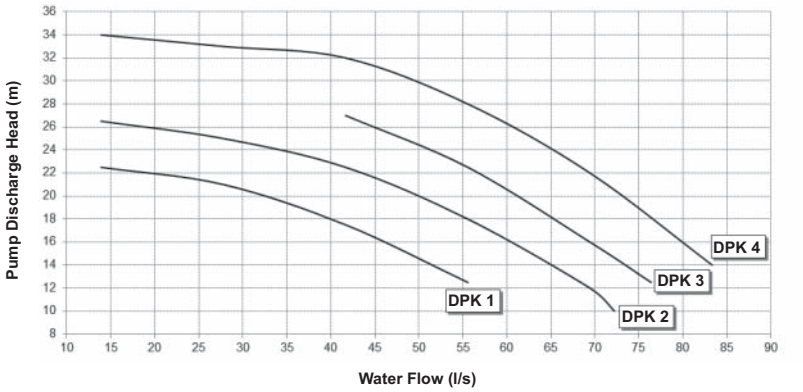
Water Pump Kit - Discharge Head

Single Pump (2 poles) - Discharge Head



Note
- the above curves are referred to the discharge head of the pump only
- when selecting the pump you have to consider the installation and evaporator pressure drops
- when using mixture of water and glycol please contact the factory as above specification can change

Tzin Pump (2 poles) - Discharge Head



Note
- the above curves are referred to the discharge head of the pump only
- when selecting the pump you have to consider the installation and evaporator pressure drops
- when using mixture of water and glycol please contact the factory as above specification can change

pump_1-2_Rev.00_1

11 Hydraulic performance

11 - 1 Pump Characteristics

Water Pump Kit - Combination Matrix

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

Single Pump			Double Pump			
SPK 1	**SPK 2**	**SPK 3**	**DPK 1**	**DPK 2**	**DPK 3**	**DPK 4**
X	X		X	X		
X	X		X	X		
X	X		X	X		
X	X		X	X		
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X		X	X	X
X	X	X		X	X	X
X	X	X		X	X	X
		X			X	X

Water Pump Kit - Technical Information

		Pump Motor Power (kW)	Pump Motor Current (A)	Power supply (V-ph-Hz)	PN	Motor Protection	Insulation (Class)	Working Temp. (°C)
Single Pump	**SPK 1**	11,0	20,0	400V-3ph-50hz	16	IP55	class F	-20 +140
	SPK 2	15,0	26,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	SPK 3	18,5	32,5	400V-3ph-50hz	16	IP55	class F	-20 +140
Double Pump	**DPK 1**	11,0	20,0	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 2	15,0	26,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 3	18,5	32,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 4	22,0	39,0	400V-3ph-50hz	16	IP55	class F	-20 +140

Note
- when using mixture of water and glycol please contact the factory as above specification can change

pump_1-2_Rev.00_2

11 Hydraulic performance

11 - 2 Total Heat Recovery Pressure Drop

Total and Partial Heat Recovery Pressure Drops

To determinate the pressure drop for different versions or at different working condition, please refer to the following formula:

$$PD_2\ (kPa) = PD_1\ (kPa) \times \left(\frac{Q_2\ (l/s)}{Q_1\ (l/s)} \right)^{1.87}$$

where:

- PD_2 Pressure drop to be determinate (kPa)
- PD_1 Pressure drop at nominal condition (kPa)
- Q_2 water flow at new working condition (l/s)
- Q_1 water flow at nominal condition (l/s)

How to use the formula: Example

The unit EWAD670CZXS has been selected for working at the following conditions:
- Partial heat recovery leaving water temperature 50/55°C

The heating capacity at these working conditions is: 81.8 kW
The water flow at these working conditions is: 3.91 l/s

The unit EWAD670CZXS at nominal working conditions has the following data:
- Partial heat recovery leaving water temperature 40/45°C
- condenser air inlet: 35°C

The heating capacity at these working conditions is: 120 kW
The water flow at these working conditions is: 5.71 l/s
The pressure drop at these working conditions is: 24 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = \mathbf{24}\ (kPa) \times \left(\frac{\mathbf{3.91}\ (l/s)}{\mathbf{5.71}\ (l/s)} \right)^{1.87}$$

$$PD_2\ (kPa) = \mathbf{12}\ (kPa)$$

totheatpd_1_Rev.00_1

12 Specification text

12 - 1 Specification Text

Technical specification for air cooled chiller

GENERAL

The chiller will be designed and manufactured in accordance with the following European directives:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Standards	UNI – EN ISO 9001:2004

To avoid any losses, the unit will be tested at full load in the factory (at the nominal working conditions and water temperatures). The chiller will be delivered to the job site completely assembled and charged with refrigerant and oil. The installation of the chiller must comply with the manufacturer's instructions for rigging and handling equipment.

The unit will be able to start up and operate (as standard) at full load with:
- outside air temperature from ..... °C to ..... °C
- evaporator leaving fluid temperature between ..... °C and ..... °C

Refrigerant

Only R-134a can be used.

PERFORMANCE

- ✓ Number of chiller(s) : ..... unit(s)
- ✓ Cooling capacity for single chiller : ..... kW
- ✓ Power input for single chiller in cooling mode : ..... kW
- ✓ Heat exchanger entering water temperature in cooling mode: : ..... °C
- ✓ Heat exchanger leaving water temperature in cooling mode : ..... °C
- ✓ Heat exchanger water flow : ..... l/s
- ✓ Nominal outside working ambient temperature in cooling mode : ..... °C

Operating voltage range should be 400V ±10%, 3ph, 50Hz, voltage unbalance maximum 3%, without neutral conductor and shall only have one power connection point.

UNIT DESCRIPTION

The chiller includes as standard not less than: two or three independent refrigerant circuits (depending on the size), semi-hermetic asymmetric type rotary single screw compressors, air cooled variable electrical frequency driver for each compressor (VFD), electronic expansion device (EEXV), refrigerant direct expansion 'shell&tube' heat exchanger, air-cooled condenser section, R-134a refrigerant, lubrication system, motor starting components, discharge line shut-off valve, control system and all components necessary for a safe and stable unit operation.
The chiller will be factory assembled on a robust base frame made of galvanized steel, protected by an epoxy paint.

SOUND LEVEL AND VIBRATIONS

Sound pressure level at 1 meter distance in free field, semispheric conditions, shall not exceed ……dB(A). The sound pressure levels must be rated in accordance to ISO 3744 (other types of rating can not be used).
Vibration on the base frame should not exceed 2 mm/s.

DIMENSIONS

Unit dimensions shall not exceed following indications:
- Unit length ..... mm
- Unit width ..... mm
- Unit height ..... mm

SPC_1-2-3-4_Rev.00_1

12 Specification text

12 - 1 Specification Text

CHILLER COMPONENTS

Compressors

- ✓ Semi-hermetic, single-screw asymmetric type with one main helical rotor meshing with two diametrical opposed gaterotors. The gaterotors' contact elements shall be constructed of composite material designed for extended life. Electrical motor shall be 2-pole, semi-hermetic, squirrel-cage induction type and cooled by suction gas.
- ✓ The oil injection shall be used in order to get high EER (Energy Efficiency Ratio) also at high condensing pressure and low sound pressure levels in each load condition.
- ✓ The compressor shall be provided with a built in, high efficiency, mesh type oil separator and oil filter.
- ✓ Refrigerant system differential pressure shall provide oil injection on all moving compressor parts to correctly lubricate them. Electrical oil pump lubricating system is not allowed.
- ✓ Compressor cooling must be done by refrigerant liquid injection. An external dedicated heat exchanger and additional piping to carry the oil from compressor to heat exchanger and viceversa is not allowed.
- ✓ The compressor shall be direct electrical driven, without gear transmission between the screw and the electrical motor.
- ✓ The compressor casing shall be provided with ports to realize economized refrigerant cycles.
- ✓ The compressor must be protected by a temperature sensor for high discharge temperature and an electrical motor thermistor for high winding temperature.
- ✓ The compressor shall be equipped with an electric oil heater.
- ✓ The compressor shall be fully field serviceable. Compressor that must be removed and returned to the factory for service shall be unacceptable.

Cooling capacity control system

- ✓ Each chiller will have a microprocessor for the control of the compressor capacity through inverter and the instantaneous RPM value of the motor.
- ✓ The unit capacity control shall be infinitely modulating, from 100% down to 40% for each circuit. The chiller shall be capable of stable operation to a minimum of 13.5% of full load without hot gas bypass.
- ✓ The system shall control the unit based on the leaving evaporator water temperature that shall be controlled by PID (Proportional Integral Derivative) logic.
- ✓ Unit control logic shall to manage frequency level of the compressor electric motor to exactly match plant load request in order to keep constant the set point for delivered chilled or hot water temperature. In this operating condition unit control logic shall modulate electrical frequency level in a range lower and upper the nominal electrical network value fixed at 50 Hz.
- ✓ The microprocessor unit control shall detect conditions that approach protective limits and take self-corrective action prior to an alarm occurring. The system shall automatically reduce the chiller capacity when any of the following parameters are outside their normal operating range:
    - o High condenser pressure
    - o Low evaporating refrigerant temperature

Unit-mounted Variable Frequency Driver (VFD) and Electrical Requirement

- ✓ All interconnecting wiring between the VFD and the chiller shall be factory-installed. Customer electrical connection for compressor motor power shall be limited to main power leads to the single point power connection located into electrical panel.
- ✓ The VFD shall be air cooled type. Water cooled design or refrigerant cooled design are not acceptable.
- ✓ The VFD full load efficiency shall meet or exceed 97% at 100% VFD rated capacity.
- ✓ Base motor frequency shall permit motor to be utilized at nameplate voltage. Adjustable frequency range, monitored by unit's microprocessor control, shall permit a stable unit capacity control down to 13.5% without hot-gas bypass.
- ✓ Starting current for the compressor shall not exceed nominal compressor load amps.
- ✓ Unit power factor shall be not less than 0.95 on entire unit capacity range, from 100% down to 13.5%.

Evaporator

- ✓ The units shall be equipped with a Direct Expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. The evaporator shall be single-pass on both the refrigerant and water sides for pure counter-flow heat exchange and low refrigerant pressure drops.
- ✓ The external shell shall be linked with an electrical heater to prevent freezing down to -28°C ambient temperature, controlled by a thermostat and shall be insulated with flexible, closed cell polyurethane insulation material (20-mm thick).

SPC_1-2-3-4_Rev.00_2

12 Specification text

12 - 1 Specification Text

- ✓ The evaporator will have 2 or 3 circuits, one for each compressor and shall be single refrigerant pass.
- ✓ The water connections shall be VICTAULIC type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.
- ✓ Evaporator is manufactured in accordance to PED approval.

Condenser coil

- ✓ The condenser coils are constructed with internally finned seamless copper tubes and arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminium fins with full fin collars for higher efficiencies. The space between the fins is given by a collar that will increase the surface area in connection with the tubes, protecting them from ambient corrosion.
- ✓ The condenser coils will have an integral subcooler circuit that provides sufficient subcooling to effectively eliminate the possibility of liquid flashing and increase the unit's efficiency with 5% to 7% without increasing in energy consumption.
- ✓ The condenser coils shall be leak-tested and submitted to a pressure test with dry air.

Condenser fans

- ✓ The condenser fans used in conjunction with the condenser coils, shall be propeller type with glass reinforced resin blades for higher efficiencies and lower sound. Each fan shall be protected by a fan guard.
- ✓ The air discharge shall be vertical and each fan must be coupled to the electrical motor, supplied as standard to IP54 and capable to work to ambient temperatures of - 20°C to + 65°C.
- ✓ The condenser fans shall have as a standard a thermally protection by internal thermal motor protection and protected by circuit braker installed inside the electrical panel as a standard.

Refrigerant circuit

- ✓ The unit shall have two or three independent refrigerant circuits (depending on the size) and one variable electrical frequency driver per compressor (VFD).
- ✓ Each circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, compressor discharge shut-off valve, replaceable core filter-drier, sight glass with moisture indicator and insulated suction line.

Condensation control

- ✓ The units will be provided with an automatic control for condensing pressure which ensures the working at low external temperatures down to - ..... °C, to maintain condensing pressure.
- ✓ The compressor automatically unloads when abnormal high condensing pressure is detected. This to prevent the shutdown of the refrigerant circuit (shutdown of the unit) due to a high-pressure fault.

Low sound unit configurations (on request)

- ✓ The unit compressor shall be connected with unit's metal base frame by rubber antivibration supports to prevent the transmission of vibrations to all metal unit structure, in order to control the unit sound.
- ✓ The chiller shall be provided with an acoustical compressor enclosure. This enclosure shall be realized with a light, corrosion resisting aluminium structure and metal panels. The compressor sound-proof enclosure shall be internally fitted with flexible, multi-layer, high density materials.

Hydronic kit options (on request)

- ✓ The hydronic module shall be integrated in the chiller chassis without increasing its dimensions and includes the following elements: centrifugal water pump with three-phase motor equipped with internal over-temperature protection, safety relief valve and filling kit.
- ✓ The water piping shall be protected against corrosion and equipped with drain and purge plugs. The customer connections shall be victaulic connections. The piping shall be fully insulated to prevent condensation (pump insulation using polyurethane foam).
- ✓ A choice of two pump types shall be available:
  - o in-line single pump
  - o in-line twin pumps

SPC_1-2-3-4_Rev.00_3

12 Specification text

12 - 1 Specification Text

Control panel

- ✓ Field power connection, control interlock terminals and unit control system should be centrally located in an electric panel (IP 54). Power and starting controls should be separated from safety and operating controls in different compartments of the same panel.
- ✓ Starting will be inverter type.
- ✓ Operating and safety controls should include energy saving control, emergency stop switch, overload protection for compressor motor, high and low pressure cut-out switch (for each refrigerant circuit), anti-freeze thermostat, cut-out switch for each compressor.
- ✓ All of the information regarding the unit will be reported on a display, and with the internal built-in calendar and clock that will switch the unit ON/OFF during day time all year long.
- ✓ The following features and functions shall be included:
  - o leaving water temperature reset by controlling the water temperature Δt, by a remote 4-20mA DC signal or by controlling the external ambient temperature;
  - o soft load function to prevent the system from operating at full load during the chilled fluid pulldown period;
  - o password protection of critical parameters of control;
  - o start-to-start and stop-to-start timers to provide minimum compressor off-time with maximum motor protection;
  - o communication capability with a PC or remote monitoring;
  - o discharge pressure control through intelligent cycling of condenser fans;
  - o lead-lag selection manual or automatically by circuit run hours;
  - o double set point for brine unit version;
  - o scheduling via internal time clock to allow programming of a yearly start-stop schedule accommodating weekends and holidays.

Optional High Level Communications Interface

- ✓ The chiller is able to communicate to BMS (Building Management System) based on the most common protocols as:
  - o ModbusRTU
  - o LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology
  - o BacNet BTP certifief over IP and MS/TP (class 4) (Native)
  - o Ethernet TCP/IP

SPC_1-2-3-4_Rev.00_4

TABLE OF CONTENTS

EWAD-CZXL

1 Features

- ESEER up to 5.24
- Inverter stepless single-screw compressor
- High efficiency, low sound levels
- Optimised for use with R-134a
- Wide operating range
- Extensive option list (heat recovery option available)
- Low starting current
- MicroTech III controller

2 Specifications

2-1 Technical Specifications					EWAD670CZXL	EWAD740CZXL	EWAD830CZXL	EWAD900CZXL	EWADC10CZXL	EWADC11CZXL	EWADC12CZXL
Cooling capacity	Nom.			kW	672 (1)	738 (1)	832 (1)	902 (1)	1,037 (1)	1,095 (1)	1,236 (1)
Capacity control	Method				Stepless						
	Minimum capacity			%	20						
Power input	Cooling	Nom.		kW	245 (1)	235 (1)	266 (1)	305 (1)	339 (1)	375 (1)	400 (1)
EER					2.74 (1)	3.14 (1)	3.13 (1)	2.96 (1)	3.06 (1)	2.92 (1)	3.09 (1)
ESEER					5.07	5.13	5.20	5.22	5.24	5.03	4.93
IPLV					5.47	5.68	5.72	5.79	5.73	5.56	5.58
Casing	Colour				Ivory white						
	Material				Galvanized and painted steel sheet						
Dimensions	Unit	Height		mm	2,540						
		Width		mm	2,285						
		Depth		mm	6,725		7,625		8,525		10,325
Weight	Unit			kg	6,170	6,280	6,900	7,150	7,720		8,850
	Operation weight			kg	6,430	6,530	7,140	7,390	8,160		9,240
Water heat exchanger	Type				Single pass shell & tube						
	Water volume			l	263	248	241		441		383
	Nominal water flow	Cooling		l/s	32.00	35.20	39.70	43.00	49.50	52.30	59.00
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	80	75	55	64	63	69	46
	Insulation material				Closed cell						
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler						
Fan	Quantity				10	12	14		16		20
	Type				Direct propeller						
	Diameter			mm	800						
	Air flow rate	Nom.		l/s	54,188	65,025	75,863		86,700		108,376
Fan motor	Drive				DOL						
	Speed	Cooling	Nom.	rpm	900						
	Input	Cooling		W	1.75						
Sound power level	Cooling	Nom.		dBA	98.6	99.2	99.5		99.9		100.5
Sound pressure level	Cooling	Nom.		dBA	77.5 (2)	78.0 (2)	78.1 (2)				78.2 (2)
Compressor	Type				Semi-hermetic single screw compressor						
	Quantity				2						
	Starting method				Inverter driven						
	Oil	Charged volume		l	32		35	38			44
Operation range	Water side	Cooling	Min.	ºCDB	-8						
			Max.	ºCDB	15						
	Air side	Cooling	Min.	ºCDB	-18						
			Max.	ºCDB	50						
Refrigerant	Type				R-134a						
	Circuits	Quantity			2						
Refrigerant circuit	Charge			kg	141	161	178		200		235
Piping connections	Evaporator water inlet/outlet (OD)				168.3mm			168.3	219.1mm		
Safety devices	Item	01			High discharge pressure (pressure switch)						
		02			High discharge pressure (pressure transducer)						
		03			Low suction pressure (pressure transducer)						
		04			Compressor motor protection						
		05			High discharge temperature						
		06			Low oil pressure						
		07			Low pressure ratio						
		08			High oil filter pressure drop						
		09			Phase monitor						
		10			Emergency stop button						
		11			Water freeze protection controller						

2 Specifications

2-1 Technical Specifications					EWADC13CZXL	EWADC14CZXL	EWADC15CZXL	EWADC16CZXL	EWADC17CZXL	EWADC18CZXL
Cooling capacity	Nom.			kW	1,308 (1)	1,450 (1)	1,545 (1)	1,622 (1)	1,709 (1)	1,802 (1)
Capacity control	Method				Stepless					
	Minimum capacity			%	20			13		
Power input	Cooling	Nom.		kW	442 (1)	488 (1)	531 (1)	558 (1)	588 (1)	611 (1)
EER					2.96 (1)	2.97 (1)	2.91 (1)		2.90 (1)	2.95 (1)
ESEER					4.74	5.02	5.17	5.03		4.85
IPLV					5.45	5.61	5.75	5.85	5.76	5.45
Casing	Colour				Ivory white					
	Material				Galvanized and painted steel sheet					
Dimensions	Unit	Height		mm	2,540					
		Width		mm	2,285					
		Depth		mm	10,325	11,625	12,525		13,425	14,325
Weight	Unit			kg	9,250	9,880	10,220	11,790	12,610	13,340
	Operation weight			kg	9,640	10,260	10,600	12,640	13,460	14,210
Water heat exchanger	Type				Single pass shell & tube					
	Water volume			l	383	374		850		871
	Nominal water flow	Cooling		l/s	62.40	69.20	73.70	77.40	81.50	86.00
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	51	61	71	62	68	64
	Insulation material				Closed cell					
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler					
Fan	Quantity				20	22	24		26	28
	Type				Direct propeller					
	Diameter			mm	800					
	Air flow rate	Nom.		l/s	108,376	119,213	130,051	129,454	140,143	151,129
Fan motor	Drive				DOL					
	Speed	Cooling	Nom.	rpm	900					
	Input	Cooling		W	1.75					
Sound power level	Cooling	Nom.		dBA	100.5	101.1		102.8	103.0	103.2
Sound pressure level	Cooling	Nom.		dBA	78.2 (2)			79.8 (2)	79.9 (2)	
Compressor	Type				Semi-hermetic single screw compressor					
	Quantity				2			3		
	Starting method				Inverter driven					
	Oil	Charged volume		l	50			57	63	69
Operation range	Water side	Cooling	Min.	ºCDB	-8					
			Max.	ºCDB	15					
	Air side	Cooling	Min.	ºCDB	-18					
			Max.	ºCDB	50					
Refrigerant	Type				R-134a					
	Circuits	Quantity			2			3		
Refrigerant circuit	Charge			kg	235	275	320	327	343	361
Piping connections	Evaporator water inlet/outlet (OD)				219.1mm			273mm		
Safety devices	Item	01			High discharge pressure (pressure switch)					
		02			High discharge pressure (pressure transducer)					
		03			Low suction pressure (pressure transducer)					
		04			Compressor motor protection					
		05			High discharge temperature					
		06			Low oil pressure					
		07			Low pressure ratio					
		08			High oil filter pressure drop					
		09			Phase monitor					
		10			Emergency stop button					
		11			Water freeze protection controller					

2 Specifications

2-2 Electrical Specifications				EWAD670CZXL	EWAD740CZXL	EWAD830CZXL	EWAD900CZXL	EWADC10CZXL	EWADC11CZXL	EWADC12CZXL
Compressor	Phase			3~						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
	Maximum running current		A	205	221		283		344	
	Starting method			VFD driven						
Compressor 2	Maximum running current		A	205	221	283		344		404
Power supply	Phase			3~						
	Frequency		Hz	50						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
Unit	Maximum starting current		A	322	349	402	444	496	537	594
	Nominal running current (RLA)	Cooling	A	362	351	398	453	504	555	597
	Maximum running current		A	451	490	560	622	691	751	828
	Max unit current for wires sizing		A	494	537	614	683	758	825	909
Fans	Nominal running current (RLA)		A	40	48	56		64		80

2-2 Electrical Specifications				EWADC13CZXL	EWADC14CZXL	EWADC15CZXL	EWADC16CZXL	EWADC17CZXL	EWADC18CZXL
Compressor	Phase			3~					
	Voltage		V	400					
	Voltage range	Min.	%	-10					
		Max.	%	10					
	Maximum running current		A	404		486	344		404
	Starting method			VFD driven					
Compressor 2	Maximum running current		A	404	486		344		404
Power supply	Phase			3~					
	Frequency		Hz	50					
	Voltage		V	400					
	Voltage range	Min.	%	-10					
		Max.	%	10					
Unit	Maximum starting current		A	635	708	762	844	901	957
	Nominal running current (RLA)	Cooling	A	656	724	789	826	873	908
	Maximum running current		A	889	978	1,068	1,127	1,196	1,265
	Max unit current for wires sizing		A	976	1,075	1,173	1,238	1,313	1,389
Fans	Nominal running current (RLA)		A	80	88	96		104	112

Notes

(1) Cooling: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC; full load operation.

(2) Sound pressure levels are measured at entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC; full load operation; Standard: ISO3744

(3) Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.

(4) Maximum starting current: starting current of biggest compressor + 75 % of maximum current of the other compressor + fans current for the circuit at 75 %

(5) Nominal current in cooling mode: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC. Compressor + fans current.

(6) Maximum running current is based on max compressor absorbed current in its envelope and max fans absorbed current

(7) Maximum unit current for wires sizing is based on minimum allowed voltage.

(8) Maximum current for wires sizing: (compressors full load ampere + fans current) x 1.1

3 Features and advantages

3 - 1 Features and Advantages

High part load efficiency
High efficiency at full load, but especially maximum efficiency at part load conditions - which is the majority of the operating time of a chiller - are the factors that allow considerable savings in a system's annual energy costs.
With the objective of bringing down these operating costs and improving a building's economical management, this inverter range has been designed to optimize the seasonal energy efficiency (ESEER).

Seasonal quietness
Very low sound levels in part load conditions are achieved by varying the fan speed, but especially thanks to the variation of compressor frequency, which ensure the minimum sound level at all the time.

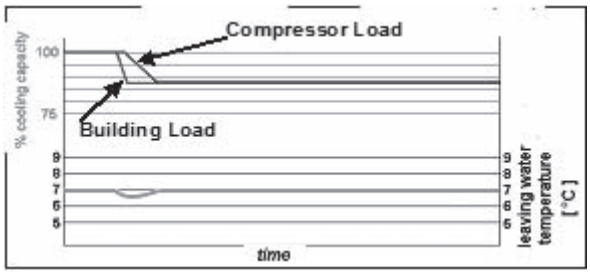
Quick comfort conditions
The ability to vary the output power in direct relation to the cooling requirements of the system, allow the possibility to achieve building comfort conditions much faster at start-up.

Low starting current
No current spikes at start-up. The starting current is always lower than current absorbed in the maximum operating conditions (FLA).

Power factor always > 0.95
This inverter range can operate always with a power factor > 0.95, which allows building owners to avoid power factor penalties and decrease electrical losses in cable and transformers.

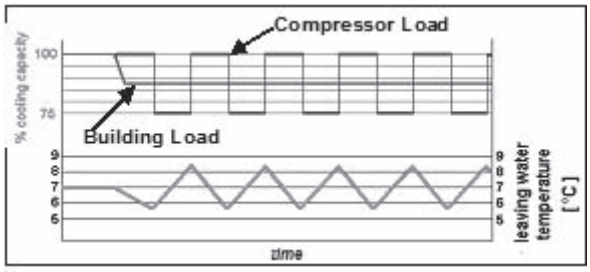
Redundancy
The range has two or three truly independent refrigerant circuits (depending on the size) guaranteeing (partial) cooling 'backup' even in case of maintenance activity

Infinitely capacity control
Cooling capacity control is infinitely variable by means of a Inverter driven screw compressor controlled by microprocessor system. Each unit has infinitely variable capacity control from 100% down to 13,5%. This modulation allows the compressor capacity to exactly match the building cooling load without any leaving evaporator water temperature fluctuation. This chilled water temperature fluctuation is avoided only with a stepless control.



ELWT fluctuation with steps capacity control

In the case that a compressor with load step control is used, the compressor capacity, at partial loads, will be too high or too low compared to the building cooling load. The result is an increase in chiller energy costs, particularly at the part-load conditions at which the chiller operates most of the time.



ELWT fluctuation with steps capacity control (4 steps)

Units with stepless regulation offer benefits that the units with step regulation are unable to match.
Only a chiller with step-less regulation, is able to follow the system cooling demand at any time and to deliver chilled water at set-point.

FTA_1-2_Rev.00_1

3 Features and advantages

3 - 1 Features and Advantages

Code requirements – Safety and observant of laws/directives

The range is designed and manufactured in accordance with applicable selections of the following:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Standards	UNI – EN ISO 9001:2004

Certifications

All units manufactured are CE marked, complying with European directives in force, concerning manufacturing and safety. On request units can be produced complying with laws in force in non European countries (ASME, GOST, etc.), and with other applications, such as naval (RINA, etc.).

Efficiency and sound configuration

The range is available in multiple sound versions:

	Sound level			
Efficiency level	Standard	Low	Reduced	Extra low
High efficiency	EWAD~CZXS	EWAD~CZXL	EWAD~CZXR	N.A.

Versions

The range is available as high efficiency version:

X: High efficiency
13 sizes to cover a range from 635 up to 1802 kW with an ESEER up to 5.8

The EER (Energy Efficiency Ratio) is the ratio of the Cooling Capacity to the Power Input of the unit. The Power Input includes: the power input for operation of the compressor, the power input of all control and safety devices, the power input for fans.

The ESEER (European Seasonal Energy Efficiency Ratio) is a weighed formula enabling to take into account the variation of EER with the load rate and the variation of air inlet condenser temperature.

ESEER = A x EER100% + B x EER75% + C x EER50% + D x EER25%

	A	B	C	D
Coefficient	0.03 (3%)	0.33 (33%)	0.41 (41%)	0.23 (23%)
Air inlet condenser temperature	35°C	30°C	25°C	20°C

Sound levels

The range is available in three different sound level configurations:

S: Standard sound
Condenser fan rotating at 900 rpm

L: Low sound
Condenser fan rotating at 900 rpm, compressor sound enclosure and flexible discharge piping.

R: Reduced sound
Condenser fan rotating at 700 rpm, compressor sound enclosure and flexible discharge piping.

FTA_1-2_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

Cabinet and structure
The cabinet is made of galvanized steel sheet and painted to provide a high resistance to corrosion. Colour Ivory White (Munsell code 5Y7.5/1) (±RAL7044).The base frame has an eye-hook to lift the unit with ropes for an easy installation. The weight is uniformly distributed along the profiles of the base and this facilitates the arrangement of the unit.

Inverter driven screw compressors with integrated oil separator
The compressor is semi-hermetic, single-screw type with gate-rotor made with the latest high-strength fibre reinforced star material. Each compressor has one inverter, which is managed by the unit microprocessor for infinitely modulating the capacity. An integrated high efficiency oil separator maximizes the oil separation and standard start is Inverter type.

Ecological R-134a refrigerant
The compressors have been designed to operate with R-134a, ecological refrigerant with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential), resulting in low TEWI (Total Equivalent Warming Impact).

Evaporator
The unit is equipped with a direct expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. The evaporator is single-pass on both the refrigerant and water side for pure counter-flow heat exchange and low refrigerant pressure drops. Both attributes contribute to the heat exchanger effectiveness and total unit's outstanding efficiency.
The external shell is covered with a 20mm closed cell insulation material and the evaporator water outlet connections are provided with victaulic kit (as standard). The evaporator has 2 or 3 circuits, one for each compressor and is manufactured in accordance to PED approval.

Condenser coils
The condenser is manufactured with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminium condenser fins with full fin collars. An integral sub-cooler circuit provides sub-cooling to effectively eliminate liquid flashing and increase cooling capacity without increasing the power input.

Condenser coil fans
The condenser fans are propeller type with high efficiency design blades to maximize performances. The material of the blades is glass reinforced resin and each fan is protected by a guard. Fan motors are protected by circuit breakers (installed inside the electrical panel as a standard) and are IP54.

Electronic expansion valve
The unit is equipped with the most advanced electronic expansion valves to achieve precise control of refrigerant mass flow. As today's system requires improved energy efficiency, tighter temperature control, wider range of operating conditions and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory.
Electronic expansion valves possess unique features: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.
Electronic expansion valves are typically working with lower ΔP between high and low pressure side, than a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (winter time) without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

Refrigerant circuit
Each unit has 2 or 3 independent refrigerant circuits and each circuit includes:
- Inverter driven screw compressor with integrated oil separator
- Air cooled condenser
- Electronic expansion valve
- Evaporator
- Discharge line shut off valve
- Liquid line shut off valve
- Suction line shut off valve (optional)
- Sight glass with moisture indicator
- Filter drier
- Charging valves
- High pressure switch
- High and low pressure transducers

GNC_1-2-3-4_Rev.00_1

4 General Characteristics

4 - 1 General characteristics

Electrical control panel
Power and control are located in the main panel that is manufactured to ensure protection against all weather conditions. The electrical panel is IP54 and (when opening the doors) internally protected with a plexiglas panel against possible accidental contact with electrical components (IP20). The main panel is fitted with a main switch interlocked door.

Power Section
The power section includes compressor inverter, fan circuit breaker, fan contactors and control circuit transformer.

MicroTech III controller
MicroTech III controller is installed as standard; it can be used to modify unit set-points and check control parameters. A built-in display shows chiller operating status plus temperatures and pressures of water, refrigerant and air, programmable values, set-points. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors, EEXV and condenser fans to keep stable operating conditions to maximise chiller energy efficiency and reliability.
MicroTech III is able to protect critical components based on external signs from its system (such as motor temperatures, refrigerant gas and oil pressures, correct phase sequence, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this is an additional security for the equipment.
Fast program cycle (200ms) for a precise monitoring of the system. Floating point calculations supported for increased accuracy in P/T conversions.

Control section - main features
• Management of the compressor capacity, inverter, and fans modulation
• Chiller enabled to work in partial failure condition
• Full routine operation at condition of:
  - high ambient temperature value
  - high thermal load
  - high evaporator entering water temperature (start-up)
• Display of evaporator entering/leaving water temperature
• Display of outdoor ambient temperature
• Display of condensing-evaporating temperature and pressure, suction and discharge superheat for each circuit
• Leaving water evaporator temperature regulation (temperature tolerance = 0,1°C)
• Compressor and evaporator pumps hours counter
• Display of Status Safety Devices
• Number of starts and compressor working hours
• Optimized management of compressor load
• Fan management according to condensing pressure
• Re-start in case of power failure (automatic / manual)
• Soft Load (optimized management of the compressor load during the start-up)
• Start at high evaporator water temperature
• Return Reset (Set point reset based on return water temperature)
• OAT (Outside ambient temperature) reset
• Set point reset (optional)
• Application and system upgrade with commercial SD cards
• Ethernet port for remote or local servicing using standard web browsers
• Two different sets of default parameters could be stored for easy restore

Safety device / logic for each refrigerant circuit
• High pressure (pressure switch)
• High pressure (transducer)
• Low pressure (transducer)
• Fans circuit breaker
• High compressor discharge temperature
• High motor winding temperature
• Phase monitor
• Low pressure ratio
• High oil pressure drop
• Low oil pressure
• No pressure change at start

System security
• Phase monitor
• Low ambient temperature lock-out
• Freeze protection

GNC_1-2-3-4_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

Regulation type
Proportional + integral + derivative regulation on the evaporator leaving water output probe.

MicroTech III
MicroTech III built-in terminal has the following features:
- 164x44 dots liquid crystal display with white back lighting. Supports Unicode fonts for multi-lingual
- Key-pad consisting of 3 keys
- Push'n'Roll control for an increased usability
- Memory to protect the data
- General faults alarm relays
- Password access to modify the setting
- Application security to prevent application tampering or hardware usability with third party applications
- Service report displaying all running hours and general conditions
- Alarm history memory to allow an easy fault analysis

Supervising systems (on request)
MicroTech III remote control
MicroTech III is able to communicate to BMS (Building Management System) based on the most common protocols such as:
- ModbusRTU
- LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology.
- BacNet BTP certifief over IP and MS/TP (class 4) (Native).
- Ethernet TCP/IP.

Standard accessories (supplied on basic unit)

Double setpoint – Dual leaving water temperature setpoints.

Compressor thermal relays – Safety devices against compressor motor overloading. This device together with internal motor protection (standard) guarantee the best safety system for compressor motor.

Phase monitor – The phase monitor controls that phases sequence is correct and controls phase loss.

Inverter compressor starter

Evaporator victaulic kit – Hydraulic joint with gasket for an easy and quick water connection.

20mm evaporator insulation – The external shell is covered with a 20mm closed cell insulation material.

Evaporator electric heater – Electric heater (controlled by a thermostat) to protect the evaporator from freezing down to -28°C ambient temperature, providing the power supply is on.

Electronic expansion valve

Discharge line shut off valves – Installed on the discharge port of the compressor to facilitate maintenance operation.

Ambient temperature sensor and setpoint reset of leaving water temperature

Hour run meter – available for compressor

General fault contactor – Alarm relay.

Set-point reset – The leaving water temperature set-point can be overwritten with the following options: 4-20mA from external source (by user); outside ambient temperature; evaporator water temperature Δt.

Demand limit – User can limit the load of the unit by 4-20mA signal or by network system

Alarm from external device – Microprocessor is able to receive an alarm signal from an external device (eg. pump, etc…). User can decide if this alarm signal will stop or not the unit.

Fan circuit breakers – Safety device against motor overloading and short circuit

Main switch interlock door

Emergency stop

GNC_1-2-3-4_Rev.00_3

4 General Characteristics

4 - 1 General characteristics

Options (on request)

Total heat recovery – Produced with plate to plate heat exchangers to produce hot water.

Partial heat recovery – Produced with plate to plate heat exchangers to produce hot water.

Brine version – Allows the unit to operate down to -8°C leaving liquid temperature (antifreeze required).

Under/Over voltage control – This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.

Ampere / Volt meter – Device installed inside the control box showing ampere and volt values

Current limit display – To limit maximum absorbed current of the unit whenever is required

Evaporator flange kit

Speedtrol – Continuous fan speed modulation on the first fan of each circuit. It allows the unit working with air temperature down to –18°C.

Condenser coil guards

Evaporator area guards

Cu-Cu condensing coils – To give better protection against corrosion by aggressive environments.

Cu-Cu-Sn condensing coils – To give better protection against corrosion in aggressive environments and by salty air.

Alucoat condensing coils – Fins are protected by a special acrylic paint with a high resistance to corrosion.

Evaporator flow switch – Supplied separately to be wired and installed on the evaporator water piping (by the customer).

Suction line shut off valves – Installed on the suction port of the compressor to facilitate maintenance operation.

High pressure side manometers

Container kit

Rubber type antivibration mounts – Supplied separately, these are positioned under the base of the unit during installation. Ideal to reduce the vibrations when the unit is floor mounted.

Spring type antivibration mounts – Supplied separately, these are positioned under the base of the unit during installation. Ideal for dampening vibrations for installation on roofs and metallic structures.

Hydronic Kit (single water pump) – Hydronic kit consists of: single direct driven centrifugal pump, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pump are protected from freezing with an additional electrical heater.

Hydronic Kit (twin water pumps) – Hydronic kit consists of: twin direct driven centrifugal pumps, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pumps are protected from freezing with an additional electrical heater.

Double pressure relief valve with diverter

Compressors circuit breakers

Fan speed regulation (includes fan silent mode) – To control the fan speed revolution for smooth operating control of the unit. This option improves the sound level of the unit during low ambient temperature operation.

Refrigerant recovery tank – This option allows to stock refrigerant charge of 1 circuit for maintenance operation. Liquid receiver includes in/out shut-off valve and reliefe valve.

Evaporator right water connections

Ground fault protection – To shut down the entire unit if a ground fault condition is detected.

Rapid restart – It allows the unit to start as fast as 30 seconds after power is restored (in case of power failure).

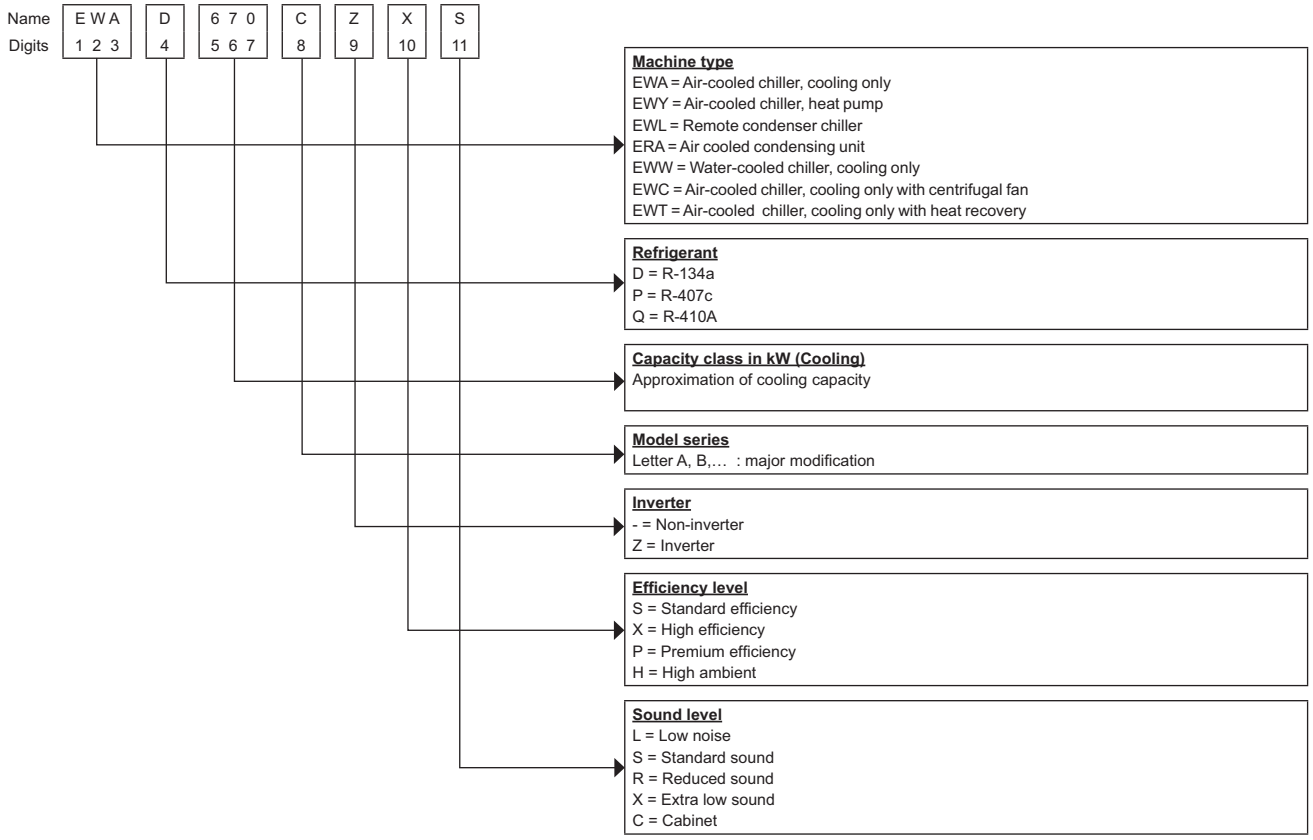
Witness test – Every unit is always tested at the test bench prior to the shipment. On request, a second test can be carried out, at customer's presence, in accordance with the procedures indicated on the test form. (Not available for units with glycol mixtures).

Acoustic test – On request, a test can be carried out, at customer's presence (Not available for units with glycol mixtures).

GNC_1-2-3-4_Rev.00_4

5 Nomenclature

5 - 1 Nomenclature



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6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD670-C13CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		4				5				6				7			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
670	25	686	189	32,70	82	706	191	33,70	87	726	193	34,60	92	745	195	35,50	96
	30	651	212	31,00	75	671	214	32,00	79	690	216	32,90	84	710	219	33,90	88
	35	614	239	29,20	68	633	241	30,10	71	652	243	31,10	75	672	245	32,00	80
	40	578	270	27,50	61	597	272	28,40	64	615	274	29,30	68	634	276	30,30	72
	46	545	316	25,90	54	562	317	26,80	58	581	318	27,70	61	599	320	28,60	65
	48	538	333	25,60	53	548	324	26,10	55	551	306	26,30	56	554	289	26,40	56
	50	481	283	22,90	44	482	266	23,00	44	491	258	23,40	45	500	251	23,80	47
740	25	749	183	35,70	77	774	186	36,90	81	799	188	38,10	86	826	191	39,40	91
	30	711	204	33,90	70	735	206	35,00	74	759	209	36,20	78	783	211	37,40	83
	35	669	228	31,90	62	692	230	33,00	66	715	233	34,10	70	738	235	35,20	75
	40	628	257	29,90	56	649	259	30,90	59	671	260	32,00	63	694	262	33,10	67
	46	586	297	27,90	49	606	299	28,90	52	626	300	29,90	56	647	301	30,90	59
	48	575	313	27,40	48	594	314	28,30	51	614	315	29,30	54	635	316	30,30	57
	50	567	329	27,00	46	586	330	27,90	49	589	312	28,10	50	601	305	28,70	52
830	25	842	210	40,10	56	870	213	41,50	60	904	216	43,10	64	939	220	44,80	68
	30	798	232	38,00	51	826	235	39,40	54	854	238	40,70	58	884	241	42,20	61
	35	753	257	35,90	46	778	260	37,10	49	804	263	38,30	52	832	266	39,70	55
	40	708	286	33,70	41	732	289	34,90	44	756	292	36,10	46	781	294	37,30	49
	46	661	326	31,50	36	684	329	32,60	39	707	331	33,70	41	730	334	34,80	43
	48	649	341	30,90	35	672	344	32,00	37	694	346	33,10	40	716	349	34,20	42
	50	641	357	30,50	34	652	349	31,10	35	663	340	31,60	37	675	332	32,20	38
900	25	917	241	43,70	65	948	245	45,20	69	984	249	46,90	74	1021	253	48,70	79
	30	868	266	41,30	59	898	270	42,80	63	927	273	44,20	67	960	277	45,80	71
	35	818	294	39,00	53	845	297	40,30	57	873	301	41,60	60	902	305	43,00	64
	40	770	325	36,70	48	796	328	37,90	51	821	332	39,20	54	847	336	40,40	57
	46	722	367	34,40	43	747	371	35,60	45	771	375	36,80	48	795	378	37,90	51
	48	712	383	33,90	41	736	386	35,10	44	760	390	36,20	47	783	394	37,30	49
	50	706	399	33,60	41	709	382	33,80	41	705	359	33,60	41	712	347	34,00	42
C10	25	1056	268	50,30	65	1094	273	52,10	69	1134	278	54,10	74	1174	282	56,00	78
	30	996	295	47,40	58	1032	300	49,20	62	1069	304	51,00	66	1107	309	52,80	71
	35	933	325	44,40	52	966	330	46,00	55	1001	334	47,70	59	1037	339	49,50	63
	40	871	358	41,50	46	902	363	43,00	49	935	367	44,60	52	968	372	46,20	55
	46	809	403	38,50	40	837	408	39,90	43	866	412	41,30	45	896	417	42,80	48
	48	794	420	37,80	39	821	424	39,10	41	849	429	40,50	44	866	420	41,30	45
	50	765	418	36,40	36	779	410	37,10	37	794	402	37,80	39	809	394	38,60	40
C11	25	1120	296	53,40	72	1155	301	55,10	76	1192	306	56,80	80	1229	311	58,70	85
	30	1058	327	50,40	65	1092	331	52,00	69	1127	336	53,80	73	1165	341	55,60	77
	35	992	360	47,30	58	1025	365	48,80	61	1060	370	50,50	65	1095	375	52,30	69
	40	929	397	44,20	51	960	402	45,80	54	993	407	47,40	58	1027	412	49,00	62
	46	864	448	41,20	45	894	453	42,60	48	924	458	44,00	51	955	463	45,60	54
	48	848	467	40,40	44	877	472	41,80	46	906	477	43,20	49	913	456	43,60	50
	50	802	448	38,20	39	805	427	38,40	40	809	407	38,60	40	813	388	38,80	40
C12	25	1255	317	59,80	48	1297	322	61,80	50	1340	327	63,90	54	1384	332	66,00	57
	30	1187	350	56,60	43	1228	355	58,50	46	1271	360	60,60	49	1313	365	62,70	52
	35	1116	385	53,20	38	1154	390	55,00	41	1194	395	56,90	44	1236	400	59,00	46
	40	1045	424	49,80	34	1082	429	51,60	36	1120	434	53,40	39	1159	439	55,30	41
	46	972	477	46,30	30	1005	482	47,90	32	1040	487	49,60	34	1076	492	51,40	36
	48	953	497	45,40	29	985	502	46,90	31	1018	506	48,60	33	1053	512	50,30	35
	50	938	517	44,70	28	954	507	45,50	29	965	489	46,00	30	991	487	47,30	31
C13	25	1334	350	63,50	53	1380	355	65,70	56	1425	360	67,90	60	1469	366	70,10	63
	30	1259	385	60,00	48	1303	391	62,10	51	1347	397	64,30	54	1393	402	66,40	57
	35	1185	425	56,40	43	1224	430	58,30	45	1265	436	60,30	48	1308	442	62,40	51
	40	1111	468	52,90	38	1149	474	54,80	41	1188	480	56,70	43	1228	485	58,60	46
	46	1038	527	49,40	34	1073	532	51,10	36	1109	538	52,90	38	1147	544	54,70	41
	48	1021	549	48,70	33	1054	554	50,30	35	1089	559	51,90	37	1125	565	53,70	39
	50	1011	572	48,10	32	1013	546	48,30	32	1003	507	47,80	32	1023	498	48,80	33

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_1

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD670-C13CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		8				9				10				11			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
670	25	764	198	36,50	101	784	200	37,40	105	804	203	38,40	110	824	205	39,40	115
	30	729	221	34,80	92	748	223	35,70	97	767	226	36,70	101	787	228	37,60	106
	35	691	248	33,00	84	711	250	34,00	88	730	252	34,90	93	749	255	35,80	97
	40	654	278	31,20	76	673	280	32,20	80	693	282	33,10	84	713	285	34,10	89
	46	618	321	29,50	69	629	314	30,10	71	641	306	30,60	73	645	290	30,80	74
	48	564	281	26,90	58	575	274	27,40	60	585	267	28,00	62	587	252	28,10	63
	50	508	244	24,30	48	517	237	24,70	50	517	223	24,70	50	519	230	24,80	50
740	25	854	193	40,80	97	880	196	42,00	103	904	199	43,20	108	930	201	44,50	114
	30	808	213	38,60	88	835	216	39,90	93	863	219	41,20	99	887	222	42,40	104
	35	762	237	36,40	79	787	240	37,60	84	812	242	38,80	89	838	245	40,10	94
	40	716	264	34,20	71	740	267	35,30	75	764	269	36,50	80	788	271	37,70	84
	46	668	303	31,90	63	690	305	33,00	66	713	307	34,10	70	736	309	35,20	75
	48	656	318	31,30	60	677	319	32,30	64	699	321	33,40	68	713	314	34,10	70
	50	613	297	29,20	53	624	290	29,80	55	628	274	30,00	56	640	268	30,60	58
830	25	975	224	46,50	73	1013	228	48,40	78	1051	233	50,20	84	1091	237	52,20	90
	30	917	245	43,80	66	951	249	45,40	70	987	253	47,20	75	1024	258	48,90	80
	35	858	269	41,00	58	889	273	42,50	62	922	277	44,00	66	956	281	45,70	71
	40	806	297	38,50	52	834	300	39,80	55	860	304	41,10	59	890	307	42,60	62
	46	753	336	35,90	46	777	339	37,10	49	801	342	38,30	52	828	345	39,60	55
	48	739	351	35,30	44	757	348	36,20	47	772	340	36,90	48	792	338	37,90	51
	50	692	330	33,00	40	710	327	33,90	41	723	320	34,60	43	743	318	35,50	45
900	25	1059	258	50,50	85	1098	263	52,50	91	1140	268	54,50	97	1182	274	56,50	104
	30	995	282	47,50	76	1031	287	49,20	81	1068	292	51,00	86	1107	297	52,90	92
	35	930	309	44,40	67	963	314	46,00	72	997	319	47,70	76	1033	324	49,40	81
	40	874	340	41,70	60	903	344	43,10	64	931	348	44,50	67	963	353	46,00	72
	46	819	382	39,10	54	844	386	40,30	57	869	390	41,50	60	897	394	42,90	63
	48	806	397	38,50	52	815	385	38,90	53	826	374	39,50	54	838	362	40,00	56
	50	724	340	34,60	43	732	329	34,90	44	741	318	35,40	45	752	308	35,90	46
C10	25	1216	287	58,10	84	1259	292	60,10	89	1302	297	62,20	95	1346	303	64,40	101
	30	1147	314	54,70	75	1187	319	56,70	80	1229	324	58,70	85	1271	330	60,70	91
	35	1074	344	51,30	67	1113	349	53,10	71	1152	354	55,00	76	1192	360	57,00	81
	40	1003	377	47,90	59	1039	382	49,60	63	1075	387	51,40	67	1113	393	53,20	71
	46	928	421	44,30	51	959	426	45,80	55	992	432	47,40	58	1014	424	48,50	60
	48	890	418	42,50	48	908	410	43,40	50	933	409	44,60	52	953	402	45,60	54
	50	824	387	39,40	42	836	375	39,90	43	846	363	40,40	44	859	352	41,00	45
C11	25	1269	315	60,60	90	1308	320	62,50	95	1349	325	64,40	101	1390	330	66,40	106
	30	1202	346	57,40	82	1240	351	59,20	87	1279	356	61,10	92	1318	361	63,00	97
	35	1132	380	54,00	73	1169	385	55,80	78	1206	390	57,60	82	1243	396	59,40	87
	40	1062	417	50,70	65	1097	423	52,40	69	1132	428	54,10	74	1167	434	55,80	78
	46	987	468	47,10	57	1018	474	48,60	61	1050	480	50,20	64	1059	460	50,60	65
	48	932	448	44,50	52	939	428	44,80	52	957	421	45,70	54	962	403	46,00	55
	50	829	380	39,60	42	844	373	40,30	43	846	356	40,40	44	861	349	41,10	45
C12	25	1430	337	68,30	60	1477	342	70,60	64	1524	347	72,80	68	1571	352	75,10	72
	30	1357	370	64,80	55	1402	375	66,90	58	1448	380	69,20	62	1494	386	71,40	65
	35	1279	406	61,00	49	1322	411	63,10	52	1365	416	65,20	56	1409	422	67,30	59
	40	1199	445	57,20	44	1240	450	59,20	47	1282	456	61,30	50	1324	462	63,30	53
	46	1113	498	53,20	38	1151	503	55,00	41	1189	509	56,80	43	1228	515	58,70	46
	48	1083	509	51,70	37	1112	507	53,10	38	1135	498	54,20	40	1165	497	55,70	42
	50	1010	478	48,20	32	1038	476	49,60	34	1059	468	50,60	35	1066	448	50,90	36
C13	25	1515	371	72,30	67	1562	377	74,60	71	1609	382	76,90	75	1657	388	79,20	79
	30	1437	408	68,60	61	1481	414	70,70	64	1527	420	72,90	68	1573	426	75,20	72
	35	1353	448	64,60	55	1398	454	66,80	58	1442	460	68,90	61	1485	467	71,00	65
	40	1268	491	60,50	49	1312	498	62,60	52	1356	505	64,80	55	1400	511	66,90	58
	46	1185	550	56,60	43	1224	556	58,40	46	1263	563	60,30	48	1305	570	62,40	51
	48	1149	556	54,90	41	1174	547	56,10	42	1184	524	56,60	43	1208	515	57,80	45
	50	1029	475	49,10	33	1050	467	50,10	35	1071	458	51,20	36	1077	437	51,50	36

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_3

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD670-C13CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		12				13				14				15			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
670	25	844	208	40,40	121	865	210	41,40	126	886	213	42,40	132	907	216	43,40	138
	30	807	231	38,60	111	826	233	39,50	116	847	236	40,50	121	867	239	41,50	127
	35	768	257	36,70	102	787	260	37,70	106	807	262	38,60	111	827	265	39,60	116
	40	732	287	35,00	93	750	290	35,90	98	769	292	36,80	102	788	295	37,70	107
	46	657	283	31,40	77	669	277	32,00	79	673	262	32,20	80	685	257	32,80	83
	48	598	246	28,60	65	608	240	29,10	67	619	234	29,60	69	620	221	29,70	69
	50	528	224	25,30	52	530	212	25,30	52	539	206	25,80	54	549	202	26,30	56
740	25	956	204	45,70	119	983	207	47,00	126	1010	210	48,30	132	1037	213	49,70	139
	30	911	225	43,60	110	937	227	44,80	115	963	230	46,10	121	989	233	47,30	127
	35	866	248	41,40	100	889	251	42,50	105	913	254	43,70	110	939	257	44,90	116
	40	813	274	38,90	89	839	277	40,20	95	867	280	41,50	100	890	283	42,60	105
	46	760	311	36,30	79	784	313	37,50	84	808	316	38,70	88	833	319	39,90	93
	48	728	307	34,80	73	734	292	35,10	74	748	286	35,80	77	754	272	36,10	78
	50	652	262	31,20	60	655	248	31,30	60	667	242	31,90	63	680	237	32,50	65
830	25	1133	242	54,20	96	1175	247	56,20	103	1219	253	58,30	110	1264	259	60,50	117
	30	1062	262	50,80	86	1102	268	52,70	92	1142	273	54,70	98	1185	279	56,70	104
	35	991	285	47,40	76	1028	290	49,20	81	1066	296	51,00	86	1106	301	52,90	92
	40	923	312	44,10	67	957	316	45,80	71	993	321	47,50	76	1030	326	49,30	81
	46	854	348	40,80	58	877	347	42,00	61	899	340	43,00	64	922	335	44,10	67
	48	809	331	38,70	53	831	330	39,70	55	850	323	40,70	57	870	318	41,60	60
	50	754	308	36,10	46	761	293	36,40	47	770	292	36,80	48	779	279	37,30	49
900	25	1227	279	58,70	111	1273	286	60,90	119	1320	292	63,20	127	1370	299	65,60	136
	30	1148	303	54,90	99	1191	309	57,00	105	1235	316	59,10	113	1281	323	61,30	120
	35	1071	329	51,20	87	1110	335	53,10	93	1151	342	55,10	99	1194	349	57,20	106
	40	998	359	47,70	77	1034	365	49,50	82	1072	371	51,30	87	1112	377	53,20	93
	46	925	399	44,20	67	946	393	45,30	70	961	378	46,00	72	978	363	46,80	74
	48	851	352	40,70	58	866	341	41,40	59	878	327	42,00	61	892	313	42,70	63
	50	764	299	36,50	47	772	285	36,90	48	773	288	37,00	48	786	276	37,60	50
C10	25	1391	308	66,50	107	1437	314	68,80	113	1484	320	71,00	120	1531	327	73,30	127
	30	1313	336	62,80	96	1356	342	64,90	102	1400	348	67,00	108	1444	355	69,20	114
	35	1232	366	58,90	86	1273	372	60,90	91	1314	379	62,90	96	1356	386	64,90	102
	40	1151	399	55,00	76	1190	406	56,90	81	1229	413	58,80	85	1268	420	60,70	90
	46	1043	424	49,90	64	1066	418	51,00	66	1096	418	52,40	70	1114	408	53,30	72
	48	974	397	46,60	56	984	381	47,10	57	1001	371	47,90	59	1018	362	48,80	61
	50	872	342	41,70	46	872	337	41,70	46	886	328	42,40	48	901	319	43,10	49
C11	25	1431	335	68,40	112	1473	341	70,50	118	1515	347	72,50	125	1557	353	74,50	131
	30	1357	367	64,90	102	1396	373	66,80	107	1435	379	68,70	113	1474	386	70,60	119
	35	1280	402	61,20	92	1316	408	63,00	97	1352	415	64,70	102	1388	423	66,50	106
	40	1201	441	57,50	82	1235	448	59,10	86	1269	455	60,70	91	1301	463	62,30	95
	46	1079	454	51,60	68	1085	436	51,90	68	1102	430	52,70	70	1105	413	52,90	71
	48	979	397	46,80	57	981	379	46,90	57	995	374	47,60	58	1008	370	48,30	60
	50	874	344	41,80	46	861	347	41,20	45	874	342	41,80	46	885	338	42,40	47
C12	25	1619	358	77,40	76	1668	363	79,80	80	1717	369	82,20	84	1766	375	84,50	89
	30	1539	391	73,60	69	1585	397	75,80	73	1631	403	78,10	77	1677	410	80,30	81
	35	1453	428	69,50	62	1497	435	71,60	66	1541	441	73,70	69	1584	448	75,90	73
	40	1366	468	65,30	56	1407	475	67,30	59	1450	482	69,40	62	1491	490	71,40	65
	46	1268	522	60,60	49	1292	514	61,80	50	1316	506	63,00	52	1347	507	64,50	54
	48	1187	489	56,80	43	1216	489	58,20	45	1236	482	59,10	47	1243	463	59,50	47
	50	1086	441	51,90	37	1091	422	52,20	37	1081	445	51,70	37	1085	428	51,90	37
C13	25	1706	394	81,60	83	1755	400	84,00	87	1805	407	86,40	92	1855	414	88,80	97
	30	1619	432	77,40	76	1666	439	79,70	80	1714	445	82,00	84	1762	452	84,30	88
	35	1530	473	73,10	68	1575	480	75,30	72	1620	487	77,50	76	1666	494	79,80	80
	40	1443	518	69,00	61	1486	525	71,10	65	1529	532	73,20	68	1573	540	75,30	72
	46	1348	577	64,40	54	1362	554	65,20	55	1375	531	65,80	56	1402	524	67,10	58
	48	1218	493	58,30	45	1242	485	59,40	47	1250	464	59,80	48	1257	444	60,20	48
	50	1098	430	52,50	38	1102	410	52,70	38	1066	461	51,00	36	1072	443	51,30	36

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_5

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC14-C18CZXS/XL

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		4				5				6				7			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C14	25	1478	386	70,40	63	1527	392	72,80	67	1577	397	75,20	71	1628	403	77,70	75
	30	1398	426	66,60	57	1445	432	68,90	60	1492	438	71,20	64	1541	444	73,50	68
	35	1311	469	62,50	51	1357	475	64,70	54	1404	481	66,90	57	1450	488	69,20	61
	40	1227	516	58,40	45	1270	523	60,50	48	1315	529	62,70	51	1361	536	64,90	54
	46	1143	580	54,50	40	1183	587	56,40	42	1225	593	58,40	45	1268	600	60,50	48
	48	1124	604	53,50	38	1162	610	55,40	41	1203	616	57,40	43	1244	623	59,40	46
	50	1111	629	52,90	38	1110	594	52,90	38	1109	559	52,90	38	1124	541	53,60	39
C15	25	1575	420	75,00	73	1626	426	77,50	77	1678	432	80,00	82	1731	439	82,60	87
	30	1492	464	71,00	66	1540	470	73,40	70	1590	476	75,80	74	1640	483	78,20	79
	35	1399	511	66,60	59	1448	518	69,00	63	1497	525	71,40	67	1545	531	73,70	71
	40	1309	563	62,40	52	1356	570	64,60	56	1403	577	66,90	59	1452	584	69,30	63
	46	1219	633	58,10	46	1263	639	60,20	49	1308	647	62,40	52	1353	654	64,60	56
	48	1198	658	57,00	45	1240	665	59,10	48	1284	672	61,20	51	1329	679	63,40	54
	50	1183	685	56,40	44	1192	655	56,80	44	1186	610	56,60	44	1197	583	57,10	45
C16	25	1659	439	79,00	64	1707	446	81,30	68	1756	453	83,70	71	1808	460	86,30	75
	30	1571	486	74,80	58	1618	493	77,10	61	1667	500	79,50	65	1719	507	82,00	69
	35	1476	537	70,30	52	1523	544	72,60	55	1573	551	75,00	58	1622	558	77,40	62
	40	1384	593	65,90	46	1429	600	68,10	49	1477	607	70,40	52	1526	614	72,80	55
	46	1292	670	61,50	41	1333	676	63,50	43	1377	683	65,70	46	1422	691	67,80	49
	48	1268	698	60,40	40	1309	705	62,40	42	1351	712	64,40	44	1372	693	65,50	46
	50	1212	682	57,70	37	1212	645	57,80	37	1218	615	58,10	37	1241	603	59,20	38
C17	25	1743	463	83,00	70	1794	471	85,50	74	1847	477	88,10	78	1901	484	90,70	82
	30	1654	513	78,80	64	1703	520	81,20	67	1755	527	83,70	71	1808	534	86,30	75
	35	1558	567	74,20	57	1607	574	76,60	61	1657	581	79,00	64	1709	588	81,50	68
	40	1464	627	69,70	51	1511	634	72,00	54	1560	641	74,40	58	1610	648	76,80	61
	46	1370	708	65,20	45	1413	715	67,40	48	1458	722	69,50	51	1505	729	71,80	54
	48	1347	737	64,10	44	1389	744	66,20	47	1432	751	68,30	49	1455	733	69,40	51
	50	1297	730	61,80	41	1315	712	62,70	42	1320	679	63,00	43	1338	659	63,80	44
C18	25	1836	479	87,50	66	1886	486	89,90	69	1938	493	92,40	72	1992	500	95,00	76
	30	1748	533	83,30	60	1797	539	85,70	63	1848	546	88,10	66	1900	553	90,60	70
	35	1654	591	78,80	54	1702	598	81,10	57	1751	605	83,50	60	1802	611	86,00	64
	40	1564	655	74,50	49	1609	662	76,70	52	1656	669	79,00	55	1705	675	81,30	58
	46	1471	741	70,10	44	1514	748	72,20	46	1560	754	74,40	49	1605	761	76,60	52
	48	1450	772	69,00	43	1491	779	71,10	45	1535	786	73,20	48	1580	793	75,40	50
	50	1390	755	66,20	40	1459	793	69,50	43	1476	772	70,40	44	1468	722	70,00	44

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_2

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC14-C18CZXS/XL

	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		8				9				10				11			
Size		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C14	25	1678	410	80,10	79	1730	416	82,60	84	1782	422	85,10	88	1834	429	87,70	93
	30	1590	450	75,90	72	1640	457	78,30	76	1690	463	80,70	80	1741	470	83,20	85
	35	1497	494	71,50	65	1545	501	73,80	68	1594	508	76,20	72	1644	515	78,60	77
	40	1407	543	67,20	58	1454	550	69,40	61	1500	557	71,70	65	1548	564	74,00	69
	46	1312	607	62,60	51	1357	614	64,80	54	1402	621	67,00	57	1448	629	69,20	61
	48	1272	613	60,70	48	1285	587	61,40	49	1314	578	62,80	51	1328	553	63,50	52
	50	1141	524	54,50	40	1158	507	55,30	41	1175	492	56,10	42	1191	475	56,90	43
C15	25	1784	445	85,20	92	1838	452	87,80	97	1893	459	90,50	102	1949	466	93,10	108
	30	1691	490	80,70	83	1743	497	83,20	88	1796	504	85,80	93	1849	511	88,40	98
	35	1594	538	76,10	75	1644	546	78,50	79	1695	553	81,00	84	1746	561	83,50	88
	40	1500	591	71,60	67	1548	599	73,90	71	1597	606	76,30	75	1647	614	78,70	79
	46	1400	661	66,80	59	1448	669	69,10	63	1496	677	71,50	67	1544	685	73,80	71
	48	1359	669	64,90	56	1375	641	65,70	57	1406	631	67,20	60	1422	604	67,90	61
	50	1224	572	58,40	47	1235	547	59,00	47	1263	537	60,30	49	1273	512	60,80	50
C16	25	1862	467	88,90	79	1917	473	91,50	84	1973	480	94,30	88	2031	487	97,10	93
	30	1770	513	84,50	72	1823	520	87,10	76	1877	527	89,70	81	1932	534	92,30	85
	35	1673	565	79,90	65	1725	572	82,40	69	1776	579	84,90	73	1828	587	87,40	77
	40	1576	621	75,20	59	1625	629	77,60	62	1675	637	80,00	66	1724	645	82,40	69
	46	1468	698	70,10	52	1515	706	72,30	55	1561	715	74,60	58	1596	711	76,30	60
	48	1394	675	66,50	47	1421	663	67,90	49	1431	634	68,40	49	1457	624	69,60	51
	50	1246	575	59,50	39	1269	564	60,60	40	1291	553	61,70	41	1293	527	61,80	41
C17	25	1957	491	93,40	87	2015	498	96,20	91	2073	505	99,10	96	2133	512	102,00	101
	30	1862	541	88,90	79	1917	548	91,60	84	1974	555	94,30	88	2031	563	97,10	93
	35	1761	596	84,10	72	1815	603	86,70	76	1869	610	89,30	80	1923	618	91,90	84
	40	1661	656	79,30	65	1712	663	81,80	68	1764	671	84,30	72	1816	680	86,80	76
	46	1553	737	74,10	57	1601	745	76,50	60	1650	753	78,80	64	1687	749	80,60	66
	48	1490	728	71,10	53	1525	723	72,80	55	1542	699	73,70	57	1571	687	75,10	58
	50	1345	628	64,20	44	1369	617	65,40	46	1394	605	66,60	47	1398	577	66,80	47
C18	25	2047	506	97,70	80	2104	513	100,50	84	2162	519	103,30	88	2221	526	106,20	93
	30	1953	560	93,20	74	2008	566	95,90	77	2064	573	98,60	81	2120	580	101,40	85
	35	1854	618	88,50	67	1906	625	91,00	70	1960	632	93,60	74	2015	639	96,30	78
	40	1755	682	83,80	61	1806	690	86,30	64	1858	697	88,80	67	1910	704	91,30	71
	46	1652	768	78,90	54	1700	776	81,20	57	1748	783	83,50	60	1798	791	85,90	64
	48	1620	793	77,30	53	1661	794	79,30	55	1697	789	81,10	57	1715	761	82,00	58
	50	1481	695	70,70	45	1507	682	72,00	46	1528	664	73,00	47	1541	638	73,70	48

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_4

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC14-C18CZXS/XL

	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		12				13				14				15			
Size		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C14	25	1887	435	90,30	98	1941	442	92,90	103	1995	449	95,50	109	2050	456	98,20	114
	30	1792	477	85,70	89	1843	484	88,20	94	1895	491	90,70	99	1948	499	93,30	104
	35	1693	522	81,00	81	1743	530	83,40	85	1793	537	85,80	90	1844	545	88,30	94
	40	1596	572	76,30	73	1645	579	78,70	77	1694	587	81,00	81	1743	595	83,40	85
	46	1479	620	70,70	63	1503	603	71,90	65	1526	586	73,00	67	1541	562	73,80	68
	48	1348	537	64,50	54	1368	521	65,50	55	1379	498	66,00	56	1406	490	67,30	58
	50	1207	461	57,70	44	1213	459	58,00	44	1193	467	57,10	43	1216	460	58,20	45
C15	25	2005	473	95,90	113	2062	480	98,60	119	2119	488	101,40	125	2177	495	104,20	132
	30	1903	519	91,00	103	1958	526	93,70	109	2013	534	96,40	114	2069	542	99,10	120
	35	1799	568	86,00	93	1852	576	88,60	98	1905	584	91,20	103	1959	593	93,80	109
	40	1698	622	81,20	84	1749	630	83,70	89	1801	639	86,20	93	1853	647	88,70	99
	46	1577	675	75,40	74	1611	665	77,10	77	1629	638	78,00	78	1647	611	78,80	80
	48	1436	578	68,70	62	1467	568	70,20	65	1481	543	70,90	66	1510	534	72,30	68
	50	1300	503	62,20	52	1291	506	61,80	51	1301	484	62,30	52	1329	475	63,60	54
C16	25	2089	494	99,90	98	2148	502	102,80	103	2208	510	105,70	108	2268	518	108,60	113
	30	1987	542	95,00	89	2043	550	97,70	94	2099	558	100,50	99	2155	567	103,20	104
	35	1880	595	89,90	81	1933	603	92,40	85	1985	612	95,00	89	2036	622	97,50	94
	40	1773	654	84,80	73	1821	663	87,10	76	1869	673	89,40	80	1916	683	91,70	84
	46	1624	700	77,60	62	1634	672	78,20	63	1660	664	79,40	65	1666	637	79,80	65
	48	1464	597	70,00	52	1487	588	71,10	53	1509	580	72,20	54	1509	556	72,30	55
	50	1313	518	62,80	42	1307	519	62,50	42	1313	516	62,80	42	1329	509	63,60	43
C17	25	2194	520	104,90	107	2255	527	107,90	112	2317	535	110,90	118	2379	543	113,90	124
	30	2088	570	99,90	98	2146	578	102,70	103	2205	587	105,50	108	2264	596	108,40	113
	35	1978	626	94,60	89	2033	635	97,20	93	2088	644	99,90	98	2143	654	102,60	102
	40	1868	688	89,30	80	1919	697	91,80	84	1971	707	94,30	88	2022	717	96,80	92
	46	1723	745	82,40	69	1749	730	83,70	71	1784	727	85,40	74	1801	705	86,20	75
	48	1580	658	75,60	59	1607	647	76,90	61	1626	631	77,80	62	1637	611	78,40	63
	50	1421	567	68,00	49	1411	560	67,50	48	1433	551	68,60	50	1453	543	69,60	51
C18	25	2281	533	109,10	97	2341	540	112,00	102	2403	547	115,00	107	2465	555	118,00	112
	30	2178	587	104,20	90	2236	595	107,00	94	2295	602	109,90	99	2355	610	112,70	103
	35	2070	647	99,00	82	2126	654	101,70	86	2182	662	104,40	90	2239	671	107,20	94
	40	1963	712	93,90	74	2016	720	96,50	78	2070	729	99,10	82	2124	737	101,70	86
	46	1847	799	88,30	67	1892	801	90,50	70	1931	798	92,40	72	1976	801	94,60	75
	48	1739	742	83,20	60	1757	716	84,00	61	1786	704	85,50	63	1795	674	85,90	63
	50	1567	627	74,90	50	1586	610	75,90	51	1590	596	76,10	51	1614	586	77,30	52

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_1_6

6 Capacity tables

6 - 2 Partial Heat Recovery Capacity tables

Partial Heat Recovery Ratings

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

Evaporator Leaving Temperature 7°C - Δt 5°C / Condenser Inlet Air 35°C"	Partial Heat Recovery Leaving Water Temperature (°C)			Partial Heat Recovery LWT 45°C	
	45 (Δt=5°C)	50 (Δt=5°C)	55 (Δt=5°C)	Water Flow	Pressure Drops
	Hc (kW)	Hc (kW)	Hc (kW)	l/s	kPa
	120	100	81,8	5,71	24
	127	106	86,6	6,05	26
	143	120	97,6	6,82	33
	157	132	108	7,52	40
	179	151	123	8,57	51
	192	161	131	9,16	39
	213	179	146	10,17	48
	228	192	156	10,90	33
	253	212	173	12,07	41
	271	227	185	12,92	46
	284	239	194	13,59	39
	300	252	205	14,31	42
	314	264	215	15,02	46

cappart_1_Rev.00_1

6 Capacity tables

6 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
40/45	606	217	700	85%	6,01
	668	203	740	85%	6,94
	754	230	836	85%	6,91
	817	267	922	85%	6,51
	935	295	1046	85%	6,71
	986	329	1118	85%	6,39
	1117	347	1244	85%	6,81
	1179	386	1331	85%	6,50
	1307	426	1473	85%	6,52
	1393	465	1580	85%	6,39
	1467	491	1664	85%	6,38
	1547	517	1755	85%	6,38
	1640	537	1850	85%	6,50

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
40/50	578	220	678	85%	5,72
	637	205	716	85%	6,59
	719	233	809	85%	6,56
	779	270	892	85%	6,19
	891	298	1011	85%	6,38
	940	333	1082	85%	6,07
	1064	351	1203	85%	6,47
	1124	391	1288	85%	6,17
	1246	431	1425	85%	6,20
	1328	471	1529	85%	6,07
	1398	497	1611	85%	6,06
	1475	523	1698	85%	6,06
	1563	543	1790	85%	6,18

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
45/55	578	222	480	60%	4,76
	637	208	507	60%	5,50
	719	236	573	60%	5,48
	779	274	632	60%	5,16
	891	302	716	60%	5,32
	940	337	767	60%	5,06
	1064	355	852	60%	5,40
	1124	396	912	60%	5,15
	1246	437	1009	60%	5,17
	1328	477	1083	60%	5,06
	1398	503	1141	60%	5,05
	1475	530	1203	60%	5,05
	1563	550	1268	60%	5,15

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
50/60	578	222	280	35%	3,86
	637	208	296	35%	4,48
	719	236	334	35%	4,47
	779	274	368	35%	4,20
	891	302	418	35%	4,33
	940	337	447	35%	4,11
	1064	355	497	35%	4,40
	1124	396	532	35%	4,19
	1246	437	589	35%	4,20
	1328	477	632	35%	4,11
	1398	503	666	35%	4,10
	1475	530	702	35%	4,11
	1563	550	739	35%	4,19

Notes:
Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)
%Hc (percentage heat recovered)
COP Hc (coefficent of performance during heat recovery = (cooling+ heating capacity) / power input)
EWC (Entering water heat recovery condenser)
LWC (Leaving water heat recovery condenser)

Data refers to:
LWE (Leaving water evaporator) = 7°C
Same evaporator flow as for nominal cooling operation
Condenser Inlet Air Temperature = 35°C
0,0176 m^2 °C/kW evaporator fouling factor

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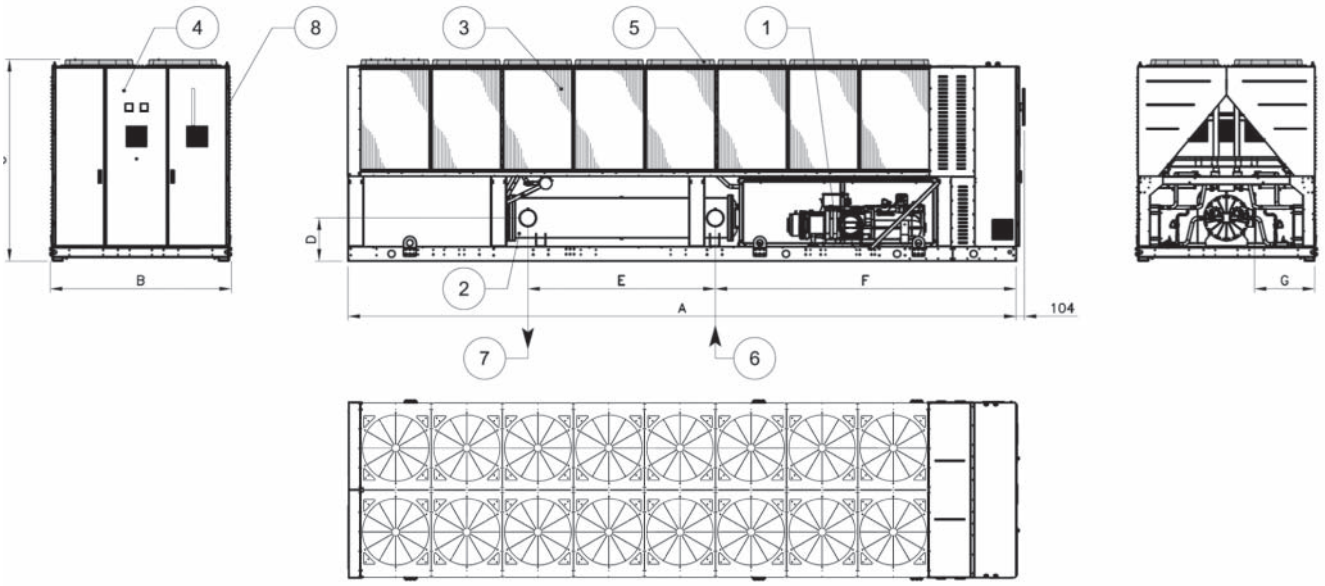
7 Dimensional drawings

7 - 1 Dimensional Drawings



The drawing is for illustration only. Please refer to the table below for unit dimensions.

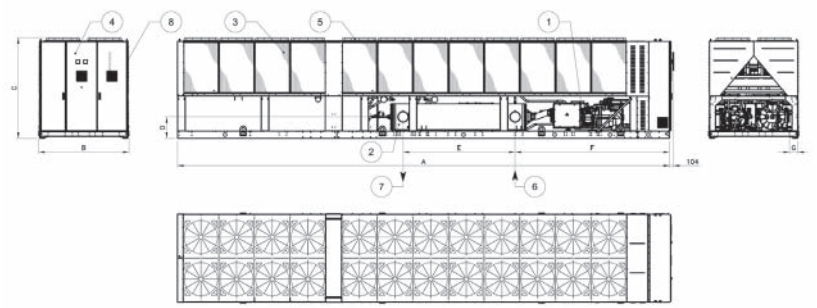
Models		Dimensions (mm)							
EWAD~CZXS/XL	EWAD~CZXR	A	B	C	D	E	F	G	Fans
670	640	6621	2285	2540	434	2412	3757	810	10
740	700	6621	2285	2540	434	2412	3757	810	12
830	790	7521	2285	2540	434	2412	3757	810	14
900	850	7521	2285	2540	434	2412	3757	810	14
C10	980	8421	2285	2540	542	2360	3794	758	16
C11	C10	8421	2285	2540	542	2360	3794	758	16
C12	C11	9321	2285	2540	542	2360	3794	758	20
C13	C12	9321	2285	2540	542	2360	3794	758	20

LEGEND
1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator water inlet
7. Evaporator water outlet
8. Power connections slot

DMN_1-2_Rev.00_1

7 Dimensional drawings

7 - 1 Dimensional Drawings



The drawing is for illustration only. Please refer to the table below for unit dimensions.

Models		Dimensions (mm)							
EWAD~CZXS/XL	EWAD~CZXR	A	B	C	D	E	F	G	Fans
C14	C13	11521	2285	2540	542	2360	3794	758	22
C15	C14	12421	2285	2540	542	2360	3794	758	24
C16	C15	12421	2285	2540	542	2830	3896	208	24
C17	C16	13321	2285	2540	542	2830	3896	208	26
C18	C17	14221	2285	2540	542	2830	3896	208	28

LEGEND
1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator water inlet
7. Evaporator water outlet
8. Power connections slot

DMN_1-2_Rev.00_2

8 Sound data

8 - 1 Sound Level Data

Sound Levels

EWAD~CZXS

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
670	64,1	65,4	72,2	76,8	78,5	72,3	68,1	59,0	**102,1**	**81,0**
740	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,0	**102,2**	**81,0**
830	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,1	**102,5**	**81,1**
900	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,1	**102,5**	**81,1**
C10	64,2	65,5	72,3	76,9	78,6	72,4	68,2	59,1	**102,9**	**81,1**
C11	64,2	65,5	72,3	76,9	78,6	72,4	68,2	59,1	**102,9**	**81,1**
C12	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**103,5**	**81,2**
C13	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**103,5**	**81,2**
C14	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**104,1**	**81,2**
C15	64,3	65,7	72,4	77,0	78,7	72,5	68,3	59,2	**104,1**	**81,2**
C16	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,8	**105,8**	**82,8**
C17	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,9	**106,0**	**82,9**
C18	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,9	**106,2**	**82,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

EWAD~CZXL

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
670	60,6	61,9	68,7	73,3	75,0	68,8	64,6	55,5	**98,6**	**77,5**
740	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,0	**99,2**	**78,0**
830	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,1	**99,5**	**78,1**
900	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,1	**99,5**	**78,1**
C10	61,2	62,5	69,3	73,9	75,6	69,4	65,2	56,1	**99,9**	**78,1**
C11	61,2	62,5	69,3	73,9	75,6	69,4	65,2	56,1	**99,9**	**78,1**
C12	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**100,5**	**78,2**
C13	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**100,5**	**78,2**
C14	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**101,1**	**78,2**
C15	61,3	62,7	69,4	74,0	75,7	69,5	65,3	56,2	**101,1**	**78,2**
C16	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,8	**102,8**	**79,8**
C17	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,9	**103,0**	**79,9**
C18	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,9	**103,2**	**79,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

EWAD~CZXR

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
640	56,6	57,9	64,7	69,3	71,0	64,8	60,6	51,5	**94,6**	**73,5**
700	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,0	**95,2**	**74,0**
790	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,1	**95,5**	**74,1**
850	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,1	**95,5**	**74,1**
980	57,2	58,5	65,3	69,9	71,6	65,4	61,2	52,1	**95,9**	**74,1**
C10	57,2	58,5	65,3	69,9	71,6	65,4	61,2	52,1	**95,9**	**74,1**
C11	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**96,5**	**74,2**
C12	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**96,5**	**74,2**
C13	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**97,1**	**74,2**
C14	57,3	58,7	65,4	70,0	71,7	65,5	61,3	52,2	**97,1**	**74,2**
C15	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,8	**98,8**	**75,8**
C16	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,9	**99,0**	**75,9**
C17	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,9	**99,2**	**75,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

NSL_1-2_Rev.00_1

8 Sound data

8 - 1 Sound Level Data

Sound pressure level correction factor for different distances

EWAD~CZXS / EWAD~CZXL / EWAD~CZXR

Unit size			Distance						
EWAD~CZ-XS	EWAD~CZ-XL	EWAD~CZ-XR	1m	5m	10m	15m	20m	25m	50m
670	670	640	0,0	7,0	11,5	14,4	16,6	18,4	24,0
740	740	700	0,0	7,0	11,5	14,4	16,6	18,4	24,0
830	830	790	0,0	6,8	11,3	14,2	16,4	18,1	23,7
900	900	850	0,0	6,8	11,3	14,2	16,4	18,1	23,7
C10	C10	980	0,0	6,6	11,0	13,9	16,1	17,9	23,4
C11	C11	C10	0,0	6,6	11,0	13,9	16,1	17,9	23,4
C12	C12	C11	0,0	6,4	10,7	13,5	15,7	17,4	22,9
C13	C13	C12	0,0	6,4	10,7	13,5	15,7	17,4	22,9
C14	C14	C13	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C15	C15	C14	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C16	C16	C15	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C17	C17	C16	0,0	6,0	10,2	12,9	15,0	16,7	22,2
C18	C18	C17	0,0	6,0	10,0	12,8	14,9	16,6	22,0

Values are dB(A) (pressure level)
Reduction to be applied to standard, low and reduced noise levels

NSL_1-2_Rev.00_2

9 Installation

9 - 1 Installation Method

Warning
Installation and maintenance of the unit must to be performed only by qualified personnel who have knowledge with local codes and regulations, and experience with this type of equipment. Must be avoided the unit installation in places that could be considered dangerous for all the maintenance operations.

Handling
Care should be taken to avoid rough handling or shock due to dropping the unit. Do not push or pull the unit from anything other than the base frame. Never allow the unit to fall during unloading or moving as this may result in serious damage. To lift the unit, rings are provided in the base frame of the unit. Spreader bar and cables should be arranged to prevent damage to the condenser coil or unit cabinet.

Location
The units are produced for outside installation on roofs, floors or below ground level on condition that the area is free from obstacles for the passage of the condenser air. The unit should be positioned on solid foundations and perfectly level; in the case of installation on roofs or floors, it may be advisable to arrange the use of suitable weight distribution beams. When the units are installed on the ground, a concrete base at least 250 mm wider and longer than the unit's footprint should be laid. Furthermore, this base should withstand the unit weight mentioned in the technical data table.

Space requirements
The units are air-cooled, then it is important to respect the minimum distances which guarantee the best ventilation of the condenser coils. Limitations of space reducing the air flow could cause significant reductions in cooling capacity and an increase in electricity consumption.
To determinate unit placement, careful consideration must be given to assure a sufficient air flow across the condenser heat transfer surface. Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation. Both these conditions cause an increase of condensing pressures that results in reductions in unit efficiency and capacity.
Moreover the unique microprocessor has the ability to calculate the operating environment of the air cooled chiller and the capacity to optimize its performance staying on-line during abnormal conditions.
Each side of the unit must be accessible after installation for periodic service. Fig.1 shows you minimum recommended clearance requirements.
Vertical condenser air discharge must be unobstructed because the unit would have its capacity and efficiency significantly reduced.
If the units are positioned in places surrounded by walls or obstacles of the same height as the units, the units should be at least 2500 mm from obstacles (fig.2). In the event the obstacles are higher than the units, the units should be at least 3000 mm from the obstacle (fig.4). Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. The microprocessor control is proactive in response "of design condition". In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.
When two or more units are positioned side by side it is recommended that the condenser coils are at least 3600 mm distance from one another (fig.3); strong wind could be the cause of air warm recirculation.
For other installation solutions, consult our technicians.

INN_1-2_Rev.00_1

9 Installation

9 - 1 Installation Method

The above recommended information are representative of general installation. A specific evaluation should be done by contractor depending on the case.

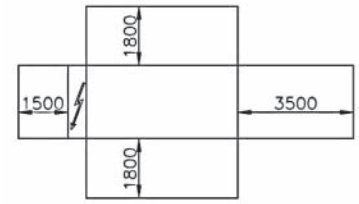


Fig. 1

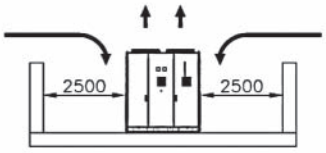


Fig. 2

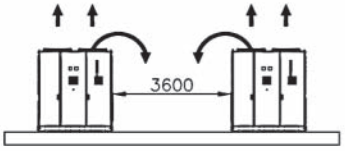


Fig. 3

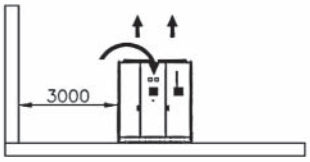


Fig. 4

Acoustic protection

When noise level must meet special requirements, it is necessary to pay the maximum attention to ensure the perfect insulation of the unit from the support base by applying appropriate vibration-dampening devices on the unit, on the water pipes and on the electrical connections.

Storage

The environment conditions have to be in the following limits:

Minimum ambient temperature: -20°C
Maximum ambient temperature: +57°C
Maximum R.H.: 95% not condensing

INN_1-2_Rev.00_2

9 Installation

9 - 2 Water Charge, Flow and Quality

Items (1) (5)			Cooling Water			Cooled Water		Heated water (2)				Tendency if out of criteria
			Circulating System		Once Flow			Low temperature		High temperature		
			Circulating water	Supply water (4)	Flowing water	Circulating water [Below 20°C]	Supply water (4)	Circulating water [20°C ~ 60°C]	Supply water (4)	Circulating water [60°C ~ 80°C]	Supply water (4)	
Items to be controlled:	pH	at 25°C	6.5 ~ 8.2	6.0 ~ 8.0	6.0 ~ 8.0	6.8 - 8.0	6.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	Corrosion + Scale
	Electrical conductivity	[mS/m] at 25°C	Below 80	Below 30	Below 40	Below 80	Below 80	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(µS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 800)	(Below 800)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl^-/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO^{2-}_4/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	M-alkalinity (pH4.8)	[mg$CaCO_3$/l]	Below 100	Below 50	Below 50	Below 100	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mg$CaCO_3$/l]	Below 200	Below 70	Below 70	Below 200	Below 70	Below 70	Below 70	Below 70	Below 70	Scale
	Calcium harness	[mg$CaCO_3$/l]	Below 150	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Silca ion	[mgSiO_2/l]	Below 50	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Scale
	Oxygen	(mg O2 /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Corrosion
	Particole size	(mm)	Below 0.5	Below 0.5	Below 0.5	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Erosion
	Total dissolved solids	(mg / l)	Below 1000	Below 1000	Below 1000	Below 1000	Below 1001	Below 1000	Below 1001	Below 1000	Below 1001	Erosion
	Ethykene, Propylene Glycol	(weight conc.)	Below 60%	Below 60%	---	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	---
Items to be referred to:	Nitrate ion	(mg NO3- /l)	Below 100	Below 100	Below 100	Below 100	Below 101	Below 100	Below 101	Below 100	Below 101	Corrosion
	TOC Total organic carbon	(mg /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Scale
	Iron	[mgFe/l]	Below 1.0	Below 0.3	Below 1.0	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Corrosion + Scale
	Copper	[mgCu/l]	Below 0.3	Below 0.1	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 0.1	Below 1.0	Below 0.1	Corrosion
	Sulfite ion	[mgS^{2-}/l]	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Corrosion
	Ammonium ion	[mgNH^+_4/l]	Below 1.0	Below 0.1	Below 1.0	Below 1.0	Below 0.1	Below 0.3	Below 0.1	Below 0.1	Below 0.1	Corrosion
	Remaining chloride	[mgCL/l]	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.25	Below 0.3	Below 0.1	Below 0.3	Corrosion
	Free carbide	[mgCO_2/l]	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 0.4	Below 4.0	Below 0.4	Below 4.0	Corrosion
	Stability index		6.0 ~ 7.0	---	---	---	---	---	---	---	---	Corrosion + Scale

1 Names, definitions and units are according to JIS K 0101. Units and figures between brackets are old units published as reference only.
2 In case of using heated water (more than 40°C), corrosion is generally noticeable. Especially when the iron materials is in direct contact with water without any protection shields, it is desireable to give the valid measure for corrosion. E.g. chemical measure
3 In the cooling water using hermetic cooling tower, close circuit water is according to heated water standard, and scattered water is according to cooling water standard.
4 Supply water is considered drink water, industrial water and ground water except for genuine water, neutral water and soft water.
5 The above mentioned items are representable items in corrosion and scale cases.
6 The limits above have to be considered as a general prescription and con not totallu assure the absence of corrossion and erosion. Some particular combinations of elements or the presence of components not listed in the table or factors not considered may trigger corrosion phenomena.

waflowqua_1-2_Rev.00_1

9 Installation

9 - 2 Water Charge, Flow and Quality

Water content in cooling circuits

The cooled water distribution circuits should have minimum water content to avoid excessive compressors start and stop.

In fact, each time the compressor starts up, an excessive quantity of oil goes from the compressor sump and simultaneously there is a rise in the temperature of the compressor motor's stator due to the inrush current during the start-up.

To prevent damage to the compressors, It has been envisaged the application of a device to limit frequent stops and restarts.

During the span of one hour there will be no more than 6 starts of the compressor. The plant side should therefore ensure that the overall water content allows a more constant functioning of the unit and consequently greater environmental comfort.

The minimum water content per unit should be calculated using this simplified formula:

For 2 compressors unit
M (liters) = (0.1595 x ΔT(°C) + 3.0825) x P(kW)

For 3 compressors unit
M (liters) = (0.0443 x ΔT(°C) + 1.6202) x P(kW)

where:

M	minimum water content per unit expressed in litres
P	Cooling Capacity of the unit expressed in kW
ΔT	evaporator entering / leaving water temperature difference expressed in °C

This formula is valid for:
- standard microprocessor parameters

For more accurate determination of quantity of water, it is advisable to contact the designer of the plant.

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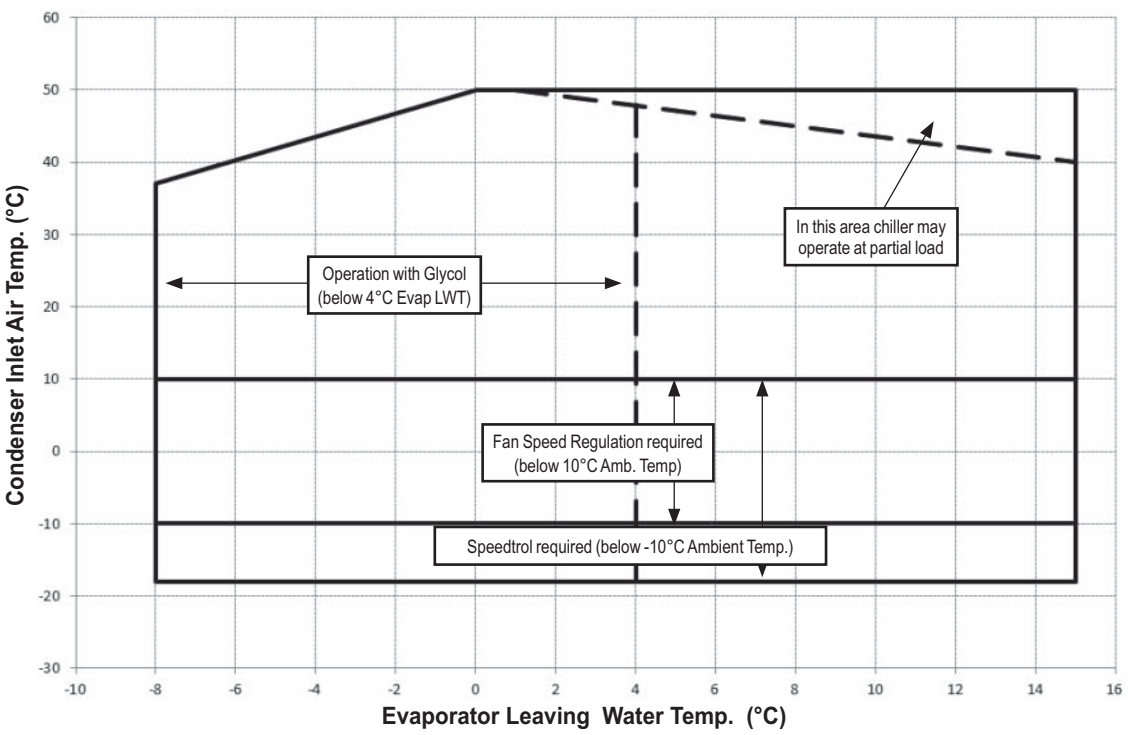
10 Operation range

10 - 1 Operation Range



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10 Operation range

10 - 2 Correction Factors

Table 1 - Evaporator minimum and maximum water Δt

Max evaporator water Δt	**°C**	**8**
Min evaporator water Δt	**°C**	**4**

Table 2 - Evaporator fouling factors

"Fouling factors m2 °C / kW"	"Cooling capacity correction factor"	"Power input correction factor"	"EER correction factor"
0,0176	1,000	1,000	1,000
0,0440	0,978	0,986	0,992
0,0880	0,957	0,974	0,983
0,1320	0,938	0,962	0,975

Table 3 - Altitude correction factors

Elevation above sea level (m)	**0**	**300**	**600**	**900**	**1200**	**1500**	**1800**
Barometric pressure (mbar)	1013	977	942	908	875	843	812
Cooling capacity correction factor	1,000	0,993	0,986	0,979	0,973	0,967	0,960
Power input correction factor	1,000	1,005	1,009	1,015	1,021	1,026	1,031
Maximum Ambient Temperature	1,000	1,000	1,000	1,000	0,992	0,980	0,968

Table 4.1 - Minimum glycol percentage for low water temperature

Evaporator Leaving Water Temperature (°C)	**2**	**0**	**-2**	**-4**	**-6**	**-8**
Ethylene glycol (%)	10	20	20	20	30	30
Propylene glycol (%)	10	20	20	30	30	30

Note: Minimum glycol percentage to be used with evaporator leaving water temperature below 4°C to prevent freezing of water circuit.

Table 4.2 - Minimum glycol percentage for low air temperature

Air Ambient Temperature (°C) (2)	**-3**	**-8**	**-15**	**-23**	**-35**
Ethylene glycol (%) (1)	10%	20%	30%	40%	50%
Air Ambient Temperature (°C) (2)	**-3**	**-7**	**-12**	**-20**	**-32**
Propylene glycol (%) (1)	10%	20%	30%	40%	50%

Note (1): Minimum glycol percentage to prevent freezing of water circuit at indicated air ambient temperature
Note (2): Air ambient temperature do exceed the operating limits of the unit, as protection of water circuit may be needed in winter season at non-working conditions

Table 5 - Correction factors for low evaporator leaving water temperature

Evaporator Leaving Water Temperature (°C)	**2**	**0**	**-2**	**-4**	**-6**	**-8**
Cooling Capacity	0,842	0,785	0,725	0,670	0,613	0,562
Compressor Power Input	0,950	0,940	0,920	0,890	0,870	0,840

Note: Correction factors have to be applied at working conditions: evaporator leaving water temperature 7°C

Table 6 - Correction factors for water and glycol mixture

	Ethylene Glycol (%)	**10%**	**20%**	**30%**	**40%**	**50%**
Ethylene Glycol	**Cooling Capacity**	0,991	0,982	0,972	0,961	0,946
	Compressor Power Input	0,996	0,992	0,986	0,976	0,966
	Flow Rate (Δt)	1,013	1,04	1,074	1,121	1,178
	Evaporator Pressure Drop	1,070	1,129	1,181	1,263	1,308
Propylene Glycol	**Cooling Capacity**	0,985	0,964	0,932	0,889	0,846
	Compressor Power Input	0,993	0,983	0,969	0,948	0,929
	Flow Rate (Δt)	1,017	1,032	1,056	1,092	1,139
	Evaporator Pressure Drop	1,120	1,272	1,496	1,792	2,128

operangecorr_1-2-3_Rev.00_1

10 Operation range

10 - 2 Correction Factors

How to use the correction factors proposed in the previous tables

A) Mixture Water and Glycol --- Evaporator leaving water temperature > 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.2 and 6)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	EWAD670CZXS
Mixture:	Water
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	672 kW
- Power input:	245 kW
- Flow rate (Δt 5°C):	32.00 l/s
- Evaporator pressure drop:	80 kPa
Mixture:	Water + Ethylene Glycol 30% (for a winter air temperature up to -15°C)
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	672 x 0.972 = 653 kW
- Power input:	245 x 0.986 = 242 kW
- Flow rate (Δt 5°C):	31.19 (referred to 653 kW) x 1.074 = 33.50 l/s
- Evaporator pressure drop:	76.25 (referred to 31.19 l/s) x 1.181 = 90.06 kPa

B) Mixture Water and Glycol --- Evaporator leaving water temperature < 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.1 and 4.2 and table 6)
- depending from the evaporator leaving water temperature (see table 5)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 5 and Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	EWAD670CZXS
Mixture:	Water
Standard working condition	ELWT 12/7°C – Condenser inlet air temperature 30°C
- Cooling capacity:	710 kW
- Power input:	219 kW
- Flow rate (Δt 5°C):	33.90 l/s
- Evaporator pressure drop:	88 kPa
Mixture:	Water + Glycol 30% (for a low evaporator leaving temperature of -1/-6°C)
Working condition:	ELWT -1/-6°C – Condenser inlet air temperature 30°C
- Cooling capacity:	710 x 0.613 x 0.972 = 423 kW
- Power input:	219 x 0.870 x 0.986 = 188 kW
- Flow rate (Δt 5°C):	20.22 l/s (referred to 423 kW) x 1.074 = 21.72 l/s
- Evaporator pressure drop:	38.28 kPa (referred to 20.00 l/s) x 1.181 = 45.21 kPa

operangecorr_1-2-3_Rev.00_2

10 Operation range

10 - 2 Correction Factors

Table 7 - Available fan static pressure correction factors

External Static Pressure (Pa)	0	10	20	30	40	50	60	70	80	90	100
Cooling Capacity (kW) Correction factor	1,000	0,998	0,996	0,995	0,993	0,992	0,991	0,989	0,986	0,985	0,982
Compr. Power Input (kW) Correction factor	1,000	1,004	1,009	1,012	1,018	1,021	1,024	1,027	1,034	1,039	1,045
Reduction of Max CIAT (°C)	1,000	-0,3	-0,5	-0,7	-1,0	-1,1	-1,3	-1,6	-1,8	2,1	-2,4

CIAT: Condenser Inlet Air Temperature

External Static Pressure (Pa)	0	10	20	30	40	50	60	70
Cooling Capacity (kW) Correction factor	1,000	0,996	0,991	0,985	0,978	0,97	0,954	0,927
Compr. Power Input (kW) Correction factor	1,000	1,005	1,012	1,02	1,028	1,039	1,058	1,092
Reduction of Max CIAT (°C)	1,000	-0,3	-0,7	-1,1	-1,6	-2,2	-3,3	-5,1

CIAT: Condenser Inlet Air Temperature

How to use the Correction factors proposed in the previous tables

Example
Unit Size: EWAD670CZXS

- External static pressure **0 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 672 kW
- Power input: 245 kW
- Maximum CIAT: 50°C (see graphic operating limit)

- External static pressure **40 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 672 x 0.978 = 657 kW
- Power input: 245 x 1.028= 252 kW
- Maximum CIAT 50 - 1.6 = 48.4°C

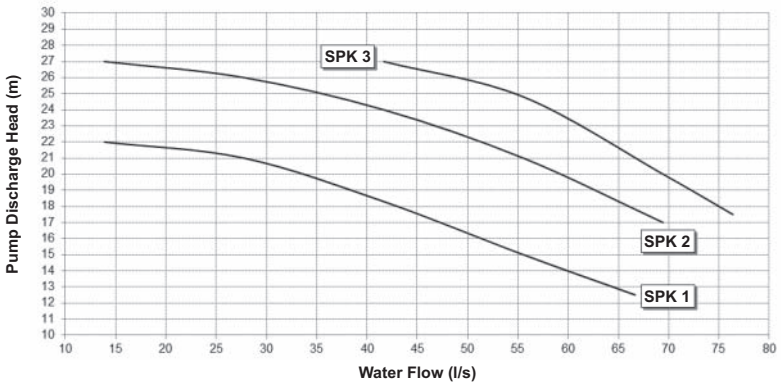
operangecorr_1-2-3_Rev.00_3

11 Hydraulic performance

11 - 1 Pump Characteristics

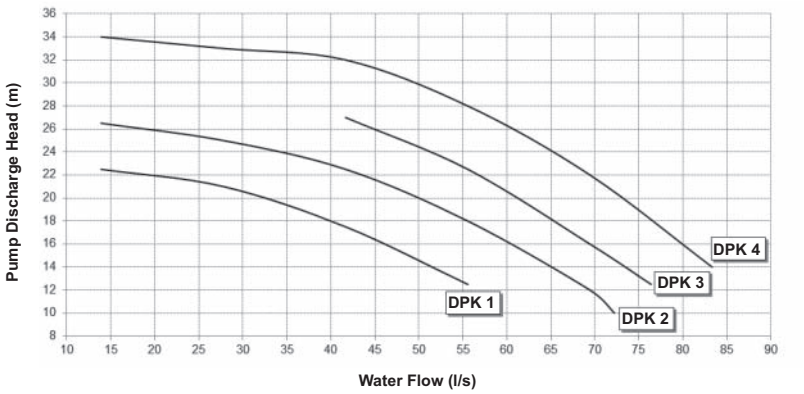
Water Pump Kit - Discharge Head

Single Pump (2 poles) - Discharge Head



Note
- the above curves are referred to the discharge head of the pump only
- when selecting the pump you have to consider the installation and evaporator pressure drops
- when using mixture of water and glycol please contact the factory as above specification can change

Tzin Pump (2 poles) - Discharge Head



Note
- the above curves are referred to the discharge head of the pump only
- when selecting the pump you have to consider the installation and evaporator pressure drops
- when using mixture of water and glycol please contact the factory as above specification can change

pump_1-2_Rev.00_1

11 Hydraulic performance

11 - 1 Pump Characteristics

Water Pump Kit - Combination Matrix

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

Single Pump			Double Pump			
SPK 1	**SPK 2**	**SPK 3**	**DPK 1**	**DPK 2**	**DPK 3**	**DPK 4**
X	X		X	X		
X	X		X	X		
X	X		X	X		
X	X		X	X		
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X		X	X	X
X	X	X		X	X	X
X	X	X		X	X	X
		X			X	X

Water Pump Kit - Technical Information

		Pump Motor Power (kW)	Pump Motor Current (A)	Power supply (V-ph-Hz)	PN	Motor Protection	Insulation (Class)	Working Temp. (°C)
Single Pump	**SPK 1**	11,0	20,0	400V-3ph-50hz	16	IP55	class F	-20 +140
	SPK 2	15,0	26,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	SPK 3	18,5	32,5	400V-3ph-50hz	16	IP55	class F	-20 +140
Double Pump	**DPK 1**	11,0	20,0	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 2	15,0	26,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 3	18,5	32,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 4	22,0	39,0	400V-3ph-50hz	16	IP55	class F	-20 +140

Note
- when using mixture of water and glycol please contact the factory as above specification can change

pump_1-2_Rev.00_2

11 Hydraulic performance

11 - 2 Total Heat Recovery Pressure Drop

Total and Partial Heat Recovery Pressure Drops

To determinate the pressure drop for different versions or at different working condition, please refer to the following formula:

$$\mathbf{PD_2}\ (\text{kPa}) = \mathbf{PD_1}\ (\text{kPa}) \times \left(\frac{Q_2\ (\text{l/s})}{Q_1\ (\text{l/s})} \right)^{1.87}$$

where:

PD_2 Pressure drop to be determinate (kPa)
PD_1 Pressure drop at nominal condition (kPa)
Q_2 water flow at new working condition (l/s)
Q_1 water flow at nominal condition (l/s)

How to use the formula: Example

The unit EWAD670CZXS has been selected for working at the following conditions:
- Partial heat recovery leaving water temperature 50/55°C
The heating capacity at these working conditions is: 81.8 kW
The water flow at these working conditions is: 3.91 l/s

The unit EWAD670CZXS at nominal working conditions has the following data:
- Partial heat recovery leaving water temperature 40/45°C
- condenser air inlet: 35°C
The heating capacity at these working conditions is: 120 kW
The water flow at these working conditions is: 5.71 l/s
The pressure drop at these working conditions is: 24 kPa

The pressure drop at the selected working condition will be:

$$\mathbf{PD_2}\ (\text{kPa}) = \mathbf{24}\ (\text{kPa}) \times \left(\frac{\mathbf{3.91}\ (\text{l/s})}{\mathbf{5.71}\ (\text{l/s})} \right)^{1.87}$$

$$\mathbf{PD_2}\ (\text{kPa}) = \mathbf{12}\ (\text{kPa})$$

totheatpd_1_Rev.00_1

12 Specification text

12 - 1 Specification Text

Technical specification for air cooled chiller

GENERAL

The chiller will be designed and manufactured in accordance with the following European directives:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Standards	UNI – EN ISO 9001:2004

To avoid any losses, the unit will be tested at full load in the factory (at the nominal working conditions and water temperatures). The chiller will be delivered to the job site completely assembled and charged with refrigerant and oil. The installation of the chiller must comply with the manufacturer's instructions for rigging and handling equipment.

The unit will be able to start up and operate (as standard) at full load with:
- outside air temperature from ..... °C to ..... °C
- evaporator leaving fluid temperature between ..... °C and ..... °C

Refrigerant

Only R-134a can be used.

PERFORMANCE

- ✓ Number of chiller(s) : ..... unit(s)
- ✓ Cooling capacity for single chiller : ..... kW
- ✓ Power input for single chiller in cooling mode : ..... kW
- ✓ Heat exchanger entering water temperature in cooling mode: : ..... °C
- ✓ Heat exchanger leaving water temperature in cooling mode : ..... °C
- ✓ Heat exchanger water flow : ..... l/s
- ✓ Nominal outside working ambient temperature in cooling mode : ..... °C

Operating voltage range should be 400V ±10%, 3ph, 50Hz, voltage unbalance maximum 3%, without neutral conductor and shall only have one power connection point.

UNIT DESCRIPTION

The chiller includes as standard not less than: two or three independent refrigerant circuits (depending on the size), semi-hermetic asymmetric type rotary single screw compressors, air cooled variable electrical frequency driver for each compressor (VFD), electronic expansion device (EEXV), refrigerant direct expansion 'shell&tube' heat exchanger, air-cooled condenser section, R-134a refrigerant, lubrication system, motor starting components, discharge line shut-off valve, control system and all components necessary for a safe and stable unit operation.
The chiller will be factory assembled on a robust base frame made of galvanized steel, protected by an epoxy paint.

SOUND LEVEL AND VIBRATIONS

Sound pressure level at 1 meter distance in free field, semispheric conditions, shall not exceed ……dB(A). The sound pressure levels must be rated in accordance to ISO 3744 (other types of rating can not be used).
Vibration on the base frame should not exceed 2 mm/s.

DIMENSIONS

Unit dimensions shall not exceed following indications:
- Unit length ..... mm
- Unit width ..... mm
- Unit height ..... mm

SPC_1-2-3-4_Rev.00_1

12 Specification text

12 - 1 Specification Text

CHILLER COMPONENTS

Compressors

- ✓ Semi-hermetic, single-screw asymmetric type with one main helical rotor meshing with two diametrical opposed gaterotors. The gaterotors' contact elements shall be constructed of composite material designed for extended life. Electrical motor shall be 2-pole, semi-hermetic, squirrel-cage induction type and cooled by suction gas.
- ✓ The oil injection shall be used in order to get high EER (Energy Efficiency Ratio) also at high condensing pressure and low sound pressure levels in each load condition.
- ✓ The compressor shall be provided with a built in, high efficiency, mesh type oil separator and oil filter.
- ✓ Refrigerant system differential pressure shall provide oil injection on all moving compressor parts to correctly lubricate them. Electrical oil pump lubricating system is not allowed.
- ✓ Compressor cooling must be done by refrigerant liquid injection. An external dedicated heat exchanger and additional piping to carry the oil from compressor to heat exchanger and viceversa is not allowed.
- ✓ The compressor shall be direct electrical driven, without gear transmission between the screw and the electrical motor.
- ✓ The compressor casing shall be provided with ports to realize economized refrigerant cycles.
- ✓ The compressor must be protected by a temperature sensor for high discharge temperature and an electrical motor thermistor for high winding temperature.
- ✓ The compressor shall be equipped with an electric oil heater.
- ✓ The compressor shall be fully field serviceable. Compressor that must be removed and returned to the factory for service shall be unacceptable.

Cooling capacity control system

- ✓ Each chiller will have a microprocessor for the control of the compressor capacity through inverter and the instantaneous RPM value of the motor.
- ✓ The unit capacity control shall be infinitely modulating, from 100% down to 40% for each circuit. The chiller shall be capable of stable operation to a minimum of 13.5% of full load without hot gas bypass.
- ✓ The system shall control the unit based on the leaving evaporator water temperature that shall be controlled by PID (Proportional Integral Derivative) logic.
- ✓ Unit control logic shall to manage frequency level of the compressor electric motor to exactly match plant load request in order to keep constant the set point for delivered chilled or hot water temperature. In this operating condition unit control logic shall modulate electrical frequency level in a range lower and upper the nominal electrical network value fixed at 50 Hz.
- ✓ The microprocessor unit control shall detect conditions that approach protective limits and take self-corrective action prior to an alarm occurring. The system shall automatically reduce the chiller capacity when any of the following parameters are outside their normal operating range:
    - o High condenser pressure
    - o Low evaporating refrigerant temperature

Unit-mounted Variable Frequency Driver (VFD) and Electrical Requirement

- ✓ All interconnecting wiring between the VFD and the chiller shall be factory-installed. Customer electrical connection for compressor motor power shall be limited to main power leads to the single point power connection located into electrical panel.
- ✓ The VFD shall be air cooled type. Water cooled design or refrigerant cooled design are not acceptable.
- ✓ The VFD full load efficiency shall meet or exceed 97% at 100% VFD rated capacity.
- ✓ Base motor frequency shall permit motor to be utilized at nameplate voltage. Adjustable frequency range, monitored by unit's microprocessor control, shall permit a stable unit capacity control down to 13.5% without hot-gas bypass.
- ✓ Starting current for the compressor shall not exceed nominal compressor load amps.
- ✓ Unit power factor shall be not less than 0.95 on entire unit capacity range, from 100% down to 13.5%.

Evaporator

- ✓ The units shall be equipped with a Direct Expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. The evaporator shall be single-pass on both the refrigerant and water sides for pure counter-flow heat exchange and low refrigerant pressure drops.
- ✓ The external shell shall be linked with an electrical heater to prevent freezing down to -28°C ambient temperature, controlled by a thermostat and shall be insulated with flexible, closed cell polyurethane insulation material (20-mm thick).

SPC_1-2-3-4_Rev.00_2

12 Specification text

12 - 1 Specification Text

- ✓ The evaporator will have 2 or 3 circuits, one for each compressor and shall be single refrigerant pass.
- ✓ The water connections shall be VICTAULIC type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.
- ✓ Evaporator is manufactured in accordance to PED approval.

Condenser coil

- ✓ The condenser coils are constructed with internally finned seamless copper tubes and arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminium fins with full fin collars for higher efficiencies. The space between the fins is given by a collar that will increase the surface area in connection with the tubes, protecting them from ambient corrosion.
- ✓ The condenser coils will have an integral subcooler circuit that provides sufficient subcooling to effectively eliminate the possibility of liquid flashing and increase the unit's efficiency with 5% to 7% without increasing in energy consumption.
- ✓ The condenser coils shall be leak-tested and submitted to a pressure test with dry air.

Condenser fans

- ✓ The condenser fans used in conjunction with the condenser coils, shall be propeller type with glass reinforced resin blades for higher efficiencies and lower sound. Each fan shall be protected by a fan guard.
- ✓ The air discharge shall be vertical and each fan must be coupled to the electrical motor, supplied as standard to IP54 and capable to work to ambient temperatures of - 20°C to + 65°C.
- ✓ The condenser fans shall have as a standard a thermally protection by internal thermal motor protection and protected by circuit braker installed inside the electrical panel as a standard.

Refrigerant circuit

- ✓ The unit shall have two or three independent refrigerant circuits (depending on the size) and one variable electrical frequency driver per compressor (VFD).
- ✓ Each circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, compressor discharge shut-off valve, replaceable core filter-drier, sight glass with moisture indicator and insulated suction line.

Condensation control

- ✓ The units will be provided with an automatic control for condensing pressure which ensures the working at low external temperatures down to - ..... °C, to maintain condensing pressure.
- ✓ The compressor automatically unloads when abnormal high condensing pressure is detected. This to prevent the shutdown of the refrigerant circuit (shutdown of the unit) due to a high-pressure fault.

Low sound unit configurations (on request)

- ✓ The unit compressor shall be connected with unit's metal base frame by rubber antivibration supports to prevent the transmission of vibrations to all metal unit structure, in order to control the unit sound.
- ✓ The chiller shall be provided with an acoustical compressor enclosure. This enclosure shall be realized with a light, corrosion resisting aluminium structure and metal panels. The compressor sound-proof enclosure shall be internally fitted with flexible, multi-layer, high density materials.

Hydronic kit options (on request)

- ✓ The hydronic module shall be integrated in the chiller chassis without increasing its dimensions and includes the following elements: centrifugal water pump with three-phase motor equipped with internal over-temperature protection, safety relief valve and filling kit.
- ✓ The water piping shall be protected against corrosion and equipped with drain and purge plugs. The customer connections shall be victaulic connections. The piping shall be fully insulated to prevent condensation (pump insulation using polyurethane foam).
- ✓ A choice of two pump types shall be available:
  - o in-line single pump
  - o in-line twin pumps

SPC_1-2-3-4_Rev.00_3

12 Specification text

12 - 1 Specification Text

Control panel

- ✓ Field power connection, control interlock terminals and unit control system should be centrally located in an electric panel (IP 54). Power and starting controls should be separated from safety and operating controls in different compartments of the same panel.
- ✓ Starting will be inverter type.
- ✓ Operating and safety controls should include energy saving control, emergency stop switch, overload protection for compressor motor, high and low pressure cut-out switch (for each refrigerant circuit), anti-freeze thermostat, cut-out switch for each compressor.
- ✓ All of the information regarding the unit will be reported on a display, and with the internal built-in calendar and clock that will switch the unit ON/OFF during day time all year long.
- ✓ The following features and functions shall be included:
  - o leaving water temperature reset by controlling the water temperature Δt, by a remote 4-20mA DC signal or by controlling the external ambient temperature;
  - o soft load function to prevent the system from operating at full load during the chilled fluid pulldown period;
  - o password protection of critical parameters of control;
  - o start-to-start and stop-to-start timers to provide minimum compressor off-time with maximum motor protection;
  - o communication capability with a PC or remote monitoring;
  - o discharge pressure control through intelligent cycling of condenser fans;
  - o lead-lag selection manual or automatically by circuit run hours;
  - o double set point for brine unit version;
  - o scheduling via internal time clock to allow programming of a yearly start-stop schedule accommodating weekends and holidays.

Optional High Level Communications Interface

- ✓ The chiller is able to communicate to BMS (Building Management System) based on the most common protocols as:
  - o ModbusRTU
  - o LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology
  - o BacNet BTP certifief over IP and MS/TP (class 4) (Native)
  - o Ethernet TCP/IP

SPC_1-2-3-4_Rev.00_4

TABLE OF CONTENTS

EWAD-CZXR

1 Features

- ESEER up to 5.8
- Inverter stepless single-screw compressor
- High efficiency, reduced sound levels
- Optimised for use with R-134a
- Wide operating range
- Extensive option list (heat recovery option available)
- Low starting current
- MicroTech III controller

2 Specifications

2-1 Technical Specifications					EWAD640CZXR	EWAD700CZXR	EWAD790CZXR	EWAD850CZXR	EWAD980CZXR	EWADC10CZXR	EWADC11CZXR
Cooling capacity	Nom.			kW	635 (1)	700 (1)	789 (1)	852 (1)	976 (1)	1,031 (1)	1,170 (1)
Capacity control	Method				Stepless						
	Minimum capacity			%	20						
Power input	Cooling	Nom.		kW	260 (1)	242 (1)	271 (1)	314 (1)	347 (1)	388 (1)	408 (1)
EER					2.44 (1)	2.89 (1)	2.91 (1)	2.71 (1)	2.81 (1)	2.65 (1)	2.86 (1)
ESEER					5.52	5.71	5.76		5.79	5.49	5.41
IPLV					5.94	6.14	6.32	6.37	6.34	6.05	5.96
Casing	Colour				Ivory white						
	Material				Galvanized and painted steel sheet						
Dimensions	Unit	Height		mm	2,540						
		Width		mm	2,285						
		Depth		mm	6,725		7,625		8,525		10,325
Weight	Unit			kg	6,170	6,470	7,100	7,360	7,950		9,120
	Operation weight			kg	6,430	6,720	7,340	7,600	8,390		9,500
Water heat exchanger	Type				Single pass shell & tube						
	Water volume			l	263	248	241		441		383
	Nominal water flow	Cooling		l/s	30.30	33.40	37.60	40.70	46.60	49.20	55.80
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	73	69	51	58	57	63	43
	Insulation material				Closed cell						
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler						
Fan	Quantity				10	12	14		16		20
	Type				Direct propeller						
	Diameter			mm	800						
	Air flow rate	Nom.		l/s	41,536	49,843	58,151		66,458		83,072
Fan motor	Drive				DOL						
	Speed	Cooling	Nom.	rpm	700						
	Input	Cooling		W	0.78					0.784	
Sound power level	Cooling	Nom.		dBA	94.6	95.2	95.5		95.9		96.5
Sound pressure level	Cooling	Nom.		dBA	73.5 (2)	74.0 (2)	74.1 (2)				74.2 (2)
Compressor	Type				Semi-hermetic single screw compressor						
	Quantity				2						
	Starting method				Inverter driven						
	Oil	Charged volume		l	32		35	38			44
Operation range	Water side	Cooling	Min.	ºCDB	-8						
			Max.	ºCDB	15						
	Air side	Cooling	Min.	ºCDB	-18						
			Max.	ºCDB	50						
Refrigerant	Type				R-134a						
	Circuits	Quantity			2						
Refrigerant circuit	Charge			kg	141	161	178		200		235
Piping connections	Evaporator water inlet/outlet (OD)				168.3mm				219.1mm		
Safety devices	Item	01			High discharge pressure (pressure switch)						
		02			High discharge pressure (pressure transducer)						
		03			Low suction pressure (pressure transducer)						
		04			Compressor motor protection						
		05			High discharge temperature						
		06			Low oil pressure						
		07			Low pressure ratio						
		08			High oil filter pressure drop						
		09			Phase monitor						
		10			Emergency stop button						
		11			Water freeze protection controller						

2 Specifications

2-2 Technical Specifications					EWADC12CZXR	EWADC13CZXR	EWADC14CZXR	EWADC15CZXR	EWADC16CZXR	EWADC17CZXR
Cooling capacity	Nom.			kW	1,235 (1)	1,332 (1)	1,443 (1)	1,545 (1)	1,631 (1)	1,712 (1)
Capacity control	Method				Stepless					
	Minimum capacity			%	20			13		
Power input	Cooling	Nom.		kW	455 (1)	524 (1)	589 (1)	580 (1)	610 (1)	631 (1)
EER					2.71 (1)	2.55 (1)	2.45 (1)	2.66 (1)	2.67 (1)	2.71 (1)
ESEER					5.05	5.45	5.60	5.51	5.33	5.19
IPLV					5.67	6.03	6.21	6.28	6.03	5.91
Casing	Colour				Ivory white					
	Material				Galvanized and painted steel sheet					
Dimensions	Unit	Height		mm	2,540					
		Width		mm	2,285					
		Depth		mm	10,325	11,625	12,525		13,425	14,325
Weight	Unit			kg	9,530	10,180	10,530	12,150	12,990	13,740
	Operation weight			kg	9,920	10,550	10,910	13,000	13,840	14,610
Water heat exchanger	Type				Single pass shell & tube					
	Water volume			l	383	374		850		871
	Nominal water flow	Cooling		l/s	58.9	63.60	68.80	73.70	77.80	81.70
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	47	53	59	57	62	59
	Insulation material				Closed cell					
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler					
Fan	Quantity				20	22	24		26	28
	Type				Direct propeller					
	Diameter			mm	800					
	Air flow rate	Nom.		l/s	83,072			99,687	107,994	116,301
Fan motor	Drive				DOL					
	Speed	Cooling	Nom.	rpm	700					
	Input	Cooling		W	0.784					
Sound power level	Cooling	Nom.		dBA	96.5	97.1		98.8	99.0	99.2
Sound pressure level	Cooling	Nom.		dBA	74.2 (2)			75.8 (2)	75.9 (2)	
Compressor	Type				Semi-hermetic single screw compressor					
	Quantity				2			3		
	Starting method				Inverter driven					
	Oil	Charged volume		l	50			57	63	69
Operation range	Water side	Cooling	Min.	ºCDB	-8					
			Max.	ºCDB	15					
	Air side	Cooling	Min.	ºCDB	-18					
			Max.	ºCDB	50					
Refrigerant	Type				R-134a					
	Circuits	Quantity			2			3		
Refrigerant circuit	Charge			kg	235	275	320	327	343	361
Piping connections	Evaporator water inlet/outlet (OD)				219.1mm			273mm		
Safety devices	Item	01			High discharge pressure (pressure switch)					
		02			High discharge pressure (pressure transducer)					
		03			Low suction pressure (pressure transducer)					
		04			Compressor motor protection					
		05			High discharge temperature					
		06			Low oil pressure					
		07			Low pressure ratio					
		08			High oil filter pressure drop					
		09			Phase monitor					
		10			Emergency stop button					
		11			Water freeze protection controller					

2 Specifications

2-3 Electrical Specifications				EWAD640CZ XR	EWAD700CZ XR	EWAD790CZ XR	EWAD850CZ XR	EWAD980CZ XR	EWADC10CZ XR	EWADC11CZ XR
Compressor	Phase			3~						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
	Maximum running current		A	205	221		283		344	
	Starting method			VFD driven						
Compressor 2	Maximum running current		A	205	221	283		344		404
Power supply	Phase			3~						
	Frequency		Hz	50						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
Unit	Maximum starting current		A	315	340	393	434	485	526	580
	Nominal running current (RLA)	Cooling	A	383	360	405	466	516	574	608
	Maximum running current		A	437	473	540	602	668	729	800
	Max unit current for wires sizing		A	480	520	594	663	735	803	881
Fans	Nominal running current (RLA)		A	26	31.2	36.4		41.6		52

2-4 Electrical Specifications				EWADC12CZXR	EWADC13CZXR	EWADC14CZXR	EWADC15CZXR	EWADC16CZXR	EWADC17CZXR
Compressor	Phase			3~					
	Voltage		V	400					
	Voltage range	Min.	%	-10					
		Max.	%	10					
	Maximum running current		A	404		486	344		404
	Starting method			VFD driven					
Compressor 2	Maximum running current		A	404	486		344		404
Power supply	Phase			3~					
	Frequency		Hz	50					
	Voltage		V	400					
	Voltage range	Min.	%	-10					
		Max.	%	10					
Unit	Maximum starting current		A	621	686	740	822	876	929
	Nominal running current (RLA)	Cooling	A	674	771	864	856	902	936
	Maximum running current		A	861	942	1,024	1,093	1,159	1,225
	Max unit current for wires sizing		A	948	1,039	1,129	1,204	1,277	1,350
Fans	Nominal running current (RLA)		A	52			62	68	73

Notes

(1) Cooling: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC; full load operation.

(2) Sound pressure levels are measured at entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC; full load operation; Standard: ISO3744

(3) Allowed voltage tolerance ± 10%. Voltage unbalance between phases must be within ± 3%.

(4) Maximum starting current: starting current of biggest compressor + 75 % of maximum current of the other compressor + fans current for the circuit at 75 %

(5) Nominal current in cooling mode: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC. Compressor + fans current.

(6) Maximum running current is based on max compressor absorbed current in its envelope and max fans absorbed current

(7) Maximum unit current for wires sizing is based on minimum allowed voltage.

(8) Maximum current for wires sizing: (compressors full load ampere + fans current) x 1.1

3 Features and advantages

3 - 1 Features and Advantages

High part load efficiency
High efficiency at full load, but especially maximum efficiency at part load conditions - which is the majority of the operating time of a chiller - are the factors that allow considerable savings in a system's annual energy costs.
With the objective of bringing down these operating costs and improving a building's economical management, this inverter range has been designed to optimize the seasonal energy efficiency (ESEER).

Seasonal quietness
Very low sound levels in part load conditions are achieved by varying the fan speed, but especially thanks to the variation of compressor frequency, which ensure the minimum sound level at all the time.

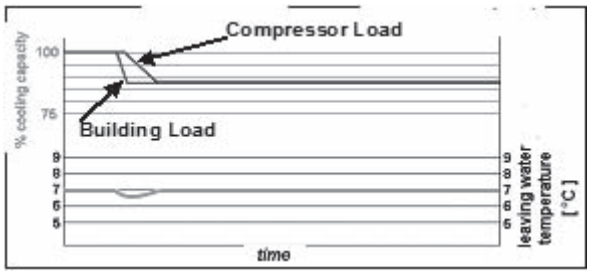
Quick comfort conditions
The ability to vary the output power in direct relation to the cooling requirements of the system, allow the possibility to achieve building comfort conditions much faster at start-up.

Low starting current
No current spikes at start-up. The starting current is always lower than current absorbed in the maximum operating conditions (FLA).

Power factor always > 0.95
This inverter range can operate always with a power factor > 0.95, which allows building owners to avoid power factor penalties and decrease electrical losses in cable and transformers.

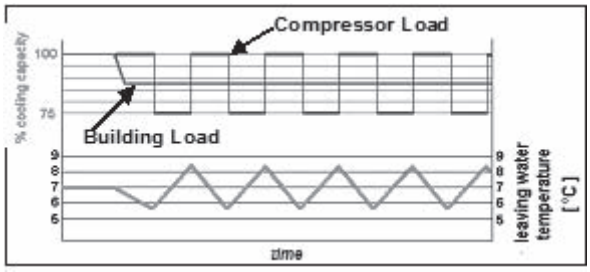
Redundancy
The range has two or three truly independent refrigerant circuits (depending on the size) guaranteeing (partial) cooling 'backup' even in case of maintenance activity

Infinitely capacity control
Cooling capacity control is infinitely variable by means of a Inverter driven screw compressor controlled by microprocessor system. Each unit has infinitely variable capacity control from 100% down to 13,5%. This modulation allows the compressor capacity to exactly match the building cooling load without any leaving evaporator water temperature fluctuation. This chilled water temperature fluctuation is avoided only with a stepless control.



ELWT fluctuation with steps capacity control

In the case that a compressor with load step control is used, the compressor capacity, at partial loads, will be too high or too low compared to the building cooling load. The result is an increase in chiller energy costs, particularly at the part-load conditions at which the chiller operates most of the time.



ELWT fluctuation with steps capacity control (4 steps)

Units with stepless regulation offer benefits that the units with step regulation are unable to match.
Only a chiller with step-less regulation, is able to follow the system cooling demand at any time and to deliver chilled water at set-point.

FTA_1-2_Rev.00_1

3 Features and advantages

3 - 1 Features and Advantages

Code requirements – Safety and observant of laws/directives

The range is designed and manufactured in accordance with applicable selections of the following:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Standards	UNI – EN ISO 9001:2004

Certifications

All units manufactured are CE marked, complying with European directives in force, concerning manufacturing and safety. On request units can be produced complying with laws in force in non European countries (ASME, GOST, etc.), and with other applications, such as naval (RINA, etc.).

Efficiency and sound configuration

The range is available in multiple sound versions:

	Sound level			
Efficiency level	Standard	Low	Reduced	Extra low
High efficiency	EWAD~CZXS	EWAD~CZXL	EWAD~CZXR	N.A.

Versions

The range is available as high efficiency version:

X: High efficiency
13 sizes to cover a range from 635 up to 1802 kW with an ESEER up to 5.8

The EER (Energy Efficiency Ratio) is the ratio of the Cooling Capacity to the Power Input of the unit. The Power Input includes: the power input for operation of the compressor, the power input of all control and safety devices, the power input for fans.

The ESEER (European Seasonal Energy Efficiency Ratio) is a weighed formula enabling to take into account the variation of EER with the load rate and the variation of air inlet condenser temperature.

ESEER = A x EER100% + B x EER75% + C x EER50% + D x EER25%

	A	B	C	D
Coefficient	0.03 (3%)	0.33 (33%)	0.41 (41%)	0.23 (23%)
Air inlet condenser temperature	35°C	30°C	25°C	20°C

Sound levels

The range is available in three different sound level configurations:

S: Standard sound
Condenser fan rotating at 900 rpm

L: Low sound
Condenser fan rotating at 900 rpm, compressor sound enclosure and flexible discharge piping.

R: Reduced sound
Condenser fan rotating at 700 rpm, compressor sound enclosure and flexible discharge piping.

FTA_1-2_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

Cabinet and structure
The cabinet is made of galvanized steel sheet and painted to provide a high resistance to corrosion. Colour Ivory White (Munsell code 5Y7.5/1) (±RAL7044).The base frame has an eye-hook to lift the unit with ropes for an easy installation. The weight is uniformly distributed along the profiles of the base and this facilitates the arrangement of the unit.

Inverter driven screw compressors with integrated oil separator
The compressor is semi-hermetic, single-screw type with gate-rotor made with the latest high-strength fibre reinforced star material. Each compressor has one inverter, which is managed by the unit microprocessor for infinitely modulating the capacity. An integrated high efficiency oil separator maximizes the oil separation and standard start is Inverter type.

Ecological R-134a refrigerant
The compressors have been designed to operate with R-134a, ecological refrigerant with zero ODP (Ozone Depletion Potential) and very low GWP (Global Warming Potential), resulting in low TEWI (Total Equivalent Warming Impact).

Evaporator
The unit is equipped with a direct expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. The evaporator is single-pass on both the refrigerant and water side for pure counter-flow heat exchange and low refrigerant pressure drops. Both attributes contribute to the heat exchanger effectiveness and total unit's outstanding efficiency.
The external shell is covered with a 20mm closed cell insulation material and the evaporator water outlet connections are provided with victaulic kit (as standard). The evaporator has 2 or 3 circuits, one for each compressor and is manufactured in accordance to PED approval.

Condenser coils
The condenser is manufactured with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminium condenser fins with full fin collars. An integral sub-cooler circuit provides sub-cooling to effectively eliminate liquid flashing and increase cooling capacity without increasing the power input.

Condenser coil fans
The condenser fans are propeller type with high efficiency design blades to maximize performances. The material of the blades is glass reinforced resin and each fan is protected by a guard. Fan motors are protected by circuit breakers (installed inside the electrical panel as a standard) and are IP54.

Electronic expansion valve
The unit is equipped with the most advanced electronic expansion valves to achieve precise control of refrigerant mass flow. As today's system requires improved energy efficiency, tighter temperature control, wider range of operating conditions and incorporate features like remote monitoring and diagnostics, the application of electronic expansion valves becomes mandatory.
Electronic expansion valves possess unique features: short opening and closing time, high resolution, positive shut-off function to eliminate use of additional solenoid valve, continuous modulation of mass flow without stress in the refrigerant circuit and corrosion resistance stainless steel body.
Electronic expansion valves are typically working with lower ΔP between high and low pressure side, than a thermostatic expansion valve. The electronic expansion valve allows the system to work with low condenser pressure (winter time) without any refrigerant flow problems and with a perfect chilled water leaving temperature control.

Refrigerant circuit
Each unit has 2 or 3 independent refrigerant circuits and each circuit includes:
- Inverter driven screw compressor with integrated oil separator
- Air cooled condenser
- Electronic expansion valve
- Evaporator
- Discharge line shut off valve
- Liquid line shut off valve
- Suction line shut off valve (optional)
- Sight glass with moisture indicator
- Filter drier
- Charging valves
- High pressure switch
- High and low pressure transducers

GNC_1-2-3-4_Rev.00_1

4 General Characteristics

4 - 1 General characteristics

Electrical control panel
Power and control are located in the main panel that is manufactured to ensure protection against all weather conditions. The electrical panel is IP54 and (when opening the doors) internally protected with a plexiglas panel against possible accidental contact with electrical components (IP20). The main panel is fitted with a main switch interlocked door.

Power Section
The power section includes compressor inverter, fan circuit breaker, fan contactors and control circuit transformer.

MicroTech III controller
MicroTech III controller is installed as standard; it can be used to modify unit set-points and check control parameters. A built-in display shows chiller operating status plus temperatures and pressures of water, refrigerant and air, programmable values, set-points. A sophisticated software with predictive logic, selects the most energy efficient combination of compressors, EEXV and condenser fans to keep stable operating conditions to maximise chiller energy efficiency and reliability.
MicroTech III is able to protect critical components based on external signs from its system (such as motor temperatures, refrigerant gas and oil pressures, correct phase sequence, pressure switches and evaporator). The input coming from the high pressure switch cuts all digital output from the controller in less than 50ms, this is an additional security for the equipment.
Fast program cycle (200ms) for a precise monitoring of the system. Floating point calculations supported for increased accuracy in P/T conversions.

Control section - main features
• Management of the compressor capacity, inverter, and fans modulation
• Chiller enabled to work in partial failure condition
• Full routine operation at condition of:
  - high ambient temperature value
  - high thermal load
  - high evaporator entering water temperature (start-up)
• Display of evaporator entering/leaving water temperature
• Display of outdoor ambient temperature
• Display of condensing-evaporating temperature and pressure, suction and discharge superheat for each circuit
• Leaving water evaporator temperature regulation (temperature tolerance = 0,1°C)
• Compressor and evaporator pumps hours counter
• Display of Status Safety Devices
• Number of starts and compressor working hours
• Optimized management of compressor load
• Fan management according to condensing pressure
• Re-start in case of power failure (automatic / manual)
• Soft Load (optimized management of the compressor load during the start-up)
• Start at high evaporator water temperature
• Return Reset (Set point reset based on return water temperature)
• OAT (Outside ambient temperature) reset
• Set point reset (optional)
• Application and system upgrade with commercial SD cards
• Ethernet port for remote or local servicing using standard web browsers
• Two different sets of default parameters could be stored for easy restore

Safety device / logic for each refrigerant circuit
• High pressure (pressure switch)
• High pressure (transducer)
• Low pressure (transducer)
• Fans circuit breaker
• High compressor discharge temperature
• High motor winding temperature
• Phase monitor
• Low pressure ratio
• High oil pressure drop
• Low oil pressure
• No pressure change at start

System security
• Phase monitor
• Low ambient temperature lock-out
• Freeze protection

GNC_1-2-3-4_Rev.00_2

4 General Characteristics

4 - 1 General characteristics

Regulation type
Proportional + integral + derivative regulation on the evaporator leaving water output probe.

MicroTech III
MicroTech III built-in terminal has the following features:
• 164x44 dots liquid crystal display with white back lighting. Supports Unicode fonts for multi-lingual
• Key-pad consisting of 3 keys
• Push'n'Roll control for an increased usability
• Memory to protect the data
• General faults alarm relays
• Password access to modify the setting
• Application security to prevent application tampering or hardware usability with third party applications
• Service report displaying all running hours and general conditions
• Alarm history memory to allow an easy fault analysis

Supervising systems (on request)
MicroTech III remote control
MicroTech III is able to communicate to BMS (Building Management System) based on the most common protocols such as:
• ModbusRTU
• LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology.
• BacNet BTP certifief over IP and MS/TP (class 4) (Native).
• Ethernet TCP/IP.

Standard accessories (supplied on basic unit)

Double setpoint – Dual leaving water temperature setpoints.

Compressor thermal relays – Safety devices against compressor motor overloading. This device together with internal motor protection (standard) guarantee the best safety system for compressor motor.

Phase monitor – The phase monitor controls that phases sequence is correct and controls phase loss.

Inverter compressor starter

Evaporator victaulic kit – Hydraulic joint with gasket for an easy and quick water connection.

20mm evaporator insulation – The external shell is covered with a 20mm closed cell insulation material.

Evaporator electric heater – Electric heater (controlled by a thermostat) to protect the evaporator from freezing down to -28°C ambient temperature, providing the power supply is on.

Electronic expansion valve

Discharge line shut off valves – Installed on the discharge port of the compressor to facilitate maintenance operation.

Ambient temperature sensor and setpoint reset of leaving water temperature

Hour run meter – available for compressor

General fault contactor – Alarm relay.

Set-point reset – The leaving water temperature set-point can be overwritten with the following options: 4-20mA from external source (by user); outside ambient temperature; evaporator water temperature Δt.

Demand limit – User can limit the load of the unit by 4-20mA signal or by network system

Alarm from external device – Microprocessor is able to receive an alarm signal from an external device (eg. pump, etc…). User can decide if this alarm signal will stop or not the unit.

Fan circuit breakers – Safety device against motor overloading and short circuit

Main switch interlock door

Emergency stop

GNC_1-2-3-4_Rev.00_3

4 General Characteristics

4 - 1 General characteristics

Options (on request)

Total heat recovery – Produced with plate to plate heat exchangers to produce hot water.

Partial heat recovery – Produced with plate to plate heat exchangers to produce hot water.

Brine version – Allows the unit to operate down to -8°C leaving liquid temperature (antifreeze required).

Under/Over voltage control – This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.

Ampere / Volt meter – Device installed inside the control box showing ampere and volt values

Current limit display – To limit maximum absorbed current of the unit whenever is required

Evaporator flange kit

Speedtrol – Continuous fan speed modulation on the first fan of each circuit. It allows the unit working with air temperature down to –18°C.

Condenser coil guards

Evaporator area guards

Cu-Cu condensing coils – To give better protection against corrosion by aggressive environments.

Cu-Cu-Sn condensing coils – To give better protection against corrosion in aggressive environments and by salty air.

Alucoat condensing coils – Fins are protected by a special acrylic paint with a high resistance to corrosion.

Evaporator flow switch – Supplied separately to be wired and installed on the evaporator water piping (by the customer).

Suction line shut off valves – Installed on the suction port of the compressor to facilitate maintenance operation.

High pressure side manometers

Container kit

Rubber type antivibration mounts – Supplied separately, these are positioned under the base of the unit during installation. Ideal to reduce the vibrations when the unit is floor mounted.

Spring type antivibration mounts – Supplied separately, these are positioned under the base of the unit during installation. Ideal for dampening vibrations for installation on roofs and metallic structures.

Hydronic Kit (single water pump) – Hydronic kit consists of: single direct driven centrifugal pump, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pump are protected from freezing with an additional electrical heater.

Hydronic Kit (twin water pumps) – Hydronic kit consists of: twin direct driven centrifugal pumps, water filling system with pressure gauge, safety valve, drain valve. The motor pump is protected by a circuit breaker installed in control panel. The kit is assembled and wired to the control panel. The pipe and pumps are protected from freezing with an additional electrical heater.

Double pressure relief valve with diverter

Compressors circuit breakers

Fan speed regulation (includes fan silent mode) – To control the fan speed revolution for smooth operating control of the unit. This option improves the sound level of the unit during low ambient temperature operation.

Refrigerant recovery tank – This option allows to stock refrigerant charge of 1 circuit for maintenance operation. Liquid receiver includes in/out shut-off valve and reliefe valve.

Evaporator right water connections

Ground fault protection – To shut down the entire unit if a ground fault condition is detected.

Rapid restart – It allows the unit to start as fast as 30 seconds after power is restored (in case of power failure).

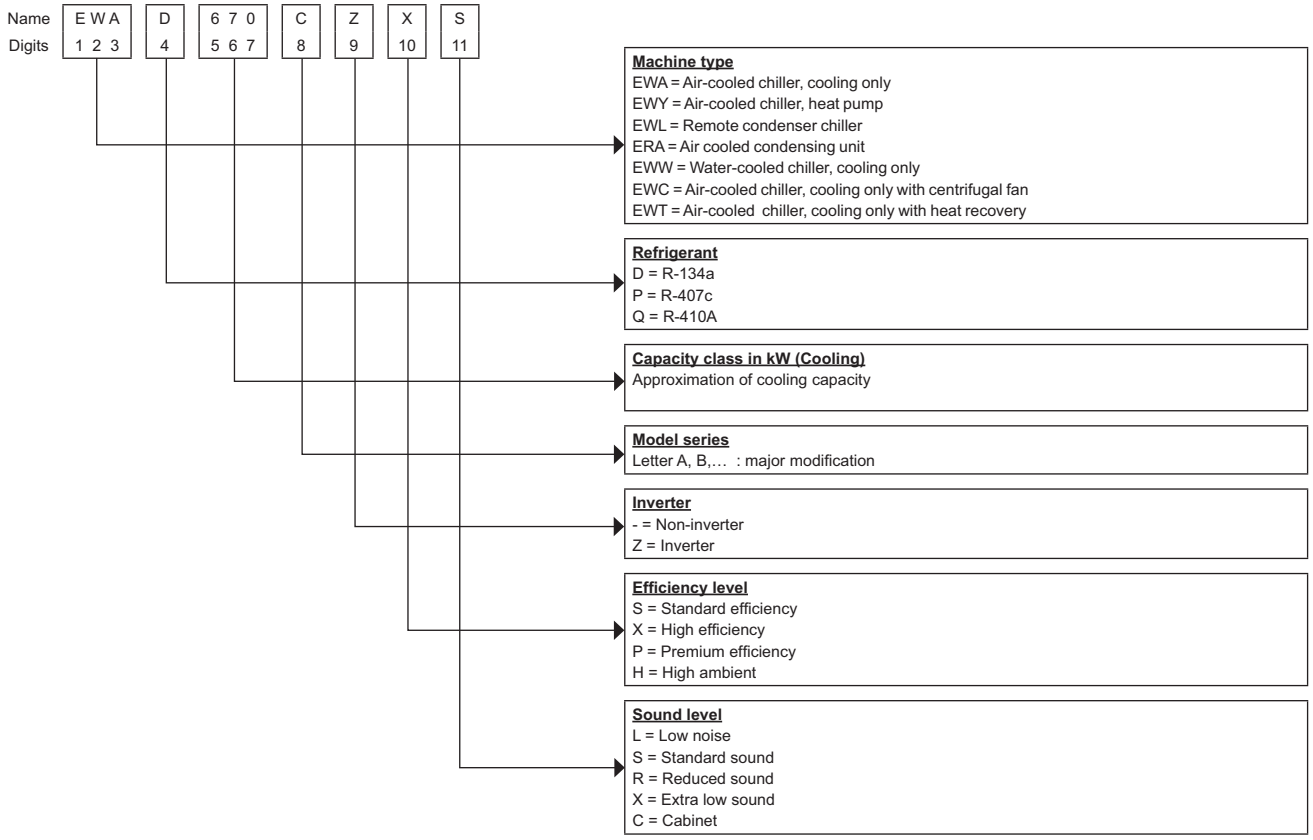
Witness test – Every unit is always tested at the test bench prior to the shipment. On request, a second test can be carried out, at customer's presence, in accordance with the procedures indicated on the test form. (Not available for units with glycol mixtures).

Acoustic test – On request, a test can be carried out, at customer's presence (Not available for units with glycol mixtures).

GNC_1-2-3-4_Rev.00_4

5 Nomenclature

5 - 1 Nomenclature



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6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD640-C12CZXR

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		4				5				6				7			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
640	25	653	197	31,10	77	672	199	32,00	81	691	202	32,90	85	710	205	33,90	90
	30	617	222	29,40	69	635	225	30,30	73	653	228	31,20	77	672	230	32,10	81
	35	581	252	27,70	62	599	255	28,50	66	617	257	29,40	69	635	260	30,30	73
	40	549	288	26,20	56	567	290	27,00	60	585	292	27,90	63	603	295	28,80	67
	46	493	288	23,50	46	495	270	23,60	47	504	262	24,00	48	505	246	24,10	49
	48	436	238	20,80	37	444	230	21,20	38	451	223	21,50	40	459	216	21,90	41
	50	382	215	18,20	29	388	208	18,50	30	395	202	18,80	31	401	196	19,10	32
700	25	717	185	34,20	72	740	188	35,30	76	764	191	36,40	81	787	193	37,60	85
	30	677	208	32,30	65	699	211	33,30	69	721	213	34,40	73	744	216	35,50	77
	35	636	235	30,30	58	657	237	31,30	62	678	239	32,30	65	700	242	33,40	69
	40	598	266	28,50	52	618	268	29,50	55	638	270	30,40	58	659	272	31,40	62
	46	564	311	26,90	47	583	313	27,80	50	602	314	28,70	53	614	306	29,30	55
	48	542	309	25,80	44	545	291	26,00	44	548	274	26,10	44	558	266	26,60	46
	50	476	251	22,70	34	484	244	23,10	36	493	236	23,50	37	501	229	23,90	38
790	25	806	210	38,40	53	834	214	39,70	56	860	217	41,00	59	891	221	42,50	63
	30	763	234	36,30	48	787	237	37,50	51	813	241	38,80	54	840	245	40,10	57
	35	718	262	34,20	43	741	265	35,30	45	765	268	36,50	48	789	271	37,60	51
	40	676	293	32,20	38	699	296	33,30	41	721	299	34,40	43	744	302	35,50	46
	46	638	337	30,40	35	660	340	31,50	37	672	331	32,00	38	683	323	32,60	39
	48	607	325	28,90	32	617	317	29,40	33	627	310	29,90	34	642	307	30,60	35
	50	560	302	26,70	27	566	289	27,00	28	571	278	27,30	28	577	278	27,50	29
850	25	874	245	41,60	61	904	249	43,10	65	932	253	44,40	69	964	258	46,00	73
	30	825	271	39,30	55	852	276	40,60	58	879	280	41,90	62	908	285	43,30	65
	35	777	301	37,00	49	802	305	38,20	52	827	310	39,40	55	852	314	40,70	58
	40	733	334	34,90	45	758	339	36,10	47	782	343	37,30	50	805	348	38,40	53
	46	700	381	33,40	41	724	386	34,50	43	721	362	34,40	43	728	350	34,80	44
	48	647	343	30,80	36	648	326	30,90	36	648	309	30,90	36	658	302	31,40	37
	50	562	278	26,80	28	570	272	27,20	28	578	265	27,60	29	578	275	27,60	29
980	25	1004	272	47,80	60	1039	277	49,50	64	1075	282	51,20	68	1112	288	53,10	72
	30	943	300	44,90	54	975	305	46,50	57	1009	311	48,10	61	1044	316	49,80	65
	35	882	332	42,00	48	912	337	43,50	51	944	342	45,00	54	976	347	46,60	57
	40	826	367	39,40	42	855	372	40,70	45	884	377	42,20	48	914	383	43,60	51
	46	773	410	36,80	37	787	401	37,50	39	802	393	38,30	40	818	385	39,00	42
	48	724	382	34,50	33	737	374	35,10	34	745	361	35,50	35	753	349	35,90	36
	50	644	326	30,70	27	645	323	30,70	27	656	316	31,30	28	668	310	31,90	29
C10	25	1063	303	50,60	67	1095	309	52,20	70	1130	315	53,90	74	1165	320	55,60	79
	30	999	336	47,60	60	1031	341	49,10	63	1064	347	50,70	67	1098	353	52,40	71
	35	936	371	44,60	53	967	377	46,10	56	998	383	47,60	60	1031	388	49,20	63
	40	879	411	41,90	47	908	417	43,30	50	938	423	44,70	53	969	429	46,20	56
	46	819	454	39,00	42	824	432	39,30	42	829	411	39,50	43	834	391	39,80	43
	48	731	381	34,80	34	732	362	34,90	34	746	354	35,60	35	760	347	36,20	36
	50	640	317	30,50	27	641	328	30,50	27	652	321	31,10	28	664	314	31,70	29
C11	25	1198	320	57,10	44	1238	325	59,00	47	1279	331	61,00	50	1320	337	63,00	53
	30	1130	354	53,80	40	1167	359	55,60	42	1205	365	57,50	45	1246	371	59,40	48
	35	1060	391	50,50	36	1095	397	52,20	38	1132	402	54,00	40	1170	408	55,80	43
	40	994	432	47,40	32	1028	438	49,00	34	1063	444	50,70	36	1099	450	52,40	38
	46	935	490	44,60	28	966	495	46,00	30	977	477	46,60	31	1003	475	47,80	32
	48	888	471	42,30	26	903	462	43,00	27	919	452	43,80	28	937	444	44,70	29
	50	810	422	38,60	22	812	401	38,70	22	827	393	39,40	23	815	400	38,90	22
C12	25	1268	356	60,40	49	1310	362	62,40	52	1354	369	64,50	55	1397	375	66,60	59
	30	1195	394	56,90	44	1233	400	58,80	47	1273	406	60,70	50	1315	413	62,70	53
	35	1122	435	53,40	40	1159	442	55,30	42	1196	448	57,10	44	1235	455	58,90	47
	40	1055	481	50,30	35	1090	488	52,00	38	1127	495	53,70	40	1164	502	55,50	42
	46	1003	546	47,80	32	1034	552	49,30	34	1026	511	48,90	34	1046	502	49,90	35
	48	925	490	44,10	28	927	466	44,20	28	929	443	44,30	28	946	434	45,20	29
	50	804	398	38,30	22	816	389	38,90	22	830	381	39,60	23	801	414	38,20	22

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_2_1

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD640-C12CZXR

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		8				9				10				11			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
640	25	728	208	34,70	94	746	210	35,60	98	764	213	36,50	102	783	216	37,40	107
	30	691	233	33,00	85	710	236	33,90	90	728	239	34,80	94	746	242	35,60	98
	35	654	263	31,20	77	672	266	32,10	81	691	269	33,00	86	710	272	33,90	90
	40	621	297	29,60	70	639	300	30,50	74	658	303	31,40	78	677	306	32,30	82
	46	514	239	24,50	50	523	232	25,00	52	532	226	25,40	53	541	219	25,90	55
	48	459	222	21,90	41	467	216	22,30	42	476	210	22,70	44	476	197	22,80	44
	50	408	190	19,50	33	414	184	19,80	34	421	178	20,10	35	427	173	20,40	36
700	25	812	196	38,70	90	838	200	40,00	96	864	203	41,30	101	887	206	42,40	106
	30	767	219	36,60	82	791	222	37,80	86	815	225	38,90	91	841	229	40,20	96
	35	722	245	34,50	73	745	248	35,60	77	768	251	36,70	82	791	254	37,80	86
	40	680	275	32,50	66	702	277	33,50	70	724	280	34,60	74	747	283	35,70	78
	46	626	299	29,90	57	638	291	30,50	59	642	276	30,70	59	655	269	31,30	61
	48	568	259	27,10	48	579	252	27,60	49	589	246	28,20	51	591	232	28,30	51
	50	509	223	24,30	39	518	216	24,70	40	511	216	24,40	39	520	210	24,90	41
790	25	923	226	44,10	68	956	230	45,70	72	990	235	47,30	77	1026	240	49,00	82
	30	866	248	41,30	60	896	253	42,80	64	928	257	44,30	68	960	262	45,90	73
	35	814	275	38,90	54	841	279	40,20	57	866	283	41,40	60	897	287	42,90	64
	40	767	305	36,60	48	791	309	37,80	51	816	313	39,00	54	842	317	40,30	57
	46	700	321	33,40	41	713	313	34,10	42	732	311	35,00	45	751	310	35,90	47
	48	658	305	31,40	37	670	298	32,00	38	674	282	32,20	38	688	276	32,90	40
	50	583	267	27,80	30	594	261	28,40	31	601	251	28,70	31	613	245	29,30	32
850	25	998	264	47,60	78	1032	269	49,30	83	1068	275	51,00	88	1105	281	52,80	94
	30	935	289	44,60	69	967	295	46,20	73	1000	300	47,80	78	1034	306	49,40	83
	35	879	319	42,00	62	907	324	43,30	66	934	329	44,60	69	966	335	46,20	73
	40	829	352	39,60	56	854	357	40,80	59	880	362	42,00	62	908	367	43,40	66
	46	741	343	35,40	45	745	326	35,60	46	759	320	36,30	48	770	310	36,80	49
	48	669	296	31,90	38	680	290	32,50	39	683	275	32,60	39	697	270	33,30	41
	50	587	269	28,00	30	593	259	28,30	31	600	250	28,70	31	614	245	29,30	32
980	25	1150	293	54,90	77	1189	299	56,80	82	1228	305	58,70	87	1268	311	60,60	92
	30	1080	322	51,50	69	1117	328	53,30	73	1154	334	55,10	77	1192	340	57,00	82
	35	1010	353	48,20	61	1044	359	49,90	65	1080	365	51,60	69	1116	372	53,30	73
	40	945	388	45,10	54	977	394	46,60	57	1009	400	48,20	61	1043	407	49,80	65
	46	839	383	40,10	44	850	371	40,60	45	868	365	41,50	46	881	354	42,10	48
	48	767	342	36,60	37	770	325	36,80	37	780	328	37,30	38	785	313	37,50	39
	50	674	298	32,20	29	681	288	32,50	30	694	282	33,20	31	697	280	33,30	31
C10	25	1201	326	57,30	83	1237	332	59,10	88	1274	337	60,90	93	1311	343	62,70	98
	30	1133	358	54,10	75	1168	364	55,80	79	1203	371	57,50	84	1239	377	59,20	88
	35	1064	394	50,80	67	1098	401	52,40	71	1131	407	54,10	75	1165	414	55,70	79
	40	1000	435	47,70	60	1032	441	49,30	63	1063	448	50,80	67	1094	456	52,30	70
	46	850	384	40,60	45	855	365	40,80	45	870	358	41,60	47	885	352	42,30	48
	48	773	340	36,90	38	775	322	37,00	38	776	334	37,10	38	778	318	37,20	38
	50	665	298	31,80	29	677	292	32,30	30	688	286	32,90	31	699	280	33,40	31
C11	25	1362	342	65,00	56	1405	348	67,10	59	1449	354	69,20	63	1493	361	71,40	66
	30	1287	377	61,40	51	1328	383	63,40	54	1370	389	65,40	57	1412	396	67,50	60
	35	1209	414	57,70	45	1249	421	59,60	48	1289	427	61,60	51	1329	434	63,50	54
	40	1135	456	54,20	41	1173	462	56,00	43	1211	469	57,90	46	1249	476	59,70	48
	46	1023	466	48,80	34	1050	465	50,10	35	1070	457	51,10	36	1091	450	52,20	38
	48	950	430	45,30	29	961	415	45,90	30	974	402	46,50	31	961	415	46,00	30
	50	831	394	39,70	23	836	376	39,90	23	852	370	40,70	24	861	359	41,20	25
C12	25	1438	382	68,70	62	1481	388	70,70	65	1524	395	72,80	69	1568	402	74,90	73
	30	1358	420	64,80	56	1400	427	66,90	59	1442	434	68,90	62	1483	441	70,90	66
	35	1275	462	60,80	50	1316	469	62,90	53	1359	477	64,90	56	1401	485	66,90	59
	40	1201	508	57,30	45	1239	516	59,20	47	1279	523	61,10	50	1320	531	63,10	53
	46	1054	478	50,30	35	1075	470	51,40	37	1083	447	51,70	37	1105	440	52,80	39
	48	965	426	46,00	30	969	404	46,30	30	987	396	47,20	32	944	429	45,10	29
	50	818	409	39,00	22	824	392	39,40	23	840	387	40,20	24	845	370	40,40	24

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_2_3

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD640-C12CZXR

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		12				13				14				15			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
640	25	802	219	38,30	112	821	222	39,30	117	840	226	40,20	122	859	229	41,10	127
	30	764	245	36,50	103	782	248	37,40	107	801	251	38,30	112	820	255	39,20	117
	35	728	274	34,80	94	746	277	35,70	98	764	281	36,50	103	782	284	37,40	107
	40	695	309	33,30	87	701	292	33,50	88	714	286	34,10	91	725	280	34,70	93
	46	550	213	26,30	57	544	213	26,00	56	554	208	26,50	58	556	196	26,60	58
	48	485	192	23,20	45	493	187	23,60	47	501	182	24,00	48	501	171	24,00	48
	50	434	168	20,70	37	440	163	21,10	38	447	158	21,40	39	444	148	21,30	39
700	25	910	209	43,50	111	935	213	44,70	117	959	216	45,90	122	985	220	47,10	128
	30	866	232	41,40	102	888	235	42,50	107	912	238	43,60	112	936	242	44,80	117
	35	815	257	39,00	91	841	260	40,20	97	866	264	41,40	102	888	267	42,50	107
	40	770	286	36,80	82	793	289	37,90	87	817	292	39,10	92	842	296	40,30	97
	46	667	263	31,90	64	671	248	32,10	64	684	243	32,70	67	688	230	32,90	67
	48	602	226	28,80	53	613	220	29,30	55	606	219	29,00	54	617	214	29,60	55
	50	530	204	25,30	42	531	193	25,40	42	540	188	25,80	44	550	183	26,30	45
790	25	1062	245	50,80	87	1099	251	52,60	93	1137	257	54,40	99	1177	263	56,30	105
	30	994	267	47,50	77	1029	273	49,20	82	1065	279	51,00	88	1102	285	52,80	93
	35	928	292	44,40	68	960	297	45,90	73	994	303	47,60	78	1029	309	49,30	83
	40	867	321	41,50	61	898	325	42,90	64	929	331	44,50	69	957	331	45,80	72
	46	766	303	36,60	48	783	298	37,40	50	796	288	38,10	52	796	278	38,10	52
	48	693	274	33,20	40	700	261	33,50	41	713	252	34,10	43	721	240	34,50	43
	50	616	232	29,50	33	630	228	30,20	34	640	219	30,60	35	640	214	30,70	35
850	25	1144	287	54,70	100	1184	294	56,60	106	1225	301	58,60	113	1268	309	60,70	120
	30	1069	313	51,10	88	1106	319	52,90	94	1145	327	54,80	100	1185	334	56,70	106
	35	998	341	47,70	78	1033	347	49,40	83	1068	354	51,10	88	1106	362	52,90	94
	40	935	372	44,70	69	967	379	46,20	74	1000	385	47,90	78	1030	387	49,30	83
	46	782	300	37,40	50	791	286	37,80	51	806	277	38,60	53	803	276	38,50	53
	48	694	272	33,20	41	703	259	33,60	42	714	247	34,20	43	725	236	34,70	44
	50	619	233	29,60	33	630	225	30,10	34	637	214	30,50	35	651	207	31,20	36
980	25	1308	318	62,60	97	1349	324	64,50	103	1390	331	66,50	109	1432	339	68,50	115
	30	1230	347	58,80	87	1269	354	60,70	92	1308	361	62,60	97	1347	369	64,50	103
	35	1152	379	55,10	77	1188	386	56,90	82	1225	394	58,60	87	1262	402	60,40	91
	40	1076	414	51,50	68	1111	422	53,10	72	1135	416	54,30	75	1164	418	55,70	79
	46	888	338	42,50	48	902	328	43,20	50	910	328	43,50	51	919	315	44,00	52
	48	796	303	38,10	40	808	294	38,70	41	808	289	38,70	41	821	281	39,30	42
	50	706	271	33,80	32	709	258	33,90	32	719	250	34,40	33	729	243	34,90	34
C10	25	1348	350	64,50	103	1385	357	66,30	108	1422	364	68,00	113	1458	371	69,80	118
	30	1273	384	60,90	93	1308	391	62,60	97	1342	399	64,20	102	1375	407	65,80	107
	35	1197	421	57,30	83	1230	429	58,80	87	1261	437	60,30	91	1291	446	61,80	95
	40	1124	463	53,80	74	1154	472	55,20	78	1162	453	55,60	79	1179	448	56,40	81
	46	887	335	42,40	48	899	330	43,00	50	898	344	43,00	49	897	329	43,00	49
	48	790	313	37,80	39	802	308	38,40	40	800	293	38,30	40	809	289	38,70	41
	50	708	275	33,90	32	704	261	33,70	32	712	256	34,10	33	718	252	34,40	33
C11	25	1536	367	73,50	70	1580	374	75,60	74	1624	381	77,70	77	1669	388	79,90	81
	30	1454	403	69,50	63	1496	410	71,60	67	1538	417	73,60	70	1579	425	75,60	74
	35	1369	441	65,50	57	1409	449	67,40	60	1450	457	69,40	63	1489	465	71,30	66
	40	1288	484	61,60	51	1325	492	63,40	54	1363	500	65,20	56	1394	501	66,70	59
	46	1104	436	52,80	39	1119	423	53,50	40	1130	411	54,10	40	1112	429	53,20	39
	48	979	409	46,80	31	983	392	47,00	31	999	386	47,80	32	1000	370	47,90	32
	50	869	348	41,50	25	869	346	41,60	25	882	341	42,20	26	888	331	42,50	26
C12	25	1612	409	77,10	76	1657	416	79,30	80	1702	424	81,50	84	1748	432	83,70	88
	30	1526	449	73,00	69	1569	456	75,00	73	1612	464	77,10	76	1655	473	79,20	80
	35	1441	492	68,90	62	1482	500	70,90	66	1523	509	72,90	69	1565	517	74,90	72
	40	1361	540	65,10	56	1402	548	67,10	59	1441	557	69,00	62	1469	549	70,30	65
	46	1112	419	53,20	39	1133	411	54,20	40	1138	391	54,40	41	1099	444	52,60	38
	48	962	423	46,00	30	968	406	46,30	31	985	400	47,10	31	988	383	47,30	32
	50	860	365	41,10	25	862	348	41,20	25	875	343	41,90	25	888	337	42,50	26

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_2_5

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC13-C17CZXR

	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		4				5				6				7			
Size		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C13	25	1372	409	65,40	56	1416	417	67,50	59	1460	424	69,60	63	1504	432	71,80	66
	30	1289	452	61,40	50	1331	460	63,40	53	1374	468	65,50	56	1418	476	67,60	59
	35	1208	499	57,50	44	1248	507	59,50	47	1290	515	61,50	50	1332	524	63,60	53
	40	1140	552	54,30	40	1178	560	56,20	43	1218	568	58,10	45	1259	577	60,10	48
	46	1013	530	48,20	32	1032	520	49,20	34	1038	494	49,50	34	1052	478	50,20	35
	48	912	477	43,40	27	922	460	43,90	27	933	444	44,50	28	952	435	45,40	29
	50	799	397	38,10	21	813	388	38,80	22	828	380	39,50	23	821	392	39,20	22
C14	25	1488	460	70,90	63	1535	469	73,10	66	1580	478	75,40	70	1627	486	77,60	74
	30	1396	508	66,50	56	1441	517	68,70	59	1487	526	70,90	63	1533	536	73,10	66
	35	1310	561	62,40	50	1354	570	64,50	53	1398	580	66,60	56	1443	589	68,80	59
	40	1241	621	59,10	45	1283	630	61,10	48	1326	640	63,30	51	1370	650	65,40	54
	46	1037	513	49,40	33	1058	503	50,40	34	1064	477	50,70	34	1086	467	51,80	36
	48	927	479	44,10	27	931	454	44,40	27	951	445	45,30	28	971	436	46,30	29
	50	809	396	38,50	21	825	387	39,30	22	841	378	40,10	22	857	370	40,90	23
C15	25	1591	452	75,80	60	1636	460	78,00	63	1684	468	80,30	66	1733	476	82,70	70
	30	1499	501	71,40	53	1545	509	73,60	56	1591	517	75,90	60	1639	525	78,20	63
	35	1407	555	67,00	48	1451	563	69,10	50	1497	571	71,40	53	1545	580	73,70	57
	40	1324	615	63,10	43	1366	623	65,10	45	1409	632	67,20	48	1454	640	69,40	51
	46	1237	680	58,90	38	1244	647	59,30	38	1251	616	59,70	39	1258	585	60,00	39
	48	1106	572	52,70	31	1108	542	52,80	31	1128	531	53,80	32	1149	520	54,80	33
	50	969	476	46,20	24	971	492	46,30	24	988	482	47,10	25	1006	471	48,00	26
C16	25	1677	475	79,90	65	1724	483	82,20	69	1774	491	84,60	73	1826	499	87,10	76
	30	1583	528	75,40	59	1630	536	77,70	62	1679	544	80,10	66	1728	552	82,50	69
	35	1489	585	70,90	53	1534	593	73,10	56	1582	602	75,40	59	1631	610	77,80	62
	40	1404	649	66,90	48	1447	657	69,00	50	1492	666	71,20	53	1539	674	73,40	56
	46	1322	724	63,00	43	1341	705	63,90	44	1354	679	64,60	45	1362	647	65,00	45
	48	1197	625	57,00	36	1206	601	57,50	36	1220	581	58,20	37	1242	569	59,30	38
	50	1054	522	50,20	28	1061	528	50,60	29	1079	517	51,50	30	1098	506	52,40	31
C17	25	1757	490	83,70	62	1805	498	86,00	65	1853	505	88,40	68	1904	513	90,80	71
	30	1666	546	79,40	56	1712	554	81,60	59	1760	562	83,90	62	1809	570	86,30	65
	35	1575	608	75,00	51	1619	616	77,20	53	1665	623	79,40	56	1712	631	81,70	59
	40	1492	676	71,00	46	1535	684	73,20	48	1580	692	75,30	51	1625	700	77,50	54
	46	1412	755	67,30	42	1453	764	69,30	44	1484	759	70,80	46	1503	738	71,70	47
	48	1297	667	61,80	36	1337	675	63,70	38	1344	647	64,10	38	1360	628	64,90	39
	50	1155	566	55,00	29	1171	567	55,80	30	1184	550	56,50	30	1204	537	57,40	31

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_2_2

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC13-C17CZXR

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		8				9				10				11			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C13	25	1550	440	74,00	70	1596	448	76,20	74	1641	456	78,40	78	1687	465	80,60	82
	30	1461	484	69,70	63	1505	492	71,90	66	1550	501	74,10	70	1595	510	76,20	74
	35	1376	532	65,70	56	1419	541	67,80	60	1462	550	69,90	63	1506	559	72,00	67
	40	1294	576	61,80	51	1329	575	63,50	53	1358	565	64,90	55	1386	555	66,30	57
	46	1074	469	51,30	36	1081	466	51,60	37	1090	443	52,10	37	1113	435	53,20	39
	48	956	413	45,60	29	976	405	46,60	30	987	390	47,20	31	975	403	46,60	30
	50	838	385	40,00	23	850	373	40,60	24	858	360	41,00	24	868	348	41,50	25
C14	25	1674	495	79,90	78	1721	505	82,20	82	1769	514	84,50	86	1818	524	86,90	90
	30	1578	545	75,30	70	1624	555	77,60	74	1671	565	79,80	77	1718	575	82,10	81
	35	1489	600	71,10	63	1535	610	73,30	66	1580	620	75,50	70	1626	630	77,70	74
	40	1401	641	66,90	56	1432	631	68,40	59	1449	603	69,20	60	1465	576	70,00	61
	46	1109	458	53,00	37	1101	461	52,60	37	1110	438	53,00	37	1134	430	54,20	39
	48	976	413	46,60	29	997	405	47,60	31	1001	383	47,80	31	1022	376	48,80	32
	50	874	361	41,70	24	891	353	42,60	25	890	333	42,50	25	907	325	43,30	26
C15	25	1783	483	85,10	73	1834	491	87,60	77	1886	499	90,10	81	1939	508	92,70	85
	30	1689	533	80,60	66	1738	541	83,00	70	1788	550	85,40	74	1837	559	87,80	78
	35	1592	588	76,00	60	1640	597	78,30	63	1688	606	80,60	67	1735	615	82,90	70
	40	1500	649	71,60	54	1546	659	73,80	57	1591	668	76,00	60	1636	678	78,20	63
	46	1282	574	61,20	41	1306	564	62,30	42	1311	536	62,60	42	1333	526	63,70	44
	48	1170	509	55,80	34	1172	483	56,00	34	1173	501	56,10	35	1177	477	56,20	35
	50	1008	447	48,10	26	1025	437	49,00	27	1042	429	49,80	28	1058	420	50,60	29
C16	25	1878	507	89,60	80	1931	516	92,20	85	1986	524	94,90	89	2041	532	97,50	94
	30	1780	560	84,90	73	1831	569	87,40	77	1883	578	90,00	81	1935	587	92,50	85
	35	1680	619	80,20	66	1729	628	82,60	69	1780	637	85,00	73	1830	646	87,40	77
	40	1586	683	75,70	59	1634	693	78,00	63	1682	702	80,30	66	1729	712	82,60	69
	46	1381	627	65,90	46	1406	616	67,20	48	1420	593	67,90	49	1438	575	68,70	50
	48	1258	551	60,00	39	1268	529	60,50	40	1278	537	61,10	40	1282	511	61,30	41
	50	1080	501	51,50	30	1099	492	52,50	31	1113	478	53,20	31	1131	470	54,10	32
C17	25	1955	521	93,30	75	2008	528	95,90	79	2062	536	98,50	83	2116	544	101,20	87
	30	1858	577	88,70	68	1909	585	91,20	72	1961	594	93,70	75	2013	602	96,20	79
	35	1761	640	84,10	62	1810	648	86,40	65	1860	656	88,90	69	1910	665	91,30	72
	40	1671	708	79,80	56	1718	717	82,00	59	1766	726	84,40	62	1814	735	86,70	66
	46	1517	709	72,40	47	1526	676	72,90	48	1552	663	74,20	50	1579	651	75,50	51
	48	1370	602	65,40	40	1393	589	66,50	41	1417	577	67,70	42	1415	557	67,70	42
	50	1181	568	56,40	30	1204	559	57,50	31	1211	535	57,80	32	1232	526	58,90	33

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_2_4

6 Capacity tables

6 - 1 Cooling Capacity Tables

EWADC13-C17CZXR

Size	ELWT (°C)	Condenser Inlet Air Temperature (°C)															
		12				13				14				15			
		Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)	Cc (kW)	Pi (kW)	Qwe (l/s)	Pdwe (kPa)
C13	25	1734	473	82,90	86	1780	482	85,20	90	1828	491	87,50	94	1875	501	89,80	99
	30	1640	519	78,40	78	1685	528	80,60	82	1731	538	82,80	86	1777	547	85,10	90
	35	1550	569	74,10	70	1595	578	76,30	74	1640	588	78,50	78	1678	588	80,30	81
	40	1422	555	68,00	60	1450	546	69,40	62	1478	538	70,80	64	1500	523	71,80	66
	46	1120	414	53,50	39	1142	406	54,60	41	1147	386	54,90	41	1138	409	54,50	40
	48	994	396	47,50	32	998	377	47,70	32	1016	370	48,60	33	1016	352	48,70	33
	50	883	341	42,20	26	882	324	42,20	25	896	317	42,90	26	909	311	43,50	27
C14	25	1867	534	89,30	95	1917	544	91,70	99	1967	555	94,10	104	2018	566	96,60	109
	30	1766	585	84,40	86	1814	596	86,80	90	1863	607	89,20	94	1913	618	91,60	99
	35	1673	641	80,00	78	1720	652	82,30	82	1768	663	84,60	86	1804	655	86,40	89
	40	1496	567	71,60	64	1512	541	72,30	65	1526	516	73,00	66	1555	507	74,40	68
	46	1141	408	54,60	39	1165	400	55,70	41	1170	379	56,00	41	1192	372	57,10	42
	48	1042	368	49,80	33	1043	347	49,90	33	1063	340	50,80	34	1060	320	50,70	34
	50	923	318	44,10	27	918	299	43,90	26	932	292	44,60	27	945	284	45,30	28
C15	25	1992	516	95,30	90	2046	525	97,90	94	2099	535	100,40	99	2152	545	103,00	103
	30	1887	568	90,30	81	1937	578	92,70	85	1987	588	95,10	89	2036	599	97,50	93
	35	1782	625	85,20	73	1828	636	87,50	77	1874	647	89,70	80	1918	659	91,80	84
	40	1680	689	80,30	66	1723	701	82,40	69	1750	692	83,70	71	1775	684	85,00	73
	46	1354	517	64,70	45	1354	493	64,80	45	1352	514	64,70	45	1369	507	65,60	46
	48	1195	469	57,10	36	1212	461	58,00	37	1227	454	58,70	38	1223	433	58,50	37
	50	1072	412	51,30	29	1066	391	51,00	29	1077	385	51,60	30	1087	378	52,00	30
C16	25	2096	541	100,20	98	2152	551	102,90	103	2208	560	105,70	108	2264	571	108,40	113
	30	1988	596	95,10	89	2041	606	97,60	94	2093	616	100,20	98	2146	627	102,70	103
	35	1879	656	89,90	81	1929	667	92,30	85	1978	678	94,70	89	2027	689	97,10	93
	40	1776	723	84,90	73	1823	734	87,20	77	1859	732	89,00	79	1894	731	90,70	82
	46	1462	565	69,90	51	1466	538	70,10	52	1474	548	70,50	52	1488	534	71,20	53
	48	1279	528	61,20	40	1294	514	61,90	41	1313	507	62,80	42	1312	484	62,80	42
	50	1143	456	54,70	33	1146	439	54,80	33	1160	432	55,50	34	1166	420	55,80	34
C17	25	2172	553	103,80	91	2228	561	106,60	95	2284	570	109,30	99	2341	579	112,10	104
	30	2066	611	98,80	83	2120	619	101,40	87	2174	629	104,00	91	2228	638	106,70	95
	35	1961	674	93,80	76	2012	684	96,30	79	2064	693	98,80	83	2116	703	101,30	87
	40	1862	744	89,10	69	1911	754	91,40	72	1960	765	93,80	76	2004	768	96,00	79
	46	1587	619	75,90	52	1613	608	77,20	53	1625	584	77,80	54	1637	578	78,40	55
	48	1439	546	68,80	43	1400	574	67,00	41	1422	565	68,00	42	1432	546	68,50	43
	50	1241	507	59,40	33	1260	499	60,30	34	1266	480	60,60	34	1283	472	61,40	35

NOTES

Cc (cooling capacity) - Pi (unit power input)
Qwe (evaporator water flow) - Pdwe (evaporator pressure drop)
ELWT (evaporator leaving water temperature – Δt 5°C).
Data are referred to 0,0176 m^2 °C/kW evaporator fouling factor

SRC_1-2_Rev.00_2_1

6 Capacity tables

6 - 2 Partial Heat Recovery Capacity tables

Partial Heat Recovery Ratings

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

	Partial Heat Recovery Leaving Water Temperature (°C)			Partial Heat Recovery LWT 45°C	
	45 (Δt=5°C)	50 (Δt=5°C)	55 (Δt=5°C)	Water Flow	Pressure Drops
Evaporator Leaving Temperature 7°C - Δt 5°C Condenser Inlet Air 35°C"	Hc (kW)	Hc (kW)	Hc (kW)	l/s	kPa
	120	100	81,8	5,71	24
	127	106	86,6	6,05	26
	143	120	97,6	6,82	33
	157	132	108	7,52	40
	179	151	123	8,57	51
	192	161	131	9,16	39
	213	179	146	10,17	48
	228	192	156	10,90	33
	253	212	173	12,07	41
	271	227	185	12,92	46
	284	239	194	13,59	39
	300	252	205	14,31	42
	314	264	215	15,02	46

cappart_1_Rev.00_1

6 Capacity tables

6 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
40/45	606	217	700	85%	6,01
	668	203	740	85%	6,94
	754	230	836	85%	6,91
	817	267	922	85%	6,51
	935	295	1046	85%	6,71
	986	329	1118	85%	6,39
	1117	347	1244	85%	6,81
	1179	386	1331	85%	6,50
	1307	426	1473	85%	6,52
	1393	465	1580	85%	6,39
	1467	491	1664	85%	6,38
	1547	517	1755	85%	6,38
	1640	537	1850	85%	6,50

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
40/50	578	220	678	85%	5,72
	637	205	716	85%	6,59
	719	233	809	85%	6,56
	779	270	892	85%	6,19
	891	298	1011	85%	6,38
	940	333	1082	85%	6,07
	1064	351	1203	85%	6,47
	1124	391	1288	85%	6,17
	1246	431	1425	85%	6,20
	1328	471	1529	85%	6,07
	1398	497	1611	85%	6,06
	1475	523	1698	85%	6,06
	1563	543	1790	85%	6,18

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
45/55	578	222	480	60%	4,76
	637	208	507	60%	5,50
	719	236	573	60%	5,48
	779	274	632	60%	5,16
	891	302	716	60%	5,32
	940	337	767	60%	5,06
	1064	355	852	60%	5,40
	1124	396	912	60%	5,15
	1246	437	1009	60%	5,17
	1328	477	1083	60%	5,06
	1398	503	1141	60%	5,05
	1475	530	1203	60%	5,05
	1563	550	1268	60%	5,15

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

EWC / LWC	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	COP Hc
50/60	578	222	280	35%	3,86
	637	208	296	35%	4,48
	719	236	334	35%	4,47
	779	274	368	35%	4,20
	891	302	418	35%	4,33
	940	337	447	35%	4,11
	1064	355	497	35%	4,40
	1124	396	532	35%	4,19
	1246	437	589	35%	4,20
	1328	477	632	35%	4,11
	1398	503	666	35%	4,10
	1475	530	702	35%	4,11
	1563	550	739	35%	4,19

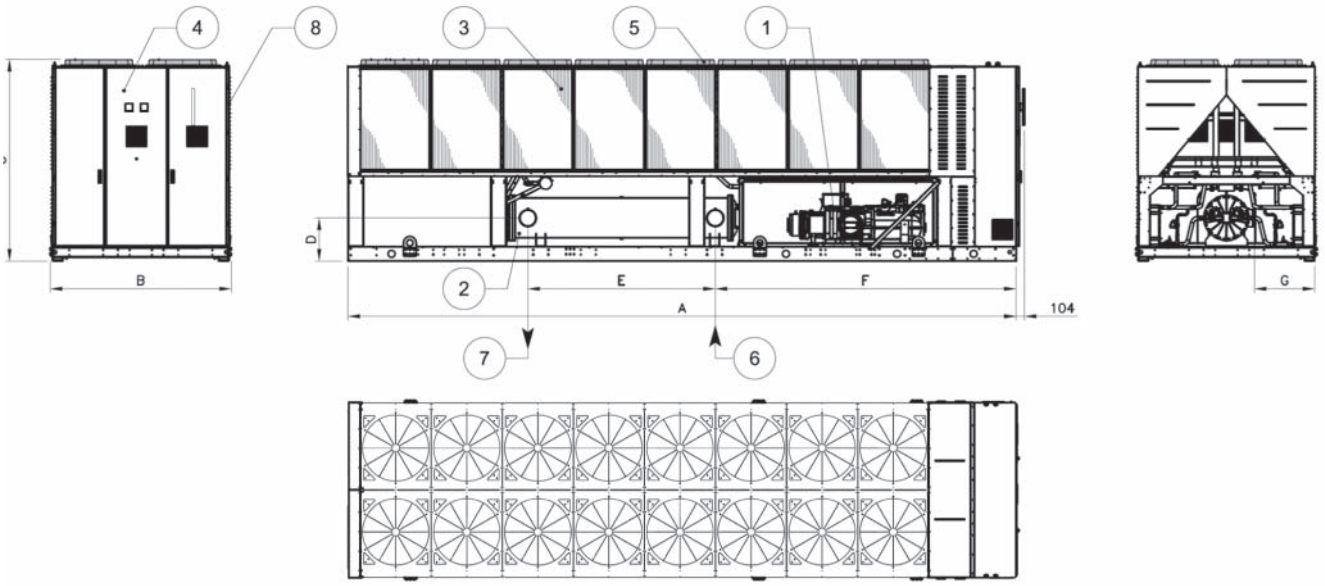
Notes:
Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)
%Hc (percentage heat recovered)
COP Hc (coefficent of performance during heat recovery = (cooling+ heating capacity) / power input)
EWC (Entering water heat recovery condenser)
LWC (Leaving water heat recovery condenser)

Data refers to:
LWE (Leaving water evaporator) = 7°C
Same evaporator flow as for nominal cooling operation
Condenser Inlet Air Temperature = 35°C
0,0176 m^2 °C/kW evaporator fouling factor

captot_1_Rev.00_1

7 Dimensional drawings

7 - 1 Dimensional Drawings



The drawing is for illustration only. Please refer to the table below for unit dimensions.

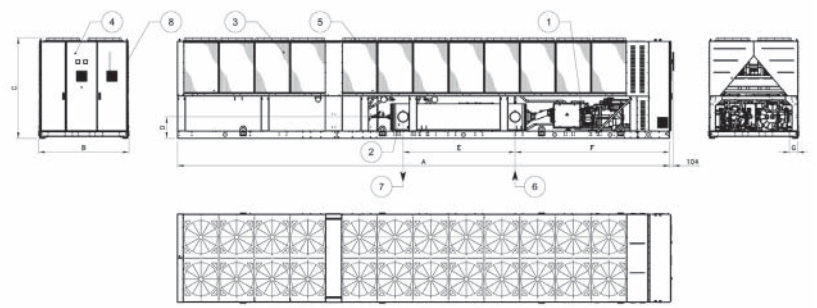
Models		Dimensions (mm)							
EWAD~CZXS/XL	EWAD~CZXR	A	B	C	D	E	F	G	Fans
670	640	6621	2285	2540	434	2412	3757	810	10
740	700	6621	2285	2540	434	2412	3757	810	12
830	790	7521	2285	2540	434	2412	3757	810	14
900	850	7521	2285	2540	434	2412	3757	810	14
C10	980	8421	2285	2540	542	2360	3794	758	16
C11	C10	8421	2285	2540	542	2360	3794	758	16
C12	C11	9321	2285	2540	542	2360	3794	758	20
C13	C12	9321	2285	2540	542	2360	3794	758	20

LEGEND
1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator water inlet
7. Evaporator water outlet
8. Power connections slot

DMN_1-2_Rev.00_1

7 Dimensional drawings

7 - 1 Dimensional Drawings



The drawing is for illustration only. Please refer to the table below for unit dimensions.

Models		Dimensions (mm)							
EWAD~CZXS/XL	EWAD~CZXR	A	B	C	D	E	F	G	Fans
C14	C13	11521	2285	2540	542	2360	3794	758	22
C15	C14	12421	2285	2540	542	2360	3794	758	24
C16	C15	12421	2285	2540	542	2830	3896	208	24
C17	C16	13321	2285	2540	542	2830	3896	208	26
C18	C17	14221	2285	2540	542	2830	3896	208	28

LEGEND
1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator water inlet
7. Evaporator water outlet
8. Power connections slot

DMN_1-2_Rev.00_2

8 Sound data

8 - 1 Sound Level Data

Sound Levels

EWAD~CZXS

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
670	64,1	65,4	72,2	76,8	78,5	72,3	68,1	59,0	**102,1**	**81,0**
740	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,0	**102,2**	**81,0**
830	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,1	**102,5**	**81,1**
900	64,2	65,5	72,2	76,8	78,5	72,4	68,2	59,1	**102,5**	**81,1**
C10	64,2	65,5	72,3	76,9	78,6	72,4	68,2	59,1	**102,9**	**81,1**
C11	64,2	65,5	72,3	76,9	78,6	72,4	68,2	59,1	**102,9**	**81,1**
C12	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**103,5**	**81,2**
C13	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**103,5**	**81,2**
C14	64,3	65,6	72,3	76,9	78,6	72,5	68,3	59,2	**104,1**	**81,2**
C15	64,3	65,7	72,4	77,0	78,7	72,5	68,3	59,2	**104,1**	**81,2**
C16	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,8	**105,8**	**82,8**
C17	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,9	**106,0**	**82,9**
C18	66,0	67,3	74,0	78,6	80,3	74,2	70,0	60,9	**106,2**	**82,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

EWAD~CZXL

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
670	60,6	61,9	68,7	73,3	75,0	68,8	64,6	55,5	**98,6**	**77,5**
740	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,0	**99,2**	**78,0**
830	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,1	**99,5**	**78,1**
900	61,2	62,5	69,2	73,8	75,5	69,4	65,2	56,1	**99,5**	**78,1**
C10	61,2	62,5	69,3	73,9	75,6	69,4	65,2	56,1	**99,9**	**78,1**
C11	61,2	62,5	69,3	73,9	75,6	69,4	65,2	56,1	**99,9**	**78,1**
C12	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**100,5**	**78,2**
C13	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**100,5**	**78,2**
C14	61,3	62,6	69,3	73,9	75,6	69,5	65,3	56,2	**101,1**	**78,2**
C15	61,3	62,7	69,4	74,0	75,7	69,5	65,3	56,2	**101,1**	**78,2**
C16	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,8	**102,8**	**79,8**
C17	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,9	**103,0**	**79,9**
C18	63,0	64,3	71,0	75,6	77,3	71,2	67,0	57,9	**103,2**	**79,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

EWAD~CZXR

Unit size	Sound pressure level at 1 m from the unit in semispheric free field (rif. 2 x 10^{-5} Pa)									Power
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
640	56,6	57,9	64,7	69,3	71,0	64,8	60,6	51,5	**94,6**	**73,5**
700	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,0	**95,2**	**74,0**
790	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,1	**95,5**	**74,1**
850	57,2	58,5	65,2	69,8	71,5	65,4	61,2	52,1	**95,5**	**74,1**
980	57,2	58,5	65,3	69,9	71,6	65,4	61,2	52,1	**95,9**	**74,1**
C10	57,2	58,5	65,3	69,9	71,6	65,4	61,2	52,1	**95,9**	**74,1**
C11	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**96,5**	**74,2**
C12	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**96,5**	**74,2**
C13	57,3	58,6	65,3	69,9	71,6	65,5	61,3	52,2	**97,1**	**74,2**
C14	57,3	58,7	65,4	70,0	71,7	65,5	61,3	52,2	**97,1**	**74,2**
C15	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,8	**98,8**	**75,8**
C16	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,9	**99,0**	**75,9**
C17	59,0	60,3	67,0	71,6	73,3	67,2	63,0	53,9	**99,2**	**75,9**

The values are according to ISO 3744 and are referred to: evaporator 12/7° C, air ambient 35° C, full load operation

NSL_1-2_Rev.00_1

8 Sound data

8 - 1 Sound Level Data

Sound pressure level correction factor for different distances

EWAD~CZXS / EWAD~CZXL / EWAD~CZXR

Unit size			Distance						
EWAD~CZ-XS	EWAD~CZ-XL	EWAD~CZ-XR	1m	5m	10m	15m	20m	25m	50m
670	670	640	0,0	7,0	11,5	14,4	16,6	18,4	24,0
740	740	700	0,0	7,0	11,5	14,4	16,6	18,4	24,0
830	830	790	0,0	6,8	11,3	14,2	16,4	18,1	23,7
900	900	850	0,0	6,8	11,3	14,2	16,4	18,1	23,7
C10	C10	980	0,0	6,6	11,0	13,9	16,1	17,9	23,4
C11	C11	C10	0,0	6,6	11,0	13,9	16,1	17,9	23,4
C12	C12	C11	0,0	6,4	10,7	13,5	15,7	17,4	22,9
C13	C13	C12	0,0	6,4	10,7	13,5	15,7	17,4	22,9
C14	C14	C13	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C15	C15	C14	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C16	C16	C15	0,0	6,1	10,3	13,1	15,2	16,9	22,4
C17	C17	C16	0,0	6,0	10,2	12,9	15,0	16,7	22,2
C18	C18	C17	0,0	6,0	10,0	12,8	14,9	16,6	22,0

Values are dB(A) (pressure level)
Reduction to be applied to standard, low and reduced noise levels

NSL_1-2_Rev.00_2

9 Installation

9 - 1 Installation Method

Warning
Installation and maintenance of the unit must to be performed only by qualified personnel who have knowledge with local codes and regulations, and experience with this type of equipment. Must be avoided the unit installation in places that could be considered dangerous for all the maintenance operations.

Handling
Care should be taken to avoid rough handling or shock due to dropping the unit. Do not push or pull the unit from anything other than the base frame. Never allow the unit to fall during unloading or moving as this may result in serious damage. To lift the unit, rings are provided in the base frame of the unit. Spreader bar and cables should be arranged to prevent damage to the condenser coil or unit cabinet.

Location
The units are produced for outside installation on roofs, floors or below ground level on condition that the area is free from obstacles for the passage of the condenser air. The unit should be positioned on solid foundations and perfectly level; in the case of installation on roofs or floors, it may be advisable to arrange the use of suitable weight distribution beams. When the units are installed on the ground, a concrete base at least 250 mm wider and longer than the unit's footprint should be laid. Furthermore, this base should withstand the unit weight mentioned in the technical data table.

Space requirements
The units are air-cooled, then it is important to respect the minimum distances which guarantee the best ventilation of the condenser coils. Limitations of space reducing the air flow could cause significant reductions in cooling capacity and an increase in electricity consumption.
To determinate unit placement, careful consideration must be given to assure a sufficient air flow across the condenser heat transfer surface. Two conditions must be avoided to achieve the best performance: warm air recirculation and coil starvation. Both these conditions cause an increase of condensing pressures that results in reductions in unit efficiency and capacity.
Moreover the unique microprocessor has the ability to calculate the operating environment of the air cooled chiller and the capacity to optimize its performance staying on-line during abnormal conditions.
Each side of the unit must be accessible after installation for periodic service. Fig.1 shows you minimum recommended clearance requirements.
Vertical condenser air discharge must be unobstructed because the unit would have its capacity and efficiency significantly reduced.
If the units are positioned in places surrounded by walls or obstacles of the same height as the units, the units should be at least 2500 mm from obstacles (fig.2). In the event the obstacles are higher than the units, the units should be at least 3000 mm from the obstacle (fig.4). Units installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. The microprocessor control is proactive in response "of design condition". In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.
When two or more units are positioned side by side it is recommended that the condenser coils are at least 3600 mm distance from one another (fig.3); strong wind could be the cause of air warm recirculation.
For other installation solutions, consult our technicians.

INN_1-2_Rev.00_1

9 Installation

9 - 1 Installation Method

The above recommended information are representative of general installation. A specific evaluation should be done by contractor depending on the case.

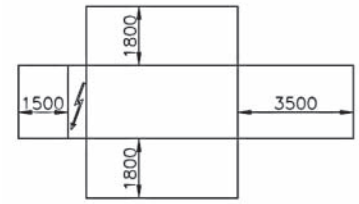


Fig. 1

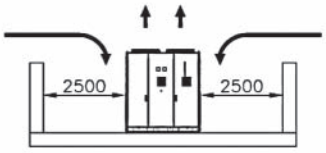


Fig. 2

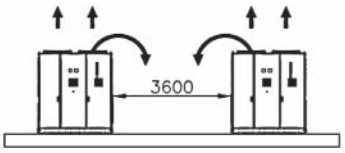


Fig. 3

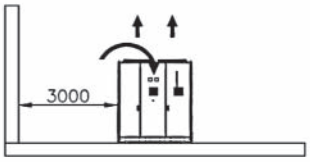


Fig. 4

Acoustic protection

When noise level must meet special requirements, it is necessary to pay the maximum attention to ensure the perfect insulation of the unit from the support base by applying appropriate vibration-dampening devices on the unit, on the water pipes and on the electrical connections.

Storage

The environment conditions have to be in the following limits:

Minimum ambient temperature:	-20°C
Maximum ambient temperature:	+57°C
Maximum R.H.:	95% not condensing

INN_1-2_Rev.00_2

9 Installation

9 - 2 Water Charge, Flow and Quality

Items (1) (5)			Cooling Water			Cooled Water		Heated water (2)				Tendency if out of criteria
			Circulating System		Once Flow			Low temperature		High temperature		
			Circulating water	Supply water (4)	Flowing water	Circulating water [Below 20°C]	Supply water (4)	Circulating water [20°C ~ 60°C]	Supply water (4)	Circulating water [60°C ~ 80°C]	Supply water (4)	
Items to be controlled:	pH	at 25°C	6.5 ~ 8.2	6.0 ~ 8.0	6.0 ~ 8.0	6.8 - 8.0	6.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	7.0 ~ 8.0	Corrosion + Scale
	Electrical conductivity	[mS/m] at 25°C	Below 80	Below 30	Below 40	Below 80	Below 80	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(µS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 800)	(Below 800)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl^-/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO^{2-}_4/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	M-alkalinity (pH4.8)	[mg$CaCO_3$/l]	Below 100	Below 50	Below 50	Below 100	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mg$CaCO_3$/l]	Below 200	Below 70	Below 70	Below 200	Below 70	Below 70	Below 70	Below 70	Below 70	Scale
	Calcium harness	[mg$CaCO_3$/l]	Below 150	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Silca ion	[mgSiO_2/l]	Below 50	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Below 30	Scale
	Oxygen	(mg O2 /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Corrosion
	Particole size	(mm)	Below 0.5	Below 0.5	Below 0.5	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Below 0.5	Below 0.6	Erosion
	Total dissolved solids	(mg / l)	Below 1000	Below 1000	Below 1000	Below 1000	Below 1001	Below 1000	Below 1001	Below 1000	Below 1001	Erosion
	Ethykene, Propylene Glycol	(weight conc.)	Below 60%	Below 60%	---	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	Below 60%	---
Items to be referred to:	Nitrate ion	(mg NO3- /l)	Below 100	Below 100	Below 100	Below 100	Below 101	Below 100	Below 101	Below 100	Below 101	Corrosion
	TOC Total organic carbon	(mg /l)	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Scale
	Iron	[mgFe/l]	Below 1.0	Below 0.3	Below 1.0	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Below 1.0	Below 0.3	Corrosion + Scale
	Copper	[mgCu/l]	Below 0.3	Below 0.1	Below 1.0	Below 1.0	Below 1.0	Below 1.0	Below 0.1	Below 1.0	Below 0.1	Corrosion
	Sulfite ion	[mgS^{2-}/l]	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Not detectable	Corrosion
	Ammonium ion	[mgNH^+_4/l]	Below 1.0	Below 0.1	Below 1.0	Below 1.0	Below 0.1	Below 0.3	Below 0.1	Below 0.1	Below 0.1	Corrosion
	Remaining chloride	[mgCL/l]	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.3	Below 0.25	Below 0.3	Below 0.1	Below 0.3	Corrosion
	Free carbide	[mgCO_2/l]	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 4.0	Below 0.4	Below 4.0	Below 0.4	Below 4.0	Corrosion
	Stability index		6.0 ~ 7.0	---	---	---	---	---	---	---	---	Corrosion + Scale

1 Names, definitions and units are according to JIS K 0101. Units and figures between brackets are old units published as reference only.
2 In case of using heated water (more than 40°C), corrosion is generally noticeable. Especially when the iron materials is in direct contact with water without any protection shields, it is desireable to give the valid measure for corrosion. E.g. chemical measure
3 In the cooling water using hermetic cooling tower, close circuit water is according to heated water standard, and scattered water is according to cooling water standard.
4 Supply water is considered drink water, industrial water and ground water except for genuine water, neutral water and soft water.
5 The above mentioned items are representable items in corrosion and scale cases.
6 The limits above have to be considered as a general prescription and con not totallu assure the absence of corrossion and erosion. Some particular combinations of elements or the presence of components not listed in the table or factors not considered may trigger corrosion phenomena.

waflowqua_1-2_Rev.00_1

9 Installation

9 - 2 Water Charge, Flow and Quality

Water content in cooling circuits

The cooled water distribution circuits should have minimum water content to avoid excessive compressors start and stop.

In fact, each time the compressor starts up, an excessive quantity of oil goes from the compressor sump and simultaneously there is a rise in the temperature of the compressor motor's stator due to the inrush current during the start-up.

To prevent damage to the compressors, It has been envisaged the application of a device to limit frequent stops and restarts.

During the span of one hour there will be no more than 6 starts of the compressor. The plant side should therefore ensure that the overall water content allows a more constant functioning of the unit and consequently greater environmental comfort.

The minimum water content per unit should be calculated using this simplified formula:

For 2 compressors unit
M (liters) = (0.1595 x ΔT(°C) + 3.0825) x P(kW)

For 3 compressors unit
M (liters) = (0.0443 x ΔT(°C) + 1.6202) x P(kW)

where:

M	minimum water content per unit expressed in litres
P	Cooling Capacity of the unit expressed in kW
ΔT	evaporator entering / leaving water temperature difference expressed in °C

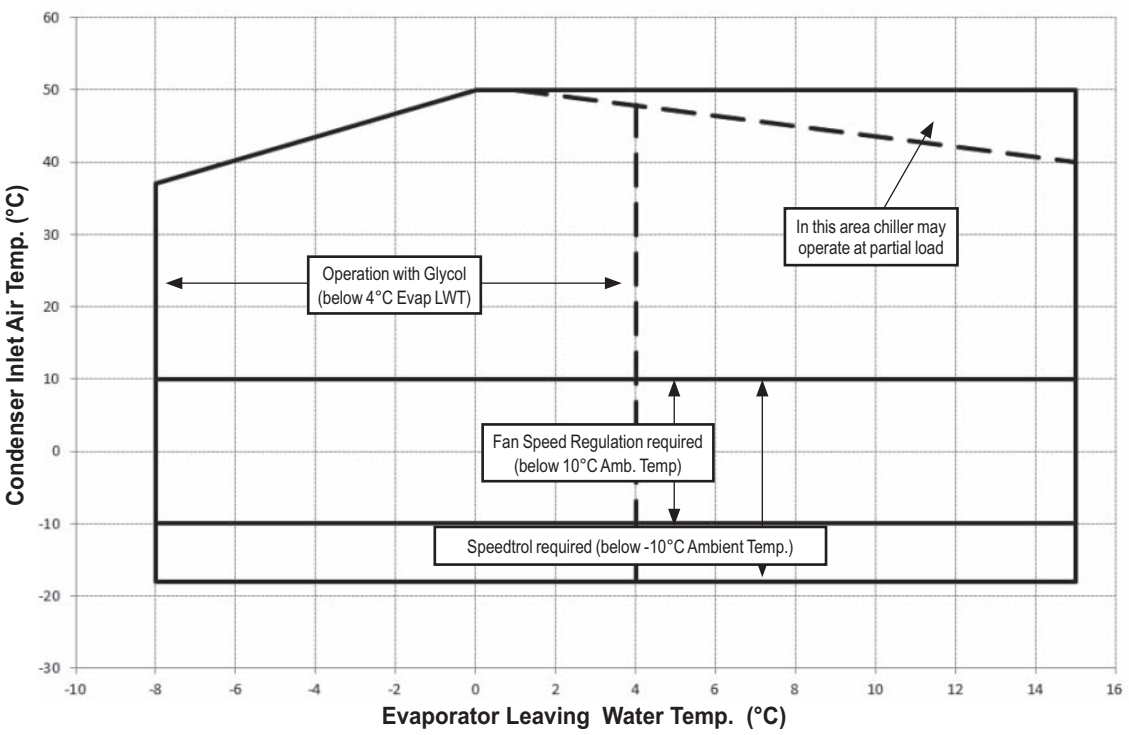
This formula is valid for:
- standard microprocessor parameters

For more accurate determination of quantity of water, it is advisable to contact the designer of the plant.

waflowqua_1-2_Rev.00_2

10 Operation range

10 - 1 Operation Range



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10 Operation range

10 - 2 Correction Factors

Table 1 - Evaporator minimum and maximum water Δt

Max evaporator water Δt	**°C**	**8**
Min evaporator water Δt	**°C**	**4**

Table 2 - Evaporator fouling factors

"Fouling factors m2 °C / kW"	"Cooling capacity correction factor"	"Power input correction factor"	"EER correction factor"
0,0176	1,000	1,000	1,000
0,0440	0,978	0,986	0,992
0,0880	0,957	0,974	0,983
0,1320	0,938	0,962	0,975

Table 3 - Altitude correction factors

Elevation above sea level (m)	**0**	**300**	**600**	**900**	**1200**	**1500**	**1800**
Barometric pressure (mbar)	1013	977	942	908	875	843	812
Cooling capacity correction factor	1,000	0,993	0,986	0,979	0,973	0,967	0,960
Power input correction factor	1,000	1,005	1,009	1,015	1,021	1,026	1,031
Maximum Ambient Temperature	1,000	1,000	1,000	1,000	0,992	0,980	0,968

Table 4.1 - Minimum glycol percentage for low water temperature

Evaporator Leaving Water Temperature (°C)	**2**	**0**	**-2**	**-4**	**-6**	**-8**
Ethylene glycol (%)	10	20	20	20	30	30
Propylene glycol (%)	10	20	20	30	30	30

Note: Minimum glycol percentage to be used with evaporator leaving water temperature below 4°C to prevent freezing of water circuit.

Table 4.2 - Minimum glycol percentage for low air temperature

Air Ambient Temperature (°C) (2)	**-3**	**-8**	**-15**	**-23**	**-35**
Ethylene glycol (%) (1)	10%	20%	30%	40%	50%
Air Ambient Temperature (°C) (2)	**-3**	**-7**	**-12**	**-20**	**-32**
Propylene glycol (%) (1)	10%	20%	30%	40%	50%

Note (1): Minimum glycol percentage to prevent freezing of water circuit at indicated air ambient temperature
Note (2): Air ambient temperature do exceed the operating limits of the unit, as protection of water circuit may be needed in winter season at non-working conditions

Table 5 - Correction factors for low evaporator leaving water temperature

Evaporator Leaving Water Temperature (°C)	**2**	**0**	**-2**	**-4**	**-6**	**-8**
Cooling Capacity	0,842	0,785	0,725	0,670	0,613	0,562
Compressor Power Input	0,950	0,940	0,920	0,890	0,870	0,840

Note: Correction factors have to be applied at working conditions: evaporator leaving water temperature 7°C

Table 6 - Correction factors for water and glycol mixture

	Ethylene Glycol (%)	**10%**	**20%**	**30%**	**40%**	**50%**
Ethylene Glycol	**Cooling Capacity**	0,991	0,982	0,972	0,961	0,946
	Compressor Power Input	0,996	0,992	0,986	0,976	0,966
	Flow Rate (Δt)	1,013	1,04	1,074	1,121	1,178
	Evaporator Pressure Drop	1,070	1,129	1,181	1,263	1,308
Propylene Glycol	**Cooling Capacity**	0,985	0,964	0,932	0,889	0,846
	Compressor Power Input	0,993	0,983	0,969	0,948	0,929
	Flow Rate (Δt)	1,017	1,032	1,056	1,092	1,139
	Evaporator Pressure Drop	1,120	1,272	1,496	1,792	2,128

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10 Operation range

10 - 2 Correction Factors

How to use the correction factors proposed in the previous tables

A) Mixture Water and Glycol --- Evaporator leaving water temperature > 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.2 and 6)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	EWAD670CZXS
Mixture:	Water
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	672 kW
- Power input:	245 kW
- Flow rate (Δt 5°C):	32.00 l/s
- Evaporator pressure drop:	80 kPa
Mixture:	Water + Ethylene Glycol 30% (for a winter air temperature up to -15°C)
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	672 x 0.972 = 653 kW
- Power input:	245 x 0.986 = 242 kW
- Flow rate (Δt 5°C):	31.19 (referred to 653 kW) x 1.074 = 33.50 l/s
- Evaporator pressure drop:	76.25 (referred to 31.19 l/s) x 1.181 = 90.06 kPa

B) Mixture Water and Glycol --- Evaporator leaving water temperature < 4°C
- depending from the type and percentage (%) of glycol filled in the circuit (see table 4.1 and 4.2 and table 6)
- depending from the evaporator leaving water temperature (see table 5)
- multiply the Cooling Capacity, the Compressor Power Input by the Correction factor of Table 5 and Table 6
- starting from this new value of Cooling Capacity, calculate the Flow Rate (l/s) and the Evaporatore Pressure Drop (kPa)
- now multiply the new Flow Rate and the new Evaporator Pressure Drop by the Correction Factors of Table 6

Example

Unit Size:	EWAD670CZXS
Mixture:	Water
Standard working condition	ELWT 12/7°C – Condenser inlet air temperature 30°C
- Cooling capacity:	710 kW
- Power input:	219 kW
- Flow rate (Δt 5°C):	33.90 l/s
- Evaporator pressure drop:	88 kPa
Mixture:	Water + Glycol 30% (for a low evaporator leaving temperature of -1/-6°C)
Working condition:	ELWT -1/-6°C – Condenser inlet air temperature 30°C
- Cooling capacity:	710 x 0.613 x 0.972 = 423 kW
- Power input:	219 x 0.870 x 0.986 = 188 kW
- Flow rate (Δt 5°C):	20.22 l/s (referred to 423 kW) x 1.074 = 21.72 l/s
- Evaporator pressure drop:	38.28 kPa (referred to 20.00 l/s) x 1.181 = 45.21 kPa

operangecorr_1-2-3_Rev.00_2

10 Operation range

10 - 2 Correction Factors

Table 7 - Available fan static pressure correction factors

External Static Pressure (Pa)	0	10	20	30	40	50	60	70	80	90	100
Cooling Capacity (kW) Correction factor	1,000	0,998	0,996	0,995	0,993	0,992	0,991	0,989	0,986	0,985	0,982
Compr. Power Input (kW) Correction factor	1,000	1,004	1,009	1,012	1,018	1,021	1,024	1,027	1,034	1,039	1,045
Reduction of Max CIAT (°C)	1,000	-0,3	-0,5	-0,7	-1,0	-1,1	-1,3	-1,6	-1,8	2,1	-2,4

CIAT: Condenser Inlet Air Temperature

External Static Pressure (Pa)	0	10	20	30	40	50	60	70
Cooling Capacity (kW) Correction factor	1,000	0,996	0,991	0,985	0,978	0,97	0,954	0,927
Compr. Power Input (kW) Correction factor	1,000	1,005	1,012	1,02	1,028	1,039	1,058	1,092
Reduction of Max CIAT (°C)	1,000	-0,3	-0,7	-1,1	-1,6	-2,2	-3,3	-5,1

CIAT: Condenser Inlet Air Temperature

How to use the Correction factors proposed in the previous tables

Example
Unit Size: EWAD670CZXS

- External static pressure **0 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 672 kW
- Power input: 245 kW
- Maximum CIAT: 50°C (see graphic operating limit)

- External static pressure **40 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 672 x 0.978 = 657 kW
- Power input: 245 x 1.028= 252 kW
- Maximum CIAT 50 - 1.6 = 48.4°C

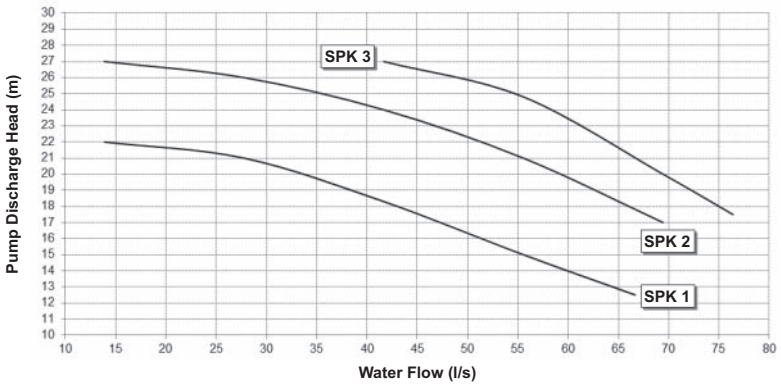
operangecorr_1-2-3_Rev.00_3

11 Hydraulic performance

11 - 1 Pump Characteristics

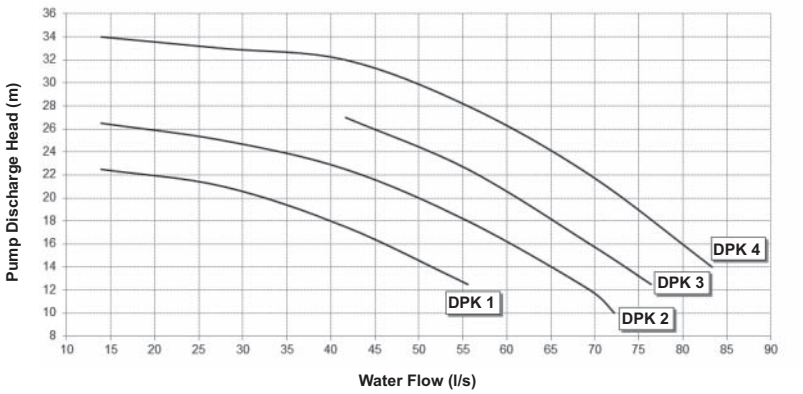
Water Pump Kit - Discharge Head

Single Pump (2 poles) - Discharge Head



Note
- the above curves are referred to the discharge head of the pump only
- when selecting the pump you have to consider the installation and evaporator pressure drops
- when using mixture of water and glycol please contact the factory as above specification can change

Tzin Pump (2 poles) - Discharge Head



Note
- the above curves are referred to the discharge head of the pump only
- when selecting the pump you have to consider the installation and evaporator pressure drops
- when using mixture of water and glycol please contact the factory as above specification can change

pump_1-2_Rev.00_1

11 Hydraulic performance

11 - 1 Pump Characteristics

Water Pump Kit - Combination Matrix

Version	Size
EWAD~CZXS EWAD~CZXL	670
	740
	830
	900
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17
	C18

Version	Size
EWAD~CZXR	640
	700
	790
	850
	980
	C10
	C11
	C12
	C13
	C14
	C15
	C16
	C17

Single Pump			Double Pump			
SPK 1	**SPK 2**	**SPK 3**	**DPK 1**	**DPK 2**	**DPK 3**	**DPK 4**
X	X		X	X		
X	X		X	X		
X	X		X	X		
X	X		X	X		
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X		X	X	X
X	X	X		X	X	X
X	X	X		X	X	X
		X			X	X

Water Pump Kit - Technical Information

		Pump Motor Power (kW)	Pump Motor Current (A)	Power supply (V-ph-Hz)	PN	Motor Protection	Insulation (Class)	Working Temp. (°C)
Single Pump	**SPK 1**	11,0	20,0	400V-3ph-50hz	16	IP55	class F	-20 +140
	SPK 2	15,0	26,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	SPK 3	18,5	32,5	400V-3ph-50hz	16	IP55	class F	-20 +140
Double Pump	**DPK 1**	11,0	20,0	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 2	15,0	26,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 3	18,5	32,5	400V-3ph-50hz	16	IP55	class F	-20 +140
	DPK 4	22,0	39,0	400V-3ph-50hz	16	IP55	class F	-20 +140

Note
- when using mixture of water and glycol please contact the factory as above specification can change

pump_1-2_Rev.00_2

11 Hydraulic performance

11 - 2 Total Heat Recovery Pressure Drop

Total and Partial Heat Recovery Pressure Drops

To determinate the pressure drop for different versions or at different working condition, please refer to the following formula:

$$\mathbf{PD_2}\ (\text{kPa}) = \mathbf{PD_1}\ (\text{kPa}) \times \left(\frac{Q_2\ (\text{l/s})}{Q_1\ (\text{l/s})} \right)^{1.87}$$

where:

PD_2 Pressure drop to be determinate (kPa)
PD_1 Pressure drop at nominal condition (kPa)
Q_2 water flow at new working condition (l/s)
Q_1 water flow at nominal condition (l/s)

How to use the formula: Example

The unit EWAD670CZXS has been selected for working at the following conditions:
- Partial heat recovery leaving water temperature 50/55°C
The heating capacity at these working conditions is: 81.8 kW
The water flow at these working conditions is: 3.91 l/s

The unit EWAD670CZXS at nominal working conditions has the following data:
- Partial heat recovery leaving water temperature 40/45°C
- condenser air inlet: 35°C
The heating capacity at these working conditions is: 120 kW
The water flow at these working conditions is: 5.71 l/s
The pressure drop at these working conditions is: 24 kPa

The pressure drop at the selected working condition will be:

$$\mathbf{PD_2}\ (\text{kPa}) = \mathbf{24}\ (\text{kPa}) \times \left(\frac{\mathbf{3.91}\ (\text{l/s})}{\mathbf{5.71}\ (\text{l/s})} \right)^{1.87}$$

$$\mathbf{PD_2}\ (\text{kPa}) = \mathbf{12}\ (\text{kPa})$$

totheatpd_1_Rev.00_1

12 Specification text

12 - 1 Specification Text

Technical specification for air cooled chiller

GENERAL

The chiller will be designed and manufactured in accordance with the following European directives:

Construction of pressure vessel	97/23/EC (PED)
Machinery Directive	2006/42/EC
Low Voltage	2006/95/EC
Electromagnetic Compatibility	2004/108/EC
Electrical & Safety codes	EN 60204–1 / EN 60335-2-40
Manufacturing Quality Standards	UNI – EN ISO 9001:2004

To avoid any losses, the unit will be tested at full load in the factory (at the nominal working conditions and water temperatures). The chiller will be delivered to the job site completely assembled and charged with refrigerant and oil. The installation of the chiller must comply with the manufacturer's instructions for rigging and handling equipment.

The unit will be able to start up and operate (as standard) at full load with:
- outside air temperature from ..... °C to ..... °C
- evaporator leaving fluid temperature between ..... °C and ..... °C

Refrigerant

Only R-134a can be used.

PERFORMANCE

- ✓ Number of chiller(s) : ..... unit(s)
- ✓ Cooling capacity for single chiller : ..... kW
- ✓ Power input for single chiller in cooling mode : ..... kW
- ✓ Heat exchanger entering water temperature in cooling mode: : ..... °C
- ✓ Heat exchanger leaving water temperature in cooling mode : ..... °C
- ✓ Heat exchanger water flow : ..... l/s
- ✓ Nominal outside working ambient temperature in cooling mode : ..... °C

Operating voltage range should be 400V ±10%, 3ph, 50Hz, voltage unbalance maximum 3%, without neutral conductor and shall only have one power connection point.

UNIT DESCRIPTION

The chiller includes as standard not less than: two or three independent refrigerant circuits (depending on the size), semi-hermetic asymmetric type rotary single screw compressors, air cooled variable electrical frequency driver for each compressor (VFD), electronic expansion device (EEXV), refrigerant direct expansion 'shell&tube' heat exchanger, air-cooled condenser section, R-134a refrigerant, lubrication system, motor starting components, discharge line shut-off valve, control system and all components necessary for a safe and stable unit operation.
The chiller will be factory assembled on a robust base frame made of galvanized steel, protected by an epoxy paint.

SOUND LEVEL AND VIBRATIONS

Sound pressure level at 1 meter distance in free field, semispheric conditions, shall not exceed ……dB(A). The sound pressure levels must be rated in accordance to ISO 3744 (other types of rating can not be used).
Vibration on the base frame should not exceed 2 mm/s.

DIMENSIONS

Unit dimensions shall not exceed following indications: - Unit length ..... mm
- Unit width ..... mm
- Unit height ..... mm

SPC_1-2-3-4_Rev.00_1

12 Specification text

12 - 1 Specification Text

CHILLER COMPONENTS

Compressors

- ✓ Semi-hermetic, single-screw asymmetric type with one main helical rotor meshing with two diametrical opposed gaterotors. The gaterotors' contact elements shall be constructed of composite material designed for extended life. Electrical motor shall be 2-pole, semi-hermetic, squirrel-cage induction type and cooled by suction gas.
- ✓ The oil injection shall be used in order to get high EER (Energy Efficiency Ratio) also at high condensing pressure and low sound pressure levels in each load condition.
- ✓ The compressor shall be provided with a built in, high efficiency, mesh type oil separator and oil filter.
- ✓ Refrigerant system differential pressure shall provide oil injection on all moving compressor parts to correctly lubricate them. Electrical oil pump lubricating system is not allowed.
- ✓ Compressor cooling must be done by refrigerant liquid injection. An external dedicated heat exchanger and additional piping to carry the oil from compressor to heat exchanger and viceversa is not allowed.
- ✓ The compressor shall be direct electrical driven, without gear transmission between the screw and the electrical motor.
- ✓ The compressor casing shall be provided with ports to realize economized refrigerant cycles.
- ✓ The compressor must be protected by a temperature sensor for high discharge temperature and an electrical motor thermistor for high winding temperature.
- ✓ The compressor shall be equipped with an electric oil heater.
- ✓ The compressor shall be fully field serviceable. Compressor that must be removed and returned to the factory for service shall be unacceptable.

Cooling capacity control system

- ✓ Each chiller will have a microprocessor for the control of the compressor capacity through inverter and the instantaneous RPM value of the motor.
- ✓ The unit capacity control shall be infinitely modulating, from 100% down to 40% for each circuit. The chiller shall be capable of stable operation to a minimum of 13.5% of full load without hot gas bypass.
- ✓ The system shall control the unit based on the leaving evaporator water temperature that shall be controlled by PID (Proportional Integral Derivative) logic.
- ✓ Unit control logic shall to manage frequency level of the compressor electric motor to exactly match plant load request in order to keep constant the set point for delivered chilled or hot water temperature. In this operating condition unit control logic shall modulate electrical frequency level in a range lower and upper the nominal electrical network value fixed at 50 Hz.
- ✓ The microprocessor unit control shall detect conditions that approach protective limits and take self-corrective action prior to an alarm occurring. The system shall automatically reduce the chiller capacity when any of the following parameters are outside their normal operating range:
    - o High condenser pressure
    - o Low evaporating refrigerant temperature

Unit-mounted Variable Frequency Driver (VFD) and Electrical Requirement

- ✓ All interconnecting wiring between the VFD and the chiller shall be factory-installed. Customer electrical connection for compressor motor power shall be limited to main power leads to the single point power connection located into electrical panel.
- ✓ The VFD shall be air cooled type. Water cooled design or refrigerant cooled design are not acceptable.
- ✓ The VFD full load efficiency shall meet or exceed 97% at 100% VFD rated capacity.
- ✓ Base motor frequency shall permit motor to be utilized at nameplate voltage. Adjustable frequency range, monitored by unit's microprocessor control, shall permit a stable unit capacity control down to 13.5% without hot-gas bypass.
- ✓ Starting current for the compressor shall not exceed nominal compressor load amps.
- ✓ Unit power factor shall be not less than 0.95 on entire unit capacity range, from 100% down to 13.5%.

Evaporator

- ✓ The units shall be equipped with a Direct Expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. The evaporator shall be single-pass on both the refrigerant and water sides for pure counter-flow heat exchange and low refrigerant pressure drops.
- ✓ The external shell shall be linked with an electrical heater to prevent freezing down to -28°C ambient temperature, controlled by a thermostat and shall be insulated with flexible, closed cell polyurethane insulation material (20-mm thick).

SPC_1-2-3-4_Rev.00_2

12 Specification text

12 - 1 Specification Text

✓ The evaporator will have 2 or 3 circuits, one for each compressor and shall be single refrigerant pass.
✓ The water connections shall be VICTAULIC type connections as standard to ensure quick mechanical disconnection between the unit and the hydronic network.
✓ Evaporator is manufactured in accordance to PED approval.

Condenser coil

✓ The condenser coils are constructed with internally finned seamless copper tubes and arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminium fins with full fin collars for higher efficiencies. The space between the fins is given by a collar that will increase the surface area in connection with the tubes, protecting them from ambient corrosion.
✓ The condenser coils will have an integral subcooler circuit that provides sufficient subcooling to effectively eliminate the possibility of liquid flashing and increase the unit's efficiency with 5% to 7% without increasing in energy consumption.
✓ The condenser coils shall be leak-tested and submitted to a pressure test with dry air.

Condenser fans

✓ The condenser fans used in conjunction with the condenser coils, shall be propeller type with glass reinforced resin blades for higher efficiencies and lower sound. Each fan shall be protected by a fan guard.
✓ The air discharge shall be vertical and each fan must be coupled to the electrical motor, supplied as standard to IP54 and capable to work to ambient temperatures of - 20°C to + 65°C.
✓ The condenser fans shall have as a standard a thermally protection by internal thermal motor protection and protected by circuit braker installed inside the electrical panel as a standard.

Refrigerant circuit

✓ The unit shall have two or three independent refrigerant circuits (depending on the size) and one variable electrical frequency driver per compressor (VFD).
✓ Each circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, compressor discharge shut-off valve, replaceable core filter-drier, sight glass with moisture indicator and insulated suction line.

Condensation control

✓ The units will be provided with an automatic control for condensing pressure which ensures the working at low external temperatures down to - ..... °C, to maintain condensing pressure.
✓ The compressor automatically unloads when abnormal high condensing pressure is detected. This to prevent the shutdown of the refrigerant circuit (shutdown of the unit) due to a high-pressure fault.

Low sound unit configurations (on request)

✓ The unit compressor shall be connected with unit's metal base frame by rubber antivibration supports to prevent the transmission of vibrations to all metal unit structure, in order to control the unit sound.
✓ The chiller shall be provided with an acoustical compressor enclosure. This enclosure shall be realized with a light, corrosion resisting aluminium structure and metal panels. The compressor sound-proof enclosure shall be internally fitted with flexible, multi-layer, high density materials.

Hydronic kit options (on request)

✓ The hydronic module shall be integrated in the chiller chassis without increasing its dimensions and includes the following elements: centrifugal water pump with three-phase motor equipped with internal over-temperature protection, safety relief valve and filling kit.
✓ The water piping shall be protected against corrosion and equipped with drain and purge plugs. The customer connections shall be victaulic connections. The piping shall be fully insulated to prevent condensation (pump insulation using polyurethane foam).
✓ A choice of two pump types shall be available:
  - o in-line single pump
  - o in-line twin pumps

SPC_1-2-3-4_Rev.00_3

12 Specification text

12 - 1 Specification Text

Control panel

- ✓ Field power connection, control interlock terminals and unit control system should be centrally located in an electric panel (IP 54). Power and starting controls should be separated from safety and operating controls in different compartments of the same panel.
- ✓ Starting will be inverter type.
- ✓ Operating and safety controls should include energy saving control, emergency stop switch, overload protection for compressor motor, high and low pressure cut-out switch (for each refrigerant circuit), anti-freeze thermostat, cut-out switch for each compressor.
- ✓ All of the information regarding the unit will be reported on a display, and with the internal built-in calendar and clock that will switch the unit ON/OFF during day time all year long.
- ✓ The following features and functions shall be included:
  - o leaving water temperature reset by controlling the water temperature Δt, by a remote 4-20mA DC signal or by controlling the external ambient temperature;
  - o soft load function to prevent the system from operating at full load during the chilled fluid pulldown period;
  - o password protection of critical parameters of control;
  - o start-to-start and stop-to-start timers to provide minimum compressor off-time with maximum motor protection;
  - o communication capability with a PC or remote monitoring;
  - o discharge pressure control through intelligent cycling of condenser fans;
  - o lead-lag selection manual or automatically by circuit run hours;
  - o double set point for brine unit version;
  - o scheduling via internal time clock to allow programming of a yearly start-stop schedule accommodating weekends and holidays.

Optional High Level Communications Interface

- ✓ The chiller is able to communicate to BMS (Building Management System) based on the most common protocols as:
  - o ModbusRTU
  - o LonWorks, now also based on the international 8040 Standard Chiller Profile and LonMark Technology
  - o BacNet BTP certifief over IP and MS/TP (class 4) (Native)
  - o Ethernet TCP/IP

SPC_1-2-3-4_Rev.00_4

Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.

Daikin Europe N.V. participates in the Eurovent Certification programme for Air Conditioners (AC), Liquid Chilling Packages (LCP) and Fan Coil Units (FC); the certified data of certified models are listed in the Eurovent Directory. Multi units are Eurovent certified for combinations up to 2 indoor units.

Daikin products are distributed by:

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