

Low Temperature Hot Water Driven Absorption Chiller 200 TR to 1640 TR (700 kW to 5765 kW)



Absorption Cooling & Heating Solutions

Sustainable Solutions in Energy & Environment

Thermax is a USD 750 million engineering major providing sustainable solutions in the areas of energy and environment. Spanning over 90 countries, customers make use of Thermax's business-to-business solutions for heating, cooling, power and cogeneration plants; waste heat recovery units; systems for water & wastewater management and air pollution control; performance improving chemicals.

Thermax's operations are supported by ongoing Research & Development and also with tie-ups from global technology majors. With an international sales & service network spread over 27 countries, Thermax also has it's state-of-the-art manufacturing facilities in 14 locations including India, Poland, Indonesia, Denmark & Germany.

Our Vision

To be a globally respected high performance organization offering sustainable solutions in energy and environment

We heat, we cool, we power and we clean

Thermax, an engineering company providing sustainable solutions in energy and environment, has the vision for the future, firmly anchored in the belief that to stay competitive, companies need to adopt sustainable development practices.



The systems, products and services developed by Thermax help industries achieve better resource productivity and improve bottom lines, while maintaining a cleaner environment. Even in the conversion of costs to profits, Thermax helps to protect the environment in it's own way. A win-win for industry and the society at large.

Thermax's business portfolio includes products for heating, cooling, water and waste management, and specialty chemicals. The company also designs, builds and commissions large boilers for steam and power generation, turnkey power plants, industrial & municipal waste water treatment plants, waste heat recovery systems and air pollution control projects.



Thermax Cooling Business

With over 50 years of expertise in the field of Thermodynamics, Thermax helps extract even the last calorie available at your facility. Solutions in the form of absorption chillers, heat pump, chiller-heaters, composite chillers, ultra low pressure vapour chiller & multi energy chillers are used in more than 100 applications and over 50 industrial segments for air conditioning, industrial cooling and heating.

Thermax absorption chillers cater to industrial-cooling, commercial air-conditioning as well as industrial and space heating needs. Thermax's USP lies in identifying the unused heat available at your plant and provide recovery based or live energy based solutions to optimize energy thus reducing your operational cost.

Thermax offers solutions from -40°C to 180°C by utilizing hot water starting from 80°C vapour or steam from 0 bar(g) onwards, flue gases from engine & turbines from 270°C onwards and a variety of liquid & gaseous fuel.

Thermax has helped clients with eco-friendly airconditioning and process cooling solutions to reduce their carbon footprints. Thermax has a global presence in 90+ countries across Asia Pacific, Africa, Middle East to CIS countries, USA and South America.

Thermax offers solutions to a wide array of industrial segments including pharmaceuticals, chemicals, fertilizers, steel, textiles, petrochemicals, food & beverages, commercial complexes, shopping complexes, office buildings, educational institutes, and airports among others.

Solutions offered by Thermax are differentiated by:

- Reduction of operational cost
- Reduction in electricity consumption
- Reduction in the GHG emissions, zero ozone depletion potential

Thermax's unique heating & cooling solutions accommodate a wide range of industrial & commercial applications across the globe. These solutions deliver high efficiency, cost effectiveness & are environment friendly.



Manufacturing Excellence

Inaugurated in early 2019, Thermax's manufacturing facility at Sricity, Andhra Pradesh is a state-of-the-art IGBC platinum certified green factory building and has been designed focusing on process automation, mechanisation and digitisation. This smart facility is equipped with best in class machinery and is a big step towards automation to facilitate zero-defect processes ensuring superior quality products. Critical processes such as welding are carried out with robots and CNC machines carry out the precision machining activities. Fabrication processes are mechanised using specially

designed fixtures. Entire manufacturing records are digitised for real time updates using MES software. Engineering design automation using 3D drawings, Cloud computing and MES have enabled this plant to employ contemporary technologies and follow the path of Industry 4.0 principles. The plant is equipped with a Welding Training Centre to hone the skills of operators. Products upto 3000 TR capacity can be tested for performance at its digitally controlled test bay facility. This infrastructure is created to deliver best in class quality output.

Certifications

Recognized by global standards

















Salient Features

Best-in-class Coefficient of Performance

Process design to ensure maximum internal heat recovery to give the lowest energy consumption benefit to the customer. Unique 'Twin Design' ensures optimum solution circulation rates, delivering highest possible COP.

Two Stage Absorption Technology

Heat input is one of the lowest in the industry, resulting in higher cooling output from the same heat input. Also, larger temperature difference in chilled water up to 30°C is possible.

Heat Recovery at Lower Temperature

Due to two stage absorption, the resultant solution concentration is low, which helps to recover heat by cooling hot water to a much lower temperature. This helps to achieve high temperature difference in hot water.

Multi-Level Spray in Generator

To improve the heat transfer in generator at lower temperature, multi-level spray system is provided. This ensures uniform spray and wettability of generator tubes

Highly Efficient Online Purge System

Factory fitted high efficiency purge system with subcooler, continuously removes non-condensable gases from the chiller into the storage tank. The rate of removal of non-condensable gases is highly improved by the independent purging from different circuits. The purge system comes fitted with an absolute pressure transmitter for precise vacuum measurement.

Plate Type Solution Heat Exchanger

The regenerative heat exchanger used is high efficiency plate type heat exchangers with SS316 plates, for improved reliability and maximum internal heat recovery.

Multi Stage Level Control

Multiple stage level control of evaporator and absorber enables effective operation during part load preventing cavitation of refrigerant and absorbent pumps. This level control system is also capable of detecting the ingress of process fluids from external circuits, maximizing uptime and minimizing maintenance cost.

Gravity Feed LiBr & Refrigerant Spray System

Nozzle-less, non-clogging gravity feed distribution mechanism for stable and reliable operation throughout the life of the machine. Drop in performance due to nozzle wear and clogging eliminated

10-100% Stepless Modulation

For cooling loads ranging from 10% to 100% of the designed capacity, the steam/hot water control valve automatically varies heat input in order to maintain the temperature of chilled water leaving the machine. An advanced PID control system continuously monitors and controls the process parameters to ensure steady temperature.

Isolation Valves for Canned Motor Pumps

The canned motor pumps fitted on the chiller are time tested and offer high degree of durability. Double seal isolation valves on the suction and discharge lines along with bolted pumps facilitate easy maintenance of the canned motor pumps without any loss of vacuum in the system. This significantly eases the maintenance process and reduces the down time of the machine.

Lowest Chilled Water and Brine Temperatures

Our innovative absorption chillers can deliver chilled water temperatures down to 1°C leaving chilled brine solution up to -5°C. This allows use of low grade heat for low temperature applications, saving precious electricity.

Non-Toxic Corrosion Inhibitor

New generation, non-precipitating, non-toxic molybdenum-based corrosion inhibitor which is more effective than conventional inhibitors based on Chromate and Nitrate. Chromates are known to have health hazards and are prohibited in several countries. Nitrates tend to disintegrate to release ammonia, which corrodes copper and copper alloys.

DLP Grade Copper Tubes

Copper tubes conforming to ASTM/JIS standards, with phosphorus content maintained below 0.005 ppm are used in chilled water and cooling water circuits. This protects the tubes from undergoing hydrogen embrittlement in LiBr environment

PLC based Control Panel



Thermax chillers are controlled through a standalone skid mounted control panel. The backbone of the control system is an advanced Programmable Logic Controller (PLC), sourced from globally respected manufacturers. This makes it possible to customize the controls and safeties based on customers process requirements. A facility which is not possible with microprocessorbased control systems. Special RTD cards are used for temperature measurement to ensure high level of accuracy.

Online Pump Health Monitor

The chiller PLC continuously monitors the health of canned motor pumps and informs user of any impending maintenance requirement.

Zero Crystallisation

Distinctive concentration monitoring and control which operates along with auto de-crystallization system, virtually eliminates crystallization. The chiller PLC continually monitors strong solution concentration, takes proactive measures to prevent crystallization. In addition to this heat input to the chiller is limited based on cooling water inlet temperature. This helps the machine to operate even at low cooling water inlet temperature without crystallization.

Redundant Chilled Water Flow Safeties

Chilled water circulation is critical to prevent water from freezing inside chilled water tubes. Redundancy in chilled water flow detection is provided by the use of a flow switch, differential pressure switch and chilled water pump run interlock.

Fail Safe Control Valves

The electro-pneumatic steam/ hot water control valves are designed to close immediately on power or signal failure to ensure reliability and equipment uptime. Option of fail-safe electric control valves are available on request.

BAS/DCS Connectivity

Direct connectivity of machine PLC panel with Third party monitoring systems like BAS (Building Automation System), DCS (Distributed Control System) or PLC (Programmable Logic Controller) can be provided via Modbus RTU protocol on RS485 network.



Customised Solutions

LiBr Absorption Chillers for Sub-Zero Cooling Applications

Lithium bromide absorption chillers can be offered for leaving brine temperatures as low as -10°C, offering great savings in operating costs.

Stand-by Pumps

For critical applications where scheduled maintenance of pumps cannot be carried out, stand-by absorbent, refrigerant and/or vacuum pump can be provided.

Fully Automatic Purging

The automatic purging system eliminates the need for periodic monitoring of purge tank pressure and operation of purge system.

Multi Sectional Shipment Arrangement

For convenience of shipping, the absorption chillers can be shipped in two or more sections depending upon the site requirement. This is particularly convenient arrangement for retrofit / replacement jobs.

Special Tube Metallurgy

Special tube materials like Cupro-Nickel, Stainless Steel or Titanium depending on water quality on site. This not only improves the reliability and efficiency but also makes the chiller suitable for special applications involving sea water and brackish water.

Customized Electrical and Instrumentation

Thermax possesses rich experience supplying chillers for critical applications in refinery and petrochemical plants across the globe. Thermax has in house capability to address critical applications such as:

- Hazardous area design for gas group class 1, division 2, IIA/IIB, per IEC and NEC Standards
- Redundant PLC systems, with redundancy at all levels, of various makes for fail safe operations
- Centralized Load Management systems for multiple machines operating in tandem
- SCADA connectivity for remote monitoring and control of machines.

Chillers for High Capacity and High Pressure

As pioneers in Absorption technology, we offer specially designed absorption chillers for high capacity, high COP and customized solutions to cater large industrial & commercial air conditioning requirements. Chillers with steam and water circuits designed for higher operating pressures such as 16bar(g) (250PSI(g)) and 25bar(g) (350PSI(g)) are also available on request.



Basic Principle

Vapour Absorption Machine uses water as the refrigerant and Lithium Bromide (LiBr) solution as the absorbent. The process of cooling goes through stages such as evaporation of refrigerant in evaporator, absorption of refrigerant by concentrated LiBr solution in absorber, boiling of dilute LiBr solution to generate refrigerant vapour in generator and condensation of refrigerant vapour in condenser. The boiling point of water is directly proportional to pressure. At 6mmHg absolute pressure the boiling point of water is 3.7°C. To change water from liquid to vapour it has to be heated. The heat, required to change the phase of a liquid to vapour, is called the Latent heat of evaporation.



LiBr is a chemical similar to common salt (NaCl). LiBr is soluble in water. The LiBr water solution has a property to absorb water due to its chemical affinity. As the concentration of LiBr solution increases, its affinity towards water vapour increases. Also as the temperature of LiBr solution decreases, its affinity to water vapour increases. Further, there is a large difference between vapour pressure of LiBr and water. This means that if we heat the LiBr water solution, the water will vapourise but the LiBr will stay in the solution and become concentrated.

Cycle of Operation





Cooling Water Hot Water



Refrigerant Liquid ****** Refrigerant Vapour



Strong Solution Intermediate Dilute Solution **Dilute Solution**

Evaporator

The lower shell consists of evaporator and absorber sections. The evaporator consists of a tube bundle, an outer shell, distribution trays, and a refrigerant pan. The chilled water flows inside the tubes of the evaporator. A refrigerant pump circulates the refrigerant from the refrigerant pan into the distribution trays. From the trays the refrigerant falls on the evaporator tubes.

The shell pressure is very low, due to which the refrigerant evaporates at a low temperature and extracts latent heat of evaporation from the water being circulated through the evaporator tubes. Thus the heat is extracted from the water being circulated through the tubes and it becomes chilled to a certain degree.

Absorber

The absorber consists of a tube bundle, an outer shell, distribution trays, and an absorbent collection sump. Concentrated absorbent solution from the generator is fed into the distribution trays. This solution falls on the absorber tubes. Concentrated absorbent has an affinity to water. Hence the vaporized refrigerant from the evaporator section is absorbed. Due to this absorption the vacuum in the shell is maintained at a low pressure, and ensures the heat extraction from the chilled water.

The concentrated absorbent becomes diluted. During this dilution the 'Heat of Dilution' is generated. This increases the temperature of the absorbent solution. The cooling water being circulated in the absorber tubes removes the heat of dilution. As it loses its heat to the cooling water, the absorbent is able to absorb more refrigerant vapour and gets further diluted. The diluted absorbent collects in the bottom of the shell.

Solution Heat exchanger

The absorbent pump pumps the diluted absorbent to the generator through the solution heat exchangers, where it gets heated up by the strong solution coming from the generator. The solution heat exchanger serves to heat up the absorbent solution before it enters the generator for regeneration. This reduces the heat input required in the generator. This increases the efficiency of the cycle.

Generator

The generator and condenser tube bundles are enclosed in a shell and are separated by an insulation plate. Hot water at the rated inlet conditions passes through the tubes in the generator. Here it heats up the dilute solution coming from absorber. The absorbent, which has become concentrated in the generator drains to the absorber to begin a new absorbent cycle. Due to boiling, the refrigerant vapours are generated.

Condenser

The vapours flow into the condenser side via the eliminators. In the condenser they get condensed in the shell side because of the cooling water passing in the tube side. The condenser consists of tube bundle, an outer shell and a refrigerant pan. The condensed refrigerant gets collected in the bottom of the condenser. The condensed refrigerant then flows back to the evaporator to begin a new refrigerant cycle.



Technical Specifications

Parameters - T	AC	UNITS	L5 D3	L5 D4	L5 E1	L5 E2	L5 E3	L5 E4
Capacity	Cooling Capacity	TR	203	233	276	302	341	376
Chilled Water Circuit	Flow rate	m ³ /hr	122.5	140.6	166.5	182.2	205.7	226.8
	Connection Diameter	mmNB	1.	25	125		150	
Cooling Water Circuit	Flow rate	m ³ /hr	203	233	276	302	341	376
	Connection Diameter	mmNB	1.	50	200		200	
Hot water Circuit	Flow rate	m ³ /hr	79	91	108	118	133	147
	Connection Diameter	mmNB	1	00	100		125	
Electrical Data	HP Absorbent Pump Motor Rating	kW (A)	2.3	1(5)	2.31(5)	4.4	5 (8)	5.35 (11
	LP Absorbent Pump Motor Rating	kW (A)	2.3	1(5)	2.31(5)	2.3	1(5)	5.75 (8)
	Refrigerant Pump Motor Rating	kW (A)	0.67	(1.4)	0.67(1.4)		0.67(1.4	l)
	Vacuum Pump Motor Rating	kW (A)						
	Total Electric Input	kVA	5	.0	5.0	5.9	5.9	7.7
	Power Supply							
Overall Dimensions	Length	mm	40)37	4707		4727	
	Width	mm	21	49	2149		2201	
	Height	mm	31	75	3175		3263	
Weights	Operating Weight	x 1000 kg	11.2	11.6	13.1	15.2	15.6	16.1
	Shipping weight	x 1000 kg	9.4	10.0	11.1	12.3	12.9	13.4
Clearance	Clearance for Tube Removal	mm	35	39	4167		4267	

Notes:

- Model Nos. : TAC L5 XX L5 Hot Water Fired Vapour Absorption Chiller
- Chilled water inlet / outlet temperature = 12/ 7 °C
- Cooling water inlet temperature = 29.4 °C
- Minimum cooling water inlet temperature is 15°C
- Ambient condition shall be between 5 to 45°C

- Maximum allowable pressure in chilled / cooling water system = 8 kg/cm²(g)
- Control panel electric input= 1kVA
- All water nozzle connections to suit ASME B16.5 Class 150
- Technical specification is based on JIS B 8622 : 2002
- VAM with higher chilled water temperature difference also available

L5 E5	L5 E6	L5 F2	L5 F3	L5 G1	L5 G2	L5 G3	L5 G4	L5 G5	L5 G6	L5 H1	L5 H2	L5 J1	L5 J2
429	472	546	602	715	787	865	917	1080	1167	1266	1354	1521	1639
258.8	284.7	329.4	363.1	431.3	474.7	521.8	553.2	651.5	704.0	763.7	816.8	917.49	988.67
2	.00	20	0	25	50	25	50	25	50	30)0	30)0
429	472	546	602	715	787	865	917	1080	1167	1266	1354	1521	1639
2	50	25	0	30	00	35	50	35	50	4()0	4(00
168	185	214	236	280	308	336	356	417	451	490	525	588.88	635.32
1	50	20	0	20	00	20)0	25	50	25	50	25	50
5.35	5 (11)	7.87	(14)	7.87	(14)	9.8	(17)	6.8((13)	6.8((13)	8.5((17)
4.45(8)	5.35 (11)	5.35 (11)	7.87(14)	7.87	(14)	9.8(17)	6.8((13)	6.8((13)	8.5((17)
0.67	7(1.4)	0.67((1.4)	2.31	l (5)	2.31	(5)	2.31	(5)	2.31	(5)	2.31	(5)
		0.7	5(1.8)										
7.7	8.7	9.6	10.5	11	.6	13	.4	11	.0	11	.0	13	.4
	415 V(±10%), 50	Hz (±5%), 3	3 Phase+	-N								
48	800	584	43	74	00	75	00	75	23	88	74	104	164
23	343	237	70	25	50	27	00	30	00	31	00	31	50
33	303	33(03	37	00	39	00	41	42	41	42	41	92
18.2	18.7	21.2	21.8	26.8	27.3	38.3	38.7	45.5	46.0	51.7	52.4	53.1	53.8
14.6	15.2	17.1	17.8	22.1	22.5	30.4	30.8	36.4	37.1	40.9	41.7	43.2	44.0
42	267	524	46	67	27	67	27	67	27	80	82	96	00

- Please contact Thermax representative / office for lower cooling water flow
- Please contact Thermax representative / office for customized specifications

Physical Dimensions





					Machi	ne Dime	nsions				
Model	L1	W1	H1	N1	N2	N3	N4	N5	N6	N7	N8
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	ММ
L5 D3	4037	2149	3175	125	125	25	150	150	25	100	100
L5 D4	4037	2149	3175	125	125	25	150	150	25	100	100
L5 E1	4707	2149	3175	125	125	25	150	150	25	100	100
L5 E2	4727	2201	3263	150	150	25	200	200	25	125	125
L5 E3	4727	2201	3263	150	150	25	200	200	25	125	125
L5 E4	4727	2201	3263	150	150	25	200	200	25	125	125
L5 E5	4800	2343	3303	200	200	25	250	250	25	150	150
L5 E6	4800	2343	3303	200	200	25	250	250	25	150	150
L5 F2	5843	2370	3303	200	200	25	250	250	25	150	150
L5 F3	5843	2370	3303	200	200	25	250	250	25	150	150
L5 G1	7400	2550	3700	250	250	25	300	300	25	200	200
L5 G2	7400	2550	3700	250	250	25	300	300	25	200	200
L5 G3	7500	2700	3900	250	250	25	300	300	25	200	200
L5 G4	7500	2700	3900	250	250	25	300	300	25	200	200
L5 G5	7523	3000	4142	250	250	25	350	350	25	250	250
L5 G6	7523	3000	4142	250	250	25	350	350	25	250	250
L5 H1	8874	3100	4142	300	300	25	400	400	25	250	250
L5 H2	8874	3100	4142	300	300	25	400	400	25	250	250
L5 J1	10464	3150	4192	300	300	25	400	400	25	250	250
L5 J2	10464	3150	4192	300	300	25	400	400	25	250	250



	Nozz	le Schedule
Nozzle	Nozzle	Description
	FL	Rating
N1	ASA 150	Chilled Water Inlet
N2	ASA 150	Chilled Water Outlet
N3	-	Chilled Water Drain Valve
N4	ASA 150	Cooling Water Inlet
N5	ASA 150	Cooling Water Outlet
N6	-	Cooling Water Drain Valve
N7	ASA 150	Hot Water Inlet
N8	ASA 150	Hot Water Outlet
N9	NPT (F)	Hot Water Drain Plug

Minimum installation clearance

- Control panel side: 1250 mm
- Top: 200 mm | Others: 500 mm
- Notes Indicates the position of anchor bolts
 - Indicates the position of power supply to the control panel



	Found	ation			
N9	L	W	В	стс	Weight
mm	mm	mm	mm	mm	Ton
12.5	112	250	1492	1352	5.5
12.5	112	250	1492	1352	5.7
12.5	136	250	1492	1352	6.5
12.5	133	270	1542	1442	7.4
12.5	133	270	1542	1442	7.7
12.5	133	270	1542	1442	7.9
12.5	133	320	1750	1610	9.6
12.5	133	320	1750	1610	9.8
12.5	172	320	1750	1610	11.4
12.5	172	320	1750	1610	11.8
12.5	229	324	1764	1644	15.4
12.5	229	324	1764	1644	15.9
12.5	225	424	2150	2010	20.5
12.5	225	424	2150	2010	20.9
12.5	227	424	2442	2302	24.1
12.5	227	424	2442	2302	24.7
12.5	274	424	2442	2302	27.8
12.5	274	424	2442	2302	28.5
12.5	333	424	2442	2302	31.8
12.5	333	424	2442	2302	32.6

Insulation Guidelines











NOTES:

- Do not cover sight glass with insulation
- The total area includes the area of pipes in the machine
- Use non combustible insulation material
- LTHE & DHE shall be insulated with 1 layer of foam
- Insulation areas given in the table have been doubled assuming 2 layers of foam used
- Do not cover refrigerant pump motor with insulation

Model	Cold Surface Insulation	Hot Surface Insulation	Model	Cold Surface Insulation	Hot Surface Insulation
	m ²	m²		m²	m²
TAC L5 D3	14.30	5.50	TAC L5 G1	32.40	11.80
TAC L5 D4	14.30	5.50	TAC L5 G2	32.40	11.80
TAC L5 E1	16.20	6.00	TAC L5 G3	38.70	13.90
TAC L5 E2	19.50	7.10	TAC L5 G4	38.70	13.90
TAC L5 E3	19.50	7.10	TAC L5 G5	42.80	15.50
TAC L5 E4	19.50	7.10	TAC L5 G6	42.80	15.50
TAC L5 E5	22.10	9.20	TAC L5 H1	50.00	17.40
TAC L5 E6	22.10	9.20	TAC L5 H2	50.00	17.40
TAC L5 F2	25.70	10.30	TAC L5 J1	58.70	19.60
TAC L5 F3	25.70	10.30	TAC L5 J2	58.70	19.60

Symbol	Surface	Description	Temperature Range
	COLD	25 mm (min) thick elastomeric foam insulation	0 ℃ [32ºF] MIN
	HOT	19 mm thick EPDM foam	180 °C [356 °F] MAX

Piping and Instrumentation Guidelines



\bowtie	Gate Valve (Open)	C-⊠	Control Valve (Open)	t t	Air Filter Regulator	M	Motor
	Gate Valve (Close)	100001	Bellow/ Flexible Connection	P	Pressure Indicator		"Y" Strainer
	Globe Valve (Open)	国家	Solenoid Valve		Temperature Indicator	*	Level Incicator
1831	Globe Valve (Close)	×	Butterfly Valve (Open)	FM	Flow Meter	¥.	Safety Valve
\square	Non Return Valve	M	Butterfly Valve (Close)	####	Pneumatic Line	₽¥	Pneumatic on/ off Butterfly valve
Å	Cock	\otimes	Inverted Bucket Steam Trap	Q	Pump	र्य इंश्व	Electro-Pneumatic Globe Type Control Valve
			Clien	t Scope 🗸	Thermax Scope		

NOTES:

- 1. Necessary arrangements to be provided to ensure that hot water inlet temperature to the machine doesn't increase beyond allowable limit (10°C above rated).
- 2. Automatic arrangements should be provided to stop cooling water flow through the machine, if the chilled water/brine flow stops.
- 3. Maximum working pressure in water headers is 8bar(g). This should be noted for design of chilled water/brine, cooling water and hot water system.
- 4. Minimum allowable cooling water inlet temperature is 20°C.Necessary arrangements to be provided to maintain constant cooling water inlet temperature to the machine.
- 5. Install automatic shut off valve on the cooling water inlet line, if cooling water pumps are not dedicated to the machine.
- 6. If cooling water pumps are dedicated to the machine

and chilled water/brine temperature is < 4.5°C, install cooling water automatic shut off valve only on the bypass line between cooling water inlet and outlet.

- 7. Ensure that the compressed air supply to the instrument is available at 5bar(g) and is free from oil and dust.
- 8. Least count of pressure gauge in the water circuits should be 0.05 bar.
- 9. Suitable expansion tank should be provided for closed loop chilled water / hot water system.
- 10. Additional y-strainers (20 mesh) should be installed on chilled water, hot water and cooling water inlet line close to the machine, to prevent choking and tube failure due to foreign particles.

Global Service Support – Cooling

Thermax has a wide network of Service Centers throughout the globe to ensure quick response to customers. With a cumulative service experience of over 6000 VACs operating for more than 30 years, Thermax service personnel are equipped to deliver the right solution to the users. Thermax has developed specific modules for different types of users depending on their usage pattern, conforming to our proactive approach.



PROICARE

PROiCARE is next generation AI based remote monitoring system. This feature enables the facility manager or Thermax engineer to monitor the performance remotely using internet. It offers features like e-logbook, status, trends, abnormal start-stops, maintenance schedules, alerts etc and keep track of their chiller. It's a round the clock service that gives you a unified view so you can track the performance of your machine from anywhere and resolve issues faster.(This feature is available on request)

Remote Services at your Fingertip

This technology offers a single point window to access and monitor the chiller performance along with easy and secure remote access to real-time operations, performance data, and historical analysis.

Advanced Monitoring

ROSS offers a wide range of services which includes remote monitoring, advance trend analysis, data logging and diagnostic, enabling Thermax to provide proactive and well advance recommendation to keep the chiller performance intact eliminating any future downtime.

Expert Opinion

Real-time data and historical data from the chiller is collected and analyzed by Thermax experts, which enables identification of a potential threat to the chiller provide resolution to the problem in time enabling unhindered continuous process by smooth operation of the chiller. In case of any major breakdown, the data analytics provides insight into the nature of the problem and hence enables a quick turnaround time.



Multi-layered security

ROSS operates on an optimum level of security for remote connections and runs on VPN network, eliminating any security breach along with two point authentication. An advanced user management ensures that data remains in safe hands at any given point.

Analytical Reports

Customized reports are being generated with the intent to make a precise decision regarding the process, ensuring the optimum performance is delivered.

Architecture



A tailor-made offering for your specific needs

FEATURES	BASIC	ADVANCED	PRO
REMOTE ACCESS (24*7*365 days easy real-time access to the chiller)	\checkmark	\checkmark	\checkmark
ALARM NOTIFICATION (Notification with the set of customized alarms)	\checkmark	\checkmark	\checkmark
DATA LOGGING (Timely data logging of equipment)	\checkmark	\checkmark	\checkmark
CORRECTIVE ACTION (Expert opinion & intervention whenever required to maximize the uptime of chiller)	\checkmark	\checkmark	\checkmark
EVENT STATISTICS (Analysis of any recurring alarm & abnormality)		\checkmark	\checkmark
REPORTING (Precised reports)		\checkmark	\checkmark
OPERATIONAL DATA INSIGHT (Operational data analysis)			\checkmark
EQUIPMENT PERFORMANCE ANALYSIS (Overall chiller performance analysis)			\checkmark

We believe in increasing uptime, reducing unscheduled interruption and optimizing chiller efficiency.

Our Prestigious Installations

Paramount Pictures, USA

The CHPC facility at Paramount Pictures in the USA includes a 230 TR Thermax Vapor Absorption Chiller triggered by hot water and four flex energy micro-turbine generators (259 mW each). Since the waste heat from engine jacket water is recovered and utilized in driving the chiller, the project is highly energyefficient and environmentally-friendly.

BMW, Germany

BMW's Landshut, plant in Germany uses 5 nos. of Thermax's Hot Water Driven Absorption Chillers for comfort cooling of their manufacturing and office area. These five Absorption Chillers have a cumulative capacity of 4475 TR and utilize hot water to drive the chiller.



Indo Gulf Fertilisers, India

Indo Gulf Fertilisers (IGF) a leading agri-solution provider, uses Thermax's Hot Water Driven Absorption Chiller of capacity 700 TR for process cooling requirements in their plant, reducing dependency on the power grid for cooling.



Maklada, Tunisia

Maklada, specialized in the manufacturing of high and low carbon steel wires and cables chose Thermax to be its preferred partner for catering to the process cooing requirement and uses Thermax's Absorption Chiller of 245 TR capacity driven by hot water.



Made In India for the World

Thermax adopts a partnering relationship with customers to address their energy and environmental challenges and enhance their performance and profits. With integrated energy-environment expertise and a proven track record in global markets, Thermax is the preferred partner of enterprises across industrial sectors in more than 85 countries.



- BMW (Germany)
- Ducati (Italy)
- Volkswagen (Germany)
- Ford Motors (India)

Honda (Thailand)

Breweries

- Karmeliten Brauerei (Germany)
- Carlsberg (India)
- Guiness Brewery (Nigeria)
- Peroni Brewery (Italy)
- United Breweries (India)

Chemicals

- Nirma (India)
- Celanese Corporation (USA)
- Gulf Flour (UAE)
- JBF RAK (UAE)
- Yaroslavl Paraffin Plant (Russia)

Commercial / Hospitality

Hyatt Plaza (Qatar)

Carlyle Hotel (USA)

Hudson Yards (USA)

Gardens by the Bay

Rome Airport (Italy)

Venice Airport (Italy)

Perth Airport (Australia)

Berlin Airport (Germany)

Istanbul Ataturk Airport

(Singapore)

Airport

(Turkey)

Atlantic City Casino (USA)

- Healthcare
- Niguarda Hospital (Italy)
- Brookedale Hospital (USA)
- DM Hospital (India)
- VallD'Herbron Hospital (Spain)
- **Royal Free Hospital**

Education

- Fordham University (USA)
- University Of Central Florida (USA)
- University of Magna Graecia
- (Italy)
- Shanghai Tech University (China)
- Michigan State University (USA)

Beverages



- Coca Cola (KSA) Silver Mill Natural Beverages
- (Sri Lanka)
- Cardinal Agri (Philippines)
- Niagra Bottling (USA)
- Tata Global Beverages (India)

Food Processing



- Ferrero (Italy) Cadburys (Nigeria)
- Perfetti Van Melle
- (Bangladesh)
 - PepsiCo (South Africa) Tipco Foods (Thailand)

Textile

- Polyplex (Turkey)
- DeMillus (Brazil)
 - Gildan TM (Honduras)
 - Envoy Textiles (Bangladesh)
 - Indorama (Thailand)

Refinery & Petrochemical

- SABIC (KSA)
 - Essar Oil (UK)
 - Petrobras (Brazil)
 - Reliance Industries (India)
 - Covestro (USA)

Pharma

- GSK (India)
 - Novartis (China)
 - Sanofi (Italy)
 - Astra Zeneca (UK)
 - Zydus Cadilla (India)

Metal



- Maklada Prestressed Steel (Tunisia) Vedanta Alumina Limited
- (India)
- PT Jindal Stainless Steel (Indonesia)
- TATA Steel (India)
- Arcelor Mittal Steel (KSA)

Dairy

- PT Santos Krimer (Indonesia)
- Lilongwe Dairy (Malawi)
- Alpro (Belgium)
- Mother Dairy (India)
- Milkfarm Bahnitz (Germany)

Edible Oil

- Cargill (Brazil)
 - Shabnam Vegetable Oil (Bangladesh)
 - Malabon Soap & Oil (Philippines)
 - PZ Wilmar (Nigeria)
 - Pan Century Edible Oils (Malaysia)

Recommended Water Quality

Water quality is a critical factor for the smooth operation of the machine. Poor water quality can result in scaling of tubes, corrosion, choking or failure of tubes. Hence it is highly recommended that proper water quality be maintained throughout the life of the VAM.

Allowable Range for Circulating Water in Chilled water and cooling water (< 40°C)

Items	Units	Copper	Cu:Ni (90:10)	SS316L	Titanium
pH (25°C)		6.8 - 8.5	6.8 - 8.5	6.8 - 8.5	6.8 - 8.5
TDS	ppm	< 600	< 20000	< 2500	4.00%
Turbidity	NTU	< 10	< 10	< 10	< 10
M Alkalinity	ppm	< 100	< 100	< 100	< 100
Chloride Ion Cl ⁻	ppm	< 300	< 10000	< 200	< 25000
Sulphates Ion SO ^₄	ppm	< 300	< 300	< 300	< 300
Silica	ppm	< 50	< 75	< 50	< 50
Total Hardness	ppm	< 300	< 300	< 300	< 300
Calcium Hardness	ppm	< 200	< 200	< 200	< 200
Total Iron Fe	ppm	< 0.5	< 0.5	< 0.5	< 0.5
Sulphide Ion S ⁻	ppm	ND	ND	ND	ND
Ammonium Ion NH4+	ppm	< 1	< 1	NA	NA
Biological Oxygen Demand	ppm	< 50	< 50	< 50	< 50
Chemical Oxygen Demand	ppm	< 100	< 100	< 100	< 100
Free Chorine	ppm	< 0.2	< 0.2	< 0.2	< 0.2
Oil & Grease	ppm	< 1	< 1	< 1	< 1
Free Carbon dioxide	ppm	< 3	< 3	< 3	< 3
Phenol, cyanide, lead, manganese etc.	ppm	ND	ND	< 0.1	< 0.1

*ND - Not Detected

*NA – Not Applicable

NOTES:

- Avoid stagnant water in Machine for longer period. In case of more than 1 day of shut down, circulate water for 30 minutes in the Machine every day. For longer duration, drain the water from Machine and keep the Machine in dry conditions. There should be no stagnant zone in the water circuit near the machine.
- When the temperature is high (40°C or higher), generally the corrosion behaviour is noticeable.
 Especially when the steel material is directly in contact with water without the protective coating, the effective corrosive protection, such as the addition of corrosion inhibitor, degassing treatment should be applied.



www.thermaxglobal.com

Corporate Office

Thermax House, 14 Mumbai-Pune Road Wakdewadi, Pune 411 003

Thermax Limited - Absorption Cooling & Heating Division

3rd Floor, Phase 1, TVH Belicia Towers Near SUN TV Office, MRC Nagar, Chennai, Tamilnadu - 600028 TEL.: 044-61334700

enquiry@thermaxglobal.com

Customer Care: 1800-209-0115

- 🔰 @thermaxglobal
- 🗿 @thermaxglobal
- in @thermaxlimited
- f @thermaxglobal
- 🛍 @thermaxmedia



Thermax Business Portfolio

- Heating
- O Cooling
- Power
- Air Pollution Control
- Chemicals
- O Water and Wastewater Solutions
- O Solar
- Specialised Services

This brochure presents only some of our products and we reserve the right to amend any product details without notice. The photographs used in the brochure are indicative and may not match the actual plant.

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