BROAD CENTRAL AIR CONDITIONING (ABSORPTION LiBr+H_2O)

BROAD X NON-ELECTRIC CHILLER

MODEL SELECTION & DESIGN MANUAL

Function

Cooling, heating, hot water (dedicatedly or simultaneously)

Application

- Provide chilled/heating water for large-scale buildings
- Produce chilled water over 5°C and heating water below 95°C

Cooling capacity

23-11,630kW(6.6-3,307Rt)

Energy sources

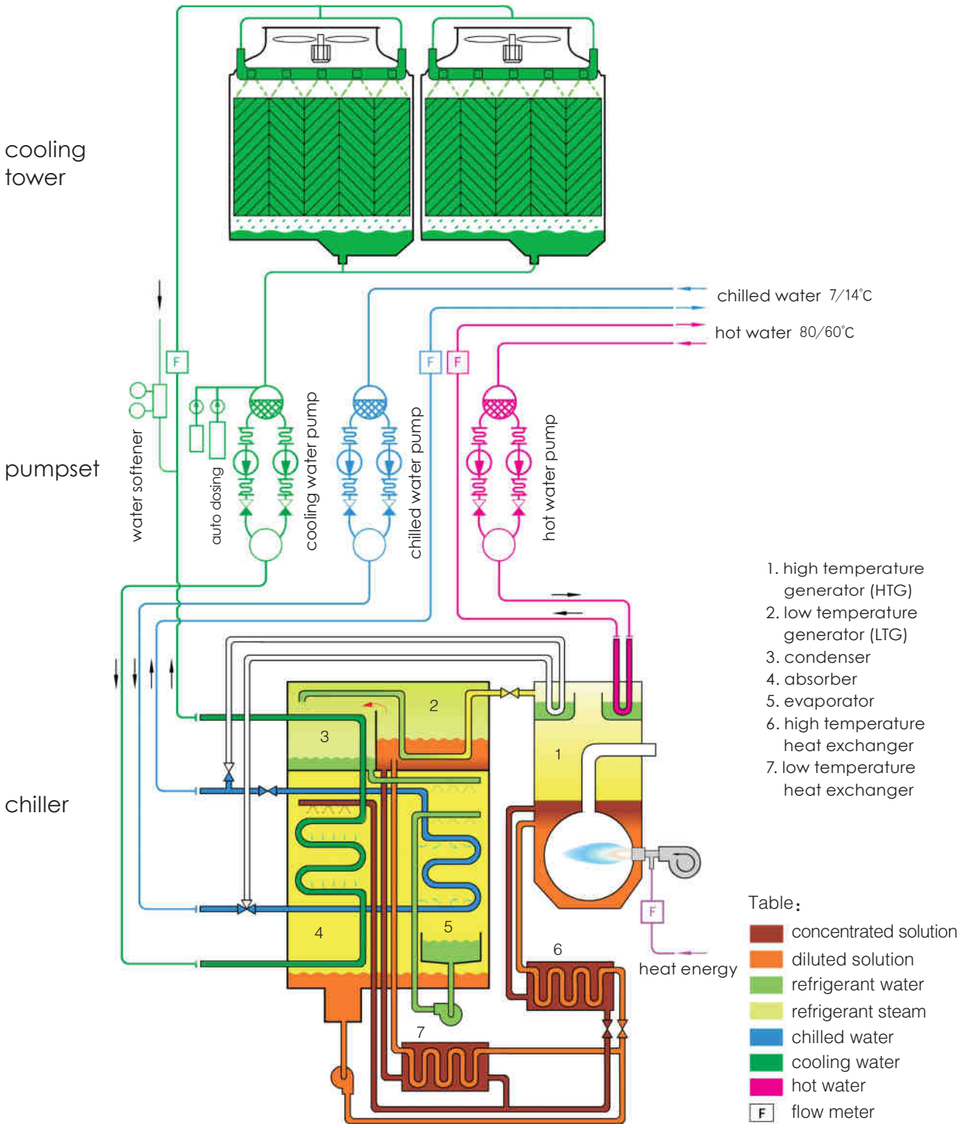
- Natural gas, town gas, biogas, diesel, recycled oil
- gas/oil dual fuel, gas & waste heat hybrid (multiple energy)
- waste heat from power generation industrial waste streams (steam, hot water, exhaust, etc)

2011.06. SI

BZ200

CONTENTS

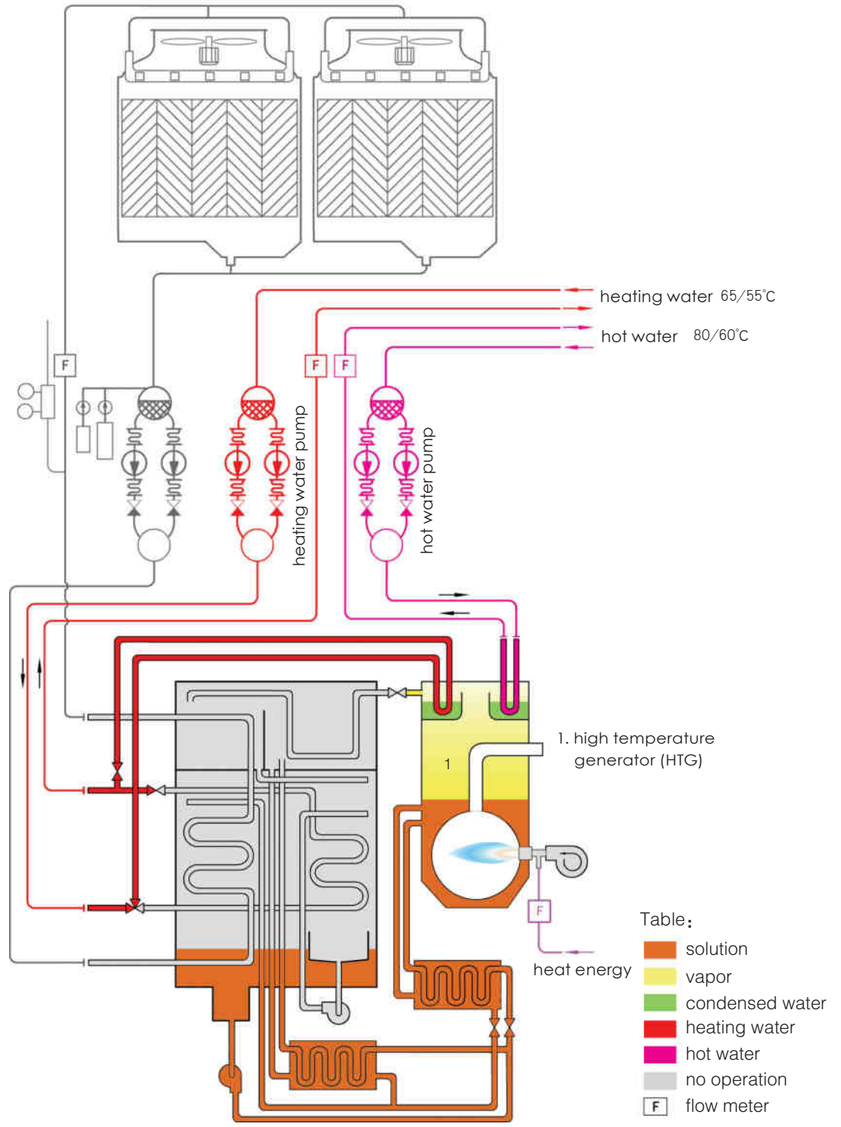
Non-electric Chiller (chiller+pumpset)



The cooling principle

The input heat energy heats LiBr solution to 140°C and generate vapor, which is then condensed into water by cooling water. When the refrigerant water enters evaporator (in high vacuum condition), its temperature goes down immediately to 5°C. And it is sprayed over the copper tubes, and chilled water from 14°C drop down 7°C to make cooling. The water absorbs heat from air conditioning system and evaporates, then is absorbed by concentrated LiBr solution from the generators. The cooling water takes away the heat and rejects it into the air. Diluted solution is pumped into HTG and LTG separately to be heated to begin the process all over again.

Notes: Lithium Bromide is high water absorbent salt nontoxic and harmless.



The heating principle

The input heat energy heats the LiBr solution. The vapor produced by the solution heats the heating water or hot water in tubes, while condensate returns to the solution to be heated and the cycle repeats. As "separate heating" is adopted, the heating cycle becomes very simple, just like a vacuum boiler. Therefore, the life span of the chiller can be doubled.

A separate heat exchanger can provide dedicated hot water while cooling or heating operation is stopped.
So, only BROAD has the unique technology in the world that can realize "three functions in one unit".

Direct-fired Absorption Chiller (P-DFA) Performance Data

Fuel: natural gas, biogas, diesel or gas/oil dual fuel

Mode	BZ	20	30	50	75	100	125	150	200	250	300	400	500	600	800	1000
Cooling capacity	kW	233	349	582	872	1163	1454	1745	2326	2908	3489	4652	5815	6978	9304	11630
	10^4kcal/h	20	30	50	75	100	125	150	200	250	300	400	500	600	800	1000
Heating capacity	kW	179	269	449	672	897	1121	1349	1791	2245	2687	3582	4489	5385	7176	8967
Hot water capacity	kW	80	120	200	300	400	500	600	800	1000	1200	1600	/	/	/	/
Chilled water																
Flow rate	m^3/h	28.6	42.9	71.4	107	143	179	214	286	357	429	571	714	857	1143	1429
Pressure drop	kPa	30	30	30	30	30	30	40	40	50	50	50	60	60	60	60
Cooling water																
Flow rate	m^3/h	48.8	73.3	122	183	244	305	366	488	610	733	977	1221	1465	1953	2442
Pressure drop	kPa	50	50	50	50	50	50	50	50	60	60	60	70	70	70	70
Heating water																
Flow rate	m^3/h	15.3	23.1	38.5	57.9	77.1	96.4	116	153	193	231	308	385	463	617	771
Pressure drop	kPa	20	20	20	20	20	20	20	30	30	40	40	50	50	60	60
Hot water																
Flow rate	m^3/h	3.4	5.2	8.6	12.9	17.2	21.5	25.8	34.4	43.0	51.6	68.8	/	/	/	/
Pressure drop	kPa	20	20	20	20	20	20	20	30	30	40	40	/	/	/	/
Natural gas consumption																
Cooling	m^3/h	16.9	25.4	42.2	63.4	84.5	106	127	169	212	254	340	424	509	679	848
Heating	m^3/h	19.2	28.8	48.1	71.9	96.1	120	144	192	241	288	384	481	577	769	961
Hot water	m^3/h	8.5	12.8	21.4	32.0	42.7	53.5	64	85	107	128	171	/	/	/	/
Power demand	kW	2.5	4.2	5.8	6.1	9.8	9.8	11.6	16.7	16.7	21.7	25.2	31.9	40.7	49.9	63.3
Solution wt.	t	1.1	1.3	2.6	3.2	3.9	4.9	5.6	8.0	9.0	11.7	13.5	17.0	21.6	28.7	34.7
Unit ship. wt.	t	5	7.0	10	12	14	17	19	26	31	/	/	/	/	/	/
Main shell ship. wt.	t	/	/	/	/	/	/	/	/	/	15	20	24	28	29	30
HTG. wt.	t	/	/	/	/	/	/	/	/	/	11	13	14	17	20	28
Operation wt.	t	5.3	7.4	10.6	13	16	19	22	29	35	42	50	63	76	89	107

Packaged Direct-fired Absorption Chiller (P-DFA)

Mode		BZY	20	30	50	75	100	125	150	200	250	300	400	500	600	800	1000
Cooling capacity		kW	233	349	582	872	1163	1454	1745	2326	2908	3489	4652	5815	6978	9304	11630
Pumpset	Chilled water pump																
	External head	mH_2O	22	22	22	24	24	27	27	27	28	28	28	32	32	32	32
	Power demand	kW	4	7.5	7.5	15	15	22	30	37	44	60	60	110	110	150	180
	Cooling water pump																
	External head	mH_2O	10	10	10	15	15	15	15	15	16	16	16	17	17	17	17
	Power demand	kW	3	7.5	7.5	15	15	22	22	37	44	44	60	90	110	150	180
	Hot water pump																
	External head	mH_2O	7	7	7	15	15	15	15	15	15	15	15	/	/	/	/
	Power demand	kW	0.4	0.6	0.6	2.2	3.0	3.0	4.4	4.4	4.4	6.0	6.0	/	/	/	/
	Total power demand	kW	7.4	15.6	15.6	32.2	33.0	47.0	56.4	78.4	92.4	110	126	200	220	300	360
	Operation wt.	t	0.6	0.8	0.9	3.8	3.8	4.2	4.3	7.1	7.4	8.1	9.8	5.9/8.6	6.1/8.8	6.1/9.8	9.6/9.8
Cooling tower	Power demand	kW	5.5	11	11	/	/	/	/	/	/	/	/	/	/	/	/
	Operation wt.	t	2.5	4.5	5.1	/	/	/	/	/	/	/	/	/	/	/	/
Enclosure	Ventilation power demand	kW	0.3	0.3	0.3	1.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	3.0	3.0	3.0
	Weight	t	0.5	0.7	0.8	3.4	3.4	3.9	3.9	5.2	5.6	6.3	6.8	11.0	11.5	14.5	15.5
Electricity and water consumption	Total power demand	kW	15.7	32.7	32.7	39.3	44.3	58.3	69.5	96.6	111.1	133.7	153.2	233.9	263.7	352.9	426.3
	Water demand for cooling	t/h	0.6	0.9	1.5	2.0	3.0	3.8	4.5	6.0	7.5	9	12	15	18	24	30

General Conditions:

1. Rated chilled W outlet/inlet temp: 7°C/14°C
2. Rated cooling W outlet/inlet temp: 37°C/30°C
3. Rated heating W outlet/inlet temp: 65°C/55°C
4. Rated hot W outlet/inlet temp: 80°C/60°C
5. Lowest permitted outlet temperature for chilled water: 5°C
6. Highest permitted outlet temperature for heating/hot water: 95°C
7. Lowest permitted inlet temperature for cooling water: 10°C
8. Adjustable chilled water flowrate: 50%~120% Adjustable heating/hot water flowrate: 65%~120%
9. Pressure limit for chilled W, cooling W, heating W, hot W: 0.8MPa (except special order)
10. Adjustable load: 5%~115%
11. Fouling factor for chilled W, cooling W, heating W, hot W: 0.086m^2·K/kW
12. Natural gas consumption is calculated: 10kWh/m^3 (8600kcal/m^3)
13. Standard natural gas pressure is 16~50kPa (1600~5000mmH_2O), lower or higher pressure can be accommodated to special orders
14. LiBr Solution concentration: 52%. Solution weight is included in unit shipment weight.
15. Rated exhaust temp for cooling: 160°C
    Rated exhaust temp for heating: 145°C
16. Machine room ambient temperature: 5~43°C, humidity ⩽ 85%
17. Standard climate conditions for cooling operation: temp 36°C, relative humidity 50% (wet bulb 27°C)
18. Heating capacity and hot water capacity refer to the capacity in separate operation, which is adjustable within this range
19. Power demand of cooling, heating, hot W is under rated working condition.
20. Rated cooling COP: 1.36
    Rated heating COP: 0.93
21. Life design: 25 years

Notes: Technical specification is based upon Japanese Industry Standard JIS B 8622 "Absorption Chiller" or based upon ARI 560 standard "AbsorptionWater Chilling And Water Heating Packages"

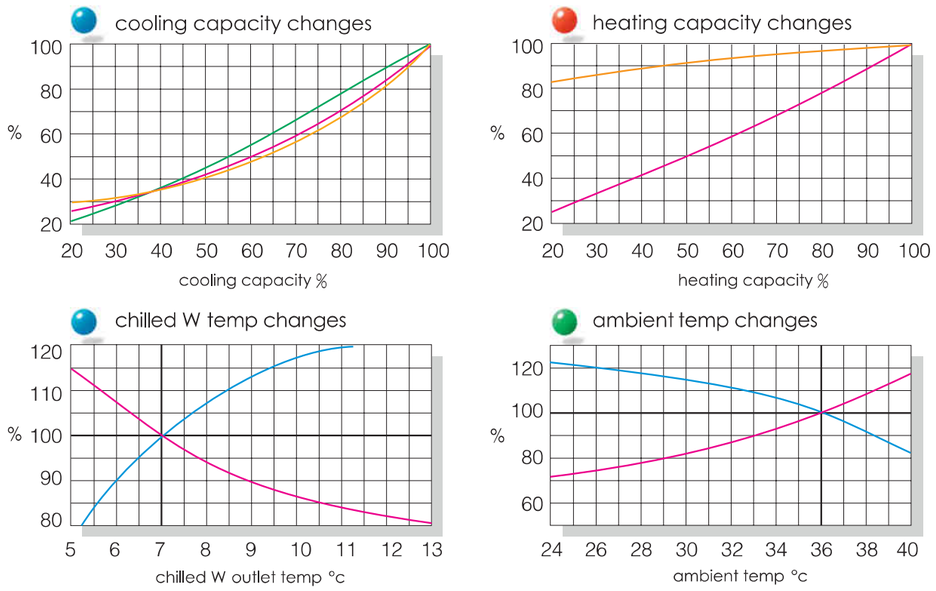
HTG(high temp generator)Enlarged Model Performance Data

Mode BZ	Enlarged Models	Heating capacity kW	Consumption m^3/h
20	H_1	215	23.0
	H_2	251	26.9
	H_3	287	30.7
	H_4	323	34.6
30	H_1	323	34.6
	H_2	377	40.3
	H_3	430	46.1
	H_4	484	51.8
50	H_1	538	57.7
	H_2	628	67.3
	H_3	717	77
	H_4	807	86
75	H_1	807	86
	H_2	942	101
	H_3	1076	115
	H_4	1211	129
100	H_1	1076	115
	H_2	1255	135
	H_3	1435	154
	H_4	1614	173
125	H_1	1345	144
	H_2	1569	168
	H_3	1793	192
	H_4	2018	216

Mode BZ	Enlarged Models	Heating capacity kW	Consumption m^3/h
150	H_1	1614	173
	H_2	1883	202
	H_3	2152	230
	H_4	2421	259
200	H_1	2152	230
	H_2	2511	269
	H_3	2869	307
	H_4	3228	346
250	H_1	2690	289
	H_2	3138	337
	H_3	3587	386
	H_4	4035	434
300	H_1	3228	346
	H_2	3766	403
	H_3	4304	461
	H_4	4842	518
400	H_1	4304	461
	H_2	5021	538
	H_3	5739	614
500	H_1	5380	577
	H_2	6277	673

Notes: Heating capacity increases by 20% for each stage of HTG enlargement. No change with pumpset and metal enclosure specs.

Packaged DFA Performance Curves



Note: electricity consumption means the consumption of the chiller and pumpset.

COP

Rated COP:1.36
IPLV COP:1.56

Load	COP	Factor	Result
A 100%	1.360	0.01	0.014
B 75%	1.569	0.42	0.659
C 50%	1.619	0.45	0.729
D 25%	1.308	0.12	0.157

Note: The integrated part load value (IPLV) reflects chiller's actual COP in operation.

Nomenclature

B Z Y 200 X D—k—H_1—Fa

- High pressure type (details in below table)
- H_1 20% more heating capacity
- Function: k-cooling-heating type, d-cooling only, default is heating, cooling and hot water
- Fuel type: B-oil C-LPG D- natural gas E-town gas
- BROAD non-electric chiller design code (X indicates 10)
- Cooling capacity: 10^4kcal/h
- Y-packaged chiller
- Chiller type: Z-direct-fired(code of other types available in "Performance Data" pages)
- Product: B-BROAD

Codes for high pressure type:

Pressure limit	Chilled water code	Cooling water code
0.81~1.2MPa	Fa	Ma
1.21~1.6MPa	Fb	Mb
1.61~2.0MPa	Fc	Mc
2.01~2.4MPa	Fd	Md

Environmental Protection Features

Operating Noise dB(A)

Model BYZ	20~50	75~200	≥250
DFA	≤57	≤58	≤60
pumpset	≤57	≤57	≤59
cooling tower	≤62	≤64	≤66
outside encloure	≤42	≤43	≤44

Emissions:

- $CO/CO_2 \leqslant 0.02\%$
- $NOx \leqslant 46ppm(O_2=5\%)$
- Special order: equipped electrostatic cleaner on exhaust port, and emission is almost zero

Model Selection & Ordering

Function selection

BROAD chillers are classified into standard type (cooling-heating-hot water), A/C type (cooling-heating) and cooling only type.

Fuel selection

- Fuels applicable to a DFA can be: natural gas, town gas, LPG, bio-gas, light oil or recycled oil.
- Natural gas and recycled oil are priority.
- Applicable to gas/oil (for special orders)
- Different fuel matches different burner.

Load selection

- Building cooling/heating load cannot be estimated, as it is more closely related to building insulation and room function than to building area.
- Model selection is mainly determined by cooling load. If the heating load is not enough, a HTG enlarged model should be selected.
- An extra boiler is recommended to meet the excessive heating requirement when heating load exceeds 1.3 times of cooling load.

Quantity

- The fewer units, the lower initial investment and operation cost (as the chiller's COP will be higher and water system's electric consumption will be lower at part load).
- 2 units are recommended for one system (the total capability equals to required load). No need to have standby unit. One unit can be considered for buildings that allow chiller stop once a year.

Flowrate selection

- BROAD pumpset adopts a large temperature difference and low flowrate design so as to save power consumption dramatically.
- BROAD designs the pump head according to its profound experience.
- If the head is proved to be insufficient, BROAD will enlarge the pump free of charge.

Pressure selection

- The standard pressure limit for chilled/heating/cooling water is 0.8MPa. Information about high pressure type is available on page 5.
- 0.81-1.2MPa system: select high pressure type. 1.21-1.6MPa system: either extra pressure type, or secondary heat exchanger, to be comprehensively evaluated. >1.6MPa system: secondary heat exchange.

Split shipment

- If limited by access of customers' machine room (or limited by container transportation), split shipment can be chosen.
- The chiller normally will be split into two pieces as main shell and HTG. 3 pipes must be connected at jobsite. Customers need to prepare welding facilities, nitrogen and provide necessary help.

Control

- BROAD chiller and its pumpset are equipped with complete control function, including internet monitoring.
- If users have a building management system(BMS), the BMS control interface can be selected as an optional supply. If the BMS interface is not ordered along with the chiller, it can be purchased later.

Machine room location

- On the floor or on building rooftop.
- If limited by facilities, the chiller and the pumpset can be installed in basement while cooling tower on the floor, on stilt or on building top.
- Metal enclosure does not apply to basement installation.
- The chiller and pumpset are installed in the same metal enclosure so as to minimize piping length.

Lead time

- ⩽ BYZ150: 2-6 months
- BYZ200-BYZ400: 4-8 months
- ⩾ BYZ500: 8-12 months

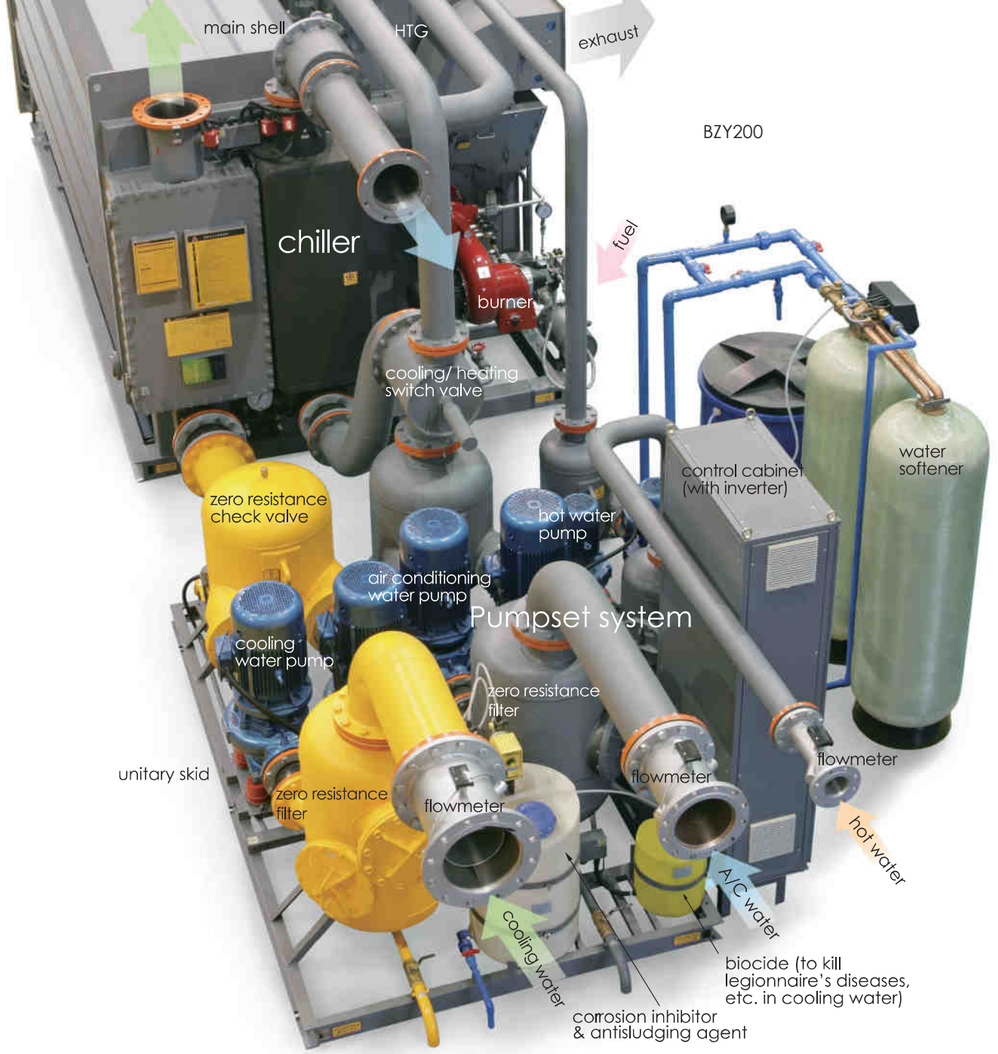
Warranty

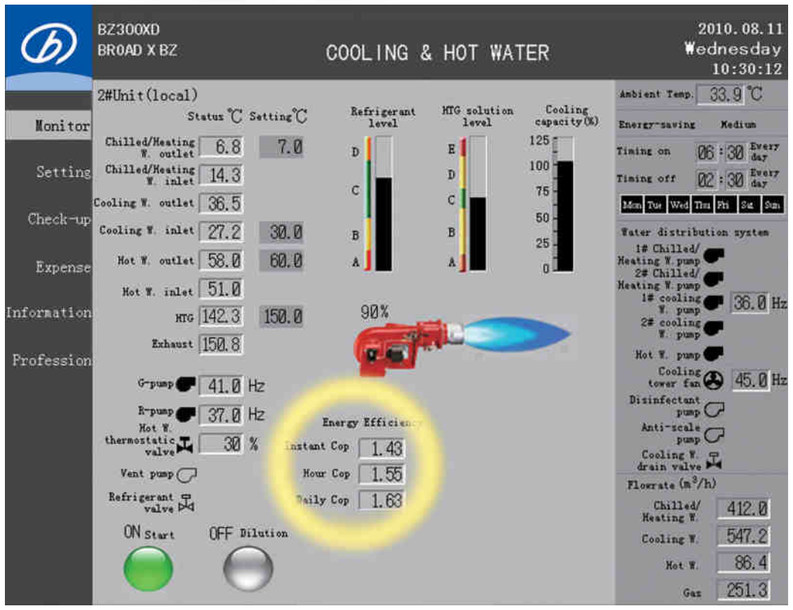
Free warranty is to cover 12 months from commissioning or 18 months from shipment, whichever comes earlier. BROAD provides paid service in the whole life span. Service price list is available upon request.

Packaged DFA Supply List

Products	Category	Item	Remarks
Chiller	Main shell	Main shell body	Includes LTG, condenser, evaporator, absorber, cold/heat insulation
		Auto purge/vent system	Includes falling head auto purge device, auto air vent device
		Solution pump, refrigerant pump	Welded canned type
		Low temp heat exchanger	Plate type including heat insulation
		Motor valve	Refrigerant motor valve, auto purge valve, etc.
	HTG	HTG shell	Includes HTG body, front/rear flue chamber, frame base, etc.
		High temp heat exchanger	Plate type
		Water heater	For heating & hot water, N.A. for cooling only type
		Thermostatic valve	1 piece each for heating water & hot water constant temp. control. N.A. for cooling only type
		Enclosure	Encloses HTG shell, high temperature heat exchanger and water heater. (Removable)
		Burner	Includes gas valve trains, filter, safety devices, muffler, etc.
		Gas flow meter	For accurate measuring of the gas consumption. N.A. for non gas-fired type
	Control system	Chiller control cabinet	Includes low voltage components, special circuit board, microprocessor or PLC, etc.
		Touch screen	For operation ("central control" for BY20 BY30 & BY50)
		External control elements	Includes temperature & pressure sensors, flow switches, solution level probes and actuators
		Inverters	Solution pump inverter and refrigerant pump inverter
		Network gateway	For Internet monitoring
		BMS interface(optional)	Connects to BMS system through dry contact or serial communication
	Solution	LiBr solution	Includes corrosion inhibitor and energy intensifier.
Pumpset system	Pumpset	Chilled/heating water pump	Two pumps (BY20, BY30, BY50 only one pump)
		Cooling water pump	Two pumps (BY20, BY30, BY50 only one pump)
		Hot water pump	Two pumps (BY20, BY30, BY50 only one pump) N.A. for cooling only and cooling-heating types
		Pumpset piping	Includes zero resistance filter, zero resistance check valve, soft connectors, valves and vibration isolator
		Enclosure piping*	Includes all piping within the system to the external connections
		Piping accessories in enclosure	Includes flow switches, vent valves and their sockets, and soft connectors.
		Motor drain valve	When water quality becomes poor, this valve automatically drains the cooling water. It also drains cooling water automatically in winter to avoid freeze.
		Cooling/heating switch	N.A. for cooling only type
		Chilled/heating water check valve	N.A. for cooling only type
		Flow meter	Includes gas, chilled/heating W, cooling W, hot W flow meters. For accurate measuring of the load.
		Water softener	For hard water softening (optional for BZY20 & BZY30 BZY50)
		Auto dosing device	Automatically charge biocide corroision inhibitor and antisludge to the cooling water
		Pumpset control cabinet	Includes cooling W pump and cooling tower fan inverters (no inverter for≥3 cooling fans), soft starter, low voltage electric parts, etc.
		Electric wiring*	Includes wires, cables, cable conduit, cable supporters, etc.
Enclosure	/	Metal enclosure	Fiber reinforced plastics shell with insulation
		Accessories	Includes ventilation and gas leakage detector (for gas type only)

Notes : 1. "*" means only standard size is available. For any size change, please specify it in purchase orders.
2. Supply list of waste heat chillers is almost the same as DFA supply list. The main difference of waste heat chillers lies in HTG. Supply list will be provided separately when the order is placed.





Steam Chiller Performance Data

BSY: Steam from power generation or industrial waste streams

Mode	BS	20	30	50	75	100	125	150	200	250	300	400	500	600	800	1000
Cooling capacity	kW	233	349	582	872	1163	1454	1745	2326	2908	3489	4652	5815	6978	9304	11630
	10^4kcal/h	20	30	50	75	100	125	150	200	250	300	400	500	600	800	1000
Chilled W																
Flowrate	m^3/h	28.6	42.9	71.4	107	143	179	214	286	357	429	571	714	857	1143	1429
Pressure drop	kPa	30	30	30	30	30	30	40	40	50	50	50	60	60	60	60
Cooling W																
Flowrate	m^3/h	48.8	72.3	122	183	244	305	366	488	610	733	977	1221	1465	1953	2442
Pressure drop	kPa	50	50	50	50	50	50	50	50	60	60	60	70	70	70	70
Steam consumption	kg/h	248	372	619	931	1240	1553	1866	2486	3112	3734	4983	6227	7473	9967	12455
Power demand	kW	1.7	3.2	4.3	4.6	6.8	6.8	6.8	10.2	10.2	11.7	13.2	17.7	20.7	25.9	34.9
Solution weight	t	0.8	1.1	1.9	2.6	3.0	4.1	4.6	6.7	7.5	9.9	11.2	14.6	17.5	22.7	28.2
Unit ship. wt	t	4	5.9	7.5	9	11.5	14	16	21	26	/	/	/	/	/	/
Main shell ship. wt	t	/	/	/	/	/	/	/	/	/	15	20	24	28	29	30
HTG. wt	t	/	/	/	/	/	/	/	/	/	5	6	8	9	11	13
Operation weight	t	4.5	6.6	8.5	10	13	16	18	24	30	35	43	54	63	75	85

Packaged Steam Chiller Performance Data

Mode		BSY	20	30	50	75	100	125	150	200	250	300	400	500	600	800	1000
Cooling capacity		kW	233	349	582	872	1163	1454	1745	2326	2908	3489	4652	5815	6978	9304	11630
Pumpset	Chilled/heating W.pump																
	External head	mH_2O	22	22	22	24	24	27	27	27	28	28	28	32	32	32	32
	Power demand	kW	4	7.5	7.5	15	15	22	30	37	44	60	60	110	110	150	180
	Cooling W.pump																
	External head	mH_2O	10	10	10	15	15	15	15	15	16	16	16	17	17	17	17
	Power demand	kW	3	7.5	7.5	15	15	22	22	37	44	44	60	90	110	150	180
	Total power demand	kW	7	15	15	30	30	44	52	74	88	104	120	200	220	300	360
	Operation weight	t	0.5	0.7	0.8	3.3	3.3	3.6	3.7	6.3	6.6	7.2	8.8	5.9/8.6	6.1/8.8	6.1/9.8	9.6/9.8
Cooling tower	Power demand	kW	5.5	11	11	/	/	/	/	/	/	/	/	/	/	/	/
	Operation weight	t	2.5	4.5	5.1	/	/	/	/	/	/	/	/	/	/	/	/
Enclosure	Ventilation power demand	kW	0.3	0.3	0.3	1.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	3.0	3.0	3.0
	Weight	t	0.5	0.7	0.8	3.4	3.4	3.9	3.9	5.2	5.6	6.3	6.8	11.0	11.5	14.5	15.5
Electricity and water consumption	Total power demand	kW	14.5	30.6	30.6	35.6	38.3	52.3	60.3	85.7	100.2	117.7	135.2	219.7	243.7	328.9	397.9
	Water demand for cooling	t/h	0.6	0.9	1.5	2.0	3.0	3.8	4.5	6.0	7.5	9	12	15	18	24	30

General Conditions:

1. Rated saturated steam pressure: 0.8 MPa, rated condensate temp: 95°C
2. Rated chilled W outlet/inlet temp: 7°C/14°C
3. Rated cooling W outlet/inlet temp: 37°C/30°C
4. Lowest permitted outlet temperature for chilled water: 5°C
5. Lowest permitted inlet temperature for cooling water: 10°C
6. Steam pressure upper limit 110%
7. Adjustable chilled water flowrate: 50%~120%
8. Pressure limit for chilled W, cooling W: 0.8MPa (except special order)
9. Adjustable load: 5%~115%
10. Fouling factor for chilled W, cooling W: 0.086 $m^2 \cdot K/kW$
11. LiBr Solution concentration: 52%. Solution weight is included in unit ship, wt.
12. Machine room ambient temperature: 5~43°C,humidity ⩽ 85%
13. Standard climate conditions for cooling operation: 36°C, relative humidity 50% (wet bulb 27°C)
14. Rated cooling COP: 1.41
15. Life design: 25 years

Performance Curves

The same as packaged direct-fired chiller. Please refer to P5 for details.

COP

Rated COP:1.41

IPLV COP:1.62

Load		COP	Factor	Result
A	100%	1.410	0.01	0.014
B	75%	1.627	0.42	0.683
C	50%	1.679	0.45	0.756
D	25%	1.356	0.12	0.163

Note:The integrated part load value (IPLV) reflects chiller's actual COP in operation. Condition & formula base on ARI560

Operating Noise dB(A)

Model BYS	20~50	75~200	⩾250
Steam chiller	⩽52	⩽53	⩽53
Pumpset	⩽57	⩽57	⩽59
Cooling tower	⩽62	/	/
outside enclosure	⩽40	⩽41	⩽42

Nomenclature

B S Y 200 X 0.8—Fa

- Product: B-BROAD
- Chiller type: S (steam type)
- Y-packaged chiller
- Cooling capacity: 10^4 kcal/h
- BROAD non-electric chiller design code (X indicates 10)
- Steam inlet pressure: 0.8 MPa
- High pressure type

Note: High pressure type (see P5)

Model Selection & Ordering

Steam selection

Please specify saturated steam pressure and temperature. The temperature of overheated steam should be ⩽180°C (except special order)

Other factors

Load, quantity, flow, pressure, split shipment, control, machine room, location, ordering and warranty are the same as those of packaged direct-fired chillers. Please refer to P6 for details.

Supply list

Refer to packaged DFA supply list on P7.

BS500

Packaged Hot W/Exhaust chiller Performance Data

BHY/BEY: hot water/exhaust from power generation or industrial waste streams
(pumpset, enclosure data are the same as steam chiller)

Code	Mode	Cooling capacity	Heating capacity	Chilled W		Cooling W		heating W		Hot water consump.	Exhaust consump.		Power demand	Solution wt.	Unit ship. wt.	Main shell ship wt.	HTG. wt.	Chiller operation weight
				Flowrate	Pressure drop	Flowrate	Pressure drop	Flowrate	Pressure drop		Cooling	Heating						
		kW	kW	m^3/h	kPa	m^3/h	kPa	m^3/h	kPa	m^3/h	kg/h	kg/h	kW	t	t	t	t	t
Two-stage hot water chiller BH hot water 180°C	20	233	/	28.6	30	48.8	50	/	/	10.1	/	/	1.7	1.0	4.5	/	/	5
	30	349	/	42.9	30	72.3	50	/	/	15.2	/	/	3.2	1.2	6.2	/	/	6.9
	50	582	/	71.4	30	122	50	/	/	25.2	/	/	4.3	2.2	8	/	/	9
	75	872	/	107	30	183	50	/	/	37.8	/	/	4.6	2.8	9.5	/	/	11
	100	1163	/	143	30	244	50	/	/	50.5	/	/	6.8	3.4	12	/	/	13
	125	1454	/	179	30	305	50	/	/	63.2	/	/	6.8	4.4	14	/	/	15
	150	1745	/	214	40	366	50	/	/	76	/	/	6.8	4.9	16	/	/	18
	200	2326	/	286	40	488	50	/	/	101	/	/	10.2	7.1	21	/	/	24
	250	2908	/	357	50	610	60	/	/	127	/	/	10.2	7.8	26	/	/	30
	300	3489	/	429	50	733	60	/	/	152	/	/	11.7	10.6	/	15	6	35
	400	4652	/	571	50	977	60	/	/	203	/	/	13.2	12.1	/	20	7	45
	500	5815	/	714	60	1221	70	/	/	253	/	/	17.7	14.8	/	24	9	55
	600	6978	/	857	60	1465	70	/	/	304	/	/	20.7	18.1	/	28	11	66
	800	9304	/	1143	60	1953	70	/	/	406	/	/	25.9	24.2	/	29	14	79
	1000	11630	/	1429	60	2442	70	/	/	507	/	/	34.9	30.5	/	30	17	92
Two-stage exhaust chiller BE exhaust 500°C	20	233	153	28.6	30	48.8	50	13.1	20	/	1527	1527	1.7	1.5	6.5	/	/	7
	30	349	230	42.9	30	72.3	50	19.6	20	/	2300	2300	3.2	2.2	8.9	/	/	9.6
	50	582	384	71.4	30	122	50	32.7	20	/	3814	3814	4.3	3.5	12	/	/	12.5
	75	872	575	107	30	183	50	49.0	20	/	5732	5732	4.6	4.4	14	/	/	16
	100	1163	767	143	30	244	50	65.4	20	/	7639	7639	6.8	5.7	18	/	/	20
	125	1454	959	179	30	305	50	81.8	20	/	9566	9566	6.8	6.6	22	/	/	24
	150	1745	1151	214	40	366	50	98	20	/	11494	11494	6.8	7.6	25	/	/	27
	200	2326	1534	286	40	488	50	131	30	/	15310	15310	10.2	10.8	33	/	/	36
	250	2908	1918	357	50	610	60	163	30	/	19165	19165	10.2	12.1	/	13	12	42
	300	3489	2301	429	50	733	60	196	40	/	22999	22999	11.7	15.8	/	15	15	50
	400	4652	3068	571	50	977	60	262	40	/	30688	30688	13.2	18.2	/	20	18	62
	500	5815	3835	714	60	1221	70	327	50	/	38349	38349	17.7	23.0	/	24	21	75
	600	6978	4602	857	60	1465	70	394	50	/	46024	46024	20.7	29.1	/	28	25	91
	800	9304	6137	1143	60	1953	70	523	60	/	61381	61381	25.9	36.5	/	29	32	110
	1000	11630	7671	1429	60	2442	70	654	60	/	76703	76703	34.9	41.0	/	30	40	125

General Conditions:

1. Rated hot W inlet/outlet temp for hot W chiller:180°C/165°C
2. Rated exhaust inlet/outlet temp for exhaust chiller: 500°C/160°C
3. Rated chilled W outlet/inlet temp: 7°C/14°C
4. Rated cooling W outlet/inlet temp: 37°C/30°C
5. Rated heating W outlet/inlet temp for two-stage exhaust chiller: 65°C/55°C
6. Lowest permitted outlet temperature for chilled water: 5°C
7. Lowest permitted inlet temperature for cooling water: 10°C
8. Adjustable chilled water flowrate: 50%~120%
9. Pressure limit for chilled/cooling water: 0.8MPa (except special order)
10. Adjustable load: 5%~115%
11. Fouling factor for chilled water, cooling W: 0.086 $m^2 \cdot K/kW$
12. LiBr Solution concentration: 52%, solution weight is included in unit shipment wt.
13. Machine room ambient temperature: 5~43°C, humidity ⩽ 85%
14. Rated cooling COP: 1.41
15. Rated heating COP for exhaust chiller: 0.93
16. Life design: 25 years
17. Please refer to P5, P6 & P7 for performance curve, model selection & ordering and supply list information.

Packaged Single-stage Steam/Hot W./Exhaust Chiller Performance Data BDSY/BDHY/BDEY: steam/hot water/exhaust

(pumpset, enclosure data are the same as steam chiller)

Code	Model	Cooling capacity	Chilled W		Cooling W		Steam consump.	Hot water consump.	Exhaust consump.	Exhaust consump.	Solution wt.	Unit ship. wt.	Main shell ship. wt.	Chiller operation weight
			Flowrate	Pressure drop	Flowrate	Pressure drop								
		kW	m^3/h	kPa	m^3/h	kPa	kg/h	m^3/h	kg/h	kW	t	t	t	t
Single-stage steam chiller BDS steam 0.1MPa	20	233	28.6	30	64.7	50	456	/	/	2.5	0.7	3.5	/	4
	30	349	42.9	30	97.1	50	688	/	/	2.5	0.8	4.5	/	5.1
	50	582	71.4	30	162	50	1146	/	/	2.5	1.7	6.5	/	7
	75	872	107	30	243	60	1714	/	/	5.3	2.2	8.5	/	9.5
	100	1163	143	30	324	60	2288	/	/	5.7	2.4	10.5	/	11.5
	125	1454	179	30	405	60	2863	/	/	5.7	3.2	12.5	/	14
	150	1745	214	40	486	60	3438	/	/	5.7	3.5	14	/	16
	200	2326	286	40	647	60	4581	/	/	8.6	5.5	20	/	22
	250	2908	357	50	809	70	5728	/	/	10.1	6.0	23.5	/	26
	300	3489	429	50	971	70	6876	/	/	10.1	8.2	28	/	31
	400	4652	571	50	1295	70	9167	/	/	13.9	8.9	32	/	37
	500	5815	714	60	1618	90	11465	/	/	13.8	11.7	/	27	44
	600	6978	857	60	1942	90	13757	/	/	17.5	14.5	/	29	49
Single-stage hot water chiller BDH hot water 98°C	20	209	25.2	25	59.5	50	/	24.4	/	2.5	0.7	3.5	/	4
	30	302	37.6	25	87.3	50	/	36	/	2.5	0.8	4.5	/	5.1
	50	512	62.9	25	146	50	/	60	/	2.5	1.7	6.5	/	7
	75	767	94.2	25	218	60	/	90	/	5.3	2.2	8.5	/	9.5
	100	1023	125	25	291	60	/	120	/	5.7	2.4	10.5	/	11.5
	125	1279	157	25	364	60	/	150	/	5.7	3.2	12.5	/	14
	150	1535	188	30	437	60	/	180	/	5.7	3.5	14	/	16
	200	2046	251	30	582	70	/	240	/	8.6	5.5	20	/	22
	250	2558	313	40	728	70	/	300	/	10.1	6.0	23.5	/	26
	300	3069	376	40	873	70	/	361	/	10.1	8.2	28	/	31
	400	4092	503	40	1164	70	/	481	/	13.9	8.9	33	/	37
	500	5115	628	50	1455	90	/	601	/	13.8	11.7	/	28	44
	600	6138	754	50	1746	90	/	722	/	17.5	14.5	/	30	50
Single-stage exhaust chiller BDE exhaust 300°C	20	233	28.6	30	64.7	50	/	/	5621	2.5	0.8	4	/	4.4
	30	349	42.9	30	97.1	50	/	/	8474	2.5	1.2	5	/	5.5
	50	582	71.4	30	162	50	/	/	14128	2.5	2.1	7	/	7.6
	75	872	107	30	243	60	/	/	21138	5.3	2.5	9	/	10
	100	1163	143	30	324	60	/	/	28218	5.7	2.8	11	/	12.5

General Conditions:

1. Rated saturated steam pressure for BDS chiller 0.1 MPa. Rated condensate temperature for BDS chiller: 95°C
2. Rated hot W inlet/outlet temp for single-stage hot W chiller: 98°C/88°C
3. Rated exhaust inlet/outlet temp for single-stage exhaust chiller: 300°C/130°C
4. Rated chilled W outlet/inlet temp: 7°C/14°C
5. Rated cooling W outlet/inlet temp: 37°C/30°C
6. Lowest permitted outlet temperature for chilled water: 5°C
7. Lowest permitted inlet temperature for cooling water: 10°C
8. Adjustable chilled water flowrate: 50%~120%
9. Pressure limit for chilled/cooling water: 0.8MPa (except special order)
10. Adjustable load: 5%~115%
11. Fouling factor for chilled W, cooling W: 0.086 $m^2 \cdot K/kW$
12. LiBr Solution concentration: 50%. Solution weight is included in unit shipment wt.
13. Machine room ambient temperature: 5~43°C, humidity ⩽ 85%
14. Rated COP: single-stage steam chiller and exhaust chiller: 0.79, single-stage hot W chiller: 0.76
15. Life design: 25 years
16. Please refer to P5, P6 & P7 for performance curve, model selection & ordering and supply list information.

Packaged Multi-energy Chiller Performance Data

BZEY/BHEY/BZHEY: gas (oil) and waste heat hybrid (multi-energy chiller)
(pumpset, enclosure data are the same as DFA)

Code	Mode	Cooling capacity	Heating capacity	Hot water capacity	Hhilled W		Heating water		Hot water		Cooling W		Power demand	Solution wt.
					Flowrate	Pressure drop	Flowrate	Pressure drop	Flowrate	Pressure drop	Flowrate	Pressure drop		
		kW	kW	kW	m^3/h	kPa	m^3/h	kPa	m^3/h	kPa	m^3/h	kPa	kW	t
Exhaust & direct-fired chiller BZE exhaust 500°C gas/oil	20	233	179	80	28.6	30	15.3	20	3.4	20	48.8	50	2.5	1.3
	30	349	269	120	42.9	30	23.1	20	5.2	20	73.3	50	4.2	1.6
	50	582	449	200	71.4	30	38.5	20	8.6	20	122	50	5.8	2.8
	75	872	672	300	107	30	57.9	20	12.9	20	183	50	6.1	3.5
	100	1163	897	400	143	30	77.1	20	17.2	20	244	50	9.8	4.4
	125	1454	1121	500	179	30	96.4	20	21.5	20	305	50	9.8	5.4
	150	1745	1349	600	214	40	116	20	25.8	20	366	50	11.6	6.1
	200	2326	1791	800	286	40	153	30	34.4	30	488	50	16.7	8.5
	250	2908	2245	1000	357	50	193	30	43.0	30	610	60	16.7	10.0
	300	3489	2687	1200	429	50	231	40	51.6	40	733	60	21.7	12.7
	400	4652	3582	1600	571	50	308	40	68.8	40	977	60	25.2	14.9
	500	5815	4489	/	714	60	385	50	/	/	1221	70	31.9	19.0
	600	6978	5385	/	857	60	463	50	/	/	1465	70	40.7	23.1
	800	9304	7176	/	1143	60	617	60	/	/	1953	70	49.9	30.2
	1000	11630	8967	/	1429	60	771	60	/	/	2442	70	63.3	36.2
Hot W & exhaust chiller BHE exhaust 500°C hot W 98°C	20	233	153	/	28.6	30	11.6	15	/	/	52.5	50	1.7	1.6
	30	349	230	/	42.9	30	19.6	20	/	/	73.3	50	3.2	2.3
	50	582	384	/	71.4	30	29.3	15	/	/	131	50	4.3	3.6
	75	872	575	/	107	30	43.8	15	/	/	196	50	4.6	4.5
	100	1163	767	/	143	30	58.4	15	/	/	262	50	6.8	5.8
	125	1454	959	/	179	30	73.0	15	/	/	327	50	6.8	6.8
	150	1745	1151	/	214	40	88.2	15	/	/	393	50	6.8	7.8
	200	2326	1534	/	286	40	117	25	/	/	525	50	10.2	11.0
	250	2908	1918	/	357	50	146	25	/	/	655	60	10.2	12.6
	300	3489	2301	/	429	50	175	35	/	/	787	60	11.7	16.2
	400	4652	3068	/	571	50	233	35	/	/	1049	60	13.2	18.7
	500	5815	3835	/	714	60	293	45	/	/	1311	70	17.7	23.7
	600	6978	4602	/	857	60	351	45	/	/	1573	70	20.7	29.8
	800	9304	6137	/	1143	60	467	55	/	/	2097	70	25.9	37.2
	1000	11630	7671	/	1429	60	584	55	/	/	2622	70	34.9	42.0
Hot W & exhaust & direct-fired chiller BZHE exhaust 500°C hot W 98°C	20	233	179	80	28.6	30	15.3	20	3.4	20	52.5	50	2.5	1.4
	30	349	269	120	42.9	30	23.1	20	5.2	20	78.7	50	4.2	1.7
	50	582	449	200	71.4	30	38.5	20	8.6	20	131	50	5.8	2.9
	75	872	672	300	107	30	57.9	20	12.9	20	196	50	6.1	3.6
	100	1163	897	400	143	30	77.1	20	17.2	20	262	50	9.8	4.5
	125	1454	1121	500	179	30	96.4	20	21.5	20	327	50	9.8	5.6
	150	1745	1349	600	214	40	116	20	25.8	20	393	50	11.6	6.3
	200	2326	1791	800	286	40	153	30	34.4	30	525	50	16.7	8.7
	250	2908	2245	1000	357	50	193	30	43.0	30	655	60	16.7	10.5
	300	3489	2687	1200	429	50	231	40	51.6	40	787	60	21.7	13.1
	400	4652	3582	1600	571	50	308	40	68.8	40	1049	60	25.2	15.4
	500	5815	4489	/	714	60	385	50	/	/	1311	70	31.9	19.7
	600	6978	5385	/	857	60	463	50	/	/	1573	70	40.7	23.8
	800	9304	7176	/	1143	60	617	60	/	/	2097	70	49.9	30.9
	1000	11630	8967	/	1429	60	771	60	/	/	2622	70	63.3	37.2

Energy consump							Unit ship. wt.	Main shell ship wt.	HTG. wt.	Operation wt.
Cooling			Heating		Hot water					
NG	Exhaust	Hot W	NG	Exhaust	NG	Exhaust				
m^3h	kg/h	m^3/h	m^3/h	kg/h	m^3/h	kg/h	t	t	t	t
16.9	458	/	19.2	458	8.5	458	6	/	/	6.3
25.4	690	/	28.8	690	12.8	690	8.2	/	/	8.6
42.2	1144	/	48.1	1144	21.4	1144	11	/	/	11.5
63.4	1720	/	71.9	1720	32.0	1720	14	/	/	15
84.5	2292	/	96.1	2292	42.7	2292	18	/	/	19
106	2870	/	120	2870	53.5	2870	21	/	/	22.5
127	3448	/	144	3448	64	3448	23	/	/	25
169	4593	/	192	4593	85	4593	31	/	/	34
212	5749	/	241	5749	107	5749	/	13	14	41
254	6900	/	288	6900	128	6900	/	15	15	47
340	9206	/	384	9206	171	9206	/	20	16	57
424	11505	/	481	11505	/	/	/	24	21	72
509	13807	/	577	13807	/	/	/	28	26	86
679	18414	/	769	18414	/	/	/	29	24	95
848	23011	/	961	23011	/	/	/	30	34	114
/	1527	6.6	/	1527	/	/	6.6	/	/	7
/	2300	9.9	/	2300	/	/	9.0	/	/	9.7
/	3814	16.4	/	3814	/	/	12	/	/	12.7
/	5732	24.7	/	5732	/	/	15	/	/	16
/	7639	32.9	/	7639	/	/	19	/	/	20.5
/	9566	41.1	/	9566	/	/	22.5	/	/	25
/	11494	49.3	/	11494	/	/	25.5	/	/	28
/	15310	65.8	/	15310	/	/	34	/	/	37
/	19165	82.2	/	19165	/	/	/	13	14	43
/	22999	98.7	/	22999	/	/	/	15	21	57
/	30688	132	/	30688	/	/	/	20	22	67
/	38349	164	/	38349	/	/	/	24	29	85
/	46024	197	/	46024	/	/	/	28	37	109
/	61381	263	/	61381	/	/	/	29	42	120
/	76703	329	/	76703	/	/	/	30	47	133
16.9	458	6.6	19.2	458	8.5	458	6.5	/	/	7
25.4	690	9.9	28.8	690	12.8	690	8.6	/	/	9.2
42.2	1144	16.4	48.1	1144	21.4	1144	11.5	/	/	12.2
63.4	1720	24.7	71.9	1720	32.0	1720	15	/	/	16
84.5	2292	32.9	96.1	2292	42.7	2292	19	/	/	20
106	2870	41.1	120	2870	53.5	2870	22	/	/	24
127	3448	49.3	144	3448	64	3448	24.5	/	/	26.5
169	4593	65.8	192	4593	85	4593	33	/	/	36
212	5749	82.2	241	5749	107	5749	/	13	15	43
254	6900	98.7	288	6900	128	6900	/	15	16	49
340	9206	132	384	9206	171	9206	/	20	19	60
424	11505	164	481	11505	/	/	/	24	25	76
509	13807	197	577	13807	/	/	/	28	30	91
679	18414	263	769	18414	/	/	/	29	37	109
848	23011	329	961	23011	/	/	/	30	50	131

General Conditions:

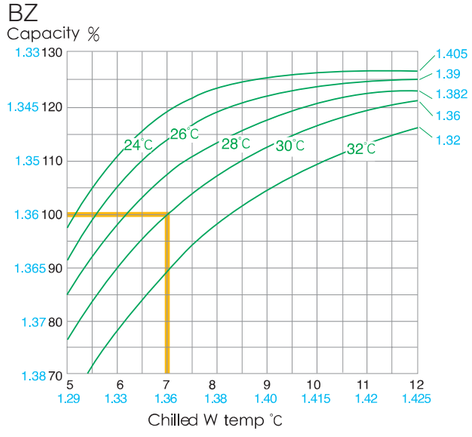
1. Rated chilled W outlet/inlet temp: 7°C/14°C
2. Rated cooling W outlet/inlet temp: 37°C/30°C
3. Rated heating W outlet/inlet temp: 65°C/55°C
4. Rated hot W outlet/inlet temp: 80°C/60°C
5. Lowest permitted outlet temperature for chilled water: 5°C
6. Highest permitted outlet temperature for heating/ hot water: 95°C
7. Lowest permitted inlet temperature for cooling water: 10°C
8. Adjustable chilled water flowrate: 50%~120%
9. Adjustable heating/hot water flowrate: 65%~120%
10. Pressure limit for chilled W, cooling W, heating W, hot W 0.8MPa (except special order)
11. Adjustable load: 5%~115%
12. Fouling factor for chilled W, cooling W, heating W, hot W: 0.086$m^2 \cdot K/kW$
13. LiBr Solution concentration: 52%. Solution weight is included in unit ship. wt.
14. Natural gas consumption is calculated: 10kWh/m^3(8600kcal/m^3).
15. Standard natural gas pressure is 16~50kPa (1600~5000mmH_2O), lower or higher pressure can be accommodated to special orders
16. Machine room ambient temperature: 5~43°C, humidity ⩽ 85%
17. Standard climate conditions for cooling operation: 36°C, relative humidity 50%(wet bulb 27°C)
18. Exhaust provides 30% of the total capacity per standard design of BZE/BZHE. Over 30% can be accommondated into special orders.
19. Energy consumption is for seperate operation of heat source and fuel
20. Life design: 25 years
21. Please refer to P5, P6 & P7 for performance curve, model selection & ordering and supply list information

Model Selection Curves

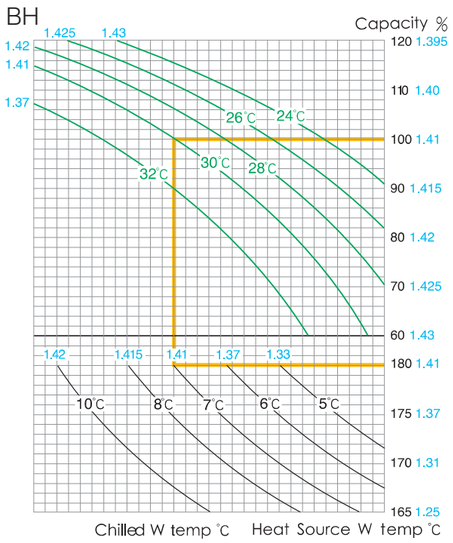
(orange means the rated value)

chilled/cooling water temp, cooling capacity, COP

BZ



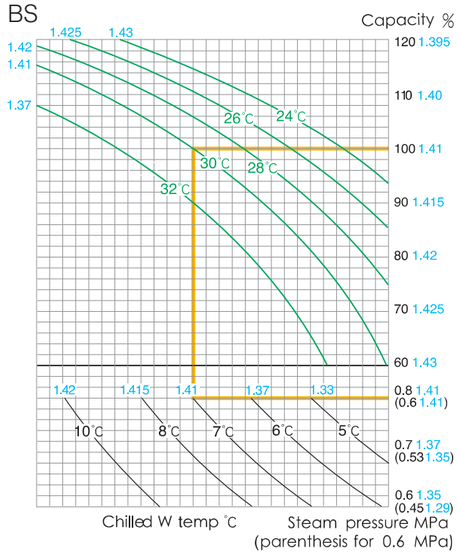
BH



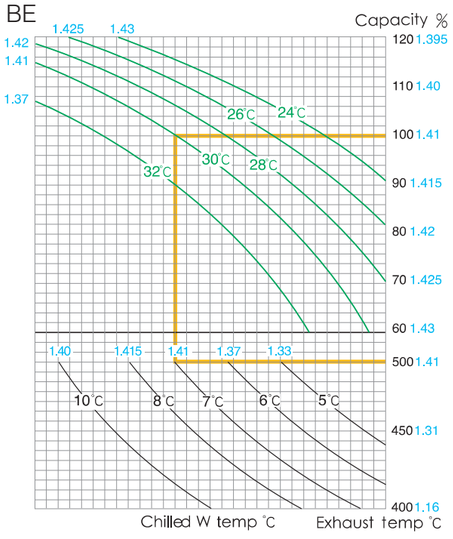
Notes: The figure in blue is COP. In calculation, 3 COP values are added and then divided by 3. e.g.

1. Cooling capacity is 100%, cooling water temp. is 28℃ , then chilled water temp. is 6.2℃ ,COP is1.358,i.e.(1.36+1.382+1.332)/3=1.358
2. Chilled water temp. is 10℃ , cooling water temp. is 30℃ , then cooling capacity is 116%, COP=1.374
3. Cooling capacity is 90%, chilled water is 6℃ , then cooling water temp is 30℃ , COP=1.352

BS



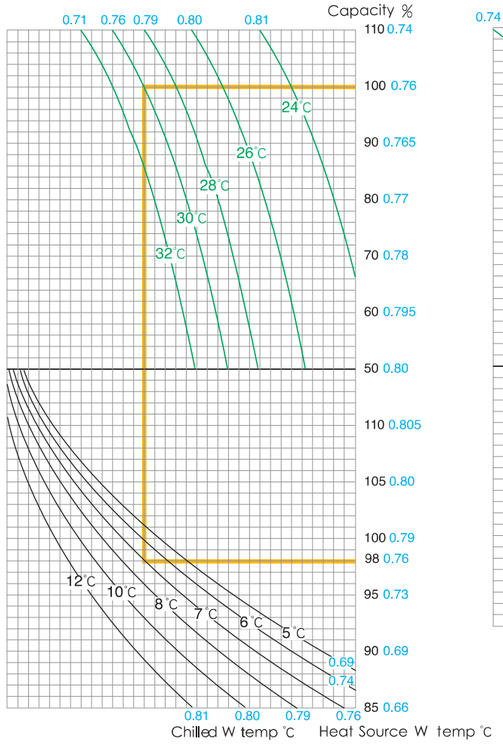
BE



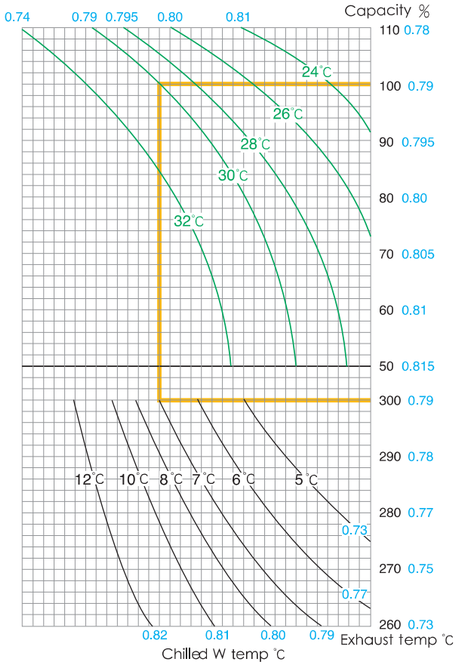
Notes: The figure in blue is COP. In calculation, 4 COP values are added and then divided by 4. e.g.

1. Cooling capacity is 100%, steam pressure 0.6 MPa, cooling water temp. is 28℃ , then chilled water temp. is 8.2℃ ,COP is 1.399,i.e.(1.41+1.42+1.35+1.416)/4=1.399
2. Steam pressure 0.7 MPa, chilled water temp. is 8℃ , cooling water temp. is 28℃ , then cooling capacity is 106%, COP=1.402
3. Cooling capacity is 90%, steam pressure 0.8 MPa, chilled water is 6℃ , then cooling water temp. is 30.5℃ , COP=1.396 (steam pressure 0.8 MPa)

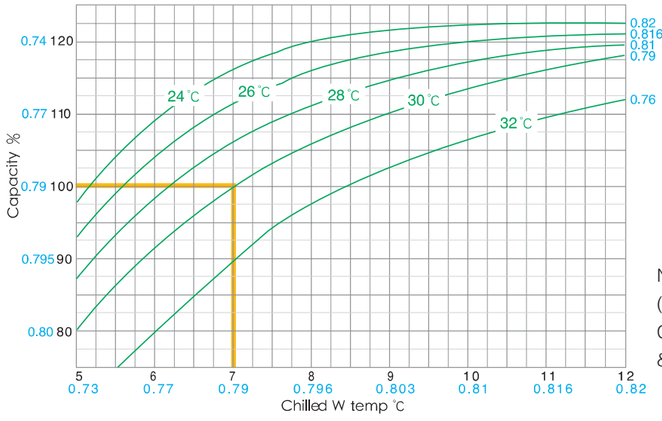
BDH



BDE



BDS



Note: The figure in blue is COP (BH, BE, BDH, BDE, BDS). Calculation is the same with BZ & BS models.

Performance Data

Mode		BCT23	BCT70	BCT115
Cooling capacity	kW	23	70	115
	Rt	6.6	20	33
Heating capacity	kW	23	70	115
Hot W.capacity	kW	7.7	39	39
A/C water				
Chilled water O/temp	℃	7/14	7/14	7/14
Heating water O/I temp	℃	57/50	57/50	57/50
Flowrate	m^3/h	2.9	8.6	14.3
External head	mH_2O	8	11	12
Hot W.				
Primary heating water O/I temp	℃	80/60	80/60	80/60
Flowrate	m^3/h	0.33	1.68	1.68
NG consumption				
Cooling	m^3/h	2.1	6.4	10.5
Heating	m^3/h	2.6	7.8	13.0
Hot W.	m^3/h	0.9	4.3	4.3
Electricity and water consumption				
Electricity for cooling	kW	1.8	5.2	7.2
Electricity for heating	kW	0.7	1.7	2.3
Water for cooling	t/h	0.06	0.18	0.30
Operating noise	dB(A)	63	65	65
Ship. weight	kg	550	1650	2480
A/C W hold-up volume	kg	10	32	48

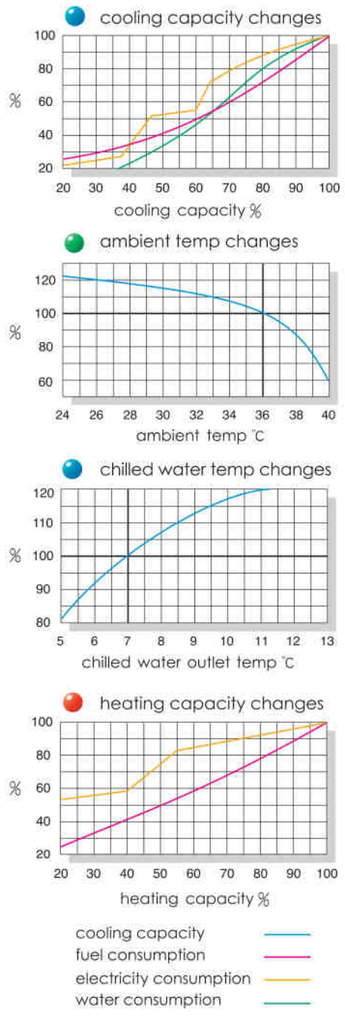
Others:

1. Fuel: NG, Town gas, LPG, Light oil, please specify it in purchase orders.
2. Natural gas consumption is calculated 10 kWh/m^3 (8,600 $kcal/m^3$).
3. Standard gas pressure: 200~650 mmH_2O. Pressure release valve has to be installed if the pressure is higher than the standard.
4. Standard condition for cooling: 36°C , humidity 50%.
5. Permitted condition: summer ⩽ 45°C winter ⩾ -30°C.
6. Lowest permitted outlet temp. for chilled W: 5°C. Pressure limit for chilled/ heating/ hot W: 40 mH_2O.
7. Hot W can only be used after secondary heat exchange, otherwise it gets scaled.
8. Single phase power for BCT23 and 3 phase for BCT70/115.
9. Rated cooling COP: 110% Rated heating COP: 88%.

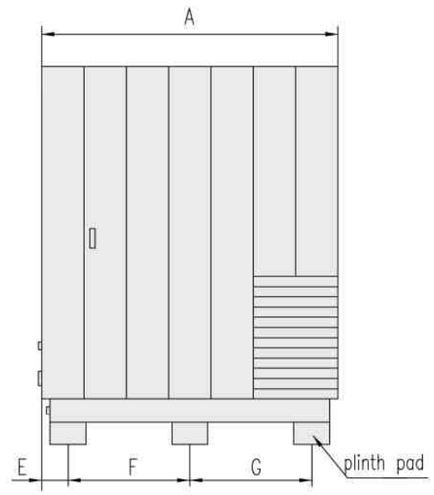
Model Selection & Ordering

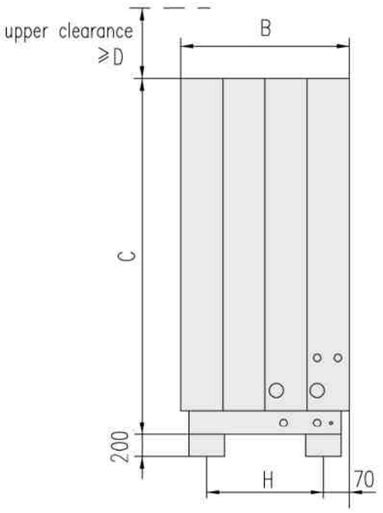
- BROAD recommendations are as follows:
  1 unit for buildings ⩽ 300m^2
  1~2 units for buildings ⩽ 2000m^2
  2~3 units for buildings > 2000m^2
  For year-round non-stop operation, at least 2 units are recommended, but standby units are not recommended. Several units can be incorporated into an integrated system.
- Lead time: 2~4 months for small quantity orders. Orders greater than 300 units, take at least 4 months.

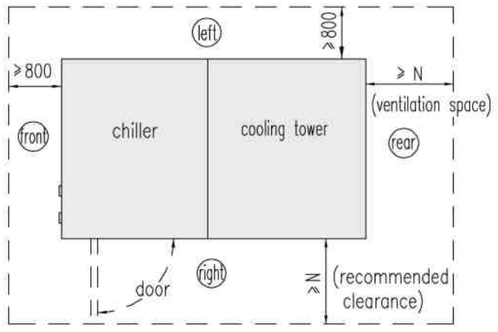
Performance Curves

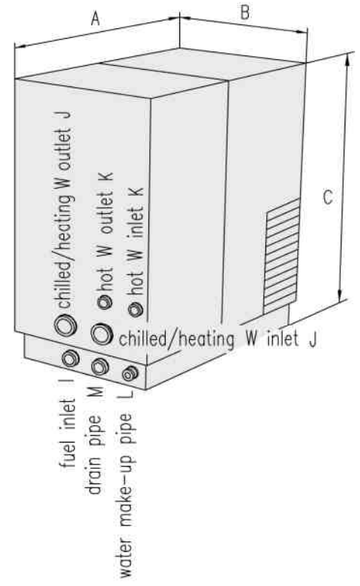


Micro Non-electric Chiller Dimensions







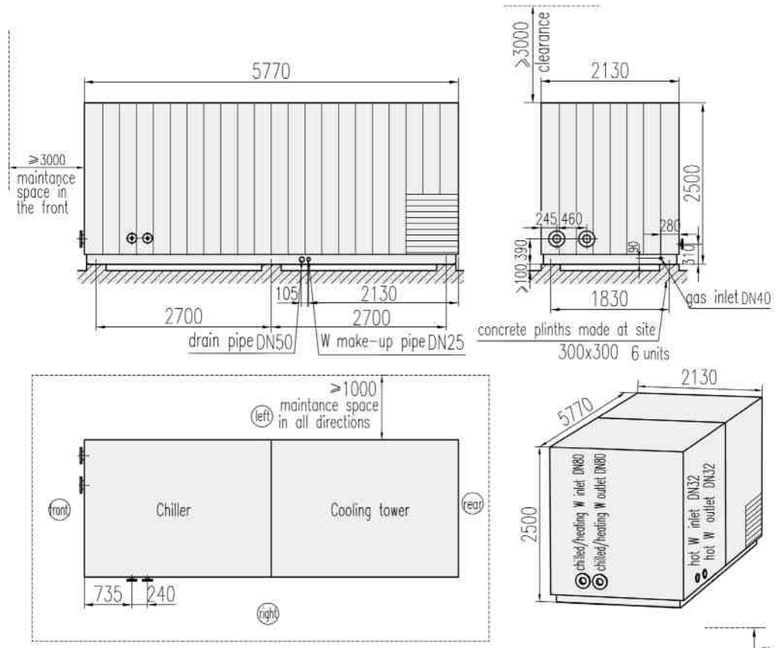


Mode	A	B	C	D	E	F	G	H	I	J	K	L	M	N
BCT23	1350	830	2230	2000	115	390	770	680	Φ22	Φ42	Φ15	Φ15	Φ22	800
BCT70	2250	1610	2230	2500	145	905	1055	1460	Φ35	Φ67	Φ35	Φ15	Φ35	1000
BCT115	2770	1610	2230	2500	145	1020	1460	1460	Φ35	Φ67	Φ35	Φ15	Φ35	1000

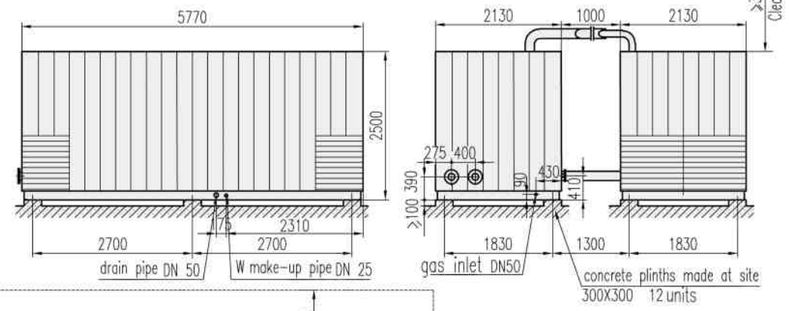
Note: All units are in mm.

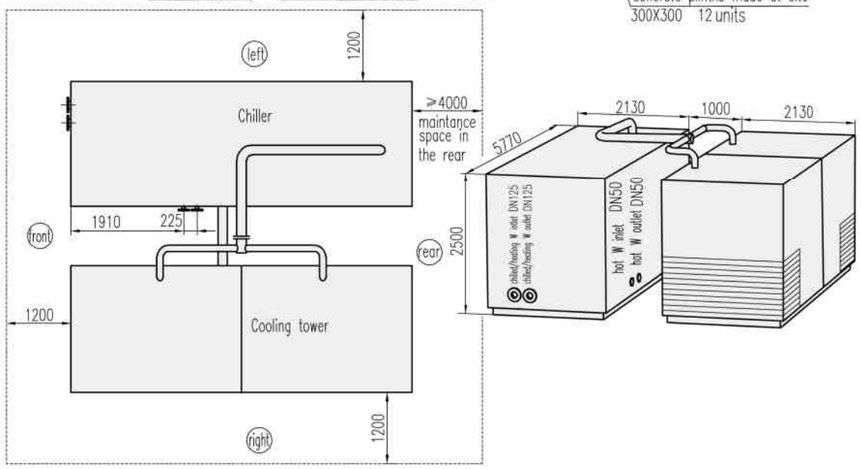
Packaged DFA

BZY20



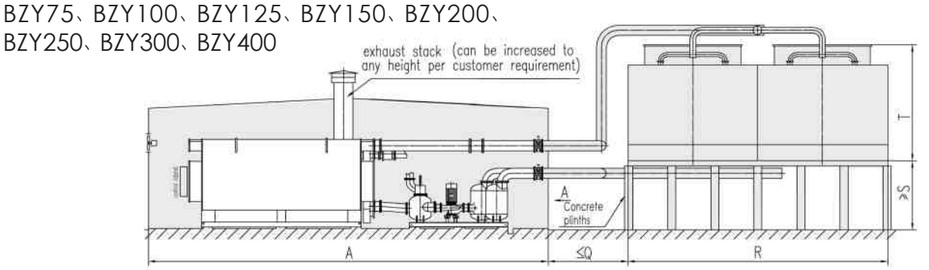
BZY30、BZY50

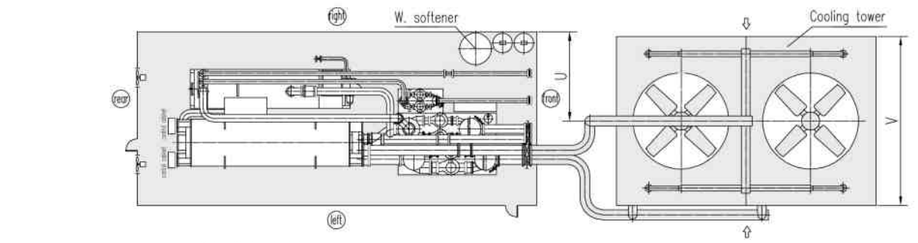


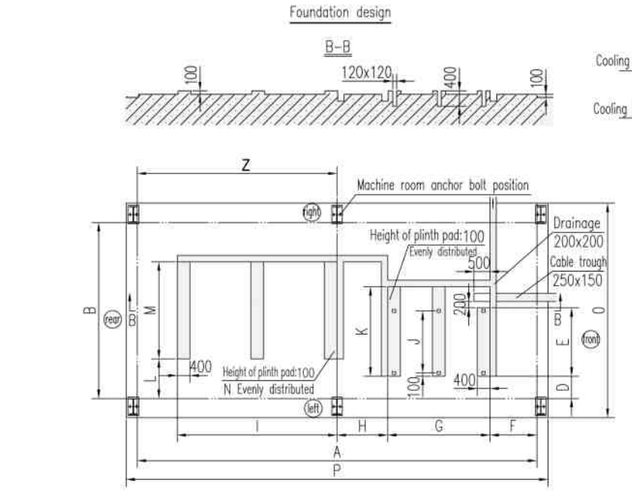


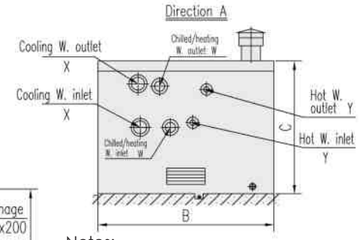
Packaged DFA Dimensions (with metal machine room)

BZY75、BZY100、BZY125、BZY150、BZY200、
BZY250、BZY300、BZY400









Notes:

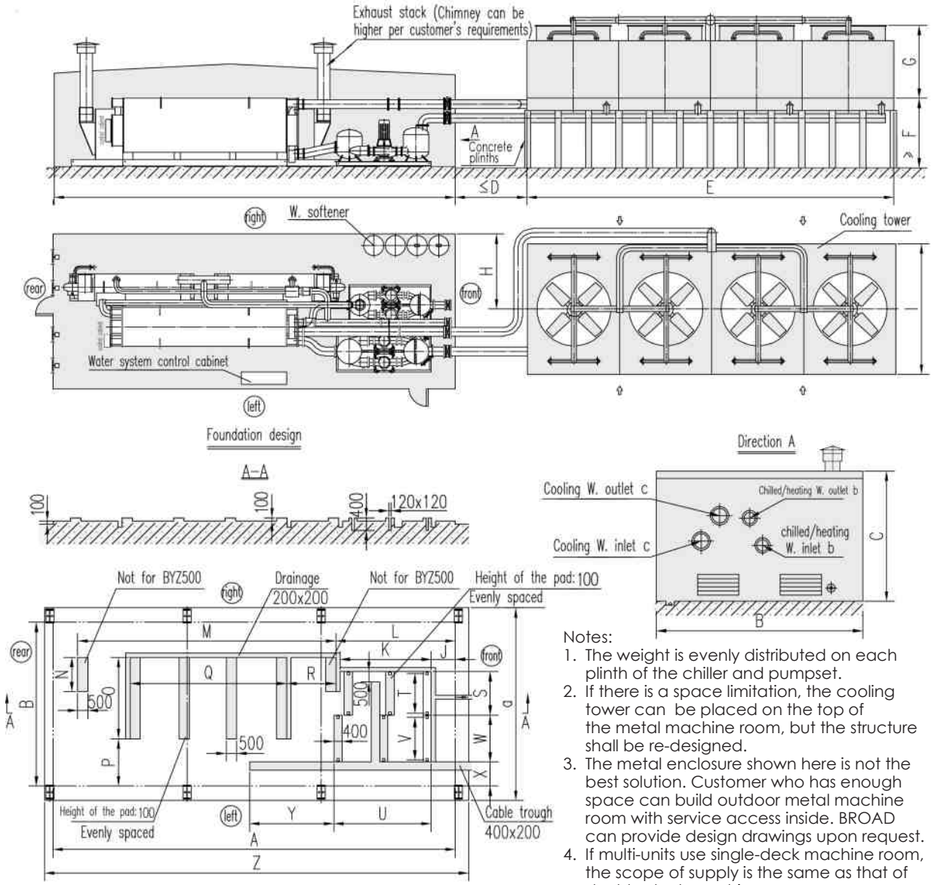
1. The weight is evenly distributed on each plinth of the chiller and pumpset.
2. If there is a space limitation, the cooling tower can be placed on the top of the metal machine room, but the structure shall be re-designed.
3. The metal enclosure shown here is not the best solution. Customer who has enough space can build outdoor metal machine room with service access inside. BROAD can provide design drawings upon request.

Mode	A	B	C	D	E	F	G	H	I	J	K	L	M
BZY75	10000	4500	3235	640	1955	755	2700	1075	4000	1755	2575	860	2300
BZY100	10000	4500	3235	745	1905	630	2900	1200	4000	1705	2525	900	2600
BZY125	11500	4500	3675	575	2045	820	2900	1330	5000	1845	2665	785	2600
BZY150	11500	4500	3675	575	2045	965	2900	1330	5000	1845	2705	775	2800
BZY200	12500	5000	4150	695	2215	965	3200	1585	5000	2015	2875	965	3400
BZY250	13500	5000	4240	540	2215	965	3200	1670	6000	2015	2875	795	3400
BZY300	14000	5500	4260	740	2215	1030	3450	1755	6000	2015	3035	1045	3700
BZY400	14500	6000	4880	625	2485	1100	3700	1850	6000	2285	3265	905	4000

Mode	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
BZY75	2	5400	10700	1500	4154	2055	3113	3235	3912	DN150	DN200	DN65	4600
BZY100	2	5400	10700	1500	5207	2040	3124	2340	4318	DN150	DN200	DN65	4600
BZY125	3	5400	12200	2000	6125	2115	3656	2250	6070	DN200	DN250	DN80	5250
BZY150	3	5400	12200	2000	6125	2115	3656	2230	6070	DN200	DN250	DN80	5250
BZY200	3	6000	13200	2000	7343	2505	3656	2500	6401	DN250	DN300	DN125	5750
BZY250	3	6000	14200	2000	8560	2560	3651	1995	6833	DN250	DN350	DN125	6250
BZY300	3	6500	14700	2500	8560	2580	3651	2255	6833	DN300	DN350	DN125	6500
BZY400	3	7000	15200	3000	7373	2588	5739	3000	6833	DN300	DN400	DN150	6500

Packaged DFA Dimensions(with metal machine room)

BZY500、BZY600、BZY800、BZY1000



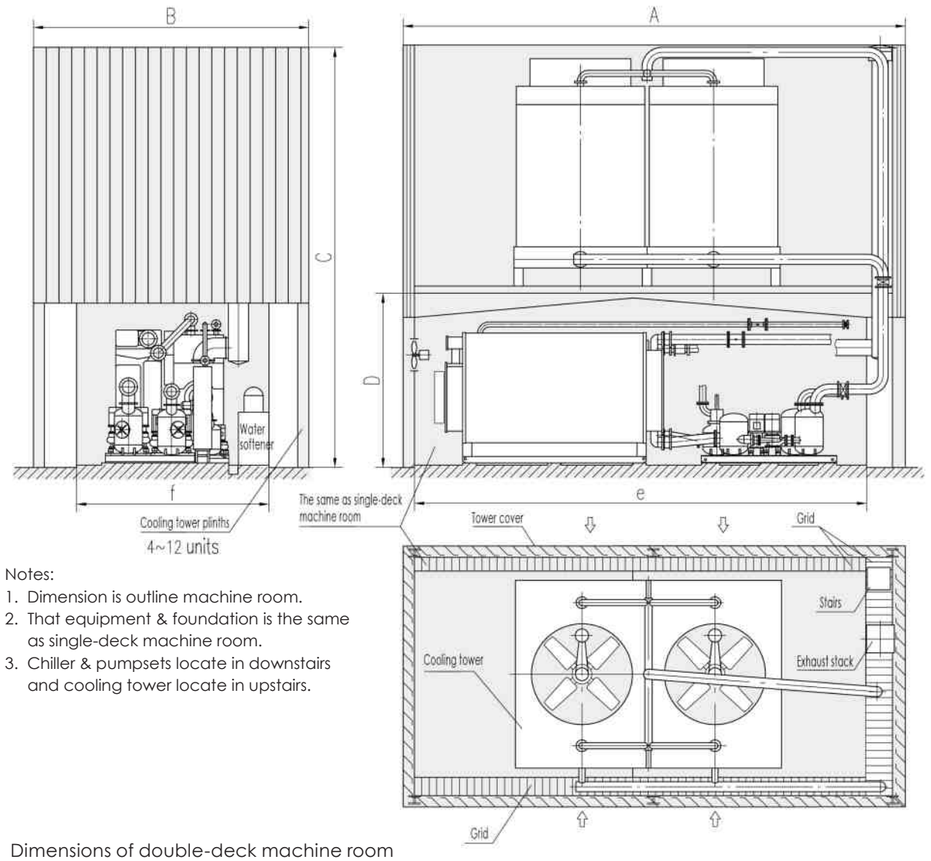
Notes:

1. The weight is evenly distributed on each plinth of the chiller and pumpset.
2. If there is a space limitation, the cooling tower can be placed on the top of the metal machine room, but the structure shall be re-designed.
3. The metal enclosure shown here is not the best solution. Customer who has enough space can build outdoor metal machine room with service access inside. BROAD can provide design drawings upon request.
4. If multi-units use single-deck machine room, the scope of supply is the same as that of double-deck machine room

Mode	A	B	C	D	E	F	G	H	I	J
BZY500	17000	6500	4500	3000	12885	3290	3652	3325	6833	960
BZY600	19500	6500	5000	3500	17210	3375	3652	4110	6833	1165
BZY800	19500	7200	5500	3500	14840	3485	5739	3415	6833	1065
BZY1000	21200	7200	5500	4000	18485	3560	5739	3670	6833	1405
Model	K	L	M	N	O	P	Q	R	S	T
BZY500	3260	/	/	/	4100	1310	8000	7560	1350	1210
BZY600	4000	5665	13000	1835	3900	1445	8000	2500	1490	1350
BZY800	4000	5565	13000	2000	4500	1715	8000	2500	1440	1300
BZY1000	4000	6905	13000	2340	4500	1710	10000	1500	1530	1370
Model	U	V	W	X	Y	Z	a	b	c	
BZY500	4600	1360	1500	905	3800	17900	7600	DN350	DN400	
BZY600	4600	1360	1500	1115	4200	20400	7600	DN400	DN450	
BZY800	5000	1360	1500	1335	4600	20400	8300	DN450	DN500	
BZY1000	5000	1360	1500	1295	4600	22150	8300	DN450	DN500	

Packaged DFA Dimensions (with enclosure)

BZY75、BZY100、BZY125、BZY150、BZY200、BZY250
BZY300、BZY400、BZY500、BZY600、BZY800、BZY1000



Notes:

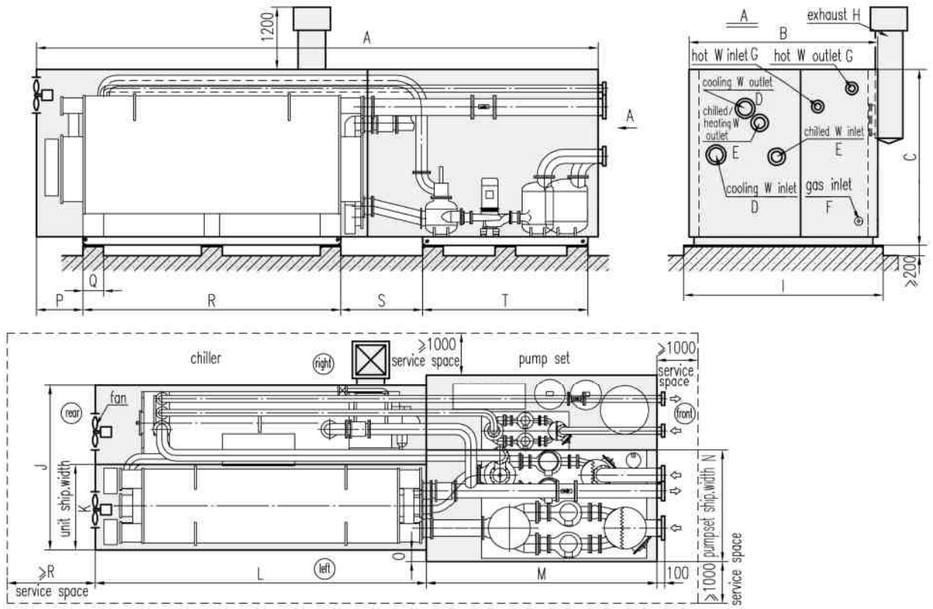
1. Dimension is outline machine room.
2. That equipment & foundation is the same as single-deck machine room.
3. Chiller & pumpsets locate in downstairs and cooling tower locate in upstairs.

Dimensions of double-deck machine room

Code	Mode	A	B	C	D	e	f
1	BZY75、BZY100	11500	5500	9000	3300	10000	4500
2	BZY125、BZY150	13000	6800	10000	3800	11500	4500
3	BZY200	14000	6800	11000	4200	12500	5000
4	BZY250BZY300、BZY400 BZY75×2、BZY100×2 BZY125×2、BZY150×2	16000	8000	11500	4900	14500	7500
5	BZY500、BZY600 BZY200×2、BZY250×2	21000	9500	12500	5100	19500	9000
6	BZY800 BZY300×2、BZY200×3	21000	10500	12500	5600	19500	10000
7	BZY1000 BZY400×2	25000	11500	13500	5600	21200	11000
8	BZY600×2、BZY400×3	21000	20000	12500	5100	21000	20000
9	BZY800×2、BZY500×3	21000	21000	12500	5600	21000	21000
10	BZY1000×2	25000	22000	13500	5600	25000	22000

Packaged DFA Dimensions (with enclosure)

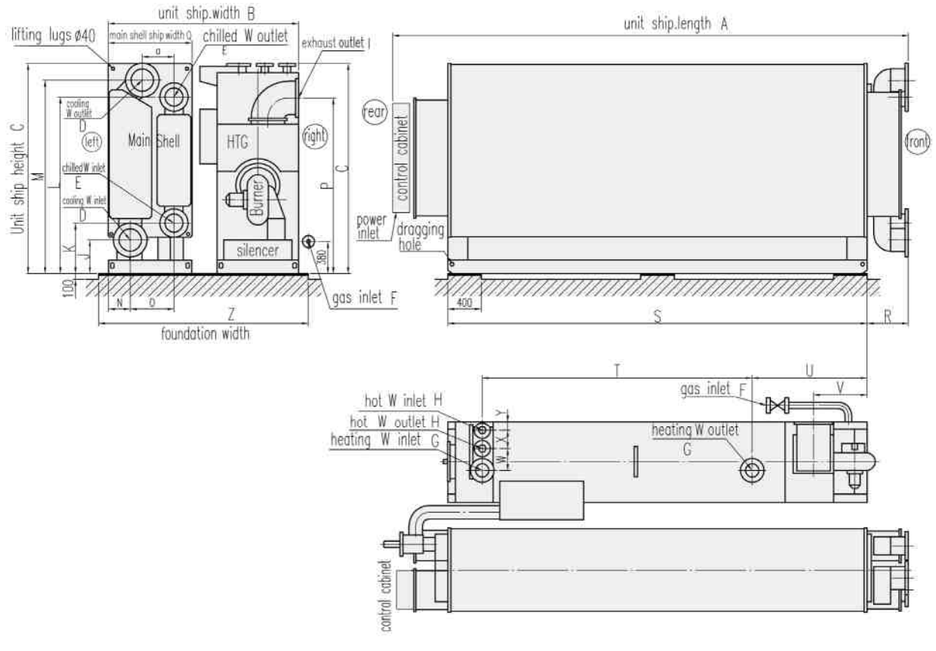
BZY75、BZY100、BZY125、BZY150
BZY200、BZY250、BZY300、BZY400、BZY500



Mode	A	B	C	D	E	F	G	H	I	J
BZY75	8825	2630	2950	DN200	DN150	DN25	DN65	320×320	2830	2100
BZY100	9000	2630	2950	DN200	DN150	DN40	DN65	350×350	2830	2480
BZY125	10100	3180	2970	DN250	DN200	DN40	DN80	400×400	3380	2540
BZY150	10100	3250	3400	DN250	DN200	DN40	DN80	440×440	3450	2740
BZY200	10800	3560	3400	DN300	DN250	DN50	DN125	560×560	3800	3180
BZY250	11400	3560	3440	DN350	DN250	DN50	DN125	560×560	3800	3180
BZY300	12600	3800	3440	DN350	DN300	DN65	DN125	610×610	4000	3560
BZY400	12750	4200	3800	DN400	DN300	DN65	DN150	710×710	4400	4000
BZY500	16000	4000	3800	DN400	DN350	DN80	/	790×790	4600	4000
Mode	K	L	M	N	O	P	Q	R	S	T
BZY75	1100	4855	3970	1930	200	850	400	4000	1075	2700
BZY100	1350	6100	2900	1930	150	850	400	4000	1200	2900
BZY125	1350	6400	3700	2000	90	870	400	5000	1330	2900
BZY150	1450	6400	3700	2000	0	870	400	5000	1330	2900
BZY200	1590	6450	4350	2140	190	900	400	5000	1500	3200
BZY250	1590	7350	4050	2140	190	800	400	6000	1300	3200
BZY300	2000	8800	3800	1500	240	1100	400	6000	1755	3450
BZY400	2000	8950	3800	1500	200	1100	400	6000	1850	3700
BZY500	2000	10900	5100	2140	420	1100	500	8000	2000	4600

DFA Dimensions

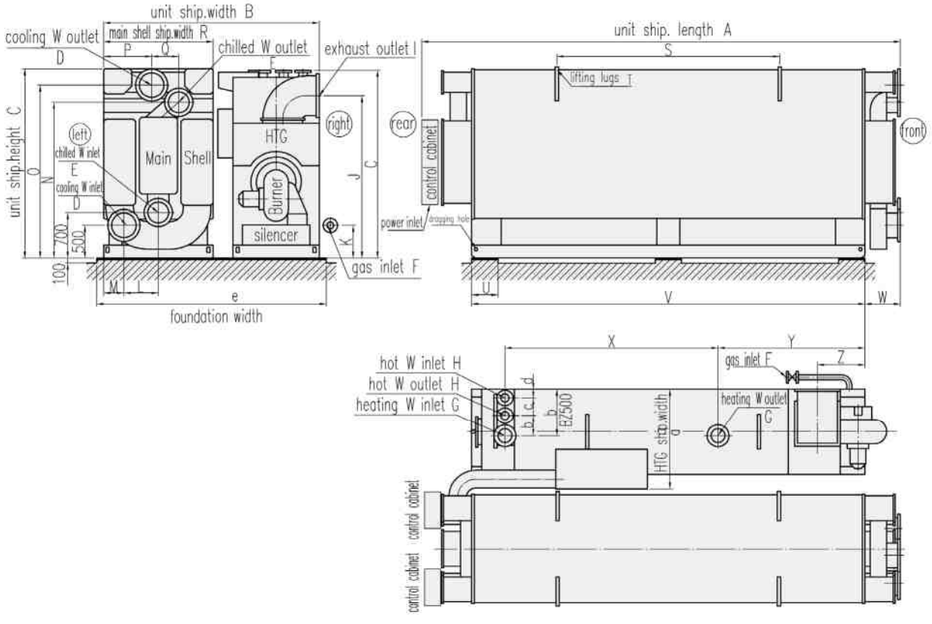
BZ75、BZ100、BZ125、BZ150



Mode	A	B	C	D	E	F	G	H	I
BZ75	5420	2150	2510	DN200	DN150	DN25	DN100	DN65	320×320
BZ100	5420	2450	2510	DN200	DN150	DN40	DN125	DN65	350×350
BZ125	6550	2450	2510	DN250	DN200	DN40	DN150	DN80	400×400
BZ150	6600	2650	2930	DN250	DN200	DN40	DN150	DN80	440×440
Mode	J	K	L	M	N	O	P	Q	R
BZ75	400	600	2100	2300	210	440	2220	1250	490
BZ100	400	600	2100	2300	260	525	2215	1450	490
BZ125	400	600	2100	2300	260	520	2090	1550	540
BZ150	500	700	2400	2705	275	515	2505	1550	540
Mode	S	T	U	V	W	X	Y	Z	a
BZ75	4000	3180	650	300	220	200	100	2300	380
BZ100	4000	3180	650	285	240	210	100	2600	380
BZ125	5000	3220	1370	640	260	220	110	2600	380
BZ150	5000	3220	1370	620	260	220	110	2800	220

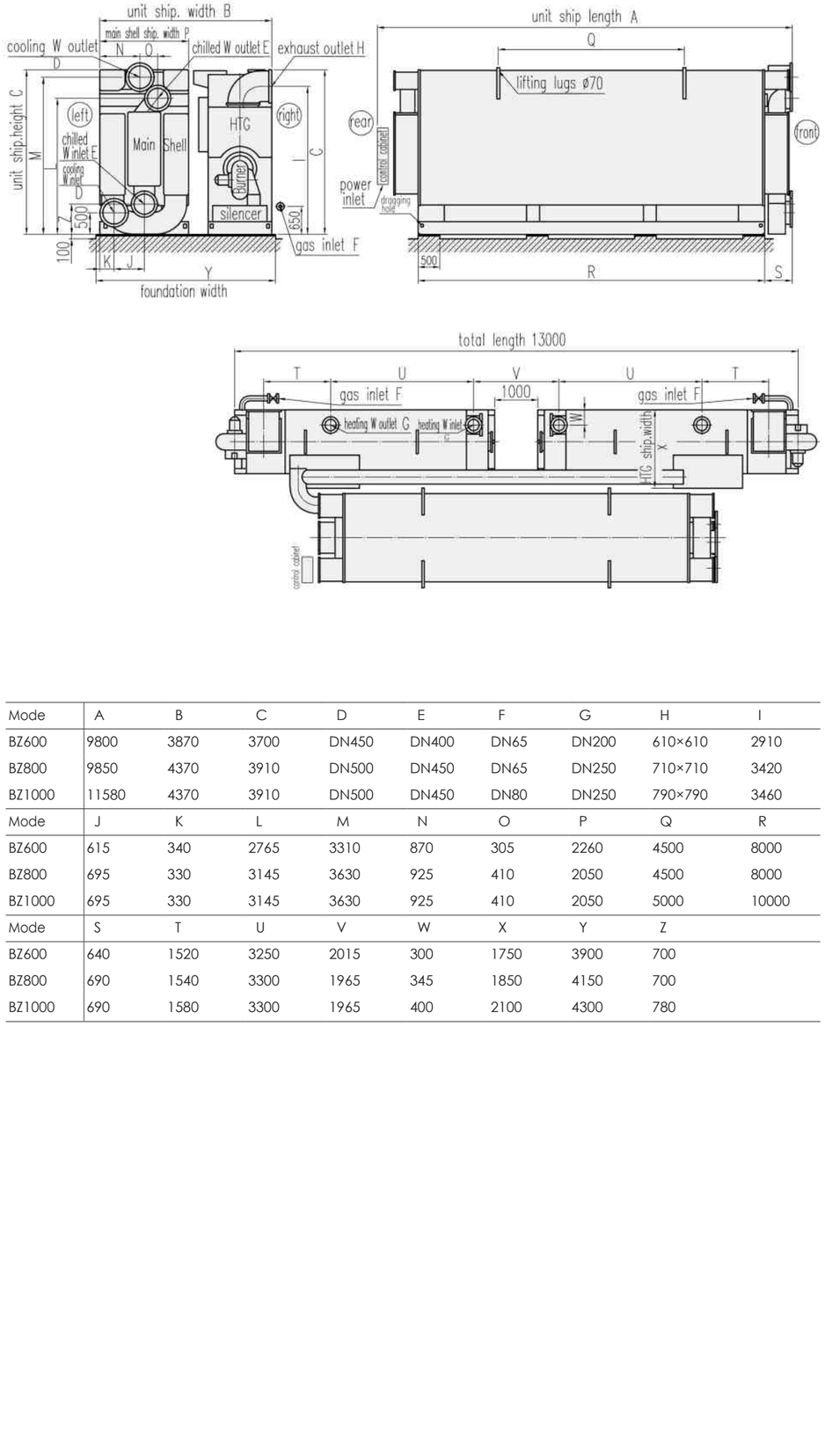
DFA Dimensions

BZ200、BZ250、BZ300、BZ400、BZ500



Mode	A	B	C	D	E	F	G	H	I	J	K
BZ200	6600	3200	3000	DN300	DN250	DN50	DN200	DN125	560×560	2470	500
BZ250	7700	3200	3000	DN350	DN250	DN50	DN200	DN125	560×560	2510	500
BZ300	7950	3530	3000	DN350	DN300	DN65	DN200	DN125	610×610	2490	500
BZ400	7950	3850	3400	DN400	DN300	DN65	DN250	DN150	710×710	2905	650
BZ500	9700	4100	3400	DN400	DN350	DN80	DN250	/	790×790	2945	650
Mode	L	M	N	O	P	Q	R	S	T	U	V
BZ200	430	295	2360	2670	725	285	2100	3000	Φ60	400	5000
BZ250	415	310	2350	2650	725	340	2100	3400	Φ60	400	6000
BZ300	525	310	2390	2650	735	410	2400	3400	Φ60	400	6000
BZ400	565	325	2720	3020	790	435	2550	3400	Φ60	400	6000
BZ500	575	315	2720	3020	750	480	2500	4300	Φ70	500	8000
Mode	W	X	Y	Z	a	b	c	d	e		
BZ200	540	3250	1350	560	1680	315	270	135	3300		
BZ250	590	3250	2240	750	1650	315	270	135	3300		
BZ300	590	3250	2240	725	1750	315	270	135	3700		
BZ400	590	3300	2215	675	1850	360	305	150	4000		
BZ500	590	3300	3570	1985	2100	400	/	/	4100		

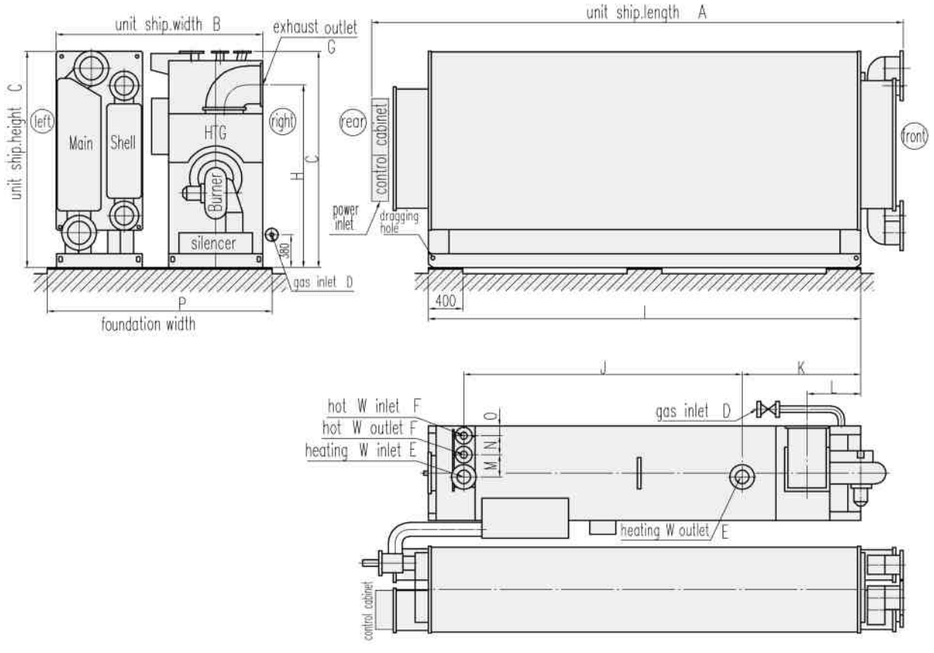
BZ600、BZ800、BZ1000



Mode	A	B	C	D	E	F	G	H	I
BZ600	9800	3870	3700	DN450	DN400	DN65	DN200	610×610	2910
BZ800	9850	4370	3910	DN500	DN450	DN65	DN250	710×710	3420
BZ1000	11580	4370	3910	DN500	DN450	DN80	DN250	790×790	3460
Mode	J	K	L	M	N	O	P	Q	R
BZ600	615	340	2765	3310	870	305	2260	4500	8000
BZ800	695	330	3145	3630	925	410	2050	4500	8000
BZ1000	695	330	3145	3630	925	410	2050	5000	10000
Mode	S	T	U	V	W	X	Y	Z	
BZ600	640	1520	3250	2015	300	1750	3900	700	
BZ800	690	1540	3300	1965	345	1850	4150	700	
BZ1000	690	1580	3300	1965	400	2100	4300	780	

HTG Enlarged Model Dimensions

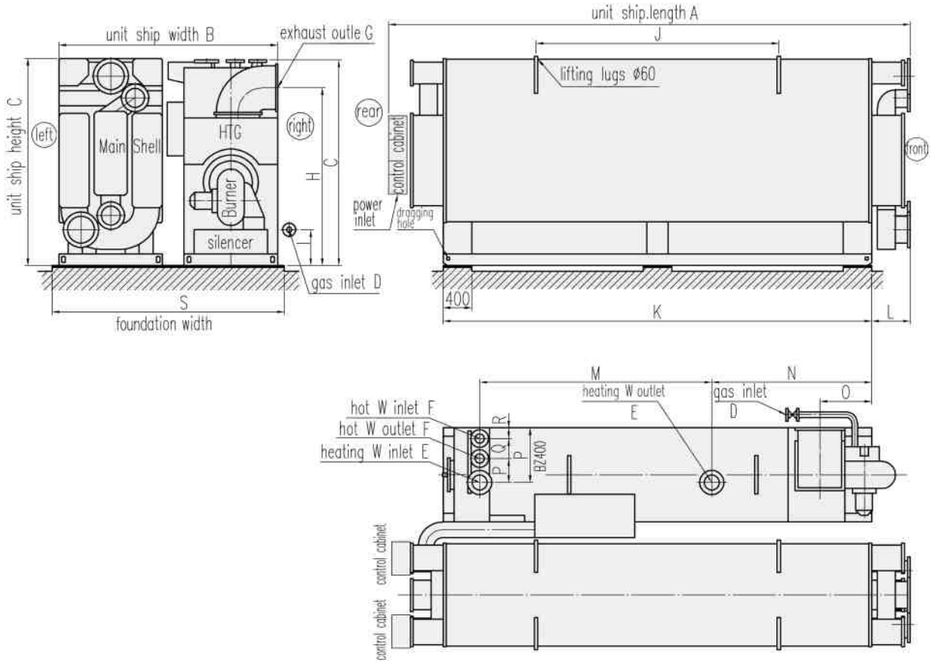
BZ75、BZ100、BZ125、BZ150



HTG Enlarged H_3,H_4 dimensions (HTG Enlarged H_1,H_2 is the same size with standard models)
(Refer to P26 of the DFA standard model for dimensions not shown in the drawing)

Mode	A	B	C	D	E	F	G	H
BZ75	5420	2250	2510	DN40	DN125	DN65	350×350	2215
BZ100	5420	2410	2510	DN40	DN150	DN80	400×400	2090
BZ125	6550	2500	2510	DN40	DN150	DN80	440×440	2110
BZ150	6600	2650	2930	DN50	DN200	DN125	560×560	2530
Mode	I	J	K	L	M	N	O	P
BZ75	4000	3180	650	285	220	200	100	2400
BZ100	4000	3220	750	20	260	210	110	2600
BZ125	5000	3220	1370	620	260	220	110	2800
BZ150	5000	3250	1350	560	335	280	150	2900

BZ200、BZ250、BZ300、BZ400

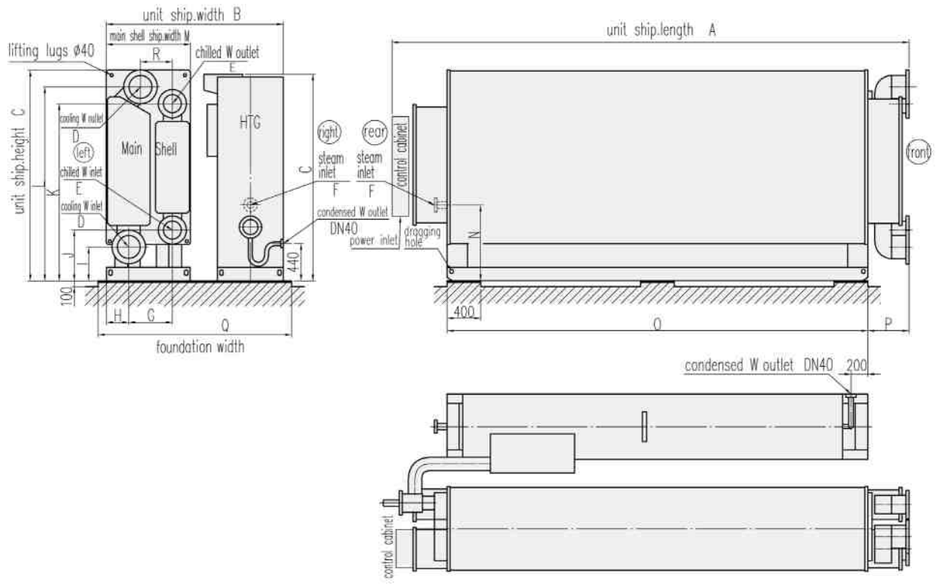


HTG Enlarged H_3,H_4 dimensions (HTG Enlarged H_1,H_2 is the same size with standard models)
(Refer to P27 of the DFA standard model for dimensions not shown in the drawing)

Mode	A	B	C	D	E	F	G	H	I	J
BZ200	6600	3200	3000	DN50	DN200	DN125	560×560	2470	500	3000
BZ250	7700	3300	3000	DN65	DN200	DN125	610×610	2490	500	3400
BZ300	7950	3670	3000	DN65	DN250	DN150	710×710	2690	500	3400
BZ400	7950	4010	3400	DN80	DN250	/	790×790	2945	650	3400
Mode	K	L	M	N	O	P	Q	R	S	
BZ200	5000	540	3250	1655	160	335	280	150	3150	
BZ250	6000	590	3250	2240	725	335	280	150	3250	
BZ300	6000	590	3300	2215	675	400	300	200	3750	
BZ400	6000	590	3300	2200	635	400	/	/	4200	

Steam Chiller Dimensions

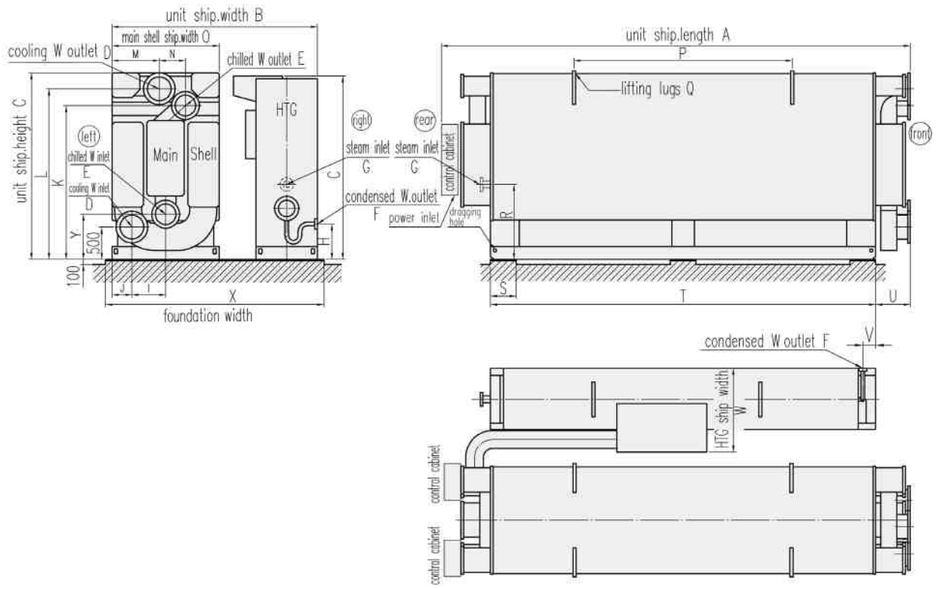
BS75、BS100、BS125、BS150



Mode	A	B	C	D	E	F	G	H	I
BS75	5420	1900	2510	DN200	DN150	DN40	440	210	400
BS100	5420	2100	2510	DN200	DN150	DN50	525	260	400
BS125	6550	2200	2510	DN250	DN200	DN50	520	260	400
BS150	6600	2300	2930	DN250	DN200	DN65	515	275	500

Mode	J	K	L	M	N	O	P	Q	R
BS75	600	2100	2300	1250	1080	4000	490	2000	380
BS100	600	2100	2300	1450	900	4000	490	2300	380
BS125	600	2100	2300	1550	900	5000	540	2300	380
BS150	700	2400	2705	1550	1325	5000	540	2400	220

BS200、BS250、BS300、BS400
BS500、BS600、BS800、BS1000

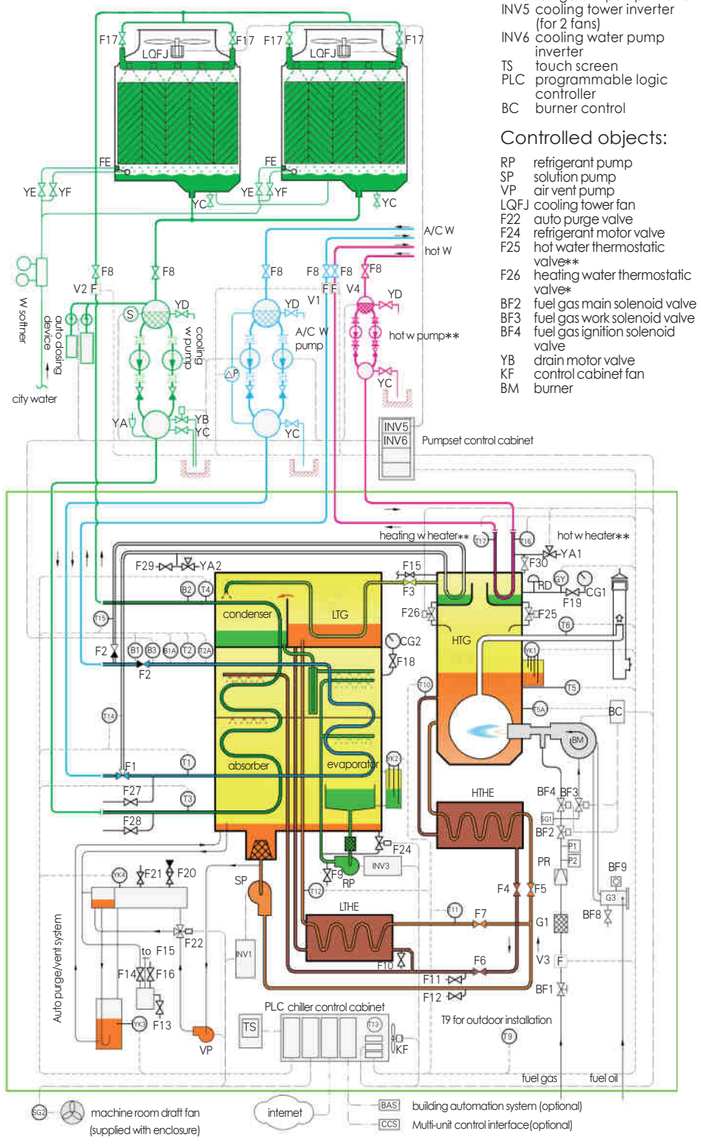


Mode	A	B	C	D	E	F	G	H	I	J	K	L	M
BS200	6600	2850	3000	DN300	DN250	DN40	DN80	550	430	295	2360	2670	725
BS250	7700	2850	3000	DN350	DN250	DN40	DN80	550	415	310	2350	2650	725
BS300	7950	3340	3000	DN350	DN300	DN50	DN100	550	525	310	2390	2650	735
BS400	7950	3480	3400	DN400	DN300	DN50	DN100	600	565	325	2720	3020	790
BS500	9700	3480	3400	DN400	DN350	DN50	DN125	600	575	315	2720	3020	750
BS600	9800	3640	3700	DN450	DN400	DN65	DN125	600	615	340	2765	3310	870
BS800	9850	4050	3910	DN500	DN450	DN65	DN150	600	695	330	3145	3630	925
BS1000	11580	4050	3910	DN500	DN450	DN65	DN150	600	695	330	3145	3630	925

Mode	N	O	P	Q	R	S	T	U	V	W	X	Y
BS200	285	2100	3000	Φ60	1165	400	5000	540	200	1200	3000	700
BS250	340	2100	3400	Φ60	1165	400	6000	590	200	1200	3000	700
BS300	410	2400	3400	Φ60	1165	400	6000	590	200	1350	3400	700
BS400	435	2550	3400	Φ60	1400	400	6000	590	300	1400	3500	700
BS500	480	2500	4300	Φ70	1400	500	8000	590	300	1400	3500	700
BS600	305	2260	4500	Φ70	1400	500	8000	640	300	1400	3700	700
BS800	410	2050	4500	Φ70	1690	500	8000	690	300	1700	4100	700
BS1000	410	2050	5000	Φ70	1690	500	10000	690	300	1700	4100	780

Note: Some dimension drawings are not included in this manual. Please request from BROAD or download CAD files from www.broad.com.

Packaged DFA P&I Diagram



Control devices:

INV1 solution pump inverter
INV3 refrigerant pump inverter
INV5 cooling tower inverter (for 2 fans)
INV6 cooling water pump inverter
TS touch screen
PLC programmable logic controller
BC burner control

Controlled objects:

RP refrigerant pump
SP solution pump
VP air vent pump
LQFJ cooling tower fan
F22 auto purge valve
F24 refrigerant motor valve
F25 hot water thermostatic valve**
F26 heating water thermostatic valve*
BF2 fuel gas main solenoid valve
BF3 fuel gas work solenoid valve
BF4 fuel gas ignition solenoid valve
YB drain motor valve
KF control cabinet fan
BM burner

Sensors:

T1 chilled W inlet temp sensor
T2 chilled W outlet temp sensor
T2A chilled W calibration temp sensor
T3 cooling W inlet temp sensor
T4 cooling W outlet temp sensor
T5 HTG temp sensor (to PLC)
T5A HTG temp control (to burner)
T6 exhaust temp sensor
T9 ambient temp sensor
T10 HTG crystallization sensor
T11 LTHE diluted solution inlet temp sensor
T12 LTG crystallization sensor
T13 control cabinet temp sensor
T14 heating W inlet temp sensor*
T15 heating W outlet temp sensor*
T16 hot w inlet temp sensor**
T17 hot w outlet temp sensor**
B1 chilled W flow switch
B1A chilled W flow switch
B2 cooling W flow switch
B3 chilled W flow switch
GY pressure control
YK1 HTG solution level probe
YK2 refrigerant level probe
YK3 non-condensable gas sensor
YK4 auto air vent probe
V1 chilled/heating W flowmeter
V2 cooling W flowmeter
V3 gas flowmeter
V4 hot W flowmeter
S conductivity sensor
ΔP differential pressure sensor (optional)
SG1 burner gas leakage sensor
SG2 machine room gas leakage sensor

Others:

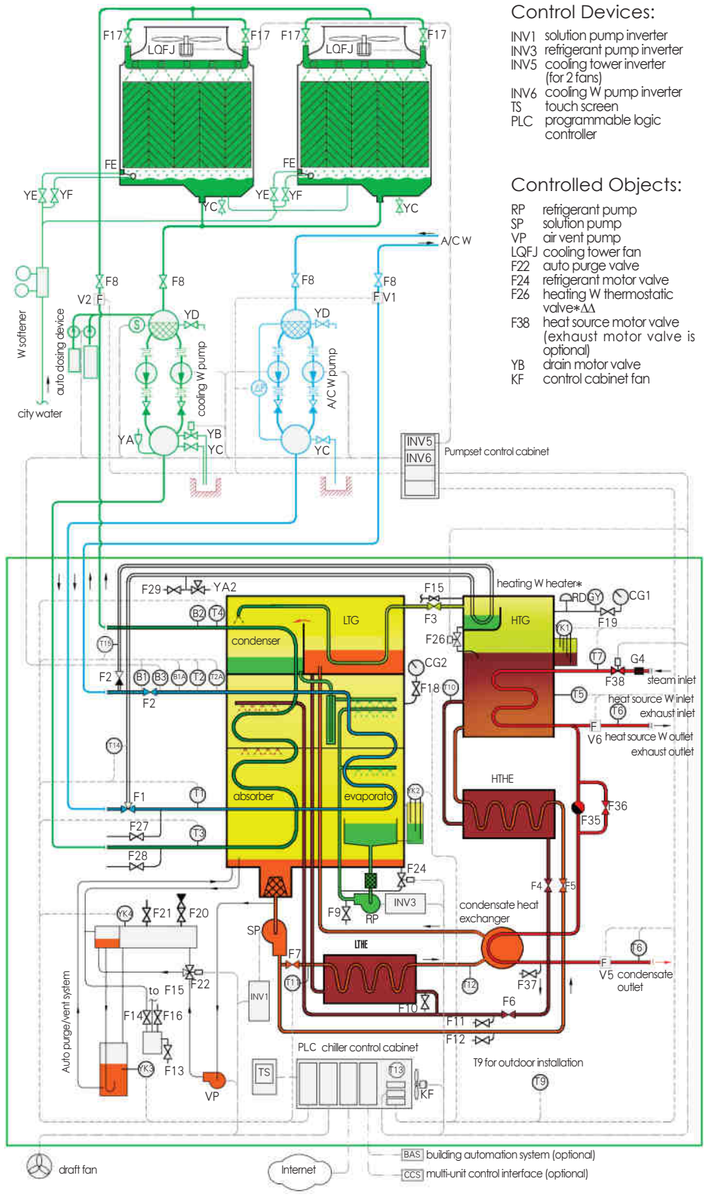
F1 chilled /heating W. switch valve
F2 chilled/heating W outlet single valve*
F3 steam angle valve
F4 concentrated solution angle valve
F5 diluted solution angle valve
F6 HTG concentration regulating valve
F7 LTG concentration regulating valve
F8 water system shutoff valve
F9 refrigerant sampling valve
F10 LTHE sampling valve
F11 HTHE sampling valve
F12 diluted solution sampling valve
F13 main purge valve
F14 direct purge valve
F15 HTG purge valve
F16 sampling purge valve
F17 balance valve
F18 main shell pressure detecting valve
F19 HTG pressure detecting valve
F20 vacuum vent valve & mannual valve
F21 nitrogen charging valve
F27 chilled water drain valve
F28 cooling water drain valve
F29 heating water drain valve*
F30 hot water drain valve**
YA2 heating water pressure release valve*
FE auto water make up valve
BF1 fuel gas ball valve
BF8 fuel oil filter discharge valve,
BF9 fuel oil filter vent valve
P1 lower limit pressure switch
P2 upper limit pressure switch
PR fuel gas pressure regulator
G1 gas filter
G3 oil filter
YA auto air vent
YC manual drain valve
YD discharge valve
YE water makeup valve
YF manual water makeup valve
CG1 HTG compound gauge
CG2 Main shell compound gauge
RD rupture disc

Notes:

1. ▭ chiller scope
2. Parts marked with "**" are not applicable to cooling/heating type, and those marked with "*" & "**" are not applicable to cooling only type.
3. Line type:
   - actuator output
   - sensor input
   - communication

Packaged Steam Chiller

(similar for BSY: steam chiller, BHY: hot W chiller, BEY: exhaust chiller)



Control Devices:

INV1 solution pump inverter
INV3 refrigerant pump inverter
INV5 cooling tower inverter (for 2 fans)
INV6 cooling W pump inverter
TS touch screen
PLC programmable logic controller

Controlled Objects:

RP refrigerant pump
SP solution pump
VP air vent pump
LQFJ cooling tower fan
F22 auto purge valve
F24 refrigerant motor valve
F26 heating W thermostatic valve*ΔΔ
F38 heat source motor valve (exhaust motor valve is optional)
YB drain motor valve
KF control cabinet fan

Sensors:

T1 chilled W inlet temp sensor
T2 chilled W outlet temp sensor
T2A chilled W calibration temp sensor
T3 cooling W inlet temp sensor
T4 cooling W outlet temp sensor
T5 HTG temp sensor
T6 heat source outlet temp sensor
T7 heat source inlet temp sensor
T9 ambient temp. sensor
T10 HTG crystallization sensor
T11 LTHE diluted solution inlet temp. sensor
T12 LTG crystallization sensor
T13 control cabinet temp sensor
T14 heating W inlet temp sensor*ΔΔ
T15 heating W outlet temp sensor*ΔΔ
B1 chilled W flow switch
B1A chilled W flow switch
B2 cooling W flow switch
B3 chilled W flow switch
GY pressure control
YK1 HTG solution level probe
YK2 refrigerant level probe
YK3 non-condensable gas sensor
YK4 auto vent probe
V1 A/C W flow meter
V2 cooling W flow meter
V5 condensate flow meter (optional) Δ
V6 heat source W flow meter (optional) ΔΔΔ
S conductivity sensor
ΔP differential pressure sensor (optional)

Others:

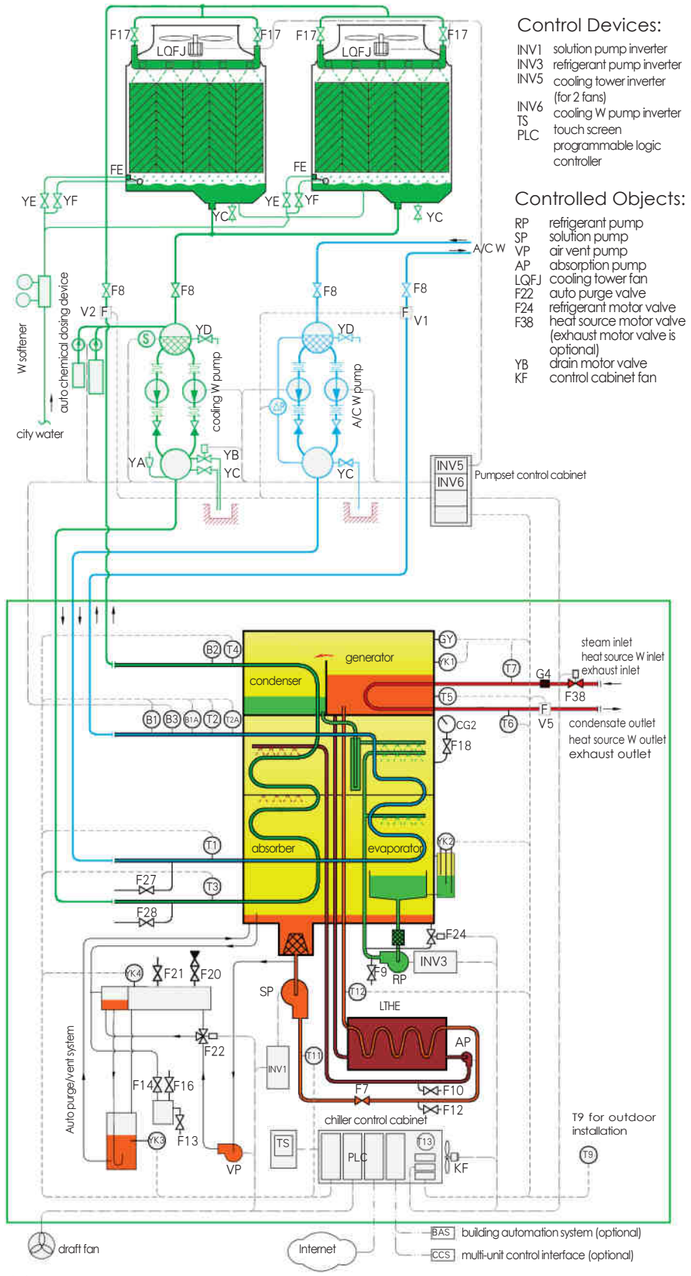
F1 chilled/heating W switch valve
F2 A/C W outlet check valve*ΔΔ
F3 steam angle valve
F4 concentrated solution angle valve
F5 diluted solution angle valve
F6 HTG concentration regulating valve
F7 LTG concentration regulating valve
F8 water system shutoff valve
F9 refrigerant sampling valve
F10 LTHE sampling valve
F11 HTHE sampling valve
F12 diluted solution sampling valve
F13 main purge valve
F14 direct purge valve
F15 HTG purge valve
F16 sampling purge valve
F17 balance valve
F18 main shell pressure detecting valve
F19 HTG pressure detecting valve
F20 vacuum vent valve & mannual valve
F21 nitrogen charging valve
F27 chilled W drain valve
F28 cooling W drain valve
F29 heating W drain valve
F35 steam trap
F36 condensate by-pass valve
F37 anti-freeze drain valve
YA2 heating W pressure release valve
FE auto W make-up valve
YA auto air vent
YC manual drain valve
YD discharge valve
YE W make-up valve
YF manual W make-up valve
CG1 HTG compound gauge
CG2 main shell compound gauge
G4 filter (N/A for exhaust chiller)
RD rupture disc

Notes:

1. ▭ chiller scope.
2. The components marked with "Δ" for steam chiller, and marked with "ΔΔ" for exhaust chiller, "ΔΔΔ" for hot W chiller.
3. The components marked with "*" are N.A with cooling only models.
4. Line type:
   - actuator signal output
   - sensor signal input
   - communication

Packaged Single-stage Steam Chiller

(similar for BDSY: Single-stage steam chiller, BDHY: Single-stage hot W chiller, BDEY: Single-stage exhaust chiller)



Control Devices:

INV1	solution pump inverter
INV3	refrigerant pump inverter
INV5	cooling tower inverter (for 2 fans)
INV6	cooling W pump inverter
TS	touch screen
PLC	programmable logic controller

Controlled Objects:

RP	refrigerant pump
SP	solution pump
VP	air vent pump
AP	absorption pump
LQFJ	cooling tower fan
F22	auto purge valve
F24	refrigerant motor valve
F38	heat source motor valve (exhaust motor valve is optional)
YB	drain motor valve
KF	control cabinet fan

Sensors:

T1	chilled W inlet temp sensor
T2	chilled W outlet temp sensor
T2A	chilled W calibration temp sensor
T3	cooling W inlet temp sensor
T4	cooling W outlet temp sensor
T5	generator temp sensor
T6	heat source W outlet temp sensor
T7	heat source W inlet temp sensor
T9	ambient temp sensor
T11	heat exchanger diluted solution inlet temp sensor
T12	generator crystallization sensor
T13	control cabinet temp sensor
B1	chilled W flow switch
B1A	chilled W flow switch
B2	cooling W flow switch
B3	chilled W flow switch
GY	pressure control
YK1	generator solution level probe
YK2	refrigerant level probe
YK3	non-condensable probe
YK4	auto purge sensor
V1	A/C W flow meter
V2	cooling W flow meter
V5	condensate flow meter(optional) Δ heat source W flow meter ΔΔ
S	conductivity sensor
ΔP	differential pressure sensor(optional) Δ

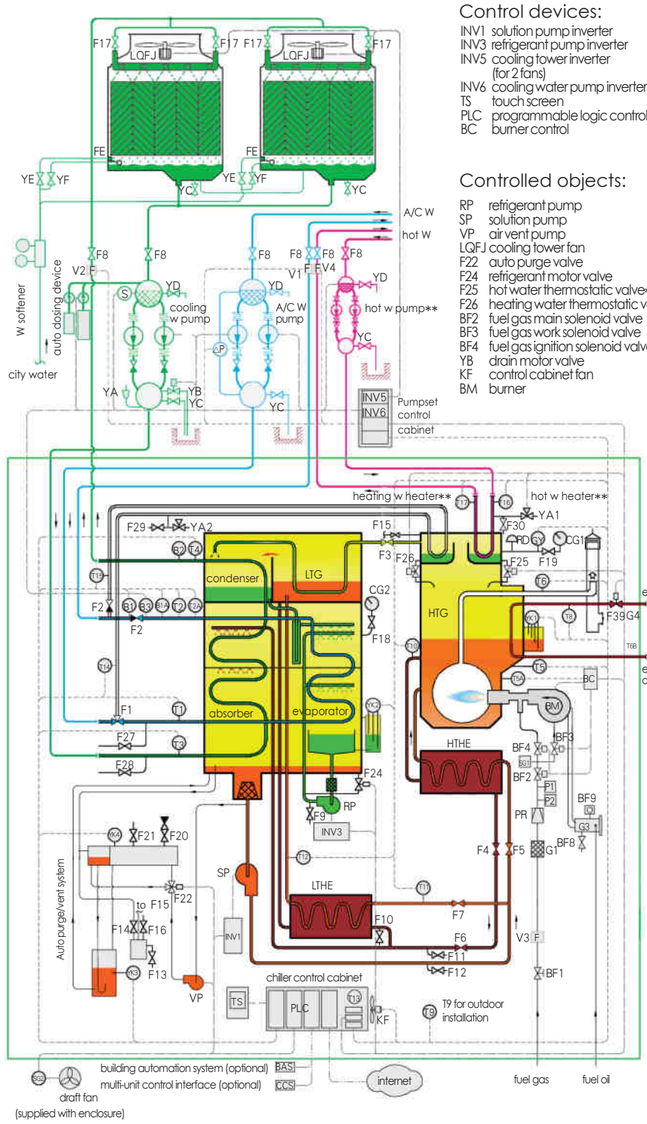
Others:

F7	concentration regulating valve
F8	W system shut-off valve
F9	refrigerant sampling valve
F10	concentrated solution sampling valve
F12	diluted solution sampling valve
F13	main purge valve
F14	direct purge valve
F16	sampling purge valve
F17	balance valve
F18	pressure detecting valve
F20	vacuum vent valve & mannual valve
F21	nitrogen charging valve
F27	chilled W drain valve
F28	cooling W drain valve
FE	auto W make-up valve
YA	auto vent valve
YC	manual drain valve
YD	discharge valve
YE	W make-up valve
YF	manual W make-up valve
CG2	compound gauge
G4	filter(N/A for exhaust type)

Notes:
1. ▭ chiller scope.
2. The components marked with "Δ" for steam chiller, and marked with "ΔΔ" for exhaust chiller, "ΔΔΔ" for hot W chiller.

3. Line type: actuator signal output
   sensor signal input
   communication

Packaged Exhaust & Direct-fired Chiller



Control devices:

INV1	solution pump inverter
INV3	refrigerant pump inverter
INV5	cooling tower inverter (for 2 fans)
INV6	cooling water pump inverter
TS	touch screen
PLC	programmable logic controller
BC	burner control

Controlled objects:

RP	refrigerant pump
SP	solution pump
VP	air vent pump
LQFJ	cooling tower fan
F22	auto purge valve
F24	refrigerant motor valve
F25	hot water thermostatic valve**
F26	heating water thermostatic valve*
BF2	fuel gas main solenoid valve
BF3	fuel gas work solenoid valve
BF4	fuel gas ignition solenoid valve
YB	drain motor valve
KF	control cabinet fan
BM	burner

Sensors:

T1	chilled W inlet temp sensor
T2	chilled W outlet temp sensor
T2A	chilled W calibration temp sensor
T3	cooling W inlet temp sensor
T4	cooling W outlet temp sensor
T5	HTG temp sensor (to PLC)
T5A	HTG temp control (to burner)
T6	exhaust temp sensor
T6A	waste heat outlet temp sensor
T8	exhaust inlet temp sensor
T9	ambient temp sensor
T10	HTG crystallization sensor
T11	LTHE diluted solution inlet temp sensor
T12	LTG crystallization sensor
T13	control cabinet temp sensor
T14	heating W inlet temp sensor*
T15	heating W outlet temp sensor*
T16	hot W inlet temp sensor**
T17	hot W outlet temp sensor**
B1	chilled W flow switch
B1A	chilled W flow switch
B2	cooling W flow switch
B3	chilled W flow switch
GY	pressure control
YK1	HTG solution level probe
YK2	refrigerant level probe
YK3	non-condensable sensor
YK4	auto air vent probe
V1	chilled/heating W flowmeter
V2	cooling W flowmeter
V3	gas flowmeter
V4	hot W flowmeter
S	conductivity sensor
ΔP	differential pressure sensor (optional)
SG1	burner gas leakage sensor
SG2	machine room gas leakage sensor

Others:

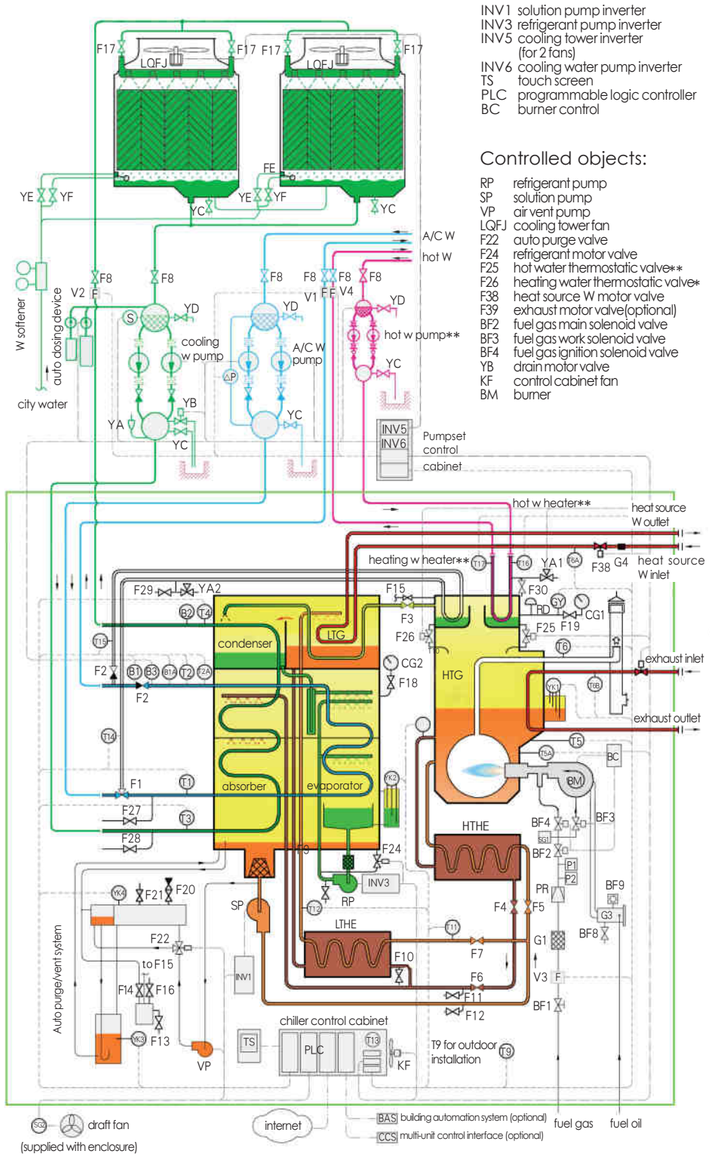
F1	chilled/heating W switch valve
F2	chilled/heating W outlet single valve*
F3	steam angle valve
F4	concentrated solution angle valve
F5	diluted solution angle valve
F6	HTG concentration regulating valve
F7	LTG concentration regulating valve
F8	water system shutoff valve
F9	refrigerant sampling valve
F10	LTHE sampling valve
F11	HTHE sampling valve
F12	diluted solution sampling valve
F13	main purge valve
F14	direct purge valve
F15	HTG purge valve
F16	sampling purge valve
F17	balance valve
F18	main shell pressure detecting valve
F19	HTG pressure detecting valve
F20	vacuum vent valve & mannual valve
F21	nitrogen charging valve
F27	chilled water drain valve
F28	cooling water drain valve
F29	heating water drain valve*
F30	hot water drain valve**
YA1	hot water pressure release valve**
YA2	heating water pressure release valve*
FE	auto water make up valve
BF1	fuel gas ball valve
BF8	fuel oil filter discharge valve,
BF9	fuel oil filter vent valve
P1	lower limit pressure switch
P2	upper limit pressure switch
PR	fuel gas pressure regulator
G1	gas filter
G3	oil filter
YA	auto air vent
YC	manual vent valve
YD	discharge valve
YE	water makeup valve
YF	manual water makeup valve
CG1	HTG compound gauge
CG2	Main shell compound gauge
RD	rupture disc

Notes:
1. ▭ chiller scope
2. Parts marked with "**" are not applicable to cooling/ heating type, and those marked with "*" & "**" are not applicable to cooling only type.

3. Line type: actuator output
   sensor input
   communication

Packaged Multi-energy Chiller

(similar for BZHEY: Hot W, exhaust & direct-fired chiller)



Notes: 1. ▭ chiller scope
2. Parts marked with "**" are not applicable to cooling/heating type, and those marked with "*" & "**" are not applicable to cooling only type.

3. Line type:
- actuator output
- sensor input
- communication

Control devices:

INV1 solution pump inverter
INV3 refrigerant pump inverter
INV5 cooling tower inverter (for 2 fans)
INV6 cooling water pump inverter
TS touch screen
PLC programmable logic controller
BC burner control

Controlled objects:

RP refrigerant pump
SP solution pump
VP air vent pump
LQFJ cooling tower fan
F22 auto purge valve
F24 refrigerant motor valve
F25 hot water thermostatic valve**
F26 heating water thermostatic valve*
F38 heat source W motor valve
F39 exhaust motor valve(optional)
BF2 fuel gas main solenoid valve
BF3 fuel gas work solenoid valve
BF4 fuel gas ignition solenoid valve
YB drain motor valve
KF control cabinet fan
BM burner

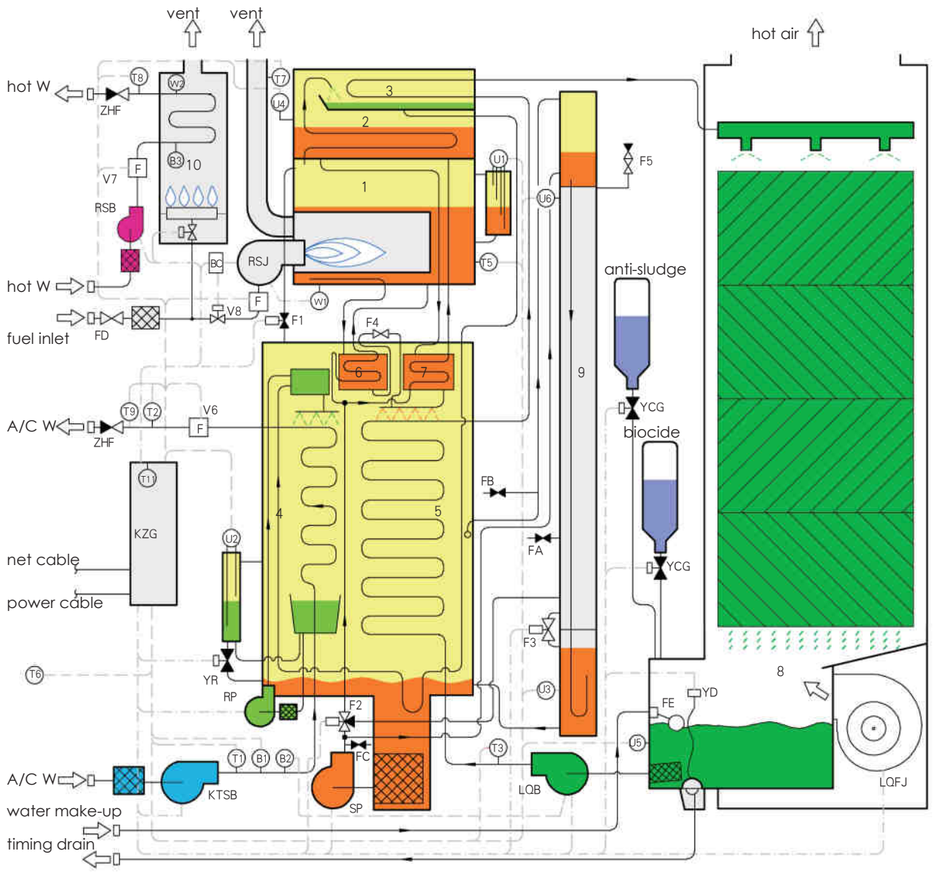
Sensors:

T1 chilled W inlet temp sensor
T2 chilled W outlet temp sensor
T2A chilled W calibration temp sensor
T3 cooling W inlet temp sensor
T4 cooling W outlet temp sensor
T5 HTG temp sensor (to PLC)
T5A HTG temp control (to burner)
T6 exhaust temp sensor
T7 heat source W inlet temp sensor
T8 exhaust inlet temp sensor
T9 ambient temp sensor
T10 HTG crystallization sensor
T11 LTHE diluted solution inlet temp sensor
T12 LTG crystallization sensor
T13 control cabinet temp sensor
T14 heating W inlet temp sensor*
T15 heating W outlet temp sensor*
T16 hot W inlet temp sensor**
T17 hot W outlet temp sensor**
B1 chilled W flow switch
B1A chilled W flow switch
B2 cooling W flow switch
B3 chilled W flow switch
GY pressure control
YK1 HTG solution level probe
YK2 refrigerant level probe
YK3 non-condensable gas sensor
YK4 auto air vent probe
V1 chilled/heating w flowmeter
V2 cooling W flowmeter
V3 gas flowmeter
V4 hot W flowmeter
S conductivity sensor
ΔP differential pressure sensor (optional)
SG1 burner gas leakage sensor
SG2 machine room gas leakage sensor

Others:

F1 chilled/heating W switch valve
F2 chilled/heating W outlet single valve*
F3 steam angle valve
F4 concentrated solution angle valve
F5 diluted solution angle valve
F6 HTG concentration regulating valve
F7 LTG concentration regulating valve
F8 water system shutoff valve
F9 refrigerant sampling valve
F10 LTHE sampling valve
F11 HTHE sampling valve
F12 diluted solution sampling valve
F13 main purge valve
F14 direct purge valve
F15 HTG purge valve
F16 sampling purge valve
F17 balance valve
F18 main shell pressure detecting valve
F19 HTG pressure detecting valve
F20 vacuum vent valve & mannual valve
F21 nitrogen charging valve
F27 chilled water drain valve
F28 cooling water drain valve
F29 heating water drain valve*
F30 hot water drain valve**
YA1 hot water pressure release valve**
YA2 heating water pressure release valve*
FE auto water make up valve
BF1 fuel gas ball valve
BF8 fuel oil filter discharge valve
BF9 fuel oil filter vent valve
P1 lower limit pressure switch
P2 upper limit pressure switch
PR fuel gas pressure regulator
G1 gas filter
G3 oil filter
G4 waste heat filter
YA auto air vent
YC manual vent valve
YD discharge valve
YE water makeup valve
YF manual water makeup valve
CG1 HTG compound gauge
CG2 Main shell compound gauge
RD rupture disc

Micro Non-electric Chiller



Note:

1	HTG	SP	solution pump	V7	heating W flow meter	ZHF	check valve	T11	control cabinet temp sensor
2	LTG	RP	refrigerant pump	V8	gas flowmeter	KZG	outdoor control cabinet	W1	HTG temp switch
3	condenser	KTSB	chilled/heating W pump	YR	refrigerant valve	BC	burner control	W2	hot W temp switch
4	evaporator	LQB	cooling W pump	YD	drain device(timer on)	T1	A/C W inlet temp sensor	B1	A/C W flow switch
5	absorber	RSB	hot W pump	FE	water make-up floating ball valve	T2	A/C W outlet temp sensor	B2	A/C W flow switch
6	HTHE	LQFJ	cooling tower fan	YCG	cooling water quality stabilizer valve(manual)	T3	cooling W inlet temp sensor	B3	hot W flow switch
7	LTHE	RSJ	burner	FA	non-condensable chamber purge valve(manual)	T5	HTG temp sensor (to PLC)	U1	HTG solution level probe
8	cooling tower	F1	cooling/heating switch	FB	direct purge valve(manual)	T6	ambient temp sensor	U2	refrigerant level probe
9	auto purge device	F2	vent three-way valve	FC	solution valve(manual)	T7	exhaust temp sensor	U3	non-condensable sensor
10	hot W.heater*	F3	vent reflow valve	FD	fuel valve(manual)	T8	hot W temperature sensor	U4	LTG crystallization sensor
		F4	HTG concentration regulating valve			T9	A/C W calibration temp sensor	U5	cooling W level probe
		F5	vacuum vent valve & mannual valve					U6	vent over level probe
		V6	chilled/heating W flowmeter						

Notes:
1. Parts marked with "*" are for hot water, not applicable to cooling-heating type.
Parts marked with "**" are for heating operation, not applicable to cooling only type.

2. Line type:
- actuator output
- sensor input

Scope of Supply/Work

Category	Item	BROAD	Customer	Remarks
Transportation and location	factory to port		√	BROAD can arrange transportation upon request.
	port to jobsite		√	
	Jobsite handling (main shell, pumpset)		√	
	Joint (for split shipment)	√		Welding machine and nitrogen to be provided by customers . Customers need to pay BROAD for joint.
Electric engineering	Power supply to enclosure		√	3 phase, 4 wires
	Internet connection	√		Network cable to the enclosure is to be provided by users
	Grounding		√	Place special grounding terminal with grounding resistance ≤ 4Ω near water system control cabinet
Construction & installation	Foundation		√	Enclosure should be installed after foundation is completed.
	Installation of metal enclosure		√	
	Pipe connection between chiller and pumpset		√	≥ BY400 model, a crane must be provided by customer
	Pipe connection between chiller and cooling tower		√	
	External piping installation		√	Includes chilled/heating water pipes, hot water pipes, water make-up and drain pipes, energy source pipes.
	Chiller insulation	√		factory-mounted
	Piping insulation in enclosure	√		
	pipeline insulation		√	
	Antifreezing		√	Water anti-freeze treatment is recommended when the ambient temp is below 0°C.
Commissioning	Jobsite chiller commissioning	√		User provides energy and air conditioning load. Customers need to pay BROAD for commissioning.
Operation & maintenance	Operator training on site	√		
	Regular maintenance	√		Paid service contract can be signed after the warranty period.

Machine Room Construction Tips

Machine room

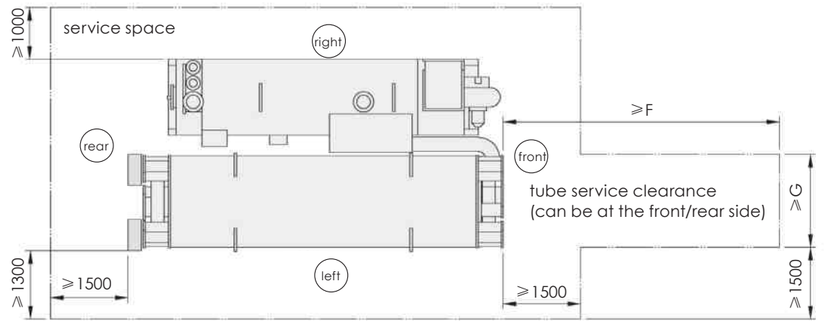
Machine rooms must be well ventilated with temp. humidity control and drain functions. It contains the service space.

Attention should be paid to machine room built by customers:

- Ventilation: poor ventilation leads to high humidity in the machine room, which may erode the unit. So serious attention should be paid to ventilation in the machine room. Please ventilate 2X machine rooms every hour and make up the combustion air. The volume of combustion air for a DFA is estimated at 1.3 m^3 for every kW fuel.
- Drainage:
  a. Chiller foundation must be on a high level in the machine room.
  b. All discharge pipes and drain pipes must be visible above the drainage.
  c. Machine room in basement must be built above a water ditch, which is equipped with an auto level-controlled submerged pump.
- Temperature: Machine room temperature must be controlled within 5-43°C. Lower temperature may crack copper tubes and water box when the chiller is shut off; higher temperature may damage electrical components. Thermometer and over temperature alarm must be installed in machine room.
- Humidity: Machine room humidity must be lower than 85%. Higher humidity may impair insulation of electrical components.
- Chiller service space

Foundation

- Please refer to dimension drawings for plinth dimensions.
- Load capacity:
  a. The machine room foundation load is recommended as 1.5 times of the operation weight.
  b. Make sure that the foundation is level without sinking or overload (for rooftop installation).
  c. The load of a chiller is evenly distributed on the contact surface between the frame base rolling steel and the plinth.
- Anchor bolts:
  a. Chiller can be placed on the foundation directly without bolts (if there is a strong earthquake source or special anti-vibration requirement, please specify in a purchase order).
  b. Anchor bolts must be pre-installed for pumpset foundation per dimension drawings.



Service space: unit: mm

Mode	20	50	75	100	125	150	200	250	300	400	500	600	800	1000
F	2300	3200	3700	3700	4500	4500	4500	5500	5500	5500	7000	7000	7000	9000
G	650	800	900	1100	1150	1300	1700	1700	1950	2100	2400	2400	2600	2600

1. If the machine room is smaller than the above size, please contact BROAD for a solution.
2. F, G is the tube service clearance that can use space of water pumps, doors or windows and can also be shared by 2 chillers.
3. It is recommended that the height of the machine room be 500mm higher than that of chillers.

Piping System

Gas system

- The standard pressure is 16-50kPa. Lower or higher pressure can be accommodated to special orders.
- Drain valve should be installed at the lowest part of gas pipes. All connecting pipes must be cleaned and tested for air tightness with 0.6Mpa air when gas piping system is completed.
- When two or more units are connected in parallel, a buffer pipe (with diameter 3-6 times of the main pipe) must be installed at the main pipe to avoid flameout due to gas low pressure caused by simultaneous startup. Manual drain valve should be equipped at the bottom of the buffer tube.
- Customers are required to inform BROAD of the fuel type, heating value and pressure so that a burner can be properly selected and the gas pipe diameter can be notified to customers. Then customers can design filter, flow meter, ball valve, diffuser tube and pressure meter. BROAD is responsible for installation of gas train valves within supply scope. External gas piping system is to be installed by customers to 1m distance from the burner.
- The ball valve of BROAD gas valve train must be closed if customers need to test piping pressure so that gas train valve will not be damaged by high pressure.
- A gas leakage alarm (acting value must be set 20% lower than danger value lower limit) must be equipped in machine room and be linkage controlled with draft fans. Machine room must be well ventilated all the time.

Oil system

- Oil system includes oil storage tank, oil pump, daily oil tank, oil filter and metering instruments. Oil tank should be equipped with oil check nozzle, air vent (breather valve), oil refill valve, oil level sensor and drain valve. The lowest oil level of daily oil tank must be 0.1m higher than the burner.
- Oil pipe should be copper pipe or seamless steel pipe and leakage test should be taken at 0.8MPa min.
- Medium filters are to be installed at inlet and outlet of oil storage tank. The filters should have enough section area, and should be convenient to install/uninstall and drain.
- Oil tank should be equipped with precision metering device.

Steam system

- The supply of the steam should be pressure-stable. The upper limit should not be over 110% of the rated pressure. If the pressure may exceed the upper limit, a regulating valve should be equipped in the pipeline.
- Safety valve should be fixed in the steam inlet pipeline. The protection value is adjusted as 110%-130% of its working pressure. The safety valve should be connected to outdoor to avoid the overpressure of the system.
- Condensed water should be able to drain smoothly. Condensed water can be stored in an open tank beside the chiller, and then pumped back to the boiler by a condensed water pump or steam trap pressurizer.

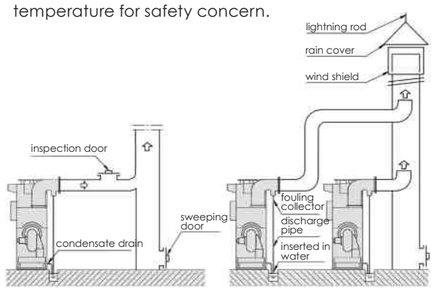
Water system

- The initial filling of the chilled/heating water must be with soft water. The leakage rate should be less than 10% every year, or else large amount of city water makeup will cause water system fouling.
- Minor leakage in chilled/heating water system is made up from the expansion water tank. An open expansion water tank instead of a closed expander is recommended for pressure balance. The water expansion volume is calculated as 4% of total water volume in the system.
- Chiller, pump set and cooling tower should be in one to one correspondence to achieve more energy saving.
- BROAD packaged chiller (pumpset) has introduced auto dosing system to solve the conventional problems with cooling water system such as corrosion inhibitor and biocide, especially legionnaire. There is a motor drain valve at the bottom of cooling water system (It's with BROAD packaged chiller supply).

- When the distance between cooling tower and machine room is≤30m, the cooling water pipe diameter can follow the dimension drawing. If it's 30-90m, the pipe diameter shall be one size larger. If it's >90m , the pipe diameter shall be two size larger.
- In water system, zero resistance filter with section area 8-15 times larger than pipe section area instead of Y-shape filters shall be used to minimize the water resistance.
- Soft connector must be installed at inlet/outlet of chilled/cooling water and hot water system. The weight of the external piping system can never be borne by the chiller.
- The installation site of the cooling tower should be far from heat source and power, especially should be at least 6m far from the chimney, or the chimney should be 2m higher than the top of the cooling tower. Otherwise the exhaust may access the cooling tower and cause corrosion to copper tubes inside the chiller.
- Piping requirements: all pipes and valves should not go across the space above the chiller to avoid chiller damage caused by pipe installation, maintenance or leakage.
- Secondary heat exchange hot water system is recommended for areas with very hard water.
- Hot W. system for BY20,BY50 must adopt secondary heat exchange.

Exhaust system

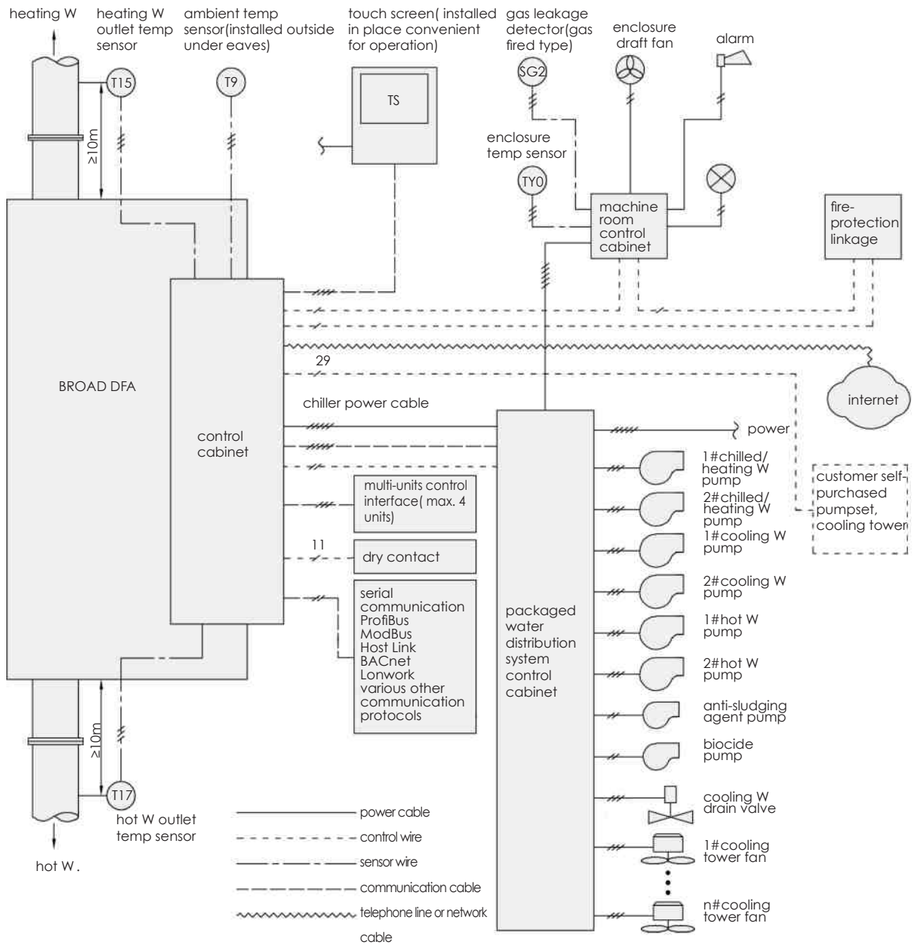
- It is recommended independent stack be used for each chiller. If chillers have to share a common stack due to space limitation, the shared stack must be inserted type and the main stack must be bigger and higher to avoid any interference from each other. Exhaust motor valve shall be installed for each exhaust duct to avoid corrosion caused by exhaust entering into chillers that are not in operation.
- The exhaust volume is dependent on the fuel heat input. It is estimated at 1.55m^3 per kW fuel input. 3-5m/s flue gas flow velocity in the stack is recommended.
- Fouling collector should be installed at flue duct inlet to the chiller to prevent condensate from flowing directly into the chiller. The indoor flue duct must be insulated. For high outdoor steel stack, insulation shall be done to maintain the up force of flue. No insulation is required for low outdoor steel exhaust stack. Try to locate the exhaust outlet as far as possible from the cooling tower, or 2m higher than the cooling tower. Otherwise the flue gas may get into cooling tower and damage the chiller.
- The rated exhaust temperature is 160°C. However, selection of insulation materials and design of fire isolation area should be based on 300°C temperature for safety concern.



An exhaust system illustration

Ventilation system is included in machine room supply if BROAD packaged chiller is ordered.

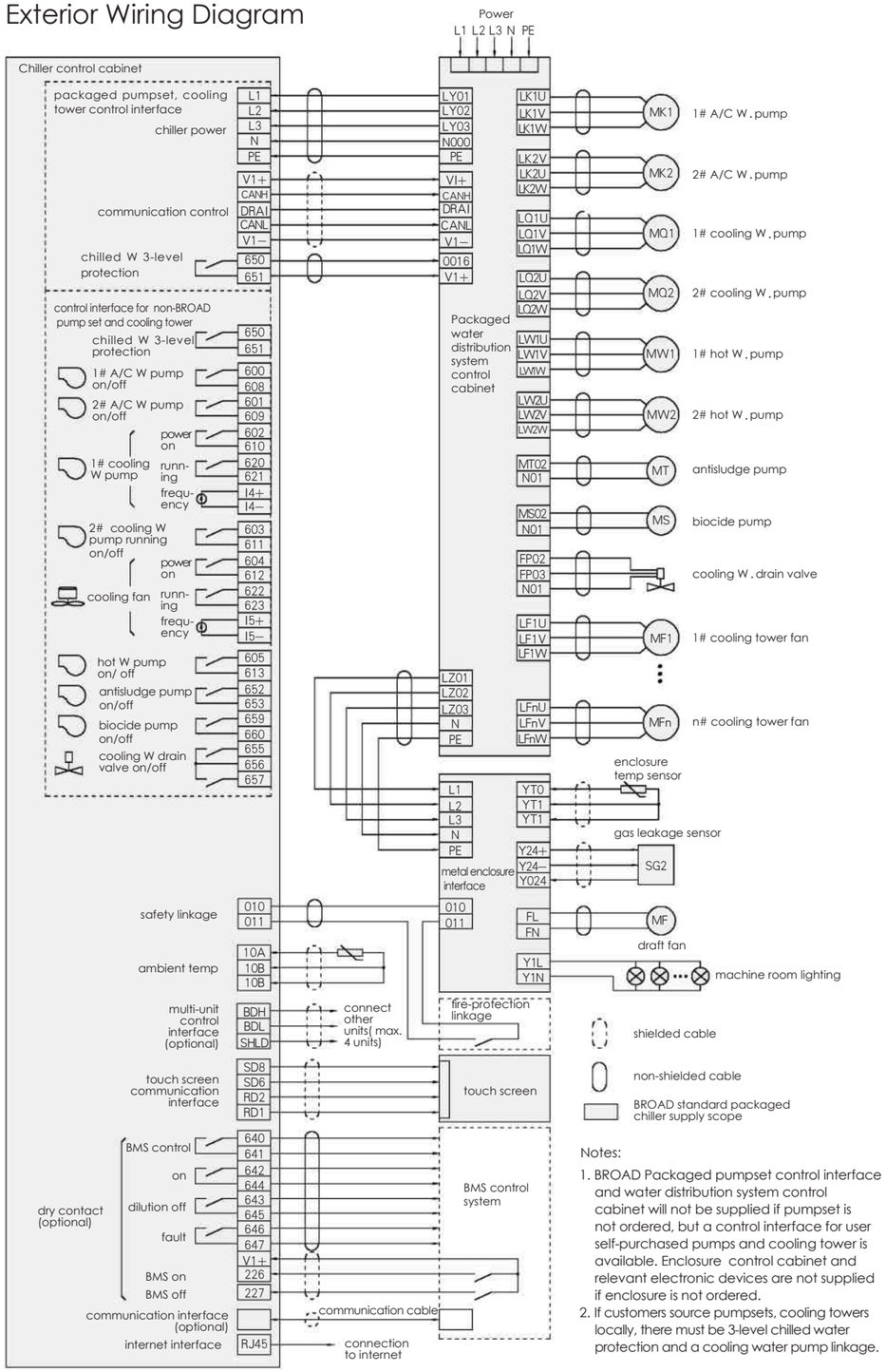
Control System



Notes:

1. BROAD Packaged chiller control system includes control interfaces for chiller, pumpset, cooling tower, outdoor enclosure, internet remote monitoring, BMS and multiple-unit control,etc.
2. Pumpset and cooling tower control interface and water distribution system control cabinet are supplied with pumpset. Enclosure control cabinet and relevant electrical parts are supplied with enclosure.
3. The customers who order several standard packaged chillers can choose multiple-unit control interface, which can automatically control the number of operational chillers according to load changes.
4. BMS control interface includes "Serial Communication" and "Dry-contact" options. Serial Communication interface can be either HostLink, ModBus, ProfiBus, BACnet or Lonwork protocol. They are all options.
5. If the customer does not order pumpset, standard control interface for pumpset and cooling tower will be provided.

Exterior Wiring Diagram



Notes:

1. BROAD Packaged pumpset control interface and water distribution system control cabinet will not be supplied if pumpset is not ordered, but a control interface for user self-purchased pumps and cooling tower is available. Enclosure control cabinet and relevant electronic devices are not supplied if enclosure is not ordered.
2. If customers source pumpsets, cooling towers locally, there must be 3-level chilled water protection and a cooling water pump linkage.

List of Control System Installation

Item		Installation position and requirement	Material	Source	BROAD scope	Customer scope
Chiller	Chiller and pumpset grounding	Grounding resistance ≤4Ω	Grounding wire	Customer	/	Grounding setup and wiring
	Chiller power	Control cabinet of chiller and water system	5-core cable (10m standard supply)	BROAD	Wiring inside chiller control cabinet	Cable installation
	Touch screen	Anywhere in office (on the wall or desk) humidity 0-85% (no condensate), temperature 0 - 30°C	5-core shielded cable (30m standard supply)	BROAD	Wiring inside chiller control cabinet	Cable installation
	Network monitoring	Chiller control cabinet	Network cable	Customer	Wiring inside chiller control cabinet	Cable installation, wiring at building side
	BMS interface (optional)	Chiller control cabinet	Communication cable (for serial communication), 11-core cable (for dry contact)	Customer	Wiring inside chiller control cabinet	Cable installation, wiring at network side
	Ambient temperature sensor	Ventilation and avoid direct sunlight	3-core cable (standard cable is 10m)	BROAD	Chiller control cabinet wiring	Temperature sensor installation wiring*
	Heating W outlet temperature sensor, hot W outlet temperature sensor	At heating W/ hot W pipe outlet side 10m away from the chiller	3-core cable (standard cable is 10m)	BROAD	Wiring	Temperature sensor installation
Pumpset	Installation of water distribution system control cabinet and power connection	Water distribution system control cabinet	Installation bolts 5-core cable	Customer	Wiring inside chiller control cabinet	Cable & control cabinet installation
	Wiring between chiller and water distribution system control cabinet	Between chiller and water distribution system control cabinet	Cable supply as per packaged chiller	BROAD	Wiring inside chiller control cabinet	Cable installation
	Wiring between pumpset and water distribution system control cabinet	Between water distribution system control cabinet and pumpset	Cable supply as per standard pumpset	BROAD	Wiring inside chiller control cabinet	Cable installation

Transportation Tips

Shipping status

- BY20 is to be shipped in one piece, while BY30 BY50 in two pieces.
- BY75-1000 chiller and pumpset are to be shipped separately.
- BY75-400: pumpset and control cabinet are to be shipped in 3 pieces.BY500-1000: pumpset and control cabinet are to be shipped in 3-5 pieces (A/C water pumpset, cooling water pumpset and control cabinet)
- All equipment can be containerized as per "Container Arrangement Reference".
- Chillers ⩽ BZ75, BE75, BS100(Max. width ⩽ 2.1m) in single piece.
- Other units will be in 2-4 pieces shipment.
- If limited by site space or machine room access, small unit can also be split shipment (or split with steel frame), or steel-joint split shipment (i.e. the main shell and HTG are split and soldered by steel plates, which will be cut off before entering the machine room).
- When the unit reaches the machine room, the split pieces need to be connected by BROAD welders. The customer needs to prepare welding facilities, nitrogen and other necessary help.
- Solution is charged into the chiller when a unit is shipped in one piece, and packed separately for split shipment or for single-piece shipment with unit shipping weight over 32 tons.
- BROAD can arrange transportation and insurance on behalf of customers. If the customer chooses to arrange by themselves, please refer to" BROAD Chiller Packing & Transportation Regulations" for container arrangement and safe transportation.

Container arrangement reference:

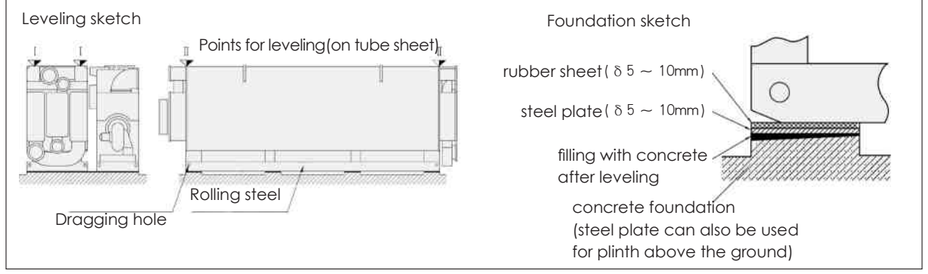
Mode	BZ	With BY pump set	BYZ enclosure	BE	BS(BH)	BZHE	BDH(S)
20	20'GP*	/*	40'HQ(BY20)*	20'GP*	20'GP*	20'GP*	20'GP*
50	20'GP*	/*	40'HQ(BY50)*	20'GP*	20'GP*	20'GP*	40'HQ*
75	40'HQ*	20'GP	40'OT×2	40'HQ*	40'HQ*	40'HQ+20'GP*	40'HQ*
100	40'HQ	20'GP×2	40'OT×2	40'HQ	40'HQ*	40'HQ+20'GP	40'HQ*
125	40'HQ+20'GP	40'GP	40'OT×2	40'HQ+20'GP	40'HQ+20'GP	40'HQ ×2	40'OT*
150	40'OT+20'GP	40'GP	40'OT×2+20'GP	40'OT+20'GP	40'OT	40'OT×2	40'OT*
200	40'OT+20'OT	40'GP+20'GP	40'OT×2+20'GP	40'OT+20'OT	40'OT+20'GP	40'OT×2	40'OT*
250	40'OT×2	40'GP+20'GP	40'OT×2+20'GP	40'OT×2	40'OT×2	40'OT×2	40'OT*
300	40'OT×2	40'GP+20'GP	40'OT×3	40'OT×2+20'GP	40'OT×2	40'OT×2+20'GP	40'OT+20'GP*
400	40'OT×2 +20'GP	40'GP×2	40'OT×3+20'GP	40'OT×2+40'GP	40'OT×2	40'OT×2+40'GP	40'FR+20'GP*
500	40'OT×2 +20'GP	40'GP×2	40'OT×3 +20'GP	40'OT×3	40'OT×2 +20'GP	40'OT×2 +40'GP	40'FR+20'GP*
600	40'FR +40'OT×2 +20'GP	40'GP×2 +20'GP	/	40'FR+40'OT×2 +20'GP	40'FR+40'OT +20'GP	40'FR+40'OT×2 +20'GP	
800	40'FR×2 +40'OT×2 +40'GP	40'GP×3 +20'GP	/	40'FR×2 +40'OT×2 +40'GP+20'GP	40'FR×2 +40'OT +40'GP	40'FR×2+40'OT×2 +40'GP+20'GP	
1000	40'FR×2 +40'OT×2 +40'GP +20'GP	40'GP×3 +20'GP	/	40'FR+40'OT×2 +40'GP×2	40'FR×2 +40'OT×1 +40'GP	40'FR×2+40'OT×2 +40'GP×2	

Notes: 1. Models marked with " * " are in one-piece shipment, and the rest in split shipment.
2. For chillers over model 500 (main shell weight exceeds requirement), there might be some changes as per actual condition.
3. In case some countries may have limitation on dimension and weight, loading shall be arranged accordingly.
4. BCT container arrangement:
   - 20'GP: BCT16:13 units; or BCT23:10 units; or BCT70:3 units; or BCT115:2 units;
   - 40'GP: BCT16:13 units; or BCT23:20 units;
   - 40'HQ: BCT70:7 units; or BCT115:4 units.

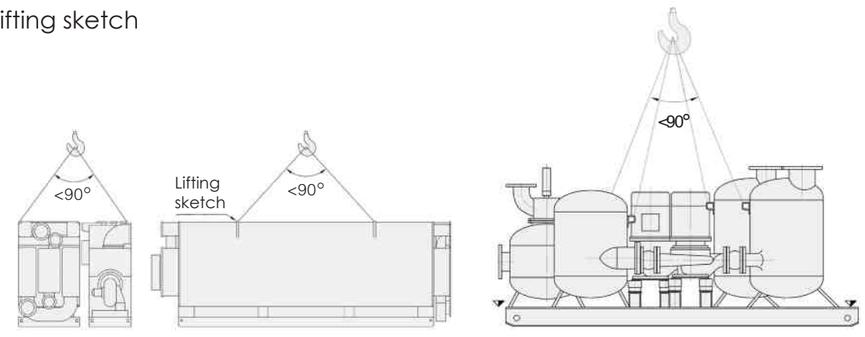
Lifting & Leveling Tips

- Lifting must be done by qualified lifting companies that are properly insured.
- The crane must be supported by crossties and firm foundation to prevent it from sinking. Check the crane steel ropes and hooks before lifting to prevent any accident. The lifting intersection angle must be less than 90°. It is strictly prohibited to lift the chiller with a single steel rope. When the chiller is lifted 20mm above the carriage or the ground, it should be kept for a little while. Lift the chiller slowly if everything is OK.
- The landing of the chiller must be with care. Crash landing is strictly forbidden! As the unit is a vacuum device, any impact on the chiller is strictly forbidden!
- When moving the chiller, only round steels or thick steel tubes can be used as rollers instead of wooden sticks. Only drag the dragging hole on the rolling steel do not place forces on other part of the chiller. Lift the unit first with jacks under the rolling steel before rigging. Both sides of HTG and main shell must be lifted simultaneously.
- Before the chiller is located, concrete foundation plinths must be molded and leveled.
- Then locate the chiller without bolts. (If there is a strong vibration source or a special anti-vibration requirement, it should be stated before ordering). The pumpset shall be fixed by anchor bolts. The foundation must be level and solid to make sure no sink or overload (when the unit is installed on the roof).
- For multiple chillers of split shipment, please make sure the original matching between HTG and the main shell. Please locate the chiller according to chiller joint drawing and make sure the joint gap is less than 1.5mm.
- After chiller locating, please adjust leveling and lay thin steel plate where it is uneven to guarantee compact contact between the chiller and base. Take tube sheet as the leveling point and make front/rear and left/right leveling (check level height of every part by acrylic tube). It should be leveled within 0.8/1000 both lengthwise and sidewise. Leveling must be done within 2 hours after locating the chiller, otherwise the chiller base will be damaged.
- The chiller must be located levelly and its steel frame bases must match the plinth, the weight of the chiller must be evenly balanced on the plinth. Otherwise, the chiller may be twisted slowly, which will finally result in damage due to leakage.
- The chiller should be protected by full time personnel during transportation & installation. No access to the chiller or valves for unauthorized persons. Valves of the chiller are forbidden to be screwed. If the machine room is under construction, protective measures are needed to avoid damage or dirt to the chiller. Do not scrape the paint or insulation layer.

Sketch of leveling and foundation



Lifting sketch



Energy saving comparison

Compared with conventional machine room mode, BROAD packaged pumpset system reduces the rated power demand by 40-60%, and the operating electricity consumption by 60-75% (the electricity for pumpset only amounts to 2-5% of the rated cooling capacity.)

Examples on power consumption comparison

• BY50 type (pumpset for 582kW/165Rt chillers)

Power consuming parts	Conventional machine room mode power demand	Packaged pumpset power demand	Packaged pumpset operating power consumption
Cooling water pump	30 kW	7.5 kW	2～7.5 kW
Cooling tower fan	11 kW	11 kW	3～11 kW
Chilled/heating W pump	22 kW	7.5 kW	7.5 kW
Total	63 kW	26 kW	17 kW (annual)
electricity/cooling capacity	10.8%	4.47%	2.92%
Annual operating consumption	**190 MWh**	**52 MWh (power saving is 73%)**	

• BY300 type (pumpset for 3489kW/992Rt chillers)

Power consumption equipment	Conventional machine room type power demand	Packaged pumpset system power demand	Packaged pumpset system operating power consumption
Cooling capacity	180 kW	44 kW	11～44 kW
Cooling tower fan	37 kW	37 kW	6～37 kW
Chilled/heating W pump	110 kW	60 kW	30～60 kW
Total	327 kW	141 kW	100 kW (annual)
Electricity/cooling capacity	9.4%	4.04%	2.86%
Annual operating consumption	**1000 MWh**	**300 MWh (power saving is 70%)**	

• BY1000 type (pumpset for 11630kW/3307Rt chillers)

Power consumption equipment	Conventional machine room type power demand	Packaged pumpset system power demand	Packaged pumpset system operating power consumption
Cooling capacity	550 kW	180 kW	30～180 kW
Cooling tower fan	110 kW	110 kW	22～110 kW
Chilled/heating W pump	440 kW	180 kW	90～180 kW
Total	1100 kW	470 kW	250 kW (annual)
Electricity/cooling capacity	9.5%	4.04%	2.15%
Annual operating consumption	**3300 MWh**	**750 MWh (power saving is 77%)**	

Notes: 1. Calculation of annual operating power consumption is based upon cooling operation, 5 months per year and 20 hours per day.
2. Operating consumption is the result of using inverters and shifting between two pumps, while the power consumption of conventional pump system equals to the power demand.

Why electricity saving ?

- Saving from design: 1. Many innovations reduce the resistance from filters, valves and piping to almost zero. 2. Specially designed pumps optimize head and flow rate to system design.
- Saving from operation: 1. BROAD leads the world in inverter control system design and operation. Standard designs incorporate inverter-controlled cooling water pump(s) and cooling tower fan(s) which are automatically adjusted according to load and ambient temperature. 2. Two pumps combined or separate operation by software analyzer. 3. Actual power consumption during operation is 30-60% of the rated design.

General Comparison

Mode	BROAD Non-electric Chillers	Other Non-electric Chillers	Electric Chillers
Investment	Low •Chiller price is high but water distribution system invests low. (design + equipment + installation + commissioning +machine room) •Small footprint. •Smaller equipment selection	High •Chillers are less expensive but customers' self-purchased water distribution system costs high. •Need separate hot water system. •Prevalently oversized equipment selection.	Higher •Electricity demand is 8-10 times more than that of non-electric chillers. •Need boiler (and boiler room) for heating. •High investment on water distribution system. •Prevalently oversized equipment selection.
Function	Three functions in one unit Provide cooling, heating and hot water simultaneously or dedicatedly, and automatically adjust all temperatures.	Two functions in one unit	Only one function Heat pump has two functions, but its heating capacity is reduced dramatically or even lost when the ambient temperature is low.
Energy Efficiency	Energy saving is visible. • Ultrasonic flow meters are installed on all pipes (fuel, chilled/heating water, cooling water, hot water) to reflect the energy efficiency directly or indirectly. •The touch screen real time displays (and records) cooling capacity and energy efficiency. •Dozens of energy saving patents assure initial and long-term energy efficiency, such as auto purge and air vent (without a vacuum pump in the life span), plate heat exchanger,upward spraying, refrigerant anti-overflow, turbulator in fire tubes, etc. •Cooling water system is equipped with water softner and biocide & antisludge auto dosing device to eliminate energy waste and cooling capacity decrease caused by fouling. •Conduct yearly energy consumption investigation and diagnosis to each user. •BROAD chillers are proven that at least 50% more energy saving per our energy investigation to thousands of users.	Energy consumption is not transparent. •No flow meters. •No energy efficiency display (not out of technical reasons, probably not willing to take the responsibility). •No auto air vent device so energy efficiency drops periodically.	Not energy-saving. •Energy mode not energy-saving. •No flow meters. •No energy efficiency display(not out of technical reasons,probably not willing to take the responsibility). •Tear & wear of moving parts causing energy efficiency decrease.
Reliability	Pursuing "zero fault" •The annual "tube freezing" rate in evaporator is as low as 0.05%, as it is equipped with 3-level temperature sensors, 3-level flow switches and ultrasonic flow meters. •"Separate heating" reduces number of parts involved in heating by 80%+, and doubles the lifespan of the main shell. •"Auto purge/ vent" prevents metals from corrosion and makes sure no cooling capacity decrease. •Water distribution system is factory made so that industrialization of central air conditioning is materialized.All aspects from designing to component quality control, production, testing, site commissioning and maintenance are integrated into a uniform quality control system. •All materials and components are outsourced from world's top manufacturers (quality comes first at any time).	Numerous faults •Annual "tube freezing" rate exceeds 5%. •Main shell heating brings many faults and short life design. •No auto air vent device causes periodical cooling capacity and energy efficiency decrease. •Water distribution system is designed individually, purchased separately and installed by non-professionals with great quality risks. •Since it does not include cooling water auto treatment device, the copper tubes that get scaled •must be cleaned by acid, which will easily cause attenuation or even puncture of the copper tubes.	Many faults •Number of moving parts is several times more than that of non-electric chillers, and they are easy to be damaged. •Water distribution system is designed individually, purchased separately and installed by non-professionals with great quality risks. •Since it does not include cooling water auto treatment device, the copper tubes that easily get scaled must be cleaned by acids, which will easily cause attenuation or even puncture of the copper tubes.
Safety	Risk free •The world's only non-electric chiller with complete American and European safety certificates •High temperature generator is equipped with 8-level mechanical and electronic anti-explosion devices to ensure explosion free (even in case of sabotage). •Cooling water system is with auto biocide device to eliminate legionnaires' disease	Risky •Not completely certified. •No comprehensive	Anti-explosion measures. •No biocide dosing
Uncertain	Customers are worry-free & carefree. •A single purchase order to solve all ordering, installation and operation problems •Automatic operation of the equipment and system makes full-time operator unnecessary. •Provide life-long maintenance & repair, or even operation management service (energy management contract). Life-long quality commitment.	Customers are not carefree. •Purchase and installation of water distribution system are troublesome. •The whole system is a combination of products from many manufacturers, making it impossible to actualize automation. •Poor after-sale service.	Customers are not carefree. •Purchase and installation of water distribution system are troublesome. •The whole system is a combination of products from many manufacturers, making it impossible to actualize automation. •Poor after-sale service.

ISO9001

BROAD central air conditioning has obtained all certification of ISO,CE, UL, ETL, ASME, and other international certication

100g

To preserve forest & water sources, pls imitate us to adopt compact layout & thin paper printing

BROAD AIR CONDITIONING
远大空调设备有限公司
BROAD Town , Changsha , China 410138 , www.broad.com
Tel +86-731-84086688 Fax 731-84611357

2011.06
The Second Edition Quantity:10,000