

Look to Sarmaafarin for the standard of excellence in absorption refrigeration... the 16 JB

Now, more than ever, absorption refrigeration is a viable alternative to costlier methods of central station refrigeration. Absorption offers operating cost savings that are too crucial to overlook in light of today's energy shortages and spiraling construction costs. In circumstances where your building has unused boiler capacity during the summer months, or where district steam is readily available, absorption machines are a wise, cost conscious choice. In areas where there is low cost natural gas, or where electrical rates have risen dramatically, absorption is an economical way to air condition a wide variety of buildings. And in a cases such as hospitals or industrial processes, where air conditioning is an absolute must, and a 100% standby generator system is required, first costs can be significantly trimmed by specifying a central station absorption machine with its comparatively low power consumption.

Absorption is a relatively quiet, vibration-free means of producing effective refrigeration. So when you consider what's available in absorption machines, consider the best—the incomparable 16JB. Fifteen standard models use either low pressure steam or hot water to produce refrigeration economically in the 70 to 815 ton range.

Absorption machines set the standard for excellence in absorption refrigeration, with these exclusive features standard—the lowest condenser water flow rate in the industry, 3.0 gpm/ton, for greater installation and operating economy; the

lowest full-load steam rate of any comparable absorption machine, for less energy usage and dramatically low operating costs; the automatic motorless purge system, for complete and continuous removal of non-condensables to an external storage chamber; U-bend generator tubes that float and adjust freely in response to rapid thermal changes, for a great reduction in tube bundle failures; and a rigorous standard of leak tightness that no other machine in the industry can approach, mass spectrometer tested to 2×10^{-8} cc std air/second.

With the 16JB, excellence is the standard. Consider—3-stage Cycle-Guard control, standard, automatically prevents over-concentration and crystallization; Extender valve control, standard, prevents over dilution and ensures a safe pump suction level. When you specify these chillers, you get economical, dependable operation with entering condenser water as low as 45 F; trouble-free leakproof hermetic pumps; and double sump design for easier servicing.

These dependable machines are the result of over a quarter-century of in-the-field servicing and factory research and development, dating back to 1945 when introduced the first high-capacity absorption equipment.

These rugged chillers are factory assembled, wired, and shipped under vacuum to the jobsite. Smaller sizes are shipped in a single package while larger models are shipped in two sections for easier rigging to either basement or rooftop locations.

16JB - an all around performer

- 31 standard models ... matched to your exact job requirements
- Enjoy energy savings at full and part load
- Accurately plan operating costs
- 3-stage Cycle-Guard and Extender controls... reliability even at 45 °F entering condenser water.
- Easy servicing convenience
- Double-sump design
- Designed with lower maintenance costs-in mind
- U-bend generator tubes
- Leakproof hermetic pumps
- Automatic motorless purge

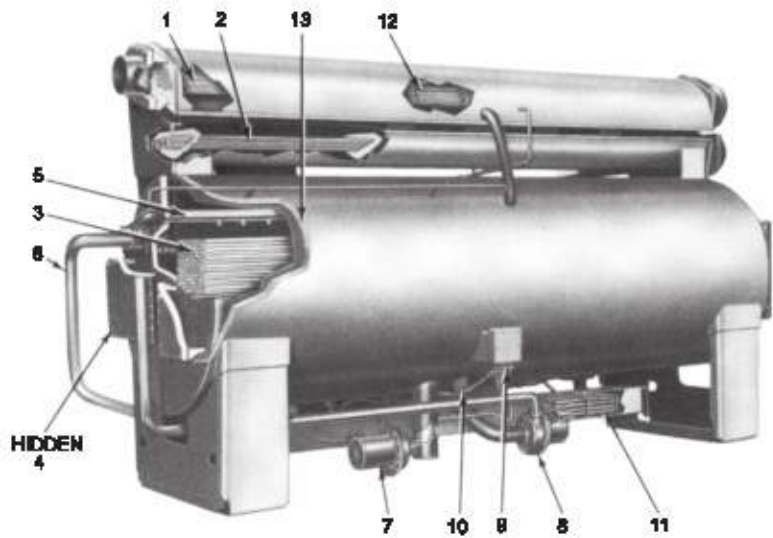
The inside story on absorption excellence...

The absorption refrigeration cycle

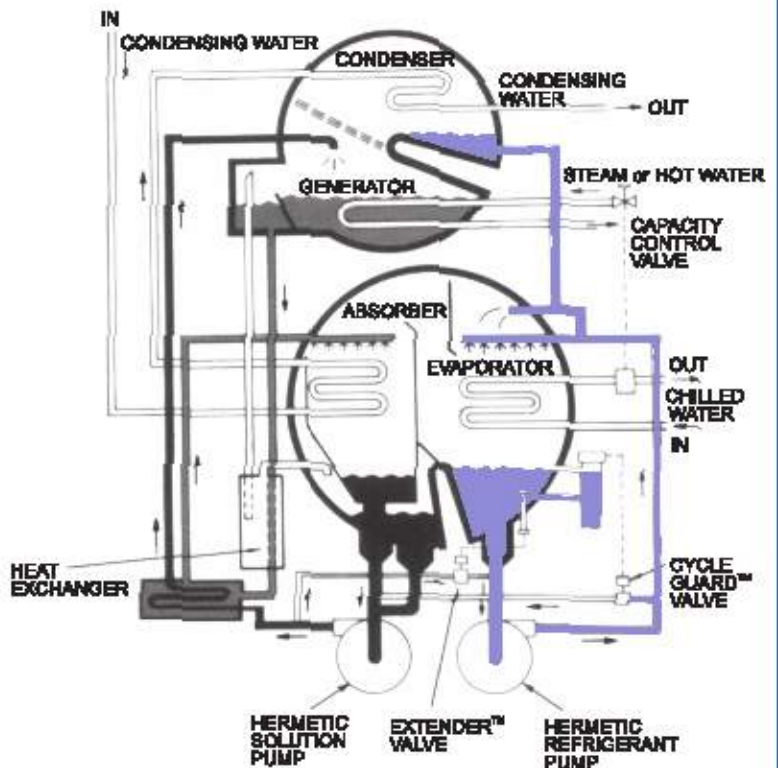
Absorption machines operate on the simple principle that under low absolute pressure, water will boil at a low temperature. The two-shell 16JB uses heat to efficiently produce refrigeration. The lower shell divided into absorber and evaporator sections, while the upper shell consists of generator and condenser sections. The evaporator section contains the refrigerant, water. A coil, thru which the building cooling system water circulates, is inserted into the evaporator to establish a heat exchange.

The refrigerant gains heat from the cooling system water, and because of low pressure maintained in the evaporator, quickly reaches saturation temperature and vaporizes, cooling the system water. The remainder of the cycle deals with reclaiming this refrigerant.

The affinity of lithium bromide for water causes the refrigerant vapor to be absorbed by the strong solution in the absorber section. The diluted (weak) solution is pumped into the generator, where steam or hot water is used to drive the water out of the solution as a vapor. The vapor passes into the condenser and changes back to liquid, which returns to the evaporator to be reused. Meanwhile, the strong solution left in the generator flows back to the absorber. This cycle is continuous as long as the machine is in operation.



- | | | |
|-------------------------|---------------------------------|----------------------------|
| 1 - Condenser Tubes | 6 - Solution Spray Header | 11 - Heat Exchanger |
| 2 - Generator Tubes | 7 - Refrig Pump | 12 - Eliminators |
| 3 - Evaporator Tubes | 8 - Solution Pump | 13 - Evaporator Insulation |
| 4 - Absorber Tubes | 9 - 3-Stage Cycle-Guard Control | |
| 5 - Refrig Spray Header | 10 - Extender Control | |



Enjoy energy savings at full and part load conditions ...

Low operating costs

The 16JB has the lowest full-load steam or hot water rate in the industry, ensuring lower operating costs than any other comparable absorption machine!

Part Load energy savings

Energy savings can be significant if the machine is able to operate at lower condenser water temperatures. In actual operation, design conditions of load and wet-bulb temperature do not frequently occur. Therefore, during much of the operating season, this conservation of energy is possible. 16JB chillers operate trouble free with uncontrolled as low as 45 F. Thus, further savings are realized with 16JB machines thru elimination of a cooling tower bypass system, including an expensive bypass valve, piping, installation and subsequent maintenance.

3-stage Cycle-Guard and extender valves: reliable control, even at 45 F entering condenser water!

The capacity control valve in the principal means of control of the 16JB. Additional control devices maintain safe, stable operation.

The revolutionary Cycle-Guard control prevents over-concentration and crystallization problems by automatically adding refrigerant (water) to the absorber if the refrigerant level in the evaporator rises to a pre-set limit. Actually, Cycle-guard is calibrated in the field by factory personnel to sense three different levels of temperature and concentration.

This extraordinary control maintains leaving chilled water temperature and allows continuous operation at full load with entering condenser water

Continuous and stable Part-load operation

Absorption machines provide continuous and stable part-load operation with lower entering condenser water temperatures, assuring significant operating and energy savings.

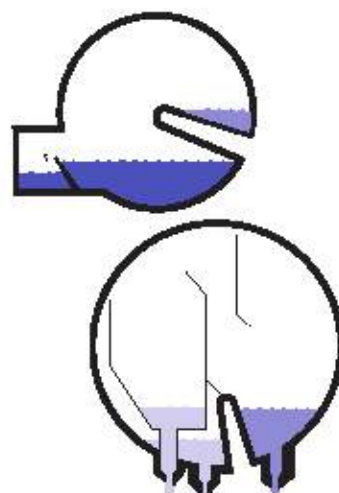
as low as 45 F. The ability to use cooler condenser water means reduced energy demand and therefore greater operating economies.

Extender valve control ensures a safe pump suction level by preventing overdilution. A control device automatically senses the safe minimum refrigerant level in the evaporator and adds solution as needed to maintain proper system balance. The Extender valve is also essential for reliable operation down to 45 F entering condenser water, since it protects the evaporator pump ... the absorber works so effectively that it must be prevented from absorbing all the refrigerant, leaving the evaporator dry. So a control device senses the safe minimum evaporator level and the Extending balanced operation to the 45 F entering condenser water range.

- easier servicing, tool

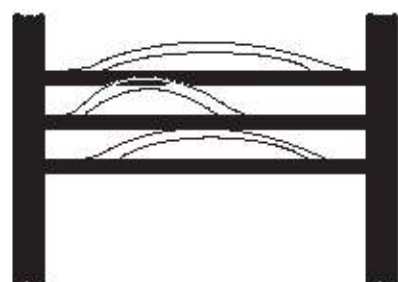
Double sumps cut pump service time

A U-baffle in the lower shell forms two sumps in the shell, allowing storage of refrigerant or solution in one sump while the other side is being serviced. The U-baffles in both the upper and lower shells serve as a natural insulating barrier between sections. Fluids being stored need not be drained or transferred to drums, a factor that greatly reduces service time and expense.



Your 16JB has features that substantially lower maintenance costs

U-bend generator tubes reduce costly tube bundle replacement



Thermal expansion of ordinary tubes results in rubbing, wear.



With U-bend tubes, there's room to expand, no contact or rubbing.

Another special feature of 16JB absorption liquid chillers is the use of U-bend generator tubes for maintenance-free operation, greatly reducing the likelihood of expensive and time-consuming tube bundle replacement.

Each cupro-nickel tube is expanded in the tube sheet and tube support sheets to eliminate tube wear. The U-bend configuration allows the entire tube bundle to expand or contract as a unit when subjected to rapid temperature changes. The tube bundle floats and adjust freely as a unit, decreasing tube wear due to thermal stresses and reducing tube bundle failures.

Inhibitor: added corrosion protection you can check in the field

Inhibitor added to the lithium bromide solution in 16JB absorption chillers provides an extra margin of protection against corrosive damage to internal machine surfaces. It assures easier maintenance at lower costs, and dependable operation.

It is not only an effective corrosion inhibitor, but is also practical to measure and maintain, using the Solution Analysis Test Kit. This portable kit contains the components needed for quick and practical evaluation of inhibitor concentration and solution chemistry - right in the field. The easy-to-use colorimeter shows immediate results ... no more delays or waiting for laboratory analysis ... now solution chemistry can be evaluated at the jobsite, and on-the-spot adjustments made, if needed.

Leakproof hermetic pumps cut maintenance expense

Hermetic pump/motor units offer freedom from maintenance, and the ultimate in simplicity and pumping reliability. Hermetic design eliminates the need for a separate, complicated, and possibly leakprone seal water system and auxiliary city water piping, while providing leaktightness and longer machine life. These pumps have conically shaped bearings which are

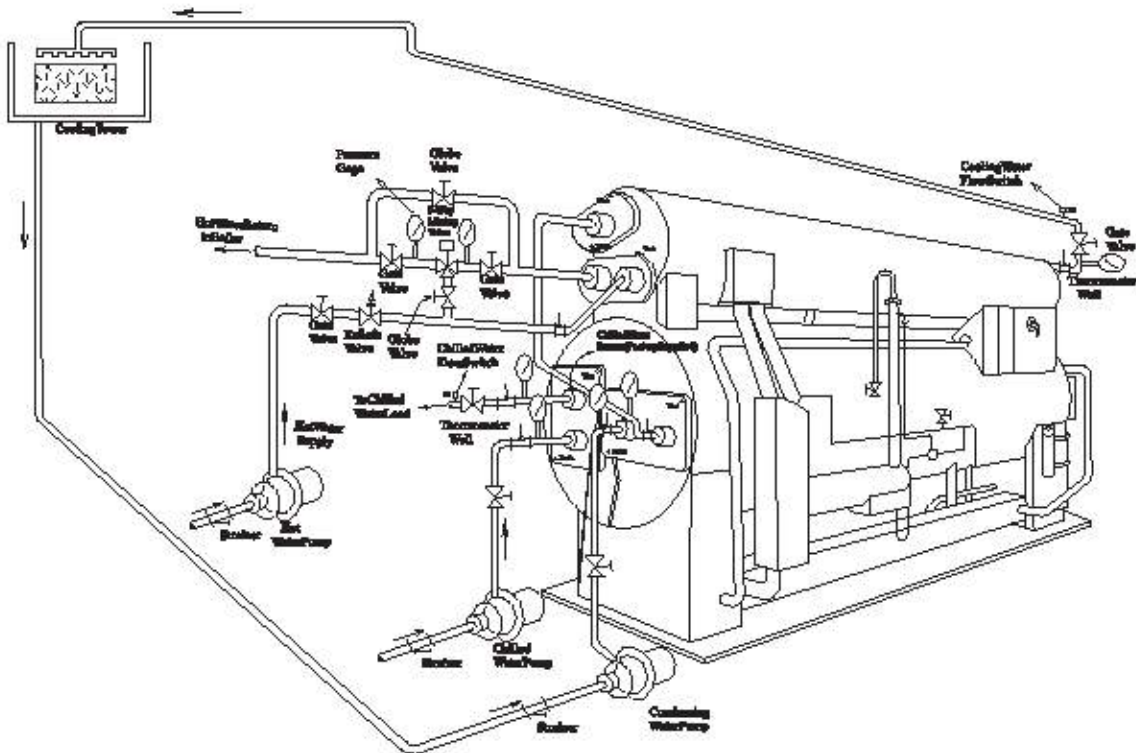


lubricated by the fluid being pumped. The solution and refrigerant pumps are hermetically sealed; require no packing glands, machined thrust bearings, magnetic strainers, or monthly servicing. They are fully field serviceable, and inspection is recommended at six-year intervals.

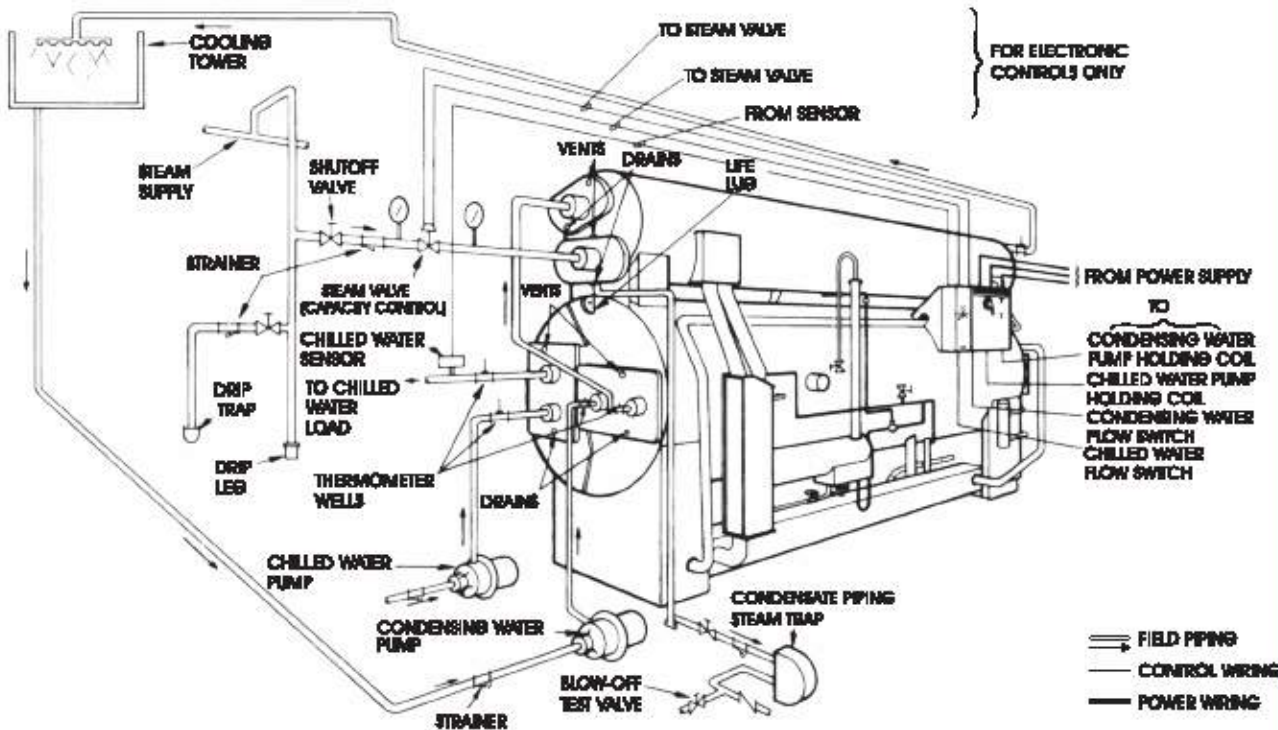
TYPICAL PIPING AND WIRING



Low temperature hot water machines



Steam and hot water machines



PHYSICAL DATA



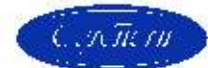
Low temperature hot water machines

UNIT 16JB	005/021	007/021	007/026	010/021	014/021	014/026	021/026	021/036
NOMINAL COOLING CAPACITY (ton)	50	58	66	100	116	132	174	201
RIGGING WEIGHT* (kg)	3208	3268	3332	4510	4590	5010	5660	6430
OPERATING WEIGHT (kg)	4107	4191	4266	5728	5668	6365	7801	8321
LITHIUM BROMIDE SOLUTION CHARGE (kg)	403	403	403	750	750	780	1085	1135
REFRIGERANT (WATER) CHARGER (kg)	111	111	111	215	215	235	275	285
CHILLED WATER								
Pipe Connection Size (in.)	3	3	3	4	4	4	6	6
No. of Passes	4	4	4	2	2	2	2	2
COOLING WATER								
Pipe Connection Size (in.)	3	3	3	6	6	6	6	6
No. of Passes								
Absorber	4	4	4	2	2	2	2	2
Condenser	1	1	1	1	1	1	1	1
HOT WATER								
Pipe Connection Size (in.)	3	3	4	3	3	4	4	4
No. of Passes	4	4	4	2	2	2	2	2

UNIT 16JB	028/036	028/047	030/047	036/057	036/068
NOMINAL COOLING CAPACITY (ton)	233	270	312	349	397
RIGGING WEIGHT* (kg)	7230	7380	8680	9260	9400
OPERATING WEIGHT (kg)	8540	8834	11537	12174	12408
LITHIUM BROMIDE SOLUTION CHARGE (kg)	1375	1415	1660	1720	1700
REFRIGERANT (WATER) CHARGER (kg)	355	395	410	450	440
CHILLED WATER					
Pipe Connection Size (in.)	6	6	8	8	8
No. of Passes	2	2	2	2	2
COOLING WATER					
Pipe Connection Size (in.)	6	8	8	8	8
No. of Passes					
Absorber	2	2	2	2	2
Condenser	1	1	1	1	1
HOT WATER					
Pipe Connection Size (in.)	4	6	6	6	6
No. of Passes	2	2	2	2	2

UNIT 16JB	047/057	047/068	057/068
NOMINAL COOLING CAPACITY (ton)	455	480	522
RIGGING WEIGHT* (kg)	11690	11630	13430
OPERATING WEIGHT (kg)	15393	16824	17761
LITHIUM BROMIDE SOLUTION CHARGE (kg)	2245	2225	2225
REFRIGERANT (WATER) CHARGER (kg)	525	515	635
CHILLED WATER			
Pipe Connection Size (in.)	6	8	8
No. of Passes	2	2	2
COOLING WATER			
Pipe Connection Size (in.)	10	10	10
No. of Passes			
Absorber	2	2	2
Condenser	1	1	1
HOT WATER			
Pipe Connection Size (in.)	6	6	8
No. of Passes	2	2	2

PHYSICAL DATA



Steam and hot water machines

UNIT 16JB	010	012	014	016	021
NOMINAL COOLING CAPACITY (ton)	108	122	137	186	211
RIGGING WEIGHT* (kg)					
Absorber/Evaporator	2,860	2,900	2,900	3,880	3,910
Generator/Condenser	1,230	1,240	1,240	1,570	1,880
Total	4,090	4,140	4,140	5,230	5,590
OPERATING WEIGHT (kg)	5,110	5,180	5,220	6,750	7,160
LITHIUM BROMIDE SOLUTION CHARGE (kg)	885	885	885	970	970
REFRIGERANT (WATER) CHARGER (kg)	150	150	150	190	190
CHILLED WATER					
Pipe Connection Size (in.)	4	4	4	6	6
No. of Passes	2	2	2	2	2
COOLING WATER					
Pipe Connection Size (in.)	6	6	6	6	6
No. of Passes					
Absorber	2	2	2	2	2
Condenser	1	1	1	1	1
STEAM/HOT WATER					
Pipe Connection Size (in.)					
Steam Inlet/Hot Water Inlet	3/2.5	3/2.5	3/2.5	4/3	4/3
Condensate Outlet/Hot Water Outlet	1.25/2.5	1.25/2.5	1.25/2.5	1.25/3	1.25/3
UNIT 16JB	024	028	032	036	041
NOMINAL COOLING CAPACITY (ton)	245	279	328	382	413
RIGGING WEIGHT* (kg)					
Absorber/Evaporator	4,850	4,710	5,890	6,010	8,180
Generator/Condenser	1,990	2,020	2,520	2,580	2,520
Total	6,840	6,730	8,410	8,590	10,700
OPERATING WEIGHT (kg)	8,570	8,820	10,880	11,100	13,670
LITHIUM BROMIDE SOLUTION CHARGE (kg)	1,210	1,210	1,455	1,455	1,820
REFRIGERANT (WATER) CHARGER (kg)	250	250	265	265	340
CHILLED WATER					
Pipe Connection Size (in.)	6	6	6	6	6
No. of Passes	2	2	2	2	2
COOLING WATER					
Pipe Connection Size (in.)	8	8	8	8	10
No. of Passes					
Absorber	2	2	2	2	2
Condenser	1	1	1	1	1
STEAM/HOT WATER					
Pipe Connection Size (in.)					
Steam Inlet/Hot Water Inlet	6/4	6/4	6/4	6/4	6/6
Condensate Outlet/Hot Water Outlet	1.5/4	1.5/4	2/4	2/4	2/6
UNIT 16JB	047	054	057	061	068
NOMINAL COOLING CAPACITY (ton)	478	539	574	818	880
RIGGING WEIGHT* (kg)					
Absorber/Evaporator	8,410	8,770	10,000	12,050	12,730
Generator/Condenser	2,520	3,180	3,180	3,180	3,380
Total	10,930	12,950	13,180	15,230	16,080
OPERATING WEIGHT (kg)	14,020	16,770	17,150	19,760	20,800
LITHIUM BROMIDE SOLUTION CHARGE (kg)	1,820	1,820	1,820	2,180	2,180
REFRIGERANT (WATER) CHARGER (kg)	340	680	680	1,000	1,000
CHILLED WATER					
Pipe Connection Size (in.)	8	8	8	8	8
No. of Passes	2	2	2	2	2
COOLING WATER					
Pipe Connection Size (in.)	10	10	10	10	10
No. of Passes					
Absorber	2	2	2	2	2
Condenser	1	1	1	1	1
STEAM/HOT WATER					
Pipe Connection Size (in.)					
Steam Inlet/Hot Water Inlet	8/6	8/6	8/6	8/6	8/6
Condensate Outlet/Hot Water Outlet	2/6	3/6	3/6	3/6	3/6

PERFORMANCE DATA



Low temperature hot water machines

UNIT 16JB	005/021	007/021	007/028	010/021	014/021	014/028	021/028	021/036
COOLING CAPACITY (Tons)	50	58	66	100	116	132	174	201
CHILLED WATER								
Flow Rate (gpm)	120	139	156	240	278	317	418	482
Pressure Drop (ft)	13.8	14.4	15	15.9	16.4	16.4	15.7	16.7
COOLING WATER								
Flow Rate (gpm)	194	226	257	369	451	514	677	782
Pressure Drop (ft)	21.3	23.8	21.8	23.2	23.2	20.9	20.9	22
HOT WATER								
Flow Rate (gpm)	114	133	151	229	268	302	389	460
Pressure Drop (ft)	7.3	9.8	8.8	8	8	5	8.5	8

UNIT 16JB	028/038	028/047	038/047	038/057	038/068	047/057	047/068	057/068
COOLING CAPACITY (Tons)	235	270	312	349	397	455	490	622
CHILLED WATER								
Flow Rate (gpm)	659	648	749	838	863	1,062	1,176	1,263
Pressure Drop (ft)	18.2	16.2	16.7	16.7	15.7	18.1	18.1	32.9
COOLING WATER								
Flow Rate (gpm)	908	1,060	1,214	1,358	1,544	1,770	1,908	2,031
Pressure Drop (ft)	22	21.8	21.8	38.2	38.3	38.2	38.3	38.3
HOT WATER								
Flow Rate (gpm)	534	618	715	799	909	1,042	1,122	1,198
Pressure Drop (ft)	11	7	8	9	7	12	10	12

Note: Ratings are based on:
 44 F Chilled water $\Delta T=10$ F
 65 F Cooling water $\Delta T=15$ F
 184 F Entering Hot water $\Delta T=15$ F

Steam and hot water machines

UNIT 16JB	010	012	014	015	021	024	026	032
COOLING CAPACITY (Tons)	108	122	137	186	211	245	279	326
CHILLED WATER								
Flow Rate (gpm)	259	282	328	446	506	587	689	781
Pressure Drop (ft)	16.9	16.0	16.4	15.8	15.7	15.9	18.2	15.8
COOLING WATER								
Flow Rate (gpm)	389	439	493	670	760	882	1004	1174
Pressure Drop (ft)	20.0	20.2	19.2	22.4	23.2	20.8	20.8	21.3
STEAM (lb/hr-ton)	1,815	2,178	2,448	3,319	3,784	4,373	5,004	5,826
(lb/hr)	17.7	17.9	17.9	17.8	17.9	17.9	17.8	17.9

UNIT 16JB	038	041	047	054	057	061	068
COOLING CAPACITY (Tons)	382	413	479	539	574	618	680
CHILLED WATER							
Flow Rate (gpm)	868	990	1,148	1,292	1,376	1,481	1,630
Pressure Drop (ft)	15.7	16.9	18.1	33.3	32.9	32.7	32.9
COOLING WATER							
Flow Rate (gpm)	1,303	1,487	1,724	1,940	2,066	2,226	2,448
Pressure Drop (ft)	22.0	20.9	21.8	35.9	36.2	38.5	36.3
STEAM (lb/hr-ton)	6,492	7,387	8,585	9,708	10,440	11,231	12,468
(lb/hr)	17.9	17.9	17.9	18.0	18.2	18.2	18.3

LEGEND

ARI - Air Conditioning and Refrigeration Institute

NOTE: Ratings are based on ARI 880, latest edition, 64/64 F (2.4 gpm/ton) chilled water; 68 F cooling water (3.5 gpm/ton); fouling factor .0025 ft² - hr - F/ft³.

ELECTRICAL DATA



Low temperature hot water machines

Steam and hot water machines

005/021

VOLTAGE	PUMP	KW	HP	FLA	LRA	MFA
50 HZ/380 -415	Solution	1.3	1.75	4	11	8
	Refrig.	3	4	8	28	12

007/021, 007/028

VOLTAGE	PUMP	KW	HP	FLA	LRA	MFA
50 HZ/380 -415	Solution	2.2	3	6.5	24	10
	Refrig.	3	4	8	28	12

010/021

VOLTAGE	PUMP	KW	HP	FLA	LRA	MFA
50 HZ/380 -415	Solution	1.3	1.75	4	11	8
	Refrig.	3	4	8	28	12

014/021, 021/028, 021/036

VOLTAGE	PUMP	KW	HP	FLA	LRA	MFA
50 HZ/380 -415	Solution	2.2	3	6.5	24	10
	Refrig.	3	4	8	28	12

028/036, 028/047, 036/047, 036/057, 036/068

VOLTAGE	PUMP	KW	HP	FLA	LRA	MFA
50 HZ/380 -415	Solution	3	4	8	28	12
	Refrig.	3	4	8	28	12

047/068

VOLTAGE	PUMP	KW	HP	FLA	LRA	MFA
50 HZ/380 -415	Solution	3.7	5	12	41	18
	Refrig.	3	4	8	28	12

057/068

VOLTAGE	PUMP	KW	HP	FLA	LRA	MFA
60 HZ/380 -415	Solution	3.7	5	12	41	18
	Refrig.	2.2	3	7	24	10

010 to 021

VOLTAGE	PUMP	HP	FLA	LRA	MFA
50 HZ/380 -415	Solution	3.0	8.0	27.5	18
	Refrig.	5.0	10.5	41.0	

028 to 068

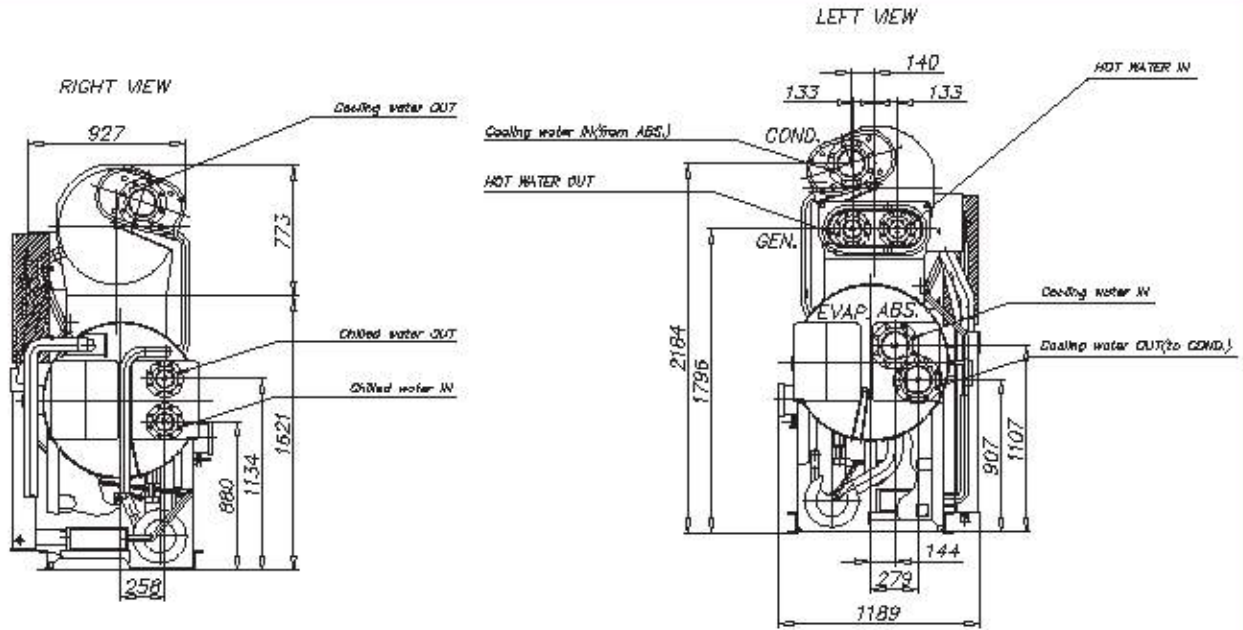
VOLTAGE	PUMP	HP	FLA	LRA	MFA
60 HZ/380 -415	Solution	5.0	10.5	41.0	18
	Refrig.	5.0	10.5	41.0	

BHP - Brake Horsepower FLA - Nameplate Full Load Amps.

NOZZLE ARRANGEMENTS



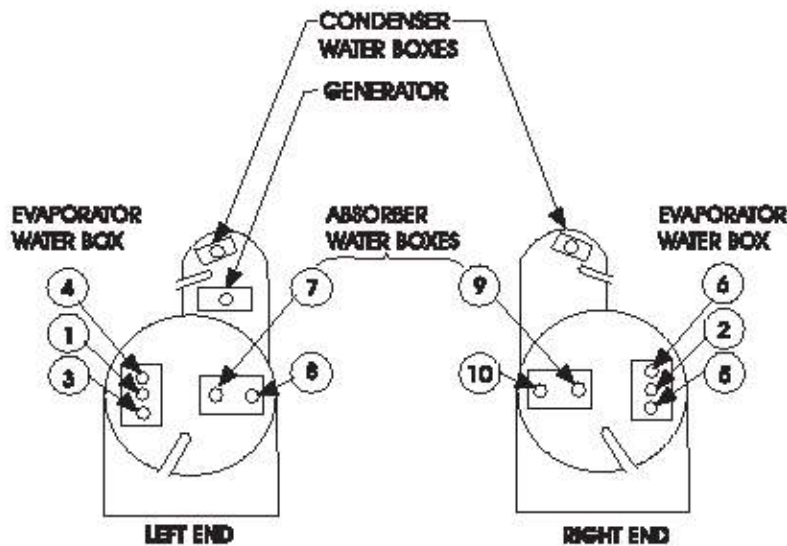
Low temperature hot water machines



Machine size: 16JB014/028 - 908

		Inlet x	Outlet ø
EVAPORATOR	2 Pass	DN 100	DN 100
ABSORBER	2 Pass	DN 150	DN 150
GENERATOR	HW	DN 100	DN 100
CONDENSER	1 Pass	DN 180	DN 180

Steam and hot water machines



EVAPORATOR								
1-Pass			2-Pass			3-Pass		
In	Out	Arr	In	Out	Arr	In	Out	Arr
1	2	T	3	4	X	5	4	V
2	1	S	5	6	W	3	6	U

ABSORBER

EVAPORATOR								
010-014			024-028			030-034		
In	Out	Arr	In	Out	Arr	In	Out	Arr
7	8	Z	8	7	Z	7	8	Z
10	9	Y	9	10	Y	9	10	Y

Arr - Arrangement

NOTES:

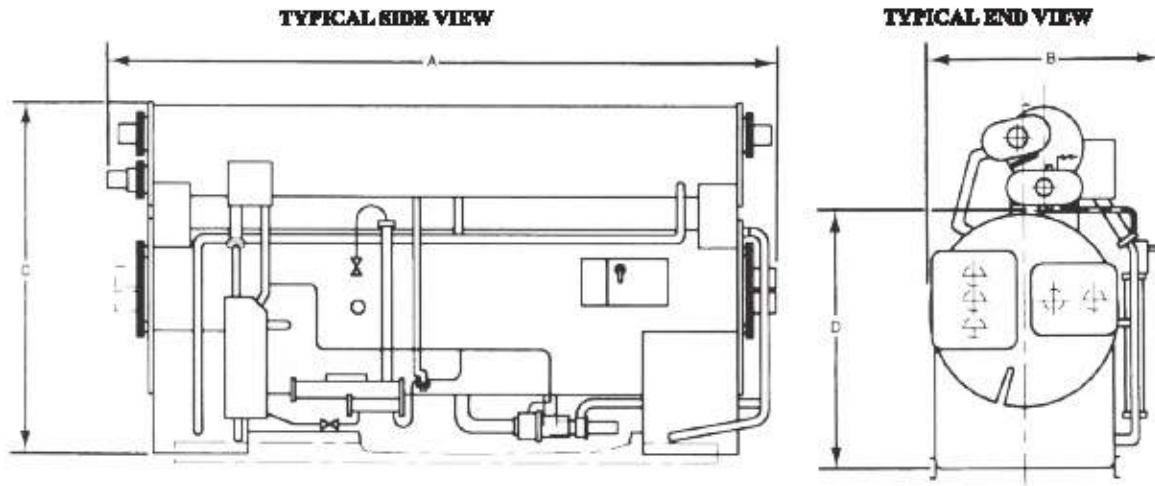
1. All machines have 1-pass condenser.
2. Generator water box is located on left end only.

NOZZLE ARRANGEMENTS



Low temperature hot water machines

Steam and hot water machines



DIMENSIONS (mm)

UNIT 16JB	028/036	028/047	036/047	036/057	036/068	047/057	047/068	057/068
Overall Length A	5244	5244	5298	5298	5298	5344	5344	6719
Overall Width B	1647	1667	2158	2158	2158	2237	2237	1960
Overall Height C	2764	2855	3188	3205	3205	3737	3737	3608
Height D*	1905	1905	2235	2235	2235	2616	2616	2489

UNIT 16JB	008/021	007/021	007/028	010/021	014/021	014/028	021/028	021/036
Overall Length A	2808	2808	2808	5500	5500	5500	6212	6212
Overall Width B	1120	1120	1120	1189	1189	1189	1378	1527
Overall Height C	2298	2298	2394	2298	2298	2394	2498	2560
Height D*	1473	1473	1473	1473	1473	1473	1702	1702

DIMENSIONS (mm)

UNIT 16JB	010	012	014	018	021	024	028	032	036	041	047	054	057	061	068
Overall Length A	5105	5105	5105	5105	5105	5160	5160	5130	5130	5130	5130	6805	6805	6805	6805
Overall Width B	1120	1120	1120	1360	1360	1560	1560	1930	1930	2260	2260	1930	1930	2230	2230
Overall Height C	2230	2230	2230	2390	2390	2540	2540	3110	3110	3505	3505	3605	3605	4020	4020
Height D*	1473	1473	1473	1702	1702	1905	1905	2235	2235	2616	2616	2489	2489	2921	2921

*Standard shipping configuration is 1-piece for sizes 010-047; 2-pieces for sizes 054-068.
Dimension "D" is height of absorber/evaporator section for 2-piece shipment

NOTES:

- All dimensions are approximate and do not take into account absorber condenser crossover piping.
- For routine maintenance, allow 3 ft (1 m) clearance all sides 6 in. (150 mm) above chiller.
- For service access, allow clearance as follows:
 - For tube removal, allow space equal "A" dimension (length) at either end of the chiller.
 - To open waterbox cover, allow clearance space equal to half of "B" dimension (width) on the waterbox end of the chiller.

