HITACHI

Centrifugal Chiller

Direct-drive with VSD | 300~1100RT

Cooling & Heating



FEATURES & ADVANTAGES

HIGH-EFFICIENCY DIRECT-DRIVE VSD CENTRIFUGAL CHILLER

- HC-F_D_GFVG Series (Super High Efficiency Type)
  1,055~3,868kW (300~1,100USRT)
- HC-F_D_GXVG Series (High Efficiency Type)
  1,055~3,692kW (300~1,050USRT)

Hitachi High Efficiency Centrifugal Chillers realize the world top-level high efficiency and downsizing thanks to the advanced technologies to optimize the design of compressors and heat-exchangers. Several series of product lineup and flexible model selections satisfy huge variety of customers' demand such as energy saving, space saving, etc. In addition, Hitachi's unique technologies accumulated through over 80-year history ensure long term stable operation.

ADVANTAGES

Gearless Direct-drive Two-stage Compressor

- Higher efficiency compared to conventional compressor because of no mechanical loss of speed increasing gear.

Excellent Downsizing

- Significantly compact and light weight design can save installation space and facilitate transportation and installation work, etc.

Saving Of Maintenance Cost

- Less rotating parts can reduce the cost of overhauling, lubrication oil, etc. and extend the product life.

OUR KEY TECHNOLOGIES REALIZING HIGH-EFFICIENCY

Environment-Friendly Refrigerant:

R134a with Zero ODP satisfies requirements for environment protection

Hi-speed Direct-drive Two-Stage Compressor:

Direct-drive gearless structure with high speed motor realizes further improvement of efficiency at (full/partial) load and further downsizing

Economizer:

External compact and high performance economizer with cyclonic system contributes for drastic downsizing

Touch Panel Type Control Panel:

10.4-inch graphic display with various information and functions contributes easy operation



Evaporator:

High-performance heat-exchaner tubes and optimum structural design enables high efficiency

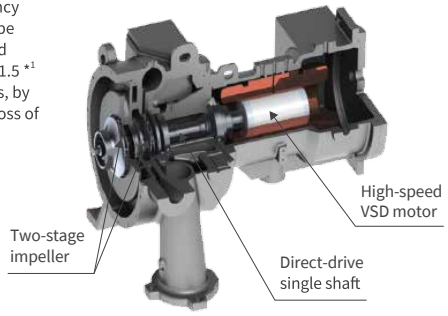
Condenser:

High-performance heat-exchaner tubes and optimum structural design enables high efficiency

Focusing On Total Efficiency All Through The Year

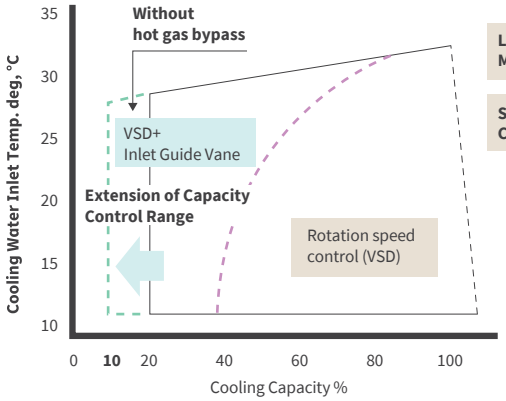
- Adopting High-speed VSD motor and Gearless Direct-drive Two-stage compressor, the new series of chiller can realize higher efficiency than the conventional type compressor with gear and achieve maximum IPLV 11.5 *1 based on AHRI conditions, by eliminating mechanical loss of speed-increasing gear.

HITACHI's Latest Development



Extension of Capacity Control Range

- Adopting High-speed VSD motor, and design of High-speed & High-frequency operation, capacity control range is extended to min. 10%



Larger Surging Margin Design

Strict Anti-Surging Control

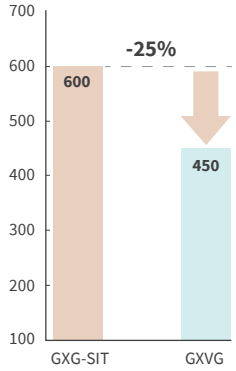
Reduction of Refrigerant

In comparison of 600RT chiller; refrigerant amount of GXVG direct-drive model can be reduced by approx. 25% compared with GXG-SIT gear model.

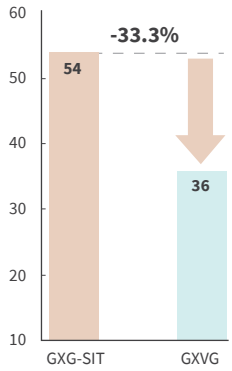
Reduction of Lubrication Oil

In comparison of 600RT compressor; number of bearing is reduced from 4 sets to 2 sets.
Accordingly amount of lubrication oil can be reduced by approx. 33.3%

Refrigerant Amount (kg)

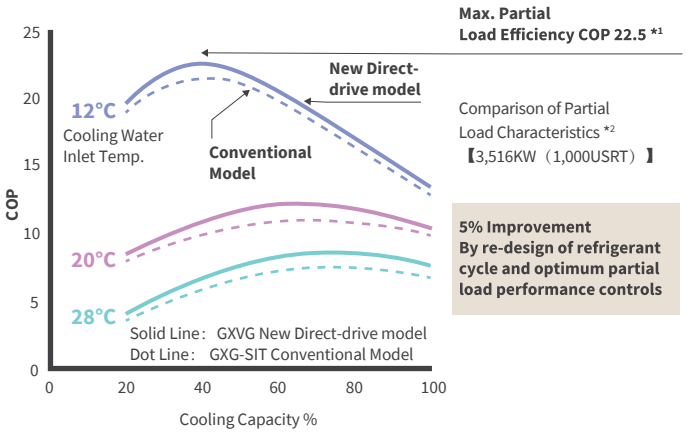


Lubrication Oil Amount (L)



Max. Partial Load Efficiency COP 22.5 *1

- Drastic improvement of partial load COP at low cooling water temperature



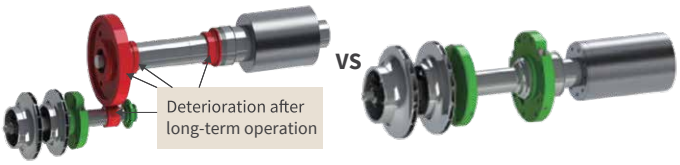
Comparison of Partial Load Characteristics *2
【3,516KW（1,000USRT）】

5% Improvement By re-design of refrigerant cycle and optimum partial load performance controls

*1: HC-F30D1000GFVG Standard Conditions,Cooling Water Inlet Temp: 12°C running under 40%load.
*2: Comparison of Partial Load Characteristics
Direct-drive model HC-F30D1000GFVG [1000USRT]
Conventional Model HC-F1000GFG-SIT [1000USRT]
Comparable Conditions: Chilled Water 12/7°C, Cooling Water: 32/37°C, Power Supply: 380V, 50Hz

Reduction of Consumable Parts

Adopting VSD direct-drive single-shaft impeller, speed increasing gear is removed and power transmission system is simplified. By reduction of moving parts, the compressor structure is simplified and its dimensions was reduced.
In comparison of 600RT chillers, major consumable parts are reduced from 6 items to 2 items (66% reduction) and contribute customer's service cost saving.



Gear type: more friction parts

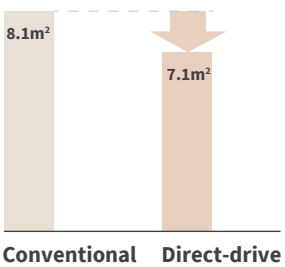
Direct-drive type: less friction parts

Installation Space and Operating Weight

Comparison of 600RT Chiller

Installation Space

Reduced by approx. 12.3%

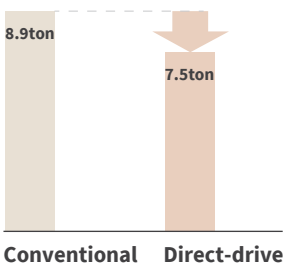


Conventional (HC-F600GXG-SIT)

Direct-drive (HC-F20D600GXVG)

Shipping Weight

Reduced by approx. 15.7%



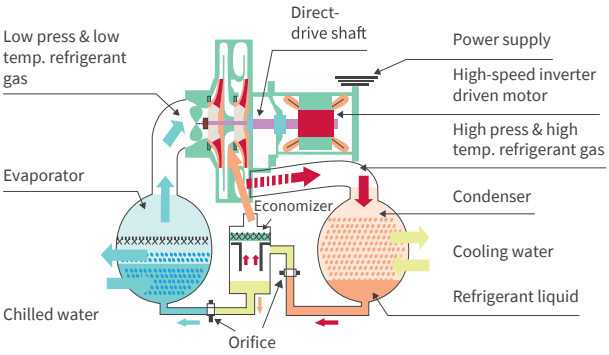
Conventional (HC-F600GXG-SIT)

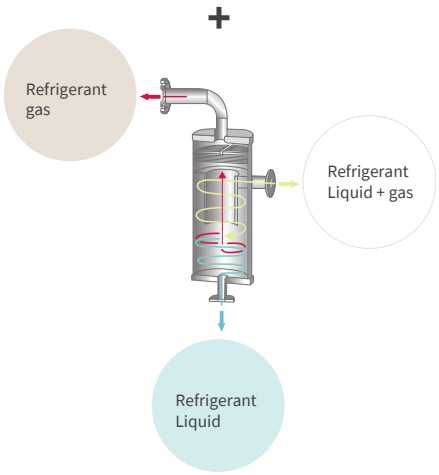
Direct-drive (HC-F20D600GXVG)

Two-stage Compressor + Economizer improved efficiency

- Two-stage compressor enables to extend the bearing life compared to single-stage compressor because of lower rotation speed.
- Hitachi's patented cyclonic type economizer can enhance sub-cooling of refrigerant to increase cooling capacity, and at the same time, reduce refrigerant flow to the first stage impeller, which decreases power consumption.

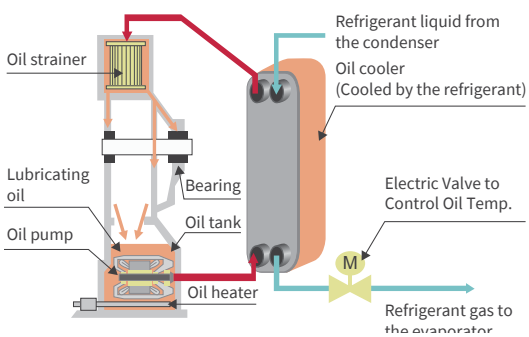
Centrifugal two-stage compressor





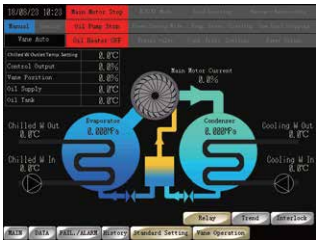
Improvement of The Oil Supply Temperature Control

When the compressor rotation speed is low, the friction heat generated at bearing decreases.
Therefore, refrigerant flow to oil cooler is controlled to keep the oil temperature property.



Easy Operation With Touch Panel Type Control Panel

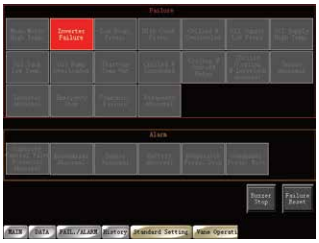
- 10.4-inch color touch panel screen
- Monitor various operating data
- Indicate trend graph during operation
- Trend data for max. 40 hours. (Updated every hour)
- Indicate and store operation history for the past 12 hours (Updated every hour)
  Indicate and store failure and alarm history (latest 6 times each)
- Show Handling Guide in case of failure
- Automatic restart function after instantaneous power failure (Option)
- Multilingual Languages Indication
  (Japanese, English, Chinese [Simplified, Traditional], Portuguese)
- Download 3-month operation data to USB memory



Operation screen



Trend data screen



Failure screen



Handling guide screen

Compatible With BMS

Chiller control panel is equipped with RS485 communication port and compatible with Building Management System through MODBUS RTU protocol.

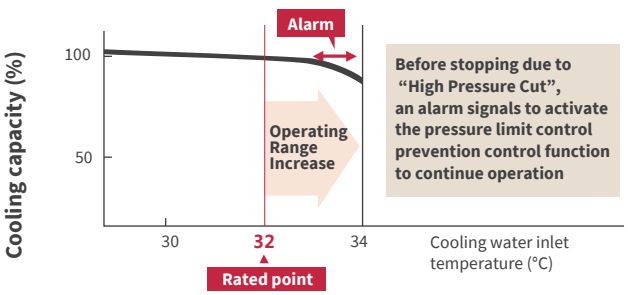
Quick Automatic Restart After Power Failure.

Chiller automatically starts up after instantaneous power failure (less than 10 sec.) and reverts to normal operation in shortest period.

Wider Operation Range

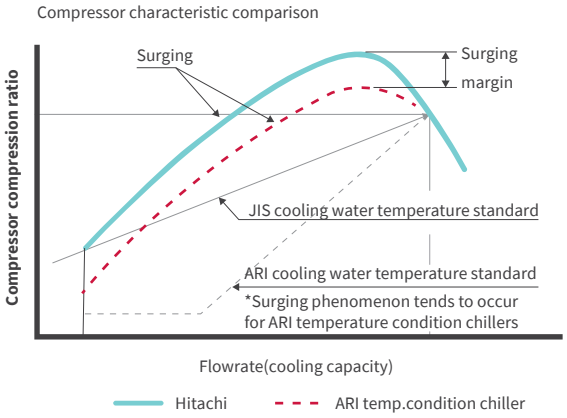
Stable operation continues even when rise of condenser pressure due to cooling water temperature in hot summer and/or proceeding of tube fouling.

* Example of rising cooling water temperature due to rising ambient temperature



Surge Protection

Adopting strict criteria specified in JIS stable operation under high cooling water temperature. 3D 2-stage impeller enables stable operation even at low cooling load or high cooling water inlet temperature which prevents occurrence of surge.



*This figure shows general characteristics and does not provide any guarantees as to the performance.

Load	JIS	ARI
100%	32°C	29.4°C
75%	30.75°C	23.9°C
50%	29.5°C	18.3°C
25%	28.25°C	18.3°C
0%	27°C	18.3°C

Other Unique Feature to Enhance Reliability

- Key-free impeller coupling system
- Accurate chilled water temperature control within ±0.2°C
- Low noise and longer bearing life due to lower rotation speed of 2-stage compression cycle.
- Continuous oil recovery with automatic refrigerant cleaner
- Prevention of oil degradation by removing residual water with filter dryer

Optional Item & Function

- Min. cooling water temperature 12°C
- Thermal insulation
- Spring isolator
- Max. working pressure up to 2.5Mpa
- Ball type automatic tube cleaning system for chilled & cooling water
- Chilled & cooling water variable flow control
- Marine type water box / Hinged type water box
- Large temperature difference (to reduce the water flow rate)
- Delivery in knockdown form
  (4 pieces-compressor, heat exchangers, economizer, control panel,
  5 pieces-evaporator & condenser is also separated.)

Mounted Type VSD Panel (option)

Unit mounted VSD (Inverter) panel is available.

Harmonic Filter (option)

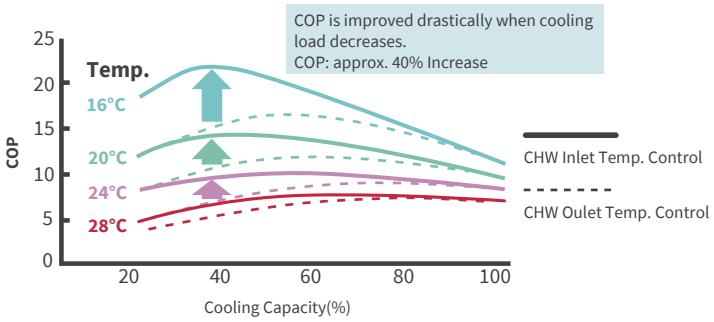
Harmonic filter is available to comply the requirement of IEEE 519.

Energy & Power Saving Operation Functions

"Eco Mode" Operation (Chilled Water Inlet Temperature Control)

The chiller is usually controlled so the chilled water outlet temperature to be constant. This "Eco Mode" operation introduces the inlet temperature control, where the chilled water inlet temperature is controlled to be constant.
The outlet temperature rises a bit but this is enough for the off-peak season air conditioning.

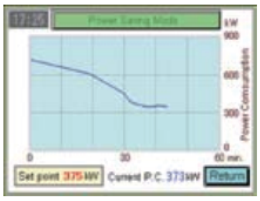
Comparison of Characteristics between CHW Outlet /Inlet Temperature Control



"Energy Saving Mode" Operation (Peak Cut Operation) (Option)

Once the target motor power consumption is set, the chiller is automatically controlled by the motor speed, the inlet guide vane opening and the chilled water outlet temperature rise. This control is extremely useful for the energy saving especially in the off-peak season when the motor speed is easily decreased.

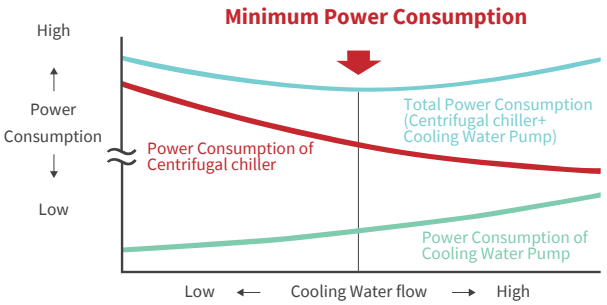
Energy Saving Mode Setting Screen



Cooling Water Variable Flow Operation (option)

When the cooling water variable flow control is applied, the cooling water flow rate is automatically calculated so the total power consumption of the compressor motor and the cooling water pump motor becomes minimum.

Characteristics of Cooling Water Variable Flow Operation



SPECIFICATIONS

HC-F_D_GFVG

Model	Cooling Capacity		COP	Overall Dimension(mm)			Shipping Weight	Operating Weight
	USRT	KW		Length(A)	Width(B)	Height(C)	kg	kg
HC-F10D300GFVG	- ~ 300	- ~ 1,055	- ~ 6.13	4,650	1,850	2,300	6,800	8,300
HC-F10D350GFVG	301 ~ 350	1,058 ~ 1,231	6.13 ~ 6.13	4,650	1,850	2,300	6,800	8,300
HC-F10D400GFVG	351 ~ 400	1,234 ~ 1,407	6.13 ~ 6.15	4,650	1,850	2,300	7,000	8,600
HC-F10D450GFVG	401 ~ 450	1,410 ~ 1,582	6.15 ~ 6.16	4,650	1,850	2,300	7,000	8,600
HC-F20D500GFVG	451 ~ 500	1,586 ~ 1,758	6.16 ~ 6.39	4,650	1,950	2,450	8,200	10,000
HC-F20D550GFVG	501 ~ 550	1,762 ~ 1,934	6.39 ~ 6.40	4,650	1,950	2,450	8,200	10,000
HC-F20D600GFVG	551 ~ 600	1,937 ~ 2,110	6.40 ~ 6.41	4,650	1,950	2,450	8,400	10,300
HC-F20D650GFVG	601 ~ 650	2,113 ~ 2,286	6.41 ~ 6.41	4,650	1,950	2,450	8,400	10,300
HC-F25D700GFVG	651 ~ 700	2,289 ~ 2,461	6.39 ~ 6.41	4,700	2,350	2,750	10,600	12,700
HC-F25D750GFVG	701 ~ 750	2,465 ~ 2,637	6.39 ~ 6.41	4,700	2,350	2,750	10,600	12,700
HC-F25D800GFVG	751 ~ 800	2,641 ~ 2,813	6.41 ~ 6.43	4,700	2,350	2,750	10,800	13,000
HC-F25D850GFVG	801 ~ 850	2,817 ~ 2,989	6.41 ~ 6.43	4,700	2,350	2,750	10,800	13,000
HC-F30D900GFVG	851 ~ 900	2,992 ~ 3,165	6.38 ~ 6.45	4,700	2,450	2,850	12,200	14,800
HC-F30D950GFVG	901 ~ 950	3,168 ~ 3,340	6.45 ~ 6.45	4,700	2,450	2,850	12,200	14,800
HC-F30D1000GFVG	951 ~ 1,000	3,344 ~ 3,516	6.45 ~ 6.47	4,700	2,450	2,850	12,500	15,200
HC-F30D1050GFVG	1,001 ~ 1,050	3,520 ~ 3,692	6.46 ~ 6.47	4,700	2,450	2,850	12,500	15,200
HC-F30D1100GFVG	1,051 ~ 1,100	3,696 ~ 3,868	6.47 ~ 6.48	4,700	2,450	2,850	12,700	15,500

HC-F_D_GXVG

Model	Cooling Capacity		COP	Overall Dimension(mm)			Shipping Weight	Operating Weight
	USRT	KW		Length(A)	Width(B)	Height(C)	kg	kg
HC-F10D300GXVG	- ~ 300	- ~ 1,055	- ~ 5.83	3,650	1,850	2,300	6,200	7,200
HC-F10D350GXVG	301 ~ 350	1,058 ~ 1,231	5.83 ~ 5.84	3,650	1,850	2,300	6,200	7,200
HC-F10D400GXVG	351 ~ 400	1,234 ~ 1,407	5.84 ~ 5.91	3,650	1,850	2,300	6,400	7,500
HC-F10D450GXVG	401 ~ 450	1,410 ~ 1,582	5.91 ~ 5.92	3,650	1,850	2,300	6,400	7,500
HC-F20D500GXVG	451 ~ 500	1,586 ~ 1,758	5.92 ~ 6.11	3,650	1,950	2,450	7,300	8,600
HC-F20D550GXVG	501 ~ 550	1,762 ~ 1,934	6.11 ~ 6.12	3,650	1,950	2,450	7,300	8,600
HC-F20D600GXVG	551 ~ 600	1,937 ~ 2,110	6.12 ~ 6.13	3,650	1,950	2,450	7,500	8,900
HC-F20D650GXVG	601 ~ 650	2,113 ~ 2,286	6.13 ~ 6.14	3,650	1,950	2,450	7,500	8,900
HC-F25D700GXVG	651 ~ 700	2,289 ~ 2,461	6.13 ~ 6.14	3,700	2,350	2,750	9,600	11,300
HC-F25D750GXVG	701 ~ 750	2,465 ~ 2,637	6.13 ~ 6.14	3,700	2,350	2,750	9,600	11,300
HC-F25D800GXVG	751 ~ 800	2,641 ~ 2,813	6.14 ~ 6.15	3,700	2,350	2,750	9,800	11,600
HC-F25D850GXVG	801 ~ 850	2,817 ~ 2,989	6.15 ~ 6.15	3,700	2,350	2,750	9,800	11,600
HC-F30D900GXVG	851 ~ 900	2,992 ~ 3,165	6.12 ~ 6.15	3,700	2,450	2,850	11,000	13,100
HC-F30D950GXVG	901 ~ 950	3,168 ~ 3,340	6.15 ~ 6.15	3,700	2,450	2,850	11,000	13,100
HC-F30D1000GXVG	951 ~ 1,000	3,344 ~ 3,516	6.15 ~ 6.16	3,700	2,450	2,850	11,200	13,400
HC-F30D1050GXVG	1,001 ~ 1,050	3,520 ~ 3,692	6.16 ~ 6.16	3,700	2,450	2,850	11,200	13,400

REMARKS

1. Please consult with our sales staff or distributor for actual Specifications for cooling capacity, expected kW input and COP, depending on selected operating parameters.
2. The above specifications are subject to change without notice for technical improvements.
   * This table is applicable to chillers to be manufactured for normal water.
3. Capacity control range is 100% to approx.10%.
4. Fouling factor is assumed to be 0.018m2k/kW for chilled water and 0.044m2K/kW for cooling water.
5. Standard main power source: 380V/400V/415V/440V/460V, AC, 50/60Hz, 3ph.
6. Auxiliary power: AC380V, 50/60Hz, 3Φ, 3W or 4W.
7. Maximum working pressure is 1.0MP a for both chilled and cooling water. If higher maximum working pressure is required, please specify at inquiry.(Up to 2.5 MPa is available.)

INVERTER PANEL

Model		Dimensions(mm)			Weight(kg)
		Width	Depth	Height	
GFVG	300、350	1,400	600	1,600	320
	400~500	1,500	650	1,800	380
	550、600	900	650	2,200	395
	650~750	1,000	650	2,200	550
	800~950	1,200	650	2,200	615
	1,000、1,050	1,200	650	2,200	650
	1,100	1,500	800	2,500	750

Model		Dimensions(mm)			Weight(kg)
		Width	Depth	Height	
GXVG	300、350	1,400	600	1,600	320
	400~500	1,500	650	1,800	380
	550、600	900	650	2,200	395
	650、700	1,000	650	2,200	550
	750~900	1,200	650	2,200	615
	950、1,000	1,200	650	2,200	650
	1,050	1,500	800	2,200	750

INSTALLATION

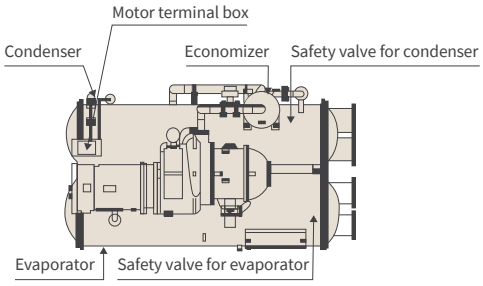
STANDARD SCOPE OF SUPPLY

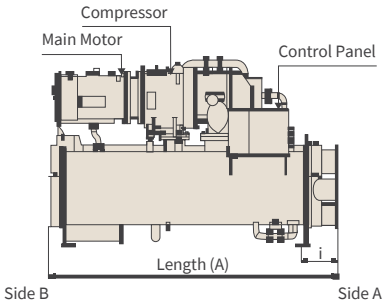
The following table shows the standard scope of supply, but the actual scope depends on the contract.
Please consult with out sales staff or distributor.

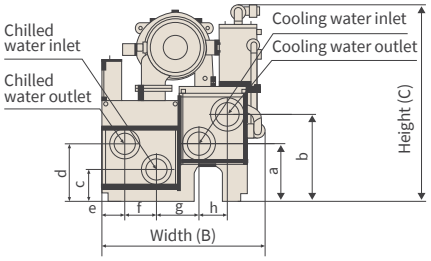
Item	Standard Scope
Main Equipment	Compressor, Main motor, Lubrication system, Heat exchanger
Auxiliary Equipment	Safety device, Control panel, Standard accessories (Corrugated rubber vibration insulator plates, Oil strainer elements, Gasket for oil strainer elements, Dryer), Starter (Optional)
Coating	Chiller main unit: Anti-corrosive prime coating Control panel: Finish coat (color: Munsell 5Y8/1 gloss) Starter (optional): Finish coat (color: Munsell 5Y7/1 semigloss)
Out of Supply Scope	Foundation work, Carrying-in, Installation, Piping work, Cold Insulation, Primary and secondary side electrical wiring, Commissioning for total system, Forced ventilation system, Outdoor discharge piping for safety valve, Counter flange, Bolt, Nut, Gasket, Foundation bolt, Refrigerant

DIMENSIONAL OUTLINE DRAWING

This dimensional outline drawing shows a standard nozzle location. Please consult with out sales staff or distributors in case of a 3-pass or 4-pass system.







POSITIONAL DIMENSION OF WATER PIPING (GFVG MODEL | GXVG MODEL)

Model	Positional Dimension of Nozzle								
	a	b	c	d	e	f	g	h	i
HC-F10D300GFVG | GXVG	688	1000	325	719	154.3	227.5	646.1	180	524
HC-F10D350GFVG | GXVG	688	1000	325	719	154.3	227.5	646.1	180	524
HC-F10D400GFVG | GXVG	688	1000	344.5	738.5	154.3	227.5	646.1	180	524
HC-F10D450GFVG | GXVG	688	1000	344.5	738.5	154.3	227.5	646.1	180	524
HC-F20D500GFVG | GXVG	693	1087	388	782	176.2	227.5	667.5	227.5	524
HC-F20D550GFVG | GXVG	693	1087	388	782	176.2	227.5	667.5	227.5	524
HC-F20D600GFVG | GXVG	693	1087	407	801	176.2	227.5	667.5	227.5	524
HC-F20D650GFVG | GXVG	693	1087	407	801	176.2	227.5	667.5	227.5	524
HC-F25D700GFVG | GXVG	768	1162	363	757	231.3	227.5	774.5	227.5	524
HC-F25D750GFVG | GXVG	768	1162	363	757	231.3	227.5	774.5	227.5	524
HC-F25D800GFVG | GXVG	740	1190	383	777	231.3	227.5	758.3	260	524
HC-F25D850GFVG | GXVG	740	1190	383	777	231.3	227.5	758.3	260	524
HC-F30D900GFVG | GXVG	765	1215	412.5	897.5	239	280	800	260	524
HC-F30D950GFVG | GXVG	765	1215	412.5	897.5	239	280	800	260	524
HC-F30D1000GFVG | GXVG	756	1224	432	917	239	280	795	270	524
HC-F30D1050GFVG | GXVG	756	1224	432	917	239	280	795	270	524
HC-F30D1100GFVG	756	1224	432	917	239	280	795	270	524

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