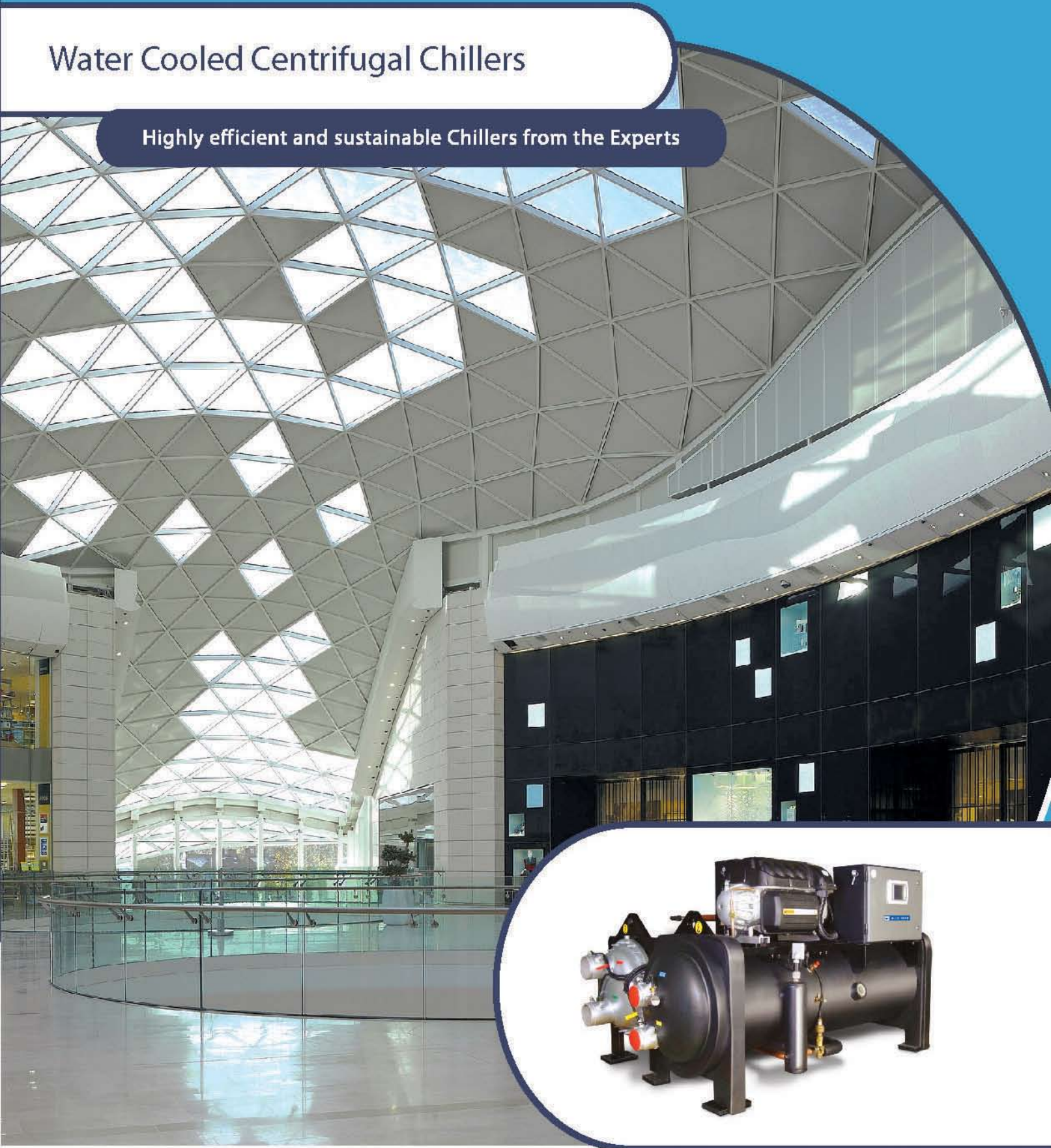




**BLUE STAR**

## Water Cooled Centrifugal Chillers

Highly efficient and sustainable Chillers from the Experts





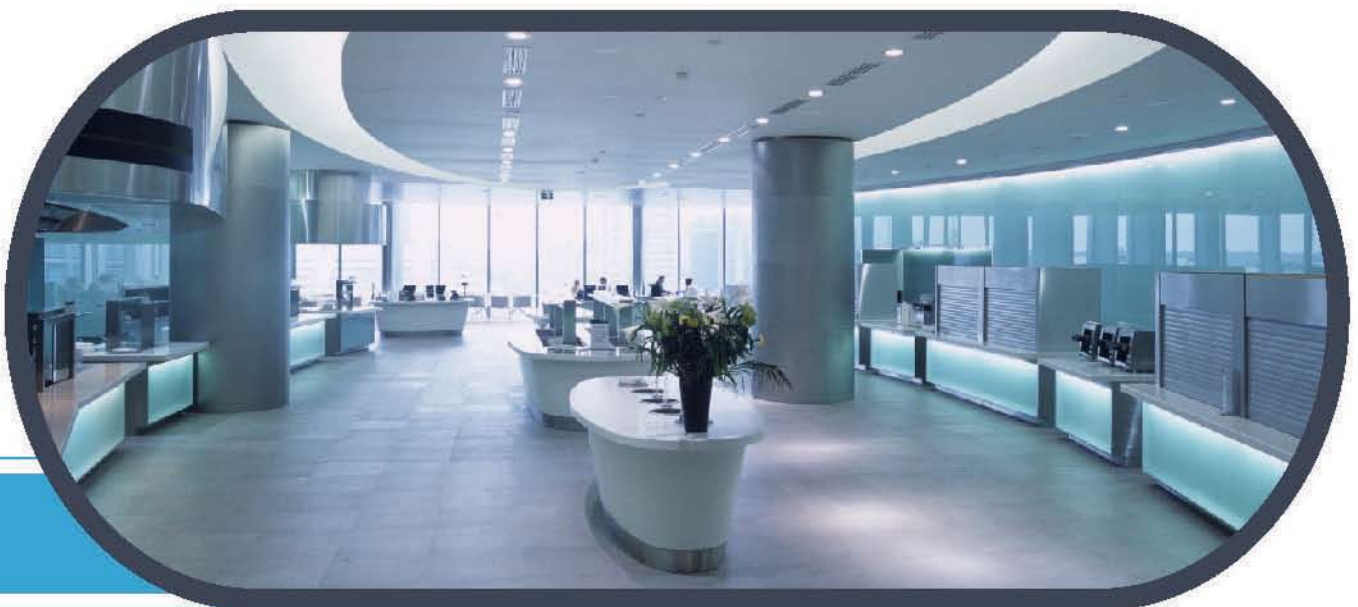
## Water Cooled Centrifugal Chillers with magnetic bearings

Introducing water cooled variable-speed centrifugal chillers with magnetic bearings 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 centrifugal chillers with oil-free technology, manufactured at its own world-class factory.

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

Blue Star water cooled centrifugal chillers 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 VSD allows centrifugal chillers 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 0.34 KW/TR. This substantially reduces operating costs.

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

	Water Cooled Centrifugal Chillers	Conventional Chillers	Savings
IPLV (kW/TR)	0.38	0.6	0.22
TR	90	90	-
kW	34.2	54	19.8
Annual operating days	260	260	-
Operating hours / day	10	10	-
Total annual kWh	88920	140400	51480
Power cost (₹ / unit)	8	8	0
Annual operating cost Rs	711360	1123200	411840





## 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 centrifugal chillers is completely eliminated. With Blue Star water cooled centrifugal chillers 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 these chillers highly efficient and reduces maintenance dramatically.

## Eco-friendly

Blue Star water cooled centrifugal chillers incorporate the eco-friendly refrigerant R-134a that has zero ozone-depletion potential. On an average, a 90 TR centrifugal chiller yields an annual CO<sub>2</sub> 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



This chiller 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 VSD 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	LCWT1-0305F	LCWT1-0515F	LCWT2-0615F	LCWT2-1015FA*	LCWT3-1565FA*
<b>Nominal cooling capacity</b>	TR	91.5	149.3	183	295.0	449.1
<b>Approx. overall dimensions:</b>						
Length	mm	2290	2430	2497	4108	4194
Width	mm	1550	1854	1854	1575	2076
Height	mm	1750	1795	1810	1432	1598
<b>Net weight (approx.)</b>						
Operating weight (approx.)	Kg.	2230	2980	3625	4250	5620
<b>Electrical Power Supply</b>		360-440 V, 3 Ph, 50 Hz				
<b>IPLV KW/TR</b>	kW/TR	0.38	0.35	0.35	0.35	0.34
<b>Compressors</b>						
No of compressors	No.	1	1	2	2	3
Type		Centrifugal VSD driven				
Maximum Operating Speed	RPM	48000	32000	48000	32000	32000
<b>Condenser</b>						
Type		Shell and Tube				
Tube type and material		Both-side Finned Copper Tubes				
Water connection size in/out	mm	125	125	150	150	200
No.of Refrigerant Circuit	Nos	1	1	1	1	1
<b>Flooded cooler</b>						
Type		Shell and Tube				
Tube type and material		Both-side Finned Copper Tubes				
Water connection size in/out	mm	100	125	125	150	200
<b>Expansion valve</b>		Electronic Type				

\*AHRI Certified models



**Rating Conditions :**

- 1) Cooler Leaving Water temp. 44 F at Flow rate of 2.4 USGPM/TR
- 2) Cooler Fouling Factor 0.0001 Hr.Ft 2.F/Btu
- 3) Entering Condenser Water temp 85 F, at Flow rate of 3 USGPM/TR
- 4) Condenser Fouling Factor 0.00025 Hr.Ft 2.F/Btu

*Specifications are subject to change due to continuous product development*





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