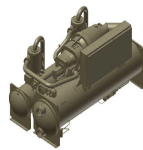


# 水冷螺杆式冷水机

---

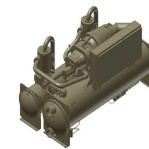
## RTHD

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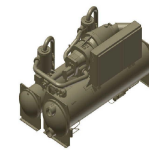
# 主要内容

- ◆ RTHD 概况
- ◆ RTHD与RTHB、RTHC机组的比较
- ◆ RTHD主要部件及运行  
控制、蒸发器、压缩机、EXV、油系统、冷凝器



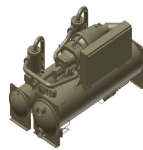
# RTHD 概况

- ◆ 产品系列: 175-450 Tons
- ◆ 单压缩机, 直接驱动
- ◆ 单制冷回路
- ◆ 0.572-0.677 kW/Ton (at ARI)
- ◆ 78 dBa 声压
- ◆ 电子膨胀阀
- ◆ 制冷剂: HFC-134a
- ◆ CH530

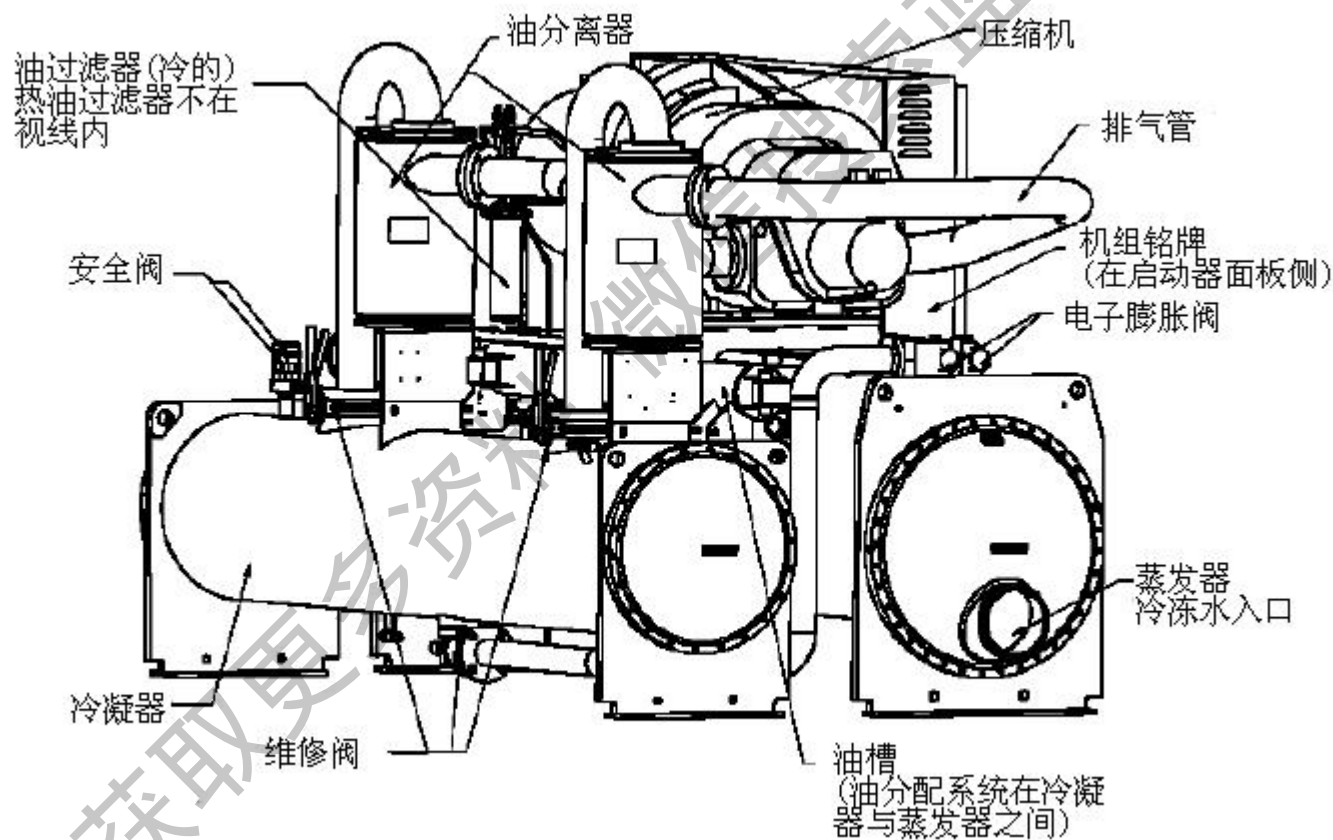


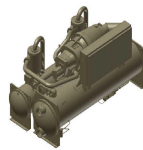
# 部件

- ◆ 蒸汽冷却电机
- ◆ 压缩机
- ◆ 气体推动卸载活塞
- ◆ 油分离器
- ◆ 油箱
- ◆ 带过冷器的冷凝器
- ◆ 油箱加热器
- ◆ 油过滤器
- ◆ 油位传感器
- ◆ 油温传感器
- ◆ 电子膨胀阀
- ◆ 降膜蒸发器
- ◆ 气泵
- ◆ 启动器/控制器面板
- ◆ 可选的油冷却器
- ◆ 主油路电磁阀
- ◆ 制冷剂过冷器(在油回路中)
- ◆ 卸载电磁阀
- ◆ 加载电磁阀

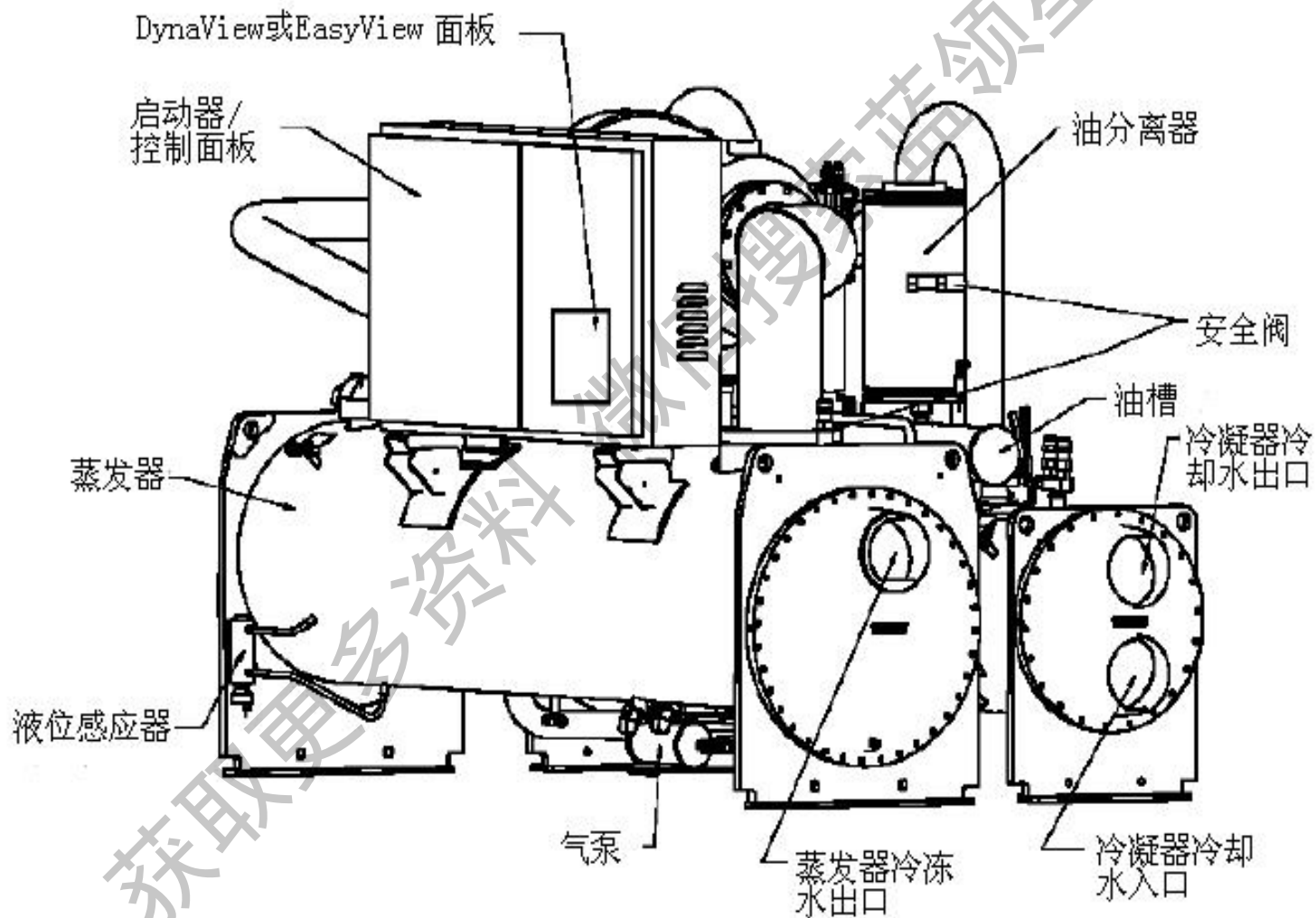


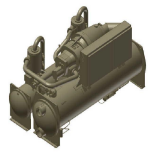
# RTHD—后视





# RTHD—前视

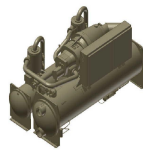




# RTHD 后视



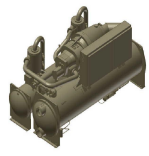


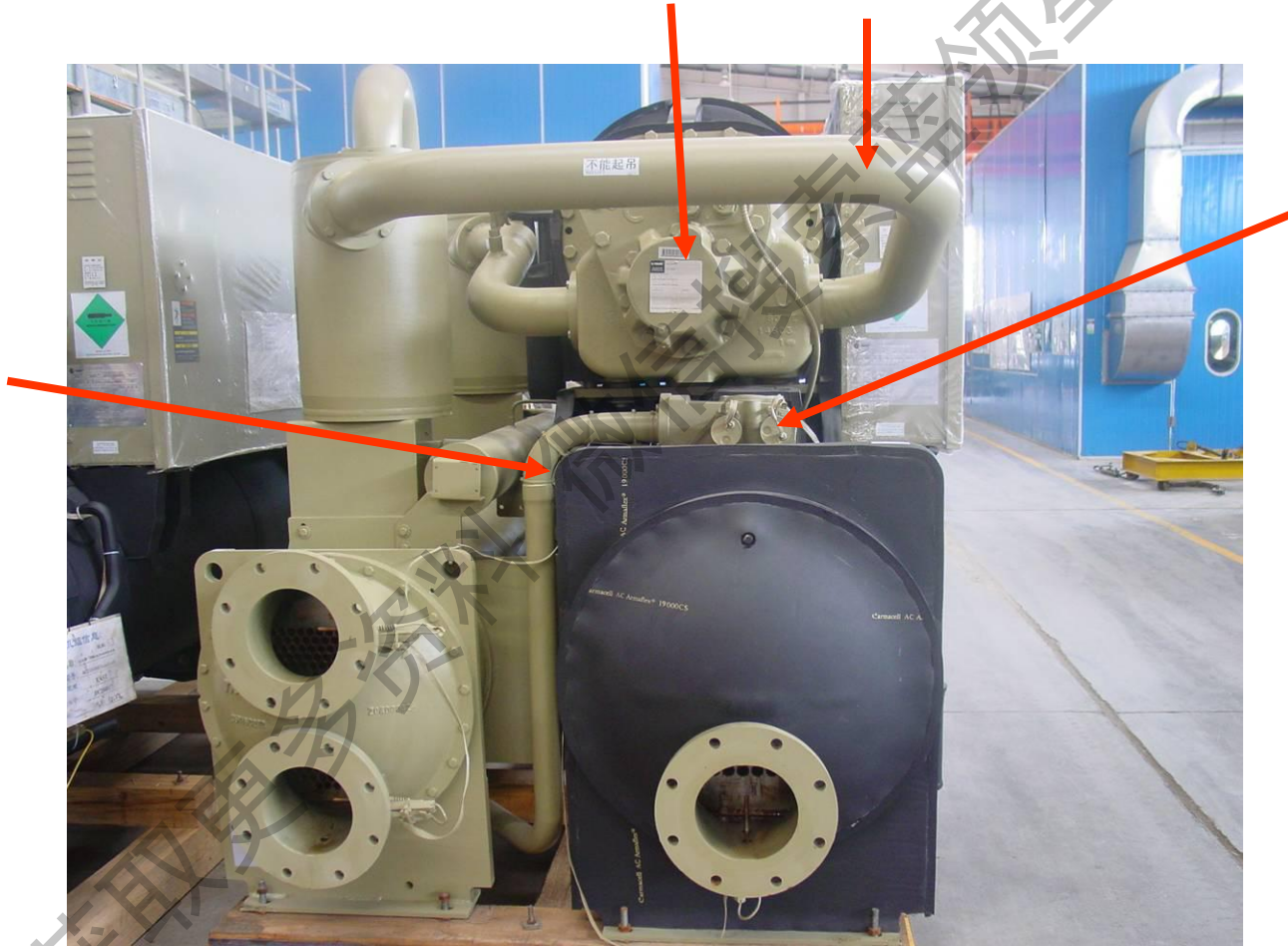


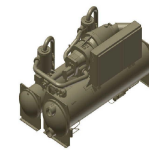
# RTHD 侧视









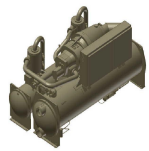


# RTHD主要部件

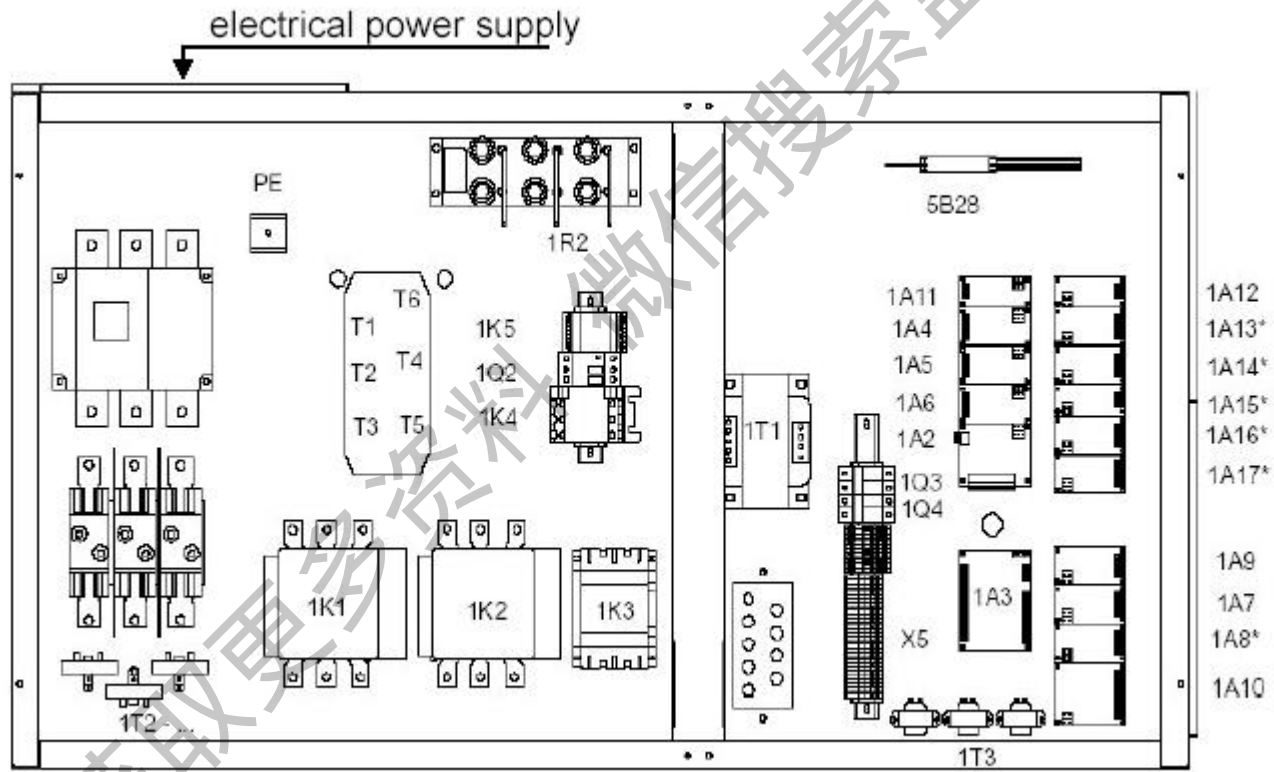
## ◆ 主要部件及运行原理

控制系统、蒸发器、压缩机、EXV、油系统、冷凝器

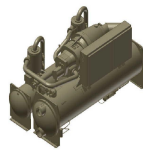
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# 控制/启动器板







## RTHD启动器面板—Y/Δ

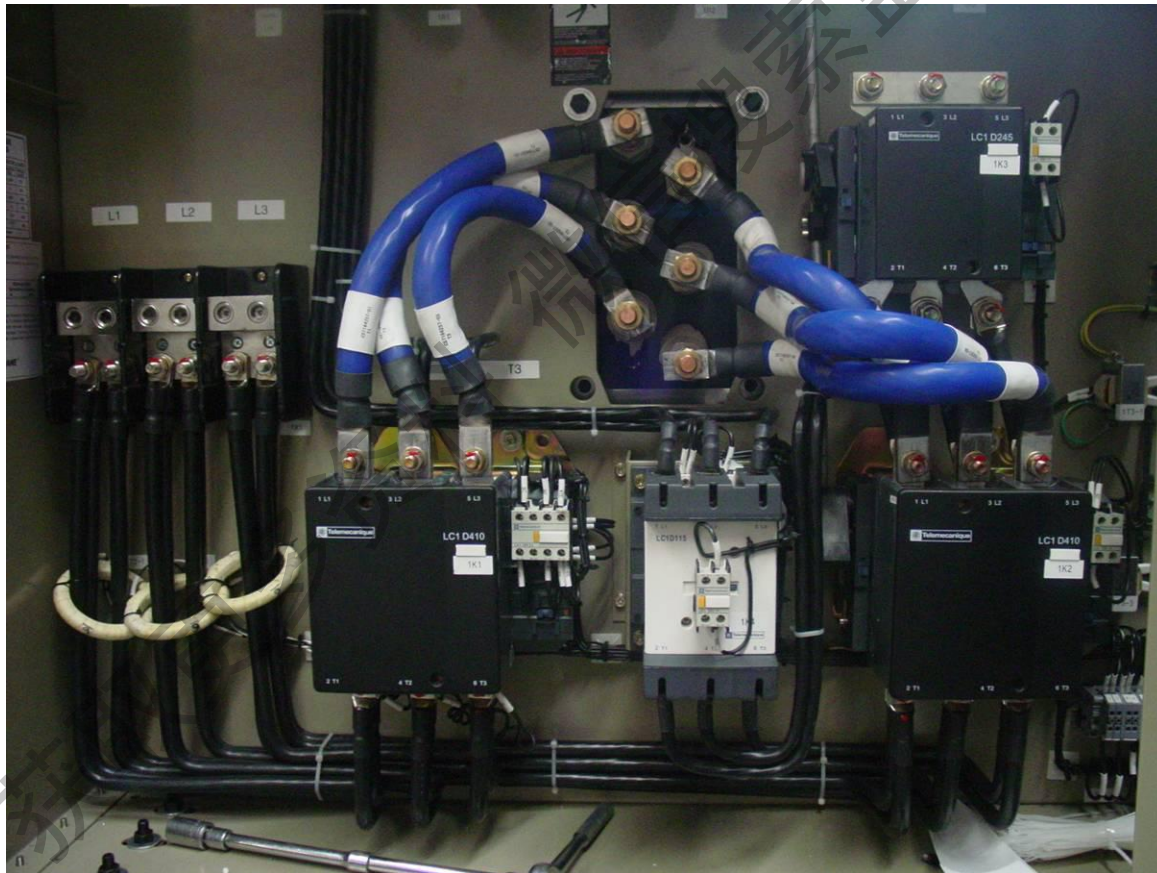
- ◆ 单控制箱设计
- ◆ UL508排列控制箱
- ◆ Y/Δ启动大小  
—直到888RLA
- ◆ 固态启动器  
—直到623RLA
- ◆ 65,000 Amp短路电路  
承载额定电压460V
- ◆ 35,000 Amp短路电路  
承载额定电压600V

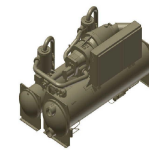


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# 星-三角启动器



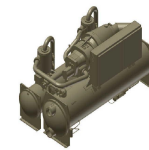


# 压缩机(CHHC)



- ◆ 两极电机
- ◆ 双排气管
- ◆ 额外的钢材
- ◆ R-134a 制冷剂
- ◆ 卸载到 25%
- ◆ 双螺杆





# RTHD机组的压缩机CHHC

- ◆ 同RTHC
- ◆ 以冷吨ton计大小

B1—180

B2—200

C1—250

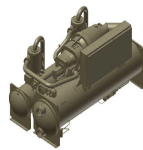
C2—300

D1—300

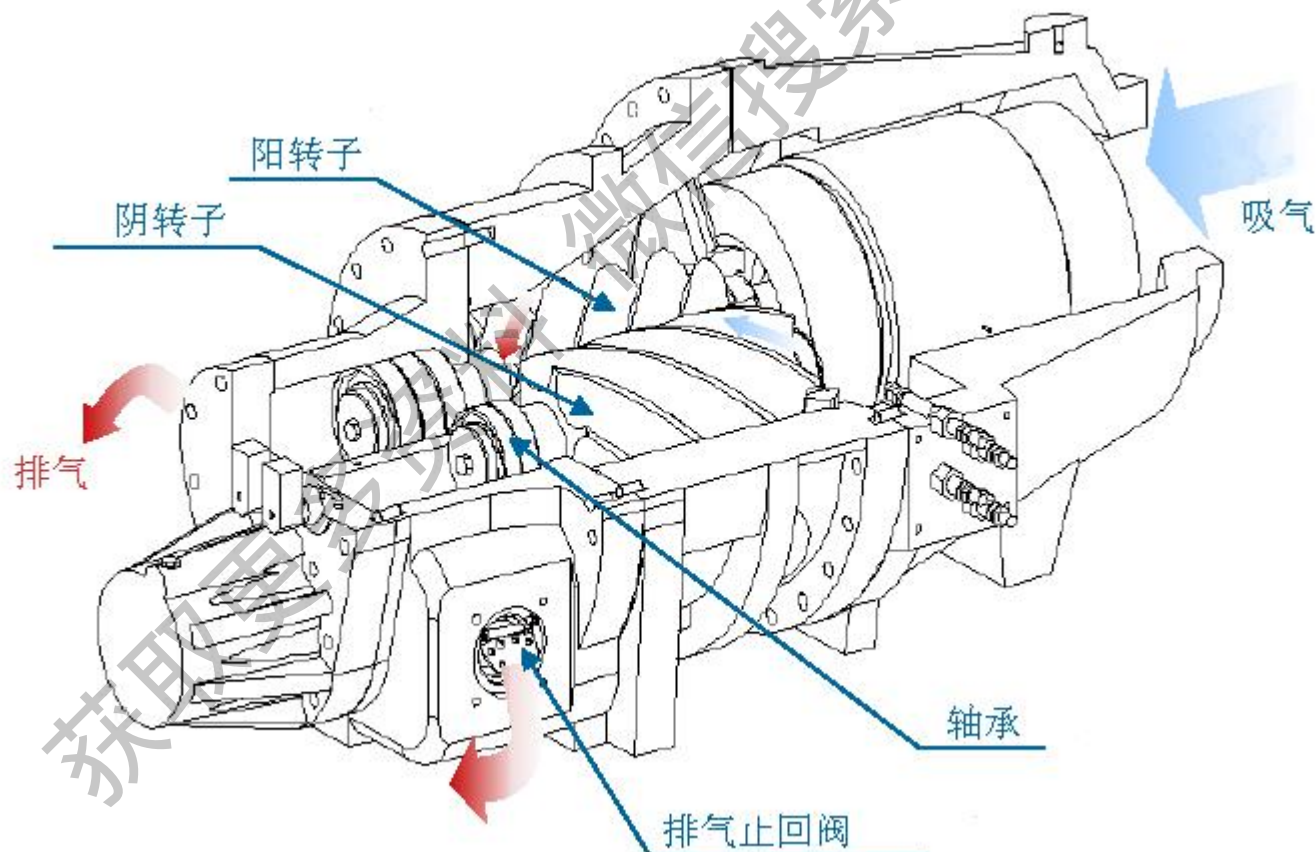
D2—360

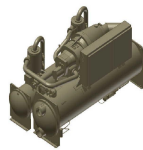
D3—450

E3—480 (epinal)



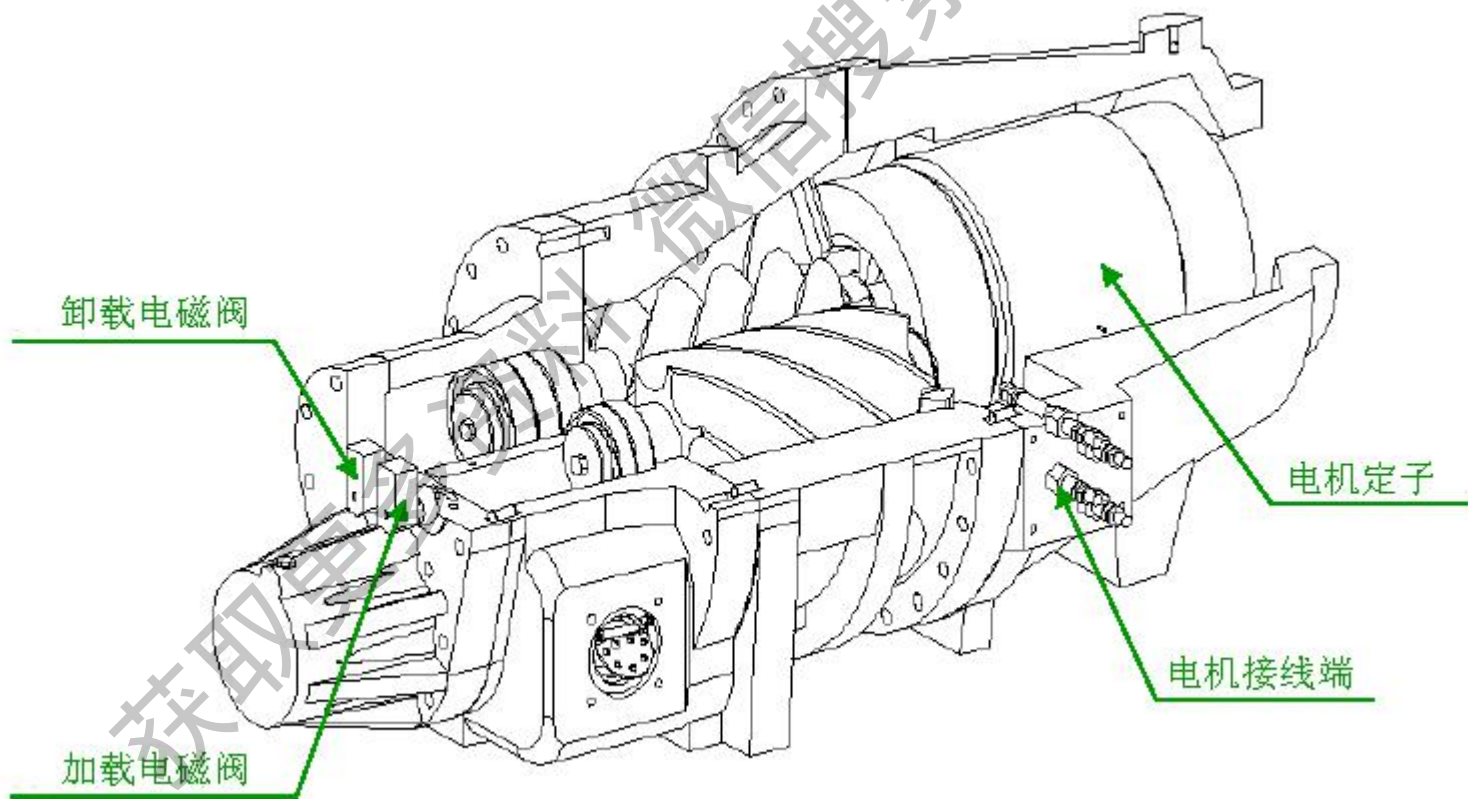
# RTHD压缩机

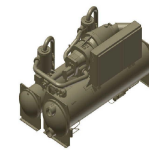




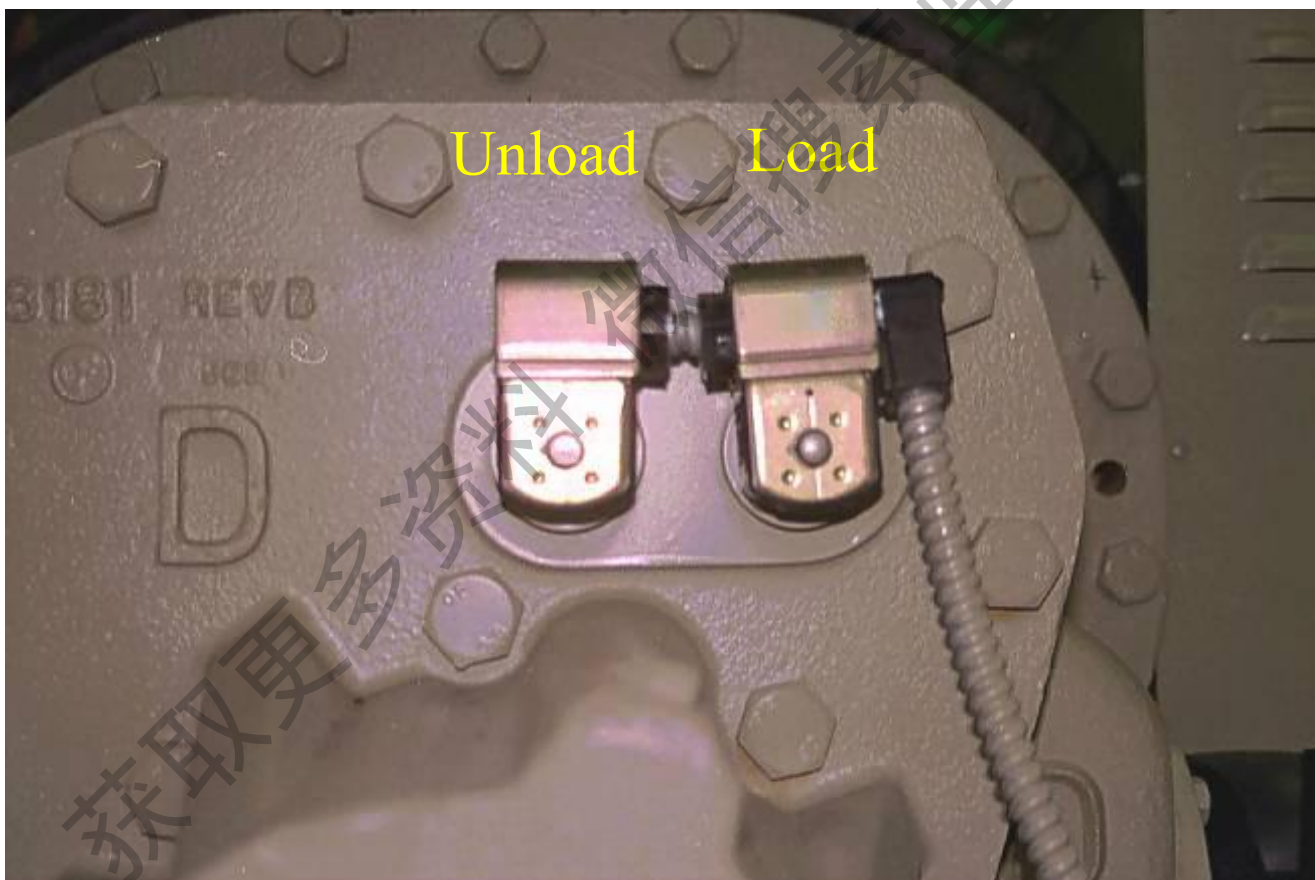
# RTHD压缩机

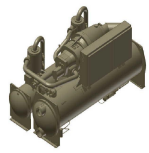
剖视图





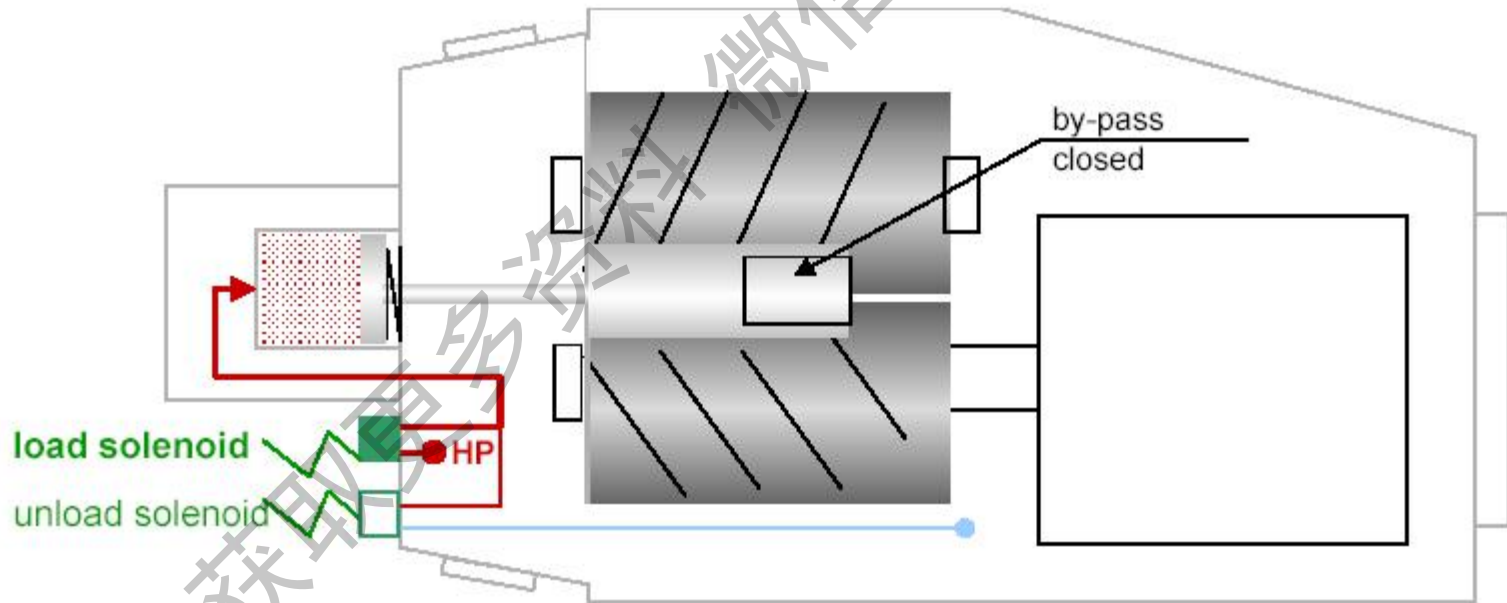
## 加载/卸载电磁阀

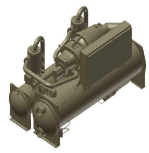




# 压缩机

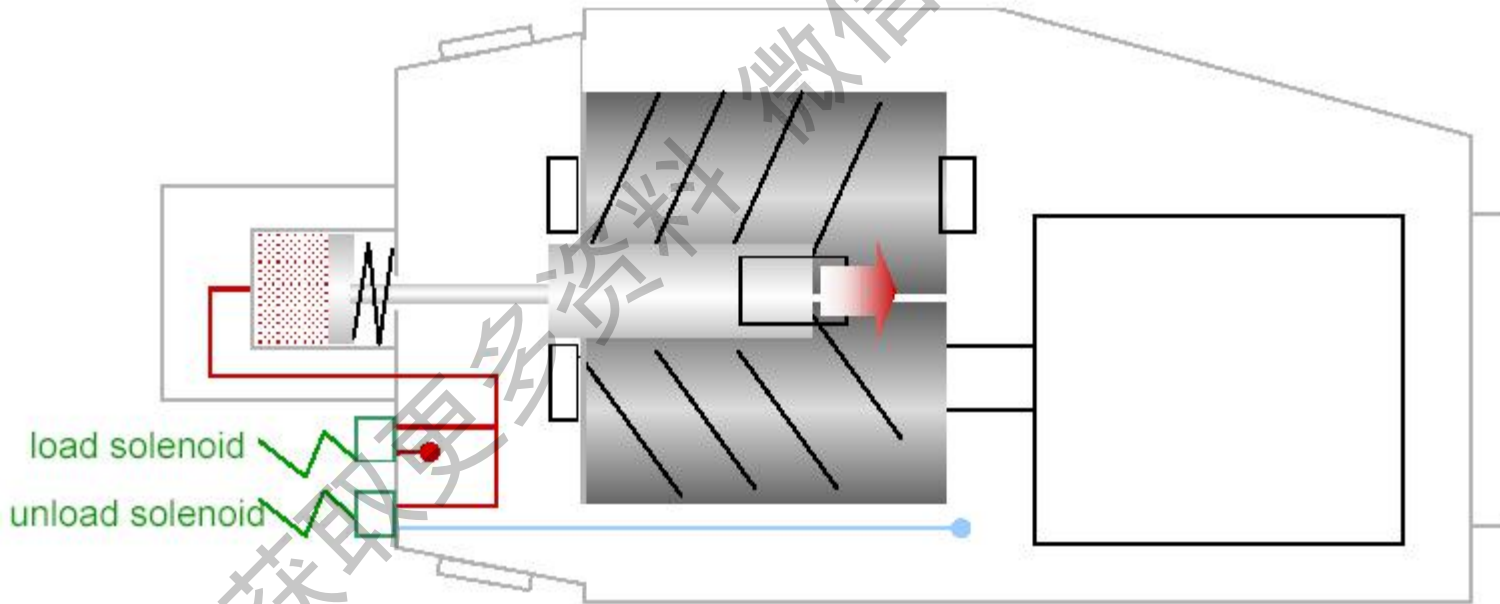
## ◆ 负荷控制—全载荷

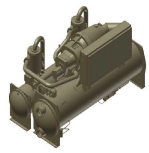




# 压缩机

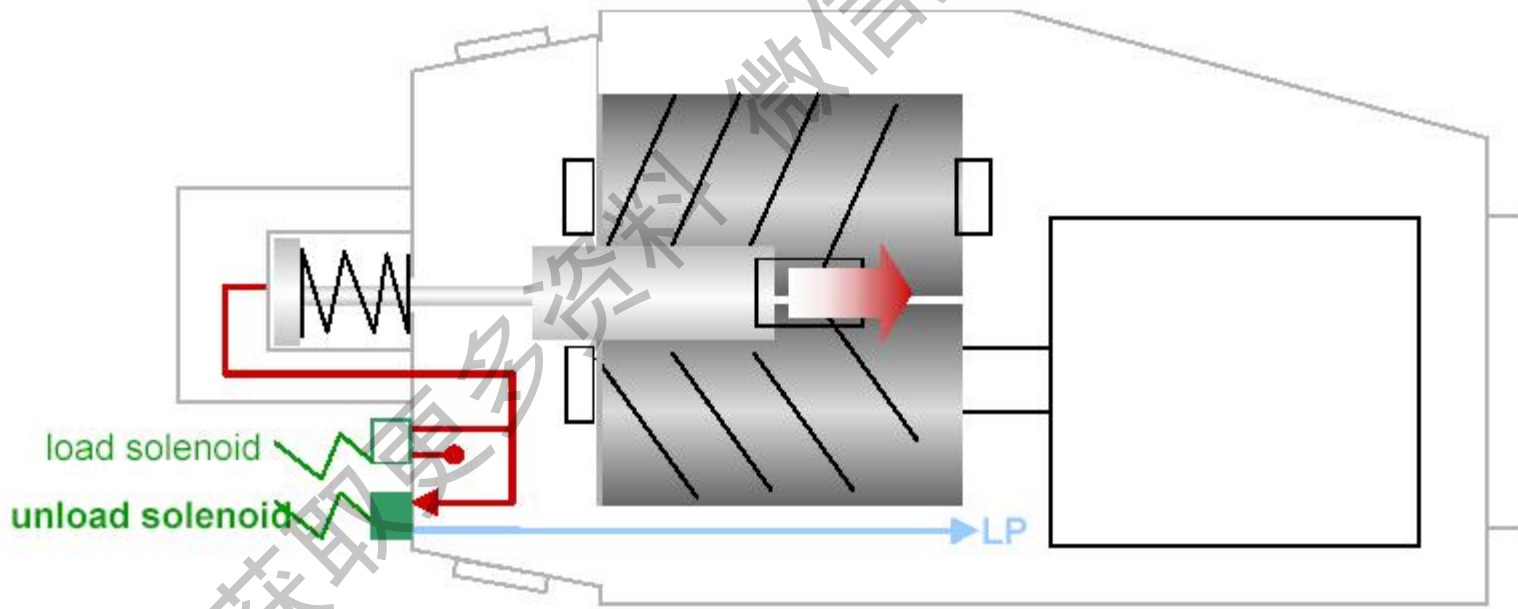
## ◆ 负荷控制—部分载荷



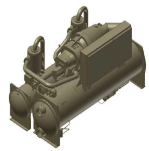


# 压缩机

## ◆ 负荷控制—卸载



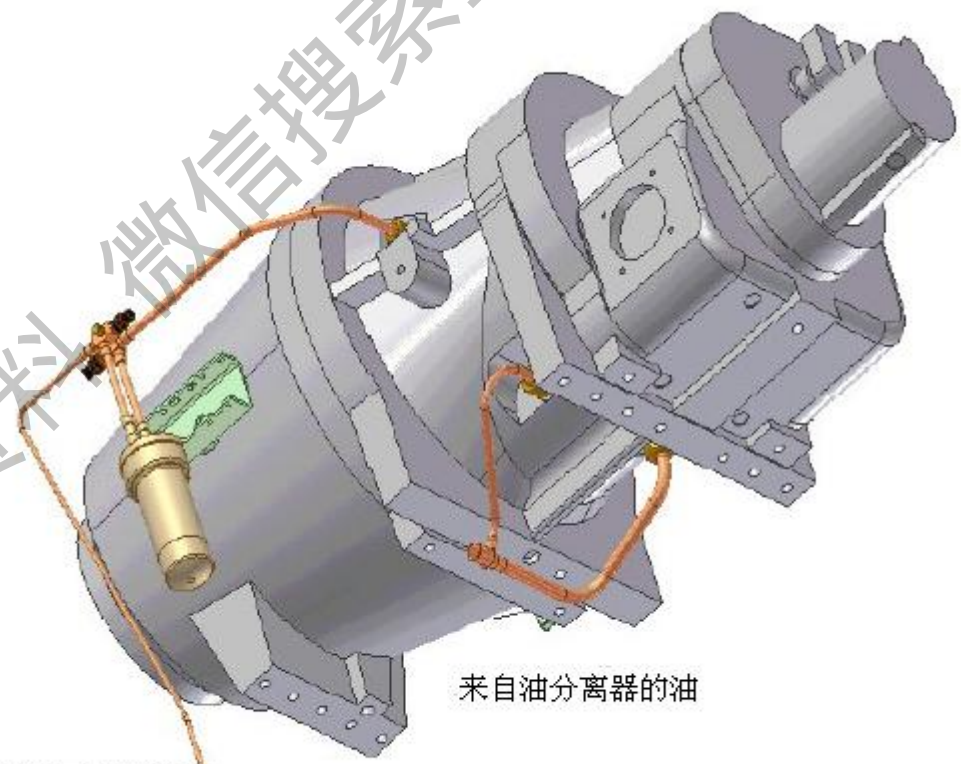




# 压缩机

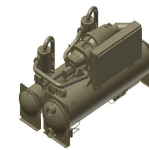
## ◆ 润滑油回油口

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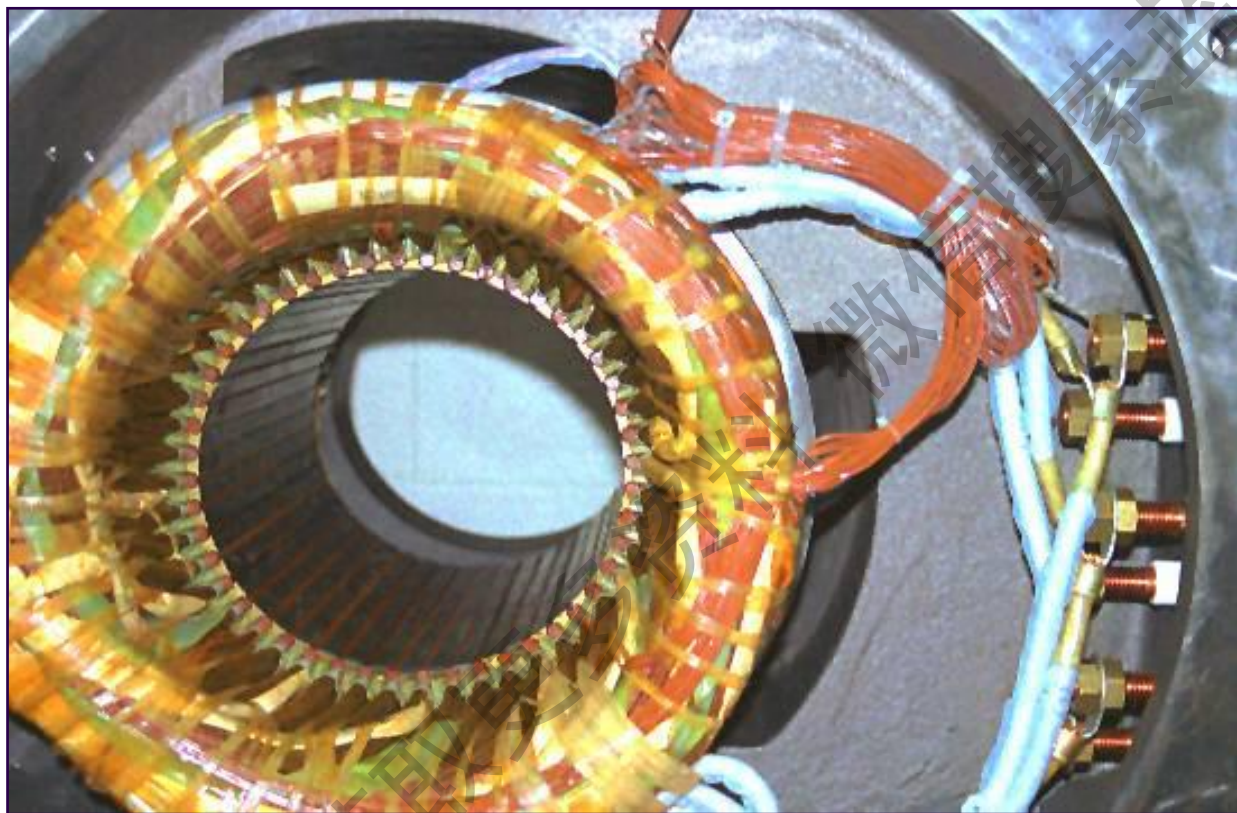


从蒸发器回收的油

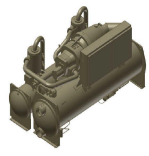
来自油分离器的油



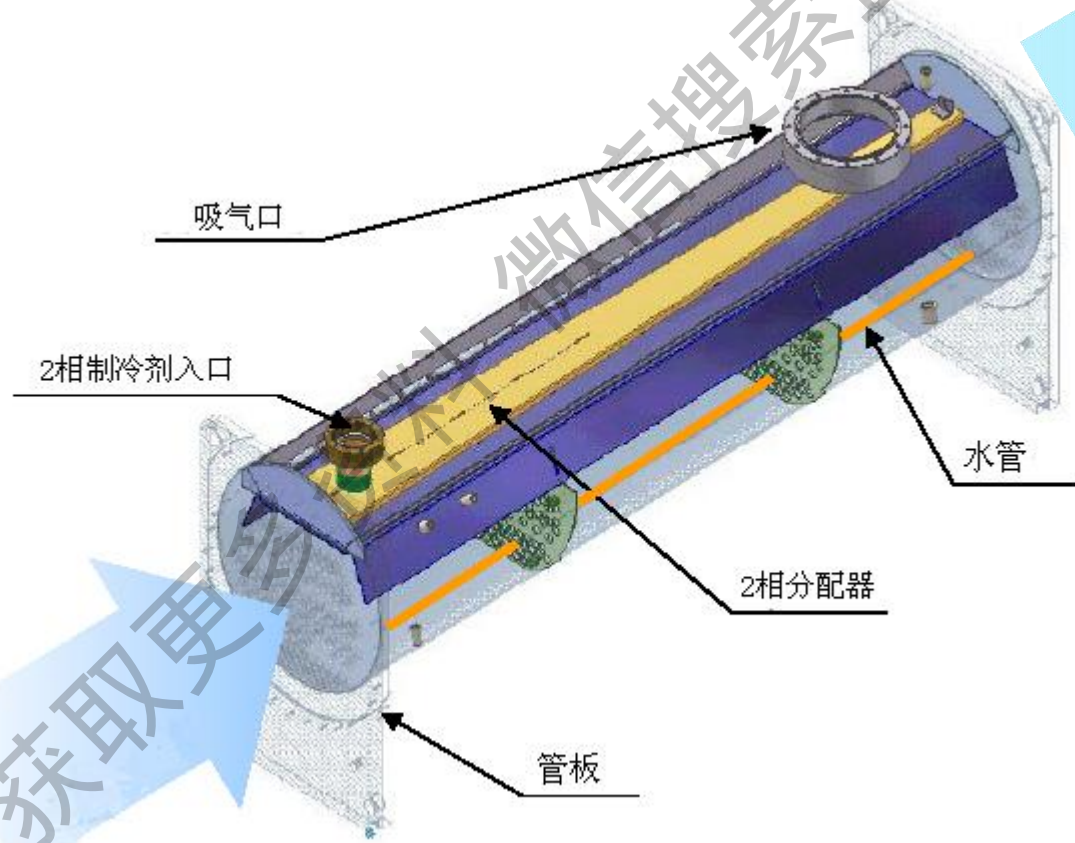
## 压缩机电机



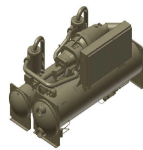
- ◆ 气体冷却
- ◆ 没有绕组温度传感器
- ◆ 在气体管上没有吸气入口过滤网
- ◆ 3600 RPM (60hz)  
3000 RPM (50hz)
- ◆ 星-三角启动器



# RTHD降膜蒸发器



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# RTHD降膜蒸发器

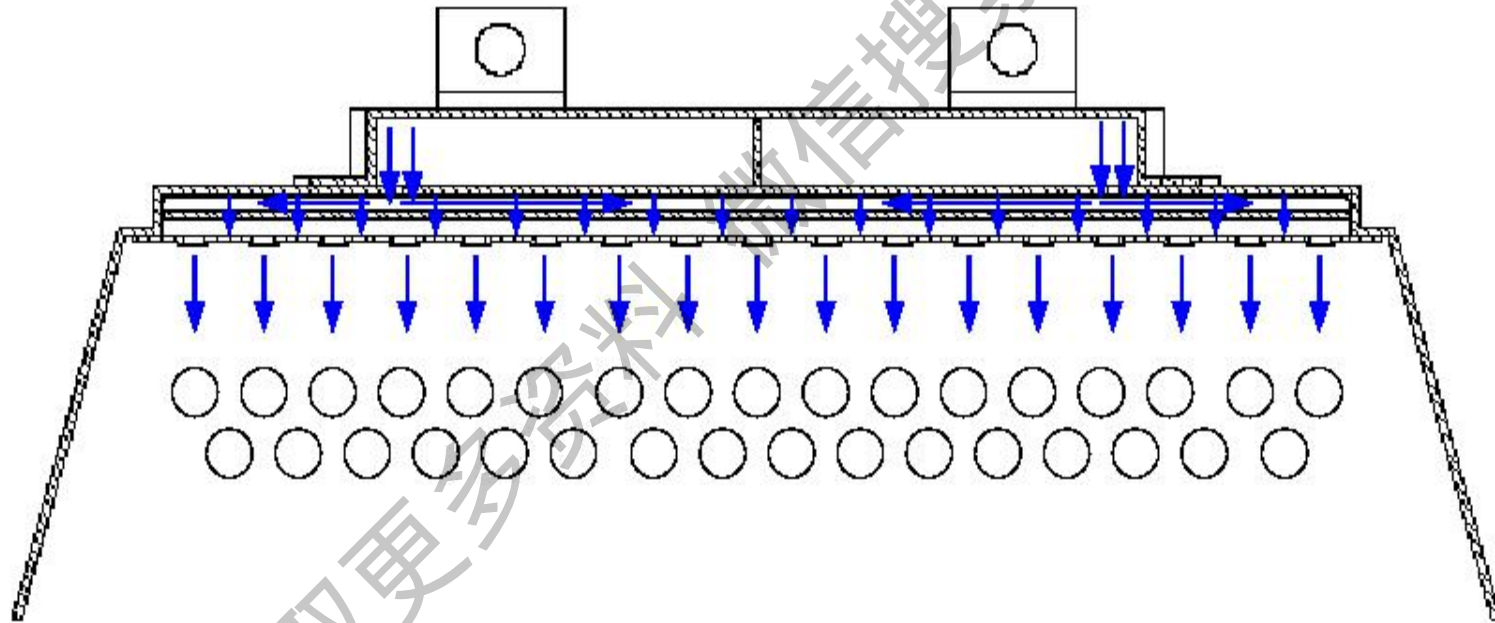
- ◆ 除去了气液分离器
  - 设计可以处理2相制冷剂
  - 维持良好的运行效率
- ◆ 降低了制造成本
- ◆ 在正常运行时有8-12psid的压降

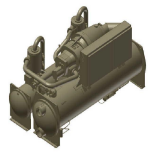




# RTHD Distributor - Operation

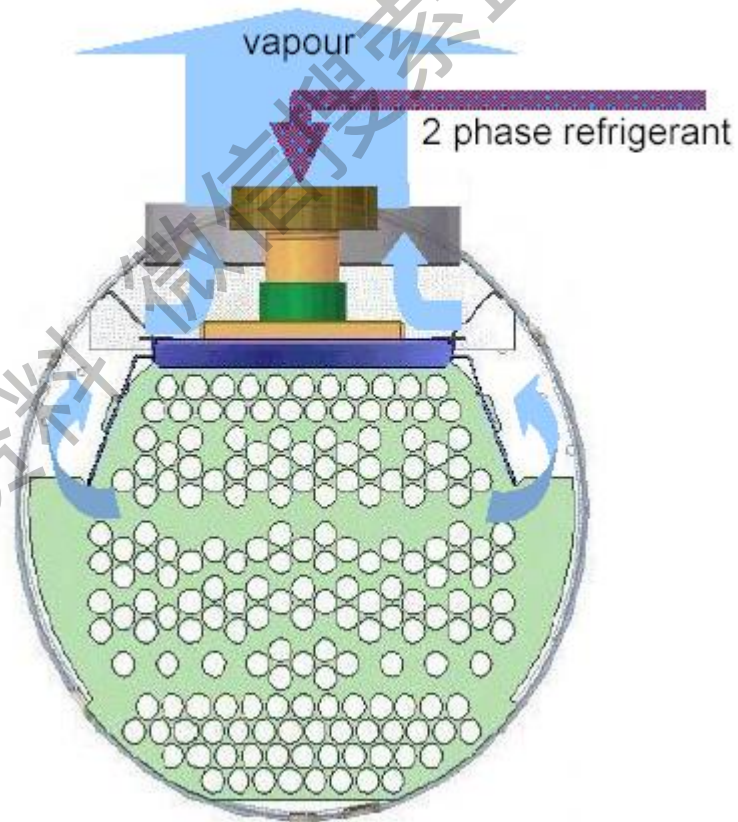
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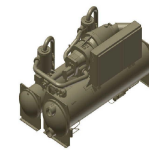




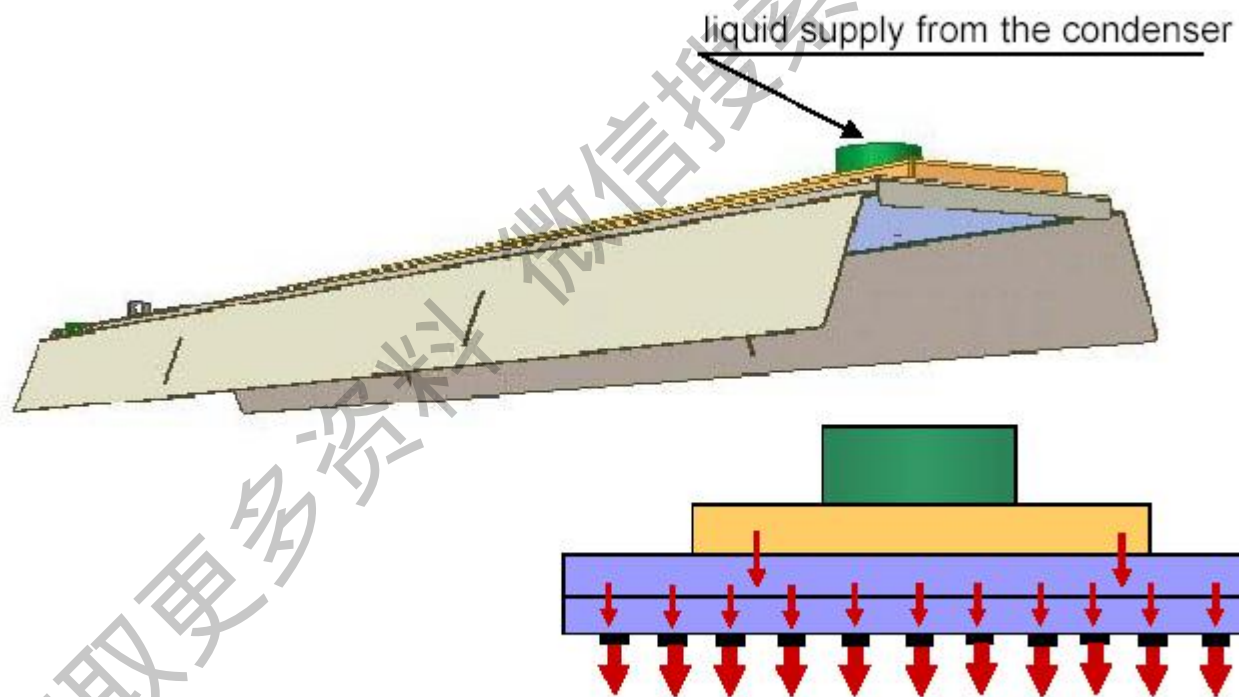
# 降膜蒸发器

## ◆ 降膜技术

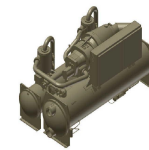




# 降膜蒸发器



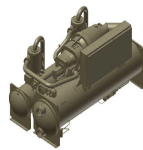




## RTHD分配器

- ◆ 功能：分配气液混合的制冷剂使液体制冷剂可以均匀的离开分配器降落在下面的换热器管簇上。

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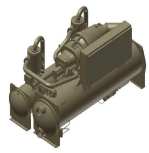
## 分配器—顶视

领先星球

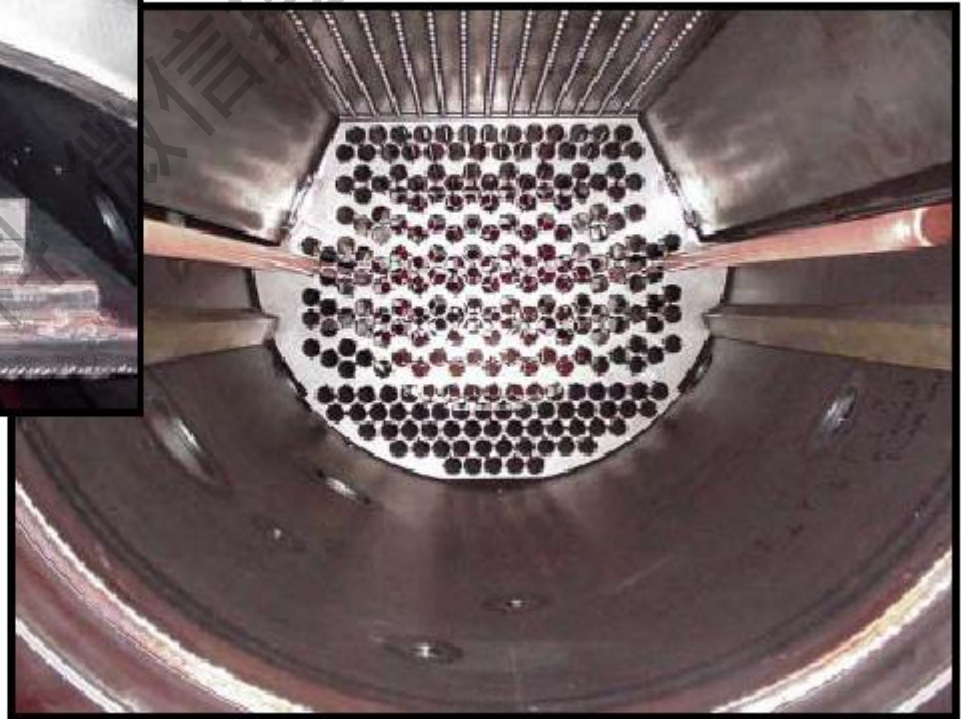
- ◆ 锥形设计—沿分配器变窄
- ◆ 确保整个分配器的供液
- ◆ 水管都需要一定量的制冷剂



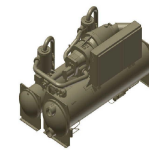
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# 分配器—内视



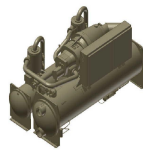
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# 分配器—吸气板

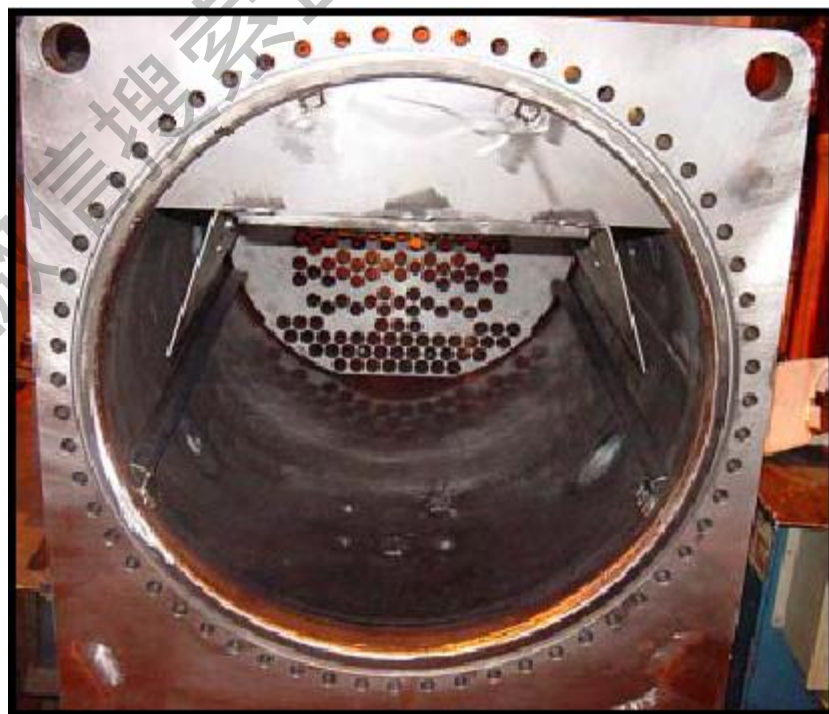




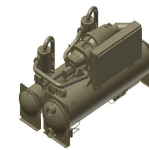


## 分配器—吸气末端挡板

- ◆ 吸气末端挡板
  - 使制冷剂气体走两侧的排气通道
  - 阻止带液



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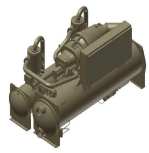


## 分配器—制冷剂出口

- ◆ 有锯齿的制冷剂出口  
—确保制冷剂离开分配器的流动均匀  
—阻止制冷剂快速流过，  
—而使其缓慢跌落



微信搜索蓝领星球  
获取更多资料

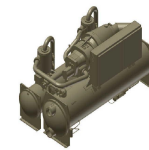


# 蒸发器

## ◆ 液位计



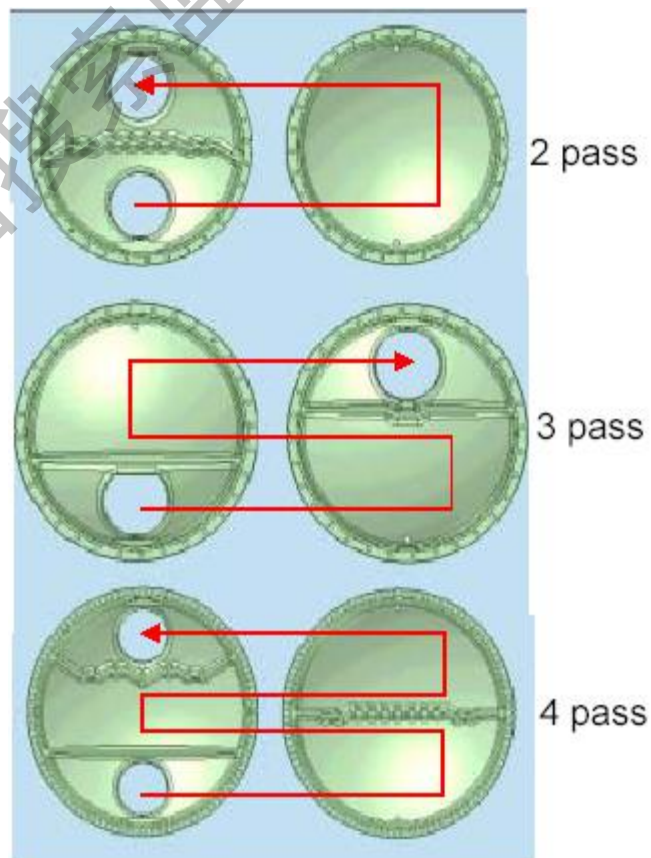




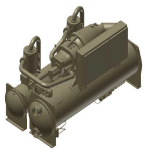
# 蒸发器

## ◆ 水室

入口在底部



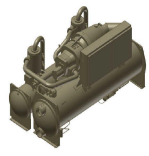
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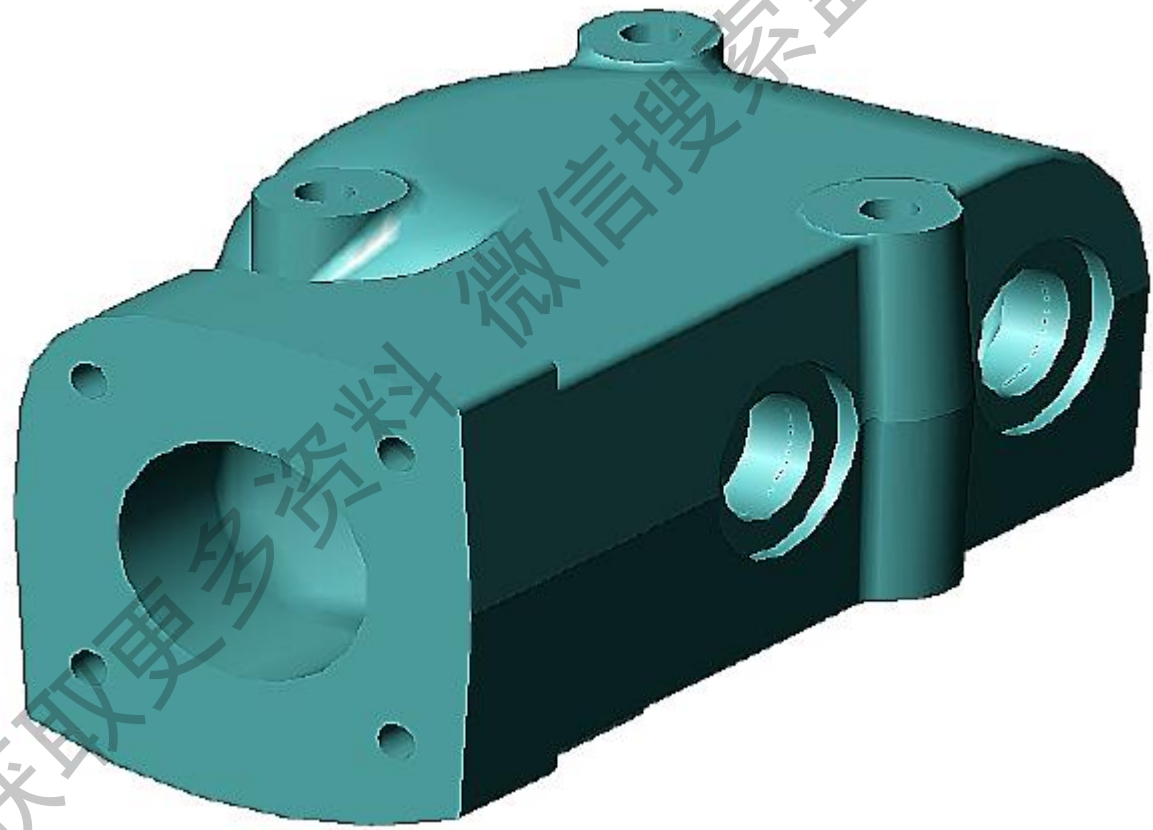
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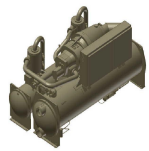
# EXV and EXV Valve Body

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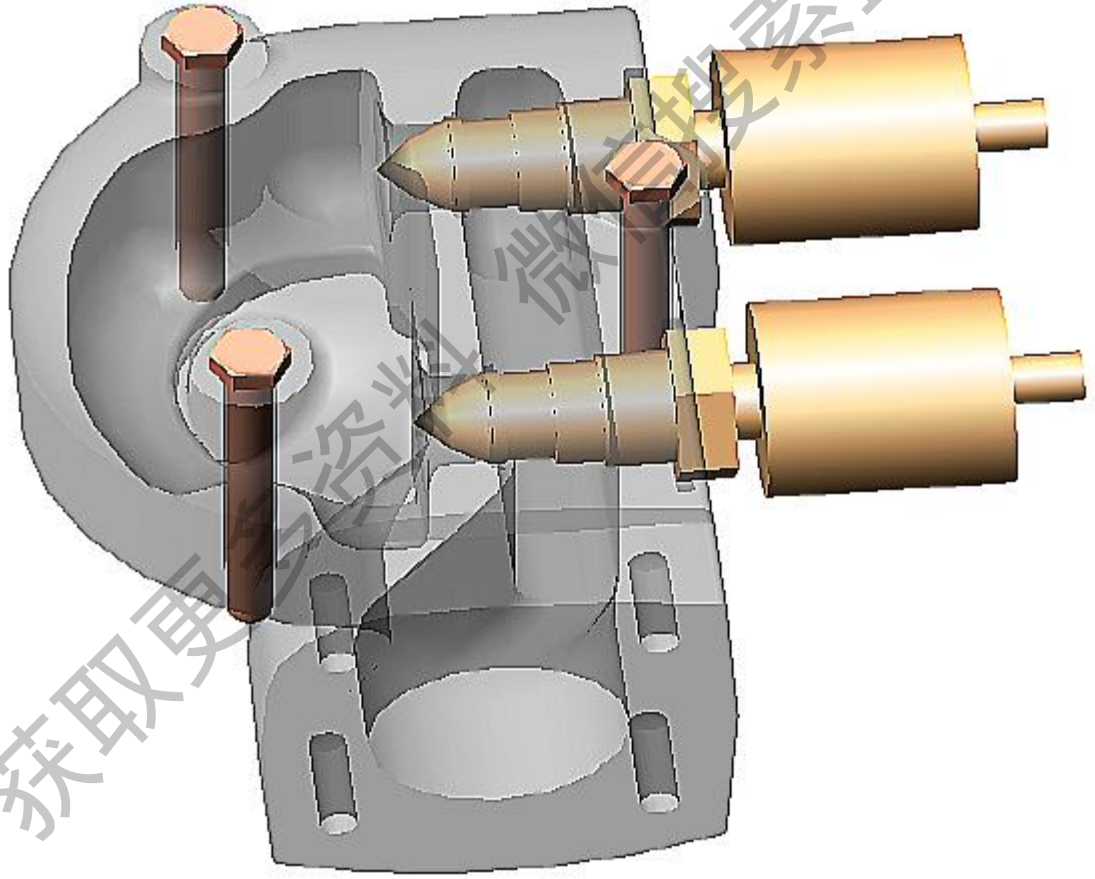


# RTHD-阀体

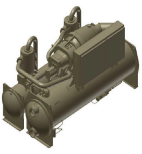




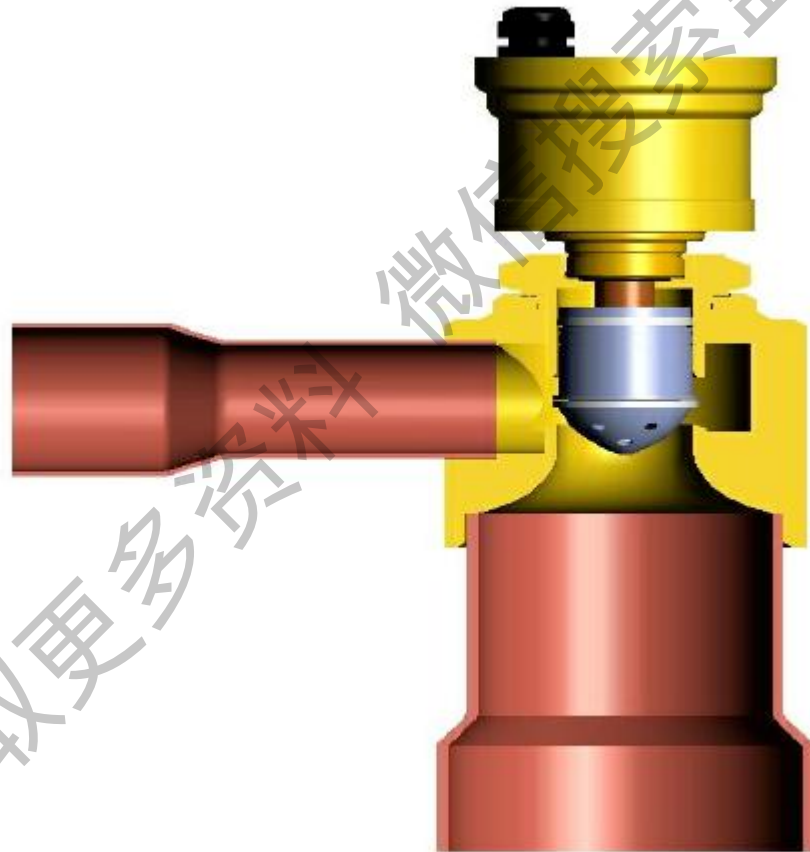
# RTHD-阀体



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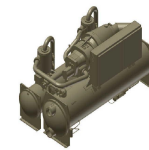


# RTAC EXV



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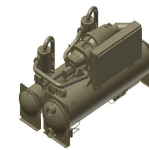




## RTHD EXV 动力部件

- ◆ 动力部件与RTAC中的一样
- ◆ 阀体为RTHD配置
- ◆ B型压缩机需要一个该部件
- ◆ C和D型压缩机需要两个

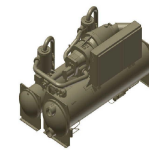




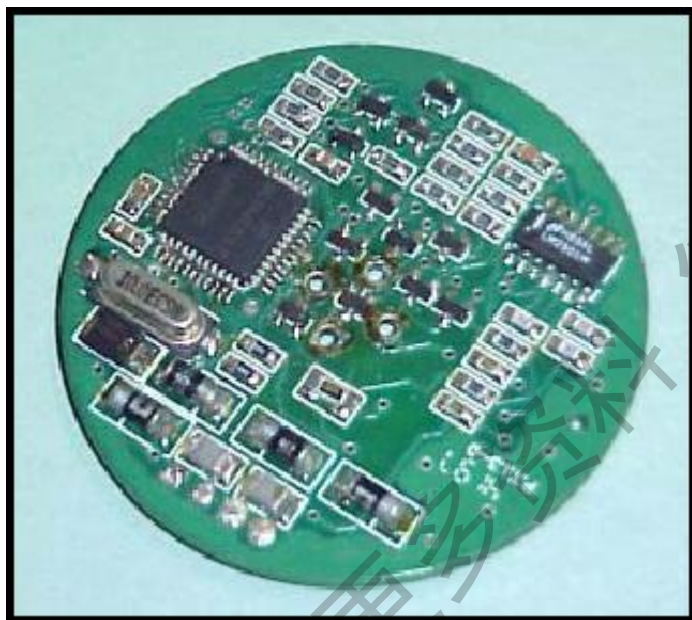
# EXV 驱动组件



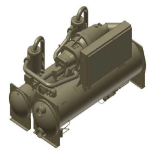
驱动电子组件  
步进电机  
传动机构  
轴承



# EXV电子组件



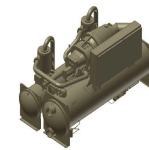
- ◆ 智能设计
- ◆ 直接与IPC3通信主干连接
- ◆ 控制步进电机调节



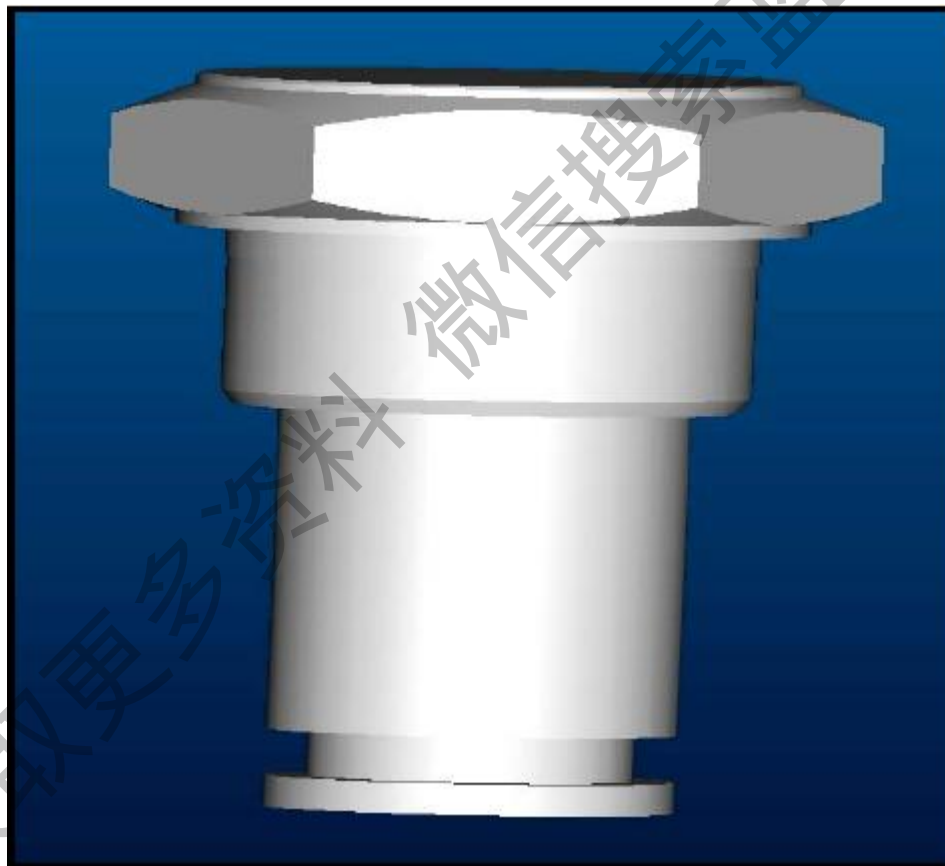
# EXV LLID 封装



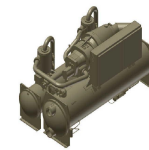
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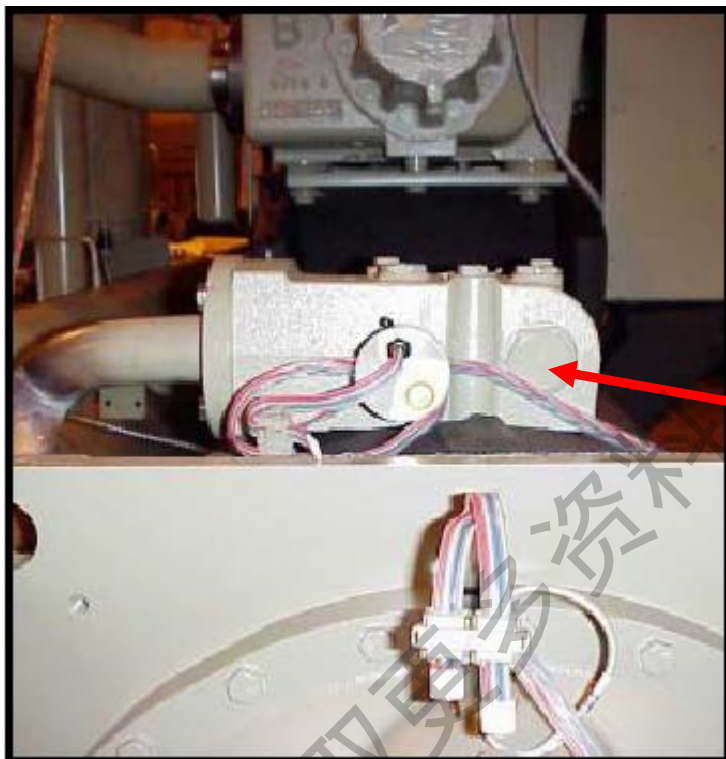
# RTHD EXV – 阀门堵头



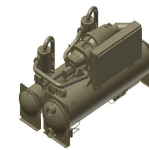




## RTHD B型 EXV – 阀门堵头

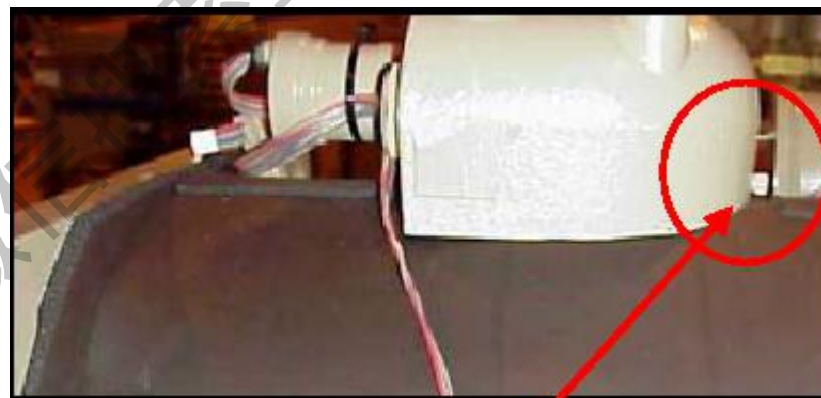


- ◆ B型机器需要一个动力部件
- ◆ 与C、D型的阀体一样
- ◆ 增加的堵头

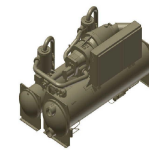


## RTHD –Schrader堵头

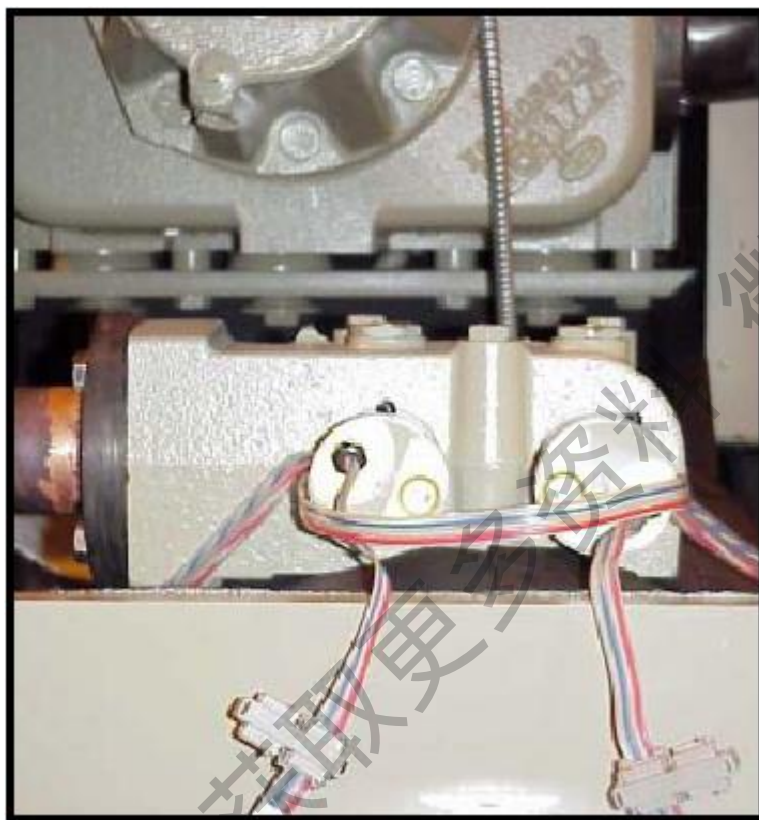
- ◆ 电子阀之后分配器之前
- ◆ 可用来测量分配器压降
- ◆ 正常的分配器压降为  
8-12psid



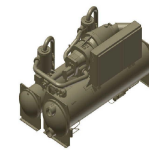
Pipe Plug



## RTHD C和D型 EXV



- ◆ C和D型机器需要2个动力部件
- ◆ 大型号的需要大的质量流量
- ◆ 阀门平行工作

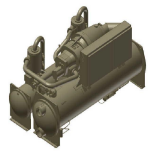


## RTHD EXV 视镜 - 位置指示器

- ◆ 位置指示器用来比较实际位置与CH530显示位置
- ◆ 用来机械诊断EXV故障



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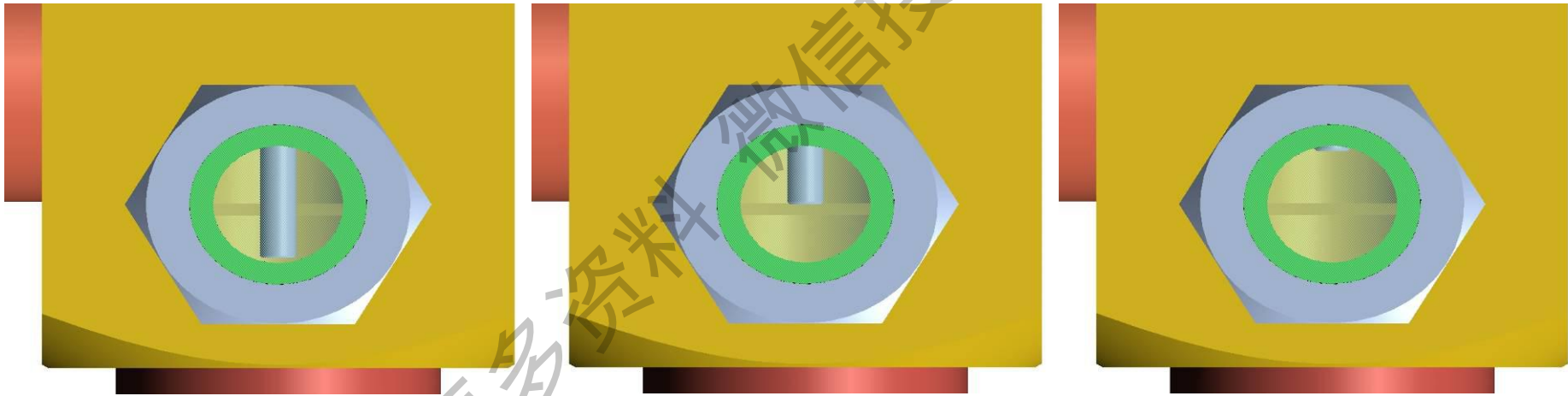


# 阀门开度位置指示器

关闭

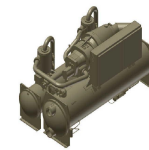
半开

全开



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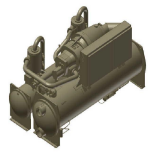




# 油系统

- ◆ 增高了油槽
  - 阻碍油迁移
  - 在反向启动条件帮助油流动
  - 改变光学油感应器位置
- ◆ 隔离阀
- ◆ 过滤器
- ◆ 油电磁阀
- ◆ 油传感器

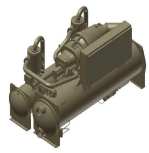




# 油路

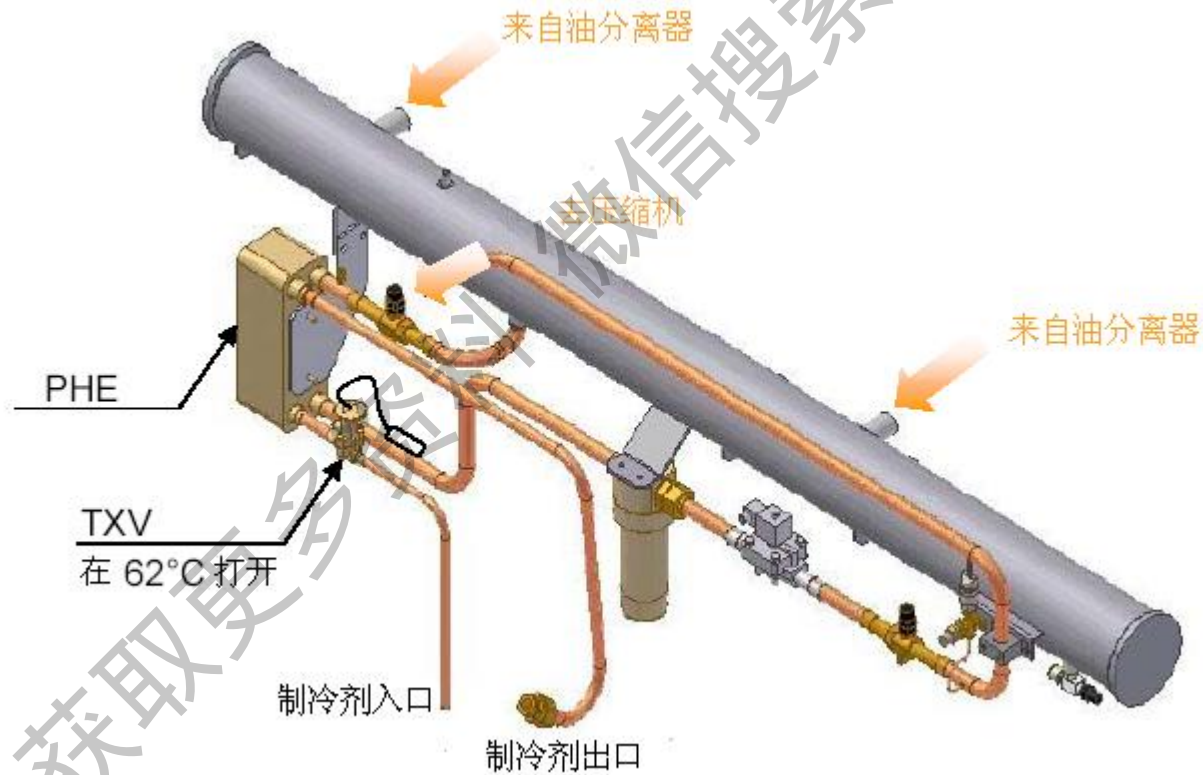
◆ 油路没有油冷却器

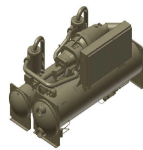




# 油路

## ◆ 油路带油冷却器



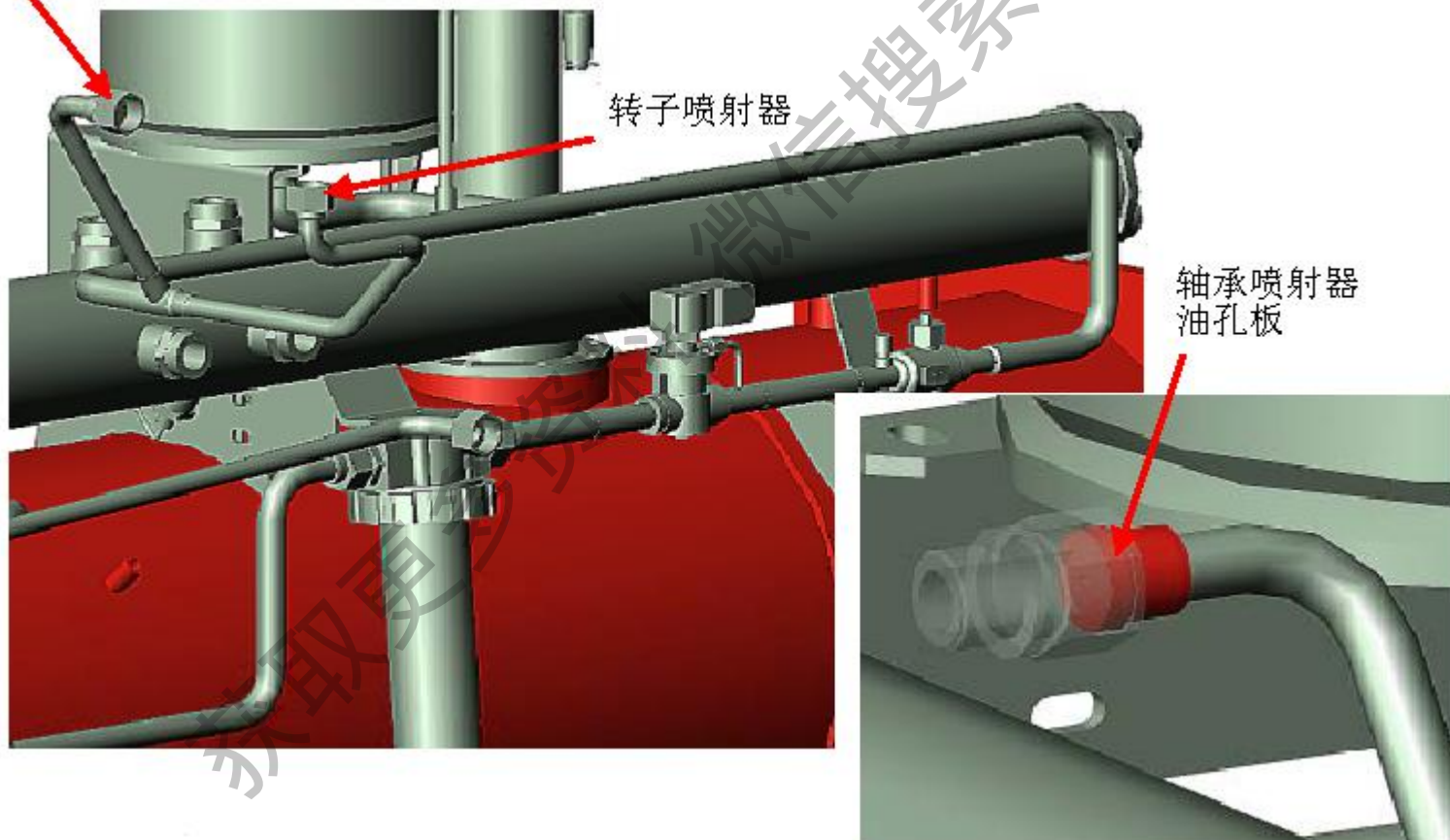


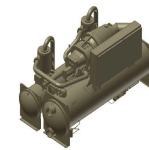
# RTHD 油系统布局

轴承喷射器

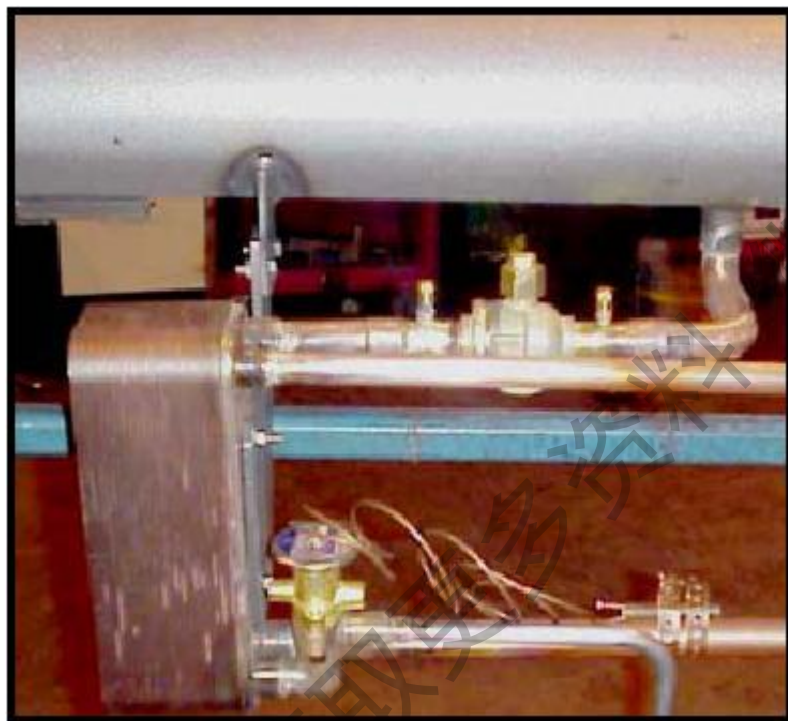
转子喷射器

轴承喷射器  
油孔板

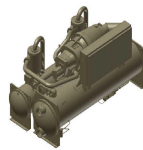




## 油系统-油冷却器



- ◆ 所有型号一个尺寸
- ◆ 蒸发器出水温度 $<40\text{F}$ 或者冷凝器出水温度 $>100\text{F}$ 时采用
- ◆ 钎焊板式换热器

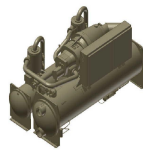


## 油冷却器-TRV

- ◆ 制冷剂冷却
  - 热响应阀控制流量
  - 离开油槽温度设定为145F
    - 阀门开大
  - 在120F开始打开
  - 不可调整的
  - 20F范围

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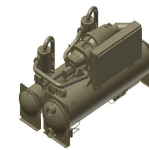


## 油系统-油槽排气

- ◆ 排气管连接到冷凝器
- ◆ 避免油槽内无法进入气体而使油无法流出
- ◆ 必须由启动工程师打开



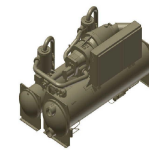
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## 油系统-油过滤器

- ◆ 与RTHC过滤器相同
  - ◆ 在正常工作一年后更换
    - 以后无需更换除非...
    - 油分析
    - 压降
- 参考IOM中的压降表

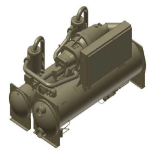




## 油系统-电磁阀

- ◆ N/C阀
  - 当压缩机运行时加电
- ◆ C和D型机器采用导阀
  - 增加额外的开启力

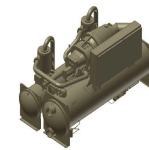




# 油系统-光学油感应器

## ◆ 光学感应器



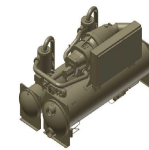


# 油系统-光学油感应器

- ◆ 在油槽下面
- ◆ 更高可靠性的位置
- ◆ 在极端油位水平可检测到油
- ◆ 在油槽底部存在任何可能的脏物
- ◆ 和RTHC的相同
- ◆ 二进制输入
  - $<1.5\text{vdc}$  = Wet
  - $>3\text{vdc}$  = Dry

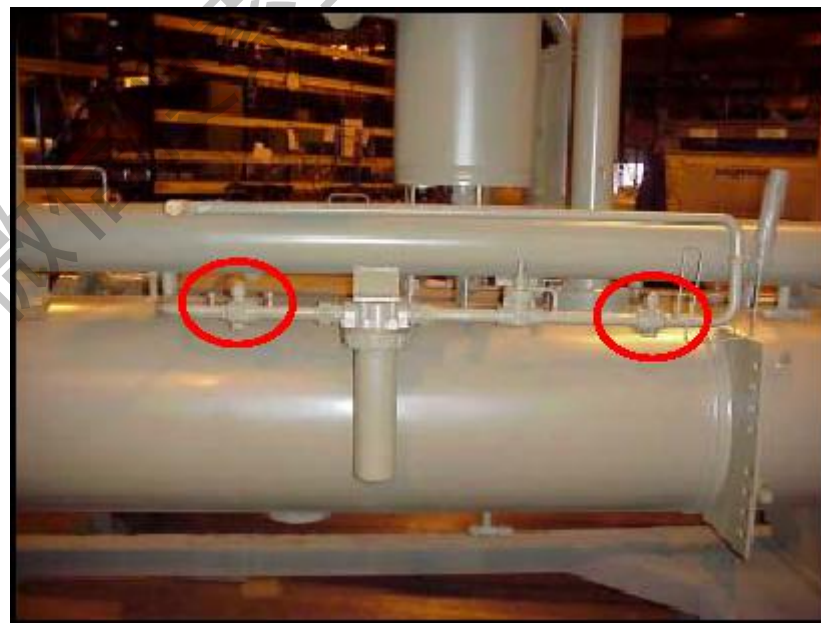


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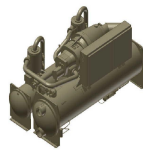


## 油系统—隔离阀

- ◆ 球阀
- ◆ 用来在更换零件时与系统的隔离
- ◆ 在机器运行时必须完全打开

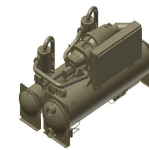






## RTHD供油

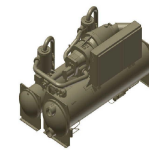
- ◆ 压力传感器
- ◆ 在RTHD上有三个压力传感器
  - 冷凝器压力
  - 蒸发器压力
  - 油压
- ◆ 必须解决逆向启动时的油流动问题
- ◆ 与RTAC采用的相同
- ◆ 为了维修的方便采用隔离阀-但是应确保在运行时打开



# RTHD 回油装置



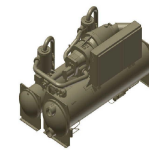
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## RTHD-冷凝器

- ◆ 和RTHC相同
  - ◆ 壳管式
  - ◆ 内外强化换热管
  - ◆ 内嵌过冷器
- 满负荷5-10F过冷  
最小负荷2-3F过冷

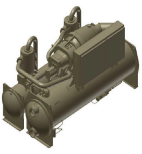




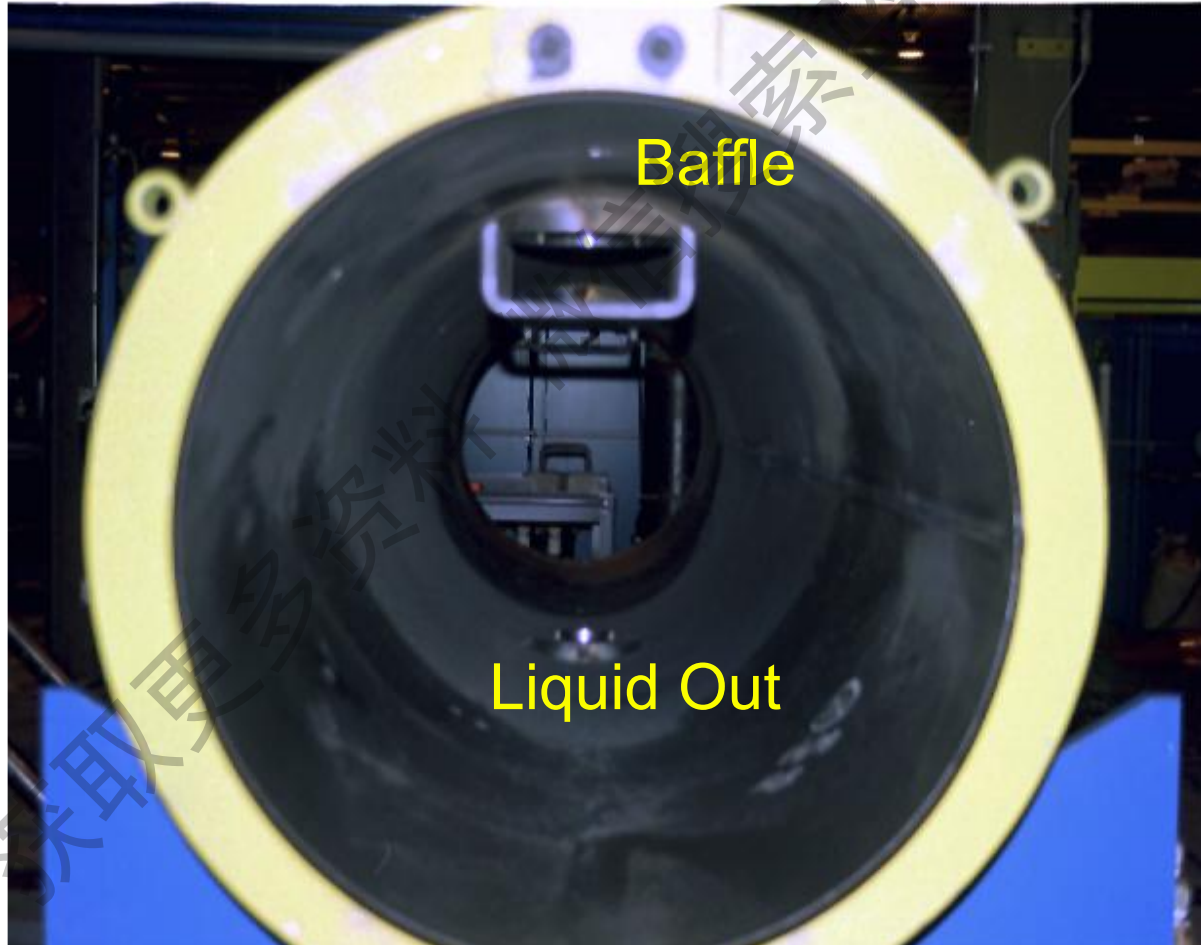
# 制冷循环 冷凝器

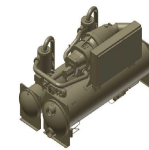


- ◆ 双入口
- ◆ 壳管
- ◆ 分离的过冷器

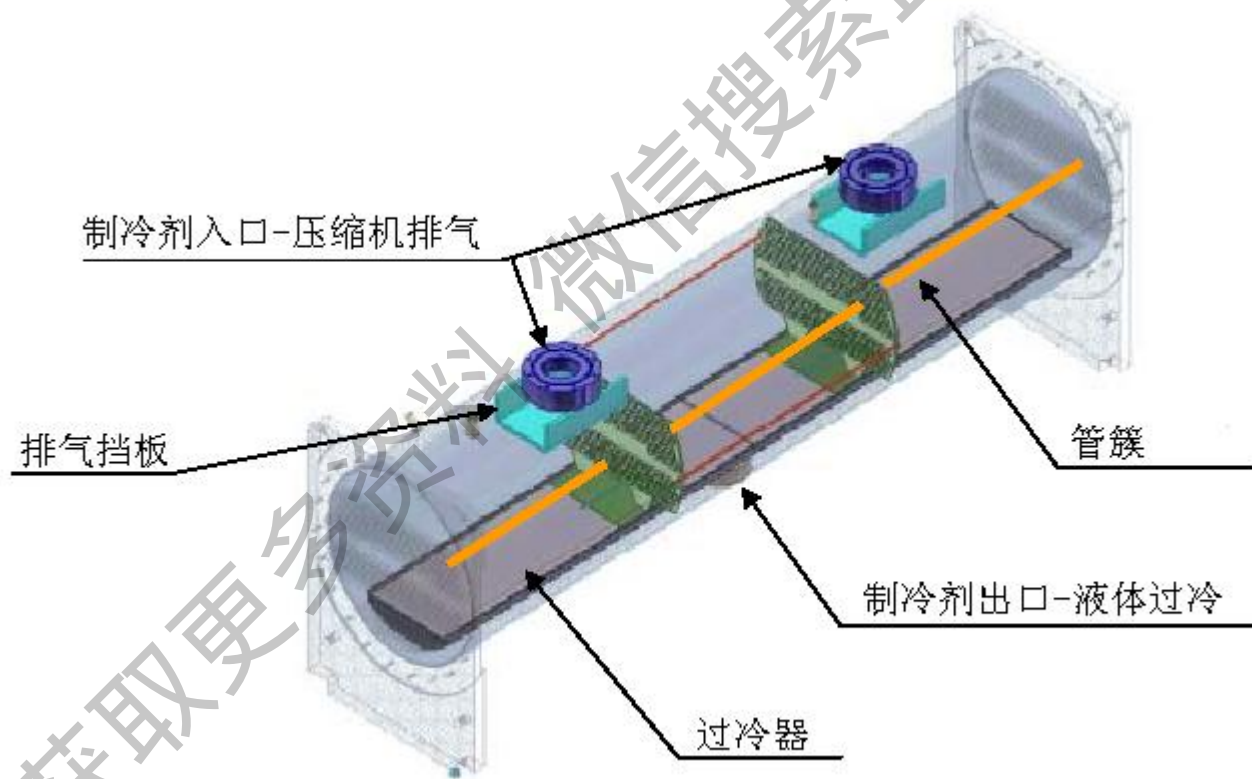


# 冷凝器壳体结构

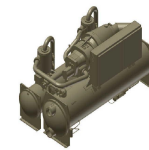




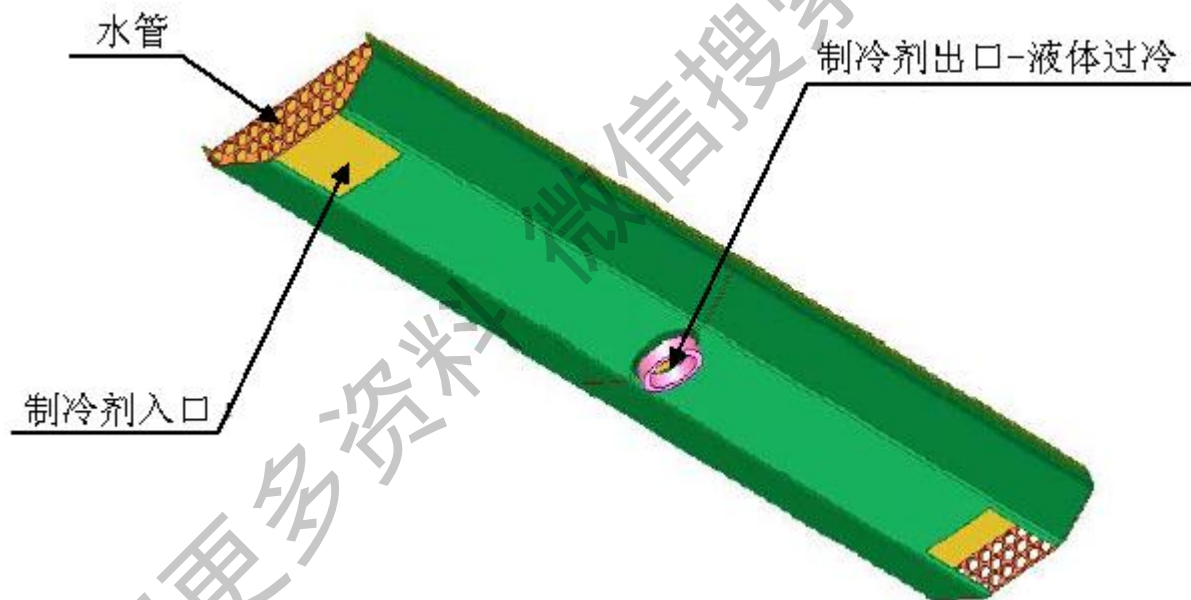
# 冷凝器





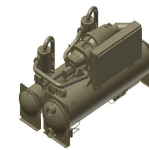


# 冷凝器-过冷器



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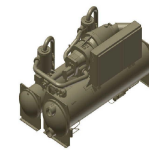
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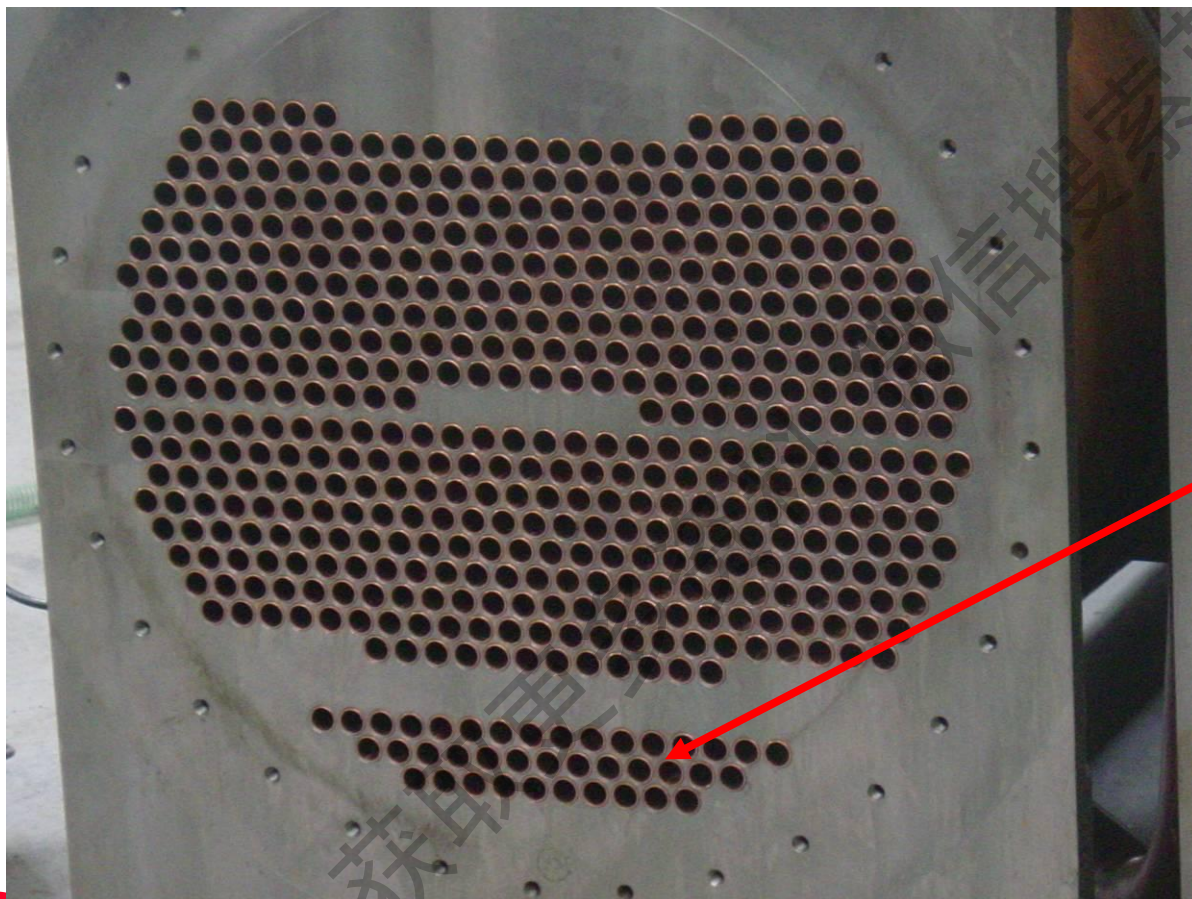
# 冷凝器



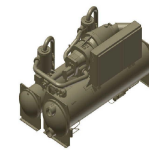
◆ 安全阀



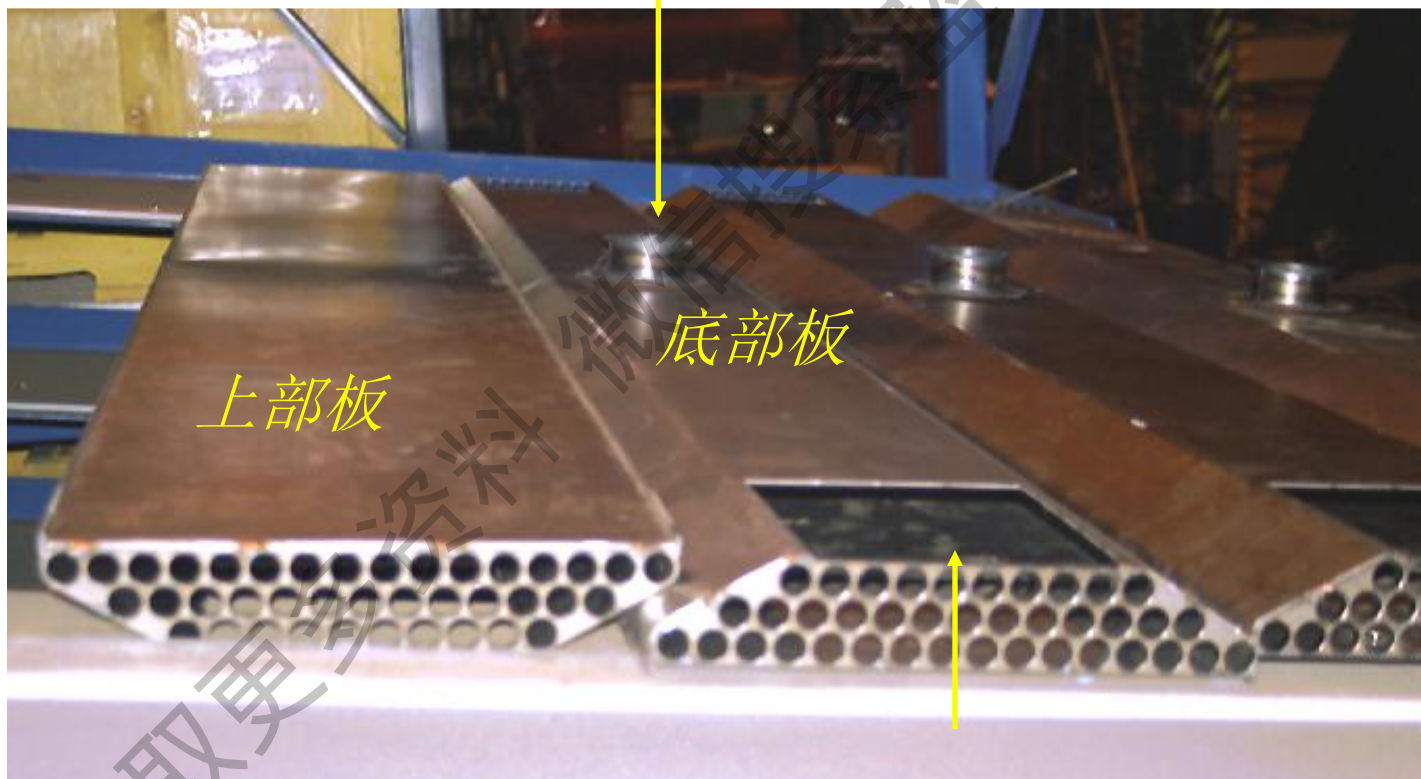
# 冷凝器

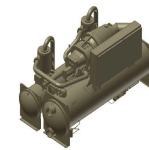


冷凝器  
过冷器



# 冷凝器过冷器





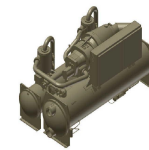
# 冷凝器



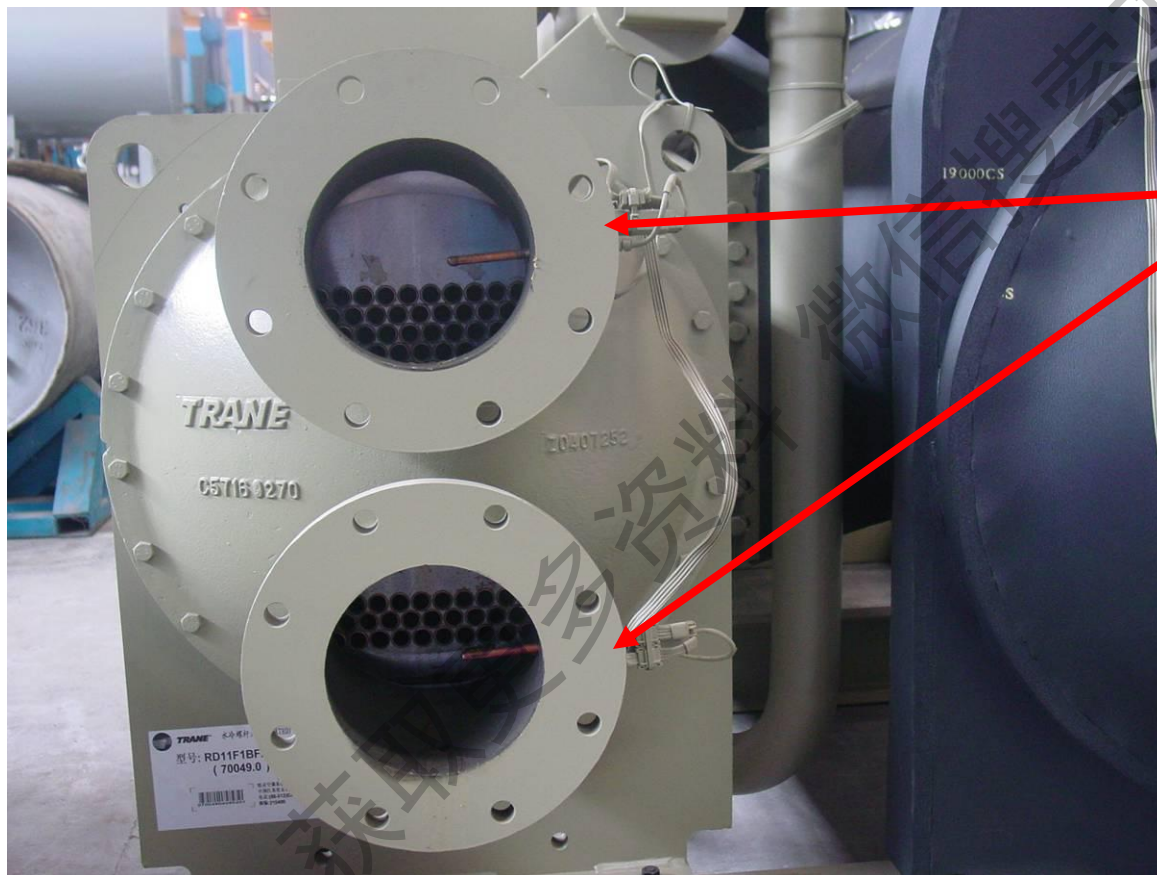
- ◆ 液体出口
- ◆ 法兰连接
- ◆ 如机器有隔离阀，这里可有一个角阀

获取更多信息



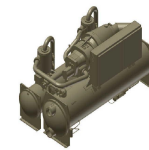


# 冷凝器水室



◆ 水温传感器





# 冷凝器

## ◆ 水室

