



BLUE STAR

MagnaSmart

Centrifugal Chillers

Highly efficient and sustainable Chillers from the Experts





MagnaSmart Centrifugal Chillers with magnetic bearings

Introducing MagnaSmart, a variable-speed centrifugal chiller from Blue Star, India's largest central airconditioning and commercial refrigeration company.

Blue Star has been developing and manufacturing chillers for various applications and providing expert cooling solutions for over six decades. All the products manufactured by the Company are energy efficient. In line with its corporate philosophy of launching innovative products, Blue Star introduces MagnaSmart centrifugal chillers with oil-free technology, manufactured at its own world-class factory.

MagnaSmart centrifugal chillers are highly energy efficient and are equipped with the new generation Turbocor centrifugal compressors with magnetic bearings. These two-stage compressors, coupled with the in-built Variable Frequency Drives, enable significant reduction in the operating cost as well as reduce emissions.

MagnaSmart centrifugal chillers from Blue Star offer the highest sustainable efficiency with low maintenance and are ideal for data centres, hospitals, hotels, green buildings, educational institutions, as well as industrial and process applications.



Highly energy efficient

While the in-built VFD allows MagnaSmart to perform at part loads, the two-stage centrifugal design of the compressor ensures its performance even at full loads. Moreover, the IPLV is as low as 0.39 KW/TR. This substantially reduces operating costs.

The following chart demonstrates the typical savings with water-cooled MagnaSmart centrifugal chillers as compared to conventional chillers.

	MagnaSmart Centrifugal Chillers	Conventional Chillers	Savings
IPLV (kW/ TR)	0.39	0.60	0.21
TR	90	90	-
kW	35.1	54.0	18.9
Annual operating days	260	260	-
Operating hours / day	10	10	-
Total annual kWh	91260	140400	49140
Power cost (₹ / unit)	8	8	-
Annual operating cost	₹ 730080	₹ 1123200	₹ 393120





Oil-free technology

Conventional flooded evaporator designs use oil for lubrication. This oil frequently migrates to the evaporator. Once it is in the evaporator, it can form a coat on the tubes. This affects the heat transfer ability of the tubes. Moreover, the efficiency drops considerably given the concentration of oil in the refrigerant. There can be up to 8% drop in efficiency on account of 3.5% oil content in the refrigerant. While many chillers incorporate oil recovery devices or have designs to minimise the oil loss, the ideal way to avoid oil contamination is to eliminate oil all together.

The need for oil in MagnaSmart centrifugal chillers is completely eliminated. With MagnaSmart, you don't need oil pumps, oil reservoirs, oil coolers, oil filters, oil relief valves, oil system controls, starters, piping or heaters. As a result, there is no need for oil samples, oil filter changes and leak detection. All in all, the oil-free technology makes MagnaSmart highly efficient and reduces maintenance dramatically.

Eco-friendly

MagnaSmart chillers incorporate the eco-friendly refrigerant R-134a that has zero ozone-depletion potential. On an average, a 90 TR MagnaSmart chiller yields an annual CO2 emission reduction of over 53000 lbs.

Low noise and vibrations

Low-noise design eliminates the need for acoustic enclosures. The high-speed design reduces vibrations transmitted to the system.

Compact design

The footprint of the chiller is small, as compared to conventional chillers of the same capacity, thanks to its weight and size. The chiller is also easy to handle.



Turbocor Compressor



MagnaSmart incorporates a two-stage centrifugal compressor, Turbocor. Unlike a conventional compressor, Turbocor is an intelligent, oil-free compressor with magnetic bearings, pioneered by Danfoss-Turbocor.

Here are some of the compressor features:

- The compressor has a bigger operating envelope compared to other conventional compressors and is protected via integrated electronics. The compressor is self-correcting and incorporates a system of self-diagnostics, monitoring and control.
- While conventional compressors of the same capacity require 500 to 600 amperes to start, Turbocor requires only 2 amperes. So the generator required is smaller in size and so is the size of the electrical cable and isolator.
- The compressor has an in-built VFD which automatically controls the compressor's speed as per the required load and operating conditions, thereby making it highly efficient.
- The compressor speed ranges from 18000 rpm to 48000 rpm. This high speed design minimises the vibrations considerably.
- In the event of a power failure, the compressor motor acts as a generator, providing power for the bearing control system. It also has a unique system to de-levitate the shaft.



High performance cooler and condenser

For enhanced heat exchange and optimum efficiency, the coolers and the condensers of this chiller are manufactured using doubly enhanced finned copper tubes. These are sized for optimum refrigerant and water velocities. The cooler uses a flooded design that allows maximum heat exchange. Also, due to absence of oil, the heat exchanger stays effective for longer periods of time.

Precise electronic expansion valve

An electronic expansion valve is provided for precise control. The expansion valve regulates the refrigerant flow through the cooler and maintains the desired liquid level. The expansion valve is very sensitive to load variations and adjusts the flow with shorter response time to achieve power savings.



User-friendly controller

Some of the salient features of the controller are enumerated below:

- Easy to read, adjustable and coloured touch-screen operator interface.
- Easy selection of any BAS supplier using standard open protocols.
- Chiller performance can be ascertained at a glance. It is also easy to select various data screens and to change settings.
- Data on historic trends can be downloaded. Parameters such as water temperature, refrigerant pressure and motor load can be plotted for further analysis.
- The compressor speed and inlet guide vane position can be adjusted in real time to precisely match the system output to demand input.
- Allows remote connectivity as a standard feature.
- Allows viewing of the compressor status.
- Enables viewing and adjusting of settings at various user levels.
- Allows viewing and adjusting of timers where applicable.
- Acknowledges and resets warnings and alarms.
- Enables viewing of alarm history.
- Configures the pre-programmed software to suit the specific application.
- Enables and/or disables inputs and/or outputs that are optional.





Technical specifications

Description	Units	Models			
		LCWT1-0305Fa	LCWT1-0515Fa	LCWT2-0615Fa	LCWT2-1015Fa*
Nominal cooling capacity	KW	305	515	615	1015
Approx. overall dimensions:					
Length	mm	2430	2430	2301	2325
Width	mm	960	1250	1431	1650
Height	mm	2081	2200	2307	2450
Net weight (approx.)					
Operating weight (approx.)	Kg.	2100	2850	3375	5750
IPLV at ARI condition	kW/TR	0.41	0.39	0.40	0.39
Power supply		400 V(+/- 10%) , 3 PH. , 50HZ			
Compressors					
No of compressors	No.	1	1	2	2
Type		Centrifugal VFD driven			
Maximum operating speed	RPM	48000	32000	48000	32000
Condenser					
Type		Shell and Tube			
Tube type and material		Both sides Finned Copper Tubes			
Water connection size in/out	Inch	5	5	6	8
Flooded cooler					
Type		Shell and Tube			
Tube type and material		Both sides Finned Copper Tubes			
Water connection size in/out	Inch	4	5	5	6
Expansion valve		Electronic Type			
Noise level at 1m distance from the chiller	dBA	73+/-2 dBA	74+/-2 dBA	75+/-2 dBA	76+/-2 dBA

* Under development.

Specifications are subject to change due to continuous product development





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