COLD-COMPRESSORS

Cold-Compressor (CC) is a single shaft high-speed machine designed for one stage compression of cryogenic Helium.

Characteristic parameters of Cold-Compressors ATEKO:

- High efficiency
- Significantly small dimensions and weight
- High life-time of the machine (limit only for ceramic ball bearings - 8 000 hours)
- Parameters are controlled by speed variation
- Minimum of maintenance and spare parts consumption
- Possibility of CC delivery with parameters according to customer's requirement

Precisely balanced rotor is situated in ceramic ball bearings. A special grease for the bearings lubrication releases no vapor or impurities and corresponds to the application in a low pressure gas system. Synchronous motors and frequency converters drive ATEKO Cold-Compressors.

CC units are fully hermetic without shaft sealing and so they are very tight (up to 10^{-8} Pa·m^3/s).

The motor shaft is elongated by a thermal bridge to insulate the working stage thermally. The working stage is formed by blades wheel and spiral case. A thermal bridge of static parts has the thermal influence to the working stage minimized by a liquid nitrogen contact.

Motor and ceramic ball bearings are operating in compressed helium gas at approx. ambient temperature. Stator of the motor and the bearings are cooled by closed cooling circuit. A channel of the cooling circuit is situated on outside surface of the motor.

Inside the motor and in bearing space there is helium gas pressure (under-pressure) corresponding to the pressure inside the real CC machine conditions.

Standard CC power range is from 0,5 kW to 2 kW but can be to 10 kW as special design. Inlet pressure can be in range from 3 kPa (a) and temperature from 2 K.

Control unit of CC is checking actual CC unit operation parameters and modifies rotating speed (or by-pass valve position) when necessary. The wheel blades, diffusor and spiral case of CC are designed to operate under the most efficient conditions and minimal thermal and friction losses.

Control unit is usually working as slave of technological equipment control unit.

CC machine design was developed in ATEKO for application in LHC CERN as a machine in figure 1. Real bigger CC machines CERN were using the active magnetic bearings. After 8 years of CC in LHC operations the ceramic ball bearings were analyzed as better solution for the operation in He gas circuits despite their limited life time.

Tel.: +420 495 844 111
Email: ateko@ateko.cz; www.ateko.cz

COLD-COMPRESSORS

Areas of CC applications:

- Compression of clean gas Helium in cryogenic temperature from 2 K

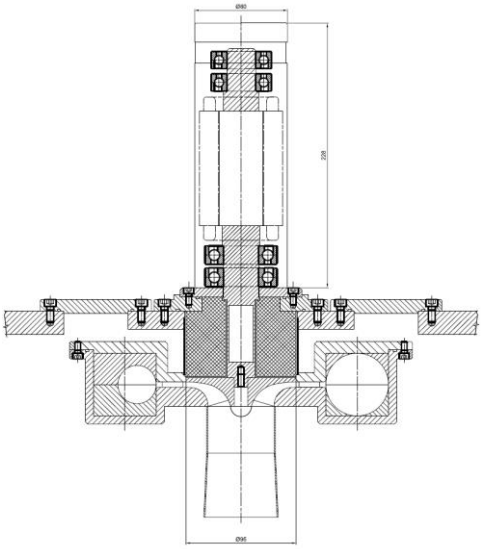
Performance maps of these custom designed units depend on real conditions.

Please contact ATEKO for further information.

Tel.: +420 495 844 111
Email: ateko@ateko.cz; www.ateko.cz

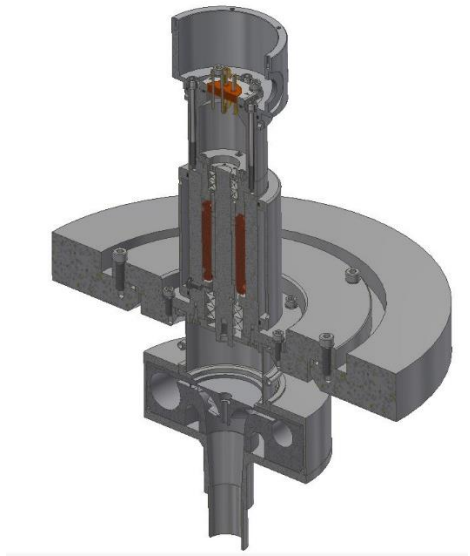
COLD-COMPRESSORS

2005 Prototype of Cold Compressor for CERN



2007 Design of working stages for 50% of real CC machines CERN

2017 Design and manufacture of the new version of CC machines (6 pcs)



Tel.: +420 495 844 111
Email: ateko@ateko.cz; www.ateko.cz