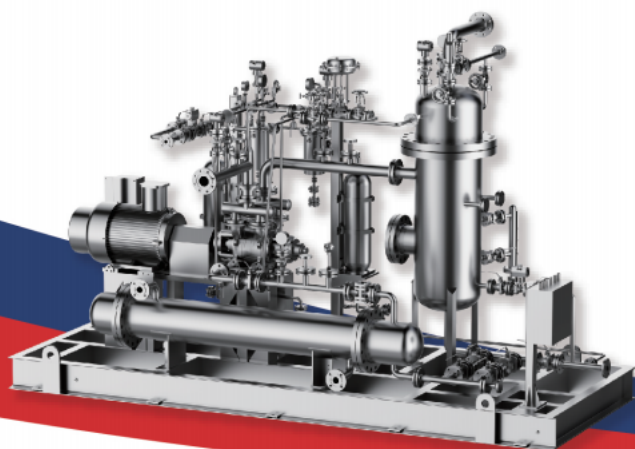


# 液环真空解决方案及应用

## Liquid Ring Vacuum Solutions and Applications



鲁阳精工真空科技(淄博)有限公司  
Chinco Vacuum Technique(Zibo) Co.,Ltd.

**EVP**<sup>®</sup>



关注公众号

**鲁阳精工真空科技(淄博)有限公司**

■ 隶属于阿特拉斯·科普柯集团

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■ Part of Atlas Copco Group

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The background of the entire image is a blue-tinted photograph of an industrial facility. It features large, complex machinery with various pipes, valves, and structural elements. The scene is dimly lit, with some light reflecting off the metallic surfaces, creating a sense of depth and scale. The blue overlay is uniform, giving the image a cohesive, corporate feel.

品牌DNA

激情 Passion  
+  
精密 Precision  
II  
完美 Perfection

Passion, Precision, Perfection is our DNA



CHINCO 的旅程始于对液环泵产品和客户的热情,同样的热情仍然是 CHINCO 所有业务的核心,我们致力于提供最好的产品。

CHINCO's journey started with a **passion** for liquid ring pump products and customers, same passion is still in the core of all CHINCO's operations offering the best possible products available.

精密制造是鲁阳精工的DNA。  
这体现在鲁阳精工的每一件产品中。

**Precision** is in the DNA Of CHINCO.  
**Precision** is present in every CHINCO product.

从高质量的液环真空泵/压缩机,到真空系统和解决方案,  
我们不断寻求知识精进、追求卓越,以提供各种各样的产品。

**Perfection:** We constantly seek new knowledge to deliver a wide variety of products, from liquid ring vacuum pumps, compressors, to vacuum systems and solution with high quality.

**EVP**



## 企业简介 About us

### 鲁阳精工真空科技(淄博)有限公司

鲁阳精工真空科技(淄博)有限公司于2022年11月1日成立于淄博市博山区湖山东路77号,是由阿特拉斯·科普柯集团对原山东精工泵业有限公司进行资产并购成立的全资子公司。公司致力于开发、制造和销售真空泵/压缩机产品及真空解决方案。我们服务于通用工业、化工、矿业、钢铁、造纸、电力、环保等多个行业领域。

### Chinco Vacuum Technology (Zibo) Co., Ltd.

Chinco Vacuum Technology (Zibo) Co., Ltd. was established on November 1, 2022, at NO.77 Hushan East Road, Boshan District, Zibo City. It is a wholly owned subsidiary of the former Shandong Chinco Pump Co., LTD., which was acquired by Atlas Copco Group. The company develops, manufactures, and sells vacuum pump/compressor products and vacuum solutions. We serve the general industry, chemical, mining, steel, paper, power, environmental protection, and other industries.



## 公司隶属于阿特拉斯·科普柯集团真空技术业务领域

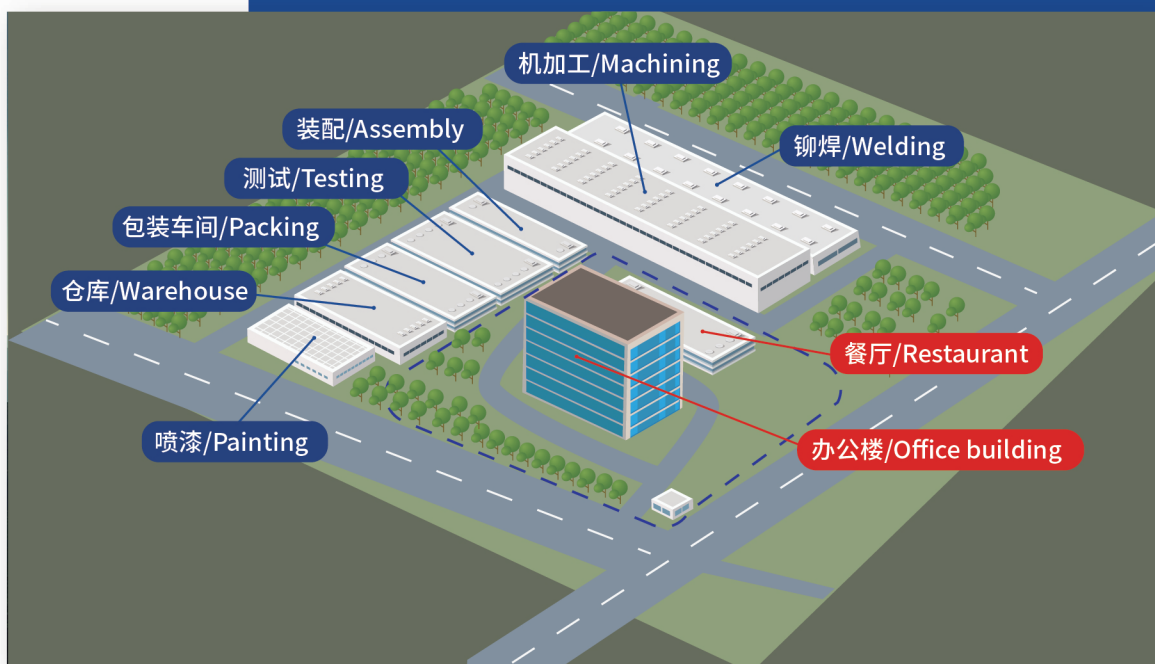
The company belongs to the Vacuum Technology Business Area of the Atlas Copco Group

赋能解决方案, 开创美好未来。在阿特拉斯·科普柯真空技术业务领域, 我们致力于开发领先的真空和工艺技术作为客户解决方案的核心, 在可持续发展的地球上确保更好的生活质量。

阿特拉斯·科普柯集团是一家成立于1873年的全球性工业公司, 总部位于瑞典斯德哥尔摩, 客户遍及180多个国家, 拥有超过53 000名员工。

Leading industrial vacuum solutions for a better future. In the Atlas Copco Vacuum Technologies Business Area, we are committed to developing leading vacuum and process technologies at the heart of our customers' solutions to ensure a better quality of life on a sustainable planet.

Founded in 1873, the Atlas Copco Group is a global industrial company headquartered in Stockholm, Sweden, with customers in more than 180 countries and more than 53,000 employees.







### **2BE系列液环真空泵及压缩机**

2BE series liquid ring vacuum pumps and compressors



### **2BV系列液环真空泵及压缩机**

2BV series liquid ring vacuum pumps



### **DLV系列双系液环真空泵**

DLV series 2-stage liquid ring vacuum pumps



### **LRC系列液环压缩机**

LRC series liquid ring compressor



### **CL系列锥体液环真空泵**

CL series cone liquid ring vacuum pumps



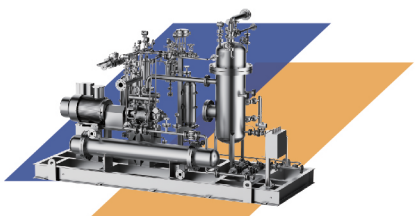
### **SY/2SY系列液环压缩机**

SY/2SY series liquid ring compressors



### **AT系列液环真空泵**

AT series liquid ring vacuum pumps

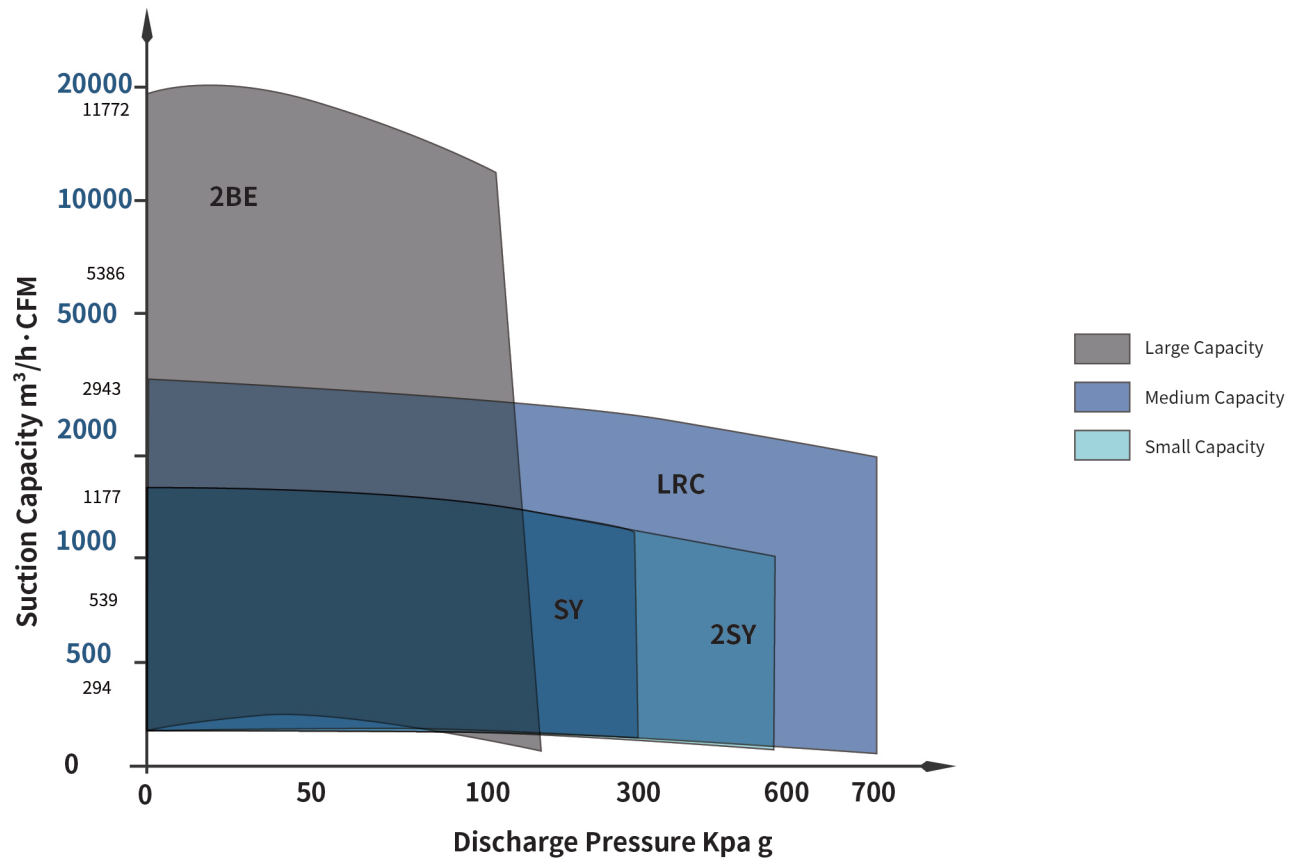
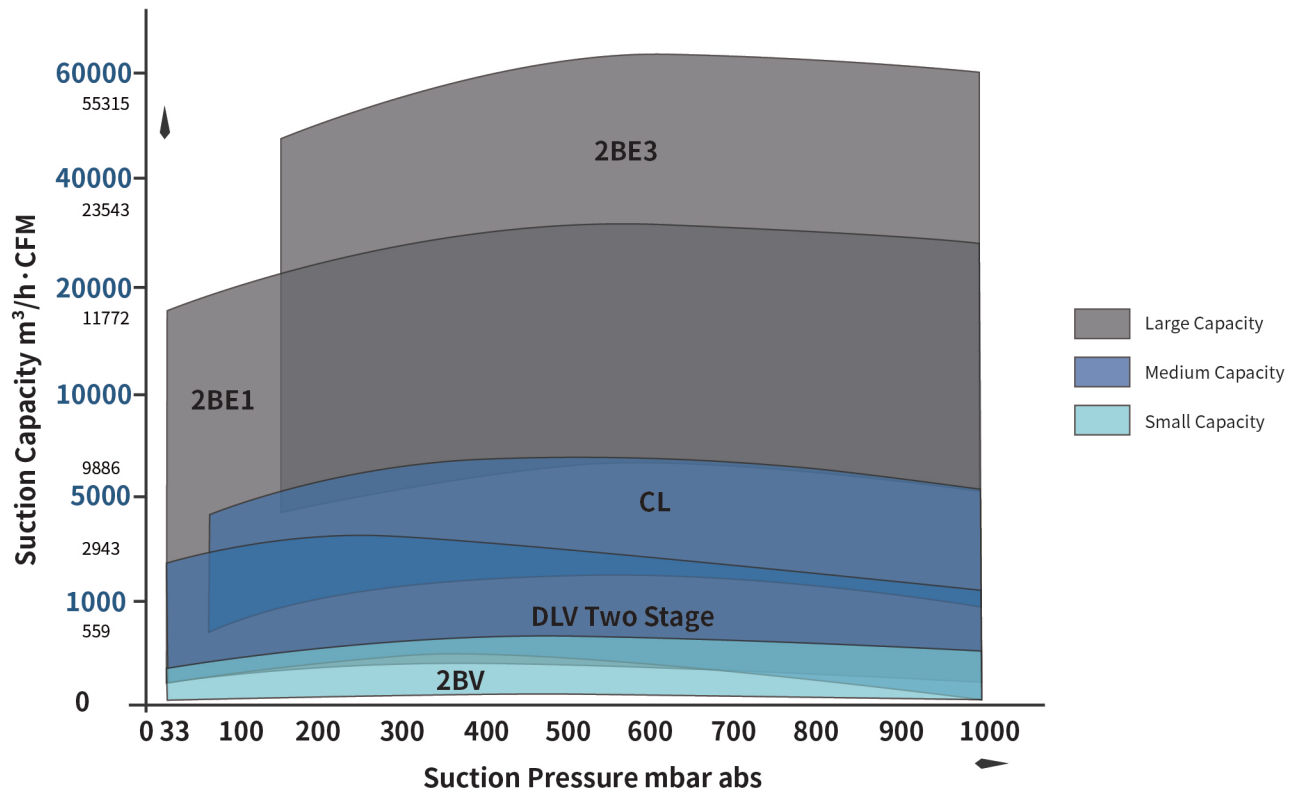


### **真空泵/压缩机系统**

LRP/LRC Systems



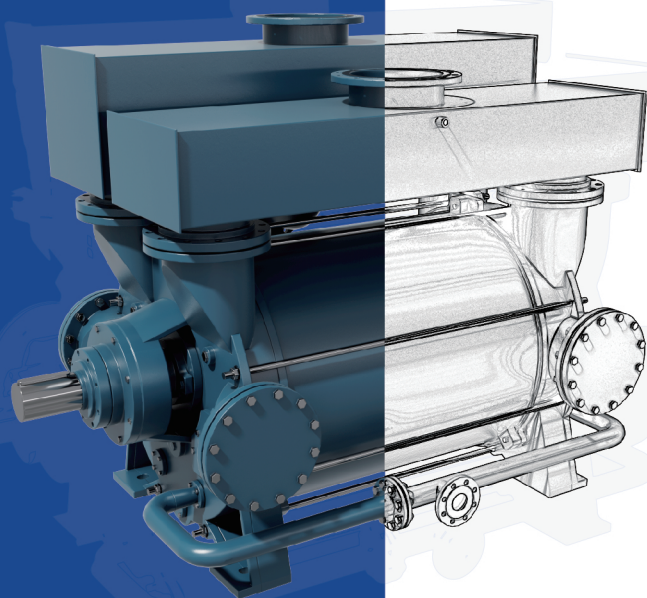
## LRVP



# 产品介绍 Product overview

## 2BE系列液环真空泵及压缩机

2BE series liquid ring vacuum pumps and compressors



经过验证的可靠性产品, 坚固耐用, 维护简便

Reliability-proven products, robust and easily maintained

气量范围大, 可适用于大多数真空应用

Large range of flow for most vacuum applications

双支撑设计, 更适应载荷冲击波动等恶劣工况

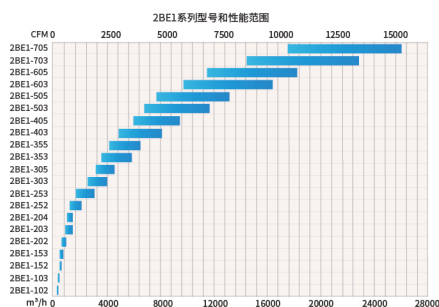
Double support design, more suitable for harsh working conditions like load impact and fluctuations

密封形式到材质, 多种配置供选择

A variety of configurations available including sealing concepts and materials

顶置进排气和侧置进排气连接口, 增加了安装选择余地

The top and side inlet and exhaust ports provide more options for installation



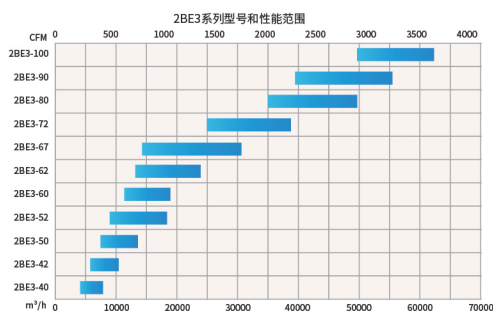
吸入压力范围: 33~1013mbar(a)

Inlet pressure range: 33~1013mbar(a)



气量范围: 165~26000m³/h

Capacity range: 165~26000m³/h



吸入压力范围: 160~1013mbar(a)

Inlet pressure range: 160~1013mbar(a)



气量范围: 4200~40000m³/h

Capacity range: 4200~40000m³/h

## 2BV系列液环真空泵及压缩机

2BV series liquid ring vacuum pumps

### 分为2BV2/5和2BV6设计

Available in 2BV2/5 and 2BV6 designs

### 2BV2/5结构紧凑, 泵电机同轴集成化设计, 降低安装成本, 降低噪音

2BV2/5: compact structure via integrated rotor on motor, which reduces installation footprint and noises

### 标配汽蚀保护孔, 保证任何工况下安全运行

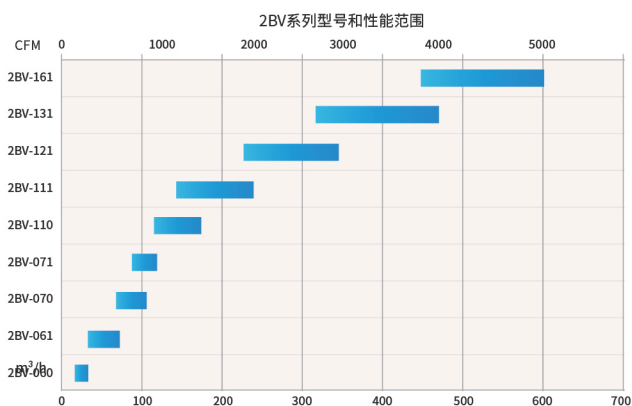
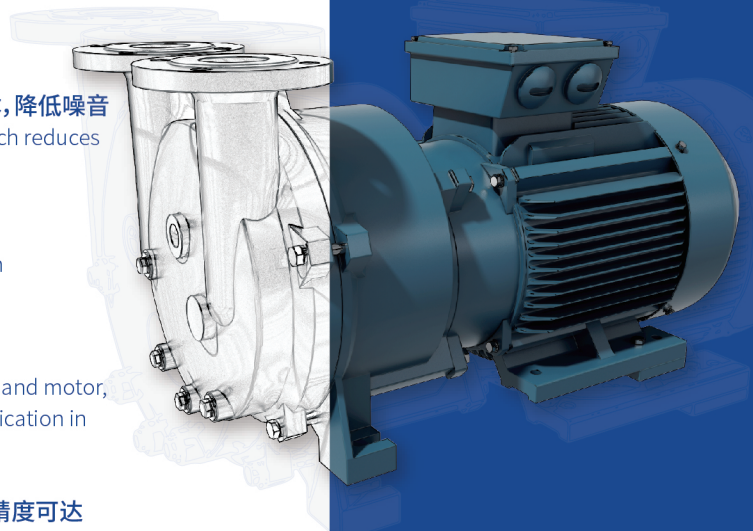
Standard cavitation protection holes to ensure safe operation under any working conditions

### 2BV6 采用连接轴设计, 配置防爆电机, 应用危险环境

2BV6: lantern design for coupling connection between pump and motor, which can be configured with explosion-proof motor for application in hazardous environment

### 多种材质可选, 标配机械密封、不锈钢转子, 叶轮动平衡精度可达 ISO G2.5

Various material configurations, standard mechanical seal, stainless steel rotor with dynamic balancing level up to ISO G2.5



吸入压力范围: 33~1013mbar(a)

Inlet pressure range: 33~1013mbar(a)



气量范围: 27~500m<sup>3</sup>/h

Capacity range: 27~500m<sup>3</sup>/h

## DLV系列双系液环真空泵

DLV series 2-stage liquid ring vacuum pumps

### 更宽的吸入压力范围

Wider inlet pressure range

### 双级叶轮压缩, 单级叶轮压缩比小, 压差小, 高真空 (<120mbarA) 工况下, 气量衰减量降低 25%, 同样节能约20%

Lower compression ratio from 2-stage impeller leads to low pressure difference. On high vacuum (< 120mbarA) working condition, the capacity degrading is improved by 25% and about energy saving 20% achieved

### 符合API 681 双支撑设计, 性能运行稳定, 噪音低

Compliant with API 681 dual-support design, stable performance and low noise

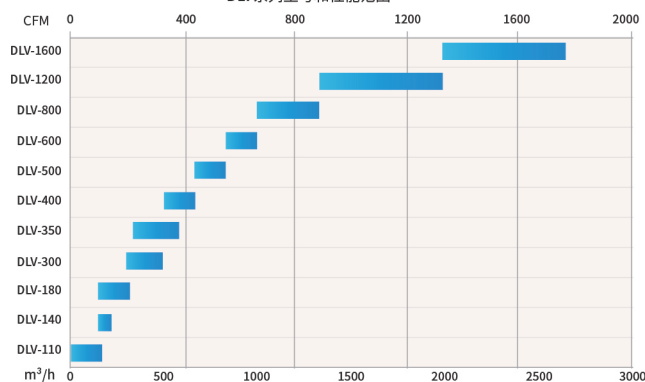
### 集装式机械密封搭配精密铸造不锈钢叶轮, 满足严苛的应用环境

Packaged mechanical seals with investment casting stainless steel impeller satisfy harsh applications

### 叶轮动平衡精度可达ISO G2.5

Dynamic balancing of rotor up to ISO G2.5

DLV系列型号和性能范围



吸入压力范围: 33~1013mbar(A)

Inlet pressure range: 33~1013mbar(A)



气量范围: 110-3000m³/h

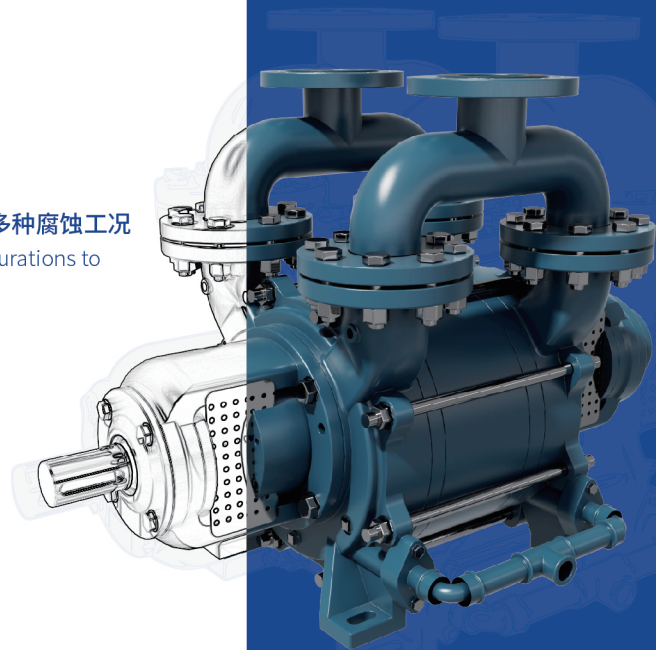
Capacity range: 110-3000m³/h



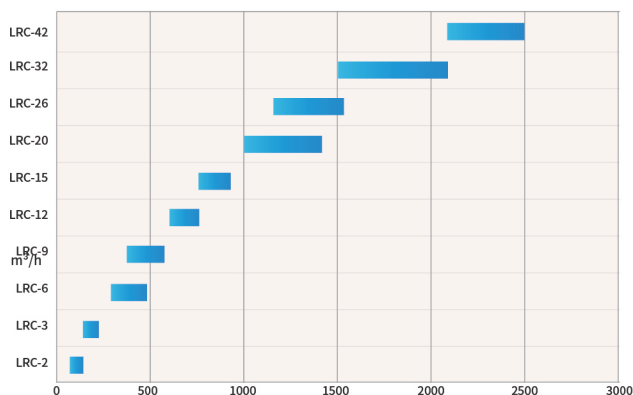
## LRC系列液环压缩机

LRC series liquid ring compressor

- 后轴承定位, 间隙可调控  
Rear bearing positioning, clearance is adjustable
- 标配集装式机封, 从碳钢到不锈钢可选用多种材质, 适用于多种腐蚀工况  
Standard packaged mechanical seal with various material configurations to satisfy a variety of corrosion conditions
- 上吸侧排结构, 启动更加方便  
Upper inlet and side exhaust structure makes it easier to start
- 泵体采用螺栓连接, 安全可靠  
The pump body uses bolt connection, safe and reliable

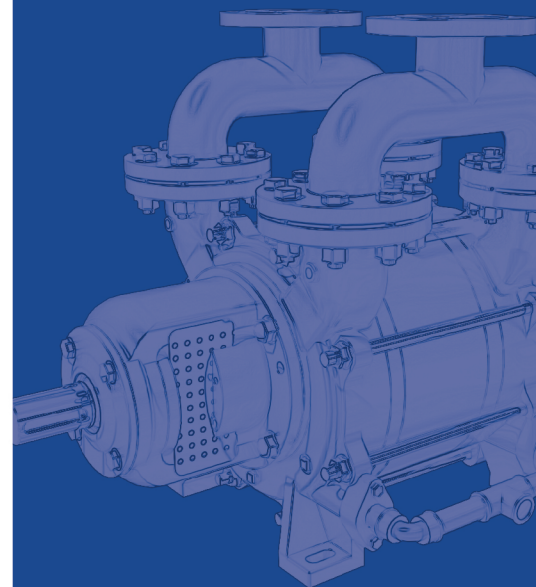


LRC系列压缩机



 **排气压力范围: 0~7bar**  
Exhaust pressure range: 0~7bar

 **气量范围: 120-2500m³/h**  
Capacity range: 120-2500m³/h



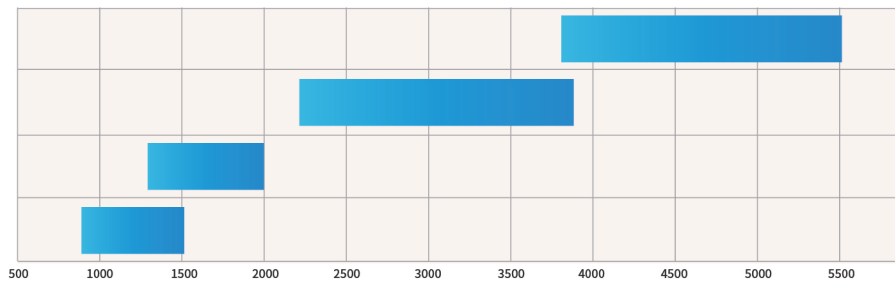


## CL系列锥体液环真空泵

CL series cone liquid ring vacuum pumps

- 多种安装点, 皮带传动/弹性联轴器的传动  
Multiple connection methods, belt drive/elastic coupling drive
- 叶轮叶片安装有围带, 更高耐久性和极强的抗侵蚀能力, 坚固而且可靠  
The impeller blade is installed with ribs, which enables higher durability and strong erosion resistance, strong and reliable
- 多种密封形式和材质可供选择, 以面对更复杂的工况  
Various sealing concepts and materials are available to face more complex working conditions
- 叶轮偏于泵的下部, 静止时液位较低, 启动电流小  
The impeller is eccentrically located on lower side of the pump, leading to low standby liquid level and low starting current

CL系列液环真空泵



**吸入压力范围: 33~1013mbar(a)**  
Inlet pressure range: 33~1013mbar(a)



**气量范围: 600-6000m³/h**  
Capacity range: 600-6000m³/h

## SY/2SY系列液环压缩机

SY/2SY series liquid ring compressors

### 结构紧凑, 运转平稳等特点

Compact structure, stable operation

### 适用于高背压应用

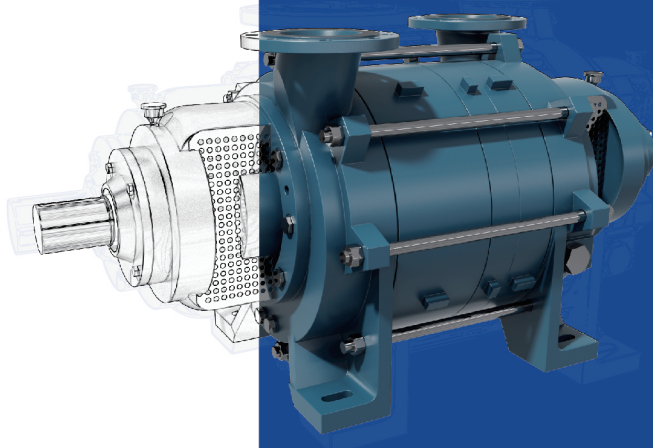
Suitable for high back pressure applications

### 特别适于抽除含有水蒸气、灰尘、易燃易爆和在高温下易产生化学反应的气体

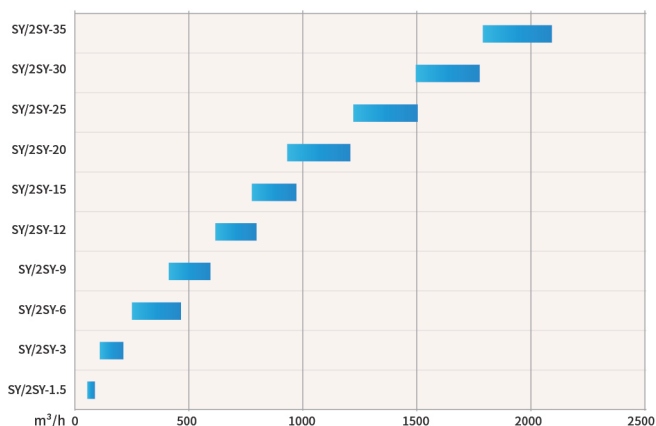
Especially suitable for extracting gases containing water vapor, dust, flammable/explosive, and gas prone to chemical reactions at high temperatures

### 高压端的柔性排气阀结构, 外冲洗双端面机械密封, 保证被压缩介质的完全无泄漏

Flexible exhaust valve structure at the high-pressure end, and external flushing double mechanical seal ensuring that the compressed medium is completely leak tight



SY/2SY系列压缩机



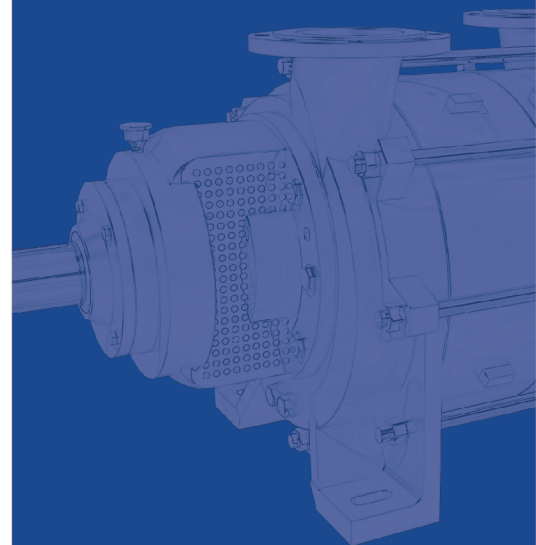
排气压力范围: 0~6bar

exhaust pressure range: 0~6bar



气量范围: 90-2100m³/h

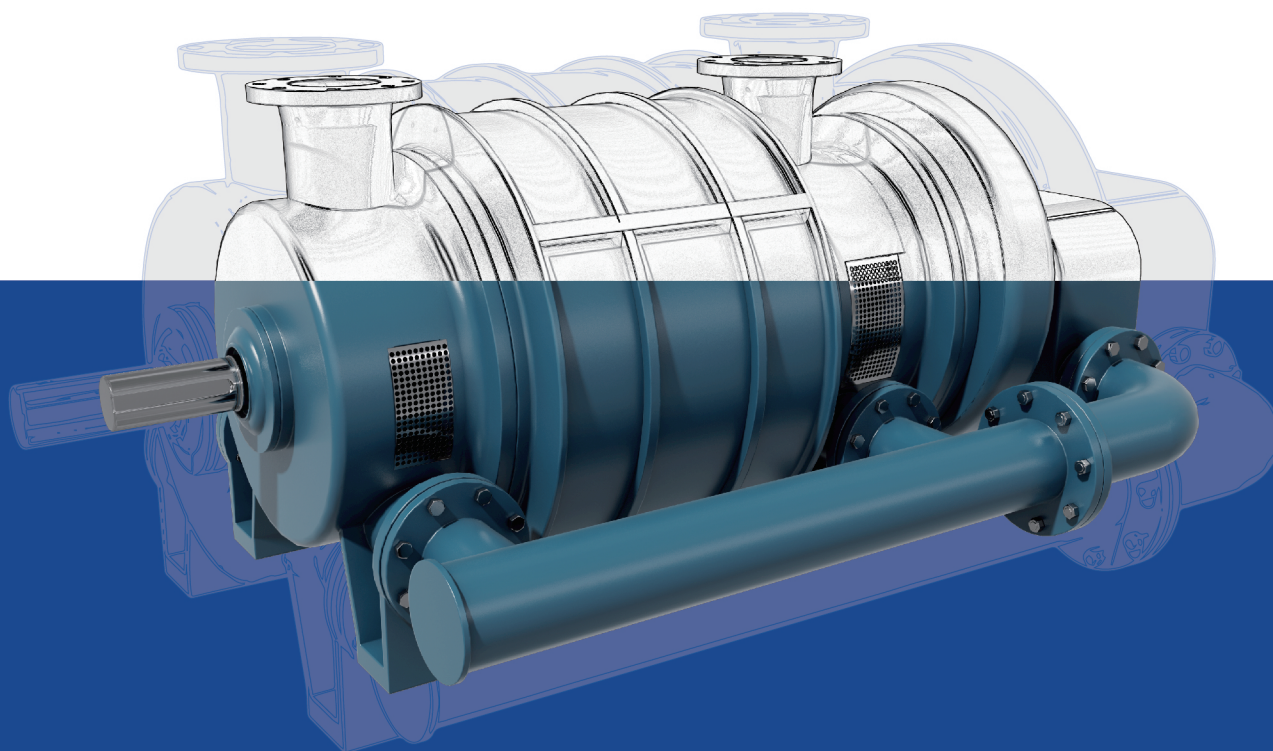
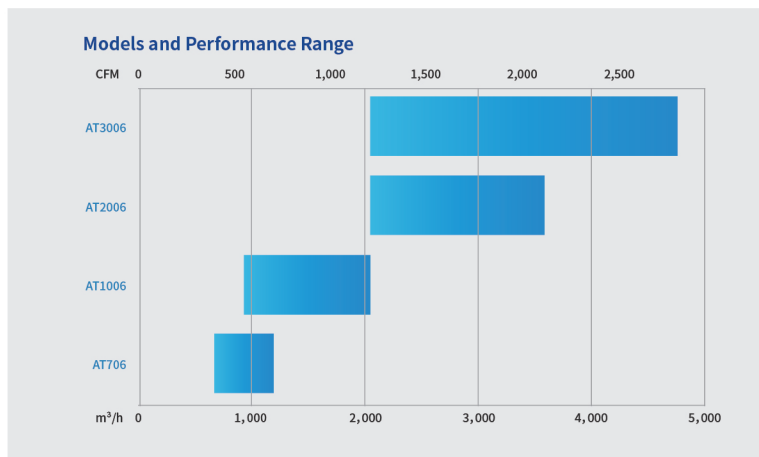
Capacity range: 90-2100m³/h

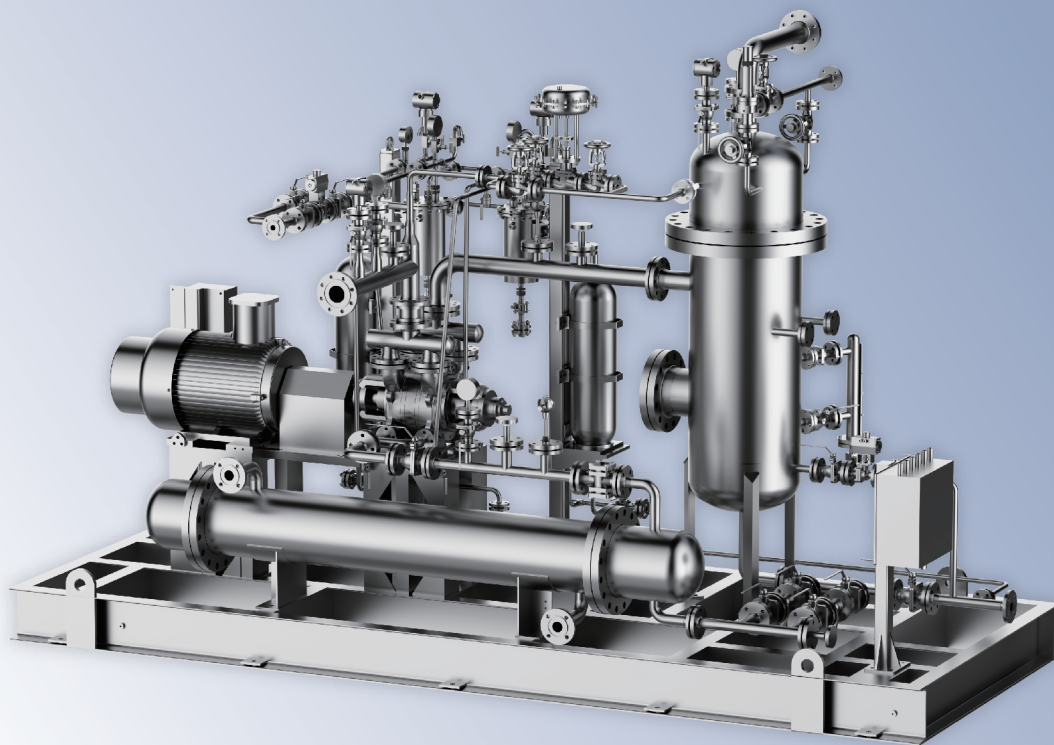


## AT系列液环真空泵

### AT series liquid ring vacuum pumps

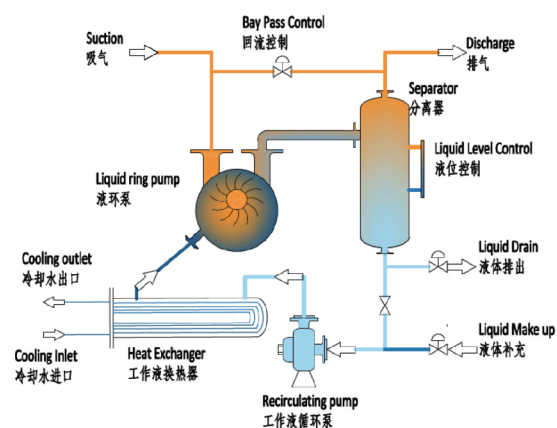
- 气量最高可达 4760 m<sup>3</sup>/h  
Max capacity: 4760 m<sup>3</sup>/h
- 锥体设计, 双级结构, 进气口可安装雾化喷嘴  
Cone design, two-stage structure, air intake can be installed atomizing nozzle
- 除了具备CL的优点以外, 适用于在发电厂抽凝汽器工况中获得更高的真空度, 极限真空可到3KPa (A)  
In addition to the advantages of CL Series, it is suitable for obtaining a higher vacuum degree in power plant extraction condenser conditions, with an ultimate vacuum of up to 3KPa (a)





## 真空泵/压缩机系统 LRP/LRC Systems

- 系统组合一般由主机,分离器,换热器,冷凝器,仪器仪表,阀门电控,及管路系统配合而成  
The system is generally composed of element, separator, heat exchanger, condenser, instruments, control valves, and piping system
- 主机可配置真空泵/压缩机、电机、减速机、联轴器、循环液离心泵等  
The element can be configured with vacuum pump/compressor, motor, reducer, shaft coupling, circulating liquid centrifugal pump, etc
- 电控系统提供开关柜装置、PLC控制系统等供选择  
Electric control system provides cubicles, PLC control system as options
- 可通过自动化仪表/阀门实现自动化监测和控制,无人值守、在线监测等功能  
Automatic monitoring and control, unattended, online monitoring and other functions can be achieved through automatic instruments/valves



液环真空泵还可以串联其他真空泵组成复合真空机组, 获得更高的使用真空度, 压缩机也可以串联使用获得更高的排气压力

The liquid ring vacuum pump can also relate to other vacuum pumps to form a composite vacuum unit to obtain a higher vacuum degree, and the compressor can also be used in series to obtain a higher exhaust pressure



# 液环泵特性 [LRP Introduction]

由服务液体形成的液环用于传输压缩气体和蒸汽所需的能量，服务液允许介质相互影响，

Liquid ring formed from the service liquid serves to transmit the energy required for the compression of gases and vapors. Service liquid allowing the media to affect each other

## ■ 几乎可以压缩所有气体

Compressing almost any gas or vapor

没有摩擦部件

No frictional contact

材质可以根据工况进行选择

The materials of construction can be selected to suit the operating conditions.

等温压缩

The compression process is more or less isothermal.

## ■ 在压缩爆炸性物质和有毒或致癌介质时具有最高安全性

Highest degree of safety in compressing explosive substances and toxic or carcinogenic media.

如果介质是可冷凝成分，则入口体积流量可以增加

If the medium is condensable constituents, the inlet volumetric rate of flow can increase.

单或双机械密封和磁力驱动确保低泄漏率

Single or double mechanical seals and magnetic drives ensure low leakage rates.

低噪音排放和低振动水平

Low noise emission and a low vibration level.

操作安全性高，维护量小

A high degree of operational safety with minimum maintenance.

## ■ 液体可以与气流一起被泵送

Liquid can be pumped along with the gas flow.



Liquid ring serving as Energy Transmitter

液体环用作能量传递



# LRP 应用 / Application

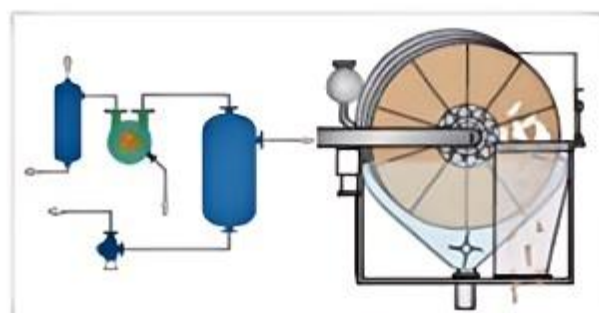
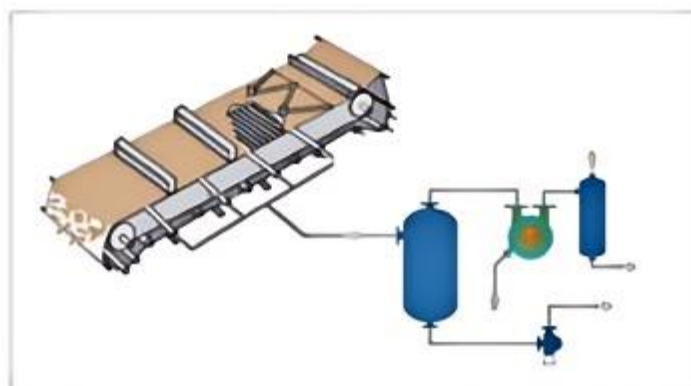
## 真空过滤或压缩过滤

## Vacuum or Compress Filtration

过滤是从液体浆料中分离固体颗粒的过程。所有形式的过滤都需要压差使液体通过多孔过滤介质/膜。各种过滤技术已经发展到满足许多不同的工业应用的要求,无论是带式过滤机还是盘式过滤机,无论是简单的脱水过滤还是操作富含高强腐蚀的酸性或者碱性液体,Chinco都能提供可靠稳定的产品来确保您的流程平稳高效地运行,并避免大量设备停机。

Filtration is the process of separating solid particles from a liquid slurry. All forms of filtration require differential pressure to move the liquid through a porous filtration medium/membrane.

A variety of filtration technologies have evolved to meet the requirements of many different industrial applications, whether it is a belt filter or a disk filter, whether it is a simple dehydration filter or the operation of acidic or alkaline liquids with high corrosion, Chinco offers reliable and stable products to ensure that your processes run smoothly and efficiently, and avoid extensive equipment downtime.



### 应用行业





## Vacuum Evaporation/Drying/ Crystallization / Concentration

## 真空蒸发/干燥/结晶/浓缩

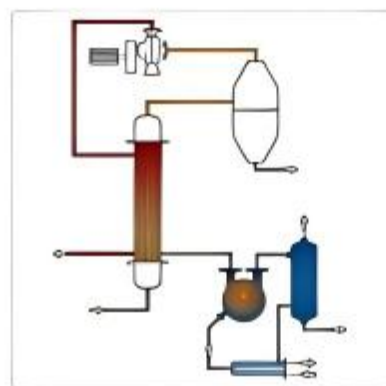
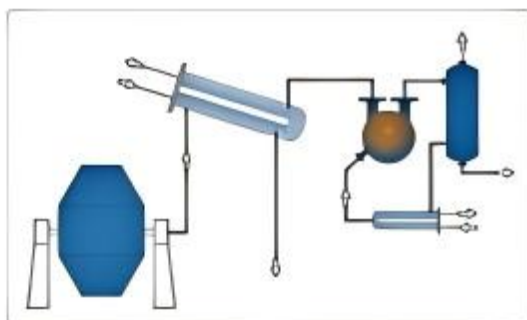
在制药, 化工, 生物技术产业的众多应用中, 溶剂的去除步骤必不可少, 减压操作是必不可少的一种工艺。通过真空泵对蒸发系统保持负压操作可以降低物料蒸发温度, 使整个工艺流程处在低温低压环境中, 即降低了能源消耗, 又保证溶剂的可回收性。

利用蒸汽压缩机对蒸发器产生的一次蒸汽进行二次增压增温, 并作为蒸发热源, 大大降低蒸发系统的能源消耗。

In many applications of the pharmaceutical, chemical, and biotechnology industries, the removal of solvents is essential, and the decompression operation is an essential process. By maintaining negative pressure on the evaporation system through the vacuum pump, the evaporation temperature of the material can be reduced.

The entire process is in a low-temperature and low-pressure environment, which reduces energy consumption and ensures the recyclability of the solvent.

The steam compressor is used to supercharge and warm the primary steam produced by the evaporator twice, and as the evaporation heat source, which greatly reduces the energy consumption of the evaporation system.



### 应用行业



## 真空蒸馏

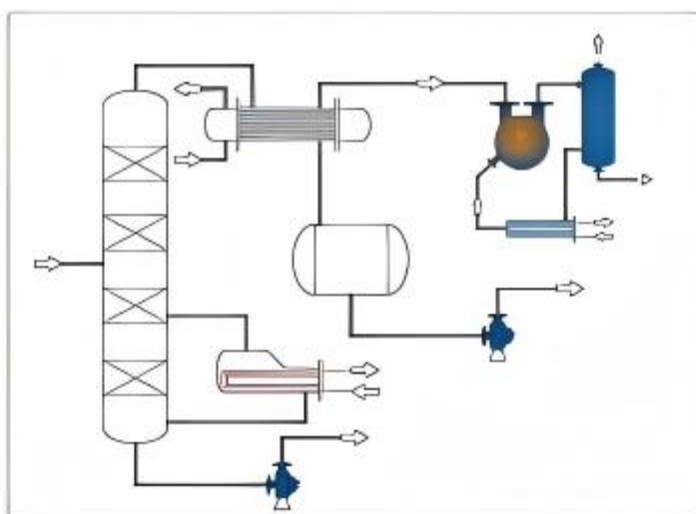
## Vacuum distillation

蒸馏就是将两种及以上具有不同温度、压力、成分和相态的层面或部分分离开来。随着蒸馏塔趋向均衡，各部分具有不同的浓度，可以从混合物种分离出来。蒸馏塔提供将不同液体成分分离开来的气压，通过改变真空度和温度进行分离。

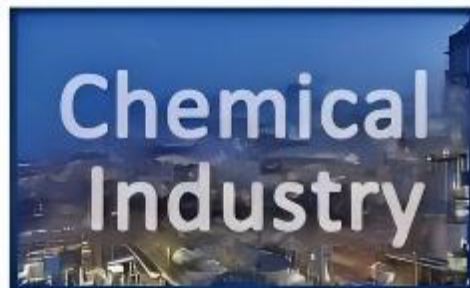
精馏系统通常操作易燃易爆的或者具有高沸点的物料成分，对真空泵及系统的可靠性和安全性具有极高的要求。无论单级低真空还是多级复合高真空机组，Chinco 根据不同的工艺需求提供工程化/定制化的设计，并可以获得整套系统的安全认证。

Distillation is the separation of two or more layers or parts with different temperatures, pressures, compositions, and phases. As the distillation column tends to equilibrate, the parts have different concentrations and can be separated from the mixed species. The distillation column provides the air pressure to separate the different liquid components by varying the vacuum and temperature.

The distillation system usually operates flammable and explosive or has a high boiling point of the material composition, the reliability and safety of the vacuum pump and system has extremely high requirements. Whether it is a single-stage low vacuum or a multi-stage complex high vacuum unit, Chinco provides engineering/customized design according to different process requirements and can obtain the safety certification of the entire system.



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## Vacuum degassing 真空脱气

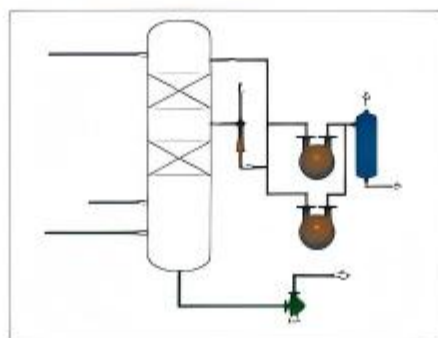
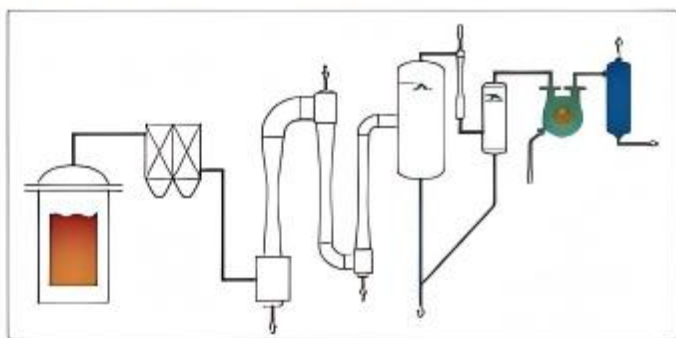
真空脱气, 通过降低容器中的压力, 从液体或糊剂中去除溶解气体的技术。

真空脱气可以应用在钢铁精炼工业, 在生产过程中, 钢水中可能注入过量的氢和碳。这些缺陷可能影响钢铁的完整性和性能, 使其延展性降低, 进而导致可锻性降低。现代方法是在真空条件下将氢气抽出, 从而确保更快生产出具有准确定义的特性的高质量钢。

在近海应用中, 海水注入油井是原油生产的基本流程, 它通常是实现并维持经济上可行的生产率的关键因素。因为氧气会对硫酸盐去除系统产生不利影响, 所用的水必须先脱气。真空脱气是当今石油和天然气行业中常用的方法。用真空系统对填料塔连续进行抽空, 从而抽出氧气和其他气体。

Vacuum degassing is the technique of removing dissolved gas from a liquid or paste by reducing the pressure in the container. Vacuum degassing can be used in the steel refining industry, where excessive hydrogen and carbon may be injected into molten steel during the production process. These defects can affect the integrity and properties of the steel, making it less ductile and thus less malleable. The modern method is to extract the hydrogen under vacuum conditions, thus ensuring faster production of high-quality steel with precisely defined characteristics.

In offshore applications, the injection of seawater into wells is the fundamental process of crude oil production, and it is often a key factor in achieving and maintaining economically viable productivity. Since oxygen can adversely affect the sulfate removal system, the water used must be degassed first. Vacuum degassing is a common method used in the oil and gas industry today. The packing tower is continuously evacuated with a vacuum system to extract oxygen and other gases.



### 应用行业



## 气体分离 Gas separating

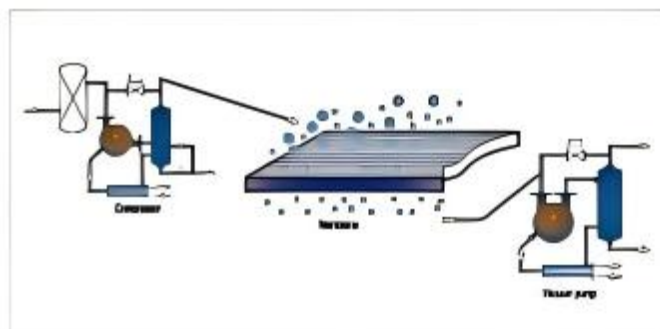
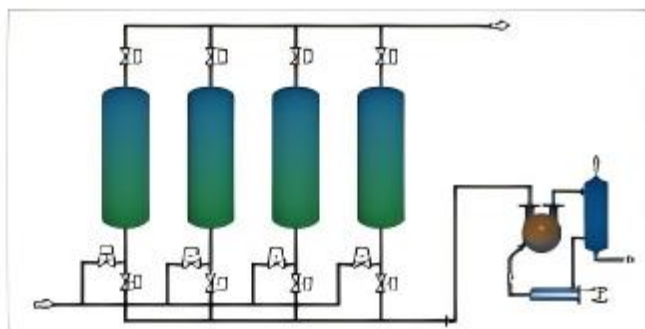
气体分离是获得纯净气体的必要工序。空气中的 $N_2/O_2$  / $CO_2$ 都是常见的工业原料。从天然气中获得纯净的 $CH_4$ 也需要应用气体分离工艺。

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现代气体分离通常采用变压吸附和膜分离的方法。两种方法都需要压力的变化驱动气体的分离。

Gas separation is a necessary process to obtain pure gas.  $N_2/O_2$  / $CO_2$  in the air are common industrial raw materials. Obtaining pure  $CH_4$  from hot air also requires the application of a gas separation process.

Modern gas separation usually adopts pressure swing adsorption and membrane separation methods. Both methods require a change in pressure to drive the gas separation.



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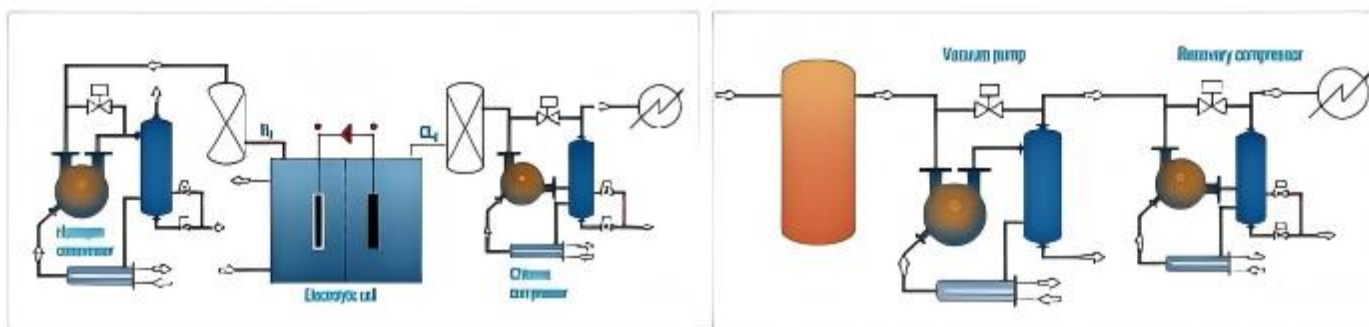


液环真空泵和液环压缩机凭借独特的特点在输送危险气体时把风险降到最低。在氯碱工业中,用于生产氢氧化钠的食盐水,经过电解产生氢气/氯气。两种危险气体需要液环压缩机输送下一步工序,对于压缩机有极高的安全性要求和性能要求,需要严格控制进气压力和排气温度。

液环真空泵在反应气的回收也有广泛的应用。例如在PVC生产过程中在一个间歇单体回收系统中,未反应的氯乙烯首先被转移到抽真空的储罐中,并在大气压或接近大气压的情况下将其输送到压缩机进口。然后,单级压缩机将气体压缩成压缩液体进行冷凝和储存。

Liquid ring vacuum pumps and liquid ring compressors have unique features that minimize risk when transporting dangerous gases. In the chlor-alkali industry, salt water used to produce sodium hydroxide is electrolyzed to produce hydrogen/chlorine gas. The two dangerous gases require the liquid ring compressor to transport the next step, which has extremely high safety and performance requirements for the compressor, and requires strict control of the intake pressure and exhaust temperature.


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A photograph of a large industrial facility, likely a vacuum furnace or a precision manufacturing plant. In the foreground, a worker in a blue hard hat and dark uniform stands on a platform, looking into a large, blue-tinted glass-enclosed machine. To the right, another worker is visible further down the line, and a third worker is in the background. The floor is cluttered with various industrial components, including large circular metal flanges and a blue metal cart filled with tools. A yellow overhead crane with a black and red striped beam is suspended from the ceiling. The scene is lit with warm, yellowish light, and the overall atmosphere is one of a busy, high-tech industrial environment.

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