Product Data

16JLH
Single Effect,
Hot Water Driven Absorption Chiller

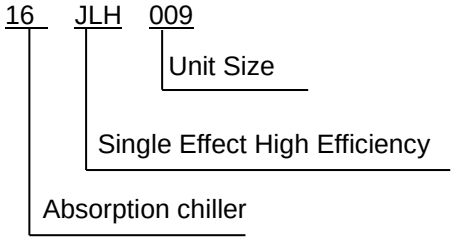
30 to 1300 Nominal Tons (105 to 4571 kW)

16JLH Hot water driven Absorption Chillers, Provides Heat Recovery water chilling to CHP System and Heat Recovery Facilities.

- No CFC's ; environmentally safe
- Quiet, vibration-free operation
- High reliability due to few moving parts

Table of contents

Model Number Nomenclature



16JLH Hot water driven Absorption Chiller provides economical Water chilling for CHP (Cooling, Heating and Power) System.

Heat recovery cooling and Excellent part load performance

Exhaust-energy water chilling - 16JLH Hot water driven absorption chiller produces cooling from Exhaust or Solar energy. Also, the use of hot water driven absorption chiller eliminates demand charges and high cost electrical usage.and high cost electrical usage.

Application versatility Designed to suit a variety of applications - From comfort cooling to providing chilled water for process applications, the 16JLH absorption chiller offers versatility for almost any job where hot water is available as the heat source, the 16JLH is sure to be the right choice for either new construction or retrofit applications.

Excellent part load performance - 16JLH standard concentration control system allows stable, part load operation at cooling water temperatures as low as 17℃ without the need for a cooling water bypass. For maximum efficiency, a variable frequency drive pump (option) automatically maintains optimum solution flow between generator and absorber at all operating condition. This will result in improved part-load efficiency. The 16JLH has a continuous operating range from 100% to 10% of rated machine capacity.

Location and installation savings

Ease of installation - 16JLH Absorption chillers are completely fabricated, assembled and wired in the factory as single-piece units.

Single-point box electrical connection - Installation costs are further reduced by eliminating field wiring between machine components. On units shipped as a single assembly, all unit-mounted electrical items are factory-wired to the chiller microprocessor control panel. Only a single-point electrical connection to the chiller from the building's electrical service is required. Voltage transformers, mounted in the chiller control panel, provide secondary, single-phase powers for the 16JLH control.

Low noise and vibration allows location flexibility - Low sound and vibration levels are characteristic of absorption chillers, primarily due to the fact the only rotating parts are the refrigerant and solution pumps. The overall sound level of 16JLH is typically 75dbA. This allows the machines to be installed near occupies spaces or in areas with strict sound requirements. Low vibration levels also make it possible to install the chiller on upper floors without special consideration for vibration dampening systems.

Low maintenance

Standard features allow simple maintenance procedures - Every 16JLH machine has numerous standard design features that provide for convenient and simple maintenance. Hinged water box cover on the absorber, and condenser facilitate tube and water box inspection. All moving parts are easily accessible for inspection or replacement, as required.

Leak-proof hermetic pumps cut maintenance costs - 16JLH solution and refrigerant pumps/ motors are leak-proof, completely self-contained, and hermetically sealed. The hermetic design eliminates the need for a separate, complicated, and possibly leak-prone seal water system while providing leak tightness and longer machine life. Specially designed bearings absorb both radial and axial thrusts to ensure correct fit at all times. There is no possibility of external contamination since the fluid being pumped lubricates and cools the pump and motor assemblies. In addition, both the rotor and the stator are separated by a stainless steel liner that protects the windings from the fluid being pumped. As an additional safety feature, thermal over-load switches are embedded in the stator to protect against high winding temperatures. The pumps are field serviceable. Inspection is recommended after 5 years or 20,000 hours of operation, whichever comes first. Pump isolation valves are included on 16JLH machines to make field service easy, if required.

Reliable operation(Certification : UL, CE, ISO, PED)

16JLH control system features automatic microprocessor control center continuously monitors machine operation, ensuring precise control – Each 16JLH absorption chiller includes a factory mounted and wired microprocessor control panel that is functionally tested prior to shipment. Continuous monitoring and control of machine operation are performed automatically. A touch screen type display on the front of the control panel identifies operational status and fault indication. All control panel components and the assembly will meet local codes including UL (Underwriters' Laboratories), and KS where appropriate and include a microprocessor CPU (central processing unit) board, molded case circuit breaker, pump contactors, ambient compensated 3-phase pump overload protection, control power transformers, and all other necessary safeties and controls.

As part of the start-up sequence, the chiller microprocessor control panel initiates a self-diagnostic system check to verify that all sensors are in range. Other standard features include a remote start/stop switch and a key-locked control panel door that protects against unauthorized access.

Superior corrosion protection – Absorption chillers must be protected from the possibility of internal corrosion that is always present when lithium bromide solution is in contact with internal machine surfaces. The 16JLH absorption chiller incorporates a highly effective corrosion inhibitor to provide an extra margin of protection against internal corrosion. Other inhibitors may require the use of exotic tube materials in certain heat exchangers since they are less effective and require frequent maintenance and analysis. The superior corrosion protection of 16JLH's inhibitor allows for the use of standard copper tubes throughout the machine. This results in long machine life and dependable operation.

Gravitational dropping refrigerant and solution distribution system (Evaporator, Absorber, Generator) – The refrigerant and solution distribution system in evaporator, absorber and generator is performed based on gravity and siphon phenomenon. This gravitational dropping distribution system adopts stainless steel tray and allows uniform solution spray and continuous heat transfer. Different from nozzle spray type of distribution system, this system does not need external pumps to spray the solutions with nozzles and prevents nozzles from clogging.

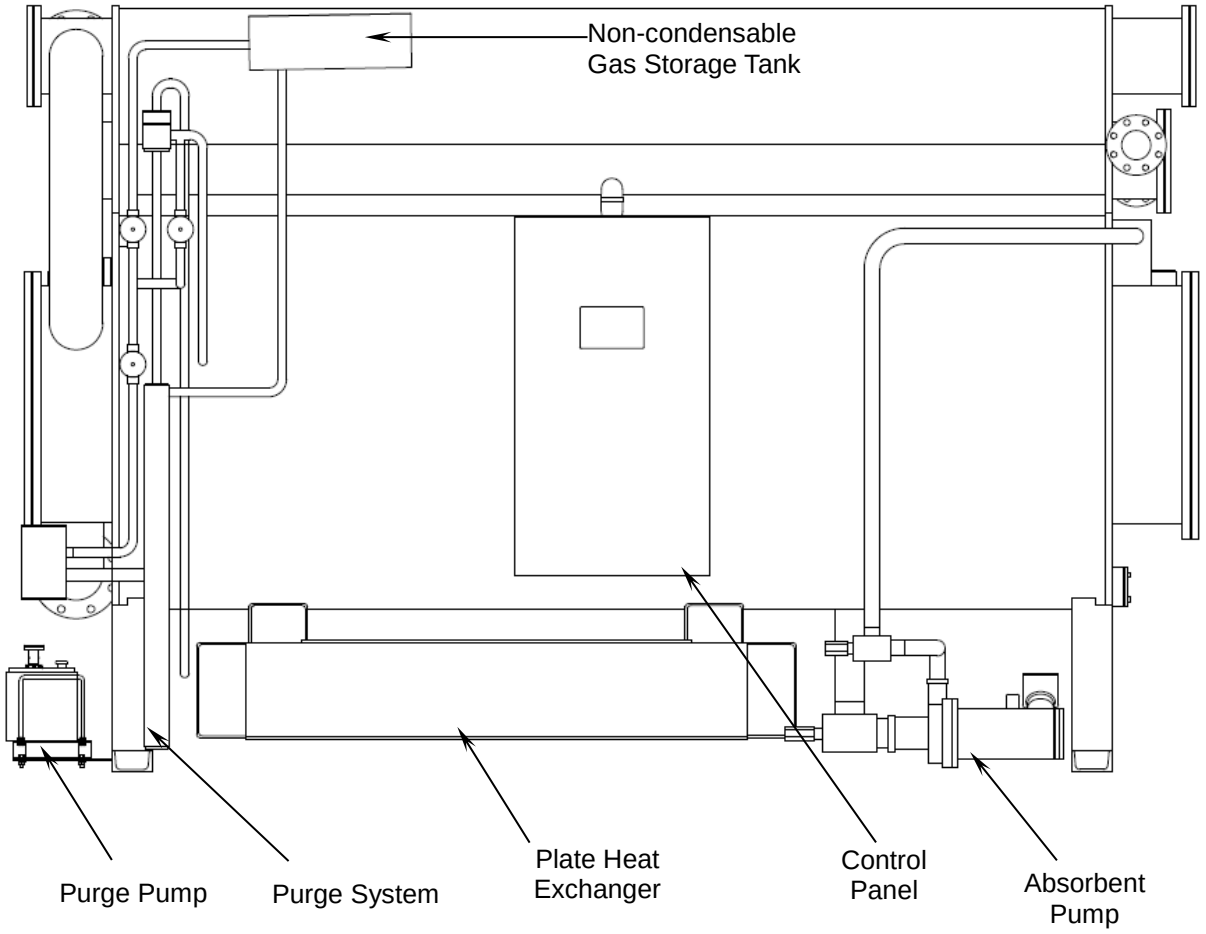
Rugged machine construction – Every 16JLH absorption chiller offers numerous standard features designed to provide reliable, trouble-free operation. The machine is fabricated to meet stringent manufacturing and design requirements and is UL-listed to ensure product safety and machine integrity.

Automatic purge system extends machine life and ensures optimum efficiency and performance – The purge system of an absorption chiller is critical to ensuring efficient operation and long machine life. Even when machines are vacuum tight or properly inhibited, all absorption chillers generate hydrogen and other non-condensable gases in small quantities. Since these gases are present in sufficient volume to interfere with proper machine operation, they must be removed to protect the unit from internal corrosion, lithium bromide solution crystallization, and/or a reduction in chiller capacity. 16JLH purge system protects the machines from these potential hazards by working continuously during machine operation.

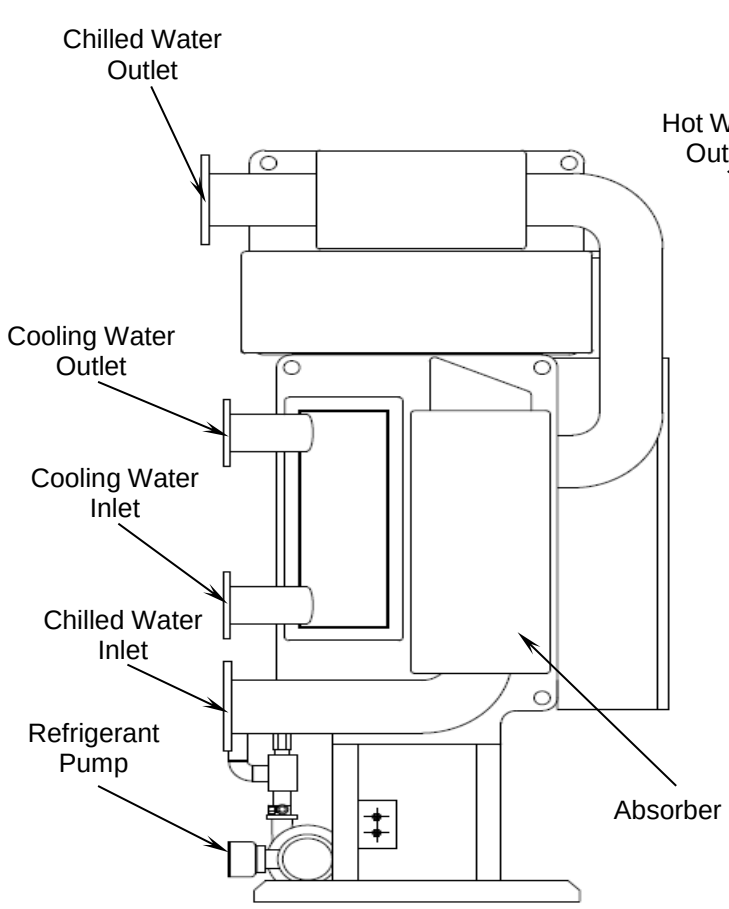
During operation, non-condensable gas tends to accumulate in the absorber section, which operates at the lowest internal pressure. A slip-stream of lithium bromide solution from the solution pump discharge flows through an eductor, creating a suction that draws non-condensable gas from the absorber. The non-

condensable gas is then entrained by the solution flowing through the eductor. The eductor discharges the solution and non-condensable gas into a separator in a purge chamber, where the non-condensable gas are separated from the solution. The non-condensable gas flows to a storage tank, while the solution returns to the absorber.
As non-condensable gas accumulates in the external storage tank, they are isolated from the chiller and cannot reenter the machine (even during shutdown). These gases must periodically be exhausted (as required) from the storage tank by a simple procedure performed while the machine is running. Evacuation can be performed by a unit-mounted vacuum pump that is connected to the purge evacuation valve.
The unit-mounted vacuum pump can also be used during chiller maintenance or service to remove non-condensable gas directly from the machine.

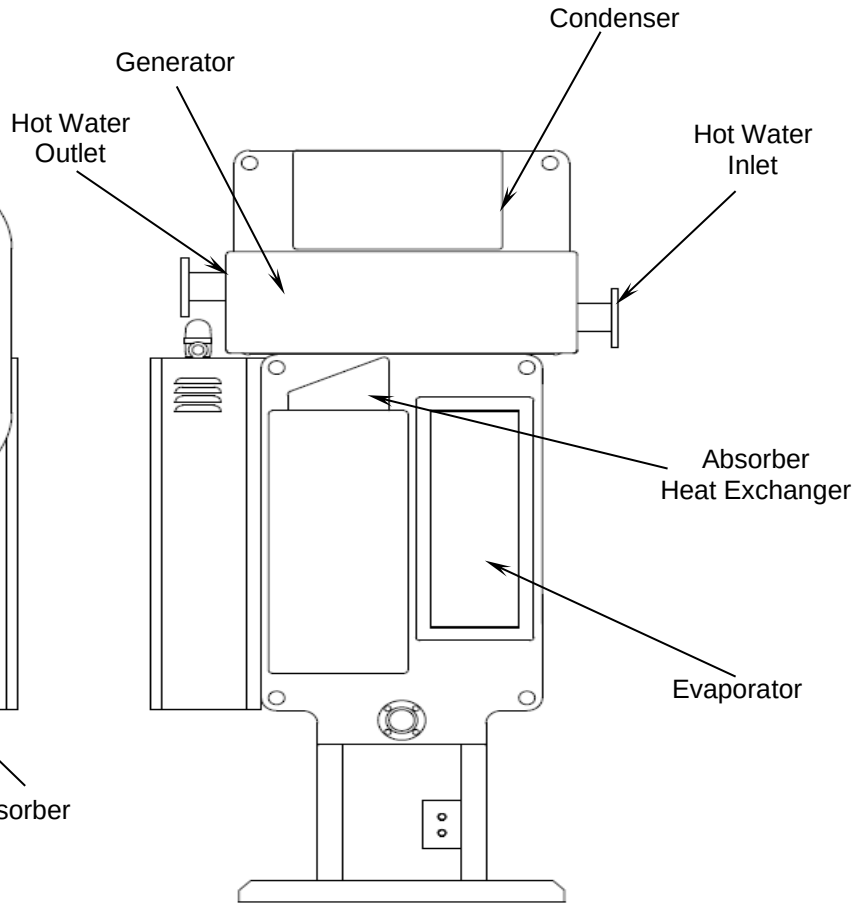
16JLH OUT LINE



<Control Panel Side>



<Left Side View>



<Right Side View>

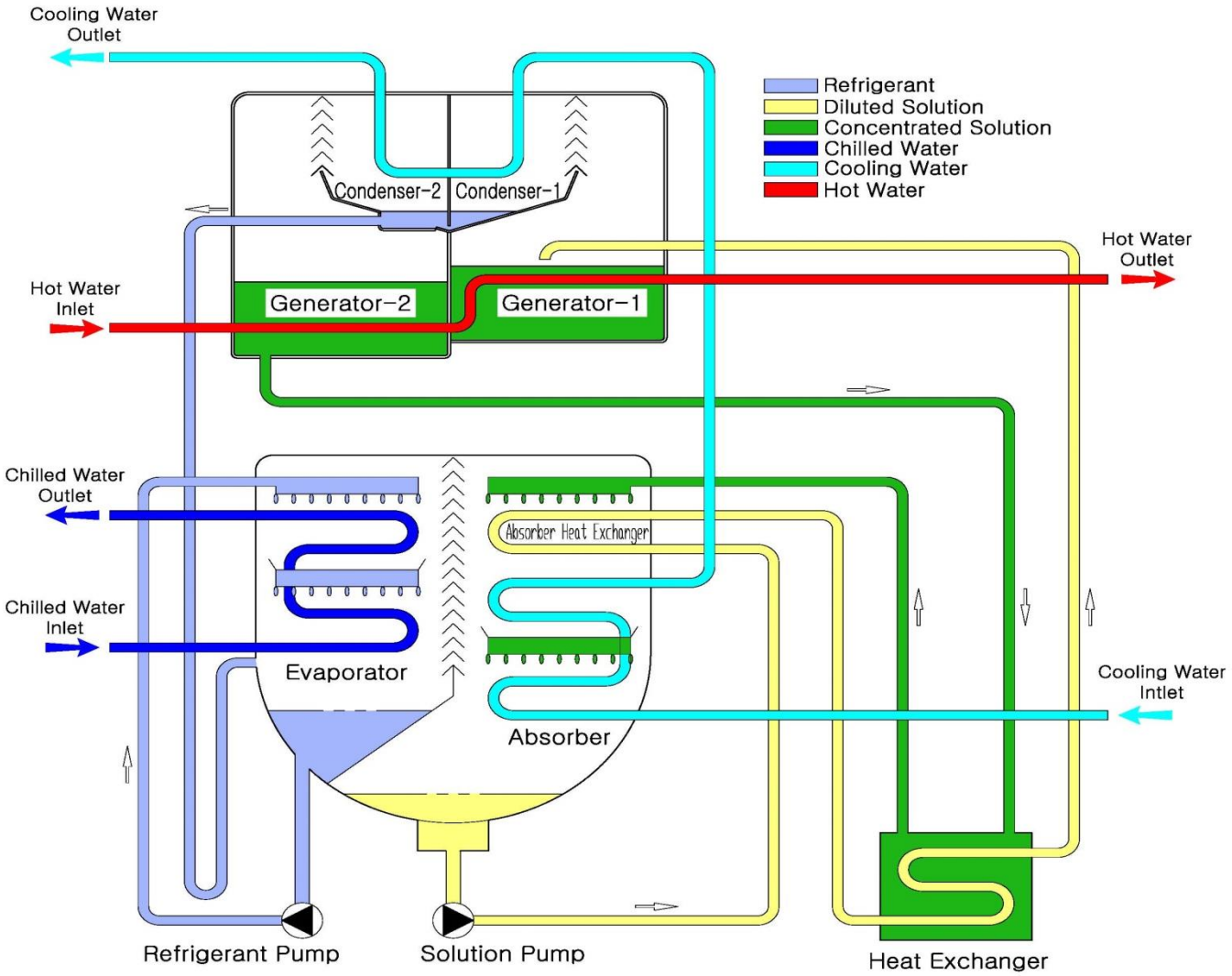
Single-effect Absorption Cycle

The 16JLH hot water driven absorption chiller consists of an evaporator, absorber, condenser, generator, solution heat exchanger, absorber heat exchanger, refrigerant/ solution pumps, purge and controls. Water is used as the refrigerant in vessels maintained under low absolute pressure (vacuum). The chiller operates on the principle that under vacuum, water boils at a low temperature. In this case water boils at approximately 5.5℃, thereby cooling the chilled water circulating through the evaporator tubes. A refrigerant pump is used to circulate the refrigerant water over the evaporator tubes to improve heat transfer.

To make the cooling process continuous, the refrigerant vapor must be removed as it is produced. For this, lithium bromide solution (which has a high affinity for water) is used to absorb the Refrigerant vapor.

As this process continuous, the lithium bromide becomes diluted, reducing its absorption capacity. A solution pump then transfers this weak (diluted) solution to the generator where it is concentrated by hot water. The Refrigerant vapor released in the shell side of the generator, enters the condenser to be cooled and returned to a liquid state. The refrigerant water returns to the evaporator to begin a new cycle.

To remove heat from the machine, relatively cooling water from a cooling tower or other source is first circulated through the tubes of the absorber to remove the heat of vaporization. The Cooling water is then circulated through the tubes of the condenser. The strong solution from the generator flows back to the absorber to begin a new cycle. For efficiency reasons, the strong solution from the generator is passed through the heat exchanger to preheat the weak solution while pre-cooling the strong solution.



Specification Data (SI unit)

Model			unit	16JLH 003	16JLH 004	16JLH 005	16JLH 006	16JLH 007	16JLH 009	16JLH 011	16JLH 013	16JLH 015	16JLH 018
Cooling Capacity			kW	105	141	176	211	264	316	387	475	545	633
			usRT	30	40	50	60	75	90	110	135	155	180
Chilled water	Temp.		°C	13 / 8									
	Flow rate		m^3/h	18.1	24.2	30.2	36.3	45.4	54.4	66.5	81.6	93.7	109
	P. Drop		mH_2O	4.6	5.2	6.1	6.8	6.7	6.9	4.6	4.9	4.5	4.5
	Connection		mm	65				80		100		125	
Cooling water	Temp.		°C	31 / 36.5									
	Flow rate		m^3/h	36.6	48.8	61.0	73.2	91.5	110	134	165	189	220
	P. Drop		m_2O	3.7	4.1	6.0	6.6	6.2	6.5	8.1	8.9	8.8	8.7
	Connection		mm	100				125		150			
Hot water	Temp.		°C	95 / 80									
	Flow rate		m^3/h	7.6	10.1	12.7	15.2	19.0	22.8	27.8	34.2	39.2	45.6
	Pressure Drop	Shell	mH_2O	0.9	1.3	2.2	2.9	1.0	1.1	138	2.1	2.2	2.6
		Control Valve	mH_2O	4.0	2.8	4.4	2.4	3.7	2.2	3.2	1.9	2.5	3.4
	Connection		mm	50				65		80			
	Control Valve		mm	40			50		65		80		
Electric	Power source		-	3Φ, 400, 50Hz									
	Abs. Pump		kW(A)	0.3 (1.4)				0.4 (1.4)					
	Ref. Pump		kW(A)	0.2 (1.2)								0.3 (1.4)	
	Purge Pump		kW(A)	0.4 (1.2)									
	Control Panel		kW(A)	0.2 (0.4)									
	Total Power		kW	1.1				1.2				1.3	
	Total Ampere		A	4.2								4.4	
Size	Length (L)		mm	2,095		2,600		2,658		3,678		3,720	
	Width (W)		mm	1,076				1,222				1250	
	Height (H)		mm	2,091				2,351				2,705	
Weight	Rigging		ton	2.1	2.2	2.6	2.7	3.6	3.7	4.6	4.8	5.5	5.8
	Operation		ton	2.3	2.5	2.9	3.1	4.1	4.2	5.2	5.	6.4	6.8
Clearance, Tube Removal			mm	1,900		2,400				3,400			

General conditions

1. Available max. working pressure of chilled water/cooling water/hot water : 1.0MPa.
2. Fouling factor 0.000044 m^2 ℃/W for Absorber and Condenser, 0.000018 m^2 ℃/W for Evaporator and Generator.

Specification Data (SI unit)

Model			unit	16JLH 021	16JLH 024	16JLH 027	16JLH 030	16JLH 034	16JLH 037	16JLH 042	16JLH 047	16JLH 052
Cooling Capacity			kW	738	844	949	1,055	1,196	1,319	1,477	1,653	1,846
			usRT	210	240	270	300	340	375	420	470	525
Chilled water	Temp.		°C	13 / 8								
	Flow rate		m^3/h	127	145	163	181	206	227	254	284	318
	P. Drop		mH_2O	9.9	9.7	10.2	10.2	9.2	9.7	4.4	5.9	5.6
	Connection		mm	125		150		200				
Cooling water	Temp.		°C	31 / 36.5								
	Flow rate		m^3/h	256	293	330	366	415	458	513	574	641
	P. Drop		mH_2O	7.1	6.8	6.9	7.0	7.1	7.1	6.1	8.2	6.6
	Connection		mm	200				250				300
Hot water	Temp.		°C	95 / 80								
	Flow rate		m^3/h	53.2	60.7	68.3	75.9	86.1	94.9	106	119	133
	Pressure Drop	Shell	mH_2O	3.9	4.1	3.9	4.0	4.0	4.0	5.5	7.3	6.9
		Control Valve	mH_2O	4.6	2.4	3.0	3.7	4.8	2.3	2.8	3.5	4.4
	Connection		mm	100				125				150
	Control Valve		mm	80	100				125			
Electric	Power source		-	3Φ, 400, 50Hz								
	Abs. Pump		kW(A)	0.4 (1.4)		1.5 (4.3)						
	Ref. Pump		kW(A)	0.3 (1.4)				0.4 (1.4)				
	Purge Pump		kW(A)	0.4 (1.2)								
	Control Panel		kW(A)	0.2 (0.4)								
	Total Power		kW	1.3		2.4		2.5				
	Total Ampere		A	4.4		7.3						
Size	Length (L)		mm	4,740		4,860		4,872		5,508	6,006	6,012
	Width (W)		mm	1,250		1,413		1,561		1,583		1,833
	Height (H)		mm	2,705		2,686		2,947				3,168
Weight	Rigging		ton	6.8	7.1	8.8	9.2	10.5	10.9	12.3	13.7	17.2
	Operation		ton	7.9	8.4	10.4	10.9	12.5	13.1	14.8	164	20.8
Clearance, Tube Removal			mm	4,600						5,200	5,700	

General conditions

1. Available max. working pressure of chilled water/cooling water/hot water : 1.0MPa.
2. Fouling factor 0.000044 m^2 ℃/W for Absorber and Condenser, 0.000018 m^2 ℃/W for Evaporator and Generator.

Specification Data (SI unit)

Model			unit	16JLH 058	16JLH 063	16JLH 067	16JLH 075	16JLH 082	16JLH 090	16JLH 097	16JLH 105	16JLH 112	16JLH 130
Cooling Capacity			kW	2,039	2,215	2,391	2,637	2,883	3,165	3,428	3,692	3,956	4,571
			usRT	580	630	680	750	820	900	975	1050	1125	1300
Chilled water	Temp.		°C	13 / 8									
	Flow rate		m^3/h	351	381	411	454	469	544	590	635	680	786
	P. Drop		mH_2O	7.4	9.2	5.5	7.1	9.1	6.9	8.6	5.2	6.4	9.5
	Connection		mm	200		250			300				
Cooling water	Temp.		°C	31 / 36.5									
	Flow rate		m^3/h	708	769	830	915	1,001	1,098	1,190	1,282	1,373	1,587
	P. Drop		mH_2O	8.6	10.8	6.7	8.7	11.0	8.3	10.3	7.1	8.7	10.4
	Connection		mm	300		350			400				450
Hot water	Temp.		°C	95 / 80									
	Flow rate		m^3/h	147	159	172	190	208	228	247	266	285	329
	Pressure Drop	Shell	mH_2O	9.0	11.3	6.7	8.7	11.0	7.9	9.9	7.5	9.2	13.6
		Control Valve	mH_2O	2.4	2.8	3.3	4.0	4.3	1.7	2.0	2.4	2.7	3.6
	Connection		mm	150					200				
	Control Valve		mm	150					200				
Electric	Power source		-	3Φ, 400, 50Hz									
	Abs. Pump		kW(A)	1.5 (4.3)		1.8 (6.0)					2.2 (6.7)		
	Ref. Pump		kW(A)	0.4 (1.4)		1.5 (4.0)					1.8 (6.0)		
	Purge Pump		kW(A)	0.4 (1.2)				0.75 (1.9)					
	Control Panel		kW(A)	0.2 (0.4)									
	Total Power		kW	2.5		3.9		4.25			4.95		
	Total Ampere		A	7.3		11.6		12.3			15.0		
Size	Length (L)		mm	6,617	7,117	6,114	6,639	7,139	6,749	7,249	7,010	7,510	8,510
	Width (W)		mm	1,833		2,177			2,467		2,930		
	Height (H)		mm	3,168		3,461			3,874		4,000		
Weight	Rigging		ton	19.0	20.6	21.7	23.9	26.0	28.5	30.8	33.1	35.4	40.0
	Operation		ton	22.9	24.9	26.3	29.0	31.6	34.6	37.5	40.3	43.2	49.0
Clearance, Tube Removal			mm	6,200	6,700	5,700	6,200	6,700	6,200	6,700	6,300	6,800	7,800

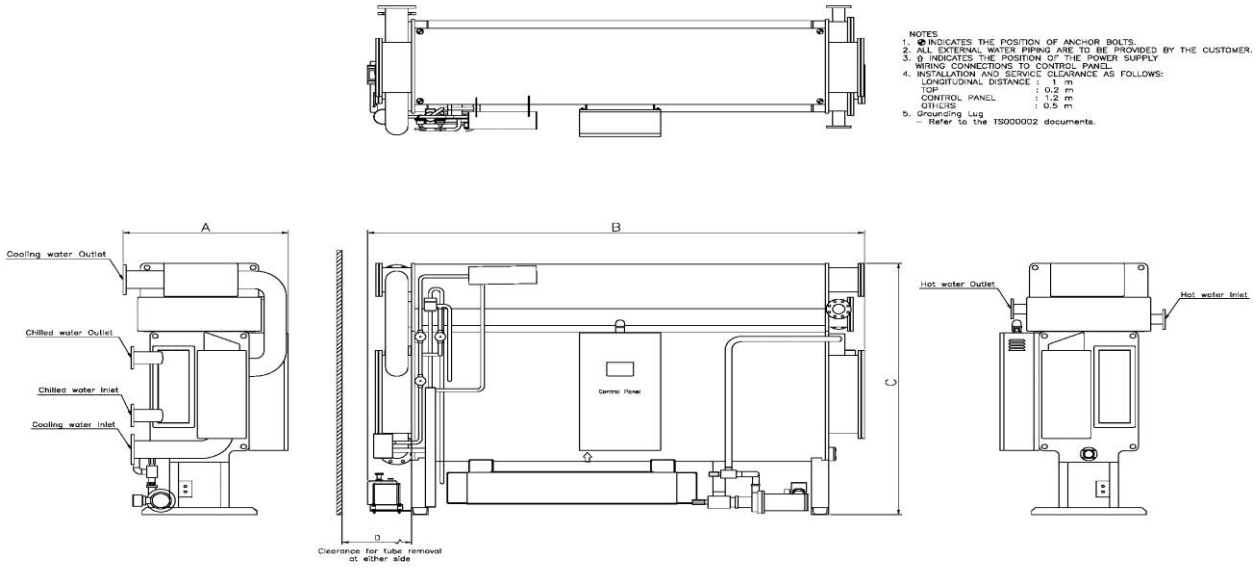
General conditions

1. Available max. working pressure of chilled water/cooling water/hot water : 1.0MPa.
2. Fouling factor 0.000044 m^2 ℃/W for Absorber and Condenser, 0.000018 m^2 ℃/W for Evaporator and Generator.

Dimensions

16JLH

Unit : mm

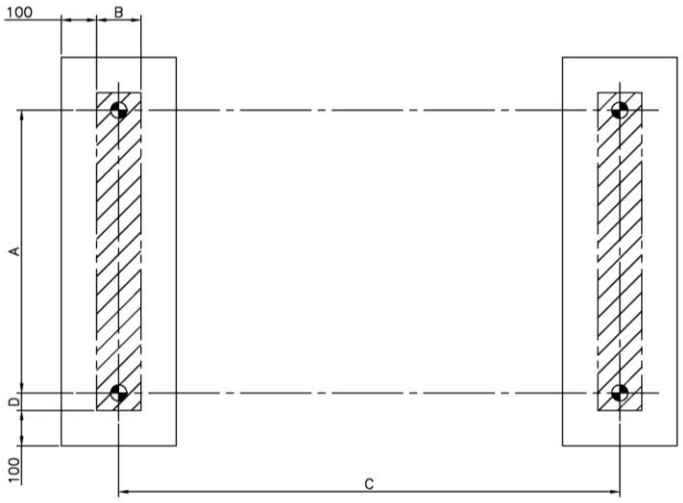


	16JLH 003	16JLH 004	16JLH 005	16JLH 006	16JLH 007	16JLH 009	16JLH 011	16JLH 013	16JLH 015	16JLH 018	16JLH 021	16JLH 024	16JLH 027	16JLH 030
A	1,076				1,222				1,250				1,413	
B	2,095		2,600		2,658		3,678		3,720		4,740		4,860	
C	2,091				2,351				2,705				2,686	
D	1,900		2,400				3,400				4,600			

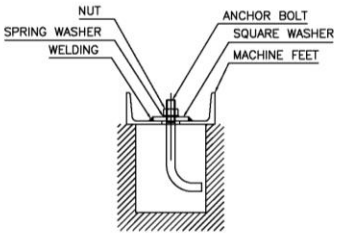
	16JLH 034	16JLH 037	16JLH 042	16JLH 047	16JLH 052	16JLH 058	16JLH 063	16JLH 067	16JLH 075	16JLH 082	16JLH 090	16JLH 097	16JLH 105	16JLH 112	16JLH 130
A	1,561		1,583		1,833			2,177			2,467		2,930		
B	4,872		5,508	6,006	6,012	6,617	7,117	6,114	6,639	7,139	6,749	7,249	7,010	7,510	8,510
C	2,947				3,168			3,461			3,874		4,000		
D	4,600		5,200	5,700		6,200	6,700	5,700	6,200	6,700	6,200	6,700	6,300	6,800	7,800

Foundation

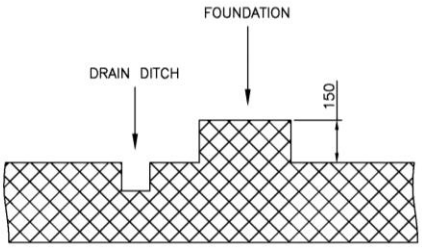
unit : mm



NOTES
1. THERE SHOULD BE A DRAIN AROUND THE FOUNDATION.
2. THE FLOOR SURFACE SHOULD BE MADE AS WATER PROOF FOR EASY MAINTENANCE WORK. HORIZONTAL LEVEL BELOW 1 mm/1000 mm
3. DIG ANCHOR BOLT HOLES AT THE EXACT LOCATION ACCORDING TO SPECIFICATIONS. MORTAR CEMENT IS TO BE POURED INTO THEM.
   # ANCHOR BOLT ARE NOT SUPPLIED WITH THE UNIT.
4. ▨ INDICATES POSITION OF LEG BASE.



EXAMPLE OF ANCHORING



Model	A	B	C	D
16JLH003&16JLH004	640	125	1,441	80
16JLH005&16JLH006			1,941	
16JLH007&16JLH009	650			100
16JLH011&16JLH013			2,961	
16JLH015&16JLH018	804	150	2,936	105
16JLH021&16JLH024			3,956	
16JLH027&16JLH030	800		3,906	
16JLH034&16JLH037	980	200		
16JLH042	1,100		4,448	
16JLH047			4,946	
16JLH052	1,000	250	4,896	
16JLH058			5,421	
16JLH063			5,921	
16JLH067	1,540	300	4,846	
16JLH075			5,371	
16JLH082			5,871	
16JLH090	1,600		5,371	
16JLH097			5,871	
16JLH105	2,100		5,371	
16JLH112			5,871	
16JLH130			6,871	

Product Specification

16JLH Hot water driven Absorption Chiller

Capacity Range: **30 ~ 1300 usRT (105 ~ 4571kW)**

1. SYSTEM DESCRIPTION

Electronically controlled, 16JLH series absorption chiller utilizing hermetic refrigerant and solution pumps, lithium bromide solution as the absorbent, and water as the refrigerant. Hot water shall be supplied to the generator as the heat source.

2. QUALITY ASSURANCE

A. Chiller performance shall be rated in accordance with ARI Standard 560 (latest edition).

B. Chiller shall be manufactured in accordance with ANSI/ASHRAE 15 (latest edition), Safety Code for Mechanical Refrigeration or KS B 6271 (Korea Standard), as applicable.

C. Chiller shall be designed and constructed to meet applicable requirements and shall bear the UL or CE label (if required).

D. Each chiller shall undergo a series of standard factory tests to ensure that the unit is leak tight, that all electrical components operate as intended, and that every aspect of the unit fabrication meets stringent quality standards in accordance with good practice and the manufacturer's quality assurance requirements.

1) The shell side of each chiller shall be leak tested by pressurizing to 76 kPa with nitrogen and then checked by spraying a soap/water mixture on all welds, tube joints, and/or gasket joints to identify any major leaks. Afterward, a mass spectrometer test shall be performed by evacuating the unit to 0.001mmHg absolute, covering the machine with a vinyl tent, and introducing helium gas under the tent. Any remaining leaks will allow the helium to be drawn into the shell side of the machine. The acceptable leak rate as measured by the mass spectrometer test shall not exceed 0.00001 cc/sec standard air.
2) The tube side of the evaporator, absorber, generator and condenser shall be hydrostatically tested at 1.5 times rated design pressure and held for 30 minutes.
3) The refrigerant and solution pump/motors shall undergo standard factory tests to ensure proper head flow, and motor output characteristics.
4) All machine wiring shall undergo an insulation resistance test. The chiller control center and all electrical components shall also be functionally tested to verify continuity and proper electrical operation.
5) Final assembly inspection shall consist of verifying that all valves ,controls, instrumentation, pumps, purge components, and all other machine components have been properly installed on the machine.
6) Each unit shall be checked for overall appearance and dimensional accuracy.
7) Final inspection shall be performed on each unit to check that painting of the unit is as specified, name-plate data is correct, and that all accessories are furnished as required.

3. EQUIPMENT

A. General:

Absorption chiller shall include evaporator, absorber, condenser, generator, solution heat exchanger, absorber heat exchanger, refrigerant/solution pumps, purge system, piping, wiring, controls and auxiliaries. Shipment of the machine shall be in one piece. Initial charge of lithium bromide can be included with the chiller for charging at the jobsite.

B. Heat Exchangers:

1) All heat exchangers shall be of shell and tube construction with shells, tube sheets, tube support sheets, and water boxes fabricated of carbon steel. All heat exchangers shall incorporate straight tubes. All tubes for generator, absorber, evaporator, condenser are expanded into grooved tube sheet.

2) Water boxes.
The evaporator, absorber, condenser and generator water boxes shall be designed for 1034 kPa working pressure. Nozzle-in-head (NIH) type water boxes shall be supplied on the evaporator while the absorber-condenser and generator water boxes shall be marine type. All water boxes shall be provided with vent and drain connections. ANSI 150 psig RF flanges shall be furnished on all water box nozzle connections.

3) Plate heat exchanger.
A solution heat exchanger shall be an integral part of the machine to increase efficiency by pre-heating weak solution on

the tube side with strong solution on the shell side. The plate heat exchanger is made SUS316L to prevent corrosion. Plate heat exchanger is built-up by a plate package of corrugated channel plates surrounded by front and rear cover plate packages. The heat plate makes channel passing two kinds of fluid. The corrugated shape formed on heat plate makes fluid turbulence and supports plates against pressure difference between two fluids.

4) Absorber heat exchanger.
Absorber heat exchanger is newly added in 16JLH series absorber, so efficiency of 16JLH series is much greater than the previous series.

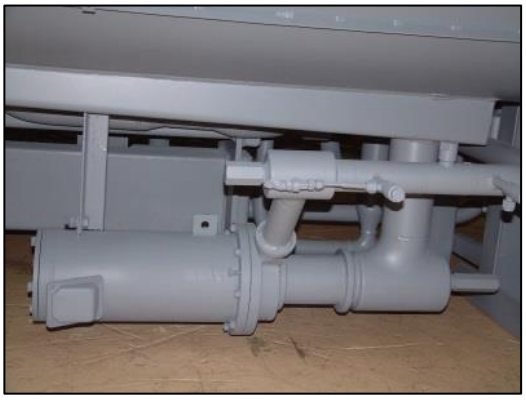
5) Tray and dripper system.
Tray and dripper system for the evaporator, absorber, and generator shall be of a non-clogging design, specifically designed for the intended duty, and shall be fabricated of a corrosion-proof material to ensure
continuous, high-efficiency operation.
Evaporator and absorber of JLH series has double tray and dripper system, chiller capacity is greatly increased
By this system.

6) Material.
Heat exchanger material and minimum wall thickness shall be contingent on the type of corrosion inhibitor used in the machine. For lithium molybdate systems, the following tube specifications shall apply to ensure long machine life and continuous operation:

Evaporator……copper, Notched floral
Absorber……....copper, Floral
Condenser. ……copper, prime (bare)
Generator……..copper, Notched floral

* Special tube material like Cupronickel, Titanium can be used as an option, if required.

C. Pump/Motors:
Refrigerant and solution pump/motors shall be self-contained, leakproof, hermetic type, with isolation valves, and internal seal water system to minimize air leakage into the machine. Lubrication and cooling shall be accomplished by the fluid being pumped; auxiliary water piping for cooling and lubrication shall not be acceptable. Pump/motor assemblies shall be designed for a minimum of 5 years (or 20,000 hours) normal operation between inspections.



D. Purge System
An automatic purge system shall be furnished to provide a continuous purging action whenever the chiller is in operation to assure long machine life and efficient performance. Non-condensable gas shall be removed from the absorber by a liquid eductor , which shall use flow from solution pump to create a suction. Non-condensable gas shall be stored external to the unit and shall be prevented from diffusing back into the machine when the unit is not operating. Evacuation of the external storage tank shall be accomplished by the use of a unit-mounted vacuum pump. The vacuum pump shall be factory mounted on the chiller and wired to the control panel by the chiller manufacturer.

E. Controls:
1) General
The Hot water absorption chiller contains a microprocessor-based control panel that monitors and controls all operations of the machine. The microprocessor controls system matches the cooling capacity of the machine to the cooling load while providing state of machine protection. The system controls cooling capacity within the set point plus the deadband by sensing the leaving chilled water and regulating the hot water control valve via a mechanically linked actuator motor.
The control system controls the operation of the machine by monitoring all operating conditions. The microprocessor control panel can diagnose a problem and let the operator know what the problem is and what to check. It promptly positions the hot water control valve to maintain leaving

chilled water temperature. It can interface with auxiliary equipment such as pumps and cooling tower fans. It continually checks all safeties to prevent any unsafe operating condition.

2) Safety Control

The Control panel monitors all safety control inputs and if required shuts down the chiller or stops solution pump to protect the chiller from possible damage from any of the critical conditions. The controller screen displays the messages if the controller starts safety controls to stop, the alarm relay operates and alarm indicator is brink. The alarm is saved in the controller alarm table to correct the problems.

3) Remote Start/Stop Control

A remote device, such as a time clock which uses a set of contacts, may be used to start and stop the chiller.

4) Spare Safety Inputs

Normally closed (NC) digital inputs for additional field-supplied safeties may be wired to the spare protective limits input channel in place of the factory-installed jumper. (Wire multiple inputs in series.) The opening of any contact will result in a safety shutdown and controller display.

5) Tower-Fan Relay

The tower-fan relay can be controlled when cooling water inlet temperature is low. The temperature setting point is adjustable in the range 15 ~ 30℃.

6) Auto Restart After Power Failure

If the control power is interrupted during operation, the chiller stops immediately without the normal shutdown sequence and dilution. Solution crystallization can occur if the concentration is high (chiller was operating with a relatively large load). The machine will start automatically when the power is back on.

F. Machine Safety Devices:

1) Machine safety and limit devices shall be included as follows:
   a. Low chilled water temperature
   b. Low chilled water flow
   c. Low cooling water flow (optional)
   d. High Generator temperature
   e. High motor winding temperature – refrigerant / solution pumps
   f. High motor amperage – refrigerant / solution pumps

G. Electrical Requirements:

1) Power supply to the unit shall be 3-ph, 60Hz with voltages of 208, 230, 460, 575 / 3-ph, 50Hz with 220V, 380V, 400V, 440V as specified on the equipment schedule. A multi-tap transformer shall provide 24V single-phase and 24 DC secondary power for the control panel
2) Contractor shall supply and install the electrical power line and all auxiliary electrical protection devices per local code requirements and as indicated necessary by the chiller manufacturer.

H. Contractor shall supply and install electrical wiring and devices required to interface the chiller controls with the building control system, if applicable.

I. Piping Requirements:

1) Piping and instrumentation for the chilled water, cooling water and hot water shall be supplied and installed by the contractor / owner.
2) Chilled water flow switch shall be factory supplied and factory installed in the evaporator water nozzle. Cooling water flow switch shall be field installed or factory installed if customer requires and supplied by either the chiller manufacturer or the contractor/owner.

J. Thermal Insulation:

Insulation of cold or hot surfaces shall be field supplied and field installed on the machine. Chiller manufacturer shall specify the recommended material and surface area to be insulated.

K. Sound Level:

The overall sound pressure level of the chiller shall not exceed 75 dbA when measured per ARI Standard 575 (latest edition).

L. Start-up:

1) Unit manufacturer shall provide a factory-trained service representative, employed by the chiller manufacturer, to perform and/or supervise chiller pressure test (when required), charge chiller with refrigerant (water) and lithium bromide solution, place unit into operation, and calibrate all controls in accordance with the manufacturer's written start-up, operating, and maintenance instructions.
2) After unit start-up has been performed, the same factory representative shall be

available for a period of instruction (not to exceed 4 hours) to instruct the owner's personnel in the proper start-up, operation, and maintenance procedures.

3) Manufacturer shall provide the following literature:
   a. Installation Instructions
   b. Start-up, Operating and Maintenance Instructions
   c. Field Wiring Diagrams

M. Options and Accessories:

1) High-Pressure Water boxes:
   Water boxes rated for 1724 kPa or 2068 kPa working pressure shall be furnished when specified on the equipment schedule.

2) Special Tubing:
   Tubing of non-standard materials and/or wall thickness shall be provided when specified on the equipment schedule.

3) Isolation Package:
   A vibration isolation package consisting of machine soleplates and neoprene isolation pads shall be furnished for field installation when specified on the equipment schedule.

4) Cooling Water Flow Switch:

5) A cooling water flow switch, rated for either 1034 kPa or 2068 kPa shall be field installed or factory installed if customer requires and supplied by either the chiller manufacturer or the contractor/owner.

Controls

Microprocessor-based Unit Controller is factory mounted, wired and tested to ensure a protection of the Machine and efficient capacity control. The program logic provides proper Start/Stop of the Machine and also enables a communication interface with others.

Component Test and Diagnostic Check
- Touch Screen Interface for Status Display, Set-point Control, and System Configuration
- Primary and Secondary Status Messages
- Individual Start/Stop Schedules for Local Mode
- Recall of Up to 999 Alarm and Alert Messages with Diagnostic Help
- Extensive Diagnostic and Service Capabilities
- Advanced Crystallization Protection

Safety Cutouts
- Solution Pump Motor Overload/High Temperature
- Refrigerant Pump Motor Overload/High Temperature
- Low Chilled Water Temperature Cutout
- Low Refrigerant Temperature Cutout
- Low Cooling Temperature Cutout
- Low Chilled Water Flow Cutout
- Low Cooling Water Flow Cutout (Option)
- Generator High Temperature Cutout
- Hot Water High Temperature Cutout

Protective Limits
- Strong Solution Leaving High Temperature Generator Alarm
- Hot Water High Temperature Alarm
- Refrigerant Pump Overload/High Temperature Alarm
- Solution Pump Motor Overload/High Temperature Alarm
- Low Refrigerant Temperature Alarm
- Low Chilled Water Temperature Alarm
- Low Cooling Water Temperature Alarm
- Low Chilled Water Flow Alarm

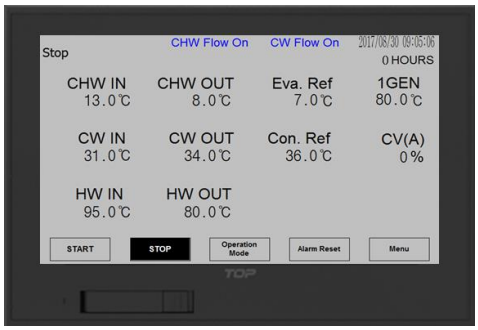
Overrides
- Hot Water High Temperature
- Generator Solution High Temperature
- High Concentration

Temperature Sensor Faults
- Leaving Chilled Water Temperature
- Cooling Water Temperature Entering Absorber
- Refrigerant Condensate Temperature from Condenser
- Refrigerant Evaporating Temperature
- Strong Solution Temperature Leaving Generator
- Entering Hot Water Temperature

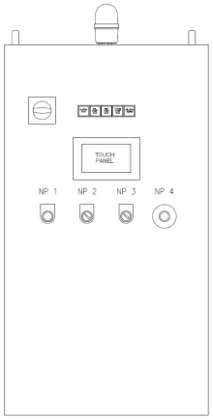
Capacity Control
- Leaving Chilled Water Control
- Running Travel Limit (Control Valve Opening Limit)

Indications
- Chiller Operating Status Message
- Absorption Cycle State Points
- Dilution Cycle
- Power-On
- Alarm
- Safety Shutdown Message
- Run Hours
- Control Valve Position

SIEMENS POL635 Controller



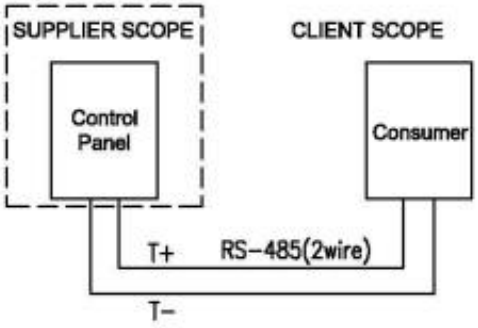
7″ color
Touch Screen Display



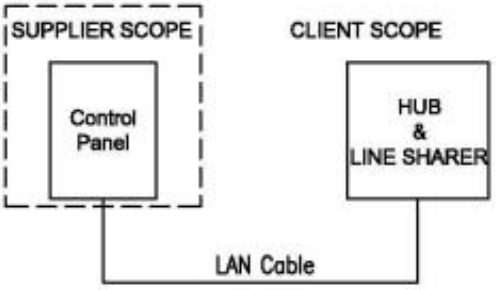
Control Panel

Communication

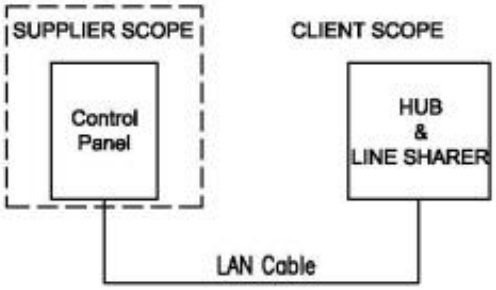
1.MODBUS-RTU



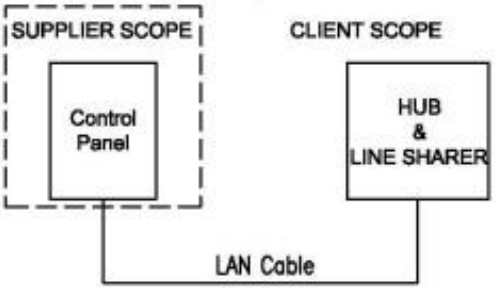
4.BACnet



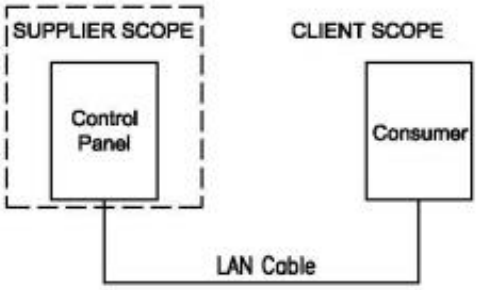
2.MODBUS-TCP



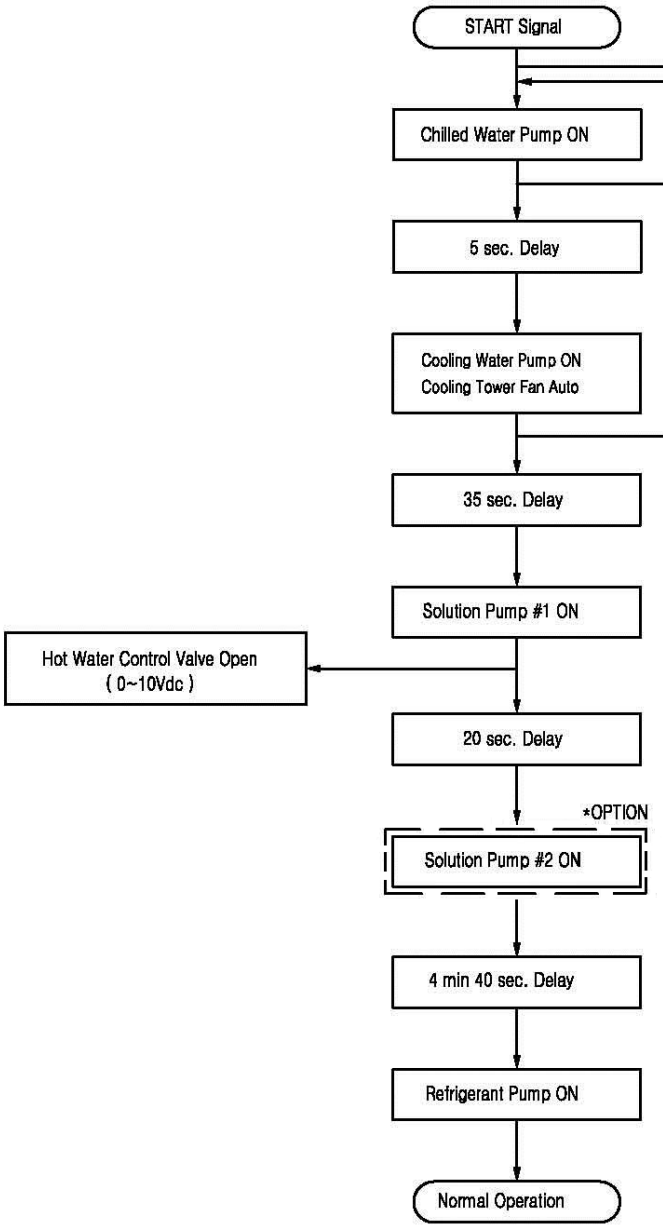
5.INTERNET KIT(PLC)



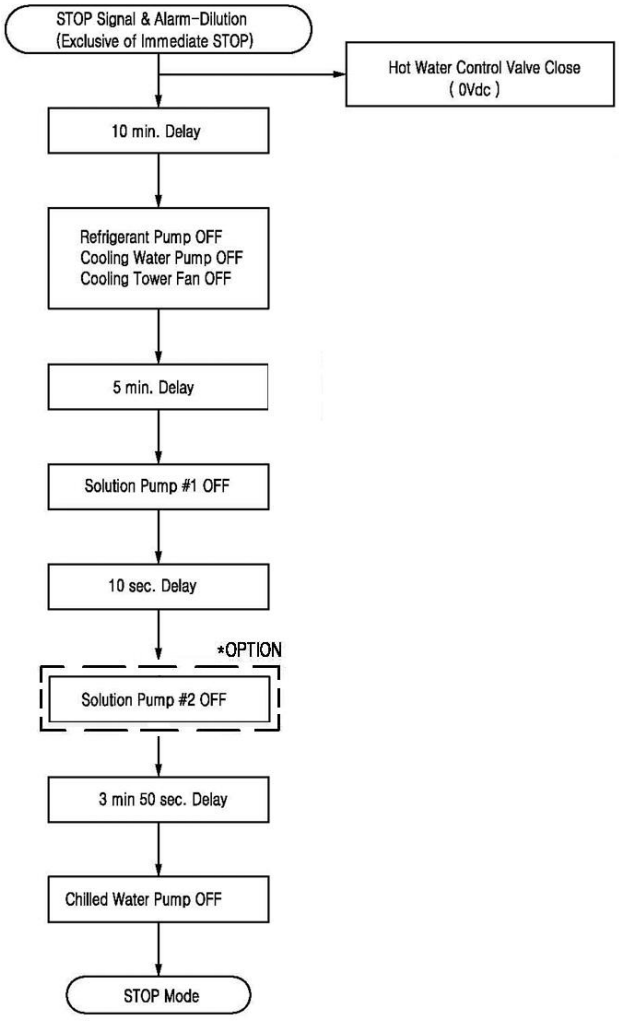
3.PROFIBUS

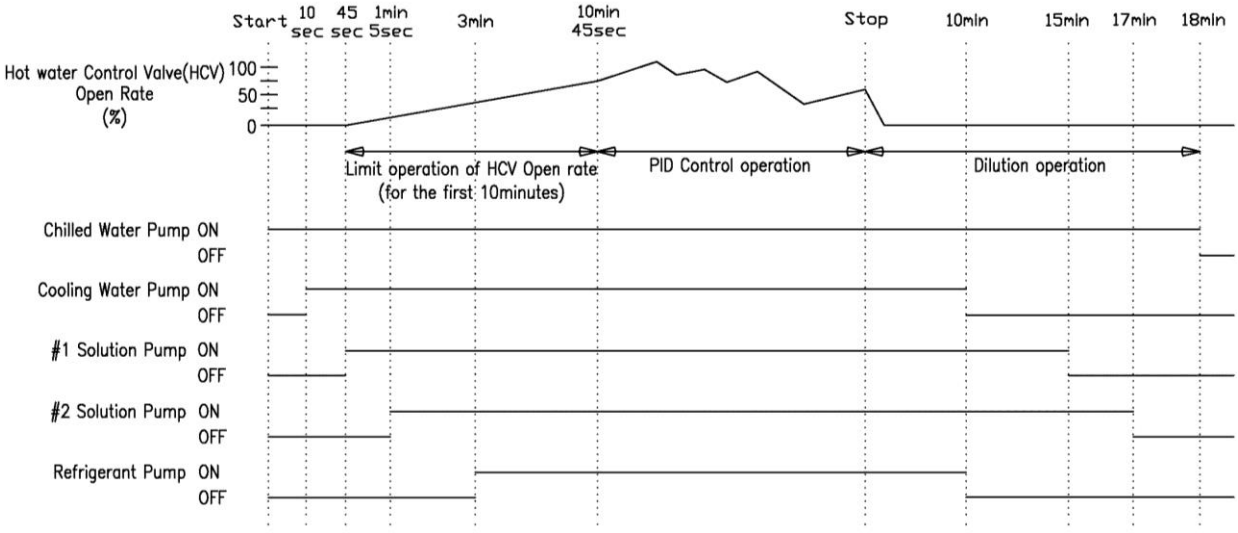


Start-up Sequence



Stop Sequence

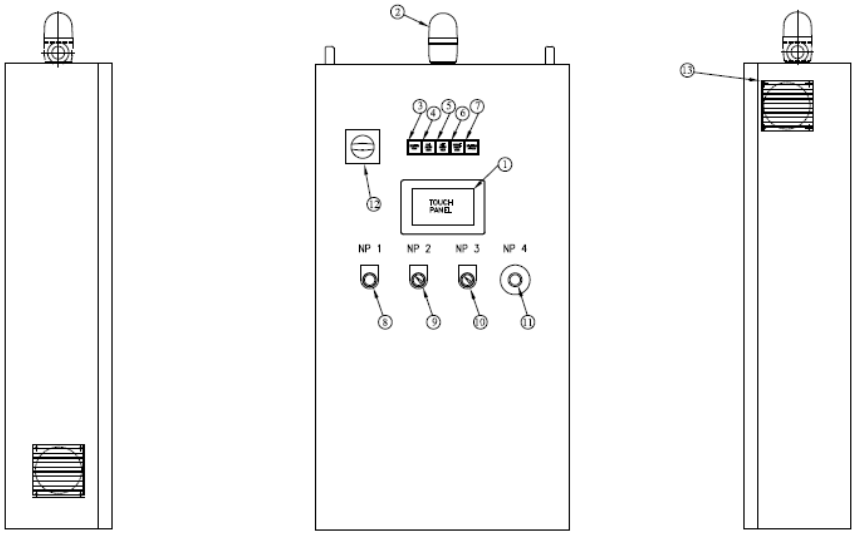




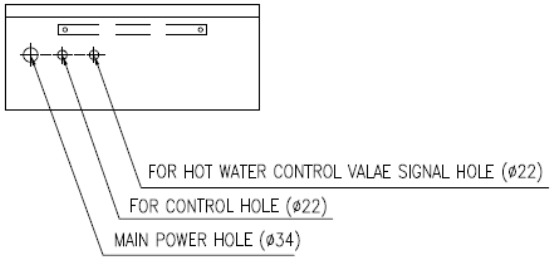
<Operation Graph>

Control Panel – Outside View (CE)

Unit : mm



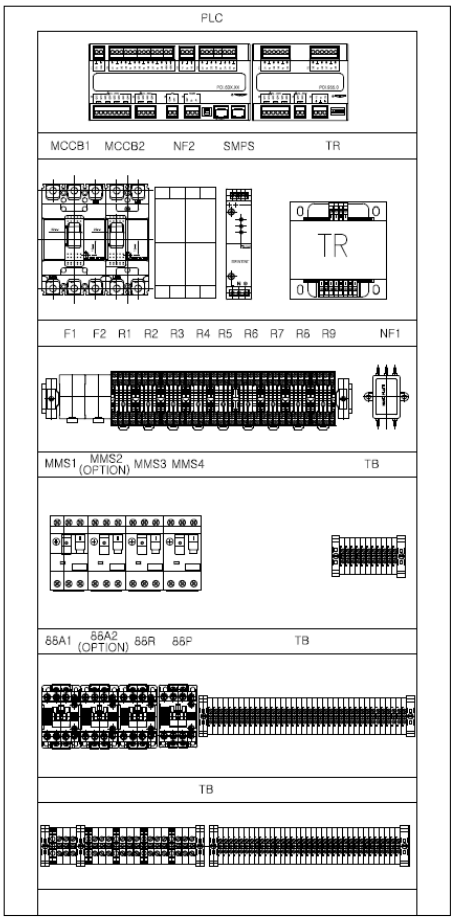
LEFT SIDE VIEW　　FRONT VIEW　　RIGHT SIDE VIEW



BOTTOM VIEW

No.	SYMBOL	DESCRIPTION
1	TOP	TOUCH OPERATION PANEL
2	LT1	STOP ALARM LIGHT
3	LT2	SYSTEM RUN LIGHT
4	LT3	SOLUTION PUMP RUN LIGHT
5	LT4	REFRIGERANT PUMP RUN LIGHT
6	LT5	PURGE PUMP RUN LIGHT
7	LT6	DILUTION ALARM LIGHT
8	BZ	BUZZER
9	S1	BUZZER STOP SWITCH
10	S2	PURGE PUMP ON/OFF SWITCH
11	S3	EMERGENCY SWITCH
12	Q1	DISCONNECT SWITCH
13	CF	COOLING FAN

Control Panel - Inside View (CE)



NO.	SYMBOL NAME	NAME OF INSTRUMENT	Q'TY
1	PLC	CONTROLLER	1
2	MCCB1	MAIN POWER CIRCUIT BREAKER	1
3	MCCB2	CONTROL CIRCUIT BREAKER	1
4	NF1~NF2	NOISE FILTER	2
5	SMPS	DC POWER SUPPLY	1
6	TR	TRANSFORMER	1
7	F1~F2	POWER FUSE	2
8	R1~R9	RELAY	9
9	88A1	SOLUTION PUMP1 CONTACTOR	1
10	88A2(OPTION)	SOLUTION PUMP2 CONTACTOR	1
11	88R	REFRIGERANT PUMP CONTACTOR	1
12	88P	PURGE PUMP CONTACTOR	1
13	MMS1	MANUAL MOTOR STARTER	1
14	MMS2(OPTION)	MANUAL MOTOR STARTER	1
15	MMS3	MANUAL MOTOR STARTER	1
16	MMS4	MANUAL MOTOR STARTER	1
17	TB	TERMINAL BLOCK	

Electric Data

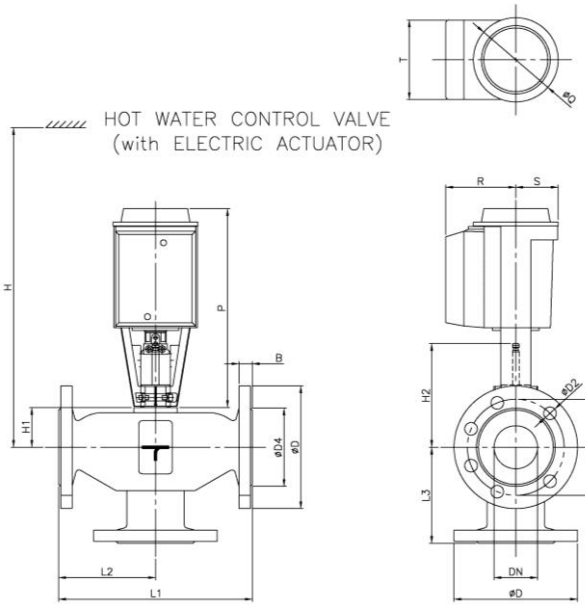
400V - 3P- 50Hz									
Models	Pump motor size (kW)			RLA (A)			LRA (A)		
	SP1	RP	VP	SP1	RP	VP	SP1	RP	VP
16JLH003~16JLH006	0.3	0.2	0.4	1.4	1.2	1.4	4.2	3.6	4.2
16JLH007~16JLH013	0.4	0.2	0.4	1.4	1.2	1.4	4.2	3.6	4.2
16JLH015~16JLH018	0.4	0.3	0.4	1.4	1.4	1.4	4.2	4.2	4.2
16JLH021~16JLH024	0.4	0.3	0.4	1.4	1.4	1.4	4.2	4.2	4.2
16JLH027~16JLH030	1.5	0.3	0.4	4.3	1.4	1.4	12.9	4.2	4.2
16JLH034~16JLH037	1.5	0.4	0.4	4.3	1.4	1.4	12.9	4.2	4.2
16JLH042~16JLH047	1.5	0.4	0.4	4.3	1.4	1.4	12.9	4.2	4.2
16JLH052~16JLH063	1.5	0.4	0.4	4.3	1.4	1.4	12.9	4.2	4.2
16JLH075	1.8	1.5	0.4	6.0	4.0	1.4	18.0	12.0	4.2
16JLH075	1.8	1.5	0.4	6.0	4.0	1.4	18.0	12.0	4.2
16JLH082	1.8	1.5	0.75	6.0	4.0	2.2	18.0	12.0	10.6
16JLH090~16JLH097	1.8	1.5	0.75	6.0	4.0	2.2	18.0	12.0	10.6
16JLH105~16JLH130	2.2	1.8	0.75	6.7	6.0	2.2	20.1	18.0	10.6

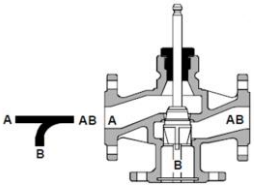
LEGEND : SP1 - Solution Pump1, RP - Refrigerant Pump, VP - Vacuum Pump
RLA - Rated Load Amps, LRA - Locked Rotor Amps
Notes : RLA = Listed RLA x (listed voltage/actual voltage), LRA = Listed LRA x (listed voltage/actual voltage)

Hot Water Control Valve

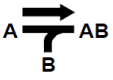
The three-way hot water control valve is supplied from factory. But, this hot water control valve is installed in the outlet(or inlet) line of hot water at jobsite. The valve has a gray cast iron body with DIN type flanged end connections. The valve size is changed 1 to 6 in., depending on the machine model or the specific job requirements. The electric actuator of valve is operated with 24Vac and controlled with 0 to 10Vdc signal. The electric power and the control signal are supplied from the chiller control panel. The hot water pipes have to be correctly connected according to the flow direction marked at the side of valve body, whether it is used as mixing type or diverting type.

* Use the 3-port valve primarily as a mixing valve.

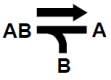




VALVE CROSS SECTION



Mixing
from A/B to AB



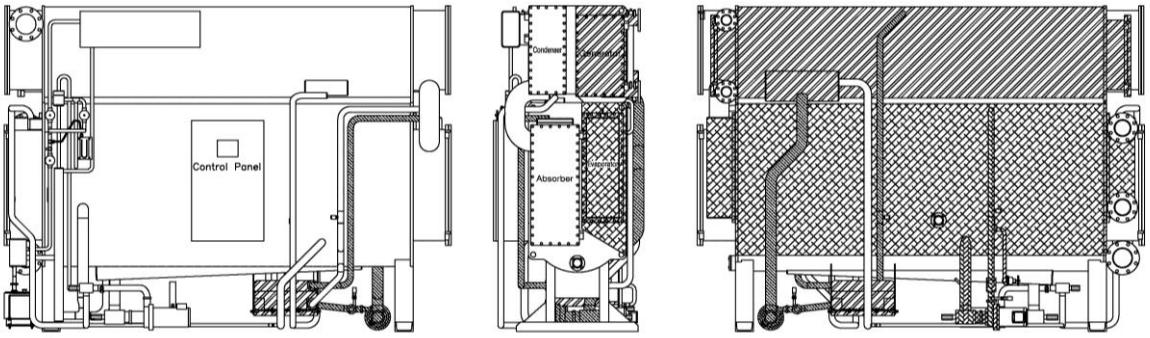
Diverting
from AB to A/B

Hot Water Control Valve Dimensions (unit : mm)

DN	B	D	D1	D2	D3	L1	L2	X	Y	K	H1	H2	H	P	Q	R	S	T
15	14	95	46	14(4x)	23	130	65	79	76	65	37	133.5	>537	300	127	105	64	120
20	16	105	56		29	150	75	86.6	83	75								
25	15	115	65		36	160	80	94.4	90.1	85								
32	17	140	76	19(4x)	46	180	90	115.6	110.7	100								
40	16	150	84		56	200	100	123.2	117.8	110								
50		165	99		69	230	115	135.2	128.4	125	50	146.5	>550					
65	17	185	118		85	290	145	150	142.5	145	75	171.5	>575					
80		200	132	19(8x)	102	310	155	-	-	160								
100		220	156		124	350	175	-	-	180	110	226.5	>685	375	178	137	89	127
125		250	184		149	400	200	-	-	210	123	239.5	>698					
150		284	211	23(8x)	174	480	240	-	-	240	150.5	267	>726					

Thermal Insulation – Surface Area

The cold and hot machine surfaces have to be thermally insulated after the initial operation at jobsite. Thermal insulation drawings will be submitted in details. Non-inflammable Polymer sponge usable at 120℃ or incombustible Glass wool should be used for cold and hot surfaces. When glass wool is used, it is wrapped with thin aluminum plate or galvanized steel plate. The motor section of refrigerant pump is not insulated and the insulations on water box sections should be disassembled for the repair. The final finish painting is performed after the insulation work. The insulation work and the final finishing paint could be performed as the optional works after factory testing.



1. INSULATION FOR HOT SURFACES

19 mm : Generator Body and It'y Water Box
Heat Exchanger Body

10 mm : Pipings of High Temperature's Parts.

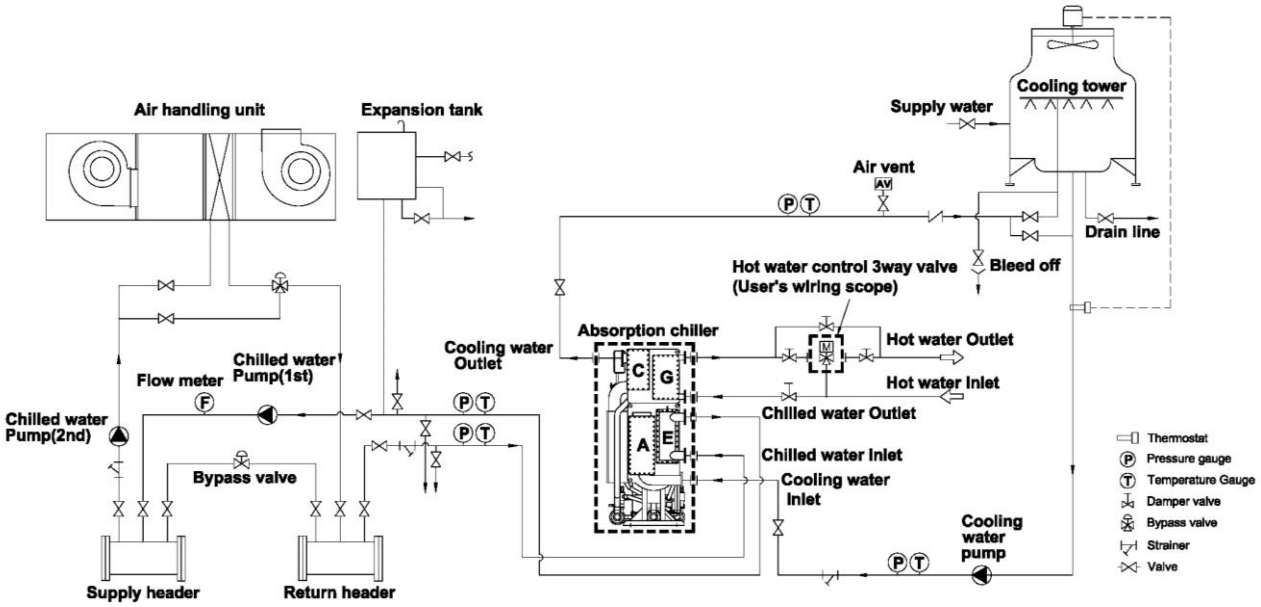
2. INSULATION FOR COLD SURFACES

19 mm : Evaporator Body and It's Water Box

10 mm : Inlet and Outlet Piping of Refrigerant Pump

Model	Hot Surface (m²)		Cold Surface (m²)	
	19 mm	10 mm	19 mm	10 mm
16JLH003	3.7	0.9	3.6	0.4
16JLH004	3.7	0.9	3.6	0.4
16JLH005	4.4	0.9	4.2	0.5
16JLH006	4.4	1.0	4.2	0.5
16JLH007	4.6	1.1	4.3	0.5
16JLH009	4.6	1.1	4.3	0.5
16JLH011	6.2	1.2	5.8	0.5
16JLH013	6.2	1.3	5.8	0.5
16JLH015	6.5	1.6	6.6	0.7
16JLH018	6.5	1.7	6.6	0.9
16JLH021	8.3	1.8	8.0	0.9
16JLH024	8.5	1.9	8.2	0.9
16JLH027	9.8	2.1	8.9	0.9
16JLH030	9.8	2.1	8.9	0.9
16JLH034	10.9	2.1	10.6	0.9
16JLH037	10.9	2.2	10.6	0.9
16JLH042	12.2	2.6	14.6	1.1
16JLH047	13.5	2.7	16.2	1.2
16JLH052	15.0	2.8	17.3	1.2
16JLH058	20.3	3.4	17.6	2.1
16JLH063	21.9	3.5	19.3	2.1
16JLH067	23.2	3.6	20.9	2.1
16JLH075	23.7	3.6	21.0	2.1
16JLH082	24.2	3.8	21.1	2.3
16JLH090	26.0	3.9	22.9	2.3
16JLH097	27.6	4.0	27.8	2.3
16JLH105	35.8	5.3	12.4	2.6
16JLH112	37.5	5.4	13.1	2.6
16JLH130	40.6	5.5	14.4	2.6

Typical Piping & Wiring



1) All external equipment out of dotted line(**- - -**) shall not be prepared and provided by Absorption Machine Manufacturer.
2) For pipe connections and diameters, please refer to the outline and specification data sheet
3) Driving hot water must be maintained as design temperature.
4) The stop valves at hot water inlet and outlet pipe shall be installed.
5) The locations of the chilled water pumps, cooling water pumps and expansion tanks shall be determined in consideration of the hydrostatic head of pumps and the height of building. And the Machine shall not be subject to a pressure larger than the designed pressure at any water headers.
6) For cooling water quality control, it is recommended to install cooling water bleed-off device on the inlet pipe line of cooling tower and higher than the water sump level of cooling tower.
7) About 10 meshes of strainers shall be installed in the cooling water line.
8) For the maintenance and the inspection of the Machine, the following equipment shall be installed on each chilled water and cooling water inlet/outlet lines as well as stop valve.
   - Thermometers and pressure gauges at chilled and cooling water inlet/outlet.
   - Air relief valves shall be installed on each chilled and cooling water lines and at the highest points of each piping.
   - Drain valves at the lowest position between the stop valves of chilled, cooling water and the Machine water box and the drain valve shall be piped to the drain ditch.
9) It should be better that a sufficient clearance for access to water box of the absorber, evaporator, condenser, and generator to facilitate inspection and cleaning work

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