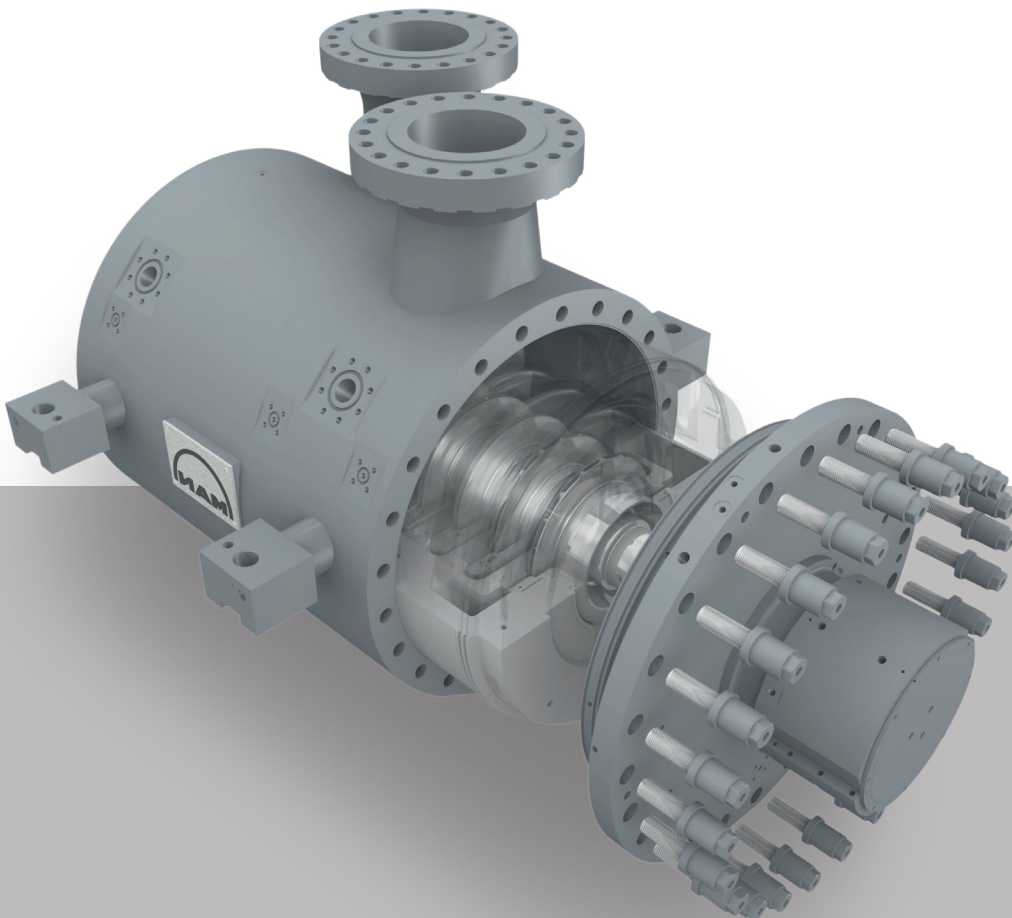


# RB

## Barrel type centrifugal compressors

**Your direct benefits**

- Highest efficiency based on optimized turbine design
- Highest availability
- Capable of specific customer requirements
- Long overhauls periods



The MAN Energy Solutions barrel type compressor is a single-shaft centrifugal compressor for applications in Oil & Gas, HPI/CPI, petrochemical processes and gas transport. Its cost effective design comes in various frame sizes. Inlet flow rates range from 200 to 230,000 Am<sup>3</sup>/h and discharge pressures go up to 800 bar.

MAN's RB centrifugal compressor allows for different numbers of impellers – up to 10 stages for a single-shaft rotor. Every shaft is equipped with tilting pad bearings. The RB compressor outer casing is forged and covers a complete cartridge. The inner cartridge is cast, steel plate material is available as an option. Compact cartridge design allows easy dis-/assembly.

For most applications, MAN offers a package design, which significantly reduces on-site installation time. This includes the RB compressor as core unit, as well as driver, gearbox (if applicable), lube oil system, seal gas rack, on skid process piping and auxiliaries.

Usually, stationary and rotating labyrinth strips are mounted at the impellers and the balance piston for sealing purposes. Only for very high pressure (VHP) applications, hole pattern seals will be mounted at the balance piston.

Sealing to atmosphere is done with dry gas seals (DGS), which can be either a tandem DGS (suction pressure  $\geq 3.5$  bar/g) or double – also called back-to-back – (suction pressure  $< 3.5$  bar/g).

The entire seal gas and bearing separation (buffer) gas distribution and control system is arranged on the dry gas seal rack. Depending on gas composition, a seal gas conditioning unit (booster and heater) or an external seal gas source may be required for start-up and settle-out conditions.

The lube oil system (if applicable) can be integrated into the compressor base frame or stand alone on a skid. The position of this unit depends on the application (onshore or offshore) and on pitch and roll rates (if applicable).

## Modular configuration

The modular configuration ranges from pre-designed RB compressor packages for the upstream, mid-stream, downstream and industrial gases market segments up to completely customized barrel compressors e.g. for VHP and CO<sub>2</sub> applications. Using predesigned components has the advantage of employing proven designs, lowering lead times and results in cost advantages.

## Applications

- Upstream: oil & gas i.e. gas lift, gas export, gas injection, gas gathering, gas treatment, gas processing, CO<sub>2</sub> injection, LNG, boil off, gas transport, liquefied petroleum gas
- Midstream: gas transport, gas storage, fuel gas, CAES
- Downstream: refineries, fertilizers, chemical & petrochemical, i.e. hydrogen production, hydrogen recovery, hydro cracking, Desulfurization, FCC, propane dehydration, methanol, olefins, IGCC, Coal-to-Liquids, GTL-Syngas, ammonia, urea, nitric acid
- Industrial gases: air separation, nitrogen, oxygen, paper, coke oven, GTL, CTL
- Power generation: fuel gas, CCS

## Base characteristics

### Multistage compressor design

- Design according to API and NACE
- Up to 3 compressor sections for side stream, or intercooling between stage groups
- Direct drive or speed in-/decreasing gear
- Maximum of 10 impeller stages
- Closed impellers which can be manufactured by (integral) milling, welding, brazing or spark eroding
- Impeller sizes: from 250 to 1,350 mm
- Nozzles: studded or flanged

### Base frame skid (if applicable)

- Single lift or separate
- Pitch 'n' Roll – anti-vibration-mounts (AVM) for FPSO's and platforms, multi-point or 3-point mount for damping

### Unit control system

- Anti surge control system
- Performance and load share control system
- Machinery protection systems (e.g. vibration monitoring) combined with SIL capable ESD systems
- Start up and stop sequencing
- Human machine interface with visualization
- Control systems based on Siemens PCS7

## Service (reliability and availability)

- The barrel type compressor was first implemented in 1968
- Proven track record of more than 38 Mio operating hours
- Designed for reliability  $\geq 98.5\%$
- World wide PrimeServ support services for the entire product life cycle: spare parts, overhauls, repairs, revamps/modernization and training

## Features

- Referenced impeller family (low and high pressure applications)
- Modular train design
- Referenced modular components
- Cartridge design
- Modularly designed sealing systems (for different pressure levels)
- Direct drive or speed in-/decreasing gear
- Suitable for a wide range of gases
- Materials

## Benefits

- Compact and high efficiency impeller technology which can be used to compress hydro carbon gases, carbon dioxide, dry air and nitrogen up to 800bara.
- Energy and cost savings.
- Several design options for each frame size. Intercooling between stage groups possible.
- Proven, powerful and reliable design concept.
- The RB cartridge contains all components (inner casing, casing covers, DGS, bearing) – easy and fast dis-/assembly and storage.
- Several sealing options, e.g. dry gas seals (tandem and double (back-to-back) and labyrinth seals, hole pattern.
- Compatible for electric motor, gas turbine or steam turbine drivers.
- To be used for:
  - Hydro carbons (natural/fuel gas/sour gas)
  - Dry and atmospheric air
  - Carbon dioxide
  - Oxygen (requires modifications), chlorine, refrigerants
- Depending on the specific application:  
extensive experience with special materials for sour/wet gas applications (according to NACE).

# Steam turbines 1-160 MW

## Technical data

Driver	Electric motor, gas turbine or steam turbine
Min. suction pressure [bara]	≤ 1
Discharge pressure [bara]	Max. 800 bara (calculated & designed) Tested and referenced up to 650 bara
Flow rate [m3/h]	Max. 230,000 m3/h
Power range [MW]	Up to 60 MW
Efficiency [%]	approx. > 80% overall efficiency possible
No of impeller stages	Max. 10

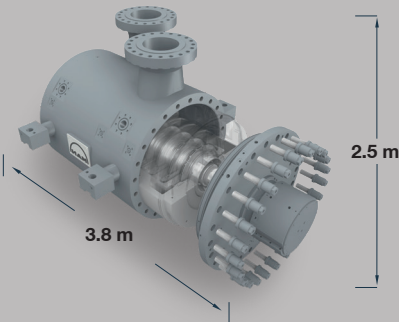
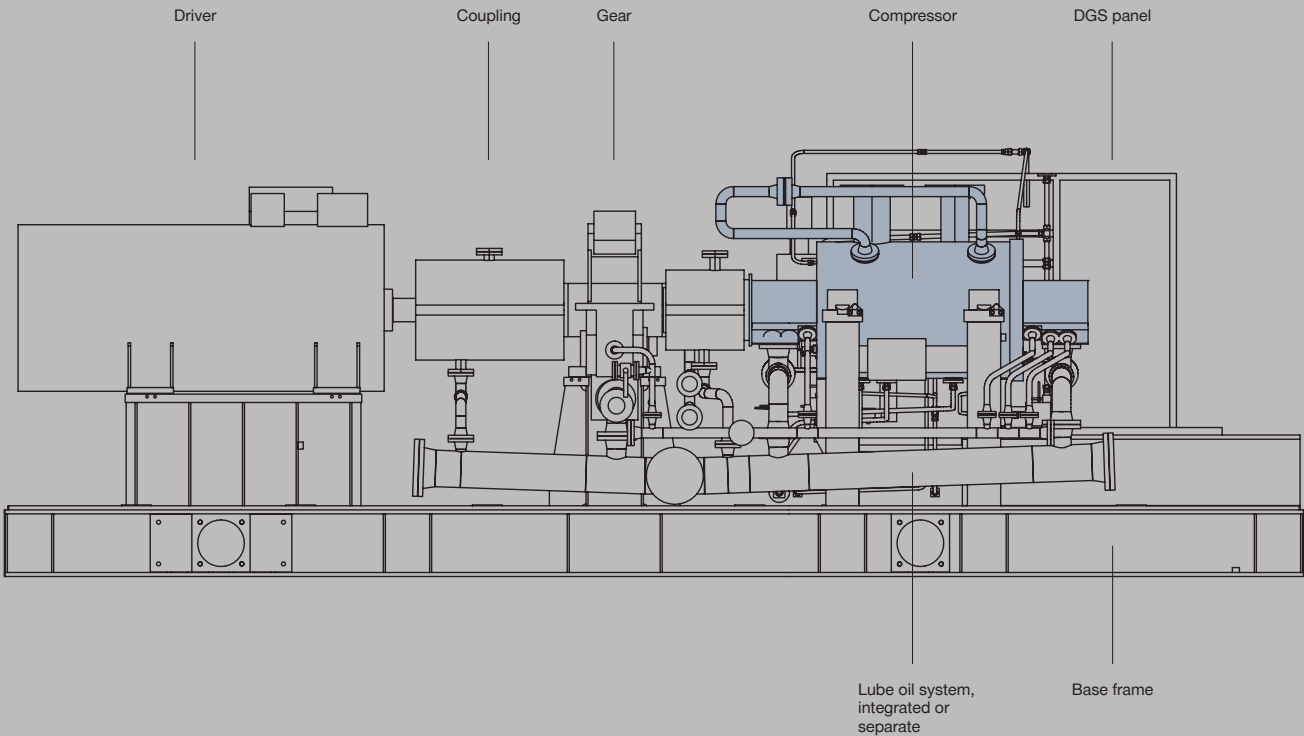


Table of modular, pre-engineered design

Modular, pre-engineered design						Customized
RB sizes	Casing (C28)	Casing (C35)	Casing (C45)	Casing (C56)	Casing (Cxx - C112)	VHP* applications
Design pressure bar absolute	500	160	180	130	–	e.g. 800 for RB 28
Average inlet volume flow Am3/h	2,000	6,000	14,000	22,000	< 230,000	–
Length [mm]	1,350	1,600	1,880	2,500	4,500	adapted
Outer casing inner diameter [mm]	670	900	1,250	1,500	–	–
*Very High Pressure	20	30	40	60	–	–
Max. power MW						



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