Carrier

AQUAFORCE™

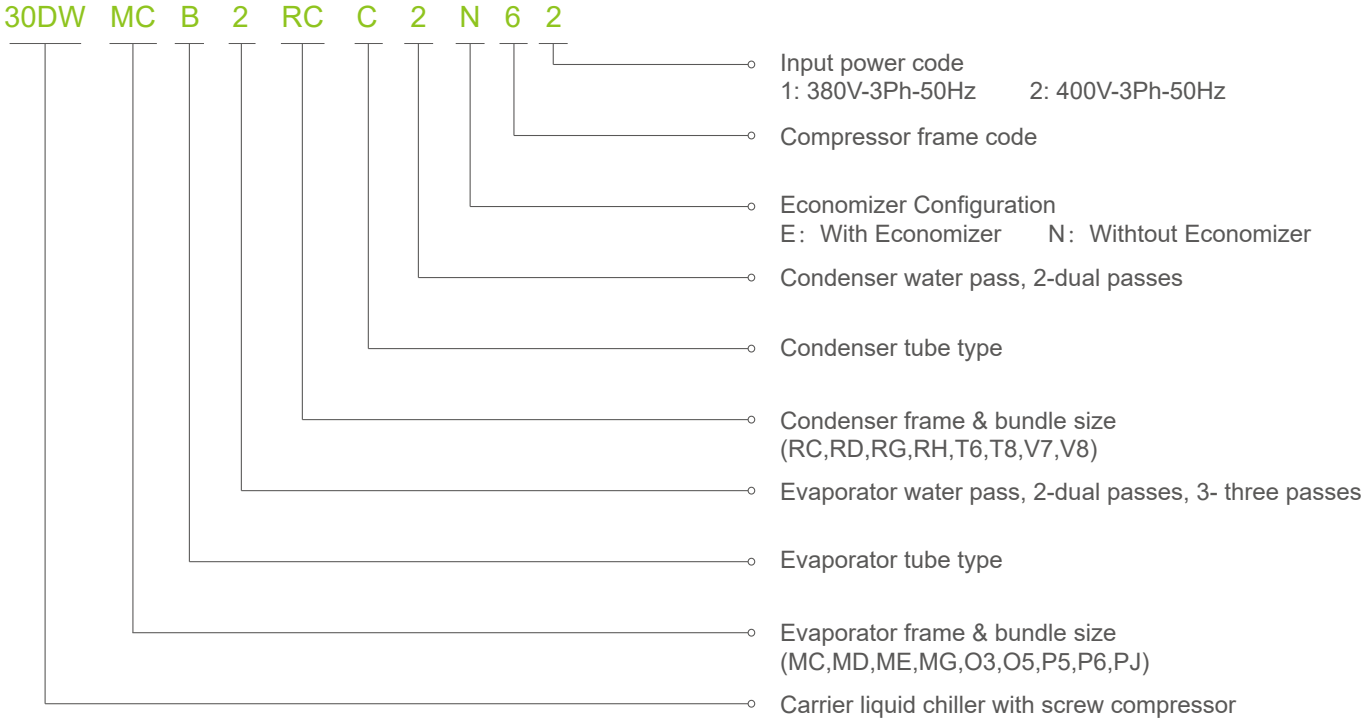
30DW
Water-Cooled Screw Liquid Chiller

Cooling capacity: 270~350RT

In 1998, Time magazine named Dr. Carrier one of its 20 most influential builders and titans of the 20thcentury.

Carrier is a leading global provider of innovative HVAC, refrigeration, fire, security and building automation technologies. Supported by the iconic Carrier name, the company's portfolio includes industry-leading brands such as Carrier, Kidde, Edwards, LenelS2 and Automated Logic. Carrier's businesses enable modern life, delivering efficiency, safety, security, comfort, productivity and sustainability across a wide range of residential, commercial and industrial applications.

Model Size Nomenclature



Operating Range

Cooling/Heating		
Evaporator	Minimum	Maximum
Entering temperature at start-up	-	35℃
Leaving temperature during operation	3.3℃*	20℃
Entering/leaving temperature difference at full load	2.8℃	11.1℃
Condenser	Minimum	Maximum
Entering temperature at start-up	13℃	-
Leaving temperature during operation	19℃**	42℃***
Entering/leaving temperature difference at full load	2.8℃	11.1℃

Notes:

1. *If the leaving water temperature is below 3.3℃ , a frost protection solution must be used.
2. **If the temperature leaving the condenser is below 19℃ , a water flow control valve (option) must be used at the condenser (two or three-way valve).
3. ***Some models' condenser leaving temperature has slight difference due to different frames during the operation, please refer to E-CAT report for details.

All data over 200Tons (50Hz) in this catalogue is certificated in accordance with AHRI Standard 550/590 and 551/591 as represented in the selection software (E-Cat).

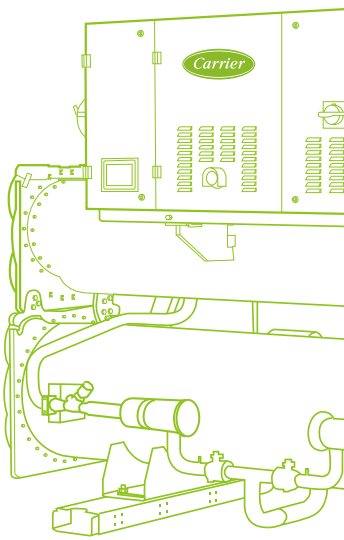
Certified units may be found in the AHRI Directory at www.ahridirectory.org

http://www.ahridirectory.org

General Features

The latest generation 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 30DW liquid chillers are designed to meet current and future requirements in terms of energy efficiency, flexibility of use and compactness. They use the most reliable technologies available today:
  - Twin-rotor screw compressors with a variable capacity valve.
  - Refrigerant R134a.
  - Carrier SmartView® control system.
  - Flooded heat exchangers that are mechanically cleanable.
- To meet to all environmental and economic requirements, the 30DW is available in different efficiency classes with flexible selection functions.
  - It can offer the standard efficiency chiller which has the excellent quality with superior cost advantage designed to maximize savings, it's the cost-effective choice, suitable for comfort cooling of hotels, offices and industrial settings.
  - It can offer the medium-efficiency chiller which optimize balance of technical and economical aspects while at the same time boasting superior energy efficiency.
  - It can also offer the high-efficiency chiller which has the unequalled energy efficiency to satisfy the most stringent demands of building owners wanting to reduce operating costs to the minimum.
- The 30DW Aquaforce is designed for air conditioning and refrigeration applications, The standard unit can provide an evaporator leaving water temperature down to 3.3℃, as for the low temperature application which allows the chiller operate with evaporator leaving glycol temperature down to -6℃.



High efficiency

- Full load efficiency up to 6.4 and part load efficiency up to 8.7 at AHRI IP operation conditions.
- New twin-rotor screw compressor 06W equipped with a high efficiency motor and a variable capacity valve that permits exact matching of the cooling capacity to the load.
- Flooded multi-pipe evaporator and condenser with sensible subcooler for increased heat exchange efficiency.
- High performance copper tube bundle with internal and external grooves along with enhanced fins improves chiller efficiency by reducing the heat transfer resistance.
- The heat changer has a low water pressure drop which results in reduced power consumption of water pump.
- Electronic expansion device permitting operation at a lower condensing pressure and improved utilization of the evaporator heat exchange surface.

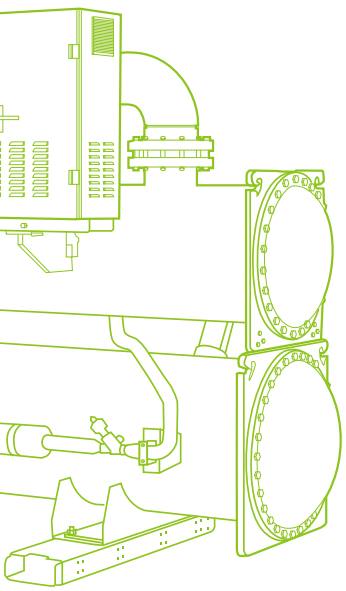
Low sound levels

- 30DW equipped with multi sound and vibration treatment technologies to improve sound performance.
- The optional innovative lagging can further reduce the unit sound level.
- 30DW chillers meet 18001 standard recommended by Occupational Health and Safety Advisory Services (OHSAS).

Environmental care

- R-134a refrigerant
  - HFC refrigerant with zero ozone depletion potential.
- Leak-tight refrigerant circuit
  - Reduction of leaks as no capillary tubes and are 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.

Absolute reliability



Major components of 30DW are selected and tested to minimize failure possibility, as well as many design choices have been taken in this perspective.

- Screw compressors
  - Industrial-type screw compressors with robust bearings,motor cooled by suction gas and stepless load adjustment by gas drived slide valve.
  - Patented line-design screw rotors and microprocessor-based control to guarantee accurate meshing and enhance service life.
  - Reduced number of moving parts, with compressor rotors directly driven by the motor to lower the failure rate and enhance reliability.
  - All compressor components are easily accessible on site minimizing down-time.
  - In case of power outages, 30DW can intelligently restart the compressor and cooling capacity can be quickly recovered to the demanded cooling load in a short period of time once the power recovers, thanks to the compressor design with fast capacity loading system.
- Evaporator
  - The electronic paddle-free flow switch can self-adapt smartly to the actual cooler size and fluid type.
  - 30DW chillers can handle sudden and large load variations up to 30% change in water flow rate per minute while maintaining leaving chilled water temperature with in close tolerance of ±1℃
- Excellent electric
  - Closed Y-delta starter as standard offer the starting current less than 2.5 times of the rated current .
  - Fused disconnect switch provide reliable protection for chiller and realize local lock out /tag on.
  - Emergency switch can disconnect compressor power supply in emergency.
  - IP23 electronic box protection level, customized IP44 (optional) can meet special environment.
- Auto-adaptive control
  - Control algorithm prevents excessive compressor cycling (Carrier patent).
  - Automatic compressor unloading in case of abnormally high condensing pressure.
  - Control system has comprehensive protection during operation, such as oil temperature control, overvoltage and overcurrent protection, discharge temperature overheat protection, heat exchanger anti-freeze protection etc. in order to ensure chiller long time reliable operation.
- 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 compact chiller design of 30DW offers ease of installation at site.
  - With a width of 1.4m, 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 fuses.
  - Transformer supply to the integrated control circuit (400/24 V).
- Simplified water connections
  - Victaulic pipe connections on the evaporator and condenser.
  - Labeled entering and leaving water pipes.
  - Flexible heat exchanger entry and exit connections at factory.
  - Additional heat exchanger passes for special requirements.
- Fast commissioning
  - Comprehensive system operation test at factory prior to the shipment.
  - Quick-test function for step-by-step verification of the instruments, expansion devices and compressors.

Carrier SmartView® Control System - Intelligent Colored Touch Screen

- 30DW chiller employs Carrier's most advanced Carrier SmartView® controller that delivers distinct capabilities of controlling and monitoring the chiller operations.
- Equipped with a 7 inch high-resolution touch screen, Carrier SmartView® controller offers more user-friendly interface with intuitive graphical operational data in real time, adapts precisely the chiller capacity to building load and provides comprehensive protection.

Reliable Start - up and Operation

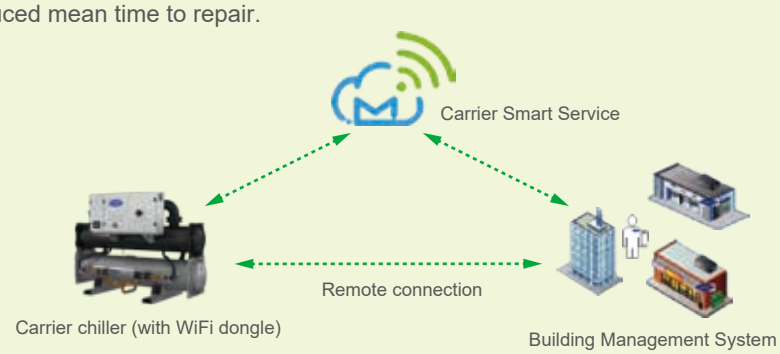
- Carrier SmartView® controller offers password protection to avoid any unauthorized operation.
- When chiller starts, the controller will activate pre-start process to check parameters such as pressure, temperature, motor status, water flow etc.
- In addition to the function of monitoring the main operational parameters, trending function provide the visual dynamic parameter curves. The intelligent and dynamic algorithm ensures optimal, effective and reliable chiller operation.
- The control system provides following comprehensive protection, which guarantees steady chiller operation:
  - Overcurrent.
  - Discharge temperature overheat.
  - Motor temperature overheat.
  - Evaporator and condenser anti-freeze.
  - Low discharge superheat.

Effective Failure Diagnostic

- Carrier SmartView® control system has more than 100 failure diagnostic function. Users can easily access chiller operation parameters via touch screen. If control system detects failure the alarm will be initiated and related code will be recorded in alarm menu. The alarm records, up to 50, can be automatically saved by control system. Carrier service technician can read and delete alarm records by Carrier service/PCDCT tools.
- The control system can automatically send out email alarm to customer or service technician.

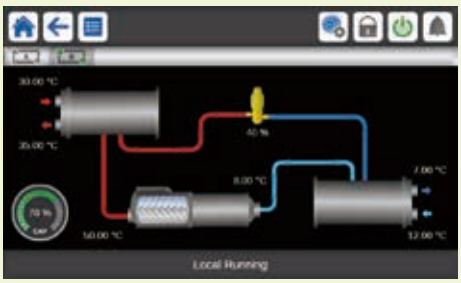
Intelligent Remote Connection and Control

- Carrier SmartView® control panel supports CCN, BACnet IP, Modbus TCP/IP and Modubs RTU protocols, with which chiller can seamlessly connect with the Building Automation System or the i-Vu™/WebCTRL control network. Moreover, LonWorks, J-Bus and BACnet MSTP is also supported with optional gateway.
- An industrial Internet intelligent protocol module WIFI dongle housed in electrical cabinet has the function of conversion and transmission of data and can connect the field chiller controllers through the wireless network. Chiller operational data can be transmitted to the remote server (Smart Service by Carrier) via wireless network, 4G, etc., so as to monitor chiller data and fault alarm.
- Carrier Smart Service (optional) based on “Big Data Processing” provides value added customer service such as online data management and analysis, daily and key performance reports, prognostics and preventative maintenance and graphic data trend. The enhanced data management and analysis will help achieve continuous optimization of the chiller and system operation.
- Carrier Smart Service changes how equipment is serviced and maintained. Carrier service technicians now utilize mobile devices with remote access to put real-time chiller data and service history in the palm of their hands. With advance notification of problems, technicians arrive at the jobsite more informed, which leads to faster problem resolution and reduced mean time to repair.



Main Page

- Control system main page operation and primary parameters monitored:
  - Main page button
  - Menu page button
  - Log in/Language button
  - Start-up/Stop page button
  - Alarm menu button
  - Setting point
  - Chiller load percentage
  - Condensing water pump status
  - Chilled water pump status
  - Condenser water inlet/outlet temperature
  - Evaporator water inlet/outlet temperature



- Customer can easily read following primary information of chiller, components status and access to other interfaces from this page:
  - Temperature/Pressure page
  - Input/Output parameter page
  - Water system parameter page
  - Operation time
  - Mode

Performance data

Model			30DW													
			30DWMCC 2RCC2N62	30DWMCB 2RHB2N62	30DWO3C 2T8C2N62	30DWP5B 2V7C2N62	30DWMCB 2RCC2N62	30DWMDB 2RHB2N62	30DWO3C 2T6B2N62	30DWP5B 2V8C2N62	30DWMGC 2RCC2N62	30DWMGC 2RGB2N62	30DWO5C 2T8C2N62	30DWP5B 2V7B2N62	30DWO3B 2T6C2N62	30DWPJB 3V8B2N62
Capacity		kW	984.7	984.7	984.7	984.7	1055	1055	1055	1055	1111	1143	1143	1143	1192	1231
		USRT	280	280	280	280	300	300	300	300	316	325	325	325	339	350
COP @ AHRI IP		kW/kW	5.274	5.560	6.011	6.254	5.309	5.620	6.024	6.270	5.370	5.628	6.032	6.330	5.987	6.445
Evaporator	Water Flow Rate	L/s	42.26	42.26	42.26	42.26	45.28	45.28	45.28	45.28	47.70	49.05	49.05	49.05	51.17	52.83
	Water Pressure drop	kPa	46.2	45.5	35.5	26.8	52.0	44.7	40.1	30.7	34.3	36.1	37.8	36.0	46.6	56.6
	Pass	No.	2													3
	Water connection	DN	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Condenser	Water Flow Rate	L/s	54.50	54.05	53.38	53.14	58.33	57.82	57.19	56.92	61.33	62.63	61.94	61.58	64.73	66.15
	Water Pressure drop	kPa	28.0	30.3	31.5	29.3	31.7	34.5	51.5	27.4	34.7	48.7	41.2	43.2	55.7	40.3
	Pass	No.	2													2
	Water connection	DN	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Compressor			Screw compressor													
		No.	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Input power		kW	186.7	177.1	163.8	157.4	198.7	187.7	175.1	168.3	207.0	203.1	189.5	180.6	199.1	191.0
Refrigerant			HFC-134a													
Refrigerant Charge		kg	180	170	290	330	180	170	280	338	195	180	300	330	280	346
Shipping weight*		kg	5422	5435	6339	6772	5422	5455	6268	6848	5509	5484	6391	6772	6268	6867
Operation weight		kg	5266	5291	6338	6874	5266	5321	6229	6989	5411	5373	6420	6874	6229	7096
Dimension	Length	mm	3475	3475	3507	3824	3475	3475	3507	3824	3475	3475	3507	3824	3507	3852
	Width	mm	1427	1427	1493	1507	1427	1427	1493	1507	1427	1427	1493	1507	1493	1507
	Height	mm	2309	2309	2449	2499	2309	2309	2449	2499	2309	2309	2449	2499	2449	2499

Notes:1. Based on AHRI IP condition: Evaporator chilled water outlet temperature 6.67℃, chilled water inlet temperature 12.22℃, fouling factor=0.0176m²K/kW
Condenser cooling water inlet water temperature 29.44℃, cooling water outlet temperature 34.61℃, fouling factor=0.044m²K/kW

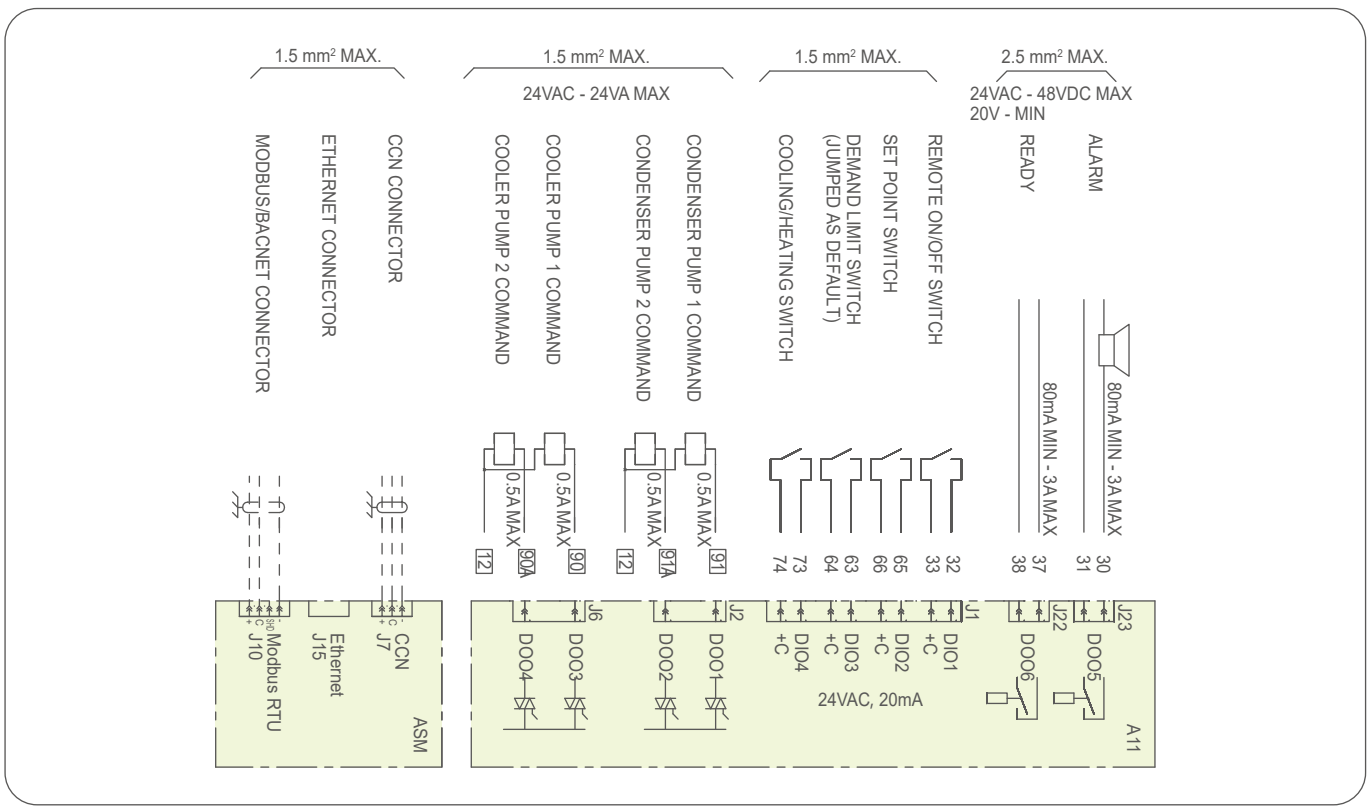
2. Above performance is based on GB pressure vessel heat exchanger design, water side pressure is 1.0MPa, for the requirements of ASME pressure vessel design etc., please contact Carrier local agencies.
3. Above performance is based on the E-Cat selection, the power supply is 400V-3Ph-50Hz.
4. Carrier will select specific models using E-Cat on different requests for tonnage and efficiency, for details or customized selections,please contact Carrier local agencies.
5. * The shipment weight is only base unit and wooden crating, excluding refrigerant and water inside.

Electrical parameters (400V-3Ph-50Hz)

Model		30DWMCC 2RCC2N62	30DWMCB 2RHB2N62	30DWO3C 2T8C2N62	30DWP5B 2V7C2N62	30DWMCB 2RCC2N62	30DWMDB 2RHB2N62	30DWO3C 2T6B2N62	30DWP5B 2V8C2N62	30DWMGC 2RCC2N62	30DWMGC 2RGB2N62	30DWO5C 2T8C2N62	30DWP5B 2V7B2N62	30DWO3B 2T6C2N62	30DWPJB 3V8B2N62
Rated Voltage	V-ph-Hz	400-3-50													
Voltage Range	V	360-440													
Control circuit		24 V per internal transformateur													
Nominal start-up current*	A	712	712	712	712	712	712	712	712	712	712	712	712	712	712
Maximum start-up current **	A	712	712	712	712	712	712	712	712	712	712	712	712	712	712
Cosine Phi		0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.92	0.91	0.91	0.91	0.91	0.91
Maximum power draw	kW	222.4	216.8	205.1	201.4	236.1	230.0	218.2	214.1	252.3	246.3	235.2	230.1	249.3	245.1
Nominal current draw	A	295.2	280.5	258.3	250.3	313.8	296.8	276.0	267.0	334.3	320.5	297.8	285.8	320.5	301.9
Maximum current draw (Un)	A	352.7	343.9	325.3	319.5	374.5	364.8	346.1	339.6	395.8	390.7	373.1	365.0	395.5	388.8
Maximum current draw (Un -10%)	A	388.0	378.3	357.8	351.5	412.0	401.3	380.7	373.6	435.4	429.8	410.4	401.5	435.1	427.7

*Instantaneous start -up current (locked rotor current of the largest compressor + the rated load current of other smaller motors at norminal operating conditions)
**Instantaneous start -up current (locked rotor current of the largest compressor + the maximum load current of other smaller motors at maximum unit conditions)
Nominal current draw obtained at AHRI IP condition: evaporator temperature entry/leave water = 12.22℃ /6.67℃ , condenser temperature entry/leave water = 29.44℃ /34.61℃ .
Maximum current/power draw obtained at operation with maximum unit power input.
Carrier will select specific models using E-Cat on different requests for tonnage and efficiency, for details or customized selections,please contact Carrier local agencies.

Wiring diagram

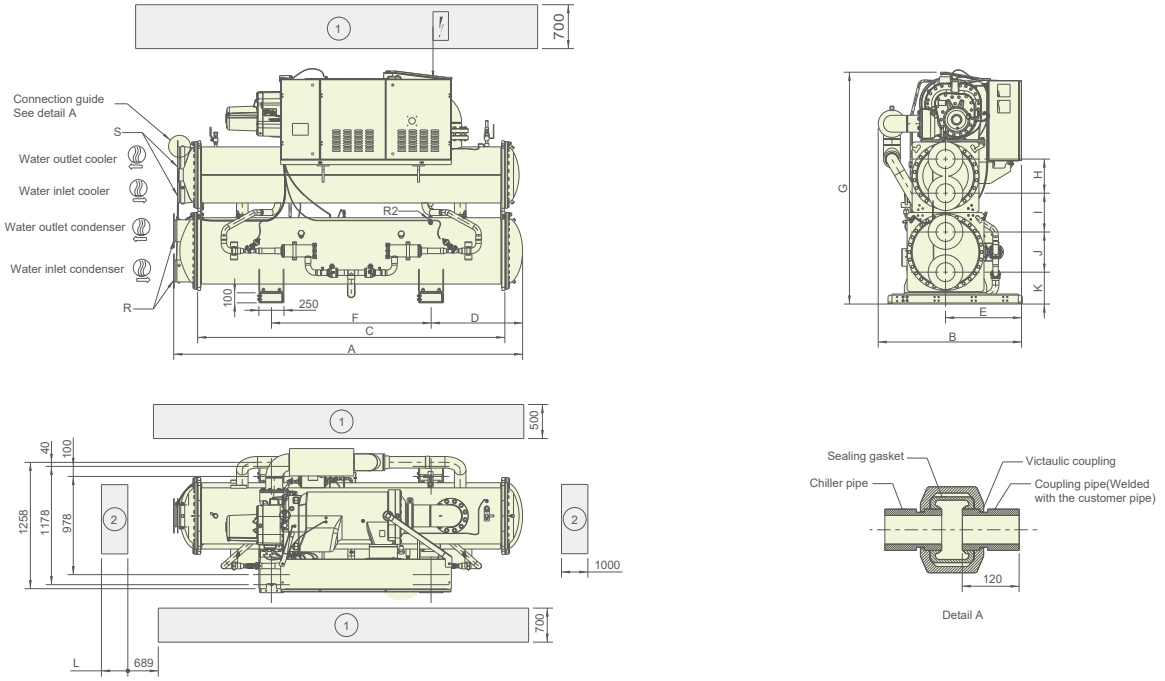


Options & accessories

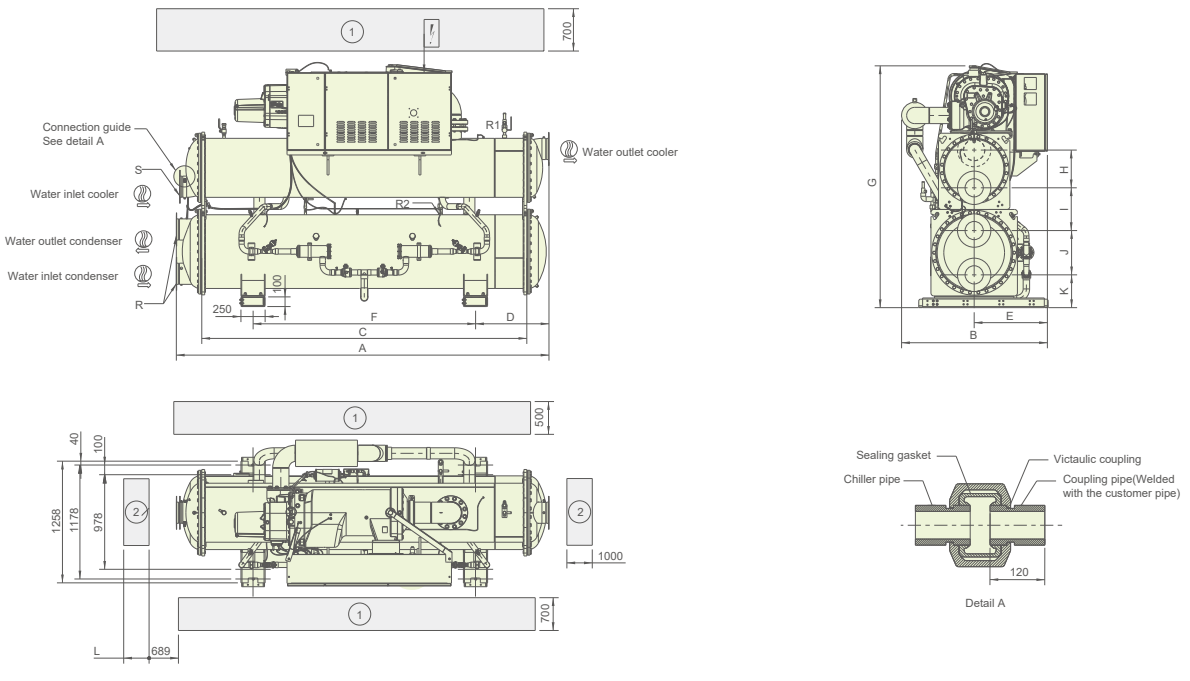
Options	Description	Advantages
Medium Brine	Brine application down to -6°C leaving fluid temperature	Covers specific application such as ice storage and industrial processes
16 bar heat exchangers	Reinforced h.x. for extension of the maximum water-side service pressure to 16 bar (standard 10 bar)	Covers applications with a high water column(high buildings)
21 bar heat exchangers	Reinforced h.x. for extension of the maximum water-side service pressure to 21 bar (standard 10 bar)	Covers applications with a high water column(high buildings)
Evaporator insulation	38mm thermal insulation on cooler and comp support	Reduce the heat dissipation of the evaporator to the outside
Condenser insulation	19mm thermal insulation on condenser	Condenser protection
Dual safety valves	Condenser and cooler with dual safety valves configuration	Easy maintenance
Discharge shut off valve	Allows referigerant to be stored inside the chiller during servicing	Reducing refrigerant loss and eliminating time-consuming transfer procedures
Control for low condenser temperature systems	Output signal (0-10 V) to control the condenser water inlet valve	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
Energy management module	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 cabniet	Easy connection by wired connection to a building management system
ASME	Heat exchangers design per ASME VIII (minimum water side service pressure to 20 bar)	Heat exchanger design meet requirements of American Society of Mechanical Engineers and different market/customer demands
Australia code	a. ASME heat exchanger pressure vessel code b. Electrical design per Australia requirement	Meets Australia government pressure vessel code AS 1210 and AS 4343
Flanged evaporator water connection kit	Victaulic piping connections with flanged joints	Easy installation
Flanged condenser water connection kit	Victaulic piping connections with flanged joints	Easy installation

Options	Description	Advantages
Evaporator with reversed water connection	Evaporator with reversed water inlet/outlet	Simplification of the water piping
Condenser with reversed water connection	Condenser with reversed water inlet/outlet	Simplification of the water piping
CCN to J bus gateway	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
CCN to Lonwork gateway	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
Master/slave operation	Unit equipped with supplementary water outlet temperature sensor kit to be field-in-stalled allowing master/slave operation of two units connected in parallel	Master/slave control to optimize performance of two units in one plant
10.4" Touch Screen	Larger colorful TouchScreen Interface	Easy operation
Soft starter	Provides a continuous start current without interrupt and inrush. * Using a soft starter instead of Wye-Delta starter	Lower peak start-up current
Hot gas bypass	Hot gas bypass mininum load down to 10%	Extend capacity operating range to match mininum load requirement
Low noise	Provide 3 dBA sound attenuation vs std to meet low noise application, Innovative lagging used	Lower operating sound levels
Super Low noise	Provide 6 to 8 dBA sound attenuation vs std to meet super low noise application * Sound enclosure used * Waterproof, rust prevention features	Lower operating sound levels with waterproof
Ultra Low noise	Provide 8 to 10 dBA sound attenuation vs std to meet super low noise application * Sound enclosure used * Waterproof, rust prevention features	Lower operating sound levels with waterproof
IP44 Enclosure	IP44 Enclosure(Control box & Terminal box)	Higher water & rust protection level for control box & terminal box
Ni charge in factory	Unit nitrogen factory charged.	Less weight. No refrigerant charged

Chiller dimension



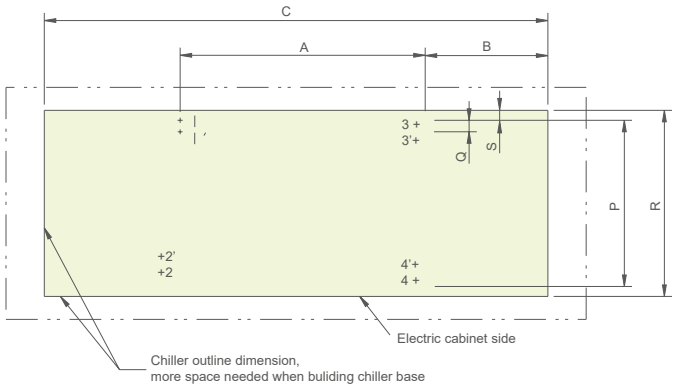
Model	A	B	C	D	E	F	G	H	I	J	K	L	S	R
30DWM**2R**2-	3475	1427	3060	911	757	1500	2309	340	387	400	318	3350	DN200	DN200
30DWO**2T**2-	3507	1493	3060	868	757	1700	2449	340	491	360	363	3350	DN200	DN200
30DWP**2V**2-	3824	1507	3360	731	757	2300	2499	340	467	458	339	3650	DN200	DN200

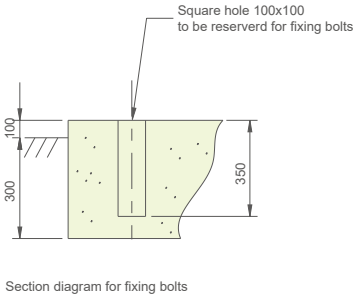


Model	A	B	C	D	E	F	G	H	I	J	K	L	S	R
30DWPJ*3V**2-	3852	1507	3360	759	757	2300	2499	390	442	458	339	3650	DN200	DN200

Notes: 1.Tolerances on nozzle locations and overall dimensions are ±25mm.
2.①Required clearances for maintenance, ②Recommended space for tube removal(clearance 3350 and 1000 can be either on the right or the left side).
3.The water pipe connector is the Victaulic coupling,the Victaulic and the pipe are supplied with the chiller,the pipe length is 120mm.
4. Above chiller dimension is based on GB pressure vessel heat exchanger design,for the requirements of ASME pressure vessel design etc.,please contact Carrier local agencies.

Chiller Basement





Section diagram for fixing bolts

Model	A(mm)	B(mm)	C(mm)	P(mm)	Q(mm)	R(mm)	S(mm)
30DWM**2R**2-	1590	911	3475	1258	100	1427	137
30DWO**2T**2-	1700	868	3507	1258	100	1493	203
30DWP**2V**2-	2300	731	3824	1258	100	1507	217
30DWPJ*3V**2-	2300	759	3852	1258	100	1507	217

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.
3. Above chiller dimension is based on GB pressure vessel heat exchanger design,for the requirements of ASME pressure vessel design etc.,please contact Carrier local agencies.

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
NH_3	<2 ppm
NH^{4+}	<2 ppm
Cl_2	<1 ppm
Cl-	< 300 ppm
H_2S*	<0.05 ppm
$SO4^{2-}$	< 70 ppm
CO_2†	<5 ppm
Fe^{2+}/Fe^{3+}	<0.2 ppm
O_2	< 5 ppm

Water Characteristics	Quality Limitation
NO_3	<100 ppm
Si	< 0.1 ppm
Al	<0.2 ppm
Mn	<0.1 ppm
Hardness	71.2<…<151.3mg/l $CaCO_3$
Resistance	>3000ohm.cm
Conductivity	200<…<600μS/cm
Ph	7.5<…<9

Guide Specifications

Applied Water-Cooled Screw Chiller

HVAC Guide Specifications — 30DW

Size Range: 270 to 350 Tons (949.5 to 1230.9 kW) Nominal
Carrier Model Number: 30DW

Part 1 — General

1.1 SYSTEM DESCRIPTION

Factory assembled 30DW water-cooled liquid chiller. Contained within the unit shall be all factory wiring, piping, controls, refrigerant charge (HFC-134a), refrigeration circuits set, 06WW screw compressor, electronic expansion valves and equipment required prior to field start-up.

1.2 QUALITY ASSURANCE

A. Chiller performance shall be rated in accordance with the latest edition of AHRI Standard 550/590 (I-P), AHRI Standard 551/591 (SI) and GB/T 18430.1.
B. Cooler and condenser refrigerant side shall include nameplate certifying compliance with NB/T 47012, pressure vessels for refrigerant equipment.
C. Chiller shall be designed and constructed to TSG 21-2016 requirements.
D. The chiller shall be factory wired and tested to verify proper operation prior to shipment.
F. Unit shall be designed, manufactured and tested in a facility with a quality management system certified ISO 9001 and environmental management system ISO 14001.
G. Unit components shall be capable of withstanding -20~+50 degC storage without damage, failure, refrigerant loss, or safety risks.

1.3 DELIVERY, STORAGE AND TRANSPORT

A. Unit shall be stored and transported in accordance with the manufacturer's instructions.
B. Unit shall be shipped with all refrigerant piping and control wiring factory installed.
C. Unit shall be shipped with the wooden or the thermoplastic and wooden base package.
D. Unit shall be shipped with firmly attached labels that indicate name of manufacturer, chiller model number, chiller serial number, and refrigerant used.
E. If the chiller is to be exported, the unit shall be sufficiently protected from the factory against sea water corrosion to be suitable for shipment in a standard ocean shipping container.

1.4 WARRANTY

Warranty shall include parts and labor for one year after start-up or 18 months from shipment, whichever occurs first.

Part 2 — Products

A. Compressor:

Unit shall have a semi-hermetic twin-screw compressor with high efficiency and low noise.
All compressor components are easily accessible on site minimizing down-time.

A.1 Motor:

Induction Motor shall be optimized for water cooled chiller specifically to ensure chiller operate efficiently at full and partial load.
Motor shall be cooled by suction gas and protected by internal winding temperature sensors.
Motor shall directly drive compressor rotors to lower the failure rate and enhance reliability.
Ceramic terminal pins are applied on this compressor to greatly guarantee security.

Guide Specifications

A.2 Rotor:

New lobes combination rotor design shall improve the efficiency and shrink the outer size of the rotor case and other cases.

A.3 Motor Bearings:

Motor bearings and lubrication system are optimized to make sure the system's reliability. Compressor bearings shall be designed for minimum 73000 hours at maximum operating conditions.

A.4 Slide Valve Load Control System:

Slide Valve shall be quick load and unload speed with stepless regulation thanks to the capacity loading system.

B. Cooler and Condenser:

1. Unit shall be equipped with a single cooler and condenser.
2. Cooler and condenser shall be manufactured, tested and stamped in accordance with the NB/T 47012 or ASME Pressure vessel code VIII.
3. The refrigerant-side design pressure will be 1600kPa, and the waterside pressure will be 1000kPa (1600kPa, 2068kPa as options).
4. The cooler and condenser shall be mechanically cleanable, shell-and-tube type with removable heads. Cooler shell shall be insulated with 19mm (38mm as optional) closed-cell foam and factory fitted.
5. Tubing shall be copper, high-efficiency type, with integral internal and external enhancement unless otherwise noted. Tubes shall be nominal 19.0mm OD or 25.4mm OD with nominal wall thickness of 0.635mm measured at the root of the fin at the enhanced areas.
6. The cooler and condenser shall have a drain and vent in each head.
7. Each cooler and condenser shall be separately equipped with one relief valve (two valves as optional).
8. Cooler and condenser shall have water inlet & outlet connection with Victaulic couplings to avoid vibrations transmission and accept small misalignment (water connection kit on demand).
9. Cooler shall be fitted with electronic auto setting water flow switch.

C. Refrigerant Flow Control:

To improve part load efficiency, liquid refrigerant shall be metered from the condenser to the cooler using electronic expansion valve to maintain the proper liquid level of refrigerant in the heat exchangers under both full and part load operating conditions.

D. Controls, Protections and Diagnostics:

D.1 Controls:

a. The chiller shall be provided with a factory installed and wired microprocessor controller. The controller shall include a 7" or 10.4" colorful touch screen, one basic SIOB, one TCPM board, one AUX board and one optional SIOB for energy managing module per system requirements. The controller can be configured in both Imperial and Metric units.

b. All chiller and compressor parameters shall be displayed on the Carrier SmartView® touch screen.

c. The controller shall use the non-volatile memory as the storage device.

d. The chiller control system shall have the ability to interface and communicate with the building management system. The protocol is BACnet / IP or Modbus / IP.

e. The screen shall contain following information:
1) Date and time
2) Synoptic screen and button
3) Main Menu button
4) User Login screen and button
5) Alarm menu and button

6) Setpoint
7) Evaporator pressure
8) Evaporator saturated temperature
9) Condenser pressure
10) Condenser saturated temperature
11) Entering chilled water temperature
12) Leaving chilled water temperature
13) Entering condenser water temperature
14) Leaving condenser water temperature
15) Chiller capacity
16) Chiller running status

f. Schedule Function:
The chiller controller can be configured as manual or automatic start-stop mode. In automatic operation mode, the controls shall be capable of automatically starting and stopping the chiller according to a stored user programmable occupancy schedule. The controller shall include the logics in terms of below:
1) 365-day occupancy schedules.
2) Minimum of 8 separate occupied/unoccupied periods per day.
3) Daylight savings start/end date.
4) 16 user-defined holidays.

g. Service Function:
The controls shall provide a password protected service function which allows authorized individuals to view an alarm history file which shall contain the last 20 alarm/alert messages with time and date stamp. These messages shall be displayed in text form, not codes.

h. Network Window Function:
Each chiller control panel shall be capable of viewing multiple point values and statuses from other like controls connected on a common network, including controller maintenance data. The operator shall be able to alter the remote controller's set points or time schedule and to force point values or statuses for those points that are operator forcible. The control panel shall also have access to the alarm history file of all like controllers connected on the network.

i. Pump Control:
Upon request to start the compressor, the control system shall start the chilled water pump, condenser water pumps and verify that flows have been established.

j. Chilled Water Reset:
The control center shall allow reset of the chilled water temperature set point based on any one of the following criteria:
1) Chilled water reset based on an external 4 to 20 mA signal.
2) Chilled water reset based on a remote temperature sensor (such as outdoor air).
3) Chilled water reset based on water temperature rise across the evaporator.

D.2 Protections:

a. Unit shall automatically shut down when any of the following conditions occur: (Each of these protective limits shall require manual reset and cause an alarm message to be displayed on the control panel screen, informing the operator of the shutdown cause.)
1) Transducers and thermistors failure
2) Low evaporator refrigerant temperature
3) High compressor discharge temperature
4) High discharge superheat temperature
5) Low discharge superheat temperature
6) High Pressure Switch Failure
7) Cooler water flow Switch failure
8) Condenser water flow switch failure
9) Compressor motor starter fault

b. Compressor shall automatically shut down when any of the following conditions occur: (Each of these protective limits shall cause an alarm message to be displayed on the control panel screen, informing the operator of the shutdown cause.)
1) Compressor related transducer failure
2) High motor temperature
3) Motor over current
4) Low Suction pressure.
5) High Discharge Pressure

c. Internal built-in protection device shall protect the chiller from low water flow rate. Flow switch option is supplied by chiller manufacturer.

d. Unit shall automatically protect the evaporator water freeze.

D.3 Diagnostics and Service:

A self-diagnostic controls test shall be an integral part of the control system to allow quick identification of malfunctioning components. Once the controls test has been initiated, all pressure and temperature sensors shall be checked to ensure they are within normal operating range. A chilled pump test shall energize the chilled water pump, and the control system shall confirm that water flow have been established and require operator confirmation before proceeding. Perform the condenser water pump test in this way, too.

In addition to the automated controls test, the controls shall provide a manual test which permits selection and testing of individual control components and inputs. A thermistor test and transducer test shall display on the Touch Pilot touch screen the actual reading of each transducer and each thermistor installed on the chiller. All out-of-range sensors shall be identified.

Carrier Smart Service (optional) based on “Big Data Processing” provides value added customer service such as online data management and analysis, daily and key performance reports, prognostics and preventative maintenance and graphic data trend. The enhanced data management and analysis will help achieve continuous optimization of the chiller and system operation.

D.4 Multiple Chiller Control:

The chiller controls shall be supplied with two chiller lead/lag system. The control system shall automatically start and stop a lag or second chiller on a two-chiller system.

E. Electrical

1. Unit shall operate on 3-phase power supply without neutral.
2. Power connection shall be single point to a factory-mounted disconnect switch.
3. Without disconnect switch is optional, in this case, main power circuit equips fuses and indicator lights on each phase.
4. Control voltage shall be supplied by a factory-installed transformer.
5. Each compressor is equipped with starter and motor protection device.
6. Each unit is equipped with emergency stop button, and the main contactor is open when the emergency stop button is pressed.
7. Unit shall have a factory installed star/delta starter as standard to limit electrical inrush current.

F. Start-up:

1. The chiller manufacturer shall provide a factory-trained representative, employed by the chiller manufacturer, to perform the start-up procedures as outlined in the Installation, Operation and Maintenance manual provided by the chiller manufacturer.
2. Manufacturer shall supply the following literature:

a. Installation, operation and maintenance instructions.
b. Field wiring diagrams.
c. One complete set of pressure vessel assemble-built drawings.

Guide Specifications

G. Special Features:

1. Carrier Comfort Network (CCN): The chiller can controlled by commands from the Carrier Comfort Network. In this case a data communication cable is used to connect the unit to the CCN communication bus.

2. Hot Gas Bypass Option
HGBP option enable the system operate at lower load by bypassing expansion valve so that the chiller minimum cooling capacity shall be extended.

3. Thermal Insulation:
Unit manufacturer shall insulate the cooler shell, cooler tube sheet, suction piping, water box, compressor, copper lines. Insulation shall be 19 mm or 38mm.

4. Cooler and Condenser Passes:
Unit manufacturer shall provide the cooler and/or condenser with 2 or 3 pass configuration on the water side.

5. Nozzle-In-Head:
Unit manufacturer shall furnish nozzle-in-head style waterboxes on the cooler and/or condenser rated at 1034 kPa(1600kPa,2068 kPa as optional)

6. Flanged Water Nozzles:
Unit manufacturer shall furnish optional flanged piping connections on the cooler and/ or condenser.

7. EMM
The Energy management is a standard function for 30DW unit. This functionality provides additional inputs and outputs for further information and switch controls.

It offers:
2 additional Analogic inputs:
- Space temperature for reset control (A13 SIOB-AI01)
- Capacity limit control (A13 SIOB-AI10)

1 additional Analogic output:
- Chiller capacity running output (A13 SIOB-AO01)

3 Customer Digital inputs:
- Occupancy override switch: In Remote mode closing this switch set occupancy to yes. (A13 SIOB-DI01)
- 2nd capacity limit switch: In remote mode enable the 2nd capacity limit setpoint (A13 SIOB-DI02)
- Customer Remote interlock: closing this input creates an alarm and stops the unit. (A13 SIOB-DI03)

3 Digital outputs:
- Circuit A running status: should be closed if compressor A is running.(A13 SIOB-DO01)
- Chiller alert status: should be closed if chiller alert generated.(A13 SIOB-DO05)
- Chiller shut down status: should be closed if chiller is shut down.(A13 SIOB-DO06)

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