



Hope Deepblue



**X Direct-fired LiBr Absorption Chiller(Heater)**



Hope Deepblue

**Continental Hope Group**  
**Hope Deepblue Air-conditioner Manufacture Corp., Ltd.**

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Continental Hope Group  
Hope Deepblue Air-conditioner Manufacture Corp., Ltd.

## Company Profile

Hope Deepblue Air-conditioner Manufacture Corp., Ltd. (Deepblue) was established in 1997. It is affiliated to Hope Group, which has been following its corporate philosophy of "Contributing to the Motherland and Striving for the Best" since its founding and has developed into an ultra-large conglomerate after over twenty years of hard work, with its annual sales revenue approaching RMB 100 billion and its business involving energy development, energy and chemicals, HVAC&R, power electronics, information network, drive control, building, real estate, hotel, food, feedstuff, finance and international trade industries.

Deepblue was founded with an investment of RMB 160 million. It is located in the Western High-tech Park in Chengdu, a national key high-tech development zone, and occupies an area of about 170 mu (1 hectare equals 15 mu). As a national key high-tech enterprise and the largest central air conditioner manufacturer in West China, Deepblue is engaged in R&D, production and sale of products in HVAC&R, and offer all kinds of air conditioners and systematic solutions according to users' different demands.

Deepblue has a strong technology R&D team consisting of renowned experts, scholars and engineers in air conditioner industry. So far it has obtained tens of patents and proprietary technologies and on this basis has developed the Deepblue Green Energy Center, the truly first heat-electricity-cooling tri-generation system with independent intellectual property rights in China, which has been operating successfully for more than six years. Besides, Deepblue developed various advanced air conditioning products including water(ground)-source central air conditioner, LiBr(lithium bromide) absorption chiller and vacuum boiler, bringing comfort and energy saving and environmental protection benefits to its customers.

Thanks to the advanced technologies, state-of-the-art production and test equipment, and scientific management, Deepblue's products has passed ISO9001, ISO14001, CCC, CRA, CSC and CE certifications, won the "Gold Medal of the Fourth Shanghai Science and Technology Exposition" and "Gold Medal of China Fair of Inventions and Technologies", and included in the National Torch Program and National Key & New Product list, and Deepblue has won a number of awards such as Key Recommended Unit for National Energy Saving Project Construction, Top Ten Most Influential HVAC&R Brand, Top Ten Most Designer-trusted HVAC&R Brand, Model Enterprise for Building's Energy Conservation and Emission Reduction, Special Contribution Prize in Building Environment and Facilities Industry, and Leading Enterprise in Waste Heat Recovery. Particularly, Deepblue's water(ground)-source central air conditioner has become the first choice in the industry due to its prominent energy efficiency and high quality.

After more than ten years of rapid development, Deepblue has formulated a nationwide marketing and service network and established powerful and professional marketing and installation teams, which provide pre-sale technical consultancy, production installation and consultancy, lifelong product maintenance, energy saving management consultancy, energy saving project retrofit, and air conditioner and energy operation management services, making customers enjoy satisfactory services during the whole process from R&D, manufacture, inspection to commissioning and after-sale maintenance.

"One Project, One Masterpiece". Deepblue has built an array of important and representative projects across China such as the Beijing Newton Office, Zhejiang World Trade Center, Hefei New City International, Lingbo Xinrong Reson(Five-star), Chengdu Homeland Hotel(Five-star), and Hongqiao Commercial Plaza. Deepblue fits top building, has been a fashion, trend and acknowledgement. Deepblue will continue to work hard and take public praise as its best encouragement and endeavor to grow into an industrial leading company.



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**Steam-fired  
Libr  
Absorption  
Chiller**

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Direct-fired LiBr-  
Absorption Chiller(Heater)

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## Certificates



CE Certificate



ISO14001 Certificate



ISO9001 Certificate



CRAA Certificate



Chiller(Heater) performance  
test room certificate



National Torch Program  
Project Certificate



Chinese Energy Conservation  
Product Certificate



High-tech Enterprise Certificate



National Industrial Product  
Production License

## Manufacturing and Test Equipment



Helium Leak Detectors



X-Ray Detectors



Ultrasonic Weld Tester

Helium mass spectrometer leak detector  
(Imported from Germany)



Machining center



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Direct-fired LiBr  
Absorption Chiller(Heater)

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- ① Welding robot
- ② Submerged Arc welding machine
- ③ CNC cutting machine
- ④ CNC Drilling machine
- ⑤ Bundle automatic welding machine

## Direct-fired LiBr Absorption Chiller Product Features(Heater)

### Working Principle

Direct-fired lithium bromide absorption chiller is a refrigeration equipment which uses steam as its driving power. The LiBr solution is the circulated working medium, with LiBr as the absorbent and water as the refrigerant.

The unit is mainly composed of the high-pressure generator (HPG), low-pressure generator (LPG), condenser, evaporator, absorber, high-temperature heat exchanger, low-temperature heat exchanger, automatic purge system, combustor, vacuum pump and canned pump, etc.

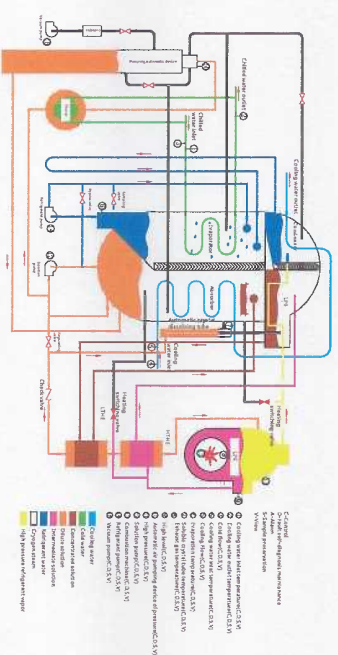
### Cooling cycle

The diluted solution, transferred by the solution pump, through the low-temperature heat exchanger, condensate water heat exchanger, high-temperature heat exchanger heating after entering in the high-pressure generator. In the high-pressure generator, the dilute solution is heated by the flame there to generate high-temperature refrigerant vapor, and then condensed into intermediate solution. The intermediate solution entered into the low-pressure generator through the high-temperature heat exchanger and is heated by the high-pressure, high-temperature refrigerant steam coming from the high-pressure generator to generate the refrigerant vapor, and then further become concentrated solution.

The high-temperature refrigerant vapor (water) generated in the high-pressure generator is heated the intermediate solution of the low-pressure generator and then cooled into refrigerant water. The refrigerant water, after throttled, pressure reducing, with the refrigerant vapor generated in the low-pressure generator entered into the condenser to be cooled by the cooling water, and become refrigerant water which is correspond with condensing pressure



## Flow Chart(cooling cycle)

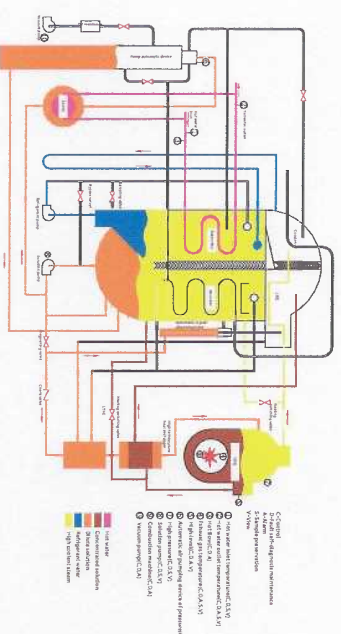


The liquid coolant of the condenser through the throttle, then enters the evaporator. Due to the low pressure of the evaporator, so that the refrigerant water in low temperature can evaporation boiling, when the coolant water is used pump for conveying, spraying in submerged tube evaporator is immediately, evaporation, absorption evaporator tube inner cooling waterHeat, so that the inner tube water temperature decrease, achieve the purpose of refrigeration

By the low pressure generator out of the concentrated solution flows through the low temperature heat exchanger into the absorber, sprayed in the evaporator tube bank, is cooled by the cooling water within the pipe, temperature reducing, absorbed the refrigerant vapor from the evaporator become a dilute solution. So, the concentrated solution constantly absorbed the refrigerant vapor generated in the evaporator made the evaporator evaporation process constantly. Due to absorbed the refrigerant vapor from the evaporator to become diluted solution, and then is transferred into the high pressure generator by the solution pump to boiling and concentrated. Thus completing a cooling cycle

### Heating cycle

The dilute solution is heated and condensed by the HPG generated the refrigerant vapor. Then the refrigerant vapor is directly transferred into the evaporator and absorber. In the evaporator heat exchange, preparation of warm water. In addition, The absorption liquid is concentrated into high concentrations entered into the absorber and mixed with the refrigerant water become the diluted solution, and then through the low temperature heat exchanger, low-temperature heat exchanger to the high pressure generator. Through the above cycle, to achieve the warming.



## Flow Chart(Heating cycle)



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Direct-fired LIB-  
Absorption Chiller (Heater)

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## Features

### —Unique structure

**Special high voltage generator structure: Compact structure, high efficiency**

Gas and solution reverse turbulence heat and heat exchange is full, the exhaust temperature  $\leq 170^{\circ}\text{C}$ , with high efficiency and compact structure.

**Mechanics and electric-controlled anti-freezing system: multiple anti-freezing measures!**

There are six anti-freezing measures: the primary spray device in the evaporator is installed at a lower place; the secondary spray device is in linkage control with refrigerant water and chilled water; anti-clogging device; two-stage chilled water flow switch; chilled water circulating pump and cooling water circulating pump are in linkage control; the failure data fails such as chilled water break, underflow and low temperature can be detected timely and protective measures be taken automatically to prevent tube freeze-up.

**Hybrid automatic purge system with multiple ejectors and fall-head structure: ensuring fast vacuum pumping and maintaining high vacuum.**

It is a new and high-efficiency automatic purge system. The ejector is actually a suction pump. Deepblue's purge system adopts many ejectors to accelerate pumping and increase the gas evacuation speed. The fall-head structure can raise the vacuum degree and enable the Unit to reach high vacuum. This feature ensures the inside of the Unit always remain high vacuum so that to prevent oxygen corrosion, extend the life of the Unit, and keep its best operating state.

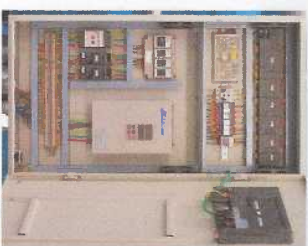
Can'd structure design: absorber solution dripping disc and an evaporator refrigerant water nozzle can be disassembled or replaced. Ensure the life period of refrigeration volume attenuation

**Solution series cycle technology: simple and reliable system piping design: Simple operation, reliable**

Solution series cycle technology to make concentrated solution further away from the crystal line, avoid crystallization, safe and reliable; the valve less, no solution regulating valve, coolant water spray control valve, high-pressure water agent, regulating valve and so on, and potential leakage points less, run or debug without operator adjustment, stable operation.

**Hybrid automatic anti-crystallization system combining level-difference dilution and crystal melting: preventing crystallization.**

Unit through its own solution concentration identification system to monitoring solution concentration operation, with electric regulating valve to drive a steam input, allowing the solution run away from the line to prevent operation of concentration crystallization, crystallization failure. All of a sudden power failure or abnormal shutdown, potential dilution system rapid dilution of lithium bromide solution, eliminate abnormal shutdown unit concentrated solution exists, avoid crystallization.



**Fine separating device: eradicating pollution**

The concentration of the LIB- solution in the generator is divided into two stages: flash vaporization stage and generation stage. It is in the former stage that pollution is truly caused. The fine separating device separates the refrigerant water during the flash vaporization finely. Only pure refrigerant water is permitted into the next link of the cycle, thus the pollution source is eliminated and refrigerant water pollution is eradicated.

**Self-adaptive cooling storage device: improving partial-load performance and shortening start/stop time**

It automatically regulates the storage amount of the refrigerant water according to the change of external load. And during partial-load operation, it automatically adjusts the solution concentration to make the Unit operating in the best state. The energy saving effect is obvious. In addition, the cooling storage device shortens the start and stop time greatly, thus reducing idle work.

**Economizer: increasing output energy**

The energy enhancer in the LIB- solution, iso-octyl alcohol, is normally insoluble in water, therefore its role as a energy enhancer is limited in conventional structure. The economizer treats iso-octyl alcohol and LIB- solution in a special way to make them join the generation and absorption process, thus increasing the energy enhancing ability of iso-octyl alcohol, reducing energy consumption, and achieving energy conservation.

**Integral sintered mirror**

The leak rate of less than  $2 \times 10^{-10}$  span /better than the national standard of three orders of magnitude to ensure the life of unit

**Special treatment technology for transfer tube surface: guaranteeing high efficiency heat exchange and reducing energy consumption**

The evaporator and absorber are hydrophilically treated to ensure the uniformity of the liquid film on the transfer tube surface, thus increasing heat exchange efficiency and reducing energy consumption.

**Inhibitor lithium molybdate: environmental friendly**

Environmentally friendly inhibitor, lithium molybdate, is used in lieu of the heavy metal inhibitor, lithium chromate.

**Variable frequency control: energy saving technology**

The operating condition of the Unit is automatically adjusted through an inverter according to the change of the cooling capacity, enabling the Unit to maintain its optimal and most energy-efficient operation.



tiger electric  
control valve



canned pump





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Direct-fired Libr  
Absorption Chiller(heatex)

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## 2.Intelligent control system

### Full automatic control function

The AI(V3.0) control system has complete and strong functions: one-key start/stop, timing on/off, safety protection system, auto adjustment functions, system linkage control, expert system, human-machine dialogue and building automation interface etc.

### Unique load-adjusting function

This function automatically regulates the output load of the Unit according to user's actual load, greatly reducing the start time, shutdown dilution time, idle work, and energy consumption

### Unique circulating solution amount control technology

The circulating amount of the solution is regulated by controlling the HPG level, concentration and temperature of the concentrated solution, instead of by simply controlling the HPG level alone. And the solution pump is controlled by an inverter. All these techniques ensure the Unit operates with appropriate circulating solution amount, improve the operating efficiency, and reduce the start time and energy use.

### Cooling water temperature limit control technology

By controlling the steam amount, AI(V3.0) limits the cooling water inlet temperature within the range between 18 and 34℃, ensuring safe and efficient operation of the Unit.

### Complete self-diagnosis and protection functions

AI(V3.0) has 34 self-diagnosis and protection functions and can automatically takes protective measures according

to fault degrees. This effectively prevents accidents, eases the labor of operators and guarantees long-term stable running of the Unit.

### Intelligent Automatic purge system

AI(V3.0) monitors the content of non-condensable gases inside the unit in real time(during operation) and starts or stops the purge system automatically, or gives an instruction if manual purge is required.

### Unique shutdown dilution control technology

Based on various conditions such as the concentration of the concentrated solution, ambient temperature and current amount of refrigerant water(in cooling cycle), AI(V3.0) can control the run time of each pump during dilution operation, ensuring an optimum concentration after shutdown of the Unit. This not only prevents crystallization, but also shortens the restart time of the Unit.

### Parameter management system

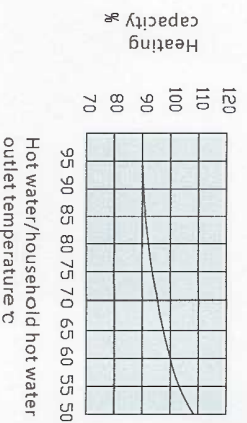
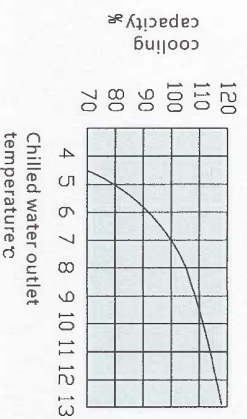
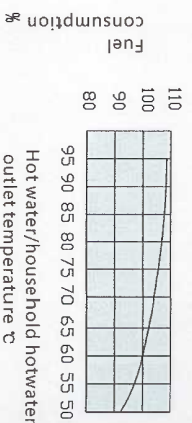
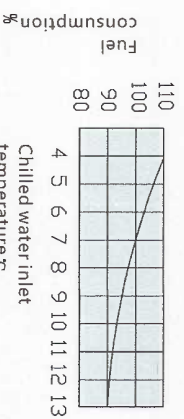
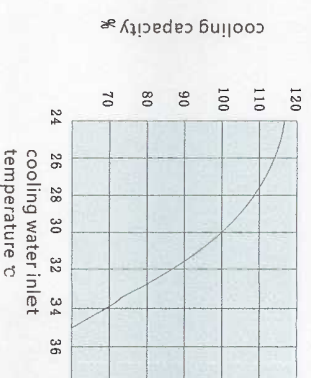
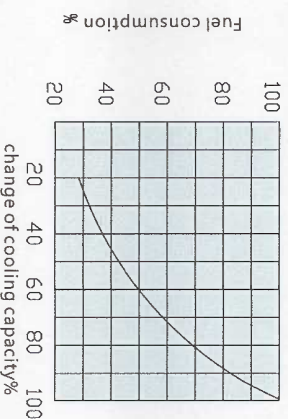
AI(V3.0) is able to display, correct and set 12 key performance parameters of the Unit through the operation interface in real time, and record the operation history.

### Fault management system

AI(V3.0) can provide detail information about failures when they occur, such as their locations and symptoms, and give treatment measures and alerts through the operation interface. In addition, it is capable of sorting and analyzing history failures, which would be helpful for repair and maintenance of the Unit.

## Technical Parameters

### Performance curve





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Direct-fired Libr  
Absorption Chiller(Heater)

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## Rated parameters

Model	ZX-	23	35	47	58	70	81	93	105	116
	KW	233	350	470	580	700	810	930	1050	1163
Cooling capacity	×10 <sup>3</sup> Kcal/h	20	30	40	50	60	70	80	90	100
	USRT	66	99	132	165	198	231	265	299	331
Heating capacity	KW	195	293	391	488	586	684	782	879	977
	×10 <sup>3</sup> Kcal/h	17	25	34	42	50	59	67	76	84
Chilled water	Intake outlet temperature	Chilled(Hot) water 2→7(55.8→60)								
	Flow rate	m <sup>3</sup> /h	40	60	80	100	120	140	160	180
Pipe diameter	Pressure drop	kPa	33	33	33	33	36	36	52	52
	DN(mm)	80	100	100	125	125	150	150	150	150
Cooling water	Intake outlet temperature	Cooling water 30→36								
	Flow rate	m <sup>3</sup> /h	56	85	113	141	169	197	226	254
Pipe diameter	Pressure drop	kPa	82	82	82	85	62	62	62	91
	DN(mm)	100	125	125	150	150	150	200	200	200
Fuel	Refrigeration	Nm <sup>3</sup> /h	14.7	22.1	29.4	36.8	44.1	51.5	58.8	66.2
	Heating	Nm <sup>3</sup> /h	17.9	26.8	35.7	44.7	53.6	62.6	71.5	80.4
Naphtha	Pressure	kPa	2.5--25			3--25				
	Pipe diameter	DN(mm)	32	40	40	40	40	50	50	50
Electric	Refrigeration	Kg/h	14.1	21.2	28.3	35.4	42.4	49.5	56.6	63.6
	Heating	Kg/h	17.2	25.8	34.4	43.0	51.6	60.1	68.7	77.3
Dinner	Total power	KW	3.2	3.4	3.6	4.6	4.9	5.3	5.7	5.7
	Power supply	3-phase 380V 50HZ								
Height	Length(H)	mm	2900	2980	2980	2980	4020	4020	4020	4640
	Width(W)	mm	1680	1770	1890	1980	1988	2102	2222	2260
shipment	Height(H)	mm	1960	2000	2160	2165	2165	2185	2350	2350
	Assembled									
Operating weight	Total shipment weight	t	3.3	4.6	5.6	6.9	8.1	9.2	10.2	11.1
	Operating weight	t	3.7	5.1	5.9	8.1	9.2	10.2	11.4	14.6

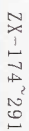
145	174	204	233	262	291	349	407	465	523	582	698
1450	1740	2040	2330	2620	2910	3490	4070	4650	5230	5820	6980
125	150	175	200	225	250	300	350	400	450	500	600
413	496	579	661	744	827	992	1157	1323	1488	1653	1984
1211	1465	1710	1954	2198	2442	2931	3419	3908	4396	4885	5862
105	126	147	168	189	210	252	294	336	378	420	504
Chilled(Hot) water 2→7(55.8→60)											
250	300	350	400	450	500	600	700	800	900	1000	1200
52	29	29	29	29	29	48	48	48	44	44	65
200	200	200	250	250	250	300	300	300	350	350	400
Cooling water 30→36											
353	423	494	564	635	705	846	987	1128	1266	1410	1692
91	91	58	58	58	58	58	51	51	63	63	76
250	250	250	300	300	350	350	350	400	400	400	500
91.9	110.3	128.7	147.1	165.4	183.8	220.6	257.4	294.1	300.9	367.6	441.2
111.7	134	156.4	178.7	201.1	223.4	268.1	312.8	357.4	402.1	446.8	536.2
5--30											
65	65	80	80	80	80	100	100	125	125	125	150
88.4	106.1	123.7	141.4	159.1	176.8	212.1	247.5	282.8	318.2	353.5	424.2
107.4	128.9	150.4	171.8	193.3	214.8	257.8	300.7	343.7	386.7	429.6	515.5
7--30											
8.5--30											
1"											
3-phase 380V 50HZ											
6.6	10	10	10.7	15.2	16.1	16.6	21.9	22.4	23.4	32.9	34.9
4658	5740	5740	5770	5840	5920	6720	6720	6800	7800	7630	9610
2452	2490	2590	2720	2768	2910	3040	3450	3950	4040	4250	4470
2652	2652	2740	2890	3200	3315	3315	3585	3585	3585	3690	3690
Assembled											
14.6	17.2	19.6	22.1	24.3	26.9	31	35.6	40.1	47.3	54.1	62.9
16.2	19.2	21.6	24.9	26.1	29.7	34.8	39.7	44.7	54.3	61.1	69.5

ISO14001 ISO9001 CQC CRAA CE

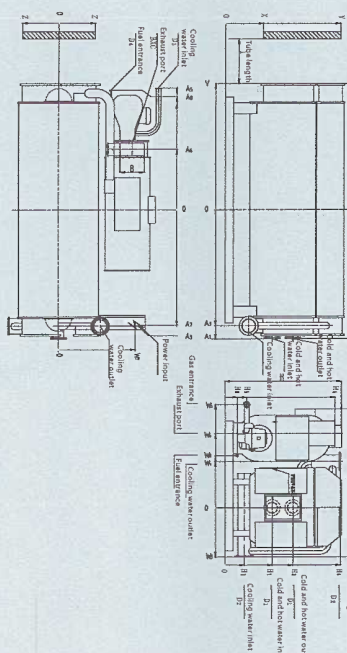
Hope Deepblue  
Waste Heat Utilization Expert



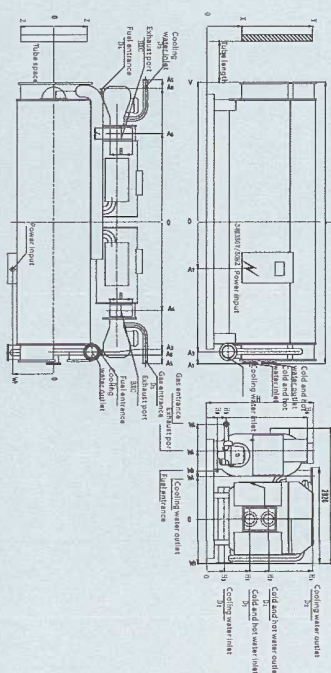
## ZX-23~58



ZX-523~582



ZX-698



**Table of pipe connection size**

Model ZX-	23	35	47	58	70	81	93	105	116	145	174	204	233	262	291	349	407	465	523	582	698	
Unit	L	2900	2900	2900	2980	2980	4020	4020	4640	4640	4658	5740	5740	5770	5840	5920	6720	6720	6800	7800	7830	9160
	W	1680	1770	1890	1980	1988	2102	2222	2260	2422	2452	2490	2590	2720	2768	2910	3040	3450	3950	4040	4250	4470
	H	1960	2000	2160	2185	2185	2165	2350	2350	2438	2652	2652	2740	2890	3200	3315	3315	3585	3585	3585	3690	3690
	V	1458	1483	1510	1510	2020	2020	2020	2270	2330	2330	2900	2900	2900	2900	2940	3420	3480	3480	3885	4050	4660
	Z	358	358	390	420	390	420	450	450	469	520	520	560	600	620	650	650	7450	900	900	960	1060
	X	628	628	628	628	628	628	728	728	720	740	740	810	800	780	910	940	910	910	910	910	910
Chilled water	Y	1860	1910	2055	2055	2055	2055	2235	2235	2260	2540	2540	2600	2800	2930	3170	3170	3170	3350	3350	3350	3350
	I	2440	2440	2440	2440	3440	3440	3440	3940	3940	3940	4930	4930	4930	4930	5930	5930	5930	5930	6930	6930	7930
	A <sub>1</sub>	1340	1350	1360	1373	1868	1880	1880	2160	2160	2160	2660	2660	2660	2660	2690	3192	3218	3510	4000	4050	4500
	W <sub>1</sub>	628	628	667	690	667	690	719	719	739	790	790	829	870	890	920	0	0	0	0	0	0
	H <sub>1</sub>	956	956	915	968	915	968	1092	1092	1058	1140	1140	1170	1218	1310	1365	1330	1350	1395	1395	1410	1460
	H <sub>2</sub>	1365	1365	1410	1420	1400	1420	1542	1542	1535	1717	1717	1775	1911	2060	2120	2080	2132	2100	2100	2270	2330
Cooling water	D <sub>1</sub>	80	100	100	125	125	125	150	150	150	200	200	200	200	250	250	300	350	350	350	400	400
	A <sub>2</sub>	1338	1338	1345	1361	1845	1845	1845	2125	2125	2125	2625	2625	2625	2625	2680	3150	3180	3305	3680	3830	4280
	A <sub>3</sub>	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	3150	3180	3175	3550	3720	4300
	W <sub>2</sub>	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	795	1095	1120	1120	1180	1220
	W <sub>3</sub>	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	1030	1030	1130	1130	1176	1245
	H <sub>3</sub>	488	488	560	488	505	465	529	529	529	530	530	537	565	542	553	553	553	560	560	560	560
Burner	H <sub>4</sub>	1853	1853	1980	1980	1940	1980	2160	2160	2160	2436	2436	2490	2710	2905	3060	3200	3200	3400	3400	3400	3400
	D <sub>2</sub>	100	125	125	150	150	150	200	200	200	250	250	300	300	300	350	350	350	400	400	400	400
	A <sub>5</sub>	1500	1500	1500	1500	1980	1980	1980	2300	2300	2300	2740	2850	2850	2850	3480	3480	3480	3480	3880	3800	4200
	W <sub>4</sub>	1100	1190	1260	1370	1420	1420	1422	1486	1566	1610	1800	1820	1920	2010	2120	2210	2400	2780	2960	2960	2850
	H <sub>5</sub>	490	490	490	490	580	580	580	580	580	600	940	940	960	960	910	950	950	950	950	950	950
	D <sub>3</sub>	32	40	40	40	40	40	50	50	50	50	65	65	80	80	80	100	100	125	125	125	100
Condensate	A <sub>6</sub>	1450	1450	1450	1450	1920	1920	1920	2160	2160	2160	2705	2705	2705	2705	2705	3400	3400	3400	3720	3720	4300
	W <sub>5</sub>	830	830	830	830	830	900	900	900	900	950	1060	1120	1120	1160	1205	1300	1400	1510	1560	1560	1560
	H <sub>6</sub>	300	300	300	300	300	300	300	300	300	400	400	400	400	400	400	400	400	400	400	400	400
	D <sub>4</sub>	/	/	/	/	/	1/2"	/	/	/	/	/	/	/	/	/	1"	/	/	/	/	/
	A <sub>7</sub>	962	962	962	962	973	1000	1040	1040	1120	1380	1420	1420	1610	1670	1740	1950	2155	2340	2770	3100	3750
	W <sub>6</sub>	980	980	980	980	1104	1104	1150	1150	1160	1160	1320	1326	1410	1410	1450	1470	1550	1740	1890	1970	1850
Electr. control	H <sub>7</sub>	1800	1850	1850	1950	1890	1920	2100	2100	2100	2270	2215	2520	2620	2930	3040	3040	3040	3040	3040	3040	3040
	B	250	250	250	300	300	300	376	376	396	446	500	500	550	550	600	696	696	750	750	750	696
	C	170	170	170	200	200	200	266	266	226	246	300	300	360	400	400	416	416	550	550	550	416
Electr. control	A <sub>7</sub>	1400	1400	1400	1400	1870	1870	1870	2100	2100	2100	2600	2600	2600	2600	2600	3150	3150	3150	3650	1800	3000
	W <sub>7</sub>	1000	1000	1000	1000	1150	1150	1150	1150	1150	1150	1200	1200	1350	1350	1350	1420	1420	1550	1680	1085	1110



Diagram of base size

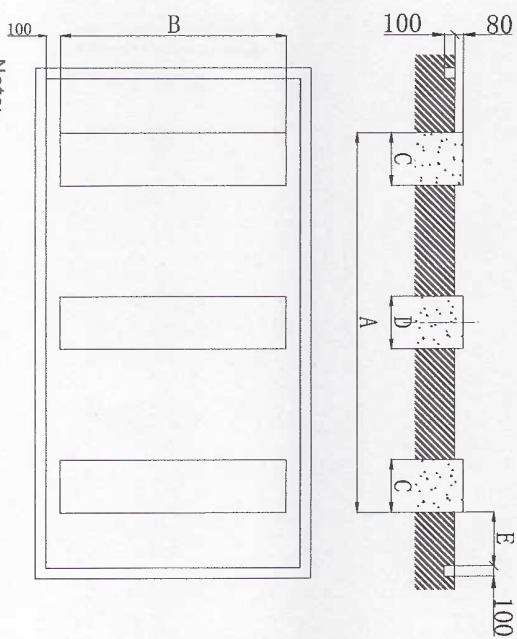
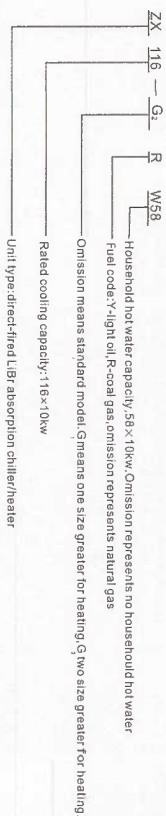


Table of base size

Rated capacity (kW)	23	35	47	58	70	81	93	105	116	145	174	204	233	262	291	349	407	445	523	562	698
A	2500	2600	2800	2800	3700	3700	3700	4200	4200	4200	4600	4600	4600	4600	4600	5100	5100	6200	7200	7200	7300
B	1480	1570	1690	1780	1780	1900	1900	2000	2200	2200	2250	2400	2400	2500	2500	2800	2800	3400	3800	3900	4100
C	250	250	250	250	300	300	300	400	400	400	500	500	500	600	600	600	700	700	700	800	700
D	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	600	800	700
E	200	200	200	200	200	200	200	200	200	200	400	400	400	400	400	400	400	200	200	200	200
Rated weight (kg)	3.6	5	6.2	7.5	8.8	10.2	11.6	12.6	13.7	16.3	19	22.2	15.3	27.6	30.1	34	40.4	45.1	49.5	53.2	64.3

Model number description





Hope Deepblue

Direct-fired Ular  
Absorption Chiller(Heater)

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## Model selection guideline

### Model No.selection

#### Lode determination

Select a model based on the cooling load of the building or the process cooling load, then check if its heat supply can meet the requirement of the heating load if not, select an heating-enlarged model.

#### Unit function

According to application requirement, the direct-fired unit falls into three series, i.e. standard (cooling/heating), cooling-only and triple-use.

#### Fuel type

A direct-fired unit can use many kinds of fuels such as natural gas, coal gas, liquefired petroleum gas, light oil and heavy oil, and different fuels have different heating values and require different burners. Therefore, the fuel type and heating value shall be determined before selection of a unit, and the pressure of the fuel shall be provided if the fuel is of gas type.

#### Chilled water outlet temperature

The chilled water outlet temperature can be different from that of a standard mode, but shall not be lower than 6℃.

#### Number pressure requirement

The standard design pressure of the chilled water and cooling water systems is 0.8MPa, if the actual pressure exceeds this value, a high-pressure model shall be select.

#### Number of units

When more than one unit are needed, the number of the units shall be determined based on the match condition between maximum load and partial load, the inspection and repair period, and area of the machine room.

#### Control method

Each standard unit has the AI control function and is equipped with control interfaces for chilled water pump, cooling water pump and tower fan. And options such as building control interface, PC monitoring system, telephone networking function, etc. are also available

### Equipment supply scope

Equipment supply scope(direct-fire unit)		
Name	Quantity	Description
Main body	1 unit	Including HP.G, LP.G, condenser, evaporator, absorber, solution heat exchanger, automatic purge system, etc.
HP.G	1 unit	Patented technology, high thermal efficiency, Triple-use type includes household hot water heater.
Burner	1 unit	Including complete set of safety devices, filters, etc
L.Br solution	Sufficient	
Canned pump	2 units	
Vacuum pump	1 unit	
Control system	1 set	Including level/pressure/flow/temperature sensors, program controllers, touch screen, etc
Inverter	1 unit	
Measuring tools	1 set	Including thermometer, ordinary tools, etc.
Spare parts	1 set	Seeing packing list(can meet 5-year maintenance demand)

### Model selection table

Model selection table		
Classification	Type	Feature
Function	Standard	Providing cooling/heating
	Triple-use	Providing cooling/heating plus household hot water
	Cooling-only	Providing cooling only
Fuel	Light oil	<35-10 light diesel oil
	Heavy oil	Heavy diesel oil, residue oil, mixed oil
	Fuel gas	Various natural gas, coal gas and liquefied petroleum gas
Special offer	Dual fuel	Light oil/natural gas, coal gas and liquefied petroleum gas
	Enlarged high-pressure generator	Heating capacity of the unit increases a grade for each one bigger size of the enlarged high-pressure generator
	High-pressure	If the pressure of the chiller/cooling water system is equal to or higher than 0.8MPa, the high-pressure model shall be selected. Water chamber has two types: 0.8-1.0MPa, 1.2-2.0MPa.
Special offer	Low-grade fuel gas	Fuel gas with lower heating value or lower pressure can be used as cooling water
	Classification	Applicable to slightly shaking conditions. Sea water can be used as cooling water
Disassembly	Disassembly	The unit can be shipped with the HP.G apart from the main body.
	Remark	Specify heating value and pressure while placing an order





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Direct-fired Libr  
Absorption Chiller(Heatron)

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## Machine room design and construction

### Delivery and construction scope

Item	Description	Delivery & construction scope	Remarks
Unit	Unit and accessories	Deepblue Customer	Refer to "Equipment supply scope"
Test/adjustment	Ex-factory test	○	
	Customer jobsite adjustment	○	For both cooling and heating
	From factory to jobsite	○	
Transport/assembling	From jobsite to Unit base	○	
	Unit in place	○	
	Unit assembling (disassembled shipment)	○	Customer provides necessary tools such as welding equipment and nitrogen gas
Electrical engineering	Sensors and instruments	○	Remove cables shall be laid by customer
	External electric wiring	○	To terminals of the Unit control cabinet
	Unit base construction	○	
	External piping	○	
	Exhaust system	○	
Other engineering	Anti-freezing of piping	○	Anti-freezing measures shall be applied to water piping when the Unit doesn't work in winter
	Cooling water quality management	○	Please install cooling water drainage system or other devices for this purpose
	Heat insulation	○	
	LiBr solution	○	
Others	Training and instruction	○	

## Machine room construction

### Site selection

Thanks to its stable, low-noise, safe and reliable operation, the Unit can be placed in the basement or on the ground floor, intermediate floors or on the top of a building. A separate machine room is also a choice.

### Ventilation

The machine room must have good ventilation so that to provide sufficient air for the combustion of the unit. Generating 10-thousand-Kcal heat normally needs 15m air

The machine room temperature shall be 5℃—40℃.

### Layout

The Unit shall be installed such that there is enough space for maintenance and it is convenient for operation. There shall be a space of at least 1 meter in front of the control cabinet. The distance between the highest point of the Unit and the lowest point of the room ceiling shall not be less than 0.3 meters. The space on each side of the unit shall not be less than 1.2 meters. And the tube-drawing space shall not be less than the length of the heat transfer tubes. If it's impossible to reserve a tube-drawing space, leave a door or window in the direction of drawing tubes.

### Drainage

The machine room shall have efficient drainage system: (1) There shall be drainage trenches around the Unit which are covered with cast iron grates; (2) all drainpipes and signal pipes in the machine room shall be laid above the drainage trenches and be visible. They are not allowed to be buried in the trenches; (3) if the machine room is in the basement, a sump and immersible pump shall be installed. And an automation device shall be installed as much as possible to drain water automatically.

### Base of the unit

The base shall be designed according to the Unit static and be firm and unsinkable, otherwise the Unit may be damaged.



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Direct-fired L18r  
Absorption Chiller(Heater)

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## Piping system

The piping system shall be designed in accordance with related standards and specifications. The pipes shall ruin the air and their arrangement shall be rational. Their support shall be firm. The weight of the piping outside the Unit must not be born by the Unit.

## Water system

Flexible joints must be mounted at the inlets/outlets of the chilled(heat) water, cooling water and household hot water. The inlets of the Unit must have filters which are easy to be dismantled. If the water system static pressure is higher than 30m H<sub>2</sub>O, it is recommended to mount the water pump at the outlet section of the Unit to reduce the pressure born by the Unit. The pipes in front of and behind the Unit shall be easy to be dismantled for cleaning transfer tubes. Safety valves must be mounted at the inlet or outlet of the household hotwater in order to avoid the high pressure condition when heat exchangers are heated and at the same time the inlet and outlet valves are closed.

## Fuel gas system

The natural gas and town gas inlet pressure shall be within the scope listed in the "Rated parameter table". If the pressure is higher than the scope, a pressure reducing device shall be installed. The fuel gas shall pass a ball valve and a filter before it enters the unit. There shall be drain valve at the lowest point of the fuel gas pipe. The machine room must be equipped with a gas leak alarm, which acts when the leakage reaches 25 percent of the lower explosion limit. The machine room shall have excellent ventilation and run around the clock. When placing an order, the customer shall provide the type, heating value and pressure of the fuel, so that Deepblue can select a burner matching the unit.

## Fuel oil system

The fuel oil system is generally composed of an oil storage tank, oil daily tank, oil transfer pump and strainers. The capacity of the oil storage tank shall be able to meet the unit's combustion need for at least seven days, it shall be equipped with access hole, oil-level probe, fired detention breather valve, lightning-proof and antistatic devices. The capacity of the oil daily tank generally shall not be greater than one day's need of the unit. An indoor oil daily tank shall be of closed type with an air pipe connecting straight to the outdoor. On the air pipe there shall be a fire arrester and rainproof device. Glass oil-level meter shall not be adopted on the oil daily tank. The lowest oil level in it shall be an emergency shut-off valve on the oil supply pipe. For heavy oil piping, a heating device shall be added. Both the oil transfer pump and burner shall have an oil strainer (60holes/inch) at their inlets and the strainers' cross section shall be great enough to reduce the resistance of the piping.

## Exhaust system

The flue ducts shall be air tight and have low resistance. The horizontal flue duct shall maintain an upward slope of at least 10% and its cross section area not be less than that of the exhaust outlet. Where multiple units share one chimney, each unit shall have an equal exhaust pumping force, and the cross section area of the general flue duct shall not be less than the sum of the cross section area of all branch flue ducts.

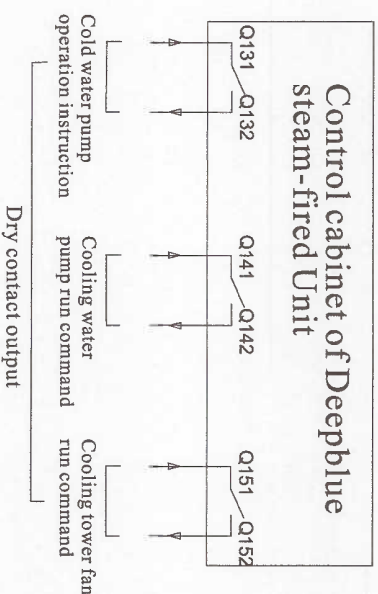
The flue ducts must be designed to have enough strength and rigidity and their weight shall not be born by the unit. The heat insulating material of the duct shall with stand 400°C, and the fire isolation zone around the unit shall be designed for the same temperature.

The horizontal flue duct nearest to the unit shall have a water collecting tank and drainpipe at its bottom to prevent the condensed water flowing into the unit and causing serious corrosion.

## Electrical system

The electrical system of the machine room must be designed to match the control system of the unit, otherwise the advancement, stability, safety and high efficiency of the unit cannot be achieved.

## External linkage control wiring diagram



- Note:
1. The capacity of the output relays for the linkage control terminals of above water pumps is AC250V, 5A(resistance load).
  2. Q131, Q132, Q141 and Q151 are numbers of wirings inside the control cabinet.
  3. The chilled water pump and cooling water pump must be in linkage control during operation of the Unit.





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Absorption Chiller(heater)

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## Field construction items for control system

Item	Installation position and requirement	Material source	By Deepblue	By customer
Power supply	In control cabinet	Customer	Wiring in control cabinet	Lay 5×6mm <sup>2</sup> cable(wire)to underside of control cabinet
Grounding	Grounding resistance ≤10Ω	Customer	Wiring	Lay grounding network and run wire to underside of control cabinet
Phone networking	Interface is in control cabinet	Customer provides telephone line(option)	Connecting in control cabinet	Lay telephone line to underside of control cabinet
PC monitoring (≤120m)	In monitoring room and control cabinet	Deepblue (option)	Field installation	Lay 7-ply cable from monitoring room to underside of control cabinet
Household hot water (triple-use unit)	HHW supply in control cabinet	Deepblue	Instruction for installation	Weld probe seat and lay 3control lines from the seat to underside of control cabinet
HHW circulating pump start/control (triple-use unit)	HHW circulating pump control panel in control cabinet	Customer	Instruction for installation	Lay 4control lines from HHW circulating pump control panel to underside of control cabinet
Oil level sensor (oil-fired unit)	Oil/daily tank/oil storage tank	Deepblue (option)	Instruction for installation	Lay 4control lines from HHW circulating pump control panel to underside of control cabinet
Gas leak detector (gas-fired unit)	In machine room, near fuel gas pipe and with POC/ventilation	Customer	Wiring in control cabinet	Install detector and lay 2control lines from the detector to underside of control cabinet
Fire fighting detector	Per fire department requirement	Customer	Wiring in control cabinet	Lay 2control lines from the detector to underside of control cabinet
Building interface	In control cabinet	Deepblue (option)	Wiring in control cabinet	Lay control cabinet to underside of control cabinet
Chilled-water pump	In or near switchboard	Customer	Wiring in control cabinet	2 control lines for each motor and 2 lines for spare use. Lay the lines from switch board to underside of control cabinet
Cooling water pump	In or near switchboard	Customer	Wiring in control cabinet	
Cooling water fan	In control cabinet	Customer	Wiring in control cabinet	

Note: control lines are multi-ply 0.7mm flexible copper line.

## The control system supports multiple communication protocols

Point-to-point interface — PPI protocol  
Multi-point interface — MPI protocol  
Process field bus — PROFIBUS protocol  
Free interface — Customer-defined protocol

### Pin definition

Pin(9-pin female connector)	PROFIBUS name	Esystem communications port
1	Shielded	Logic ground
2	24V return	Logic ground
3	RS-485signal B	RS-485signal B
4	Send request	RTS(TTL)
5	5V return	Logic ground
6	“+” 5V	“+” 5V, 100Ω
7	“+” 24V	“+” 24V
8	RS-485signal A	RS-485 signal A
9	Reserved	10-bit protocol selection(input)

## Handling and Installation in Place

### Shipment:

The Unit is generally shipped as a single piece, but it can be shipped in two parts — main body and high-pressure generator — if the transport passage at the service site is not large enough. After the Unit is put in place, Deepblue is responsible for connecting the Unit's internal piping, while the customer provides welding equipment and other aids.

Shipment recommendation: the Unit shall be hoisted according to the “Unit Hoisting Specification” provided by Deepblue. The hoisting cable and fixing tools can only be placed at those points marked on the Unit. Deepblue can help the customer go through procedures for transport and insurance.

### Installation in place

A steel plate and a rubber pad shall be placed on the base of the Unit. After the Unit is put in place, it shall be calibrated in levelness with the four hoists (④ ⑤) on its both sides as the reference points. The levelness of the Unit shall be within 1/1000. There shall be no clearance between the base and the support of the Unit so that the Unit can bear the load evenly.

During the process of hoisting, installation in place and construction, measures shall be taken to protect the Unit. Heavy impact to the Unit or turning of valves is prohibited.



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## Water quality management

With the cooling water vaporizing in the cooling tower continuously, the salt content in the water increases and the water quality deteriorates. This will result in corrosion and scaling in the heat transfer pipes. And algae growing in summer plus dirt and scales raise the thermal resistance of copper pipes, which in turn leads to a great decrease of the cooling capacity.

## Make-up water quality requirements

Index	Unit	Make-up water standard	Cooling water standard	Tendency Corrosion	Scaling
Ph (25℃)		6.5-8.0	6.5-8.0	△	△
Conductivity (25℃)	US/cm	<200	<200	△	△
Cl <sup>-</sup>	mgCl <sup>-</sup> /L	<50	<200	△	
So <sub>4</sub> <sup>2-</sup>	mgSO <sub>4</sub> <sup>2-</sup> /L	<50	<200	△	
Acid consumption(PH4.8)	mgCaCO <sub>3</sub> /L	<50	<100		△
Full hardness	mgCaCO <sub>3</sub> /L	<50	<100		△
Fe	mgFe/L	<0.3	<1.0	△	△
S <sup>2+</sup>	mgS <sup>2+</sup> /L	Undetectable	Undetectable	△	
Nh <sub>4</sub> <sup>+</sup>	mgNH <sub>4</sub> <sup>+</sup> /L	<0.2	<1.0	△	
SiO <sub>2</sub>	mgSiO <sub>2</sub> /L	<30	<50		△



## System chart

