

PRODUCT SELECTION DATA



Unit with option 279 (compressor enclosure)

- Compactness
- Extended operating envelope
- Reduced refrigerant charge
- Full list of options - maximum configurability

Air-Cooled Liquid Chillers

30XAS 242 - 482



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AQUAFORCE

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30XAS 242-482

Nominal cooling capacity 242-482 kW

50 Hz

Introduction

The Aquaforce liquid chillers are the premium solution for industrial and commercial applications where installers, consultants and building owners require optimal performances and maximum quality. The units are designed to operate up to 55 °C outside air temperature.

The Aquaforce liquid chillers are designed to meet current and future requirements in terms of energy efficiency and operating sound levels. They use the best technologies available today:

- Twin-rotor screw compressors with a variable capacity valve.
- Single refrigerant R-134a.
- Low-noise generation IV Flying Bird fans made of composite material.
- Aluminium micro-channel heat exchangers (MCHE)
- Touch Pilot control system.

To meet to all environmental and economic requirements, the Aquaforce is available in two versions:

One offers an extremely low noise level while at the same time boasting superior energy efficiency.

The other offers unequalled energy efficiency to satisfy the most stringent demands of building owners wanting to reduce operating costs to the minimum. This version is also recommended for applications in geographical zones where the air temperature is very high.

Customer Benefits

Very economical operation

- Exceptionally high full load and part load energy efficiency:
 - Eurovent energy efficiency class A and C.
 - Standardised Eurovent values in accordance with EN14511-3:2013: EER up to 3,2 and ESEER up to 4,0.
 - New twin-rotor screw compressor equipped with a high-efficiency motor and a variable capacity valve that permits exact matching of the cooling capacity to the load.
 - All aluminium condenser with high-efficiency micro-channels.
 - Flooded shell-and-tube evaporator to increase the heat exchange efficiency.
 - Electronic expansion device permitting operation at a lower condensing pressure and improved utilisation of the evaporator heat exchange surface (superheat control).
 - Economiser system with electronic expansion device for increased cooling capacity.

Low operating sound levels

- Compressors
 - Discharge dampers integrated in the oil separator (Carrier patent).
 - Silencer on the economiser return line.
 - Acoustic compressor and oil separator enclosure reducing radiated noise (option).
- Condenser section
 - Condenser coils in V-shape with an open angle, allowing quieter air flow across the coil
 - Low-noise 4th generation Flying Bird fans, made of a composite material (Carrier patent) are now even quieter and do not generate intrusive low-frequency noise
 - Rigid fan mounting preventing start-up noise (Carrier patent).

Easy and fast installation

- Integrated hydronic module (option)
 - Centrifugal high-pressure water pump
 - Dual pump with operating time balancing and automatic changeover to the back-up pump if a fault develops
 - Water filter protecting the water pump against circulating debris
 - High-capacity membrane expansion tank ensures pressurisation of the water circuit
 - Thermal insulation and aluminium protection (option)
 - Pressure sensor to check filter pollution and for direct numerical display of the water flow rate with an estimate of the instantaneous cooling capacity at the control interface
 - Water flow control valve.
- Simplified electrical connections
 - Main disconnect switch with high trip capacity
 - Transformer to supply the integrated control circuit (400/24 V).
- Fast commissioning
 - Systematic factory operation test before shipment
 - Quick-test function for step-by-step verification of the instruments, expansion devices, fans and compressors.

Environmental care

- R-134a refrigerant
 - Refrigerant of the HFC group with zero ozone depletion potential
 - 30% reduction in the refrigerant charge through the use of micro-channel heat exchangers
- Leak-tight refrigerant circuit
 - Reduction of leaks as no capillary tubes and flare connections are used
 - Verification of pressure transducers and temperature sensors without transferring refrigerant charge
 - Liquid line service valve for simplified maintenance (option).

Absolute reliability

- Screw compressors
 - Industrial-type screw compressors with oversized bearings and motor cooled by suction gas.
 - All compressor components are easily accessible on site minimising down-time.
 - Protection increased by an electronic board.
- Air condenser
 - All aluminium micro-channel heat exchanger (MCHE) with high corrosion resistance. The all aluminium design eliminates the formation of galvanic currents between aluminium and copper that cause coil corrosion in saline or corrosive environments.
- Evaporator
 - Thermal insulation with aluminium sheet finish (option) for perfect resistance to external aggression (mechanical and UV protection).
- Auto-adaptive control
 - Control algorithm prevents excessive compressor cycling (Carrier patent)
 - Automatic compressor unloading in case of abnormally high condensing pressure. If condenser coil fouling or fan failure occurs, the Aquaforce continues to operate, but at reduced capacity
- Exceptional endurance tests
 - Partnerships with specialised laboratories and use of limit simulation tools (finite element calculation) for the design of critical components.
 - Transport simulation test in the laboratory on a vibrating table. The test is based on a military standard and equi-valent to 4000 km by truck.
 - Salt mist corrosion resistance test in the laboratory for increased corrosion resistance.

TECHNICAL INSIGHTS

Touch Pilot Control

Touch Pilot control, 5" user interface



- New innovative smart control features:
 - An intuitive and user-friendly, coloured, 5" interface (7" optional)
 - Direct access to the unit's technical drawings and the main service documents
 - Screen-shots with coincisive and clear information in local languages

- Complete menu, customised for different users (end user, service personnel and Carrier-factory technicians)
- Easy access to the controller box with inclined touch screen mounting to ensure legibility under any lighting conditions
- Safe operation and unit setting: password protection ensures that unauthorised people cannot modify any advanced parameters
- Simple and "smart" intelligence uses data collection from the constant monitoring of all machine parameters to optimise unit operation.
- Energy management:
 - Internal time schedule clock controls chiller on/off times and operation at a second set-point
 - The DCT (Data Collection Tool) records the alarms history to simplify and facilitate service operations.

Remote Management (Standard)

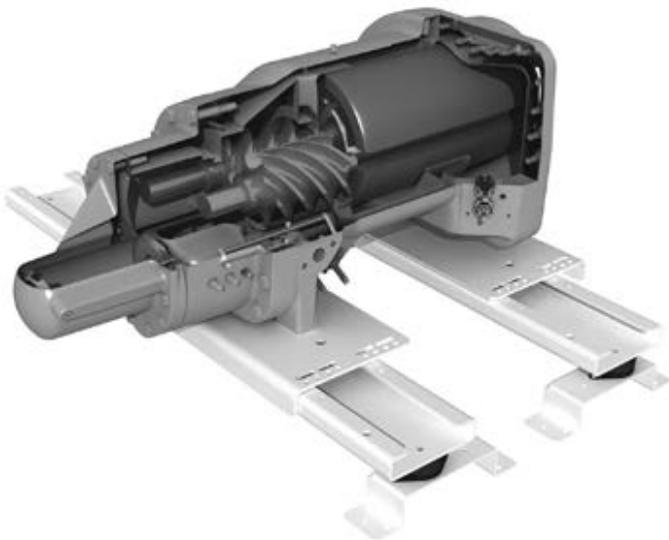
- Units with Touch Pilot control can be easily accessed from the internet, using a PC with an Ethernet connection. This makes remote control quick and easy and offers significant advantages for service operations.
- Aquaforce is equipped with an RS485 serial port that offers multiple remote control, monitoring and diagnostic possibilities. When networked with other Carrier equipment through the CCN (Carrier Comfort Network - proprietary protocol), all components form a HVAC system fully-integrated and balanced through one of the Carrier's network system products, like the Chiller System Manager or the Plant System Manager (optional).
- Aquaforce also communicates with other building management systems via optional communication gateways.
- The following commands/visualisations are possible from remote connection:
 - Start/stop of the machine
 - Dual set-point management: through a dedicated contact is possible to activate a second set-point (example: unoccupied mode)
 - Demand limit setting: to limit the maximum chiller capacity to a predefined value
 - Water pump control: these outputs control the contactors of one/two evaporator water pums
 - Water pumps on reversal (only with options 116C/116G): these contacts are used to detect a water pump operation fault and automatically change over to the other pump
 - Operation visualisation: indication if the unit is operating or if it's in stand-by (no cooling load) - alarm visualisation.

Remote Management (EMM option)

- The Energy Management Module (EMM) offers extended remote control possibilities:
 - Room temperature: Permits set-point reset based on the building indoor air temperature (if Carrier thermostat are installed)
 - Set-point reset: Ensures reset of the cooling set-point based on a 4-20 mA or 0-10 V signal
 - Demand limit: Permits limitation of the maximum chiller capacity based on 0-10 V signal

- Demand limit 1 and 2: Closing of these contacts limits the maximum chiller capacity to two predefined values
- User safety: This contact can be used for any customer safety loop; opening the contact generates a specific alarm
- Ice storage end: When ice storage has finished, this input permits return to the second set-point (unoccupied mode)
- Time schedule override: Closing of this contact cancels the time schedule effects
- Out of service: This signal indicates that the chiller is completely out of service
- Chiller capacity: This analogue output (0-10 V) gives an immediate indication of the chiller capacity
- Alert indication: This volt-free contact indicates the necessity to carry out a maintenance operation or the presence of a minor fault
- Compressors running status: Set of outputs (as many as the compressors number) indicating which compressors are running.

06T Screw Compressor



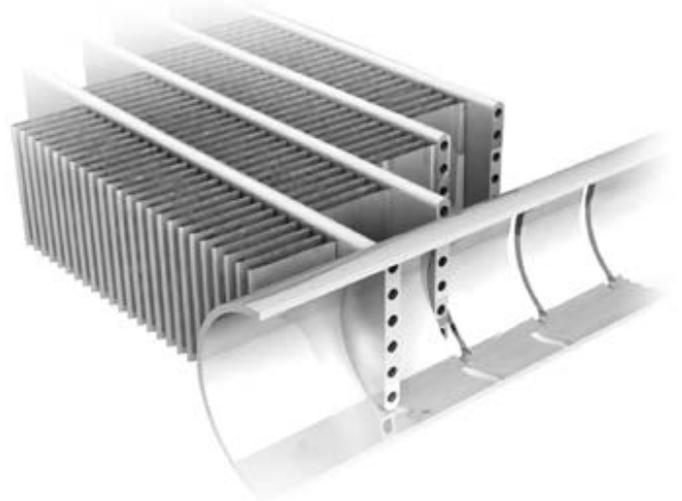
The Carrier 06T screw compressor benefits from Carrier's long experience in the development of twin-rotor screw compressors. The compressor is equipped with bearings with oversized rollers, oil pressure lubricated for reliable and durable operation, even at maximum load.

A variable control valve controlled by the oil pressure permits infinitely variable cooling capacity. This system allows optimal adjustment of the compressor cooling capacity and ensures exceptionally high stability of the chilled water leaving temperature.

Among the other advantages: if a fault occurs e.g. if the condenser is fouled or at very high outside temperature, the compressor does not switch off, but continues operation with a reduced capacity (unloaded mode).

The compressor is equipped with a separate oil separator that minimises the amount of oil in circulation in the refrigerant circuit and with its integrated silencer considerably reduces discharge gas pulsations for much quieter operation.

Novation® Heat Exchangers with Micro-Channel coil Technology



Already utilised in the automobile and aeronautical industries for many years, the MCHE micro-channel heat exchanger used in the Aquaforce is entirely made of aluminium. This one-piece concept significantly increases its corrosion resistance by eliminating the galvanic currents that are created when two different metals (copper and aluminium) come into contact in traditional heat exchangers. Unlike traditional heat exchangers the MCHE heat exchanger can be used in moderate marine and urban environments (Carrier recommendation).

From an energy efficiency point-of-view the MCHE heat exchanger is approximately 10% more efficient than a traditional coil and allows a 30% reduction in the amount of refrigerant used in the chiller. The low thickness of the MCHE reduces air pressure losses by 50% and makes it susceptible to very little fouling (e.g. by sand). Cleaning of the MCHE heat exchanger is very fast using a high-pressure washer.

To ensure constant level of performance during time and protect coils from early deterioration or, what's worse, refrigerant leaks, Carrier offers (as options) dedicated treatments for installations in corrosive environments.

The Novation® heat exchangers with Enviro-Shield protection (option 262) are recommended for installations in moderately corrosive environments. The Enviro-Shield protection utilises corrosion inhibitors which actively arrest oxidation in case of mechanical damage.

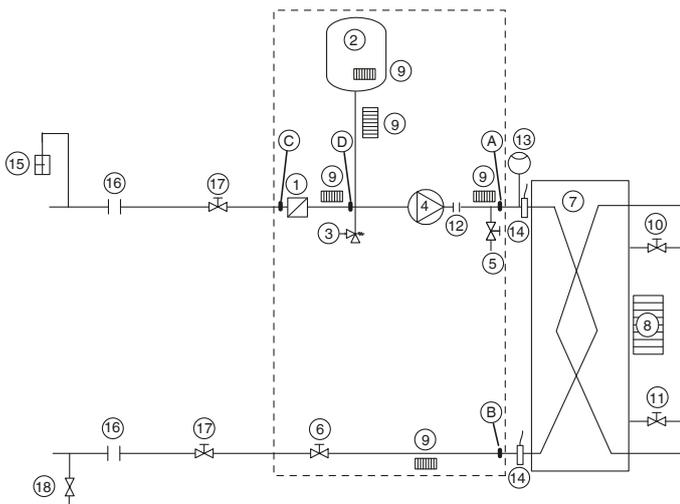
The Novation® heat exchangers with the exclusive Super Enviro-Shield protection (option 263) are recommended for installations in corrosive environments. The Super Enviro-Shield protection consist in an extremely durable and flexible epoxy coating uniformly applied over all coil surfaces for complete isolation from the contaminated environment.

Options

Options	No.	Description	Advantages	Use
Corrosion protection, traditional coils	2B	Factory application of Blygold Polual treatment on the copper/ aluminium coils	Improved corrosion resistance, recommended for industrial, rural and marine environments	30XAS 242-482
Corrosion protection, traditional coils	3A	Fins made of pre-treated aluminium (polyurethane and epoxy)	Improved corrosion resistance, recommended for moderate marine and urban environments	30XAS 242-482
Unit equipped for air discharge ducting	10	Fans equipped with discharge connection flanges - maximum available pressure 60 Pa	Facilitates connections to the discharge ducts	30XAS 242-482
IP54 control box	20A	Increased leak tightness of the unit	Protects the inside of the electrical box from dusts, water and sand. In general, this option is recommended for installations in polluted environments	30XAS 242-482
Grilles and enclosure panels	23	Metal grilles on the 4 unit sides, plus side enclosure panels at each end of the coil	Improves aesthetics, protection against intrusion to the unit interior, coil and piping protection against impacts.	30XAS 242-482
Enclosure panels	23A	Side enclosure panels at each end of the coil	Improves aesthetics, coil and piping protection against impacts.	30XAS 242-482
Winter operation down to -20 °C	28	Fan speed control via frequency converter	Stable unit operation for air temperature down to -20 °C	30XAS 242-482
Evaporator frost protection	41A	Electric resistance heater on the evaporator and discharge valve	Evaporator frost protection down to -20 °C outside temperature	30XAS 242-482
Evap.and hydraulic mod. frost protection	41B	Electric resistance heater on evaporator, discharge valve and hydronic module	Evaporator and hydronic module frost protection down to -20 °C outside temperature	30XAS 282-482
Total heat recovery	50	Unit equipped with additional heat exchanger in parallel with the condenser coils.	Production of free hot-water simultaneously with chilled water production	30XAS 242-482
Master/slave operation	58	Unit equipped with supplementary water outlet temperature sensor kit to be field-installed allowing master/slave operation of two units connected in parallel	Optimised operation of two units connected in master/slave operation with operating time equalisation	30XAS 242-482
Service valve set	92	Liquid line valve (evaporator inlet), compressor suction and discharge line valves and economiser line valve	Allow isolation of various refrigerant circuit components for simplified service and maintenance	30XAS 242-482
Compressor discharge valves	93A	Shut-off valve on the compressor discharge piping	Simplified maintenance	30XAS 242-482
HP dual-pump hydronic module	116C	Complete hydronic module equipped with water filter, expansion tank with relief valve, two high pressure pumps, drain valve and water flow control valve. For more details, refer to the dedicated chapter	Easy and fast installation (plug & play). Increased system reliability	30XAS 282-482
High energy efficiency	119	Higher air flow through the condenser coils improving heat exchange efficiency on the condenser	Energy cost reduction and extended operating envelope (full load operation at higher air temperature)	30XAS 242-482
J-Bus gateway	148B	Two-directional communication board complying with JBus protocol	Connects the unit by communication bus to a building management system	30XAS 242-482
Lon gateway	148D	Two-directional communication board complying with Lon Talk protocol	Connects the unit by communication bus to a building management system	30XAS 242-482
Bacnet over IP	149	Two-directional high-speed communication using BACnet protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a building management system. Allows access to multiple unit parameters	30XAS 242-482
Energy Management Module	156	Control board with additional inputs/outputs. See Energy Management Module option chapter	Extended remote control capabilities (Set-point reset, ice storage end, demand limits, boiler on/off command...)	30XAS 242-482
Touch Pilot control, 7" user interface	158A	Touch Pilot control supplied with a 7 inch colour touch screen user interface	Enhanced ease of use.	30XAS 242-482
Leak detection	159	0-10 V signal to report any refrigerant leakage in the unit directly on the controller (the leak detector itself must be supplied by the customer)	Immediate customer notification of refrigerant losses to the atmosphere, allowing timely corrective actions	30XAS 242-482
Dual relief valves installed w/ 3-way valve	194	Three-way valve upstream of the relief valves on the evaporator and the oil separator	Valve replacement and inspection facilitated without refrigerant loss. Conforms to European standard EN378/BGVD4	30XAS 242-482
Compliance with Russian regulations	199	EAC certification	Conformance with Russian regulations	30XAS 242-482
Compliance with Australian regulations	200	Unit approved to Australian code	Conformance with Australian regulations	30XAS 242-482
Power factor correction	231	Capacitors for automatic regulation of power factor (cos phi) value to 0.95.	Reduction of the real electrical power, compliance with minimum power factor limit set by utilities	30XAS 242-482
Traditional coils (Cu/Al)	254	Coils made of copper tubes with aluminium fins	None	30XAS 242-482
Traditional coils (Cu/Al) without slots	255	Coils made of copper tubes with aluminium fins without slots	None	30XAS 242-482
Insulation of the evap. in/out ref.lines	256	Thermal insulation of the evaporator entering/leaving refrigerant lines with flexible, anti-UV insulant	Prevents condensation on the evaporator entering/leaving refrigerant lines	30XAS 242-482
Low noise level	257	Sound insulation of main noise sources (includes option 279)	5 to 12 dB(A) quieter than standard unit (depending model and size). Refer to the physical data table for detailed values	30XAS 242-482
Very low sound level	258	Enhanced sound insulation of main noise sources combined with fans speed management (includes option 279)	2 to 3 dB(A) quieter than unit with option 257. Refer to the physical data table for detailed values	30XAS 242-482
Enviro-Shield anti-corrosion protection	262	Coating by conversion process which modifies the surface of the aluminum producing a coating that is integral to the coil. Complete immersion in a bath to ensure 100% coverage. No heat transfer variation, tested 4000 hours salt spray per ASTM B117	Improved corrosion resistance, recommended for use in moderately corrosive environments	30XAS 242-482
Super Enviro-Shield anti-corrosion protection	263	Extremely durable and flexible epoxy polymer coating applied on micro channel heat exchangers by electro coating process, final UV protective topcoat. Minimal heat transfer variation, tested 6000 hours constant neutral salt spray per ASTM B117, superior impact resistance per ASTM D2794	Improved corrosion resistance, recommended for use in extremely corrosive environments	30XAS 242-482
Compressor enclosure	279	Compressor sound enclosure	4 to 10 dB(A) quieter than standard unit. Refer to the physical data table for detailed values	30XAS 242-482
Evaporator with aluminium jacket	281	Evaporator covered with an aluminium sheet for thermal insulation protection	Improved resistance to aggressive climate conditions	30XAS 242-482
230 V electrical plug	284	230 V AC power supply source provided with plug socket and transformer (180 VA, 0,8 Amps)	Permits connection of a laptop or an electrical device during unit commissioning or servicing	30XAS 242-482
Carrier Connect link (BSS regions only)	298	3G router board Note 1: Require option 149 Note 2: When more than one machine is installed on site, only one of them shall be equipped with option 298, while all of them must be equipped with option 149 Note 3: If a Carrier® PlantCTRL™ is on site, option 298 shall be integrated in the Carrier® PlantCTRL™ while option 149 is still mandatory for each single unit.	Enabler for Carrier Connect service offer	30XAS 242-482

Hydronic module (option 116C)

Typical hydronic circuit diagram



Legend

Components of unit and hydronic module

- A Pressure sensor (A-B = Δp evaporator)
- B Pressure sensor
- C Pressure sensor (C-D = Δp water filter)
- D Pressure sensor
- 1 Victaulic screen filter
- 2 Expansion tank
- 3 Safety valve
- 4 Available pressure pump
- 5 Drain valve
- 6 Water flow control valve
- 7 Evaporator
- 8 Evaporator defrost heater (option)
- 9 Hydronic module defrost heater
- 10 Air vent (evaporator)
- 11 Water purge (evaporator)
- 12 Expansion compensator (flexible connections)
- 13 Flow switch
- 14 Water temperature sensor

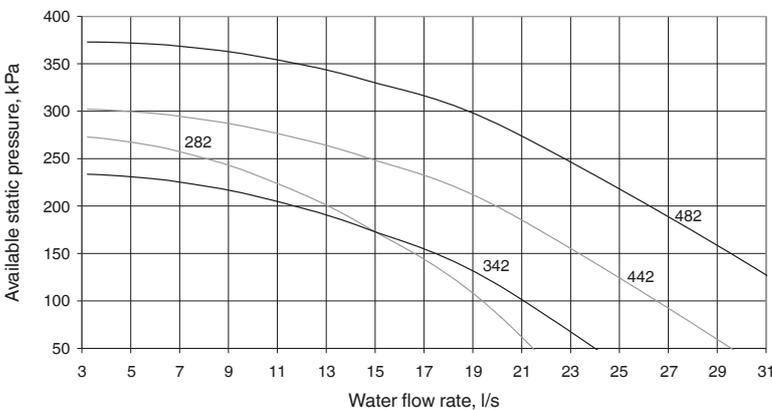
System components (supplied by customer)

- 15 Air vent
- 16 Flexible connection
- 17 Shut-down valves
- 18 Charge valve
- Hydronic module (option)

Available external static pressure for unit with hydronic module (option 116C)

Data applicable for:

- Fresh water 20 °C
- In case of use of the glycol, the maximum water flow is reduced.
- When the glycol is used, it's limited to 40%.



Electrical data (option 116C)

The pumps that are factory-installed in these units comply with the European Ecodesign directive ErP. The additional electrical data required by regulation 640/2009 is given in the installation, operation and maintenance manual.

This regulation concerns the application of directive 2009/125/EC on the eco-design requirements for electric motors.

Fan with available pressure (option 10)

This option allows a duct connection at the discharge side of the condenser fan. The unit is supplied with axial fans with a speed of 15.8 r/s (option 119), each equipped with a duct connection frame. The chiller can operate up to 60 Pa with reduced performance.

Selection example

The base capacities are those of option 119 (page 6 of this document). To obtain capacities at various pressure drops use the correction factors in the table opposite.

Selection at Eurovent conditions

30XAS options 119 + 10		Sizes 282-482			
Fan pressure drop, Pa		0	20	40	60
		Correction factor			
Air flow	% l/s	1	-3.5	-7.5	-12.1
Cooling capacity	% kW	0	-0.5	-1.0	-1.5
EER	% kW/kW	0	-1.5	-3.5	-5.0
Power input	% kW	0	+1.0	+2.5	+3.5

Example

30XAS 282 with 40 Pa pressure drop

Values for option 119 at the following conditions:

35°C outside air temperature

12/7°C entering/leaving water temperature

30XAS 282		0 Pa	Correction factor, %	40 Pa
Air flow	l/s	22569	-7.5	20876
Cooling capacity	kW	280	-1	277
EER	kW/kW	3.17	-3.5	3.06
Power input	kW	88	+3.5	90

Total heat reclaim (option 50)

Suitable for heating, domestic hot water preparation, agriculture and food industry, industrial processes and other hot-water requirements.

With the total heat reclaim option it is possible to reduce the energy consumption bill considerably compared to conventional heating equipment such as fossil fuel boilers or electric water tanks.

Operating principle

If hot water production is required, the compressor discharge gases are directed towards the heat reclaim condenser. The refrigerant releases its heat to the hot water that leaves the condenser at a temperature of up to 60°C. In this way 100% of the heat rejected by the liquid chiller can be used to produce hot water. When the demand for heat is satisfied, the hot gas is again directed towards the air condenser where the heat is rejected to the outside air by the fans. Hot water temperature control is ensured by the chiller Pro-Dialog+ control.

Note: Heat reclaim is only possible, if the unit produces cold water at the same time.

Condenser water temperature (°C)	Minimum	Maximum
Entering temperature at start-up	12.5*	55
Entering temperature during operation	20	55
Leaving temperature during operation	25	60
Evaporator water temperature (°C)		
Entering temperature at start-up	-	45
Entering temperature during operation	6.8	21
Leaving temperature during operation	3.3	15

* The entering water temperature at start-up must not fall below 12.5°C. For installations with a lower temperature a three-way valve must be used.
 Note: If the evaporator leaving water temperature is below 4°C, a glycol-water solution or the frost protection option must be used.

In part-load operation, the limitation of the condenser leaving water temperature is due to the operating range of the screw compressor. If the condenser leaving water temperature is above the limit value given in the curves on the right, the unit will automatically change over to the mode without heat recovery:

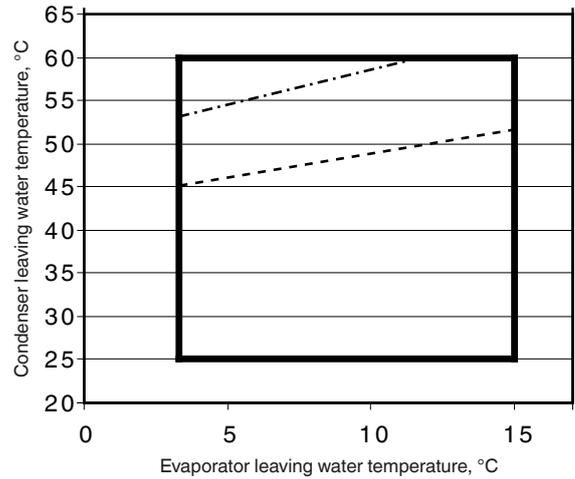
Physical data, option 50

These are the same as for the standard unit except:

30XAS heat reclaim mode		282	342	442	482
Cooling capacity*	kW	278	329	428	475
Heating capacity*	kW	349	411	538	599
Total power input (unit)*	kW	77.7	90.2	120.6	136.0
Total energy efficiency ratio (EER)	kW/kW	3.58	3.65	3.55	3.49
Total coefficient of performance (COP)	kW/kW	4.49	4.56	4.46	4.40
Operating weight**	kg	3260	3320	4190	4280
Refrigerant charge	kg	73	78	90	95
Heat reclaim condenser		Flooded shell-and-tube condenser			
Water volume	l	55	55	68	68
Water connection		Type Victaulic			
Diameter	inch	4	4	4	4
Outside diameter	mm	114.3	114.3	114.3	114.3

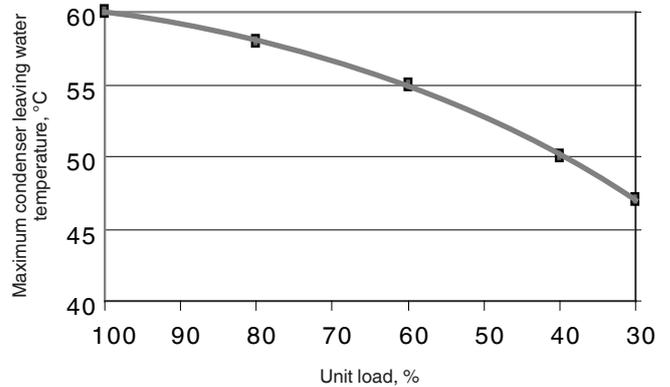
* Nominal conditions: Entering/leaving water temperature: evaporator 12°C/7°C; heat reclaim condenser: 40°C/45°C; evaporator and heat reclaim condenser fouling factor = 0 m² K/kW.
 Gross performances, not in accordance with EN14511-3:2011. These performances do not take into account the correction for the proportional heating capacity and power input generated by the water pump to overcome the internal pressure drop in the heat exchanger.

** Weights are for guidance only



— Full load
 - · - · - Part load limit, approx. 60%
 - - - Minimum load limit, approx. 30%

Part load operating limits (evaporator leaving water temperature = 7°C)



Physical data, sizes 242 to 482

30XAS		242	282	342	442	482
Air conditioning application as per EN14511-3:2013† - standard unit and unit with option 279*						
Nominal cooling capacity	kW	232	284	334	430	467
ESEER	kW/kW	3.78	3.93	3.99	3.87	3.96
EER	kW/kW	2.76	3.00	3.08	2.93	2.87
Eurovent class cooling		C	B	B	B	C
Air conditioning application†† - standard unit and unit with option 279*						
Nominal cooling capacity	kW	233	285	335	432	469
ESEER	kW/kW	3.85	4.01	4.09	3.97	4.07
EER	kW/kW	2.78	3.03	3.11	2.96	2.91
Air conditioning application as per EN14511-3:2013† - unit with option 119 and unit with options 119/279						
Nominal cooling capacity	kW	245	285	345	461	486
ESEER	kW/kW	3.69	3.69	3.80	3.75	3.79
EER	kW/kW	2.97	3.15	3.24	3.15	3.09
Eurovent class cooling		B	A	A	A	B
Air conditioning application†† - unit with option 119 and unit with options 119/279						
Nominal cooling capacity	kW	245	286	346	462	488
ESEER	kW/kW	3.75	3.76	3.90	3.84	3.89
EER	kW/kW	2.99	3.18	3.28	3.18	3.13
IPLV - standard unit	kW/kW	4.23	4.55	4.72	4.55	4.60
IPLV - unit with option 119*	kW/kW	4.16	4.23	4.44	4.36	4.41
Sound levels - Standard unit						
Sound power level***	dB(A)	99	98	98	103	102
Sound pressure level at 10 m****	dB(A)	67	66	66	70	70
Unit + option 279*						
Sound power level***	dB(A)	94	94	93	97	96
Sound pressure level at 10 m****	dB(A)	62	62	61	65	64
Unit + option 257*						
Sound power level***	dB(A)	92	92	91	95	94
Sound pressure level at 10 m****	dB(A)	60	60	59	62	61
Unit + option 258*						
Sound power level***	dB(A)	89	89	88	92	91
Sound pressure level at 10 m****	dB(A)	57	57	56	59	58
Unit + option 119*						
Sound power level***	dB(A)	96	96	96	98	98
Sound pressure level at 10 m****	dB(A)	64	64	63	66	66
Unit + option 119* + 279*						
Sound power level***	dB(A)	96	96	96	98	98
Sound pressure level at 10 m****	dB(A)	64	64	63	66	66
Dimensions - standard unit						
Length	mm	2410	3604	3604	4798	4798
Width	mm	2253	2253	2253	2253	2253
Height	mm	2297	2297	2297	2297	2297
Dimensions - Unit + options 254/255*						
Length	mm	3604	3604	4798	4798	4798
Width	mm	2253	2253	2253	2253	2253
Height	mm	2297	2297	2297	2297	2297
Operating weight**						
Standard unit		2390	2810	2870	3630	3720
Unit + option 119*	kg	-	3070	3190	3990	4150
Unit + option 254/255*	kg	2540	3060	3140	3950	4070
Compressors						
Refrigerant**		R-134a				
No of circuits	kg	1	1	1	1	1
Standard unit						
Refrigerant charge	kg	60	72	73	83	88
	teqCO2	85.8	103	104.4	118.7	125.8
Unit + option 254/255						
Refrigerant charge	kg	85	95	105	120	130
	teqCO2	121.6	135.9	150.2	171.6	185.9
Capacity control						
Minimum capacity	%	Touch Pilot, electronic expansion valve (EXV)			30	30
		30	30	30	30	30
Condensers						
All-aluminium micro-channel heat exchanger						
Fans						
Standard unit and unit + option 119/254*						
Quantity		4	5	6	7	8
Standard unit						
Maximum total air flow	l/s	13667	17083	20500	23917	27333
Max speed	r/s	11.7	11.7	11.7	11.7	11.7
Standard unit + options 119*						
Maximum total air flow	l/s	18055	22569	27083	31597	36111
Max speed	r/s	15.7	15.7	15.7	15.7	15.7
Evaporator						
Water content	l	Flooded multi-pipe type		53	75	75
		53	53	53	75	75
Without hydronic module						
Water inlet/outlet connections						
Nominal diameter	in	Victaulic				
Actual outside diameter	mm	5	5	5	5	5
Maximum water-side pressure†	kPa	141.3	141.3	141.3	141.3	141.3
		1000	1000	1000	1000	1000
With hydronic module (option 116C)						
Water inlet/outlet connections						
Nominal diameter	in	Victaulic				
Actual outside diameter	mm	-	4	4	4	4
Expansion tank volume	l	-	114.3	114.3	114.3	114.3
Maximum water-side pressure	kPa	-	50	50	50	50
		-	400	400	400	400
Chassis paint colour						
		Colour code: RAL7035				

† Eurovent-certified performances in accordance with standard EN14511-3:2013.

†† Cooling mode conditions: evaporator water entering/leaving temperature 12°C/7°C, outside air temperature 35°C. evaporator fouling factor 0 m2 K/W
Gross performances, not in accordance with EN14511-3:2013. These performances do not take into account the correction for the proportional heating capacity and power input generated by the water pump to overcome the internal pressure drop in the heat exchanger. Evaporator water entering/leaving temperature 12°C/7°C, outside air temperature 35°C. evaporator fouling factor

0 m2 K/W

* Options: 119 = High energy efficiency, 257 = low noise level, 279 = compressor enclosure, 258, = very low sound level, 254 = traditional coils (Cu/Al), 255 = traditional coils (Cu/Al) without slots

** Weights are guidelines only. Refer to the unit nameplate.

*** in dB ref=10-12 W, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in accordance with ISO 9614-1 and certified by Eurovent.

**** in dB ref 20µPa, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). For information, calculated from the sound power level Lw(A).

Notes:

1 Option 119 can be used with options 254 or 255. Contact your Carrier representative for the performances.



Eurovent certified values

Electrical data

30XAS		242	282	342	442	482
Power circuit						
Nominal power supply	V-ph-Hz	400-3-50				
Voltage range	V	360-440				
Maximum supply cable section	mm ²	2 x 150	2 x 95	2 x 150	2 x 150	2 x 240
Short-circuit stability current (TN system)*	kA	38	50	50	50	50
Control circuit						
24 V via internal transformer						
Start-up current**	A	303	388	388	587	587
Standard unit						
Cosine Phi maximum***		0.89	0.88	0.88	0.87	0.87
Cosine Phi nominal****		0.85	0.85	0.86	0.84	0.85
Total harmonic distortion	%	0	0	0	0	0
Maximum power input†	kW	101	113	134	184	213
Nominal unit current draw****	A	141	153	174	258	278
Maximum unit current draw (Un)†	A	165	185	218	305	353
Maximum unit current draw (Un) with option 231†	A	148	167	201	284	333
Maximum current draw (Un -10%)***	A	180	198	231	324	375
High energy efficiency unit (option 119)						
Cosine Phi maximum***		0.88	0.88	0.88	0.87	0.87
Cosine Phi nominal****		0.84	0.85	0.85	0.83	0.84
Maximum power input†	kW	105	118	139	190	221
Nominal current draw****	A	141	153	175	254	271
Maximum current draw (Un)†	A	172	194	229	318	368
Maximum current draw (Un -10%)***	A	187	207	242	337	390

* kA eff: efficiency value: rms for English version

** Instantaneous start-up current (locked rotor current in star connection of the compressor).

*** Values obtained at operation with maximum unit power input.

**** Values obtained at standard Eurovent unit operating conditions: air 35°C, water 12/7°C.

† Values obtained at operation with maximum unit power input. Values given on the unit name plate.

Note:

Motor and fan electrical data if the unit operates at Eurovent conditions (motor ambient temperature 50°C): 1.9 A

Start-up current: 8.4 A

Power input: 760 W

Electrical data notes and operating conditions for 30XAS units:	
<ul style="list-style-type: none"> 30XAS 242-482 units have a single power connection point located immediately upstream of the main disconnect switch. The control box includes the following standard features: <ul style="list-style-type: none"> One general disconnect switch Starter and motor protection devices for the compressor, the fan(s) and the pump Control devices Field connections: <ul style="list-style-type: none"> All connections to the system and the electrical installations must be in full accordance with all applicable local codes. The Carrier 30XAS units are designed and built to ensure conformance with these codes. The recommendations of European standard EN 60 204-1 (corresponds to IEC 60204-1) (machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment. IMPORTANT: <ul style="list-style-type: none"> Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60 204 is the best means of ensuring compliance with the Machines Directive § 1.5.1. Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines. 	<ol style="list-style-type: none"> Power supply frequency variation: ± 2 Hz. The neutral (N) line must not be connected directly to the unit (if necessary use a transformer). Overcurrent protection of the power supply conductors is not provided with the unit. The factory-installed disconnect switch(es)/circuit breaker(s) is (are) of a type suitable for power interruption in accordance with EN 60947-3 (corresponds to IEC 60947-3). The units are designed for simplified connection on TN(s) networks (IEC 60364). For IT networks derived currents may interfere with network monitoring elements, and it is recommended to create an IT type divider for the system units that require this and/or a TN type divider for Carrier units. Please consult the appropriate local organisations to define the monitoring and protection elements and carry out the electrical installation. Units delivered with speed drive (options 28) are not compatible with IT network. Derived currents: If protection by monitoring of derived currents is necessary to ensure the safety of the installation, the control of the cut-out value must take the presence of leak currents into consideration that result from the use of frequency converters in the unit. A value of at least 150 mA is recommended to control differential protection devices. Capacitors that are integrated as part of the option 231 can generate electrical disturbances in the installation the unit is connected to. Presence of these capacitors must be considered during the electrical study prior to the start-up. <p>NOTE: If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.</p>
<ol style="list-style-type: none"> Environment* - Environment as classified in EN 60 364 (corresponds to IEC 60364) : <ul style="list-style-type: none"> Outdoor installation* Ambient temperature range: from -20 °C to +55 °C** Altitude less than or equal to 2000 m (for hydronic module, see paragraph 4.3 in the IOM) Presence of hard solids, class AE3 (no significant dust present)* Presence of corrosive and polluting substances, class AF1 (negligible) Competence of persons: BA4 (Persons wise); 30XAS machines are not intended to be installed in locations open to anyone, including people with disabilities and children. 	<p>* The required protection level for this class is IP43BW (according to reference document IEC 60529). All 30XAS units are protected to IP44CW and fulfil this protection condition.</p> <p>** The maximum ambient temperature allowed for machines equipped with option 231 is +40°C.</p>

Part load performances

With the rapid increase in energy costs and the care about environmental impacts of electricity production, power consumption of air conditioning equipment has become an important topic. The energy efficiency of a liquid chiller at full load is rarely representative of the actual performance of the units, as on average a chiller works less than 5% of the time at full load.

IPLV (in accordance with AHRI 550/590)

The IPLV (integrated part load value) allows evaluation of the average energy efficiency based on four operating conditions defined by the AHRI (Air Conditioning, Heating and Refrigeration Institute). The IPLV is the average weighted value of the energy efficiency ratios (EER) at different operating conditions, weighted by the operating time.

IPLV (integrated part load value)

Load %	Air temperature °C	Energy efficiency	Operating time %
100	35	EER ₁	1
75	26.7	EER ₂	42
50	18.3	EER ₃	45
25	12.8	EER ₄	12

$$\text{IPLV} = \text{EER}_1 \times 1\% + \text{EER}_2 \times 42\% + \text{EER}_3 \times 45\% + \text{EER}_4 \times 12\%$$

	242	282	342	442	482	
30XAS						
Standard units						
IPLV		kW/kW 4.23	4.55	4.72	4.55	4.60
ESEER		kW/kW 3.78	3.93	3.99	3.87	3.96
High-efficiency units (option 119)						
IPLV		kW/kW 4.16	4.23	4.44	4.36	4.41
ESEER		kW/kW 3.69	3.69	3.80	3.75	3.79

ESEER Calculations according to standard performances (in accordance with EN14511-3:2011) and certified by Eurovent.
IPLV Calculations according to standard performances (in accordance with AHRI 550-590)

The heat load of a building depends on many factors, such as the outside air temperature, the exposure to the sun and the building occupancy.

Consequently it is preferable to use the average energy efficiency, calculated at several operating points that are representative for the unit utilisation.

ESEER (in accordance with EUROVENT)

The ESEER (European seasonal energy efficiency ratio) permits evaluation of the average energy efficiency at part load, based on four operating conditions defined by Eurovent. The ESEER is the average value of energy efficiency ratios (EER) at different operating conditions, weighted by the operating time.

ESEER (European seasonal energy efficiency ratio)

Load %	Air temperature °C	Energy efficiency	Operating time %
100	35	EER ₁	3
75	30	EER ₂	33
50	25	EER ₃	41
25	20	EER ₄	23

$$\text{ESEER} = \text{EER}_1 \times 3\% + \text{EER}_2 \times 33\% + \text{EER}_3 \times 41\% + \text{EER}_4 \times 23\%$$

Sound spectrum

30XAS - standard unit

	dB	Octave bands, Hz						Sound power levels	
		125	250	500	1k	2k	4k		
242	dB	85	94	97	95	89	84	db(A)	99
282	dB	88	93	98	93	88	80	db(A)	98
342	dB	86	94	95	94	89	87	db(A)	98
442	dB	89	98	98	100	93	89	db(A)	103
482	dB	89	94	97	100	91	85	db(A)	102

30XAS - Unit with option 257*

	dB	Octave bands, Hz						Sound power levels	
		125	250	500	1k	2k	4k		
242	dB	85	94	91	85	79	74	db(A)	92
282	dB	88	93	93	83	78	71	db(A)	92
342	dB	86	94	90	85	79	77	db(A)	91
442	dB	89	98	92	89	82	79	db(A)	95
482	dB	89	94	92	90	81	76	db(A)	94

30XAS - unit with option 279*

	dB	Octave bands, Hz						Sound power levels	
		125	250	500	1k	2k	4k		
242	dB	85	94	94	88	82	76	db(A)	94
282	dB	88	93	96	86	81	73	db(A)	94
342	dB	86	94	92	87	82	79	db(A)	93
442	dB	89	98	95	93	86	81	db(A)	97
482	dB	89	94	95	93	84	78	db(A)	96

30XAS - unit with option 258*

	dB	Octave bands, Hz						Sound power levels	
		125	250	500	1k	2k	4k		
242	dB	85	91	88	83	76	71	db(A)	89
282	dB	88	90	89	82	76	68	db(A)	89
342	dB	86	91	85	83	77	74	db(A)	88
442	dB	89	96	89	87	78	75	db(A)	92
482	dB	89	91	89	87	78	73	db(A)	91

30XAS - unit with option 119*

	dB	Octave bands, Hz						Sound power levels	
		125	250	500	1k	2k	4k		
242	dB	96	95	98	96	90	85	db(A)	100
282	dB	96	95	99	94	89	82	db(A)	99
342	dB	97	95	96	95	90	88	db(A)	99
442	dB	98	99	98	101	94	89	db(A)	103
482	dB	98	96	98	101	92	87	db(A)	103

30XAS - unit with option 119 + 257*

	dB	Octave bands, Hz						Sound power levels	
		125	250	500	1k	2k	4k		
242	dB	96	95	93	89	84	80	db(A)	95
282	dB	96	95	94	89	84	80	db(A)	95
342	dB	97	95	92	90	85	82	db(A)	95
442	dB	98	99	94	92	86	83	db(A)	97
482	dB	98	96	94	93	86	82	db(A)	97

30XAS - unit with option 119 + 279*

	dB	Octave bands, Hz						Sound power levels	
		125	250	500	1k	2k	4k		
242	dB	96	95	95	91	85	81	db(A)	96
282	dB	96	95	96	90	85	80	db(A)	96
342	dB	97	95	94	91	86	82	db(A)	96
442	dB	98	99	96	94	88	84	db(A)	98
482	dB	98	96	96	94	87	83	db(A)	98

* Options: 119 = high energy efficiency units; 257 = low sound level; 258 = very low sound level; 279 = compressor enclosure

Operating limits

Evaporator water temperature	°C	Minimum	Maximum
Water entering temperature at start-up	-		45*
Water entering temperature during operation	6.8		21
Water leaving temperature during operation	3.3		15

Note: If the leaving water temperature is below 4°C, a glycol/water solution or the frost protection option must be used.

Condenser air temperature	°C	Minimum	Maximum
Storage		-20	68
Operation:			
Standard unit		-10	55**
With option 28: winter operation		-20	55**
With option 119: high energy efficiency***		-10	55****

Note: If the air temperature is below 0°C, a glycol/water solution or the frost protection option must be used.

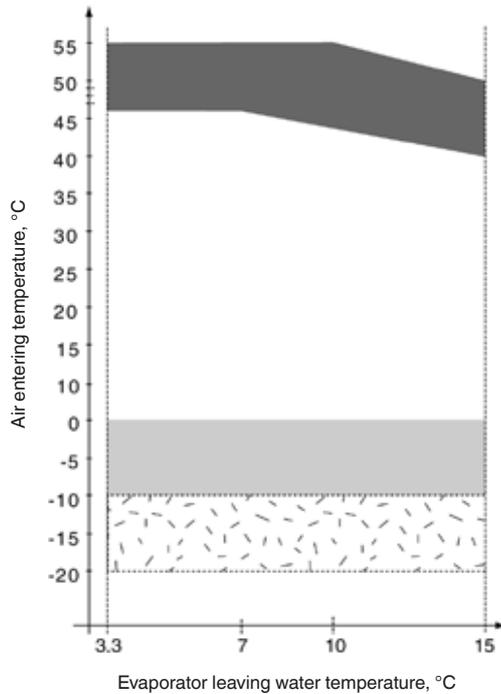
- * Based on the installation type and the air temperature
- ** Part load, based on the water temperature
- *** Recommended for operation above 46°C
- **** Part-load operation

Evaporator water flow rate (l/s)		
30XAS	Minimum	Maximum*
242	3.2	30.7
282	3.7	30.7
342	4.4	30.7
442	5.8	41.0
482	6.5	41.0

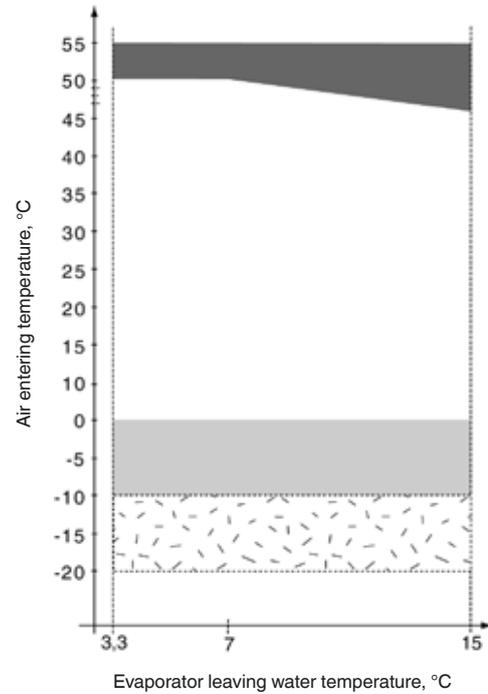
* The maximum water flow rate corresponds to a pressure drop of 100 kPa.

Operating range

30XAS standard unit



30XAS high energy efficiency unit or option 119

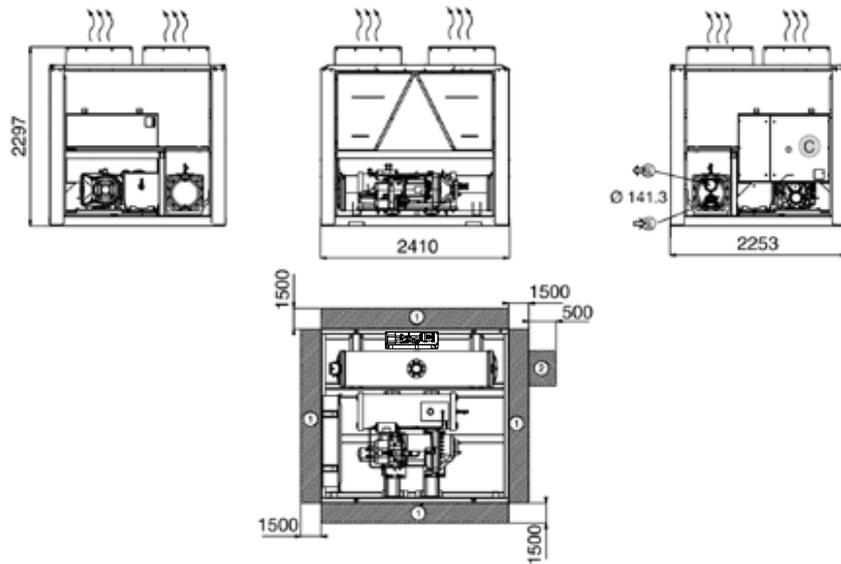


Legend

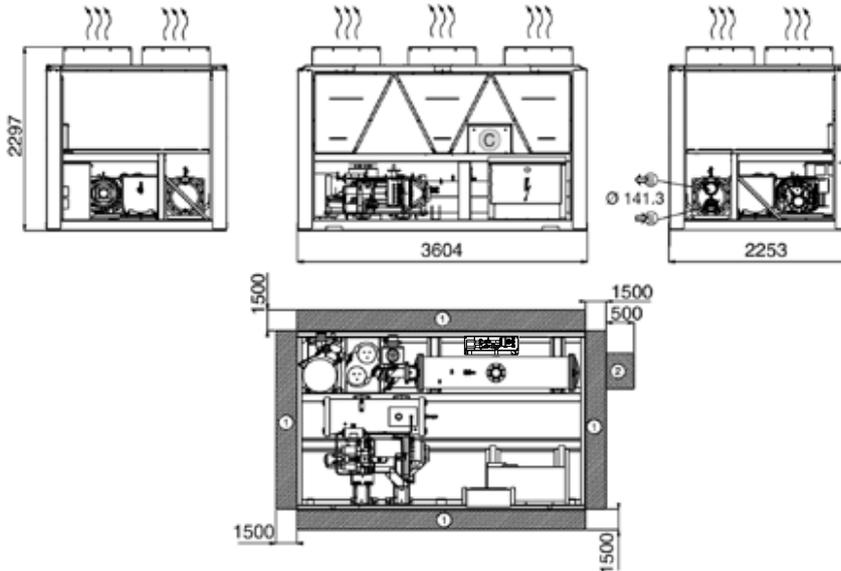
- Operating range, unit equipped with option 28 "Winter operation"
- Below 0°C air temperature the unit must either be equipped with the evaporator frost protection option (41A or 41B), or the water loop must be protected against frost by using a frost protection solution (by the installer).
- Part load average

Dimensions/clearances

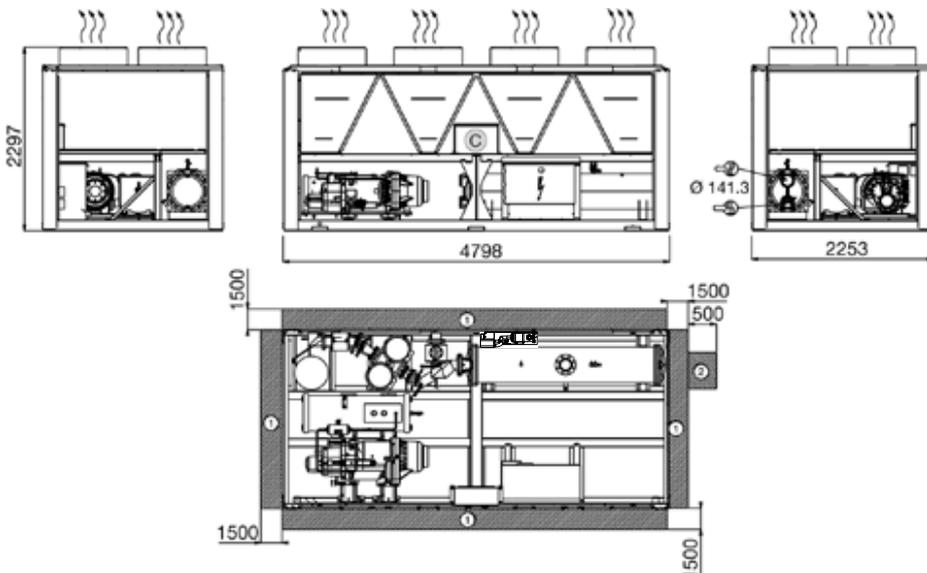
30XAS 242



30XAS 282-342



30XAS 442-482



Legend

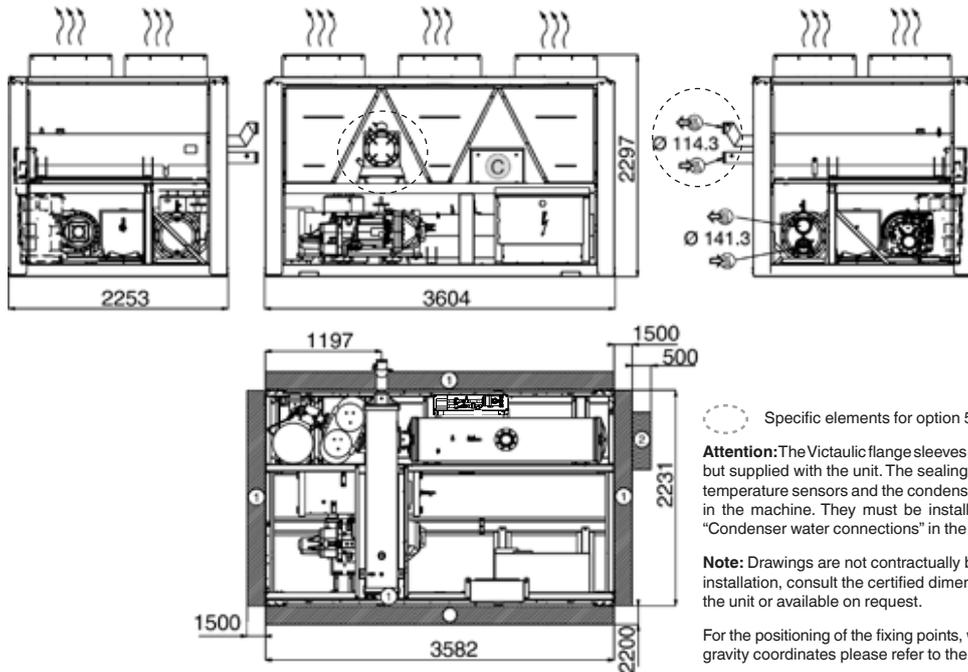
All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- Water inlet
- Water outlet
- Air outlet – do not obstruct
- Power supply connection
- Control circuit connection

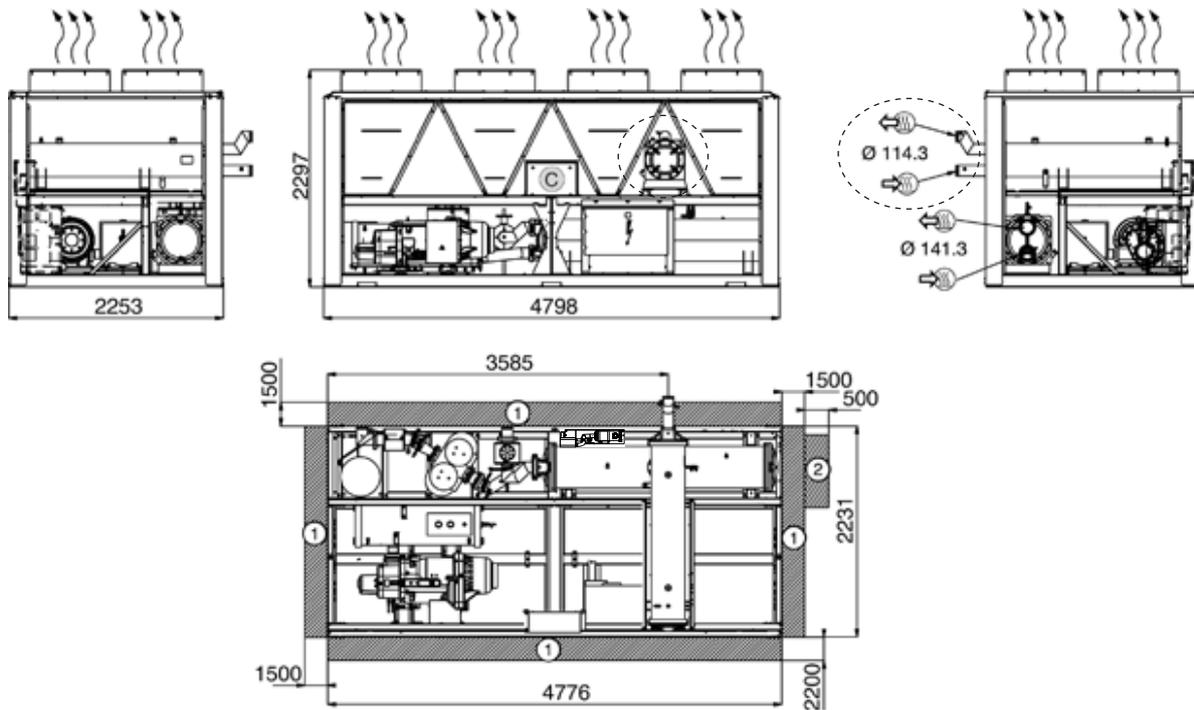
Note: Drawings are not contractually binding. Before designing an installation, consult the certified dimensional drawings, available on request.

Dimensions/clearances

30XAS 282-342 - heat reclaim unit (option 50)



30XAS 442-482 - heat reclaim unit (option 50)



Legend

All dimensions are given in mm.

- ① Required clearances for maintenance and air flow
- ② Recommended space for evaporator tube removal
- Water inlet
- Water outlet
- Air outlet – do not obstruct
- Power supply connection
- Control circuit connection

Specification Guide

General description

Factory assembled single piece air-cooled chiller, shall include all factory wiring, piping, controls, refrigerant charge (R134a), one single refrigerant circuit, screw compressor, electronic expansion valves and equipment required prior to field start-up.

Quality assurance

Unit construction shall comply with European directives:

- Pressurized equipment directive (PED) 2014/68/EU
- Machinery directive 2006/42/EC, modified
- Low voltage directive 2014/35/EU, modified
- Electromagnetic compatibility directive 2014/30/EU, modified, and the applicable recommendations of European standards
- Machine safety: electrical equipment in machines, general requirements, EN 60204-1
- Electromagnetic compatibility emission EN61000-6-4
- Electromagnetic compatibility immunity EN61000-6-2
- Directive 2009/125/EC with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW
- Directive 2005/32/EC with regard to ecodesign requirements for electric motors
- (If pumps on board) Directive 2009/125/EC with regard to ecodesign requirements for water pumps

Unit shall be designed, manufactured and tested in a facility with a quality management system certified ISO 9001 and environmental management system ISO 14001.

Unit shall be run tested at the factory.

Design performance data

- Cooling capacity (kW):
- Unit power input (kW):
- Part load energy efficiency, ESEER (kW/kW):
- Full load energy efficiency, EER (kW/kW):
- Eurovent Class
- Evaporator entering/leaving water temperature (°C): ... /
- Fluid type:
- Fluid flow rate (l/s):
- Evaporator pressure drops (kPa):
- Outdoor air temperature (°C):
- Sound power level at full load (dB(A)):
- Dimensions, length x depth x height (mm): ... x ... x

Performance shall be declared in accordance with EN14511-3:2013 and certified by Eurovent.

The unit shall operate at full load with ambient temperatures ranging from -10°C to 46°C without use of additional adiabatic cooler systems, with evaporator leaving liquid temperature between 3,3 and +7°C. When evaporator leaving water temperature is higher than 7°C, up to 15°C, the maximum outdoor air temperature may be lower to secure machine safe operation. The machine shall continue to operate (at reduced capacity) in ambient temperatures of up to 55°C, with evaporator leaving liquid temperature between 3,3 and +10°C.

- (*Carrier option 119*) The unit shall operate at full load up to 50 °C without use of additional adiabatic cooler systems, with evaporator leaving liquid temperature between 3.3 and +7 °C. The machine shall continue to operate (at reduced capacity) in ambient temperatures of up to 55 °C, with evaporator leaving liquid temperature between 3.3 and +15 °C.
- (*Carrier option 28*) The unit shall operate at full load down to -20°C.

Frame

- Machine frame and enclosure shall be made of galvanised sheet steel
- Frame and enclosure shall be painted in oven-baked polyester powder paint in light grey colour (RAL 7035)
- Removable panels and electrical panel doors shall be accessible by 1/4-turn screws
- (*Carrier option 23*) Machine shall be protected from foreign bodies through the use of metal grilles factory-mounted on the four vertical faces. Coils refrigerant connections shall be covered by side panels of galvanised sheet steel, for enhanced aesthetic and safety during transportation.
- (*Carrier option 23A*) Coils refrigerant connections shall be covered by side panels of galvanised sheet steel, for enhanced aesthetic and safety during transportation.

Compressor

- Unit shall have semi-hermetic twin-screw compressors with internal relief valve and check valve to avoid reverse rotation on shut down
- Unit shall be equipped with a muffler to reduce discharge gas pulsations
- Compressor bearings shall be designed for minimum 73000 hours at maximum operating conditions
- Capacity control shall be provided by a slide valve
- Compressor capacity control shall be stepless from 100% to 30% load
- Compressor shall start in unloaded condition
- Motor shall be cooled by suction gas and protected through a dedicated electronic board against:
- Thermal overload by internal winding temperature sensors
- Electrical overload and short circuit by dedicated fuses (one per phase)
- Reverse rotation
- Loss of phase
- Undervoltage and power supply failure.
- Lubrication oil system shall include pre-filter and external filter capable of filtration to 5 microns.
- The oil filter line shall be equipped with service shut off valves for easy filter replacement
- The oil separator, separated from the compressor, shall not require oil pump and shall include an internal muffler to reduce discharge gas pulsations
- The oil separator shall be designed for 2100 kPa working pressure

- The oil separator shall include a temperature actuated heater and an oil level safety switch
- Compressors shall be installed on flexible anti-vibration mounts and isolated from the main unit chassis
- (*Carrier option 93A*) Each compressor shall be equipped with a discharge shut-off valve
- (*Carrier option 279*) Each compressor and oil separator shall be installed within an insulated acoustic enclosure with removable panels to facilitate service access.

Evaporator

- Unit shall be equipped with a single flooded evaporator
- Evaporator shall be manufactured by the chiller manufacturer
- Evaporator shall be tested and stamped in accordance with the European directive for pressurised equipment 2014/68/EU
- The maximum refrigerant-side operating pressure will be 2100 kPa, and the maximum waterside pressure will be 1000 kPa
- The evaporator shall be mechanically cleanable, shell-and-tube type with removable heads
- Tubes shall be internally and externally grooved, seamless-copper, and shall be rolled into tube sheets
- Shell shall be insulated with 19 mm closed-cell foam with a maximum K factor of 0.28. Evaporator thermal insulation shall be factory fitted
- The evaporator shall have a drain and vent in each head
- Chiller shall have only one water inlet & outlet connection with Victaulic couplings to avoid vibrations transmission and to accommodate minor pipework misalignment (Victaulic adapter kit shall be available on demand)
- Evaporator shall be fitted with electronic auto setting water flow switch. Paddle switches or differential pressure switches shall not be acceptable
- (*Carrier option 281*) Unit shall be fitted with a cooler jacket to protect the insulation from the long-term effects of UV radiation.

Condenser

- Condenser coils shall be designed to ensure sub-cooling of the liquid refrigerant
- Condenser coils shall be V-shaped with a minimum open angle of 50° to ensure optimum air distribution
- Coils shall be entirely made of aluminium alloy, micro-channels type.
- Coils shall consist of a two-pass arrangement
- Coils shall be leak-tested at 15,5 bar with 100% He
- (*Carrier options 254/255*) Coils shall use copper tubes and aluminium fins
- Fans shall be direct-drive, equipped with an impeller with 9 aerodynamic blades and a rotating shroud to ensure optimal leak-tightness between the blades and the fan housing
- Fans impellers shall be of one-piece and made of a corrosion-resistant composite material, and statically and dynamically balanced

- The fans discharges shall be protected by polyethylene-coated steel wire grilles
- The three-phase electric motors shall have isolation class F, IP 55 protection and a minimum efficiency of 80%. They shall have individual overload protection via a disconnect switch
- (*Carrier option 10*) Fans shall be equipped with discharge connection flanges increasing available discharge pressure up to 60 kPa
- (*Carrier option 262*) Coils shall be suitable for installations in moderately corrosive environments. The protection shall consist on a nano-scale conversion coating, 100 to 200 nm thick, which uniformly covers the entire surface of the coil. Non conversion coating shall not be accepted. The coating process shall include immersion in a coating bath. The coating shall be applied by an autocatalytic conversion process which shall modify the surface of the aluminium producing a coating that is integral to the coil. Complete immersion shall ensure that 100% of the surface is coated, forming a continuous and even film. Spray coating process shall not be accepted. The coating shall be integral to the MCHE and shall not flake or loose adhesion with cross hatch adhesion of 5B per ASTM D3359. The thin coating shall have no variation in heat transfer on air flow per ARI 410. The coating shall utilize corrosion inhibitors which actively arrest damage due to environmental or mechanical damage. Corrosion durability of coated micro-channel coils shall be confirmed through testing to no less than 4000 hours constant neutral salt spray per ASTM B117
- (*Carrier option 263*) Coils shall be suitable for installations in the most severe environments. The protection shall consist on a flexible epoxy polymer coating uniformly applied to all coil external surface areas without material bridging between fins and louvers. The coating process shall be an electrocoating process with immersion in a coating bath and a final UV protective topcoat to shield the fins from ultraviolet degradation and to ensure coating durability and long life. Spray coating and non-electrocoating shall not be accepted. Coating process shall ensure complete coil encapsulation, including all exposed fin edges. The coating shall have a uniform thickness of 20 to 40 µm on all external coil surface areas including fin edges. The coating shall have minimal variation (<1%) in heat transfer on air flow per ARI 410. The coating shall have superior hardness characteristics of 2H per ASTM D3363 and cross hatch adhesion of 4B-5B per ASTM D3359. Impact resistance shall be up to 100 in/lb (ASTM D2794). Corrosion durability of coated micro-channel coils shall be confirmed through testing to no less than 6000 hours constant neutral salt spray per ASTM B117.

Refrigerant circuit

- Refrigerant circuit components shall include: compressor, oil separator, high and low side pressure relief devices, economizer, filter driers, moisture indicating sight glasses, long stroke electronic expansion device, and complete operating charge of both refrigerant R134a and compressor oil

- (*Carrier option 92*) A compressor suction and discharge line shut off valve, an evaporator inlet valve and economizer line valve, shall be mounted to isolate all main components (filter drier, oil filter, expansion device and compressor) and allow refrigerant to be safely stored during service operation
- (*Carrier option 93A*) The compressor shall be equipped with a discharge shut-off valve
- (*Carrier option 257*) Compressor and oil separator sub-assembly and refrigerant gas suction line shall be acoustically insulated
- (*Carrier option 258*) Compressor and oil separator sub-assembly, refrigerant gas suction line and the economizer subassembly (if needed) shall be acoustically insulated.

- (*Carrier option 148D*) A two-directional communication board shall allow plug and play interfacing of the machine with any BMS using the LonTalk protocol
- (*Carrier option 149*) Machine shall be supplied with factory-installed two-directional high-speed communication using BACnet protocol over Ethernet network (IP-connection). The BACnet over-IP communication shall have no limitation in reading/writing controller points and shall use standardized alarm codes as defined with BACnet protocol. Field programming shall be required.
- (*Carrier option 298*) Machine shall be accessible via wireless connection for remote monitoring with the scope of preventive maintenance.

Power control box

- Unit shall operate at 400 Volts (+/- 10%), 3-phases, 50 Hertz power supply without neutral
- Unit shall be designed for simplified connection on TN(s) networks
- Unit shall have maximum holding short circuit current of 50000 Amps up to 500 kW nominal cooling capacity
- Control circuit voltage shall be 24 V maximum, supplied by a factory-installed transformer
- Unit shall be supplied with factory-installed main circuit breaker/isolator
- Unit shall have a factory installed star/delta starter as standard to limit electrical inrush current
- Power control box is powered painted with hinged and gasket sealed doors and is protected to IP44CW
- (*Carrier option 20A*) The power control box shall be protected to IP54 to grant safe operation for installations in polluted environment
- (*Carrier option 231*) The unit shall integrate additional capacitors to ensure a power factor of 0,95 at full load.

Controls

- Unit control shall include as a minimum: microprocessor with non-volatile memory, picture guided unit/operator interface, the LOCAL/OFF/REMOTE/CCN selector and a 5 inches coloured touch-screen display with multiple language capability
- (*Carrier option 158A*) Unit control shall include as a minimum: microprocessor with non-volatile memory, picture guided unit/operator interface, the LOCAL/OFF/REMOTE/CCN selector and a 7 inches coloured touch-screen display with multiple language capability
- Pressure sensors shall be installed to measure suction, discharge, and oil pressure
- Temperature probes shall be installed to read cooler entering and leaving temperatures and outdoor air temperature
- Unit control shall have an IP port to permit user connection via web browser, allowing same level of access to control menus as unit mounted interface (excluding start/stop and alarm reset capabilities)
- Control shall store technical documentation, drawings and spare parts list specific to each particular unit
- (*Carrier option 148B*) A two-directional communication board shall allow plug and play interfacing of the machine with any BMS using the J-Bus protocol

Unit shall be capable of performing the following functions:

- Electronic expansion valve control optimising evaporator refrigerant charge while ensuring minimum refrigerant superheat and optimum subcooling at condenser outlet
- Capacity control based on leaving chilled fluid temperature
- Limitation of the chilled fluid-temperature pull-down rate at start-up to an adjustable range of 0.1°C to 1.1°C per minute to prevent excessive demand spikes at start-up
- Automatic change-over and cycling of compressors to equalize running hours and number of starts
- Reset enable of leaving chilled-water temperature based on the outdoor air temperature or via 0-10 V signal (as option)
- Dual set point management for the leaving chilled water temperature activated by a remote contact closure signal or by the built in time clock
- 2-level demand limit control (between 0 and 100%) activated by remote contact closure or by the built in time clock
- Time scheduling management to enable unit start-up control, demand limit and set-point changes
- Trending of main variables (accessible by web browser only)
- (*Carrier option 58*) lead/lag type control of two chillers running in series or parallel
- (*Carrier option 116*) Evaporator pump control, including additional safety pump (if installed)
- (*Carrier option 156*) The following inputs contacts shall be available on the unit control board:
 - Setpoint reset by indoor air temperature sensor
 - Cooling setpoint reset by 4-20 mA
 - Time schedule override
 - Ice storage input
 - Demand limit
 - Unit shut down

The following outputs contacts shall be available on the unit control board:

- Instantaneous chiller capacity by 0-10 V signal
- Complete shut-down due to a chiller fault
- Compressor operation indication.

Diagnosis

- Control interface shall be capable of displaying set points, system status including temperatures, pressures, current for each compressor, run time and percent loading
- Control interface shall perform trending of up to 10 preselected variables
- Control system shall allow a quick test of all machine elements to verify the correct operation of every switch, circuit breaker, contactor etc. before the chiller is started
- In case of alarm, control system shall send an email to specific mail box set by user during machine commissioning
- Control shall have black box function which permit to store data set of 20 variables with interval of 5 seconds, during 14 minutes preceding the alarm and 1 minute following the alarm event. The black box recording capability shall permit recording for 20 events and once the threshold is reached new data shall over-write the oldest ones.

Safeties

Control system shall provide the unit with protection against the following:

- Reverse rotation
- Low chilled water temperature
- Low oil pressure (compressor-side)
- Current imbalance
- Compressor thermal overload
- High pressure (with automatic compressor unloading in case of excessive condensing temperature)
- Electrical overload and short circuit
- Loss of phase, undervoltage and power supply failure

Control shall provide separate general alert (minor incident) and alarm (circuit down) remote indication.

Hydraulic module (optional)

- (*Carrier option 116C*) Dual high-pressure pumps shall be installed within the chiller frame
- The unit control shall automatically manage the change-over and cycling of pumps to equalize running hours and number of starts
- The hydronic module shall be integrated in the chiller chassis without increasing its dimensions
- The hydronic module shall include the following elements:
 - Removable screen filter
 - Centrifugal monocell water pump with three-phase motor equipped with internal over-temperature protection
 - Electronic water flow switch without paddle
 - Safety relief valve calibrated to 4 bar
 - Long stroke flow control valve
 - Pressure gauge and valve set for differential pressure measurement
- The water pump shall be isolated from the chiller structure and water piping by anti-vibration mountings and expansion compensators, in order to limit vibration and noise transmission
- The water piping shall be protected against corrosion and equipped with drain and purge plugs
- The hydraulic connections shall be Victaulic type
- Both pump and piping shall be fully insulated with polyurethane foam covered with aluminum panels to prevent condensation
- Pumps frost protection shall be guaranteed down to -20°C by electric resistance heaters
- Piping frost protection shall be guaranteed down to -20°C by automatic pumps activation when liquid temperature falls below a safety limit.

Total heat recovery (optional)

- (*Carrier option 50*) The unit shall include an additional heat exchanger in parallel with the condenser coils to recover 100% of condensing heat.



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Manufacturer reserves the right to change any product specifications without notice.



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