



SUPER ABSORPTION



16TJ 11-53

Nominal cooling capacity 352-2461 kW

The Carrier Corporation has more than 100 years experience in providing HVAC systems and equipment around the world. Sanyo is a leading manufacturer in the field of high-efficiency absorption chillers. Carrier-Sanyo absorption chillers, produced by Sanyo for Carrier, provide a unique choice of models for all absorption chiller applications.

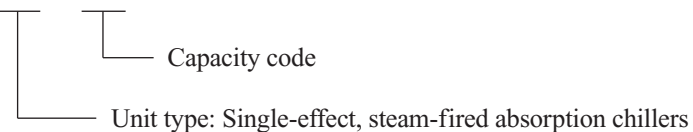
Features

- The Carrier-Sanyo 16TJ single-effect absorption chillers are designed for cooling applications where low-pressure steam is available as waste heat.
- They can tie into district steam systems.
- Carrier-Sanyo absorption chillers allow diversification of critical cooling requirements. Critical cooling loads are met **with minimal electrical power input.**
- They allow smaller emergency generators compared to an electrical driven chiller.
- The units are ozone-safe and CFC-free. Cooling requirements are met without chlorine-based refrigerants.
- They reduce the contribution to global warming and minimize the global impact by greatly reducing electricity consumption and production of greenhouse gases.
- The solution inhibitor has no impact on the environment.
- An absorption chiller does not utilize a large motor-compressor, and this leads to quiet, vibration-free operation.
- The use of high-efficiency heat transfer surfaces has reduced the space required for installation of the absorption chiller, resulting in a smaller footprint.

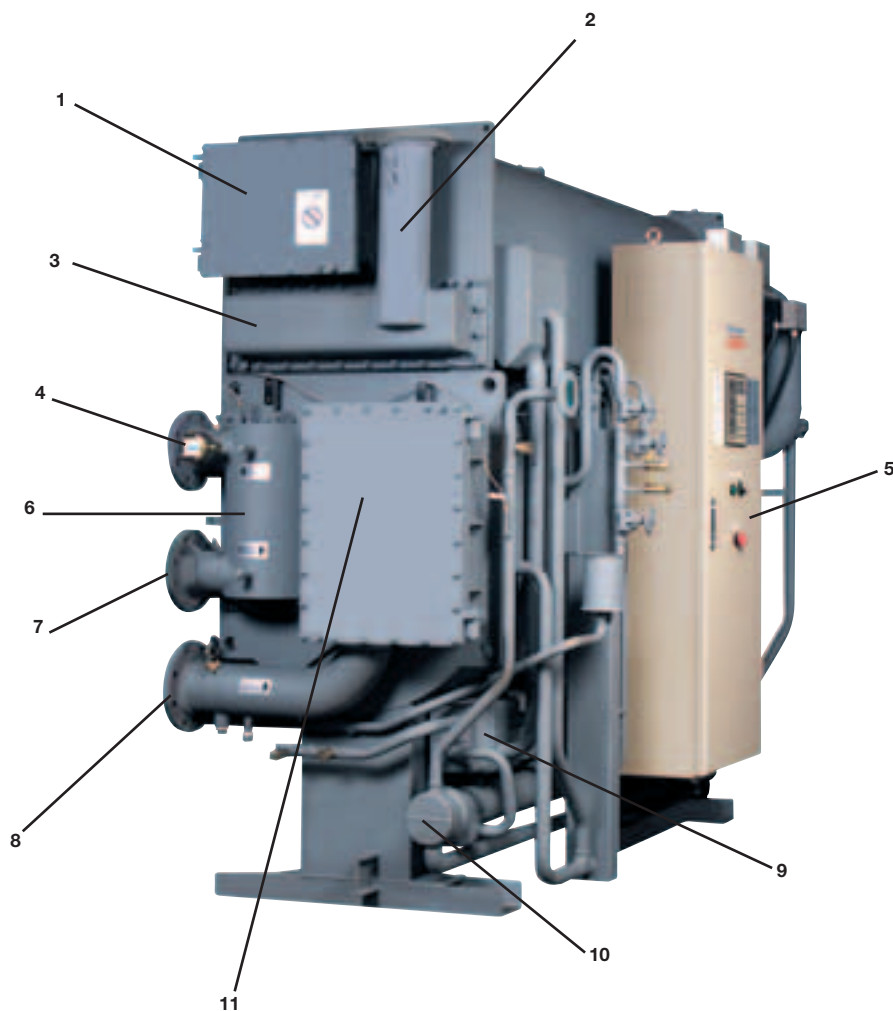
Carrier-Sanyo is the industry leader in compact absorption units.

Nomenclature

16TJ - 11



Component identification



Legend

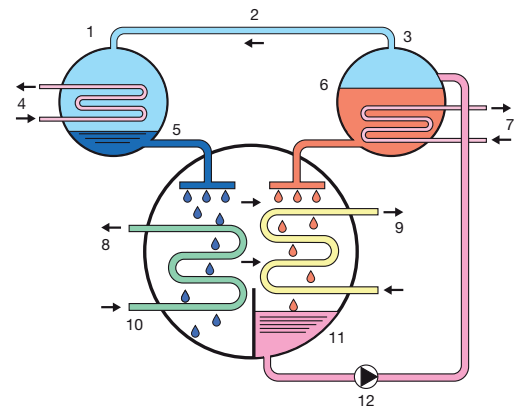
- 1. Condenser
- 2. Steam inlet
- 3. Generator
- 4. Chilled-water outlet
- 5. Control panel
- 6. Evaporator
- 7. Chilled-water inlet
- 8. Cooling water inlet
- 9. Heat exchanger
- 10. Heat reclaimer
- 11. Absorber

The absorption cycle

The absorption cooling cycle, like the mechanical vapour compression refrigeration cycle, utilizes the latent heat of evaporation of a refrigerant to remove heat from the entering chilled water. Vapour compression refrigeration systems use a chlorine-based refrigerant and a compressor to transport the refrigerant vapour to be condensed in the condenser. The absorption cycle, however, uses water as the refrigerant and an absorbent lithium bromide solution to absorb the vaporized refrigerant. Heat is then applied to the solution to release the refrigerant vapour from the absorbent. The refrigerant vapour is then condensed in the condenser.

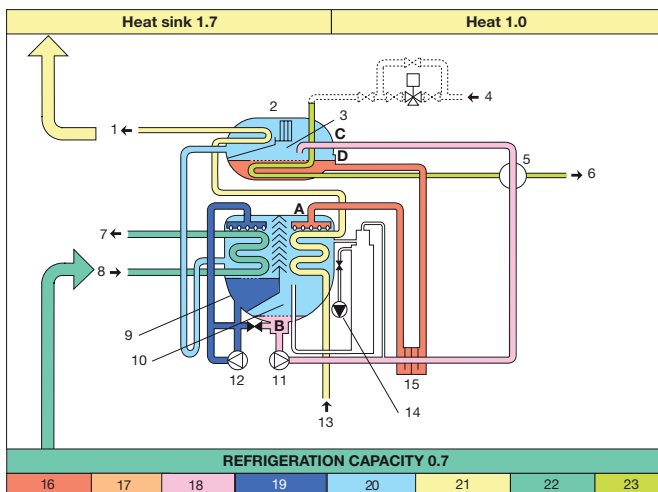
The basic single-effect absorption cycle (see Figure 1) includes generator, condenser, evaporator and absorber with refrigerant (liquid) and lithium bromide as the working solutions. The generator utilizes a heat source (burner, steam or hot water) to vaporize the diluted lithium bromide solution. The water vapour that is released travels to the condenser where it is condensed back into a liquid, transferring the heat to the cooling tower water. Once condensed, the liquid refrigerant is distributed over the evaporator tubes, removing the heat from the chilled water and vaporizing the liquid refrigerant. The concentrated lithium bromide solution from the generator passes into the absorber, absorbs the refrigerant vapour solution from the evaporator and dilutes itself. The diluted lithium bromide solution is then pumped back to the generator where the cycle is started again.

Figure 1 - Simplified absorption cycle

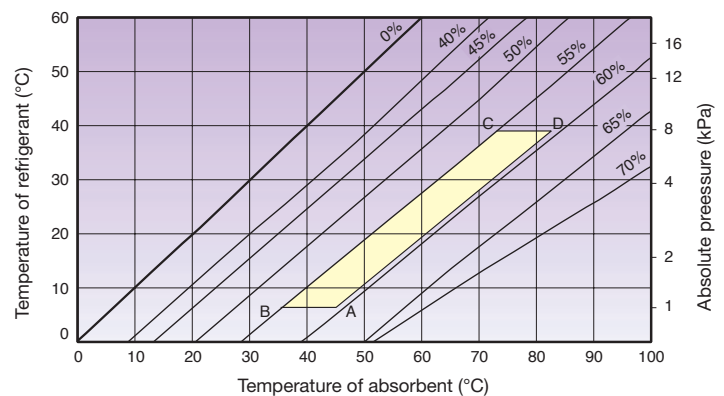


- Legend**
1. Condenser
 2. Refrigerant vapour
 3. Generator
 4. Cooling water
 5. Liquid refrigerant
 6. Concentrated solution
 7. Heat source
 8. Chilled water
 9. Cooling water
 10. Evaporator
 11. Absorber
 12. Absorbent pump

Cooling cycle schematic



- Legend**
1. Cooling water outlet
 2. Condenser
 3. Generator
 4. Steam inlet
 5. Condensate drain heat exchanger
 6. Condensate outlet
 7. Chilled water outlet
 8. Chilled water inlet
 9. Evaporator
 10. Absorber
 11. Pump
 12. Absorbent pump
 13. Cooling water inlet
 14. Purge pump
 15. Heat exchanger
 16. Concentrated solution
 17. Intermediate solution
 18. Diluted solution
 19. Liquid solution
 20. Refrigerant vapour
 21. Cooling water
 22. Chilled water
 23. Steam



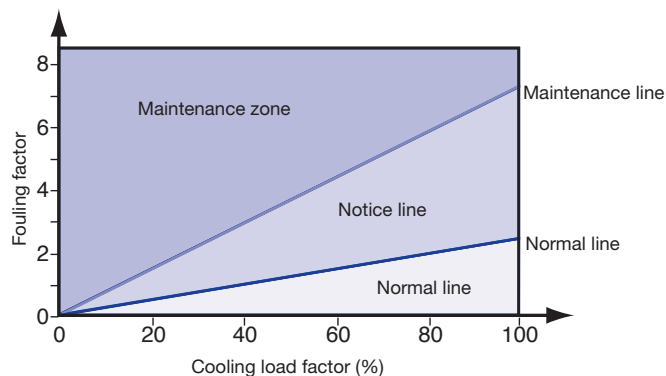
Chiller features

Expert self-diagnosis function

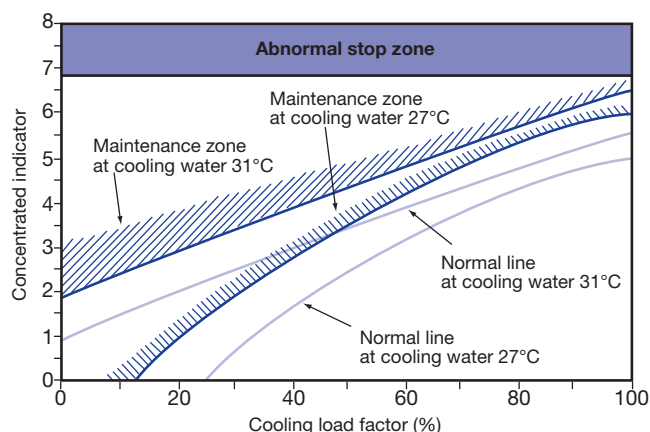
- The expert function is provided to monitor operating conditions, predict chiller information and maintain stable operation.

Predictive maintenance information

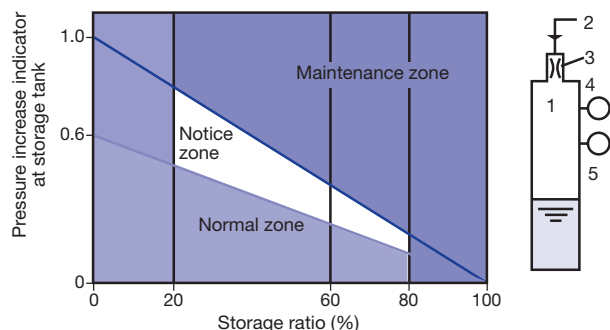
Graph 1 - Fouling of heat transfer tubes in cooling water system



Graph 2 - Trend of absorbent concentration



Graph 3 - Vacuum condition monitoring



Legend

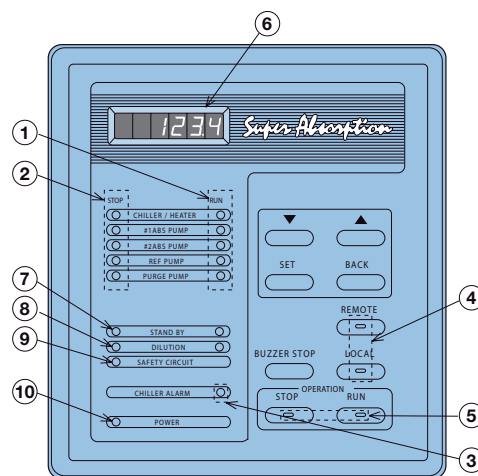
1. Storage tank
2. Diluted solution
3. Purge nozzle
4. Pd cell
5. Pressure sensor

Carrier-Sanyo control system

- The Carrier-Sanyo control system surpasses other proportional only control systems available today. The digital PID (proportional plus integral plus derivative) control maximizes unit performance by maintaining a ± 0.5 K variance in leaving chilled-water temperature from the setpoint. Proportional controls can typically only maintain a ± 1 K variance from the setpoint. The controller's innovative design also incorporates the ability to start and stop the system chilled and cooling water pumps. During shutdown these pumps are sequenced to ensure a complete dilution cycle.
- The leaving chilled-water temperature is measured every five seconds and steam input is changed according to the gradient of the leaving chilled-water temperature curve. System temperatures, setpoints, and operational records are displayed along with indicator lights for the chiller and pumps.
- The Carrier-Sanyo control system offers its users self-diagnostics by constantly monitoring the chiller status and will automatically shut the chiller down should a fault occur. The cause of shutdown will be retained in the memory and can be displayed for immediate operator review. The controller's memory will also retain and display the cause of the last three system fault conditions. This method of retaining fault conditions is extremely useful for maintaining an accurate record of unit performance and fault history.

Display and control board

Figure 2 - Indication lights



Legend

Name	LED colour
1. Operation indication light	Green
2. Stop indication light	Orange
3. Alarm indication light	Red
4. Remote/local select button with LED	Green
5. Operation select button with LED	Green
6. Data display	7 segment LED (red)
7. Stand-by indication light	Green
8. Dilution indication light	Green
9. Safety circuit indication light	Green
10. Power indication light	Orange
GL*. Purge indication light	Green
43P*. Purge pump on-off switch	
43ES*. Emergency stop switch	

* On the control panel door, see p.16

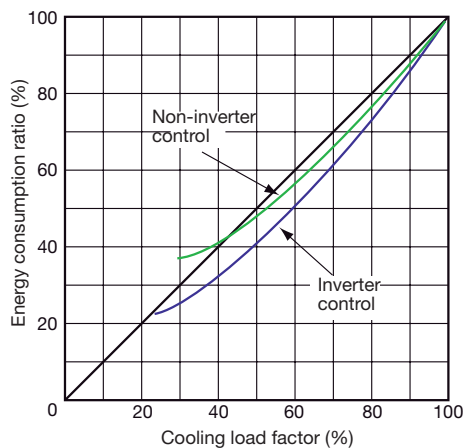
Fast digital PID control

- The introduction of new digital PID control to the J-model stabilizes the chilled-water temperature with higher accuracy than the previous E-model. It quickly responds to the load fluctuation and supplies stable chilled-water temperature. It is suitable for air-conditioning intelligent buildings which require sophisticated control.

Saving energy with the inverter (option)

- Balancing the load and flow rate with the absorbent pump's inverter control enables efficient and energy-saving operation. As a result, it reduces input energy and electric power consumption. Running cost is decreased by 5% compared to non-inverter control.

Graph 4 - Running cost curve



Notes:

1. Chilled-water leaving temperature 7°C constant
2. Cooling water entering temperature:

Load factor (%)	Temperature (°C)
100	32
50	27
30	25

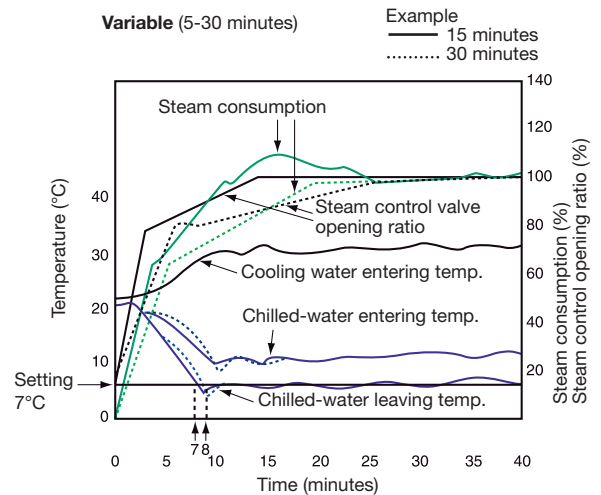
Purge system

- The high-performance purge system maintains the required operating pressure, preserves chiller performance characteristics, minimizes chiller maintenance to one purge operation per season (for year-round operation).

Steam valve opening control

- At the start-up the opening angle of the steam control valve is controlled in three stages, reducing the amount of steam and the time needed to reach the desired level, compared with the previous model.
- Adjusting the opening speed of the steam control valve at the second and third stage, it is possible to set up the most suitable conditions for the site auxiliary equipment.

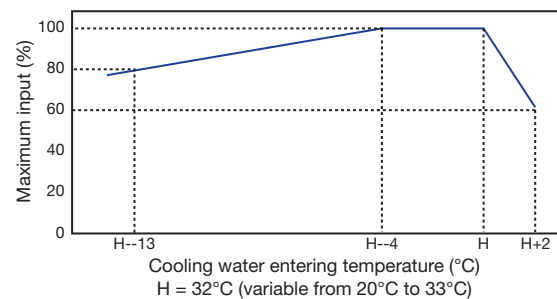
Graph 5 - Steam valve opening control



Expansion of safe operating zone

- This ensures quick response to rapid changes and maintains stable operation.
- The safe operating zone is between 19°C and 34°C cooling water temperature (for a nominal cooling water entering temperature of 32°C)

Graph 6 - Safe operating zone chart



Crystallization protection

- A microprocessor monitors the absorbent concentration. Steam supply is stopped, and the unit is returned to normal operation, when the concentration is over a certain limit, to prevent the crystallization of absorbent.

Technical data

Single effect steam-fired absorption chillers

16TJ		11	12	13	14	21	22	23	24	31	32	41	42	51	52	53
Cooling capacity	kW	352	422	527	633	738	844	985	1125	1266	1407	1582	1758	1969	2215	2461
Chilled-water system*																
Flow rate	l/s	15.1	18.2	22.7	27.3	31.8	36.3	42.4	48.4	54.5	60.6	68.1	75.7	84.8	95.4	106.0
Pressure drop	kPa	49	51	63	66	59	62	41	44	47	51	41	44	38	51	66
Connection (ANSI)	inch	4	4	4	4	5	5	6	6	6	6	8	8	8	8	8
Retention volume	m ³	0.12	0.13	0.15	0.17	0.22	0.24	0.28	0.30	0.34	0.36	0.46	0.48	0.65	0.71	0.77
Cooling water system**																
Flow rate	l/s	22.7	27.3	34.1	40.7	47.7	54.5	63.6	72.7	81.8	90.8	102.2	113.6	127.2	143.1	159.0
Pressure drop	kPa	34	36	31	36	31	34	64	69	54	56	59	63	41	54	70
Connection (ANSI)	inch	5	5	5	5	6	6	8	8	8	8	10	10	12	12	12
Retention volume	m ³	0.35	0.38	0.43	0.48	0.60	0.65	0.72	0.79	0.99	1.06	1.25	1.35	2.03	2.18	2.32
Steam system																
Consumption	kg/h	780	940	1170	1410	1640	1880	2190	2500	2810	3120	3510	3900	4370	4920	5460
Steam inlet	inch	5	5	5	5	6	6	8	8	8	8	8	8	10	10	10
Drain outlet	inch	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2
Control valve	inch	2	2	2-1/2	2-1/2	2-1/2	3	3	4	4	4	4	4	4	5	5
Shutoff valve	inch	2	2	2-1/2	2-1/2	2-1/2	3	3	4	4	4	4	4	4	5	5
Length (L)	mm	2680	2681	3690	3690	3770	3770	4850	4850	4910	4910	4960	4960	5050	5590	6090
Width (W)	mm	1295	1295	1295	1295	1455	1455	1455	1455	1515	1515	1615	1615	1950	1950	1950
Height (H)	mm	2215	2215	2215	2215	2350	2350	2350	2350	2620	2620	2870	2870	3200	3200	3200
Tube removal space	mm	2400	2400	3400	3400	3400	3400	4500	4500	4500	4500	4500	4500	4600	5200	5700
Operating weight	kg	3900	4100	5000	5200	6400	6700	7800	8200	10100	10500	12200	12700	17400	18800	20100
Max. shipping weight	kg	3400	3600	4400	4600	5600	5800	6800	7100	8800	9100	10500	10800	14700	15900	17000
Shipping method	One-piece															
Power supply	400 V-3 ph-50 Hz															
Apparent power	kVA	4.0	4.0	4.0	4.0	5.8	5.8	5.9	5.9	7.3	7.3	7.3	7.3	7.3	7.3	7.3
Total electric current	A	6.2	6.2	6.2	6.2	8.7	8.7	9.0	9.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
No.1 absorbent pump	kW	1.1	1.1	1.1	1.1	2.2	2.2	2.2	2.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	A	2.8	2.8	2.8	2.8	5.5	5.5	5.5	5.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Refrigerant pump	kW	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	A	1.25	1.25	1.25	1.25	1.25	1.25	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Purge pump	kW	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	A	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Pd cell heater	W	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Control circuit	W	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300

Legend

* In accordance with ARI 560 - 2000

12.2 → 6.7°C (Fouling factor = 0.0176 m² K/kW)

29.4 → 38.4°C (Fouling factor = 0.044 m² K/kW)

Saturated steam 10 kPa

Note: For selection outside ARI operating conditions please contact Carrier.

Scope of supply

1. Standards met

The units comply with the following standards:

- ARI 560-2000
- 89/392/EEC (machine directive)
- 73/23/EEC (low-voltage directive)
- 89/336/EEC (electromagnetic compatibility directive)
- 97/23/EC (pressure equipment directive)

2. Absorption chiller, comprising:

1. Lower shell
 - Evaporator and refrigerant dispersion tray
 - Absorber and absorbent dispersion tray
 - Eliminators
 - Bases
2. Upper shell
 - Generator
 - Condenser
 - Low temperature (LT) generator
 - Eliminators
 - Rupture disk mounting flange
3. Heat exchangers
4. Pumps
 - Absorbent pump with isolating valves
 - Refrigerant pump with isolating valves
 - Purge pump
5. Purge unit
 - Purge tank
 - Ejector and liquid trap
 - Piping and various manual valves
 - Palladium cell with heater
6. Control panel
 - Controller with data display LEDs and operation buttons
 - Inverter for absorbent pump (option)
 - Circuit breaker
 - Transformer
 - Relays and terminal blocks
 - Purge pump operation switch
7. Locally mounted parts
 - Temperature sensors
 - Chilled-water flow switch
 - Generator pressure switch
8. Interconnecting piping and wiring
 - Refrigerant and absorbent piping
 - Internal power and control wiring
9. Initial charge
 - Absorbent (lithium bromide)
 - Refrigerant (water)
 - Inhibitor (lithium molybdate)
10. Painting
 - Main unit: Rust-preventive paint
 - Control panel: Finish paint
11. Accessories
 - Operation manual: One set
 - Washer (for fixing foundation bolts): One set
 - Gasket and sealant for rupture disk: One set

3. Factory test

1. Check of external dimensions
2. Hydraulic pressure test of water headers
 - Test pressure is 1.5 times of maximum working pressure
3. Vacuum-side leak test
4. Electric insulation resistance test
5. Dielectric breakdown test
6. Function test of electric circuit and safety devices

4. Scope of supply of the purchaser

1. Building and foundations
2. External chilled water, cooling water and steam piping work including various safety valves, isolation valves, mating flanges, gaskets, bolts and nuts, etc.
3. External wiring and piping for the chillers including necessary parts
4. Insulation for the chillers including necessary parts.
5. Finish painting of the chillers (if needed)
6. Cooling water entering temperature control device
7. Cooling water treatment device
8. Various temperature/pressure gauges for steam and water lines.
9. Cooling tower(s), chilled-water pump(s) and steam control valve and steam shut-off valve
10. Electric power supply (as specified)
11. Supply of chilled water, cooling water, steam and air* at rated conditions
12. Maintenance of the chiller
13. Necessary tools, labour and materials for installation and site test operation
14. Any other item not specifically mentioned in the scope of supply

** If pneumatic steam valve control is used*

Scope of order

Item	Standard	Option
Chilled water		
Temperature	Entering: 12.2°C, leaving: 5°C through 12°C Leaving: 6.7°C, temperature difference 3 K through 10 K	
Flow rate	0.043 l/s x kW. Changes depending on chilled water temperature difference (min 50%)	
Max. working pressure	1034 kPa	1540 kPa, 2068 kPa
Hydraulic test pressure	Max. working pressure x 1.5	Max. working pressure x 1.5
Fouling factor	0.018 m² K/kW. Max. 0.18 m² K/kW	
Tube material	Copper tube	Cu Ni tube
Water quality	Refer to JRA-GL02E-1994	No option
Structure of water header	Removable type and epoxy treated	No option
Manufacturing standard of water header	Flanged ANSI	No option
Cooling water		
Temperature	Entering: 29.4°C Leaving: 38.4°C, entering: 20°C through 33°C	
Flow rate	0.065 l/s per kW. Within the water flow rate range of each model	
Max. working pressure	1034 kPa	1540 kPa, 2068 kPa
Hydraulic test pressure	Max. working pressure x 1.5	
Fouling factor	0.044 m² K/kW. Max. 0.18 m² K/kW	
Tube material	Copper tube	Cu Ni tube
Water quality	Refer to JRA-GL02E-1994	No option
Structure of water header	Hinged type and epoxy treated	No option
Manufacturing standard of water header	Flanged ANSI	No option
Steam		
Supply pressure	100 kPa, 50 kPa through 100 kPa, max. 5 K superheat	
Specific steam consumption	2.22 kg/h/kW. Changes depend on the specifications.	
Max. working pressure	146 kPa	No option
Hydraulic test pressure	Max. working pressure x 1.5	No option
Tube material	9/1 Copper nickel tube	No option
Steam quality	Refer to JIS-B-8223	No option
Manufacturing standard of water header	Flanged ANSI	No option
Electricity		
Power supply	400 V - 3 phase - 50 Hz (Voltage control within ±10%, frequency control within ±5%)	Contact the Carrier-Sanyo representative
Shipment		
	One section	Multi shipment
Control		
Safety functions	Refrigerant temperature Chilled-water freeze protection Chilled-water flow switch Cooling water temperature HT generator temperature HT generator pressure HT generator solution level Crystallization protection Motor protection	Cooling water flow switch
Capacity control	Digital PID control by chilled-water temperature	Inverter control of #1 absorbent pump
Parts	Selected by Carrier-Sanyo	No option
Control panel		
Painting	Munsell 5Y-7/1	No option
Indication lights	Operation Stop Alarm	No option No option No option
Display	LED	No option
External terminals (Volt-free normally open contact)	Operation indication Stop indication Alarm indication Feedback indication Cooling mode indication	No option
Structure	Indoor type	No option
Parts	Selected by Carrier-Sanyo	No option
Electrical wiring and piping		
	Wire: 600 V polyvinyl grade (chloride-insulated wires)	No option
	Pipe: Plicatube (flexible metal conduits)	No option
Insulation condition		
Place	Indoor	No option
Ambient temperature	5°C through 40°C	No option
Ambient humidity	Relative humidity: max 90% at 45°C	No option
Atmosphere	Be sure the following are not present - Corrosive gas - Explosive gas - Poisonous gas	No option

Pass arrangement

16TJ	Evaporator			Absorber			Condenser		
	Minimum	Standard	Maximum	Minimum	Standard	Maximum	Minimum	Standard	Maximum
11	2	4	6	2	3	4	1	2	2
12	2	4	6	2	3	4	1	2	2
13	2	3	4	2	2	3	1	1	2
14	2	3	4	2	2	3	1	1	2
21	2	3	4	2	2	3	1	1	2
22	2	3	4	2	2	3	1	1	2
23	2	2	4	2	2	3	1	1	2
24	2	2	4	2	2	3	1	1	2
31	2	2	4	2	2	3	1	1	2
32	2	2	4	2	2	3	1	1	2
41	2	2	4	2	2	3	1	1	2
42	2	2	4	2	2	3	1	1	2
51	2	2	4	2	2	3	1	1	2
52	2	2	4	2	2	3	1	1	2
53	2	2	4	2	2	3	1	1	2

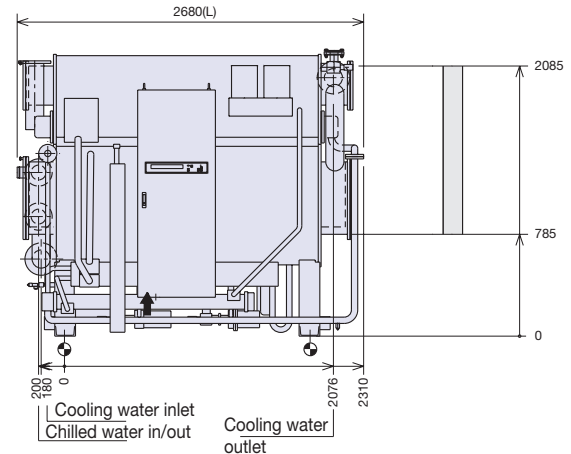
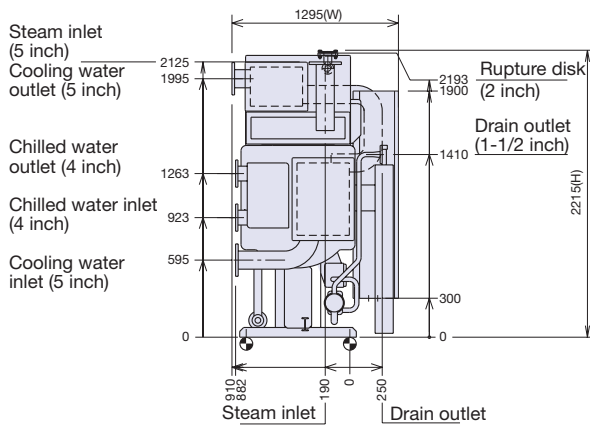
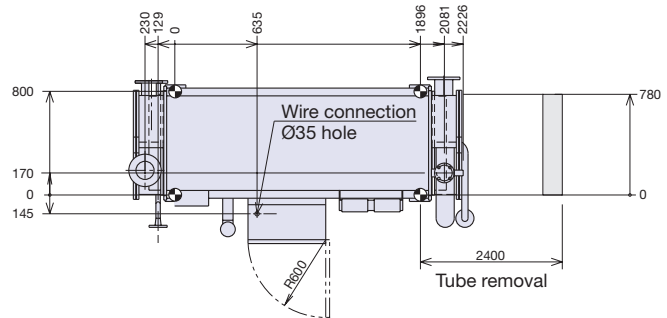
NOTE: The drawings shown on the following pages are for the standard number of passes. For applications outside the nominal conditions of this catalogue, computer selection software can automatically select the most appropriate number of passes.

Dimensional drawings, mm

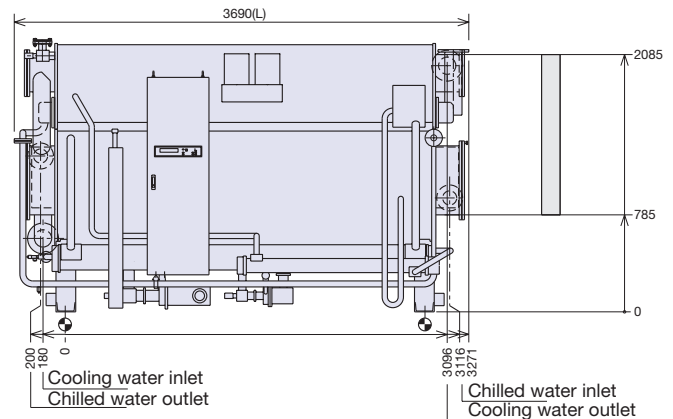
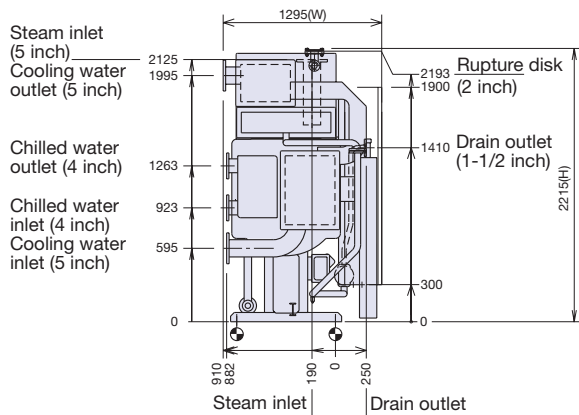
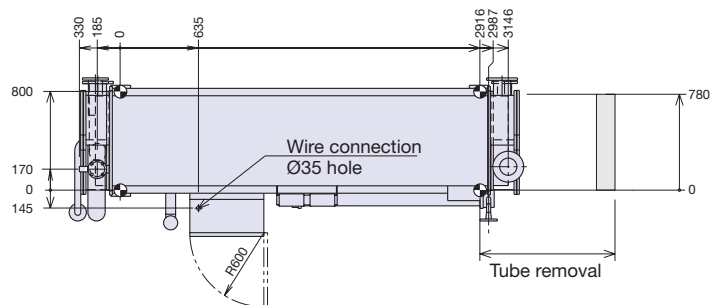
16TJ 11 through 16TJ 12

NOTES

1. Dimensions (L), (W), (H) are for a standard machine.
The dimensions are changed by parts added.
2. ● indicates the position of anchor bolts.
3. Clearance space must be available at the front and rear of the chiller.
4. All external water piping must be provided with welded ANSI 150 LB flanges by the customer.
5. ↑ indicates the position of the power supply connection on the control panel (diameter 35 mm)
6. Installation clearance:
Ends 1000 mm
Top 200 mm
Others 500 mm



16TJ 13 through 16TJ 14



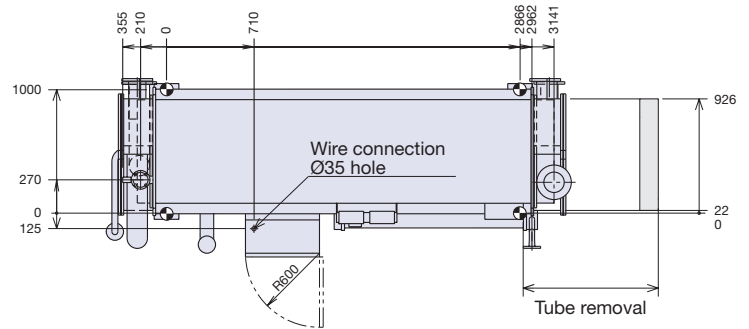
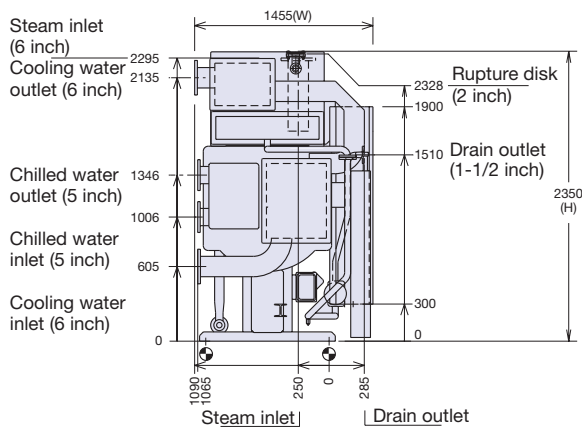
NOTE: Dimensions are for guidance only. Always refer to the certified drawings supplied upon request when designing an installation.

16TJ 21 through 16TJ 22

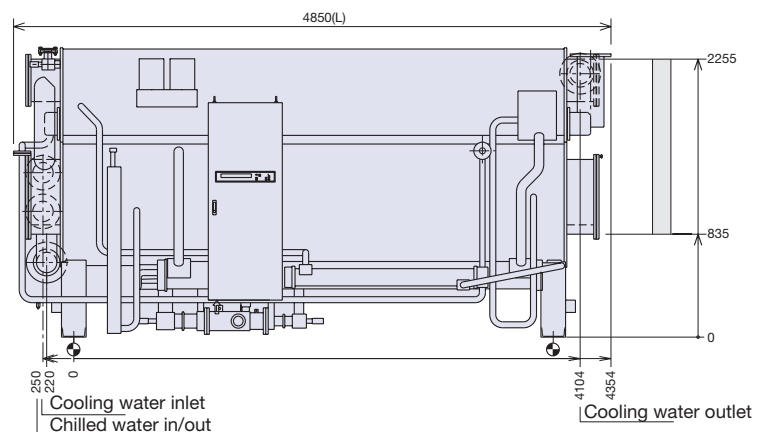
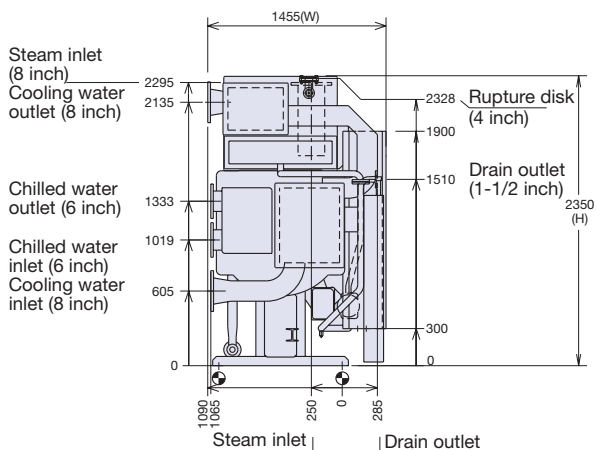
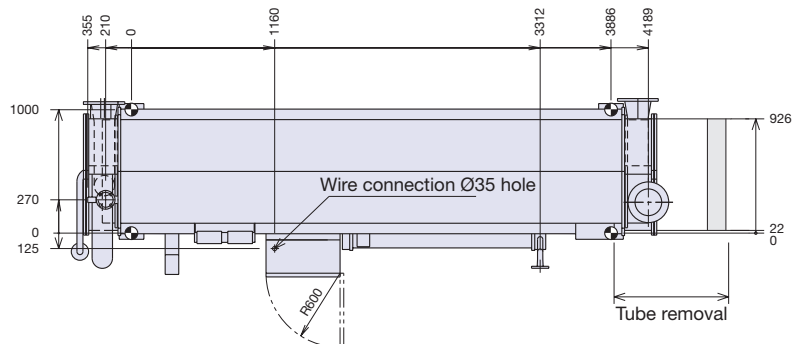
NOTES

1. Dimensions (L), (W), (H) are for a standard machine.
The dimensions are changed by parts added.
2.  indicates the position of anchor bolts.
3. Clearance space must be available at the front and rear of the chiller.
4. All external water piping must be provided with welded ANSI 150 LB flanges by the customer.
5.  indicates the position of the power supply connection on the control panel (diameter 35 mm)
6. Installation clearance:

Ends	1000 mm
Top	200 mm
Others	500 mm



16TJ 23 through 16TJ 24



NOTE: Dimensions are for guidance only. Always refer to the certified drawings supplied upon request when designing an installation.

16TJ 31 through 16TJ 32

NOTES

1. Dimensions (L), (W), (H) are for a standard machine.
The dimensions are changed by parts added.

2.  indicates the position of anchor bolts.

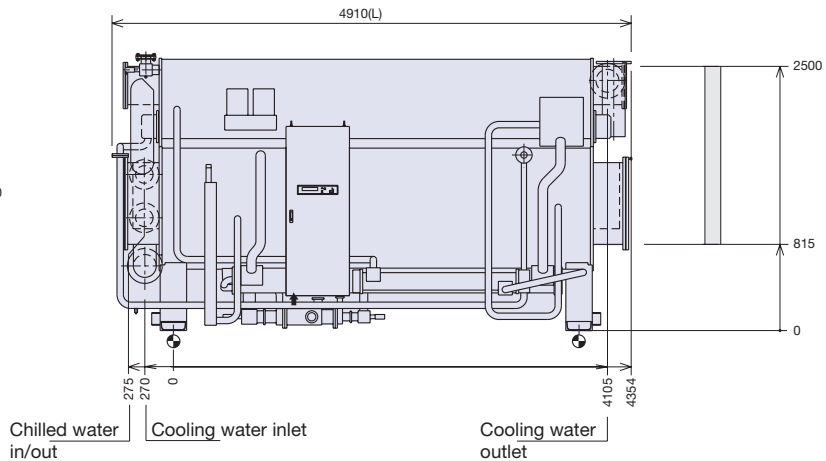
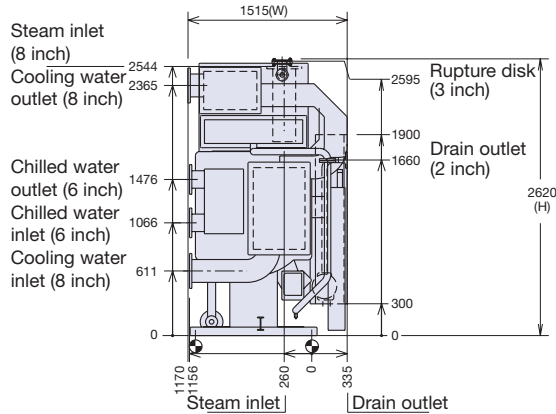
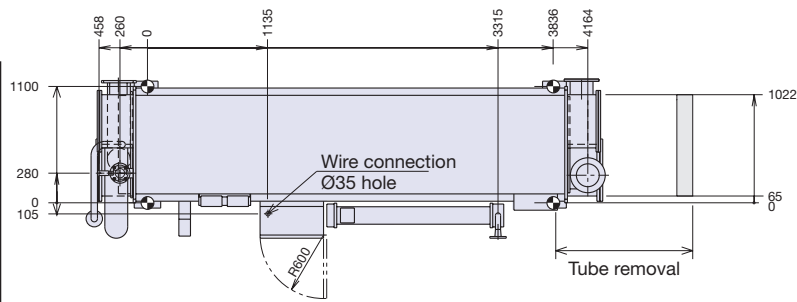
3. Clearance space must be available at the front and rear of the chiller.

4. All external water piping must be provided with welded ANSI 150 LB flanges by the customer.

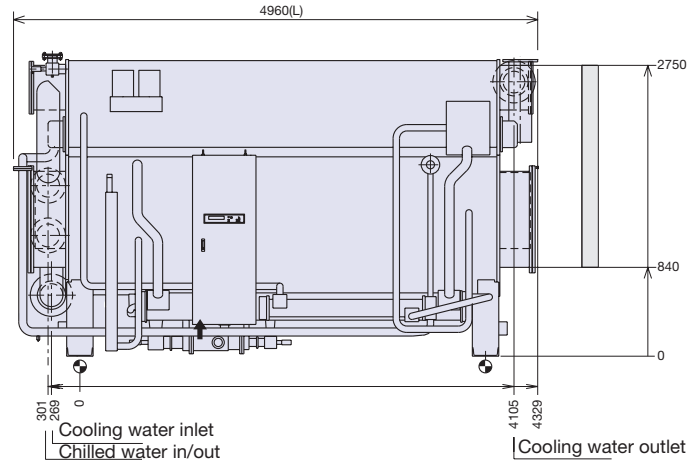
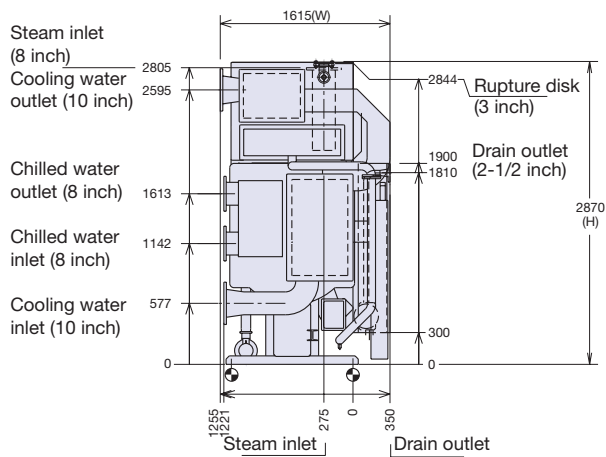
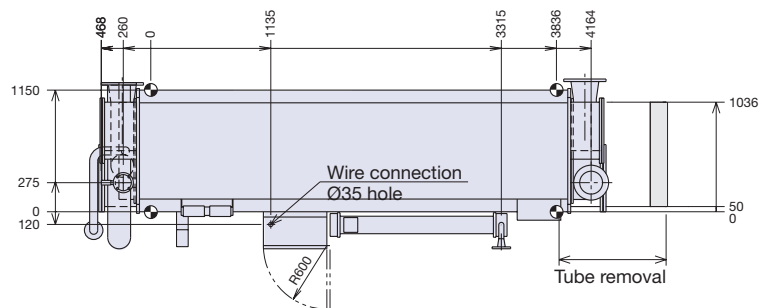
5.  indicates the position of the power supply connection on the control panel (diameter 35 mm)

6. Installation clearance:

Ends	1000 mm
Top	200 mm
Others	500 mm



16TJ 41 through 16TJ 42



NOTE: Dimensions are for guidance only. Always refer to the certified drawings supplied upon request when designing an installation.

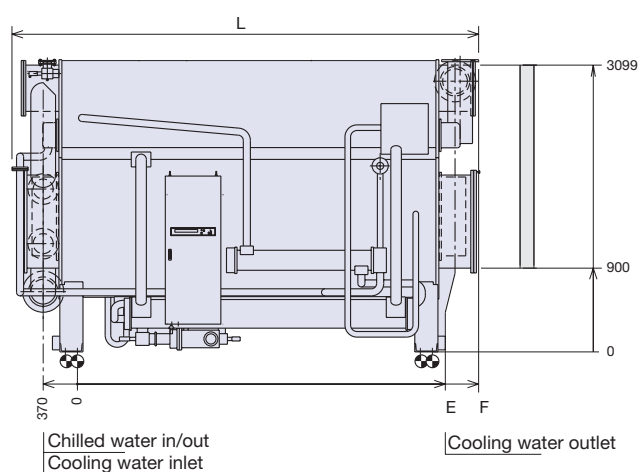
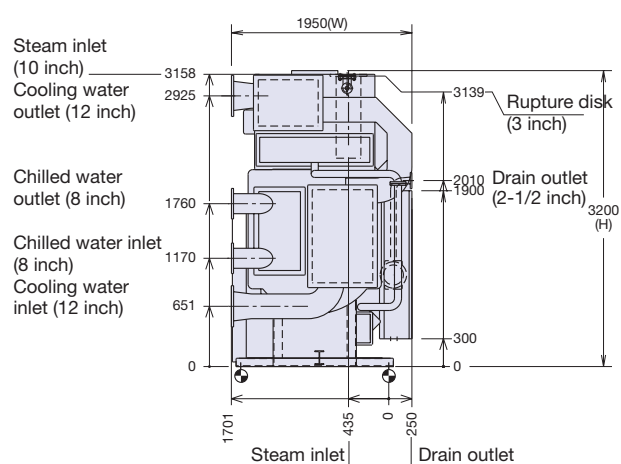
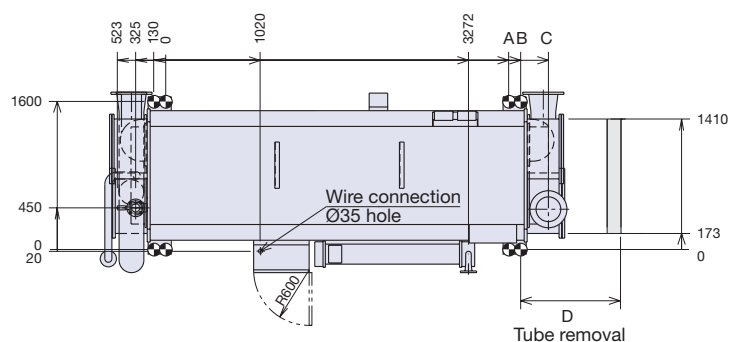
16TJ 51 through 16TJ 53

NOTES

1. Dimensions (L), (W), (H) are for a standard machine.
The dimensions are changed by parts added.
2.  indicates the position of anchor bolts.
3. Clearance space must be available at the front and rear of the chiller.
4. All external water piping must be provided with welded ANSI 150 LB flanges by the customer.
5.  indicates the position of the power supply connection on the control panel (diameter 35 mm)
6. Installation clearance:

Ends	1000 mm
Top	200 mm
Others	500 mm

16TJ	A	B	C	D	E	F	L
51	3706	3836	4136	4600	4078	4336	5050
52	4248	4378	4678	5250	4623	4878	5590
53	4746	4876	5176	5700	5121	5378	6090



NOTE: Dimensions are for guidance only. Always refer to the certified drawings supplied upon request when designing an installation.

Foundation dimensions, mm

Figure 3 - 16TJ-11 through 16TJ-42

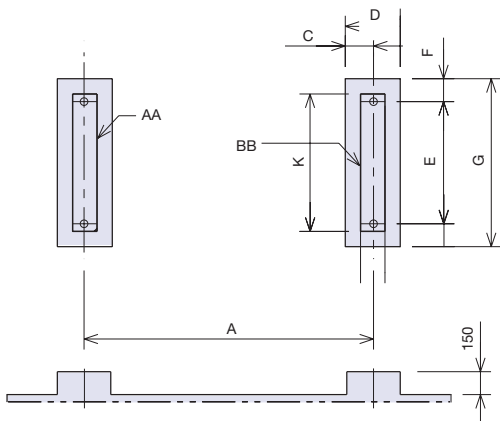


Figure 5 - 16TJ-51 through 16TJ-53

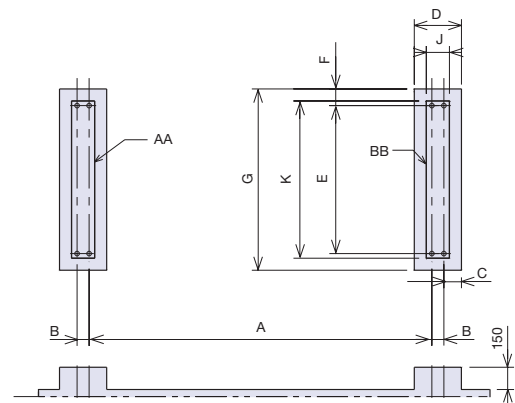
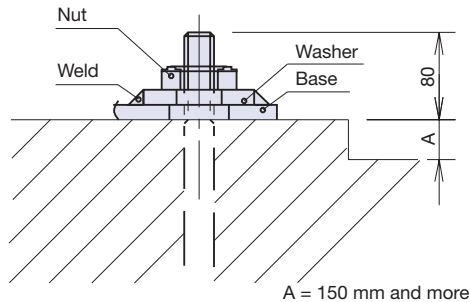


Figure 4 - Details of weld



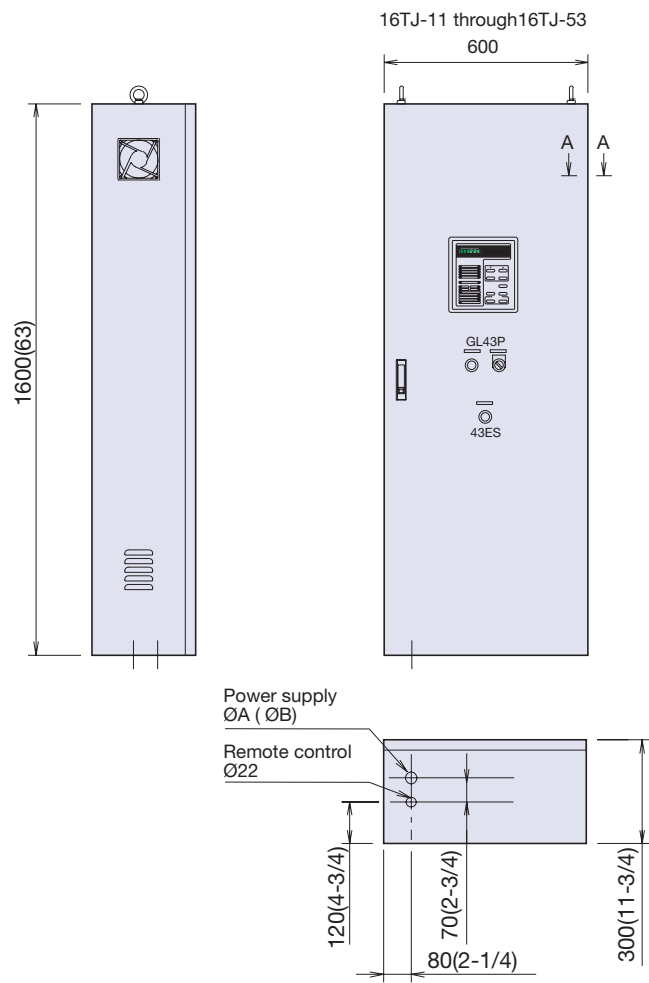
NOTES:

1. The machine base has $\phi 50$ -mm hole for the anchor bolt.
2. The anchor bolt should be fixed as shown in the detail drawing. Washer should be welded to the base (see Fig. 4)
3. There should be a drain channel around the foundation.
4. The floor surface should be made waterproof to facilitate maintenance work.
5. The surface of the foundation should be made flat.
6. Anchor bolts and nuts are to be supplied by customer.

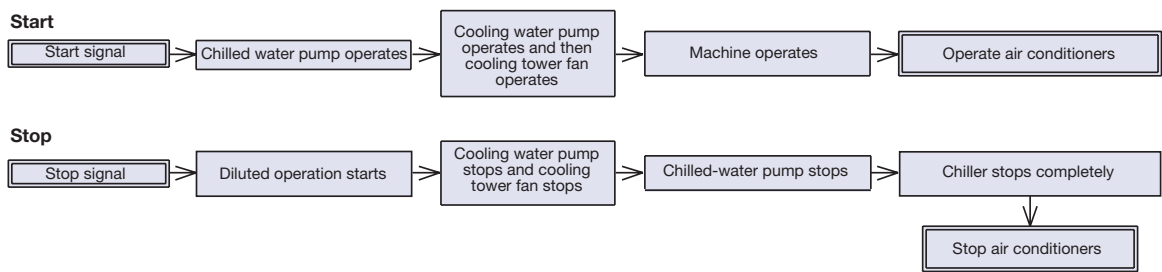
Table 1 - Dimensional data

16TJ	Weight, kg AA + BB	AA	BB	Dimensions, mm								
				A	B	C	D	E	F	G	J	K
11	3800	1900	1900	1890	--	175	360	800	150	1100	160	900
12	4000	2000	2000	1890	--	175	360	800	150	1100	160	900
13	4900	2450	2450	2916	--	175	360	800	150	1100	160	900
14	5100	2550	2550	2916	--	175	360	800	150	1100	160	900
21	6200	3100	3100	2866	--	200	400	1000	150	1300	200	1100
22	6500	3250	3250	2866	--	200	400	1000	150	1300	200	1100
23	7600	3800	3800	3886	--	200	400	1000	150	1300	200	1100
24	8000	4000	4000	3886	--	200	400	1000	150	1300	200	1100
31	9800	4900	4900	3836	--	225	450	1100	150	1400	250	1200
32	10200	5100	5100	3836	--	225	450	1100	150	1400	250	1200
41	11800	5900	5900	3836	--	225	450	1150	150	1450	250	1250
42	12300	6150	6150	3836	--	225	450	1150	150	1450	250	1250
51	16900	8450	8450	3706	130	190	510	1600	180	1960	250	1700
52	18300	9150	9150	4248	130	190	510	1600	180	1960	250	1700
53	19600	9800	9800	4746	130	190	510	1600	180	1960	250	1700

Control panel dimensions, mm

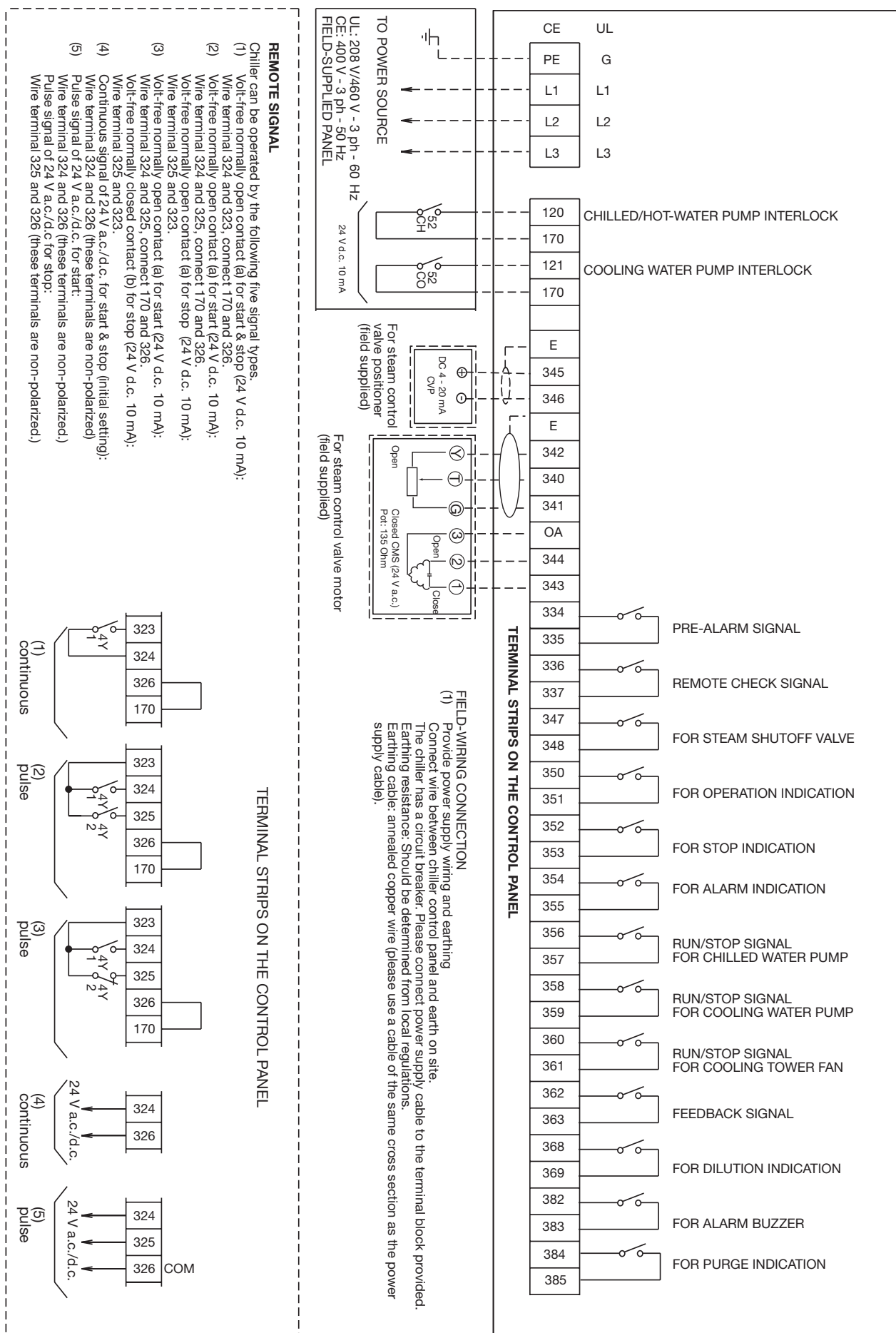


Start/stop sequence of auxiliary equipment

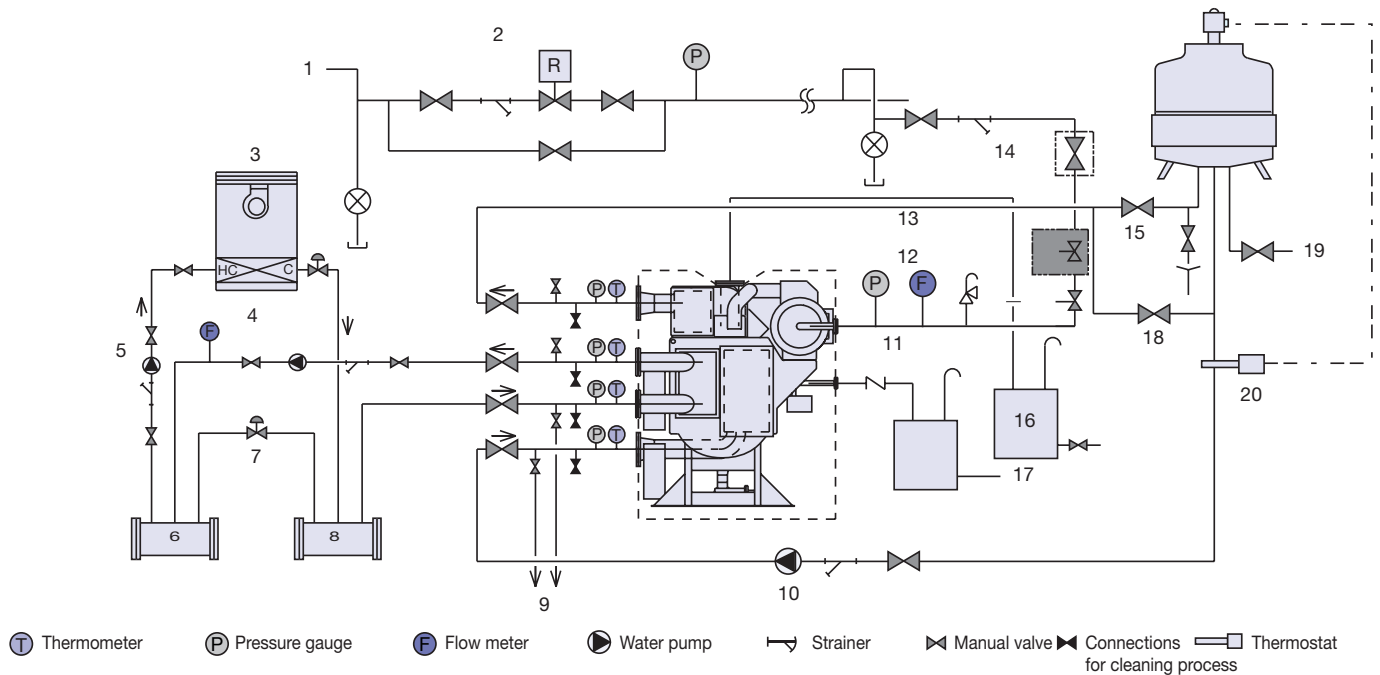


Field wiring

Figure 6 - Typical electrical field connection diagram - steam-fired absorption chillers (TJ)



Typical piping diagram



Legend

- | | | |
|-----------------------------------|-------------------------|--|
| 1. Main steam piping | 8. Return header | 16. Minimum tank capacity 1 m ³ |
| 2. Reducing valve | 9. To drain channel | 17. To boiler |
| 3. Cooling load | 10. Cooling water pump | 18. Bypass valve |
| 4. Chilled-water pump (primary) | 11. Check valve | 19. Water supply |
| 5. Chilled-water pump (secondary) | 12. Relief valve | 20. Cooling water thermostat |
| 6. Supply header | 13. Steam control valve | |
| 7. Bypass valve | 14. Steam shutoff valve | |
| | 15. Blow-down valve | |

NOTE: In order to prevent freezing of the chilled water ensure continued operation of the primary and secondary chilled-water pumps during dilution cycle operation of the chillers.

General remarks on piping

- Work outside the area surrounded by this line ---- shall be undertaken at the expense of the owner.
- For pipe connections and diameters refer to the dimensional drawings and specification tables.
- Steam pressure at the inlet of the machine cannot exceed 146 kPa. Please refer to the diagram to install a pressure relief valve near the chiller to release pressure above 146 kPa. The relief valve should be piped to the outdoors.
- Even if a reducing valve is not required, a strainer, pressure gauge and drain trap should be provided for each machine near the steam inlet.
- The back pressure of the steam drain outlet pipe should be controlled below 19.6 kPa.
- Determine the location of the chilled and cooling water pumps with due consideration of the pump's hydrostatic head. The machine should not be subject to a pressure larger than 1034 kPa at any water headers.
- Cooling water minimum entering control has to be supplied (please refer to the Installation Manual).
- Provide a thermometer and a pressure gauge at the cooling water and chilled water outlet and inlet.
- Provide an air vent valve in each of the chilled and cooling water lines at a point higher than the header for chilled water and cooling water.
- Drain pipes from the evaporator and absorber should be piped to the drain channel.
- Provide a blow-down valve in the cooling water line for water quality control.
- All external water piping is to be designed for maximum unit water-side pressure (to cover any options used).
- Be sure to provide a shutoff valve to prevent steam flow into the chiller during shut-down.
In case two or more chillers are installed, provide an automatic shutoff valve.
- Be sure to design the location of the cooling tower to prevent contamination of cooling water by exhaust gas from flues.
- If required, fit the rupture disk on the chiller according to the rupture disk manual.
- Separate chilled and cooling water pumps should preferably be provided for each chiller.
- Provide an expansion tank in the chilled-water line.
- There should be sufficiently large clearance for easy access to the evaporator, absorber and condenser, to facilitate inspection and cleaning work.



Safety considerations

Before operating the unit

- Before operating the unit be sure to read the operation manual carefully.
- Installation should conform to all applicable local codes and regulations.

During the installation

- Read the installation manual carefully before offloading and installing the unit.
- All work must be carried out by qualified personnel to prevent injuries and damage to the equipment.
- Waterproof the unit foundation and provide a drain channel to prevent water damage to the surrounding equipment.
- Provide adequate space around the unit for maintenance work to ensure safe working conditions.

Maintenance

- In addition to daily inspection periodical maintenance is required. Insufficient or incorrect maintenance may cause fire, electric shock and injuries.
- Please consult your local service office for further guidance.

Avoiding hazardous places

- Keep the units away from dangerous inflammable substances such as gasoline, thinner and combustible gases, as these may result in a fire.

