

TURBO-CIRCULATORS



Turbo-circulator (TC) is a single shaft high-speed machine designed with one or two-stage compression of Helium and other gases (N_2 , Ar, CO_2 , CH_4 , LFG, air, radioactive gases and others)

Characteristic parameters of TC ATEKO:

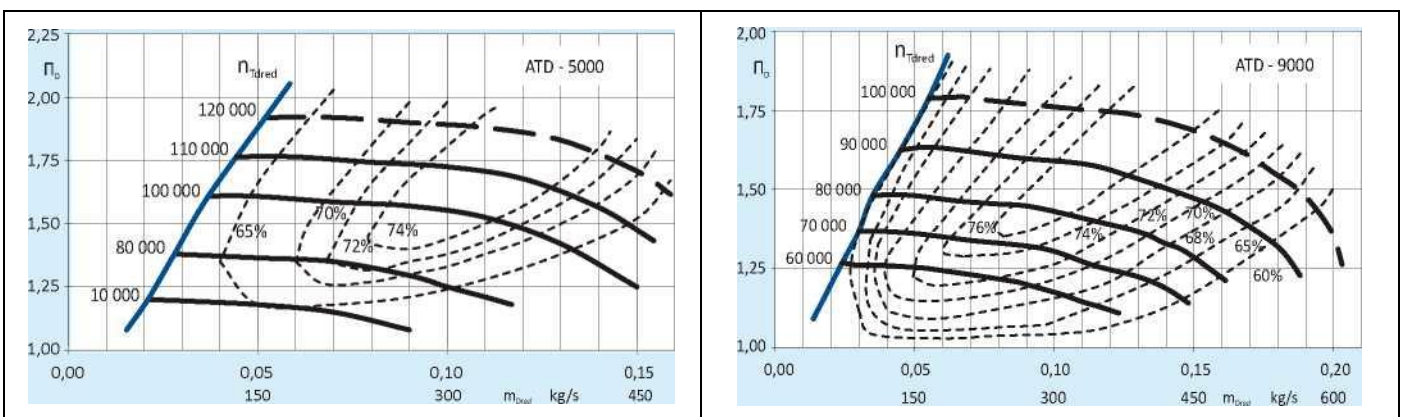
- High efficiency (* note is at the end of this paper)
- Significantly small dimensions and weight
- Oil "free" operation
- Application of fully dynamic gas (or magnetic) bearings. Gas bearings operate directly with compressed gas
- High life-time (~100 000 h)
- Capacity is controlled by speed variation
- Application for flammable and explosive gases (approved also for permanently explosive atmosphere - zone 0)
- Minimum of maintenance and spare parts consumption
- Application for radioactive gases
- Possibility of TC delivery with parameters according to customer's requirement

Asynchronous or synchronous motors and frequency converters drive ATEKO Turbo-circulators. Precisely balanced rotor is situated in gas or magnetic bearings. Fully dynamic radial and thrust gas bearings are operating directly with compressed gas. Dynamic gas bearings don't need any additional source of the pressure bearing gas. Oil "free" gas bearings don't bring any impurities into compressed gas.

TC units are fully hermetic without shaft sealing and so they are very tight (10^{-6} Pa m^3/s).

TC power range is: 0,5 kW, 3 kW, 5 kW, 9 kW, 22 kW, 30 kW, 230 kW and inlet pressure range can be up to 15 MPa.

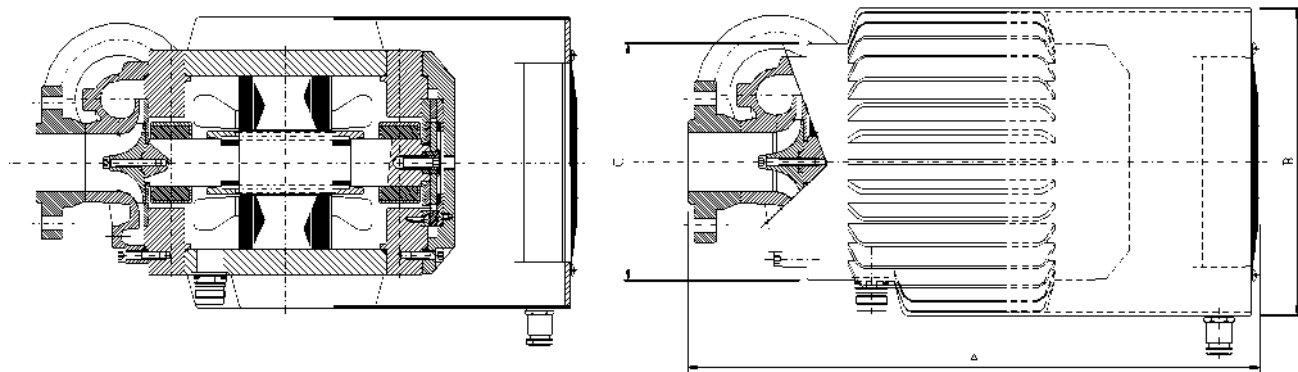
Performance of the ATD 5000 and ATD 9000 air Turbo-compressors is as follows:



Control unit is checking actual TC unit operation parameters and modifies the rotating speed and by-pass valve position when necessary. TC unit is so operating under the most efficient conditions of performance and energy consumption point of view. TC control unit is usually working as slave of technological equipment control unit.

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Noise level does not oversize 80 dB (A) limit thanks the TC fully closed design. Noise level is possible to decrease utilizing a noise silencer enclosure.



Technical information - compressed gas (air, Ar, He, N, LFG):

Type of TC	Flow	Medium	Compression ratio	Inlet pressure (bar abs)	Max speed (rpm)	Power (kW)	Length A (mm)	Width B (mm)
ATD 3000	200 Nm ³ /h	Air(gas)	1,25	1,0	90 000	3	345	190
ATD 5000	450 Nm ³ /h	Air(gas)	1,3	1,0	100 000	5	345	191
ARC 6300	350 Nm ³ /h	Argon	1,5	3,0	80 000	6,3	400	320
ATD 9000 LFG	600 Nm ³ /h	LFG	1,5	1,0	90 000	9	405	219
TC CEA 9000	0,1 - 1,0 kg/s	He, N	1,05	80	85 000	9	440	230
TC EFDA, KIT	1,4 kg/s	He	1,15	82 / 100	40 000	232	1 150	1 050
TC KATHELO	0,2 kg/s	He	1,079	95/103	76 000	22	751	670
TC IPR	0,225 kg/s	He	1,06	78	75 000	18	751	670
TC SUSEN	0,0129 kg/s	He	1,029	70	150 000	0,7	400	140
TC S-ALEEGRO	0,500 kg/s	He	1,0143	70	79 000	28	600	500
TC SUSEN2	0,0445 kg/s	He	1,0071	70	140 000	1,2	400	140

Areas of TC applications (Compression of wide spectrum of gases):

- Compression of clean air (drinking water supply treatment, pharmacy industry)
- Compression of gases with requirement to very clean of compressed gas (research and special processes)
- Compression of gases with requirement to very high circuits tightness (nuclear industry, radioactive gases, gases,...)
- Compression of flammable and explosive gases (transportation of LFG, mining CH₄ gases extraction)
- Compression of gases at silent operation conditions (under 80 dB)

Performance maps of these custom designed units correspond to the real customer conditions.

Please contact ATEKO for further information.

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ARC 2500

CERN, Switzerland, 2000, custom modification of ATD unit for the compression of super clean mixture of Argon + CO₂ in muon detector.



ARC 6300

CERN, Switzerland, 2005, custom modification of ATD unit for the compression of super clean mixture of Argon + CO₂ in muon detector.



ATD 9000 LFG

ZITAS, Czech Republic, 2006, transport of LFG to the distant cogeneration units.



TC EFDA

Brasimone, Italy, 2009, 232 kW, 40 000 rpm.

Karlsruhe, Germany, 2010, 232 kW, 40 000 rpm.



TC KIT

Karlsruhe, Germany, 2012, 232 kW, 40 000 rpm.



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TC CEA CEA Cadarache, France, 2010, 9 kW, compression of gas mixtures (He, N₂ + He, N₂), for ITER.



TC KATHELO KIT Karlsruhe, Germany, 2013, 22 kW, compression of the He.



TC IPR Institute for Plasma Research, India, 2016, compression of the He, 2x18 kW in parallel operation, 75 000 rpm.



TC S-ALLEGRO CV Rez, Czech Republic, 2017, Installed into Experimental testing loop for cooling DHR circuits and new type of reactor.



TC SUSEN CV Rez, Czech Republic, 2016, Installed into HTHL.

