



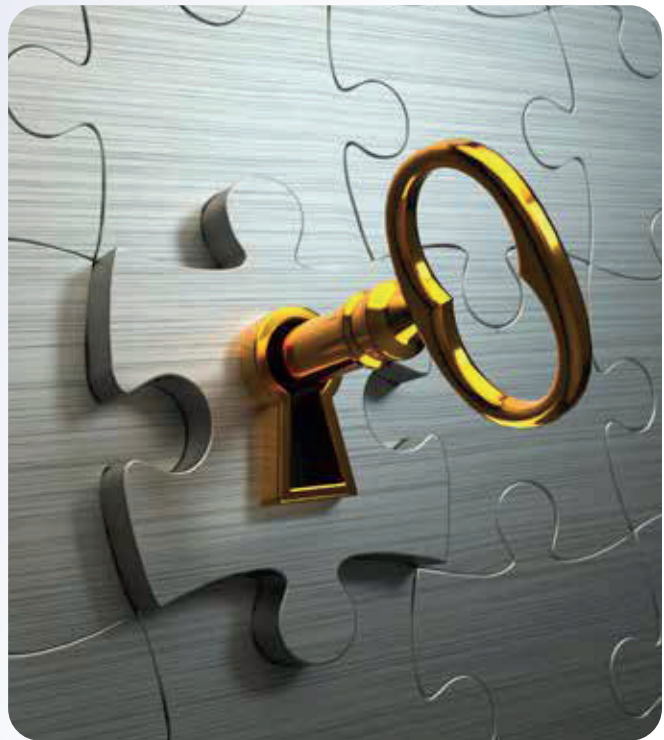
*MagBoost*

# Magnetic Bearing Centrifugal Chiller 170-1800RT



# What is Clivet Solution?

MagBoost magnetic bearing centrifugal chiller is the latest generation of oil-free centrifugal chillers with fully-independent intellectual property rights and featuring Clivet's core technologies. The series offers oil free, high efficient, stable, reliable, low-noise and wide range operation. It is eco-friendly and economical as well. It adopts many of the core technologies that Clivet has spent years developing such as the aerodynamic technology, magnetic bearing control, micro-channel refrigerant-cooled VFD and high-efficiency permanent magnet synchronous motors. The series can be used in various buildings including airports, rail transit, hotels, businesses and new or reconstructed buildings, providing customers with efficient and energy-saving green building solutions.



## The longer you use, the more you save



Competitive initial investment



Lower operation costs

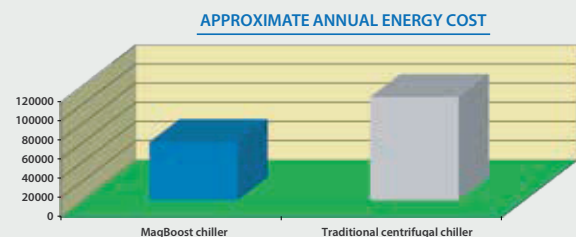


Lower maintenance costs

### Operation cost comparison



Compare a 1100RT MagBoost chiller with a 1100RT traditional centrifugal chiller (4000 operating hours, energy rate 0.0813 \$/kWh). The system can help customers save **44%** per year. Given the system's service life, OPEX savings making investing in an inverter chiller system worthwhile.



Otherwise, adopting magnetic bearing without the need for lubrication. The refrigerating system can realize 100% oil free operation to eliminate the heat transfer loss resulting from lubricating oil.

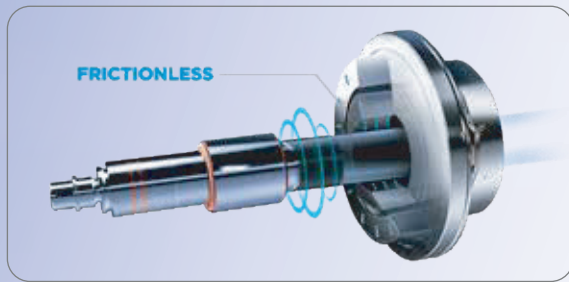
### Less maintenance

No oil system, no oil system fault and no need for regular maintenance.

| No. | Maintenance tasks               | R123 chiller           | R134a chiller          | Magnetic bearing centrifugal chiller (oil-free) |
|-----|---------------------------------|------------------------|------------------------|-------------------------------------------------|
| 1   | Oil change                      | Once a year            | Once every three years | No                                              |
| 2   | Oil filter change               | Once a year            | Once a year            | No                                              |
| 3   | Oil pump pressure detect        | Twice a year           | Twice a year           | No                                              |
| 4   | Oil quality check               | Once a year            | Once a year            | No                                              |
| 5   | Oil filter pressure drop detect | Once a month           | Once a month           | No                                              |
| 6   | Oil pump insulation check       | Once every three years | Once every three years | No                                              |
| 7   | Oil heater check                | Once every three years | Once every three years | No                                              |



# Key Technologies



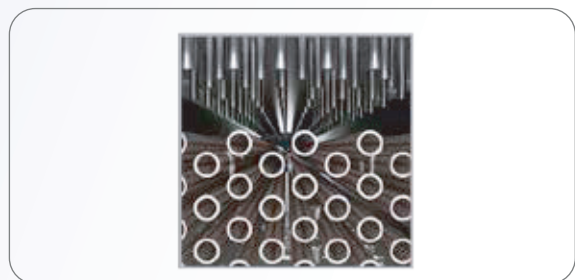
Magnetic bearing



Aerodynamic technology



PMS motor



Full falling film evaporation

## Magnetic bearing

Industrial-level magnetic bearing assembly including the radial magnetic bearing, thrust magnetic bearing and position sensor, featuring low power consumption, high bearing capacity and high reliability.

## Aerodynamic design

Aerodynamic design optimizes the overall flow field efficiency and improves the compressor's isentropic efficiency.

Back-to-back two-stage compression structure balances the thrust forces for longer life span and improves efficiency.

Enclosed impeller design, reduced leakage and improved efficiency.

6% higher efficiency than single-stage compression.

## Full falling film evaporating technology

First created the full falling film evaporator and adopted spray technology to achieve film evaporation on the surface of the heat exchange tube, greatly increasing overall heat transfer efficiency and reducing refrigerant.

The patented refrigerant distributor can improve the homogeneity of the liquid to avoid local drying, fully showcasing the performance of the heat exchange tube and increasing unit efficiency.

## Permanent magnet synchronous motor technology

Motor efficiency exceeds 96% in the full operating range, with the highest efficiency of up to 97%.

The space vector pulse width modulation (SVPWM) technology is used for speed regulation and driving. Accurate and efficient operation is achieved according to changes in the operating conditions. The startup current is small, the operating current is low, the operating electricity charge and distribution cost of the whole life cycle are low.

The real-time monitoring system of stator temperature and rotor shaft elongation achieve precise, highly-reliable cooling of the motor.

# Ultimate Reliability



## Back-to-back compressor structure

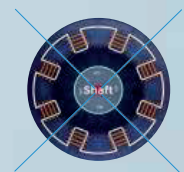
Balance the thrust forces for longer life span and improved efficiency by less seal leakage and no gear loss.



## Bearing control

The bearing control system adopts prospective vibration compensation technology, which detects and controls the position at a high frequency to effectively reduce the impact of vibration on the rotating shaft by the amount of imbalance.

20 kHz dynamic position scanning and adjustment and position control precision at the  $\mu\text{m}$  level ensure the accuracy of the shaft levitation position.



## Long-life spare bearing

The spare bearing employs a set of high-strength rolling bearings and a damping shock absorption ring to effectively stop the rotor shaft during high-speed rotation if a magnetic bearing controller failure occurs, avoiding wear between the magnetic bearing, sensor and rotor and resulting in damage to the compressor.

## Self-generating electricity control

Clivet's self-developed VFD control + permanent magnet motor technology can automatically switch the motor to the generator mode in the event of unexpected power failure to ensure the stability of the bus voltage and the 40-750 V wide voltage adaptability of the bearing is combined to ensure the power supply safety of the magnetic bearing.

The self-generating mode guarantees continuous power supply of above 15 Hz to the unit's magnetic bearing, ensuring the bearing remains levitating.

## Micro-channel refrigerant-cooled

Clivet's independently-developed high-power VFD employs micro-channel refrigerant-cooled technology to fix problems such as high heat flux density, poor heat dissipation effects, tendency of liquid-cooled heat dissipation to form condensation, high network-side harmonic current, poor reliability of an abnormal power grid product, high stray inductance which easily damages IGBT, high temperature lack of temperature-reducing capacity, heavy air-cooled VFD and excessive noisiness of the high-power VFD, greatly improving reliability and adaptability of the VFD, enhancing the efficiency of the overall unit and greatly reducing noise.





## Ensure the fastest chiller restarts with Quick Start feature

Temperature-sensitive applications such as data centers, manufacturing processes and hospitals where the unit is required to restart quickly in case of power failure.

Now there's a sure way to reduce the risk of cooling disruption — the Quick Start feature from Clivet. This feature for Clivet centrifugal chillers can save you both time and money by:

- ◎ Reducing time for chiller restart after power failure
- ◎ Keeping process equipment cooled
- ◎ Reducing risks of expensive downtime
- ◎ Providing a faster initial start, too

## Reduce restart time to seconds

After power is interrupted, it can take a standard centrifugal chiller many minutes to restart. But with the Quick Start feature, once power is restored, the chiller can restart as soon as possible!

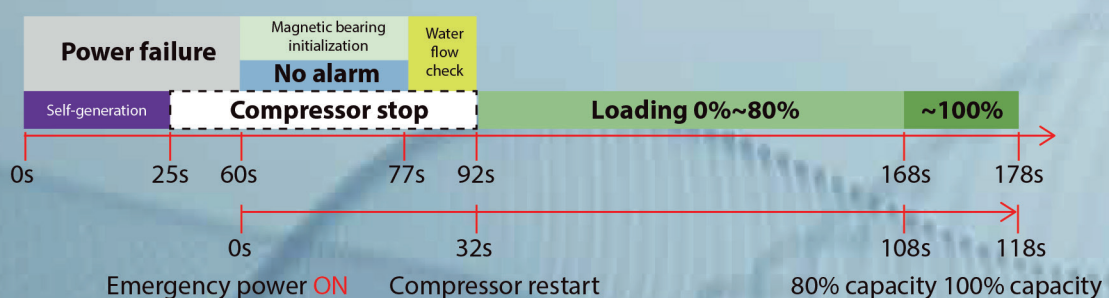
## Faster restarts due to smarter power management

The Quick Start feature is available in two configurations, for use with or without an uninterruptible power supply (UPS).

## Quick Start feature without UPS is fast:

Once emergency power is established, the chiller can restart as soon as the control panel reboots, assuming coastdown of the compressor has been completed. The chiller will restart as following:

The water pumps are equipped with UPS, the chiller is not with or with UPS. Emergency power supply will be restored after power failure for 60 seconds.



# Intelligent Control



All in Control



Cloud Energy  
Efficiency Management



Management  
Cockpit



AI "E+E"

© 10-inch true color graphic touch screen.

© Compatible with QuickView, M-cloud, Midea Chiller Plant Control and M-BMS.

M-BMS is Midea's latest comprehensive automated management platform for building equipment including air conditioning, ventilation, lighting, water supply/drainage, elevator and other systems. Equipped with Midea AI E+E (Efficiency + Environment). AI E+E is the algorithmic core of the entire building management system and has five core functions: AI start-stop + AI temperature control + AI operating load control + AI optimization of settings + AI combined control.

Make buildings 20% more comfortable, conserve electricity by more than 30% and reduce manpower by more than 50%.

## Environmental Sustainability

### Quiet operation

Permanent magnetic motor eliminates the noise that comes from mechanical transmission contact, very quiet and low vibration levels.

The back-to-back impeller + external pipe-type reflux device structure of the compressor reduces the pneumatic noise of refrigerant while flowing.

The specially-designed compressor body structure uses the solid-gas-solid interface to dissipate high-frequency noise and achieve ideal sound insulation and noise reduction effects.

With reference to AHRI standard 575-2017, sound pressure ratings are as low as 70 dB(A).

### Green solution

High efficiency leads substantial reduction in power consumption.

HFC-134a refrigerant has ZERO ozone-depletion potential and no phase-out date.

Full falling-film evaporator reduces refrigerant charge by up to 40%.

Helps you achieve LEED® certification.



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