



United Technologies

turn to the experts



## 30XW-V

### Variable-speed water-cooled screw chiller & heat pump

Cooling capacity: 567–1432kW

Heating capacity: 624–1574kW



## Turn To The Experts

Founded by the inventor of modern air conditioning, Carrier is the world's leader in high-technology heating, air-conditioning and refrigeration solutions. Carrier experts provide sustainable solutions, integrating energy-efficient products, building controls and energy services for residential, commercial, retail, transport and food service customers. Carrier is a part of UTC Building & Industrial Systems, a unit of United Technologies Corp., a leading provider to the aerospace and building systems industries worldwide.

With a broad portfolio of advanced technical patent awards, our global R&D center in Shanghai develops innovative heat, ventilation and air-conditioning (HVAC) solutions.

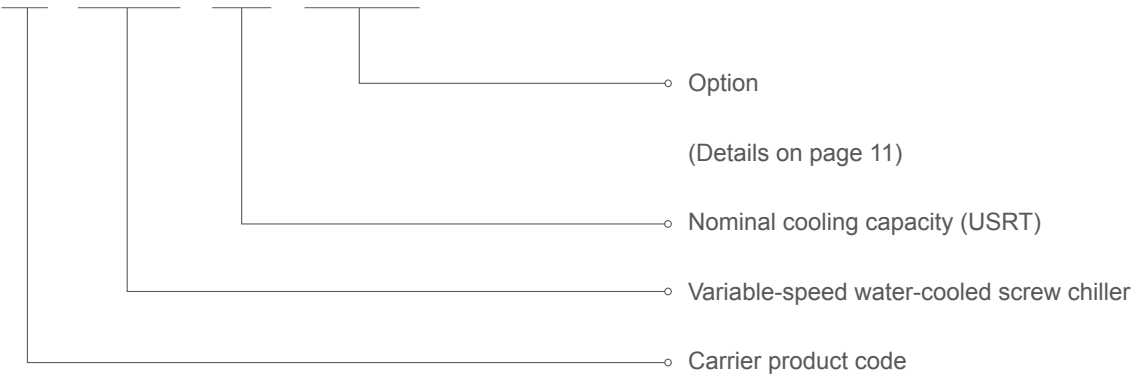


In 1998, Time magazine named Dr. Carrier one of its 20 most influential builders and titans of the 20<sup>th</sup> century.



## Nomenclature

30 XW - V 200 - PT150D



## Operating Range

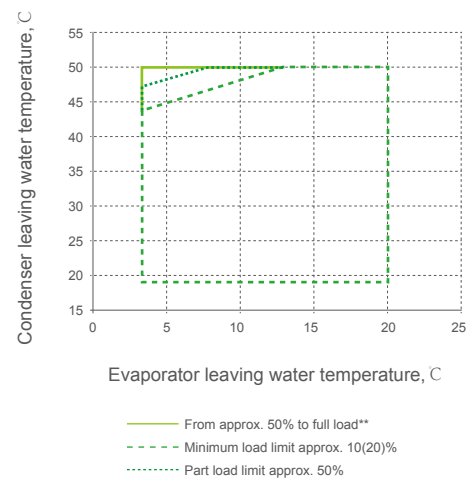
Cooling		
Evaporator	Minimum	Maximum
Entering temperature at start-up	-	35 °C
Leaving temperature during operation	3.3 °C *	20 °C
Entering/leaving temperature difference at full load	2.8 °C	11.1 °C
Condenser	Minimum	Maximum
Entering temperature at start-up	13 °C	-
Leaving temperature during operation	19 °C	50 °C
Entering/leaving temperature difference at full load	2.8 °C	11.1 °C

Note:

1.\* If the leaving water temperature is below 3.3 °C , a frost protection solution must be used.

2.\*\* For 30XW-V 308~368, the condenser maximum water leaving temperature is 45 °C , please refer IOM for detailed operation envelope.

3. During storage and transport of the unit the minimum and maximum permissible temperatures are -20 °C and 60 °C . These temperatures should be taken into consideration for transport by container.



## Cooling Capacity

567~1432kW

## Heating Capacity

624~1574kW



All data over 200Tons in this catalogue is rated in accordance with AHRI Standard 550/590 as represented in the Packaged Chiller Builder Selection Program (E-Cat)



## General Features

The AquaForce® 30XW-V variable speed screw chillers are the premium solution for industrial and commercial applications where installers, consultants and building owners require maximum quality and optimal performances, especially at part load. They are designed to meet current and future requirements in terms of energy efficiency, versatility and compactness.

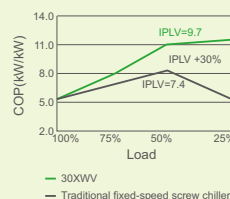
- ✔ The 30XW-V use the most reliable technologies available today:
  - Exclusive inverter-driven screw compressors, an evolution of the proven traditional Carrier twin-rotor screw compressor design.
  - New Touch Pilot control.
  - Extremely efficient mechanically cleanable flooded evaporators.
  - Environment stewardship refrigerant HFC-134a.
- ✔ The 30XW-V range is split into two versions:
  - 30XW-V for air conditioning and refrigeration applications.
  - 30XW-V-PT150D/G for hot water and heating applications.
- ✔ As standard, the unit can provide an evaporator leaving water temperature down to 3.3 °C, and when operating as a heat pump, it can deliver up to 50 °C on the condenser side.

## High Energy Efficiency

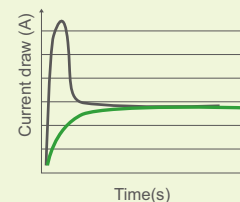
The 30XW-V was designed for high performance both at full load and at part load. Exceptional IPLV/NPLV\* values set new benchmarks for low energy consumption.

- ✔ Inverter-driven twin-rotor screw compressors allow precise capacity matching of building load changes and significantly reduce unit power input, especially at part-load.
- ✔ Flooded multi-pipe evaporator and condenser for increased heat exchange efficiency.
- ✔ Electronic expansion device permits operation at a lower condensing pressure and improved utilization of the evaporator heat exchange surface.
- ✔ Inverter-driven motors ensure negligible start-up current, optimised electrical performance.

Part Load Efficiency(AHRI)



Low Start-up Current



Notes: \*IPLV(Integrated Part-Load Value), a single number of part-load efficiency, it's rated at 100%, 75%, 50%, and 25% load relative to the full-load rating net refrigerating capacity at the standard rating AHRI conditions. Condenser EWT is 29.4 °C, 23.8 °C, 18.3 °C, 18.3 °C, respectively. Evaporator LWT is kept constant 6.7 °C.

NPLV(Non-Standard Part-Load Value), a single number of part-load efficiency referenced to conditions other than IPLV conditions. At 100% load, the condenser EWT is user-defined, at 75% load, condenser EWT is vary linearly from the selected EWT at 100% load to 18.3 °C at 50% load, and fixed at 18.3 °C for 50% to 0% load. Evaporator LWT at each load is user-defined too.

## Variable-frequency for green building design

The air conditioning system uses about 40% of the annual building energy consumption. Selection of the right air conditioning unit is one the main aspects to consider when designing a green building.

- ✔ Buildings with a variable load throughout the year 30XW-V units offer the solution to this important challenge.
- ✔ High efficiency inverter with automatic energy optimization function, optimise energy savings due to quicker commissioning and better system efficiency.
- ✔ The low total harmonic current distortion rate (THDI) options ensure that the VFD can not exceed IEEE-519 standard, for distortion at the points of common coupling, the evaluation of the compatibility level of harmonic interference on the public low-voltage power distribution system can be done using technical report IEC61000-3-4.
- ✔ With the primary pump variable flow system, variable speed chiller and water pump unit synchronous control, to meet the energy saving demands.

## Environmental Care

- ✓ Stewardship refrigerant
  - HFC-134a refrigerant with zero ozone depletion potential, has no expire date.
- ✓ 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.
  - Discharge line shut-off valve and liquid line service valve for simplified maintenance.

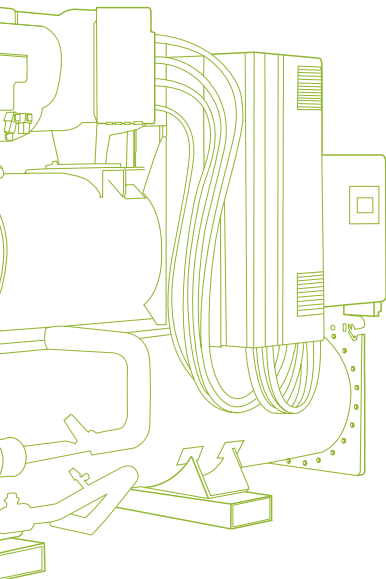
## High Reliability

- ✓ Inverter-driven screw compressors
  - Industrial-type screw compressors with oversized bearings and motor cooled by suction gas.
  - The inverter is optimized for each compressor motor to ensure reliable operation and easy maintenance.
  - All compressor components are easily accessible on site minimizing down-time.
- ✓ Evaporator
  - Electronic paddle-free flow switch. Auto-setting according to cooler size and fluid type.
- ✓ Auto-adaptive control
  - Control algorithm prevents excessive compressor cycling.
  - Automatic compressor unloading in case of abnormally high condensing pressure or discharge temperature.
- ✓ Exceptional endurance tests
  - Partnerships with specialized 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 and then on an endurance circuit.

## Easy and fast installation

- ✓ Compact design
  - The 30XW-V units are designed to offer compact dimensions for easy installation.
  - With a width of approximately 1.2 m, the units can pass through standard door openings and only require minimum floor space in the plant room.
- ✓ Simplified electrical connections
  - Main disconnect switch with high trip capacity.
  - Transformer supply to the integrated control circuit (400/24 V).
- ✓ Simplified water connections
  - Victaulic connections on the evaporator and condenser.
  - Practical reference marks for entering and leaving water connections.
  - Possibility to reverse the heat exchanger water inlet and outlet at the factory.
  - Possibility to modify the number of heat exchanger passes.
- ✓ Fast commissioning
  - Systematic factory operation test before shipment.
  - Quick-test function for step-by-step verification of the instruments, expansion devices and compressors.

**AQUAFORCE** greenspeed



# Touch Pilot Control

New innovative smart control for variable-drive screw compressor chillers. With the ultimate touch screen interface, the Touch Pilot Control includes:

- ✔ An intuitive and user-friendly interface. Concise and clear information is available in local languages.
- ✔ Complete menu, customized for different users (end user, service personnel or Carrier engineers).
- ✔ Safe operation and unit setting: password protection ensures that unauthorized people cannot modify any advanced parameters.
- ✔ General access without password to the most important operating parameters.
- ✔ Touch Pilot Control combines intelligence with operating simplicity.

For optimum energy efficiency the control constantly monitors all machine parameters and precisely manages the operation of compressors, electronic expansion devices and of the evaporator and condenser water pumps.

## Energy management

- ✔ Internal time schedule clock: controls chiller on/off times and operation at a second set-point.
- ✔ Set-point reset based on the return water temperature.
- ✔ 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.

The 30XW-V is equipped with an RS485 serial port that offers multiple remote control, monitoring and diagnostic possibilities. Carrier offers a vast choice of control products, specially designed to control, manage and supervise the operation of an air conditioning system. Please consult your Carrier representative for more information.

The 30XW-V could connect to the PC using a web browser with Java to connect to the Touch Pilot Control enter the IP address of the unit in the address bar of the web browser. Unit default address: 169.254.0.1. This address can be changed, two users can be connected simultaneously, with no priority between users; the last modification is taken into account.

The 30XW-V also communicates with other building management systems via optional communication gateways.

A connection terminal allows remote control of the 30XW-V by wired cable:

- ✔ Start/stop: opening of this contact will shut down the unit.
- ✔ Dual set-point: closing of this contact activates a second set-point (example: unoccupied mode).
- ✔ Demand limit: closing of this contact limits the maximum chiller capacity to a predefined value.
- ✔ Operation indication: this volt-free contact indicates that the chiller is operating (cooling load) or that it is ready to operate (no cooling load).
- ✔ Alarm indication: this volt-free contact indicates the presence of a major fault that has led to the shut-down of one or several refrigerant circuits.

## Remote management (EMM option)

The Energy Management Module offers extended remote control possibilities:

- ✔ Room temperature: permits set-point reset based on the building indoor air temperature (with Carrier thermostat).
- ✔ Set point reset: ensures reset of the cooling set-point based on a 4-20 mA.
- ✔ Demand limit: permits limitation of the maximum chiller power or current based on a 0-10 V signal.
- ✔ Demand limit 1 and 2: closing of these contacts limits the maximum chiller power or current 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.

# Carrier products and green building certification

## Introduction

Energy usage and costs combined with increasing concerns to reduce CO<sub>2</sub> emissions are among the most important environmental challenges in today's world. New and existing buildings are one area where energy efficiency and the conservation of natural resources is a high priority.

## Green building design

Design teams increasingly focus on designing "green buildings" to address today's energy efficiency and environmental sustainability needs. A green building is a building that is environmentally sustainable and has been designed, constructed and is operated to minimise the total impact of the environment.

The underlying principles of this approach: the resulting building will be economical to operate, offer increased comfort and create a healthier environment for the people who live and work there, increasing productivity.

The main strategies\* adopted to achieve a green building design include:

- 🌿 Sustainable Sites (SS)
- 🌿 Water Efficiency (WE)
- 🌿 Energy & Atmosphere (EA)
- 🌿 Materials & Resources (MR)
- 🌿 Indoor Environmental Quality (IEQ)
- 🌿 Innovation in Design (ID)

## Green building certification

A number of green building certification programs exist in the market and offer third-party assessment of green building measures for a wide variety of building types. Some examples of existing programs include:

- 🌿 LEED (Leadership in Energy & Environmental Design)
- 🌿 BREEAM
- 🌿 ESTIDAMA PEARL
- 🌿 NABERS (National Australian Built Environment Rating System)

## HVAC products and systems

Carrier HVAC products are built to high energy efficiency and indoor air quality standards. They assist building designers and owners by offering high-performance heating, ventilation, and air conditioning (HVAC) systems and products with reduced energy consumption and enhanced indoor air quality for the occupants, contributing to optimised green building performance.

Each certification program may address and prioritise different green building design strategies according to local and regional needs and legislation. The following example looks at how Carrier's new 30XW-V range helps customers involved in LEED building certification.

\* Source USGBC: LEED

## Example: 30XW-V and LEED® certification

The LEED® (Leadership in Energy and Environmental Design) green building certification programme is a pre-eminent programme to rate the design, construction and operation of green buildings with points assigned in seven credit categories:

- 🌿 Sustainable Sites (SS)
- 🌿 Water Efficiency (WE)
- 🌿 Energy & Atmosphere (EA)
- 🌿 Materials & Resources (MR)
- 🌿 Indoor Environmental Quality (IEQ)
- 🌿 Innovation in Design (ID)
- 🌿 Regional Priority (RP)

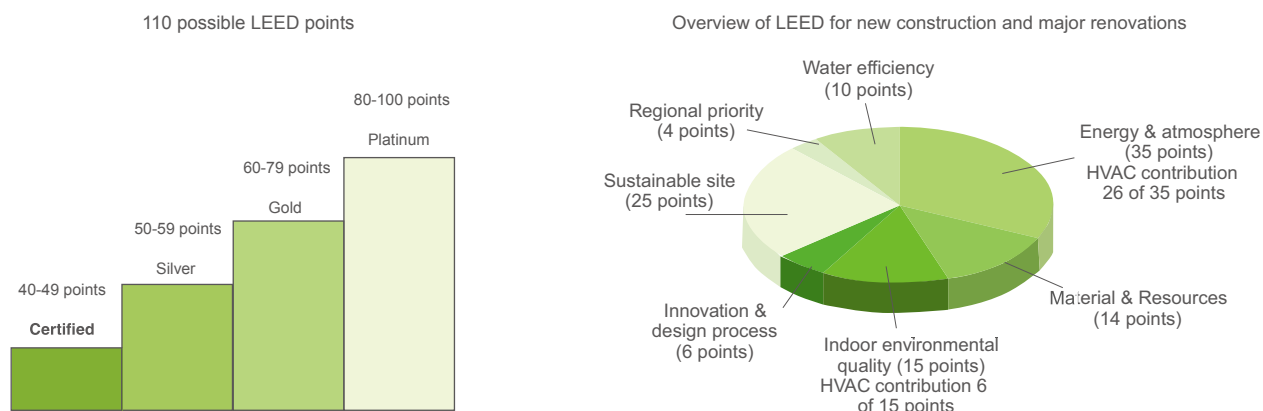
There are a number of different LEED® products. Whilst the strategies and categories assessed remain the same, the point distribution varies to address different building types and application needs, for example according to New Construction, Schools, Core & Shell, Retail and Healthcare. All programmes now use the same point scale.

The majority of credits in LEED® rating systems are performance-based and achieving them is dependent on the impacts to the overall building.

The contribution any product or system may make to the points achieved depends on how it impacts the entire building and its operations.

Whilst the LEED® green building certification programme does not certify products or services, the selection of products or service programmes is critical to obtaining LEED® certification for a registered project because the right products or service programmes can help meet the goals of green construction and ongoing operation and maintenance.

The choice of heating, ventilating and air conditioning (HVAC) products in particular can have a significant impact on LEED® certification, as the HVAC system directly impacts two categories that together influence 40% of the available points.



The new 30XW-V units from Carrier can assist building owners to earn LEED® points in the Energy & Atmosphere (EA) credit category and help address the following prerequisites and credit requirements:

#### EA prerequisite 2: Minimum Energy Performance

The 30XW-V exceeds the energy-efficiency requirements of ASHRAE 90.1-2007; therefore it complies with the prerequisite standard.

#### EA prerequisite 3: Fundamental Refrigerant Management

The 30XW-V does not use chlorofluorocarbon (CFC) refrigerants satisfying the prerequisite statement

#### EA credit 1; Optimise energy performance (1 to 19 points)

One component for this credit requires the energy cost reduction of the proposed building compared to ASHRAE 90.1-2007 minimum tables and beyond the performance level required to meet EA prerequisite 2.

The 30XW-V is designed for efficient part-load performance and therefore satisfies this LEED® credit. In addition, the Carrier HAP (Hourly Analysis Program) can be used in the energy analysis component of this credit. The HAP program can run analysis programs that comply with the modeling requirements for this credit and produce reports that are easily transferable to LEED® templates.

#### EA credit 4: Enhanced refrigerant management (2 points)

With this credit, LEED® awards systems that minimise the Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) of the system.

The 30XW-V uses a reduced R134a charge and therefore contributes toward satisfying this credit under LEED®.

**NOTE:** This section describes the prerequisites and credit requirements in LEED® for New Construction and is directly related to the 30XW-V. Other prerequisites and credit requirements are not directly and purely related to the air-conditioning unit itself, but more to the control of the complete HVAC system. i-Vu®, Carrier's open control system, has features that can be valuable for:

- 🌱 EA prerequisite 1: Fundamental commissioning of energy management systems
- 🌱 EA credit 3: Enhanced commissioning (2 points)
- 🌱 EA credit 5: Measurements and verification (3 points)

**NOTE:** Products are not reviewed or certified under LEED®. LEED® credit requirements cover the performance of materials in aggregate, not the performance of individual products or brands. For more information on LEED®, visit: [www.usgbc.org](http://www.usgbc.org).



## Performance data

Model			30XW-V								
			160	180	200	235	308	338	368	385	400
Capacity		kW	567	641	824	905	1076	1191	1233	1352	1432
		USRT	161	182	234	257	306	339	351	384	407
Full load COP		kW/kW	5.67	5.62	5.51	5.53	5.96	5.82	5.82	5.82	5.82
NPLV @ AHRI		kW/kW	9.61	9.76	9.66	9.61	10.00	9.97	10.07	9.63	9.41
Evaporator	Flow rate	L/s	24	28	35	39	46	51	53	58	62
	Water Pressure drop	kPa	42	48	38	43	68	65	68	68	74
	Water connection	DN	150	150	200	200	150	200	200	200	200
Condenser	Flow rate	L/s	30	34	44	49	58	64	66	72	76
	Water Pressure drop	kPa	68	81	60	67	57	68	72	52	58
	Water connection	DN	150	150	200	200	200	200	200	200	200
Compressor			Inverter-driven screw type								
		No.	1	1	1	1	1	1	1	2	2
Capacity control range			20%-100%							10%-100%	
Motor	Power	V-Ph-Hz	400-3-50								
	Input power	kW	100	114	150	164	181	205	212	232	246
Refrigerant Charge			HFC-134a								
	Circuit A	kg	135	135	180	180	330	340	340	130	130
	Circuit B	kg	-	-	-	-	-	-	-	140	140
Shipping weight(with refrigerant)		kg	3348	3371	4386	4392	6578	6752	6752	7187	7741
Operation weight		kg	3061	3084	4210	4216	6384	6606	6606	7087	7641
Dimension	Length	mm	3056	3056	3288	3288	4166	4166	4166	4695	4695
	Width	mm	1137	1137	1215	1215	1396	1405	1405	1231	1231
	Height	mm	1743	1743	1949	1949	2321	2403	2403	2064	2064

Based on AHRI condition:

Evaporator leaving water temperature 6.7 °C , 0.043 l/s-kW, fouling factor=0.018m²K/kW.

Condenser entering water temperature 29.4 °C , 0.054 l/s-kW, fouling factor=0.044m²K/kW.

Above are recommended models. Carrier can offer more models and computer selections at required conditions. For details, please contact Carrier local agencies.

## Performance data, 30XW-V Heating units (Option)

Model			30XW-V-PT150D/G								
			160	180	200	235	308	338	368	385	400
Cooling											
Cooling Capacity		kW	569	644	828	910	1081	1196	1239	1360	1436
Input power		kW	101	115	151	165	183	207	214	235	248
Evaporator	Flow rate	L/s	27	31	40	43	52	57	59	65	68
	Water Pressure drop	kPa	50	57	49	55	85	80	85	82	90
Condenser	Flow rate	L/s	32	36	47	51	60	67	69	76	80
	Water Pressure drop	kPa	75	90	66	73	61	74	78	57	63
Heating											
Heating Capacity		kW	624	706	905	1001	1193	1324	1371	1491	1575
Input power		kW	133	148	189	213	239	270	279	300	323
Evaporator	Flow rate	L/s	15	17	22	24	29	32	33	36	38
	Water Pressure drop	kPa	19	22	15	15	27	25	26	28	31
Condenser	Flow rate	L/s	30	34	44	48	58	64	66	72	76
	Water Pressure drop	kPa	64	77	55	63	53	65	68	50	55
Condenser water connection		DN	150	150	200	200	150	200	200	200	200
Evaporator water connection		DN	150	150	200	200	200	200	200	200	200
Compressor			Inverter-driven screw type								
		No.	1	1	1	1	1	1	1	2	2
Capacity control range			20%-100%							10%-100%	
Power		V-Ph-Hz	400-3-50								
Refrigerant Charge			HFC-134a								
	Circuit A	kg	135	135	180	180	330	340	340	130	130
	Circuit B	kg	-	-	-	-	-	-	-	140	140
Shipping weight(with refrigerant)		kg	3348	3371	4386	4392	6578	6752	6752	7187	7741
Operation weight		kg	3061	3084	4210	4216	6384	6606	6606	7087	7641
Dimension	Length	mm	3056	3056	3288	3288	4166	4166	4166	4695	4695
	Width	mm	1137	1137	1215	1215	1396	1405	1405	1231	1231
	Height	mm	1743	1743	1949	1949	2321	2403	2403	2064	2064

Cooling condition: Evaporator entering/leaving water temperature 12 °C /7 °C .

Condenser entering/leaving water temperature 30 °C /35 °C .

Heating conditions: Evaporator entering/leaving water temperature 15 °C /7 °C .

Condenser entering/leaving water temperature 40 °C /45 °C .

Evaporator fouling factor=0.018m²K/kW, Condenser fouling factor=0.044m²K/kW.

Cooling and heating capacity based on maximum load(60Hz).

Maximum heating temperature 50 °C . 30XW308/338/368 maximum temperature is 45 °C .

Above are recommended models. Carrier can offer more models and computer selections at required conditions. For details, please contact Carrier local agencies.

# Electrical parameters

Models 30XW-V		160	180	200	235	308	338	368	385	400
Power circuit	V-ph-Hz V	400-3-50 360~440								
Rated Voltage										
Voltage Range										
Control circuit		24 V per internal transformateur								
Power Factor										
At nominal capacity*		0.91	0.91	0.91	0.91	0.92	0.92	0.92	0.91	0.91
At maximum capacity†		0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.92	0.92
Cosine phi		>0.98	>0.98	>0.98	>0.98	>0.98	>0.98	>0.98	>0.98	>0.98
Maximum start-up current **										
Circuit A	A	<245	<300	<346	<383	<387	<465	<465	<346	<383
Circuit B	A	-	-	-	-	-	-	-	<300	<346
Maximum power input†										
Circuit A	kW	155	193	222	246	249	300	300	209	205
Circuit B	kW	-	-	-	-	-	-	-	160	186
Nominal current draw *										
Circuit A	A	159	182	238	261	286	322	336	236	240
Circuit B	A	-	-	-	-	-	-	-	181	218
Maximum current draw (Un) †										
Circuit A	A	245	300	346	383	387	465	465	346	383
Circuit B	A	-	-	-	-	-	-	-	300	346
Maximum current draw (Un -10%) †										
Circuit A	A	270	330	380	421	426	512	512	380	421
Circuit B	A	-	-	-	-	-	-	-	330	380

\*Values obtained at operating condition: evaporator temperature entry/leave water = 12.2 °C /6.7 °C , condenser temperature entry/leave water = 29.4 °C /34.6 °C .

\*\*Instantaneous start -up current (locked rotor current of the largest compressor + the maximum load current of other smaller motors at maximum unit conditions).

†Values obtained at operation with maximum unit power input.

Notes, electrical data and operating condition 30XW-V units

- ✓ The control box includes the following standard features:
  - One main disconnect switch per circuit
  - Anti-short cycle protection devices
  - Control devices
- ✓ Field connections:
 

All connections to the system and the electrical installations must be in full accordance with all applicable codes.
- ✓ The Carrier 30XW-V units are designed and built to ensure conformance with local codes.
 

The recommendations of European standard EN 60204-1 (corresponds to IEC 60204-1)(machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment\*.
- ✓ Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines. The ones described below apply to 30XW-V units and complement other information in this document:
  1. Physical environment\*\*: Environment as classified in EN 60721 (corresponds to IEC 60721):
    - indoor installation
    - ambient temperature range: minimum temperature +5 °C to +42 °C , class AA4
    - altitude: lower than or equal to 2000 m
    - presence of water: class AD2 (possibility of water droplets)
    - presence of hard solids, class 4S2 (no significant dust present)
    - presence of corrosive and polluting substances, class 4C2 (negligible)
  2. Power supply frequency variation: ± 2 Hz.
  3. The neutral (N) line must not be connected directly to the unit (if necessary use a transformer).
  4. Overcurrent protection of the power supply conductors is not provided with the unit.
  5. The factory installed disconnect switch(es)/circuit breaker(s) is (are) of a type suitable for power interruption in accordance with EN 60947-3 (corresponds to IEC 60947-3).
  6. The units are designed for connection to TN networks (IEC 60364). In IT networks the use of noise filters integrated into the frequency variator(s) make machine use unsuitable. In addition, the short-circuit holding current characteristics have been modified. Provide a local earth, consult competent local organisations to complete the electrical installation.
  7. Electromagnetic environment: classification of the electromagnetic environment is described in standard EN 61800-3 (corresponds to IEC

61800-3):

- Immunity to external interference defined by the second environment\*\*\*
- Interference emission as defined in category C3†

- ✓ Due to the harmonic currents the integrated frequency variator in the 30XW-V units is a source of interference. An analysis may be required to verify if these interferences exceed the compatibility limits of the other devices connected to the same power supply network. The compatibility levels inside an electrical installation, that must be met at the in-plant coupling point (IPC) to which other loads are connected are described in standard 61000-2-4.

Two characteristics are required for this analysis:

- The short-circuit ratio (Rsc) of the installation calculated at the in-plant coupling point (IPC).
- The total harmonic current distortion rate (THDI), calculated for the machine at maximum capacity.

Note: The evaluation of the compatibility level of harmonic interference on the public lowvoltage power distribution system can be done using technical report IEC61000-3-4. In this document the THDI rate of the 30XW-V units permits a stage 2 connection procedure for any Rsc value above 350: the connection is based on the system data and the material.

- ✓ Derived currents: If protection by monitoring the leakage currents is necessary to ensure the safety of the installation, the presence of derived currents introduced by the use of frequency variators in the unit must be considered. In particular the choice the detection type and a control value not lower than 150 mA are recommended to control differential protection devices.

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.

\* Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60204-1 is the best means of ensuring compliance with the Machinery Directive.

\*\* The required protection level for this class is IP21B or IPX1B (according to reference document IEC 60529). All 30XWV have IP23 units fulfil this protection condition.

\*\*\* Example of installations of the second environment: industrial zones, technical locations supplied from a dedicated transformer.

† Category C3 is suitable for use in an industrial environment and is not designed for use in a public low-voltage system that supplies residential locations. As an option, conformity with category C2 permits this type of installation.

## Options & accessories

Options	Code	Description	Advantages	Use
Evaporator with reversed water connection	107E	Evaporator with reversed water inlet/outlet	Simplification of the water piping	30XW-V160~400(except 30XW-V308/338/368)
Condenser with reversed water connection	107C	Condenser with reversed water inlet/outlet	Simplification of the water piping	30XW-V160~400(except 30XW-V308/338/368)
CCN to J bus gateway	148B	Two way protocol converter board between CCN and J-Bus for easy connection to BMS. Consist of: - Electronic board mounted in the unit electrical cabinet - Automatic configuration at start up	Easy connection by communication bus to a building management system	30XW-V160~400
CCN to Lon work gateway	148D	Two way protocol converter board between CCN and Lon work for easy connection to BMS. Consist of: - Electronic board mounted in the unit electrical cabinet - Automatic configuration at start up	Easy connection by communication bus to a building management system	30XW-V160~400
CCN to BAC Net-IP gateway	149	Two way protocol converter board between CCN and BAC Net-IP for easy connection to BMS. Consist of: - Electronic board mounted in the unit electrical cabinet - Automatic configuration at start up	Easy connection by communication bus to a building management system	30XW-V160~400
Heat pump (Max condenser leaving temp 50°C)	150D	Heat pump control logic to control condenser LWT - Condenser insulation - Heat pump Control logic	Allows heating applications with max condenser leaving temp 50 C	30XW-V160~400
Heat pump (Max condenser leaving temp 45°C)	150G	Heat pump control logic to control condenser LWT - Condenser insulation - Heat pump Control logic	Allows heating applications with max condenser leaving temp 45 C	30XW-V308/338/368
Condenser water valve control (0-10V signal)	152	Output signal (0-10V) to control the condenser water inlet valve Consist of: - One 8DO+4AI/2AO Board - Connector for 3 way valve Note: Power supply for water valve is not included	Used for applications with cold water at the condenser inlet (well water). In this case the valve controls the water entering temperature to maintain an acceptable condensing pressure	30XW-V160~400
Energy management module	156	Remote control module. Additional contacts for an extension of the unit control functions (without communication bus) Consist of: - Electrinoc board mounted in the unit electrical cabinet	Easy connection by wired connection to a building management system	30XW-V160~400
7 inch touch screen display	158A	Larger colorful touch screen display	Easy operation	30XW-V160~400
Evaporator flanged connections	314E	Victaulic to Flange water connections	Easy installation	30XW-V160~400
Condenser flanged connections	314C	Victaulic to Flange water connections	Easy installation	30XW-V160~400
Australia code*	312A	Meets Australia government pressure vessel code AS 1210 and AS 4343	Meets Australia government pressure vessel code AS 1210 and AS 4343	30XW-V160~400
EMC Classification according to IEC 61800-3-class C2	282	Frequency variator with RFI filter class C2	Reduces the risk of electromagnetic interference, if the unit is installed in a residential environment	30XW-V160~400
Nitrogen charge	320	Unit nitrogen factory charged	Less weight. No refrigerant charged	30XW-V160~400
Discharge shut off valve	321	Allows refrigerant to be stored inside the chiller during servicing	Allows refrigerant to be stored inside the chiller during servicing	30XW-V160~400
Master/Slave	58	Optimal controller could manage two units, one unit is Master and the other is slave	Master/slave control to optimize performance of two units in one plant	30XW-V160~400
5% Total Harmonic Current Distortion	323A	Free standing passive filter with lower 5 %THD offering	Reduce Harmonic, cleaning power source	30XW-V160~400
10% Total Harmonic Current Distortion	323B	Free standing passive filter with lower 10% THD offering	Reduce Harmonic, cleaning power source	30XW-V160~400

Notes: Australia code PT312A is not compatible with PT104/PT104A16.

## 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. 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 %	Condenser entering water temperature( C )	Energy efficiency	Operating time(%)
100	29.4	EER <sub>1</sub>	1
75	23.9	EER <sub>2</sub>	42
50	18.3	EER <sub>3</sub>	45
25	18.3	EER <sub>4</sub>	12
IPLV = EER <sub>1</sub> x 1% + EER <sub>2</sub> x 42% + EER <sub>3</sub> x 45% + EER <sub>4</sub> x 12%			

The heat load of a building depends on many factors, such as the outside air temperature, the exposure to the sun and its occupation. Consequently it is preferable to use the average energy efficiency, calculated at several operating points that are representative for the unit utilisation.

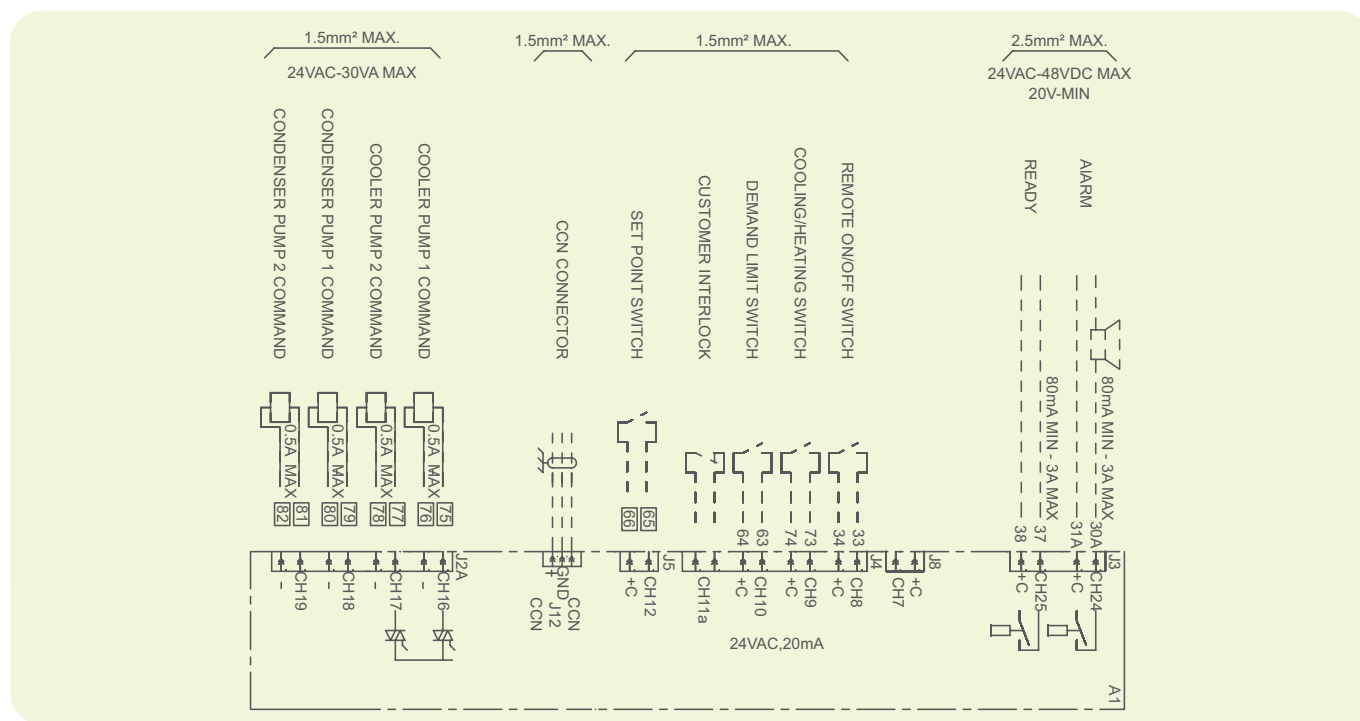
### ESEER (in accordance with EUROVENT)

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 %	Condenser entering water temperature( C )	Energy efficiency	Operating time(%)
100	30	EER <sub>1</sub>	3
75	26	EER <sub>2</sub>	33
50	22	EER <sub>3</sub>	41
25	18	EER <sub>4</sub>	23
ESEER = EER <sub>1</sub> x 3% + EER <sub>2</sub> x 33% + EER <sub>3</sub> x 41% + EER <sub>4</sub> x 23%			

## Wiring Diagram



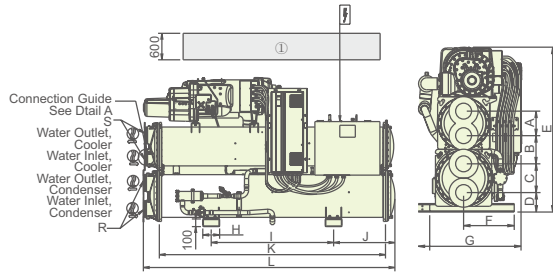
#### Notes:

1. Sound pressure level measured in accordance with AHRI575, horizontal distance from chiller to receiver is 1.0 m
2. Noise value at part load is much lower than full load, it can be stated in product's selection report

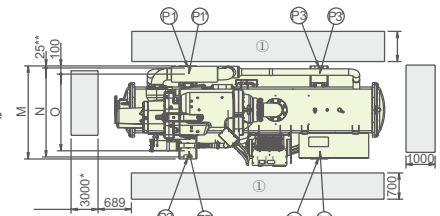
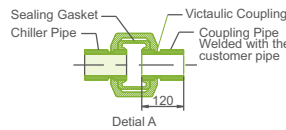


# Dimension Drawing

## 30XW-V160-368

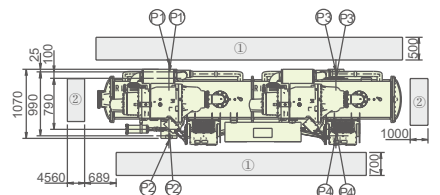
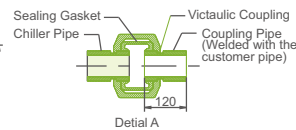
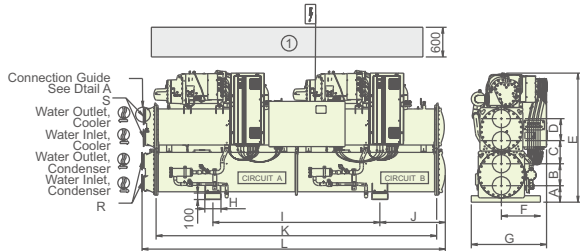


30XW-V308/338/368 are three passes design, the condenser and evaporator water outlet connection is in the opposite side compared to inlet, please refer outline drawings for details.



\*30XW-V308/338/368 is 3920mm  
\*\*30XW-V308/338/368 is 40mm

## 30XW-V385-400



## Dimension (mm)

MODEL	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	S	R
30XW-V160	242	299	304	222	1743	539	1137	250	1200	889	2756	3056	1008	958	808	DN150	DN150
30XW-V180	242	299	304	222	1743	539	1137	250	1200	889	2756	3056	1008	958	808	DN150	DN150
30XW-V200	290	333	340	230	1949	599	1215	220	1600	801	2956	3288	1135	1085	935	DN200	DN200
30XW-V235	290	333	340	230	1949	599	1215	220	1600	801	2956	3288	1135	1085	935	DN200	DN200
30XW-V308	339	456	413	339	2321	725	1396	250	2165	1005	3660	4166	1258	1178	978	DN150	DN200
30XW-V338	392	491	409	339	2403	734	1405	250	2165	1005	3660	4166	1258	1178	978	DN200	DN200
30XW-V368	392	491	409	339	2403	734	1405	250	2165	1005	3660	4166	1258	1178	978	DN200	DN200
30XW-V385	255	340	358	340	2064	698	1231	250	2585	1013	4344	4695	1231	1151	951	DN200	DN200
30XW-V400	255	340	358	340	2064	698	1231	250	2585	1013	4344	4695	1231	1151	951	DN200	DN200

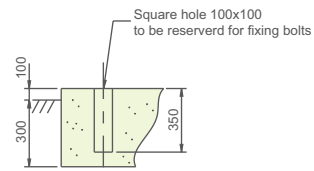
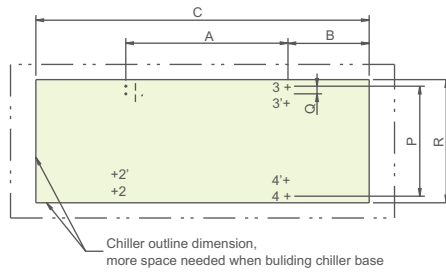
## Weight distribution (kg)

MODEL	P1	P2	P3	P4	P1'	P2'	P3'	P4'	PT
30XW-V160	963	956	573	569	963	955	574	569	3061
30XW-V180	970	963	578	574	971	962	578	573	3084
30XW-V200	1324	1578	597	711	1311	1591	591	717	4210
30XW-V235	1326	1580	597	712	1313	1593	592	718	4216
30XW-V308	2207	2034	1116	1028	2224	2016	1124	1019	6384
30XW-V338	2309	2078	1168	1051	2333	2055	1179	1039	6606
30XW-V368	2309	2078	1168	1051	2333	2055	1179	1039	6606
30XW-V385	2133	1697	1814	1443	2179	1651	1853	1404	7087
30XW-V400	2300	1830	1956	1556	2349	1780	1998	1514	7641

Note:

1. Tolerances on nozzle locations and overall dimensions are  $\pm 25$ mm.
2. ① Required clearances for maintenance, ② Recommended space for tube removal
3. P1 and P1' are two group of bolts to fix the chiller, either group can be selected.
4. The water pipe connector is the Victaulic coupling, the Victaulic and the pipe are supplied with the chiller, the pipe length is 120mm.

## Basement Drawing



Section diagram for fixing bolts

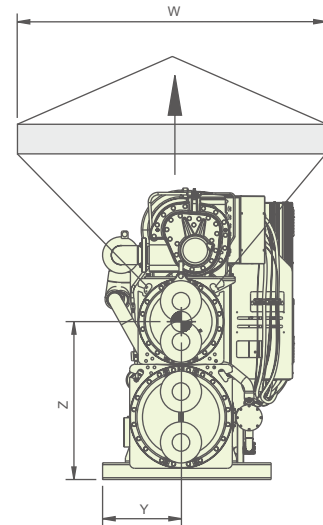
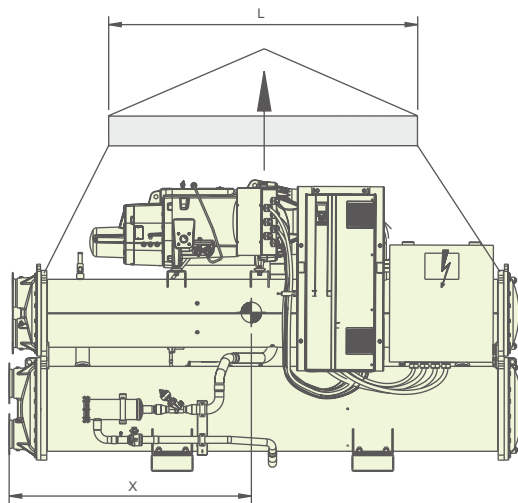
MODEL	A(mm)	B(mm)	C(mm)	P(mm)	Q(mm)	R(mm)
30XW-V160	1200	889	3056	985	75	1137
30XW-V180	1200	889	3056	985	75	1137
30XW-V200	1600	801	3288	1085	75	1215
30XW-V235	1600	801	3288	1085	75	1215
30XW-V308	2165	1005	4166	1258	100	1396
30XW-V338	2165	1005	4166	1258	100	1405
30XW-V368	2165	1005	4166	1258	100	1405
30XW-V385	2585	1013	4695	1151	100	1231
30XW-V400	2585	1013	4695	1151	100	1231

### Notes:

1.4 bolts used to fix chiller, bolt size M20×300.

2.User can select 1, 2, 3, 4 or 1', 2', 3', 4' as a group to fix bolts.

## Dimension Drawing



MODEL	PT(kg)	X(mm)	Y(mm)	Z(mm)	L(mm) min	W(mm) min
30XW-V160	3061	1447	502	930	2000	1200
30XW-V180	3084	1447	502	930	2000	1200
30XW-V200	4210	1382	615	1045	2000	1200
30XW-V235	4216	1382	615	1045	2000	1200
30XW-V308	6387	1723	605	1198	4200	1400
30XW-V338	6606	1723	598	1209	4200	1400
30XW-V368	6606	1723	598	1209	4200	1400
30XW-V385	7087	2285	520	1114	4800	1400
30XW-V400	7641	2285	520	1114	4800	1400

### Notes:

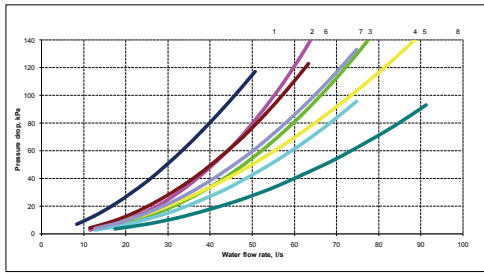
1.Each spider bar must with stand unit weight.

2.Gravity center must be aligned with lifting bar.

3.Loading by lifting lug of condenser is prohibited.

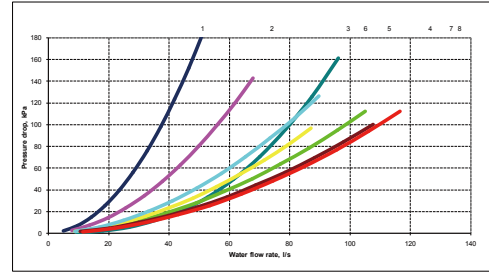
## Pressure drop curve 30XW-V units

Cooler pressure drop curve



1.30XWV-160/180 2.30XW-V200/235 4.30XW-V385/400  
6.30XW-V308 7.30XW-V338/368

Condenser pressure drop curve



1.30XWV-160/180 2.30XW-V200/235  
4.30XW-V385/400 6.30XW-V308338/368

## Water flow rate range

30XW-V	Evaporator		Condenser	
	min*	max***	min**	max***
160	8.4	50.7	5.1	51.1
180	8.4	50.7	5.1	51.1
200	11.4	68.7	7.8	67.9
235	11.4	68.7	7.8	67.9
308	11.4	63.4	8.8	89.7
338	12.7	74.8	8.8	89.7
368	12.7	74.8	8.8	89.7
385	16.0	97.0	11.5	105.1
400	16.0	97.0	11.5	105.1

Note:

\*Based on flow velocity: 0.5m/s.

\*\*Based on flow velocity: 0.3m/s.

\*\*\*Based on flow velocity: 3.05m/s.

## Recommendations on heat exchange fluids

Filters are required to be installed in water entering side, and water quality analysis periodically implement.

Water quality should be maintained within the limits indicated in below table.

Water Characteristics	Quality Limitation
NH3	<2 ppm
NH4+	<2 ppm
Cl2	<1 ppm
Cl-	< 300 ppm
H2S*	<0.05 ppm
SO42-	< 70 ppm
CO2†	<5 ppm
Fe2+/Fe3+	<0.2 ppm
O2	< 5 ppm

Water Characteristics	Quality Limitation
NO3	<100 ppm
Si	< 0.1 ppm
Al	<0.2 ppm
Mn	<0.1 ppm
Hardness	71.2<...<151.3mg/l CaCO3
Resistance	>3000ohm.cm
Conductivity	200<...<600μS/cm
Ph	7.5<...<9

# Guide Specifications

## General description

Factory assembled single piece variable speed water-cooled liquid chiller. Contained within the unit shall be all factory wiring, piping, controls, refrigerant charge (HFC-134a), refrigeration circuits set, screw compressors, variable frequency drive, electronic expansion valves and equipment required prior to field start-up.

Size Range:

161 to 407 Tons (567 to 1432 kW) Nominal

Carrier Model Number:

30XW-V xxx

## Part 1 — General

### 1.01 SYSTEM DESCRIPTION

Microprocessor controlled Variable speed water-cooled liquid chiller utilizing screw compressor, variable frequency drive and electronic expansion valves.

### 1.02 QUALITY ASSURANCE

- Unit performance shall be rated in accordance with AHRI Standard 550/590.
- Unit shall be designed and constructed to meet GB9237-2001 Mechanical refrigeration system safety requirement and GB5226.1-2002 Safety of machinery-Electrical equipment of machines.
- Unit shall be designed, manufactured and tested in a facility with a quality management system certified ISO 9001 and environmental management system ISO 14001.

### 1.03 DELIVERY, STORAGE, AND HANDLING

- Unit shall be capable of withstanding 60°C storage without damage, failure, refrigerant loss, or safety risks.
- Chiller should be stored indoors, protected from construction dirt and moisture. An inspection should be conducted under shipping tarps, bags, or crates to be sure water has not collected during transit. Protective shipping covers should be kept in place until machine is ready for installation.

## Part 2 — Products

### 2.01 General:

Factory assembled, single-piece, variable speed water-cooled liquid chiller. Unit sizes 165-235 shall have single independent refrigerant circuit. Unit sizes 330-460 shall have dual independent refrigerant circuit. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge (HFC-134a) and special features required prior to field start-up.

### 2.02 Compressor (s) :

- 06T semi-hermetic twin-screw compressors with internal relief valve and check valve to avoid reverse rotation on shut down.
- Each compressor is equipped with discharge shut-off valve (optional) .
- Compressor capacity control is ensured by successive use of speed variation (using a variable frequency drive) and swept volume variation at the screws (ensured by the slide valve) , capable of reducing compressor capacity down to 20% of full load. Compressor shall start in unloaded condition.
- Motor shall be cooled by suction gas and protected by internal winding temperature sensors. Compressor bearings shall be designed for minimum 73000 hours at maximum operating conditions.
- Lubrication oil system shall include pre-filter and external filter capable of filtration to 5 microns.

### 2.03 Evaporator:

- Evaporator shall be manufactured, tested and stamped in accordance with the NB/T 47012-2010(JB/T 4750) and TSG R004-2009.
- The maximum refrigerant-side working pressure will be 1500 kPa and the maximum waterside pressure will be 1000 kPa (1600, 2100kPa as an option).
- 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.
- Shall be equipped with victaulic fluid connections or flanged fluid connections.
- 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.

# Guide Specifications

- ✱ The evaporator shall incorporate an active refrigerant level control system to ensure optimum heat transfer performance under all load conditions.
- ✱ Evaporator shall be fitted with electronic auto setting water flow switch.

## 2.04 Condenser:

- ✱ Condenser shall be manufactured, tested and stamped in accordance with the NB/T 47012-2010(JB/T 4750) and TSG R004-2009.
- ✱ The maximum refrigerant-side working pressure will be 1500 kPa and the maximum waterside pressure will be 1000 kPa (1600, 2100kPa as an option).
- ✱ The condenser 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.
- ✱ Shall be equipped with victaulic fluid connections or flanged fluid connections.
- ✱ The condenser shall have a drain and vent in each head.

## 2.05 Refrigeration Components:

- ✱ Refrigerant circuit components shall include, compressor, oil separator, high and low side pressure relief devices, compressor discharge shutoff valves (optional), refrigerant liquid sub assembly line, filter driers, moisture indicating sight glasses, long stroke electronic expansion device, and complete operating charge of both refrigerant HFC-134a and compressor oil.
- ✱ To facilitate service and maintenance and avoid refrigerant charge transfers, it must be possible to isolate the following components and systems independently: filter driers, oil filters.

## 2.06 Touch pilot colorful screen user interface:

This touch pilot colorful screen user interface allow customer to select menu or action by pressing directly on the screen. It is recommended to use a pen for the navigation via the touch screen. It prevents screen maintenance and allows more precision during the selections.

## 2.07 Variable frequency drive:

30XW-V/30XW-V Heating units are equipped with a frequency variator that permits compressor capacity adjustment by varying the motor speed in the 30-60 Hz frequency range. The compressor drive uses power supply waveform generation with variable frequency and voltage, generated by pulse width modulation (PWM).

Compressor start-up and stopping and the frequency setting for the operating range is only by RS485 communication in the LEN protocol via the Carrier controller. One of the other frequency variator functions is to ensure the unit safety stop function using wired pressure switches at the digital drive inputs.

## 2.08 Controls (Pro-dialog 7):

Unit controls shall include the following minimum components:

- ✱ Microprocessor with non-volatile memory, picture guided unit/operator interface, the LOCAL/OFF/REMOTE/CCN selector and a display with multiple language capability.
- ✱ Pressure sensors shall be installed to measure suction, discharge and oil pressure.
- ✱ Thermostats shall be installed to measure cooler entering and leaving temperatures (on cooler and condenser side).

Unit controls shall include the following functions:

- ✱ Automatic change-over and cycling of compressors to equalize running hours and number of starts.
- ✱ EXV control, based on throttling optimizes evaporator charging, ensuring condenser superheat and sub-cooling.
- ✱ Capacity control based on leaving chilled fluid temperature with return fluid temperature sensing.
- ✱ Limit 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.
- ✱ Enable reset of leaving chilled water temperature according to the return water temperature or by means of a 0-10V signal.
- ✱ Provide a dual set point for the leaving chilled water temperature activated by a remote contact closure signal or by the built in time clock.
- ✱ Enable a 2-level demand limit control (between 0 and 100%) or a maximum current drawn limit activated by a remote contact closure or by the built in time clock.
- ✱ Control evaporator water pump and the condenser pump.
- ✱ Allow two time scheduling programs to enable unit start-up control, demand limit and set-point changes.
- ✱ Enable lead lag control of two chillers running in series or parallel.



# Guide Specifications

## 2.09 Diagnostics:

- Display module shall be capable of displaying set points, system status including temperatures, pressures, current for each compressor, run time and percent loading.
- The control system shall allow a quick test of all machine elements to verify the correct operation of every switch before the chiller is started.

## 2.10 Safeties:

- Unit shall be equipped with all necessary components, and in conjunction with the control system shall provide the unit with protection against the following:
  - Reverse rotation.
  - Low chilled water temperature.
  - Low oil pressure (per compressor).
  - Current imbalance.
  - Compressor thermal overload
  - Automatic compressor unloading in case of excessive condensing temperature
  - High pressure.
  - Electrical overload.
  - Loss of phase.
  - Variable speed drive failure
- Control shall provide separate general alert (minor incident) and alarm (circuit down) remote indication.

## 2.11 Operating Characteristics:

- Unit shall be capable of starting with 13 °C entering water temperature to the condenser.
- Unit shall be capable of starting with 35 °C entering water temperature to the evaporator.

## 2.12 Electrical Characteristics:

- Unit shall operate on 3-phase power supply (400V-3-50Hz) without neutral.
- Control voltage shall be supplied by a factory-installed transformer.
- Unit shall be supplied with factory-installed electrical disconnect/isolator switch integrating main fuses.
- Unit shall have a factory installed variable frequency drive as standard to well control the electrical inrush current below maximum operation current.

## 2.13 Option Features:

- Energy Management Module:**  
A factory or field installed module shall provide the following energy management capabilities: 4 to 20 mA signals for leaving fluid temperature reset, cooling set point reset or demand limit control; 2-point demand limit control (from 20 to 100%) activated by a remotcontact closure; and discrete input for "Ice Done" indication for ice storage system interface.
- BACnet Translator Control:**  
Unit shall be supplied with factory or field-installed interface between the chiller and a BACnet Local Area Network (LAN, i.e., MS/TP EIA-485).
- LON Translator Control:**  
Unit shall be supplied with factory or field-installed interface between the Chiller and a Local Operating Network (LON, i.e., Lon Works FT-10A ANSI/EIA-709.1).
- BACnet Communication:**  
Shall provide factory installed communication capability with a BACnet MS/TP network and allows integration with i-Vu® Open control system or a BACnet building automation system.
- Medium Temperature Brine:**  
Unit shall be factory modified to start and operate at leaving chilled fluid temperatures below 3.3 °C . Chiller shall be equipped with condenser water flow switch.
- Marine Waterboxes:**  
Marine waterboxes shall provide water piping connections extending from the side of the waterbox (as opposed to extending from the end of the waterbox). This option also includes a removable bolt on waterbox cover allowing access to the heat exchanger tubes without breaking the existing field piping. This option is available for both the evaporator and condenser.
- Heat machine:**  
Heat machine condensers shall include factory-installed thermal insulation on the condenser, condenser flow switch and leaving water temperature sensor. Heat machine units require field-installed thermal insulation on waterbox heads because of high temperature.



Carrier improves the world around us; Carrier improves people's lives; our products and services improve building performance; our culture of improvement will not allow us to rest when it comes to the environment.



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