



EBARA

CR8113EA

HOT WATER DRIVEN DUAL STAGE ABSORPTION CHILLERS

MODEL RFHA SERIES

LOW TEMPERATURE HOT WATER

*"Model 000" in this catalog is our model code.



MODEL: RFHA is;

The Dual Cycle Single Effect Absorption Chiller is able to Easy to apply for Co-Generation purpose, both Gas Turbine

FEATURES

1. Large Temperature difference hot water is applicable. (by Dual Absorption Cycle)

The dual absorption cycle is applied for Model RFHA series Single effect absorption chiller. Both hot water and chilled water are flowed counter, then able to operate large temperature difference condition.

2. Use Advanced Microprocessor

Use advanced Microprocessor controls, which has many features as listed below.

- Several operating conditions are indicated at 7 segment LED display panel.
- Confirm Failure archival record
- Indicate Precaution Number on the 7 segment LED display to prevent failure.
- Interlocking feature: chilled water pump, cooling water pump & cooling tower fan

3. Preventing Failure

Many cycle temperatures, pressures and other data are collected to maintain safety operation and protect failure.

4. Many Anti-Crystallization Protection

Overflow piping, solution mixing, dual absorption cycle and other safety devices protect crystallization of LiBr solution.

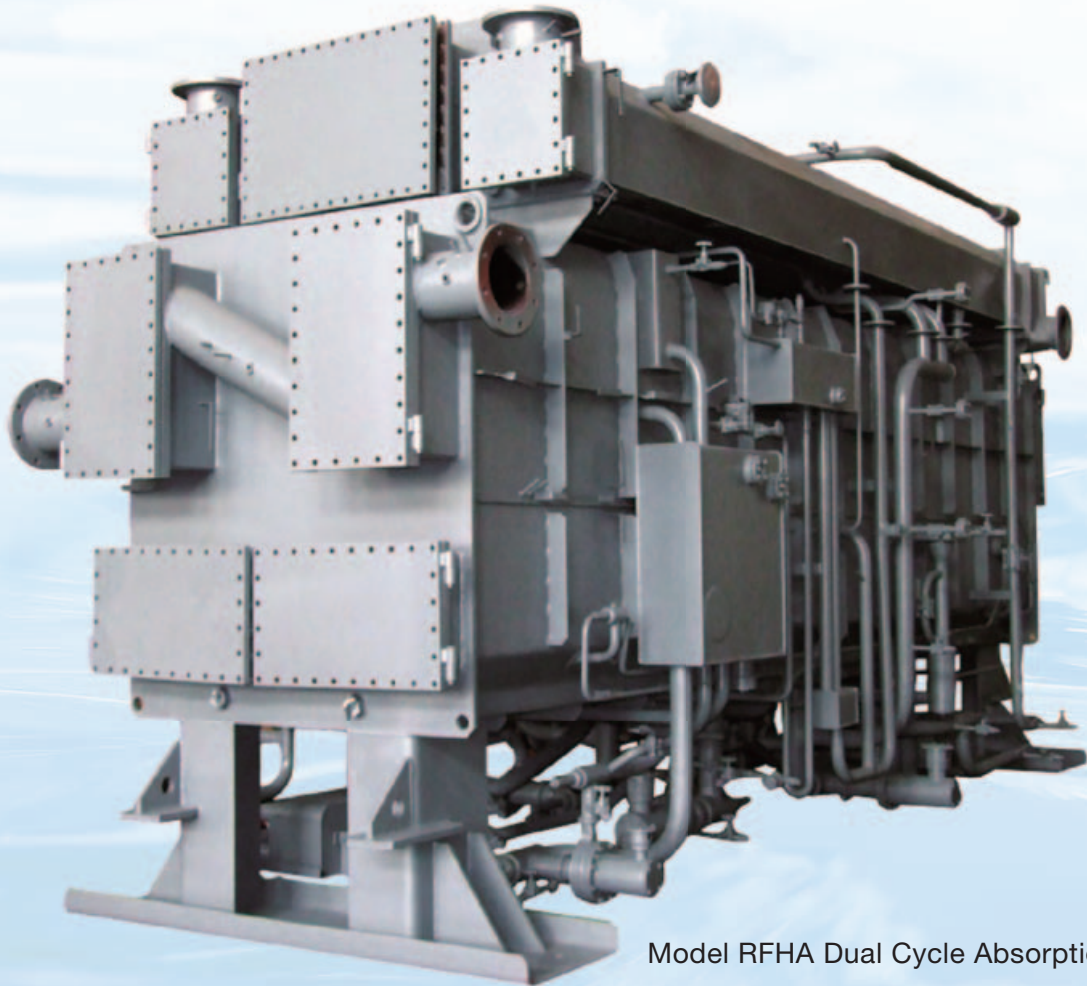
5. Automatic Purge unit

While the chiller is running, the ejector uses the discharge pressure of the solution pump to continuously feed non-condensable (Hydrogen is generated in the chiller and leaked air from out side) to the purge tank, thus keeping the inside of the chiller clean. Accumulated non-condensable gas in the tank is automatically discharged to outside by the auto purge unit.

6. Marine Type water boxes as standard

To facilitate tube inspection and cleaning, a marine water box is provided as standard design for both chilled and cooling water circuit. Also cover of the water box is hinged so that tubes can be cleaned easily at site.

**operate under Large Hot Water Temperature Difference.
and Diesel Engine application.**



Model RFHA Dual Cycle Absorption Chiller

7. Preventing Over Cooling of Hot water

The hot water valve is properly set for slow start to prevent over cooling of hot water temperature at cold start, Also, the operation system of the energy source avoid problems.

8. Instantaneous power failure recovery circuit as standard

As standard, the chiller contains an instantaneous power failure recovery circuit. An optional failuar protection circuit is also available to restart the chiller within 10 minutes power failure. The circuit enables the chiller to start automatically once power is recovered. However, this requires equipment to cut off the steam at power failure. When a power failure lasts longer than 10 minutes, a safety shutdown functions automatically.

MODEL: RFHA

SPECIFICATION SHEET (98°C → 88°C)

Model		RFHA	040	058	066	083	100	120	135	150	166	182	200
Capacity		kW	1,407	2,040	2,325	2,919	3,517	4,220	4,747	5,275	5,838	6,400	7,033
		USRt	400	580	661	830	1,000	1,200	1,350	1,500	1,660	1,820	2,000
		Mcal/h	1,210	1,754	1,999	2,510	3,024	3,629	4,082	4,536	5,020	5,504	6,048
Chilled Water	Temperature (in → out)	12 → 7											
	Flow Rate	m ³ /h	241.9	350.8	399.8	502.0	604.8	725.8	816.5	907.2	1,004.0	1,100.7	1,209.6
	Pressure Loss	kPa	83	124	118	123	126	122	123	128	58	54	67
		mAq	8.5	12.7	12	12.5	12.9	12.4	12.6	13.1	5.9	5.5	6.8
	Pass	-	2+2										
Connection Size	mm	200	200	250	250	250	300	300	300	300	350	350	
Cooling Water	Temperature (in → out)	32 → 37									31 → 38		
	Flow Rate	m ³ /h	470.4	662.1	777.3	976.1	1,176.0	1,411.2	1,587.8	1,764.0	1,673.3	1,843.6	2,016.0
	Pressure Loss	kPa	49	105	162	107	108	108	106	108	134	130	162
		mAq	5.0	10.7	16.5	10.9	11.0	11.0	10.8	11.1	13.7	13.3	16.5
	Pass	-	2+1										
Connection Size	mm	200	300	300	350	400	400	450	450	450	500	500	
Hot Water	Temperature (in → out)	98 → 88											
	Flow Rate	m ³ /h	161.3	233.9	266.5	334.7	403.2	483.8	544.3	604.8	669.3	733.8	806.4
	Pressure Loss	kPa	25	92	79	86	80	83	87	79	132	130	162
		mAq	2.5	9.4	8.1	8.8	8.2	8.5	8.9	8.1	13.5	13.3	16.5
	Pass	-	2+2										
Connection Size	mm	150	150	200	200	250	250	250	300	300	300	300	
Power	V × Hz × φ	380 × 50 × 3											
Motor Power	Refrigerant Pump	kW × sets	0.4 × 2	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 × sets	3.0 × 2	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
	Spray Pump	kW × sets	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	1.8 × 2
	Vacuum Pump	kW	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Power Capacity	kVA	21.8	21.8	21.8	21.8	26.5	29.3	29.3	29.3	35.6	35.6	35.6
Dimension & Weight	Length	mm	5,850	6,850	6,870	6,930	6,975	7,045	7,085	7,085	7,995	8,090	8,590
	Width	mm	2,145	2,145	2,210	2,460	2,600	3,030	3,150	3,360	3,150	3,400	3,395
	Height	mm	3,280	3,280	3,440	3,720	3,990	4,160	4,350	4,360	4,350	4,360	4,360
	Max Shipping Weight	t	15	16.6	21.2	24.5	20.2	24.4	26.7	28.7	29.4	31.7	33.7
	Total Shipping Weight	t	21	23.0	25.1	29.1	32.9	39.6	43.2	46.7	48.9	53.2	56.2
	Operation Weight	t	24.5	27.0	29.7	34.9	39.7	48.0	52.8	57.2	59.7	65.1	68.7

Notes:

- Design working pressure for each water box (Evaporator/Absorber/Condenser & Generator) is 0.78MPa gauge.
- Chilled water lowest leaving temperature is 5°C.
- Chiller can be operating down to 15°C cooling water from design condition.
- Capacity control range is from 100% down to 20% of full load.
- If valvule chilled water flow control is required, we could accept from 100% to 60%, because of avoiding freezing problem.
- From Model RFHA 040 to 083, one piece shipment is standard. Over them, two pieces shipment is standard.
- LiBr solution accessories are included in total shipping weight.

Quality Standard for Cooling Water

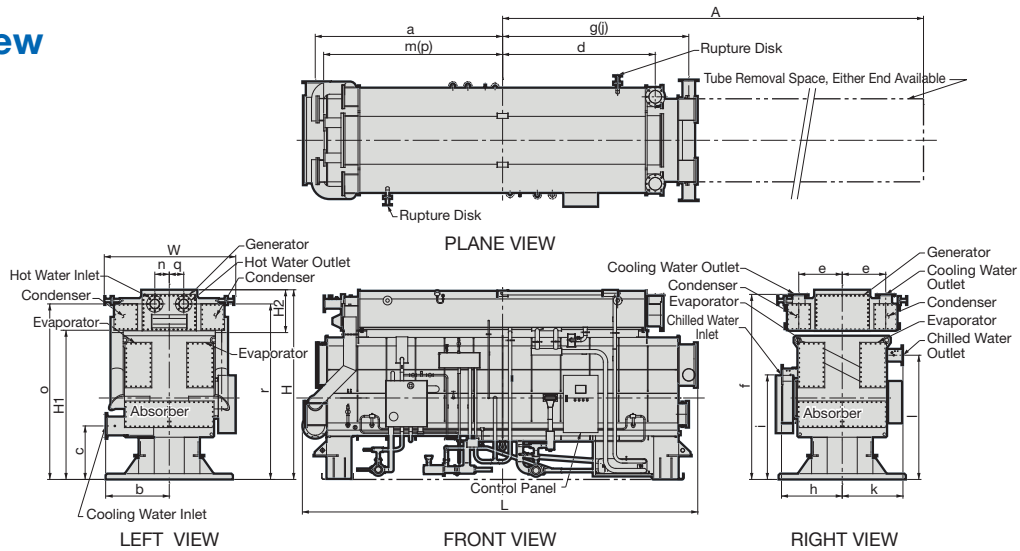
For efficient operation of the unit for a long term, the water quality control is necessary. The following table shows a quality guideline of the cooling water complied with Japan Refrigeration and Air conditioning Association. (JRA GL-02-1994)

Item	Cooling water system			Tendencies	
	Circulating water			Corrosion	Scale/Slime
	Circulating water	Make-up water			
Standard items	pH (25°C)	6.5~8.2	6.0~8.0	○	○
	Electric conductivity (25°C) (mS/m)	80 or less	30 or less	○	○
	Chloride ions (mg-Cl/L)	200 or less	50 or less	○	
	Sulfate ions (mg-SO ₄ ²⁻ /L)	200 or less	50 or less	○	
	Acid consumption (pH4.8) (mg-CaCO ₃ /L)	100 or less	50 or less		○
	Total hardness (mg-CaCO ₃ /L)	200 or less	70 or less		○
	Calcium hardness (mg-CaCO ₃ /L)	150 or less	50 or less		○
	Ionized silica (mg-SiO ₂ /L)	50 or less	30 or less		○

Note: As the JRA standard, other items are also listed for your reference.

MODEL: RFHA

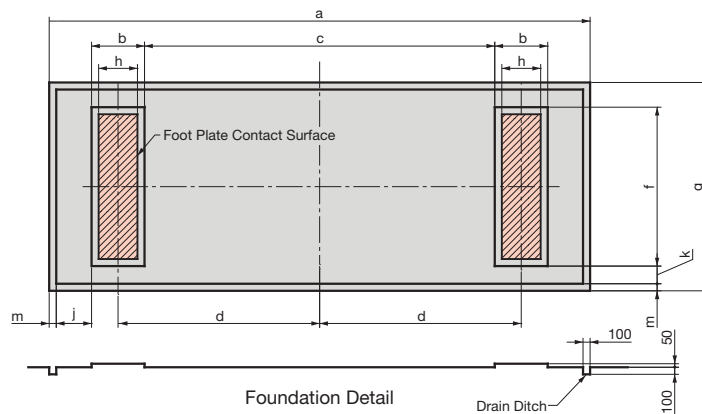
General View



Unit: mm

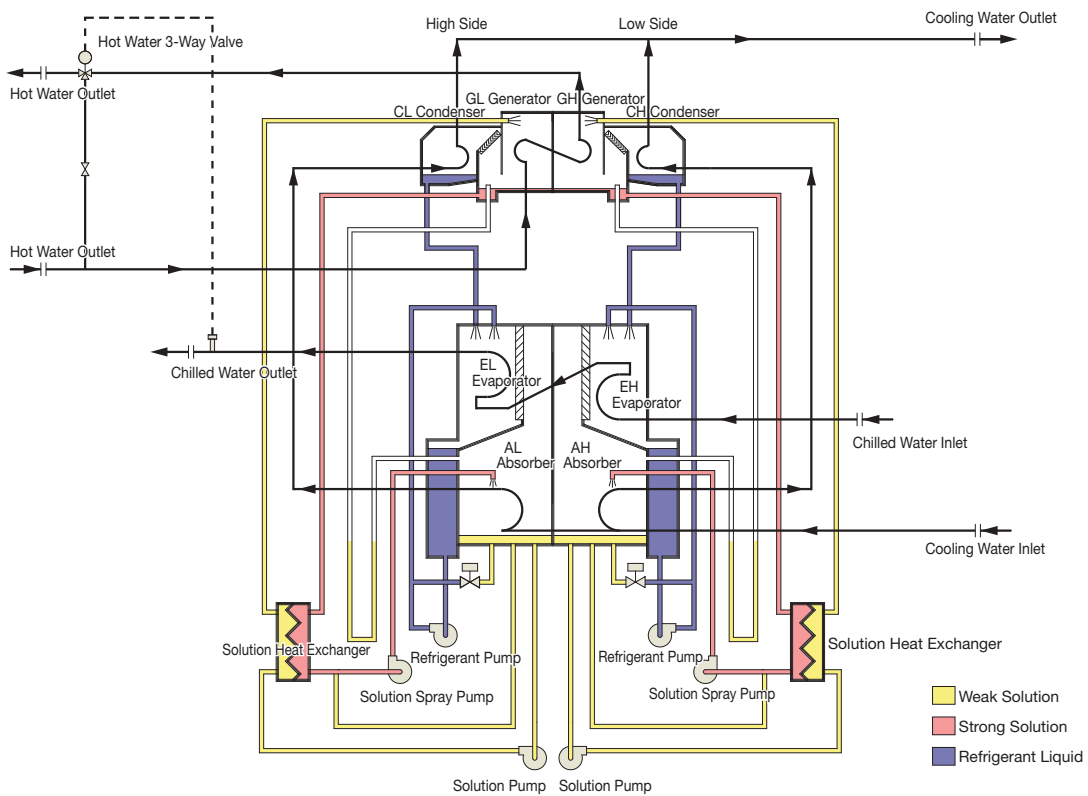
Model	RFHA	040	058	066	083	100	120	135	150	166	182	200
Cooling water Entering	a	2,740	3,240	3,240	3,252	3,282	3,282	3,305	3,305	3,770	3,790	4,040
	b	1,100	1,100	1,110	1,230	1,250	1,430	1,480	1,600	1,480	1,600	1,600
	c	925	925	944	970	968	975	991	985	991	985	985
Cooling water Leaving	d	2,140	2,640	2,642	2,655	2,655	2,692	2,717	2,715	3,256	3,254	3,459
	e	752	752	797	894	943	1,088	1,139	1,244	1,139	1,244	1,244
	f	3,200	3,200	3,350	3,630	3,900	4,070	4,270	4,280	4,270	4,280	4,280
Chilled water Entering	g	2,720	3,220	3,209	3,213	3,218	3,235	3,239	3,235	3,694	3,710	3,961
	h	1,050	1,050	1,100	1,200	1,225	1,480	1,480	1,600	1,480	1,600	1,600
	i	1,808	1,808	1,883	1,980	2,057	2,107	2,158	2,160	2,158	2,160	2,160
Chilled water Leaving	j	2,720	3,220	3,209	3,213	3,218	3,235	3,239	3,235	3,694	3,710	3,961
	k	1,050	1,050	1,100	1,200	1,225	1,480	1,480	1,600	1,480	1,600	1,600
	l	2,148	2,148	2,263	2,460	2,606	2,707	2,825	2,825	2,825	2,825	2,825
Hot water Entering	m	2,595	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,640	3,640	3,845
	n	250	250	250	250	250	250	250	250	250	250	250
	o	3,035	3,035	3,190	3,455	3,700	3,865	4,035	4,040	4,035	4,040	4,040
Hot water Leaving	p	2,595	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,640	3,640	3,845
	q	250	250	250	250	250	250	250	250	250	250	250
	r	3,035	3,035	3,190	3,455	3,700	3,865	4,035	4,040	4,035	4,040	4,040
Separate height (Lower)	H1	2,540	2,540	2,630	2,950	3,130	3,210	3,320	3,320	3,320	3,320	3,320
Separate height (Upper)	H2	900	900	925	990	1,075	1,080	1,150	1,170	1,150	1,170	1,170
Dimension	L	5,850	6,850	6,870	6,930	6,975	7,045	7,085	7,085	7,995	8,090	8,500
	W	2,145	2,145	2,210	2,460	2,600	3,030	3,150	3,360	3,150	3,400	3,395
	H	3,280	3,280	3,440	3,720	3,990	4,160	4,360	4,360	4,360	4,360	4,360
Tube Removal Space	A	8,400	9,600	9,600	9,600	9,600	9,600	9,600	9,600	10,700	10,700	11,450

Foundation



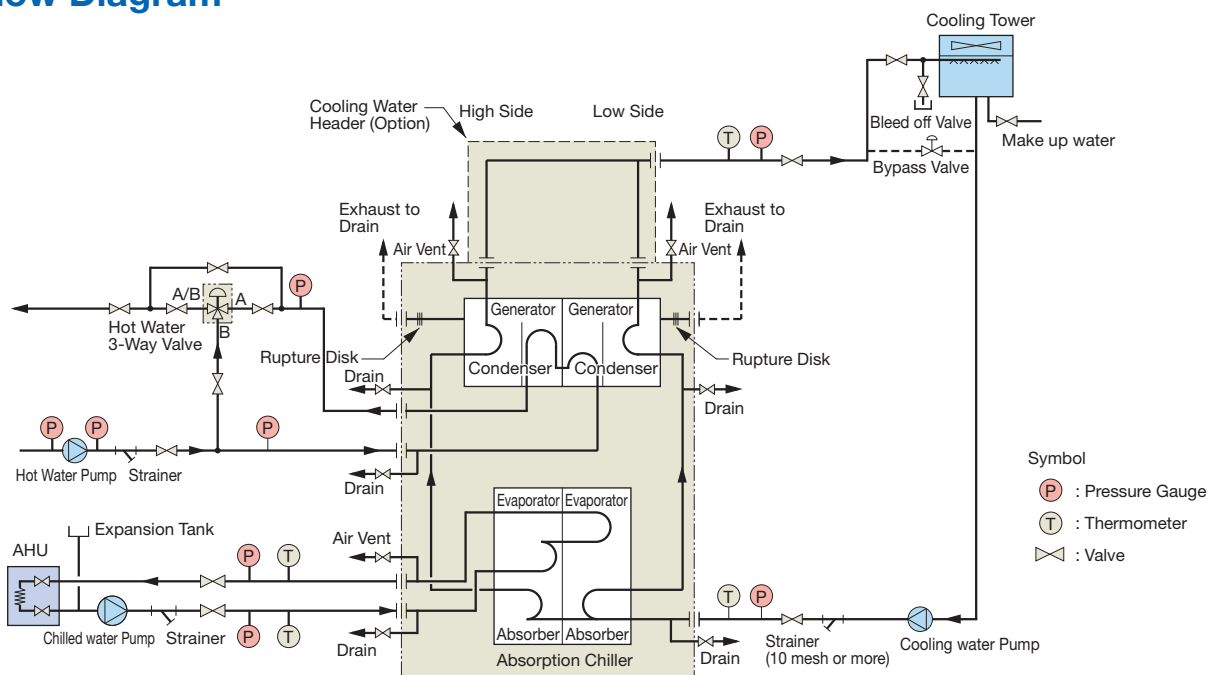
Model RFHA	040	058	066	083	100	120	135	150	166	182	200
a	6,660	7,660	7,660	7,660	7,660	7,660	7,660	7,660	8,570	8,570	9,070
b	750	750	750	750	750	750	750	750	750	750	750
c	3,960	4,960	4,960	4,960	4,960	4,960	4,960	4,960	5,870	5,870	6,370
d	2,355	2,855	2,855	2,855	2,855	2,855	2,855	2,855	3,310	3,310	3,560
e	2,050	2,050	2,200	2,290	2,450	2,800	2,900	3,200	2,900	3,200	3,200
f	2,250	2,250	2,400	2,400	2,650	3,000	3,100	3,400	3,100	3,400	3,400
g	2,950	2,950	3,100	3,190	3,350	3,700	3,800	4,100	3,800	4,100	4,100
h	550	550	550	550	550	550	550	550	550	550	550
j	50	500	500	500	500	500	500	500	500	500	500
k	250	250	250	250	250	250	250	250	250	250	250
m	100	100	100	100	100	100	100	100	100	100	100

Refrigeration Cycle



Model RFHA chiller consists of two sets of single effect chiller. Cooling water cools both solution in two absorbers and cools refrigerant in two condensers. Chilled water is chilled by evaporated refrigerant in high side and then low side series. Hot water to heat the solution in the both generators and separate refrigerant from weak solution and then solution is concentrated. Chilled water and hot water is flowed counter way. Then each thermal head is reduced for better performance. Strong solution is return to absorber and absorbed refrigerant, which is evaporated in the evaporators, in the absorbers. The chilled water is chilled by this evaporated refrigerant.

Piping Flow Diagram



MODEL: RFHA

Scope of Supply

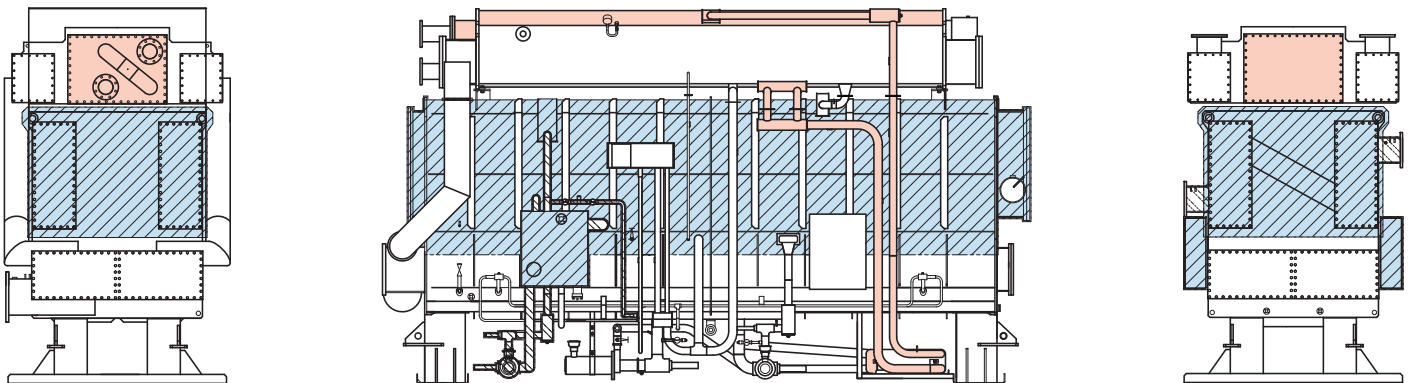
Supply Portion: ○ : Ebara × : Purchaser

Item	Scope of Supply	Remarks	Item	Scope of Supply	Remarks
Chiller	○		External pipework	×	Companion-flanges not included.
Control panel	○		External wiring	×	Interlock wiring not included.
System wiring and pipework	○	Connecting piping between absorber and condenser is not required.	Final coat of paint on chiller	×	
Absorber solution and refrigerant	○	Amount for initial charging	Insulation work for chiller	×	
Factory test	○	Airtightness test only	Factory witnessed test	×	
Transportation	○	Tie point is FOB Yokohama or Tokyo port	Cooling water temperature control	×	(Note 2)
			Thermometers, pressure gauges	×	
Supervision of installation at site	×	(as option) (Note 1)	Flow meter	×	
Fixing anchor bolts	×		Drain valve, air vent valve	×	
Protection during transportation	×		Anchor bolts	×	
Disposal of packing materials	×		Instruction manual	○	Three copies
Nitrogen gas for storage	×	(Note 3)	Fuses	○	Spares
Commissioning Supervision	×	(as option) (Note 1)			
Foundation work	×				

Notes:

1. Please be sure to supply water, electricity, gas and consumables required for installation, test operation and adjustment at supervision.
2. If the temperature of the entering cooling water falls down to 15°C or lower, the temperature of the cooling water must be controlled. The ON-OFF control circuit for the cooling tower fan is provided as standard scope of supply (including thermal sensor).
3. N₂ gas is charged in the chiller before shipment. During storage at site, N₂ gas pressure shall be well maintained by purchaser.

 Cold Insulation  Hot Insulation





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