

# 23XR vs. 23 XL Screw Compressor

CCS Service Training  
2012

# The Holy Grail of Vapor Compression Refrigeration

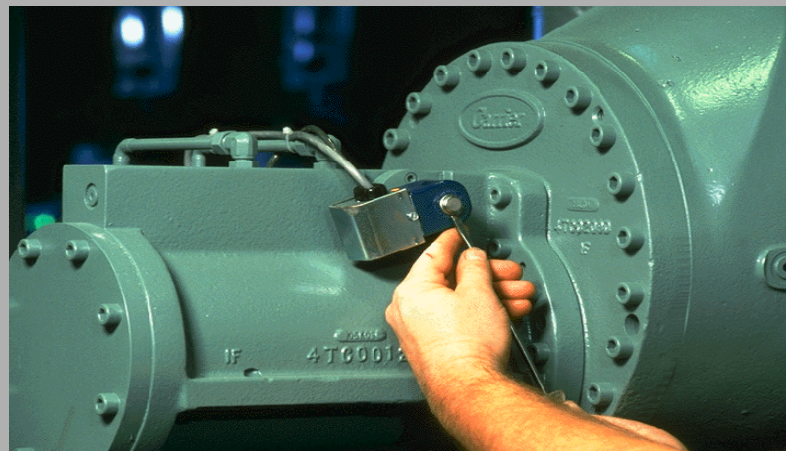
- High Efficiency
- Non Surging
- Quiet
- Inexpensive
- Small
- **OIL LESS COMPRESSORS**

# The 23 XL Ain't It

- R-22 Bridge the Gap to R-134a
- Rolling Element Bearings
- Didn't Surge
- Size not Bad
- Muffler Required
- Sure Wasn't Cheep
- Oil Separators Required

# The 23 XL Ain't It

- Did I Mention Making Oil Pressure at Start-up
- Did I Mention Oil Separators
- Did I Mention SLIDE VALVES

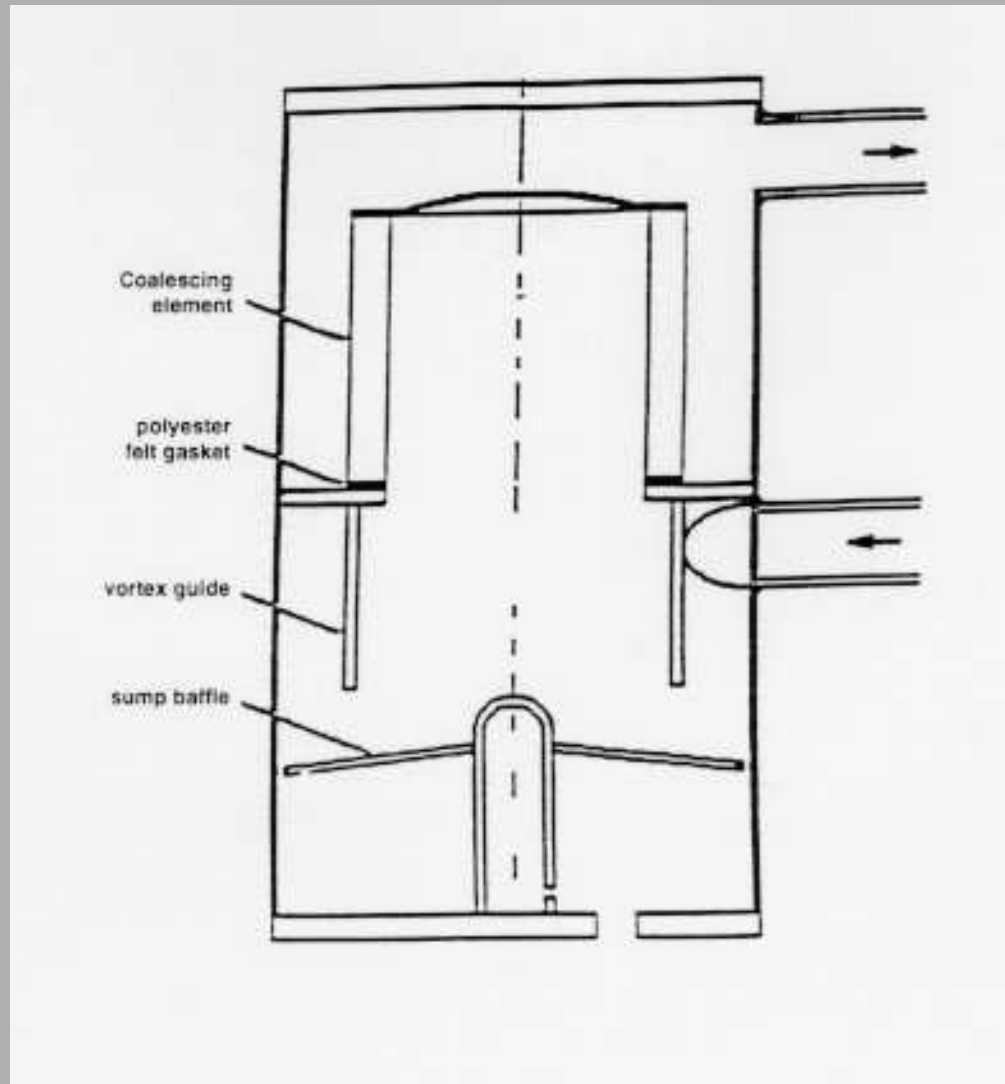


# What Did We Do With All That Oil

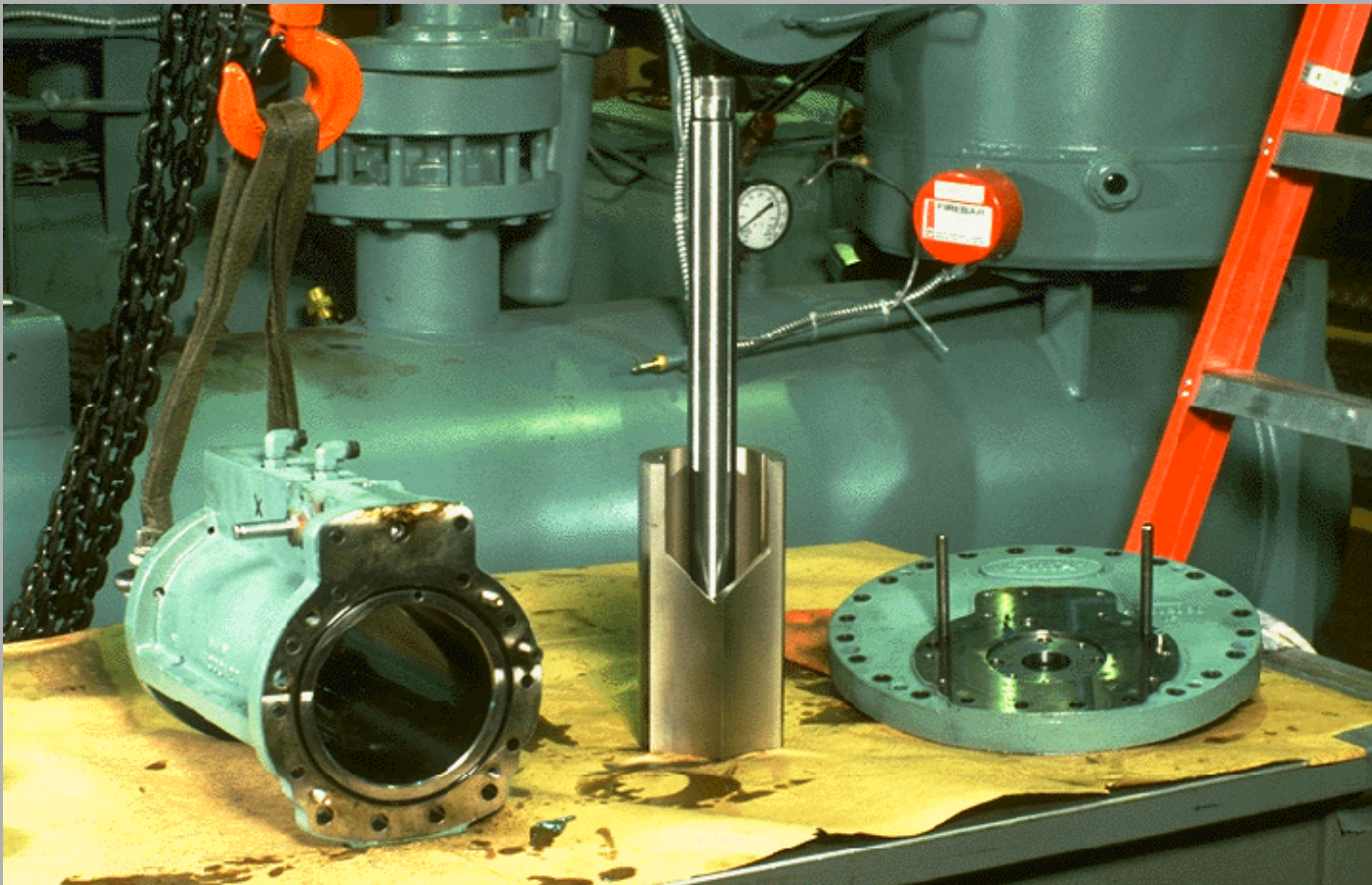
- We Sealed Rotors to Rotors
- We Sealed Rotors to Case Radially
- We Sealed Rotors to Case at the End Plane
- We Lubricated Bearings
- We Cooled Bearings
- And It Blew Out  
as Fast as We Pumped It In

# 23 XL Oil Separator

## Vertical Design 2

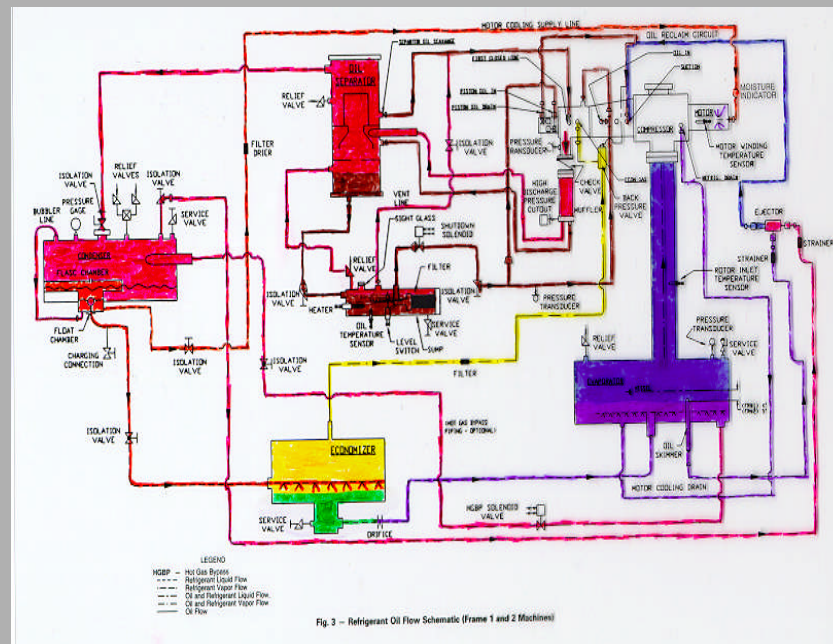


# Did I Mention SLIDE VALVES



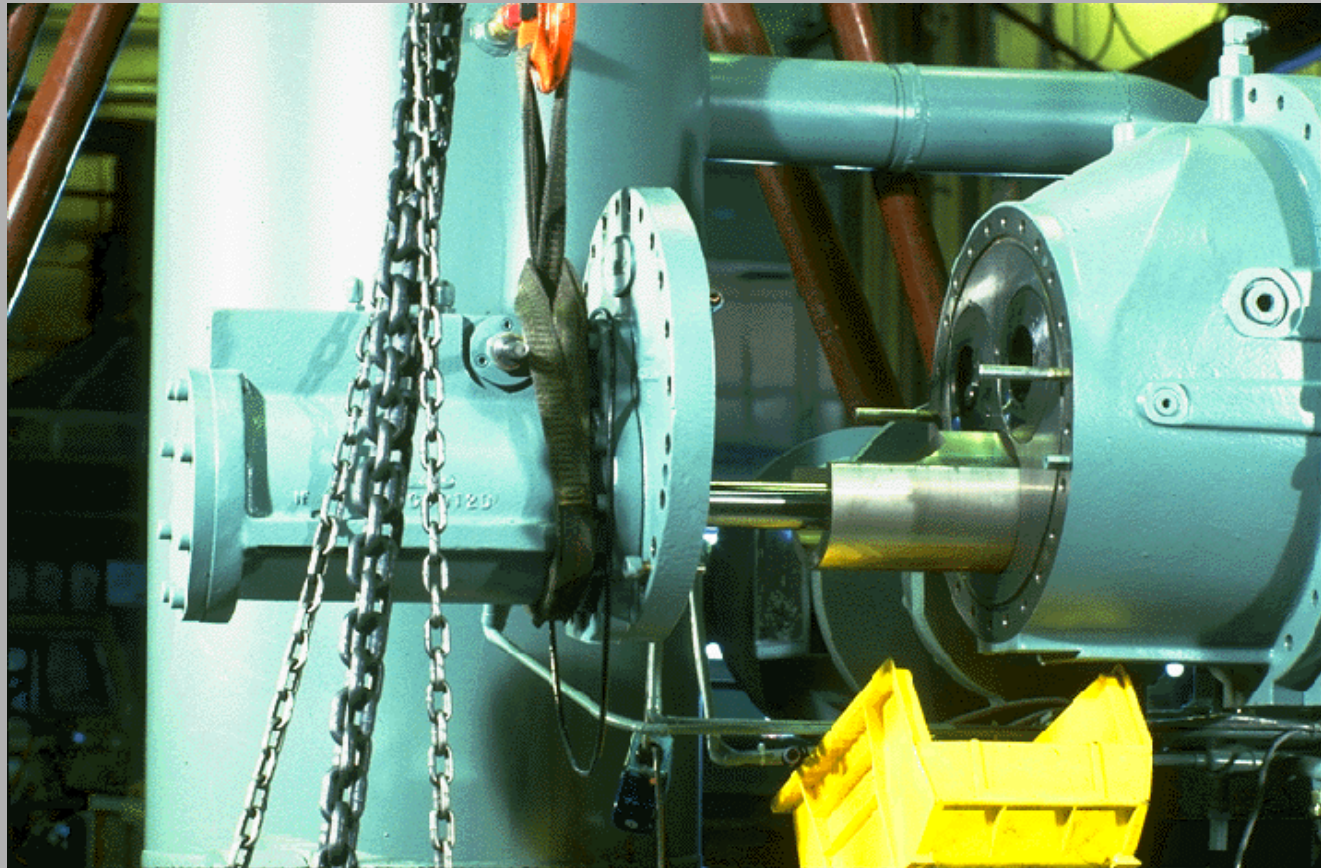
## 23 XL Piping Frame 1&2

- No Oil Pump
- High Side Oil Sump
- Oil Heater On Only at Shutdown
- The Oil Temp Was Kept Up to Minimize Refrigerant Absorption
- Sealing and Lubricating Rolling Element Bearings





# Did I Mention SLIDE VALVES

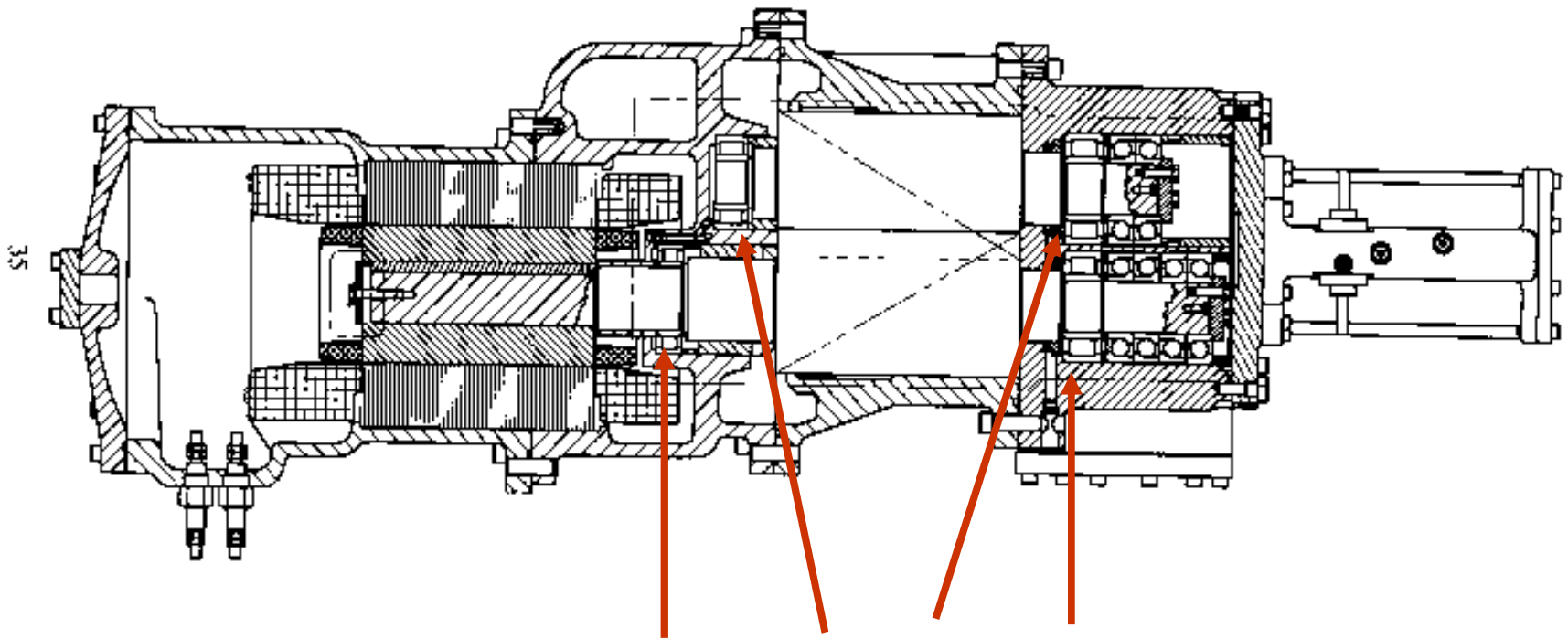


# Remember The 23 XL Twin Screw

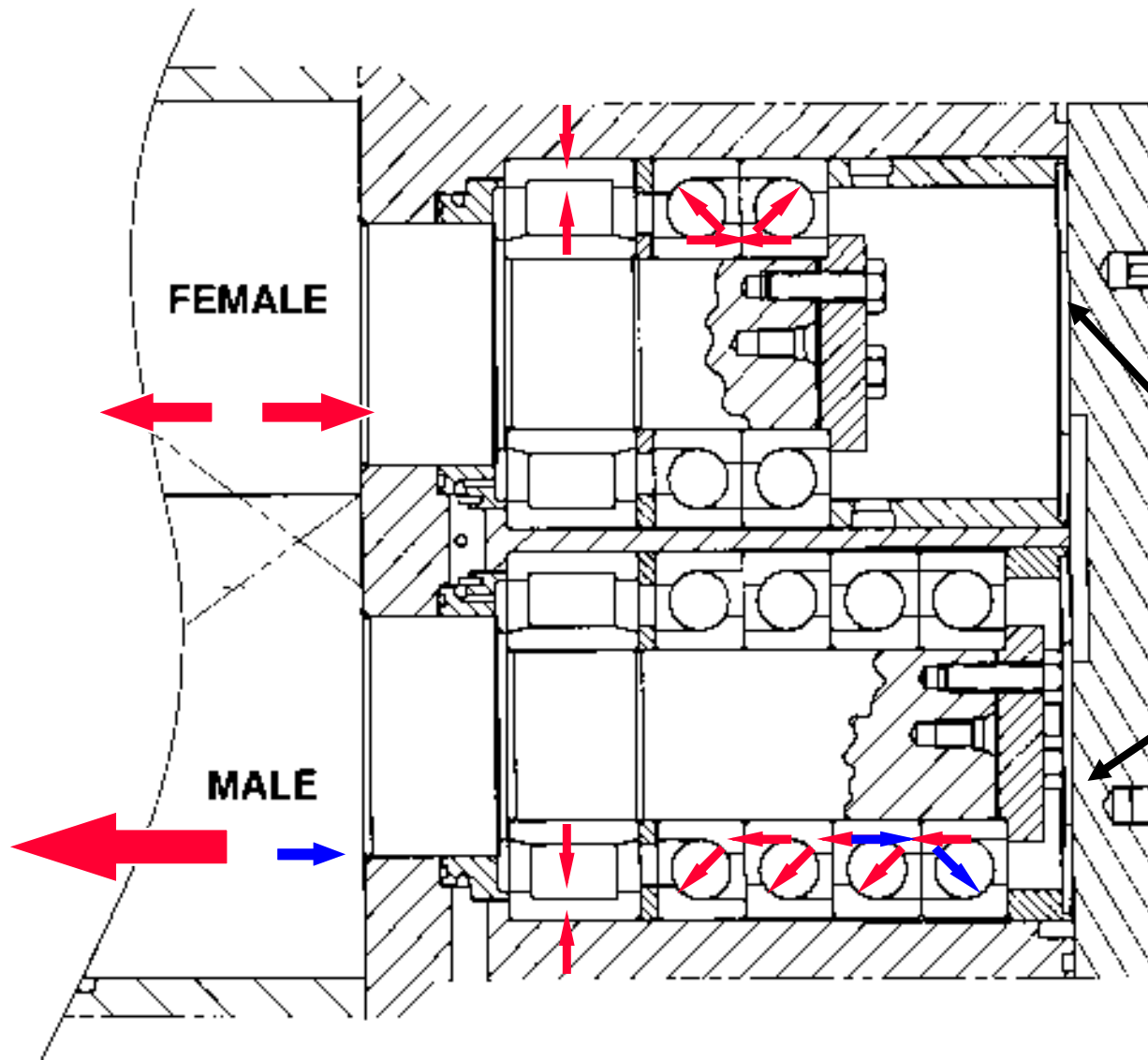


Gravity Down / Gas Pressure Up / Thrust Back

# Remember The 23 XL Twin Screw



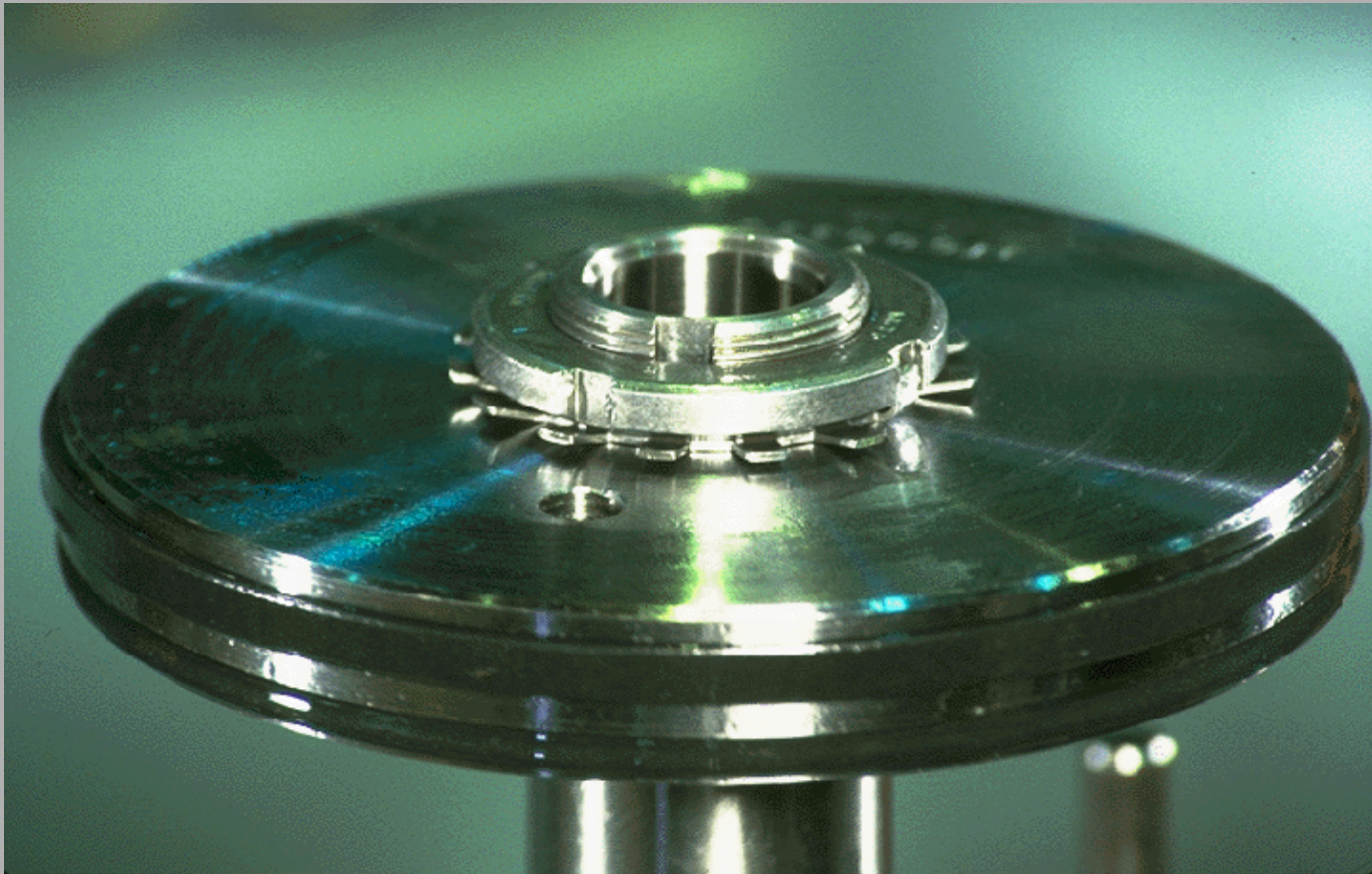
Roller Bearings For Radial Load



Remember  
Bellville  
Washers

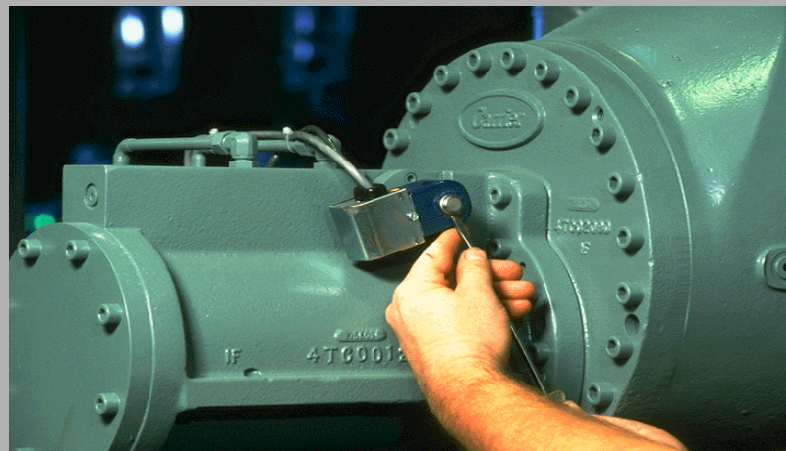
Ball Bearings For Thrust Loads

# Did I Mention SLIDE VALVES



# Slide Valve

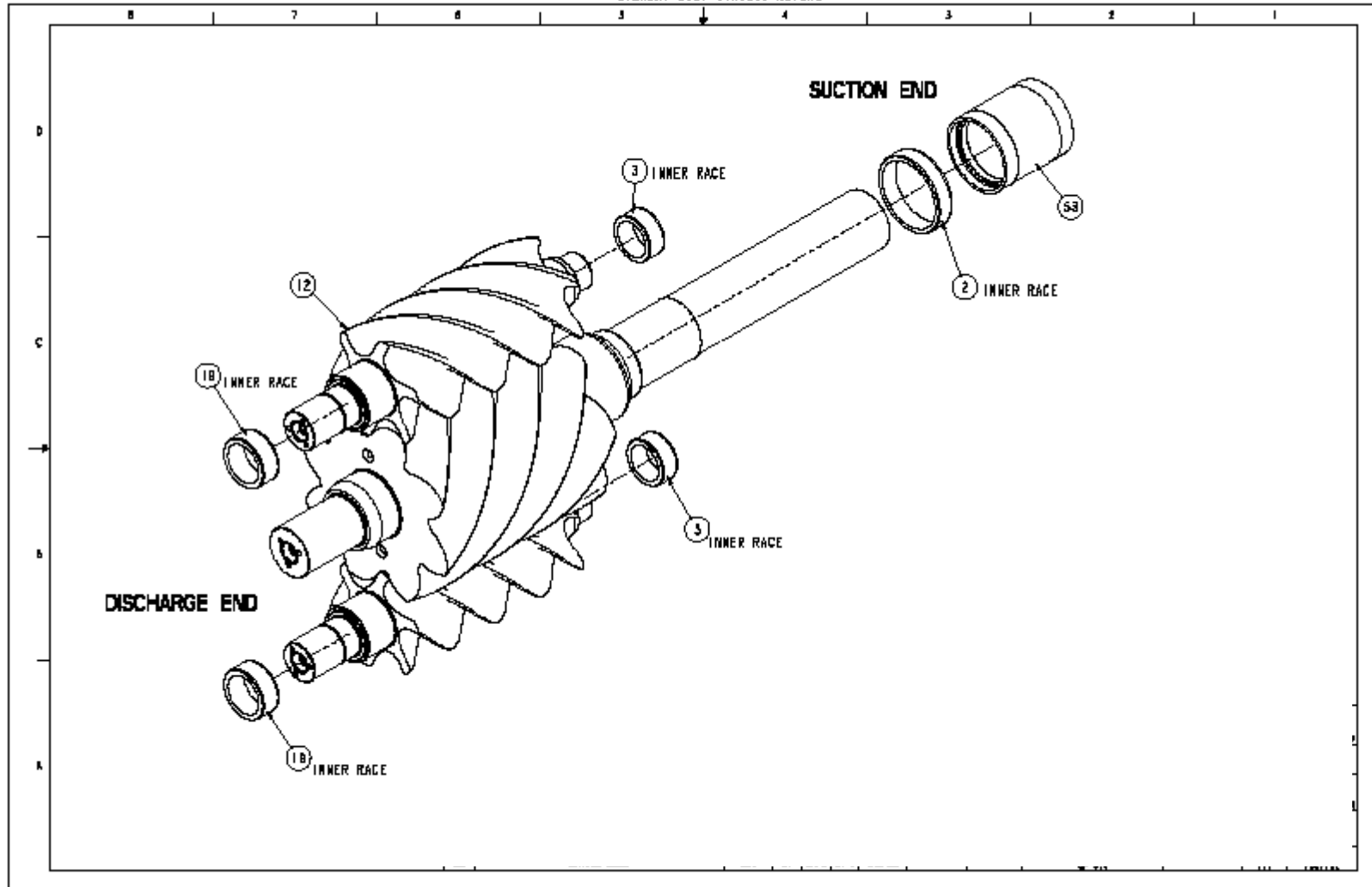
- Continuously Adjustable Capacity Control
- Variable VI Option
- **A Ton of Problems**

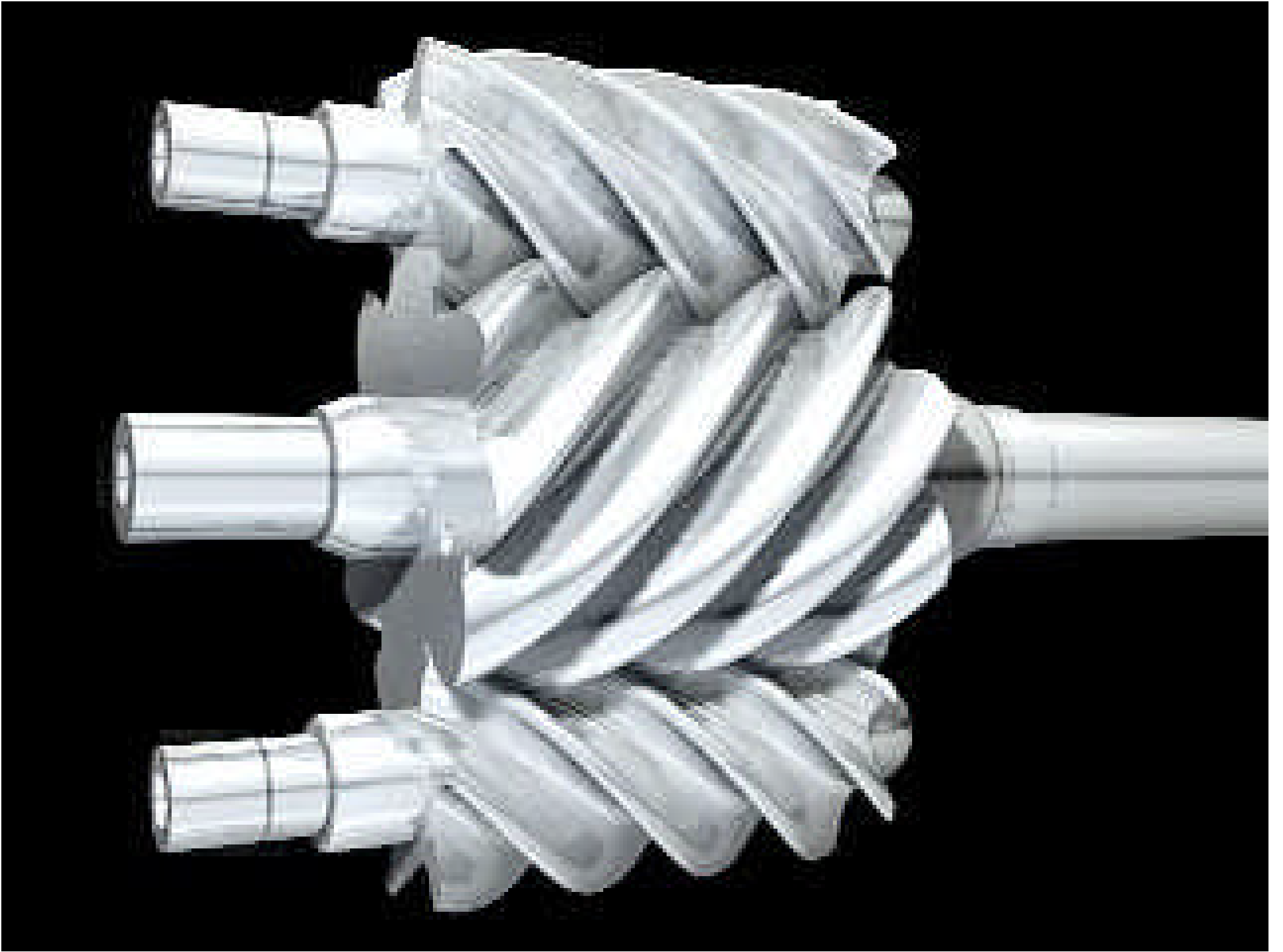


# The Original Tri Rotor

- Three Rotors
  - Balanced Loads
  - Reduced Loads
- Reduced Clearances
- Ceramic Bearings
- Oil Less

OVERLAY DWG: QTR300D-ROTORS

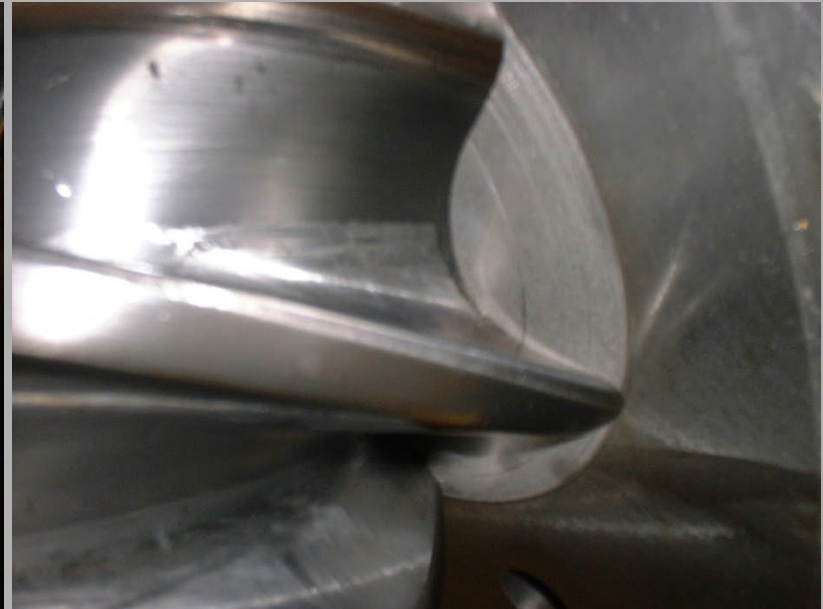


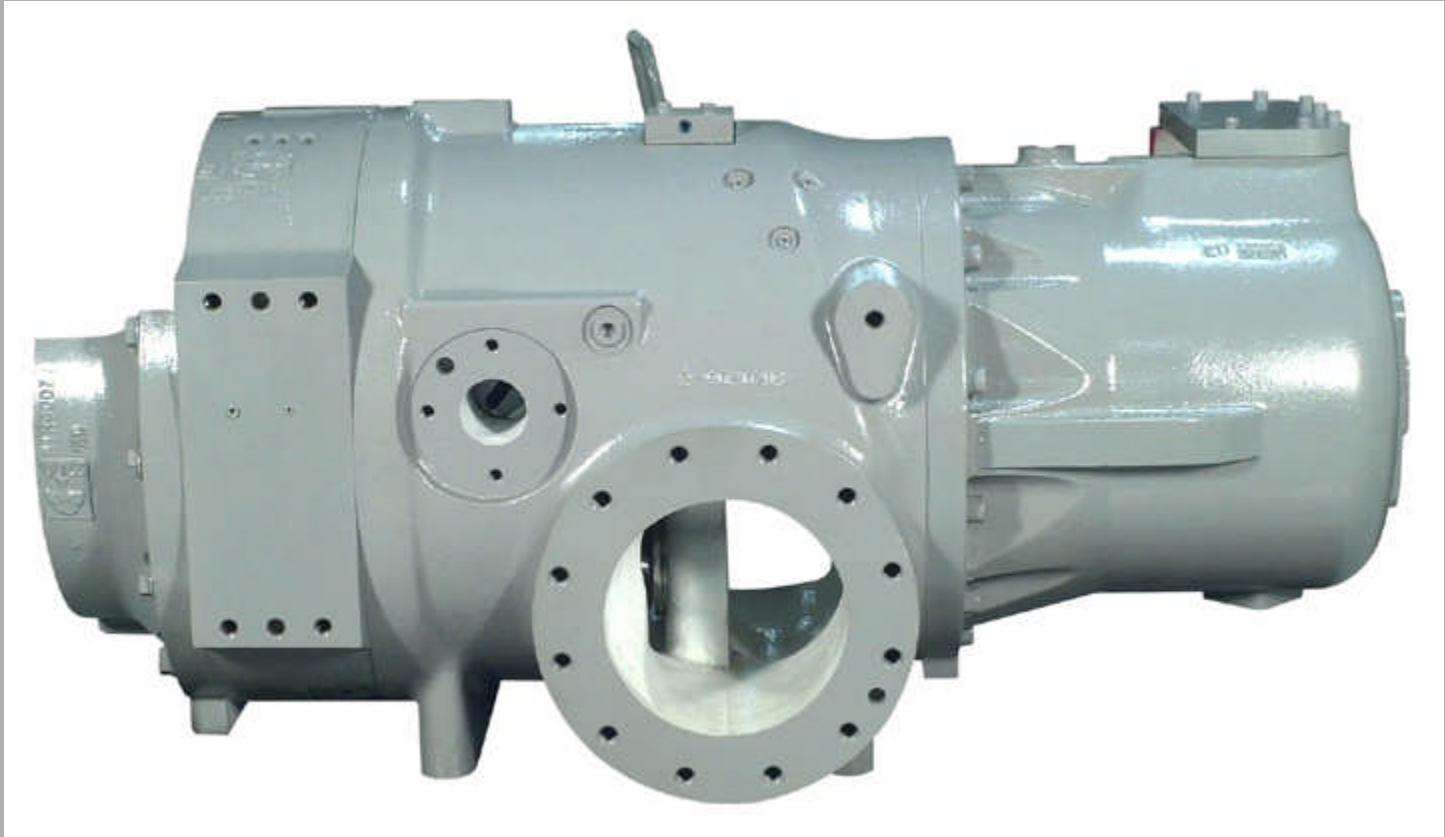


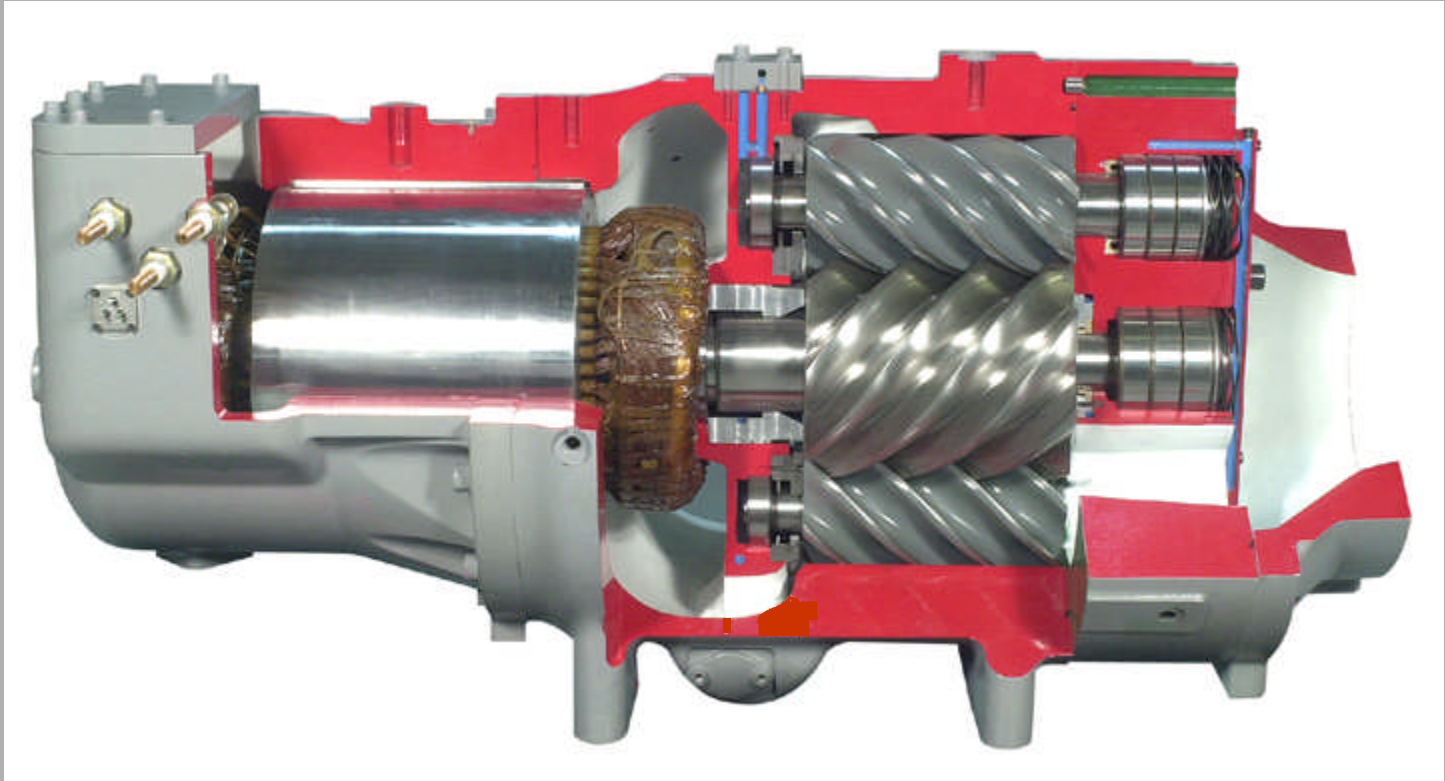
# 23XR Compressor

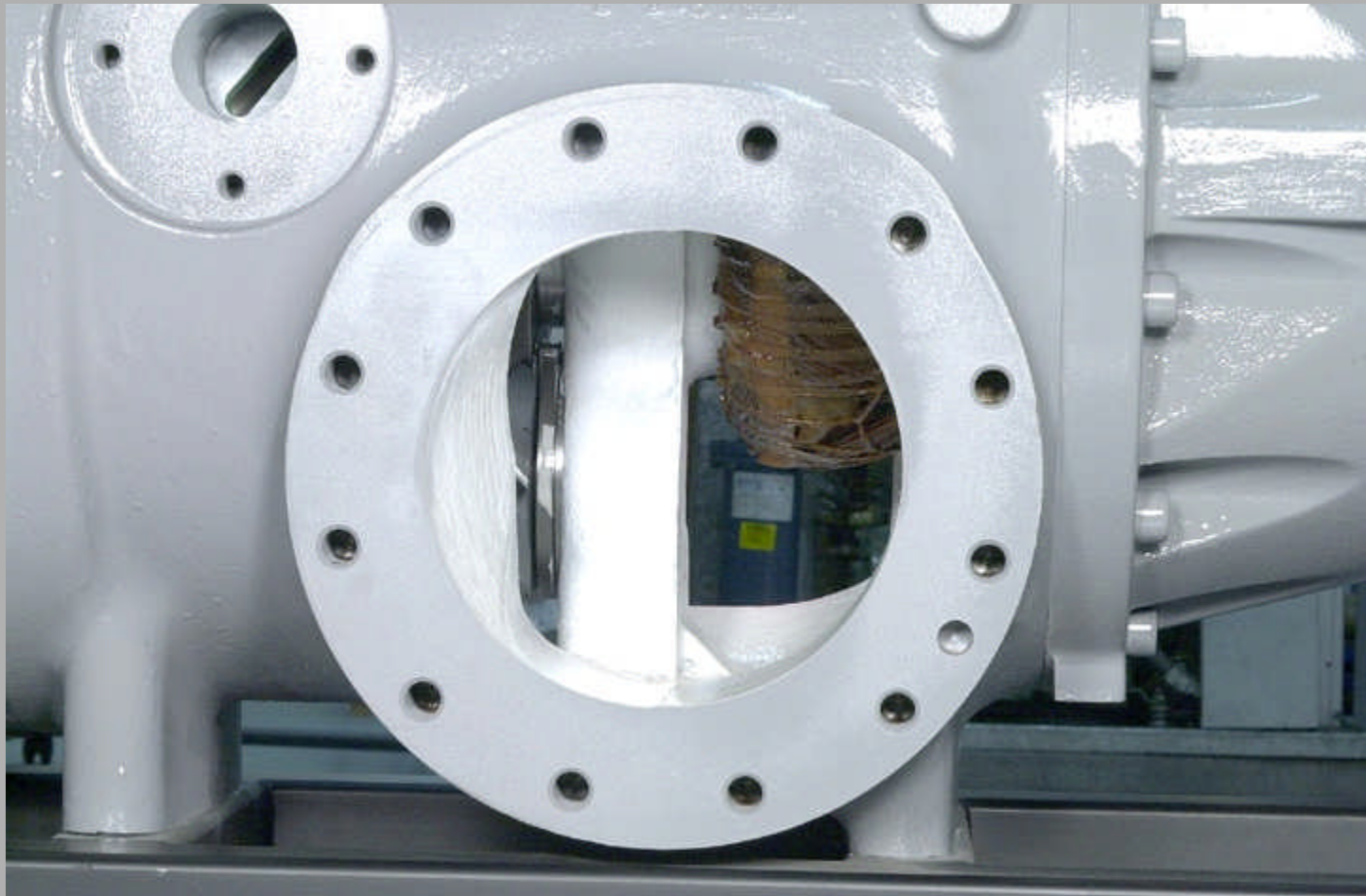
- Tri Rotor
- R-134a Design
- Improved Machining
- Conformal Coatings
- Greatly Reduced Oil Flow
- Muffler Required

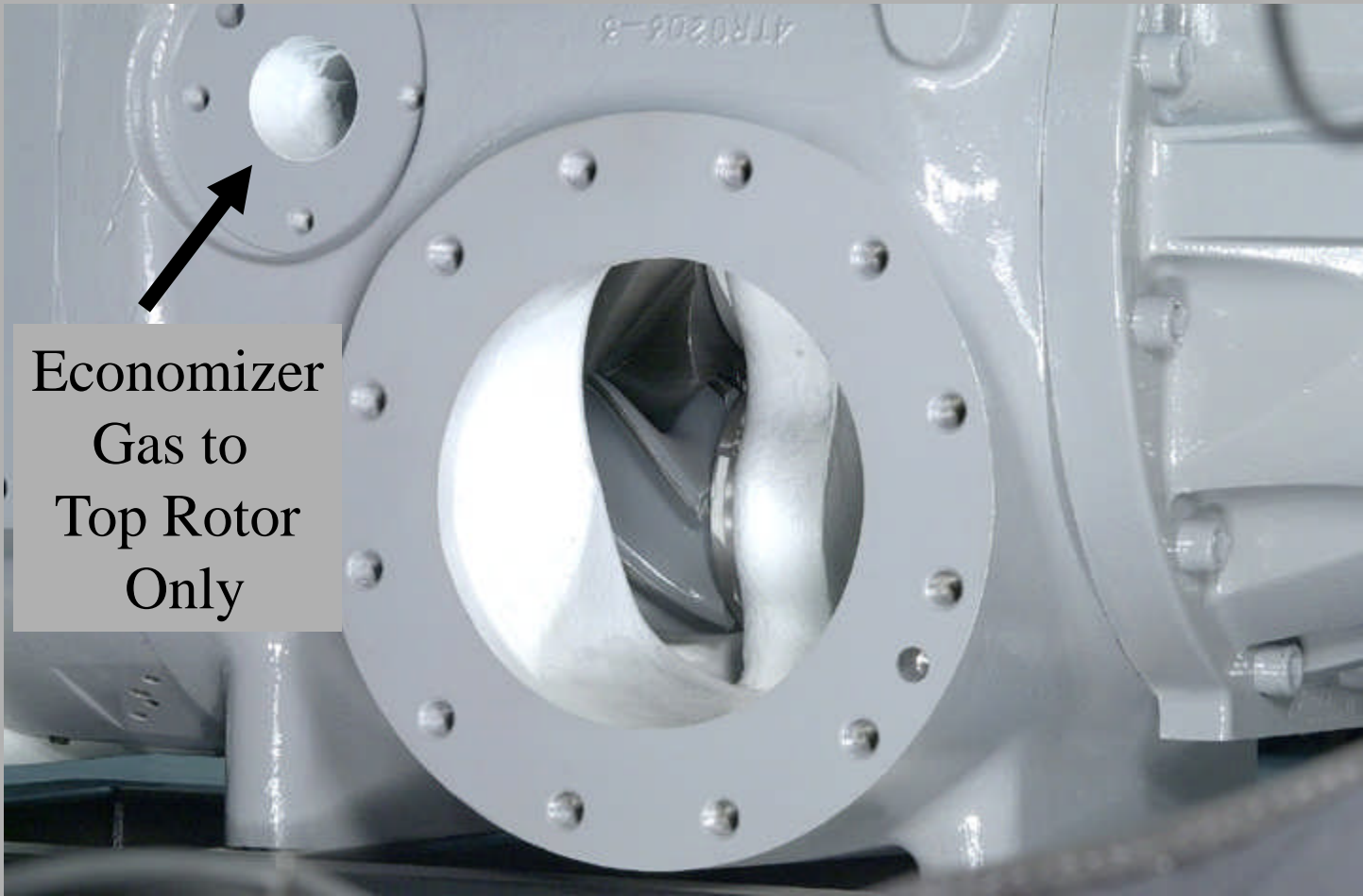
# Conformal Coatings



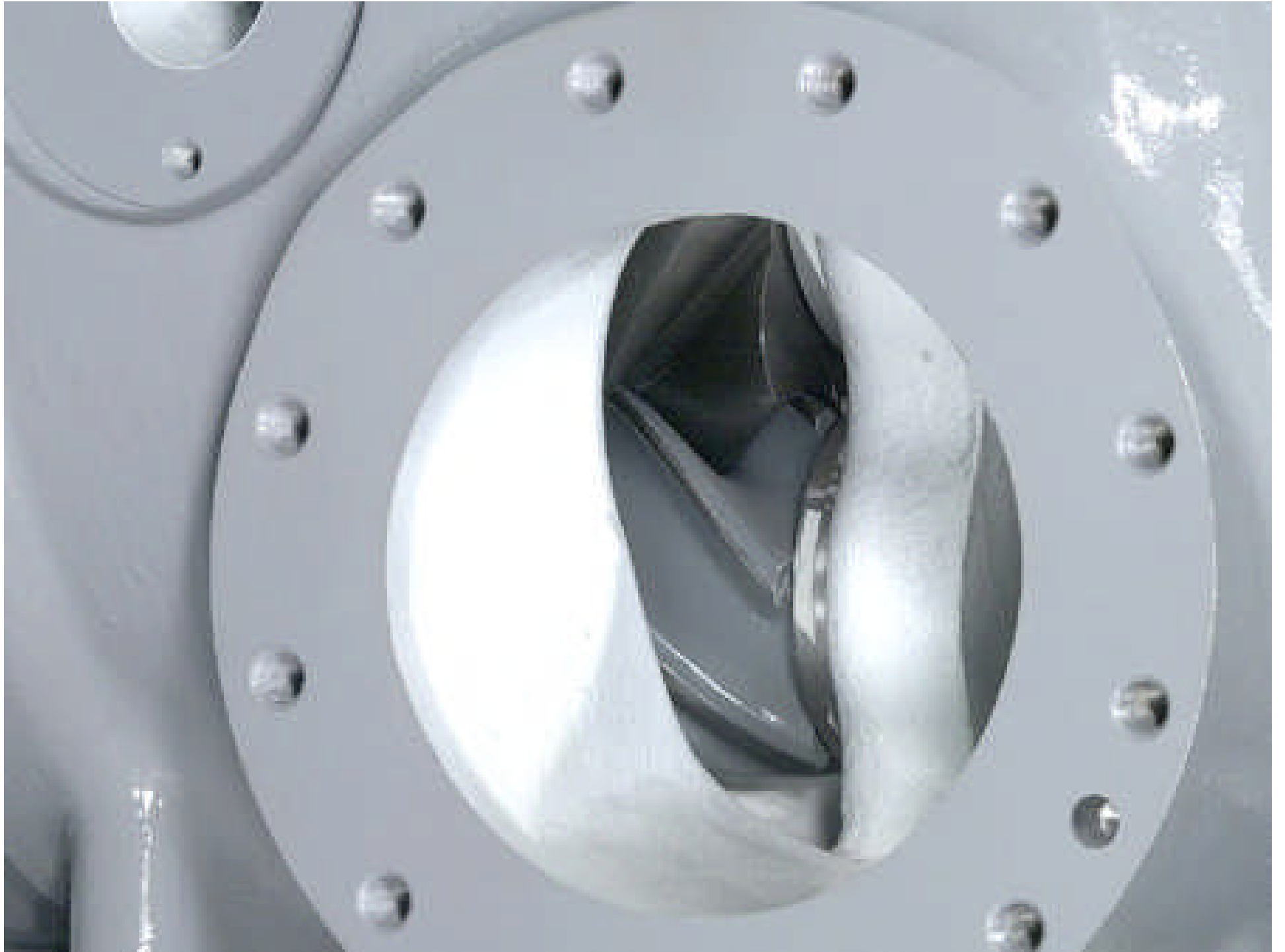


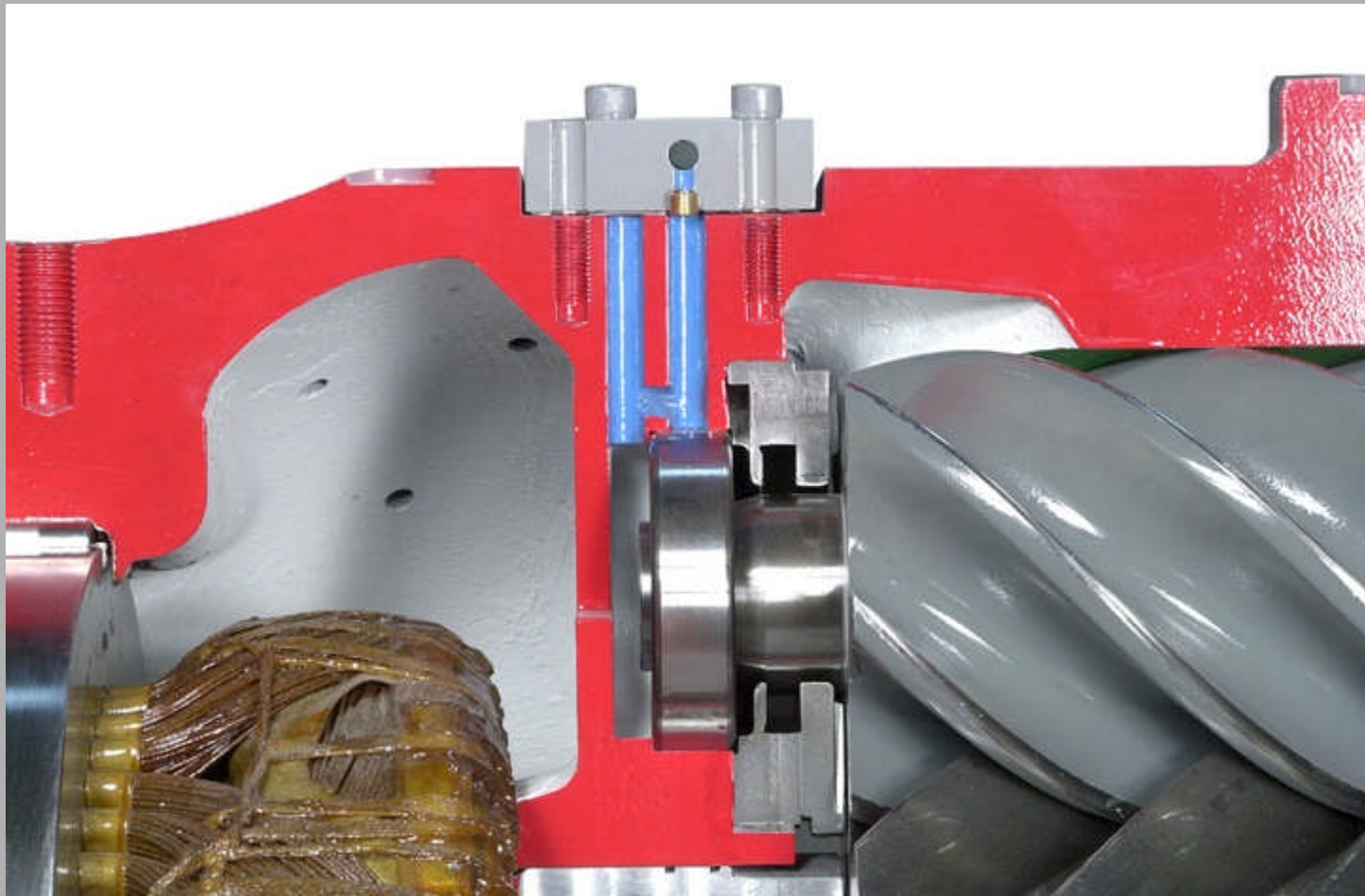




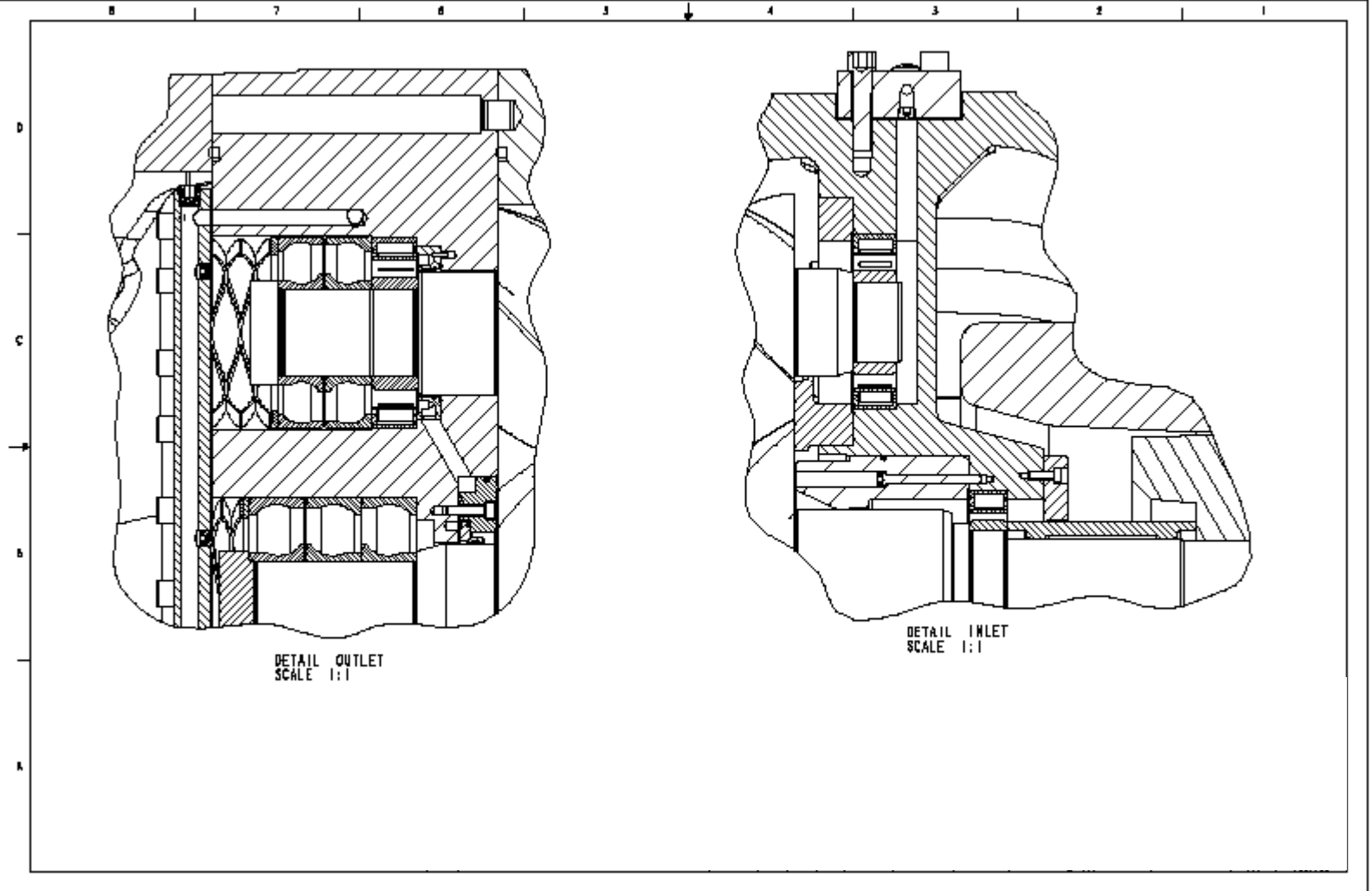


Economizer  
Gas to  
Top Rotor  
Only



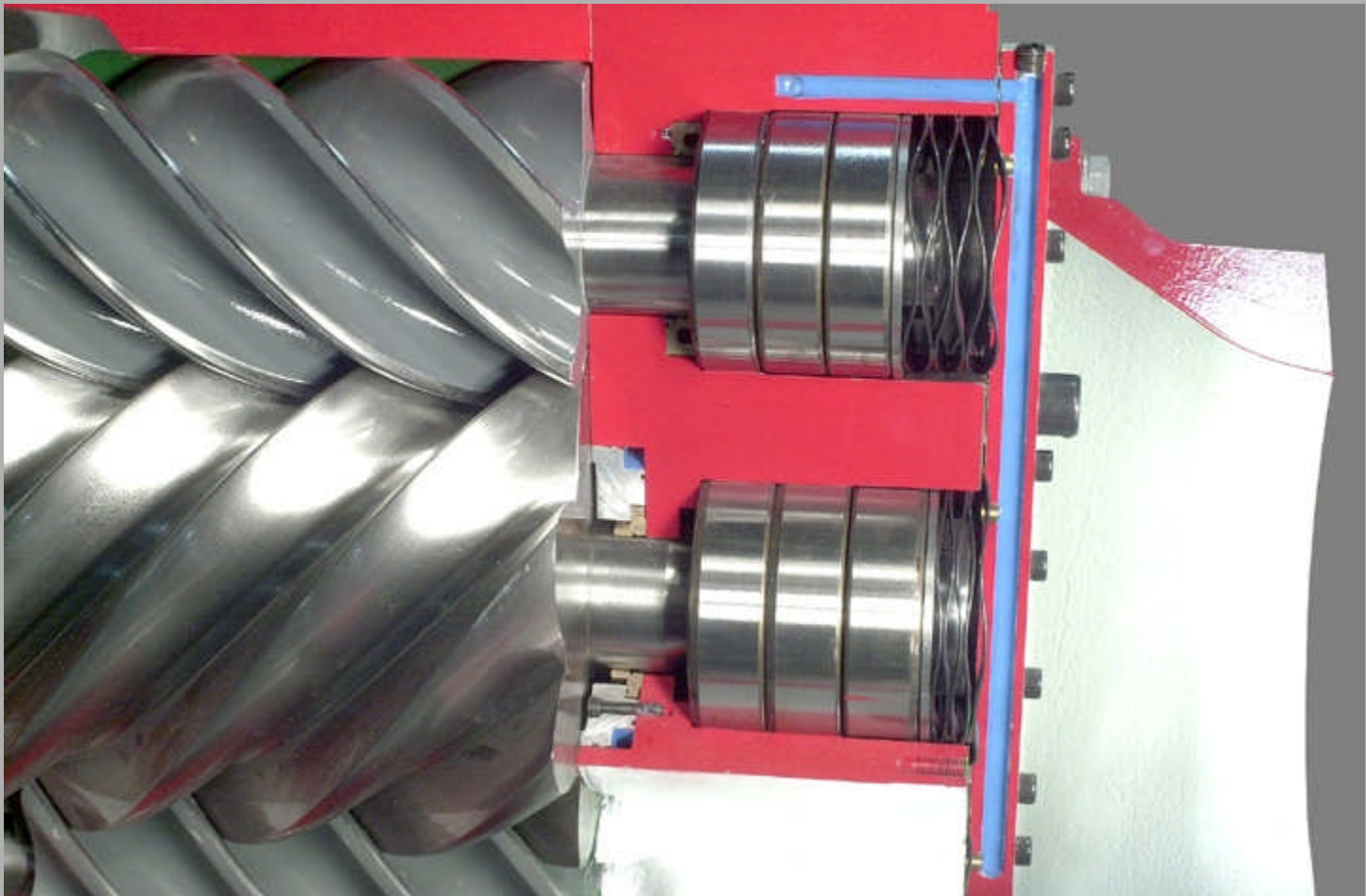


OVERLAY DWG: DTR3000-FLAT



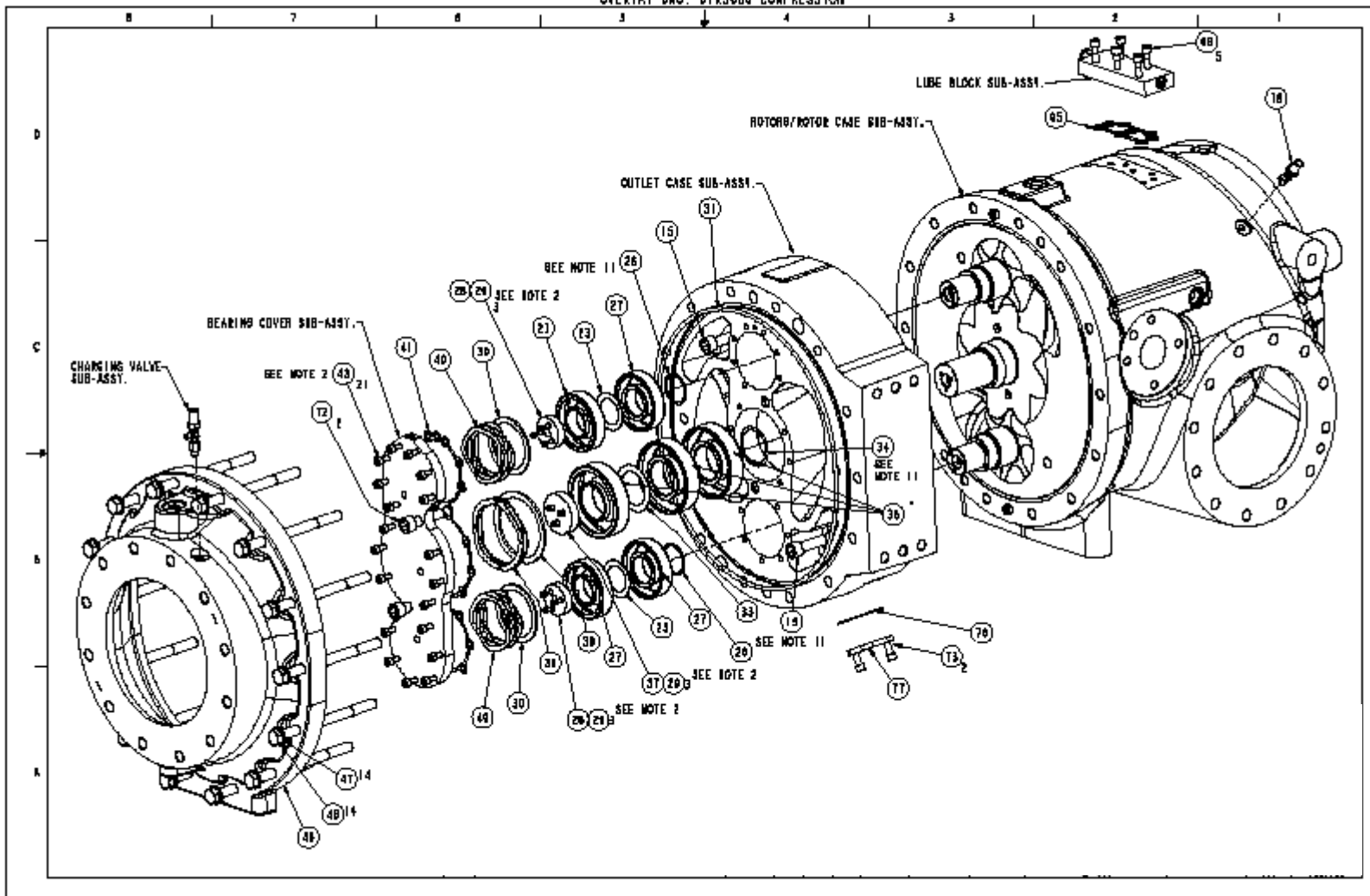
DETAIL OUTLET  
SCALE 1:1

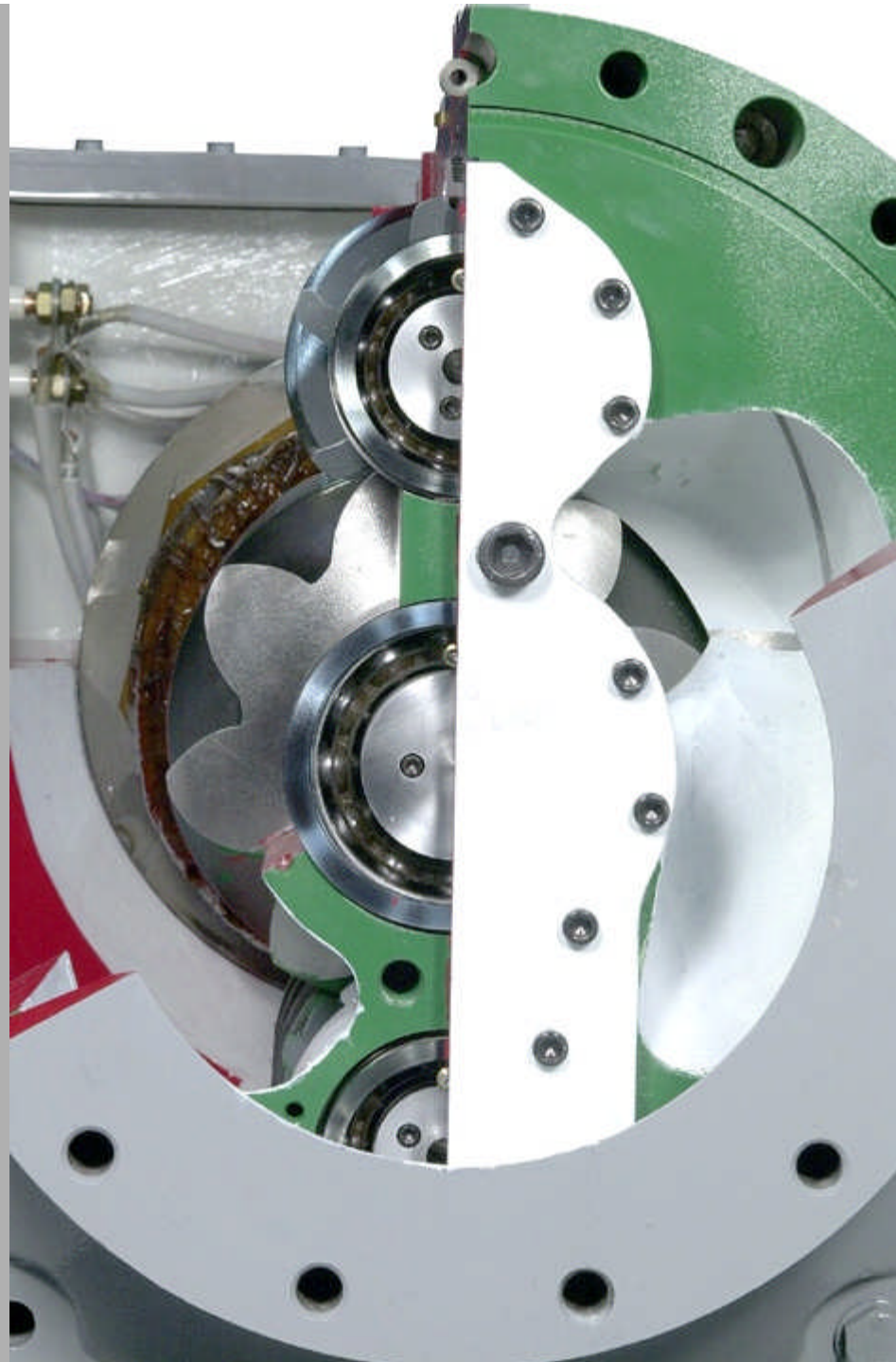
DETAIL INLET  
SCALE 1:1





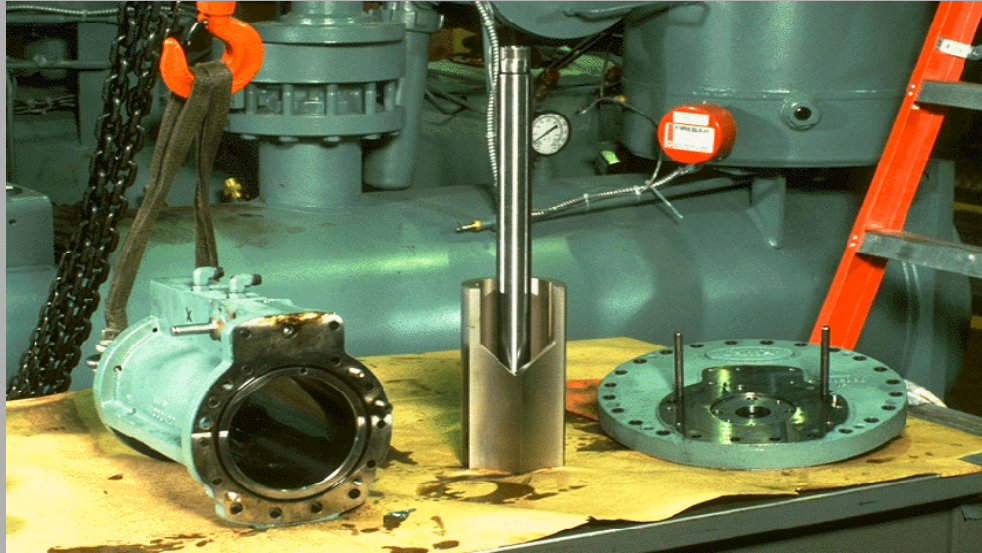
OVERLAY DRG: 0TR3600-COMPRESSION







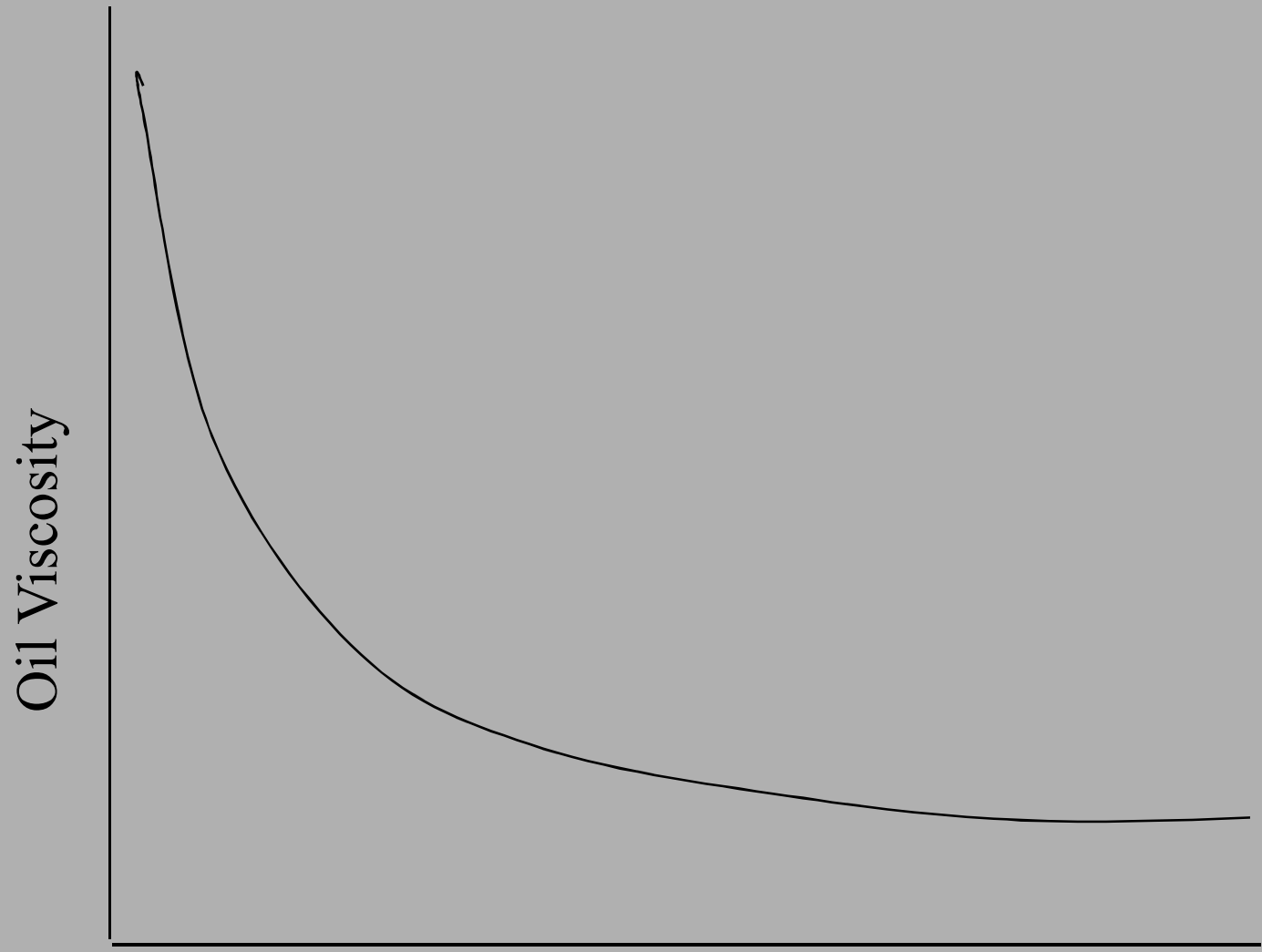
# Did I Mention SLIDE VALVES



23XR No Slide Valve, Speed Control Capacity Control.  
Unlike a Centrifugal There is No Efficiency Improvement  
with Speed Reduction, Just Capacity and Power

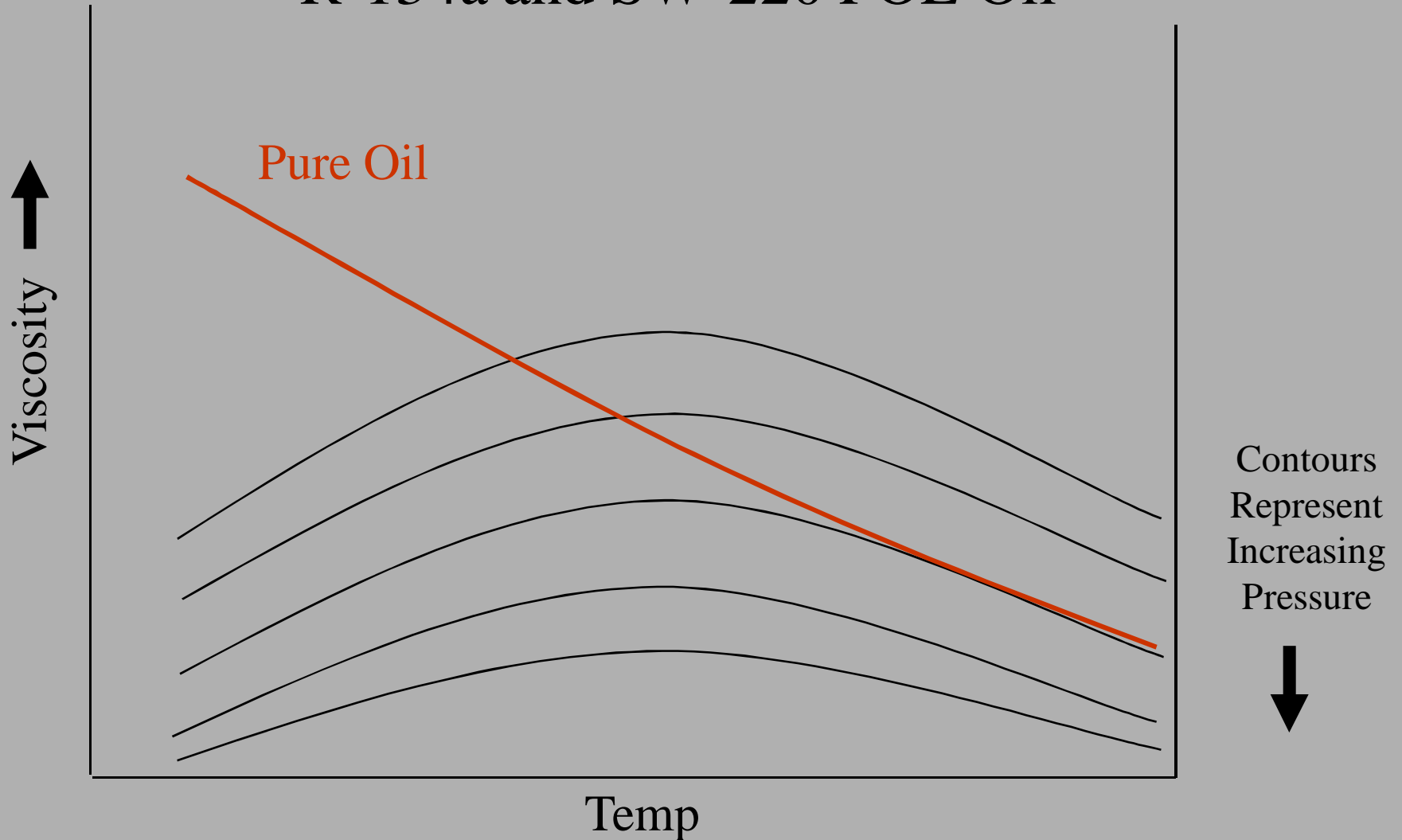
# Speed Control and Rolling Element Bearings

- The lower the RPM the greater the viscosity required to lubricate and maintain bearing reliability
- To remove sufficient refrigerant to accomplish this. The pressure is reduced to suction and the temperature is elevated



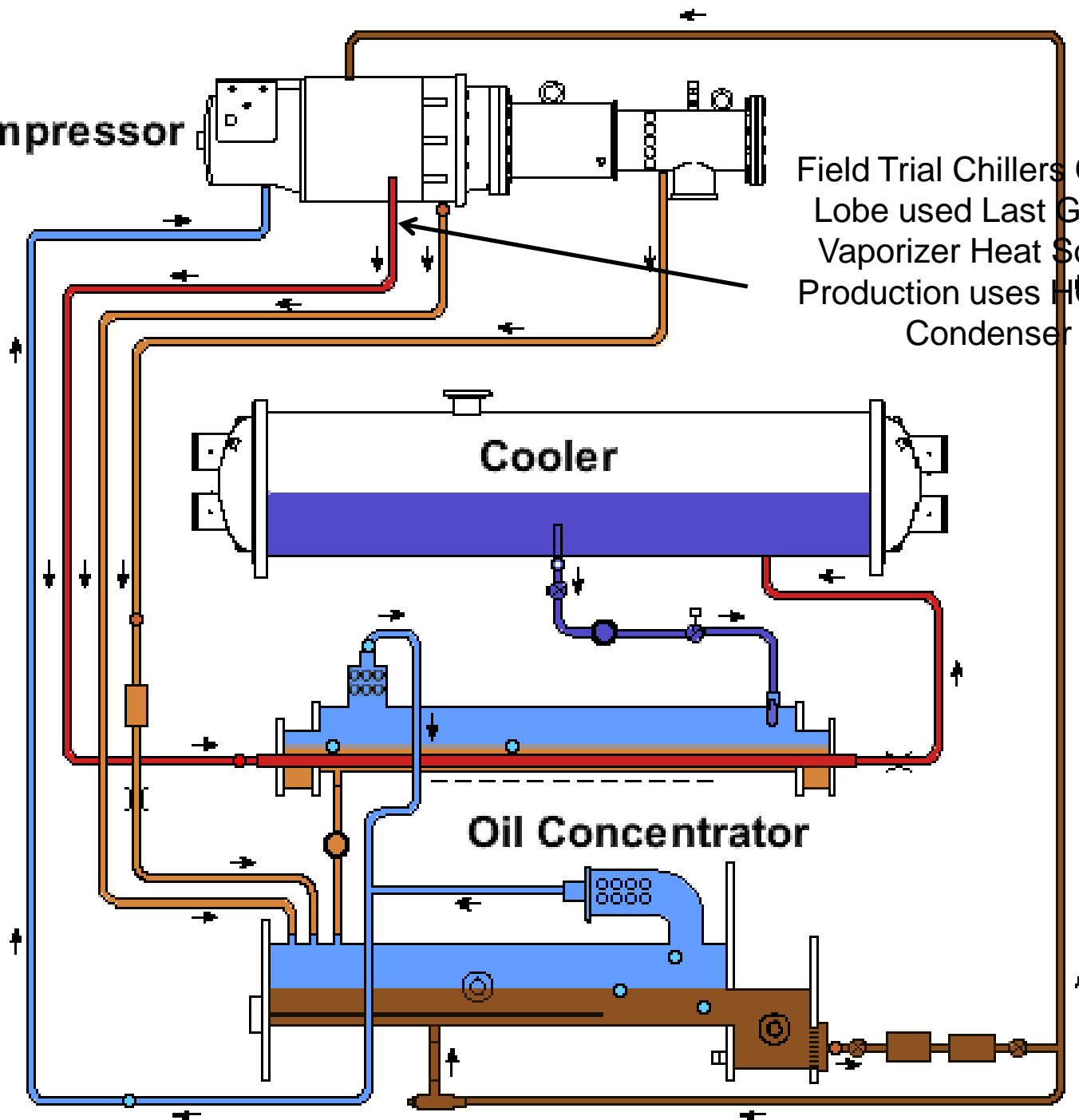
Minimum RPM for Adequate Lubrication

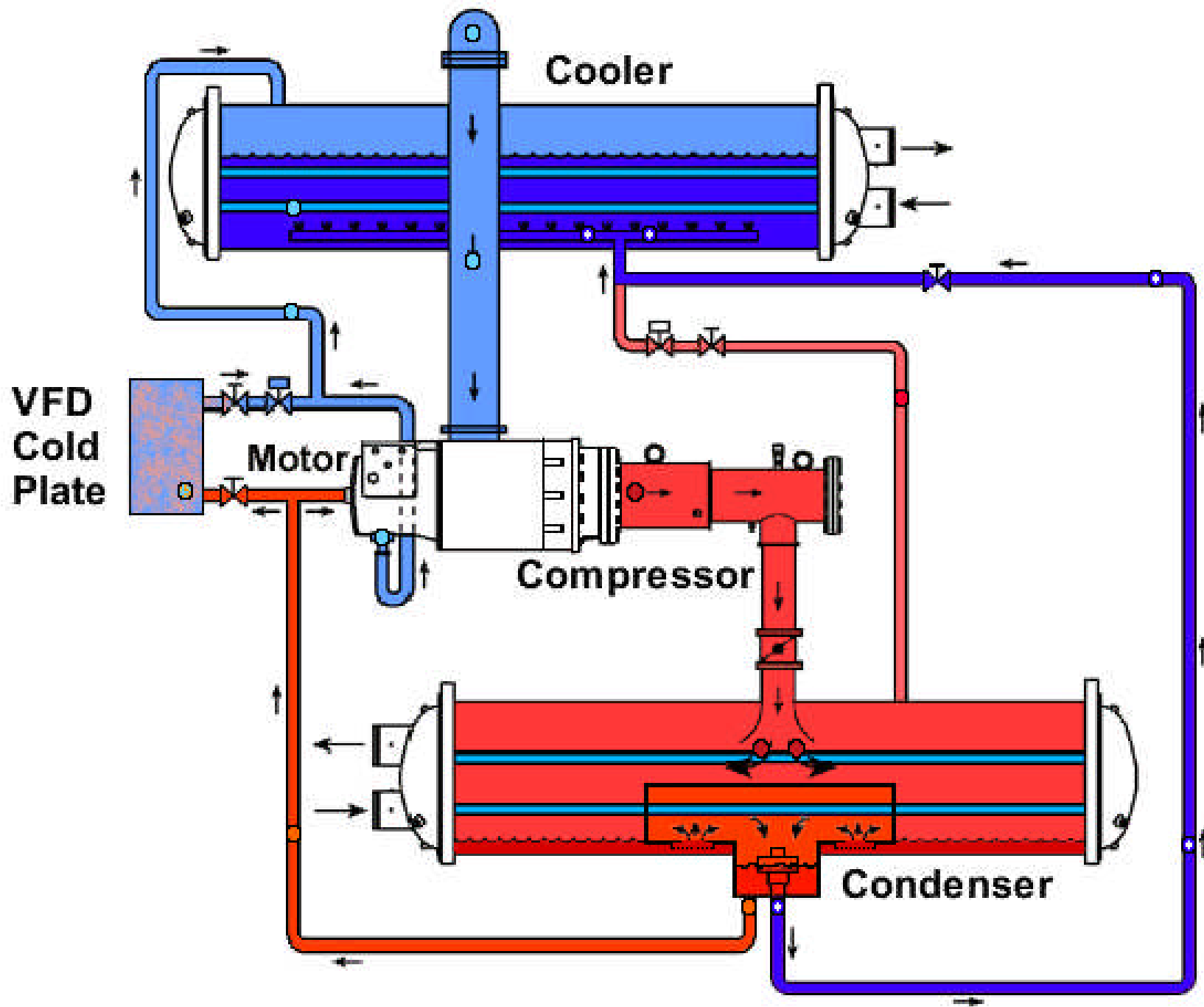
# Temp vs Viscosity Oil Refrigerant Mixture R-134a and SW-220 POE Oil

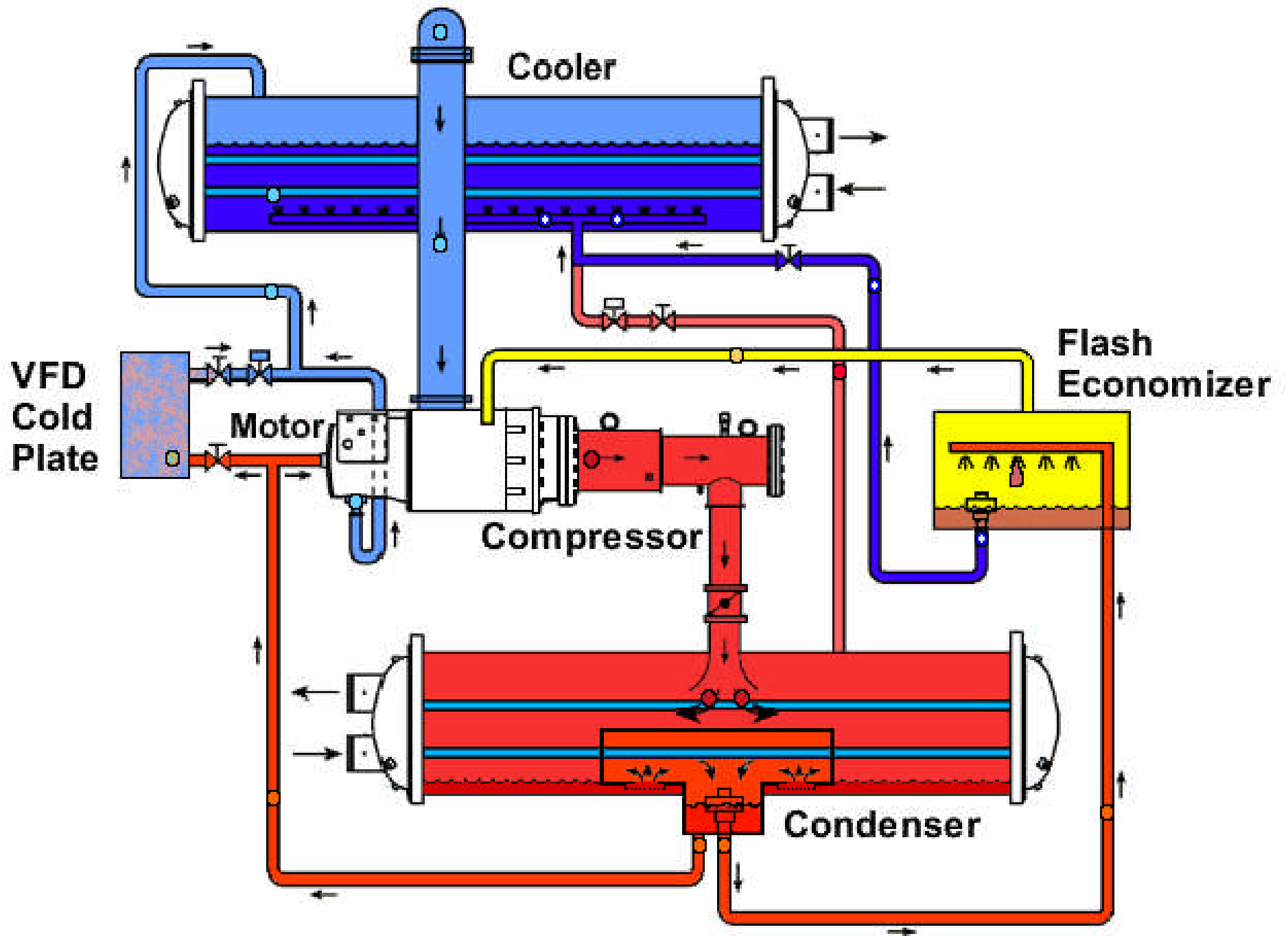


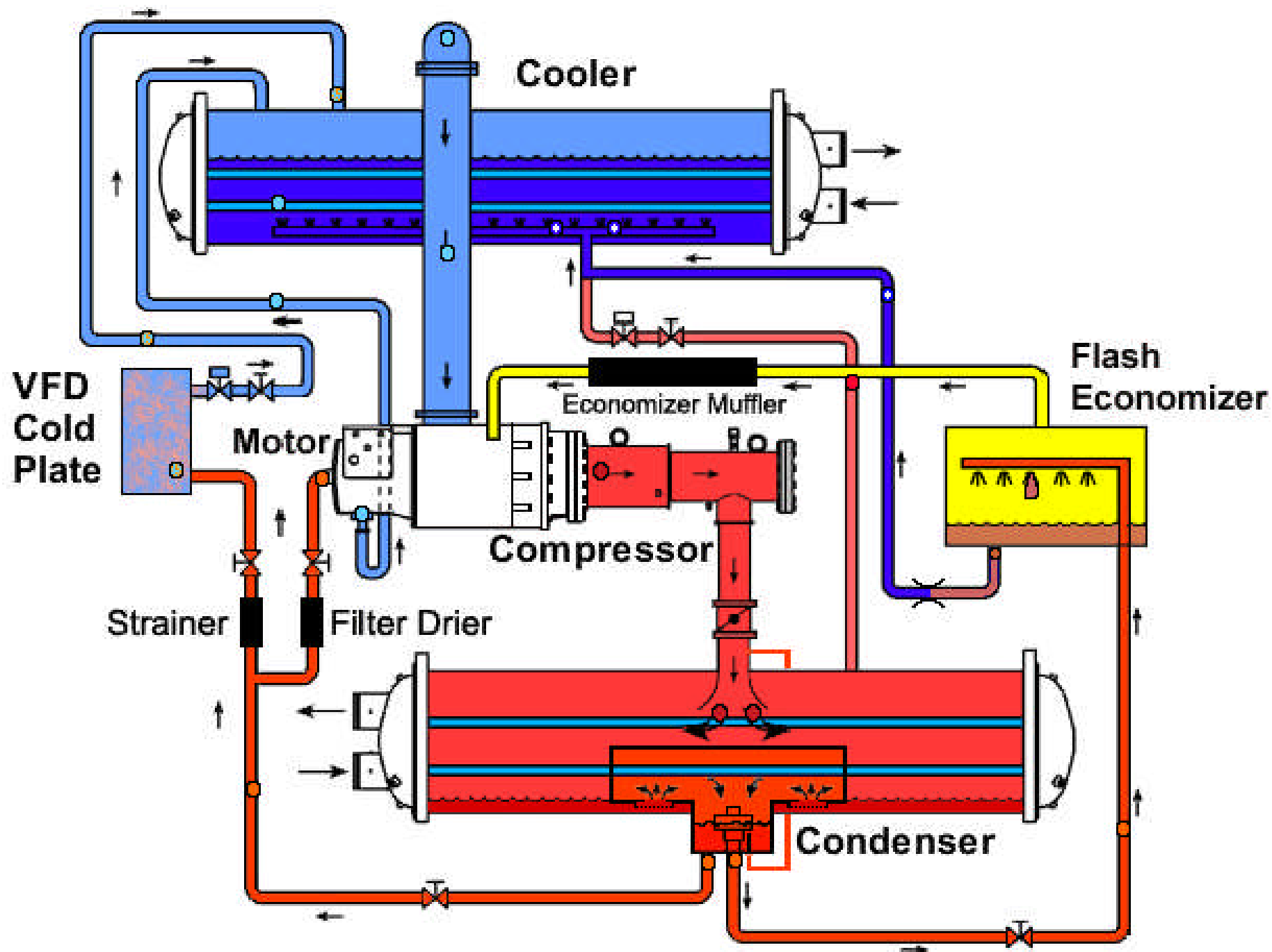
**Compressor**

Field Trial Chillers Closed  
Lobe used Last Gas as  
Vaporizer Heat Source  
Production uses HG from  
Condenser



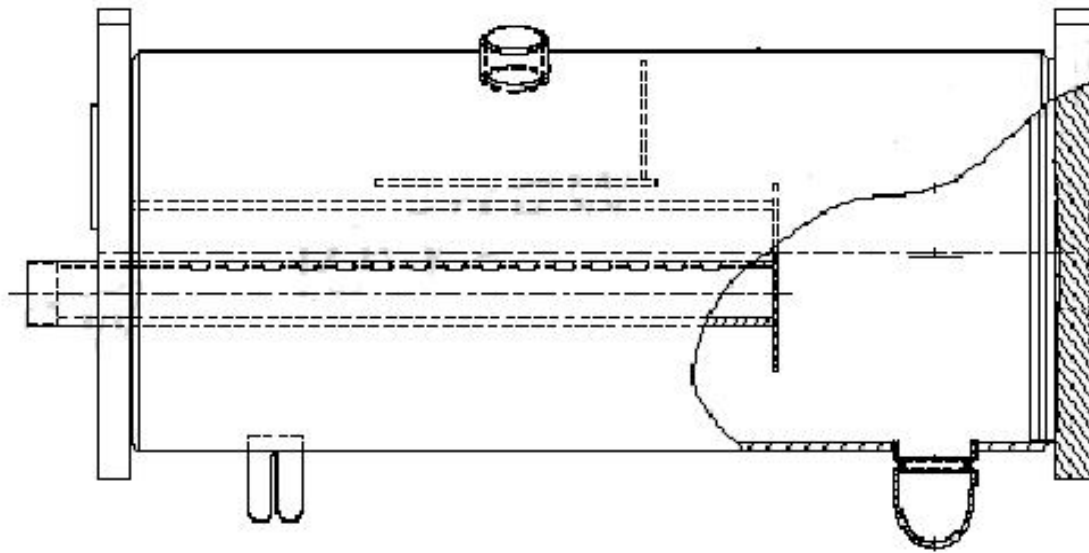


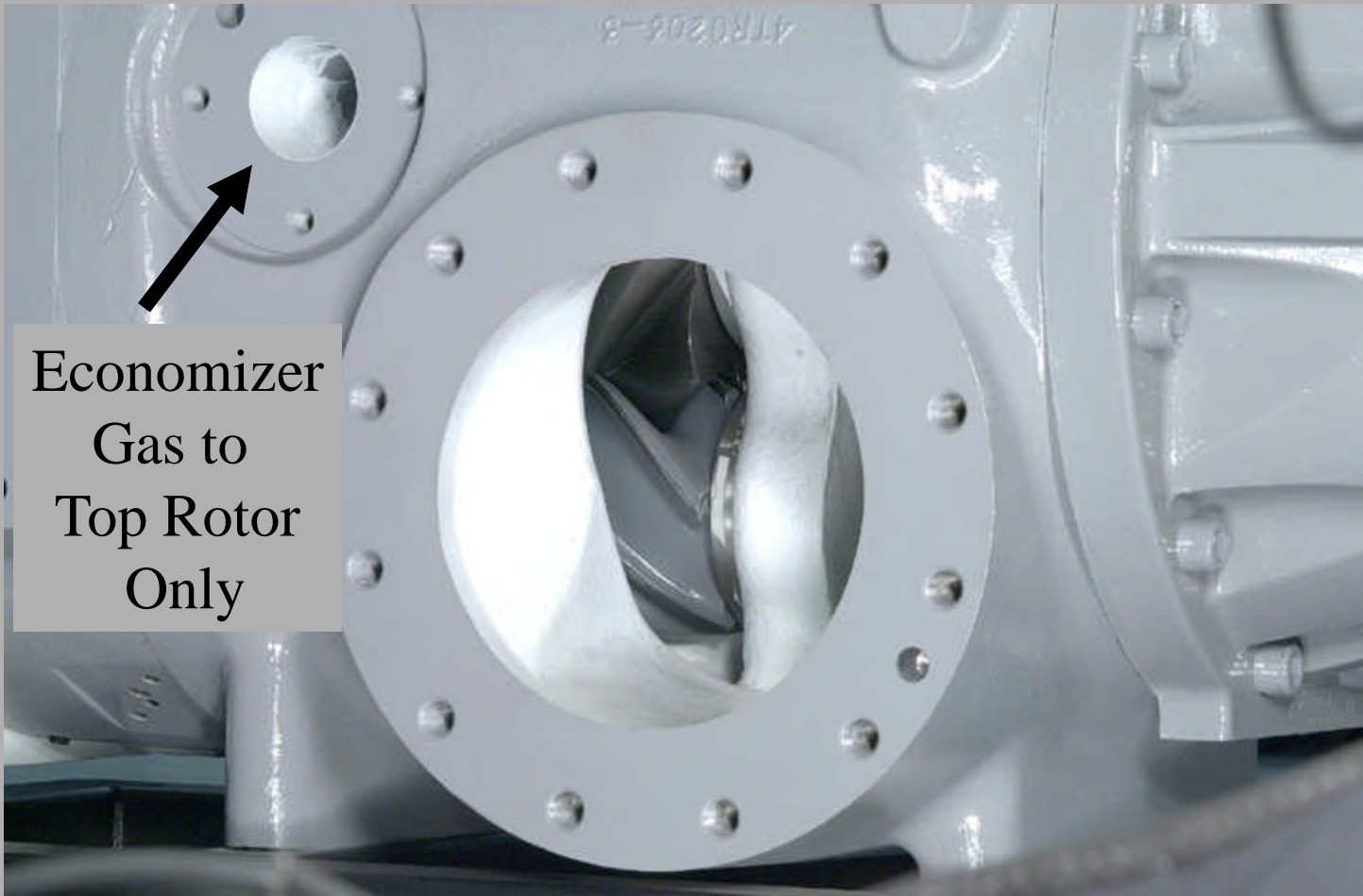






# 23XR V Economizer





Economizer  
Gas to  
Top Rotor  
Only



**DID I MENTION**

**THE END**