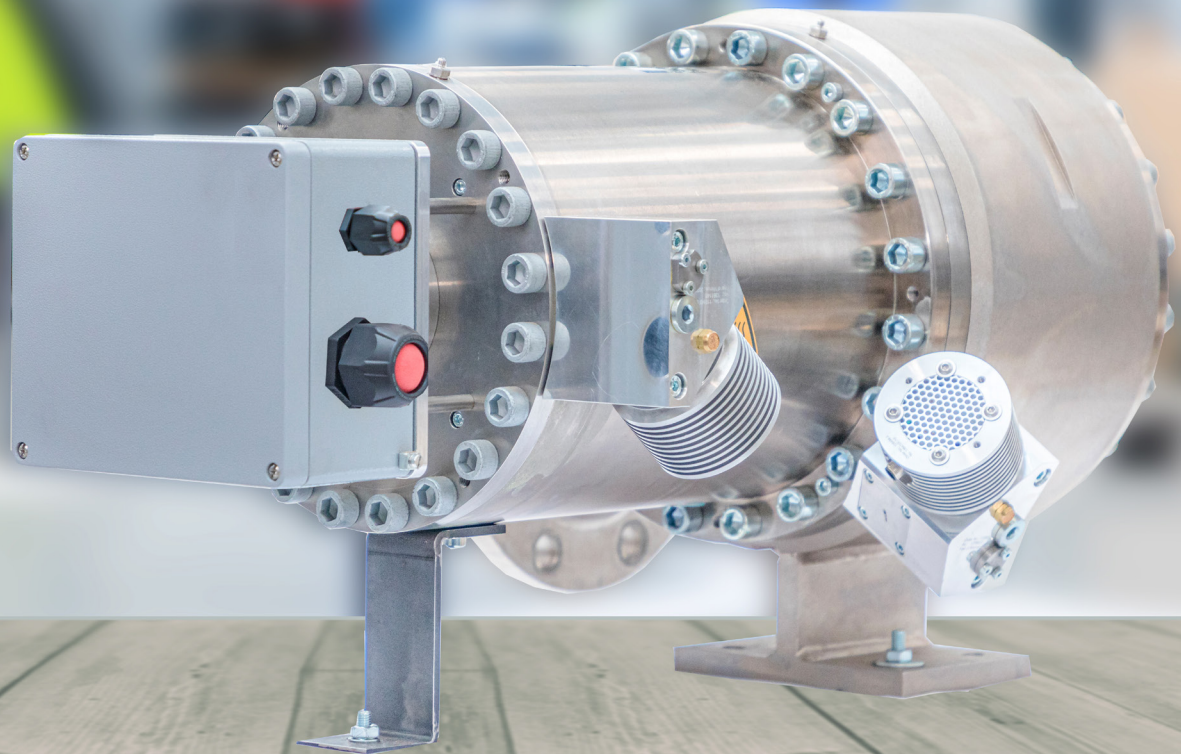


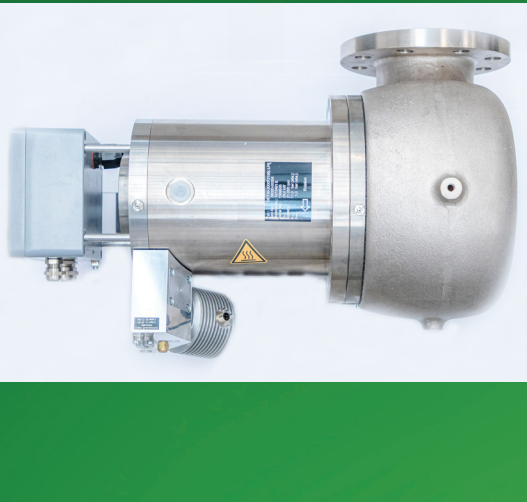
Green Energy



## GET GREEN ENERGY TURBINE

Gas expansion turbine with generator





## THE GET TURBINE GENERATOR ... AN INNOVATION THAT PAYS YOU BACK!

The turbine generator is used to recover even small amounts of residual or waste energy and convert it into electrical energy. The performance range of the turbine is between 5 and 350 kW. This electricity can be fed into the network or used for in-house industrial consumption.

As a leading manufacturer of expansion turbines, DEPRAG can be instrumental in increasing your energy efficiency. The goal of reducing CO<sub>2</sub> emissions can therefore be achieved as part of the Germany Federal government's requirements for climate protection. To date, DEPRAG has supplied and launched more than 300 turbine generators, as axial and radial turbines in a variety of processes, in series production worldwide.

The gas expansion turbine is a turbo machine. The specific fluid-mechanical design of the components for the turbine and generator will depend on your individual processing parameters. The product is aimed at ORC system manufacturers and companies which are able to integrate an ORC turbine in their existing process or plant.

## OUR PRODUCT – THE GAS EXPANSION TURBINE

The unit consists of an expansion turbine and generator for optimal decentralised energy recovery for the power range 5 kW to 350 kW.

As a "waste to power" solution, the small, robust and compact turbine generator can be integrated peripherally anywhere small amounts of residual and surplus energy are left unused from a process.

A great variety of applications can be realised:

- Direct usage in open systems using pressure and temperature gradients, such as a gas expansion system
- Indirect usage in a closed energy generation cycle, such as an Organic Rankine Cycle (ORC) for cogeneration or combined heat and power plants (CHP), in geothermal power plants or for waste heat utilisation in industrial processes

## THE OUTSTANDING FEATURES OF THE TURBO EXPANDER:

<p><b>Impressive degree of efficiency</b></p> <p>The gas expansion turbine is specifically designed for the processing conditions required. The degree of efficiency can reach up to 80% and is therefore significantly higher than when using standard machines, such as piston motors or screw expanders.</p>	<p><b>Exceptionally low maintenance</b></p> <p>The turbine unit does not require a gear between the turbine and the generator. The generator's rotor is located directly on the shaft with the turbine wheel and is driven by it. The GET turbine generator is therefore extremely low maintenance and ideally suited for continuous use.</p>	<p><b>From 15,000€</b></p> <p>Thanks to our calculation programs, the Green Energy Turbine can be designed swiftly in accordance with your own specific requirements. For the generator components, we use a standard modular system, resulting in a cost-effective investment.</p>
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## TECHNICAL DATA – GAS EXPANSION TURBINE

Generator sizes	kW	5 / 30 / 60 / 120 / 175 additional sizes on request	
Pressure range	bar	0 - 63 higher pressures on request	
Temperature range	°C	- min. temperature required -20°C - max. range of use up to 250°C - depending on the medium used	Do you already have a specific application and your processing data prepared?
Processes		- direct usage or open process - indirect usage or closed process	<b>Design your gas expansion turbine here</b> and our engineers will be able to process your request even more quickly.
Power range	kW	5 - 350 kW turbine power	
Mediums		- compressed air, CO <sub>2</sub> - refrigerant (ORC medium), e.g. R245fa, R-1234yf, R-1224yd(Z), R-600, etc. - siloxane, alkane, etc. - currently under <b>development</b> : natural gas (ATEX), steam - generally <b>not</b> suitable: hydrogen, oxygen	




**TURBINE GENERATOR FUNCTION**

The GET Green Energy Turbine is a turbo machine which can be used axially or radially with one or more stages. The expander converts the available energy into electrical energy due to the expansion of a gas from high to low pressure at constant mass flow. As an impulse or reaction turbine, the kinetic energy is passed into the jets and turbine wheel.



<p><b>Axial turbine</b></p> <ul style="list-style-type: none"> <li>■ High degree of efficiency even outside nominal operating conditions                     <ul style="list-style-type: none"> <li>→ enables extremely efficient operation even at partial load</li> </ul> </li> <li>■ Axial impulse or constant pressure turbines, single or double row available</li> <li>■ Axial reaction turbine, single or double stage options (multistage available on request)</li> </ul>	<p><b>Radial turbine</b></p> <ul style="list-style-type: none"> <li>■ Even higher degree of efficiency directly at the design point                     <ul style="list-style-type: none"> <li>→ only partial expansion of the gases in the jets</li> <li>→ the rest of the expansion and redirection takes place in the turbine wheel</li> </ul> </li> <li>■ High degree of efficiency in comparison with the axial design</li> <li>■ Also known as a reaction turbine or radial outflow turbine</li> </ul>
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**THE DIFFERENT APPLICATION AREAS OF THE TURBINE**

The DEPRAG gas expansion turbine recovers energy, meaning that even small amounts of residual process gas can be utilised. This means that energy recovery with the latest technology is an option for many sectors of industry. Our engineers will be happy to speak with you today to discuss whether your company is able to use our environmentally friendly turbine.

 <p><b>Energy recovery in energy-intensive industrial processes</b></p> <p>In the glass, steel, ceramic or building materials industries, mediums such as compressed air or gas are used to supply the processes. The GET turbine generator can convert the existing pressure energy into electricity and feed it into the electricity network or use it for in-house consumption. This prevents compressed air losses and increases the efficiency of the necessary pressure reduction in the gas network.</p>	 <p><b>Energy recovery from residual energy in power stations</b></p> <p>When burning gas, e.g. in combined heat and power plants (CHP) which are operated with biogas, gas or synthesis gas, as well as in furnaces, waste heat from the motor cooling system or exhaust gas flow can be recovered. In a closed cycle, such as the Organic Rankine Cycle (ORC), an organic medium is vaporised (surplus heat in the cycle), expanded in the ORC turbine and converted into electricity using the generator.</p>	 <p><b>Energy recovery through geothermal energy</b></p> <p>Geothermal energy refers to the use of thermal energy from the earth's crust for power generation and heat supply. Turbines play an essential role in this usage by converting the thermal energy extracted from the earth's crust into mechanical energy that is used to generate electricity. In a geothermal power plant with an ORC system, our turbine is the central element that converts the heat into electricity.</p>
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**THE UTILISATION PRINCIPLES OF THE GAS EXPANSION TURBINE**

 <p><b>Direct usage</b></p> <p>During direct usage, the energy is recovered through a drop in pressure and converted into electrical energy. This occurs, for example, during the expansion of compressed gases such as compressed air or gas using an expansion turbine or gas expansion turbine.</p>	 <p><b>Indirect usage</b></p> <p>In the case of indirect usage, previously unused surplus heat is converted into electrical energy using a closed process. This occurs, for example, during waste heat recovery in a closed cycle (ORC system), such as an ORC turbine, which can be used in geothermal power plants, the waste heat from ship engines or combined heat and power plants or other industrial processes.</p>
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## FUTURE-ORIENTED RESEARCH AND DEVELOPMENT AT DEPRAG

DEPRAG continually invests in research and development. It is our aim to give further impetus to the use of sustainable energy supported by new ideas and innovative solutions. We also rely on cooperation with external institutions and higher education facilities:

- East Bavarian University of Applied Sciences (OTH) Amberg-Weiden – Center of Excellence for Cogeneration Technologies (CeCoGen)
- Nuremberg Institute of Technology Georg Simon Ohm – Centre of Competence for Energy Engineering
- University of Bayreuth – The Center for Energy Technology (ZET)

### Completed projects:

- Project “TurboSmart – adaptive micro expansion turbine for energy recovery”

Funded by the Bavarian Research Foundation

The research project was led by the Center of Excellence for Cogeneration Technologies at the OTH Amberg-Weiden in

cooperation with DEPRAG and the Center for Energy Technology at the University of Bayreuth. It dealt with the intelligent use and generation of electricity from process heat.



**Federal Ministry  
for Economic Affairs  
and Energy**

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Are you working on a particular research project?  
**Contact us now** and we can step into the future together!

# DEPRAG

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