Absorption Chiller
RFH·ON9N

EBARA

EBARA-ALWAYS BENEFITING THE EARTH

RFH-Y

HOT WATER OPERATED
TWO STAGE TYPE LITHIUM BROMIDE ABSORPTION CHILLER

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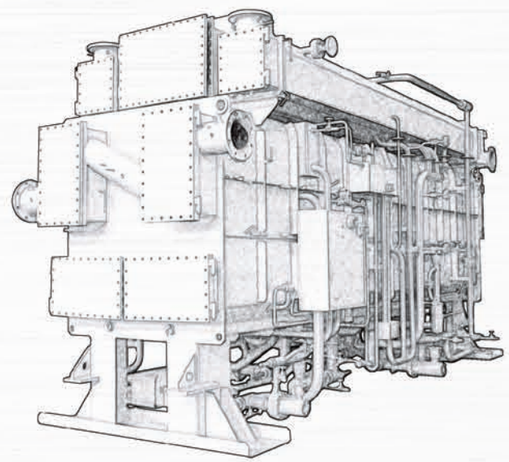
Absorption Chiller
Electrical Chiller
Industrial Blower
Cooling Tower



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CONTENTS

EBARA
ALL AROUND THE WORLD

AN ENVIRONMENTALLY FRIENDLY COMPREHENSIVE ENGINEERING COMPANY

Ebara All Around The World

EBARA Corporation

Ebara Corporation is one of the world's largest manufacturers of pumps, compressors, fans, heat pumps and other HVAC and refrigeration equipment. Since its establishment in 1912, Ebara Corporation has been fully dedicated to protecting the environment with a comprehensive and contemporary commitment. “Ebara-Always Benefiting the Earth” is the philosophy that guides Ebara corporate strategy.

ERSC Company Profile

EBARA refrigeration equipment & systems（china）co.,ltd. established in 1996, is the only overseas production base of Ebara Japan for manufacturing air conditioning equipment including absorption heat pumps, absorption chiller, centrifugal chiller (heat pump), screw chiller(heat pump), cross-flow (closed) type cooling tower, etc. Its products are exported to JAPAN and all over the world. ERSC lways keeps up with the products and technology development of Ebara Japan.

TRUST & EXPECTATION

BEYOND BOUNDARIES

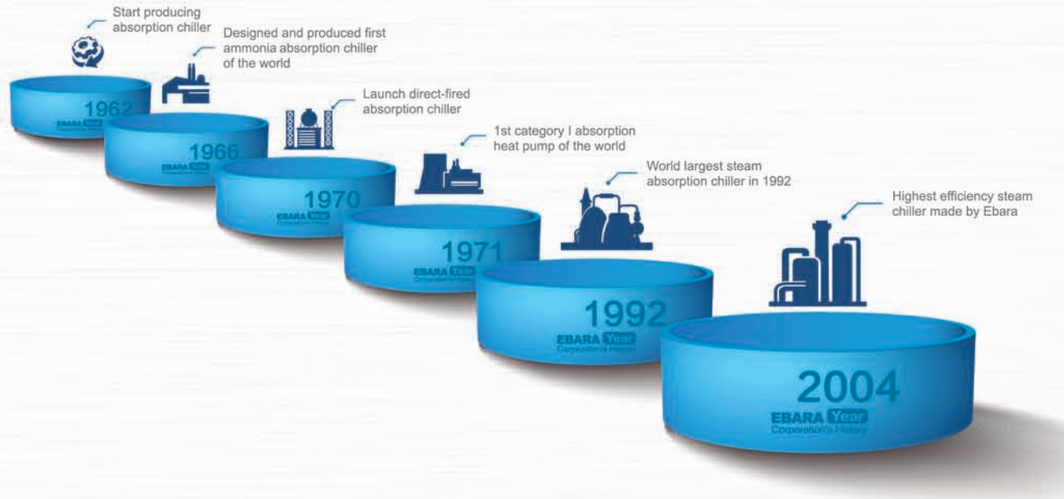
1962
Start producing absorption chiller in 1962

1967
1st double effect absorption chiller launched in 1967

1992
World largest steam absorption chiller in 1992

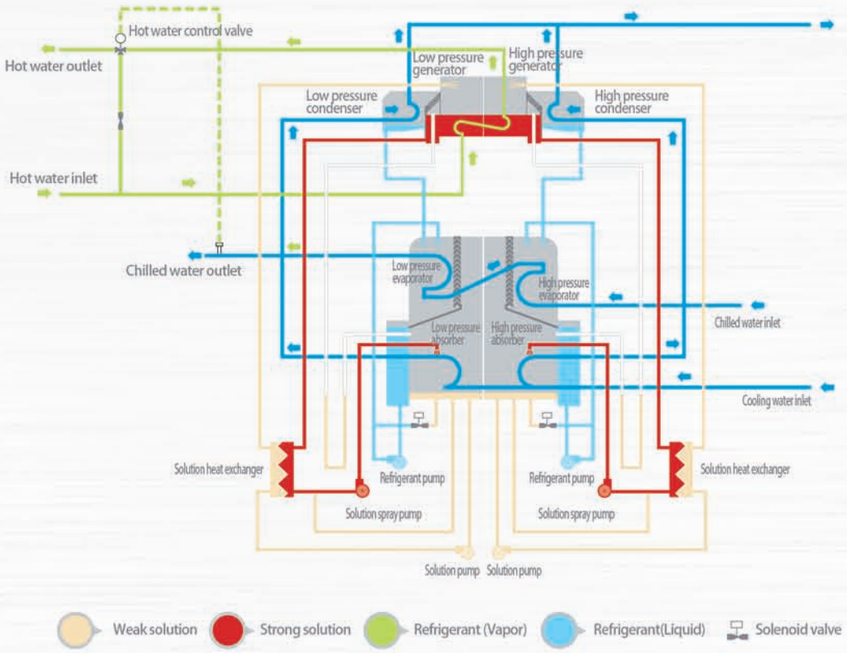
2004
Highest efficiency steam chiller made by Ebara

Product Development History



RFH-Y REFRYGERATION PRINCIPLE

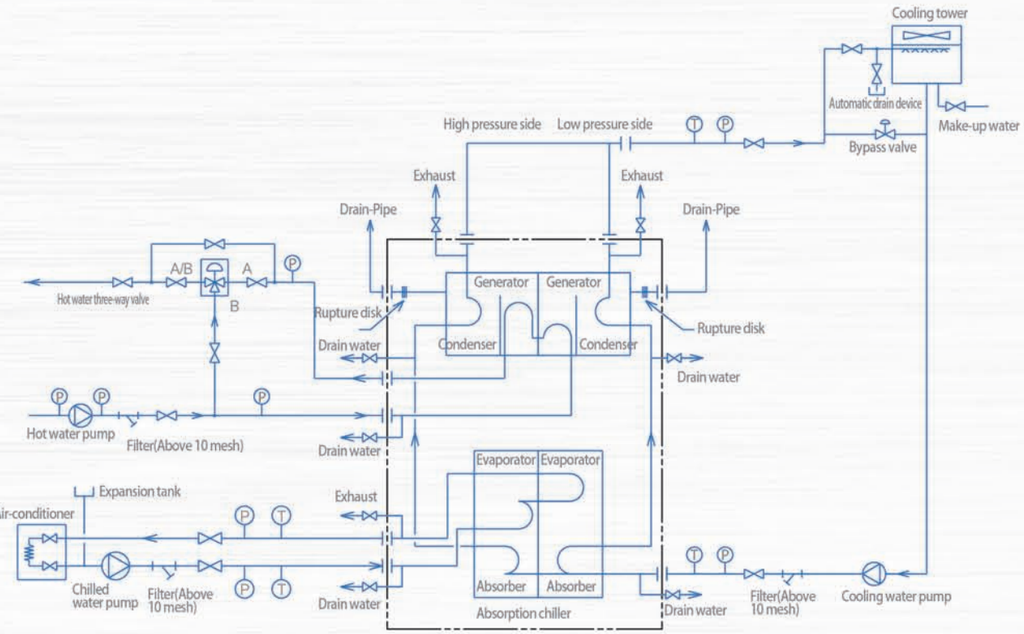
Working Principle



Liquid refrigerant in evaporator vaporize and cool the chilled water. Then refrigerant vapor goes into absorber and absorbed by strong solution. The strong solution becomes weak solution, then goes into heat exchanger. After that, the solution pump circulates this weak solution back to generator. In generator, weak solution is heated by heat source and become strong solution, After heat exchanger, the strong solution will goes into absorber to absorb refrigerant vapor from evaporator. Refrigerant generated in generator is cooled by cooling water in condenser and return to evaporator.

SYSTEM P&I DIAGRAM

P&I Diagram



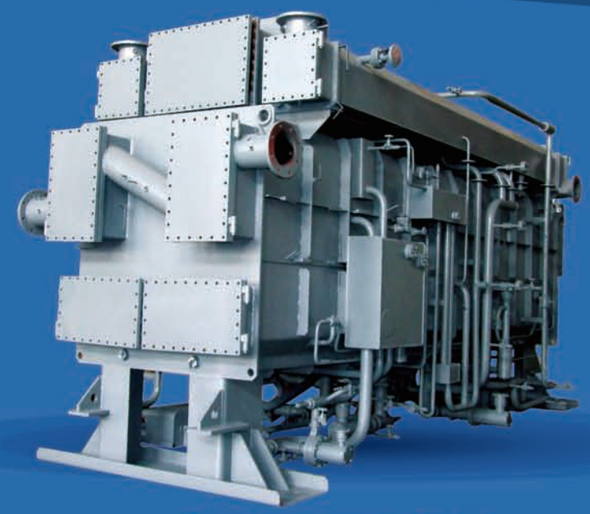
Sign

- (P) Pressure sensor
- (T) Temp.sensor
- ⋈ Shut-off valve

01. Within is the standard supply scope.
02. The diagram shows the typical piping system without standard supply scope
03. Hot water three-way valve: electric type is standard, Mechanical type is Optional, Air pressure load: 0.4~0.6Mpa

RFH-Y
PRODUCT FEATURE

Product features



RFH-Y HOT WATER ABSORPTION CHILLER

High Intelligence control system: English colorful touch screen interface， visual display of running parameters, fault record,flow chart, performance curve, etc. Easy operation, standard design of fault auto diagnosing, communication interface, chiller interlocking control, etc.

Wide Application: The chiller is able to use heat from 70~135℃, Max. temperature difference can be up to 62℃ (Hot water inlet temp. must be above 130℃)

Unique single stage operation function: If chiller load operate in light load, then the RFH chiller can operate in single stage function.

Failure avoid control: The chiller detect the upward trend of temperature， pressure, concentration. This function make the chiller be away from failure or stop so that to keep the chiller running.

Dual Evaporator/Condenser: The absorber and evaportor are divided into high and low side to operate at different pressures. The weak solution concentration can be lower, and the solution concentration range can be extended. Heat Exchanger efficiency is increased. The generator and condenser are also divided into high and low side, so the chiller is consist of two separate cooling systems in parallel.

Auto-purge System: Vacuum pump automatically purge the non-condensable gas according to chiller operating condition.

Multi Anti-crystallization Design: Crystallization pre-alarm function is installed, the chiller will auto calculate the chiller crystallization redundancy according to the chiller real-time operation parameters, if the redundancy is less than set value, then the chiller will auto dilution and crystallization will never happen. A "J" type tube is installed as overflow tube in low temperature generator to melt the crystallization in case it happens. Auto-diluting process will start after chiller power off.

Ultra Low Pressure Spray Adopt Ebara patent super low pressure spray nozzle technology for solution and refrigerant spraying, better pulverization, larger wetting surface, increase absorption effect. Spray pump is installed and zero possibility of bolck in the spray nozzle.

Product features

RFH-Y — Series Name

083 — Cooling capacity 830USRt

TECHNICAL
DATA SHEET

Performance data

Hot water 98℃→88℃

Model		RFH(−)Y	N015	N018	N021	N025	N028	N032	N036	N040	N045	N050
Cooling capacity		USRt	150	180	210	250	280	320	360	400	450	500
		kW	528	633	739	879	985	1125	1266	1407	1583	1759
		10^4kcal/h	45	54	64	76	85	97	109	121	136	151
Chilled water	Inlet/outlet temp.	℃	12→7									
	Flow rate	m^3/h	90.7	108.9	127.0	151.2	169.3	193.5	217.7	241.9	272.2	302.4
	Pressure drop	mH_2O	7.6	7.9	7.7	8.0	3.2	2.5	2.7	2.9	3.0	3.2
		kPa	75	78	75	78	31	24	27	28	30	32
	Pass	–	4	4	4	4	2	2	2	2	2	2
	Pipe size	mm	125	125	150	150	150	200	200	200	200	200
Cooling water	Inlet/outlet temp.	℃	32→38									
	Flow rate	m^3/h	177.8	213.3	248.9	296.3	331.8	379.2	426.6	474.0	533.3	592.5
	Pressure drop	mH_2O	3.2	3.4	3.2	3.4	6.5	5.7	5.9	6.0	6.1	6.3
		kPa	31	33	31	33	64	56	58	59	60	62
	Pass	–	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1
	Pipe size	mm	200	200	250	250	250	300	300	300	300	300
Hot water	Inlet/outlet temp.	℃	98→88									
	Flow rate	t/h	61.3	73.6	85.8	102.2	114.4	130.8	147.1	163.5	183.9	204.3
	Pressure drop	mH_2O	9.3	8.4	9.4	9.2	7.0	5.9	6.0	6.1	5.7	5.9
		kPa	91	82	92	90	68	58	59	60	56	58
	Pass	–	3+3	3+3	3+3	3+3	2+2	2+2	2+2	2+2	2+2	2+2
	Pipe size	mm	100	100	125	125	125	150	150	150	200	200
Power		V × Hz × ϕ	380 × 50 × 3									
Electric power	Vacuum pump	kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Refrigerant pump	kW	0.3×2	0.3×2	0.3×2	0.3×2	0.3×2	0.4×2	0.4×2	0.4×2	0.4×2	0.4×2
	Solution pump	kW	1.8×2	1.8×2	1.8×2	2.2×2	2.2×2	2.2×2	2.2×2	2.2×2	3.0×2	3.0×2
	Solution spray pump	kW	0.75×2	0.75×2	0.75×2	1.3×2	1.3×2	1.3×2	1.8×2	1.8×2	1.8×2	1.8×2
	Power capacity	kVA	13.3	13.3	13.3	17.2	17.2	17.2	19.0	19.0	21.6	21.6
Dimension	Length	mm	3800	3800	3850	3900	4800	4900	4900	5000	5000	5000
	Width	mm	2100	2150	2250	2300	2250	2300	2400	2500	2500	2600
	Height	mm	2700	2800	2850	2900	2850	2900	3000	3000	3100	3150
Weight	Max. shipping weight	ton	7.1	8.2	9.2	10.3	11.3	12.4	13.4	14.3	15.4	16.3
	Total shipping weight	ton	8.1	9.3	10.5	11.9	13.0	14.4	15.7	16.8	18.2	19.4
	Operating weight	ton	8.9	10.3	11.7	13.3	14.6	16.4	17.8	19.2	20.9	22.4

Note:
1. Maximum working pressure for chilled water, hot water, cooling water, source water side is 0.8MPaG. Higher working pressure is optional.
2. Minimum chilled water outlet temp. is 5℃, minimum cooling water inlet temp. is 15℃.
3. Cooling capacity application scope: 20%~100%,Chilled water and cooling water flow rate application scope: 60%~100%.
4. LiBr solution is placed separately, and the weight is included in the total weight.
5. Transportation: RFH015~RFH050 is integral transportation.

Performance data

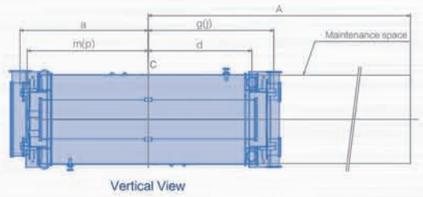
Hot water 98℃→88℃

	RFH(−)Y	N058	N066	N083	N100	N120	N135	N150	L166	L182	K200
Cooling capacity	USRt	580	661	830	1000	1200	1350	1500	1660	1820	2000
	kW	2040	2325	2919	3517	4220	4748	5276	5838	6401	7034
	10^4kcal/h	175	200	251	302	363	408	454	502	550	605
Chilled water Inlet/outlet temp.	℃	12→7									
Flow rate	m^3/h	350.8	399.8	502.0	604.8	725.8	816.5	907.2	1004.0	1100.7	1209.6
Pressure drop	mH_2O	12.7	12.0	12.5	12.9	12.4	12.6	13.1	5.9	5.5	6.8
	kPa	124	117	122	126	122	124	128	58	54	67
Pass	–	4	4	4	4	4	4	4	2	2	2
Pipe size	mm	200	250	250	250	300	300	300	300	350	350
Cooling water Inlet/outlet temp.	℃	32→38							31—38		
Flow rate	m^3/h	682.1	777.3	976.1	1176.0	1411.2	1587.6	1764.0	1673.3	1834.6	2016.0
Pressure drop	mH_2O	10.7	16.5	10.9	11.0	11.0	10.8	11.1	13.7	13.2	16.5
	kPa	105	162	107	108	108	106	108	134	130	162
Pass	–	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1
Pipe size	mm	300	300	350	400	400	450	450	450	500	500
Hot water Inlet/outlet temp.	℃	98→88									
Flow rate	t/h	233.9	266.5	334.7	403.2	483.8	544.3	604.8	669.3	733.8	806.4
Pressure drop	mH_2O	9.4	8.1	8.8	8.2	8.4	8.8	8.1	13.5	13.3	16.5
	kPa	92	79	86	80	83	87	79	132	130	162
Pass	–	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2
Pipe size	mm	150	200	200	250	250	250	300	300	300	300
Power	V × Hz × ϕ	380 × 50 × 3									
Electric power Vacuum pump	kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Refrigerant pump	kW	0.4×2	0.4×2	0.4×2	0.4×2	0.8×2	0.8×2	0.8×2	0.8×2	0.8×2	0.8×2
Solution pump	kW	3.0×2	3.0×2	3.0×2	3.7×2	3.7×2	3.7×2	3.7×2	4.5×2	4.5×2	4.5×2
Solution spray pump	kW	1.8×2	1.8×2	1.8×2	1.8×2	1.8×2	1.8×2	1.8×2	1.8×2	1.8×2	1.8×2
Power capacity	kVA	21.8	21.8	21.8	26.5	29.3	29.3	29.3	35.6	35.6	35.6
Dimension Length	mm	6850	6870	6930	6975	7045	7085	7085	7995	8090	8590
Width	mm	2145	2210	2460	2600	3030	3150	3360	3150	3400	3395
Height	mm	3280	3440	3720	3990	4160	4350	4360	4350	4360	4360
Weight Max. shipping weight	ton	19.6	21.2	24.5	20.2	24.4	26.7	28.7	29.4	31.7	33.7
Total shipping weight	ton	23.0	25.1	29.1	32.9	39.6	43.2	46.7	48.9	53.2	56.2
Operating weight	ton	27.0	29.7	34.9	39.7	48.0	52.8	57.2	59.7	65.1	68.7

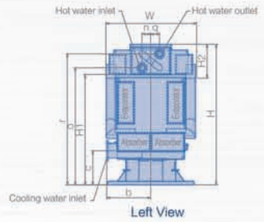
Note:
1. Maximum working pressure for chilled water, hot water, cooling water, source water side is 0.8MPaG. Higher working pressure is optional.
2. Minimum chilled water outlet temp. is 5℃, minimum cooling water inlet temp. is 15℃.
3. Cooling capacity application scope: 20%~100%,Chilled water and cooling water flow rate application scope: 60%~100%.
4. LiBr solution is placed separately, and the weight is included in the total weight.
5. Transportation: RFH058~RFH083 is integral transportation.RFH100 or above is split transportation.

RFH-Y
DIMENSION
DRAWING

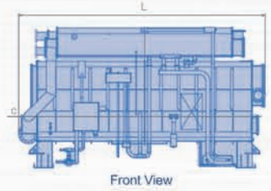
Outline drawing



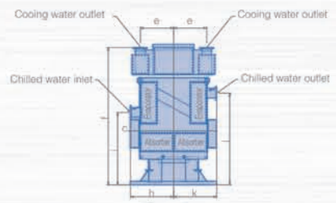
Vertical View



Left View



Front View

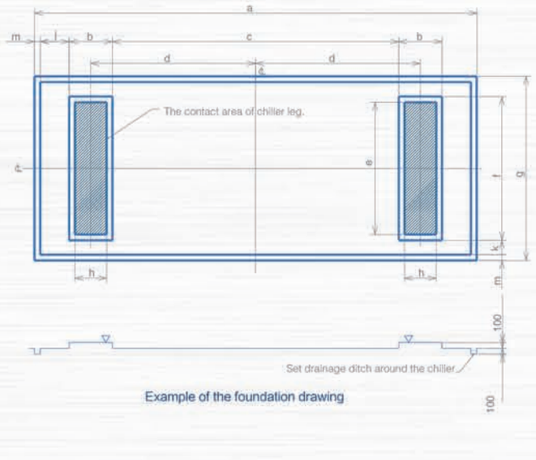


Right View

Unit：mm

Item	RFH(−)Y	N058	N066	N083	N100	N120	N135	N150	L166	L182	K200
Cooling water inlet	a	3240	3240	3252	3282	3282	3305	3305	3770	3790	4040
	b	1100	1110	1230	1250	1430	1480	1600	1480	1600	1600
	c	925	944	970	968	975	991	985	991	985	985
Cooing water outlet	d	2640	2642	2655	2655	2692	2717	2715	3256	3254	3459
	e	752	797	894	943	1088	1139	1244	1139	1244	1244
	f	3200	3350	3630	3900	4070	4270	4280	4270	4280	4280
Chilled water inlet	g	3220	3209	3213	3218	3235	3239	3235	3694	3710	3961
	h	1050	1100	1200	1225	1480	1480	1600	1480	1600	1600
	I	1808	1883	1980	2057	2107	2158	2160	2158	2160	2160
Chilled water outlet	j	3220	3209	3213	3218	3235	3239	3235	3694	3710	3961
	k	1050	1100	1200	1225	1480	1480	1600	1480	1600	1600
	l	2148	2263	2460	2606	2707	2825	2825	2825	2825	2825
Hot water inlet	m	3095	3095	3095	3095	3095	3095	3095	3640	3640	3845
	n	250	250	250	250	250	250	250	250	250	250
	o	3035	3190	3455	3700	3865	4035	4040	4035	4040	4040
Hot water outlet	p	3095	3095	3095	3095	3095	3095	3095	3640	3640	3845
	q	250	250	250	250	250	250	250	250	250	250
	r	3035	3190	3455	3700	3865	4035	4040	4035	4040	4040
Cut dimension(down)	H1	2540	2630	2950	3130	3210	3320	3320	3320	3320	3320
Cut dimension (up)	H2	900	925	990	1075	1080	1150	1170	1150	1170	1170
Total length	L	6850	6870	6930	6975	7045	7085	7085	7995	8090	8590
Total width	W	2145	2210	2460	2600	3030	3150	3360	3150	3400	3395
Total height	H	3280	3440	3720	3990	4160	4350	4360	4350	4360	4360
Maintenance space	A	9600	9600	9600	9600	9600	9600	9600	10700	10700	11450

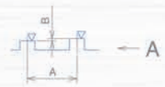
Foundation drawing



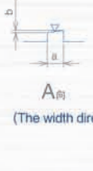
Example of the foundation drawing

Note:
Foundation manufacture precision
Making concrete foundation, surface flatness of the foundation should be within below limitations.

<b / a B / A ≤ 1 / 1000>



(The length direction of chiller)



(The width direction of chiller)

Chiller foundation dimension

Unit：mm

RFH(−)Y	N058	N066	N083	N100	N120	N135	N150	L166	L182	K200
a	7660	7660	7660	7660	7660	7660	7660	8570	8570	9070
b	750	750	750	750	750	750	750	750	750	750
c	4960	4960	4960	4960	4960	4960	4960	5870	5870	6370
d	2855	2855	2855	2855	2855	2855	2855	3310	3310	3560
e	2050	2200	2290	2450	2800	2900	3200	2900	3200	3200
f	2250	2400	2490	2650	3000	3100	3400	3100	3400	3400
g	2950	3100	3190	3350	3700	3800	4100	3800	4100	4100
h	550	550	550	550	550	550	550	550	550	550
j	500	500	500	500	500	500	500	500	500	500
k	250	250	250	250	250	250	250	250	250	250
m	100	100	100	100	100	100	100	100	100	100

RFH-Y

Reference value of water quality

In order to keep the chiller work effectively in long term, the water quality should be guaranteed. The data below show the reference value for chilled water and cooling water. During daily operating, please manage the water quality within the reference value.

The reference value is based on GB/T18431-2014, just for reference.

Item	Cooling W. System		Chilled W. system		Tendency	
	Circulating W.	Back up W.(≤20℃)	Circulating W.	Back up water	Corrosion	Scaling
PH[25℃]	6.5~8.0	6.0~8.0	6.8~8.0	6.8~8.0	—	—
Conductivity [25℃](μS/cm)	800	200	400	300	—	—
Cl^-(mgCl^-/L)	200	50	50	50	—	
SO_4^{2-}(mg/L)	200	50	50	50	—	
[PH4.8] (mg$CaCO_3$ /L)	100	50	50	50		—
(mg$CaCO_3$/L)	200	70	70	70		—
(mg$CaCO_3$/L)	150	50	50	50		—
(mgSiO_2/L)	50	30	30	30		—

INSTALLATION INSTRUCTION

Foundation

01. The chiller operating weight should be evenly distributed on the contact surface of foundation. (Please refer to dimension drawing and foundation drawing)
02. Foundation can be fixed with anchor bolts. Anchor bolts and metal gaskets are optional.
03. For the foundation level precision, please refer to the foundation drawing.
04. Foundation should be waterproof, better for chiller maintenance.
05. Set the water drain gouge around the chiller.

Transportation

01. Select right size lifting crane according to the chiller weight.
02. During transportation, the chiller should be lifted up/down horizontally.
03. Please avoid collision with other objects during lifting.
04. Especially the chiller front side, where there are a lot of pipes and meters. Be sure there is no damage or collision.
05. For split lifting, please lift the part which will be installed further to the entrance.

Installation

01. Select well-ventilated place as machine room, ventilation device should be installed in the machine room.
02. Do not select place where is too moist or dusty, that may cause electrical failure for the chiller, so please avoid that.
03. Keep the plant room temperature above 0℃, if less than 0℃, chiller need be specially designed;
04. Keep the plant room temperature less than 40℃;
05. Pay attention to the machine room lighting, convenient for regular monitoring and maintenance checking;
06. chiller should be installed at place easy to drain water;
07. The chiller levelness, the shell length direction and width direction, all should be within 1/1000;
08. During installation, use the steel gasket to look for a horizontal vertical degree, if anchor bolts to be installed, the anchor bolts hole should be filled by concrete to fix the anchor bolts.
09. About anchor bolt installation, please refer to foundation drawing.
10. For chiller dimension drawing, the tolerance is +20mm, -10mm;
11. Please refer to the dimension drawing and foundation drawing, and make sure there is enough space around the chiller for maintenance (At least 1m around and 0.2m on the top) and tube drawing ;

RFH-Y

INSTALLATION INSTRUCTION

Chilled W. & Cooling W. pipe work

1. Please refer to the outline drawing for the cooling/chilled water inlet pipe direction and size. For the flange connection specifications, please refer to the dimension drawing and specification.
2. Cooling water piping between absorber and condenser will be installed in Ebara factory.
3. For chilled water pipe direction, please refer to outline drawing.
4. During designing the installation position of chilled/heating water pump, cooling water pump, expansion tank, please consider the precondition of static water pressure and pump water head, the pressure to both chiller/heating water and cooling water cannot be over the Max. Working pressure.
5. To keep the water flowrate stable, each chiller should be installed with specialized chilled water pump and cooling water pump.
6. A 10 mesh strainer is requested for both chilled water and cooling water inlet.
7. Please install pressure gages and thermometers at the chilled water inlet and cooling water inlet. And, in order to ensure the control stability, the chilled circle water storage volume should be at least 5 times than the volume of one minute circulation.
8. For chilled water and cooling water piping, please set vent valve above absorption chiller water chamber, set drain valve at lowest point.
9. There are air release connection plinths in the upper of evaporator and condenser water box (Rc3/4 internal thread). Install the on/off valve to use it, and pipe it to the water drain gouge.
10. There are water release connection plinths under the evaporator and condenser water box(Rc3/4 internal thread). Install the on/off valve to use it, and pipe it to the water drain gouge.
11. If the cooling water temp. is below 15℃, please control the cooling water temp. E.g., use the cooling tower fan on-off to control cooling water temp., please use the cooling tower fan interlock function through chiller control panel.
12. Please install the cooling water drainage regulation valve at the cooling tower inlet piping.
13. Prepare water source for tube cleaning
14. No load-bearing on the chiller water flange connections, install support frame under them.
15. Install soft connecting pipe for the water connection point.
16. When water box piping at front side, in order to open the water box cover, please install short bent tube at the connection point.
17. When testing the water pressure of chilled/heating water and cooling water, please make sure the testing pressure is less than the stamped testing pressure on the water box flange, furthermore, if use pneumatic pressure test at that time, it will be very dangerous if the broken fragment fly around.

INSTALLATION INSTRUCTION

Hot W. pipe work

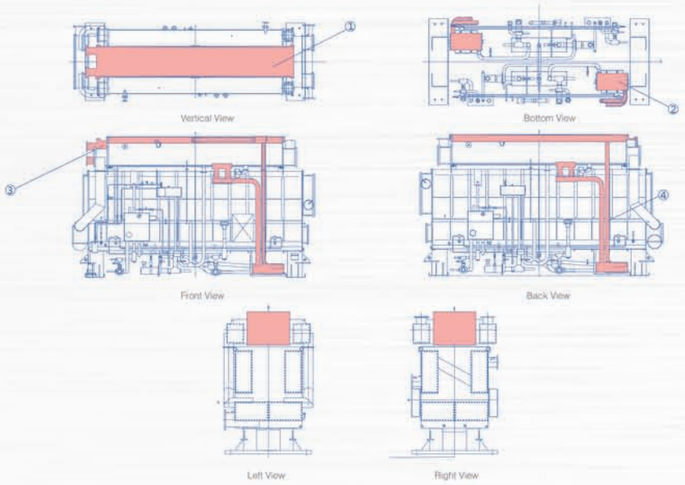
01.Please refer to the outline drawing for the hot water inlet pipe direction and size.
02.During designing the installation position of hot water pump, please consider the precondition of static water pressure and pump water head, the pressure to hot water cannot be over the Max. Working pressure.
03.A 10 mesh strainer is requested for hot water inlet.
04.Install at least 1m straight pipe before or after the hot water control valve, the distance from hot water control valve to chiller generator should be above 1.5 m.
05.The hot water control valve size depends on steam inlet pressure and hot water flow rate, if the hot water control valve diameter is smaller than the hot water pipe diameter, then variable diameter pipe should be installed.
06.The by-pass valve for hot water control valve is recommended, better for maintenance.
07.For the hot water supply system, please set main valve, which should be off during chiller power off period, if the chiller is remote controlled and steam main valve is still open during the chiller power off period, then hot water isolating valve should be installed.(optional part)
08.For the Generator inlet flange, please consider to changes after the hot water supply (The heat insulation layer should be dismountable)
09.The generator flange should be dismountable, it can be fastened after the hot water supply.
10.As to the heat deformation of flange for steam please consider to use the heat deformation pipe at the flange connection to eliminate the thermal stress.
11.In the construction of the chiller installation site, please wiring between the hot water control valve and control panel
12.There are air release connection plinths in the upper of generator water box (Rc3/4 internal thread). Install the on/off valve to use it, and pipe it to the water drain gouge.
13.There are water release connection plinths under the generator water box (Rc3/4 internal thread). Install the on/off valve to use it, and pipe it to the water drain gouge.
14.For the water quality standard, please refer to reference sheet of water quality, anything special need to handled, please inform Ebara.



RFH-Y

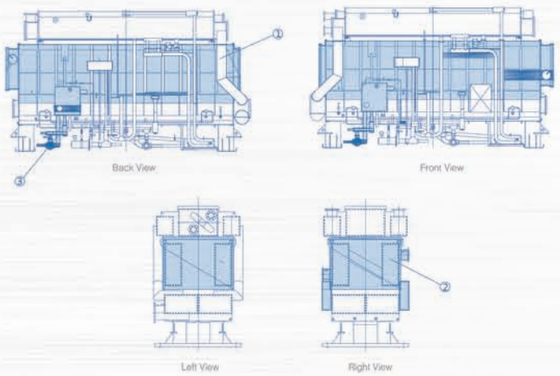
INSTALLATION INSTRUCTION

Heat installation



Note ①Generator tube plate ②Solution heat exchanger ③Generator water box & water box cover ④solution piping
Thermal insulation material : glass fiber, high grade glass cotton material or the same series of product.

Cold installation



Note ① Evaporator ② Evaporator water box & water box cover ③ Refrigerant piping
Thermal insulation material: glass fiber, high grade glass cotton material or the same series of product

Job References