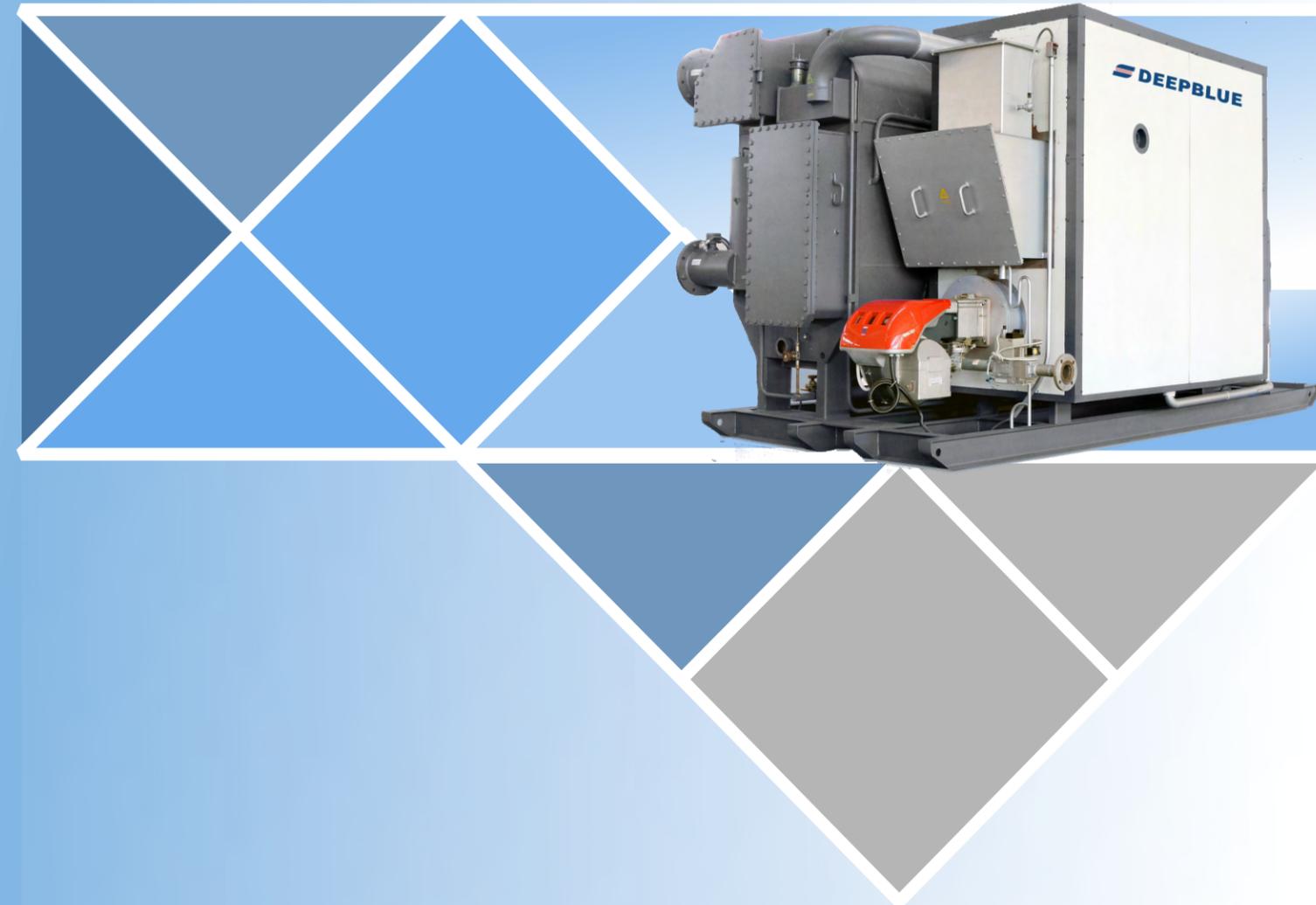


 HOPE DEEPBLUE

 DEEPBLUE

GREENER WORLD, BLUER SKY



 Hope Deepblue

**Continental Hope Group**

**Hope Deepblue Air Conditioning Manufacture Corp.,Ltd**

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NO. SL202104

**DIRECT FIRED  
LIBR ABSORPTION CHILLER**



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## CONTINENTAL HOPE GROUP

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Dream Achieves Wonderfulness, Hope Creates Excellence!

Continental CHG (CHG) was founded in 1982. After years of steady development, CHG has now developed into a diversified comprehensive group focusing on four major industrial sections: Mechanical&Electronic, Energy&Chemical, Tourism&Real Estate, and Construction&Contract. The industry involves transmission control, HVAC&R, construction engineering, network engineering, sodium chlorate, hydroelectric development, sapphire, tourism, hotel, real estate, feed, food, financial investment and other fields.

The Mechanical&Electronic section takes energy conservation and environmental protection as its own responsibility. The Senlan Inverter and Deepblue HVAC&R equipment developed by our own intellectual property rights are widely used in the fields of transmission control, energy conservation, HVAC&R, waste heat utilization in China and abroad, which shows the Road of Chinese Brand. The Energy&Chemical sector builds a green circular economy industrial chain integrating "power generation, transmission, power distribution, salt chemicals, and new materials", transforming water conservancy and power resources into sodium chlorate chemical products, as well as gems. Hope Cultural and

Tourism sector devotes to creating an ideal life of living, travel and business, created China's Eight Luxury Real Estate. The Construction&Contract section has several special professional qualifications, using strength to build assured projects and build city dreams.

Hope Group takes high technology as the core, comprehensive utilization of resources as the link, and carries out industrial layout around "energy saving, environmental protection, circular economy, quality life, city music", and initially forms a close and three-dimensional upstream and downstream industries.

**Business philosophy**---- Excellence Beyond Boarder

**Vision**----Greener World Bluer Sky Better Life

**Mission**----Create higher value for customers with excellent products and services.

**Values**-----Sincere and trustworthy, achieving customers, contributing to the human.



**Based on China**  
Service all over the world

## HOPE DEEPBLUE AIR CONDITIONING MANUFACTURE CORP., LTD

Hope Deepblue Air Conditioning Manufacture Corp.,Ltd (Deepblue) was founded with an investment of 20 million USD by Continental Hope Group (CHG) in 1997. It is located in national high-tech zone Chengdu, China, covering an area of 170 acres, which is the largest LiBr absorption equipment manufacture base in West China. Deepblue is engaged in the fields of refrigeration, heat pump, and industrial waste heat utilization product R&D, manufacture, sales, service, and providing one-stop energy system solutions to customers. Deepblue product includes LiBr absorption chiller, absorption heat pump, central vacuum hot water unit, which have been exported to many countries and regions. Deepblue has developed Deepblue Green Energy Center project (DGEC), which is the first CCHP project (Tri-generation) with independent intellectual property right in China. DGEC has been operating stably since 2003, which is known as the longest running time distributed energy project in China.

Thanks to strong technology and manufacture ability, Deepblue has established marketing and service network in China, involving in thousands projects and well known as expert of heat recovery in coking, textile, pharmaceutical, chemical, food, metallurgy, solar energy, rubber tires, power plants, petroleum, urban central heating and other industrial fields. Now Deepblue is paying more and more attention on developing oversea market and is open to cooperate with partners all over the world.

Deepblue products have obtained the National Industrial Product Production License, and have passed the ISO9001, ISO14001, OHSAS18001, CE, CRAA, CSC certification, etc. Deepblue won the Gold Award of China Science and Technology Expo, Gold Award of China Patent Technology Expo. Listed in the National Torch Plan Project, National Key New Product Project, Key Recommendation Unit for China Energy Conservation Project Construction, Top Ten Brands in China's HVAC and Refrigeration Industry, Top Ten Most Trusted Brands by Chinese Designers, China Model Enterprise for Building Energy Conservation and Emission Reduction, China Waste Heat leading company in the recycling field, Special Contribution Award for China's Building Environment and Equipment Industry, and the China Distributed Energy Outstanding Project Award etc.



## Certificates



Business License



National Industry Products Production License



High-tech Enterprise Certificate



Disinfection Product Hygienic License



Chinese Top 10 Trusted Brands



Chinese Construction Energy Conservation and Emission Reduction Enterprise



CE Certificate



ISO9001 Certificate



ISO14001 Certificate



18001 Certificate



Chinese Energy Conservation Product Certificate



National Torch Program Project Certificate



Chinese Best Patent Program Certificate



CRAA Certificate

## Manufacturing Equipment



CNC Processing Center



CNC Drilling Machine



Submerge-Arc Auto Welding Machine



CNC Cutting Machine



Auto Welding Robot



Sheet Metal Processing Center



Hydraulic Plate Shear



Painting Room



Hydraulic Cutting Machine

## Testing Equipment



Helium Leakage Detector



X-Ray Detector



Welding Seam Inspector



Flue Gas Analyzer



Electric Testing Device

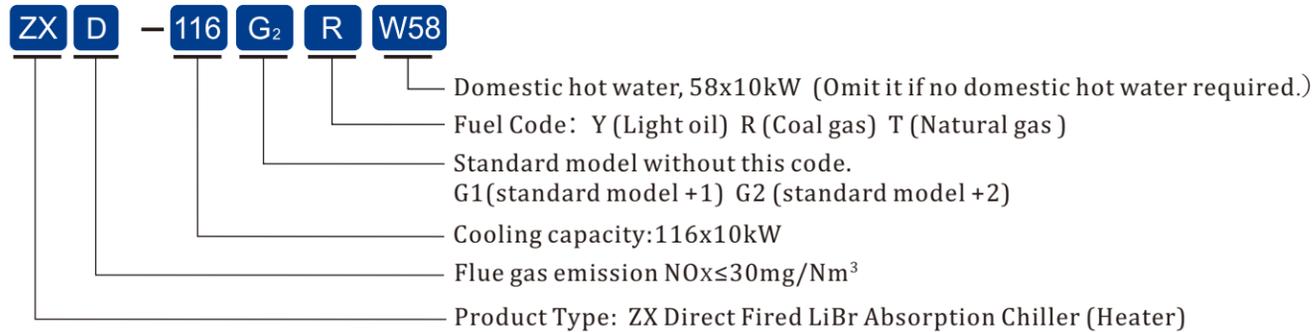


Whole Unit Performance Testing Center



Ultrasonic Pipe Flaw Detector

## Product Model



## General Description

Direct fired LiBr absorption chiller (heater) is a type of refrigeration (heating) equipment powered by natural gas, coal gas, biogas, fuel oil etc. LiBr aqueous solution is used as the circulating working fluid, in which the LiBr solution is used as the absorbent and water is the refrigerant.

The chiller primarily comprises of the HTG, LTG, condenser, evaporator, absorber, high-temp heat exchanger, low-temp heat exchanger, auto purge device, burner, vacuum pump and canned pumps.



## Working Principle

### Refrigeration Cycle

The refrigeration principle of this chiller (heater) is shown in Figure 1. The heating and cooling switch valve F5 is opened, and F6-F10 are closed. The diluted solution from absorber is transported by the LTG solution pump, and heated by the low-temp heat exchanger and then enters the LTG. In the LTG, the diluted solution is heated and boiled by the flowing high-pressure and high-temp refrigerant vapor from HTG and the solution is concentrated into an intermediate solution.

Most of the intermediate solution is transported by the HTG solution pump into HTG, after heated by the high-temp heat exchanger. In HTG, the fuel combustion releases heat to heat the LiBr solution to generate high-pressure, high-temp refrigerant vapor, and the solution is further concentrated into concentrated solution.

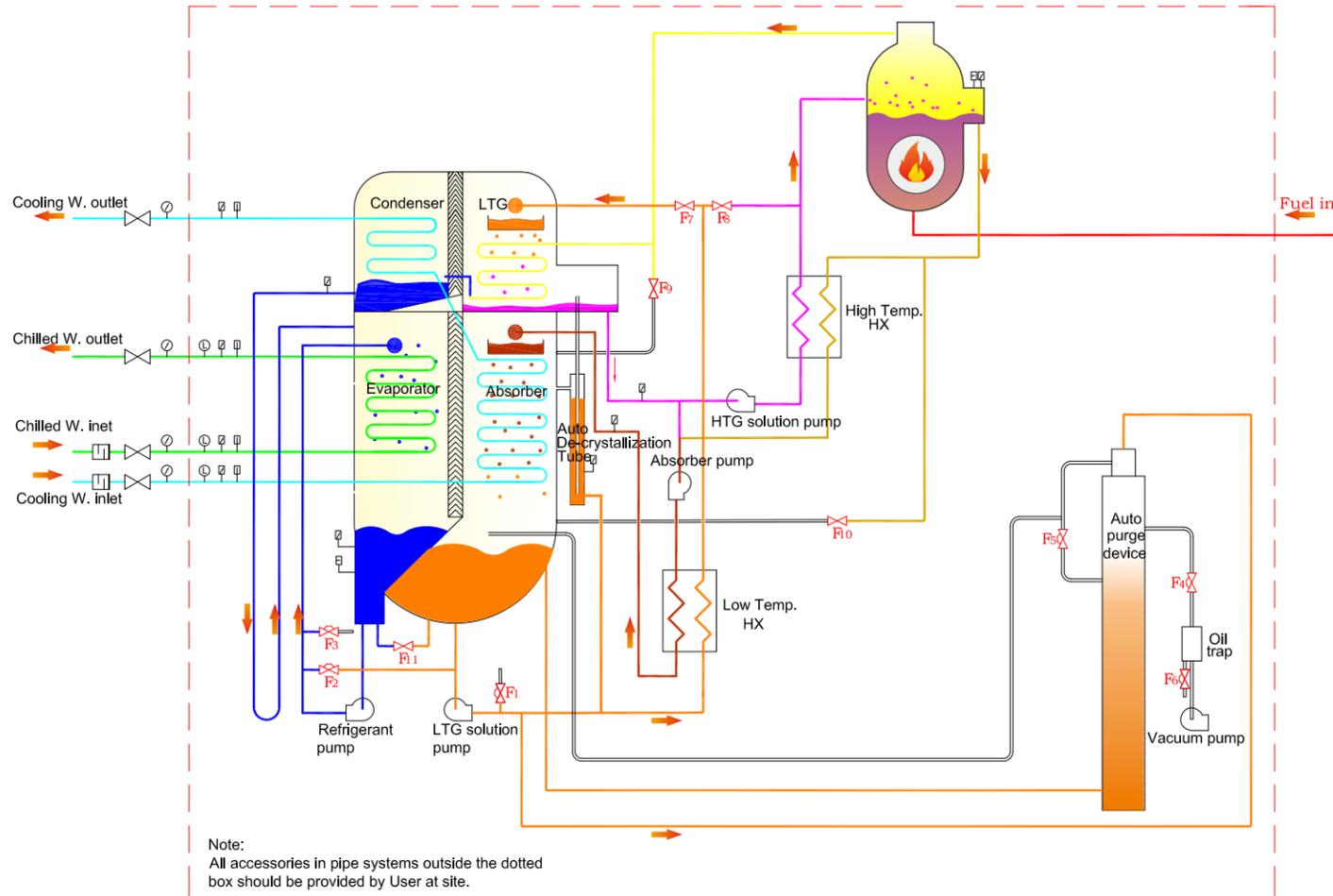
In the LTG, the high-pressure, high-temp refrigerant vapor from the HTG heats the dilute solution in the LTG and condenses into refrigerant water, which enters the condenser together with the refrigerant vapor generated in the LTG through throttling and depressurization, and then cooled into the refrigerant water corresponding to the condensing pressure by the cooling water in the condenser.

The refrigerant water in the condenser enters the evaporator after being throttled by the U-type tube, and then delivered by the refrigerant pump, sprayed on the evaporator tube cluster, absorbing the heat of the chilled water and evaporating, and then the temperature of the chilled water in the tubes drops, so as to achieve the purpose of refrigeration.

After part of intermediate solution from the LTG mixed with the concentrated solution from the HTG, it flows through the low-temp heat exchanger and enters the absorber, sprays on the absorber tube cluster, and is cooled by the cooling water, and absorbs the refrigerant vapor from the evaporator at the same time and then becomes the diluted solution. The LiBr solution diluted by absorbing the refrigerant vapor in the evaporator is transported into the generator for heating and concentration by the generator pump, which completes a refrigeration cycle. The process is repeated so that the evaporator can continuously produce low-temp chilled water for air conditioning or production process.

### Heating Cycle

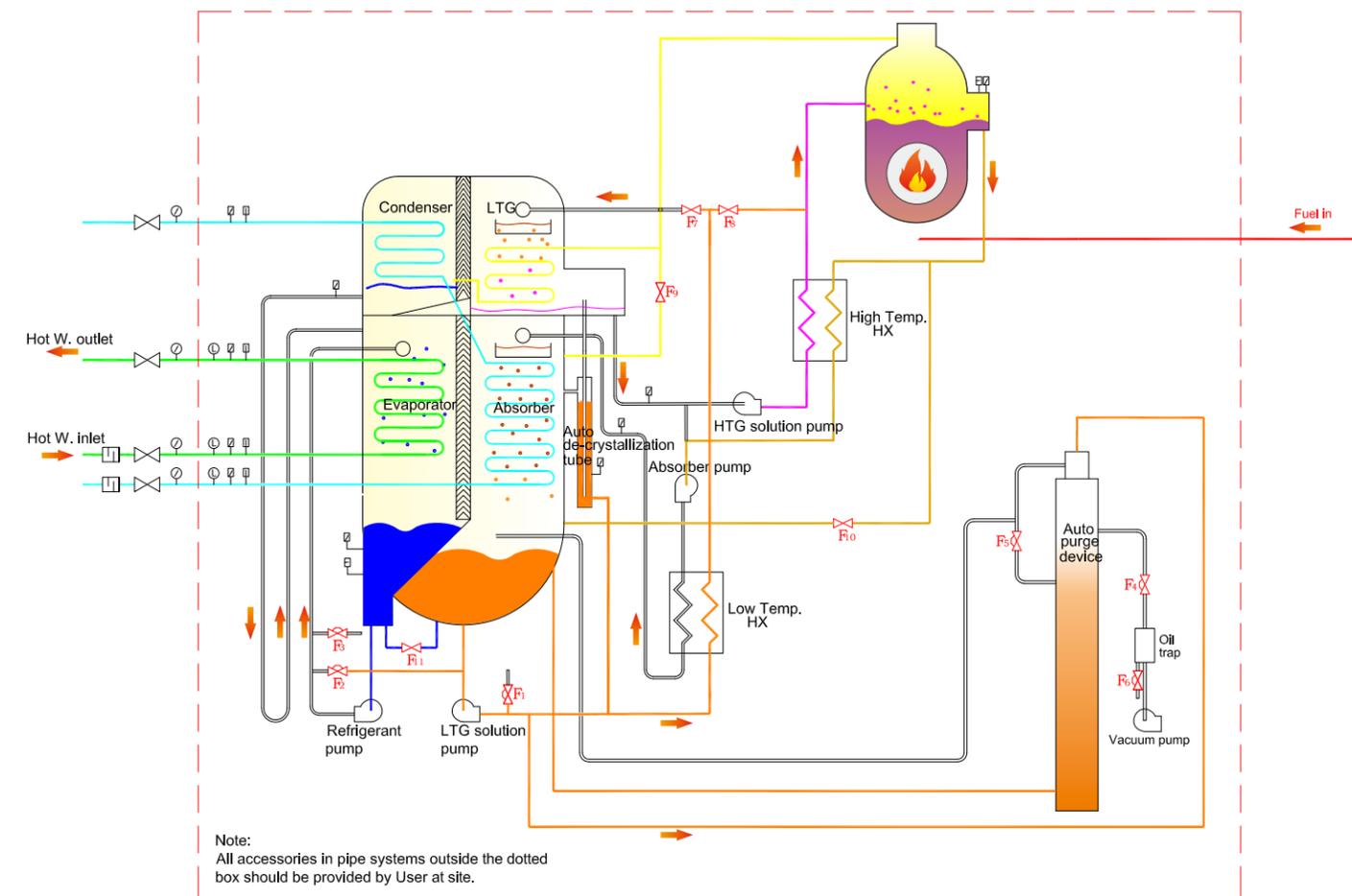
The heating process of the direct fired LiBr absorption chiller (heater) is shown in Figure 2, the heating and cooling switch valves F5, F13, F14 are closed, F6-F10 are opened, the cooling water circuit and the refrigerant water circuit stop running, and the chilled water circuit is converted to a domestic hot water circuit. The Absorber, condenser, LTG, high-temp heat exchanger, low-temp heat exchanger stop working. The diluted solution in absorber is delivered to HTG and concentrated through the solution pump. The generated refrigerant vapor enters the evaporator through the tube and valve F7, condenses on the evaporator tube cluster, and heats the domestic hot water. The condensed refrigerant water enters the absorber from the evaporator water tray through valve F9. The concentrated solution in HTG enters the absorber through valve F8, and is mixed with the refrigerant water in absorber becoming diluted solution. The diluted solution is delivered back to HTG by solution pump and heated. The aforesaid cycle occurs repeatedly to form a continuous heating process.



- |                             |                                 |  |
|-----------------------------|---------------------------------|--|
| Cooling water               | LTG concentrated solution       | F1 Solution sampling valve               |
| Chilled water               | HTG concentrated solution       | F2 Refrigerant water re-generation valve |
| Fuel                        | Refrigerant water               | F3 Refrigerant water sampling valve      |
| Diluted solution            | Refrigerant vapor               | F4 Master purge valve                    |
| Mixed concentrated solution | High pressure refrigerant vapor | F5 Absorber purge valve                  |
|                             |                                 | F6 Extreme purge valve                   |
|                             |                                 | F7-11 Cooling/heating switching valve    |

Diaphragm valve	Check valve	Filter	Target flow switch	Pressure gauge	Temp. sensor	Thermometer	Liquid level

Fig 2-1 Cooling process



- |                             |                                 |  |
|-----------------------------|---------------------------------|--|
| Cooling water               | LTG concentrated solution       | F1 Solution sampling valve               |
| Chilled water               | HTG concentrated solution       | F2 Refrigerant water re-generation valve |
| Fuel                        | Refrigerant water               | F3 Refrigerant water sampling valve      |
| Diluted solution            | Refrigerant vapor               | F4 Master purge valve                    |
| Mixed concentrated solution | High pressure refrigerant vapor | F5 Absorber purge valve                  |
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Diaphragm valve	Check valve	Filter	Target flow switch	Pressure gauge	Temp. sensor	Thermometer	Liquid level

Fig 2-1 Heating process

- **Wet-back water-tube HTG: compact structure and high efficiency**

Flue gas and solution reverse turbulence heat exchange is sufficient, exhaust temperature  $\leq 170^{\circ}\text{C}$ .

- **Solution reverse series and parallel circulation technology: more full use of heat sources, higher unit efficiency (COP)**

The solution reverse series and parallel circulation technology makes the solution concentration of LTG in the middle position, and the concentration of the concentrated solution in HTG is the highest. Before entering the low temperature heat exchanger, solution concentration will reduce after the intermediate solution mixing with concentrated solution. Then unit will obtain a large range for vapor discharge and higher efficiency, also be far away from the crystallization, which is safe and reliable.

- **Interlock mechanical&electrical anti-freezing system: multi anti-freezing protection**

The coordinated anti-freezing system features following merits: a lowered primary sprayer design for the evaporator, an interlock mechanism which links the secondary sprayer of evaporator with the supply of chilled water and cooling water, a pipe blockage prevention device, a two-hierarchy chilled water flow switch, an interlock mechanism designed for the chilled water pump and cooling water pump. Six levels anti freezing design ensures timely detection of break, underflow, low temperature of chilled water, automatic actions will be taken to prevent tube freezing.

- **Auto purge system combining multi-ejector&fall-head technology: speedy vacuum purging and high vacuum degree maintenance**

This is a new, high efficiency automatic air purge system. The ejector functions as a small air extraction pump. DEEPBLUE automatic air purge system adopts multiple ejectors to increase the air extraction and purge rate of unit. Water head design can help to evaluate vacuum limits and maintain a high vacuum degree. This design can provide a high vacuum degree for every part of unit at any time. Therefore, oxygen corrosion is precluded, service life time is prolonged and optimal operating status is maintained for unit.

- **Viable structure design: easy to maintain**

Both the absorber solution drop tray and the evaporator refrigerant water nozzle can be disassembled and replaced, to ensure that the cooling capacity does not decrease during the life span.

- **Automatic anti-crystallization system combining level difference dilution and crystal dissolution: eliminate crystallization**

A self-contained temperature&level difference detection system enables unit to monitor excessively high concentration of the concentrated solution. On the one hand upon detecting an overly high concentration the unit will bypass refrigerant water to concentrated solution for dilution. On the other hand, the chiller utilizes HT LiBr solution in generator to heat concentrated solution to a higher temperature. In the event of a sudden power failure or abnormal shutdown, level difference dilution system will start rapidly to dilute LiBr solution and to ensure rapid dilution after power supply recovers.

- **Fine separation device: eradicate pollution**

The concentration of the LiBr solution in the generator is divided into two stages, the flash generation stage and the generation stage. The real cause of pollution is in the flash generation phase. The fine separation device finely separates the refrigerant vapor with solution in the flash process, so that the pure refrigerant vapor can enter the next step of the refrigeration cycle, eliminating the source of pollution and eradicating the pollution of the refrigerant water.

- **Fine flash evaporation device: refrigerant waste heat recovery**

The waste heat of the refrigerant water inside the unit is used to heat the diluted LiBr solution to reduce the heat load of the LTG and achieve the purpose of waste heat recovery, energy saving and consumption reduction.

- **Economizer: energy output boosting**

Isooctanol with a conventional chemical structure as an energy boosting agent added to LiBr solution, is normally an insoluble chemical that has only a limited energy boosting effect. The economizer can prepare mixture of isooctanol and LiBr solution in a special way to guide isooctanol into generation and absorption process, therefore enhancing energy boosting effect, effectively reducing energy consumption and realizing energy efficiency.

- **Unique surface treatment for heat exchange tubes: high performance in heat exchanging&less energy consumption**

The evaporator and absorber have been hydrophilic treated to ensure even liquid film distribution on tube surface. This design can improve heat exchange effect and lower energy consumption.

- **Self-adaptive refrigerant storage unit: improving part load performance and shortening startup/shutdown time**

The refrigerant water storage capacity can be automatically adjusted according to external load changes, particularly when unit works under partial load. The adoption of refrigerant storage device can shorten startup/shutdown time substantially and reduce idle work.

- **Plate heat exchanger: saving more than 10% energy**

A stainless corrugated plate heat exchanger is adopted. This type of plate heat exchanger has a very sound effect, a high heat recovery rate and remarkable energy saving performance. Meanwhile, the stainless steel plate has a service life of over 20 years.

- **Integral sintered sight glass: a powerful guarantee for high vacuum performance**

The leakage rate of the whole unit is lower than  $2.03 \times 10^{-10} \text{ Pa} \cdot \text{m}^3 / \text{S}$ , which is 3 grade higher than national standard, can ensure unit's lifespan.

- **Li<sub>2</sub>MoO<sub>4</sub> Corrosion inhibitor: an environment-friendly corrosion inhibitor**

Lithium Molybdate (Li<sub>2</sub>MoO<sub>4</sub>), an environment-friendly corrosion inhibitor, is used to replace Li<sub>2</sub>CrO<sub>4</sub> (Containing heavy metals) during the preparation of LiBr solution.

- **Frequency control operation: an energy-saving technology**

Unit can adjust its operation automatically and maintain optimal working according to different cooling load.

- **Tube broken alarm device**

When the heat exchange tubes broke in unit at abnormal condition, control system send out an alarm to remind operator to take actions, reduce damage.

- **Super long lifespan design**

The designed service life of the whole unit is  $\geq 25$  years, reasonable structure design, material selection, high vacuum maintenance and other measures, guarantees the long service life of unit.

- **Environmental-friendly combustion type direct fired HTG (optional)**

Direct fired HTG combustion technology adopts the most advanced combustion technology, and all indicators of exhaust emissions meet the most stringent National Environmental Protection Requirements, especially NO<sub>x</sub> emissions  $\leq 30 \text{ mg/Nm}^3$ .

### Fully-automatic control functions

The control system (AI, V5.0) is featured by powerful and complete functions, such as one-key startup/shutdown, timed startup/shutdown, mature safety protection system, multiple automatic adjustment, system interlock, expert system, human machine dialogue(multi languages), building automation interfaces, etc.

### Complete unit abnormality self-diagnosis and protection function

The control system (AI, V5.0) features 34 abnormality self-diagnosis & protection functions. Automatic steps will be taken by system according to level of an abnormality. This is intended to prevent accidents, minimize human labor and ensures a sustained, safe and stable operation of unit.

### Unique load adjustment function

The control system (AI, V5.0) has a unique load adjustment function, which enables automatic adjustment of unit output according to actual load. This function not only helps to reduce startup/shutdown time and dilution time, but also contributes to less idle work and energy consumption.

### Unique solution circulation volume control technology

The control system (AI, V5.0) employs an innovative ternary control technology to adjust solution circulation volume. Traditionally, only parameters of generator liquid level are used to control of solution circulation volume. This new technology combines merits of concentration&temperature of concentrated solution and liquid level in generator. Meanwhile, an advanced frequency-variable control technology is applied to solution pump to enable unit to achieve an optimal circulated solution volume. This technology improves operating efficiency and reduces startup time and energy consumption.

### Cooling water temperature control technology

The control system (AI, V5.0) can control and adapt the heat source input according to cooling water inlet temperature changes. By maintaining cooling water inlet temperature within 15-34°C, unit operates safely and efficiently.

### Solution concentration control technology

The control system (AI, V5.0) uses a unique concentration control technology to enable real-time monitoring/control of concentration and volume of concentrated solution as well as heat source input. This system can maintain unit under safe and stable at high concentration condition, improve unit operating efficiency and prevent crystallization.

### Intelligent automatic air purging function

The control system (AI, V5.0) can realize real-time monitoring of vacuum condition and purge out the non-condensable air automatically.

### Unique shutdown dilution control

This control system (AI, V5.0) can control operation time of different pumps required for dilution operation, according to the concentration of concentrated solution, ambient temperature and remaining refrigerant water volume. Therefore, an optimal concentration can be maintained for the unit after shutdown. Crystallization is precluded and unit re-start time is shortened.

### Working parameter management system

Through interface of this control system (AI, V5.0), operator can perform any of following operations for 12 critical parameters relating to unit performance: real-time display, correction, setting. Records can be kept for historical operation events.

### Unit fault management system

If any prompt of occasional fault is displayed on operation interface, this control system (AI, V5.0) can locate and detail fault, propose a solution or trouble shooting guidance. Classification and statistical analyses of historical faults can be conducted to facilitate maintenance service provided by operators.

## Remote Operation&Maintenance System

Deepblue Remote Monitoring Center collects the data of the units distributed around the world. Through the classification, statistics, and analysis of real-time data, it displays in the form of reports, curves, and histograms to achieve an overall overview of equipment operating status and fault information control. Through a series of collection, calculation, control, alarm, early warning, equipment ledger, equipment operation and maintenance information and other functions, as well as customized special analysis and display functions, the remote operation, maintenance, and management needs of the unit are finally realized. The authorized client can browse the WEB or APP, which is convenient and fast.



Model		ZX (D) -	23	35	47	58	70	81	93	105	116	
Cooling Capacity		kW	233	350	470	580	700	810	930	1050	1163	
		×10 <sup>4</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>4</sup> kcal/h	17	25	34	42	50	59	67	76	84	
Chilled (hot) water	Inlet/outlet temp	°C	Chilled water 12~7 Hot water 55.8~60									
	Flow rate	m <sup>3</sup> /h	40	60	80	100	120	140	160	180	200	
	Pressure drop	kPa	33	33	33	33	36	36	36	52	52	
	Joint connection	DN	80	100	100	125	125	125	150	150	150	
Cooling water	Inlet/outlet temp	°C	32~37.5									
	Flow rate	m <sup>3</sup> /h	60	90	120	150	180	210	240	270	300	
	Pressure drop	kPa	82	82	82	82	62	62	62	91	91	
	Joint connection	DN	100	125	125	150	150	150	200	200	200	
Fuel	Natural gas	Cooling	Nm <sup>3</sup> /h	13.8	20.9	28.2	34.8	42.0	48.7	55.7	62.9	69.8
		Heating	Nm <sup>3</sup> /h	17.9	26.8	35.7	44.7	53.6	62.6	71.5	80.4	89.4
		Joint connection	DN	32	40	40	40	40	50	50	50	50
		Pressure	kPa	2.5--25			3--25					
	Oil	Cooling	kg/h	13.3	20.1	27.1	33.4	40.4	46.8	53.5	60.5	67.1
		Heating	kg/h	17.2	25.8	34.4	43.0	51.6	60.1	68.7	77.3	85.9
		Joint connection	DN	1/2"								
Electric	Total power	kW	3.2	3.4	3.6	4.6	4.9	4.9	8	8.3	8.3	
	Power supply	3ph\380V\AC\50Hz										
Dimension	Length	mm	3050	3200	3224	3250	4250	4290	4400	4800	4800	
	Width	mm	2000	2020	2159	2050	2050	2400	2610	2500	2550	
	Height	mm	1950	2300	2217	2250	2280	2400	2460	2650	2700	
Transportation Status		Overall transportation										
Transportation Weight (including solution)		t	5.7	6.7	7.8	8.8	10.1	11.2	12.1	14	16.1	
Operation weight		t	6.3	7.6	8.5	9.7	11.1	12.2	13.1	15.6	17.7	

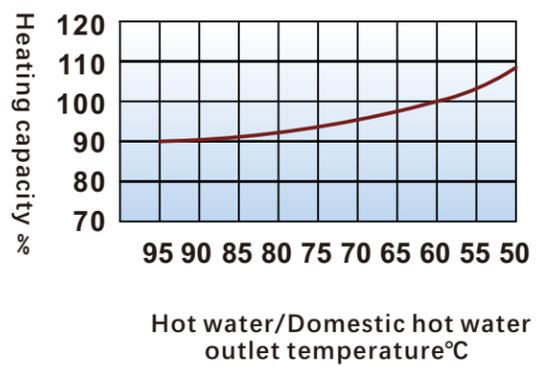
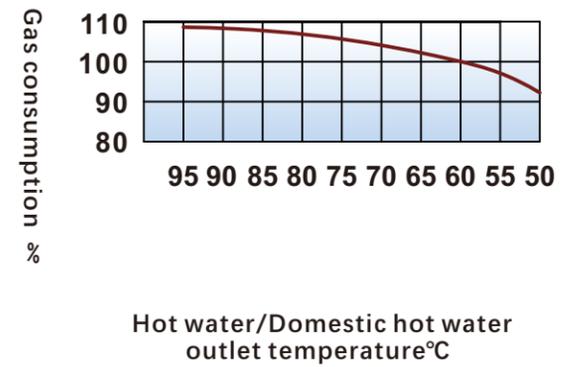
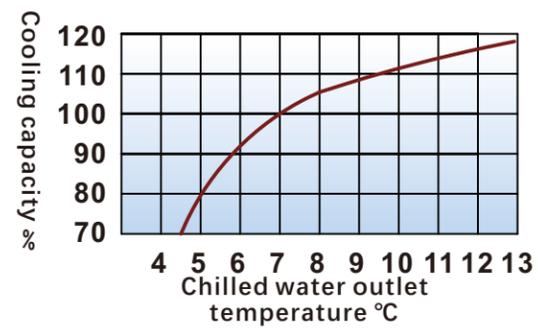
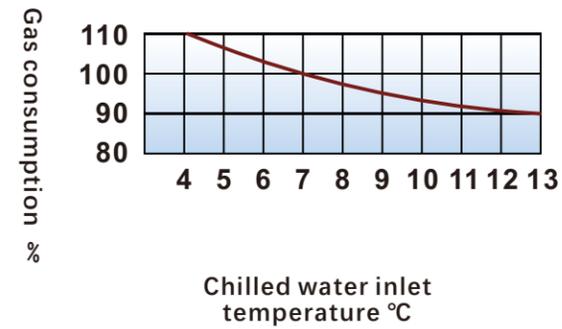
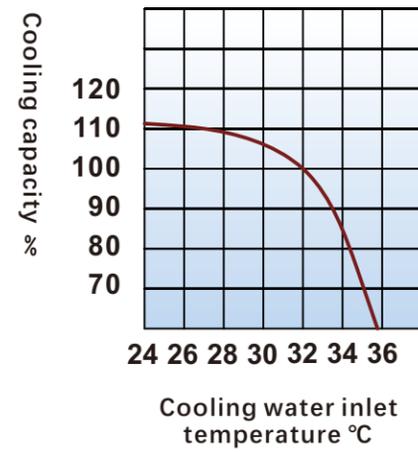
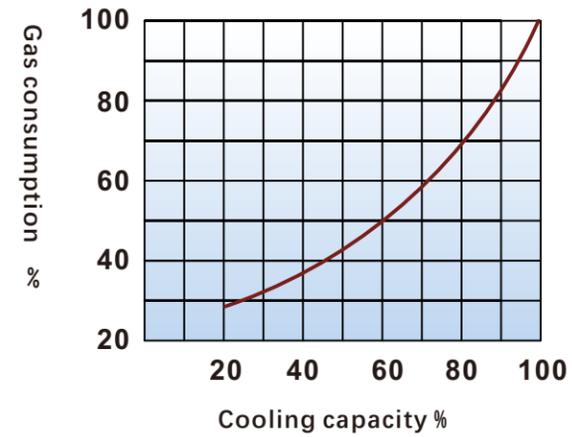
- Low heat value of natural gas: 10000Kcal/Nm<sup>3</sup>. Low heat value of oil: 10400Kcal/kg.
- Minimum chilled water outlet temp. -5°C. Minimum cooling water inlet temp. 15°C.
- Chilled (Hot) water, cooling water, domestic hot water fouling factor 0.086m<sup>2</sup>C/kW. Maximum working pressure:0.8MPa. Special notice required when the working pressure>0.8MPa.
- Machine room environment: relative humidity≤85%, temp.5~43°C.
- Chilled (Hot) water flow adjustable range 60%-120%, cooling water flow adjustable range 50%-120%.
- Cooling (Heating) capacity regulation range 5%~115%.

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	479	661	744	827	992	1157	1323	1488	1653	1984
1221	1465	1710	1954	2198	2442	2931	3419	3908	4396	4885	5862
105	126	147	168	189	210	252	294	336	378	420	504
Chilled water 12~7 Hot water 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	250	300	300	350	350	400
32~37.5											
374	449	525	600	674	749	900	1048	1198	1349	1499	1799
91	58	58.0	58.0	58.0	58.0	51.0	51.0	51.0	63	63	76
250	250	250	300	300	350	350	350	400	400	400	500
87.0	104.3	122.4	139.8	157.0	174.3	209.4	243.5	278.6	313.7	348.6	418.7
111.7	134.0	156.4	178.7	201.1	223.4	268.1	312.8	357.4	402.1	446.8	536.2
65	65	80	80	80	80	100	100	125	125	125	150
5--30			7--30			8.5--30					
83.6	100.3	117.7	134.4	150.9	167.6	201.4	234.1	267.9	301.6	335.2	402.6
107.4	128.9	150.4	171.8	193.3	214.8	257.8	300.7	343.7	386.7	429.6	515.5
1"											
10.5	13.6	14.8	16.6	21.2	23.5	24	36.9	37.4	38.4	47.9	49.9
3ph\380V\AC\50Hz											
4812	6100	6100	6100	6100	6220	7100	7350	7600	8400	8600	9400
2588	3410	3500	3550	3600	3700	3800	3950	4200	4450	4650	4780
2807	2850	3030	3100	3450	3400	3460	3500	3865	3700	3810	4000
Overall transportation											
18.5	22.4	24.3	26.1	29.3	31.5	34.3	36	41.2	47.3	54.1	62.9
20.5	24.4	26.3	29	31.3	34.3	38	40.5	44.8	54.3	61.1	69.5

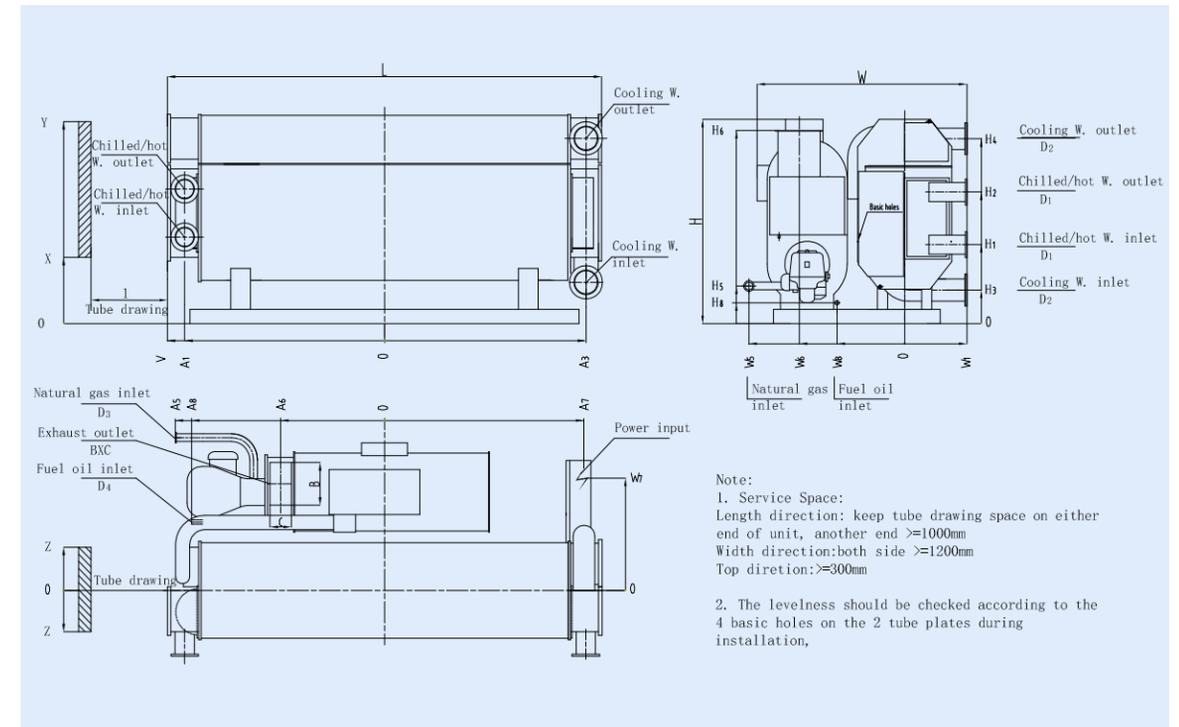
- Cooling exhaust temp.≤170°C, heating exhaust temp.≤150°C.
- According to users' needs, Deepblue can provide HTG flue gas heat exchanger, recycle the condensate heat, and use the waste heat to heat solution or domestic hot water based on users' actual conditions, and exhaust temp.≤100°C.
- According to users' demands, 65°C domestic hot water can be provided, and 90°C hot water is also available for special needs. Specific heating load should be provided by user.
- The unit with exhaust emission NOx≤Nm<sup>3</sup> has a certain difference in appearance from the general unit.
- Hope Deepblue reserves the right of interpretation, the parameters maybe amended at final design.

## Performance Curve

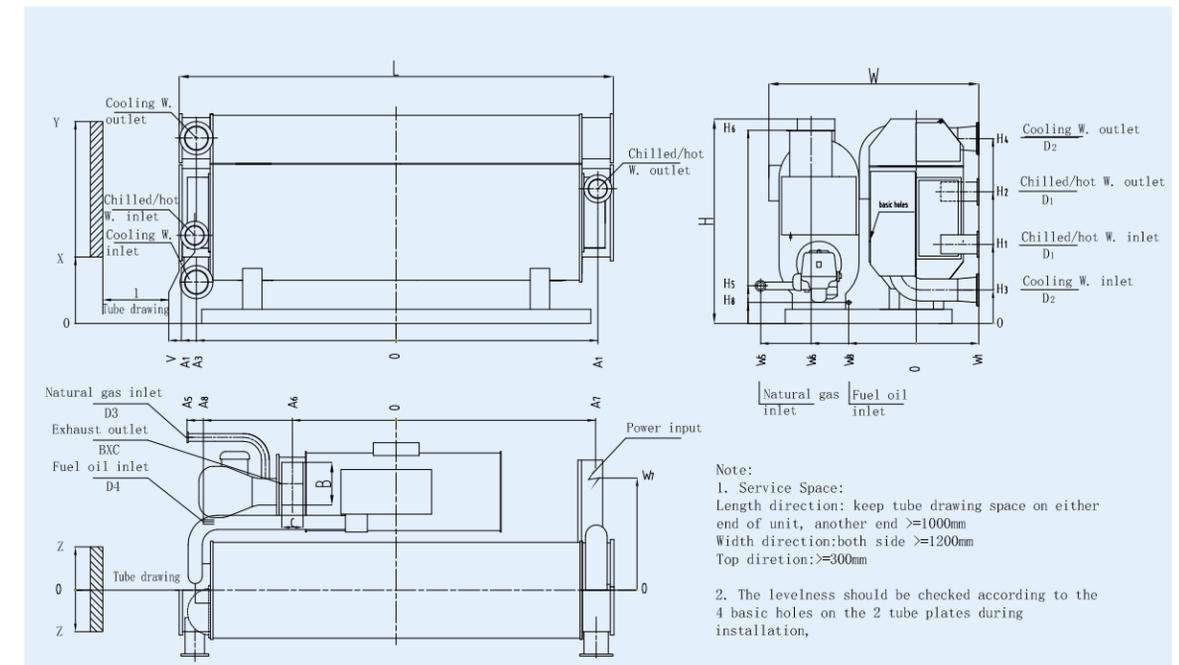
## Outside Drawing



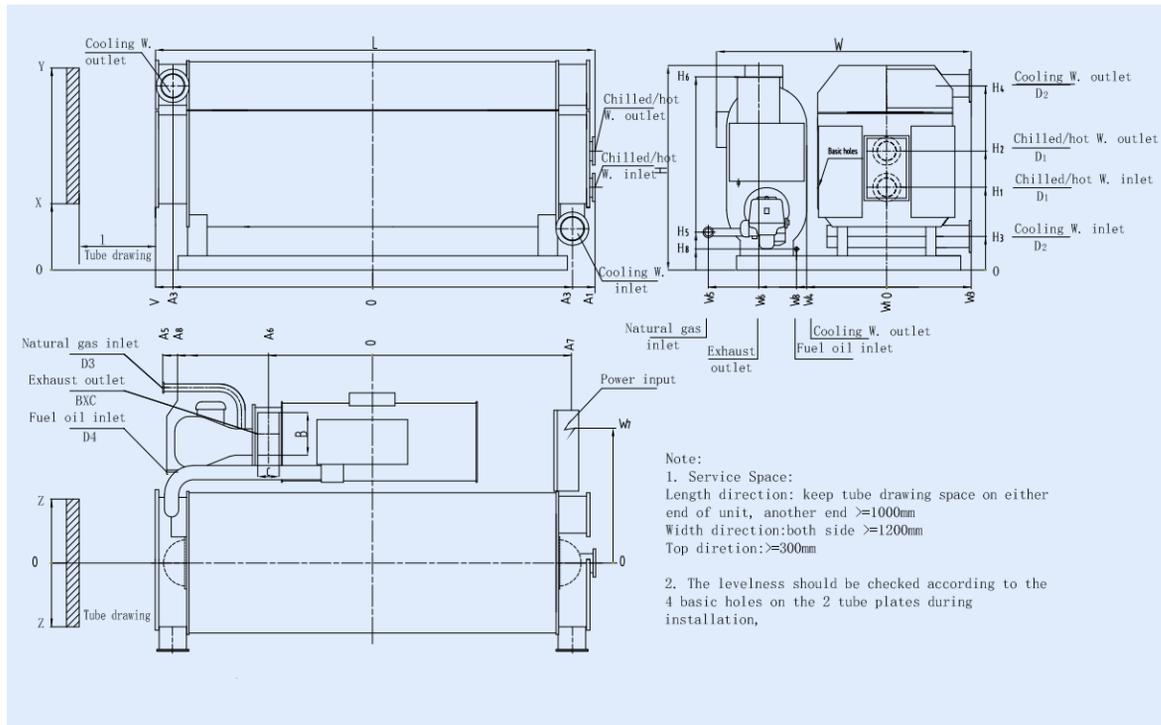
Model: ZX-23~58



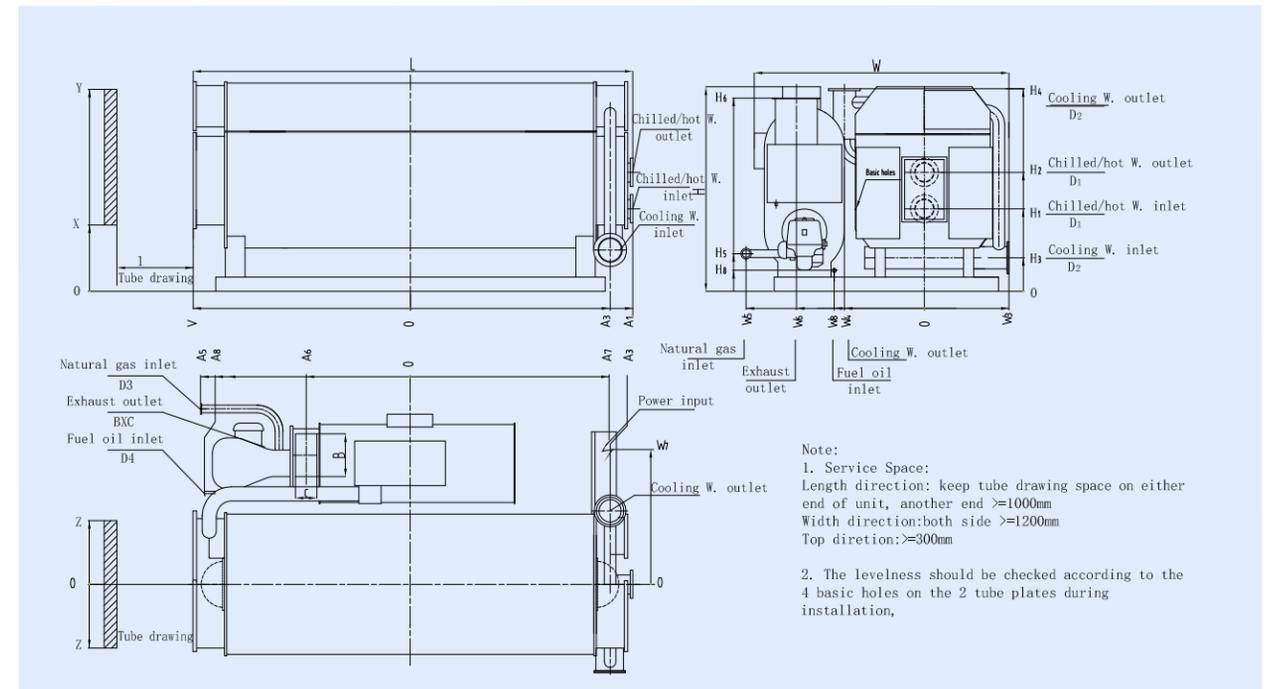
Model: ZX-70~145



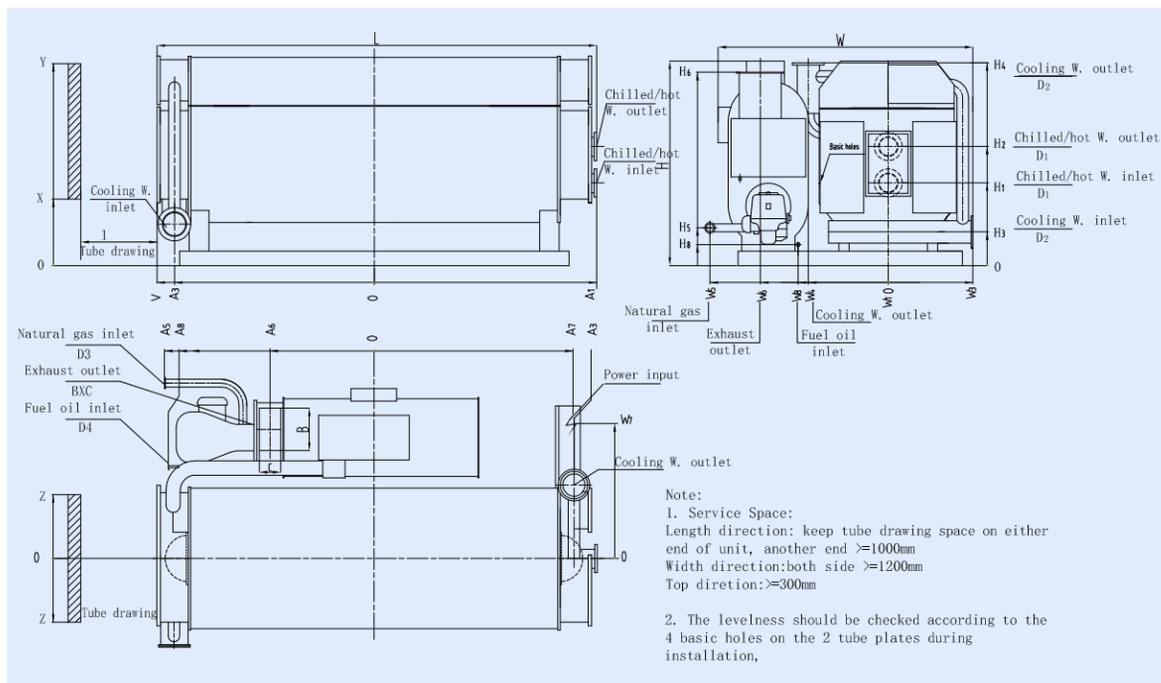
Model: ZX-174~291



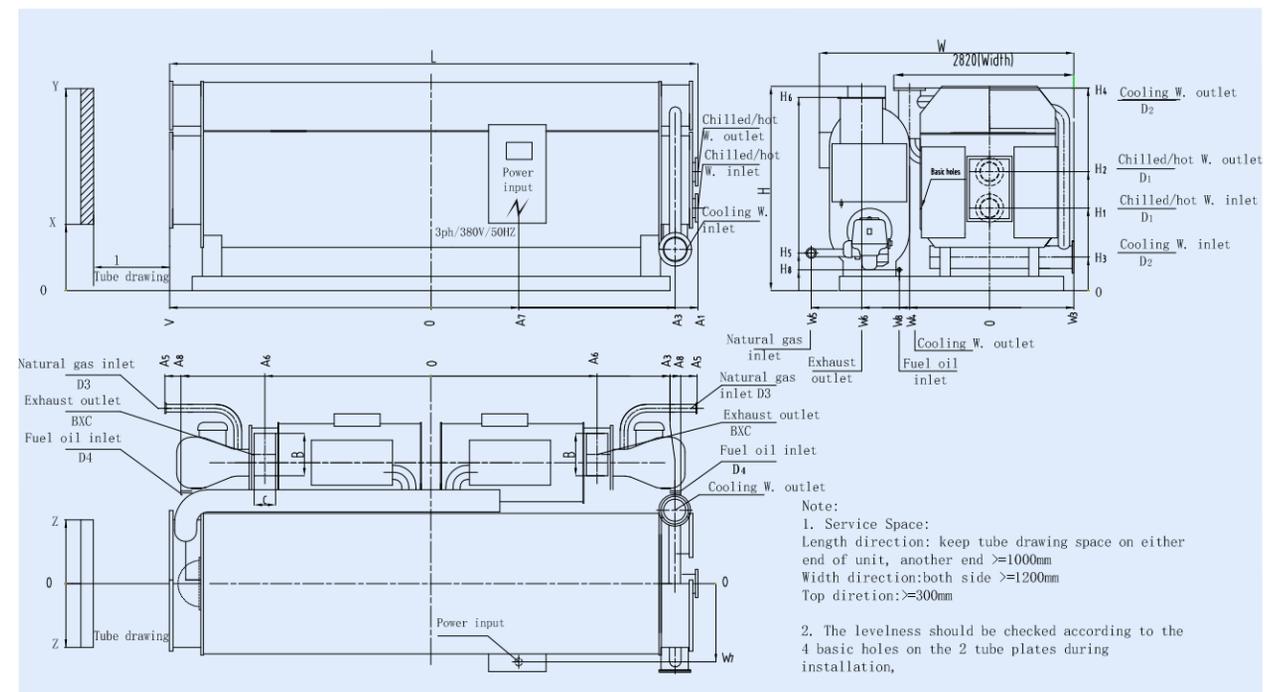
Model: ZX-523~582



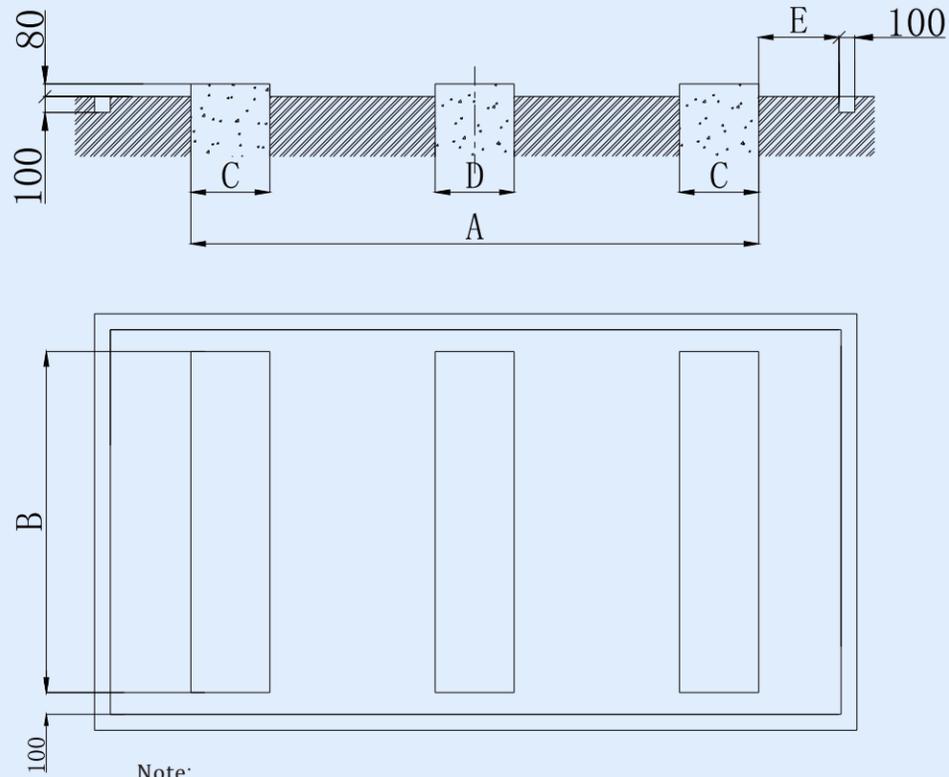
Model: ZX-349~465



Model: ZX-698



### Foundation drawing



Note:

1. The levelness of the foundation should be within 2/1000.
2. The grooves should be connected with the gutter around.

### Foundation Dimension Sheet

unit: mm

Model	ZX(D) -	23	35	47	58	70	81	93	105	116	145	174	204	233	262	291	349	407	465	523	582	698
A		2600	2600	2600	3700	3700	3700	3700	4600	4600	4600	5100	5100	5100	5100	6200	6200	6200	7200	7200	8200	
B		1480	1570	1690	1780	1780	2200	2200	2600	2600	2600	3400	3400	3400	3400	3400	3400	3900	3400	4100	4100	4100
C		250	250	250	250	300	300	300	400	400	400	500	500	500	600	600	600	600	700	700	700	
D		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	600	600	700	700	700
E		200	200	200	200	200	200	200	200	200	400	400	400	400	400	400	200	200	200	200	200	

### Outside drawing

unit: mm

Model	ZX(D) -	23	35	47	58	70	81	93	105	116	145	174	204	233	262	291	349	407	465	523	582	698	
Chiller	L	3050	3200	3224	3250	4250	4290	4400	4800	4800	4812	6100	6100	6100	6100	6220	7100	7350	7600	8400	8600	9400	
	W	2000	2020	2159	2050	2050	2400	2610	2500	2550	2588	3410	3500	3550	3600	3700	3800	3950	4200	4450	4650	4780	
	H	1950	2300	2217	2250	2280	2400	2460	2650	2700	2807	2850	3030	3100	3450	3400	3460	3500	3865	3700	3810	4000	
	V	1504	1510	1525	1450	2065	2045	2020	2385	2400	2410	3110	3100	3100	3100	3110	3420	3630	3480	4120	4250	4660	
	Z	358	358	400	430	400	420	450	520	520	520	720	720	730	750	750	750	930	930	930	970	1060	
Chilled water	X	628	628	628	628	728	728	728	840	840	840	1000	820	820	820	800	1010	1010	1010	1210	1210	1230	
	Y	1860	1910	2055	2055	2155	2205	2235	2700	2700	2700	2650	2600	2800	2930	2700	3300	3270	3410	3450	3600	3800	
	I	2440	2440	2440	2440	3440	3440	3440	3940	3940	3940	4930	4930	4930	4930	4930	5930	5930	5930	6930	6930	7930	
	A <sub>1</sub>	1400	1420	1425	1380	1880	1920	1880	2160	2160	2206	3110	3110	3110	3150	3160	3210	3500	3510	3520	4210	4225	4500
	W <sub>1</sub>	448	560	580	580	580	595	690	719	739	739	739	0	0	0	0	0	0	0	0	0	0	0
Cooling water	H <sub>1</sub>	867	900	910	927	940	933	911	1092	1058	1145	1311	1270	1270	1260	1232	1380	1310	1320	1595	1540	1650	
	H <sub>2</sub>	1210	1335	1360	1360	1320	1420	1542	1640	1635	1710	1761	1775	1815	1830	1805	2080	2050	2060	2195	2270	2400	
	D <sub>1</sub>	80	100	100	125	125	125	150	150	150	200	200	200	200	250	250	250	300	350	350	350	400	
	A <sub>3</sub>	1351	1360	1370	1366	1880	1860	1845	2125	2125	2180	2680	2700	2700	2755	2850	3180	3300	3260	3930	3950	4280	
	W <sub>3</sub>											2990	2700	2750	2800	2950	3180	3300	3190	3930	3950	4300	
Burner	W <sub>4</sub>										1060	1060	1080	1080	1100	1130	1265	1338	1400	1460	1500	1500	
	H <sub>3</sub>	618	550	530	461	515	505	473	515	515	505	822	800	780	765	623	725	650	640	888	810	820	
	H <sub>4</sub>	1597	1853	1835	1913	1970	2050	2165	2150	2150	2160	2320	2486	2490	2500	2505	3310	3350	3455	3475	3700	3880	
	D <sub>2</sub>	100	125	125	150	150	150	200	200	200	200	250	250	300	300	300	350	350	400	400	400	500	
	A <sub>5</sub>	1260	1560	1560	1530	1550	1980	1980	2300	2300	2300	2400	2400	2740	2850	2850	3280	3480	3480	3880	3880	4290	
Exhaust	W <sub>5</sub>	1150	1300	1300	1300	1300	1420	1442	1486	1566	1580	2020	1820	1920	2010	2120	2350	2400	2780	2960	2960	2850	
	H <sub>5</sub>	490	490	490	490	580	580	580	580	580	600	860	940	960	960	910	955	950	1290	950	950	950	
	D <sub>3</sub>	32	40	40	40	40	50	50	50	50	65	65	80	80	80	80	100	100	125	125	125	150	
	A <sub>6</sub>	1200	1500	1500	1470	1790	1920	1920	2160	2160	2250	2300	2705	2705	2705	2705	3200	3400	3400	3720	3720	4300	
	W <sub>6</sub>	830	830	830	830	830	900	900	900	900	950	1060	1060	1120	1120	1160	1205	1300	1400	1510	1560	1560	
Electric control	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>																						
	A <sub>7</sub>	638	800	886	900	1060	960	1040	1040	1120	1265	1105	1420	1610	1670	1880	2000	2100	2300	2300	2385	2855	
	W <sub>7</sub>	890	1050	1170	1050	1090	1120	1150	1150	1160	1345	1775	1326	1410	1410	1920	1835	1950	2160	2160	2310	2205	2450
	H <sub>7</sub>	1585	1750	1820	1870	2010	1970	2100	2100	2100	2320	2510	2520	2620	2930	2750	2780	2960	3390	3100	3315	3550	
Electric control	B	250	250	250	300	300	300	376	376	396	446	500	500	550	550	600	696	696	750	750	750	750	
	C	170	170	170	200	200	200	226	226	246	300	300	300	360	400	400	416	416	550	550	550	550	
Electric control	A <sub>7</sub>	1350	1450	1570	1400	1970	2100	2100	2100	2100	2215	2720	2600	2600	2600	2800	2985	3080	3080	3680	3680	4200	
	W <sub>7</sub>	1000	1000	1000	1000	1150	1150	1150	1150	1150	1225	1650	1680	1750	1750	1820	1730	1810	2030	2150	2080	2250	

## Model Selection

### Load confirmation

Choose the model of the direct fired unit based on the air conditioning or processing cooling load in the building. Check whether its heating capacity can meet the heating load demand. If not, a larger unit is required.

### Unit function

According to different application, direct fired unit can be divided into standard type (cooling&heating type), cooling type, and three-purpose type.

### Fuel type

There are many types of fuels used in direct fired LiBr absorption unit. Commonly natural gas, coal gas, LPG, light oil, heavy oil and so on. Different heating value results in different burners application. Therefore, before choosing the unit, it is necessary to determine the fuel's type and heating value. For gas fuel, the gas pressure should be provided as well.

### Chilled water outlet temperature

Besides the specified chilled water outlet temperature of a standard unit, other outlet temperature values (min -5°C) may also be selected.

### Pressure bearing requirements

The design pressure bearing standard capacity of the chilled water/cooling water system of the unit is 0.8MPa. If the actual pressure of the water system exceeds this standard value, a HP-type unit should be used.

### Unit Qty

If more than one unit are used, the unit's QTY should be determined by comprehensive consideration of max load, partial load, maintenance period as well as machine room's size.

### Control mode

The standard direct fired LiBr absorption unit is supported by an AI (artificial intelligence) control system that enables automatic operation. Meanwhile, there are a number of options available for the customers, such as control interfaces for the chilled water pump, cooling water pump, cooling tower fan, building control, centralized control system and IoT access.



## Scope of Supply

Direct Fired LiBr Absorption Unit		
Item	Qty	Remarks
Main unit	1 set	LTG, condenser, evaporator, absorber, solution heat exchanger, auto purge device, etc.
HTG	1 set	Patented technology, high heating efficiency. Three-purpose type can provide domestic water heater.
Burner	1 set	Including safety devices, filters, etc.
LiBr solution	Adequate	
Canned pump	2/4 set	Different quantity according to difference figuration.
Vacuum pump	1 set	
Control system	1 set	Including sensors&control elements (liquid level, pressure, flow rate and temperature), PLC and touch screen.
Frequency converter	1 set	
Commissioning tools	1 set	Thermometer and common tools
Accompanying accessories	1 set	Refer to Packing List, which can meet the demand for 5 years maintenance.

## Model Selection Sheet

Item	Type	Features	Remarks
Function	Standard	Cooling or Heating	
	Three-purpose	Cooling, heating meanwhile supplying domestic hot water	Heat of domestic hot water need to be specified when ordering.
	Cooling	Cooling only	
Fuel	Light oil type	-35~10# light diesel oil	
	Heavy oil type	Heavy diesel oil, residual oil, mixed oil	Viscosity should be specified when ordering.
	Gas type	All All kinds of natural gas, coal gas, LPG	Heat value and pressure should be specified when ordering.
	Dual fuel type	Light oil/gas heavy oil/gas	
Special order	HTG enlarged type	Enhance the heating capacity, larger unit, more heating supply	
	HP type	When the chilled water/cooling water and hot water system pressure $\geq$ 0.8MPa, a high pressure water chamber will be adopted. The pressure bearing capacity may be 0.8-1.6MPa or 1.6-2.0MPa.	
	Low grade type	Gas with low heat value or pressure	Heat value and pressure should be specified when ordering.
	Vessel-applied type	This type applies to occasions with slight wobbling. Seawater can be used as cooling water.	
	Split type	Limited by the size of the user's site, the main body and the HTG can be transported separately.	

## Machine Room Design and Construction

### Scope of Delivery and Construction

Items	Description	Scope of Delivery and Construction		Remarks
		Deepblue	User	
Unit	Chiller and accessories	●		Please refer to Scope of Supply.
Performance test	Ex-factory performance test	●		
	Site commissioning	●		Depends on Sales Contract
Transportation to the site	From the factory to the worksite		●	Depends on Sales Contract
	From the worksite to the mounting		●	Depends on Sales Contract
	Installation in place		●	Depends on Sales Contract
	Unit assembly (separate delivery)	●		The user must provide welding equipment, nitrogen and other necessary tools.
Electrical engineering	Sensors and meters	●		The user must be responsible for laying remote control cables.
	External electrical wiring engineering		●	The wires extend till the outlet of the wiring terminal of the control cabinet.
Other engineering	Foundation construction		●	
	External tubing engineering		●	
	Air extraction system		●	
	Tubing system anti-freezing measures		●	During winter shutdowns, please adopt anti-freezing measures for the water tubing.
	Cooling water quality management		●	Please set the cooling water discharge valve or other unit to enable proper water quality.
	Insulation engineering		●	Optional, depends on Sales Contract
Other	LiBr solution	●		
	Operation training & instructions	●		

## Civil Works for the Machine Room

### Site Selection of the Machine Room

The direct fired absorption unit can operate stably, safely and reliably with very little noise, so it may be installed in the basement or on the first floor, middle floors or rooftop or in independent machine rooms.

### Machine Room Ventilation

The machine room should have a good ventilation environment.

### Ambient Temperature in the Machine Room

The temperature should be controlled within the range of 5-43°C.

### Drainage

The machine room should be equipped with good drainage facilities:

- ① Drains covered by cast iron grates should be available around the chiller. Water in the drains can flow out of the machine room without difficulty.
- ② All the discharge pipes and signal pipes in the machine room should be installed at a visible place above the drains. They should not be installed in the drains.
- ③ Sump pits and submerged pumps should be available in a machine room located in the basement. Automatic control devices should be provided to enable automatic drainage.

### Machine Room Arrangement

The installation location of the machine room should ensure handy operation and adequate maintenance space. A 1-meter-wide operation space (minimum) should be left at the front of the electrical control cabinet. A 0.3m distance (minimum) should be reserved between the top of the chiller and the bottom of the beam of the machine room. A 1.2-meter-wide space (minimum) should be left for the other sides of the chiller. A space for drawing heat conducting tubes (length: no less than the tube length) should be reserved at any end of the lengthwise direction of the unit. If this space can not be reserved, a window or door may be designed for tube drawing.

### Unit Foundation

The unit's foundation may be designed on the basis of the dead load of the unit. The design should ensure stable, firm and unshakable, otherwise the unit may suffer damage or a shortened service life.

### Tubing System

The tubing system should be designed and planned as a whole in compliance with the requirements of the applicable standards and regulations. The tubes should be arranged in an orderly and neat way. Try to adopt overhead installation. The tubes should be firmly supported. The gravity of external tubing must not be applied to the unit.

### Water System

Flexible joints must be fitted for chilled water/cooling water supply to the chiller. A filter must be fitted for the inlet end at a place easy for disassembly. If the hydrostatic pressure of the water supply system is more than 30mH<sub>2</sub>O, it is recommended that the water pump be installed on the outlet side so as to relieve unnecessary pressure load. Tubes at both inlet and outlet ends should be easy to uninstall. This is intended to facilitate the cleaning of heat conducting tubes by opening the watertight cover.

### Gas System

Normally the inlet pressure of natural gas and artificial coal gas need to meet the requirements within the range listed in the nominal parameter sheet, otherwise pressure reduction devices should be installed. A drain valve should be installed at the lowest point of the gas pipeline. A reliable gas leak alarm device must be installed in the machine room, and its action value should alarm when the gas leak content reaches 1/4 of the maximum explosive limit. The machine room should be well ventilated. When natural ventilation cannot meet the requirements, mechanical ventilation devices should be installed and can be operated for 24 hours continuously. The user should provide the type, heating value, pressure of the gas to Hope Deepblue when ordering, to choose corresponding burner.

### Fuel System

The fuel system generally consists of oil storage tanks, daily fuel tanks, fuel pumps, filters and other equipment. The capacity of the oil storage tank should meet the fuel consumption using for at least seven days for the unit. Oil storage tanks should be equipped with inspection holes, oil level detection devices, fire-stop breathing valves, lightning protection and anti-static devices, etc. The total capacity of the daily fuel tank should generally not be greater than the unit's daily needs. The indoor daily fuel tank should use a closed fuel tank with a vent pipe that directly leads to the outside. The vent pipe should be equipped with a flame damper and rainproof device, the fuel tank should not be equipped with a glass tube level gauge. The minimum oil level of the daily fuel tank should be 0.5m higher than the burner. The oil pipeline should be welded by seamless steel pipes, and an emergency shut-off valve should be installed on the oil supply pipeline. The heavy oil pipeline system needs to be equipped with a heating device. A fuel filter (60 mesh/inch) with enough passage area to reduce the pipeline resistance should be installed near the inlet of the fuel pump and the burner.

### Exhaust System

The flue duct should have good air tightness and low resistance. The horizontal pipe should keep a slope more than 1%, and the cross-sectional area of the flue duct should not be less than that of the exhaust interface of the unit. The exhaust pressure of the flue gas outlet of the unit is between -50-0Pa. Chimney height  $\geq$  horizontal flue length(m)  $\times$  0.6 + elbows qty  $\times$  1.2 (m). When multiple units are combined with a chimney, the exhaust force of each unit should be uniform, and the total flue sectional area is not less than the sum of the sub-flue. The flue design should ensure sufficient strength and rigidity. The gravity of the flue should not be borne by the unit. The insulation of the flue should be selected according to 400°C, and the surrounding fire isolation zone should be designed according to 400°C as well. The bottom of the horizontal flue closest to the unit should be equipped with a water collection trough and a drainage pipe to prevent condensate from flowing into the unit and causing serious corrosion.



### Delivery Status:

Delivery usually takes the form of whole-unit delivery.

Transportation suggestion: During the lifting process of the unit, it should be carried out in accordance with the "Lifting Instruction" provided by Hope Deepblue. Lifting ropes and fastening devices can only be placed at the indicated marks on the unit.

### Installation in Place:

A layer of steel plate and rubber sheet should be laid on the foundation of the unit. After the unit is in place, the length direction and width should be corrected with the small holes ( $\varphi 4$ ) on both sides as the reference point, and the levelness of the unit should be controlled within 1/1000. There should be no gap between the bracket of the unit and the foundation to ensure the uniform pressure.

During the lifting, installation and construction of the unit, protective measures should be taken and strictly forbid to hit the unit with heavy objects and to screw the valve to prevent it from being damaged.

### Water Quality Management

The cooling water evaporates continuously through the cooling tower, in which the salt is concentrated, and the water quality deteriorates, causing corrosion and fouling in the heat transfer tube of the unit. The high temperature in summer causes algae to grow, dirt and scale increase the thermal resistance of the heat exchange tube, which greatly reduces the cooling capacity of the unit.

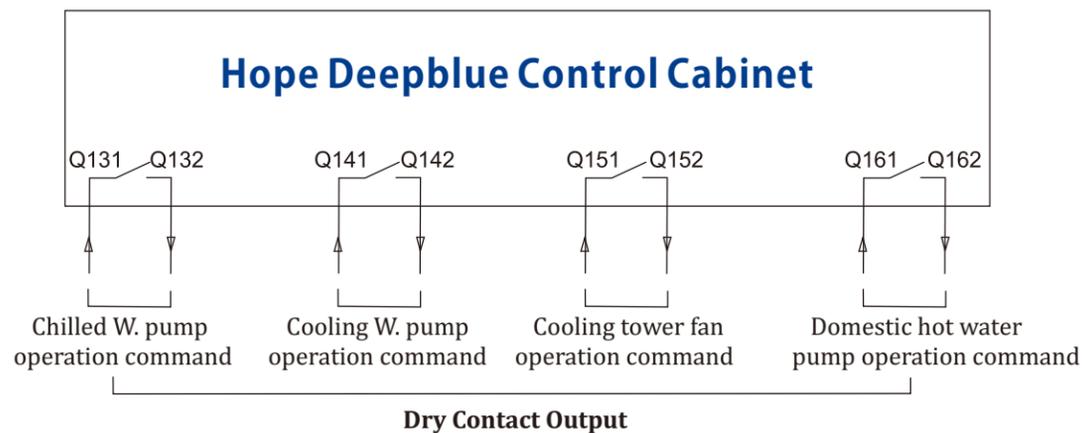
### Refer to the following table for the water quality requirements on cooling water

Item	Unit	Makeup Water	Cooling Water Requirements	Tendency	
				Corrosion	Scaling
pH value(25°C)		6.5-8.0	6.5-8.0	△	△
Conductivity (25 °C)	$\mu S / cm$	<200	<800	△	
Chloride ion $Cl^-$	$mgCl^- / L$	<50	<200	△	
Sulfate ion $SO_4^{2-}$	$mgSO_4^{2-} / L$	<50	<200	△	
Acid consumption (pH:4.8)	$mgCaCO_3 / L$	<50	<100		△
Total hardness	$mgCaCO_3 / L$	<50	<200		△
Ferric ion (Fe)	$mgFe / L$	<0.3	<1.0	△	△
Sulfide ion $S^{2-}$	$mgS^{2-} / L$	Undetectable	Undetectable	△	
Ammonium ion $NH_4^+$	$mgNH_4^+ / L$	<0.3	<1.0	△	
Silicon dioxide $SiO_2$	$mgSiO_2 / L$	<30	<50		△

## Control System

The electrical system in the machine room must match the control system of the LiBr absorption unit to achieve full automation. Otherwise, the advanced nature, reliability, safety and high efficiency of the unit cannot be realized.

### Interlock Control Diagram for User Water System

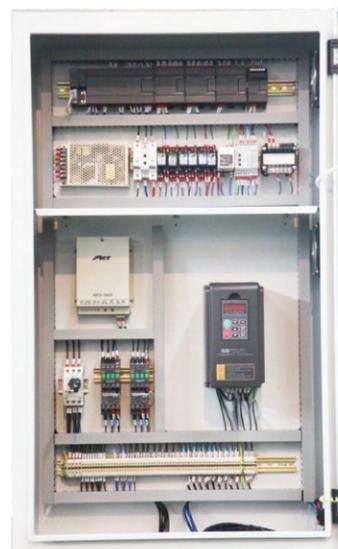


Note:

1. The capacity of the output relays for the interlock control terminals of above water pumps is AC250V, 5A (resistance load).
2. Q131, Q132, Q141, Q142, Q151, Q152, Q161, Q162 are numbers of wirings inside the control cabinet.
3. The chilled W. pump and cooling W. pump must be interlocked control during operation of the unit. The interlock control of domestic hot water pump can only work when the unit has this configuration.

### Hope Deepblue LiBr Absorption Unit Control System Support Multiple Protocols

- Point to point interface----PPI protocol
- Multi-point --MPI protocol
- PROFIBUS ----PROFIBUS protocol
- Free interface-----User defined protocol



### Communication interface pins are assigned as follows

Pin ( 9 pin female connector)	PROFIBUS Name	System communication interface
1	RS-485 Signal A	RS-485 Signal A
2	RS-485 Signal B	RS-485 Signal B

### Control System Site Construction Project

Item	Installation place & Requirement	Material source	Deepblue construction	User construction
Power supply	In control cabinet	User	In-cabinet connection	Lay 5×6mm <sup>2</sup> cables (wires) under the control cabinet
Ground connection	Ground resistance ≤10Ω	User	Connection	Lay the grounding grid and connect the wire to the bottom of the unit control cabinet
IoT	Interface in control cabinet	Users provide Internet	In-cabinet plug-in line	Lay the network cable under the control cabinet
PC Monitor < (1200m)	In user's monitoring room, in control cabinet	Deepblue (Optional accessories)	On-site installation	Lay the seven-core cable from the monitoring room to the bottom of the unit control cabinet
Domestic hot water temperature probe base (three-purpose unit)	In user's mixing tank domestic hot water outlet, in control cabinet	Deepblue	Instructed installation	Weld the probe base, the 3 control wires are laid from the bottom of it to the bottom of the unit control cabinet
Domestic hot water circulating pump start-stop control (three-purpose unit)	Domestic hot water circulating pump control panel, in control cabinet	User	Instructed installation	Lay the 4 control wires from the domestic hot water circulating pump control panel to the bottom of the unit control cabinet
Oil level sensor (fuel type unit)	Daily fuel tank/ storage tank	Deepblue (Optional)	Instructed installation	Lay the 4 control wires and the oil pump control panel under the control cabinet of the unit
Gas leak detector (Gas-fired unit)	Installed at poorly ventilated place and close to gas pipe line	User	In-cabinet connection	Install the detector, and lay the 2 control wires from the detector to the bottom of the unit control cabinet
Fire detector	According to the requirements of Fire Dept	User	In-cabinet connection	Lay the 2 control wires from the detector to the bottom of the unit control cabinet
Building interface	In control cabinet	Deepblue (Optional)	In-cabinet connection	Lay the control wires under the control cabinet of the unit
Chilled/hot water pump	Frequency conversion linkage control Inside or near the power distribution panel in the machine room	User	In-cabinet connection	Each motor has 2 control wires, and another 2 spare control wires, which are laid by the power distribution panel in the machine room to the lower part of the unit control cabinet.
Cooling water pump				
Cooling tower fan	Frequency conversion linkage control In control cabinet	User	In-cabinet connection	
Domestic hot water circulating pump				

Note: The control wire is 0.75mm<sup>2</sup> multi-strand soft copper wire.

Project Background				
Project Name				
Chiller Application		<input type="checkbox"/> Comfort A/C <input type="checkbox"/> Industrial process cooling/heating		
Chiller Installation Environment		<input type="checkbox"/> Safe <input type="checkbox"/> Combustible <input type="checkbox"/> Corrosive air <input type="checkbox"/> Dusty		
NOTE: Safe means the environment is not harmful to human being and chiller operation.				
Chiller				
Chiller Type		<input type="checkbox"/> Hot water <input type="checkbox"/> Steam		
		<input type="checkbox"/> Direct fired <input type="checkbox"/> Multi-energy		
Unit Cooling(Capacity)		-----Kw		
Unit Heating(Capacity)		-----Kw		
QTY				
Heat Source	<input type="checkbox"/> Steam	Source	<input type="checkbox"/> Boiler <input type="checkbox"/> District heating	
		Pressure	<input type="checkbox"/> 0.4Mpa <input type="checkbox"/> 0.6Mpa <input type="checkbox"/> 0.8Mpa <input type="checkbox"/> Others	
	<input type="checkbox"/> Direct fire	Type	<input type="checkbox"/> NG <input type="checkbox"/> Coal gas <input type="checkbox"/> LGP	
		Species	Heat value	Kcal/Nm <sup>3</sup>
	<input type="checkbox"/> Fuel	Type	<input type="checkbox"/> Heavy Oil <input type="checkbox"/> Waste Oil	
		Viscosity	-----	
	<input type="checkbox"/> Hot water	Inlet/Outlet	<input type="checkbox"/> 95-85°C <input type="checkbox"/> Other _____°C	
		Pressure	_____ to _____ Mpa	
	<input type="checkbox"/> Exhaust	Temperature	_____ to _____ °C	
		Pressure	Allowable	Pressure Mpa
Water Temp.	Chilled water	Inlet/Outlet	<input type="checkbox"/> 12-7°C <input type="checkbox"/> 23-16°C <input type="checkbox"/> Other _____ to _____ °C	
		Pressure	<input type="checkbox"/> 0.8Mpa <input type="checkbox"/> 1.0Mpa <input type="checkbox"/> Other _____	
	Domestic hot water	Inlet/Outlet	<input type="checkbox"/> 55.8-60°C <input type="checkbox"/> Other _____ to _____ °C	
		Pressure	<input type="checkbox"/> 0.8Mpa <input type="checkbox"/> 1.0Mpa <input type="checkbox"/> Other _____ Mpa	
	Cooling water	Inlet/Outlet	<input type="checkbox"/> 30-36°C <input type="checkbox"/> 32-37°C <input type="checkbox"/> Other _____ to _____ °C	
		Pressure	<input type="checkbox"/> 0.8Mpa <input type="checkbox"/> 1.0Mpa <input type="checkbox"/> Other _____ Mpa	
Water Quality	Chilled water	<input type="checkbox"/> Standard <input type="checkbox"/> Special		
	Domestic hot water	<input type="checkbox"/> Standard <input type="checkbox"/> Special		
	Cooling water	<input type="checkbox"/> Standard <input type="checkbox"/> Special		
	Hot water	Standard <input type="checkbox"/> Special		
Operation Condition	Operation Time/Day	<input type="checkbox"/> 24hours <input type="checkbox"/> 8-10hours <input type="checkbox"/> _____ hours		
	Operation Time/Year	<input type="checkbox"/> All Year <input type="checkbox"/> Summer <input type="checkbox"/> Winter		
		<input type="checkbox"/> Other _____		
Average Load	<input type="checkbox"/> >=90% <input type="checkbox"/> 75-90% <input type="checkbox"/> 60-75%			
	<input type="checkbox"/> Other _____			
Lead Time	_____ days			
Other	_____			
NOTE:Please full fill as much as possible.				



GREENER WORLD, BLUER SKY