ATEKO a.s.

1949 – 2020

Rotary Machines Group
Helium Expansion Turbines (HET)

- A single shaft high-speed cryogenic machine braked by eddy current brake
- Designed as a one stage expansion of He or other gases (N₂, Ar, CO₂, CH₄ etc.)
- Up to 300,000 rpm
- HET 2 – 10 kW, HEXT 0.1 – 2 kW
- Inlet temperature: from approx. 5 K (or by customer requirements)
- Pressure: up to 25 bar, a (or by customer requirements)
Rotary Machines Group

Turbo-Circulators (TC)

- A single shaft high-speed machine with one or two-stage compression of He or other gases (N₂, Ar, CO₂, CH₄, LFG, air, radioactive gases etc.)
- Up to 250 000 rpm
- 0.5 kW – 400 kW
- Temperature: up to approx. 800 K
- Pressure: up to 150 bar (or by customer requirements)
Cold Compressors (CC)

- A single shaft high-speed machine
- Designed as a one stage compression of cryogenic Helium
- Up to 54,000 rpm (or higher according to operating parameters and customer requirements)
- 0.1 - 10 kW
- Temperature from approx 2.5 K
- Pressure from: 3 kPa (or lower or higher)
Turbo-Expander Circulator (TEC) – Cryogenic Cooling System Brayton (CSB)

- A cryogenic cooling system Brayton
- 250 000 rpm
- Cooling power: 0.1 - 20 kW
- Temperature: 170 - 5 K
- Pressure: 25 bar,a (or higher according to customer requirements)
KIMM – Korea Institute of Machinery and Materials, Korea
• Neon Turbo Expander
• Brayton Cycle Test Circuit
• Design and delivery
NFRI – National Fusion Research Institute, Daejeon, Korea
  • Cold Compressor
  • Delivery and on-site commissioning
  • Helium vapours - 3,8 K Working Temperature
TIPC, China
• 3 pcs.
• Cold compressors
• Including control system
• Delivered and on-site tested
• Inlet pressure 3 – 25 kPa,a
• Max. 43 000 rpm
ASIPP, China
• Helium turbo-expanders
• Cooling power: 500 - 10 000 W
• Inlet temperature 14 K – 80 K
• Inlet pressure 0.5 – 2.0 Mpa,a
• Max. 250 000 rpm
• 2 types (HET and HEXT)
• 12 pieces – 7x HET, 5x HEXT
TIPC, China
- Helium turbo-expanders
- Cooling power: 500 - 10 000 W
- Inlet temperature 14 K – 45 K
- Inlet pressure 0.5 – 1.8 Mpa,a
- max. 250 000 rpm
- 7 pieces
ELI Beamlines
• AV CR, 2014 - 2015, Czech Republic
• Cooling System Brayton
• 1x Helium turbo-expander-circulator, 1x Turbo-circulator
• Cooling power: 300 W
• Cooling temperature 150 K
• Design pressure 1.2 MPa,a
• 120 000 rpm
RMG References – ITER Project 1

**EFDA, KATHELO**
- 2011 - 2013, KIT, Karlsruhe, Germany
- 2x TC 1x TC
- $P = 232\ \text{kW}$ $P = 22\ \text{kW}$
- $n = 40\ 000\ \text{rpm}$ $n = 76\ 000\ \text{rpm}$
- $\Theta_n = 50^\circ\text{C}$ $\Theta_n = 50^\circ\text{C}$
- $p_n = 80\ \text{bar, g}$ $p_n = 80\ \text{bar, g}$
- Active magnetic and Aerodynamic gas bearings

**EFDA**
- 2009, ENEA, Brasimone, Italy
- TC
- $P = 232\ \text{kW}$
- $n = 40\ 000\ \text{rpm}$
- $\Theta_n = 50^\circ\text{C}$
- $p_n = 80\ \text{bar, g}$
- Active magnetic bearings
IPR
• 2016, India
• 2x TC
• $P = 18 \text{ kW}$
• $n = 75\,000 \text{ rpm}$
• $\Theta_n = 60^\circ \text{C}$
• $p_n = 78 \text{ bar,g}$
• Aerodynamic gas bearings
Thank you for your attention

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