BROAD PUMPSET

MODEL SELECTION & DESIGN MANUAL

Global Partner of Expo 2010 Shanghai China

Functions

- Transmission of central air conditioning water systems including A/C water, cooling water, hot water as well as other water medium.
- Auto dosing, auto water discharging and filling, auto water softener, inverter controlled pumps, auto cooling/heating metering by ultrasonic flow meter, and auto protection for A/C water off.

Applications

- Any water-cooled central air conditioning systems including electric and non-electric ones.
- Fields of clean water, hot water, fire fighting water, high-rise water supply, residence water supply, industrial water supply (special orders for specified filter, pump power & head).

Features

- Miraculous electricity saving
  Zero water resistance design enables 60%+ electricity saving compared with conventional water distribution systems. Inverter controlled water pumps reduce the operating electricity consumption to 30%~50% of the rated power.
- Complete bacteria killing
  Auto dosing device charges biocide to the cooling water system automatically to eradicate legionnaire's diseases.
- Quick installation
  Installation time is 10% of that needed for conventional projects, which saves a lot of time cost and labor cost for customers.
- Cost and space saving
  One-shot investment solves all problems: designing, purchasing, installation, commissioning, and 50% footprint reduction.
- Worry-free & carefree
  Whole system factory made and tested. Customers' management cost saved. All European/US safety certificates secured. Central Air conditioning industrialization materialized.

Oct. 2008 .SI

Technical Advantages

Case study

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.

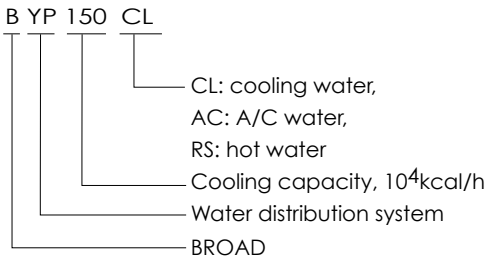
Why electricity saving ?

- 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.

Specifications

No.	Items	Specifications
1	Transmission medium	Clean water (dreggy cooling water is permitted). Special order for other water medium
2	Medium temperature	0~95℃ (antifreeze to be added if ambient temperature is below 0℃)
3	Ambient temperature	-10 ~40℃
4	Working pressure	Rated: 0.8MPa, Max.: 2.4MPa (special order)
5	Protection grade	IP44
6	Power	380V, 50Hz (other power requests can be accommodated)
7	Auto water treatment	Automatic dosing of antisludge agent & biocide for cooling water
8	Softened water	Outlet water hardness: ≤ 1.5 mg $CaCO_3$/L

Nomenclature



Parameters

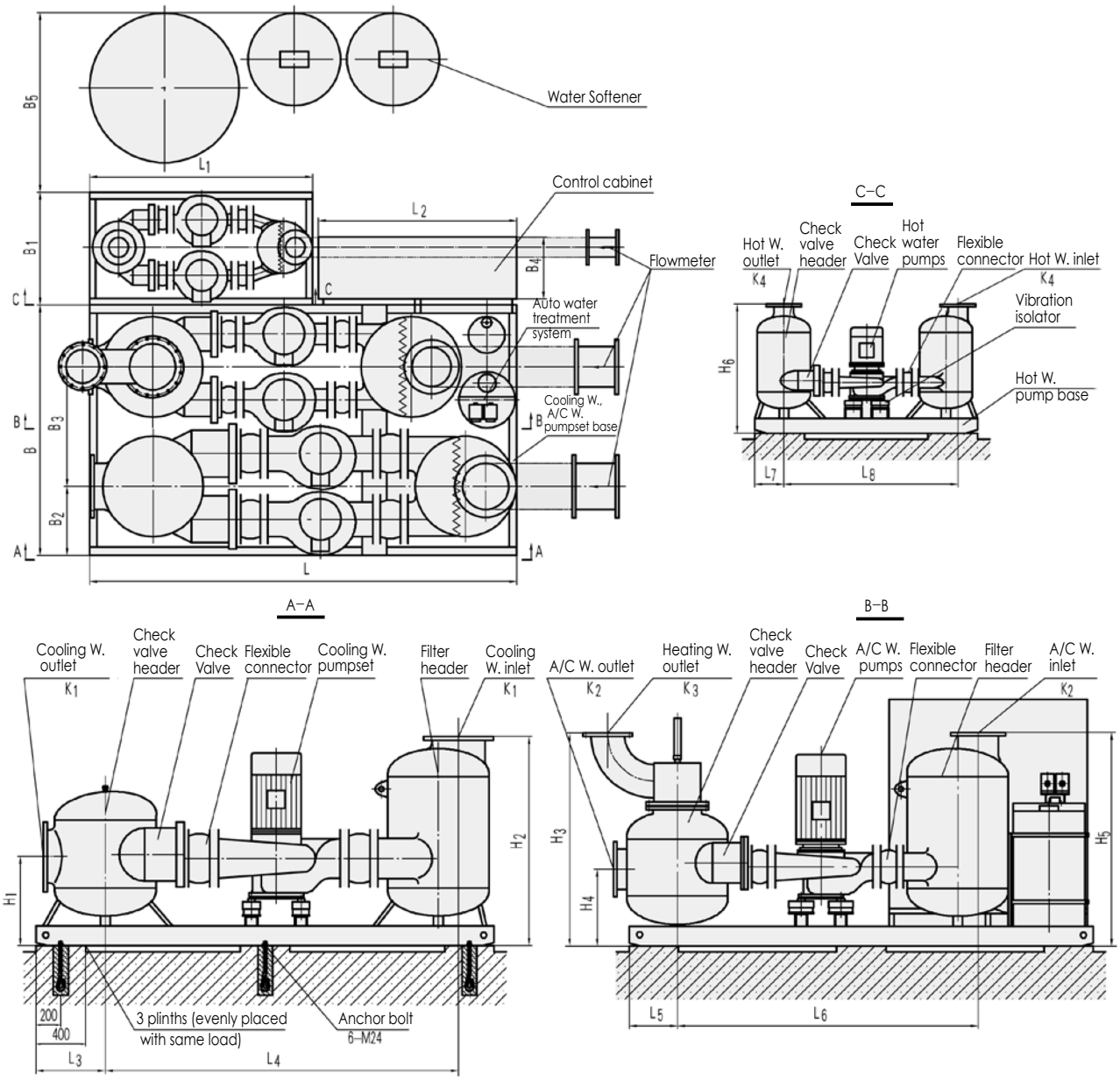
No.	Model	Cooling capacity	Cooling water		A/C water		Hot water		Power demand	Shipment Weight	Operation Weight	Filter mesh		
			Rated flow rate	External pump head	Rated flow rate	External pump head	Rated flow rate	External pump head				A/C water	Cooling water	Hot water
		10^4kcal/h	m^3/h	mH_2O	m^3/h	mH_2O	m^3/h	mH_2O	kW	t	t			
1	BYP75	75	190	15	107	24	12.9	15	32.2	2.8	3.8	18	4	18
2	BYP100	100	250	15	143	24	17.2	15	33	2.8	3.8	18	4	18
3	BYP125	125	310	15	179	27	21.5	15	47	3.1	4.2	18	4	18
4	BYP150	150	375	15	214	27	25.8	15	56.4	3.3	4.4	18	4	18
5	BYP200	200	500	15	285	27	34.4	15	78.4	4.8	7.1	18	4	18
6	BYP250	250	625	16	357	28	43	15	92.4	5	7.4	18	4	18
7	BYP300	300	750	16	429	28	51.5	15	110	5.5	8.1	18	4	18
8	BYP400	400	1000	16	571	28	68.8	15	126	6.8	9.8	18	4	18
9	BYP500	500	1250	17	714	32	/	/	200	8.1	13	18	4	/
10	BYP600	600	1500	17	857	32	/	/	220	9.2	14.9	18	4	/
11	BYP800	800	2000	17	1143	32	/	/	300	10	15.9	18	4	/
12	BYP1000	1000	2500	17	1429	32	/	/	360	11	19.4	18	4	/

Model selection and ordering

- Structure: two pumps in parallel are equipped with filter header, check valve header, flexible connector, vibration isolator and control cabinet. Unitary skid for models ≤ BYP400, and three split parts including cooling water pumpset, A/C water pumpset and control cabinet for models ≥BYP500. The cooling water pumpset is fitted with the auto water treatment system. Cold insulation for A/C water pumpset and heat insulation for hot water pumpset are factory-mounted.
- Control: when linkage controlled with BROAD IX or X generation non-electric chillers, it can actualize automatic on/off, inverter control for cooling water pump and cooling tower fans (if the system is combined with other chillers or equipment, PLC control cabinet and related wiring must be added).
- Ordering: select the corresponding water distribution system according to flow rate and pump head. Customer can also select cooling water pumpset, A/C water pumpset or hot water pumpset separately. Special orders can be accommodated for specified pump power and head.
- Lead time: two months for models ≤ BYP500 and three months for models ≥ BYP600, special orders will take longer.

Dimensions

BYP75～BYP400



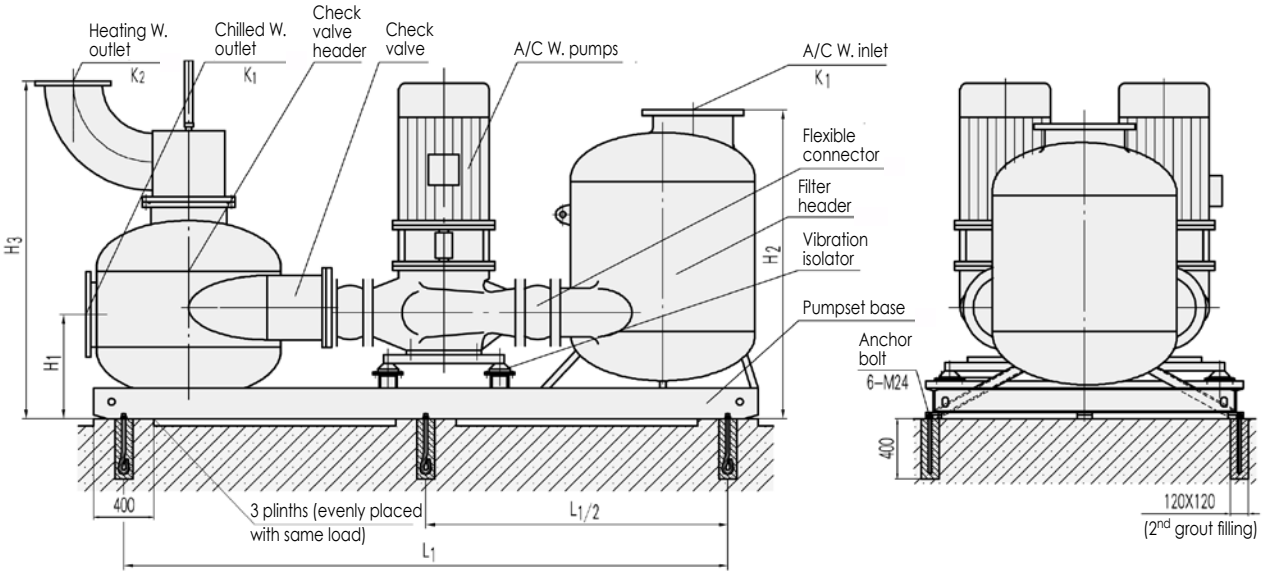
Note: when it is connected with BROAD IX or X generation non-electric chillers, the flow meters will be mounted at water outlet pipes of every chiller.

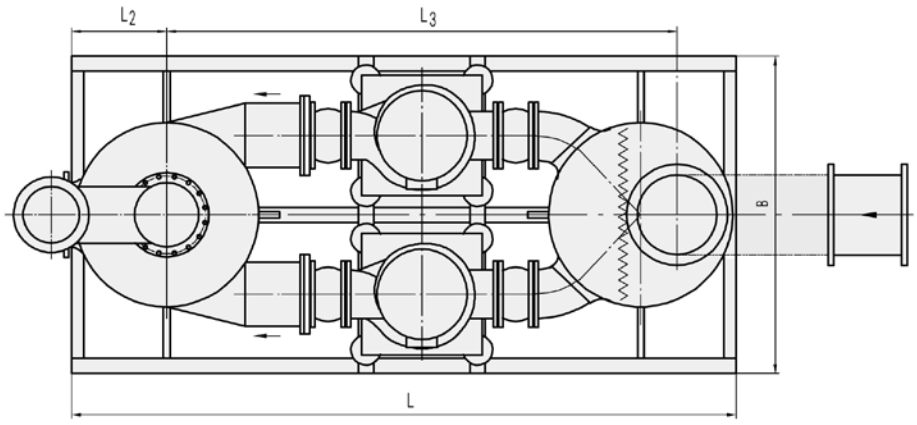
(Unit: mm)

Model	Dimensions									Piping location												Piping size(DN)			
	L	B	B_1	L_1	B_2	B_3	B_4	B_5	L_2	L_3	L_4	L_5	L_6	L_7	L_8	H_1	H_2	H_3	H_4	H_5	H_6	K_1	K_2	K_3	K_4
BYP75	2700	1880	700	1350	480	895	400	800	800	670	1770	325	1745	140	1115	600	1340	1420	540	1340	720	200	150	100	65
BYP100	2900	1880	700	1350	475	905	400	800	800	710	1770	340	1840	150	1090	600	1340	1420	540	1340	720	200	150	125	65
BYP125	2900	1960	700	1350	500	950	400	1000	800	615	1930	335	1840	150	1095	600	1340	1420	540	1340	720	250	200	150	80
BYP150	2900	1960	740	1570	505	940	400	1000	800	530	1995	335	1840	240	1210	600	1340	1420	540	1340	920	250	200	150	80
BYP200	3200	2090	740	1700	585	1020	500	1200	1400	540	2415	360	2000	235	1330	685	1725	1420	540	1340	920	300	250	200	125
BYP250	3200	2090	740	1700	585	1015	500	1200	1400	515	2415	395	2015	235	1330	685	1725	1420	540	1340	920	350	250	200	125
BYP300	3450	2200	900	1700	600	1080	500	1300	1600	550	2595	425	2330	210	1335	705	1745	1795	705	1745	940	350	300	200	125
BYP400	3700	2320	900	1700	580	1140	500	1450	1600	605	2840	415	2465	210	1335	705	1745	1795	705	1745	940	400	300	250	150

BYP500～BYP1000

A/C water pumpset





Note: when it is connected with BROAD IX or X generation non-electric chillers, flow meters will be mounted at water outlet pipes of every chiller.

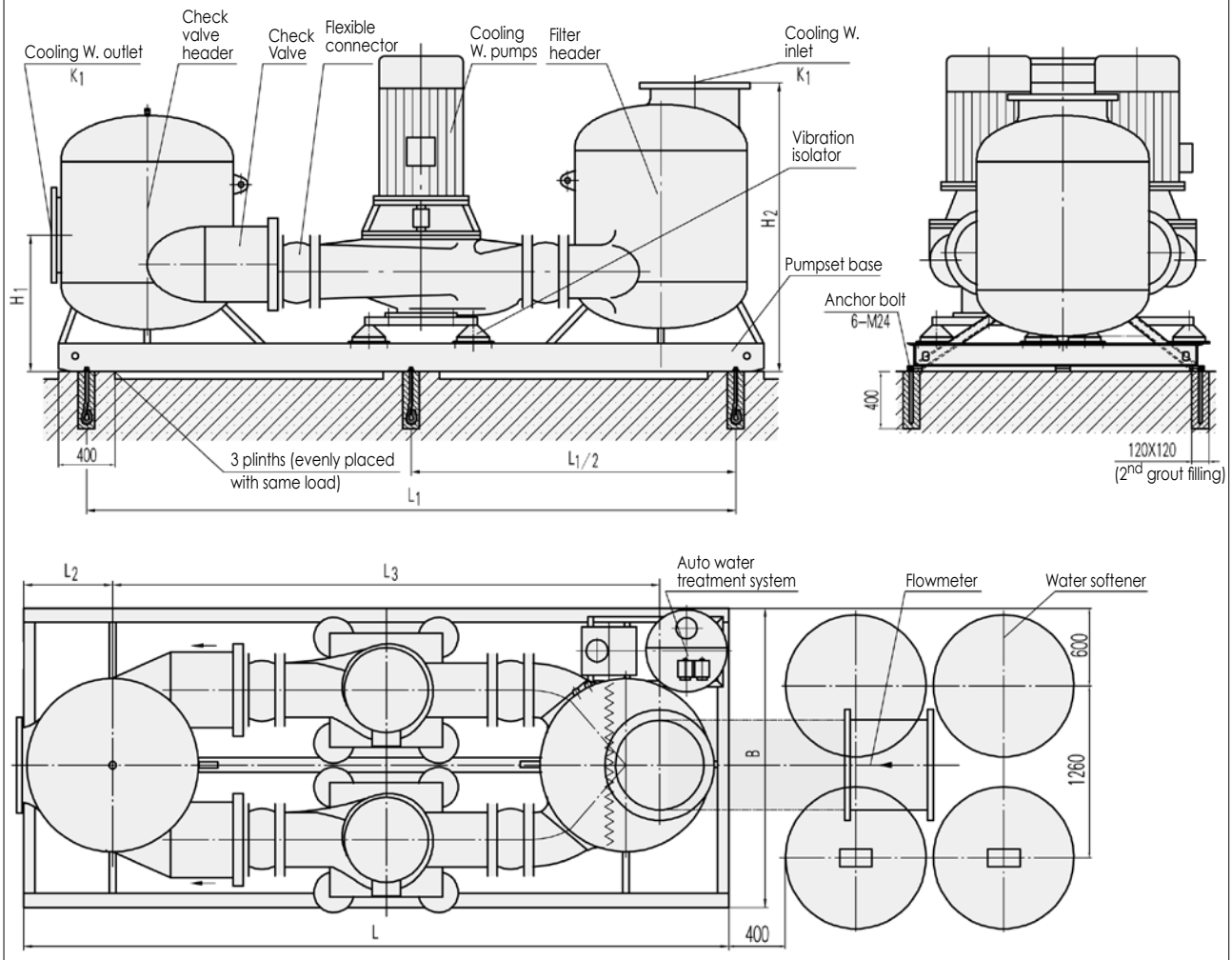
(Unit: mm)

Model	Dimension				Piping location				Piping size (DN)	
	L	B	L_2	L_3	L_1	H_1	H_2	H_3	k_1	k_2
BYP500AC	3260	1350	460	2400	2860	495	1795	1795	350	250
BYP600AC	4000	1490	540	2545	3600	595	2060	2150	400	300
BYP800AC	4000	1440	540	2920	3600	595	2060	2150	450	350
BYP1000AC	4400	1530	630	3140	4000	595	2150	2235	450	350

Dimensions

BYP500～BYP1000

Cooling Water Pumpset



Note: when it is connected with BROAD IX or X generation non-electric chillers, the flow meters will be mounted at water pipes of every chiller.

(Unit: mm)

Model	Dimension				Piping location			Pipping size(DN)
	L	B	L_2	L_3	L_1	H_1	H_2	k_1
BYP500CL	4600	1845	630	3240	4200	900	2150	400
BYP600CL	4600	1845	630	3240	4200	900	2150	450
BYP800CL	5000	1875	605	3690	4600	900	2150	500
BYP1000CL	5000	1875	610	3680	4600	900	2150	500

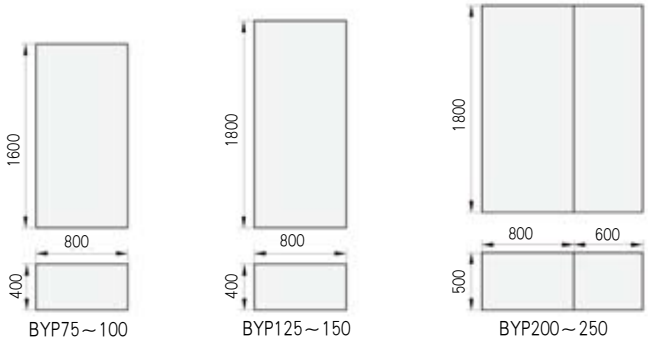
Electrical Control

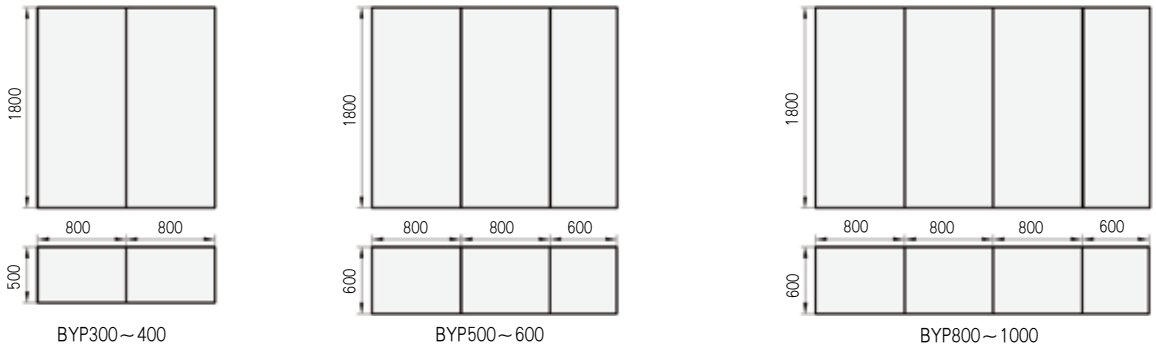
- Water distribution system consists of control cabinet, PLC control cabinet, temperature sensors, flow meters, conductivity sensor, drain valves and etc.
- Inverters for cooling water pump, low voltage control parts for pumps , remote communication control I/O modules and power sensors are equipped in the control cabinet. The control cabinet controls the system operation per control signal from PLC control cabinet or chiller. Meanwhile it checks the flow rates, cooling water conductivity and A/C water differential pressure, etc.
- The control interface for cooling tower fan inverters is built-in.
- PLC control cabinet contains PLC controller, touch screen etc. PLC controller is connected with the control cabinet through Device Net communication interface to control the operation of water distribution system. It can be connected with all water-cooled chillers through the signal-input interface to implement chiller linkage which controls the relevant pumps and cooling tower fans per chiller operating signals, and feeds back the operating signals to chiller. Touch screen is used for operation supervision, parameter setting, water distribution system commissioning and manual operation etc.
- BROAD IX and X generation chillers equipped with remote control interface can directly control water distribution system without a PLC control cabinet.
- Temperature sensors and flow meters for A/C water and cooling water are used for inverter-controlled energy-saving operation of water distribution system, as well as cooling/heating capacity and water consumption metering.
- Conductivity sensor detects the conductivity of cooling water which is used to control the cooling water auto discharge and auto dosing device.

Control cabinet

PLC control cabinet

Dimensions of control cabinet





Installation Guide

Transportation and jobsite locating

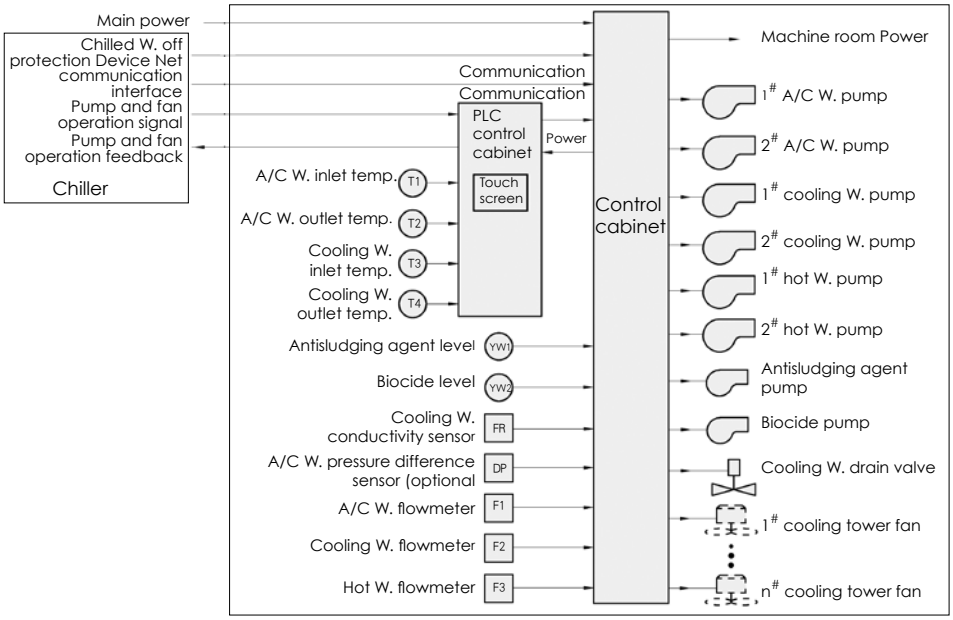
- shipment for models ≤ BYP400, and three-piece split shipment including cooling water pumpset, A/C water pumpset and control cabinet for models ≥BYP500. Each piece of the three parts can be loaded into a 20'GP container.
- Select installation location per dimensions to facilitate pipe connection. Keep the service space not less than 1m and prepare the foundation.
- Prepare the foundation and preinstall the anchor bolt hole exactly per dimensions. The anchor bolt hole depth is in accordance with the length of bolts.
- ±10mm tolerance is permitted for foundation height. Keep the steel sheet solid and full touch with foundation. Pumpset frame should be well-connected with foundation. The tolerance in vertical/horizontal direction should be ≤0.8/1000 after installation.
- BROAD can arrange shipment and insurance on behalf of customers.

List of control system installation

Item	Installation location & requirements	Material	Source	BROAD scope	Customer scope
Installation and wiring (for non-BROAD chiller) of temp sensors, flow switch, flow meter	According to requirements of Users Manual. The straight pipe segments adjacent to the flow meter must satisfy the requirements: front 6 times and rear 3 times of the pipe diameter	PT100 temp sensor; flow switch; flow meter	BROAD	Sensors and wiring in cabinets	Wiring from sensor to control cabinet
Installation of control cabinet and inverter cabinet, power connection and wiring in cabinets	According to requirements of Users Manual	Installation bolts, 5-core cable	Customer	Wiring in cabinets	Main power wiring and control cabinet installation
Wiring between water distribution system and chiller	Between water distribution system and chiller	Multiple core cable, 0.5~1.0 mm^2	Customer	Wiring in cabinets	Wiring

Note: If non-BROAD chiller users need to add flow switches to enable chilled water off protection, BROAD will supply the materials and wiring but site installation should be done by users.

Control System Diagram



Note:
a.BROAD IX and X generation chillers equipped with Device Net communication interface need not PLC control cabinet and the related wiring. The water distribution system is controlled by chiller directly.
b.Inverter contorl interface for cooling tower fan is provided.

Supply List

No.	Name	Unit	Qty	Description
1	A/C W. pump	pc	2	Special order for specified pump head and power
2	Cooling W. pump	pc	2	Special order for specified pump head and power
3	Hot W. pump	pc	2	N/A if without hot water function
4	Pipeline	set	1	Including flexible connectors, vibration isolator, valves
5	Water drainage motor valve	pc	1	Discharge the cooling W. automatically when water quality becomes poor
6	Zero resistance filter header	pc	3	Two pieces if without hot water function
7	Zero resistance check valve header	pc	3	Two pieces if without hot water function (cooling/heating switch valve inside A/C W. check valve header)
8	A/C W. flow meter	pc	1	For precise metering chiller load and A/C W. flow rate. Can be ordered separately
9	Hot W. flow meter	pc	1	For precise metering chiller load and hot W. flow rate. N/A if without hot water function
10	Cooling W. flow meter	pc	1	Verify chiller load and cooling water flow rate. Can be ordered separatly
11	Water softener	set	1	Cooling water and A/C water make-up. It can be ordered separately
12	Auto water treatment system	set	1	Antisludge agent, corrosion inhibitor and biocide for cooling water
13	Control cabinet	pc	1	Including inverters and starters. It can be ordered separately
14	Inverter	pc	2	For $1^{\#}$ cooling water pump
15	PLC control cabinet	pc	1	N/A for BROAD Ⅸ and Ⅹ generation chiller
16	PLC	pc	1	N/A for BROAD Ⅸ and Ⅹ generation chiller
17	Touch screen	pc	1	N/A for BROAD Ⅸ and Ⅹ generation chiller
18	Starter	pc	3	For A/C water pumps, $2^{\#}$ cooling water pump
19	Switch gear	pc	1	Main power
20	Circuit breaker	pc	6	5 pieces if without hot water function
21	A/C contactor	pc	0～18	per orders
22	Thermal relay	pc	0～5	per orders
23	Power meter	pc	1	/
24	Temperature sensor	pc	4	N/A for BROAD Ⅸ and Ⅹ generation chiller
25	Pressure difference sensor	pc	1	Optional
26	Conductivity sensor	pc	1	/
27	Flow switch	pc	1	For non-BROAD chillers. Cut off the cooling water pump when A/C water is low or off

Certificates

CE Low voltage Directive

CE Low voltage Directive

CERTIFICATE

of Conformity
Low Voltage Directive 73/23/EEC
as last amended by EEC Directive 93/68/EEC

Registration No.: AN 50037854 0001

Report No.: 16002338 001

Holder: Broad Air Conditioning
Broad Town
Changsha, Hunan 410138
P.R. China

Product:

Identification:

This certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical Report and documentation are at the Licence Holder's disposal.This is to certify that the tested sample is in conformity with all revision of Annex I of Council Directive 73/23/EEC, in its latest amended version, referred to as the Low Voltage Directive. This certificate does not imply assessment of the series-production of the product and does not permit the use of a TÜV Rheinland mark of conformity. The holder of the certificate is authorized to use this certificate in connection with the EC declaration of conformity according to Annex III of the Directive.

Certification Body

Cologne 05.02.2004

TÜV Rheinland Product Safety GmbH - Am Grauen Stein - D-51105 Köln

CE The CE marking may be used if all relevant and effective EC Directives are complied with. CE

CE EMC

Competent Body
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Am Grauen Stein
D-51105 Köln

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Date: 30.,2005

SGS

Broad Air Conditioning Co., Ltd.

ISO 14001:2004

ISO14001

TÜV CERT

RTIFICATE

ÜV CERT Certification Body

einland Industrie Service GmbH

ertifies in accordance with
ÜV CERT procedures that

ir-Conditioning Co., Ltd.

ngsha City, Hunan Province 410138, P. R. China

d and applies a quality management system for

anufacturing and Sales of Non-electrical
tioning System & Vacuum Heating Boiler

audit was performed, Report No. 79240.

een furnished that the requirements according to

DIN EN ISO 9001:2000

are fulfilled.

he certificate is valid until 2009-03-31.

rtificate Registration No. 01 100 79240

TÜV Rheinland Group

ISO9001

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Date: 27 Feb, 2004

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