DAIKIN

Applied Systems

Technical Data

Air cooled chiller, high ambient

EEDEN13-414

EWAD-D-HS

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EWAD-D-HS

1 Features

- High ambient
- Standard sound level configuration: condenser fan rotating at 890 rpm, rubber antivibration under compressor
- Stepless single-screw compressor
- Optimised for use with R-134a
- MicroTech III controller
- Large operation range (ambient temperature down to -18ºC)

2 Specifications

2-1 Technical Specifications					EWAD200D-HS	EWAD210D-HS	EWAD230D-HS	EWAD260D-HS	EWAD270D-HS	EWAD290D-HS	EWAD310D-HS	EWAD340D-HS
Cooling capacity	Nom.			kW	194 (1)	208 (1)	233 (1)	255 (1)	272 (1)	288 (1)	305 (1)	334 (1)
Capacity control	Method				Stepless							
	Minimum capacity			%	13							
Power input	Cooling	Nom.		kW	77.9 (1)	76.0 (1)	83.9 (1)	92.1 (1)	98.9 (1)	105 (1)	114 (1)	122 (1)
EER					2.49 (1)	2.73 (1)	2.77 (1)		2.75 (1)	2.73 (1)	2.68 (1)	2.75 (1)
ESEER					3.01	3.17	3.21	3.08	3.16	3.13	3.11	
IPLV					3.56	3.74	3.77	3.66	3.74	3.73	3.72	3.64
Casing	Colour				Ivory white							
	Material				Galvanized and painted steel sheet							
Dimensions	Unit	Height		mm	2,223							
		Width		mm	2,234							
		Depth		mm	2,239		3,339					4,040
Weight	Unit			kg	2,475	2,470	2,865		2,870			3,185
	Operation weight			kg	2,500		2,960					3,300
Water heat exchanger	Type				Plate heat exchanger		Single pass shell & tube					
	Water volume			l	25	30	95		90			115
	Nominal water flow	Cooling		l/s	9.3	9.9	11.1	12.2	13.1	13.8	14.6	16.0
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	32	24	46	52	54	59	64	58
	Insulation material				Closed cell							
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler							
Fan	Quantity				4		6					8
	Type				Direct propeller							
	Diameter			mm	800							
	Air flow rate	Nom.		l/s	21,848	21,153	32,772		32,250	31,729		43,696
Fan motor	Drive				Direct on line							
	Input	Cooling		W	7,000		10,500					14,000
	Speed	Cooling	Nom.	rpm	890							
Sound power level	Cooling	Nom.		dBA	96							97
Sound pressure level	Cooling	Nom.		dBA	77							
Compressor	Type				Semi-hermetic single screw compressor							
	Quantity				2							
	Oil	Charged volume		l	26							
Operation range	Water side	Cooling	Min.	°CDB	-15							
			Max.	°CDB	15							
	Air side	Cooling	Min.	°CDB	-18							
			Max.	°CDB	48							
Refrigerant	Type				R-134a							
	Circuits	Quantity			2							
Refrigerant circuit	Charge			kg	36	42	44		55	56		58
Piping connections	Evaporator water inlet/outlet (OD)				3"		4"					
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			Water freeze protection controller							

2-2 Technical Specifications			EWAD380D-HS	EWAD420D-HS	EWAD450D-HS	EWAD480D-HS	EWAD510D-HS	EWAD550D-HS	EWAD590D-HS
Cooling capacity	Nom.	kW	379 (1)	413 (1)	446 (1)	476 (1)	512 (1)	545 (1)	585 (1)
Capacity control	Method		Stepless						
	Minimum capacity	%	13						

2 Specifications

2-2 Technical Specifications					EWAD380D-HS	EWAD420D-HS	EWAD450D-HS	EWAD480D-HS	EWAD510D-HS	EWAD550D-HS	EWAD590D-HS
Power input	Cooling	Nom.		kW	129 (1)	143 (1)	152 (1)	164 (1)	177 (1)	185 (1)	194 (1)
EER					2.93 (1)	2.90 (1)	2.93 (1)	2.90 (1)	2.89 (1)	2.95 (1)	3.02 (1)
ESEER					3.38	3.47	3.52	3.51		3.54	3.63
IPLV					3.99	4.00	4.05	3.99	4.10	4.18	4.50
Casing	Colour				Ivory white						
	Material				Galvanized and painted steel sheet						
Dimensions	Unit	Height		mm	2,223						
		Width		mm	2,234						
		Depth		mm	4,040			4,940			
Weight	Unit			kg	3,185	3,277	3,942	4,356	4,361		4,366
	Operation weight			kg	3,300	3,447	4,112	4,526			
Water heat exchanger	Type				Single pass shell & tube						
	Water volume			l	115	170			165		160
	Nominal water flow	Cooling		l/s	18.2	19.8	21.4	22.8	24.5	26.1	28.0
	Nominal water pressure drop	Cooling	Heat exchanger	kPa	70	46	53	58	51	56	53
	Insulation material				Closed cell						
Air heat exchanger	Type				High efficiency fin and tube type with integral subcooler						
Fan	Quantity				8			10			
	Type				Direct propeller						
	Diameter			mm	800						
	Air flow rate	Nom.		l/s	43,696		42,306	54,620			
Fan motor	Drive				Direct on line						
	Input	Cooling		W	14,000			17,500			
	Speed	Cooling	Nom.	rpm	890						
Sound power level	Cooling	Nom.		dBA	99	97	98			99	100
Sound pressure level	Cooling	Nom.		dBA	79	77	78			79	80
Compressor	Type				Semi-hermetic single screw compressor		asymmetric single screw compressor				
	Quantity				2						
	Oil	Charged volume		l	26	32					
Operation range	Water side	Cooling	Min.	°CDB	-15						
			Max.	°CDB	15						
	Air side	Cooling	Min.	°CDB	-18						
			Max.	°CDB	48						
Refrigerant	Type				R-134a						
	Circuits	Quantity			2						
Refrigerant circuit	Charge			kg	66	70	90	95	100		
Piping connections	Evaporator water inlet/outlet (OD)				4"	5"					
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			Water freeze protection controller						

2-3 Electrical Specifications				EWAD200D-HS	EWAD210D-HS	EWAD230D-HS	EWAD260D-HS	EWAD270D-HS	EWAD290D-HS	EWAD310D-HS	EWAD340D-HS
Compressor	Phase			3~							
	Voltage		V	400							
	Voltage range	Min.	%	-10							
		Max.	%	10							
	Maximum running current		A	78			94		105		119
	Starting method			Wye-delta							

2 Specifications

2-3 Electrical Specifications				EWAD200D-HS	EWAD210D-HS	EWAD230D-HS	EWAD260D-HS	EWAD270D-HS	EWAD290D-HS	EWAD310D-HS	EWAD340D-HS
Compressor 2	Maximum running current		A	78		94		105		119	
Power supply	Phase			3~							
	Frequency		Hz	50							
	Voltage		V	400							
	Voltage range	Min.	%	-10							
		Max.	%	10							
Unit	Maximum starting current		A	222		239		282	291	303	307
	Nominal running current (RLA)	Cooling	A	134	131	145	157	169	180	191	204
	Maximum running current		A	172		196	213	223	234	248	271
	Max unit current for wires sizing		A	189		216	234	246	257	273	298
Fans	Nominal running current (RLA)		A	16		24					32

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

2-4 Electrical Specifications				EWAD380D-HS	EWAD420D-HS	EWAD450D-HS	EWAD480D-HS	EWAD510D-HS	EWAD550D-HS	EWAD590D-HS
Compressor	Phase			3~						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
	Maximum running current		A	125	140	153		174		185
	Starting method			Wye-delta						
Compressor 2	Maximum running current		A	125	147	153	174		185	
Power supply	Phase			3~						
	Frequency		Hz	50						
	Voltage		V	400						
	Voltage range	Min.	%	-10						
		Max.	%	10						
Unit	Maximum starting current		A	311	422	468	489		498	
	Nominal running current (RLA)	Cooling	A	214	239	258	275	295	306	320
	Maximum running current		A	283	320	337	366	387	398	409
	Max unit current for wires sizing		A	311	352	371	403	426	438	450
Fans	Nominal running current (RLA)		A	32			40			

Notes

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

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3 Features and advantages

3 - 1 Features and Advantages

Features and advantages

Low operating cost

This chiller range is the result of careful design, aimed to optimize the energy efficiency of the chillers, with the objective of bringing down operating costs and improving installation profitability, effectiveness and economical management.

The chillers feature a high efficiency single rotor screw compressor design, large condenser coil surface area for maximum heat transfer and low discharge pressure, advanced technology condenser fans and a 'plate to plate' or 'shell&tube' evaporator with low refrigerant pressure drops.

Low operating sound levels

Very low sound levels both at full load and part load conditions are achieved by the latest compressor design and by a unique new fan that moves large volume of air at exceptionally low sound levels and by the virtually vibration-free operation.

Excellent serviceability

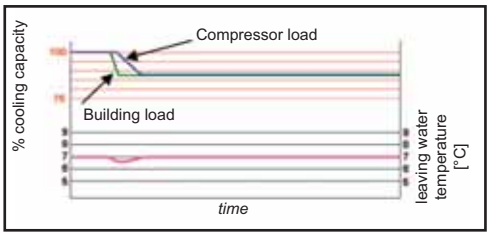
Field serviceability has not been sacrificed to meet design performance objectives. The compressor is equipped with discharge, liquid and suction shut off valves. The compressor and serviceable components such as filter-driers are located on the outside edges of the base allowing, together with the shape of the coil, an easy access for inspection and service. Moreover, the MicroTech III controller gives detailed information on the causes of an alarm or fault.

Proven reliability

Full factory testing of every unit with water hook-up helps in providing a trouble-free start-up. Extensive quality control checks during testing means that each equipment protection and operating control is properly adjusted and operates correctly before it leaves the factory.

Infinite capacity control

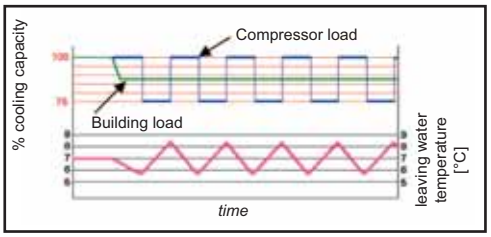
Cooling capacity control is infinitely variable by means of a single screw compressor controlled by microprocessor system. Each unit has infinitely variable capacity control from 100% down to 12.5%. This modulation allows the compressor capacity to exactly match the building cooling load. Chilled water temperature fluctuation is avoided only with a stepless control.



ELWT fluctuation with stepless capacity control

In the case that the 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.

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.



ELWT fluctuation with steps capacity control (4 steps)

Superior control logic

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

FTA_1-2-3a_Rev.01_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 Stds	UNI – EN ISO 9001:2004

Certifications

All units manufactured by Daikin 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 for other applications, such as naval (RINA, etc.).

Efficiency and sound configuration

The range is available in multiple efficiency and sound versions:

	Sound level			
Efficiency level	Standard	Low	Reduced	Extra low
Standard efficiency	EWAD~D-SS	EWAD~D-SL	EWAD~D-SR	EWAD~D-SX
High efficiency	EWAD~D-XS	N.A.	EWAD~D-XR	N.A.
High ambient	EWAD~D-HS	N.A.	N.A.	N.A.

Versions

The range is available in three versions:

S: Standard efficiency

7 sizes to cover a range from 389 up to 578 kW with an EER up to 2.03 and an ESEER up to 3.56 (data refers to Standard sound configuration)

X: High efficiency

11 sizes to cover a range from 247 up to 622 kW with an EER up to 3.20 and an ESEER up to 4.01 (data refers to Standard sound configuration)

H: High ambient temperature

15 sizes to cover a range from 195 up to 587 kW with an EER up to 3.07 and an ESEER up to 3.79 (data refers to Standard sound configuration)

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 weighted 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

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3 Features and advantages

3 - 1 Features and Advantages

Sound levels

The range is available in four different sound level configurations:

S: Standard sound

Condenser fan rotating at 890 rpm, rubber antivibration under compressor

L: Low sound

Condenser fan rotating at 900 rpm (EWAD180-370D-SL) and 705 rpm (EWAD400-530D-SL), rubber antivibration under compressor.

R: Reduced sound

Condenser fan rotating at 680 rpm (EWAD180-370D-SR) and 705 rpm (EWAD400-530D-SR), rubber antivibration under compressor, compressor sound enclosure.

X: Extra low sound

Condenser fan rotating at 500 rpm, rubber antivibration under compressor, compressor and evaporator sound enclosure.

FTA_1-2-3a_Rev.01_3a

4 General Characteristics

4 - 1 General characteristics

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.

Screw compressors with integrated oil separator

The range features two types of single-screw compressors:

A) The compressor is semi-hermetic, single-screw type with gate-rotors made of carbon impregnated engineered composite material. The compressor has one slide managed by the unit microprocessor for infinitely modulating the capacity between 100% to 25%. An integrated high efficiency oil separator maximizes the oil separation and standard start is Wye-delta (Y-Δ) type.

This compressor is offered on following models:
- EWAD180~370D-SL
- EWAD180~370D-SR
- EWAD210~310D-SX
- EWAD250~400D-XS
- EWAD240~390D-XR
- EWAD200~380D-HS

B) 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.

This compressor is offered on following models:
- EWAD390~580D-SS
- EWAD400~530D-SL
- EWAD400~530D-SR
- EWAD370~490D-SX
- EWAD470~620D-XS
- EWAD460~600D-XR
- EWAD420~590D-HS

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

For size EWAD180~200D-SL, EWAD180~190D-SR and EWAD200~210D-HS

The units are equipped with a direct expansion plate to plate type evaporator. This heat exchanger is made of stainless steel brazed plates and is covered with a 20mm closed cell insulation material. The exchanger is equipped with a heater for protection against freezing down to –28°C and evaporator water outlet connections of 3”. Each evaporator has 2 circuits, one for each compressor and is manufactured in accordance to PED approval. Water pressure differential switch on evaporator standard factory mounted. Water filter is standard.

All the other units are equipped with a Direct Expansion shell&tube evaporator with copper tubes rolled into steel tubesheets. 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 external shell is covered with a 10mm closed cell insulation material and the evaporator water outlet connections are provided with victaulic kit (as standard). Each evaporator has 2 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.

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4 General Characteristics

4 - 1 General characteristics

Condenser coil fans
Fan 710 mm diameter
The condenser fans are propeller type with wing-profile blades for achieving better performance. Each fan is protected by a guard.

Fan 800 mm diameter
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 independent refrigerant circuits and each one includes:

- 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
- Sight glass with moisture indicator
- Filter drier
- Charging valves
- High pressure switch
- High and low pressure transducers

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 fuses, 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.

GNC_1a-2-3-4-5-6_Rev.01_2

4 General Characteristics

4 - 1 General characteristics

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-2-3-4-5-6_Rev.01_3

4 General Characteristics

4 - 1 General characteristics

Condensing pressure
Condensing pressure can be controlled in according to the entering air temperature to the condenser coil. The fans can be managed either with steps, or with a 0/10V modulating signal or with a mixed 0/10V + Steps strategy to cover all possible operational conditions.

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)

Evaporator victaulic kit – Not available on units EWAD180~200D-SL, EWAD180~190D-SR and EWAD200~210D-HS
Evaporator water design pressure (10Bar)
Discharge line shut off valves – Installed on the discharge port of the compressor to facilitate maintenance operation.
Suction line shut off valve – Installed on the suction port of the compressor to facilitate maintenance operation.
Wye-Delta Compressors starter (Y-Δ) – For low inrush current and reduced starting torque.
Double set-point – Dual leaving water temperature set-points.
Phase monitor – The phase monitor controls that phases sequence is correct and controls phase loss.
Water pressure differential switch on evaporator – Not available on units EWAD390~580D-SS, EWAD230~530D-SL, EWAD220~530D-SR, EWAD210~490D-SX, EWAD250~620D-XS, EWAD240~600D-XR, EWAD230~590D-HS
Evaporator electric heater type – 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 device
20 mm evaporator insulation – Only for EWAD180~200D-SL, EWAD180~190D-SR, EWAD210D-SX and EWAD200~210D-HS
Ambient outside temperature sensor and set-point reset
Hour run meter
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 (pump etc…). User can decide if this alarm signal will stop the unit or not.
Fans circuit breakers – Safety device against motor overloading and short circuit
Main switch interlock door

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4 General Characteristics

4 - 1 General characteristics

Options (on request)

Total heat recovery – Provided with plate to plate heat exchangers to produce hot water.
Total heat recovery (1 circuit)
Partial heat recovery – Plate to plate heat exchangers installed between the compressor discharge and the condenser coil, allowing producing hot water.
Brine version – Allows the unit to operate down to -15°C leaving liquid temperature (antifreeze required).
Evaporator flanged connections – Not available for EWAD180~200D-SL, EWAD180~190D-SR, EWAD210D-SX and EWAD200~210D-HS
Condenser coil 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.
Hydronic Kit (single water pump - low or high lifting) – (N.A. on EWAD210~490D-SX) Hydronic kit consists of: single direct driven centrifugal pump, water filling system with pressure gauge, safety valve, drain valve. The pump motor 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 - low or high lifting) – (N.A. on EWAD180~190D-SR and on EWAD210~490D-SX). 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
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/Overvoltage control – This device control the voltage value of power supply and stop the chiller if the value exceeds the allowed operating limits.
Energy Meter – This device allows to measure the energy absorbed by the chiller during its life. It is installed inside the control box mounted on a DIN rail and show on a digital display: Line-to-Line Voltage, Phase and Average Current, Active and Reactive Power, Active Energy, Frequency.
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.
Fan silent mode
Speedtrol – (N.A. on EWAD210~490D-SX) 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).
High pressure side manometers (one per circuit)
Compressors circuit breakers
Fan speed regulation – Standard option for EWAD~D-SX
To control the fan speed revolution for smooth operating control of the unit. During low ambient temperature operation, this option improves also the sound level of the unit. With “Fan speed regulation” option, by different microprocessor setting, it is also possible to set the “Fan Silent Mode” configuration. It means that the microprocessor clock switches the fan at low speed according to the client setting (i.e. Night & Day), providing that the ambient temperature/condensing pressure is allowing the speed change. It allows a perfect condensing control down to –10°C.

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4 General Characteristics

4 - 1 General characteristics

Rubber type anti vibration mounts – Supplied separately, these are positioned under the base of the unit during installation to reduce vibrations.
Spring type 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.
External tank without cabinet (500 L / 1000 L)
External tank with cabinet (500 L / 1000 L)
Container kit
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 (please contact the factory) (This test is not available for units with glycol mixtures).
Acoustic test – On request, a test can be carried out, at customer's presence (please contact the factory) (This test is not available for units with glycol mixtures).

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5 Nomenclature

5 - 1 Nomenclature

Name	E W A	D	3 9 0	D	-	S	S	0	0 1
Digits	1 2 3	4	5 6 7	8	9	10	11	12	13 14

Machine type
EWA = Air-cooled chiller, cooling only
EWY = Air-cooled chiller, heat pump
EWL = Remote condenser chiller
ERA = Air cooled condensing unit
EWW = Water-cooled chiller, cooling only
EWC = Air-cooled chiller, cooling only with centrifugal fan
EWT = Air-cooled chiller, cooling only with heat recovery

Refrigerant
D = R-134a
P = R-407c
Q = R-410a

Capacity class in kW (Cooling)
Always 3-digit code
Idem as previous

Model series
Letter A, B,… : major modification

Inverter
- = Non-inverter
Z = Inverter

Efficiency level
S = Standard efficiency
X = High efficiency
P = Premium efficiency (N.A for this range)
H = High ambient

Sound level
S = Standard noise
L = Low noise
R = Reduced noise
X = Extra low noise
C = Cabinet (N.A for this range)

Warranty
0 = 1 year of warranty
B = 2 years of warranty
C = 3 years of warranty
... = ... years of warranty

Sequential number
000 = Base model
001 = First order for this model (1 or more units)
002 = Second order for this model (1 or more units)
... = ... order for this model
B01 = First order for this model + 1 year warranty
B02 = Second order for this model (1 or more units)
... = ... order for this model

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6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD200-340D-HS

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
200	25	201	64.3	9.6	34	213	66.2	10.2	37	225	68.1	10.8	41	238	70.1	11.4	46	251	72.2	12.1	50	264	74.5	12.7	55
	30	192	69.8	9.2	31	204	71.8	9.8	35	216	73.8	10.4	38	228	75.9	10.9	42	241	78.0	11.6	47	254	80.3	12.2	51
	35	182	75.8	8.7	28	194	77.9	9.3	32	206	80.0	9.9	35	218	82.1	10.4	39	230	84.3	11.0	43	242	86.6	11.6	47
	40	172	82.3	8.2	25	183	84.4	8.8	28	195	86.6	9.3	32	207	88.8	9.9	35	218	91.1	10.5	39	230	93.5	11.1	43
	45	161	89.3	7.7	22	172	91.5	8.2	25	183	93.7	8.8	28	194	96.0	9.3	32	206	98.4	9.9	35	218	101.0	10.5	39
	48	154	93.7	7.3	21	165	96.0	7.9	23	176	98.2	8.4	26	184	98.9	8.8	29	187	94.9	9.0	30	191	92.6	9.2	31
210	25	214	62.8	10.2	25	228	64.6	10.9	28	242	66.6	11.6	31	257	68.7	12.3	35	271	70.7	13.0	38	285	72.8	13.7	42
	30	206	68.3	9.8	23	217	70.0	10.4	26	231	72.1	11.1	29	246	74.2	11.8	32	260	76.4	12.5	36	274	78.5	13.2	39
	35	196	74.2	9.3	21	208	76.0	9.9	24	220	77.9	10.5	26	234	80.1	11.2	29	248	82.4	11.9	33	262	84.7	12.6	36
	40	184	80.5	8.8	19	197	82.5	9.4	22	209	84.5	10.0	24	221	86.6	10.6	27	235	88.9	11.3	30	249	91.3	12.0	33
	45	173	87.3	8.3	17	185	89.4	8.8	19	197	91.5	9.4	22	209	93.7	10.0	24	221	95.8	10.6	27	235	98.3	11.3	30
	48	165	91.6	7.9	16	177	93.7	8.5	18	189	95.9	9.1	20	202	98.2	9.7	23	213	100.0	10.2	25	220	99.2	10.6	26
230	25	239	70.0	11.4	48	253	71.7	12.1	54	268	73.6	12.9	60	283	75.5	13.6	66	298	77.5	14.3	73	314	79.7	15.1	80
	30	229	75.8	11.0	45	243	77.6	11.7	50	258	79.5	12.4	56	272	81.5	13.1	62	287	83.5	13.8	68	302	85.7	14.6	75
	35	219	82.1	10.5	41	233	83.9	11.1	46	247	85.9	11.8	51	261	87.9	12.5	57	276	90.1	13.2	63	290	92.3	14.0	69
	40	207	88.9	9.9	38	221	90.9	10.6	42	235	92.9	11.3	47	249	95.0	12.0	52	263	97	12.7	58	278	99	13.4	64
	45	195	96.3	9.3	34	209	98.3	10.0	38	222	100.0	10.7	43	236	103	11.3	48	250	105	12.0	53	264	107	12.7	58
	48	187	101.0	9.0	31	201	103	9.6	35	214	105	10.3	40	228	107	10.9	45	242	110	11.6	50	256	112	12.3	55
260	25	262	76.6	12.6	55	278	78.6	13.3	61	293	80.7	14.1	67	309	82.8	14.9	74	326	85.1	15.7	82	343	87.4	16.5	90
	30	252	83.1	12.1	51	267	85.1	12.8	57	282	87.2	13.5	63	298	89.4	14.3	69	314	91.7	15.1	76	330	94.1	15.9	84
	35	240	90.1	11.5	47	255	92.1	12.2	52	270	94.3	13.0	58	285	96.6	13.7	64	301	99.0	14.5	71	317	101.0	15.3	78
	40	228	98	10.9	43	242	100	11.6	48	257	102	12.3	53	272	104.0	13.1	59	287	107	13.8	65	303	109	14.6	72
	45	214	106	10.2	38	229	108	11.0	43	243	110	11.7	48	258	113	12.4	53	273	115	13.1	59	288	118	13.9	65
	48	206	111	9.8	35	220	113	10.5	40	235	116	11.2	45	249	118	12.0	50	264	121	12.7	56	279	123	13.4	62
270	25	281	82.2	13.4	57	297	84.5	14.3	63	314	86.8	15.1	70	332	89.2	16.0	77	350	91.7	16.8	85	368	94.4	17.7	93
	30	269	89.1	12.9	52	285	91.4	13.7	58	302	93.8	14.5	65	319	96.3	15.3	72	337	98.9	16.2	79	354	102.0	17.1	87
	35	256	96.5	12.3	48	272	98.9	13.1	54	289	101.0	13.9	60	306	104	14.7	66	323	107.0	15.5	73	340	109.0	16.4	81
	40	243	105	11.6	44	259	107	12.4	49	275	110	13.2	55	291	112	14.0	61	308	115	14.8	67	325	118	15.6	74
	45	228	113	10.9	39	244	116	11.7	44	259	119	12.4	49	275	121	13.2	55	292	124	14.0	61	308	127	14.8	68
	48	219	119	10.5	36	234	122	11.2	41	250	124	12.0	46	266	127	12.8	52	282	130	13.5	57	298	133	14.3	64
290	25	296	87.4	14.2	63	314	89.8	15.1	69	332	92.2	15.9	77	350	94.8	16.8	85	368	97.5	17.7	93	388	100.0	18.7	102
	30	284	94.8	13.6	58	301	97.3	14.4	64	319	99.8	15.3	71	336	102.0	16.2	79	355	105.0	17.1	87	373	108.0	18.0	96
	35	271	103	13.0	53	288	105	13.8	59	305	108	14.6	66	322	111	15.5	73	340	114	16.4	81	358	117	17.3	89
	40	257	112	12.3	48	273	114	13.1	54	290	117	13.9	60	307	120	14.8	67	324	123	15.6	74	342	126	16.5	82
	45	242	121	11.6	43	258	124	12.3	49	274	127	13.2	54	291	129	14.0	61	308	132	14.8	67	325	136	15.6	74
	48	232	127	11.1	40	248	130	11.9	45	264	133	12.7	51	281	136	13.5	57	297	139	14.3	63	314	142	15.1	70
310	25	314	94.1	15.1	68	333	96.7	16.0	75	351	99.4	16.9	83	370	102	17.8	92	390	105.0	18.8	101	410	108.0	19.8	111
	30	301	102	14.4	63	319	105	15.3	70	337	108	16.2	78	356	111	17.1	86	375	114	18.1	94	394	117	19.0	103
	35	287	111	13.8	58	305	114	14.6	64	323	117	15.5	72	341	120	16.4	79	359	123	17.3	87	378	126	18.2	96
	40	272	120	13.0	52	289	123	13.9	59	307	126	14.7	65	324	129	15.6	72	343	133	16.5	80	361	136	17.4	88
	45	256	131	12.2	47	273	134	13.1	53	290	137	13.9	59	307	140	14.8	66	325	143	15.6	73	343	147	16.5	80
	48	245	137	11.7	43	262	140	12.6	49	279	143	13.4	55	296	147	14.2	61	312	149	15.0	68	324	149	15.6	72
340	25	343	101	16.4	61	361	103	17.3	67	379	106	18.2	73	398	108	19.1	80	417	111	20.1	88	436	114	21.0	95
	30	330	110	15.8	57	348	112	16.7	63	366	115	17.6	69	384	117	18.5	75	403	120	19.4	82	422	123	20.3	90
	35	316	119	15.1	53	334	122	16.0	58	352	124	16.9	64	370	127	17.8	70	388	130	18.7	77	407	133	19.6	84
	40	301	129	14.4	48	319	132	15.3	54	337	135	16.2	59	354	137	17.0	65	372	140	17.9	71	391	143	18.8	78
	45	284	140	13.6	43	302	143	14.5	49	320	146	15.4	54	338	149	16.2	60	355	152	17.1	66	373	155	18.0	72
	48	273	147	13.1	40	291	150	13.9	45	309	153	14.8	51	327	156	15.7	56	344	159	16.6	62	362	162	17.4	68

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.

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6 Capacity tables

6 - 1 Cooling Capacity Tables

EWAD380-590D-HS

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
380	25	377	105	18.0	69	395	107	18.9	75	413	110	19.8	82	432	112	20.8	89	450	114	21.7	96	470	117	22.7	104
	30	370	116	17.7	67	388	118	18.6	73	406	120	19.5	79	425	123	20.4	86	443	125	21.4	93	463	128	22.3	101
	35	361	127	17.3	64	379	129	18.2	70	397	132	19.1	76	416	134	20.0	83	435	137	20.9	90	454	140	21.9	97
	40	351	139	16.8	61	369	142	17.7	67	387	144	18.6	73	406	147	19.5	79	424	150	20.4	86	443	153	21.4	93
	45	338	152	16.2	57	356	155	17.1	63	375	158	18.0	69	393	160	18.9	75	412	163	19.8	82	431	167	20.8	89
	48	330	160	15.8	54	348	163	16.7	60	366	166	17.6	66	385	169	18.5	72	403	172	19.4	79	422	175	20.3	85
420	25	420	117	20.1	47	442	120	21.2	52	465	123	22.3	57	487	126	23.4	62	510	129	24.5	67	533	132	25.7	73
	30	407	128	19.5	44	430	131	20.6	49	452	134	21.7	54	475	137	22.8	59	497	141	23.9	64	519	144	25.0	70
	35	391	139	18.7	41	413	143	19.8	46	436	146	20.9	50	457	150	22.0	55	479	153	23.0	60	501	157	24.1	65
	40	371	153	17.7	38	392	156	18.8	42	414	160	19.8	46	435	164	20.9	50	456	168	21.9	55	477	172	22.9	60
	45	344	168	16.4	33	365	172	17.4	36	385	176	18.5	40	406	180	19.5	44	426	184	20.5	49	446	189	21.5	53
	48	325	178	15.5	30	344	182	16.5	33	364	186	17.5	37	380	187	18.2	39	394	186	18.9	42	407	186	19.5	45
450	25	460	126	22.0	55	484	129	23.2	61	509	133	24.4	67	533	136	25.6	73	559	140	26.9	79	585	144	28.2	86
	30	442	137	21.2	52	466	140	22.4	57	490	143	23.5	62	514	147	24.7	68	539	151	25.9	74	564	155	27.2	81
	35	422	149	20.2	48	446	152	21.4	53	470	156	22.5	58	493	159	23.7	63	517	163	24.9	69	541	167	26.1	75
	40	399	163	19.1	43	422	166	20.2	48	446	170	21.4	53	469	174	22.5	58	492	177	23.6	63	515	181	24.8	69
	45	371	179	17.7	38	394	183	18.9	42	417	186	20.0	47	439	190	21.1	51	462	194	22.2	56	485	198	23.3	61
	48	352	190	16.8	34	374	194	17.9	38	397	197	19.0	43	419	201	20.1	47	442	205	21.2	52	464	209	22.3	57
480	25	489	136	23.4	61	514	140	24.7	67	540	143	25.9	73	566	147	27.2	80	593	151	28.6	87	620	155	29.9	94
	30	471	148	22.6	57	496	151	23.8	63	521	155	25.0	69	547	158	26.3	75	573	162	27.6	82	600	166	28.9	89
	35	451	161	21.6	53	476	164	22.8	58	500	168	24.0	64	525	171	25.2	70	551	175	26.5	76	576	179	27.8	83
	40	428	176	20.5	48	452	179	21.7	53	476	183	22.8	58	500	187	24.0	64	525	191	25.2	70	550	195	26.5	76
	45	400	194	19.1	42	424	197	20.3	47	447	201	21.5	52	471	204	22.6	57	495	208	23.8	63	519	212	25.0	68
	48	380	206	18.2	39	403	209	19.3	43	427	212	20.5	48	451	216	21.6	53	474	220	22.8	58	497	224	23.9	63
510	25	529	147	25.3	54	557	151	26.7	59	587	155	28.2	65	617	159	29.6	72	647	164	31.1	78	678	168	32.7	85
	30	508	159	24.3	50	536	163	25.7	55	564	167	27.1	61	594	171	28.5	67	623	176	30.0	73	653	181	31.5	80
	35	484	173	23.2	46	512	177	24.5	51	540	181	25.9	56	568	185	27.3	62	596	190	28.7	67	625	195	30.1	74
	40	457	189	21.9	41	484	193	23.2	46	511	197	24.5	51	538	202	25.8	56	565	206	27.2	61	593	211	28.5	67
	45	424	208	20.3	36	451	212	21.6	40	477	216	22.9	45	503	221	24.2	50	530	225	25.4	54	556	230	26.8	59
	48	402	221	19.2	33	427	224	20.4	37	453	229	21.7	41	479	233	23.0	45	505	238	24.3	50	514	232	24.7	52
550	25	554	150	26.5	57	583	154	27.9	63	612	158	29.4	69	642	162	30.9	75	673	166	32.4	82	705	171	33.9	89
	30	537	165	25.7	54	565	169	27.1	60	594	173	28.5	65	623	177	29.9	71	653	181	31.4	78	683	186	32.9	85
	35	517	181	24.7	51	545	185	26.1	56	573	189	27.5	61	601	193	28.9	67	630	198	30.3	73	659	202	31.7	79
	40	493	200	23.6	47	520	203	24.9	51	547	207	26.2	56	574	212	27.6	62	602	216	28.9	67	630	221	30.3	73
	45	463	222	22.1	41	489	226	23.4	46	515	230	24.7	50	542	234	26.0	55	568	238	27.3	60	595	243	28.6	66
	48	430	231	20.6	36	460	238	22.0	41	485	240	23.2	45	501	236	24.0	48	514	231	24.7	50	520	232	25.0	52
590	25	586	155	28.1	53	616	158	29.5	58	647	162	31.1	63	679	166	32.6	69	711	170	34.2	75	743	174	35.8	82
	30	572	172	27.4	51	602	176	28.8	55	632	180	30.3	61	662	184	31.8	66	693	188	33.3	72	725	193	34.9	78
	35	556	190	26.6	48	585	194	28.0	53	614	198	29.4	57	643	202	30.9	63	673	207	32.3	68	703	212	33.8	74
	40	534	211	25.6	45	562	214	26.9	49	590	219	28.3	54	618	223	29.7	58	647	227	31.1	63	676	232	32.5	69
	45	505	237	24.1	40	532	240	25.5	44	559	244	26.8	49	586	248	28.1	53	614	252	29.5	58	634	253	30.5	61
	48	463	243	22.1	35	499	253	23.9	40	513	247	24.6	42	518	235	24.9	42	512	218	24.6	42	514	223	24.7	42

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.

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6 Capacity tables

6 - 2 Partial Heat Recovery Capacity tables

Partial Heat Recovery Ratings
EWAD~D-HS

EWC / LWC	"Model EWAD~D-HS"	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	EER Hc
50/60	200	159	80.0	84	35%	3.03
	210	171	78.4	87	35%	3.30
	230	196	83.3	98	35%	3.52
	260	213	92.2	107	35%	3.48
	270	227	105	116	35%	3.28
	290	240	112	123	35%	3.23
	310	259	124	134	35%	3.18
	340	281	128	123	30%	3.15
	380	329	141	122	26%	3.20
	420	332	161	173	35%	3.13
	450	373	172	191	35%	3.27
	480	403	189	207	35%	3.24
	510	432	206	223	35%	3.18
	550	461	219	238	35%	3.19
	590	508	225	191	26%	3.10

NOTES

Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)
%Hc (percentage heat recovered)
EER 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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6 Capacity tables

6 - 3 Total Heat Recovery Capacity Tables

Total Heat Recovery Ratings
EWAD~D-HS

EWC / LWC	"Model EWAD~D-HS"	Cc (kW)	Pi (kW)	Hc (kW)	% Hc	EER Hc
40/45	200	167	76.7	207	85%	4.88
	210	179	75.1	216	85%	5.27
	230	205	80.0	243	85%	5.60
	260	224	88.4	265	85%	5.54
	270	238	102	289	85%	5.19
	290	251	109	306	85%	5.12
	310	272	120	333	85%	5.04
	340	294	124	314	75%	4.89
	380	345	137	314	65%	4.81
	420	348	154	427	85%	5.02
	450	391	165	473	85%	5.23
	480	423	183	515	85%	5.13
	510	453	200	555	85%	5.05
	550	484	213	592	85%	5.06
	590	533	219	488	65%	4.67
40/50	200	159	77.5	201	85%	4.65
	210	171	75.9	210	85%	5.02
	230	196	80.8	235	85%	5.33
	260	213	89.3	257	85%	5.27
	270	227	103	281	85%	4.94
	290	240	110	297	85%	4.88
	310	259	121	323	85%	4.81
	340	281	125	305	75%	4.66
	380	329	138	304	65%	4.58
	420	332	156	415	85%	4.79
	450	373	167	459	85%	4.99
	480	403	185	500	85%	4.89
	510	432	202	539	85%	4.81
	550	461	215	575	85%	4.82
	590	508	221	474	65%	4.44
45/55	200	159	78.4	143	60%	3.85
	210	171	76.8	149	60%	4.16
	230	196	81.7	167	60%	4.43
	260	213	90.4	182	60%	4.38
	270	227	104	199	60%	4.11
	290	240	111	210	60%	4.05
	310	259	122	229	60%	3.99
	340	281	127	204	50%	3.82
	380	329	140	202	43%	3.80
	420	332	158	294	60%	3.97
	450	373	169	325	60%	4.13
	480	403	187	354	60%	4.06
	510	432	204	382	60%	3.99
	550	461	217	407	60%	4.00
	590	508	223	314	43%	3.68

NOTES

Cc (cooling capacity
Pi (unit power input)
Hc (heating heat recovery capacity)
%Hc (percentage heat recovered)
EER 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 m² °C/kW evaporator fouling factor

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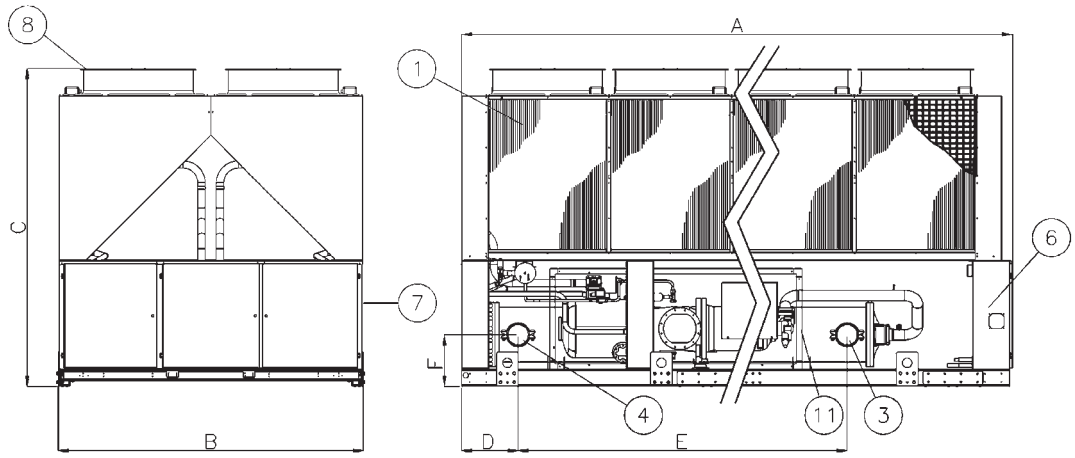
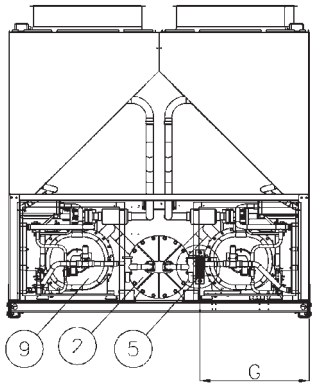
7 Dimensional drawings

7 - 1 Dimensional Drawings

Dimensions EWAD~D-





Models	Dimensions (mm)						
EWAD	A	B	C	D	E	F	G
EWAD390D-SS	3139	2234	2223	392	1875	339	873
EWAD440~580D-SS	4040	2234	2223	392	2450	339	855
EWAD230~300D-SL	3139	2234	2355	374	1911	339	873
EWAD320D-SL	4040	2234	2355	374	2486	339	873
EWAD400~530D-SL	4040	2234	2223	392	2450	339	855
EWAD220~280D-SR	3139	2234	2355	374	1911	339	873
EWAD310D-SR	4040	2234	2355	374	2486	339	873
EWAD400~530D-SR	4040	2234	2223	392	2450	339	855
EWAD210D-SX	3139	2234	2420	374	1911	339	873
EWAD230~310D-SX	4040	2234	2420	374	2486	339	873
EWAD370~490D-SX	4040	2234	2420	392	2450	339	873
EWAD250D-XS	3138	2234	2355	374	1911	339	873
EWAD280~400D-XS	4040	2234	2355	374	2486	339	873
EWAD470D-XS	4040	2234	2223	414	2412	379	873
EWAD520~620D-XS	4940	2234	2223	414	2412	379	815
EWAD240D-XR	3138	2234	2355	374	1911	339	873
EWAD270~390D-XR	4040	2234	2355	374	2486	339	873
EWAD460D-XR	4040	2234	2223	414	2412	379	873
EWAD510~600D-XR	4940	2234	2223	414	2412	379	815
EWAD230~310D-HS	3339	2234	2223	374	1911	339	873
EWAD340~380D-HS	4040	2234	2223	374	2486	339	873
EWAD420~590D-HS	4040	2234	2223	392	2450	339	873

LEGEND

1 – Condenser Coil
2 – Water heat exchanger (evaporator)
3 – Evaporator water inlet
4 – Evaporator water outlet
5 – Victaulic connection
6 – Operating and control panel
7 – Slot for power and control connection
8 – Fan
9 – Compressor

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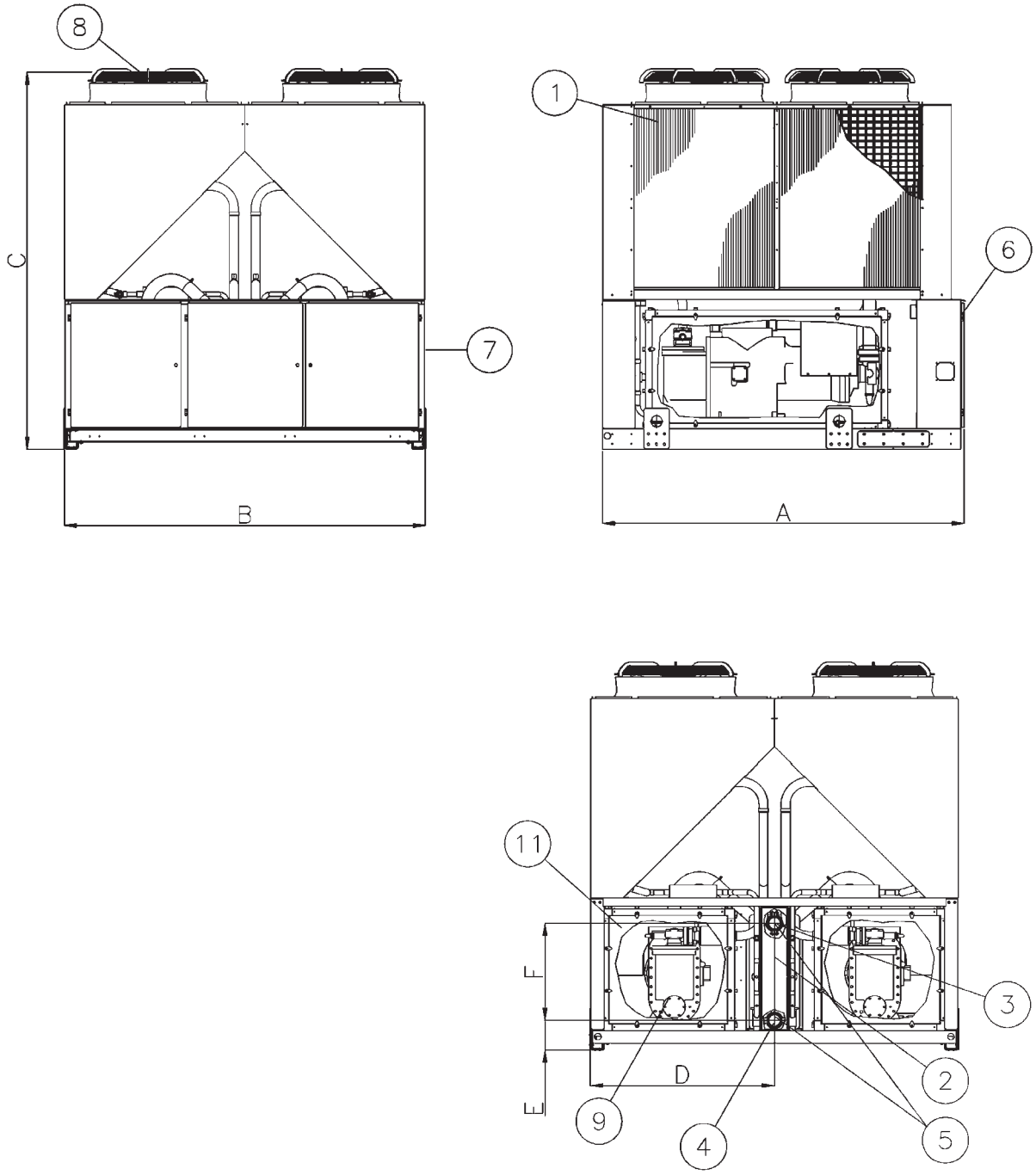
7 Dimensional drawings

7 - 1 Dimensional Drawings



Models	Dimensions (mm)					
EWAD	A	B	C	D	E	F
EWAD180~200D-SL	2239	2234	2355	1117	181	590
EWAD180~190D-SR	2239	2234	2355	1117	181	590
EWAD200~210D-HS	2223	2234	2223	1117	181	590

LEGEND

1 – Condenser Coil
2 – Water heat exchanger (evaporator)
3 – Evaporator water inlet
4 – Evaporator water outlet
5 – Victaulic connection
6 – Operating and control panel
7 – Slot for power and control connection
8 – Fan
9 – Compressor

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8 Sound data

8 - 1 Sound Level Data

EWAD~D-HS

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)
200	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**95.7**
210	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**95.7**
230	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**96.3**
260	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**96.3**
270	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**96.3**
290	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**96.3**
310	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**96.3**
340	79.0	74.3	72.4	78.8	67.8	65.2	56.5	50.8	77.0	**96.7**
380	81.0	76.4	74.4	80.7	70.2	67.4	58.8	52.9	79.0	**98.7**
420	63.0	72.0	70.5	77.0	68.5	71.0	58.5	50.4	77.0	**96.7**
450	63.0	72.0	71.5	77.0	70.0	71.5	58.5	51.5	77.5	**97.7**
480	63.0	72.0	71.5	77.0	70.0	71.5	58.5	51.5	77.5	**97.7**
510	63.0	72.0	71.5	77.0	70.0	71.5	58.5	51.5	77.5	**97.7**
550	64.5	73.5	73.5	78.5	71.5	73.0	60.0	53.0	79.0	**99.2**
590	65.0	74.0	74.0	79.0	72.1	73.6	60.5	53.5	79.5	**99.7**

NOTES

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

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8 Sound data

8 - 1 Sound Level Data

EWAD~D-HS

Unit size	Distance						
	1m	5m	10m	15m	20m	25m	50m
200	0.0	-8.4	-13.4	-16.5	-18.8	-20.6	-26.4
210	0.0	-8.4	-13.4	-16.5	-18.8	-20.6	-26.4
230	0.0	-8.0	-12.9	-16.0	-18.2	-20.1	-25.8
260	0.0	-8.0	-12.9	-16.0	-18.2	-20.1	-25.8
270	0.0	-8.0	-12.9	-16.0	-18.2	-20.1	-25.8
290	0.0	-8.0	-12.9	-16.0	-18.2	-20.1	-25.8
310	0.0	-8.0	-12.9	-16.0	-18.2	-20.1	-25.8
340	0.0	-7.8	-12.6	-15.7	-17.9	-19.7	-25.4
380	0.0	-7.8	-12.6	-15.7	-17.9	-19.7	-25.4
420	0.0	-7.8	-12.6	-15.7	-17.9	-19.7	-25.4
450	0.0	-7.8	-12.6	-15.7	-17.9	-19.7	-25.4
480	0.0	-7.5	-12.3	-15.3	-17.6	-19.3	-25.0
510	0.0	-7.5	-12.3	-15.3	-17.6	-19.3	-25.0
550	0.0	-7.5	-12.3	-15.3	-17.6	-19.3	-25.0
590	0.0	-7.5	-12.3	-15.3	-17.6	-19.3	-25.0

NOTES

Values are dB(A) (pressure level)

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9 Installation

9 - 1 Installation Method

Installation notes

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. The unit must be installed to allow all the maintenance operations.

Handling

Care should be taken to avoid rough handling or shock due to dropping of 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 result in reductions in unit efficiency and capacity.

Moreover the unique microprocessor has the ability to analyse the operating environment of the air cooled chiller and to optimize its performance to stay 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 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.

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9 Installation

9 - 1 Installation Method

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

Minimum recommended installation clearances

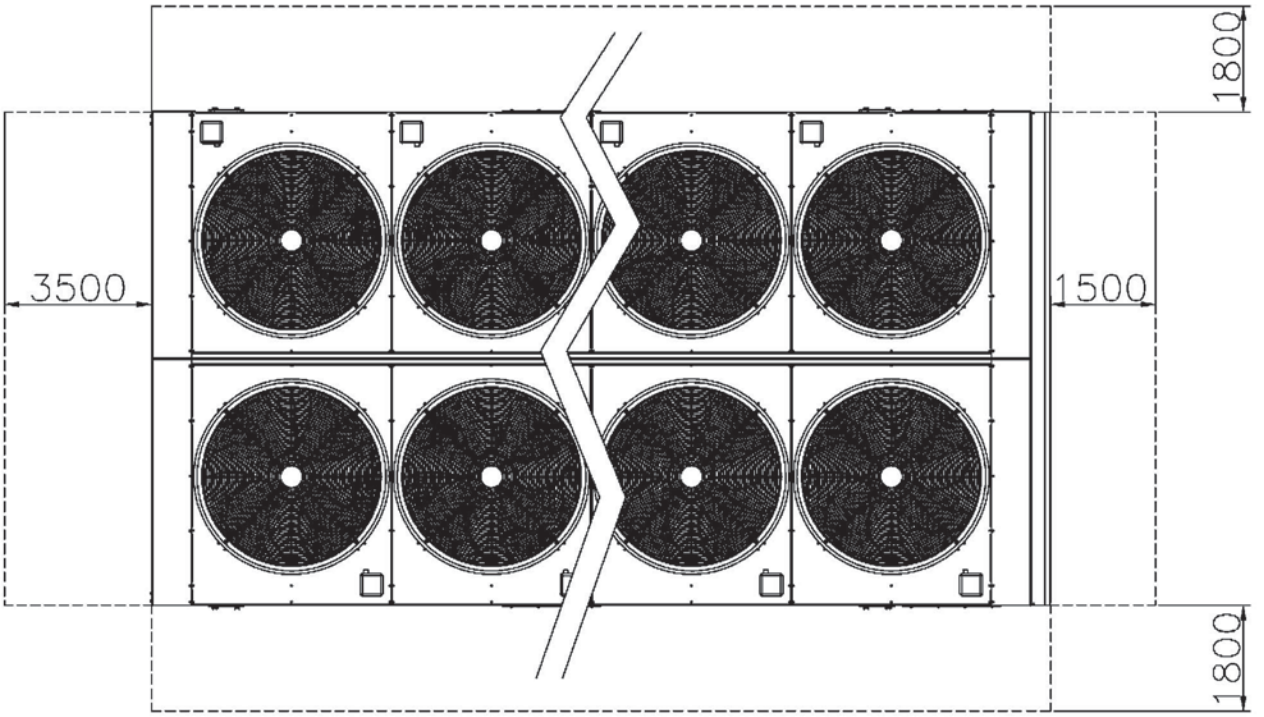

Fig. 1

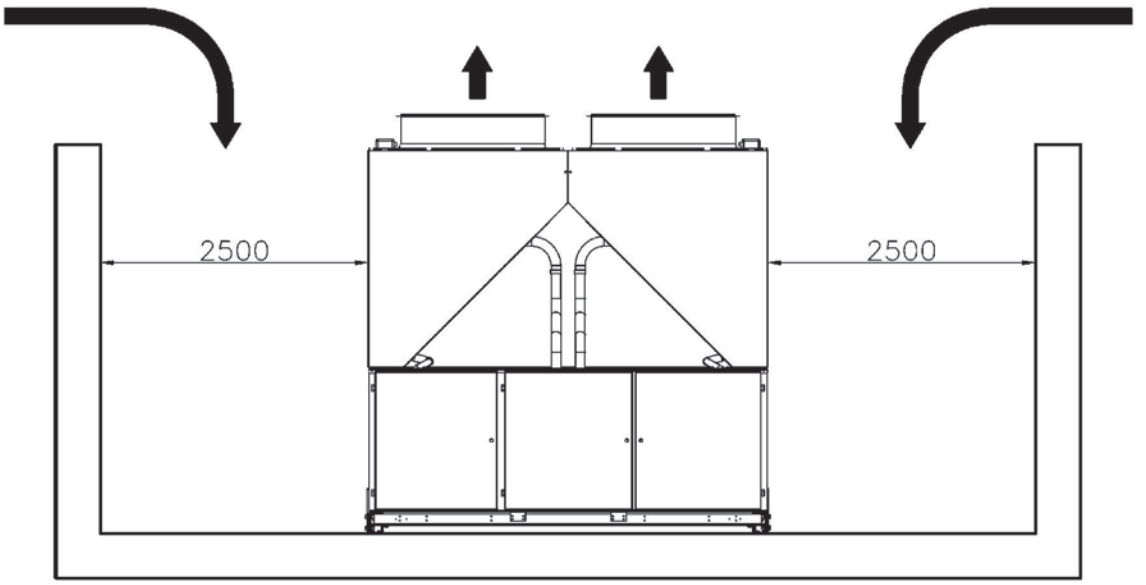

Fig. 2

INN_1-2-3_Rev.00_2

9 Installation

9 - 1 Installation Method

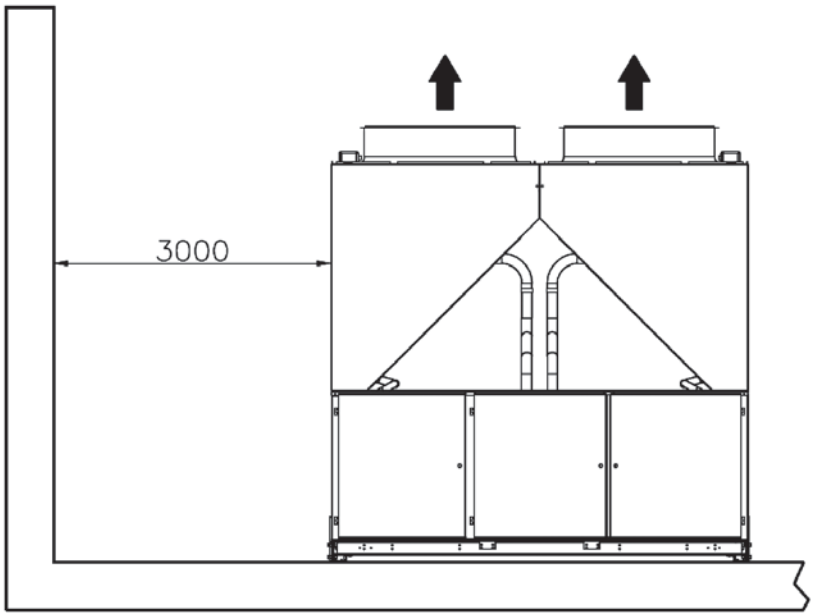

Fig. 3

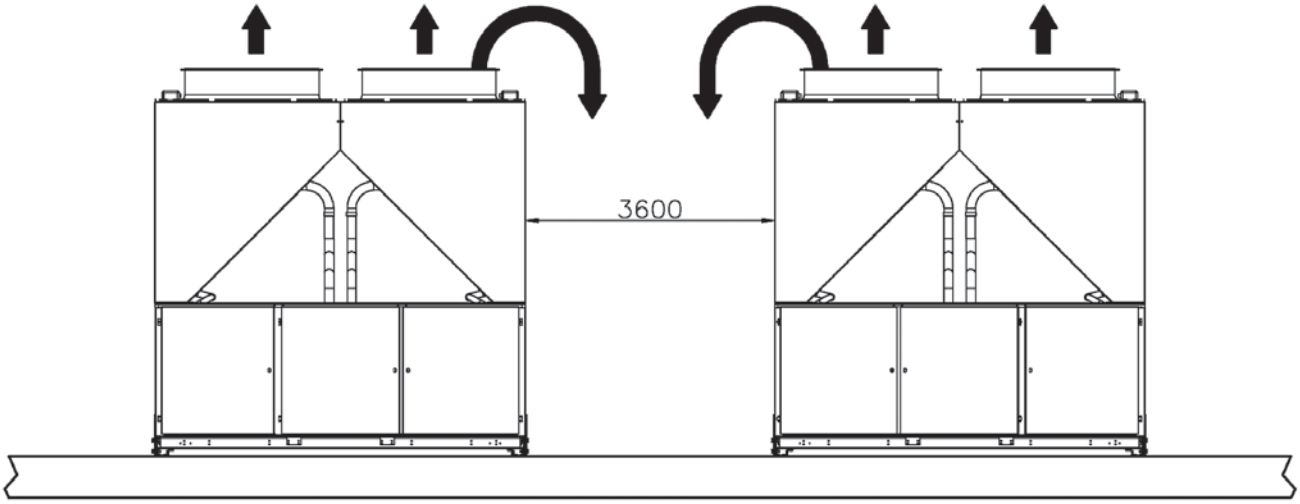

Fig. 4

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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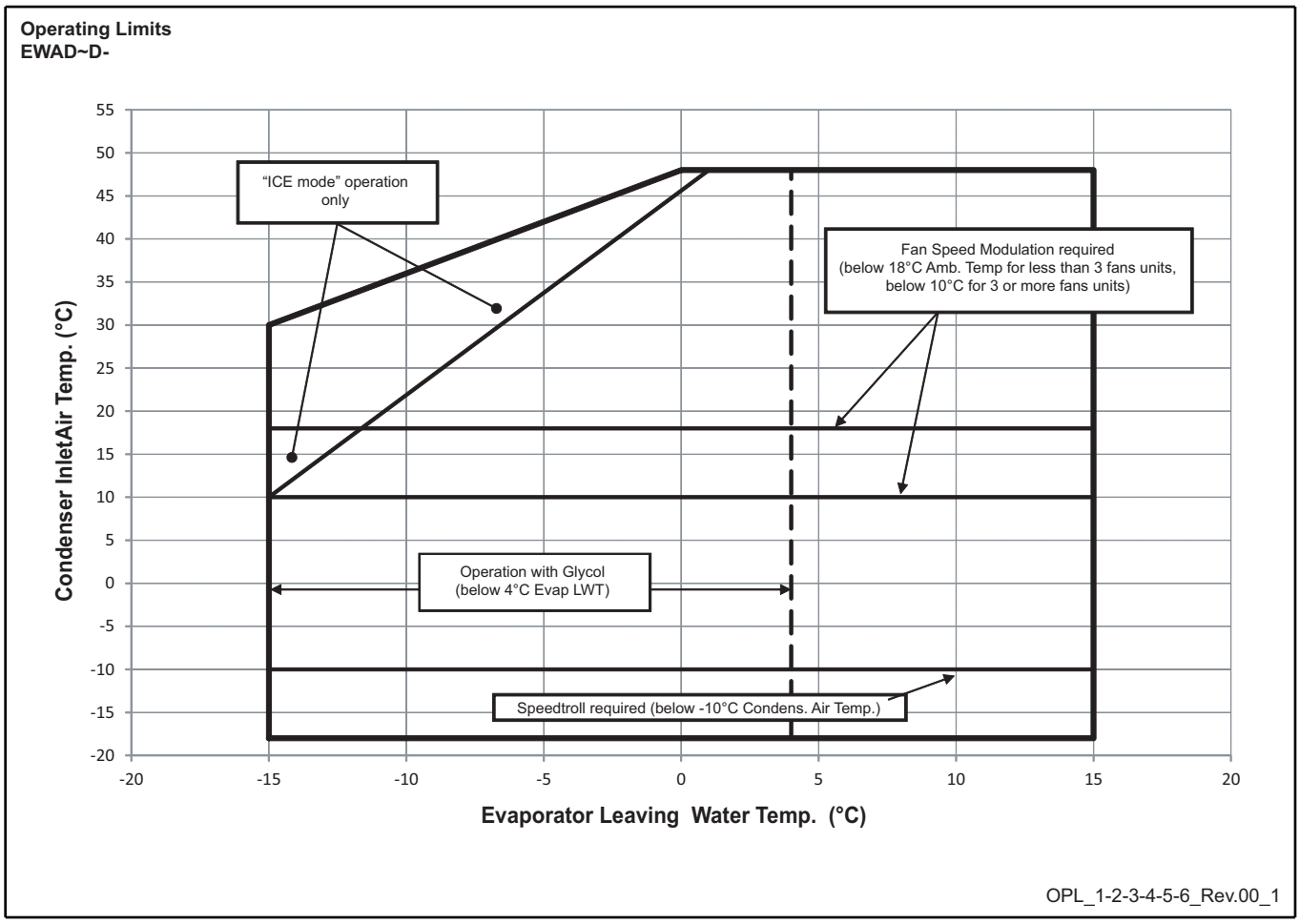
10 Operation range

10 - 1 Operation Range



10 Operation range

10 - 1 Operation Range

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 - Air heat exchanger - 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 operating altitude is 2000 m above sea level.
- Contact factory in case the unit has to be installed at altitudes between 1000 and 2000 m above sea level.

Table 4.1 - Minimum glycol percentage for low water temperature

EWLT (°C)	2	0	-2	-4	-6	-8	-10	-12	-15
Ethylene glycol (%)	10	20	20	20	30	30	30	40	40
Propylene glycol (%)	10	20	20	30	30	30	40	40	40

- ELWT (Evaporator Leaving Water Temperature (°C).
- 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 ambient temperature

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

- Minimum glycol percentage to prevent freezing of water circuit at indicated air ambient temperature.
- 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 (EWLT < 4°C)

EWLT (°C)	-4	-6	-8	-10	-12	-15
Cooling Capacity	0.670	0.613	0.562	0.510	0.455	0.375
Compressor Power Input	0.890	0.870	0.840	0.798	0.755	0.680

- ELWT (Evaporator Leaving Water Temperature (°C).
- 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

- Contact factory for water temperature out of operating limits.

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10 Operation range

10 - 1 Operation Range

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:	**EWAD390D-SS**
Mixture:	Water
Working condition:	ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity:	389 kW
- Power input:	152 kW
- Flow rate (Δt 5°C):	18.60 l/s
- Evaporator pressure drop:	46 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:	389 x 0.972 = 378 kW
- Power input:	152 x 0.986 = 150 kW
- Flow rate (Δt 5°C):	18 (referred to 378 kW) x 1.074 = 19.33 l/s
- Evaporator pressure drop:	49 (refererd to 19.33 l/s) x 1.181 = 58 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:	**EWAD390D-SS**
Mixture:	Water
Standard working condition	ELWT 12/7°C – Condenser inlet air temperature 30°C
- Cooling capacity:	412 kW
- Power input:	139 kW
- Flow rate (Δt 5°C):	19.7 l/s
- Evaporator pressure drop:	51 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:	412 x 0.613 x 0.972 = 245 kW
- Power input:	139 x 0.870 x 0.986 = 119 kW
- Flow rate (Δt 5°C):	11.71 l/s (referred to 245 kW) x 1.074 = 12.58 l/s
- Evaporator pressure drop:	23 kPa (referred to 12.58 l/s) x 1.181 = 27 kPa

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10 Operation range

10 - 1 Operation Range

Table 7.1 - 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

ESP table refers to fan diameter Ø800, available on units as follows: EWAD390~580D-SS, EWAD470~620D-XS, EWAD420~590D-HS

Table 7.2 - Available fan static pressure correction factors

"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

ESP table refers to fan diameter Ø800, available on units as follows: EWAD320~530D-SL/SR, EWAD460~600D-XR

How to use the Correction factors proposed in the previous tables

Example

Unit Size: **EWAD390D-SS**

- External static pressure **0 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 389 kW
- Power input: 152 kW
- Maximum CIAT 48°C (see graphic operating limit)

- External static pressure **40 Pa**
- Working condition: ELWT 12/7°C – Condenser inlet air temperature 35°C
- Cooling capacity: 389 x 0.993 = 386 kW
- Power input: 152 x 1.018= 155 kW
- Maximum CIAT 48 - 1.0 = 47°C

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10 Operation range

10 - 1 Operation Range

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	6.0 ~ 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 40	Below 30	Below 30	Below 30	Below 30	Below 30	Corrosion + Scale
		(µS/cm) at 25°C	(Below 800)	(Below 300)	(Below 400)	(Below 400)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	(Below 300)	Corrosion + Scale
	Chloride ion	[mgCl^{2-}/l]	Below 200	Below 50	Below 50	Below 50	Below 50	Below 50	Below 50	Below 30	Below 30	Corrosion
	Sulfate ion	[mgSO^{2-}_4/l]	Below 200	Below 50	Below 50	Below 50	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 50	Below 50	Below 50	Below 50	Below 50	Below 50	Scale
	Total hardness	[mg$CaCO_3$/l]	Below 200	Below 70	Below 70	Below 70	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
Items to be referred to	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	[mg$NH+_4$/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

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.

OPL_1-2-3-4-5-6_Rev.00_5

10 Operation range

10 - 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)

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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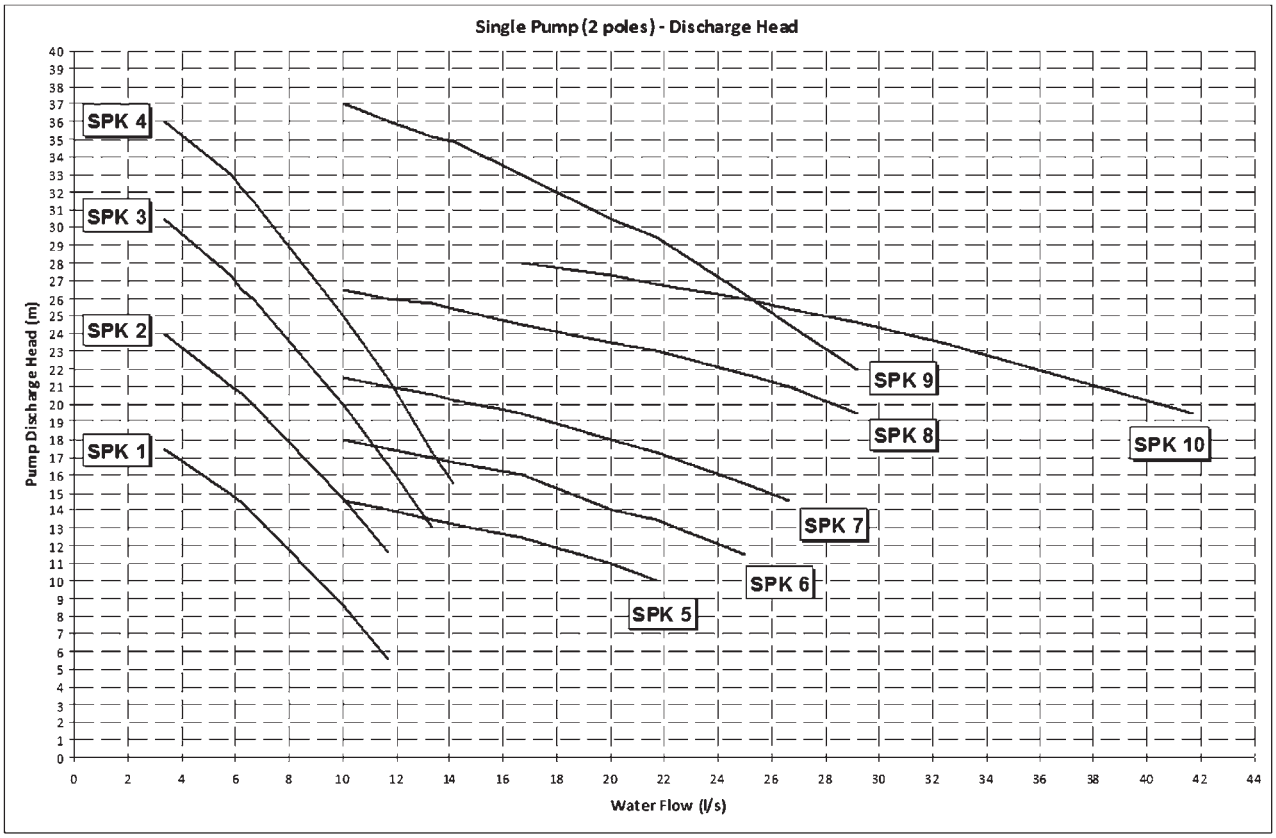
11 Hydraulic performance

11 - 1 Pump Characteristics

Water Pump Kit - Available External Static Pressure



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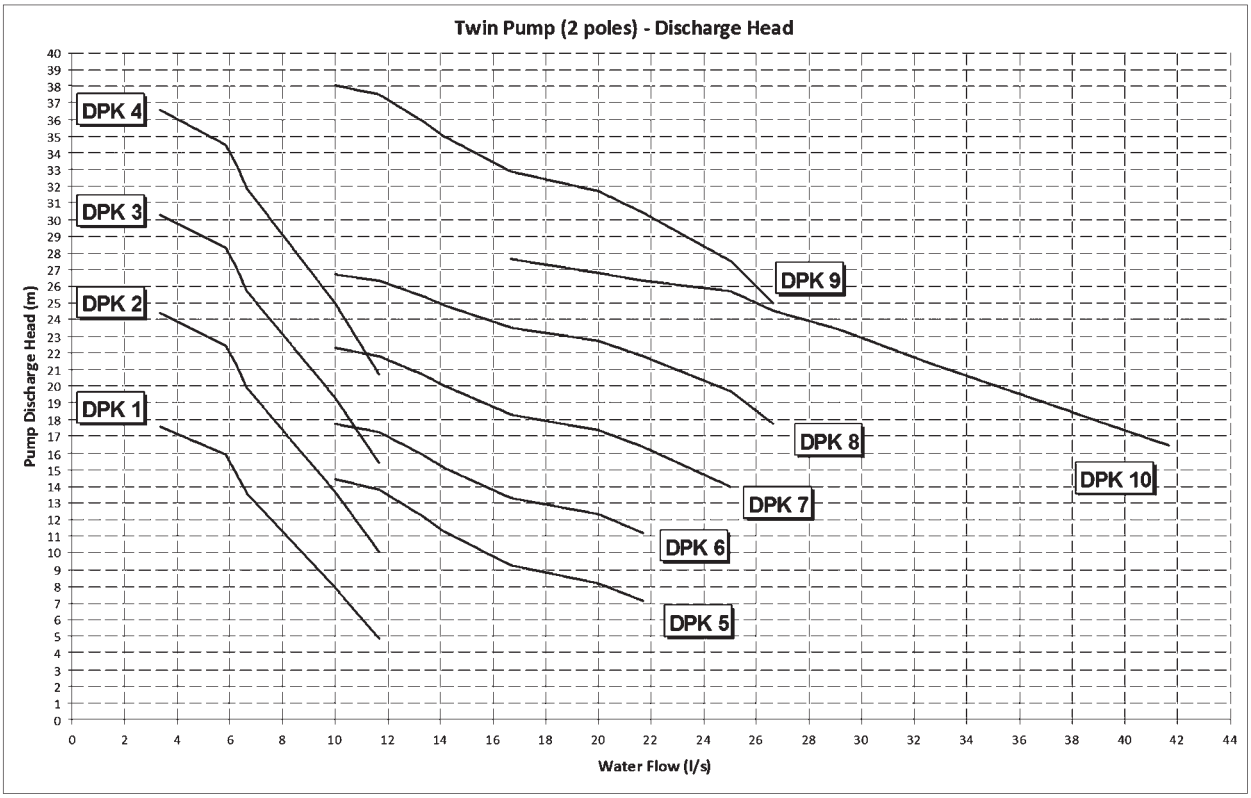
Water Pump Kit - Available External Static Pressure



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11 Hydraulic performance

11 - 1 Pump Characteristics

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	1.5	3.5	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 2	2.2	5.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 3	3.0	6.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 4	4.0	8.1	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 5	3.0	6.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 6	4.0	8.1	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 7	5.5	10.1	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 8	7.5	13.7	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 9	11.0	20.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	SPK 10	11.0	20.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
Double Pump	DPK 1	1.5	3.5	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 2	2.2	5.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 3	3.0	6.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 4	4.0	8.1	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 5	3.0	6.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 6	4.0	8.1	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 7	5.5	10.1	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 8	7.5	13.7	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 9	11.0	20.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130
	DPK 10	11.0	20.0	400V-3ph-50hz	PN10	IP55	F	-10 ~ 130

NOTES

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

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11 Hydraulic performance

11 - 1 Pump Characteristics

Water Pump Kit - Combination Matrix

Version	Size	Single Pump									
		SPK 1	SPK 2	SPK 3	SPK 4	SPK 5	SPK 6	SPK 7	SPK 8	SPK 9	SPK 10
EWAD~D-SS	390						X	X	X	X	X
	440						X	X	X	X	X
	470						X	X	X	X	X
	510						X	X	X	X	X
	530							X	X	X	X
	560							X	X	X	X
	580								X	X	X
EWAD~D-SL	180	X	X	X	X						
	200	X	X	X	X						
	230		X	X	X		X	X	X	X	
	250			X	X		X	X	X	X	
	260			X	X		X	X	X	X	
	280			X	X	X	X	X	X	X	
	300					X	X	X	X	X	
	320					X	X	X	X	X	
	370					X	X	X	X	X	X
	400					X	X	X	X	X	X
	440						X	X	X	X	X
	480						X	X	X	X	X
	510						X	X	X	X	X
	530							X	X	X	X
EWAD~D-SR	180	X	X	X	X						
	190	X	X	X	X						
	220		X	X	X		X	X	X	X	
	240		X	X	X		X	X	X	X	
	250			X	X		X	X	X	X	
	270			X	X		X	X	X	X	
	280			X	X		X	X	X	X	
	310					X	X	X	X	X	
	370					X	X	X	X	X	X
	400					X	X	X	X	X	X
	440						X	X	X	X	X
	480						X	X	X	X	X
	510						X	X	X	X	X
	530							X	X	X	X
EWAD~D-SX	210		X	X	X						
	230		X	X	X	X	X	X	X	X	
	250			X	X	X	X	X	X	X	
	270			X	X	X	X	X	X	X	
	290				X	X	X	X	X	X	
	300					X	X	X	X	X	
	310					X	X	X	X	X	
	370					X	X	X	X	X	X
	410					X	X	X	X	X	X
	450					X	X	X	X	X	X
	490					X	X	X	X	X	X
EWAD~D-XS	250			X	X	X	X	X	X	X	
	280			X	X	X	X	X	X	X	
	300					X	X	X	X	X	
	330					X	X	X	X	X	
	350					X	X	X	X	X	X
	380					X	X	X	X	X	X
	400					X	X	X	X	X	X
	470						X	X	X	X	X
	520						X	X	X	X	X
	580								X	X	X
	620										X
EWAD~D-XR	240		X	X	X	X	X	X	X	X	
	270			X	X	X	X	X	X	X	
	300					X	X	X	X	X	
	320					X	X	X	X	X	
	350					X	X	X	X	X	
	370					X	X	X	X	X	X
	390					X	X	X	X	X	X
	460						X	X	X	X	X
	510						X	X	X	X	X
	560								X	X	X
	600								X	X	X
EWAD~D-HS	200		X	X	X						
	210		X	X	X						
	230		X	X	X	X	X	X	X	X	
	260			X	X	X	X	X	X	X	
	270			X	X	X	X	X	X	X	
	290				X	X	X	X	X	X	
	310					X	X	X	X	X	
	340					X	X	X	X	X	
	380					X	X	X	X	X	X
	420					X	X	X	X	X	X
	450						X	X	X	X	X
	480						X	X	X	X	X
	510						X	X	X	X	X
	550							X	X	X	X
	590								X	X	X

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11 Hydraulic performance

11 - 1 Pump Characteristics

Water Pump Kit - Combination Matrix

Version	Size	Double Pump									
		DPK 1	DPK 2	DPK 3	DPK 4	DPK 5	DPK 6	DPK 7	DPK 8	DPK 9	DPK 10
EWAD~D~SS	390						X	X	X	X	X
	440						X	X	X	X	X
	470							X	X	X	X
	510							X	X	X	X
	530								X	X	X
	560								X	X	X
	580										X
EWAD~D~SL	180	X	X	X	X						
	200	X	X	X	X						
	230		X	X	X			X	X	X	
	250						X	X	X	X	
	260							X	X	X	
	280					X	X	X	X	X	
	300					X	X	X	X	X	
	320						X	X	X	X	
	370						X	X	X	X	X
	400						X	X	X	X	X
	440						X	X	X	X	X
	480							X	X	X	X
	510							X	X	X	X
	530								X	X	X
EWAD~D~SR	180	X	X	X	X						
	190	X	X	X	X						
	220		X	X	X		X	X	X	X	
	240		X	X	X		X	X	X	X	
	250						X	X	X	X	
	270							X	X	X	
	280							X	X	X	
	310							X	X	X	
	370							X	X	X	X
	400							X	X	X	X
	440							X	X	X	X
	480							X	X	X	X
	510							X	X	X	X
	530								X	X	X
EWAD~D~SX	210		X	X	X						
	230		X	X	X	X	X	X	X	X	
	250			X	X	X	X	X	X	X	
	270			X	X	X	X	X	X	X	
	290				X	X	X	X	X	X	
	300					X	X	X	X	X	
	310					X	X	X	X	X	
	370					X	X	X	X	X	X
	410					X	X	X	X	X	X
	450					X	X	X	X	X	X
	490						X	X	X	X	X
EWAD~D~XS	250						X	X	X	X	
	280					X	X	X	X	X	
	300					X	X	X	X	X	
	330					X	X	X	X	X	
	350						X	X	X	X	X
	380						X	X	X	X	X
	400						X	X	X	X	X
	470							X	X	X	X
	520							X	X	X	X
	580										X
	620										X
EWAD~D~XR	240		X	X	X		X	X	X	X	
	270					X	X	X	X	X	
	300					X	X	X	X	X	
	320					X	X	X	X	X	
	350						X	X	X	X	
	370						X	X	X	X	X
	390						X	X	X	X	X
	460							X	X	X	X
	510							X	X	X	X
	560										X
	600										X
EWAD~D~HS	200	X	X	X	X						
	210	X	X	X	X						
	230		X	X	X		X	X	X	X	
	260							X	X	X	
	270					X	X	X	X	X	
	290					X	X	X	X	X	
	310						X	X	X	X	
	340						X	X	X	X	
	380						X	X	X	X	X
	420						X	X	X	X	X
	450						X	X	X	X	X
	480							X	X	X	X
	510							X	X	X	X
	550								X	X	X
	590										X

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11 Hydraulic performance

11 - 2 Partial Heat Recovery Pressure Drop

Partial Heat Recovery pressure drops

EWAD~D-HS	200	210	230	260	270	290	310	340	380	420	450	480	510	550	590
Heating Capacity (kW)	84	87	98	107	116	123	134	123	122	173	191	207	223	238	191
Water Flow (l/s)	4.00	4.17	4.67	5.11	5.55	5.88	6.40	5.86	5.84	8.25	9.12	9.90	10.67	11.38	9.11
Heat Recovery Pressure Drops (kPa)	4	5	5	6	6	6	7	5	4	7	2	3	3	3	2

NOTES

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – condenser air inlet 35°C – water heat recovery in/out 50/60°C

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11 Hydraulic performance

11 - 3 Total Heat Recovery Pressure Drop

Partial Total Heat Recovery pressure drops

EWAD~D-HS	200	210	230	260	270	290	310	340	380	420	450	480	510	550	590
Heating Capacity (kW)	207	216	243	265	289	306	333	314	314	427	473	515	555	592	488
Water Flow (l/s)	9.89	10.34	11.59	12.68	13.82	14.63	15.91	15.00	14.98	20.41	22.59	24.61	26.52	28.28	23.33
Heat Recovery Pressure Drops (kPa)	23	25	28	28	31	31	35	26	23	37	13	15	17	19	11

NOTES

Water flow and pressure drop referred to nominal codition: evaporator water in/out: 12/7°C – saturated discharge temperature 45°C – water heat recovery in/out 40/45°C

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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:

$$PD_2\ (kPa) = PD_1\ (kPa) \times \left(\frac{Q_2\ (l/s)}{Q_1\ (l/s)} \right)^{1.80}$$

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 EWAD390D-SS has been selected for working at the following conditions:
- Total heat recovery leaving water temperature 40/50°C
The heating capacity at these working conditions is: 415 kW
The water flow at these working conditions is: 9.91 l/s

The unit EWAD390D-SS at nominal working conditions has the following data:
- Total heat recovery leaving water temperature 40/45°C
- condenser air inlet: 35°C
The heating capacity at these working conditions is: 427 kW
The water flow at these working conditions is: 20.41 l/s
The pressure drop at these working conditions is: 37 kPa

The pressure drop at the selected working condition will be:

$$PD_2\ (kPa) = 37\ (kPa) \times \left(\frac{9.91\ (l/s)}{20.41\ (l/s)} \right)^{1.80}$$

$$PD_2\ (kPa) = 10\ (kPa)$$

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Technical Specification for Water Cooled Screw Chiller

GENERAL

The air cooled screw chiller will be designed and manufactured in accordance with 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 Stds	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 air cooled screw chiller(s) : ..... unit(s)
- ✓ Cooling capacity for single air cooled screw chiller : ..... kW
- ✓ Power input for single air cooled screw 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 independent refrigerant circuits, semi-hermetic type rotary single screw compressor, electronic expansion device (EEXV), refrigerant 'plate to plate' or 'shell&tube' heat exchanger (depending on the size), air-cooled condenser section, R-134a refrigerant, lubrication system, motor starting components, discharge line shut-off valve, suction 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.

NOISE 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.

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DIMENSIONS

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

CHILLER COMPONENTS

Compressors

- ✓ The compressor is semi-hermetic, single-screw type with gate-rotors made of carbon impregnated engineered composite material or the latest high-strength fibre reinforced star material (depending on the size). The gaterotor supports will be constructed of cast iron.
- ✓ 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 slide valve position.
- ✓ The unit capacity control shall be infinitely modulating, from 100% down to 25% for each circuit. The chiller shall be capable of stable operation to a minimum of 12.5% 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.
- ✓ The unit control logic shall manage the compressor slides to exactly match the plant load request in order to keep constant the set point for delivered chilled water temperature.
- ✓ 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:
  - ○ High condenser pressure
  - ○ Low evaporating refrigerant temperature

Evaporator

- ✓ The units shall be equipped (depending on the size) with a ‘plate to plate’ or ‘shell&tube’ evaporator:
  - ○ The ‘plate to plate’ evaporator is made of stainless steel brazed plates and is covered with a 20mm closed cell insulation material. The exchanger is equipped with a heater for protection against freezing down to –28°C and evaporator water outlet connections of 3”. Each evaporator has 1 circuit (one compressor) and the water filter is standard.
  - ○ The ‘shell&tube’ evaporator is made with copper tubes rolled into steel tubesheets. The evaporators are single-pass on both the refrigerant and water sides for pure counter-flow heat exchange and low refrigerant pressure drops. The external shell is covered with a 10mm closed cell insulation material and the evaporator water outlet connections are provided with victaulic kit (as standard). Each evaporator has 2 circuits, one for each compressor and the water filter is standard.
- ✓ The evaporator is manufactured in accordance to PED approval.

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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 independent refrigerant circuits.
- ✓ Each circuit shall include as standard: electronic expansion device piloted by unit's microprocessor control, compressor discharge shut-off valve, suction 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:
  - ○ in-line single pump low and high lifting
  - ○ in-line twin pumps low and high lifting

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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 Wye-Delta type (Y-Δ).
- ✓ 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:
  - ○ leaving water temperature reset by controlling the water temperature Δt, by a remote 4-20mA DC signal or by controlling the external ambient temperature;
  - ○ soft load function to prevent the system from operating at full load during the chilled fluid pulldown period;
  - ○ password protection of critical parameters of control;
  - ○ start-to-start and stop-to-start timers to provide minimum compressor off-time with maximum motor protection;
  - ○ communication capability with a PC or remote monitoring;
  - ○ discharge pressure control through intelligent cycling of condenser fans;
  - ○ lead-lag selection manual or automatically by circuit run hours;
  - ○ double set point for brine unit version;
  - ○ 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:
  - ○ 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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