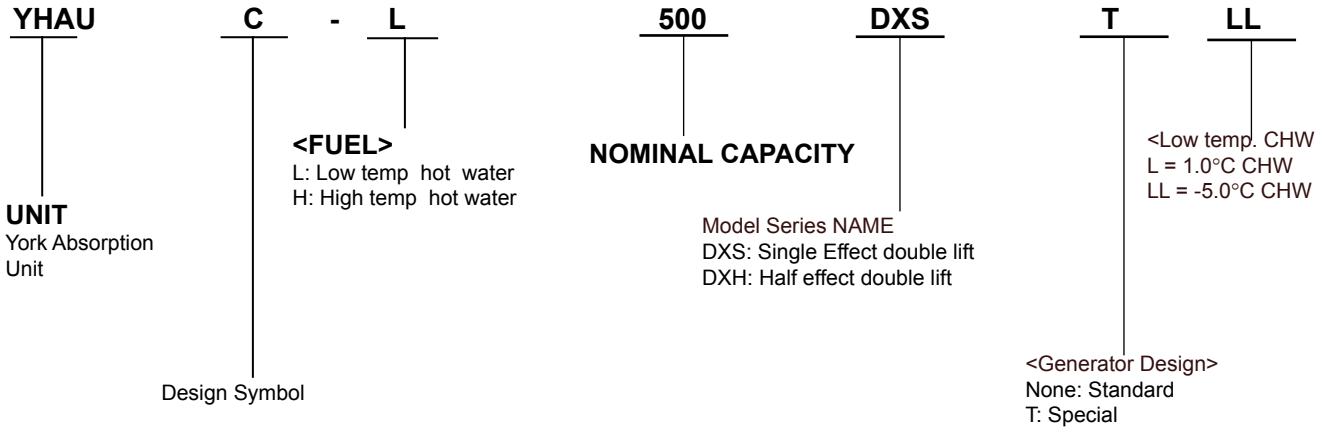
FORM 155.39-EG2.EN.CE/GB (1017)

MODEL YHAU-CL-DXS SERIES DOUBLE LIFT HOT WATER ABSORPTION CHILLER

50 - 1250 Tons
176 - 4395 kW
50 Hz

YORK®
INSTALL CONFIDENCE

Nomenclature



Approvals

- GB/T 18431-2014

For Europe

- CE
- EN ISO 12100:2010
- EN 60204-1: 2006+A1: 2009
- EMC Directive 2014/30/EC
- EN 55011: 2009+A1: 2010 (Group 1, Class A)
- EN 61000-6-2: 2005
- Pressure Equipment Directive 2014/68/EC if applicable
- For other counties:
- Pressure vessel code for CH model chiller GB 150-2011

Images contained in this document may represent the standard product with available options.

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Introduction

Today's environmental and energy considerations demand innovative chiller plant designs which save expensive peak load kW hours and eliminate CFC's. In a growing number of applications with waste heat or abundant low temperature hot water, double lift absorption chillers offer an ideal means of saving on cooling costs without a significant installation cost penalty.

That is why Johnson Controls is proud to present the YHAU-CL-DXS Double lift Absorption Chiller. The YHAU-CL-DXS Absorption Chiller offers a rugged, industrial grade design, with PLC-based controls, designed to increase reliability and enhance performance.

Applications particularly well suited for the YHAU-CL-DXS Absorption Chiller include the following:

Combined Heat & Power or Cogeneration – For CHP systems, high pressure steam has many valuable uses, while low pressure hot water is considerably less useful, yet more plentiful. In these plants, the YHAU-CL-DXS absorber can provide cooling with low temperature hot water, freeing high pressure steam for power generation or other valuable uses.

Waste Heat Recovery – Recover waste heat from industrial processes or gas engine jacket water to provide required comfort or process cooling at little operational cost.

Commercial Cooling/Peak Shaving – For particularly pronounced peak loads with few operating hours, the YHAU-CL-DXS absorber's lower first cost may provide an acceptable payback when more efficient, yet more expensive double effect chillers cannot.

For these and similar cost saving designs, consider the field proven YHAU-CL-DXS design. In many years of operation, the double lift design has proven itself in applications ranging from schools to refineries. Now, with state of the art controls and continual product improvement, the YHAU-CL-DXS absorption chiller is truly without peer. When it comes to absorption technology, there is only one leader - Johnson Controls.

How It Works

The double lift (hot water driven) absorption chiller uses water as the refrigerant and lithium bromide (LiBr) solution as the absorbent. It is the strong affinity that these two substances have for one another that makes the chiller cycle work. The vapor pressure of the lithium bromide solution is lower than the vapor pressure of the refrigerant. The vapor pressure of the LiBr solution is directly related to the amount of refrigerant (water) present in the solution with the LiBr and the solution temperature. The entire absorption process occurs in almost a complete vacuum.

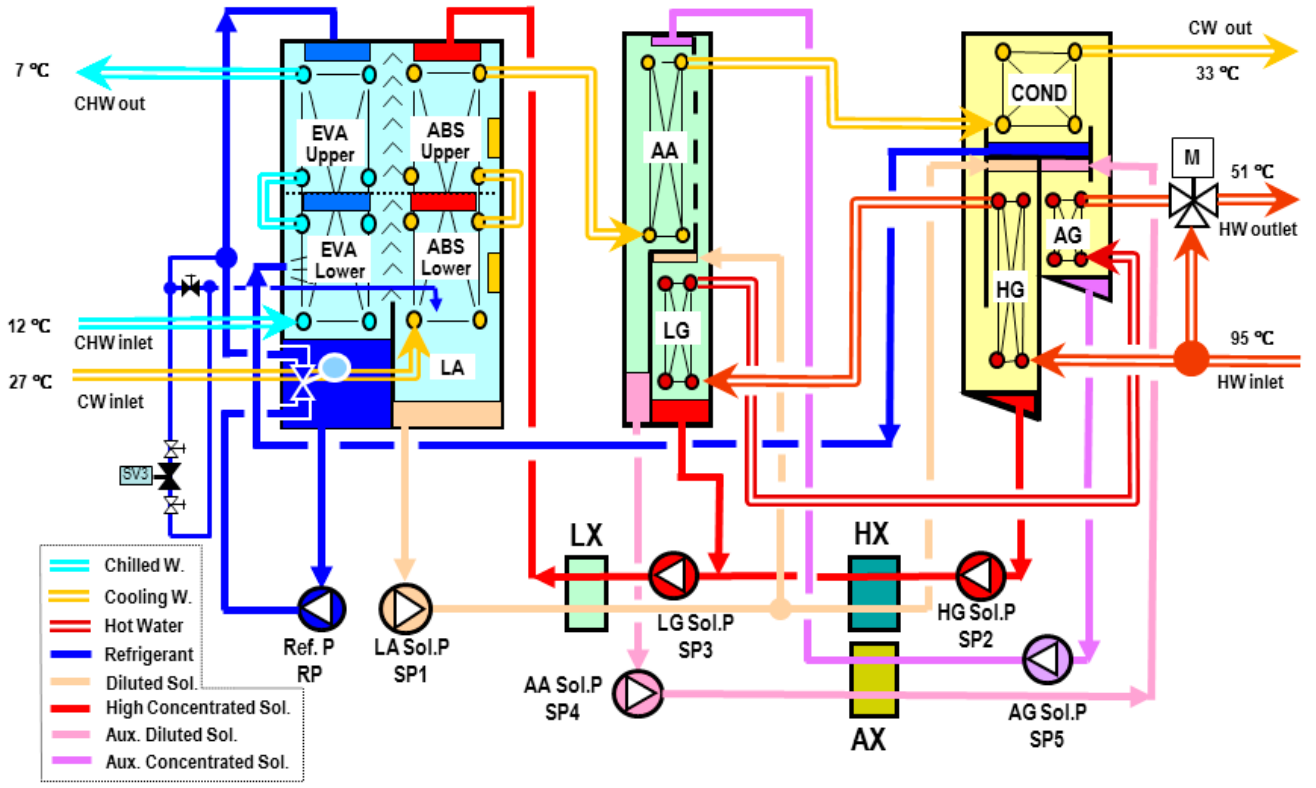


FIGURE 1 - DOUBLE LIFT HOT WATER ABSORPTION CYCLE

How it Works (Cont'd)

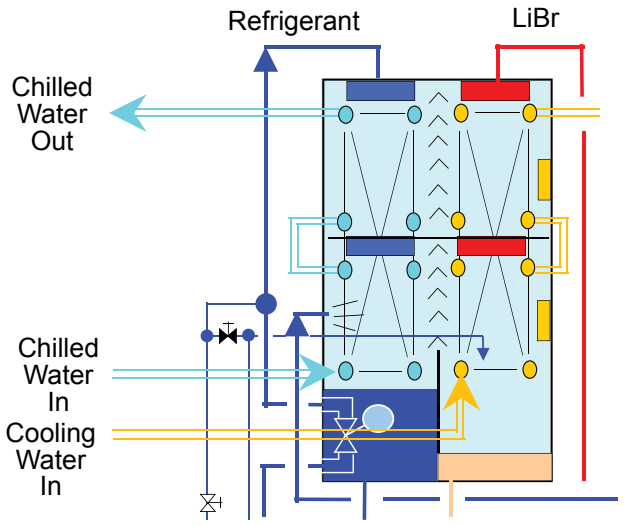
TWO STEP EVAPORATOR-ABSORBER

The evaporator as well as the absorber is split into two sections. This design, similar to a series counterflow chiller arrangement, provides an advantage in that it allows the overall cycle concentration to be lower than a similar chiller with a conventional absorber/evaporator. This innovative design provides higher reliability, increased efficiency, and the ability to use lower temperature hot water in the Generator.

The two evaporators are in series with respect to the chilled water flow through the tubes. In other words, the chilled water flows through the lower evaporator tubes first and then the upper evaporator tubes. Each evaporator operates at a slightly different temperature and pressure. The refrigerant in the lower evaporator boils at a slightly higher temperature than in the upper evaporator, consequently cooling the chilled water in two steps. The two absorber sections are split as well, with the strong solution first entering the top of the uppermost absorber and flowing down through the top absorber bundle. It then flows into the top of the lower Absorber section. The strong solution entering the upper Absorber takes advantage of its lower vapor pressure allowing the upper Evaporator to operate at a lower pressure and temperature.

When the LiBr solution enters the lower Absorber section it is already somewhat diluted from the refrigerant vapor that boiled off in the upper evaporator. At this lower concentration the solution vapor pressure would normally not be sufficient to provide a low enough evaporator pressure to satisfy the leaving chilled water design. However, since the lower evaporator is the first step of the chilled water cooling, the dilute solution vapor pressure is adequate to maintain the lower evaporator at the required temperature and pressure.

The cooling tower water enters the lower absorber section first, keeping the vapor pressure of the weaker solution as low as possible.



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How it Works (Cont'd)

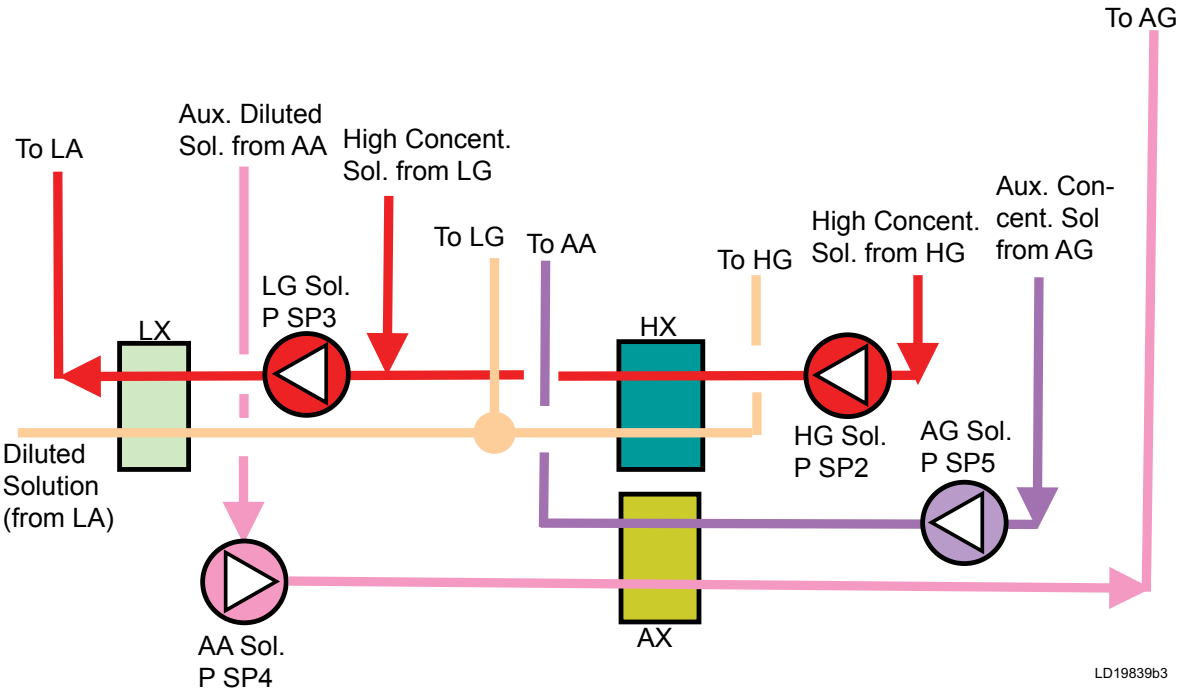
SOLUTION HEAT EXCHANGER

As the low temperature absorber (LA) dilute LiBr solution is sent to the low temperature generator (LG) and the high temperature generator (HG), it passes through a low temperature solution heat exchanger (LX) first. There, the solution is pre-heated before it enters the LG and HG.

The pre-heating of the dilute solution reduces the driving heat source requirement in the LG and HG. It also helps to cool the high concentrated solution before it enters the upper absorber section.

As the auxiliary absorber (AA) dilute LiBr solution is sent to the auxiliary generator (AG), it passes through an auxiliary solution heat exchanger (AX) first. There, the solution is pre-heated before it enters the AG.

The pre-heating of the dilute solution reduces the driving heat source requirement in the AG. It also helps to cool the auxiliary concentrated solution before the enters the AA section.

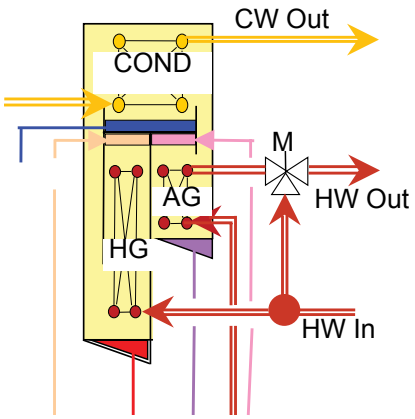


HIGH TEMPERATURE GENERATOR (HG)

The HG section is of a falling film design. Such a design ensures substantially reduced wear and tear at the tube supports compared to the conventional flooded design. The falling film design ensures superior heat transfer and extended tube life. It also reduces the quantity of LiBr solution. That helps to reduce startup time from a cold start. The stainless steel tubes are arranged in a series counter flow arrangement.

How it Works (Cont'd)

The pre-heated low temperature absorber (LA) dilute solution enters the HG on the top of the HG tubes. There it is heated by the hot water (driving heat source) flowing through the stainless steel tubes. The refrigerant (water) vapors migrate to the condenser. The LiBr solution left behind is a concentrated (strong) solution. The solution is cooled before it is sent to the upper LA.



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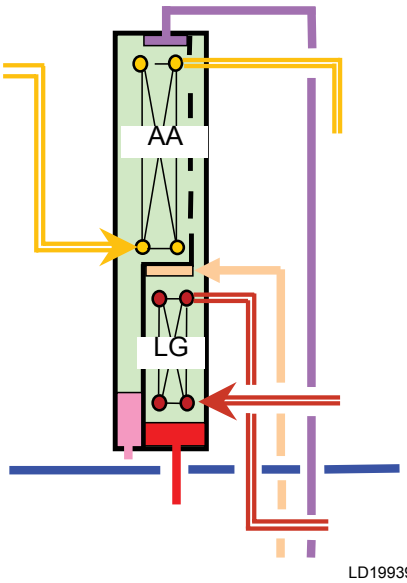
LOW TEMPERATURE GENERATOR

The LG section is also a falling film design. The pre-heated LA dilute solution enters the LG on the top of the LG tubes. There, it is heated by the hot water (driving heat source) flowing through the stainless steel tubes. The refrigerant (water) vapors migrate to the auxiliary absorber (AA). The LiBr solution left behind is a concentrated (strong) solution. The solution is cooled before it is sent to the upper low temperature absorber (LA).



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CONDENSER

The refrigerant vapors leaving the HG & AG condense in the condenser section into liquid refrigerant, using cooling (condenser) water. The liquid refrigerant water is then distributed first in the lower evaporator section.

How it Works (Cont'd)

AUXILIARY ABSORBER (AA)

The HW heat source migrates the refrigerant vapors from the LG. The LiBr of the AA is diluted by the cooling water of the auxiliary absorber. The diluted AA LiBr solution is then sent to the auxiliary generator (AG). And, the concentrated LG LiBr is sent to the LA.

AUXILIARY GENERATOR (AG)

The AG section is a falling film design as well. The pre-heated AA dilute solution enters the AG on the top of the AG tubes.

There, it is heated by the hot water (driving heat source) flowing through the stainless steel tubes. The refrigerant (water) vapors migrate to the condenser. The LiBr solution left behind is a concentrated (strong) solution. The solution is cooled before it is sent to the upper AA (auxiliary absorber).

HOW TO RECOVER THE HOT WATER FOR LOW TEMP.

The refrigerant vapor is absorbed by three pressure couples. They are:

- **EVAP / LA:** lowest pressure couple
- **LG / AA:** intermediate couple
- **HG / AG / COND:** highest pressure couple

The first step is absorbed at the evaporator and the low temperature absorber. The second step is absorbed at the low temperature generator and the auxiliary absorber. The double-lift absorption chiller is made with a double-lift absorption cycle.

The hot water (driving heat source) flows from the high temperature generator to the low temperature generator. Then, to the auxiliary generator.

The double-lift ABS chiller recovers the heat through the HG, LG, and AG. The hot water heat source is recovered with cascading temperatures.

- **HG hot water inlet / outlet temp.:** 95 / 63 °C.
- **LG hot water inlet / outlet temp.:** 63 / 55 °C.
- **AG hot water inlet / outlet temp.:** 55 / 51 °C.

Dilution and Regeneration

The highly concentrated LiBr solution is diluted through the evaporator and the low temperature absorber. The LiBr then goes to the high temperature generator and the low temperature generator where it is regenerated.

Next, the auxiliary concentrated LiBr is diluted through the auxiliary absorber. Them it is regenerated by the auxiliary generator heat source.

Using this process, the LiBr solution is run through dilution and concentration two times. The second time through, the solution concentration in the low temperature generator increases as the refrigerant vapor from the auxiliary absorber is absorbed.

The dilution and regeneration cycle defines the double-lift absorption process.

Equipment Overview

GENERAL

The YHAU-CL-DXS Hot Water Double Lift Absorption Chillers are factory-packaged including the evaporator, condenser, generator, absorber, pumps, automatic purging system, control center, interconnecting unit piping and wiring.

The initial charge of refrigerant is supplied for each chiller. Actual shipping procedures will depend on a number of project-specific details.

Johnson Controls factory-trained, field service representatives will supervise or perform the initial start-up, and provide concurrent operator instructions.

CONSTRUCTION

The chiller shall consist of a generator, solution heat exchanger, absorber, condenser and an evaporator. To minimize the risk of corrosion, the evaporator dispersion tray and the absorber dispersion tray are stainless steel. Each dispersion tray has two stage construction and any foreign material is removed from the lithium bromide solution or the refrigerant at the first stage tray. This will avoid any degradation of dispersion performance due to clogging.

The evaporator, absorber, condenser and generator are a shell and tube construction. The hot water generator is designed for 8 bar(g) and water tested to 11.6 bar(g) for Europe, 10 bar(g) and water tested to 12.5 bar(g) for other countries. A shell-side pressure releasing valve is furnished and set to blow at 0.8 bar(g).

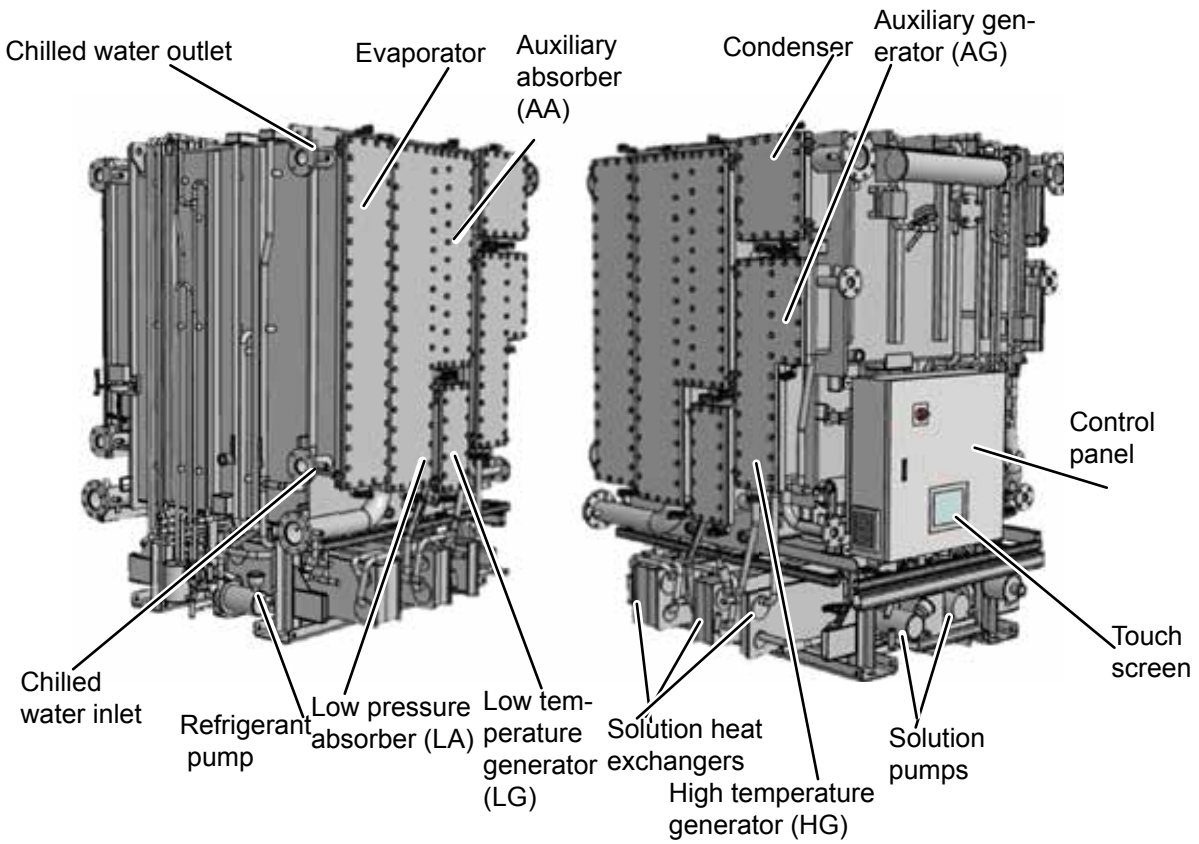

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FIGURE 2 - UNIT COMPONENTS

Equipment Overview (Cont'd)

The evaporator cycle and the absorber cycle consists of two-steps (upper stage and lower stage). This technology makes the absorber solution concentration weak, extending the machine life. Furthermore, this technology makes the generator solution temperature lower than the ordinary chiller, which enables to utilize lowered hot water temperature as driving heat source.

The hot water generator is a falling liquid film type.

The plate-type solution heat exchanger preheats the diluted solution in order to achieve higher efficiency.

TUBE MATERIALS

Generator tubes are 0.8 mm wall stainless steel (CL: SUS436LTB; CH: SS22053) and allow for the removal of the tubes from either end of the machine. Evaporator and Absorber tubes are made of low residual phosphorus deoxidized copper (C1201), finned type with a wall thickness before finning of 0.6 mm. Condenser tubes are made of 0.6 mm wall low residual phosphorus deoxidized copper (C1201).

WATERBOXES

Waterboxes are marine type to permit tube cleaning and replacement. Water circuit tubing are replaceable from either end of the absorption unit. All waterboxes and associated water circuit nozzles and tube bundles are designed for 8 bar(g) working pressure and water tested to 11.6 bar(g) for Europe, 10 bar(g) working pressure and water tested to 12.5 bar(g) for other countries. Vent and drain connections are provided on each water box. All the water connections are equipped with DIN flanges for Europe, GB flanges for other countries. Mating flanges are not included. Inside of waterboxes and waterbox covers are coated with epoxy paint, except the Generator.

FULLY AUTOMATIC DECRYSTALLIZATION SYSTEM

The YHAU-CL-DXS chiller is built with an anti-crystallization system. The Absorber and the Evaporator are located side by side in the same shell and separated by the eliminator. When the concentration of lithium bromide in the chiller goes up, the water level at the Evaporator increases and automatically spills over to the Absorber. This causes the concentration of the solution at the absorber to go down.

PUMPS

Solution and refrigerant pumps are hermetically sealed, self-lubricating, totally enclosed, factory-mounted, wired, and tested. Motor windings are not exposed to lithium bromide or water. The suction and discharge connections for each pump are fully welded to the unit piping to minimize the opportunity for leaks. Suction and discharge connections are equipped with factory installed isolation valves to permit quick and easy servicing of pumps. Pumps are designed to operate for a total of 60,000 hours. The parts in the pumps such as bearings, and sealing gaskets, are replaced every 20,000 hours.

Equipment Overview (Cont'd)

AUTOMATIC PURGING SYSTEM

The chiller is equipped with a purging system to remove non-condensable gases from the unit during operation. Non-condensables are collected by an eductor and accumulated in the purge tank. The chiller can dictate the pressure increase in the purge tank and automatically remove the non-condensable gas through the operation of an electric vacuum pump.

The purge pump is an oil rotary double stage design, and is furnished complete with a motor, and all required accessories. The purge pump is shipped mounted on the chiller and connecting hose is factory installed. The purge pump oil is charged at the job site.

LITHIUM BROMIDE AND REFRIGERANT CHARGE

Lithium bromide shall contain lithium molybdate corrosion inhibitor to minimize the rate of ferrous metal corrosion on both the solution and refrigerant sides of the unit. Deionized water is supplied for the refrigerant charge. For models CL1120DXS or smaller, solution and refrigerant is charged to the chiller at the factory before the shipment. For Models CL1250DXS, solution and refrigerant is shipped separately, and be charged at job site.

HOT WATER VALVE

Hot water absorption chillers are furnished with a 3-way mixing type valve, linkage, and the actuator motor. This assembly is shipped loose for field installation. The valve features a cast iron or carbon steel body. The 3-way valve assembly is capable of modulating hot water flow continuously from 20% to 100% of the maximum design chiller capacity into the chiller.

The actuator motor is powered by the chiller’s control panel. Actuator motor position is controlled by the control panel through a 4-20 mA DC control signal.

CONTROL PANEL

Each unit is furnished complete with a factory mounted and pre-wired control system. The control panel enclosure is equipped with a hinged access door with lock and key. The protection rating of the control panel is IP42. All temperature sensors and other control devices necessary to sense unit operating parameters are factory mounted and wired to panel. The control panel includes a touch panel showing all system parameters in various languages with numeric data in Metric units.

The operating program is stored in non-volatile memory (SRAM) to eliminate chiller failure due to AC power failure.

Capacity Control - The control panel automatically controls the input hot water flow rate to maintain the programmed leaving chilled water setpoint for cooling loads ranging from 20% to 100% of design. The input hot water flow rate can also be manually adjusted from the control panel to any setting between minimum and maximum, when automatic operation is not desired and when hot water input is not being inhibited by a specific operating condition.

Equipment Overview (Cont'd)

YHAU CONTROL CENTER

The YHAU-CL-DX Control Center, furnished as standard on each chiller, provides the ultimate in efficiency, monitoring, data recording, chiller protection and operating ease. The Control Center is a factory-mounted, wired and tested state-of-the-art microprocessor based control system for lithium bromide absorption chillers. The panel is configured with a color display with keys that are integrated into the display, which are redefined with one keystroke based on the screen displayed at that time. This revolutionary development makes chiller operation quicker and easier than ever before. Instead of requiring keystroke after keystroke to hunt for information on a small monochrome LCD screen, a single button reveals a wide array of information on a large, full-color illustration of the appropriate component, which makes information easier to interpret. This is all mounted in the middle of a keypad interface and installed in a locked enclosure.

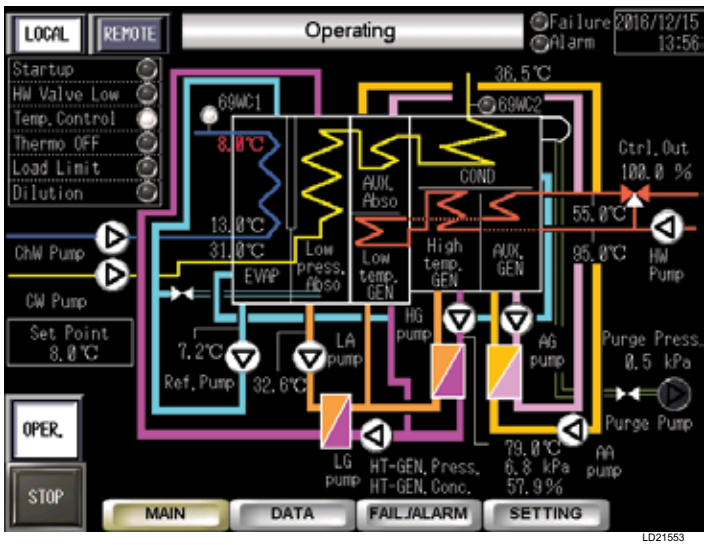
The LCD display allows graphic animated display of the chiller, chiller sub-systems and system parameters; this allows the presentation of several operating parameters at once. In addition, the operator may view a graphical representation of the historical operation of the chiller as well as the present operation. A Status Bar is displayed at all times on all screens.

The panel verbiage is available in various languages as standard and can be changed on the fly without having to turn off the chiller. Data can be displayed in Metric units plus keypad entry of setpoints to 0.1 increments.

Security access is provided to prevent unauthorized changes to setpoints. This is accomplished with three different levels of access and passwords for each level. There are certain screens, displayed values, programmable setpoints and manual controls not shown that are for servicing the chiller. The following listing describes the various system screens and subscreens, and what information they provide.

MAIN SCREEN

The Main Screen displays equipment status (chiller start/stop, operating conditions, pumps ON/OFF, purge pump ON/OFF, and chilled, cooling, and hot water pumps ON/OFF). Also displayed is the Operating Status of the various modes of chiller operation.



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Equipment Overview (Cont'd)

DATA SCREEN

The Data Screen displays values showing temperatures, operating hours, operating frequency, data trends and a history of failures, alarms, and time based temperature trends.

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FAILURE/ALARM SCREEN

This screen displays failure indications (time outs, operation interlock, overcooled refrigerant, over and under temperatures, and problems with the unit's pumps) and system alarms.

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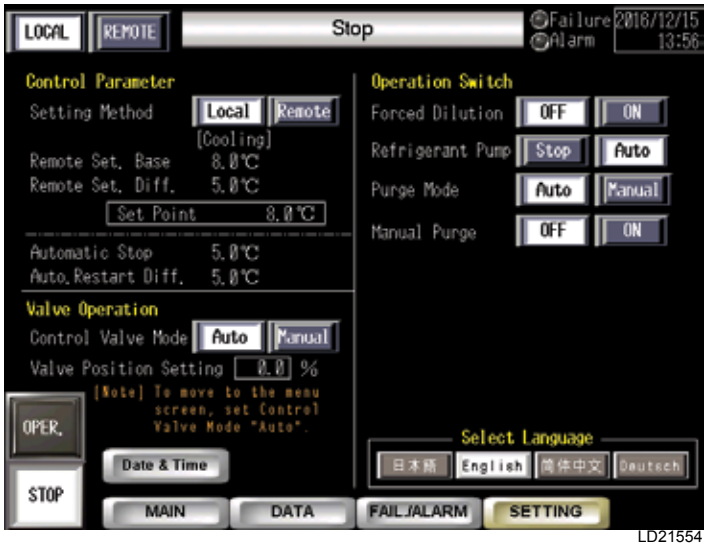
Equipment Overview (Cont'd)

SETTING SCREEN

This screen displays control parameters (setting method, remote setting base temperature and differential temperature), valve operation (control valve mode auto/manual, pump operation, forced dilution, and purge mode (auto/manual), various languages and date and time parameters.



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Options and Accessories

Optional Tubes – CuNi (90/10), SUS436L, SUS316L,SUS304 and Titanium options for Absorber/Condenser and Evaporator tubes are available, however the chiller rating may change with these options. Certified selection is issued by Johnson Controls engineering department. Price additions for non–standard tube materials and wall thickness is provided on a job specific basis.

Dry Shipment - Solution and Refrigerant Shipped Separately – The solution and refrigerant will be charged at the factory and used for chiller testing. The solution and refrigerant will then be removed and shipped in barrels with the chiller.

Chilled Water Pressure 10 bar(g) for Europe – A chilled water pressure 10 bar(g) option is available with compact or marine water boxes.

Chilled Water Pressure 16 bar(g) – A chilled water pressure **16** bar(g) option is available with compact or marine waterboxes.

Cooling Water Pressure 10 bar(g) for Europe– A cooling water pressure 10 bar(g) option is available. Both compact and marine water boxes are available for all model as standard.

Cooling Water Pressure 16 bar(g) – A cooling water pressure **16** bar(g) option is available. Both compact and marine waterboxes are available for all models through CL1250DXS as standard.

Hot Water Pressure 10 bar(g) for Europe - Hot water at a pressure of 10 bar(g) is available with compact or marine water boxes as an option.

Hot Water Pressure 16 bar(g) – Hot water at a pressure of **16** bar(g) is available with compact or marine waterboxes as an option.

Chilled Water Pressure 20 bar(g) – Chilled water at a pressure of 20 bar(g) is available with marine waterboxes as an option.

Cooling Water Pressure 20 bar(g) – Cooling water at a pressure of 20 bar(g) is available with marine waterboxes as an option.

Hot Water Pressure 20 bar(g) – Hot water at a pressure of 20 bar(g) is available with marine waterboxes as an option.

IP54 (Indoor Use) – Protection rating for control panel, electrical component and pumps are IP54. Water– resistant flexible conduit are used for chiller wiring. If the plant room will ever get below 10 °C, you must have the cold ambient option.

Outdoor Installation – Protection rating for control panel, electrical component and pumps is IP54. Water–resistant flexible conduit are used for chiller wiring. Minimum allow-able temperature for outdoor installation is 0 °C, provided that the chiller includes the cold ambient option. Outdoor installations will be considered on a case-by-case basis.

Hot and cold insulation and metal jacketing are done by the customer at job site.

Band heater and insulation for refrigerant piping are done at the factory.

Options and Accessories (Cont'd)

Remote Interface Option – Permit the use of 0 – 10 V or 4 - 20 mA remote signals to limit hot water control valve opening.

Junction Box For Separate Installation Of Control Panel – A junction box is furnished when the control panel is installed at a remote location from the unit.

Cold Surface Insulation – Elastomeric foam insulation on cold surfaces is applied at the Factory as option.

Cooling Water Pressure Differential Switch – Chilled Water Pressure Differential Switch is included in the base unit. Pressure differential switches for the condenser water are provided as an option when it is required.

Isolation Pads – Four (4) pads of 10 mm thick NBR isolation are provided as an option.

Factory Testing: Factory testing is only available with single piece equipment.

Factory Performance Test Option Not 3rd Party Witnessed – Provides a full load performance test and a signed report of capacity and performance. (**NOTE:** Full load single point test. Additional part load points or special testing requirements will be addressed by marketing on a project specific basis.)

Customer Witness Factory Test – Permits a customer witnessed factory performance test of a given chiller at design full load conditions. The time of the test will be based by the manufacturing schedule and will be confirmed by the factory.

Application Data

The following discussion is a guide for the application and installation of YHAU-CL-DXS Double-lift Absorption Chillers to ensure reliable, trouble free life for which this equipment was designed.

LOCATION

YHAU-CL-DXS units make very little noise or vibration and may generally be located at any level in a building where the construction will support the total system emergency weight.

The system location should provide sufficient space around the unit to permit tube removal, if required. If a door or other large opening is conveniently located opposite one end of the system, the tubes may be extracted and replaced through these openings. Allow sufficient clearance on the remaining sides of the unit for necessary access and maintenance.

Standard absorption chillers are not suitable for outdoor installation. The machine room must be enclosed, well lighted and properly ventilated to keep its temperature no higher than 40 °C and no lower than 10 °C.

WATER CIRCUITS

Flow Rate – For normal fluid chilling duty, the evaporator and absorber/condenser flow rates are permitted at water velocity levels in the heat exchangers tubes of up to 3.3 m/s.

Under variable chilled water and cooling water flow conditions, special attention needs to be paid to the rate of change of flow rate with time and the minimum/maximum velocities through the tubes. Applications involving chilled and condenser fluid flow rates which vary by more than +10% from design will require special considerations on a case by case basis.

Water Quality – The practical and economical application of liquid chillers requires that the quality of the water supply for the evaporator and the absorber/condenser be analyzed by a water treatment specialist. Water quality may affect the performance of any chiller through corrosion, deposits of heat resistant scale, sedimentation or organic growth. These will hurt chiller performance and increase operation and maintenance costs. Normally, performance may be maintained by corrective water treatment and periodic cleaning of tubes. If water conditions exist which cannot be corrected by proper water treatment, it may be necessary to provide a larger allowance for fouling, and/or specify special materials of construction.

General Water Piping – All chilled water and cooling water piping should be designed and installed in accordance with accepted piping practice. Chilled water and cooling water pumps should be located to discharge through the YHAU-CL-DXS unit to assure positive pressure and flow through the unit. Piping should include offsets to provide flexibility and should be arranged to prevent drainage of water from the evaporator, absorbers, and condenser when the pumps are shut down. Piping should be adequately supported and braced independent of the chiller to avoid imposition of strain on chiller nozzles and components. Hangers must allow for alignment of the pipe. Isolators in the piping and in the hangers are highly desirable in achieving sound and vibration control.

Application Data (Cont'd)

Convenience Considerations – With consideration given to facilitating the performance of routine maintenance work, some or all of the following steps may be taken by the purchaser.

- Evaporator, absorber and condenser waterboxes are equipped with plugged vent and drain connections.
- If desired, vent and drain valves may be installed with or without piping to an open drain.
- Pressure gauges with stop cocks, and stop valves, may be installed in the inlets and outlets of the tower and chilled water lines as close as possible to the chiller.
- An overhead monorail or beam hoist may be used to facilitate servicing.

Connections – The standard unit is designed for 8 bar(g) working pressure for Europe and 10 bar(g) working pressure for other countries in both the chilled and cooling water circuits. The connections (water nozzles) to these circuits are furnished in accordance with DIN flanges for Europe, GB flanges for other countries. Piping should be arranged for ease of disassembly at the unit for performance of routine maintenance such as tube cleaning. All water piping should be thoroughly cleaned of all dirt and debris before final connections are made to the YHAU-CL-DXS unit.

Chilled Water – The chilled water circuit uses a differential pressure switch as standard, factory mounted in the water nozzle connection and wired to the chiller control panel. A water strainer with a 10 mesh, should be field installed in the chilled water inlet line as close as possible to the chiller. If located close enough to the chiller, the chilled water pump may be protected by the same strainer. The flow sensor and strainer assure chilled water flow during unit operation. The loss or severe reduction of water flow could seriously impair the YHAU-CL-DXS unit performance or even result in tube freeze up.

Cooling Water – Like the chilled water circuit, the cooling water circuit requires a means of proving flow. Low flow protection are provided by an optional differential pressure switch mounted in the water nozzle connection and wired to the chiller control panel.

The YHAU-CL-DXS chiller is engineered for maximum efficiency at both design and part load operation by taking advantage of the colder cooling tower water temperatures which naturally occur in the winter months. For standard air conditioning applications, YHAU-CL-DXS absorbers can tolerate entering cooling water temperatures as low as 18 °C without a cooling tower bypass.

For process or critical applications which have strict requirements for leaving chilled water temperatures, a three-way cooling tower bypass valve is recommended.

CONTROL VALVES

An automatic control valve is furnished with the unit for field mounting and wiring. The valve will be electrically actuated and will automatically close on unit shutdown. The valve should be located at the absorption unit generator hot water circuit outlet.

Automatic control valves are sized according to job specific full load hot water parameters.

Application Data (Cont'd)

SOUND AND VIBRATION CONSIDERATIONS

Since the YHAU-CL-DXS unit generates very little vibration, vibration eliminating mounts are not required. However, when the machine is installed where even mild noise is a problem, rubber pads can be used.

THERMAL INSULATION

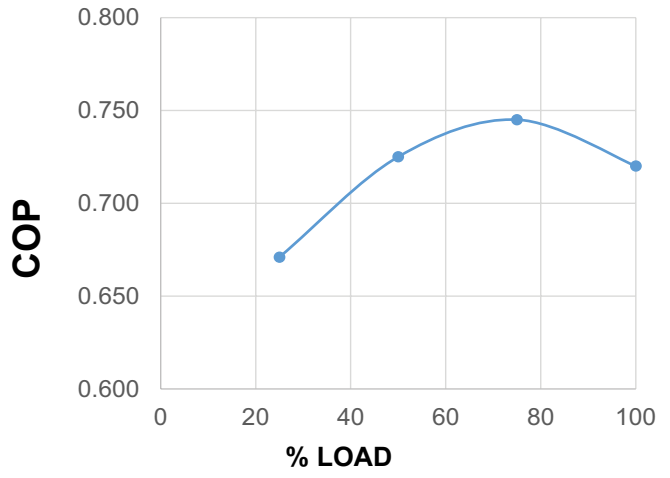
YHAU-CL-DXS units require thermal insulation (by others) on both hot and cold surfaces in order to achieve maximum efficiency and prevent sweating.

TYPICAL OPERATIONAL RANGE

PARAMETER	ALLOWABLE RANGES		OPTIONAL
	EUROPE	OTHER COUNTRIES	
Chilled Water In	7 - 25 °C		4-7 °C
Chilled Water Out	4 - 16 °C		1-4 °C
Cooling Water In	20 - 37 °C		
Cooling Water Out	25 - 42 °C		
Hot Water In	55-110 ° C	55-99 °C	
Hot Water Out	40-109 °C	40-98 °C	

Part Load Characteristics

PART LOAD

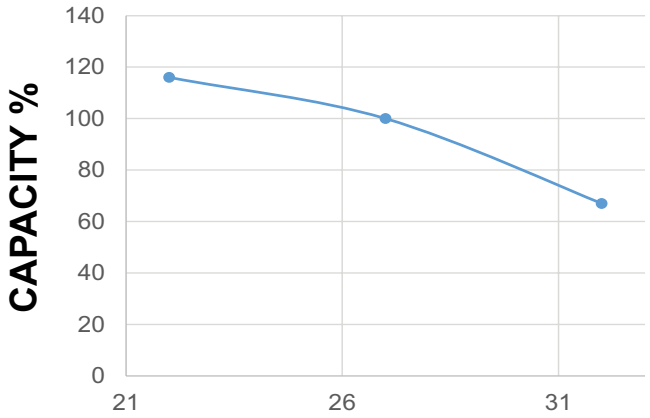


LD19925

Conditions

CHW outlet 7° const./Flow volume const.
CW outlet : 100% :27 °C,75%: 24.2 °C,50%: 21.3 °C,25%: 18.5 °C
CW Flow volume const.
HW inlet 95 °C const./Flow volume variable

CAPACITY

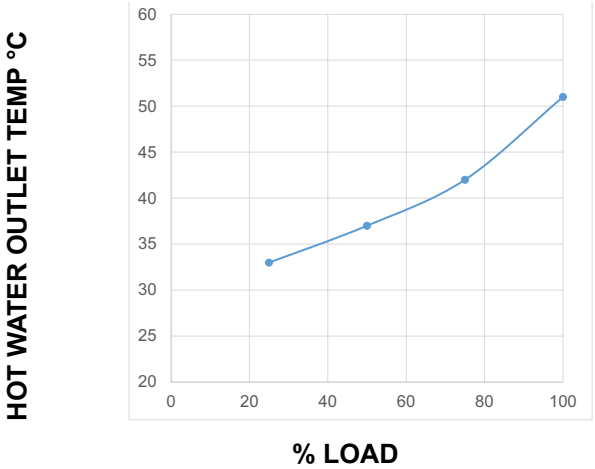


LD19927

Conditions

Cooling Capacity Const.
CHW outlet 7 °C const./Flow volume const.
CW Flow volume const.
HW inlet 95 °C const./Flow volume const.

PART LOAD

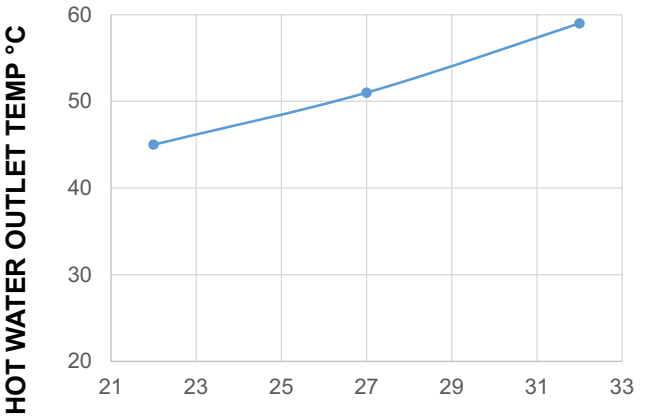


LD19926

Conditions

CHW outlet 7 °C const./Flow volume const.
CW outlet : 100% :27 °C,75%: 24.2 °C,50%: 21.3 °C,25%: 18.5 °C
CW Flow volume const.
HW inlet 95 °C const./Flow volume variable

HOT WATER OUTLET TEMP



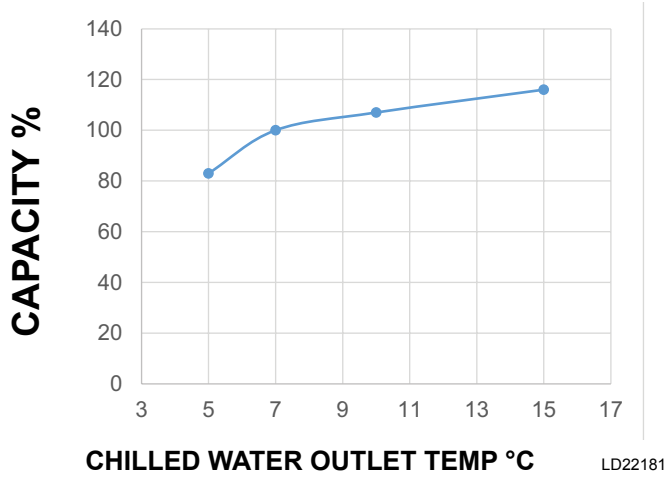
LD19928

Conditions

CHW outlet 7 °C const./Flow volume const.
CW Flow volume const.
HW inlet 95 °C const./Flow volume const.

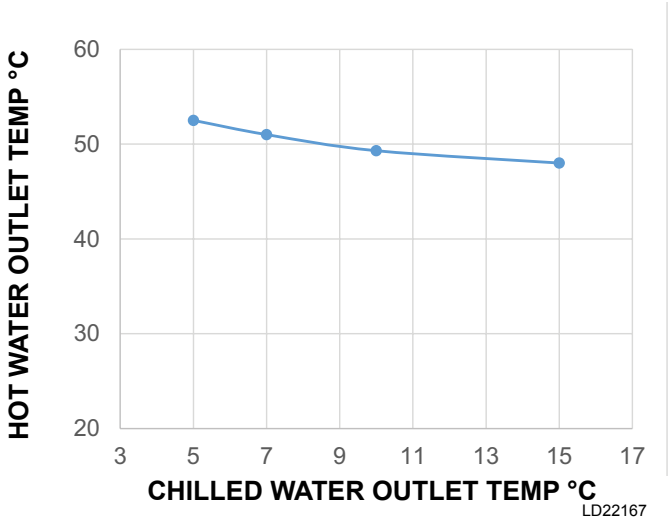
Part Load Characteristics (Cont'd)

CAPACITY



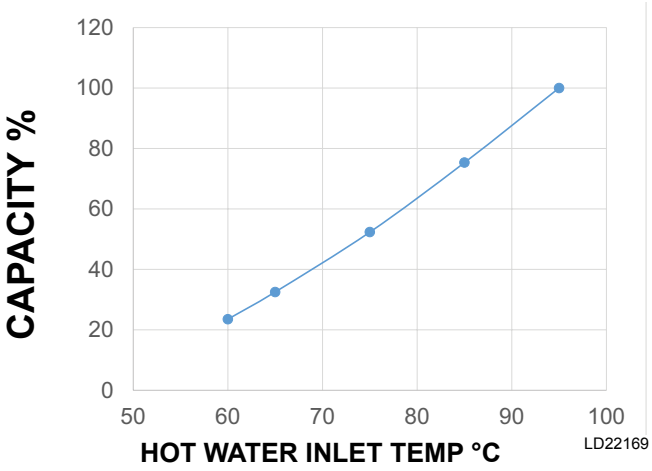
Conditions
CHW Flow volume const.
CW inlet 27 °C const./Flow volume const.
HW inlet 95 °C const./Flow volume const.

HOT WATER OUTLET TEMP.



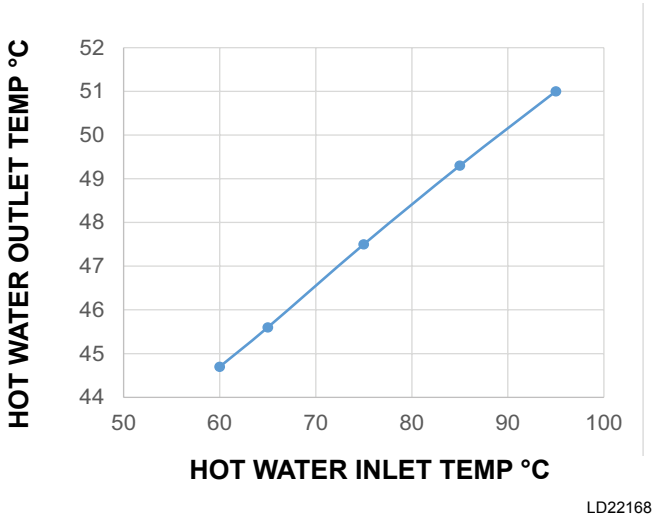
Conditions
CHW Flow volume const.
CW inlet 27 °C const./Flow volume const.
HW inlet 95 °C const./Flow volume const.

CAPACITY



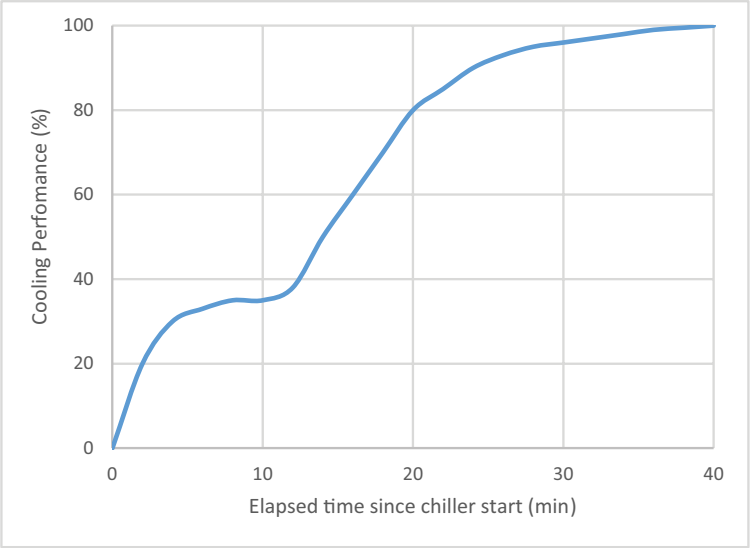
Conditions
CHW outlet 7 °C const./Flow volume const.
CW inlet 27 °C const./Flow volume const.
HW Flow volume const.

HOT WATER OUTLET TEMP



Conditions
CHW outlet 7 °C const./Flow volume const.
CW inlet 27 °C const./Flow volume const.
HW Flow volume const.

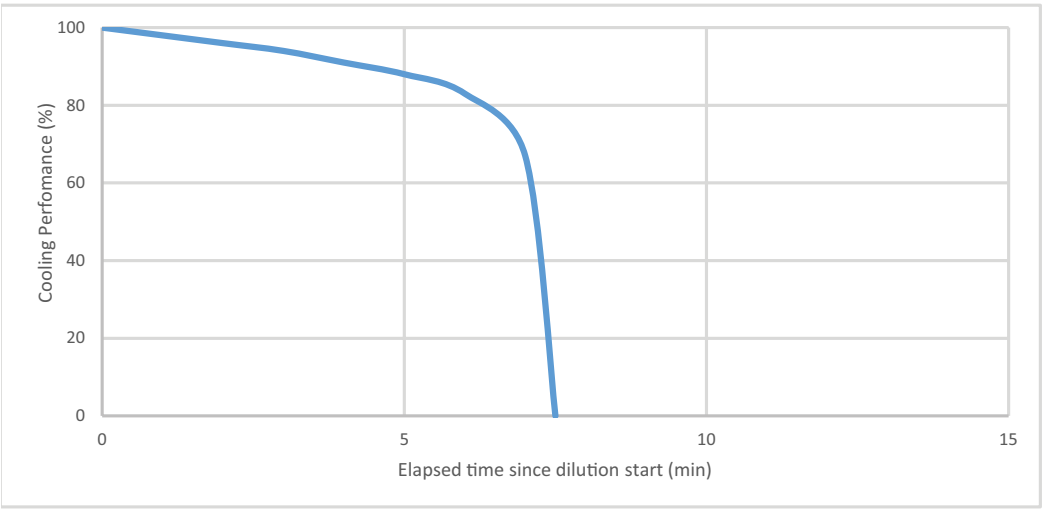
Ramp-Up and Ramp-Down Characteristics



LD22539

FIGURE 3 - RAMP UP TIMING

ELAPSED TIME SINCE CHILLER START (MIN.)	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
COOLING PERF. (%)	0	20	30	33	35	35	38	50	60	70	80	85	90	93	95	96	97	98	99	99.5	100



LD22540

FIGURE 4 - RAMP DOWN TIMING

ELAPSED TIME SINCE DILUTION START (MIN)	0	1	2	3	4	5	6	7	8
COOLING PERF. (%)	100	98	96	94	91	88	83	67	0

Nozzle Arrangements

50-1250 DXS

YHAU-CL-DXS	NOZZLE LOCATION								
	CHILLED WATER (CHW)			COOLING WATER (COW)			HOT WATER (HW)		
	INLET	OUTLET		INLET	OUTLET		INLET	OUTLET	
50-1250DXS	A	ODD PASS	B	A	ODD PASS	B	A	ODD PASS	B
		EVEN PASS	A		EVEN PASS	A		EVEN PASS	A

NOTE:
These images are representations of nozzle arrangements. Reference general arrangement drawings for detailed nozzle locations for each specific unit.

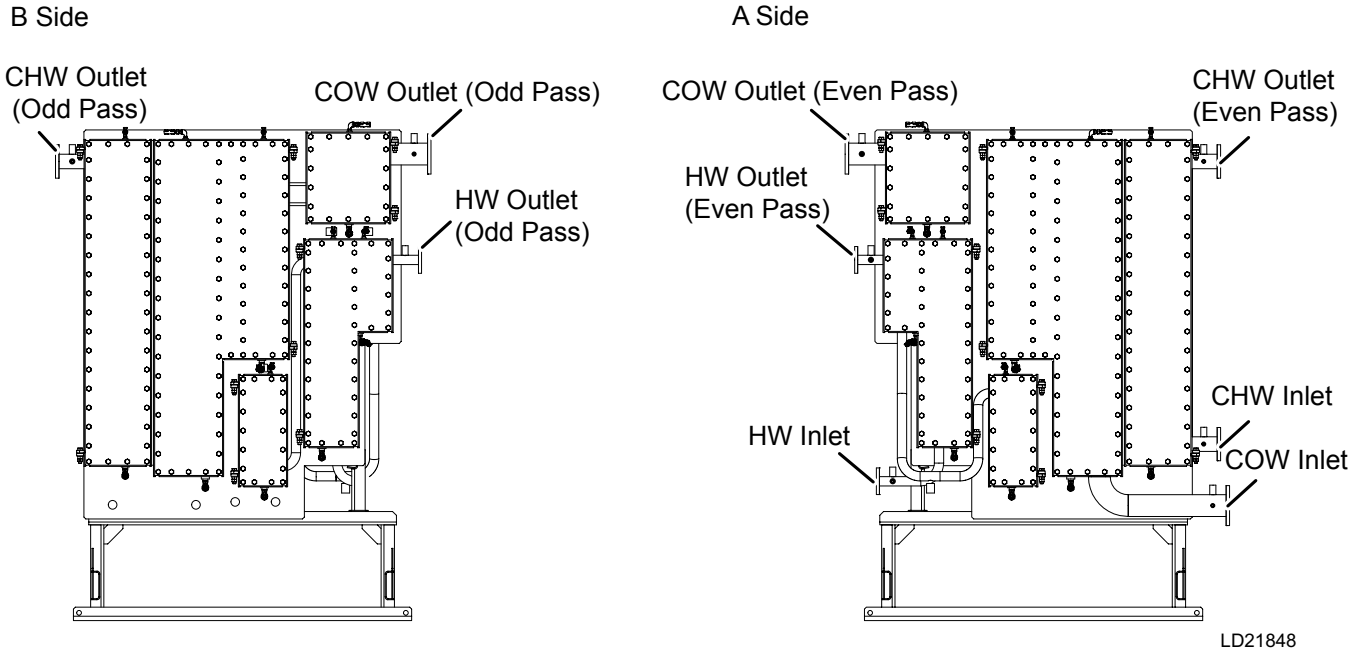


FIGURE 5 - YHAU-CL-DXS-50 - 1250 DXS NOZZLE LOCATIONS

Weights and Dimensions

YHAU-CL-DXS	WEIGHT			OUTLINE DIMENSION			
	MAXIMUM SHIPPING (TON)	OPERATION (TON)	EMERGENCY (FILLED WITH WATER) (TON)	LENGTH (M)	WIDTH (M)	HEIGHT (M)	TUBE EXTRACTING SPACE (M)
50DXS	7.1	8.3	11.9	1.9	2.1	2.7	1.4
60DXS	7.7	8.9	13.2	2.2	2.1	2.7	1.6
80DXS	8.4	9.8	15.1	2.6	2.1	2.7	2.0
100DXS	9.6	11.1	17.9	3.2	2.2	2.7	2.6
130DXS	10.8	12.5	21.1	3.9	2.2	2.7	3.2
160DXS	12.2	14.6	23.4	2.7	2.5	3.0	2.0
200DXS	13.8	16.5	27.7	3.3	2.5	3.0	2.6
255DXS	15.5	18.7	32.8	4.0	2.5	3.0	3.2
320DXS	18.6	22.2	39.9	4.8	2.6	3.0	4.0
400DXS	21.4	25.6	47.8	5.8	2.6	3.0	5.0
500DXS	25.6	31.9	59.0	5.4	3.0	3.3	4.5
600DXS	28.9	35.9	67.9	6.2	3.0	3.3	5.3
700DXS	32.8	40.7	78.7	7.2	3.0	3.3	6.3
800DXS	35.3	43.7	86.0	7.9	3.0	3.3	7.0
900DXS	40.7	51.0	98.0	7.3	3.8	3.9	6.3
1000DXS	43.5	54.6	106.9	8.0	3.8	3.9	7.0
1120DXS	49.3	61.4	121.2	9.0	3.8	4.2	8.0
1250DXS	46.7	66.8	134.1	10.0	3.8	4.2	9.0

NOTE:
Refer to the general arrangement drawings for specific center of gravity locations and data.

Physical Data

YHAU-CL-DXS	COLD INSULATION AREA (M^2)	HOT INSULATION AREA (M^2)	AMOUNT OF RADIATION (WITH INSULATION, AMBIENT TEMP. 10°C) (KW)	AMOUNT OF RADIATION (WITHOUT INSULATION, AMBIENT TEMP. 10°C) (KW)	WATER VOLUME		
					CHILLED WATER (EVAP) (M^3)	COOLING WATER (ABS & COND) (M^3)	HOT WATER (GEN) (M^3)
50DXS	7.0	10.0	2.2	27.0	0.32	0.58	0.24
60DXS	8.0	11.0	2.7	32.0	0.34	0.62	0.26
80DXS	10.0	12.0	3.6	43.0	0.36	0.68	0.29
100DXS	11.0	13.0	4.0	49.0	0.40	0.76	0.34
130DXS	13.0	15.0	5.3	63.0	0.45	0.87	0.40
160DXS	12.0	16.0	6.5	78.0	0.60	1.25	0.53
200DXS	14.0	18.0	7.3	88.0	0.68	1.41	0.62
255DXS	17.0	21.0	9.3	112.0	0.77	1.61	0.74
320DXS	19.0	25.0	12.0	141.0	0.88	1.88	0.86
400DXS	23.0	28.0	13.0	156.0	1.01	2.19	1.01
500DXS	26.0	33.0	16.0	195.0	1.49	3.24	1.52
600DXS	30.0	38.0	20.0	234.0	1.64	3.58	1.70
700DXS	34.0	42.0	20.0	239.0	1.83	4.04	1.95
800DXS	37.0	46.0	23.0	273.0	1.97	4.34	2.11
900DXS	39.0	51.0	22.0	264.0	2.64	5.03	2.61
1000DXS	42.0	54.0	24.0	293.0	2.83	5.39	2.80
1120DXS	47.0	63.0	23.0	273.0	3.10	5.90	3.07
1250DXS	52.0	67.0	25.0	305.0	3.37	6.42	3.34

Load Points for DXS Units

	LOAD (1)	LOAD (2)	LOAD (3)	LOAD (4)
50 DXS	2.08	2.08	2.08	2.08
60 DXS	2.23	2.23	2.23	2.23
80 DXS	2.45	2.45	2.45	2.45
100 DXS	2.78	2.78	2.78	2.78
130 DXS	3.13	3.13	3.13	3.13
160 DXS	3.65	3.65	3.65	3.65
200 DXS	4.13	4.13	4.13	4.13
255 DXS	4.68	4.68	4.68	4.68
320 DXS	5.55	5.55	5.55	5.55
400 DXS	6.40	6.40	6.40	6.40
500 DXS	7.98	7.98	7.98	7.98
600 DXS	8.98	8.98	8.98	8.98
700 DXS	10.18	10.18	10.18	10.18
800 DXS	10.93	10.93	10.93	10.93
900 DXS	12.75	12.75	12.75	12.75
1000 DXS	13.65	13.65	13.65	13.65
1120 DXS	15.35	15.35	15.35	15.35
1250 DXS	16.70	16.70	16.70	16.70

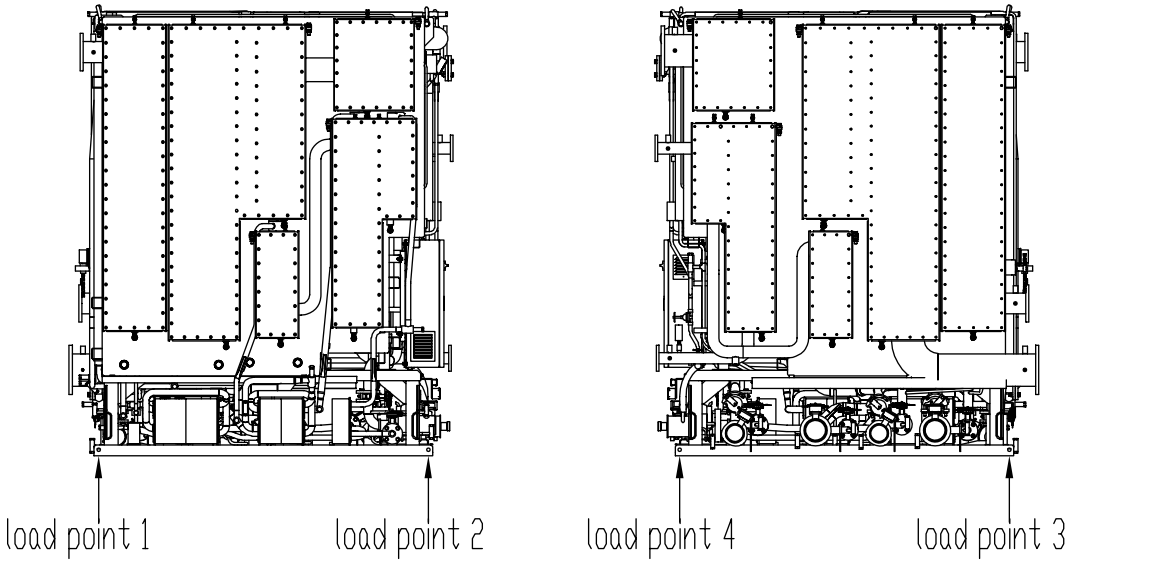


FIGURE 6 - LOAD POINTS FOR DXS UNITS

Process and Instrumentation

The following System Flow and P & I diagram are used for quoting and bidding. Temperatures and pressures on this graphic are representative; actual values may differ.

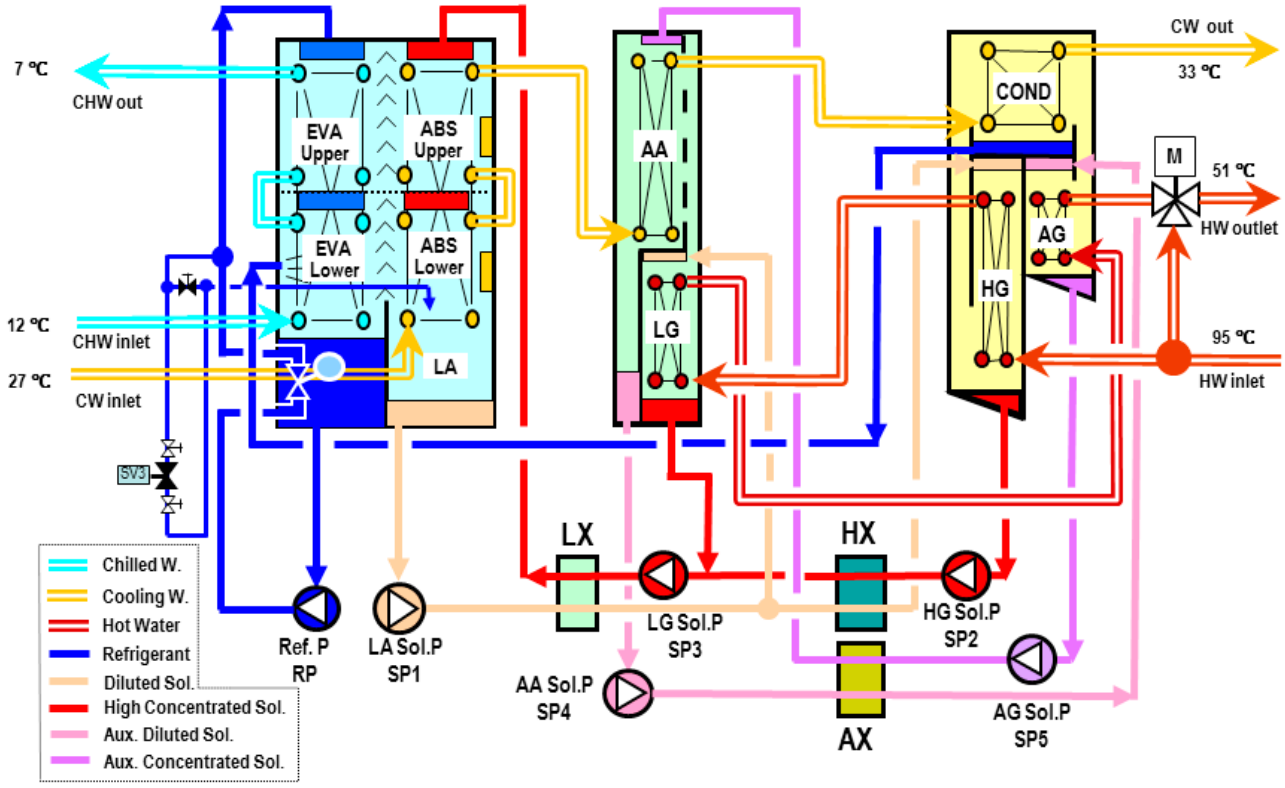
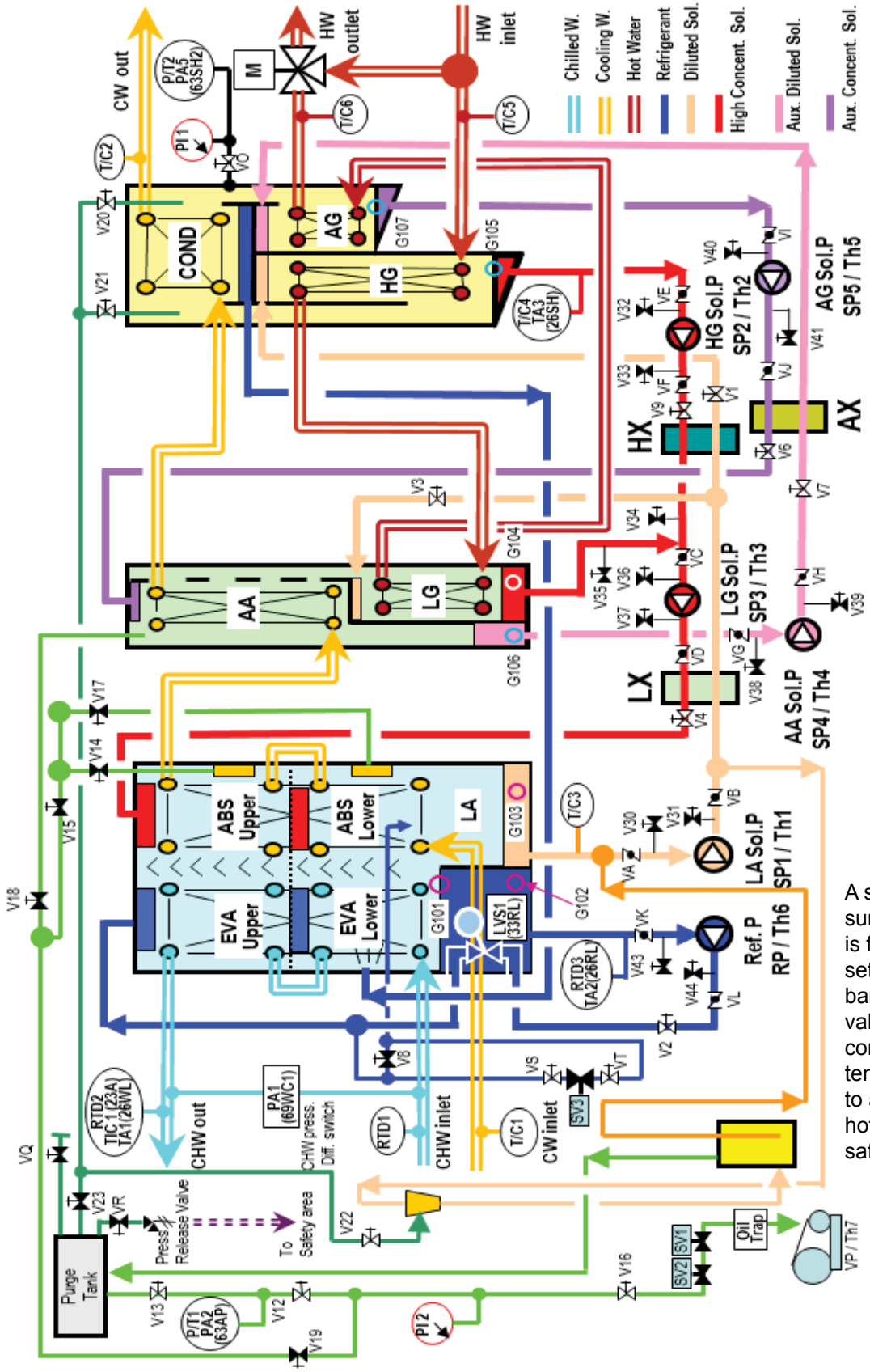


FIGURE 7 - DOUBLE LIFT WATER ABSORPTION CHILLER CYCLE DIAGRAM

Process and Instrumentation (Cont'd)



A shell-side pressure releasing valve is furnished and set to blow at 0.8 bar(g). The relief valve should be connected with a tension-free tubing to a place where the hot water can be safely drained.

FIGURE 8 - PROCESS AND INSTRUMENTATION DIAGRAM (DETAIL)

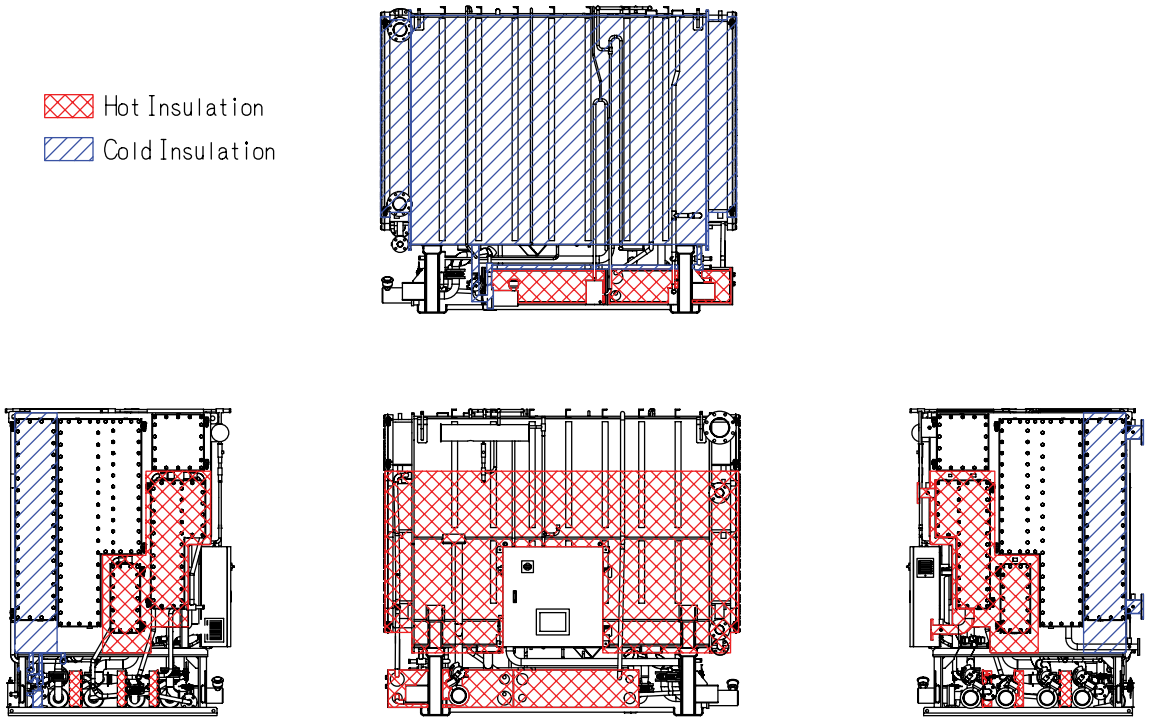
Insulation

TABLE 1 - INSULATING MATERIAL AND THICKNESS

	HOT INSULATION	COLD INSULATION
Material	Rock wool or glass wool	Polyurethane foam, polystyrene foam, or glass wool
Thickness	50 mm	50 mm

TABLE 2 - POINTS REQUIRING HOT AND COLD INSULATION

POINT REQUIRING HOT INSULATION	POINT REQUIRING COLD INSULATION	POINT THAT MUST NOT BE HEAT-INSULATED
Generator Shell	Evaporator Shell	Sight Glass
Generator Water Chamber Casing	Evaporator Water Chamber Case	Valve Manipulator
Solution Return Piping	Refrigerant Piping	Pressure Gauge
Heat Exchanger	Refrigerant Blow Piping	Thermometer Insertion Hole
	Valve for Vacuuming (use a factory only)	Relay Insertion Hole



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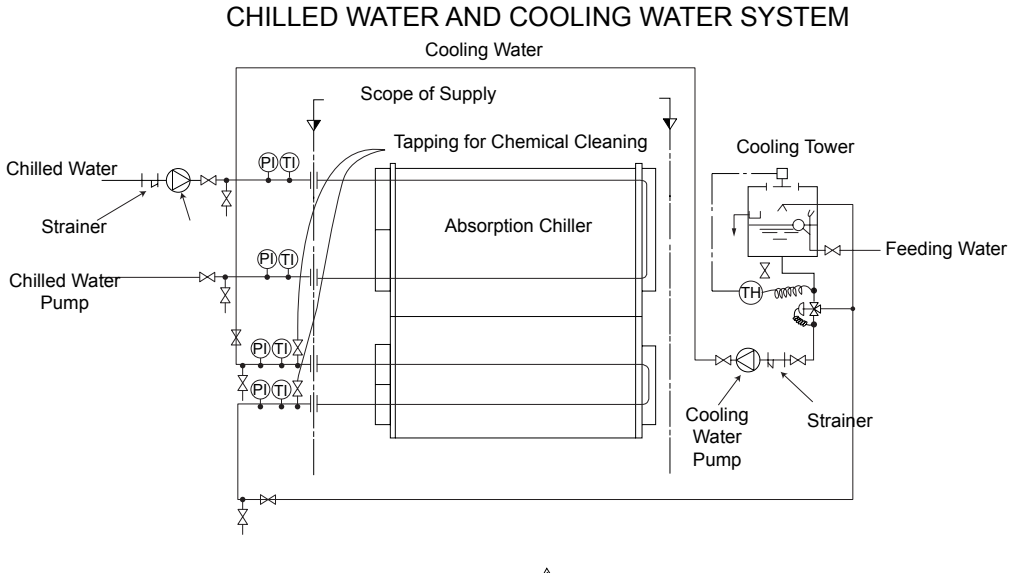
Water Quality

ELEMENT (1) (3)	COOLING WATER		CHILLED WATER		HOT WATER		TENDENCY (2)	
	Circulating Water	Feeding Water	Circulating Water	Feeding Water	Circulating Water	Feeding Water	Corrosion	Scale Forming
PH (25 °C)	6.5~8.2	6.0~8.0	6.8~8.0	6.8~8.0	7.0~8.0	7.0~8.0	○	○
Conductivity Factor (mS/m) (25 °C)	Less than 80	Less than 30	Less than 40	Less than 30	Less than 30	Less than 30	○	○
(μS/cm) (25 °C)	(Less than 800)	(Less than 300)	(Less than 400)	(Less than 300)	(Less than 300)	(Less than 300)		
Chloride Ion (mgCl-/l)	Less than 200	Less than 50	Less than 50	Less than 50	Less than 30	Less than 30	○	
Sulfulic Ion (mgSO42-/l)	Less than 200	Less than 50	Less than 50	Less than 50	Less than 30	Less than 30	○	
Oxygen Consumption (PH4.8) (mgCaCO3/l)	Less than 100	Less than 50	Less than 50	Less than 50	Less than 50	Less than 50		○
Hardness (mgCaCO3/l)	Less than 200	Less than 70	Less than 70	Less than 70	Less than 70	Less than 70		○
Calcium Hardness (mgCaCO3/l)	Less than 150	Less than 50	Less than 50	Less than 50	Less than 50	Less than 50		○
Ionized Silica (mgSiO2/l)	Less than 50	Less than 30	Less than 30	Less than 30	Less than 30	Less than 30		○
Iron (mgFe/l)	Less than 1.0	Less than 0.3	Less than 1.0	Less than 0.3	Less than 1.0	Less than 0.3	○	○
Copper (mgCu/l)	Less than 0.3	Less than 0.1	Less than 0.1	Less than 0.1	Less than 0.1	Less than 0.1	○	
Sulfurization Ion (mgS2-/l)	nil	nil	nil	nil	nil	nil	○	
Ammonium Ion (mgNH4+/l)	Less than 1.0	Less than 1.0	Less than 1.0	Less than 1.0	Less than 1.0	Less than 1.0	○	
Residual Chlorine (mgCl/l)	Less than 0.3	Less than 0.3	Less than 0.3	Less than 0.3	Less than 1.0	Less than 0.3	○	
Floating Carbonate (mgCO2/l)	Less than 4.0	Less than 4.0	Less than 4.0	Less than 4.0	Less than 4.0	Less than 4.0	○	
Stability Index	6.0~7.0	-	-	-	-	-	○	○

NOTES: (1)Names and units are according to JIS K 0101-91.
(2)The symbol ○ indicates the factor related to corrosion and scale forming.
(3)Units and figures inside parentheses ( ) are according conventional units and shown for reference.

Chilled and Cooling Water System

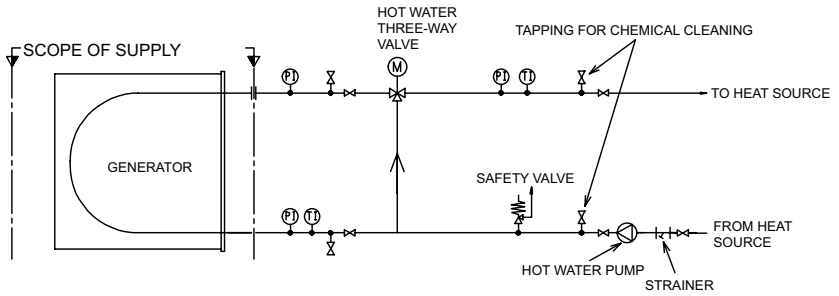


Manufacturer recommends installing expansion joints for hot water, chilled water, and cooling water connections

FIGURE 9 - CHILLED WATER AND COOLING WATER SYSTEM

Hot Water System

FLOW MIXING CONTROL WITH THREE-WAY VALVE



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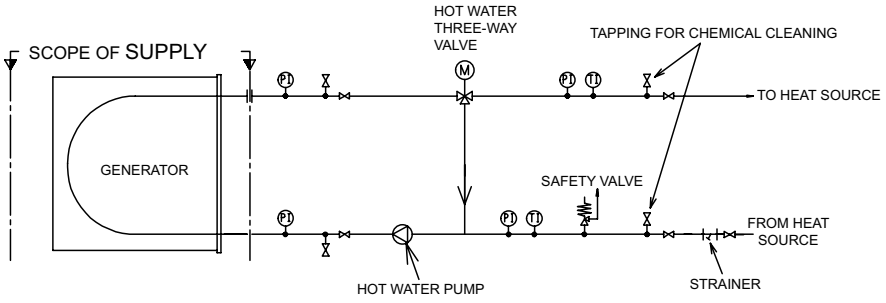
FLOW DIVERTING CONTROL WITH THREE-WAY VALVE



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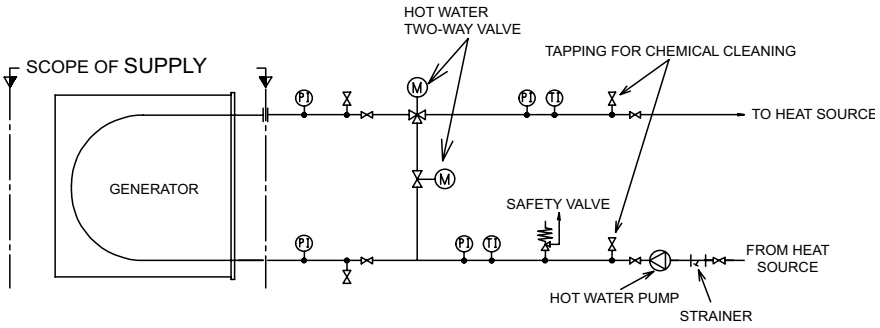
FLOW MIXING CONTROL WITH TWO-WAY VALVES



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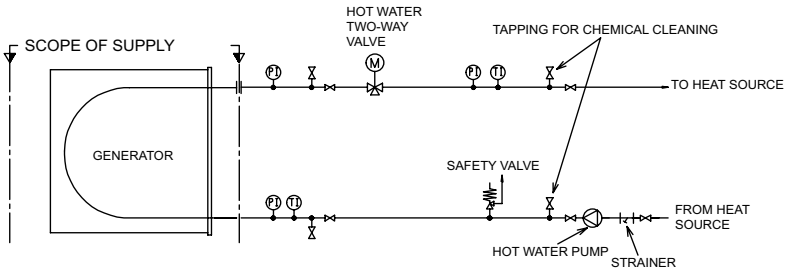
NON-BYPASS CONTROL WITH TWO-WAY VALVE



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NOTE

Be certain that when you start sequential operation, the hot water pump does NOT start until the two-way valve is open enough.

Control Panel

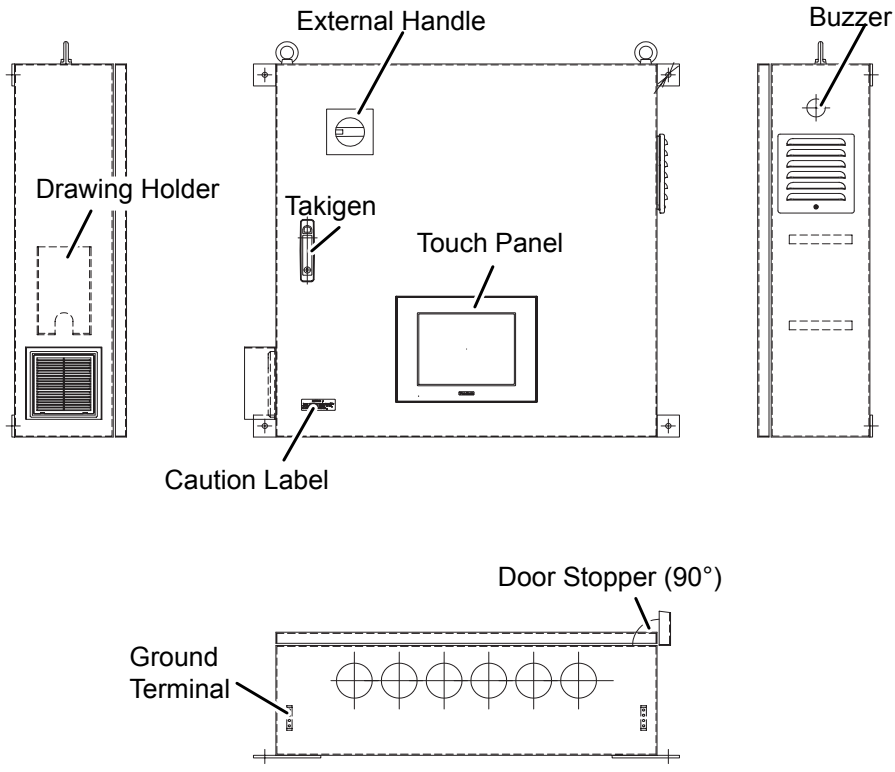


FIGURE 10 - EXTERIOR OF CONTROL PANEL (50DXS - 400DXS)

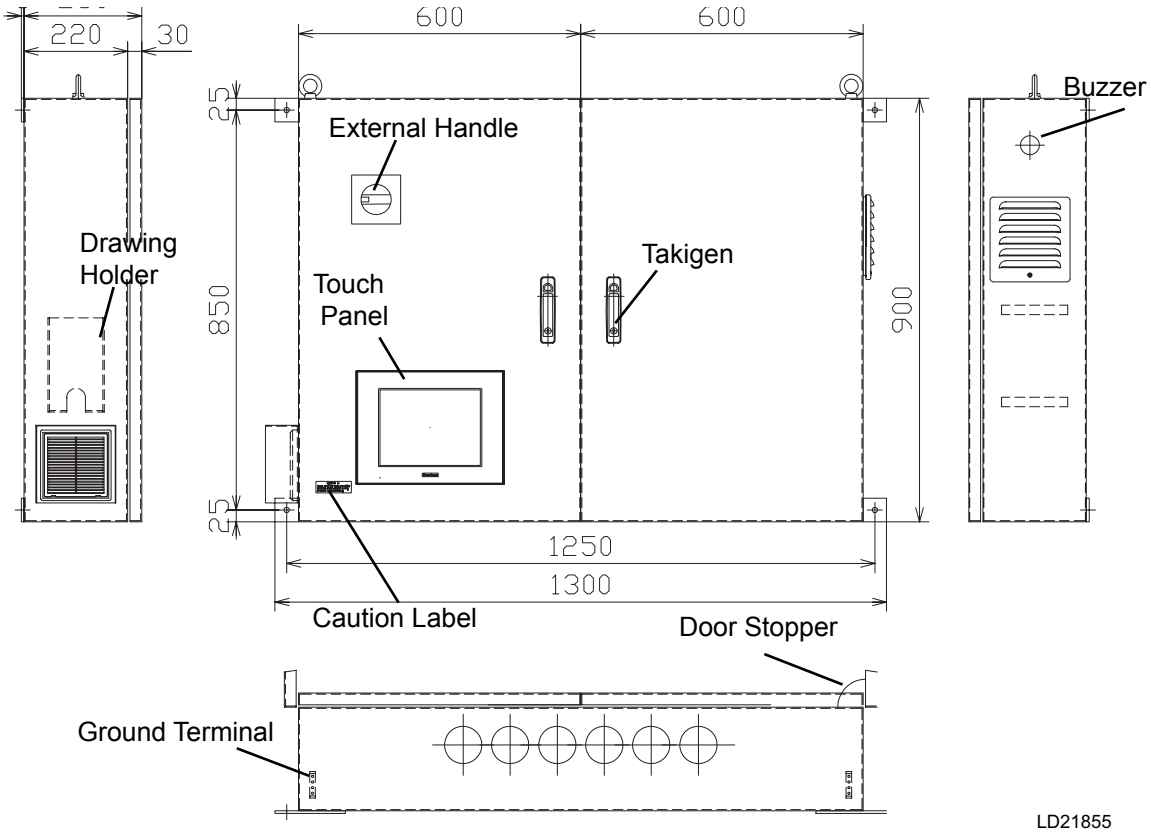


FIGURE 11 - EXTERIOR OF CONTROL PANEL (500DXS - 1250DXS)

Terminal Details - For Europe

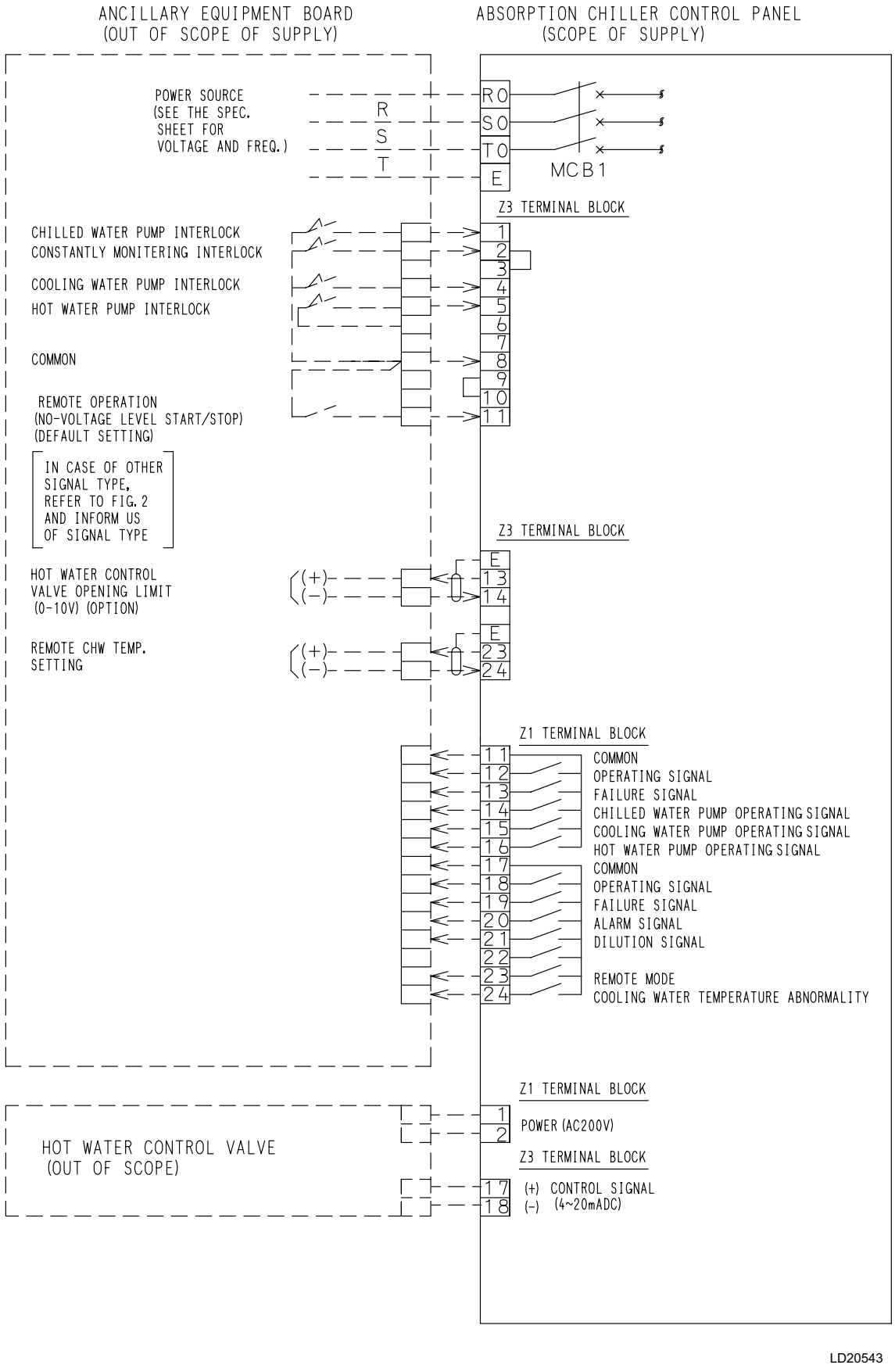


FIGURE 12 - EXTERNAL CONNECTION TERMINAL DETAILS - FOR EUROPE

Terminal Details - For Other Countries

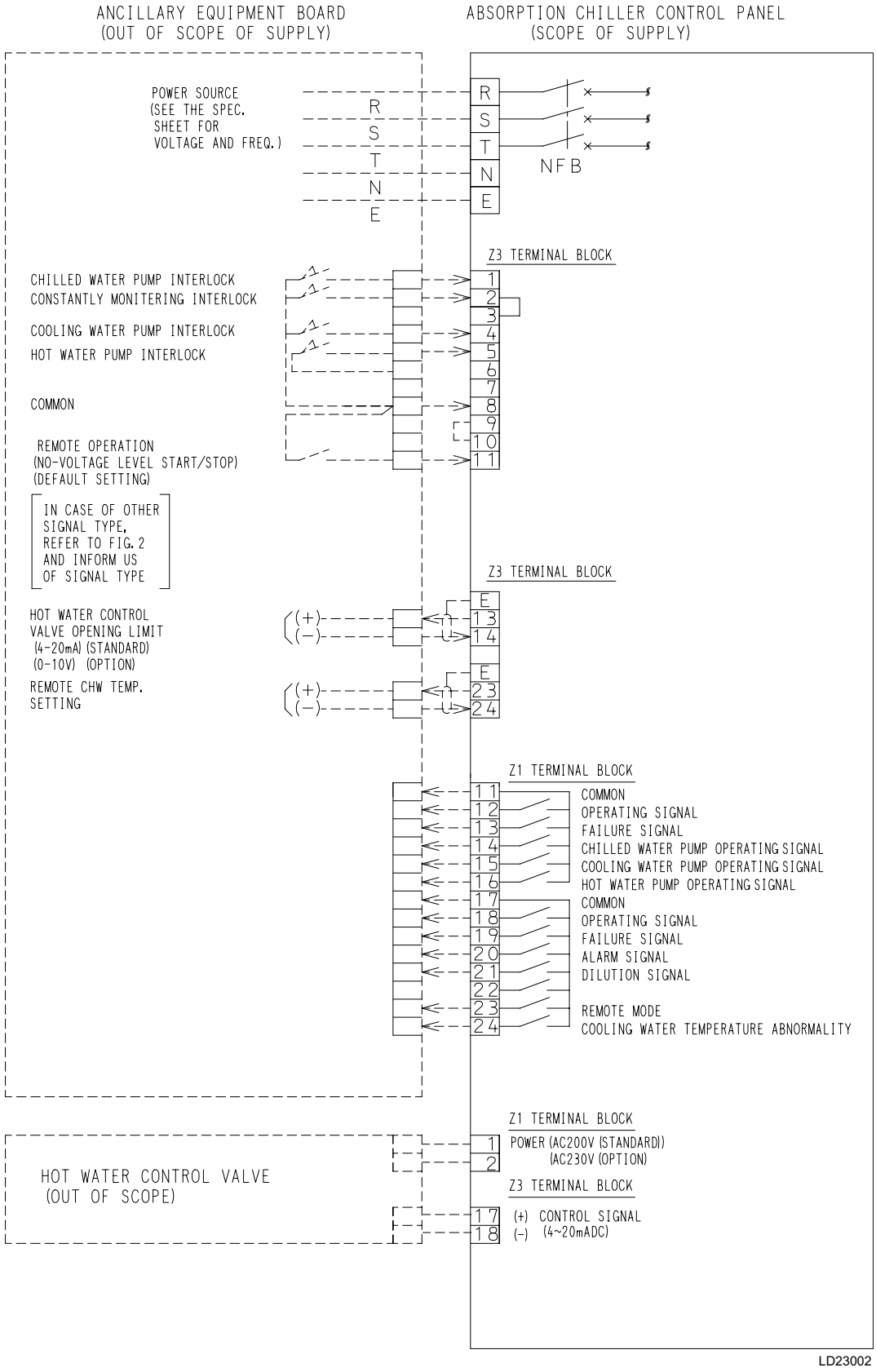
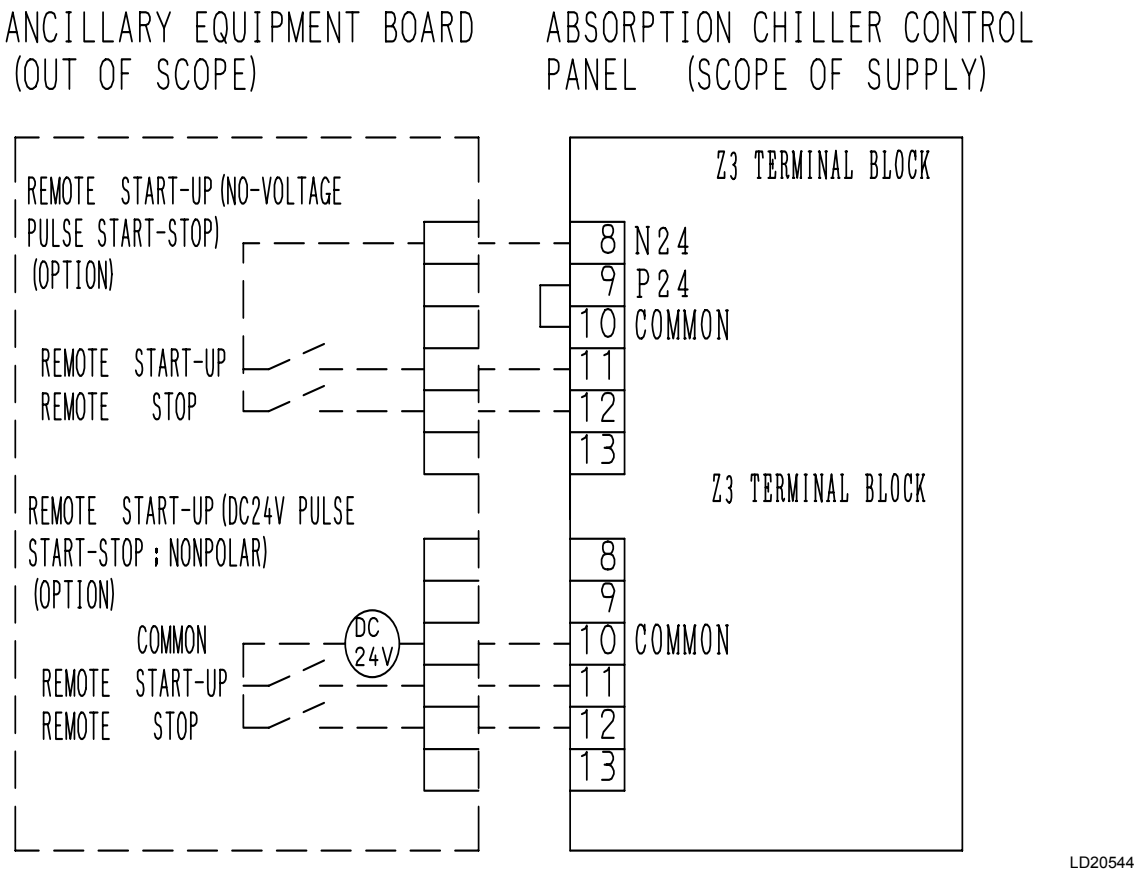


FIGURE 13 - EXTERNAL CONNECTION TERMINAL DETAILS - FOR OTHER COUNTRIES

Remote Transmission Signals



LD20544

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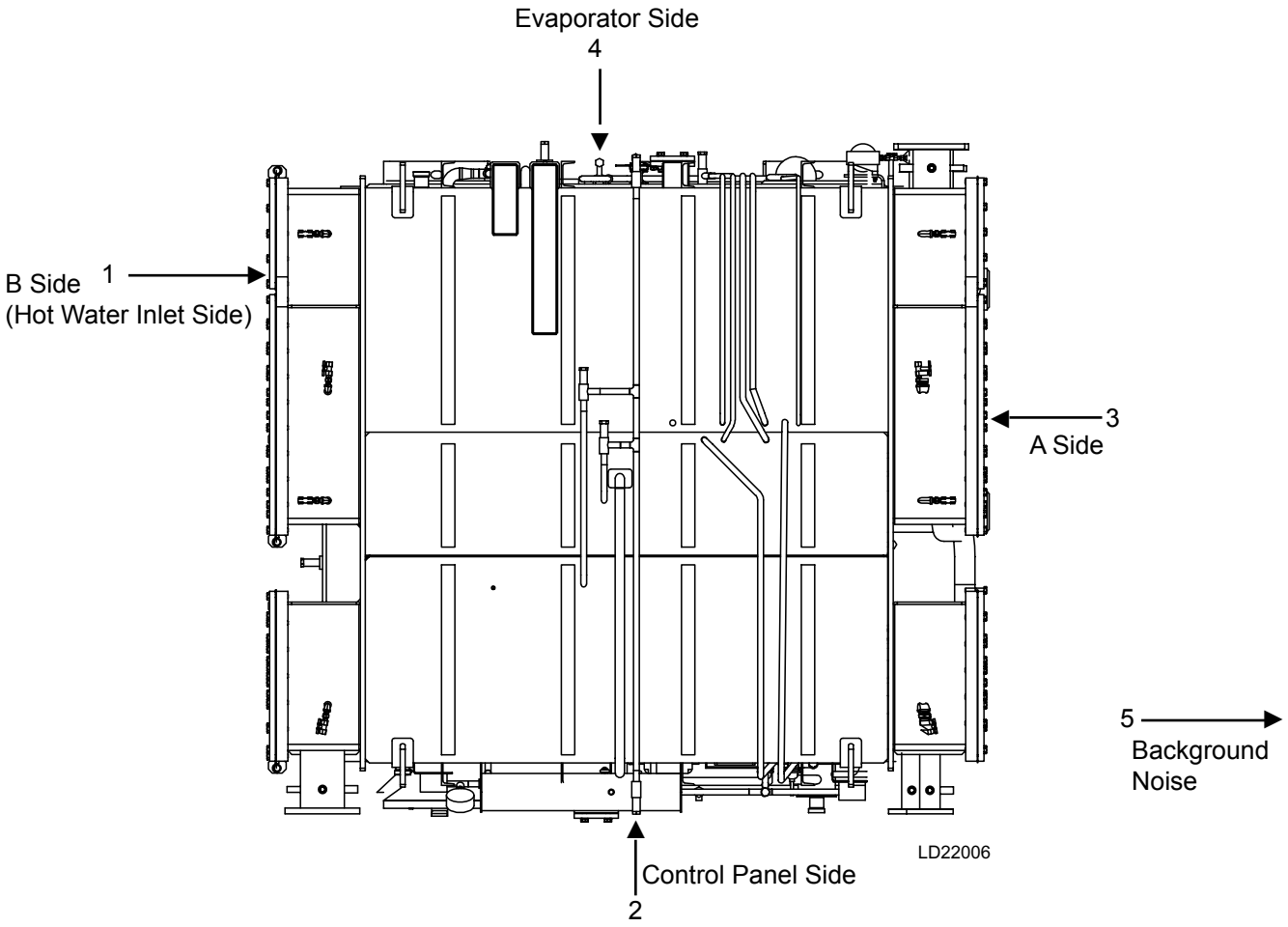
Electrical Data

YHAU-CL-DXS	VOLTAGE (V-PH-HZ)	MAIN BREAKER		LA SOLUTION PUMP (SP1)			HG SOLUTION PUMP (SP2)			LG SOLUTION PUMP (SP3)			AA SOLUTION PUMP (SP4)		
		RATED CURRENT	FRAME SIZE	KW	FLA	LRA	KW	FLA	LRA	KW	FLA	LRA	KW	FLA	LRA
50DXS	AC380V-3Ph-50Hz	25	30	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1
	AC400V-3Ph-50Hz				3.45	12.6		3.45	12.6		3.45	12.6		3.45	12.6
60DXS	AC380V-3Ph-50Hz	25	30	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1
	AC400V-3Ph-50Hz				3.45	12.6		3.45	12.6		3.45	12.6		3.45	12.6
80DXS	AC380V-3Ph-50Hz	25	30	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1
	AC400V-3Ph-50Hz				3.45	12.6		3.45	12.6		3.45	12.6		3.45	12.6
100DXS	AC380V-3Ph-50Hz	25	30	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1
	AC400V-3Ph-50Hz				3.45	12.6		3.45	12.6		3.45	12.6		3.45	12.6
130DXS	AC380V-3Ph-50Hz	25	30	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1	1.1	3.4	12.1
	AC400V-3Ph-50Hz				3.45	12.6		3.45	12.6		3.45	12.6		3.45	12.6
160DXS	AC380V-3Ph-50Hz	25	30	2.2	6.1	23.0	1.1	3.4	12.1	2.2	6.1	23.0	1.1	3.4	12.1
	AC400V-3Ph-50Hz				5.8	24.0		3.45	12.6		5.8	24.0		3.45	12.6
200DXS	AC380V-3Ph-50Hz	25	30	2.2	6.1	23.0	1.1	3.4	12.1	2.2	6.1	23.0	1.1	3.4	12.1
	AC400V-3Ph-50Hz				5.8	24.0		3.45	12.6		5.8	24.0		3.45	12.6
255DXS	AC380V-3Ph-50Hz	25	30	2.2	6.1	23.0	1.1	3.4	12.1	2.2	6.1	23.0	1.1	3.4	12.1
	AC400V-3Ph-50Hz				5.8	24.0		3.45	12.6		5.8	24.0		3.45	12.6
320DXS	AC380V-3Ph-50Hz	38	50	3	8.1	29.0	2.2	6.1	23.0	3.0	8.1	29.0	2.2	6.1	23.0
	AC400V-3Ph-50Hz				7.8	30.0		5.8	24.0		7.8	30.0		5.8	24.0
400DXS	AC380V-3Ph-50Hz	38	50	3	8.1	29.0	2.2	6.1	23.0	3.0	8.1	29.0	2.2	6.1	23.0
	AC400V-3Ph-50Hz				7.8	30.0		5.8	24.0		7.8	30.0		5.8	24.0
500DXS	AC380V-3Ph-50Hz	38	50	3	8.1	29.0	2.2	6.1	23.0	3.0	8.1	29.0	2.2	6.1	23.0
	AC400V-3Ph-50Hz				7.8	30.0		5.8	24.0		7.8	30.0		5.8	24.0
600DXS	AC380V-3Ph-50Hz	63	75	5.5	14.2	60.0	3	8.1	29.0	5.5	14.2	60.0	3	8.1	29.0
	AC400V-3Ph-50Hz				13.5	63.0		7.8	30.0		13.5	63.0		7.8	30.0
700DXS	AC380V-3Ph-50Hz	63	75	5.5	14.2	60.0	3	8.1	29.0	5.5	14.2	60.0	3	8.1	29.0
	AC400V-3Ph-50Hz				13.5	63.0		7.8	30.0		13.5	63.0		7.8	30.0
800DXS	AC380V-3Ph-50Hz	63	75	5.5	14.2	60.0	3	8.1	29.0	5.5	14.2	60.0	3	8.1	29.0
	AC400V-3Ph-50Hz				13.5	63.0		7.8	30.0		13.5	63.0		7.8	30.0
900DXS	AC380V-3Ph-50Hz	88	100	7.5	19.8	68.6	5.5	14.2	60.0	7.5	19.8	68.6	5.5	14.2	60.0
	AC400V-3Ph-50Hz				19.2	72.0		13.5	63.0		19.2	72.0		13.5	63.0
1000DXS	AC380V-3Ph-50Hz	88	100	7.5	19.8	68.6	5.5	14.2	60.0	7.5	19.8	68.6	5.5	14.2	60.0
	AC400V-3Ph-50Hz				19.2	72.0		13.5	63.0		19.2	72.0		13.5	63.0
1120DXS	AC380V-3Ph-50Hz	88	100	7.5	19.8	68.6	5.5	14.2	60.0	7.5	19.8	68.6	5.5	14.2	60.0
	AC400V-3Ph-50Hz				19.2	72.0		13.5	63.0		19.2	72.0		13.5	63.0
1250DXS	AC380V-3Ph-50Hz	88	100	7.5	19.8	68.6	5.5	14.2	60.0	7.5	19.8	68.6	5.5	14.2	60.0
	AC400V-3Ph-50Hz				19.2	72.0		13.5	63.0		19.2	72.0		13.5	63.0

Electrical Data (Cont'd)

YHAU-CL-DXS	AG SOLUTION PUMP (SP5)			REFRIGERANT PUMP (RP)			VACUUM PUMP (VP)			POWER KW	CAPACITY KVA	CONSUMPTION KW	SCCR KA
	KW	FLA	LRA	KW	FLA	LRA	KW	FLA	LRA				
50DXS	1.1	3.4	12.1	0.2	1.1	3.0	0.75	1.8	9.0	6.5	13.4	10.7	1.5
		3.45	12.6		1.2	3.3		1.8	9.0		14.3	11.5	
60DXS	1.1	3.4	12.1	0.2	1.1	3.0	0.75	1.8	9.0	6.5	13.4	10.7	1.5
		3.45	12.6		1.2	3.3		1.8	9.0		14.3	11.5	
80DXS	1.1	3.4	12.1	0.2	1.1	3.0	0.75	1.8	9.0	6.5	13.4	10.7	1.5
		3.45	12.6		1.2	3.3		1.8	9.0		14.3	11.5	
100DXS	1.1	3.4	12.1	0.4	1.6	4.2	0.75	1.8	9.0	6.7	13.7	11.0	1.5
		3.45	12.6		1.65	4.4		1.8	9.0		14.6	11.7	
130DXS	1.1	3.4	12.1	0.4	1.6	4.2	0.75	1.8	9.0	6.7	13.7	11.0	1.5
		3.45	12.6		1.65	4.4		1.8	9.0		14.6	11.7	
160DXS	1.1	3.4	12.1	0.4	1.6	4.2	0.75	1.8	9.0	8.9	17.3	13.8	1.5
		3.45	12.6		1.65	4.4		1.8	9.0		17.9	14.3	
200DXS	1.1	3.4	12.1	0.4	1.6	4.2	0.75	1.8	9.0	8.9	17.3	13.8	1.5
		3.45	12.6		1.65	4.4		1.8	9.0		17.9	14.3	
255DXS	1.1	3.4	12.1	0.4	1.6	4.2	0.75	1.8	9.0	8.9	17.3	13.8	1.5
		3.45	12.6		1.65	4.4		1.8	9.0		17.9	14.3	
320DXS	2.2	6.1	23.0	0.4	1.6	4.2	0.75	1.8	9.0	13.8	25.2	20.2	1.5
		5.8	24.0		1.65	4.4		1.8	9.0		25.6	20.4	
400DXS	2.2	6.1	23.0	0.4	1.6	4.2	0.75	1.8	9.0	13.8	25.2	20.2	1.5
		5.8	24.0		1.65	4.4		1.8	9.0		25.6	20.4	
500DXS	2.2	6.1	23.0	0.4	1.6	4.2	0.75	1.8	9.0	13.8	25.2	20.2	1.5
		5.8	24.0		1.65	4.4		1.8	9.0		25.6	20.4	
600DXS	3	8.1	29.0	1.3	3.9	11.9	0.75	1.8	9.0	22.1	38.7	31.0	1.5
		7.8	30.0		3.8	12.8		1.8	9.0		39.1	31.3	
700DXS	3	8.1	29.0	1.3	3.9	11.9	0.75	1.8	9.0	22.1	38.7	31.0	1.5
		7.8	30.0		3.8	12.8		1.8	9.0		39.1	31.3	
800DXS	3	8.1	29.0	1.5	4.7	12.5	0.75	1.8	9.0	22.3	39.3	31.4	1.5
		7.8	30.0		4.5	13.0		1.8	9.0		39.6	31.7	
900DXS	5.5	14.2	60.0	1.5	4.7	12.5	0.75	1.8	9.0	33.8	58.7	46.9	1.5
		13.5	63.0		4.5	13.0		1.8	9.0		59.3	47.5	
1000DXS	5.5	14.2	60.0	1.5	4.7	12.5	0.75	1.8	9.0	33.8	58.7	46.9	1.5
		13.5	63.0		4.5	13.0		1.8	9.0		59.3	47.5	
1120DXS	5.5	14.2	60.0	1.5	4.7	12.5	0.75	1.8	9.0	33.8	58.7	46.9	1.5
		13.5	63.0		4.5	13.0		1.8	9.0		59.3	47.5	
1250DXS	5.5	14.2	60.0	1.5	4.7	12.5	0.75	1.8	9.0	33.8	58.7	46.9	1.5
		13.5	63.0		4.5	13.0		1.8	9.0		59.3	47.5	

Sound Testing



	SOUND MEASURE LOCATIONS				
Optional Condition	1	2	3	4	5
Full Load Operation	70 dbs	72 dbs	71 dbs	72 dbs	60 dbs

* Position of Measuring Instrument
Height: 1.5 m, Horizon: 1.0 m (from chiller surface)

Note: These are reference values, as the chiller unit was not insulated and water pipes were not permanently secured during the measurement.

FIGURE 14 - SAMPLE SOUND TESTING FOR YHAU-CL-DXS CHILLER

Guide Specifications

GENERAL

Provide Double Lift Hot Water Absorption Chiller(s) capable of producing chilled water per the capacities shown on drawings and schedules.

Each chiller will be of hermetic design and factory helium leak tested.

The chiller ships as a one-piece assembly charged with nitrogen. A modulating control valve is shipped loose for field installation.

All unit mounted controls and control panels are factory mounted, wired, tested, and shipped pre-installed as integral components of the chiller.

Purchase price includes start-up service and parts and labor warranty for a period of one year from start-up or eighteen months from delivery, whichever occurs first.

BASE UNIT INCLUDES:

- DIN flanges for Europe, GB flanges for other countries for Chilled water, Cooling water and Hot water, mating flanges are not included
- Solution Heat Exchanger
- Solution Pump (SP1 - SP5), and Refrigerant Pump (RP)
- Pump Isolation Valves
- Compact waterboxes (8 bar(g) for Europe and 10 bar(g) for other countries) for Chilled water
- Marine type waterboxes (8 bar(g) for Europe and 10 bar(g) for other countries) for Cooling water for all models
- Undercoat YORK Caribbean blue paint (Munsell 4.65G 4.50/2) for Chiller main body
- Epoxy paint inside Chilled waterboxes and Cooling waterboxes
- Control Panel
- Power supply 3 phase/380 V or 400 V/50 Hz 3 wires for Europe, 4 wires for other countries
- Pressure release valve for over pressure relief 0.8 bar(g)
- Chilled water pressure differential switch
- Compound gauge
- Automatic Purge System including Purge Pump
- 4-20 mA Remote Temperature Reset Control for Chilled water
- CE marking for Europe
- Initial Startup
- Hot Water Control Valve
- PED CE European Pressure Vessel Code if applicable
- LiBr (Lithium Bromide + Lithium Molybdate Inhibitor)

Guide Specifications (Cont'd)

- Deionized water Refrigerant
- 2-Ethyl Hexyl Alcohol
- Modbus / RTU (factory initial setting) / TCP (shall be applied with customer's DCS system. It shall be installed at factory as option).
- Factory end of line run test.

NOTE: For models CL1125DXS, LiBr solution and Refrigerant water are shipped in barrels and are charged at the job site.

BASE UNIT DOES NOT INCLUDE:

- Cold surface insulation (Option)
- Hot surface insulation
- Cooling water pressure differential switch (Option)
- Solution charge of Models CL1250DXS
- Field reassembly of split shipped units
- Factory performance test (Option)

CONSTRUCTION

The chiller shall consist of evaporator, low pressure absorber (LA), condenser, high temperature generator (HG), low temperature generator (LG), auxiliary absorber (AA), auxiliary generator (AG), high temperature solution heat exchanger (HX), low temperature solution heat exchanger (LX) and auxiliary solution heat exchanger (AX).

To minimize the risk of corrosion, the all of dispersion tray shall be stainless steel.

Each of evaporator and low pressure absorber (LA) dispersion tray has two step constructions and any foreign material shall be removed from Lithium Bromide solution or the refrigerant at the first step tray to avoid any degradation of dispersion performance by clogging.

The evaporator, low pressure absorber (LA), condenser, high temperature generator (HG), low temperature generator (LG), auxiliary absorber (AA) and auxiliary generator (AG) shall be of shell and tube construction.

The evaporator, low pressure absorber (LA), condenser, high temperature generator (HG), low temperature generator (LG), and auxiliary generator (AG) shall be designed for 8 bar(g) and tested to 11.6 bar(g) for Europe, 10 bar(g) and tested 12.5 bar(g) for other countries. A shell-side pressure releasing valve shall be furnished and set to blow at 0.8 bar(g).

The evaporator cycle and the low pressure absorber (LA) cycle shall consist of two-step (upper stage and lower stage). This technology makes solution concentration of low pressure absorber (LA) weak, which enables to extend the machine life. Furthermore, this technology makes generator solution temperature relatively lower than the single-step machine, which enables to utilize hot water as driving heat source to a lowered hot water outlet temperature.

The high temperature generator (HG), low temperature generator (LG)and auxiliary generator (AG) are falling liquid film type.

Guide Specifications (Cont'd)

The hot water generator is falling liquid film type.

Three plate type solution heat exchangers (high temperature solution heat exchanger, low temperature solution heat exchanger and auxiliary solution heat exchanger) are equipped to preheat the diluted solution and achieve higher efficiency.

TUBE MATERIALS

High temperature generator and Low temperature generator tubes shall be Stainless Steel (SUS436LTB) finned type and 0.8 mm wall thickness. Auxiliary generator tubes shall be Stainless Steel (SUS436LTB) with flat surface and 1.0 mm wall thickness, and allow for the removal of the tubes from either end of the machine. Evaporator, Low pressure absorber and Auxiliary absorber tubes shall be Low Residual Phosphorus Deoxidized Copper (C1201) finned type and 0.6 mm wall thickness. Condenser tubes shall be Low Residual Phosphorus Deoxidized Copper (C1201) with flat surface and 0.6 mm wall thickness.

WATERBOXES

Water boxes shall be removable to permit tube cleaning and replacement. All water boxes shall be marine type. Water circuit tubing to be replaceable from either end of the absorption unit. All water boxes and associated water circuit nozzles and tube bundles shall be designed for 8 bar(g) working pressure and water tested to 11.6 bar(g) for Europe, 10 bar(g) working pressure and water tested to 12.5 for other countries. Vent and drain connections shall be provided on each water box. All the water connections are equipped with DIN flanges. Mating flanges are not included. Inside of water boxes and water box covers shall be coated with epoxy paint (POR15) except the generator.

AUTOMATIC DECRYSTALLIZATION SYSTEM

Chiller shall have a construction of anti-crystallization system. The evaporator and the low pressure absorber (LA) are located side by side in a same shell and separated by the eliminator. When the concentration rate of Lithium Bromide in the chiller goes up, the water level at the evaporator shall increase and automatically spill over to the low pressure absorber (LA) and the concentration rate of the solution at the Low pressure absorber (LA) will go down.

PUMPS

Low pressure absorber (LA) solution pump (SP1), high temperature generator solution pump (SP 2), low temperature generator solution pump (SP 3), auxiliary absorber solution pump (SP 4), auxiliary generator solution pump (SP5) and refrigerant pump (RP) shall be hermetically sealed, self-lubricating, totally enclosed, factory-mounted, wired and tested.

Motor windings are not exposed to lithium bromide or water. The suction and discharge connections for each pump are fully welded to the unit piping to minimize the opportunity for leaks. Suction and discharge connections are equipped with factory installed isolation valves to permit quick and easy servicing of pumps. The pump durability is designed to operate for a total of 60,000 hours. The parts of pumps such as bearings, sealing gaskets are to be inspected every 20,000 hours and replaced depending on necessity.

Guide Specifications (Cont'd)

AUTOMATIC PURGING SYSTEM

The chiller shall be equipped with a purging system to remove non-condensable gases from the unit during operation. Non-condensable shall be collected by an ejector and accumulated in the purge tank. The chiller can dictate the pressure increase in the purge tank and automatically remove the non-condensable gas through the operation of an electric vacuum pump.

The purge pump shall be of an oil rotary double-stage design, and shall be furnished complete with a motor, and all required accessories. The purge pump shall be shipped mounted on the chiller and connecting hose shall be factory installed. The purge pump oil shall be charged at the job site (by JCI).

LITHIUM BROMIDE AND REFRIGERANT CHARGE

Lithium bromide contains lithium molybdate corrosion inhibitor to minimize the rate of ferrous metal corrosion on both the solution and refrigerant sides of the unit. Deionized water is supplied for the refrigerant charge. Solution and refrigerant is charged to the chiller at the factory before the shipment. Units from 50DXS to 1120DXS are shipped fully charged with lithium bromide and refrigerant. 1250DXS is shipped with the lithium bromide and refrigerant shipped separately in barrels.

HOT WATER VALVE

Double lift hot water chiller shall be furnished with a 3-way mixing type valve, linkage and the actuator motor. This assembly is shipped loose for field installation. The valve features a cast iron or carbon steel body. The 3-way valve assembly is capable of modulating hot water flow continuously from 20% to 100% of the maximum design chiller capacity into the chiller. The actuator motor is powered from the chiller's Control Panel. Actuator motor position to be controlled via the Control Panel through a 4-20 mA DC control signal.

CONTROL PANEL

Each unit is furnished complete with a factory mounted and pre-wired control system. The control panel enclosure is equipped with hinged access door with lock and key. Protection rating of the control panel shall be IP42. All temperature sensors and other control devices necessary to sense unit operating parameters to be factory mounted and wired to panel. The control panel includes a touch panel showing all system parameters in the English language with numeric data in Metric units.

The operating program is stored in non-volatile memory (SRAM) to eliminate chiller failure due to AC power failure.

Capacity Control - The control panel automatically controls the input hot water flow rate to maintain the programmed leaving chilled water set-point for cooling loads ranging from 20% to 100% of design. The input hot water flow rate can be manually adjustable from the control panel to any setting between minimum and maximum when automatic operation is not desired and when hot water input is not being inhibited by a specific operating condition.

Guide Specifications (Cont'd)

MAIN SCREEN

1. Equipment Status:
    - Chiller Stop/Operating/Failure Activating
    - Solution Pump (SP1 - SP5), Refrigerant Pump (RP) ON/OFF
    - Purge Pump ON/OFF
    - Chilled Water Pump/Cooling Water Pump/Hot Water Pump ON/OFF
2. Operation Status:
    - Startup
    - High temperature generator (HG) pressure
    - High temperature generator (HG) Concentration
    - Hot Water Valve Low Limit
    - Temperature Control
    - Thermo OFF
    - Load Limit
    - Dilution Operation
    - Set Point of Chilled Water Leaving Temperature
    - 3-Way Valve Control Output
    - Chilled Water Entering/Leaving Temperature
    - Cooling Water Entering/Leaving Temperature
    - Refrigerant Temperature
    - Hot Water Inlet Temperature
    - Hot Water Outlet Temperature
    - Low Pressure Absorber (LA) temperature
    - High temperature Generator (HG) temperature.
    - High temperature Generator (HG) Pressure.
    - High temperature Generator (HG) Concentration.
    - Purge Tank Pressure

Guide Specifications (Cont'd)

3. Condition Lamps:
    - Chiller Stop/Operation
    - Local/Remote
    - Failure/Alarm
4. Operation button:
    - Chiller Stop/Operation
    - Local/Remote Mode Select

DATA SCREEN

1. Measured Value:
    - Chilled Water Entering Temperature (°C)
    - Chilled Water Leaving Temperature (°C)
    - Cooling Water Entering Temperature (°C)
    - Cooling Water Leaving Temperature (°C)
    - Hot Water Entering Temperature (°C)
    - Hot Water Leaving Temperature (°C)
    - Evaporator Refrigerant Temperature (°C)
    - Low Pressure Absorber (LA) Temperature (°C)
    - High temperature Generator (HG) temperature (°C)
    - High temperature Generator (HG) Pressure (kPa)
    - High temperature Generator (HG) Concentration (%)
    - 3-Way Valve Control Output (%)
2. Operation Hours:
    - Chiller Operation Hours
    - Solution Pump (SP1) Operation Hours
    - Refrigerant Pump (RP) Operation Hours
3. Frequency:
    - Chiller Operation Times
    - Start Times
    - Failure Times
    - Alarm Times
    - Purge Times

Guide Specifications (Cont'd)

4. Trend:
    - Chilled Water Temperature
    - Cooling Water Temperature
    - High temperature Generator (HG) temperature
    - Hot Water Temperature
5. History Menu:
    - Hourly Operation History (12 hours)
    - Minute Operation History (12 minutes)
    - Failure History (6 times)
    - Alarm History (6 times)

FAILURE/ALARM SCREEN

1. Failure:
    - Chilled water time out
    - Cooling water time out
    - Operation interlock
    - Cooling water pump interlock
    - Monitoring interlock
    - Hot water pump interlock
    - Chilled water suspension
    - Chilled water overcooled
    - Refrigerant overcooled
    - Low cooling water inlet temperature
    - Control sensor abnormal
    - CPU abnormal
    - High temperature generator (HG) High temperature
    - High temperature generator (HG) High pressure
    - LA solution pump (SP1) Abnormal
    - HG solution pump (SP 2) Abnormal
    - LG solution pump (SP3) Abnormal
    - AA solution pump (SP4) Abnormal
    - AG solution pump (SP5) Abnormal
    - Refrigerant pump(RP) Abnormal

Guide Specifications (Cont'd)

2. Alarm:
    - Abnormal purge frequency
    - Purge abnormal
    - Chilled water overcool prevention
    - Refrigerant overcool prevention
    - High temperature generator (HG) high temperature prevention
    - High temperature generator (HG) high pressure prevention
    - Cooling water tube fouling
    - Refrigerant pump (RP) stop
    - Low cooling water inlet temperature
    - High cooling water inlet temperature
    - High temperature generator (HG) high concentration prevention
    - Recording senor abnormal
    - Low battery voltage
    - ELB for Arrester Trip
    - Low hot water inlet temperature
    - High hot water inlet temperature

SETTING SCREEN

1. Control Parameter:
    - Setting Method Local/Remote
    - Remote Setting Base
    - Remote Setting Differential
    - Automatic Stop Temperature
    - Automatic Restart Temperature
2. Valve Operation:
    - Control Valve Mode Auto/Manual
    - 3-Way Valve Position Setting

Guide Specifications (Cont'd)

3. Operation Switch:
    - Forced Dilution ON/OFF
    - Refrigerant Pump ON/OFF
    - Purge Mode Auto/Manual
    - Manual Purge ON/OFF
4. Select Language:
    - Japanese, English (and other language shall be added depending later.)
5. Date & Time

Touch panel mechanical specification -

- Screen size : 10.4 inches
- Electrical power supply : DC 24 V
- Electrical power consumption : Less than 17 W
- Display : TFT 65,536 colors
- Graphic mode : 640 x 480 dot. (VGA)

Communication – Modbus communication as standard.

- Modbus / RTU (factory initial setting)
- Modbus/TCP (shall be applied with customer's DCS system, it shall be installed at factory as option)

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