Micro Turbines

www.g-team.cz
G - Team Inc. is a company with a range of activity in the area of power and heating plant equipment. At present it is an important supplier of equipment for power engineering for steam and condensate equipment. The supply areas cover boilers, steam turbines, valves and fittings, piping systems, draining and condensate systems.

Power units
Power units up to the capacity of 10 MW and others
- steam turbines up to the capacity of 10 MW
- micro turbines up to the capacity of 3000 kW
- steam generators
- cogeneration units
- steam cooling regulation
- monitoring

Heating equipment and components
For all industry areas
- desuper heaters
- steam dryers
- condensate lifters
- feed-water tanks
- deaerating plants
- steam expanders
- pipelines
- bypass stations

Valves and fittings
Steam and condensate valves and fittings for power plants and industrial equipment. From PN6 to PN400, dimensions from DN10 to DN1000
- gate and control valves
- reduction valves
- trip valves
- blowdown and sludge valves
- control and shutting flaps
- check valves, flap valves
- globe valves
- pressure locks
- strainers
- safety valves
- safety rupture discs

Measurement and Process Control
Process control and optimization in power engineering
- pressure, temperature and quantity control
- energy quantity measurement
- steam turbine control, regulating and safety systems
- micro turbines control, regulating and safety systems
- BOSB systems
- actuator assembly and adjustment
- rotary machine vibration and displacement - Reutlinger
- state and quality measurement of steam traps

Engineering
Power equipment planning, projection, designs
- technical papers aimed at energy savings
- power equipment designs
- turnkey projects
- energy audits
- consulting

Services
Everything for your satisfaction
- equipment assembly
- piping system assembly
- spare parts supply
- method proposals
- project financing
Basic classification of turbines in the production programme

**Turbines with overhung impeller**
- Simple construction, low costs for installation and rapid pay-back
- With most types, efficiency optimization is possible thanks to partial steam admission
- Minimum build-up dimensions
- High total thermal efficiency
- Service life minimum 25 years
- Simple attendance and minimum maintenance
- Suitable as drives for electric generators, feedwater pumps and blowers
- Easy installation
- Type symbol:

**Turbines with the impeller between the bearings**
- High service life
- Both, mechanical and electronic control is possible
- More rows of moving blades are possible
- Suitable for drives of generators, feedwater pumps, blowers, and cane mills
- Type symbol:

**Multi-stage turbines**
- Processing high temperature drops
- Steam extraction possibility
- High output
- Suitable mainly for a generator drive
- Type symbol:

**Turbines with a frequency converter**
- With this type the gear box is replaced by a frequency converter
- Minimum demand for installation space
- Suitable only for integrated high-frequency generator drive
- Type symbol:

**Gas expansion turbines**
- They are integrated directly into the gas distribution systems
- Only for a generator drive
- Low capital costs
- Type symbol:
TR320

This turbine is specially designed for a steam isoentropic drop \( \Delta h \) higher than 120 kJ/kg with the possibility to control partial steam admission.

The turbine stator is attached to the gear box that reduces the speed of the turbine wheel to the generator speed. On the base frame, a part of which is a complete oil system, there is a gear box, which is connected to the driven machine by means of a flexible coupling. Rotor tightness against steam leakage is ensured by means of a special mechanical seal.

### Description:

1. Stator – turbine body
2. Rotor
3. Welded steel frame
4. Asynchronous generator
5. Gear box
6. Steam admission
7. Steam exhaust
8. Coupling
9. Seal

### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>TR320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>maximum 700 kW</td>
</tr>
<tr>
<td>Admission steam pressure</td>
<td>0.6 – 6.3 MPa ( a )</td>
</tr>
<tr>
<td>Exhaust steam pressure</td>
<td>0.05 – 1.4 MPa ( a )</td>
</tr>
<tr>
<td>Admission steam temperature</td>
<td>maximum 420 °C</td>
</tr>
<tr>
<td>Concrete foundation size</td>
<td>1400 x 3200 mm</td>
</tr>
</tbody>
</table>
This turbine is specially designed for a steam isentropic drop $\Delta h$ higher than 120 kJ/kg with the possibility to control two partial steam admission valves.

The turbine stator is attached to the gear box that reduces the speed of the turbine wheel to the generator speed. On the base frame of the rotary reduction, a part of which is a complete oil system, there is a gear box there. The driven machine is situated separately on a concrete foundation and it is connected to the rotary reduction by means of a flexible coupling. Rotor tightness against steam leakage is ensured by means of a special mechanical seal.

### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>TR560</th>
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<tbody>
<tr>
<td>Output</td>
<td>max 3000 kW</td>
</tr>
<tr>
<td>Admission steam pressure</td>
<td>0,6 – 4,0 MPa a</td>
</tr>
<tr>
<td>Exhaust steam pressure</td>
<td>0,05 – 1,4 MPa a</td>
</tr>
<tr>
<td>Admission steam temperature</td>
<td>maximum 550 °C</td>
</tr>
<tr>
<td>Concrete foundation size</td>
<td>2400 x 4500 mm</td>
</tr>
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</table>

### Description:
1. Stator – turbine body
2. Rotor
3. Welded steel frame
4. Synchronous generator
5. Gear box
6. Steam admission
7. Steam exhaust
8. Coupling
9. Seal
TRm600

This turbine is usually used with a gear box. One advantage of this type is the possibility to use more rows of blading. Control of this type can be ensured both, electronically and mechanically. The turbine consists of a welded base frame on which the turbine body, driven machine (generator, pump or the second gear box for the cane mill drive), oil system and oil tank are situated. The rotor of the rotary reduction is mounted between two friction bearings. The rotor shaft is connected with the gear box by means of a flexible coupling. The rotor tightness against steam leakage is ensured by means of two labyrinth seals - which the gland steam is taken away.

Parameters | TRm 600
---|---
Output | 50 – 1200 kW
Admission steam pressure | 0,6 – 6,3 MPa a
Exhaust steam pressure | 0,05 – 0,9 MPa a
Admission steam temperature | max. 450 °C
Concrete foundation size | 900 x 2300 mm
The TANDEM turbine has two stages and it is the most suitable type for a steam isentropic drop $\Delta h$ higher than 400 kJ/kg, namely for the condensing operation with the possibility to use controlled steam extraction behind the first stage.

**Description:**
1. Turbine 1
2. Turbine 2
3. Steam admission
4. Steam extraction
5. Steam exhaust
6. Gear box
7. Generator

**Parameters**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>TR 320 TANDEM</th>
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<tbody>
<tr>
<td>Output</td>
<td>5,000 kW</td>
</tr>
<tr>
<td>Admission steam pressure</td>
<td>0,6 – 6,3 MPa a</td>
</tr>
<tr>
<td>Exhaust steam pressure</td>
<td>0,05 – 1,4 MPa a</td>
</tr>
<tr>
<td>Admission steam temperature</td>
<td>maximum 550 °C</td>
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</tbody>
</table>
TR Hi 150

The TR Hi 150 turbine is a special machine for reducing the water steam pressure developed for extremely low steam flows with high requirements for mechanical operation safety and high efficiency. The turbine casing together with the electric generator stator forms an assembly without a coupling and secondary rotating parts. The turbine wheel overhangs the rotor of the high-frequency electric generator. The rotor tightness against steam leakage is ensured by means of a special mechanical seal. A complete oil system for the supply of the control and lubrication oils is a part of the turbine.

![Diagram of TR Hi 150 turbine]

**Parameters**

- **Output**: maximum 150 kW
- **Admission steam pressure**: 0.3 – 4.0 MPa a
- **Exhaust steam pressure**: 0.05 – 1.4 MPa a
- **Admission steam temperature**: maximum 420 °C
- **Concrete foundation size**: 400 x 780 mm

**Description:**

1. Turbine body
2. Turbine rotor
3. Welded steel frame
4. High-frequency electric generator
5. Steam admission
6. Steam exhaust
7. Steam seal
Natural gas belongs among industrial gases and in compliance with a global trend of a more effective utilization of energy sources it is suitable to complete the existing reducing stations for fuel gases with back-pressure expansion turbines and thus to utilize the produced mechanical energy for an electric generator drive.

The TRex 370 expansion turbine is manufactured in a one-stage configuration with an impeller mounted on the asynchronous generator rotor. The turbine impeller with a diameter of 370 mm and axial blading milled from a special alloy steel is mounted on the generator shaft and secured with a pre-stressed bolt.

Description:
1. Turbine stator
2. Impeller
3. Nozzle vanes
4. Generator
5. Electric current outlet bushings
6. Gas inlet
7. Gas outlet

<table>
<thead>
<tr>
<th>Parameters</th>
<th>TRex 370</th>
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<tbody>
<tr>
<td>Output</td>
<td>50 kW</td>
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<tr>
<td>Admission steam pressure</td>
<td>0.3 – 4.0 MPa a</td>
</tr>
<tr>
<td>Exhaust steam pressure</td>
<td>0.05 – 0.3 MPa a</td>
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<tr>
<td>Admission steam temperature</td>
<td>maximum 420 °C</td>
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<td>Concrete foundation size</td>
<td>400 x 800 mm</td>
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The G – Team company has been certified by the ISO 9001 quality system

For the delivered equipment Declaration of Conformity is issued according to Government Decree No. 26/2003 Coll. (amending the previous Decree No. 22/1997 Coll.).

Our Subsidiaries on the map of the Czech Republic
# G - Team Inc., contacts

<table>
<thead>
<tr>
<th>Registered office</th>
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</tr>
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<tbody>
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<td>Šeříková 580</td>
<td>334 41 Dobřany</td>
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<tr>
<td>The Czech Republic</td>
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<td><a href="http://www.g-team.cz">www.g-team.cz</a></td>
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<table>
<thead>
<tr>
<th>Headquarters</th>
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<table>
<thead>
<tr>
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<tbody>
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<th>Tušimice Service Centre</th>
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