

CENTRIFUGAL COMPRESSOR

MAPNA TURBINE ENGINEERING & MANUFACTURING Co. (TUGA)



MAPNA Centrifugal Compressors

Together with industrial turbines as mechanical drives, centrifugal compressors for gas pipelines are produced in different ranges of flow and pressure. The reliable and flexible compressors with a life-long service ensure safe and smooth operation of the turbo-compressor system. Other features of these compressors are listed in the next section.

TUGA is able to perform tailor-made design and manufacture of process centrifugal compressors with electro motor or gas turbine drive for actual flow rates in the range of 600 to 350000 m³/h and discharge pressure up to 350 bar. In addition, specific requirements are satisfied by TUGA compressors across a wide range of gas composition, including natural gas, sour gas and associated gas.

Product Specifications

Parameter	Lower Limit	Upper Limit
Performance Data		
Actual Discharge Flow, m³/h	600	350000
Discharge Pressure, bar	>1	350
Pressure Ratio	>1	6
Machine Specifications		
Number of Stages	1	9
Speed, rpm	-	14500
Nominal Power Consumption, MW	0.2	55
Impeller/Diffuser Blade Geometry	2D -3D	
End Seals	Mechanical Seal/Dry Gas seal	
Bearing Type	Actual Hydrodynamic Bearing	
Process Gas Specifications		
Molecular Weight	14	46

Specifications for Typical Compressors

Compressor name	Number of stage	Speed (rpm)	Impeller diameter (mm)	Actual Inlet flow (m ³ /h)	Discharge pressure (bar)	Power (MW)
MCC-C8-300-6792	3	5000	775	18000	91	13.6
MCC-C6-400-6792	2	5000	835	24000	91	17.7
MCC-C8-400-5076	3	5000	835	24000	74	17.3
MCC-C5-200-3395	6	8670	596	12000	93	17.7



Advantages

- Split configuration
- Forged steel casing with end cover
- Covering maximum changes in operating points
- Tilting pad bearings equipped with thermocouples
- Materials of construction suitable for sour gas (if required)

Other Features

These special design considerations make our centrifugal gas compressors unique:

Oil System

The oil system provides lubrication for compressor rotor bearings conforming to the requirements of API 614. The seal oil provided is filtered, which ensures safe operation of bearings.

Gas seal system

The gas seal, which is designed for tightening the compressor shaft, plays a significant role in ensuring that the compressor reliably produces an appropriate pressure ratio. Dry Gas Seal (DGS) system includes two sub-systems: buffer gas supply and barrier air supply.

Surge Control System

Protection against the destructive surge phenomena is among the most important points in a control system. Ours is a complete solution that ensures reliable operation. Anti-surge regulator is one of the components used by the multi-processor control system of the mechanical drive to control the gas compressor unit. The anti-surge regulation consists of three functional blocks: diagnostic block of pre-surge conditions, block of surge reserve calculation and ASV (anti-surge valve) control block.



The Centrifugal Compressors Test Stand

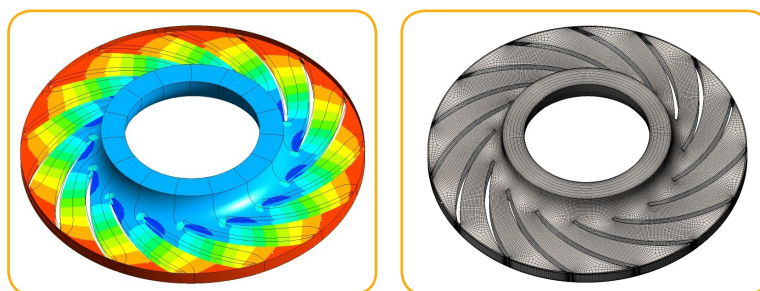
Brand new compressors shall undergo mechanical and functional tests applying the industry's most stringent test standards and methods. The tests are performed within an in-house test rig. Mechanical running test is to verify vibrations, bearing temperatures and lube oil parameters; while functional test is performed with air or other gases in open loop to verify performance of the compressor, driven by an electric motor with hydraulic coupling and gearbox.

Other elements of the test rig include DGS, lubrication system, pipes and valves, venting, environmental and safety equipment. As well, the station is equipped with sophisticated systems

for control, data acquisition, and processing of test results. The compressors are carefully tested in order to guarantee an optimal match to their design criteria to assure long-lasting continuous operation.

Research and Development

Customer needs and new markets are what drive our investment in research and development. MAPNA Turbine (TUGA) is now heading towards more diversity in products. Our R&D involves not only improving efficiency of the machines, but also increasing product availability and component lifetime in order to reduce operation and maintenance costs.



Services Offered After Sales

The following services are available to the clients after sales.

Provision of spare parts for the unit

Our own manufacture, as well as reliable network of spare parts suppliers enables us to satisfy individual client demands, including capital spares, as per order.

Long-term supply and support agreements

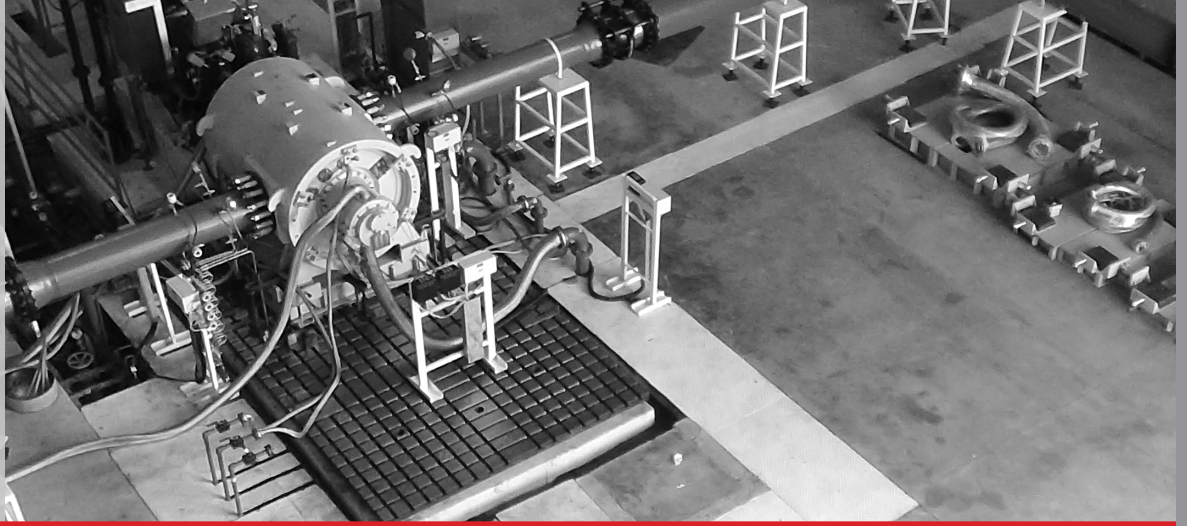
We offer long-term contracts for various types of support and service.

Supervision with installation and commissioning

Installation and commissioning are performed by skilled personnel under our direct supervision. Personnel can also be made readily available on and off the client site until the end of the guarantee period.

Technical consultation services for end users

Our experienced and knowledgeable technical and engineering team is available for consultation at any time.



Training of end-user staff

We offer several training courses for new staff on site, such as general plant knowledge, operation, and maintenance.

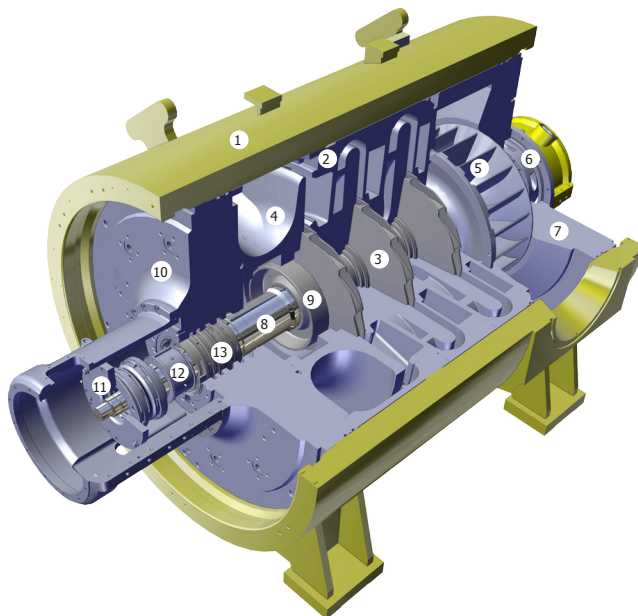
Performing inspections and overhauls

Our experienced maintenance personnel can perform inspections and overhauls thoroughly.

Fabrication and repair of special parts

Thanks to our state-of-the-art machineries and skilled manufacturing personnel, we can provide fabrication and repair of special parts.

- 1 Outer Casing
- 2 Diaphragm
- 3 Impeller
- 4 Volute
- 5 IGV
- 6 Journal Bearing
- 7 End Cover
- 8 Shaft
- 9 Balance Piston
- 10 End Cover
- 11 Thrust Bearing
- 12 Journal Bearing
- 13 DGS



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