

HYUNDAI Gas Compressor

Licensed by and Collaborating with
Mitsubishi Heavy Industries
Compressor Corporation (**MCO**)





Gas Compressor Collaboration

Hyundai Heavy Industries (HHI)

- ◆ Since 1979 in industrial pump business
- ◆ Continuous localization and supply of industrial and marine equipment by collaboration with world-class technology partners to customer satisfaction
 - Thermal & nuclear power plants
 - Desalination plants
 - Ship owners & Ship builders
 - Industrial plants (LNG terminal, Oil refineries)
- ◆ Accumulated experiences in manufacturing and supplying
 - Major pumps for power plants
 - Turbo-chargers
 - LNG ship propulsion steam turbines
 - Cargo oil pumps and driving turbines
- ◆ License Agreement with Mitsubishi Heavy Industries Compressor Corporation (MCO) in Feb. 17, 2011





*We offer Reliable,
High quality,
Cost-effective,
Timely supported
Compressor.*

Licensed Products & Division of Responsibilities

◆ Licensed Products

- Integrally Geared Centrifugal Fuel Gas Compressor
For NG fuel boosting in industrial plants including CCPP
- Vertically split Centrifugal Compressor
For Oil & Gas application (for Offshore / Onshore)
- Gas processing & treatment
- Gas gathering
- Gas lift
- Gas injection

◆ Division of Responsibilities

- HHI

- Sales and promotion, delivery
- Single point responsibility including driver
- Compressor manufacturing, auxiliaries & test
- Customer support

- MCO

- Engineering, technical support
- Compressor design
- Rotor manufacturing
- Driving steam turbine supply, if required

Mitsubish Heavy Industries Compressor Corporation (MCO)

- ◆ The 1st Compressor manufactured in 1917
- ◆ New Business Unit reformed as MCO in 2010 from Mitsubishi Heavy Industries and MHI Turbo-Techno Co.
- ◆ Almost 100 years Compressor experiences
- ◆ World-class Centrifugal Compressor & Mechanical Driving Steam Turbine Supplier
- ◆ Core manufacturing center is in Hiroshima, Japan
- ◆ Design, manufacturing, sales, engineering of compressor and steam turbine drivers
- ◆ Consulting service and incidental related business
- ◆ Air separation plants & Process air
- ◆ Chemical & Petrochemical application
 - Chemical plants
 - Ethylene plants
 - Fertilizer plants
 - Methanol plants
- ◆ Oil & Gas application
 - Oil refineries
 - Gas processing, treatment, injection, etc.
 - Gas pipelines
 - LNG plants

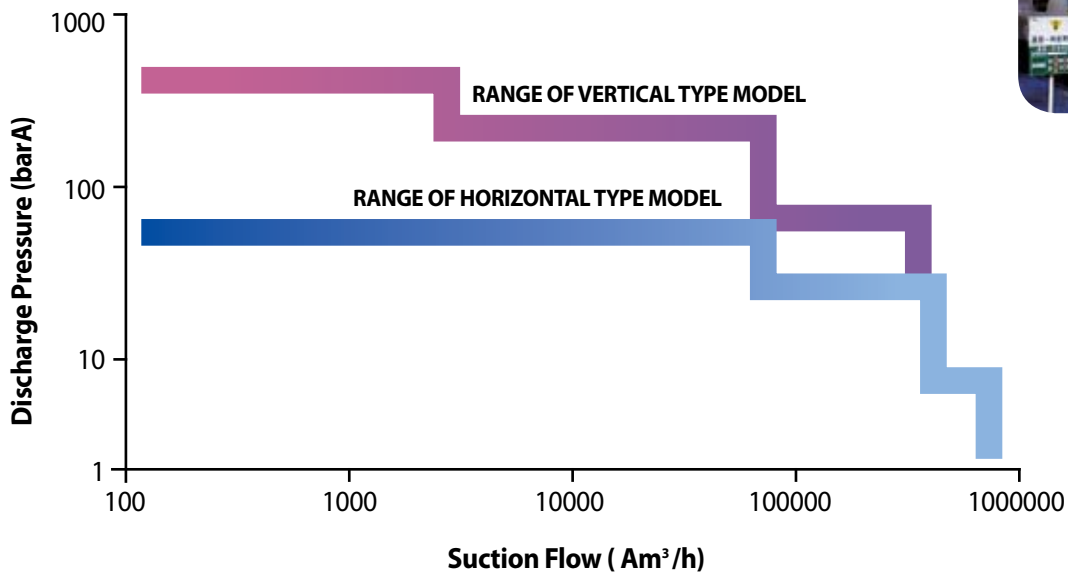


HEAVY INDUSTRIES
CORPORATION

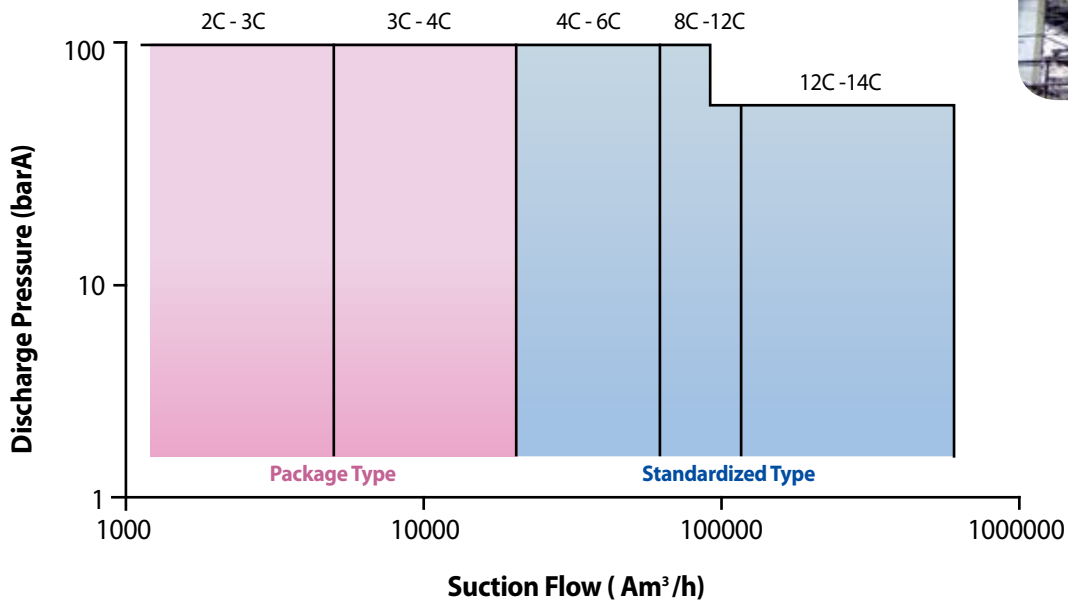


Collaboration Range

Application Range of Centrifugal Compressors



Application Range of Integrally Geared Centrifugal Compressors



Integrally Geared Centrifugal Compressor

Licensed Model; 2C, 3C, 4C

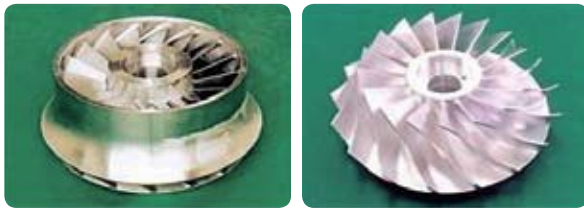
Flow; up to 17,600 Am³/h

Discharge Pressure; up to 40 barA

Application Service

- Fuel gas compressor
 - Industrial plants
 - Simple or Combined cycle gas turbine power plant

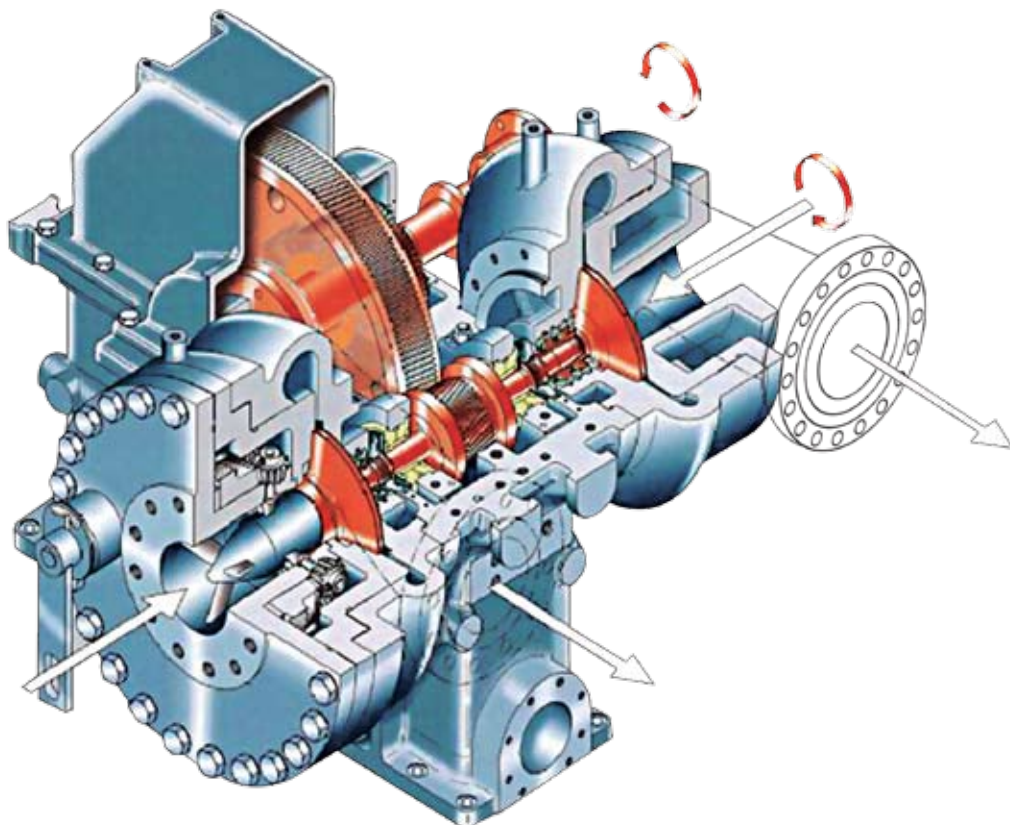
3-Dimensional Impeller



Optimum speed selection of gear



High Efficiency & Suitable Performance



Integrally Geared Centrifugal Compressor Fuel Gas Application



Country	Taiwan
Compressor	3C type (Geared)
Pressure	25.8 to 34.4 barA
Power	720 kW
Speed	17,400 rpm
Shaft Seals	Dry Gas Seal
Control	MIGV (Inlet Guide Vane)
Driver	Constant Speed, Induction Motor

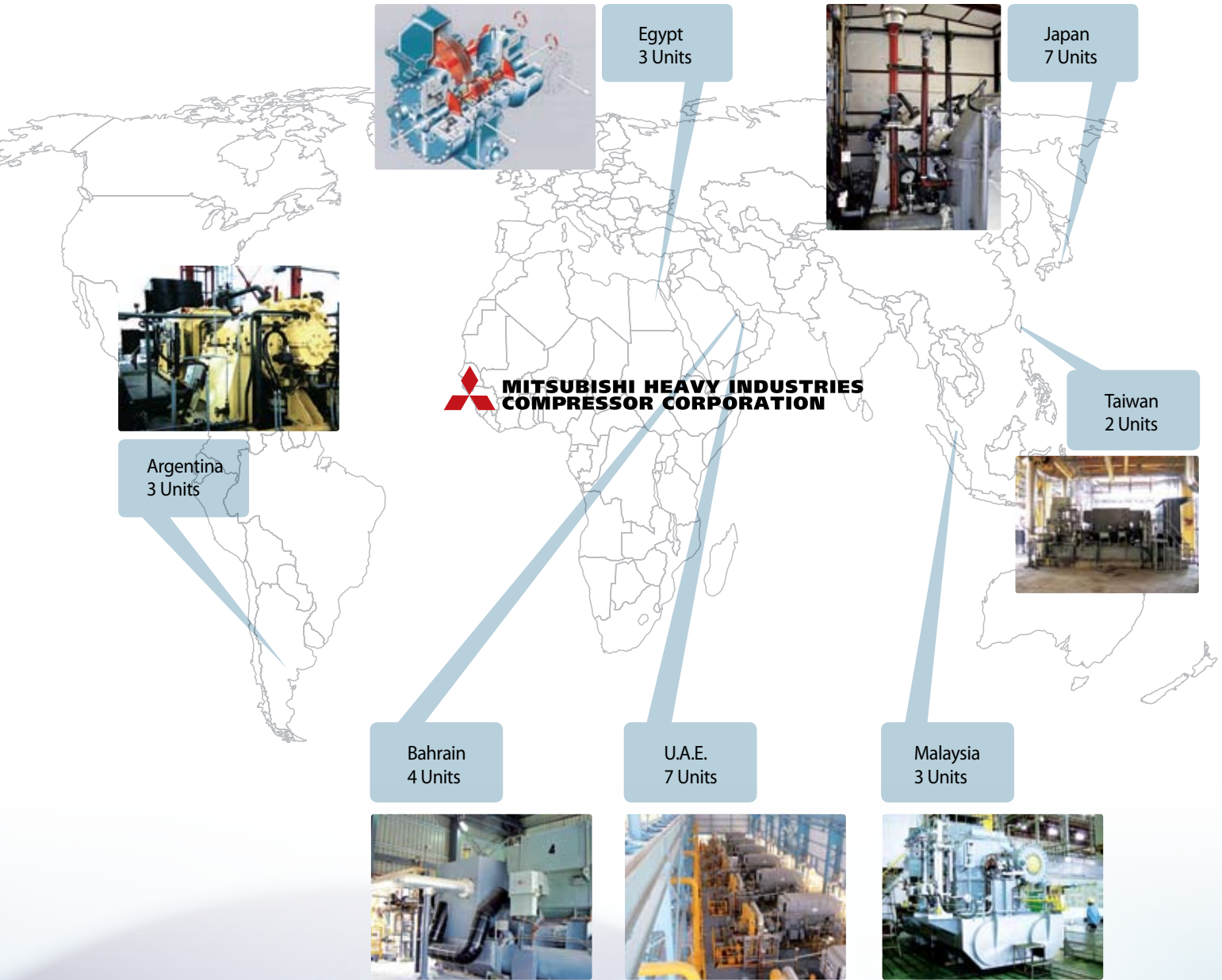


Country	Bahrain
Compressor	3C type (Geared)
Pressure	19.0 to 29.0 barA
Power	3,200 kW
Speed	12,536 rpm
Shaft Seals	Dry Gas Seal
Control	MIGV (Inlet Guide Vane)
Driver	Constant Speed, Induction Motor



Country	Malaysia
Compressor	3C type (Geared)
Pressure	26.8 to 41.1 barA
Power	1,500 kW
Speed	14,926 rpm
Shaft Seals	Dry Gas Seal
Control	MIGV (Inlet Guide Vane)
Driver	Constant Speed, Induction Motor

Fuel Gas Compressor Reference



Vertically Split Centrifugal Compressor

Licensed Model; 3V, 4V, 5V

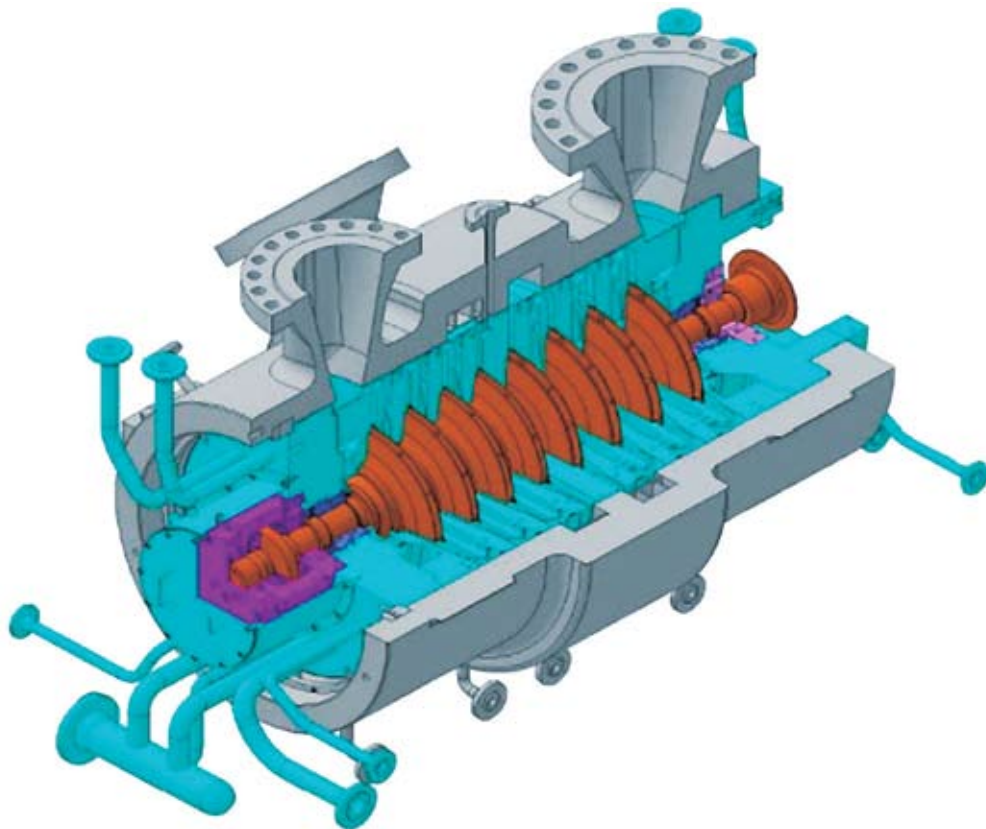
Flow; up to 48,000 Am³/h

Discharge Pressure; up to 150 barA

*High Performance,
High Reliability
Easy Maintenance*

Application Service

- Gas Field Application (Offshore/ FPSO/ Onshore)
 - Gas processing
 - Gas treatment
 - Gas gathering
 - Gas lift
 - Gas injection

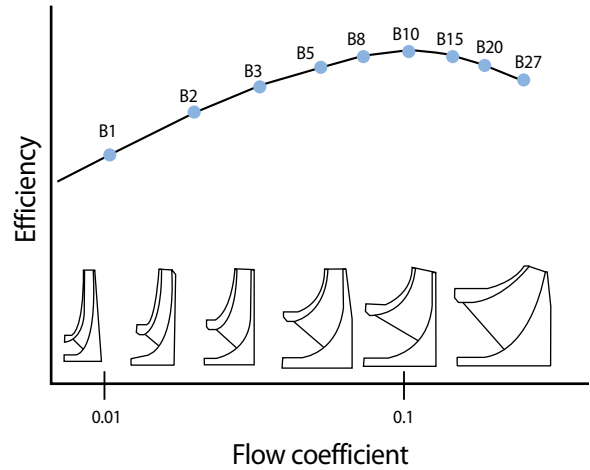


(In-Line Compressor)

Major Design Feature

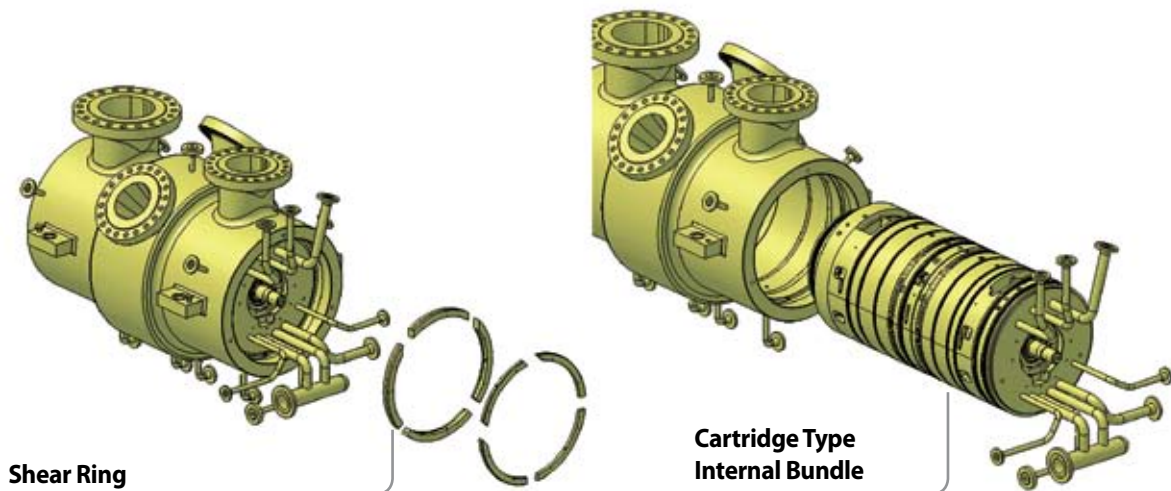
■ High Efficiency & Wide Operating Range

- Advanced Full 3-D Impeller
- (Impeller Line-up covers wide flow coefficient range)



■ Shear Ring (Stop ring) & Cartridge Bundle

(Easy Maintenance by taking Shear Ring out from casing, then pulling out Cartridge type internal bundle)



Offshore Application Reference



Export Gas Compressor for Offshore platform

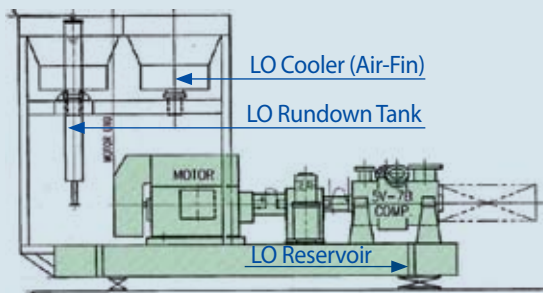
Country	Iwaki, Japan
Compressor	3V-6
Gas MW	18.3
Pressure	10.8 barA / 40.2 barA
Power & Speed	1,872 kW @ 15,500 rpm
Shaft Seals	Tandem Dry Gas Seal
Driver	Gas Turbine

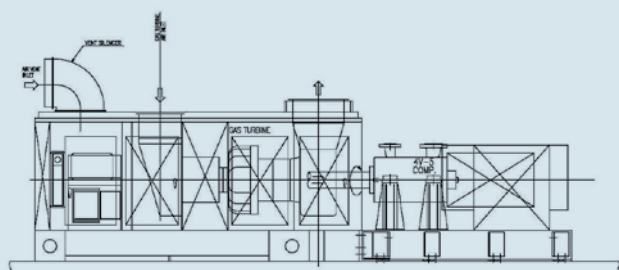
Flare Gas Compressor for Offshore platform

Country	U.A.E.
Compressor	5V-9B
Gas MW	27.9
Pressure	0.98 barA / 12.3 barA
Power & Speed	2,150 kW @ 7,650 rpm
Shaft Seals	Tandem Dry Gas Seal
Driver	Electric Motor



Lube Oil System on Common Base Skid





Wet Gas Compressor for Offshore platform

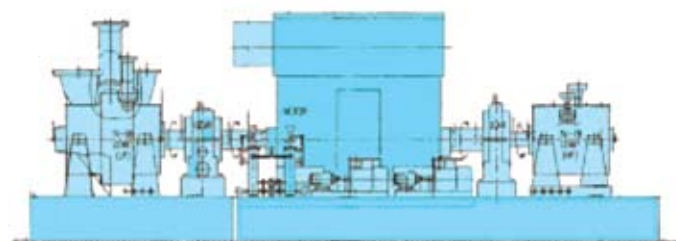
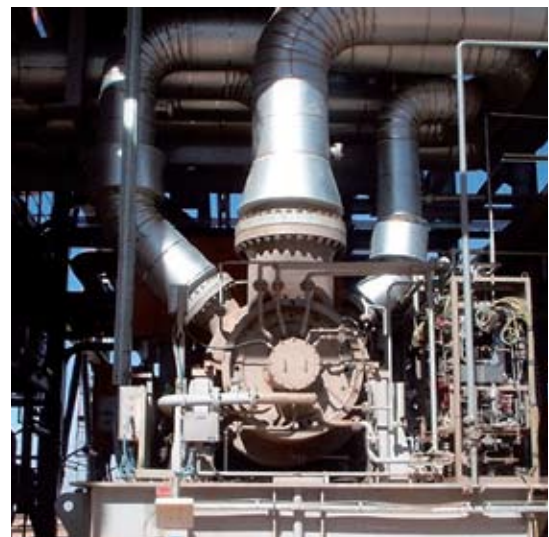
Country	Thailand
Compressor	4V-5
Gas MW	22.6
Pressure	17.7 barA / 54.9 barA
Power & Speed	5,740 kW @ 11,800 rpm
Shaft Seals	Tandem Dry Gas Seal
Driver	Gas Turbine

CO₂ Injection Compressor for FPSO

Country	Brazil
Service	CO ₂ Injection
Compressor	LP: 5V-6B MP: 3V-7B
Pressure	4 / 245 barA
Shaft Power	11,400 kW
Speed	7,700 / 9,600 rpm
Gas MW	28~37 (CO ₂ Max. 70%)
Shaft Seals	Tandem Dry Gas Seal
Driver	Gas Turbine

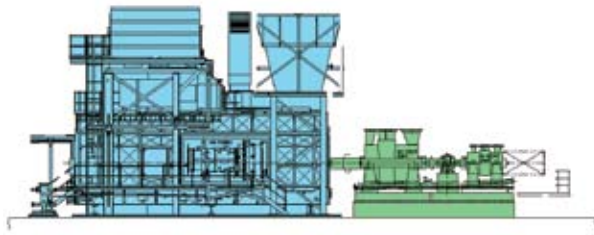


Onshore Application Reference



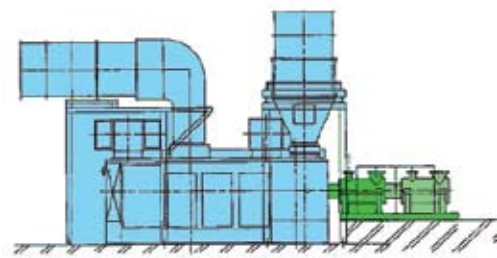
CO₂ Re-Injection Compressor (CO₂ Capture & Storage; CCS)

Country	Algeria
Delivery	Jan, 2003
Compressor	7V-6B, 3V-7B
Capacity	2,200 t/day CO ₂
Pressure	1.4 / 207 kg/cm ² a (203 barA)
Shaft Power	10,200 kW
Speed	8,890/10,290 rpm
Driver	Synchronous Motor with Soft-starter



Gas Lift Compressor

Country	Algeria
Compressor	9H-7B, 4V-8B
Gas MW	21.9
Pressure	1.08 barA / 67.7 barA
Power & Speed	11,760 kW @ 6,660 / 12,900 rpm
Shaft Seals	Oil Film Seal
Driver	Gas Turbine

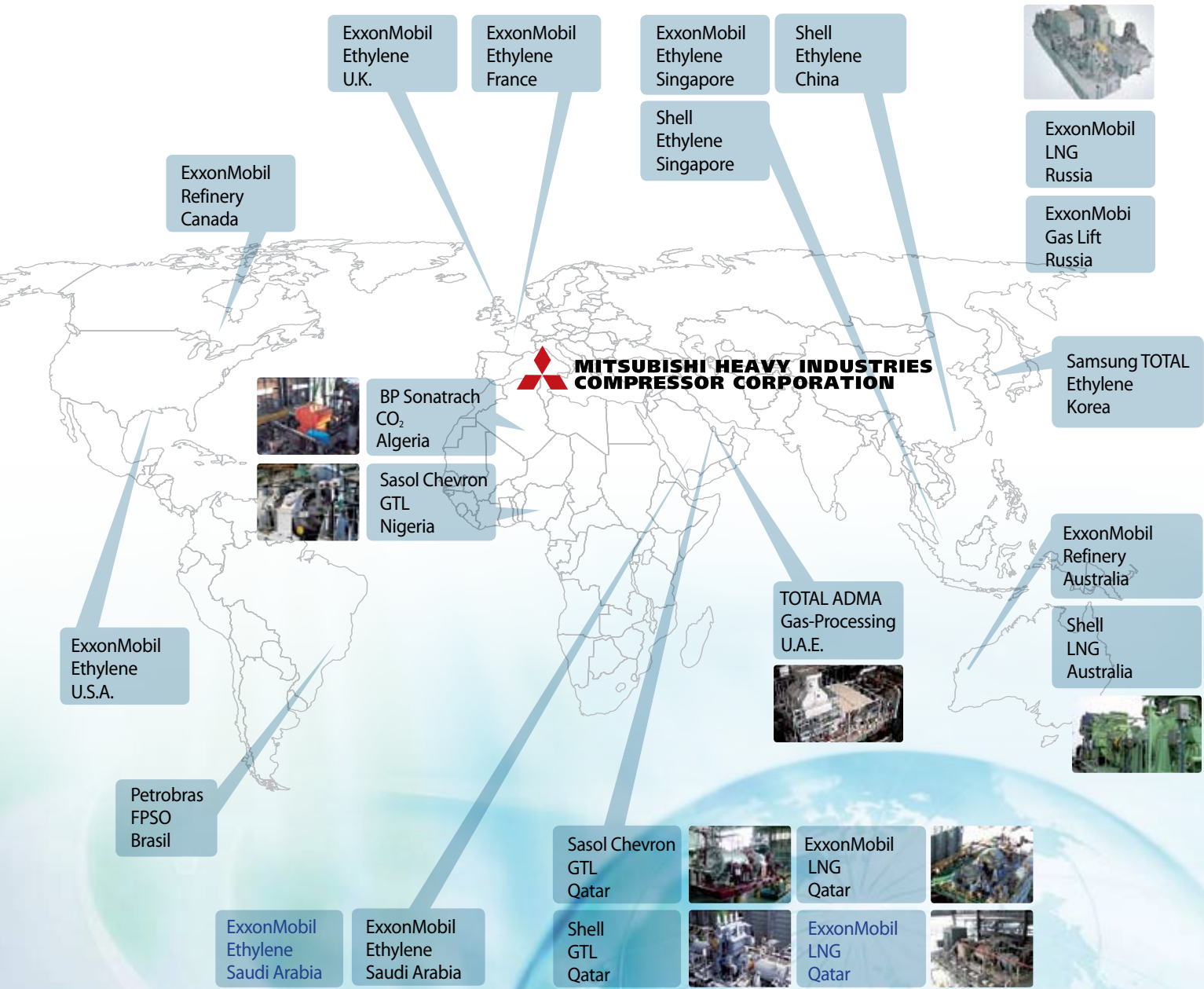


Gas Gathering Compressor

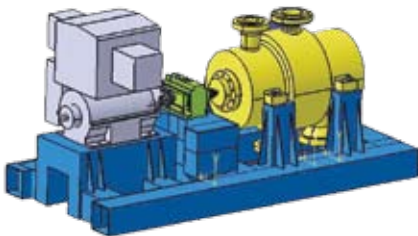
Country	Pakistan
Compressor	5V-6, 5V-6
Gas MW	18.6
Pressure	9.81 barA / 61.8 barA
Power & Speed	7,600 kW @ 9,600 rpm
Shaft Seals	Tandem Dry Gas Seal
Driver	Gas Turbine



Oil Major Reference



Test Facilities at HHI



■ Test Driver

- 20 MW Motor with Hydrocoupling
- 7 MW Motor with Increasing gear & Inverter

■ Mechanical Running Test Drive

- 500 kW Motor with Increasing gear & Inverter

■ Test Steam

- Superheated; 25 bar, 350°C x 20 ton/hr
- Saturated; 16 bar x 30 ton/hr

■ Hydrostatic Pressure Test Equipment

- Max. 1,000 bar

■ High Speed Balancing Machine

- Max. Dia. 1.7m, 8 ton, 6m L / 15,000 rpm
- Max. Dia. 1.7m, 1.25 ton, 6.6m L / 30,000 rpm

■ Low Speed Balancing Machine

- Max. Dia. 3.5m, 7 ton, 4.5m L

Test Facilities at MCO



Test at MCO can be available, if required



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