

BROAD Electric Chiller

Oil Free MAG-LEV Centrifugal Chiller & Water Distribution System (Packaged)

BROAD Air Conditioning India Pvt. Ltd.

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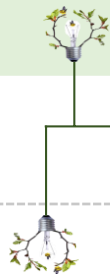
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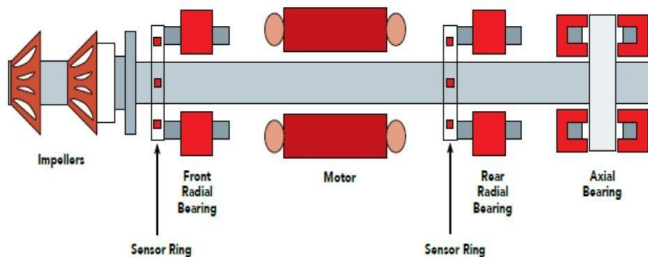
BROAD ELECTRIC CHILLER

HIGH EFFICIENCY



Danfoss Turbocor Compressor

BROAD power efficient chiller is equipped with Danfoss Turbocor Magnetic Levitation Compressor, which will enhance the energy efficiency greatly.



Rotor shaft is levitated using patented magnetic bearing technology.

Electronic Expansion valve

Control the liquid refrigerant spraying into the evaporator precisely. Also control the compressor, evaporator and condenser running at the optimum efficiency.

SAVINGS

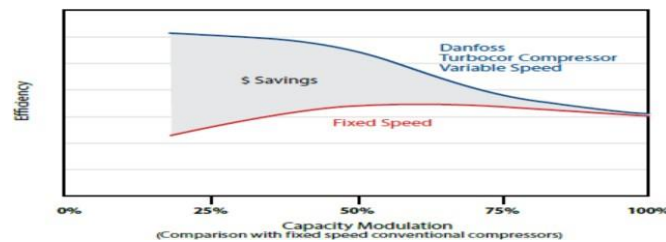


CONVENIENCE & RELIABILITY



Inverter control

The inverter centrifugal compressor adopts the integrated driving module. When the condensing temperature decreases or load reduces; lower the compressor revolution, then optimum the compressor energy efficiency with 10%~100% of rated load.



Low Consumption and High IPLV

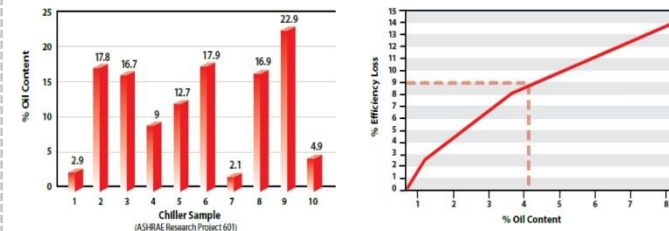
Different type of chillers IPLV are different such as Screw chiller: 0.6 ~ 0.7, (kW/Ton), Centrifugal chiller: 0.65 ~ 0.75 (kW/Ton), Normal oil free chiller: 0.35 ~ 0.4 (kW/Ton) **But BROAD take only : 0.3~ 0.37 (kW/Ton).** BROAD oil free chiller IPLV is 11.5 (IPLV: integrated part-load value AHRI standards). This high IPLV can reduce energy consumption by 40% when compared to traditional electric chillers. BROAD Packaged Water Distribution System can reduce electricity consumption up to 76% when compared to conventional field-built systems.

Low Start-up current

The size of BROAD oil free chiller impeller is much smaller than the conventional chiller because of adopting magnetic bearing and also, impeller is very small, thus when the system start up, only 2A current is necessary to suspend the axis, low starting torque, which results in low interference for electricity net. The normal chiller start current can reach 1500A.

Frictionless System

The digital magnetic bearing system will be suspended when compressor is running. The movement parts do not need oil, which avoid the oil film in the heat exchanger that lays on the pipe to reduce the heat exchanging efficiency. Thus it will ensure the Chiller has steady, reliable and outstanding performance in its operation period. The oil content of old type chiller is 9% on average, which will reduce the efficiency up to 15% to 20%. BROAD centrifugal chiller can enhance efficiency over 15% because of oil-free lubrication system.



Superior Metallurgy

Enhanced copper tubes (99.999 %) in evaporator will improve refrigerant flow and thus enhance the heat exchange efficiency. Condenser uses S.S 316 L tubes.





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Chiller Operational Cost Saving

Comparing with normal centrifugal chiller, BROAD Oil Free chiller can save cost up to 40%~50%. About Less than 3 years BROAD oil free chiller can take back the initial investment.

Packaged Pump Set Cost Saving

Compared with conventional machine room layout, BROAD packaged pump set system reduces the rated power demand by 50~70%, and the operating electricity consumption by 70~85% (the electricity for pump set only amounts to 2~5% of the rated cooling capacity.)

Examples on power consumption comparison

· BY50 (pumpset for 582kW/165Rt chillers)

Power consuming parts	Conventional machine room power demand	Packaged pumpset	
		power demand	Operating power consumption
Cooling water pump	30 kW	7.5 kW	2~7.5 KW
Cooling tower fan	11 kW	11 kW	3~11 KW
Chilled/heating W. pump	22 kW	7.5 kW	7.5 kW
Total electricity/cooling capacity	63 kW	26 kW	17 kW (annual)
	10.8%	4.47%	2.92%
Annual operating consumption	190 MWh	52 MWh (power saving rate 79%)	

Energy prices		Electricity price(USD/kWh) 0.1					Water price(USD/m3) 0.9						
		York air cooled chiller					BROAD power-efficient chiller						
Load	Cooling capacity TR	kW	kW/TR	Operation hours	Chiller energy cost		Cooling capacity TR	kW	kW/Ton	Operation hours	Chiller energycost	Water consumption	Water cost
100%	240	258.48	1.077	4	\$103.39		240	140	0.5833	4	\$56.00	1.5	5.4
93%	223.2	220.812	0.9893	225	\$4,968.26		223.2	126	0.5645	225	\$2,835.00	1.395	282.4875
87%	208.8	190.843	0.914	1889	\$36,050.28		208.8	112	0.5364	1889	\$21,156.80	1.305	2218.6305
80%	192	162.662	0.8472	1893	\$30,791.99		192	98	0.5104	1893	\$18,551.40	1.2	2044.44
73%	175.2	134.886	0.7699	702	\$9,469.03		175.2	84	0.4795	702	\$5,896.80	1.095	691.821
67%	160.8	118.397	0.7363	29	\$343.35		160.8	77	0.4789	29	\$223.30	1.005	26.2305
60%	144	98.9424	0.6871	1	\$9.89		144	63	0.4375	1	\$6.30	0.9	0.81
53%	127.2	82.0058	0.6447	0	\$0.00		127.2	56	0.4403	0	\$0.00	0.795	0
47%	112.8	69.4622	0.6158	0	\$0.00		112.8	49	0.4344	0	\$0.00	0.705	0
40%	96	58.2144	0.6064	0	\$0.00		96	42	0.4375	0	\$0.00	0.6	0
38%	91.2	53.3246	0.5847	1	\$5.33		91.2	39.2	0.4298	1	\$3.92	0.57	0.513
36%	86.4	49.2048	0.5695	1	\$4.92		86.4	36.4	0.4213	1	\$3.64	0.54	0.486
Annual electricity cost	\$81,746.46						\$48,733.16					Annual water cost	\$5,270.82
Annual cost saving	\$27,742.48												
Price idea	80,000~100,000						150,000~180,000						
Payback(years)	2.7												

Maintenance Cost Saving

Since BROAD oil free chiller contains less friction parts, gearing system and low weight parts thus it saves almost 90% of maintenance cost when compared with traditional electric chillers.

Maintenance content	Chiller type	centrifugal chiller R123	centrifugal chiller R-134a	BROAD Power-efficient chiller
Clean oil cooler, change oil		Once a year	Once a year	No need
Change oil and filter		Once a year	No Need	No need
Oil pump pressure and delay		Once per season	Once per season	No need
Oil quality test(Color, quality)		Once a week	Once a week	No need
Oil filter pressure test		Once a month	Once a month	No need
Compressor vibration test		Once a year	Once a year	No need
Motor winding check		Once a year	Once a year	No need
Contact and overload setting check		Once a year	Once a year	No need
Refrigerant cleanliness check		Once a week	No need	No need
Change refrigerant filter		Once a season	No need	No need

Space and Time Saving

Compared with the traditional electric chillers, BROAD packaged chiller reduces volume by 30~50% and weight by 30%. BROAD Packaged Water Distribution System and stainless steel metal enclosures can be installed outside which reduces mechanical room footprint requirements. Thus reducing land cost and labor cost (by saving installation time).



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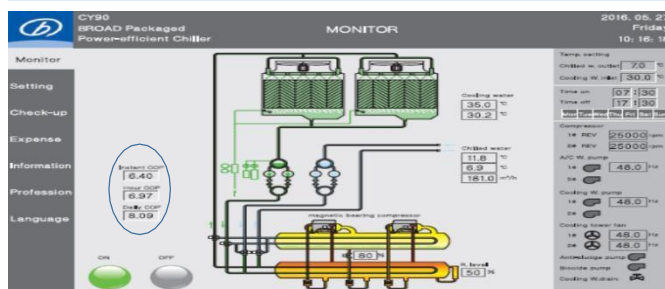


SAVINGS



Online COP Calculations & Detailed Touch Screen

BROAD own developed control system that makes the operation much convenient and reliable. Broad is the only manufacturer that displays instant COP. All BROAD Electric chillers are certified by AHRI which guarantees the capacity and COP.



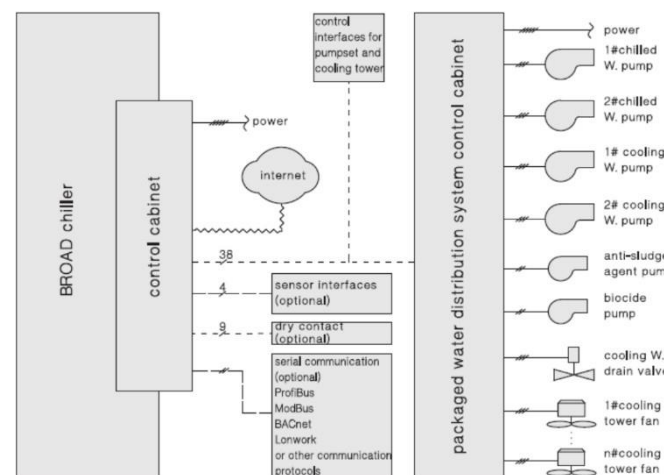
Online Monitoring and BMS

BROAD have more than 20 years' experience of remote monitoring online the machine, fault alarming and performance monitoring – Free throughout the life span of chiller. BMS function can implement. (Optional).



Control System

BROAD Electric Chillers have intelligent control systems. The chiller itself acts as the brain of system. BROAD packaged chiller control system includes interfaces for chiller / pump set / cooling tower fan / internet / BMS etc. Pump set and cooling tower control interface and water distribution system control cabinet are supplied with pump set.



Smart Anti-Surge Control

BROAD PLC "Smart anti-surge control" module insures the chiller always operate in a safe range.

Long Life

Broad Chillers are designed for a lifespan of 30 years.

Compact and Canopy Designed

Compared with other centrifugal chiller, BROAD oil free chiller comes with a S.S metal enclosure for open air installation with very low running noise, same as that of a telephone ring. Compact design makes it easy to transport and maintenance.



Environment friendly Refrigerant

Danfoss Compressor is designed for HFC-134a which is green, safe, non-pollutant and has zero ozone depletion potential. The device has nearly no vibrations with running noise lower than 70dB(A), while the normal chiller's is higher than 85dB(A).



Certifications

BROAD power-efficient chillers and packaged water distribution system are ISO, CE, ETL, ASME, AHRI certified. AHRI Certifications in particular guaranty the COP and Capacity of chiller.