AQUAEDGE™

19XR Two-stage Centrifugal Chiller
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AquaEdge™ 19XR two-stage centrifugal chiller cooling capacity reaches up to 3,000 tons, advanced technologies applied like optimized two-stage compressor via dynamic modeling approaches, 3-D enhanced heat transfer and latest PIC5 intelligent control system contribute the leading performance in industry. 19XR-7 can achieve up to 6.5 full load COP at AHRI condition and down to 85dB(A) operation noise.

Extended operation temperature from -6°C to 65°C makes it applicable for versatile segments such as district cooling or heating, airports, large commercial complex, data centers and industrial facilities to achieve customer expectations of high efficiency and energy saving.

Since the world first centrifugal chiller was invented by Carrier in 1922, it has been dedicating in centrifugal technology innovation and development to boost the world green city building via high efficient and reliable solutions.

Pursuing quality excellence
Carrier has been dedicating in offering customers high efficient and reliable products over one century. Carrier subjects every component and procedure of rigorous definition, testing and qualification during new product development. Carrier AquaEdge™ 19XR complies with AHRI standard 550 / 590.

Customized value add
AdvanTEC solution group has been founded to provide customized system solution to optimize chiller plant efficiency and comfortable cooling, as well as to support customer to achieve LEED certificate.

Boost of green city and sustainable future
Carrier AquaEdge™ 19XR two-stage centrifugal chiller fully meets China Energy Saving grade level 1 to help customer significantly reduce lifecycle operation cost and carbon emission by using renewable source of energy and waste heat.

It is prompted to replace boiler heating to reduce pollution emission to mitigate city PM2.5 issue.

Non-ozone depleting HFC-134a refrigerant is used in AquaEdge™ 19XR two-stage centrifugal chillers with no expiration risk.
High reliability

Reliability is first consideration during AquaEdge™ 19XR development. The chiller is designed with optimized modeling tools of computational fluid dynamics significantly reduces the number of aero parts. To fully guarantee the reliability AquaEdge™ 19XR chiller applies AGMA Class 11 gears from product assembly to operation.

The semi-hermetic compressors and refrigerant cooled hermetic motors design eliminates the risk of refrigerant and oil leakages from shaft seals and also prevents reliability loss due to coupling design, as well as expensive replacing cost of such consumable parts.

Outstanding performance

The two-stage compressor has been designed to integrate with an intermediate economizer to realize inter-stage gas supplement to benefit system cycle efficiency. Under part-load conditions, the optimized blunt leading edge inlet guide vane by UTC aerodynamics approach contributes effectiveness of intake resistance reduction and minimizes energy loss during load adjustment.

In addition, the AquaEdge™ 19XR chiller delivers a COP of up to 6.5 under AHRI conditions.

Wider operation range

Two-stage compressor with vanless diffuser, design greatly extends operation range. With its multiple impellers and gear codes AquaEdge™ 19XR chiller is flexible to satisfy a variety of operational conditions.

AquaEdge™ 19XR chiller’s leaving water temperature can reach as low as -6°C for rapid ice making, while its heat pump temperature can reach as high as 65°C for superior indoor comfort.

Large cooling capacity

AquaEdge™ 19XR chiller offers cooling capacity up to 3,000 tons, which is double of legacy 1,500-ton chillers.

It is more economical and reliable than dual-compressor chillers, as well as the advantages of saving chiller plant room space, thus brings benefits when a retrofit or reinvestment is required.

Lower operating noise

Refrigerant-cooled hermetic motors, fewer aero components, improved flow channel and 70% operation speed of legacy design, all these features contribute to reduce friction loss and airflow noise.

The 3,000-ton chiller has lower noise level of just 85dB(A), fully meets the 18001 standards recommended by Occupational Health and Safety Advisory Services (OHSAS).

HFC-134a refrigerant

AquaEdge™ 19XR chiller adopts non-ozone depleting HFC-134a refrigerant to achieve better performance. Positive pressure design reduces the size and weight of chiller thus adds value to customer.

HFC-134a refrigerant with its no damaging to ozone layer and no expiring date characteristics can be used permanently without any environmental concerns.

Industry-leading two-stage compressor technologies

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AquaEdge™ 19XR chiller adopts latest 3-D enhanced heat transfer tubes to improve heat exchanger efficiency.

High-efficiency economizer generates flash gas to achieve additional cooling capacity and cool inter-stage compressed gas to improve system performance.

AquaEdge™ 19XR chiller takes FLASC sub-cooling technology to improve condensation efficiency to reduce system power consumption.

The unique double-grooved tube sheet tightly bonds with heat transfer tube thus greatly reduces the risk of refrigerant leakage.

The unit adopts a short shell design to significantly reduce the size of the heat exchanger and the machine room space, with a notable decrease in both refrigerant charge and water pressure drop.

Refrigerant isolation valves located on both inlet and outlet of condenser allows refrigerant to be remained in the condenser shell during unit maintenance. No other liquid receivers are required.

There are four sets of dual relief valves located on the heat exchanger to ensure the reliability under extreme working conditions and greatly improve the convenience of field service.

Advanced control technology

Carrier AquaEdge™ 19XR two-stage centrifugal chiller equips PIC5 Micro-Computer Control System with 10.5” color touch screen and graphical user interface to ensure user friendly operation.

Multiple AquaEdge™ 19XR chillers can be simply controlled via the integrated i-Vu® Control Network. Building control system can seamlessly connect with chiller through communication protocol conversion models.

Deploying with Carrier AdvanTE³C Chiller Plant Optimization System further improves chiller plant system efficiency to achieve customer operational cost reduction.
Carrier AquaEdge™ 19XR two-stage centrifugal chillers are widely operated in versatile applications like district cooling or heating, airports, large commercial complex, data centers and process cooling etc. Contributed by its strong cooling and heating capability, outstanding performance and wider operation range, AquaEdge™ 19XR chillers focus on large capacity and high efficiency applications to boost China green city development.
Higher cooling capacity

AquaEdge™ 19XR two-stage centrifugal chiller extends cooling capacity up to 3,000 tons to reduce chiller number and assistant facilities required to serve typical building. This makes flexible chiller installation and machine room saving, initial capital investment and ongoing operating cost reduction as well as benefits to future retrofit. As an example, to a 10,000 tons project, 5 units of 2,000 tons solution can save almost 30% area compare with 10 units of 1,000 tons solution.

Excellent performance at large temperature differential conditions

To reduce energy loss during distribution, the approach of maximizing the temperature differential between water supply and return are usually proposed for large-scale district cooling and heating systems. For example, when common 5°C chilled temperature difference increase up to 8°C, the chilled water pump power consumption will significantly reduce about 75%, thus reduce the water pump operation cost. On the other hand, the chiller’s leaving water temperature is lower than that of a common air-conditioning system, which makes the system can deliver chilled water to end user at design target, thus ensures the function of removing heating and de-humidity to create a comfortable environment. Carrier AquaEdge™ 19XR two-stage centrifugal chiller has 10%-20% better performance than a single-stage centrifugal chiller system, and can reliably operate even at extreme conditions.

Strong thermal storage capability

Ice and water storage systems are designed to reduce the capacity of chiller and cooling tower. The chiller with such design can deliver rapid cooling capacity at emergency and is very easy to maintain in transition seasons. Carrier AquaEdge™ 19XR two-stage centrifugal chiller owns strong thermal storage capability. The lower leaving water temperature of -6°C ensures rapid icing and reduces night-time operating costs. In addition, the large ice storage capacity allows a smaller frame chiller to be installed so that reduces cost expensed in peak-time when electricity price is expensive.

Tianjin Goldin 117 Finance Tower

Tianjin Goldin 117 Finance Tower, as one of the world’s tallest steel structures rises 597 meters high with construction area of 830,000 square meters. Its complex consists of level A-grade office space, a six-star luxury hotel, upscale apartments, pubs, shopping center and hanging garden, especially a rooftop swimming pool. In supporting of achieving LEED platinum certificate, the building will deploy 13 Carrier AquaEdge™ 19XR two-stage centrifugal chillers. This skyscraper will become a landmark of Binhai New Area in Tianjin after completion construction.
Flexible dual-duty applications
A heat pump chiller must deliver excellent year-round cooling and heating performance in summer and winter respectively as well as reliable operation during various working conditions. The AquaEdge™ 19XR two-stage compressor can be configured with various gear ratios to ensure optimal operation while maintaining a perfect balance between efficiency and reliability. Due to the high-lift capability of the two stage compressors, the chiller has a wide operation range and is able to smoothly operate 24 hours a day. There is no surge risk even unit is working under some extreme conditions.

Superior heating performance
While centrifugal heat pump is efficient for district heating applications, it requires a minimum leaving water temperature higher than 50°C to mitigate the larger water temperature drop during long distance distribution. The comfort of heating will decrease a lot if distributed water temperature to customer end is lower than design target. Carrier AquaEdge™ centrifugal heat pump has outstanding heating capacity with maintaining leaving water temperature as high as 65°C, thus ensuring customer needs of optimal heating comfort. In some extreme conditions, the chiller leaving water temperature can maintain higher than 50°C even when evaporator leaving temperature is as low as 3°C.

Perfect replacement of high-polluting boilers
Carrier AquaEdge™ 19XR two-stage centrifugal heat pump significantly reduces yearly heating costs about 77% compare with conventional gas or oil water boilers. It is capable of making use of various low-grade energy sources, such as earth source, groundwater, surface water, grey/dark water and industrial waste water to generate cooling and heating capacity with high operation efficiency. With its replacement of high polluting boilers, the AquaEdge™ heat pump can greatly save energy and reduce PM2.5 and CO₂ emissions, thereby protecting urban environment and human health.

Water / ground-source heat pump solution

Beijing South Railway Station
Beijing South Railway Station is the largest passenger station in Asia and the world’s third-busiest station in terms of its passenger numbers. It adopts heat pumps with usage of sewage-source from nearby sewage pump station to deliver year-round heating and part of cooling capacity. After six years of operation, the original single-stage compressor system could no longer afford efficient heating performance or sufficient cooling capacity. It was thus retrofitted current chiller with AquaEdge™ 19XR two-stage centrifugal heat pump. The system’s heating performance has been greatly improved with favorable result of energy consumption reduced by more than 23%.
High efficiency high-voltage drive

Carrier AquaEdge™ 19XR two-stage centrifugal chiller is able to directly use 10kV power, eliminates the investment of intermediate transformer equipment and connection cables. This advantage does not only save up to 12% of the initial investment but also reduce the area required for the chiller in machine room. During operation, there is no energy consumption by intermediate transformer equipments. The advantage of less thermal loss of motor and connection cables also reduces customer maintenance cost.

Low inrush current minimizes impact on power grid

Carrier’s high-voltage hermetic motor has 40% reduction of inrush current than that of conventional open-drive air-cooled motor at same cooling capacity. Carrier high-voltage motor is cooled by refrigerant to achieve higher efficiency and reliable operation with no heat rejection to the machine room. Unlike a conventional air-cooled motor, the characteristic of refrigerant cooling contributes to a smaller motor size by absorbing heat generated by motor windings, while open type motor always requires a bigger size and sufficient air cooled area to prevent it from overheating.

Refrigerant cooled motor eliminates heat rejection to machine room

Carrier’s high-voltage hermetic motor is cooled by refrigerant liquid spraying to achieve higher efficiency and reliable operation. Furthermore, it does not reject heat to the machine room compare with conventional open type motor. In contrast, a conventional open motor should be fitted with a cooling water jacket (IP55) or additional chiller plant ventilation system to reduce the heat rejected.
Year-round high-efficiency variable frequency drive solution

Reduce year-round operating cost

AquaEdge™ 19XR variable frequency drive adjusts compressor speed and integrates with inlet guide vane change that greatly improves unit operation efficiency, especially in transition seasons or at night time when entering condenser water temperature is lower. AquaEdge™ 19XR is able to achieve IPLV as high as 10.5 under AHRI conditions significantly reduce year-round operation cost. A variable speed centrifugal chiller can generally achieve an annual operation cost saving of 30% compares with a fixed-speed chiller.

Swift restart and rapid cooling capacity recovery

Facilities such as factories and data centers require continual cooling, even if a brief interruption to cooling can cause indoor heat accumulation and a rapid rise in temperature, thus leads to an increase in production defects and IT equipments failure. AquaEdge™ 19XR variable frequency drive centrifugal chiller with swift restart function offers a restart time 75% faster than a conventional variable frequency drive centrifugal chiller, ensuring faster recovery of cooling capacity to protect data security. In addition, a variable frequency drive chiller’s inrush current does not exceed the full-load operating current, reducing the impact on power grid. The needs of power distribution equipment are also decreased that makes it ideal for retrofit projects.

No extra filters required

For data centers, hospitals and other facilities that request sophisticated electronic equipment, Carrier variable frequency driver offers a total harmonic distortion rate lower than 5%. It equips advanced front-end rectifier technology and meets the IEEE519-1992 standard without any additional on-site harmonic filters. Its self-corrective solution also operates with power factor no less than 95%, the reliable operation of the chillers and surrounding equipments are satisfied.

China Unicom Data Center Base in Central China

With a total investment of RMB 7.2 billion, total ground area of 317 acres and construction area of 267,000 meter square, China Unicom’s new data center in Henan province is an important infrastructure project designed to meet requirements of information development for central China before 2025. It is an important information base to provide industrial operation management and information service. Carrier has offered eight variable frequency drive two-stage centrifugal chillers in this center, delivering a total cooling capacity of 8,800 tons. Data center security is assured with total harmonic distortion less than 5%. The data center makes substantial operating cost saving with an expected investment payback period of only 1.2 years due to Carrier entire variable frequency solution.
Carrier supports green city development with leading centrifugal technologies.
We make the world a better place to live. We create comfortable, efficient, healthy, safe and secure environments, and ensure the global food supply is transported and preserved for safe consumption.