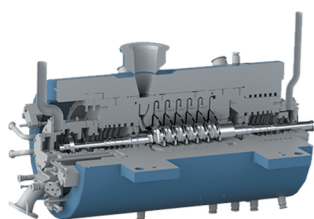
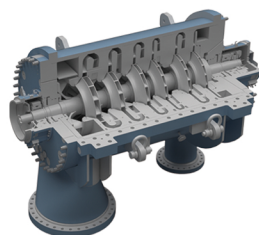


## Product Overview



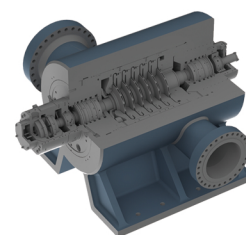
CP Series Centrifugal Compressor

Outlet Pressure: Up to 450 barG  
Flow Rate: Up to 143,000 m<sup>3</sup>/h  
Typical Applications: Onshore/Offshore Oil and Gas, Petrochemicals, Methanol, Natural Gas Storage and Transportation, Refining, Fertilizers, FPSO



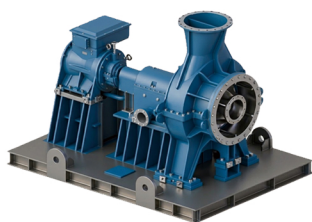
SP Series Centrifugal Compressor

Outlet Pressure: Up to 45 barG  
Flow Rate: Up to 265,800 m<sup>3</sup>/h  
Typical Applications: Onshore/Offshore Oil and Gas, Petrochemicals, Fertilizers, Olefins, Refining, General Chemicals, Dry Chlorine



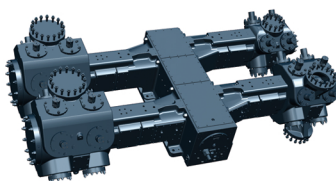
GS Series Centrifugal Compressor

Exhaust Pressure: Up to 222 bar  
Shaft Power: Up to 56,000 kW  
Typical Application: Natural Gas Pipeline



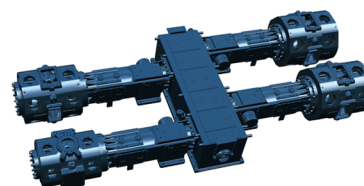
DB Series Compressor

Flow Rate: Up to 300,000 m<sup>3</sup>/h  
Pressure Ratios: Up to 3  
Typical Application: Used in Ethylene / Butanol / Acrylic Acid / Polypropylene applications and all kinds of blowers



ZXH Series Reciprocating Compressor

Horsepower: Up to 6,500 kW  
Speed: 1,000-1,800 RPM  
Throws: 2, 4 or 6  
Typical Applications: Onshore & Offshore Oil and Gas Production, LNG, Natural Gas Storage & Transportation, Fuel Gas Boosting, Hydrogen Energy, and Natural Gas/Carbon Dioxide Injection, etc.



ZX Series Reciprocating Compressor

Speed: 240-720 RPM  
Throws: 1 - 10  
Typical Applications: Refining, Petrochemicals, Chemicals, Hydrogen, Carbon Dioxide Compression, etc.

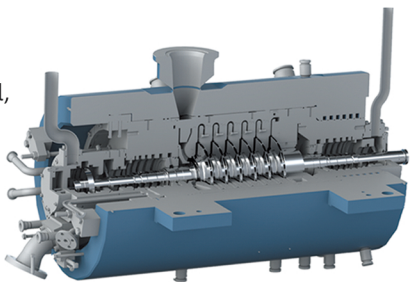
# Centrifugal Compressor Product Features

- 1. Optimized calculation of aerodynamic flow coefficient
- 2. Aerodynamic model stage validated through performance testing
- 3. Optimized stator design with strict clearance requirements for a more compact unit structure
- 4. Rigorous manufacturing process control and supplier quality assurance

## Centrifugal Compressor Product Series

### CP Series (High-Ultrahigh Pressure)

- Application Scenarios: Onshore/Offshore Oil and Gas, Petrochemicals, Methanol, Natural Gas Storage and Transportation, Refining, Fertilizers, FPSO
- Typical Model: CP306-A
- Suitable for re-injection gas processes on offshore natural gas platforms
- Outlet Pressure: 236 barG
- Flow Rate: 600 m<sup>3</sup>/h

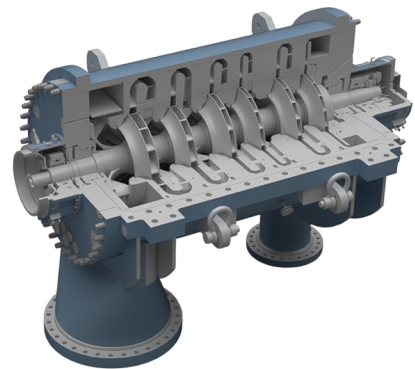


| Compressor Type | Impeller Diameter<br>mm | Maximum Flow Rate<br>m <sup>3</sup> /h | Pressure Limit<br>BarG | Design Rotational Speed<br>RPM |
|-----------------|-------------------------|----------------------------------------|------------------------|--------------------------------|
| CP30X           | Up to 300               | 10600                                  | Up to 450              | 11111-21000                    |
| CP40X           | Up to 400               | 18900                                  | Up to 400              | 8333-20000                     |
| CP50X           | Up to 500               | 29600                                  | Up to 320              | 6666-15000                     |
| CP60X           | Up to 600               | 42600                                  | Up to 250              | 5555-12000                     |
| CP70X           | Up to 700               | 58000                                  | Up to 200              | 4760-10000                     |
| CP80X           | Up to 800               | 75800                                  | Up to 200              | 4167-8570                      |
| CP90X           | Up to 900               | 95900                                  | Up to 200              | 3700-7500                      |
| CP100X          | Up to 1000              | 118400                                 | Up to 100              | 3333-6666                      |
| CP110X          | Up to 1100              | 143000                                 | Up to 50               | 3030-6000                      |

# Centrifugal Compressor Product Series

## SP Series (Medium-Low Pressure, Capable of Handling Ultra-large Flow Rates)

- Application Scenarios: Onshore/Offshore Oil and Gas, Petrochemicals, Fertilizers, Olefins, Refining, General Chemicals, Dry Chlorine
- Typical Model: 2SP806-B
- Suitable for instrument air compression
- Outlet Pressure: 8 barG
- Flow Rate: Approx. 70000 m<sup>3</sup>/h



| Compressor Type | Impeller Diameter mm | Maximum Flow Rate m <sup>3</sup> /h | Pressure Limit BarG | Design Rotational Speed RPM |
|-----------------|----------------------|-------------------------------------|---------------------|-----------------------------|
| SP30X           | Up to 300            | 10600                               | Up to 45            | 11111-21000                 |
| SP40X           | Up to 400            | 18900                               | Up to 45            | 8333-19000                  |
| SP50X           | Up to 500            | 29600                               | Up to 45            | 6666-15500                  |
| SP60X           | Up to 600            | 42600                               | Up to 45            | 5555-12000                  |
| SP70X           | Up to 700            | 58000                               | Up to 45            | 4760-10000                  |
| SP80X           | Up to 800            | 75800                               | Up to 30            | 4167-8570                   |
| SP90X           | Up to 900            | 95900                               | Up to 30            | 3700-7500                   |
| SP100X          | Up to 1000           | 118400                              | Up to 20            | 3333-6666                   |
| SP110X          | Up to 1100           | 143000                              | Up to 20            | 3030-6000                   |
| SP120X          | Up to 1200           | 170000                              | Up to 20            | 2780-5454                   |
| SP130X          | Up to 1300           | 200000                              | Up to 20            | 2565-5000                   |
| SP140X          | Up to 1400           | 231500                              | Up to 20            | 2380-4615                   |
| SP150X          | Up to 1500           | 265800                              | Up to 20            | 2200-4285                   |

## Naming & Interpretation of Centrifugal Compressor

2 CP 4 09 – B

- 2 stands for 2 process stages
- CP stands for vertically split compressor
- 4 stands for nominal diameter (impeller tip diameter in decimeters, rounded up)
- 09 stands for impeller number (quantity of stages)
- B stands for back-to-back arrangement rotor

# Supercritical Carbon Dioxide (sCO<sub>2</sub>) Brayton Cycle Waste Heat Power Generation Solution

## Main Scope of Supply

### Core Main Equipment

- Centrifugal Compressor (API 617)
- Axial Expander (API 617)
- Gearbox
- Common Baseplate

### Power Drive Equipment

- Asynchronous Motor / Generator

### Auxiliary Process Systems

- Lubricating Oil Station
- Seal Gas Control Cabinet

### Electrical and Control Systems

- Unit Control Panel
- VFD Control Cabinet
- Local Control Cabinet

## Main Applications: Medium- and Low-Temperature Heat Sources (300–500°C)

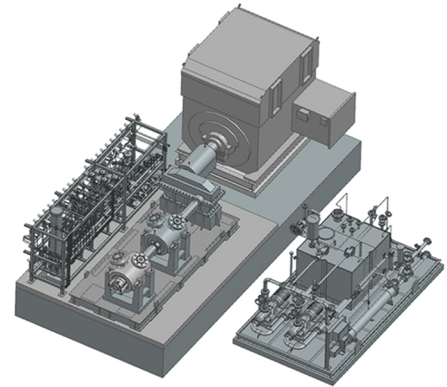
### Gas Turbine Waste Heat Recovery: Power generation

through recovery of exhaust heat from gas turbines

- Onshore Applications: Natural Gas Compressor Stations
- Offshore / Marine Applications: Marine Propulsion Systems, FPSOs, Offshore Platforms
- Best-Fit Units: 10–35 MW Gas Turbines

**Industrial Process Waste Heat Recovery:** Power generation through recovery of waste heat from boilers, smelting furnaces, incinerators, heat treatment facilities, etc.

Applicable Industries: Steel, Cement, Glass, Paper, Chemical Processes, etc.



## sCO<sub>2</sub> Turbomachinery Design and Manufacturing Capabilities

### • Aerodynamic and Rotor Dynamic Design

#### Accurate capture of rapid property changes near the critical region and flow control for compressors

- Coupled real-gas state modeling and 3D multiphase CFD
- Accurate prediction of transonic / supersonic flow induced by leading-edge flow acceleration
- Stable operation under variable conditions with surge and choke resistance

#### Flow-path reconstruction and residual velocity loss optimization for expanders under ultra-high power density

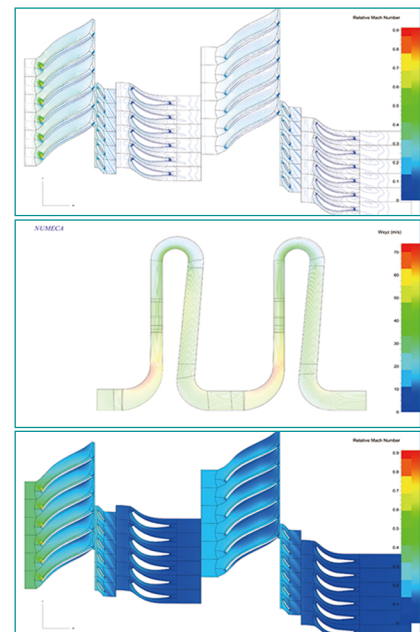
- Precise matching of impeller outlet reaction to minimize exhaust residual velocity losses
- Precise 3D swept and twisted blade design to ensure aerodynamic efficiency under high-temperature and high-enthalpy-drop conditions

#### Adaptation to excitation caused by high fluid density

- High-precision rotor dynamic modeling and verification for the complete shaft system under multiple operating conditions and coupled multi-physics fields
- Integral cast honeycomb seals or hole-pattern seals are adopted at critical locations to introduce positive damping

#### Extreme thermal management and shaft seal control under severe temperature and pressure boundaries

- Transient thermo-structural coupled FEA under extreme temperature gradients
- Thermal isolation design of the shaft system

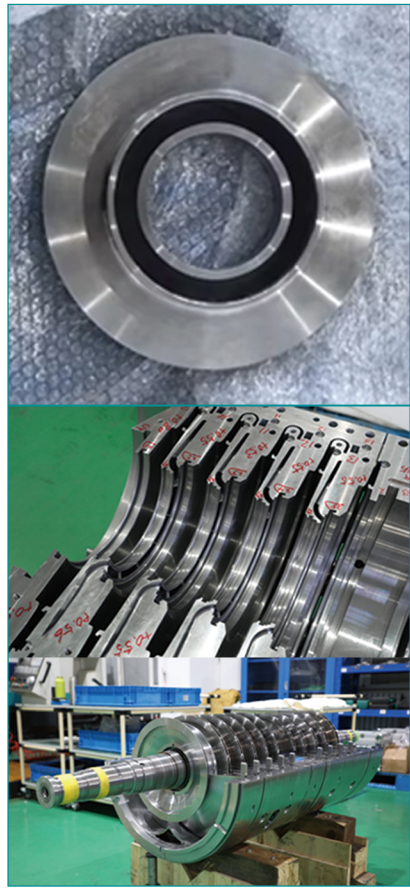




# sCO<sub>2</sub> Turbomachinery Design and Manufacturing Capabilities

## • Key Components

|                                                 |                                                                                                                                                                                                                               |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Rotor</b>                                    | <ul style="list-style-type: none"><li>• High-speed rotor design and manufacturing</li><li>• Dynamic balancing verification</li><li>• Long-term stable operation</li></ul>                                                     |
| <b>Impeller</b>                                 | <ul style="list-style-type: none"><li>• Integral five-axis CNC machining</li><li>• High-efficiency aerodynamic blade profile</li><li>• Application of high-strength materials</li></ul>                                       |
| <b>Diaphragm and Stator Components</b>          | <ul style="list-style-type: none"><li>• Precision flow-path machining and aerodynamic performance optimization</li><li>• Modular structure design for easier assembly and maintenance</li></ul>                               |
| <b>Casing and Pressure-Retaining Components</b> | <ul style="list-style-type: none"><li>• High-pressure design</li></ul>                                                                                                                                                        |
| <b>Tilting Pad Journal Bearing (TPJB)</b>       | <ul style="list-style-type: none"><li>• Five-pad oil-lubricated tilting pad bearing design</li><li>• Long service life and low maintenance requirements</li><li>• Excellent damping performance and rotor stability</li></ul> |
| <b>Oil Lubrication System</b>                   | <ul style="list-style-type: none"><li>• Supports frequent start-stop operation and long-term stable operation</li></ul>                                                                                                       |
| <b>Process Sealing System</b>                   | <ul style="list-style-type: none"><li>• Equipped with standard dry gas seals</li><li>• Minimizes process gas leakage losses</li></ul>                                                                                         |
| <b>Generator and Drive System</b>               | <ul style="list-style-type: none"><li>• Standard low-speed generator solution</li><li>• High reliability and low operation and maintenance costs</li></ul>                                                                    |



## • Flexible Control and System Integration



### Flexible Control Methods

Flow can be flexibly adjusted according to cycle load and operating conditions

- Adjustable inlet guide vanes can be used for regulation
- Speed regulation via VFD



### Skid-Mounted System Integration

- Skid-mounted design for easier installation and system integration
- All rotating equipment integrated on the same skid
- Standard base unit adaptable to multiple application

## • Manufacturing Capabilities : Five-Axis EDM Machining (Integral Manufacturing)



**450 m/s**  
Closed impeller tip speed up to



Verified on rotor test bench, with  
approximately **40%** performance margin



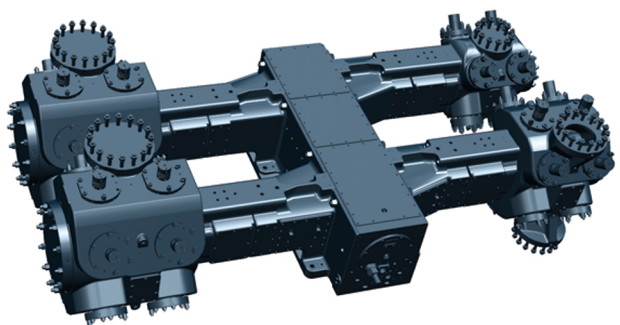
**400°C 235 barA**  
High-temperature and high-pressure  
adaptable design, up to

# Reciprocating Compressor Product Series

## – ZXH Series Reciprocating Compressor

### Separable high-speed reciprocating compressor (compliant with ISO 13631; API 618 available)

- Designed for natural gas gathering, processing, and storage applications, including CNG and LNG services. The available power range extends up to 6,500 kW.
- ZXH-H – Medium Oilfield High Speed Recip.
- ZXH-I – Heavy Oilfield High Speed Recip.
- ZXH-J – Super Heavy Oilfield High Speed Recip.



### Compressor Specifications

- Power: 405 – 6,500 kW
- Speed: 600 – 1,800 RPM
- Rated pressure: Outlet pressure slightly above atmospheric pressure—55MPa

| Model | Stroke (mm)     | Throws   | Max. Power (kW) | MACCRL (kN) | Cyl. bore range (mm) |
|-------|-----------------|----------|-----------------|-------------|----------------------|
| ZXH-H | 127 / 152 / 178 | 2,4 or 6 | 3,310           | 200         | 120-520              |
| ZXH-I | 127 / 152 / 178 | 2,4 or 6 | 5,370           | 265         | 120-710              |
| ZXH-J | 152 / 178       | 2,4 or 6 | 6,500           | 375         | 120-710              |

### Naming & Interpretation of Reciprocating Compressor

X   Model   X   –   XXX   XX   –   XXXX  
Throws   Compressor Model   Stages   Stroke   L -Lubricated   Cylinder Bore  
N-Non-lubricated

2 ZX-B 2 - 381 N - 508X355.6

2-Throw, ZX-B Type, 2-Stage Reciprocating Compressor, 381 mm Stroke, Non-Lubricated,  
First-Stage Cylinder Bore 508 mm, Second-Stage Cylinder Bore 355.6 mm.