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Air-Cooled Water Chilling Packages
AHRI Standards 550/590 and 551/591

Elevate Your Green Quotient.
Enhance Your Savings.



Water Cooled Screw
Chillers with VFD

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A paradigm shift in energy savings

Here's something that will set a new standard for Screw Chillers across the entire spectrum of operating parameters: The new Blue Star VFD Water Cooled Screw Chiller range. Driven by variable frequency drives and certified by the AHRI, these chillers are 30% more energy efficient than regular chillers, which means they give you significant savings while taking a big step towards conserving the environment.

These VFD Screw Chillers are brought to you by India's largest central airconditioning company, Blue Star, which has been providing expert cooling solutions for over seven decades now. As a leader in the industry, Blue Star has been manufacturing a wide range of Scroll, Screw and Centrifugal Chillers, which are cooling many critical applications across the country, such as hospitals, airports, green buildings, hotels, malls, etc.





Chillers exceeding international standards

Due to the huge skew between supply and demand in the power sector, governments across the globe have stipulated energy codes for chiller compliance to ensure that large buildings are energy - efficient. Blue Star's entire range of VFD Screw Chillers don't just meet but go well beyond the stipulations of even the most severe international standards like ECBC and ASHRAE 90.1 both at Full and Partial Load, providing superior energy saving for efficiency conscious owners and green building applications. These chillers also use the environment - friendly R134A refrigerant, making them further eco-friendly.

ECBC Standards

Equipment Class		Minimum COP	Minimum IPLV	Test Standard
Rotary Screw and Scroll Compressor, Water-cooled Chiller	< 530 kW (< 150 tons)	4.7	5.49	ARI 550/590-1998
	≥ 530 and < 1050 kW (≥ 150 and < 300 tons)	5.4	6.17	ARI 550/590-1998
	≥ 1050 kW (≥ 300 tons)	5.75	6.43	ARI 550/590-1998

ASHRAE 90.1 2010 Standards (Path B)

Equipment Class		Minimum COP	Minimum IPLV	Test Standard
Water-cooled, electrically operated, positive displacement	≥ 75 tons and < 150 tons	≤ 0.79 kW/ton	≤ 0.586 IPLV	AHRI 550/590
	≥ 150 tons and < 300 tons	≤ 0.718 kW/ton	≤ 0.54 IPLV	
	≥ 300 tons	≤ 0.639 kW/ton	≤ 0.49 IPLV	



Limitations of conventional Screw Chillers

Traditionally the part load performance of screw chillers is modulated through a slide valve mechanism which controls the rate of compression of refrigerant in the compressor and thereby the cooling capacity. Because of its inherent design limiting compression ratios, the slide valve invariably either over-compresses or under-compresses the refrigerant, resulting in:

- Loss of efficiency
- Higher power consumption
- High starting current

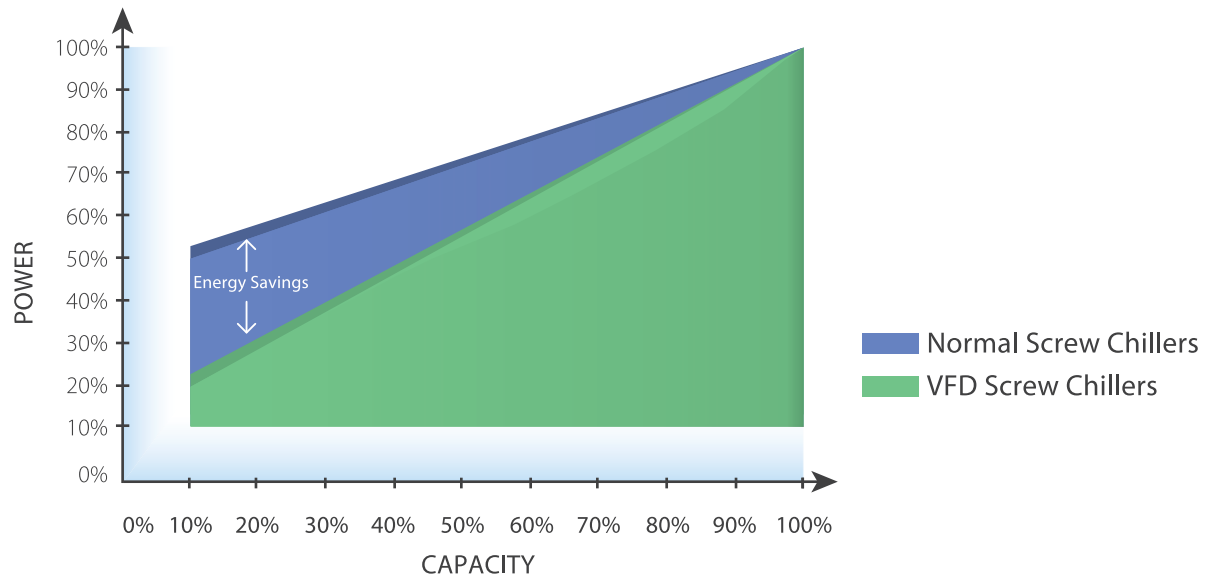
Blue Star's latest VFD Screw Chillers

In order to provide the best-in-class performance and to deliver the most energy-efficient chillers, Blue Star has launched the latest VFD-driven Screw Chillers wherein not only the frequency of the compressor is continuously modulated but also has variable compression ratios to match the chiller load to achieve precise capacity control and hence achieve maximum power savings.

Blue Star's latest VFD Screw Chillers achieve significantly high energy savings that are unheard of so far. The energy consumption achieved is as low as 0.349 IPLV and COP as high as 5.8. This quantum leap in savings in energy cost over the chiller's total life cycle is designed to be the new benchmark in the industry.

Applications like large hospitals, hotels, malls, etc., are typically provided with positive displacement screw compressors, in order to maintain the required comfort. These chillers operate at part loads for a vast majority of time in a calendar year because of varying ambient and internal load conditions.

Compressor Power Vs. Capacity (Load)



Salient features of Blue Star VFD Screw Chillers

Twin Screw specifically designed for Variable Frequency Drive

The Blue Star VFD-driven semi-hermetic screw compressor has the simplest design with just two moving parts, the male and female screws. These compressors, tested in accordance with AHRI standards, offer the following benefits:



Advanced 5-6 patented profile and precision design for optimum modulation of volumetric ratios results in high efficiency at all operating conditions of the chiller



Separate radial and axial force bearings enhances the chiller's life



Two-level protection for compressor safety ensures maximum compressor performance, even after running 1 lakh hours under heavy operating conditions



Unlike a mono screw, in Twin Screws there is no direct contact between the gate rotor and main rotor which eliminates wearing out of rotors and thereby the corresponding frictional loss, resulting in increased efficiency





Wide range

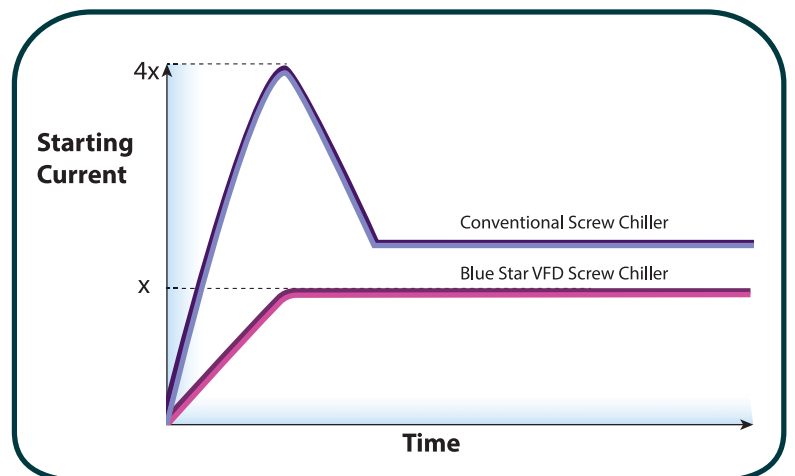
Blue Star offers a complete range of Screw Chillers fitted with highly reliable variable frequency drives starting from 90 tons (316kW) to 380 tons (1336kW) offering great advantage compared to conventional Screw Chillers.

The performance of these chillers is fully validated by AHRI for the complete range, covering all the models offered.

Minimum starting current

Conventional chillers typically consume a very high starting current (3-4 times) compared to that of VFD chillers. Following are the benefits of VFD chiller because of the lower starting current:

- Much smaller electrical ancillaries/accessories needed including generator backup
- No need for expensive soft starters to avoid initial spike in current
- High power factor resulting in higher transmission efficiency and thereby further lower power consumption

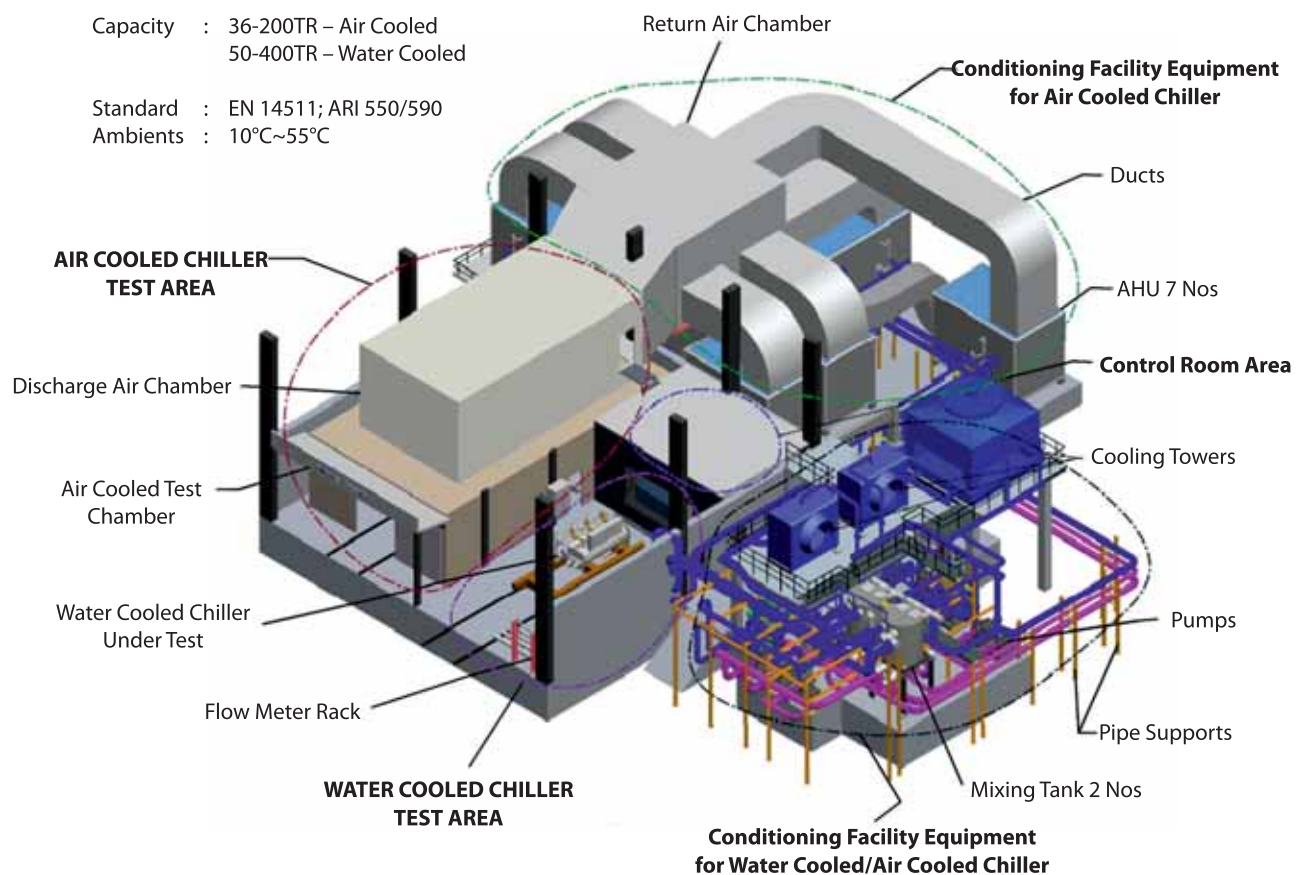


AHRI certification

VFD Screw Chillers are manufactured at Blue Star's own ISO 9001-certified modern facility. All these chillers are certified by the international rating body AHRI (Airconditioning, Heating and Refrigeration Institute). Blue Star has India's only precision testing facility certified by AHRI to test and rate all the chillers manufactured by us.

Internationally, AHRI-certified test facilities for Water Cooled Screw Chillers are for ranges above 200TR. However, AHRI has recently announced that they can check, verify and certify the performance of chillers in the sub - 200TR range if the chiller manufacturers are willing to do so.

Subsequent to this announcement, Blue Star has volunteered to get the entire range of VFD Screw Chillers manufactured by them tested and certified by AHRI for both full and part load operations. That means the whole and wide range of Blue Star VFD-driven Screw Chillers from 90 tons to 380 tons are fully certified by AHRI for performance.





Light-weight, compact and service-friendly design

Blue Star VFD Screw Chillers are simple in design. These chillers are compact and light in weight which enable easy handling of these chillers both during installation and service. A typical 380 ton VFD-driven Screw Chiller is as much as 25% to 30% less in overall size and weight compared to a conventional chiller. These features help in freeing up valuable floor space.

Lower sound levels

VFD compressors running at part-load conditions have lower sound levels than single-speed compressors.

Compressor speeds can also be programmed to reduce noise at desired times such as mornings and evenings.

Wide range of applications

Process and industrial applications would require maintenance of chilled water temperatures throughout the year. Blue Star VFD Screw Chillers designed with advanced control logic can provide designed chiller performance even at 15°C condenser water entering temperature which may prevail during low ambient conditions. Conventional chillers are not designed to operate at such low ambient conditions.



Specially designed Variable Frequency Drive (VFD)

Blue Star VFD Screw Chillers are equipped with state-of-the-art Variable Frequency Drives designed to deliver maximum output at ambient temperatures up to 50°C.








Our drive sets new standards with a minimum 98% efficiency at full load. This reduces initial costs and operating costs due to the smaller heat load airconditioning requirement in the switch room/plant room, thereby maximising energy efficiency.



Advanced Controller

Blue Star VFD Screw Chillers are fitted with a microcontroller which provides flexibility with set points and control options that can be selected, both prior to commissioning of the system and when the unit is live.

Salient features of the Control panel

-  Dynamic data logging of readings (1020 sets of readings)
-  Trending facility to analyse chiller operating data for maximum energy savings and enhancing machine uptime
-  Direct communication through RS-485 to MODBUS
-  Power supply of 230V AC
-  Graphic display, clear and simple language of information
-  Scheduling to facilitate auto operation
-  Option to upgrade the memory of the controller up to 2GB via a flash card



Other Key Features

-  Real-time clock with battery backup to retain data in controller memory during power failure
-  Storage of operating data for 99 trippings to facilitate troubleshooting
-  Remote monitoring of the chiller facilitated
-  Real-time performance monitoring module with display in the controller for important parameters: • Cooling Capacity (tons) • Power (kW) • kW/tons • Evaporator flow
-  Display of Evaporator Approach Temperature to help in the monitoring of the Evaporator's performance
-  kWh counter meter to monitor electricity units consumed by the chiller
-  Cooling capacity modulation governed by advanced Rate of Change (ROC) control logic which continuously monitors the water-leaving temperature over period of time and controls the speed of compressor through VFD and mass flow through the expansion device
-  Non-volatile memory backup for all set points
-  Automatic power failure reset
-  Password protection at 3 levels, i.e. User, Service & Factory, with access of various parameters authorised through each login
-  Touch-screen facility available as an option



Technical Specifications

Description	Units	LCWX1-0320FIVA	LCWX1-0380FIVA	LCWX1-0435FIVA	LCWX1-0520FIVA	LCWX1-0575FIVA	LCWX1-0690FIVA	LCWX1-0790FIVA	LCWX1-1010FIVA	LCWX1-1180FIVA	LCWX1-1350FIVA
Cooling Capacity	kW	316	380	432	513	573	686	791	1002	1178	1336
	TR	90	108	123	146	163	195	225	285	335	380
Compressor Type		Semi-Hermetic Screw									
Quantity	No	1	1	1	1	1	1	1	1	1	1
Motor Type		Semi-Hermetic, 3Ph, 2 Pole Variable Speed Induction Motor; Refrigerant gas cooled									
Electrical Power Supply		400 V +/- 10% , 3 Ph , 50Hz									
Cooler Type		Shell & Tube, Flooded									
Passes (Water side)	Nos	2									
Water Connection Size In/Out	mm	125	125	125	125	125	150	150	200	200	200
Refrigerant Circuits	Nos	1									
Condenser Type		Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Passes (Water side)	Nos	2									
Water Connection Size In/Out	mm	125	125	125	150	150	150	200	200	200	200
Refrigerant Circuit	Nos	1									
Overall Dimensions:											
Length	mm	3566	3566	3566	3624	3624	4224	4224	4280	4282	4296
Width	mm	1100	1100	1100	1170	1170	1170	1170	1342	1385	1413
Height	mm	1842	1858	1858	2032	2032	2294	2294	2445	2556	2626
Operating Weight (approx.)	Kg	2383	2575	2695	3462	3590	4450	4662	6330	7130	7520

Rating Conditions :

1. Cooler Leaving Water temp. 44 °F at Flow rate of 2.4 USGPM/TR
2. Cooler Fouling Factor 0.0001 Hr.Ft².F/Btu
3. Entering Condenser Water temp 85 °F at Flow rate of 3 USGPM/TR
4. Condenser Fouling Factor 0.00025 Hr.Ft².F/Btu

Specifications subject to change due to continuous product development

Widest Range Of Products

