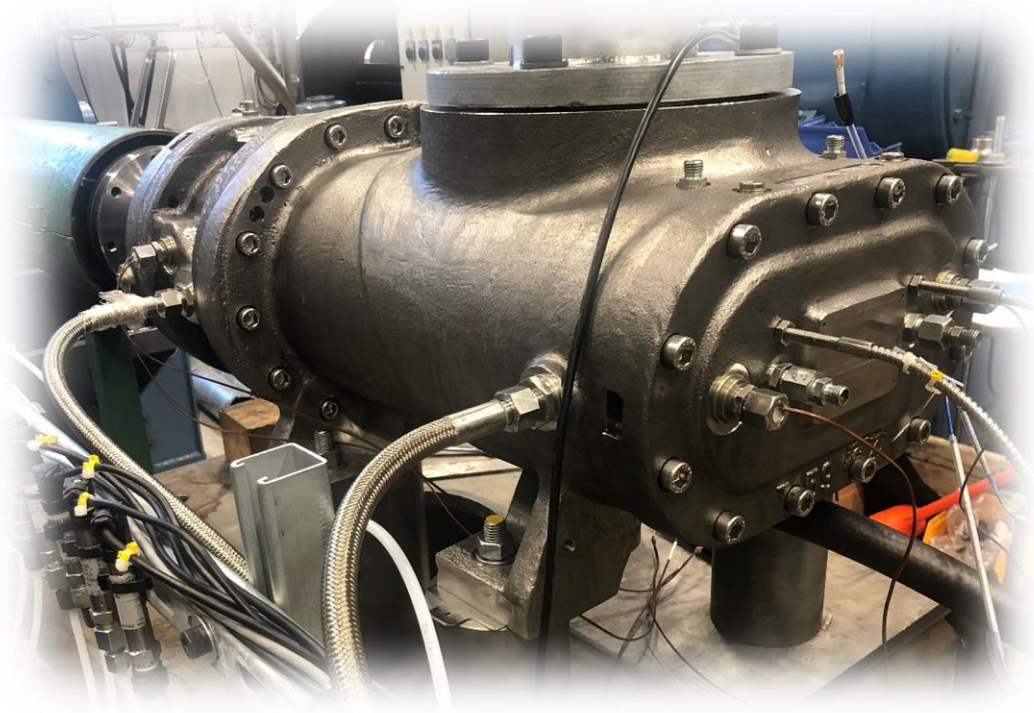




# **WB 900**

## **Water Lubricated Biogas Compressor**



### **GENERAL INFORMATION**

# 1 General information

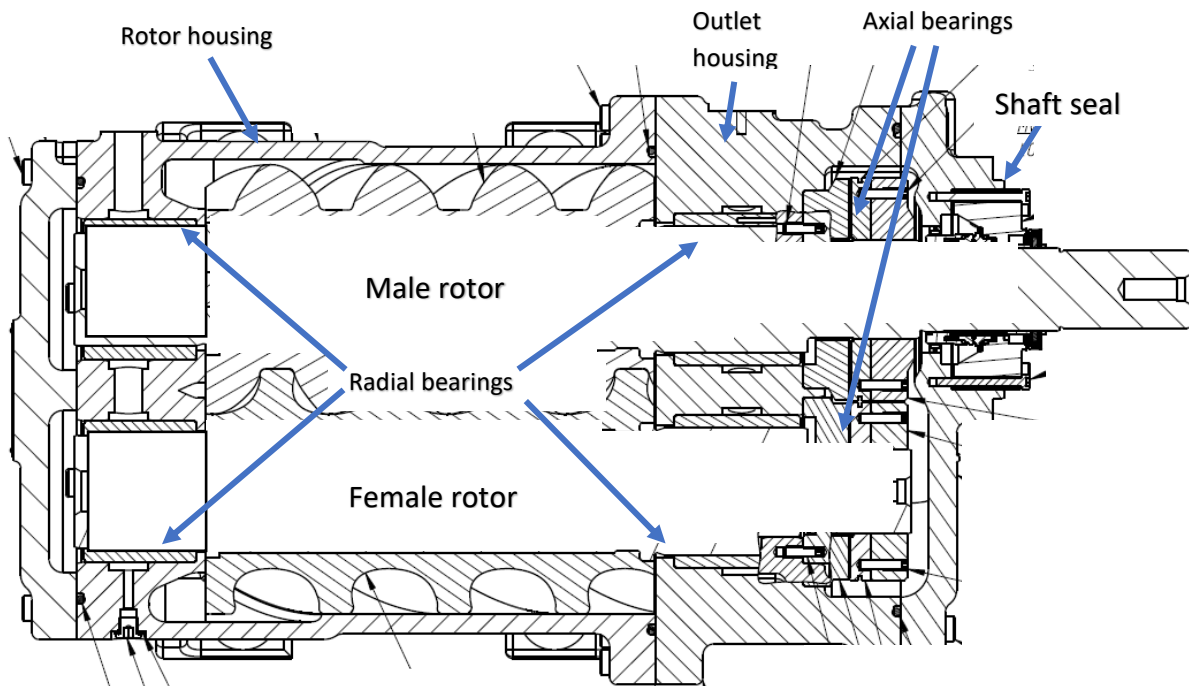
The WB900 compressor is a water-lubricated and water injected twin screw compressor designed to compress biogas and similar gases, containing hydrocarbons, CO<sub>2</sub> and large amount H<sub>2</sub>S.

The screw compressor is a positive displacement compressor with low gas pulsations compared to other displacement compressors. The principle of the compression cycle can be divided into three steps as shown in figure below.



The cycle starts with a suction phase where air is taken in to the chamber between the screws and the housing. Further rotation of screws causes reduction of the enclosed chamber volume, In the second stage the gas is compressed inside the screw shaped compression chamber. When this chamber meets the discharge port in the casing, the gas is discharged to the outlet port of the compressor. This implies that the screw compressor has internal compression of the gas, which reduces power consumption and pressure pulsations in relation to other positive displacement compressors.

The compressor is absolutely oil-less as no oil or grease is introduced into the compressor. Key features of the compressor are the hydrodynamic bearing arrangement, plastic/ceramic rotors and water injection. Hydrodynamic bearings have been used to avoid oil or grease in the compressor.



## 1.1 Basic data and limits of operation

### Compressor data:

Over all dimensions:	836 x 420 x 312
Weight:	280 kg
Material in housing:	Stainless steel
Material in rotors:	Polymer/Ceramic on stainless steel shaft
Shaft seal:	Mechanical shaft seal SRM part no: DA058321
Gas flow at inlet conditions:	4.4 – 19 m <sup>3</sup> /min
Operating ambient temperature	5 – 50 °C
Suction flange pressure:	0.9 – 1.5 bar(a)
Operating pressure range (P <sub>d</sub> ):	4 – 14 bar(a)
Maximum Working Pressure	19 bar a
Hydraulic test pressure:	28 bar a
Inertia (without coupling):	0.080 kg m <sup>2</sup>
Shaft speed range:	1500 – 4800 rpm
Speed range at P <sub>d</sub> ≤ 7 bar(a):	1500 – 4800 rpm
Speed range at P <sub>d</sub> ≤ 11 bar(a):	1500 – 4800 rpm
Speed range at P <sub>d</sub> >11 bar(a):	2500 – 4800 rpm
Inlet flange dimension:	DN125 PN16
Outlet flange dimension:	DN65 PN40

### Water injection

Water is injected in the compressor for following reasons:

- 1 Lubricate rotors and bearings
- 2 Increase the efficiency by sealing the internal gas leakage
- 3 Cool the gas during compression
- 4 Lubricate and cool the shaft seal
- 5 In biogas water scrubber systems the injected water will also absorb CO<sub>2</sub> gas more effectively to the small size droplets which are created in the compressor after water injection.

It is essential to inject water before start and throughout the operation of the compressor.

### Water quality requirements

All water injected to the compressor should be properly treated in order to avoid scale and deposit build up as well as bacterial growth inside the high precision bearings and rotors of the compressor.

Conductivity of system water supplied to the bearings should be maintained in the range of approximately 20-50 μSiemens/cm in order to avoid scaling or erosion on internal surfaces of the compressor. This level of conductivity can be realized by passing some of the water through ion exchange filter or reverse osmosis system when conductivity increases. Such systems can be arranged in different ways as long as it serves the purpose of controlling system water conductivity.

Filtration should be applied separately for bearings and rotor injection connections with filtration grades given in the text below.

If the system water contains large amount of bacteria such particles will be stuck in pipe walls as well as inside the sensitive bearings of the compressor. Also note that bacteria have sub micron size which cannot be removed easily by filtration. The effective removal of bacteria is essential, especially for biogas applications.

## 2 Installation

