Carrier

AQUASNAP®

30RB C Series
Air-Cooled Liquid Chiller

Nominal cooling capacity: 180~546kW

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.

Nomenclature

30RB232 C PT015/116C/254

Options

PT002B	Blygold PoluAl
PT003A	Golden fin
PT012	High static pressure fan
PT023	Protection grilles
PT116C	High pressure dual pump hydronic module
PT116D	Unit without hydronic module
PT116F	Low pressure single pump hydronic module
PT116G	Low pressure dual pump hydronic module
PT116H	Super high pressure single pump hydronic module
PT116I	Super high pressure dual pump hydronic module
PT156	EMM (Energy Management Module)
PT158A	7" Carrier® SmartVu™ touch screen
PT254	Cu/Al condenser coils

Design Series

Unit Model

30RB	Air-cooled scroll chiller

Operating Range, 30RB182~522C

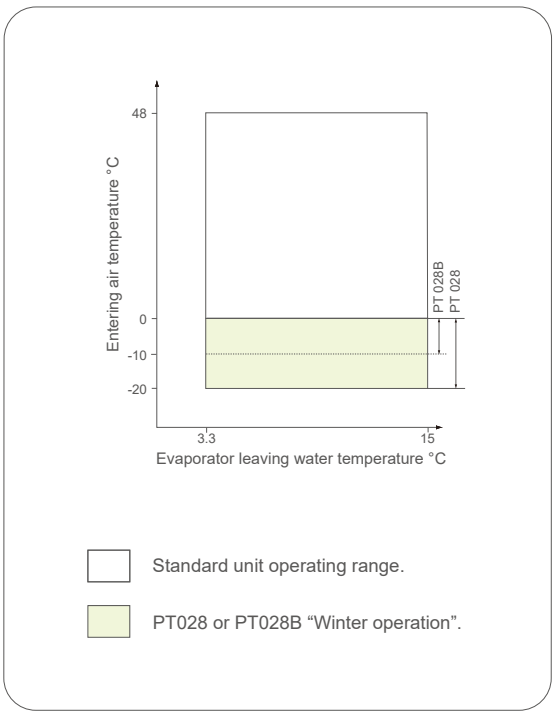
Evaporator water temperature

	Minimum(℃)	Maximum(℃)
Entering water temperature at shut-down	-	48
Entering water temperature at start-up	6.8	40
Entering water temperature during operation	6.8	25
Leaving water temperature during operation	3.3	15

Condenser air temperature

	Minimum(℃)	Maximum(℃)
Standard unit	0	48
With winter operation option (PT028)	-20	48
With winter operation option (PT028B)	-10	48

Note:Evaporator and condenser Δt = 5℃



Features

Developed from Carrier's leading technologies, the AquaSnap® Chiller delivers all-in-one packaged design with leading efficiency and compact footprint, which make it be a premium solution for medium size commercial or industrial projects.

Economical operation

Industry leading efficiency at full load thanks to:
- Optimized air management system including improved heat exchanger design and patented Flying bird IV fans.
- Specifically designed direct expansion evaporator increases heat exchange performance and features higher flexibility to harsh water condition.

Increased energy efficiency at part load
- The refrigerant circuit includes several compressors connected in parallel. At part load, around 99% of the operating time, only the compressors that are absolutely necessary operate.
- The electronic expansion device (EXV) allows operation at a lower condensing pressure (EER and COP optimization), and dynamic superheat management for better utilization of the evaporator heat exchanger surface.

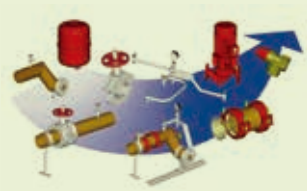
Reduced maintenance costs
- Maintenance-free scroll compressors.
- Fast diagnosis of possible incidents and their history via the Touch Pilot control.
- HFC-410A refrigerant is easier to use than other refrigerant blends.

Easy and quick installation

Integrated built-in hydronic modules:
- Save efforts on design and installation by integrating all the core components of the hydronic system including centrifugal pumps, water filters, expansion tank, water flow switch, water flow control valve,, etc.
- Address various customer needs on job site through diversified options of different pressure head and pump quantity (single or dual).

Simplified electrical connections
- A single power supply point without neutral.
- Main disconnect switch with high trip capacity.

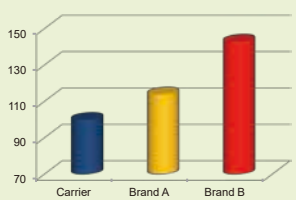
Fast commissioning
- Systematic factory operation test before shipment.
- Quick-test function for step-by-step verification of the instruments, electrical components and motors.

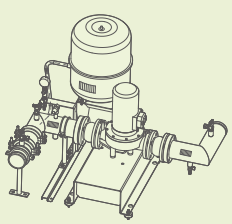


Compact footprint

With specifically sized coils and system design, the chiller featuring superior compact footprint that saves valuable installation space is the ideal choice for retrofit projects.

The built-in hydronic module brings one-stop installation to save significantly save installation space by up to 50% compared to decentralized hydronic system.





Environmental sound

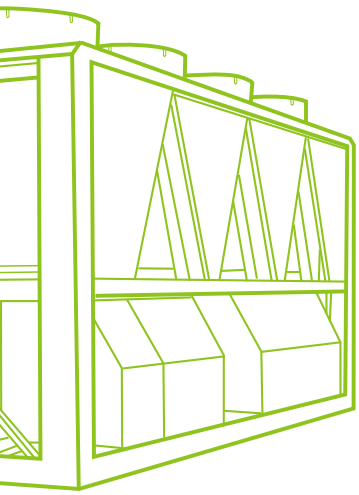
Ozone-friendly R410A refrigeran
- Chlorine-free refrigerant of the depletion potential.
- Very efficient - gives an increas

Leak-tight refrigerant circuit.
- Brazed refrigerant connections
- Reduction of leaks as no capilla are used.
- Verification of pressure transdu without transferring refrigerant

Easy management

Thanks to new innovative Touch Pilot control platform, Aquasnap chillers offer easy local and remote management:

- Convenient operation:
  - An intuitive and user-friendly, colored, 4.3 inch (7 inch as option) interface
  - Easy access to the controller box with inclined touch screen mounting to ensure legibility under any lighting conditions.
  - Screen-shots with concise and clear information in local languages.
  - Complete menu, customized for different users (end user, service personnel and Carrier-factory technicians).
- Easy and quick service
  - Direct access to the unit's technical drawings and the main service documents.
  - Simple and "smart" intelligence uses data collection from the constant monitoring of all machine parameters to optimise unit operation.
  - Graphic trending of main operating variables: evaporator entering/leaving temperature, OAT, condensing and evaporating temperature
  - Alarm notification through emails.
- Excellent remote communication
  - Easy access from any local Ethernet-enabled device or intranet-network
  - Connectivity to BA system through diverse communication protocals
  - High speed Bacnet IP connectivity
  - Multiple protocols: BACnet IP & MSTP, Modbus IP & RTU, LON Talk, J-Bus are supported



Quiet operation

- Compressors
  - Low-noise scroll compressors with low vibration level.
  - The compressor assembly is installed on an independent chassis and supported by anti-vibration mountings.
  - Dynamic suction and discharge piping support minimize vibration transmission (Carrier patent).
  - Acoustic compressor enclosure reduces radiated noise emission (option).
- Condenser section
  - Condenser coils in V-shape with an open angle allows quieter air flow across the coil.
  - Low-noise 4th generation Flying Bird fans (Carrier patent) enjoy quieter operation and never generate intrusive low-frequency noise.
  - Rigid fan mounting preventing start-up noise (Carrier patent).

t
HFC group with zero zone

ed energy efficiency ratio.

for increased leaktightness.
ary tubes and flare connections

cers and temperature sensors
charge.

Absolute reliability

- Auto-adaptive control:
  - Control algorithm prevents excessive compressor cycling (Carrier patent).
  - Automatic compressor unloading in case of abnormally high condensing pressure. If condenser coil fouling or fan failure occurs, the Aquasnap continues to operate, but at reduced capacity.
- Exceptional endurance tests
  - Corrosion resistance tests in salt mist in the laboratory.
  - Accelerated ageing test on components that are submitted to continuous operation: compressor piping,fan supports.
  - Transport simulation test in the laboratory on a vibrating table. The test is based on a military standard and equivalent to 4000 km by truck.

Carrier® SmartVu™ Control

General Features

New innovative smart control features:

- An intuitive and user-friendly,colored,4.3 inch interface
- Direct access to the unit's technical drawings and the main service documents
- Screen-shots with concise and clear information in local languages
- Complete menu, customized for different users (end user, service personnel and Carrier-factory technicians)
- Easy access to the controller box with inclined touch screen mounting to ensure legibility under any lighting conditions
- Safe operation and unit setting: password protection ensures that unauthorized people cannot modify any advanced parameters
- Simple and "smart" intelligence uses data collection from the constant monitoring of all machine parameters to optimise unit operation
- Night mode

Energy management:

- Internal time schedule clock controls chiller on/off times and operation at a second set-point
- The DCT (Data Collection Tool) records the alarms history to simplify and facilitate service operations

Remote Management (Standard)

Units with Touch Pilot control can be easily accessed from the internet, using a PC with an Ethernet connection. This makes remote control quick and easy and offers significant advantages for service operations

Aquaforce is equipped with an RS485 serial port that offers multiple remote control, monitoring and diagnostic possibilities. When networked with other Carrier equipment through the CCN (Carrier Comfort Network - proprietary protocol), all components form a HVAC system fully-integrated and balanced through one of the Carrier's network system products, like the Chiller System Manager or the Plant System Manager (optional).

The 30RB also communicates with other building management systems via optional communication gateways.

The following commands/visualizations are possible from remote connection:

- Start/Stop of the machine
- Dual set-point management: Through a dedicated contact is possible to activate a second set-point (example: unoccupied mode)
- Demand limit setting: To limit the maximum chiller capacity to a predefined value
- Water pump control: These outputs control the contactors of one/two evaporator water pumps
- Water pumps on reversal (only with options 116C/116G):These contacts are used to detect a water pump operation fault and automatically change over to the other pump
- Operation visualization: Indication if the unit is operating or if it's in stand-by (no cooling load)
- Alarm visualization

Remote Management (EMM option)

The Energy Management Module (EMM) offers extended remote control possibilities:

- Room temperature: Permits set-point reset based on the building indoor air temperature (if Carrier thermostat are installed)
- Set-point reset: Ensures reset of the cooling set-point based on a 4-20 mA or 0-10 V signal
- Demand limit: Permits limitation of the maximum chiller power or current based on 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
- Time schedule override: Closing of this contact cancels the time schedule effects
- Out of service: This signal indicates that the chiller is completely out of service
- Chiller capacity: This analogue output (0-10 V) gives an immediate indication of the chiller capacity
- Alert indication: This volt-free contact indicates the necessity to carry out a maintenance operation or the presence of a minor fault
- Compressors running status : Set of outputs (as many as the compressors number) indicating which compressors are running

Technical Specification

Performance data

30RB		182CPT254	202CPT254	232CPT254	262CPT254	322CPT254	342CPT254	402CPT254	462CPT254	522CPT254
Nominal cooling capacity*	kW	180	206	240	273	322	351	415	484	546
Compressor power input	kW	49	60	66	82	93	106	127	147	167
EER	kW/kW	3.29	3.09	3.27	3.06	3.17	3.06	3.03	3.05	3.03
Operating weight										
Standard unit**	kg	2131	2195	2230	2350	2949	2999	3180	3821	3900
Unit without hydronic module	kg	1906	1970	2071	2150	2807	2816	2957	3608	3688
Refrigerant										
Circuit A	kg	20.0	22.0	22.0	22.0	22.0	22.0	33.0	33.0	42.0
Circuit B	kg	22.0	22.0	22.0	22.0	30.0	33.0	33.0	44.0	44.0
Compressor		Hermetic scroll compressors								
Circuit A		1	1	2	2	2	2	3	3	4
Circuit B		2	2	2	2	3	3	3	4	4
Number of capacity stages		3	3	4	4	5	5	6	7	8
Minimum capacity	%	33%	33%	25%	25%	18%	20%	17%	14%	13%
Control		Carrier® SmartVu™ controls								
Condensers		Grooved copper tubes and aluminium fins								
Fans		Axial Flying Bird IV with rotating shroud								
Quantity		3	4	4	4	5	5	6	7	8
Total air flow	l/s	13542	18056	18056	18056	22569	22569	27083	31597	36111
Speed	rpm	950								
Evaporator		Direct expansion shell-and-tube								
Water volume	l	110	110	110	110	125	125	125	113	113
Nominal water flow rate	m^3/h	30.9	35.3	41.2	46.8	55.1	60.1	71.2	82.9	93.7
Unit internal water pressure drop	kPa	22	26	29	35	33	37	50	54	64
Max. water-side operating pressure										
without hydronic module	kPa	1000								
with hydronic module	kPa	400								
Hydronic module		Centrifugal pump,victaulic screen filter,safety valve,expansion tank,air vent, flow switch, water flow control valve, etc.								
Water pressure external to chiller										
Standard unit**	kPa	190	182	181	160	197	183	176	159	196
Unit with low pressure pump	kPa	125	102	111	99	86	109	81	105	74
Unit with super high pressure pump	kPa	291	282	266	295	291	288	256	246	264
Expansion tank	l	50	50	50	50	80	80	80	80	80
Water connections										
Diameter (with hydronic module)	DN	100	100	100	100	100	100	100	125	125
Diameter (without hydronic module)	DN	100	100	100	100	100	100	100	150	150
Electrical data										
Main power supply		400V-3Ph-50Hz								
Control power supply		Main power supply by built-in transformer								
Nominal unit operating current draw, circuit A+B	A	103	120	135	154	179	193	233	275	311
Maximum operating current draw, circuit A+B	A	131	151	173	196	228	245	295	348	395
Maximum start-up current, circuit A+B	A	320	381	362	426	458	475	525	578	625
Total fan power input	kW	5.6	7.1	7.1	7.1	8.6	8.6	10.1	11.6	13.1
Pump power input (standard unit**)	kW	2.6	2.9	3.5	3.7	4.9	5.0	6.0	6.5	10.3

* Nominal cooling mode - evaporator entering/leaving water temperature 12/7℃, outside air temperature 35℃; Evaporator fouling factor 0.018m^2K/kW.
** Standard unit is equipped with high speed single pump hydronic module.

Options & accessories

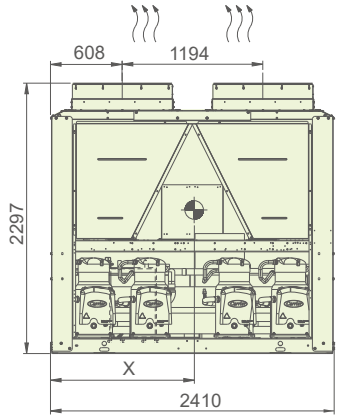
Options	No.	Description	Advantages	Available for
Blygold PoluAL	002B	Coil with factory-applied Blygold PoluAL treatment	Improved corrosion resistance, recommended for heavy marine and industrial environments	All models
Golden Fin	003A	Fin made of pre-treated aluminium (polyurethane and epoxy)	Improved corrosion resistance, recommended for light marine environments	All models
High static pressure fan	012	1130rpm to provide 150Pa static pressure for indoor unit installation with discharge ducts	Available for ducted condenser air discharge, optimized condensing temperature control	All models
Protection grilles	023	Metallic grilles on the four unit aces Better chiller protection and aesthetics	Better chiller protection and aesthetics	All models
Winter operation (-20ºC)	028	Fan speed control by frequency inverter	Stable operation between 0℃ and -20℃ outdoor air temperature	All models
Winter operation (-10ºC)	028B	Two-speed ontrol by frequeny inerter	Stabe operation between o 0℃ and -20℃ outdoor air temperature	All models
Anti-freezing evaporator electrical heater	041	Electrical heater equipped on evaporator	Prevent evaporator to be freezed under winter seasons	All models
Lead lag control	058	To allow master/slave operation of two chillers connectted in parallel or series	Optimised operation of two chillers connected in parrallel with operating time balancing	All models
Evaporator Aluminium caldding	088	Evaporator with aluminium cladding	Evaporator with aluminium cladding	All models
Suction & discharge valve	092A	Shut off valves on the suction and dischrage pipiping of compressor	Simplifed maintenance	All models
Discharge valve	093A	Shut off valves on the dischrage pipiping of compressor	Simplifed maintenance	All models
High pressure dual pump hydronic module (with electrical heater)	116C	Provide integrated hydronic module with high pressure dual pump	Easy and quick installation, operating safety	All models
Unit without hydronic module or electrical heater	116D	Unequip high pressure singl pump hydronic module in standard unit	Easy and quick installation, operating safety	All models
Low pressure single pump hydronic module (with electrical heater)	116F	Provide integrated hydronic module with low pressure single pump	Easy and quick installation, operating safety	All models

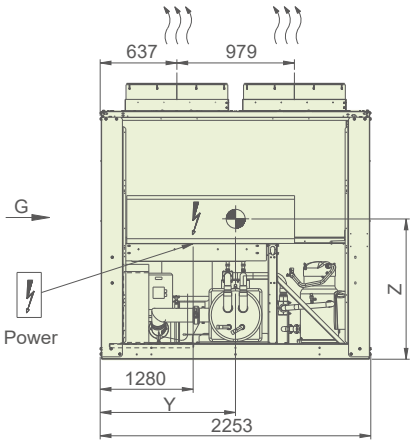
Options & accessories

Options	No.	Description	Advantages	Use
Low pressure dual pump hydronic module (with electrical heater)	116G	Provide integrated hydronic module with low pressure dual pump	Easy and quick installation, operating safety	All models
Super high pressure single pump hydronic module (with electrical heater)	116H	Provide integrated hydronic module with super high pressure single pump	Easy and quick installation, operating safety	All models
Super high pressure dual pump hydronic module (with electrical heater)	116I	Provide integrated hydronic module with super high pressure dual pump	Easy and quick installation, operating safety	All models
CCN to J-Bus gateway	148B	Two-directional communication board with J-Bus protocol	Easy connection by communication bus to building management system	All models
CCN to Bacnet gateway	148C	Two-directional communication board with LonTalk protocol	Easy connection by communication bus to building management system	All models
CCN to LonTalk gateway	148D	Two-directional communication board with LonTalk protocol	Easy connection by communication bus to building management system	All models
Energy Management Module (EMM)	156	See control manual	Ease of unit operation and energy saving management	All models
7" Carrier® SmartVu™ screen	158A	7" colorful touch screen display	Better operation experience	All models
Cu/Al condenser coils	254	Coils made of copper tube with aluminium fin	-	All models
Australian compliance	312A	Compliance with Australian regulation	-	All models
Blue fin	303	Hydrophilic Aluminium coil	Enhanced hydrophilic character and better aesthetics	All models

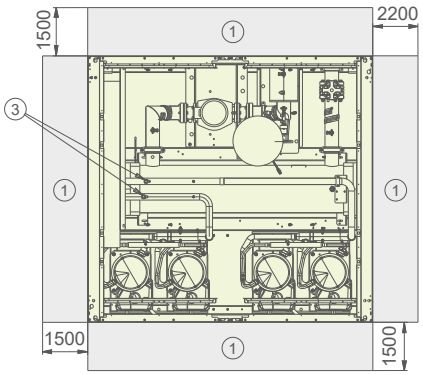
Dimensions/Clearances

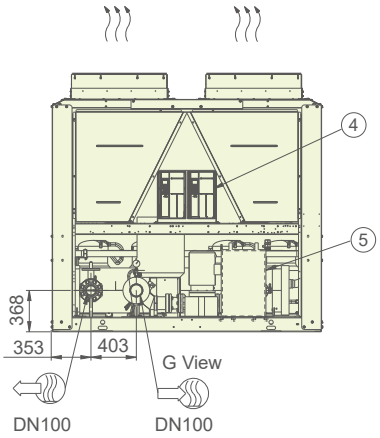
30RB182C~262C



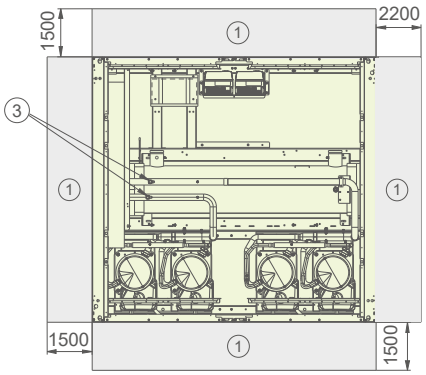


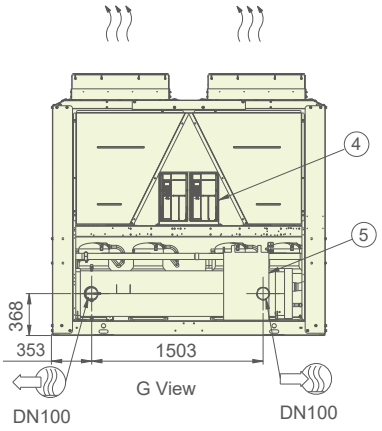
Standard unit with high pressure single pump hydronic module*





unit without hydronic module





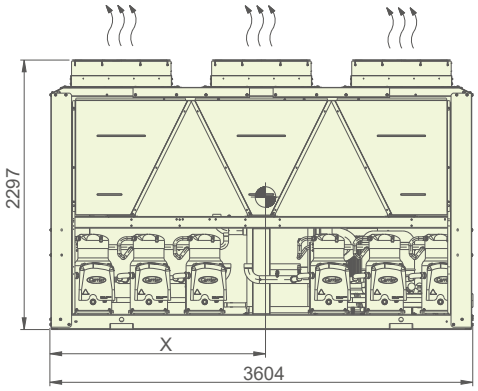
unit model	X (mm)	Y (mm)	Z (mm)
30RB182C	1272	1151	860
30RB202C	1248	1143	903
30RB232C	1215	1209	844
30RB262C	1239	1205	847

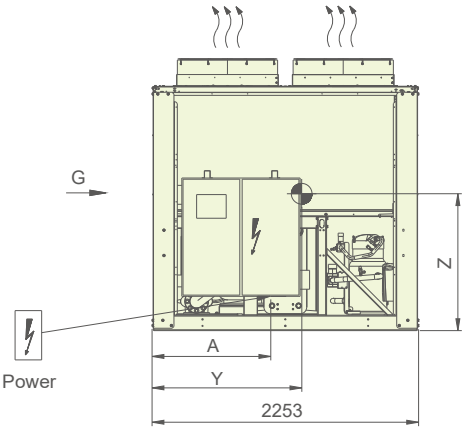
① Required clearances for maintenance and air flow
③ Safety valve
Water inlet
Water outlet
Air outlet
Power supply connection
Center gravity
④ PT012VFD(option)
⑤ PT028VFD(B)VFD(option)

*Please contact local Carrier operation for other integrated hydronic module options.

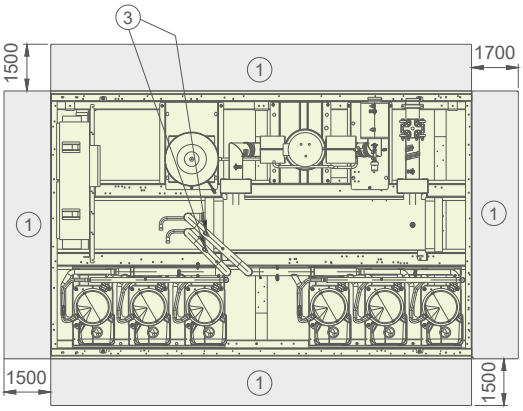
Dimensions/Clearances

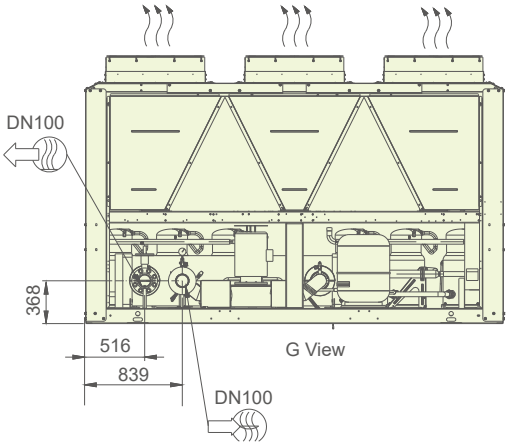
30RB322C~402C



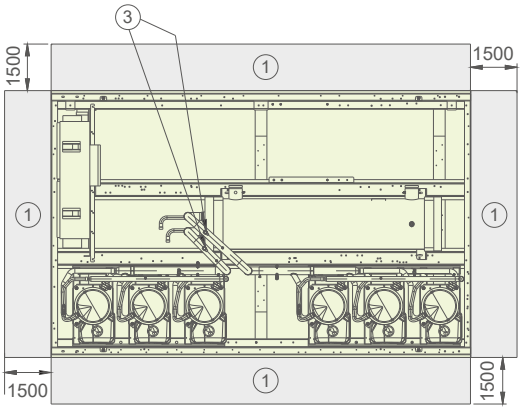


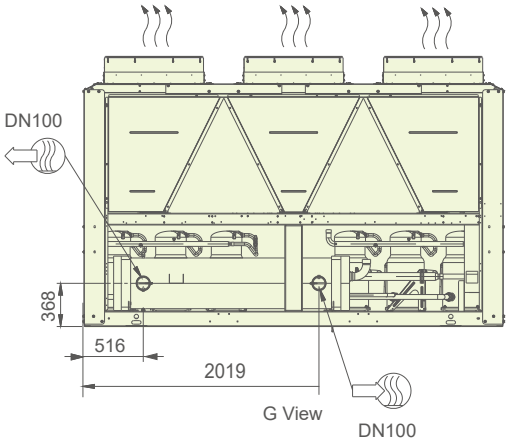
Standard unit with high pressure single pump hydronic module*





PT116D (unit without hydronic module)





unit model	X (mm)	Y (mm)	Z (mm)	A (mm)
30RB322C	1771	1192	858	868
30RB342C	1773	1190	848	868
30RB402C	1817	1221	853	1069

① Required clearances for maintenance and air flow

③ Safety valve

Center gravity

Water inlet

Water outlet

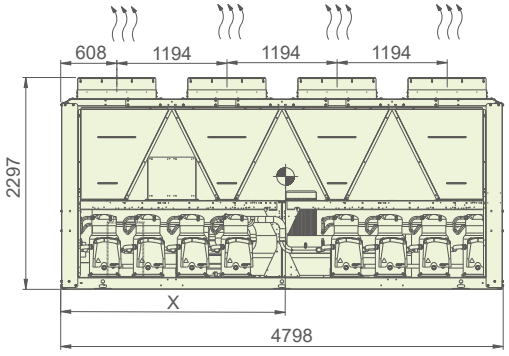
Power supply connection

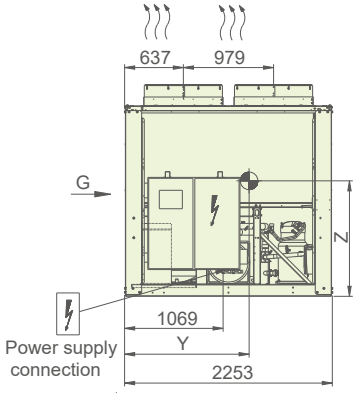
Air outlet - do not obstruct

*Please contact local Carrier operation for other integrated hydronic module options.

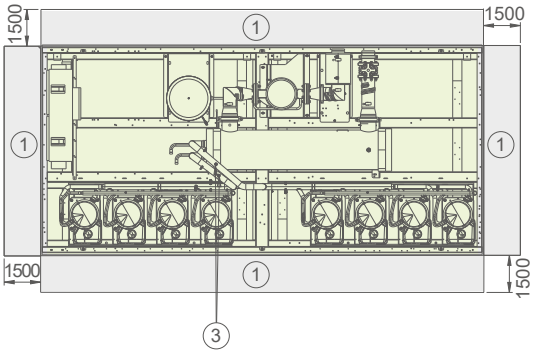
Dimensions/Clearances

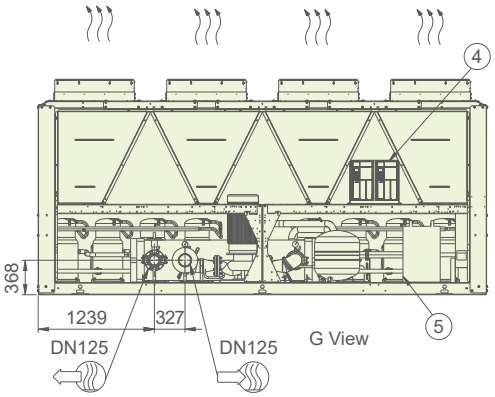
30RB462C~522C



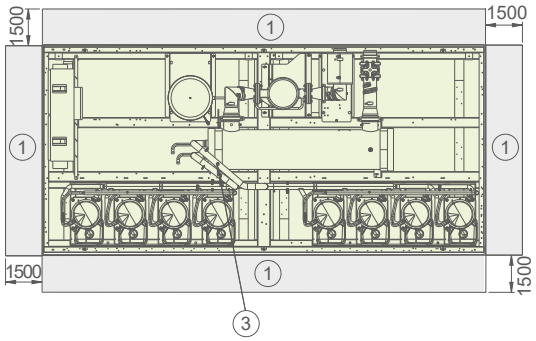


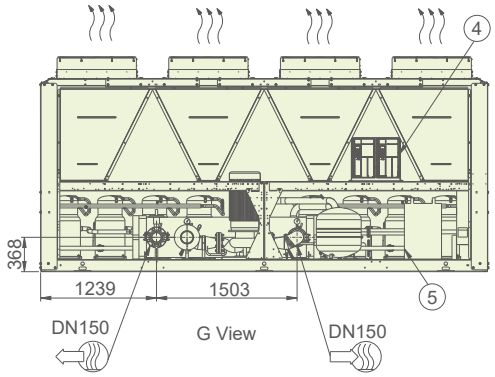
Standard unit with high pressure single pump hydronic module*





PT116D(unit without hydronic module)





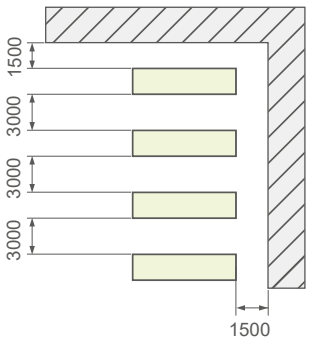
unit model	X (mm)	Y (mm)	Z (mm)
30RB462C	2257	1248	939
30RB522C	2400	1230	980

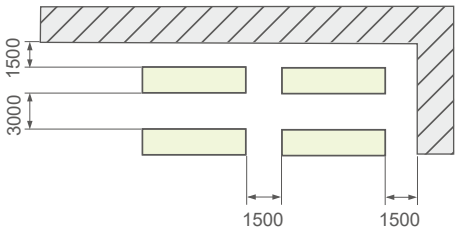
① Required clearances for maintenance and air flow
③ Safety valve
Center gravity

Water inlet
Water outlet
Power supply connection
Air outlet - do not obstruct

*Please contact local Carrier operation for other integrated hydronic module options.

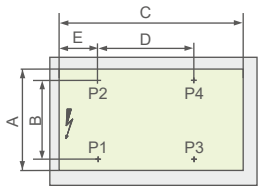
Multiple Chillers Installation



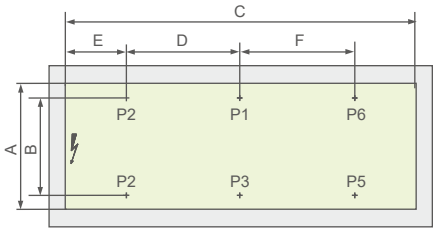


Note: If the height of wall exceeds 2m, please contact local Carrier Sales & Service Corporation.

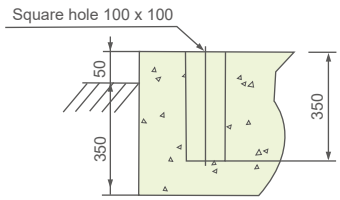
Weight Distribution



30RB182C-402C



30RB462C-522C

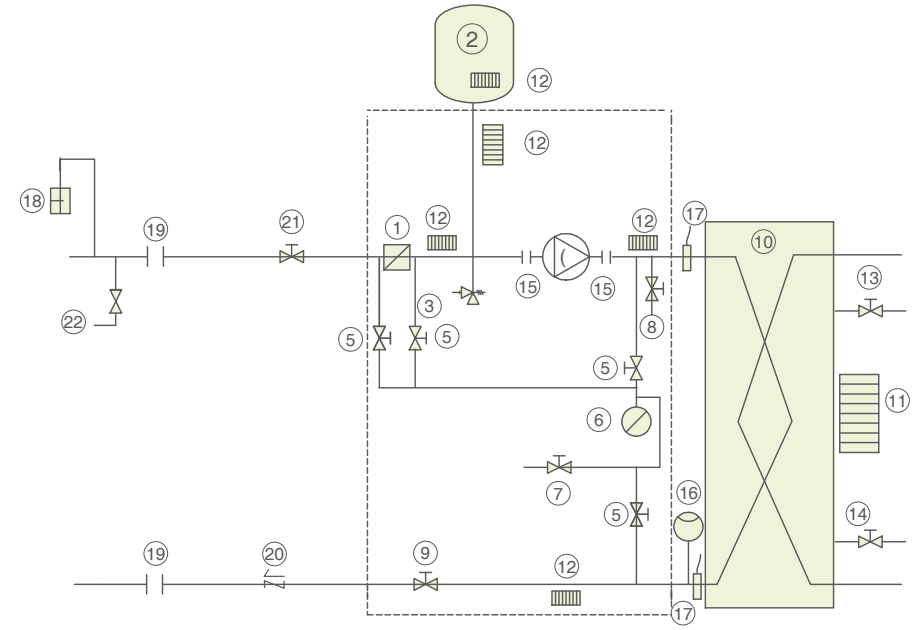


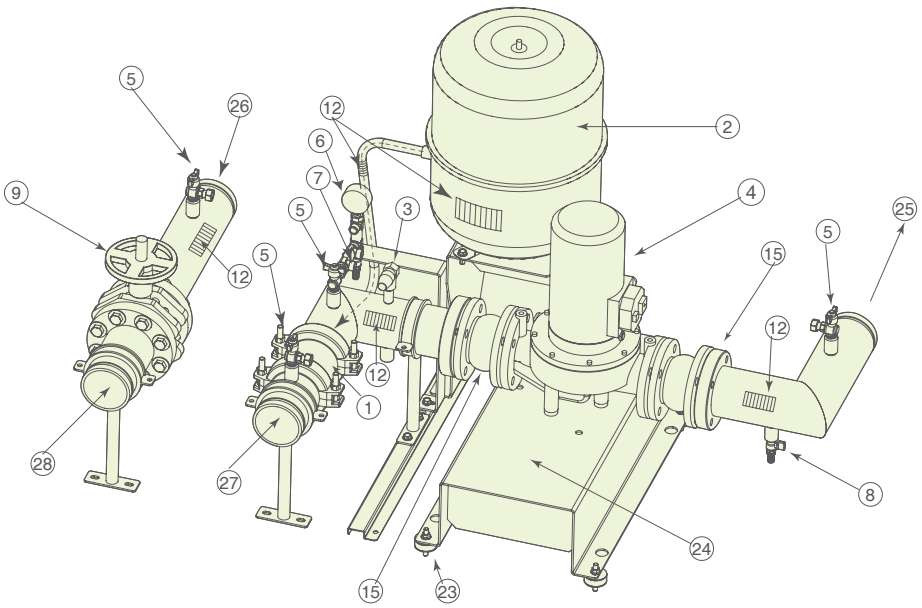
Section F-F

Model	Dimension (mm)					Weight distribution (kg)						Operating weight (kg)
	A	B	C	D	E	P1	P2	P3	P4	P5	P6	
30RB182CPT254	2231	2139	2388	1496	-	508	478	591	554	-	-	2131
30RB202CPT254	2231	2139	2388	1496	-	524	469	634	568	-	-	2195
30RB232CPT254	2231	2139	2388	1496	-	601	486	633	510	-	-	2230
30RB262CPT254	2231	2139	2388	1496	-	620	514	664	552	-	-	2350
30RB322CPT254	2231	2139	3582	2690	-	818	685	787	659	-	-	2949
30RB342CPT254	2231	2139	3582	2690	-	832	697	800	670	-	-	2999
30RB402CPT254	2231	2139	3582	2690	-	851	677	920	732	-	-	3180
30RB462CPT254	2231	2139	4776	1942	1942	580	472	946	725	612	486	3821
30RB522CPT254	2231	2139	4776	1942	1942	592	484	963	740	625	496	3900

Hydronic Connections

Standard unit with integrated high pressure single pump hydronic module





Legend:

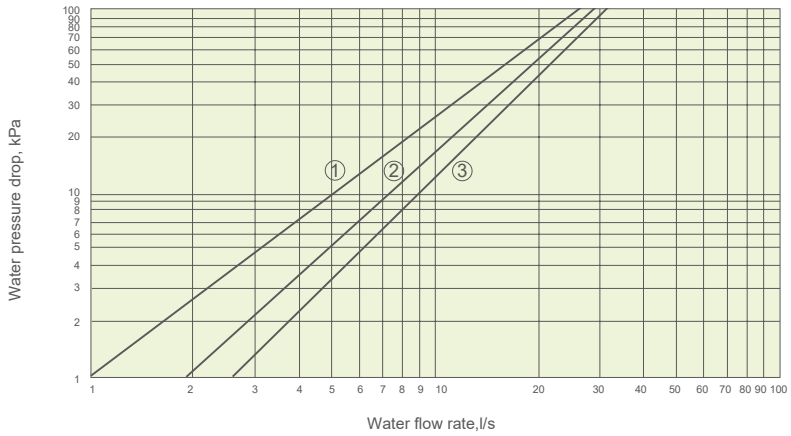
Components of the unit and hydronic module.

1. Victaulic screen filter
2. Expansion tank
3. Safety valve
4. Water pump
5. Shut-off valve
6. Pressure gauge
7. Air vent
8. Drain valve
9. Water flow control valve
10. Shell-and-tube heat exchanger
11. Evaporator heater
12. Hydronic module heater
13. Air vent (evaporator)
14. Water purge (evaporator)
15. Flexible connections
16. Electronic flow switch
17. Water temperature sensor

Installation components

18. Air vent
19. Flexible connections
20. Check valve
21. Shut-off valve
22. Water charge valve
23. Anti-vibration pad
24. Water pump support
25. Evaporator water inlet
26. Evaporator water outlet
27. Hydronic module water inlet
28. Hydronic module water outlet

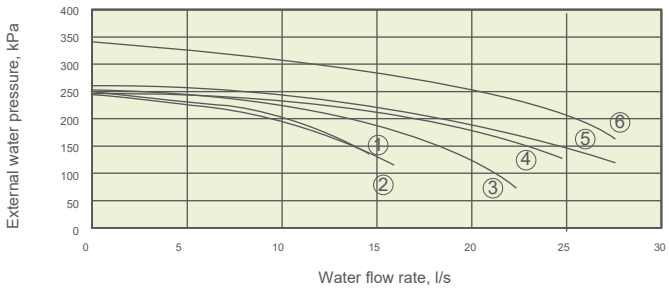
Heat Exchanger Water Pressure Drop



① 30RB182C/202C/232C/262C
② 30RB322C/342C/402C
③ 30RB462C/522C

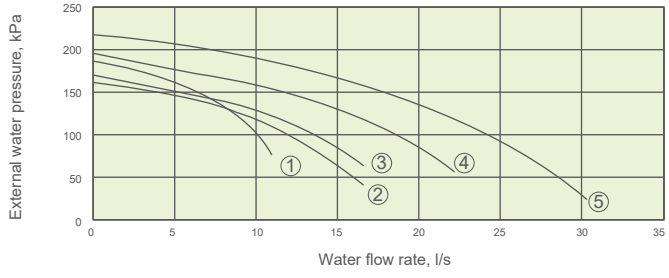
Available Static Pressure

High pressure pump hydronic module



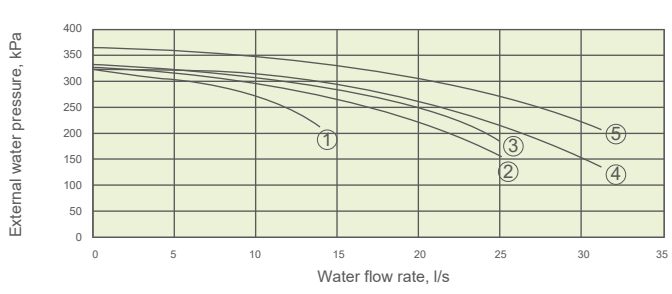
① 30RB182C/202C
② 30RB232C/262C
③ 30RB322C/342C
④ 30RB402C
⑤ 30RB462C
⑥ 30RB522C

Low pressure pump hydronic module



① 30RB182C/202C
② 30RB232C/262C
③ 30RB322C
④ 30RB342C/402C
⑤ 30RB462C/522C

Super high pressure pump hydronic module



① 30RB182C/202C/232C
② 30RB262C
③ 30RB/322C/342C/402C
④ 30RB462C
⑤ 30RB522C

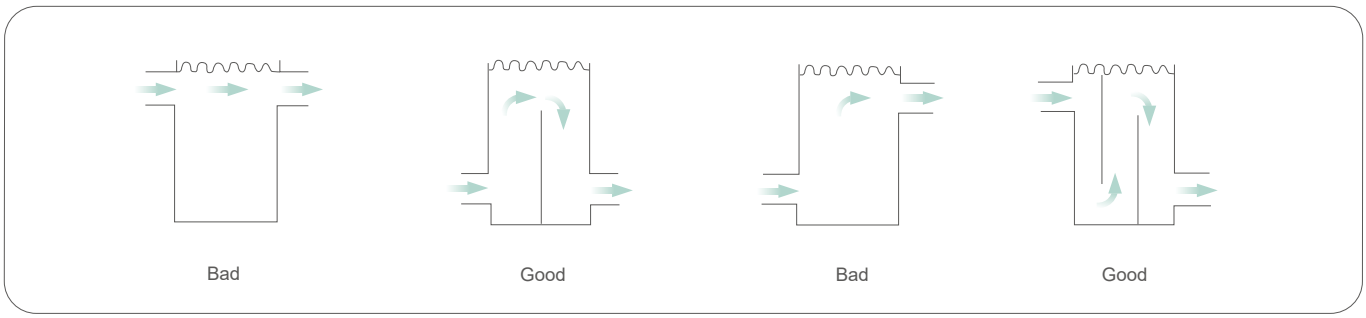
Minimum Water Loop Volume

For better control of leaving water temperature, the water loop minimum capacity is given by the formula:

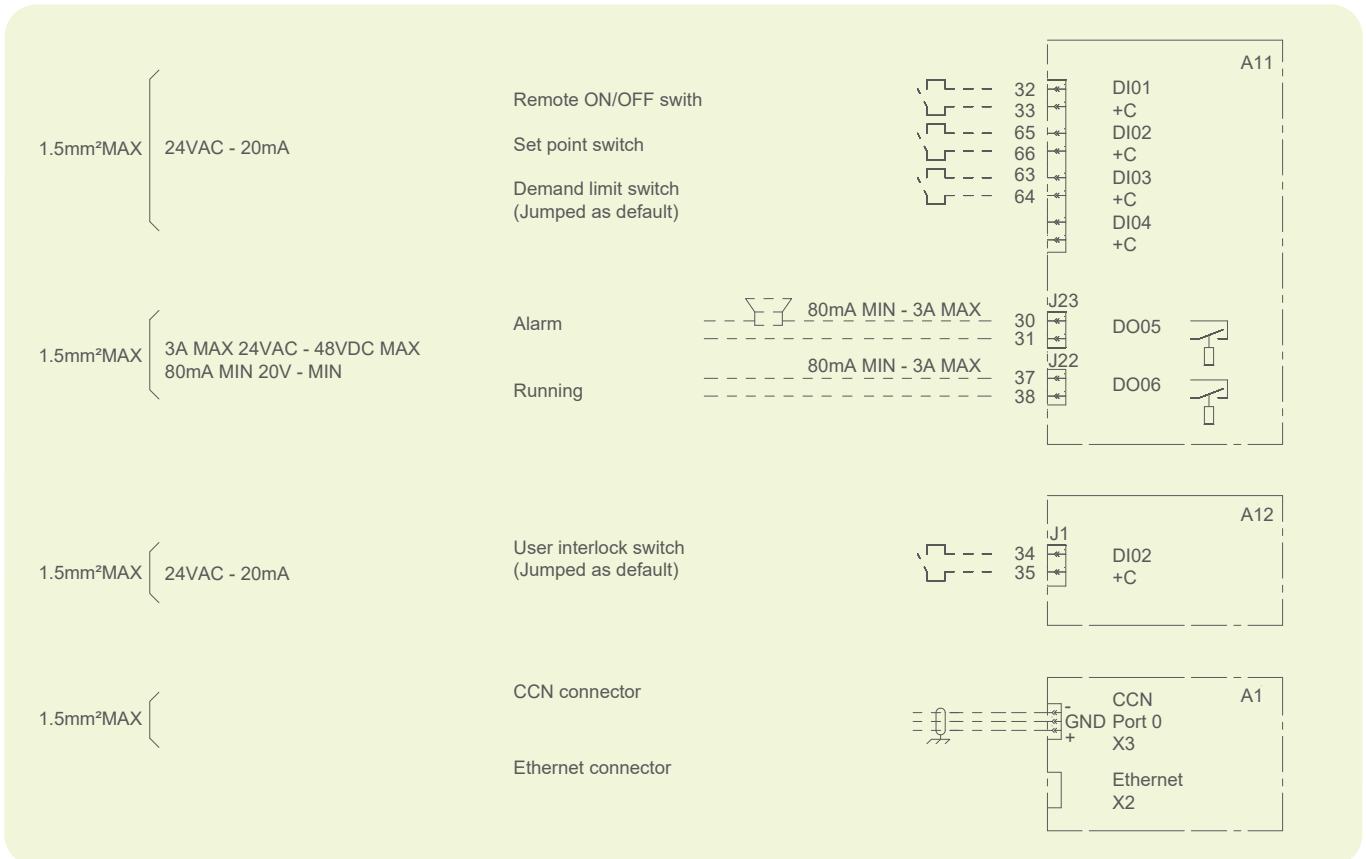
Capacity = CAP (kW) × N Liters

Application	Model	N
Normal air conditioning	30RB	3.5
Process cooling	30RB	6.5

Where Cap is the nominal system cooling capacity (kW) at the nominal operating conditions of the installation.
This volume is necessary for stable operation and accurate temperature control.
It is often necessary to add a buffer water tank to the circuit in order to achieve the required volume. The tank must be internally baffled in order to ensure proper mixing of the liquid (water or brine).Refer to the examples below.



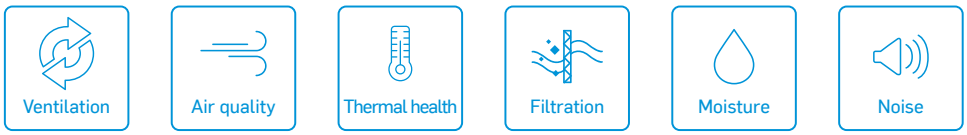
Field Control Wiring (with hydronic module)



HEALTHY**BUILDINGS**

As the inventors of modern air conditioning and a world leader in HVAC, refrigeration, and fire and security, solutions, Carrier has a legacy of creating safe and comfortable buildings. Our Healthy Buildings Program builds on that legacy through in-depth expertise and a holistic suite of healthy building technologies and services .to address the immediate pandemic concerns and long into the future.

6 of 9 foundations of healthy building are related closely to air conditioning system.



Primary support for the study came from Carrier.
MacNaughton P, Allen J, Satish U, Laurent J, Flanigan S, Vallarino J, Coull B, Spengler. 2016. The Impact of Working in a Green Certified Building on Cognitive Function and Health. Building and Environment DOI: 10.1016/j.buildenv.2016.11.041

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