



天来节能科技（上海）有限公司

TIANLAI ENERGY-EFFICIENCY TECHNOLOGY (SHANGHAI) CO., LTD.

离心雾化器—— 助力空调精准加湿、高效制冷！

CENTRIFUGAL ATOMIZER——
PRECISION IN HUMIDITY, EFFICIENCY IN COOLING!



价值陈述 | Value Proposition

显著节能 可使冷却系统的整体能效比最高提升30%	Significant energy efficiency Delivers up to 30% boost to the overall COP of the cooling system.
强力降温 在制冷季节，能为冷凝器实现平均10.5℃的显著温降	Strong cooling effect Delivers a remarkable average inlet air temperature drop of 10.5℃ for the system under dry conditions.
节约资源 相比传统喷淋技术，可为系统节约20%-30%的工艺用水消耗	Resource saving Delivers 20%-30% lower process water consumption for the system versus traditional spray technology.
安全运行 可大幅增强系统应对极端热负荷的能力，有效避免高压报警与停机	Safe operation Boosts system extreme heat load resistance, avoids high-pressure alarms & unexpected shutdowns.

技术原理 | Technical Principle

离心雾化技术是一种利用高速电机旋转产生的离心力，由雾化盘将水转化为微米级雾粒的工艺。这些雾粒凭借巨大的比表面积，在与周围空气接触时发生急剧地相变（蒸发），此过程通过吸收环境显热并转化为汽化潜热，从而高效驱动换热效率，实现快速蒸发冷却。

Centrifugal atomization technology leverages the centrifugal force from high-speed rotation to disperse water into micron-level droplets. Boasting an enormous specific surface area, these droplets rapidly undergo phase change (evaporation) upon contact with ambient air. This process absorbs sensible heat from the surroundings and converts it into latent heat of vaporization, significantly boosting heat transfer efficiency to deliver fast, high-efficiency evaporative cooling.



技术优势 | Technical Advantages

平行水雾

由离心雾化器形成的水雾和空调换热翅片形成平行覆盖，水雾均匀分布，蒸发冷却效率更高

Parallel Water Mist

Centrifugal water mist runs parallel to AC heat exchange fins for full, uniform coverage, boosting evaporative cooling efficiency

智能水量

喷雾水量根据空调负载自动调节，负载高水量大、负载低水量小，维持冷凝压力在高效区间

Smart Water Control

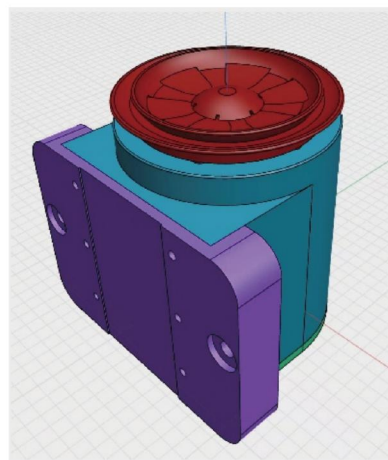
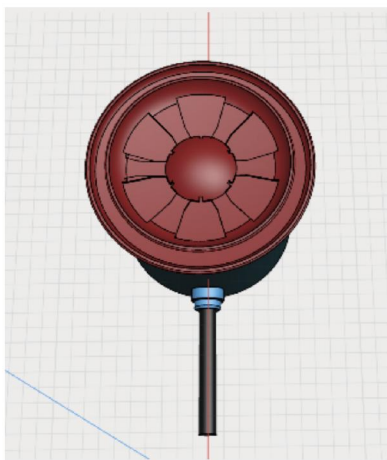
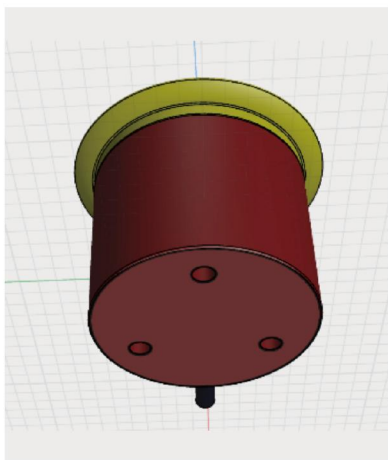
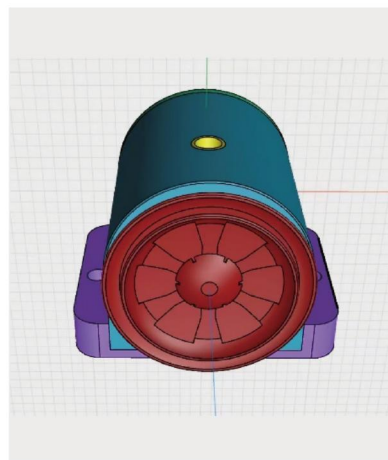
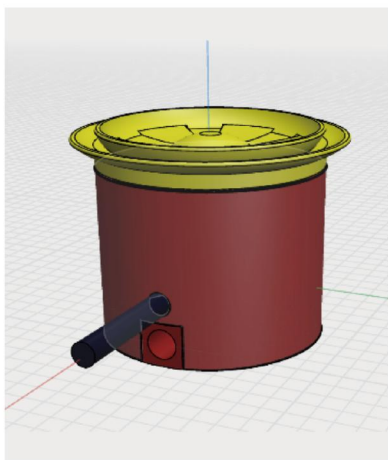
Spray water volume auto-adjusts to real-time AC load, keeping condensing pressure in the 14-16 bar high-efficiency range

恒雾粒

离心雾化器根据喷雾水量自动调节电机转速，水量大转速高、水量少转速低，使水雾颗粒保持稳定，蒸发效率更高

Consistent Droplet Size

The centrifugal atomizer auto-tunes motor speed to spray volume: higher speed for more water, lower speed for less. Stable droplet size ensures consistently high evaporation efficiency



离心雾化器性能参数 | Atomizer Performance Parameters

离心雾化器是离心雾化技术的核心执行单元，主要由无刷直流电机与精密雾化盘构成。为适配不同集成需求，天来节能提供驱动板内置（一体化）与驱动板外置（分体式）两种配置版本，以满足客户的多样化应用场景。

As the core actuation component of our centrifugal atomization technology, the centrifugal atomizer consists of a brushless DC (BLDC) motor and a high-precision atomizing disc. To fit different integration needs, Tianlai Energy Saving offers two configurations: integrated type with built-in drive board, and split type with external drive board, to satisfy customers' diverse application scenarios.

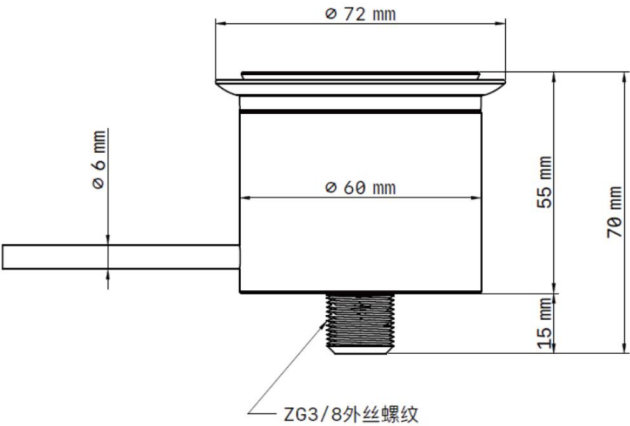
基本参数 | Basic Parameters

型号 Model	T01N60I	T01N60F	T01N60M	T01W60
特点 Features	智能转速 Intelligent Speed Control	指定转速 Fixed Speed	485通信 RS485 Communication	外置驱动 External Drive
驱动板形式 Driver Board Type	内置 Integrated driver	内置 Integrated driver	内置 Integrated driver	外置 External Drive
转速 Speed [rpm]	6000-13000	6000-15000	6000-15000	6000-12000
通径 Bore [mm]	2.80	2.80	2.80	2.80
喷雾水量 Spray Water Volume [L/H]	6-60	6-60	6-60	6-80
喷雾直径 Spray Coverage Diameter [m]	1.6	1.6	1.6	1.6
接口螺纹 Thread Connection	Rc3/8	Rc3/8	Rc3/8	G1/8

技术参数 | Technical Parameters

规格 Specification [mm]	70*72
重量 Weight [g]	320
工作电压 Operating Voltage [V]	DC18~26V
功率 Power [W]	12~48W
雾化盘材质 Material of Atomizing Disc	PA66
防护等级 IP Rating	IP68
雾粒直径 Atomized Particle Diameter [μm]	30~120

外形尺寸 | Overall Dimensions



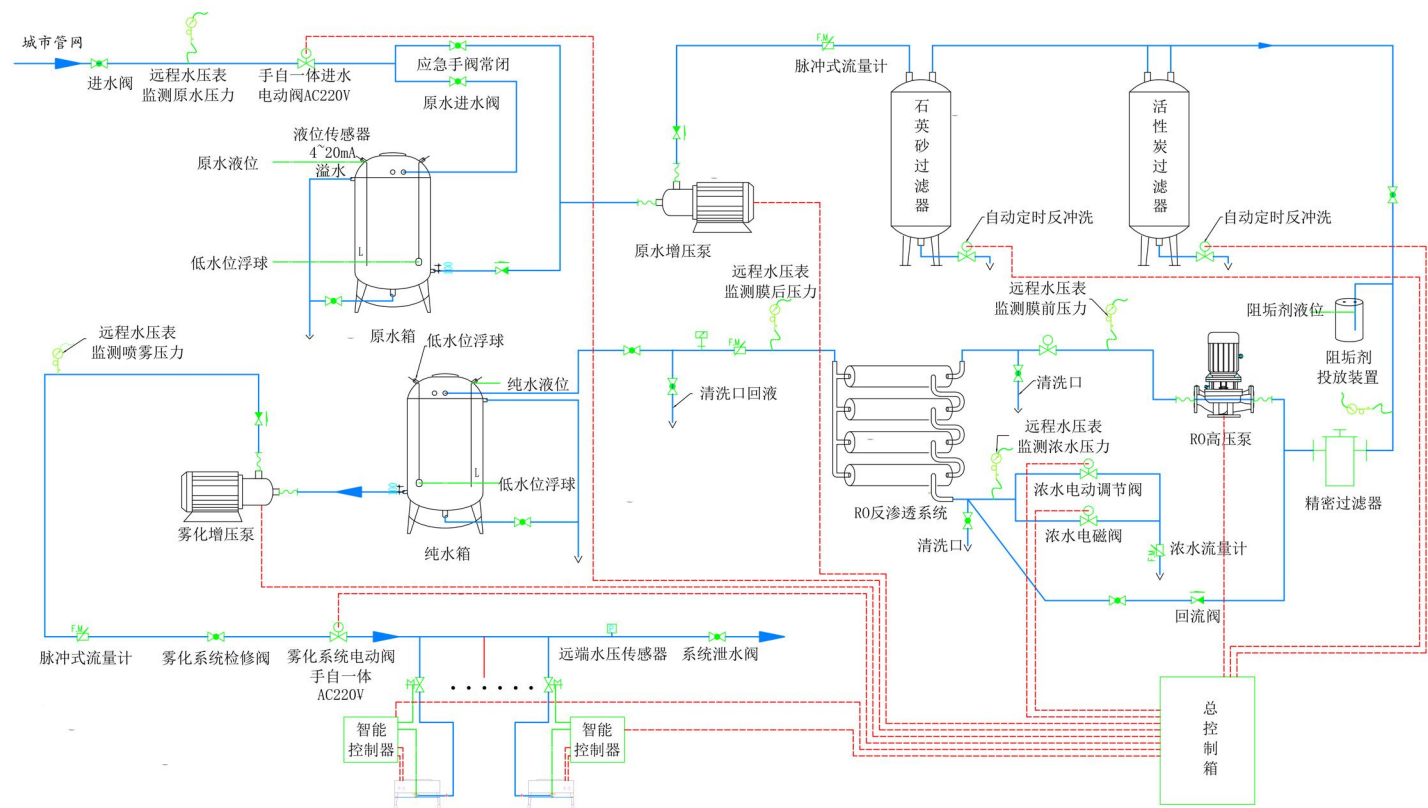
相变（雾化）冷却节能系统简介 | System Overview

相变（雾化）冷却节能系统由离心雾化器、智能控制系统与供水单元构成。系统通过离心雾化产生微米级雾滴，利用其蒸发相变高效吸热；智能控制系统实时精准调节雾化量与运行参数，以适配动态工况；供水单元包含水处理系统以保障水质，防止翅片结垢和腐蚀，共同为冷却系统提供稳定、高效且节能的降温解决方案。

Phase-Change (Atomization) Cooling and Energy-Efficiency System consists of three core parts: a centrifugal atomizer, an intelligent control system, and a water supply unit. The system produces micron-scale droplets via centrifugal atomization, which absorb heat efficiently through evaporation phase change. The intelligent control system precisely adjusts atomization volume and operating parameters in real time to match dynamic working conditions. The water supply unit comes with an integrated water treatment system to guarantee water quality and avoid scaling and corrosion of heat exchange fins. All components work in tandem to deliver a stable, high-efficiency, energy-efficiency cooling solution.

相变（雾化）冷却节能系统原理示意图

Schematic Diagram of the Working Principle of the Phase-Change (Atomization) Cooling and Energy-Efficiency System



应用场景 | Application Scenarios

面向设备制造商

场景1：将高效间接蒸发冷却模块集成于其空调箱或冷水机组中，作为核心节能部件，显著提升整机能效比（COP），打造产品差异化竞争力

场景2：为冷却塔配套提供增效喷雾系统，在高温干燥条件下直接喷淋，有效降低逼近温度，提升冷却塔出力和稳定性

For Equipment Manufacturers

Scenario 1: The high-efficiency indirect evaporative cooling module is integrated into their air handling units (AHUs) or chillers as a core energy-saving component, which can significantly improve the overall unit Coefficient of Performance (COP) and build a differentiated competitive edge for their products.

Scenario 2: We supply efficiency-enhancing spray systems as a complementary upgrade for cooling towers. The system performs direct spray under high-temperature and dry conditions, which effectively reduces the approach temperature, and improves the cooling capacity and operational stability of the cooling tower.

面向系统集成商与终端用户

场景（数据中心冷却）：作为机房空调的辅助冷却模块，对室外进风或冷凝器进风进行喷雾降温，有效降低压缩机负载，实现PUE的持续优化，并增强系统在极端天气下的可靠性。

场景（商业建筑节能）：在商场、酒店的空调系统中，对新风或回风进行雾化加湿降温，在过渡季节大幅减少主机运行时间，降低运营成本。

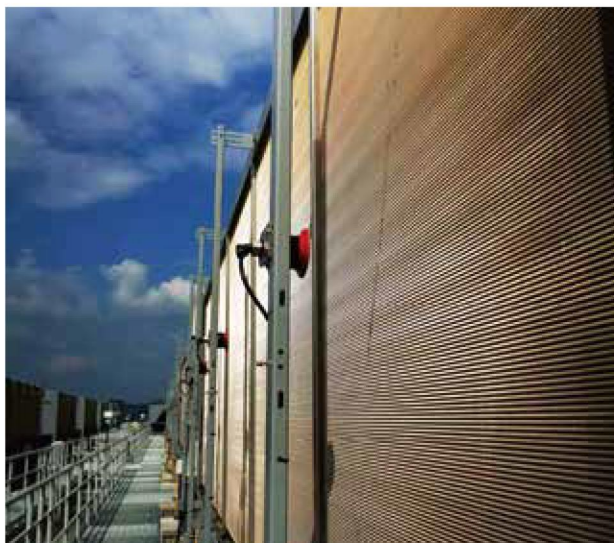
场景（工业/工艺冷却）：在食品加工或制药车间，对工艺冷却水进行喷雾预冷，减轻冷水机组负荷，实现节能并保障工艺温度稳定

For System Integrators and End Users

Scenario (Data Center Cooling): Serving as an auxiliary cooling module for Computer Room Air Conditioning (CRAC) units, the system performs spray cooling on the outdoor intake air or condenser inlet air, which effectively reduces the compressor load, realizes continuous optimization of Power Usage Effectiveness (PUE), and enhances the system reliability under extreme weather conditions.

Scenario (Commercial Building Energy Saving): In the heating, ventilation and air conditioning (HVAC) systems of shopping malls and hotels, atomization humidification and cooling are applied to the fresh air or return air. This greatly cuts down the operating hours of the main chiller unit in transition seasons, thus reducing operating costs.

Scenario (Industrial/Process Cooling): For food processing and pharmaceutical workshops, spray pre-cooling for process cooling water cuts chiller load, delivers energy efficiency gains, and guarantees stable process temperature control.



关于天来 | About Us

天来节能成立于2013年6月，始终致力于将离心雾化技术应用于节能与环保领域，总部位于上海，业务覆盖全国，是国家高新技术及上海市专精特新企业。天来节能专注于离心雾化技术的研发与创新，为空调节能事业提供雾化冷却技术与解决方案。同时，我们为数据中心、商用建筑及工业场所提供专业的喷雾降温与节能服务，通过精准的温湿度控制，有效降低空调系统能耗与运营成本，以创新技术推动可持续的绿色发展。

Tianlai Energy-Efficiency established in June 2013 and headquartered in Shanghai, we have long been dedicated to the application of centrifugal atomization technology in energy conservation and environmental protection, with nationwide business coverage. We hold the official titles of National High-Tech Enterprise and Shanghai "Specialized, Sophisticated, Distinctive and Innovative" Enterprise. Specializing in the R&D and innovation of centrifugal atomization technology, we supply high-efficiency, reliable indirect evaporative cooling modules and solutions for leading air conditioning manufacturers. We also provide professional spray cooling and energy-efficiency services for data centers, commercial buildings and industrial facilities. With precise temperature and humidity control, we effectively cut the energy consumption and operating costs of air conditioning systems, and boost sustainable green development through innovative technologies.



知识产权 | Intellectual Property

天来节能构建了以离心雾化技术为核心的完整自主知识产权体系。围绕平行水雾、智能水控与恒雾粒等创新，完成了从核心雾化器到高效相变冷却系统的全面专利布局。该技术可无缝集成于各类制冷系统，通过高效蒸发冷却显著提升能效、降低能耗，并为设备提供稳定可靠的降温增湿方案。

Tianlai Energy-Efficiency has developed a full independent intellectual property system centered on our proprietary centrifugal atomization technology. With core innovations in parallel water mist, intelligent water control and constant droplet size management, we have built a comprehensive patent portfolio spanning from core atomizer components to high-efficiency phase-change cooling systems. This technology can be seamlessly integrated into all kinds of refrigeration systems. Leveraging high-efficiency evaporative cooling, it delivers a marked boost in energy efficiency and a significant reduction in energy consumption, while providing stable, reliable cooling and humidification solutions for your equipment.



联系我们 | Contact Us

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