DAIKIN

Applied Systems

Technical Data

Air cooled chiller, high efficiency, reduced sound

EEDEN13-417

EWAD-C-XR

TABLE OF CONTENTS

EWAD-C-XR

1 Features

- High efficiency, reduced sound levels
- Stepless single-screw compressor
- Large operation range (ambient temperature down to -18ºC and up to 50ºC)
- All models are PED pressure vessel approved
- Optimised for use with R-134a
- 2-3 truly independent refrigerant circuits
- Standard electronic expansion valve
- DX shell and tube evaporator – one pass refrigerant side to minimize pressure drops
- Partial and total heat recovery option available
- MicroTech III controller

2 Specifications

2-1 Technical Specifications					EWAD740C-XR	EWAD810C-XR	EWAD870C-XR	EWAD970C-XR	EWADC10C-XR	EWADC11C-XR	EWADC12C-XR	EWADC13C-XR	EWADH14C-XR	EWADH15C-XR
Cooling capacity	Nom.			kW	732 (1)	808 (1)	862 (1)	970 (1)	1,036 (1)	1,164 (1)	1,243 (1)	1,297 (1)	1,361 (1)	1,461 (1)
Capacity control	Method				Stepless									
	Minimum capacity			%	13									
Power input	Cooling	Nom.		kW	238 (1)	257 (1)	285 (1)	313 (1)	348 (1)	369 (1)	409 (1)	420 (1)	461 (1)	498 (1)
EER					3.07 (1)	3.15 (1)	3.03 (1)	3.10 (1)	2.98 (1)	3.16 (1)	3.04 (1)	3.09 (1)	2.95 (1)	2.93 (1)
ESEER					4.00	4.14	4.01	4.12	4.01	4.21	4.07	4.10		4.12
IPLV					4.55	4.62	4.51	4.63	4.54	4.65	4.54	4.58	4.68	4.77
Casing	Colour				Ivory white									
	Material				Galvanized and painted steel sheet									
Dimensions	Unit	Height		mm	2,540									
		Width		mm	2,285									
		Depth		mm	6,185	7,085		7,985		9,785				
Weight	Unit			kg	6,280	6,630	6,650	7,480	7,760	8,510	8,530	9,190		
	Operation weight			kg	6,520	6,870	6,890	7,880	8,160	8,900	8,920	10,180		
Water heat exchanger	Type				Single pass shell & tube									
	Water volume			l	251	243		403		386		979		
	Nominal water flow	Cooling		l/s	35.1	38.7	41.3	46.5	49.7	55.7	59.5	62.1	65.2	70.0
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	77	54	61	58	65	43	49	64	73	79
	Insulation material				Closed cell									
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler									
Fan	Quantity				12	14		16		20				
	Type				Direct propeller									
	Diameter			mm	800									
	Air flow rate	Nom.		l/s	49,209	57,410		65,611		82,014				
	Speed			rpm	700									
Fan motor	Drive				Direct on line									
	Input	Cooling		W	9,400	11,000		12,500		15,700				
Sound power level	Cooling	Nom.		dBA	92			94		95				
Sound pressure level	Cooling	Nom.		dBA	72				73	72		73		
Compressor	Type				asymmetric single screw compressor									
	Quantity				2									
	Oil	Charged volume		l	38			44	50					
Operation range	Water side	Cooling	Min.	ºCDB	-8									
			Max.	ºCDB	15									
	Air side	Cooling	Min.	ºCDB	-18									
			Max.	ºCDB	52									
Refrigerant	Type				R-134a									
	Circuits	Quantity			2									
Refrigerant circuit	Charge			kg	146	162		182		214		225	248	
Piping connections	Evaporator water inlet/outlet (OD)				168.3mm			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									Emergency stop button
		11			Water freeze protection controller									

2 Specifications

2-2 Technical Specifications					EWADC1 4C-XR	EWADC1 5C-XR	EWADC1 6C-XR	EWADC1 7C-XR	EWADC1 8C-XR	EWADC1 9C-XR	EWADC2 0C-XR	EWADC2 1C-XR	EWADC2 2C-XR
Cooling capacity	Nom.			kW	1,378 (1)	1,486 (1)	1,544 (1)	1,632 (1)	1,715 (1)	1,805 (1)	1,849 (1)	1,897 (1)	1,947 (1)
Capacity control	Method				Stepless								
	Minimum capacity			%	7								
Power input	Cooling	Nom.		kW	438 (1)	479 (1)	518 (1)	548 (1)	574 (1)	604 (1)	629 (1)	663 (1)	695 (1)
EER					3.15 (1)	3.1 (1)	2.98 (1)		2.99 (1)		2.94 (1)	2.86 (1)	2.80 (1)
ESEER					4.34	4.26	4.06	3.99	4.00	3.97	4.05	3.96	3.93
IPLV					4.72	4.65	4.60	4.59		4.57	4.58	4.51	4.49
Casing	Colour				Ivory white								
	Material				Galvanized and painted steel sheet								
Dimensions	Unit	Height		mm	2,540								
		Width		mm	2,285								
		Depth		mm	11,985			12,885	13,785	14,685			
Weight	Unit			kg	11,000	11,760	12,010	12,350	12,700	13,040			
	Operation weight			kg	11,490	12,610	12,870	13,200	13,580	13,910			
Water heat exchanger	Type				Single pass shell & tube								
	Water volume			l	491	850			871	850			
	Nominal water flow	Cooling		l/s	65.85	70.98	74.0	78.2	82.2	86.5	88.5	90.7	93.1
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	74	54	59	65		71	37	39	41
	Insulation material				Closed cell								
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler								
Fan	Quantity				24			26	28	30			
	Type				Direct propeller								
	Diameter			mm	800								
	Air flow rate	Nom.		l/s	98,414		98,417	106,619	114,820	123,021			
	Speed			rpm	715		700						
Fan motor	Drive				DOL		Direct on line						
	Input	Cooling		W	780		18,800	20,400	22,000	23,500			
Sound power level	Cooling	Nom.		dBA	95.1	95.2	95	96				97	
Sound pressure level	Cooling	Nom.		dBA	72.6	72.8	73					74	
Compressor	Type				Semi-hermetic single screw compressor		asymmetric single screw compressor						
	Quantity				3								
	Oil	Charged volume		l	63	69	75						
Operation range	Water side	Cooling	Min.	ºCDB	-8								
			Max.	ºCDB	15								
	Air side	Cooling	Min.	ºCDB	-18								
			Max.	ºCDB	50		52						
Refrigerant	Type				R-134a								
	Circuits	Quantity			3								
Refrigerant circuit	Charge			kg	-		297	312	328	343			
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						Emergency stop button		
		11			Water freeze protection controller								

2 Specifications

2-3 Electrical Specifications				EWAD740C-XR	EWAD810C-XR	EWAD870C-XR	EWAD970C-XR	EWADC10C-XR	EWADC11C-XR	EWADC12C-XR	EWADC13C-XR	EWADH14C-XR	EWADH15C-XR
Compressor	Phase			3~									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
	Maximum running current		A	231		274		333		398			451
	Starting method			Wye-delta									
Compressor 2	Maximum running current		A	231	274		333		398			451	
Power supply	Phase			3~									
	Frequency		Hz	50									
	Voltage		V	400									
	Voltage range	Min.	%	-10									
		Max.	%	10									
Unit	Maximum starting current		A	610	647		911	959	1,015			1,058	1,071
	Nominal running current (RLA)	Cooling	A	392	426	470	518	572	613	679	699	753	807
	Maximum running current		A	493	542	585	649	708	783	847		901	954
	Max unit current for wires sizing		A	540	592	640	710	775	856	927		985	1,044
Fans	Nominal running current (RLA)		A	31	36		42		52				

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

(9) Cooling: entering evaporator water temp. 12ºC; leaving evaporator water temp. 7ºC; ambient air temp. 35ºC. Compressor + fans current.

2 Specifications

2-4 Electrical Specifications				EWADC1 4C-XR	EWADC1 5C-XR	EWADC1 6C-XR	EWADC1 7C-XR	EWADC1 8C-XR	EWADC1 9C-XR	EWADC2 0C-XR	EWADC2 1C-XR	EWADC2 2C-XR
Compressor	Phase			3~								
	Voltage		V	400								
	Voltage range	Min.	%	-10								
		Max.	%	10								
	Maximum running current		A	269	326	333		398			451	
	Starting method			Wye-delta								
Compressor 2	Maximum running current		A	269	326	333		398			451	
Power supply	Phase			3~								
	Frequency		Hz	50								
	Voltage		V	400								
	Voltage range	Min.	%	-10								
		Max.	%	10								
Unit	Maximum starting current		A	1,133.8	1,179.4	1,246	1,303	1,359		1,402	1,444	1,458
	Nominal running current (RLA)	Cooling	A	734 (5)	799 (5)	854	903	951	1,000	1,040	1,087	1,136
	Maximum running current		A	926	983	1,063	1,132	1,201	1,271	1,324	1,377	1,431
	Max unit current for wires sizing		A	1,019	1,082	1,163	1,238	1,314	1,390	1,449	1,507	1,566
Fans	Nominal running current (RLA)		A	62			68	73	78			

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

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3 Features and advantages

3 - 1 Features and Advantages

Low operating cost

This unit is the result of careful design, aimed to optimizing the energy efficiency of the chillers, with the objective of bringing down operating costs and improving installation profitability, effectiveness and economical management.
A very high efficiency single rotor screw compressor design are used in this application, together with large condenser coil surface area for maximum heat transfer and low discharge pressure, advanced technology condenser fans, a single-pass pure counter-flow shell&tube direct-expansion evaporator with low refrigerant pressure drops.

Low operating sound levels

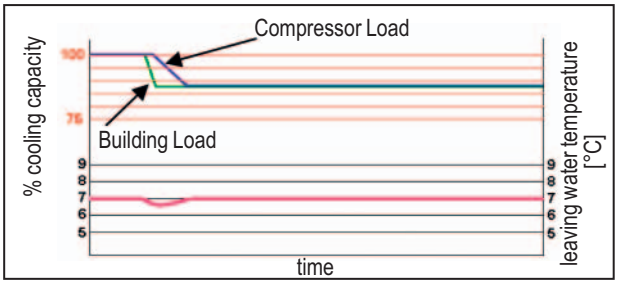
Very low noise levels both at full load and part load conditions are achieved by the latest compressor design that use a single main rotor with two adjacent rotating composite gaterotors making gas flow velocities and subsequent noise levels among the lowest available. By a unique new fan that moves large volume of air at exceptionally low sound levels and by the virtually vibration-free operation.

Outstanding reliability

The chillers have two or three truly independent refrigerant circuits depending on the size, in order to assure maximum safety for any maintenance, whether planned or not. They are equipped with a rugged compressor design with advanced composite compressor gaterotors material, a proactive control logic and are full factory-run-tested to optimized trouble-free operation.

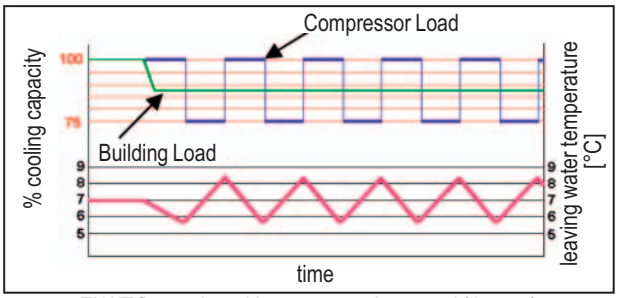
Infinite capacity control

Cooling capacity control is infinitely variable by means of a single screw asymmetric compressor controlled by microprocessor system. Each unit has infinitely variable capacity control from 100% down to 12.5% (two compressor unit), down to 7% (three compressors units). 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 stepless capacity control

With a compressor load step control in fact, 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. The ability to follow the system energy demand at any time and the possibility to provide steady outlet water temperature without deviations from the set-point, are the two points that allow you to understand how the optimum operating conditions of a system can be met only through the use of a unit with step-less regulation.

Superior control logic

The new MicroTech III controller provides an easy to use control environmental. 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.

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3 Features and advantages

3 - 1 Features and Advantages

Code requirements – Safety and observant of laws/directives
Units are 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 Stds	UNI – EN ISO 9001:2004

Certifications
Units 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.).

Versions
Three different Efficiency Versions available:

S: Standard Efficiency
15 sizes to cover a range from 647 up to 1922 kW with an EER up to 2.99 and an ESEER up to 4.08 (data referred to Standard Noise)

X: High Efficiency
17 sizes to cover a range from 756 up to 2008 kW with an EER up to 3.29 and an ESEER up to 4.33 (data referred to Standard Noise)

P: Premium Efficiency
9 sizes to cover a range from 821 up to 1562 kW with an EER up to 3.64 and an ESEER up to 4.53 (data referred to Standard Noise)

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.

$$ESEER = A \times EER_{100\%} + B \times EER_{75\%} + C \times EER_{50\%} + D \times EER_{25\%}$$

	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 Configuration
Standard, low and reduced sound configurations available as follows:

SS: Standard Noise
Condenser fan rotating at 900 rpm, rubber antivibration under compressor

SL: Low Noise
Condenser fan rotating at 900 rpm, rubber antivibration under compressor, compressor sound enclosure.

SR: Reduced Noise
Condenser fan rotating at 700 rpm, rubber antivibration under compressor, compressor sound enclosure.

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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.

Compressor (Asymmetric Single Screw) The compressor is semi-hermetic, single-screw type with gate-rotor made with the latest high-strength fibre reinforced star material. The compressor has an asymmetric slide regulation managed by the unit controller for infinitely modulating capacity from 100% to 25%. An integrated high efficiency oil separator maximizes the oil separation and standard start is Wye-Delta (Y-Δ) type.

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 (Shell&Tube) The unit is equipped with a direct expansion shell&tube evaporator with refrigerant evaporating inside the tubes and water flowing outside. The tubes are enhanced for maximum heat transfer and rolled into steel tube sheet and sealed.
The evaporators are single-pass on both the refrigerant and water sides 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 water side is designed for 10 bar of maximum operating pressure and is provided with vents and drain.
The external shell is covered with a 20mm closed cell insulation material and the evaporator water connections are provided with victaulic kit (as standard). Each evaporator has 2 or 3 circuits, one for each compressor and is manufactured in accordance to 97/23/EC directive (PED).

Condenser The condenser is manufactured with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into lanced and rippled aluminum 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.

Heat Recovery Exchanger The unit is equipped with a plate to plate type heat exchanger for each circuit made of stainless steel brazed plates and manufactured in accordance to PED approval.

Condenser fans (ø 800) 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 one includes:
- Compressor with integrated oil separator
- Refrigerant
- Evaporator
- Air Cooled Condenser
- Electronic expansion valve
- Discharge line shut off valve
- Liquid line shut off valve
- Sight glass with moisture indicator
- Filter drier
- Charging valves
- High pressure switch
- High pressure transducers
- Low pressure transducers
- Oil pressure transducer

GNC_1a-2a-3a-4a_Rev.01_1a

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 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 compressors and fans protection devices, compressors and fans starters and control circuit power supply.

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 Pressure / Temperature conversions.

Control section - main features
• Management of the compressor stepless capacity 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.

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

GNC_1a-2a-3a-4a_Rev.01_2a

4 General Characteristics

4 - 1 General characteristics

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 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 Options (supplied on basic unit)

Wye-Delta compressor starter (Y-D) - For low inrush current and reduced starting torque
Double setpoint - Dual leaving water temperature setpoints.
Phase monitor - The phase monitor controls that phases sequence is correct and controls phase loss.
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 valve - Installed on the discharge port of the compressor to facilitate maintenance operation.
Ambient outside temperature sensor and setpoint reset
Hour run meter
General fault contactor
Setpoint reset, Demand limit and Alarm from external device - (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.
Fans circuit breakers - Safety device against motor overloading and short circuit
Main switch interlock door
Emergency stop

Options (on request)

MECHANICAL
Total heat recovery - Produced with plate to plate or Shell&Tube 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).
Evaporator flange kit
Condenser coil guards
Evaporator area guards
Cu-Cu condenser coil - To give better protection against corrosion by aggressive environments.
Cu-Cu-Sn condenser coil - To give better protection against corrosion in aggressive environments and by salty air.
Alucoat fins coil - Fins are protected by a special acrylic paint with a high resistance to corrosion.
Suction line shut-off valve - Installed on the suction port of the compressor to facilitate maintenance operation.
High pressure side manometers
Low pressure side manometers
One centrifugal pump (low lift) - 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.

GNC_1a-2a-3a-4a_Rev.01_3a

4 General Characteristics

4 - 1 General characteristics

One centrifugal pump (high lift) 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.
Two centrifugal pump (low lift) - 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.
Two centrifugal pump (high lift) 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
Evaporator right water connections

ELECTRICAL / CONTROL
Soft starter - Electronic starting device to reduce the mechanical stress during compressor start-up
Compressor thermal overload relays - Safety devices against compressor motor overloading. This device together with internal motor protection (standard) guarantee the best safety system for compressor motor.
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.
Energy meter - Device installed inside the control box showing ampere and volt values
Capacitors for power factor correction - To increase the operating power factor of the unit at nominal operating conditions. The capacitors are “dry” self-regenerating type with over pressure disconnecting safety device insulated with a no toxic dielectric mix with no PCB or PCT.
Current limit - To limit maximum absorbed current of the unit whenever is required
Speedtrol (fan speed control device - ON/OFF - up to -18°C) - Continuous fan speed modulation on the first fan of each circuit. It allows the unit working with air temperature down to –18°C.
Evaporator flow switch - Supplied separately to be wired and installed on the evaporator water piping (by the customer).
Compressors circuit breakers
Fans speed regulation (+ 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.
Ground fault relay - 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).

INSTALLATION
Rubber anti vibration 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 anti vibration 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.

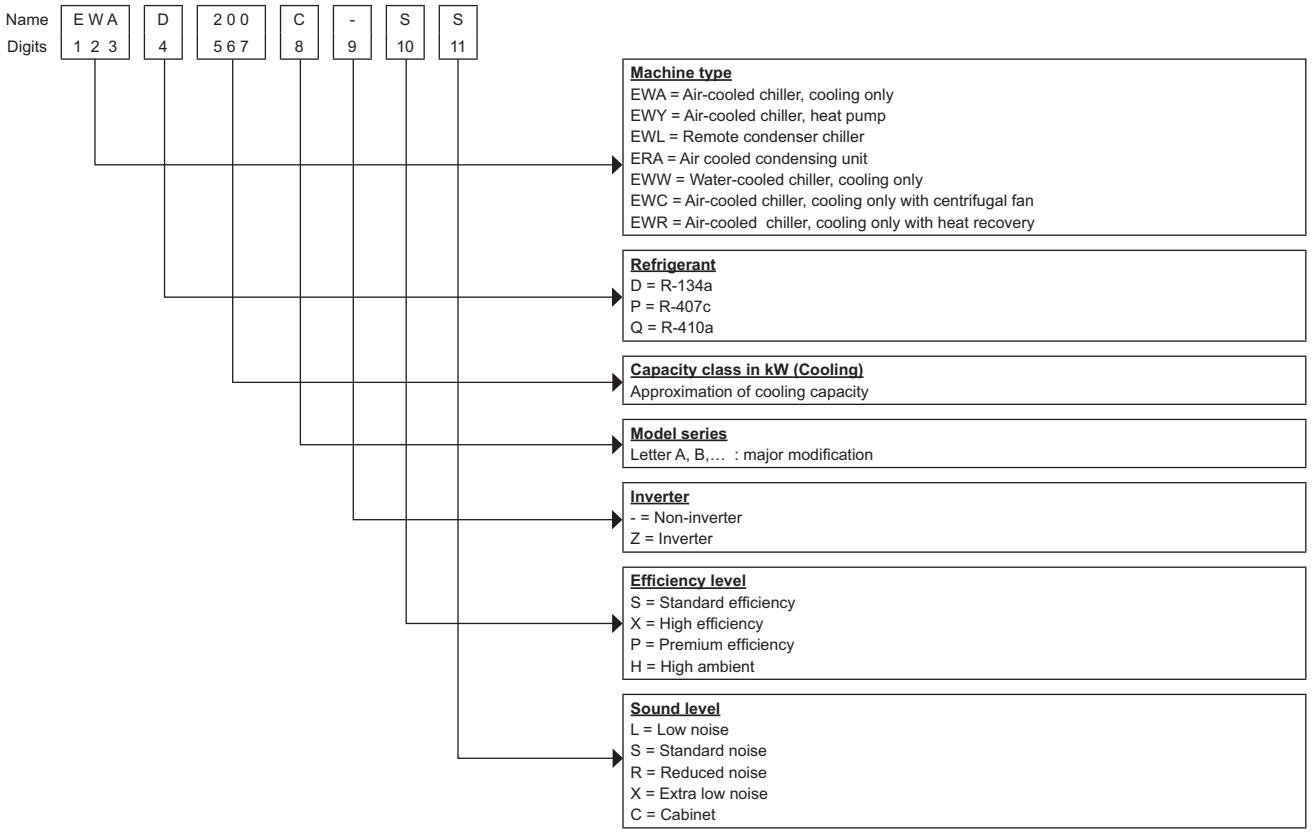
OTHER
Container Kit
Witness test
Acoustic test
Refrigerant recovery unit - This option allows to stock refrigerant charge of 1 circuit for maintenance operation. Liquid receiver includes in/out shut-off valve and relief valve.
Transport kit

GNC_1a-2a-3a-4a_Rev.01_4a

5 Nomenclature

5 - 1 Nomenclature

Nomenclature



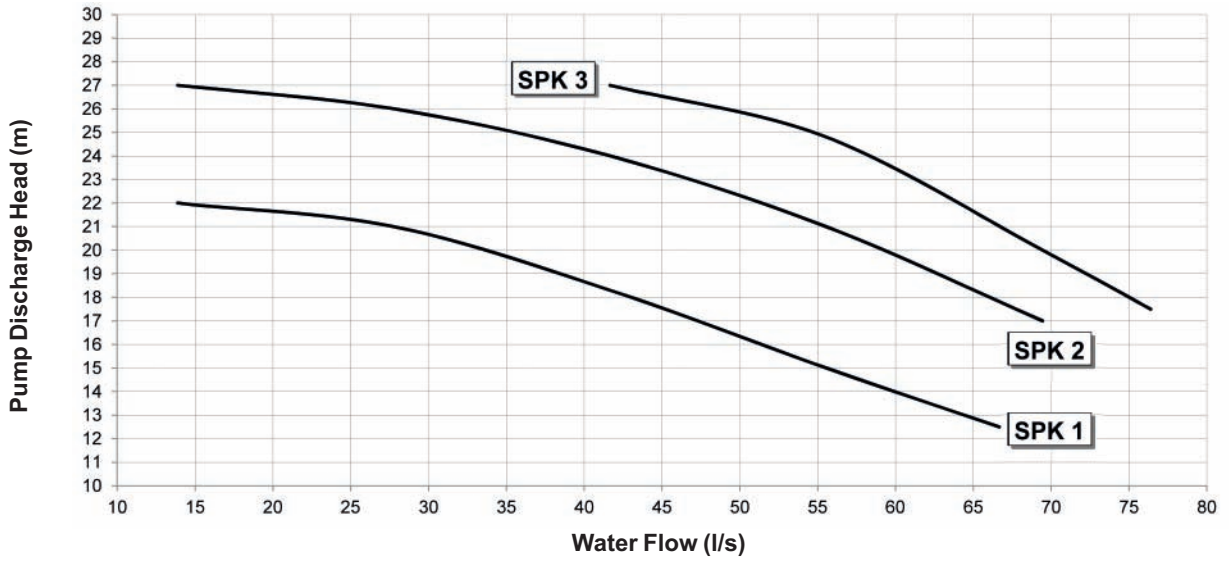
NMC_1-2_Rev.00

6 Options

6 - 1 Water Pump Kit - Technical Information

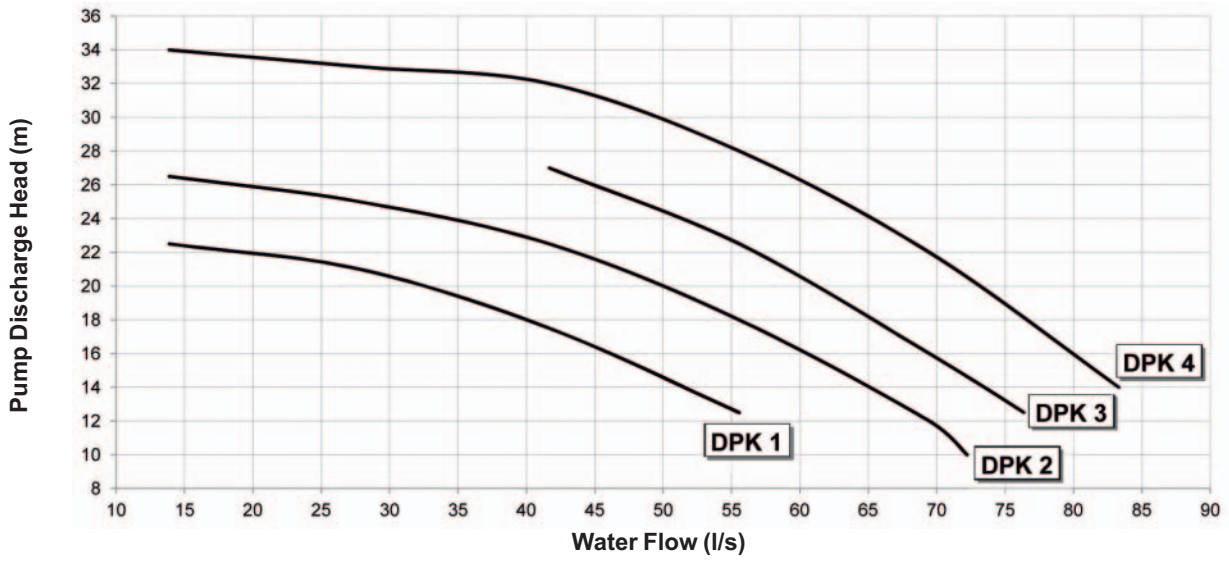
Water Pump Kit - Discharge Head

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

Twin Pump (2 poles) - Discharge Head



NOTES

- 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

WPKTI_1a-2a-3a_Rev.03_1a

6 Options

6 - 1 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 specificiation can change

WPKTI_1a-2a-3a_Rev.03_3a

6 Options

6 - 2 Water Pump Kit - Combination Matrix

				Single Pump			Double Pump			
Version	**Size**	**Version**	**Size**	**SPK 1**	**SPK 2**	**SPK 3**	**DPK 1**	**DPK 2**	**DPK 3**	**DPK 4**
EWAD~C-SS EWAD~C-SL	650	EWAD~C-SR	620	X	X		X	X		
	740		720	X	X		X	X		
	830		790	X	X		X	X		
	910		880	X	X		X	X		
	970		920	X	X	X	X	X		
	C11		C10	X	X	X	X	X		
	C12		C11	X	X	X	X	X	X	X
	C13		C12		X	X			X	X
	H14		H14			X				X
EWAD~C-XS EWAD~C-XL	760	EWAD~C-XR	740	X	X		X	X		
	830		810	X	X		X	X		
	890		870	X	X		X	X		
	990		970	X	X	X	X	X	X	X
	C10		C10	X	X	X	X	X	X	X
	C11		C11	X	X	X		X	X	X
	C12		C12	X	X	X		X	X	X
	C13		C13	X	X	X		X	X	X
	H14		H14			X				X
	H15		H15			X				X
EWAD~C-PS EWAD~C-PL	820	EWAD~C-PR	810	X	X		X	X		
	890		880	X	X		X	X		
	980		960	X	X	X	X	X		
	C11		C10	X	X	X	X	X	X	X
	C12		C11	X	X	X		X	X	X
	C13		C13	X	X	X		X	X	X
	C14		C14		X	X		X	X	X
	C15		C15			X				X
	C16		C16							

WPKCM_1a-2a-3a_Rev.03_2a

7 Capacity tables

7 - 1 Cooling Capacity Tables

EWAD740-H14C-XR

Ta: Condenser inlet air temperature; Twout: Evaporator leaving water temperature (Δt 5°C);
CC: Cooling capacity; PI: Power input; qw: Fluid flow rate; dpw: Fluid pressure drop

	Condenser inlet air temperature	Twout																							
		5				7				9				11				13				15			
		CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw
Size	Ta	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa
740	30	718	212	34.4	74	758	220	36.4	82	799	228	38.4	90	840	235	40.4	99	881	244	42.5	108	923	252	44.5	118
	35	693	230	33.2	70	732	238	35.1	77	772	247	37.1	85	811	255	39	93	851	264	41	102	891	272	42.9	110
	40	661	250	31.7	64	698	258	33.5	71	736	267	35.3	78	774	276	37.2	85	812	285	39.1	93	850	295	41	102
	46	610	276	29.2	55	645	285	30.9	61	653	281	31.3	63	659	273	31.6	64	667	267	32.1	65	673	260	32.4	66
	48	566	273	27.1	48	573	266	27.4	49	577	258	27.7	50	584	250	28	51	580	256	27.9	51	587	248	28.2	52
	50	489	247	23.4	37	495	240	23.7	38	493	248	23.6	38	500	240	24	39	505	231	24.2	39	512	223	24.6	41
810	30	790	229	37.8	52	836	237	40	58	881	244	42.3	64	925	252	44.4	70	971	260	46.7	76	1015	268	48.9	83
	35	764	248	36.6	49	808	257	38.7	54	852	265	40.9	60	896	274	43	66	940	282	45.2	72	984	291	47.3	78
	40	731	270	35	45	773	278	37	50	815	288	39.1	55	858	297	41.2	61	900	306	43.3	66	942	316	45.3	72
	46	679	298	32.4	40	715	307	34.2	44	736	306	35.3	46	761	308	36.5	49	783	306	37.6	52	792	301	38.1	53
	48	637	297	30.4	35	661	298	31.6	38	679	296	32.5	40	690	291	33.1	41	687	289	33	41	697	282	33.5	42
	50	578	285	27.6	30	577	285	27.6	30	587	278	28.1	31	595	270	28.5	31	603	262	28.9	32	605	260	29	32
870	30	846	254	40.5	59	894	263	42.8	65	942	272	45.2	72	985	280	47.3	78	1029	289	49.5	85	1073	297	51.7	91
	35	817	275	39.1	55	862	285	41.3	61	909	295	43.6	67	954	304	45.8	74	996	314	47.9	80	1038	323	50	86
	40	779	299	37.3	51	822	309	39.4	56	866	320	41.5	62	911	330	43.7	68	954	341	45.9	74	994	351	47.8	80
	46	719	331	34.4	44	754	340	36.1	48	758	331	36.4	49	770	325	37	50	774	313	37.1	50	787	308	37.8	52
	48	654	320	31.3	37	666	314	31.9	38	671	303	32.1	39	684	297	32.8	40	673	301	32.3	39	686	295	33	41
	50	569	291	27.2	29	563	299	26.9	28	574	292	27.5	29	582	283	27.9	30	592	275	28.4	31	600	265	28.8	32
970	30	951	279	45.5	56	1006	289	48.2	62	1063	299	51	69	1119	310	53.8	75	1177	321	56.6	83	1235	332	59.5	90
	35	917	303	43.9	52	970	313	46.5	58	1024	324	49.1	64	1079	335	51.8	71	1134	347	54.5	77	1190	359	57.3	84
	40	874	328	41.8	48	924	339	44.3	53	975	351	46.8	59	1028	363	49.3	65	1080	376	51.9	71	1133	388	54.5	77
	46	804	362	38.4	41	829	361	39.7	44	856	361	41	46	885	362	42.5	49	891	352	42.8	50	894	352	43	50
	48	741	352	35.4	36	764	350	36.5	38	777	343	37.2	39	774	342	37.1	39	784	332	37.6	40	794	323	38.1	41
	50	649	339	31	28	657	329	31.4	29	667	320	31.9	30	674	309	32.3	30	675	306	32.4	30	688	298	33	31
C10	30	1019	310	48.8	63	1078	321	51.7	70	1137	333	54.6	77	1195	345	57.4	85	1254	357	60.3	93	1313	370	63.2	101
	35	981	336	46.9	59	1036	348	49.7	65	1093	361	52.4	72	1149	374	55.2	79	1205	387	58	86	1262	400	60.8	94
	40	932	365	44.6	54	984	378	47.1	60	1037	391	49.7	66	1091	405	52.4	72	1145	419	55	79	1198	433	57.7	85
	46	848	401	40.6	45	855	390	40.9	46	863	379	41.4	47	875	370	42	48	883	359	42.4	49	877	366	42.1	49
	48	747	370	35.7	36	753	358	36	37	770	351	36.9	38	758	357	36.3	37	768	346	36.8	38	781	336	37.5	39
	50	632	356	30.2	27	642	345	30.7	28	652	335	31.2	28	659	322	31.6	29	669	311	32.1	30	683	303	32.8	31
C11	30	1140	328	54.5	42	1204	339	57.6	46	1271	351	60.9	51	1337	362	64.2	56	1405	374	67.5	61	1474	387	70.9	67
	35	1102	357	52.7	39	1164	369	55.7	43	1228	381	58.8	48	1293	393	62	52	1358	406	65.2	57	1424	419	68.5	63
	40	1053	388	50.3	36	1113	400	53.3	40	1174	413	56.2	44	1236	426	59.3	48	1298	440	62.3	53	1361	454	65.4	58
	46	976	429	46.6	31	1025	439	49	34	1055	438	50.5	36	1092	440	52.3	39	1123	439	53.9	41	1133	427	54.4	41
	48	914	427	43.7	28	946	426	45.2	30	973	424	46.6	31	984	413	47.1	32	984	413	47.2	32	994	400	47.7	33
	50	824	407	39.4	23	825	408	39.5	23	834	395	39.9	24	849	386	40.6	25	860	374	41.2	25	859	369	41.2	25
C12	30	1220	364	58.4	47	1288	377	61.7	52	1357	389	65	57	1425	402	68.4	63	1495	416	71.9	68	1567	430	75.4	74
	35	1178	396	56.3	44	1243	409	59.5	49	1309	423	62.7	54	1375	437	66	59	1442	451	69.3	64	1510	466	72.6	70
	40	1123	430	53.7	40	1185	444	56.7	45	1247	459	59.8	49	1311	474	62.9	54	1374	490	66	59	1438	505	69.1	64
	46	1034	476	49.4	35	1078	485	51.6	38	1084	471	51.9	38	1100	462	52.8	39	1114	450	53.4	40	1123	436	53.9	41
	48	939	459	44.8	29	950	446	45.4	30	964	435	46.1	31	974	422	46.7	31	967	432	46.4	31	978	418	46.9	32
	50	814	417	38.9	23	805	429	38.5	22	814	414	39	23	833	405	39.9	24	840	389	40.3	24	851	375	40.8	25
C13	30	1273	374	60.9	62	1349	388	64.7	69	1426	403	68.4	76	1504	418	72.3	84	1584	434	76.2	92	1665	451	80.2	101
	35	1225	405	58.6	57	1297	420	62.1	64	1370	436	65.7	71	1444	452	69.4	78	1519	469	73.1	85	1596	486	76.9	94
	40	1162	439	55.6	52	1230	455	58.9	58	1299	471	62.3	64	1369	488	65.7	71	1439	506	69.2	77	1511	524	72.7	85
	46	1065	484	50.9	45	1081	477	51.7	46	1092	464	52.3	47	1098	449	52.7	47	1109	436	53.2	48	1105	446	53.1	48
	48	942	451	45	36	950	437	45.5	36	963	425	46.1	37	958	437	45.9	37	972	424	46.6	38	980	408	47	39
	50	818	411	39.1	28	807	421	38.6	27	821	410	39.3	28	831	395	39.8	29	845	382	40.5	30	854	368	41	30
H14	30	1342	409	64.3	71	1418	424	68	78	1496	440	71.8	87	1573	456	75.6	95	1651	473	79.5	104	1729	491	83.3	113
	35	1289	444	61.7	66	1361	461	65.2	73	1434	477	68.8	80	1508	495	72.5	88	1582	513	76.1	96	1657	532	79.8	105
	40	1220	483	58.4	60	1288	500	61.7	66	1356	518	65.1	72	1421	534	68.3	79	1463	536	70.3	83	1508	540	72.6	88
	46	1060	500	50.7	46	1073	487	51.4	47	1085	473	52	48	1090	472	52.3	49	1102	458	52.9	50	1105	454	53.1	50
	48	933	459	44.6	37	938	459	44.9	37	952	446	45.6	38	953	442	45.7	38	967	428	46.4	39	980	414	47.1	40
	50	801	429	38.3	28	803	427	38.4	28	819	415	39.2	29	829	399	39.7	30	844	387	40.5	31	859	375	41.2	32

NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
Fluid: Wasser
Υγρό: Νερό
Líquido: agua
Liquide: Eau
Fluido: Acqua
Vloeistof: Water
Жидкость: Вода

2 For working conditions where dpw values are in italic, please contact factory.
Für Arbeitsbedingungen mit kursiv gedruckten dpw-Werten, wenden Sie sich bitte an den Hersteller.
Για τις συνθήκες εργασίας όπου οι τιμές dpw είναι σε πλάγια γραφή, παρακαλούμε επικοινωνήστε με το εργοστάσιο.
Para las condiciones de funcionamiento en las que los valores dpw están en cursiva, póngase en contacto con la fábrica.
Pour les conditions de travail lorsque les valeurs dpw sont en italique, veuillez contacter l'usine.
Per le condizioni d'esercizio in cui i valori dpw sono riportati in corsivo, contattare il produttore.
Voor bedrijfsomstandigheden met schuingedrukte dpw-waarden, gelieve contact op te nemen met de fabriek.
Если условия работы соответствуют значениям dpw, указанным курсивом, обратитесь на завод-изготовитель.

SRC_1-2-3-4-5-6-7-8-9_Rev.02_6_(1-2)

7 Capacity tables

7 - 1 Cooling Capacity Tables

EWADH15-C22C-XR

Ta: Condenser inlet air temperature; Twout: Evaporator leaving water temperature (Δt 5°C);
CC: Cooling capacity; PI: Power input; qw: Fluid flow rate; dpw: Fluid pressure drop

	Condenser inlet air temperature	Twout																							
		5				7				9				11				13				15			
		CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw	CC	PI	qw	dpw
Size	Ta	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa	kW	kW	l/s	kPa
H15	30	1446	441	69.2	77	1526	458	73.2	85	1608	476	77.3	94	1688	493	81.2	103	1769	511	85.2	112	1850	530	89.2	121
	35	1385	481	66.3	71	1461	498	70	79	1538	517	73.8	86	1616	536	77.7	95	1692	555	81.4	103	1768	575	85.2	112
	40	1307	524	62.6	64	1377	542	66	71	1449	562	69.5	78	1512	578	72.7	84	1526	564	73.4	85	1546	553	74.4	88
	46	1078	511	51.5	45	1096	498	52.5	47	1110	482	53.2	48	1104	492	53	48	1120	477	53.7	49	1129	458	54.3	50
	48	949	467	45.3	36	943	477	45.1	36	960	464	46	37	973	447	46.6	38	989	433	47.4	39	1000	416	48	40
	50	805	448	38.5	27	819	433	39.2	28	836	420	40	29	849	404	40.7	30	866	393	41.5	31	880	379	42.2	32
C16	30	1519	461	72.7	57	1602	476	76.7	63	1684	493	80.8	69	1768	509	84.9	76	1854	527	89.1	82	1941	545	93.4	90
	35	1464	500	70	53	1544	518	74	59	1623	535	77.9	65	1703	553	81.8	71	1785	571	85.8	77	1867	591	89.8	84
	40	1393	544	66.6	49	1468	562	70.3	54	1545	581	74.1	59	1621	600	77.8	65	1697	620	81.6	70	1775	640	85.4	76
	46	1272	600	60.8	41	1281	583	61.3	42	1303	572	62.4	43	1310	553	62.8	44	1334	543	64	45	1323	553	63.5	45
	48	1120	553	53.5	33	1139	540	54.5	34	1154	525	55.3	35	1137	534	54.5	34	1152	517	55.2	35	1171	502	56.2	36
	50	946	532	45.2	24	960	516	45.9	25	977	500	46.7	26	997	487	47.7	27	1012	471	48.5	28	1023	452	49.1	28
C17	30	1605	488	76.8	63	1691	504	81	69	1778	521	85.3	76	1866	538	89.7	83	1956	557	94.1	91	2048	575	98.6	99
	35	1549	530	74.1	59	1632	548	78.2	65	1716	566	82.3	71	1800	584	86.4	78	1886	604	90.7	85	1972	624	95	92
	40	1477	576	70.6	54	1555	595	74.5	60	1635	615	78.4	66	1715	635	82.4	72	1796	655	86.3	78	1878	676	90.4	85
	46	1355	637	64.8	47	1389	633	66.5	49	1410	622	67.6	50	1420	603	68.1	51	1443	591	69.3	52	1440	591	69.2	52
	48	1213	600	58	38	1231	585	58.9	39	1248	570	59.8	40	1242	569	59.5	40	1247	562	59.8	40	1266	546	60.8	41
	50	1039	566	49.6	29	1043	561	49.9	29	1059	543	50.7	30	1078	528	51.6	31	1095	511	52.5	32	1108	492	53.1	33
C18	30	1684	511	80.6	63	1776	528	85.1	69	1869	546	89.7	76	1964	564	94.3	83	2061	583	99.1	91	2159	603	104	99
	35	1627	555	77.8	59	1715	574	82.2	65	1804	592	86.5	71	1895	612	91	78	1987	632	95.5	85	2081	653	100.2	93
	40	1552	604	74.3	54	1636	624	78.4	60	1721	644	82.5	65	1807	665	86.7	72	1894	686	91	78	1982	708	95.4	85
	46	1433	670	68.5	47	1491	680	71.4	50	1509	667	72.3	52	1525	650	73.2	53	1544	634	74.1	54	1550	624	74.5	54
	48	1306	647	62.4	40	1321	629	63.2	41	1341	614	64.2	42	1350	606	64.7	42	1344	609	64.5	42	1362	591	65.4	43
	50	1133	588	54.1	31	1122	605	53.7	30	1138	587	54.5	31	1155	567	55.3	32	1175	551	56.4	33	1194	534	57.3	34
C19	30	1771	539	84.8	69	1867	556	89.5	76	1965	575	94.3	83	2064	594	99.2	91	2166	614	104.2	99	2270	634	109.3	108
	35	1713	586	82	65	1805	604	86.5	71	1899	624	91.1	78	1994	644	95.8	85	2091	666	100.6	93	2189	688	105.4	102
	40	1638	637	78.3	60	1725	657	82.6	66	1813	678	87	72	1903	700	91.4	79	1995	722	95.9	86	2088	745	100.5	93
	46	1516	707	72.5	52	1597	729	76.5	57	1617	717	77.5	58	1632	699	78.3	60	1653	683	79.4	61	1669	663	80.2	62
	48	1399	695	66.9	45	1417	677	67.8	46	1439	662	69	47	1457	643	69.9	48	1441	656	69.1	48	1458	635	70	49
	50	1213	630	57.9	35	1204	650	57.6	34	1220	630	58.4	35	1238	610	59.3	36	1261	594	60.5	37	1279	574	61.4	38
C20	30	1820	559	86.9	36	1911	576	91.4	39	2005	593	96	43	2099	611	100.7	47	2196	630	105.4	51	2294	649	110.2	55
	35	1761	611	84.1	34	1849	629	88.5	37	1939	648	92.8	41	2030	667	97.3	44	2122	687	101.8	48	2215	708	106.4	52
	40	1683	668	80.4	31	1768	688	84.6	34	1853	708	88.7	37	1940	729	93	41	2027	750	97.2	44	2116	772	101.6	48
	46	1532	731	73.2	26	1596	740	76.3	29	1622	727	77.6	29	1639	707	78.5	30	1653	703	79.3	31	1672	683	80.2	31
	48	1403	705	67	23	1422	686	68	23	1427	676	68.3	23	1447	657	69.3	24	1452	664	69.6	24	1471	643	70.6	25
	50	1211	653	57.8	17	1228	632	58.7	18	1224	635	58.5	18	1240	612	59.4	18	1265	596	60.6	19	1285	577	61.6	19
C21	30	1870	589	89.3	38	1963	606	93.9	41	2058	625	98.6	45	2154	643	103.3	49	2252	663	108.1	53	2351	683	113	58
	35	1808	644	86.4	36	1897	663	90.7	39	1988	683	95.2	42	2080	703	99.7	46	2173	724	104.3	50	2268	746	108.9	54
	40	1725	706	82.4	33	1810	727	86.6	36	1896	748	90.8	39	1984	770	95.1	42	2072	793	99.4	46	2161	816	103.8	50
	46	1544	761	73.8	27	1592	758	76.1	28	1612	738	77.1	29	1630	717	78.1	30	1637	724	78.5	30	1657	703	79.5	31
	48	1389	715	66.3	22	1409	693	67.3	23	1407	696	67.3	23	1429	676	68.4	23	1446	671	69.3	24	1467	650	70.4	25
	50	1191	673	56.8	17	1208	650	57.7	17	1220	643	58.3	18	1234	618	59.1	18	1261	602	60.4	19	1283	583	61.5	19
C22	30	1922	616	91.8	40	2017	634	96.5	44	2113	654	101.2	47	2211	673	106	52	2310	694	110.9	56	2410	715	115.8	60
	35	1856	675	88.7	37	1947	695	93.1	41	2039	716	97.6	44	2132	737	102.2	48	2226	759	106.9	52	2322	782	111.5	56
	40	1768	742	84.5	34	1854	763	88.7	37	1941	785	93	41	2029	808	97.3	44	2118	832	101.7	48	2208	857	106.1	52
	46	1558	789	74.4	27	1586	771	75.8	28	1604	747	76.7	29	1623	724	77.7	29	1618	740	77.6	29	1640	718	78.7	30
	48	1376	722	65.7	22	1397	699	66.8	22	1389	713	66.5	22	1413	693	67.7	23	1438	673	68.9	24	1460	651	70	24
	50	1170	689	55.8	16	1190	666	56.8	17	1215	647	58.1	17	1230	622	58.9	18	1255	604	60.1	19	1278	585	61.3	19

NOTES - ANMERKUNGEN - Σημειώσεις - NOTAS - REMARQUES - NOTE - OPMERKINGEN - примечания

1 Fluid: Water
Fluid: Wasser
Υγρό: Νερό
Líquido: agua
Liquide: Eau
Fluido: Acqua
Vloeistof: Water
Жидкость: Вода

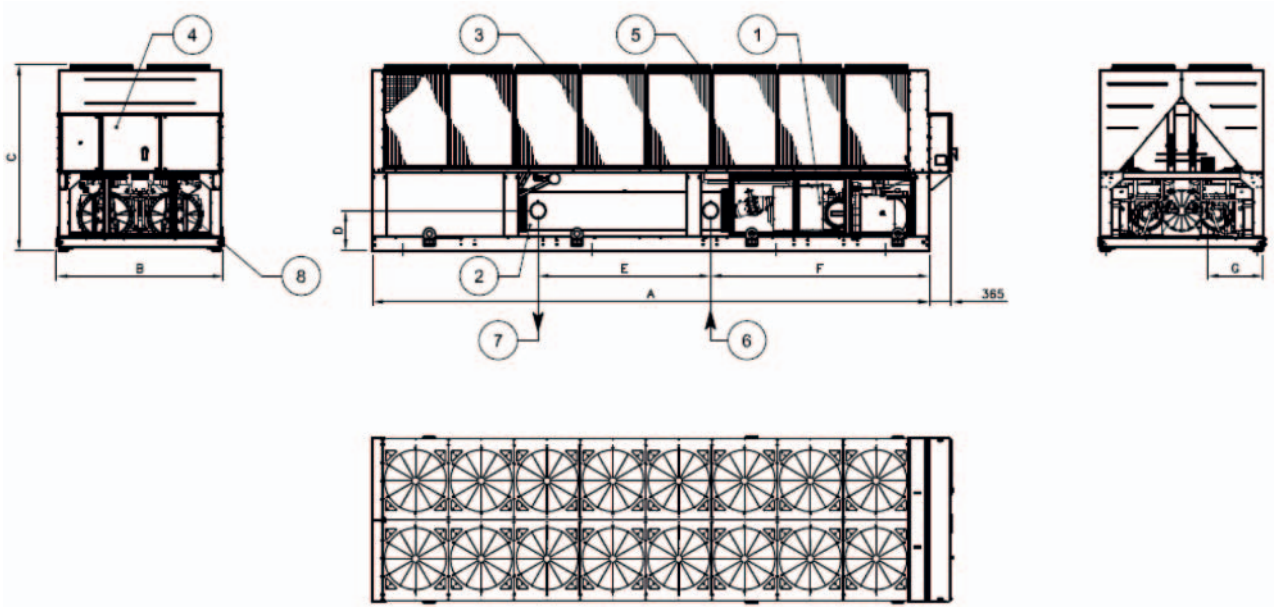
2 For working conditions where dpw values are in italic, please contact factory.
Für Arbeitsbedingungen mit kursiv gedruckten dpw-Werten, wenden Sie sich bitte an den Hersteller.
Για τις συνθήκες εργασίας όπου οι τιμές dpw είναι σε πλάγια γραφή, παρακαλούμε επικοινωνήστε με το εργοστάσιο.
Para las condiciones de funcionamiento en las que los valores dpw están en cursiva, póngase en contacto con la fábrica.
Pour les conditions de travail lorsque les valeurs dpw sont en italique, veuillez contacter l'usine.
Per le condizioni d'esercizio in cui i valori dpw sono riportati in corsivo, contattare il produttore.
Voor bedrijfsomstandigheden met schuingedrukte dpw-waarden, gelieve contact op te nemen met de fabriek.
Если условия работы соответствуют значениям dpw, указанным курсивом, обратитесь на завод-изготовитель.

SRC_1-2-3-4-5-6-7-8-9_Rev.02_6_(2-2)

8 Dimensional drawings

8 - 1 Dimensional Drawings

EWAD-C- (2 circuits)



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

EWAD~C-	Dimensions (mm)								Fans
Size	Size	A	B	C	D	E	F	G	
EWAD650÷830C-SS/SL	EWAD620÷720C-SR	6185	2285	2540	450	2412	435	810	Nr 10
EWAD910÷970C-SS/SL	EWAD880÷920C-SR	6185	2285	2540	450	2412	435	810	Nr 12
EWADC11C-SS/SL	EWADC10C-SR	7085	2285	2540	1350	2412	435	810	Nr 14
EWADC12C-SS/SL	EWADC11C-SR	7985	2285	2540	2250	2412	435	810	Nr 16
EWADC13÷H14C-SS/SL	EWADC12÷H14C-SR	8885	2285	2540	3170	2360	540	760	Nr 18
EWAD760C-XS/XL	EWAD740C-XR	6185	2285	2540	470	2412	435	810	Nr 12
EWAD830÷890C-XS/XL	EWAD810÷870C-XR	7085	2285	2540	1370	2412	435	810	Nr 14
EWAD990÷C10C-XS/XL	EWAD970÷C10C-XR	7985	2285	2540	2270	2360	540	760	Nr 16
EWADC11÷C13C-XS/XL	EWADC11÷C13C-XR	9785	2285	2540	4070	2360	540	760	Nr 20
EWADH14÷H15C-XS/XL/XR		9785	2285	2285	2920	3440	540	685	Nr 20
EWAD820÷890C-PS/PL	EWAD810÷880C-PR	8885	2285	2540	2020	3510	540	760	Nr 18
EWAD980C-PS/PL	EWAD960C-PR	8885	2285	2540	2020	3440	540	685	Nr 18
EWADC11÷C12C-PS/PL	EWADC10÷C11C-PR	9785	2285	2540	2920	3440	540	685	Nr 20
EWADC13C-PS/PL	EWADC13C-PR	11085	2285	2540	4205	3440	540	685	Nr 22
EWADC14C-PS/PL	EWADC14C-PR	11985	2285	2540	5105	3440	540	685	Nr 24
EWADC15÷C16C-PS/PL/PR		11985	2285	2285	5130	3440	540	685	Nr 24

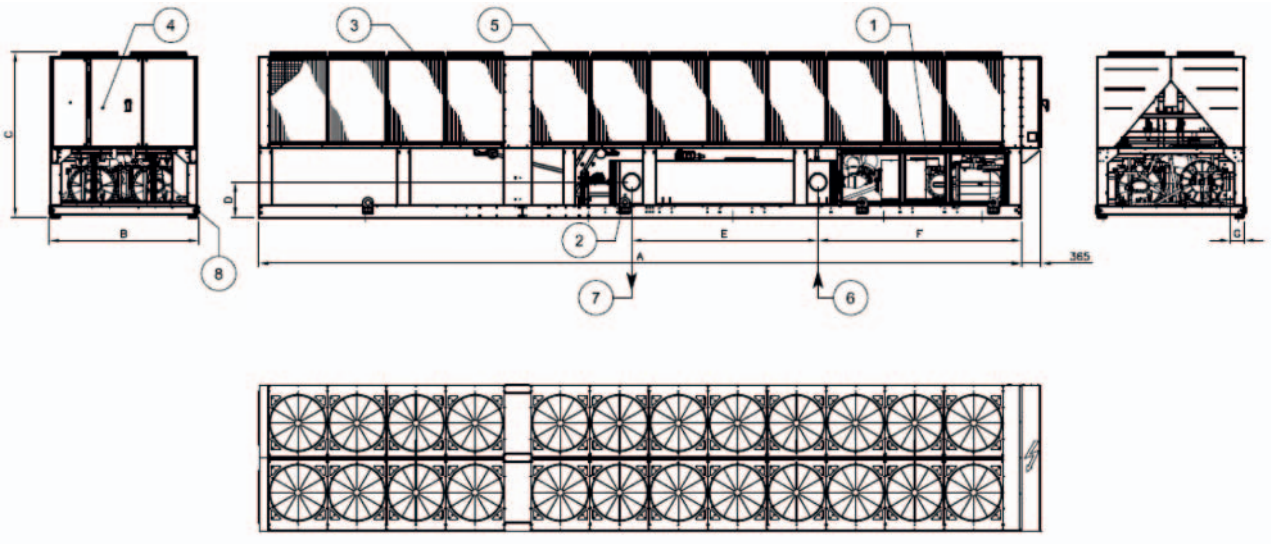
LEGEND
1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator Water inlet
7. Evaporator Water outlet
8. Slot for power and control connection

DMN_1c-2b_Rev.03_1c

8 Dimensional drawings

8 - 1 Dimensional Drawings

EWAD-C- (3 circuits)



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

EWAD~C-		Dimensions (mm)							Fans
Size	Size	A	B	C	D	E	F	G	
EWADC14÷C15C-SS/SL	EWADC13÷C14C-SR	10185	2285	2540	4440	2360	540	285	Nr 20
EWADC16÷C17C-SS/SL	EWADC15÷C16C-SR	11085	2285	2540	5340	2360	540	285	Nr 22
EWADC18C-SS/SL	EWADC17C-SR	11085	2285	2540	4780	2840	540	210	Nr 22
EWADC19÷C20C-SS/SL	EWADC18÷C19C-SR	11985	2285	2540	5680	2840	540	210	Nr 24
EWADC14C-XS/XL	EWADC14C-XR	11985	2285	2540	5680	2910	540	285	Nr 24
EWADC15÷C16C-XS/XL	EWADC15÷C16C-XR	11985	2285	2540	5680	2840	540	210	Nr 24
EWADC17C-XS/XL	EWADC17C-XR	12885	2285	2540	6580	2840	540	210	Nr 26
EWADC18C-XS/XL	EWADC18C-XR	13785	2285	2540	7480	2840	540	210	Nr 28
EWADC19C- XS/XL	EWADC19C-XR	14685	2285	2540	8380	2840	540	210	Nr 30
EWADH14÷H15C-XS/XL/XR		14685	2285	2285	8380	2840	540	210	Nr 30

LEGEND

1. Compressor
2. Evaporator
3. Condenser coil
4. Electrical panel
5. Fan
6. Evaporator Water inlet
7. Evaporator Water outlet
8. Slot for power and control connection

DMN_1c-2b_Rev.03_2b

9 Sound data

9 - 1 Sound Power Spectrum

SOUND LEVELS
EWAD~C-XS

	Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)									Power
MODEL	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
760	74,6	76,7	79,5	78,7	74,6	70,1	60,5	51,4	**79,7**	**100,2**
830	74,6	76,7	79,5	78,7	74,6	70,1	60,5	51,4	**79,7**	**100,5**
890	74,6	76,7	79,5	78,7	74,6	70,1	60,5	51,4	**79,7**	**100,5**
990	75,1	77,2	80,0	79,2	75,1	70,6	61,0	51,9	**80,2**	**101,4**
C10	75,6	77,7	80,5	79,7	75,6	71,1	61,5	52,4	**80,7**	**101,9**
C11	75,2	77,3	80,1	79,3	75,2	70,7	61,1	52,0	**80,3**	**102,4**
C12	75,3	77,4	80,2	79,4	75,3	70,8	61,2	52,1	**80,4**	**102,5**
C13	75,3	77,4	80,2	79,4	75,3	70,8	61,2	52,1	**80,4**	**102,5**
H14	75,3	77,4	80,2	79,4	75,3	70,8	61,2	52,1	**80,4**	**102,5**
H15	75,3	77,4	80,2	79,4	75,3	70,8	61,2	52,1	**80,4**	**102,5**
C16	75,8	77,9	80,7	79,9	75,8	71,3	61,7	52,6	**80,9**	**103,2**
C17	75,7	77,8	80,6	79,8	75,7	71,2	61,6	52,5	**80,8**	**103,5**
C18	75,9	78,0	80,8	80,0	75,9	71,4	61,8	52,7	**81,0**	**103,7**
C19	75,9	78,0	80,8	80,0	75,9	71,4	61,8	52,7	**81,0**	**103,9**
C20	75,9	78,0	80,8	80,0	75,9	71,4	61,8	52,7	**81,0**	**103,9**
C21	75,9	78,0	80,8	80,0	75,9	71,4	61,8	52,7	**81,0**	**103,9**
C22	75,9	78,0	80,8	80,0	75,9	71,4	61,8	52,7	**81,0**	**103,9**

EWAD~C-XL

	Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)									Power
MODEL	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
760	71,2	73,3	76,1	75,3	71,2	66,7	57,1	48,0	**76,3**	**96,8**
830	71,4	73,5	76,3	75,5	71,4	66,9	57,3	48,2	**76,5**	**97,4**
890	71,4	73,5	76,3	75,5	71,4	66,9	57,3	48,2	**76,5**	**97,4**
990	71,8	73,9	76,7	75,9	71,8	67,3	57,7	48,6	**76,9**	**98,0**
C10	72,0	74,1	76,9	76,1	72,0	67,5	57,9	48,8	**77,1**	**98,2**
C11	71,6	73,7	76,5	75,7	71,6	67,1	57,5	48,4	**76,7**	**98,8**
C12	71,7	73,8	76,6	75,8	71,7	67,2	57,6	48,5	**76,8**	**98,9**
C13	71,7	73,8	76,6	75,8	71,7	67,2	57,6	48,5	**76,8**	**98,9**
H14	71,7	73,8	76,6	75,8	71,7	67,2	57,6	48,5	**76,8**	**98,9**
H15	71,7	73,8	76,6	75,8	71,7	67,2	57,6	48,5	**76,8**	**98,9**
C16	72,2	74,3	77,1	76,3	72,2	67,7	58,1	49,0	**77,3**	**99,6**
C17	72,3	74,4	77,2	76,4	72,3	67,8	58,2	49,1	**77,4**	**100,0**
C18	72,4	74,5	77,3	76,5	72,4	67,9	58,3	49,2	**77,5**	**100,2**
C19	72,4	74,5	77,3	76,5	72,4	67,9	58,3	49,2	**77,5**	**100,4**
C20	72,4	74,5	77,3	76,5	72,4	67,9	58,3	49,2	**77,5**	**100,4**
C21	72,4	74,5	77,3	76,5	72,4	67,9	58,3	49,2	**77,5**	**100,4**
C22	72,4	74,5	77,3	76,5	72,4	67,9	58,3	49,2	**77,5**	**100,4**

EWAD~C-XR

	Sound pressure level at 1 m from the unit (rif. 2 x 10-5 Pa)									Power
MODEL	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB(A)	dB(A)
740	68,1	61,3	68,4	73,6	61,0	57,4	49,1	36,5	**71,5**	**92,0**
810	68,1	61,3	68,4	73,6	61,0	57,4	49,1	36,5	**71,5**	**92,3**
870	68,1	61,3	68,4	73,6	61,0	57,4	49,1	36,5	**71,5**	**92,3**
970	68,9	62,1	69,2	74,4	61,8	58,2	49,9	37,3	**72,3**	**93,5**
C10	69,1	62,3	69,4	74,6	62,0	58,4	50,1	37,5	**72,5**	**93,7**
C11	68,8	62,0	69,1	74,3	61,7	58,1	49,8	37,2	**72,2**	**94,3**
C12	68,9	62,1	69,2	74,4	61,8	58,2	49,9	37,3	**72,3**	**94,5**
C13	68,9	62,1	69,2	74,4	61,8	58,2	49,9	37,3	**72,3**	**94,5**
H14	69,1	62,3	69,4	74,6	62,0	58,4	50,1	37,5	**72,5**	**94,6**
H15	69,1	62,3	69,4	74,6	62,0	58,4	50,1	37,5	**72,5**	**94,6**
C16	69,5	62,7	69,8	75,0	62,4	58,8	50,5	37,9	**72,9**	**95,3**
C17	69,5	62,7	69,8	75,0	62,4	58,8	50,5	37,9	**72,9**	**95,6**
C18	69,6	62,8	69,9	75,1	62,5	58,9	50,6	38,0	**73,0**	**95,7**
C19	69,6	62,8	69,9	75,1	62,5	58,9	50,6	38,0	**73,0**	**95,9**
C20	69,9	63,1	70,2	75,4	62,8	59,2	50,9	38,3	**73,3**	**96,2**
C21	70,3	63,5	70,6	75,8	63,2	59,6	51,3	38,7	**73,7**	**96,6**
C22	70,3	63,5	70,6	75,8	63,2	59,6	51,3	38,7	**73,7**	**96,6**

NOTE

Reduction to be applied to standard, low and reduced sound configuration.

NSL_1a-2b-3b-4a_Rev.03_2b

9 Sound data

9 - 1 Sound Power Spectrum

Sound pressure level correction factor for different distances

EWAD~C-SS / EWAD~C-SL / EWAD~C-SR

Unit size			Distance						
EWAD~C-SS	EWAD~C-SL	EWAD~C-SR	1m	5m	10m	15m	20m	25m	50m
650	650	620	0,0	-7.1	-11,6	-14,6	-16,8	-18,6	**-24,2**
740	740	720	0,0	-7.1	-11,6	-14,6	-16,8	-18,6	**-24,2**
830	830	790	0,0	-7.1	-11,6	-14,6	-16,8	-18,6	**-24,2**
910	910	880	0,0	-7.1	-11,6	-14,6	-16,8	-18,6	**-24,2**
970	970	920	0,0	-7.1	-11,6	-14,6	-16,8	-18,6	**-24,2**
C11	C11	C10	0,0	-6.9	-11,4	-14,3	-16,5	-18,3	**-23,9**
C12	C12	C11	0,0	-6,7	-11,2	-14,1	-16,3	-18,0	**-23,6**
C13	C13	C12	0,0	-6,6	-11,0	-13,9	-16,0	-17,8	**-23,4**
H14	H14	H14	0,0	-6,6	-11,0	-13,9	-16,0	-17,8	**-23,4**
C15	C15	C14	0,0	-6,4	-10,7	-13,6	-15,7	-17,4	**-17,4**
C16	C16	C15	0,0	-6.3	-10,5	-13,4	-15,5	-17,2	**-17,2**
C17	C17	C16	0,0	-6.3	-10,5	-13,4	-15,5	-17,2	**-17,2**
C18	C18	C17	0,0	-6.3	-10,5	-13,4	-15,5	-17,2	**-22,8**
C19	C19	C18	0,0	-6,2	-10,4	-13,2	-15,3	-17,0	**-22,5**
C20	C20	C19	0,0	-6,2	-10,4	-13,2	-15,3	-17,0	**-22,5**

EWAD~C-XS / EWAD~C-XL / EWAD~C-XR

Unit size			Distance						
EWAD~C-XS	EWAD~C-XL	EWAD~C-XR	1m	5m	10m	15m	20m	25m	50m
760	760	740	0,0	-7,1	-11.6	-14,6	-16,8	-18,6	**-24,2**
830	830	810	0,0	-6,9	-11.4	-14,3	-16,5	-18,3	**-23,9**
890	890	870	0,0	-6,9	-11.4	-14,3	-16,5	-18,3	**-23,9**
990	990	970	0,0	-6,7	-11.2	-14,1	-16,3	-18,0	**-23,6**
C10	C10	C10	0,0	-6,7	-11.2	-14,1	-16,3	-18,0	**-23,6**
C11	C11	C11	0,0	-6,5	-10.8	-13,7	-15,8	-17,5	**-23,1**
C12	C12	C12	0,0	-6,5	-10.8	-13,7	-15,8	-17,5	**-23,1**
C13	C13	C13	0,0	-6,5	-10.8	-13,7	-15,8	-17,5	**-23,1**
H14	H14	H14	0,0	-6,5	-10.8	-13,7	-15,8	-17,5	**-23,1**
H15	H15	H15	0,0	-6,5	-10.8	-13,7	-15,8	-17,5	**-23,1**
C16	C16	C16	0,0	-6,2	-10.4	-13,2	-15,3	-17,0	**-22,5**
C17	C17	C17	0,0	-6,1	-10.3	-13,0	-15,1	-16,8	**-22,3**
C18	C18	C18	0,0	-6,0	-10.1	-12,9	-15,0	-16,7	**-22,1**
C19	C19	C19	0,0	-5,9	-10	-12,7	-14,8	-16,5	**-22,0**
C20	C20	C20	0,0	-5,9	-10,0	-12,7	-14,8	-16,5	**-22,0**
C21	C21	C21	0,0	-5,9	-10	-12,7	-14,8	-16,5	**-22,0**
C22	C22	C22	0,0	-5,9	-10	-12,7	-14,8	-16,5	**-22,0**

EWAD~C-PS / EWAD~C-PL / EWAD~C-PR

Unit size			Distance						
EWAD~C-PS	EWAD~C-PL	EWAD~C-PR	1m	5m	10m	15m	20m	25m	50m
820	820	810	0,0	-6,6	-11,0	-13,9	-16,0	-17,8	**-23,4**
890	890	880	0,0	-6,6	-11,0	-13,9	-16,0	-17,8	**-23,4**
980	980	960	0,0	-6,6	-11,0	-13,9	-16,0	-17,8	**-23,4**
C11	C11	C10	0,0	-6,5	-10,8	-13,7	-15,8	-17,5	**-23,1**
C12	C12	C11	0,0	-6,5	-10,8	-13,7	-15,8	-17,5	**-23,1**
C13	C13	C13	0,0	-6,3	-10,5	-13,4	-15,5	-17,2	**-22,8**
C14	C14	C14	0,0	-6,2	-10,4	-13,2	-15,3	-17,0	**-22,5**
C15	C15	C15	0,0	-6,2	-10,4	-13,2	-15,3	-17,0	**-22,5**
C16	C16	C16	0,0	-6,2	-10,4	-13,2	-15,3	-17,0	**-22,5**

NOTE

Reduction to be applied to standard, low and reduced sound configuration.

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10 Installation

10 - 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.3). 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.4); strong wind could be the cause of air warm recirculation.
For other installation solutions, consult our technicians.

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

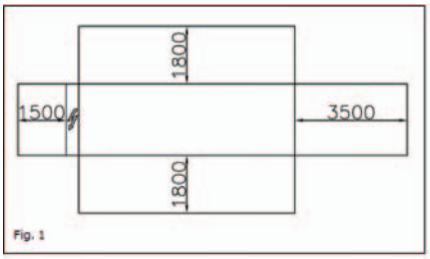

Fig. 1

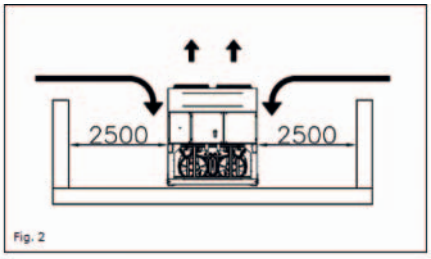

Fig. 2

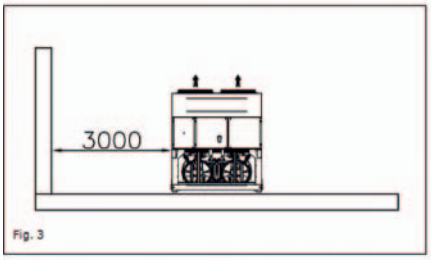

Fig. 3

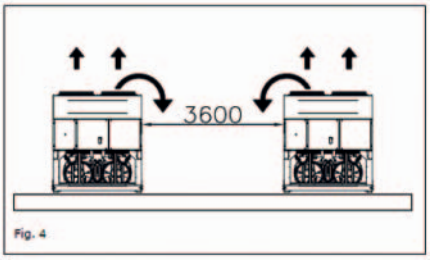

Fig. 4

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

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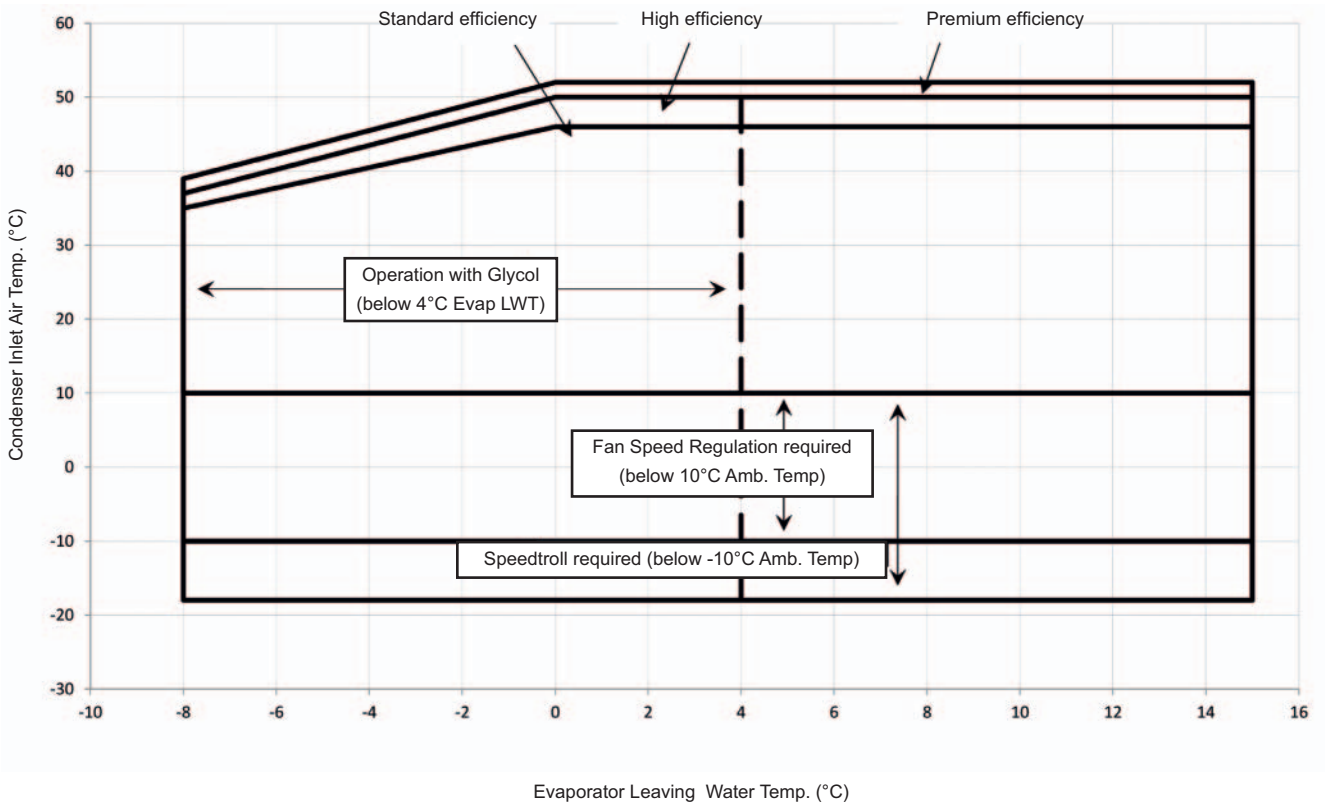
11 Operation range

11 - 1 Operation Range



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Water charge, flow and quality

Items (1) (6)			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	[mgCl2-/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO2-4/l]	Below 200	Below 50	Below 50	Below 200	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	M-alkalinity (pH4.8)	[mgCaCO3/l]	Below 100	Below 50	Below 50	Below 100	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mgCaCO3/l]	Below 200	Below 70	Below 70	Below 200	Below 70	Below 70	Below 70	Below 70	Below 70	Scale
	Calcium harness	[mgCaCO3/l]	Below 150	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Silca ion	[mgSiO2/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	[mgS2-/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	[mgCO2/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

NOTES

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 totally assure the absence of corrosion 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.

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11 Operation range

11 - 1 Operation Range

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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12 Hydraulic performance

12 - 1 Water Pressure Drop Curve Evaporator

Evaporating Pressure Drops

EWAD~C-SS EWAD~C-SL	650	740	830	910	970	C11	C12	C14	C15	C16	C17
Cooling Capacity (kW)	647	744	832	912	967	1064	1152	1419	1538	1622	1714
Water Flow (l/s)	30.90	35.56	39.74	43.60	46.21	50.85	55.04	67.78	73.5	77.51	81.89
Pressure Drops (kPa)	73	59	52	61	68	63	72	47	59	65	73

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser air inlet: 35°C

EWAD~C-SR	650	740	830	910	970	C11	C12	C14	C15	C16	C17
Cooling Capacity (kW)	619	715	789	876	922	1020	1112	1367	1471	1556	1623
Water Flow (l/s)	29.57	34.15	37.71	41.83	44.05	48.75	53.11	65.32	70.28	74.32	77.57
Pressure Drops (kPa)	67	55	47	57	62	58	68	44	54	60	66

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser air inlet: 35°C

EWAD~C-XS EWAD~C-XL	760	830	890	990	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19
Cooling Capacity (kW)	756	830	889	1001	1074	1196	1280	1349	1409	1526	1596	1685	1768	1858
Water Flow (l/s)	36.10	39.67	42.49	47.82	51.32	57.13	61.18	64.45	67.34	72.90	76.24	80.48	84.47	88.79
Pressure Drops (kPa)	80	56	64	61	69	45	51	71	77	57	62	68	64	37

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser air inlet: 35°C

EWAD~C-XR	760	830	890	990	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19
Cooling Capacity (kW)	736	811	866	974	1041	1168	1247	1302	1378	1486	1550	1639	1722	1813
Water Flow (l/s)	35.17	38.74	41.36	46.54	49.76	55.78	59.56	62.21	65.85	70.98	74.07	78.32	82.3	86.61
Pressure Drops (kPa)	76	54	61	58	65	43	49	67	74	54	59	65	61	35

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser air inlet: 35°C

EWAD~C-PS EWAD~C-PL	820	890	980	C11	C12	C13	C14
Cooling Capacity (kW)	821	890	975	1074	1158	1279	1390
Water Flow (l/s)	39.22	42.53	46.6	51.30	55.31	61.12	66.41
Pressure Drops (kPa)	57	65	30	61	69	60	73

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser air inlet: 35°C

EWAD~C-PR	820	890	980	C11	C12	C13	C14
Cooling Capacity (kW)	809	875	956	1053	1132	1251	1359
Water Flow (l/s)	38.65	41.81	45.69	50.30	54.11	59.76	64.95
Pressure Drops (kPa)	56	63	29	59	66	58	70

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser air inlet: 35°C

Evaporating Pressure Drops

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

$$PD_2\ (kPa) = PD_1\ (kPa) \times \left(\frac{Q_2\ (l/s)}{Q_1\ (l/s)} \right)^{1.8}$$

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 EWAD650C-SS has been selected for working at the following conditions:
- evaporator water in/out : 11/6°C
- condenser air inlet: 46°C

The cooling capacity at these working conditions is: 536 kW
The water flow at these working conditions is: 25.61 l/s

The unit EWAD650C-SS at nominal working conditions has the following data:
- evaporator water in/out : 12/7°C
- condenser air inlet: 35°C

The cooling capacity at these working conditions is: 647 kW
The water flow at these working conditions is: 30.90 l/s
The pressure drop at these working conditions is: 73 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = 73\ (kPa) \times \left(\frac{25.61\ (l/s)}{30.90\ (l/s)} \right)^{1.8}$$

$$PD_2\ (kPa) = 52\ (kPa)$$

NOTES

If the calculated evaporator water pressure drop is below 10 kPa or above 100 kPa please contact the factory for dedicated evaporator.

EPD_1-2-3-4_Rev.00_1-4

13 Specification text

13 - 1 Specification Text

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 Chiller shall supply the following performances:
- 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 Chiller shall include as standard not less than: two or three independent refrigerant circuits (depending on the size), semi-hermetic asymmetric type rotary single screw compressors, 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

Compressors (Asymmetric) The unit shall be equipped with:
- 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.

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13 Specification text

13 - 1 Specification Text

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).
- 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.
- The evaporator will be manufactured in accordance to PED approval.

Condenser coil The unit shall be equipped with condenser coils 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 refrigerant circuits (depending on the size).

- The circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, compressor discharge shut-off valve, liquid line shut-off valve, sight glass with moisture indicator, replaceable filter drier, charging valves, high pressure switch, high and low pressure transducers, oil pressure transducer and insulated suction line.

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 pump with motor protected by a circuit breaker installed in control panel, water filling system with pressure gauge, safety valve, drain valve.

- The hydronic module shall be assembled and wired to the control panel.
- The water piping shall be protected against corrosion and freezing and insulated to prevent condensation.
- A choice of two pump types shall be available:

- in-line single pump
- in-line twin pumps.

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Electrical control panel Power and control shall be located in the main panel that will be manufactured to ensure protection against all weather conditions.
- The electrical panel shall be IP54 and (when opening the doors) internally protected with plexiglas panel against possible accidental contact with electrical components (IP20).
- The main panel shall be fitted with a main switch interlocked door.
- The power section will include compressors and funs protection devices, compressors and fans starters and control circuit power supply.

Controller The controller will be installed as standard and it will be used to modify unit set-points and check control parameters.
- A built-in display will shows chiller operating status plus temperatures and pressures of water, refrigerant and air, programmable values, set-points.
- A sophisticated software with predictive logic, will select the most energy efficient combination of compressors, EEXV and condenser fans to keep stable operating conditions to maximise chiller energy efficiency and reliability.
- The controller will be 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 will be 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.

Controller main features
- Management of the compressor stepless capacity 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.

High Level Communications Interface (on request) The chiller shall be able to communicate to BMS (Building Management System) based on the most common protocols 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.

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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 (FCU), Check ongoing validity of certificate online: www.eurovent-certification.com or using: www.certiflash.com"

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