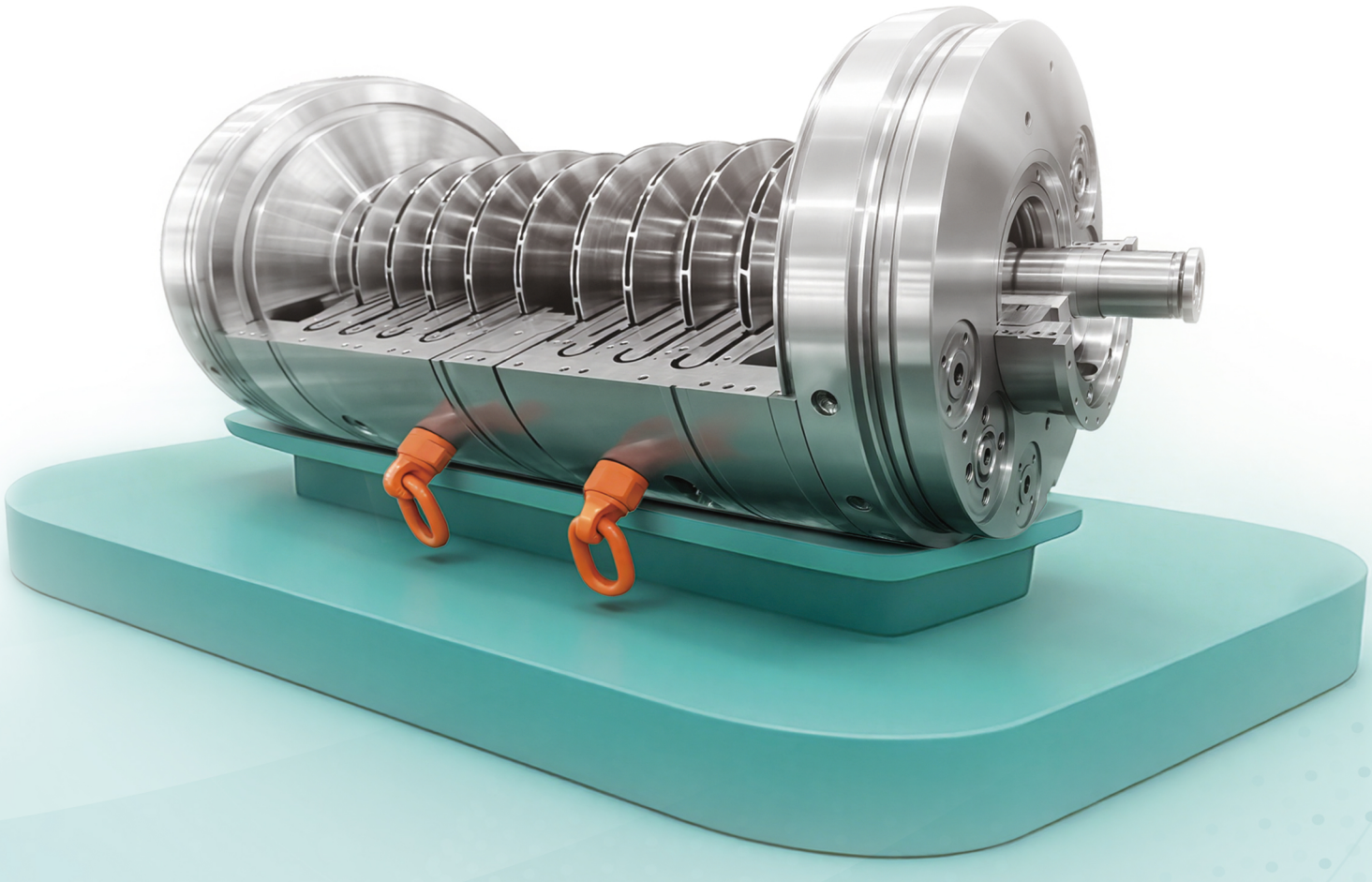
QualRotate

Process Gas Compressor & Solution Specialist



Contents

Explore our products, solutions, services, and applications.

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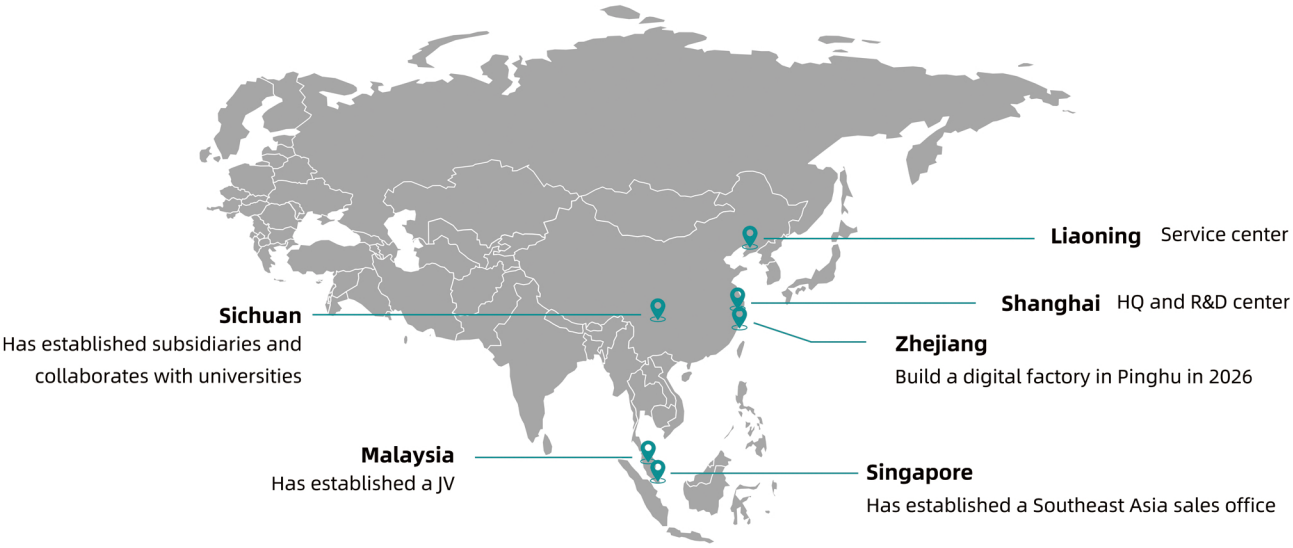
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08 | Reciprocating Compressor Product Series – ZXH Series Reciprocating Compressor

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Company Profile

QualRotate specializes in clean energy and digitalization, focusing on the R&D, manufacturing, and marketing of large industrial rotating equipment and auxiliary systems. We provide high-performance compressors and integrated solutions. Our process gas compressors deliver outstanding industrial performance, stability, and efficiency to meet the demands of rigorous operating conditions.



Headquartered in Shanghai with an R&D center, QualRotate has a service center in Liaoning, an engineering center in Sichuan, a joint venture in Malaysia, and a Southeast Asia sales office in Singapore, steadily expanding its global footprint. Our core team brings extensive industry experience, featuring top engineers from leading foreign OEMs and central and state-owned enterprises. The company is certified as a High-Tech Enterprise and a "SRDI" Enterprise, and holds multiple invention patents.

To further enhance overall manufacturing and automation capabilities, **QualRotate's Pinghu Digital Factory**, completed in 2026, has an annual production capacity of **30 units**. We also operate a dedicated pneumatic model testbed and possess fully independent impeller R&D capabilities.



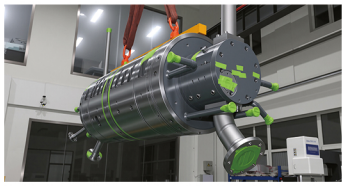
Service Scope

1 Compressor Complete Unit Retrofit

· Existing Unit Assessment & Retrofit Design

· Engineering Verification & Quality Assurance

· Manufacturing & Assembly

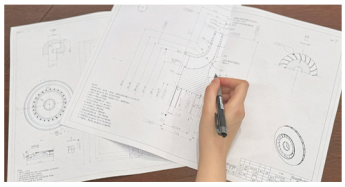


2 Compressor Consultancy

· Operating Condition Analysis, Equipment Selection & System Solution Design

· Aerodynamic, Structural & Compressor System Layout Evaluation

· Performance Optimization, Technical Assessment & Retrofit Recommendations



3 Compressor Spare Parts & Repair Services

· Spare Parts Supply, Component Repair & Manufacturing

· Compressor Turnkey Overhaul, Factory Repair & On-site Maintenance

· Inspection, Commissioning & Start-up Support Services



4 Compressor Skid Package

· Skid Package Design & Layout Optimization

· Equipment Integration & System Configuration

· Package Testing & Performance Verification

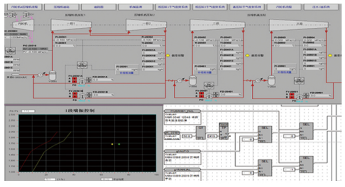


5 Compressor Control System

· Control System Hardware & Software Design

· System Integration, Testing & Documentation

· FAT/SAT Testing & Site Commissioning



6 Rotating Equipment Digitalization Software

· Condition monitoring, data analytics, and fault diagnostics

· Predictive maintenance, PHM, and operational optimization

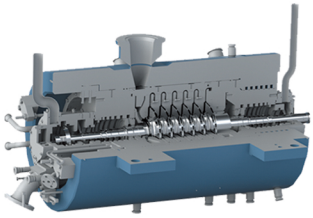
· Equipment registry and spare parts management



QualRotate

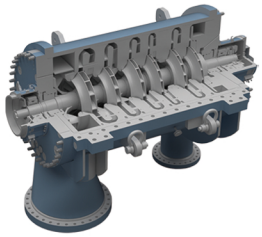
Accelerate Clean Energy Transition

Product Overview



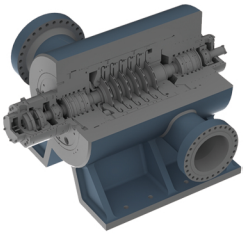
CP Series Centrifugal Compressor

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



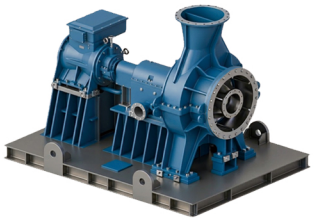
SP Series Centrifugal Compressor

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



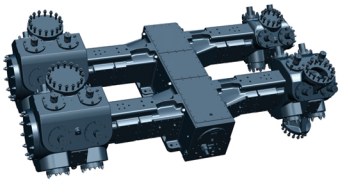
GS Series Centrifugal Compressor

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



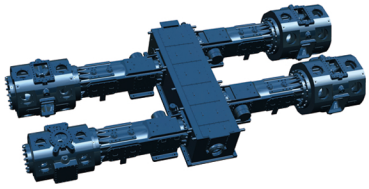
DB Series Compressor

Flow Rate: Up to 300,000 m^3/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)

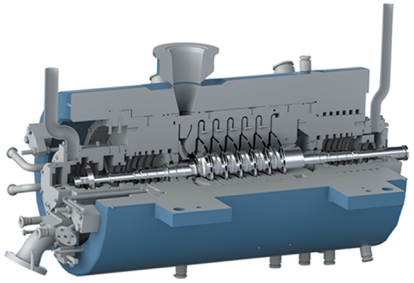
Application Scenarios: Onshore/Offshore Oil and Gas, Petrochemicals, Methanol, Natural Gas Storage and Transportation, Refining, Fertilizers, FPSO

Typical Model: CP306-A

· Suitable for re-injection gas processes on offshore natural gas platforms

· Outlet Pressure: 236 barg

· Flow Rate: 600 m^3/h



Compressor Type	Impeller Diameter mm	Maximum Flow Rate m^3/h	Pressure Limit barg	Design Rotational Speed 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)

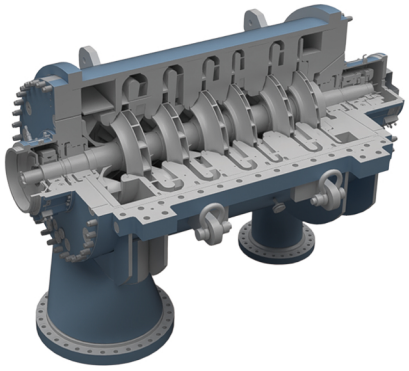
Application Scenarios: Onshore/Offshore Oil and Gas, Petrochemicals, Fertilizers, Olefins, Refining, General Chemicals, Dry Chlorine

Typical Model: 2SP806-B

· Suitable for instrument air compression

· Outlet Pressure: 8 barg

· Flow Rate: Approx. 70000 m^3/h



Compressor Type	Impeller Diameter mm	Maximum Flow Rate m^3/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_2) 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

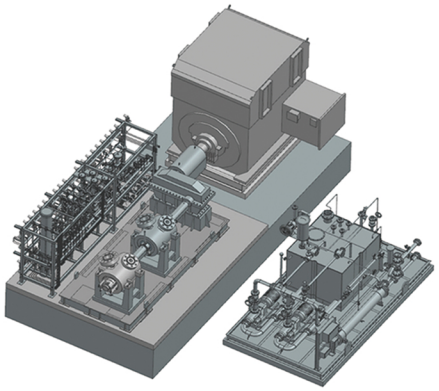
· Asynchronous Motor / Generator

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_2 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

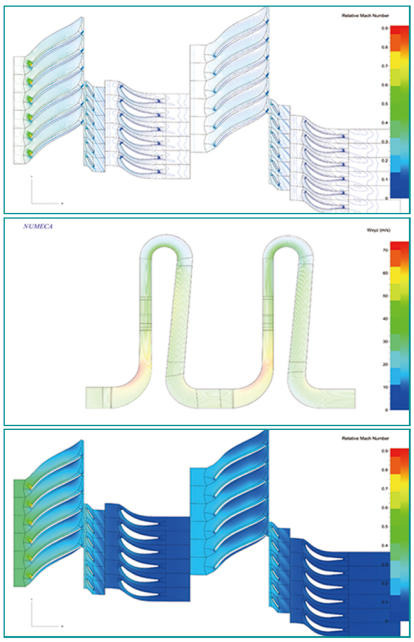
- **Precise matching of impeller outlet reaction** to minimize exhaust residual velocity losses
- **Precise 3D swept and twisted blade design** to ensure aerodynamic efficiency under high-temperature and high-enthalpy-drop conditions

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
- **Integrally machined honeycomb seals or hole-pattern seals** are applied in critical components. Positive damping technology is introduced

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

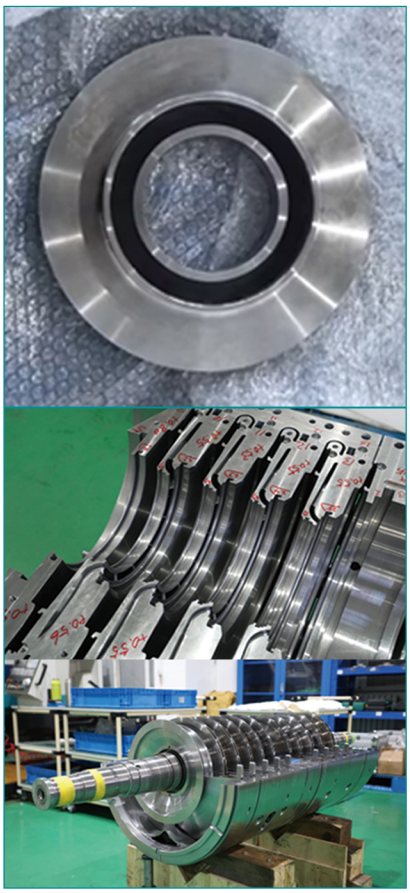
- Transient thermo-structural coupled FEA under extreme temperature gradients
- Thermal isolation design of the shaft system



sCO_2 Turbomachinery Design and Manufacturing Capabilities

· Key Components

Rotor	• High-speed rotor design and manufacturing • Dynamic balancing verification • Long-term stable operation
Impeller	• Integral five-axis CNC machining • High-efficiency aerodynamic blade profile • Application of high-strength materials
Diaphragm and Stator Components	• Precision flow-path machining and aerodynamic performance optimization • Modular structure design for easier assembly and maintenance
Casing and Pressure-Retaining Components	• High-pressure design
Tilting Pad Journal Bearing (TPJB)	• Five-pad oil-lubricated tilting pad bearing design • Long service life and low maintenance requirements • Excellent damping performance and rotor stability
Oil Lubrication System	• Supports frequent start-stop operation and long-term stable operation
Process Sealing System	• Equipped with standard dry gas seals • Minimizes process gas leakage losses
Generator and Drive System	• Standard low-speed generator solution • High reliability and low operation and maintenance costs



· 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

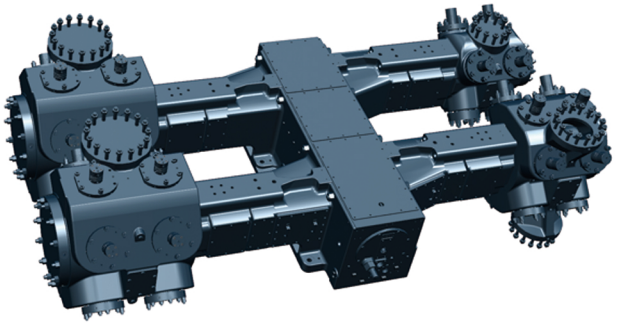
Verified on rotor test bench, with approximately **40**% performance margin

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.
· 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 N-Non-lubricated		Cylinder Bore

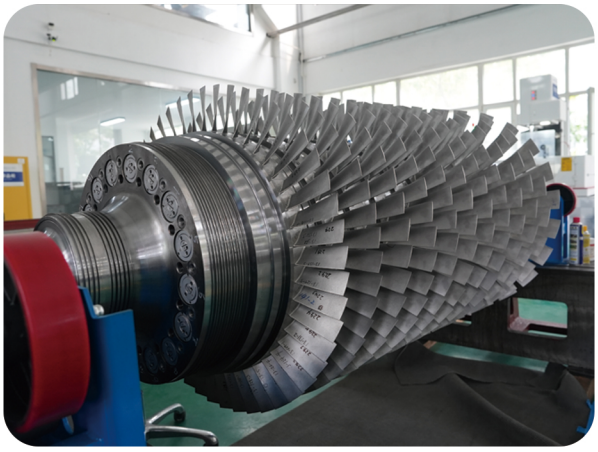
2 ZX-B 2 - 381 N - 508X355.6

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.

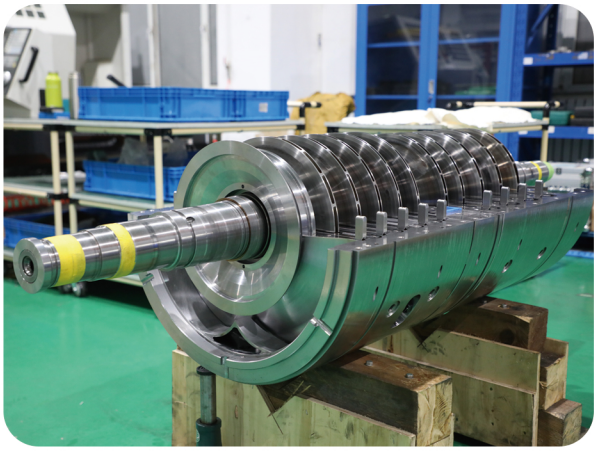
Application Cases



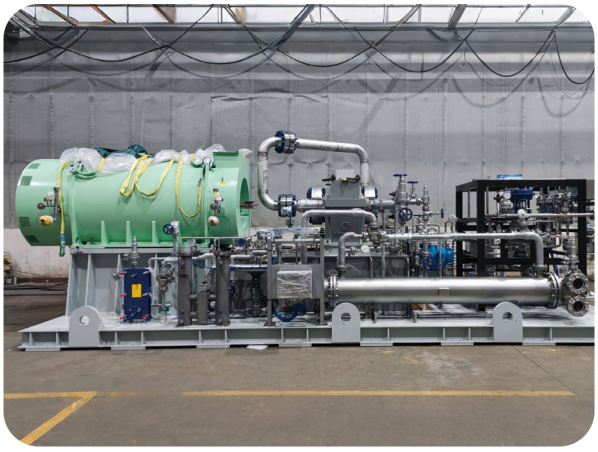
Offshore Centrifugal Natural Gas Compressor Supply



FCC Axial-Flow Component Localization



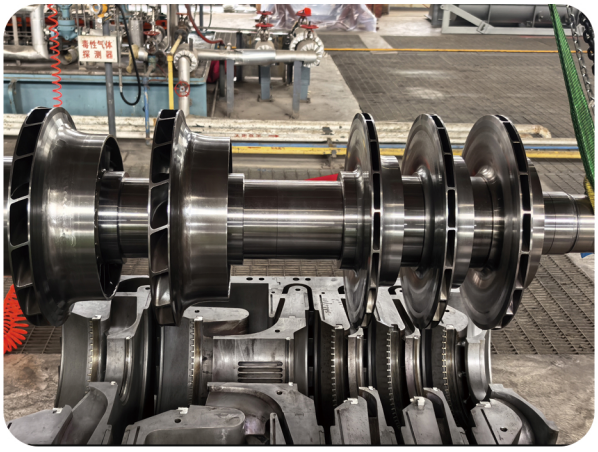
Natural Gas Compressor Bundle Localization



Petrochemical PTA Reactor Feed Pump Skid



LNG MRC Compressor Overhaul



Methanol Syngas Compressor Overhaul

QualRotate Official Website

QualRotate Machinery

QualRotate

Accelerate Clean Energy Transition

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