



## High-Performance Turbomachinery

### › REVOLVING AROUND EFFICIENCY AND RELIABILITY

Inpraise Systems is an SME specializing in prototyping and small series production of high-speed turbomachines integrated with power and control electronics for critical applications in space, power, chemical, and transportation industries.

The product range covers pumps, compressors, turbines, motors, generators, and inverters. Our technological approach prioritizes high reliability, lifetime, and performance.

We offer product lines of high-frequency stators and control electronics for tailored high-speed electromotive drive applications. Additionally, the portfolio includes low-viscosity hydrodynamic bearings and gas bearing technology.

### › KEY PRODUCT CHARACTERISTICS

- + Delivery of complex turbomachines integrated with control and power electronics
- + High power density and oilless technology
- + Compact and lightweight design
- + Power rating from hundreds of watts to hundreds of kilowatts
- + For gaseous media, our machines can operate within the range of 0 up to 450 000 rpm, depending on size and media type
- + When handling low-viscosity liquid media, our machines can run at speeds ranging from 1 000 up to 150 000 rpm, again depending on size and media type



TURBOMACHINES



STATORS

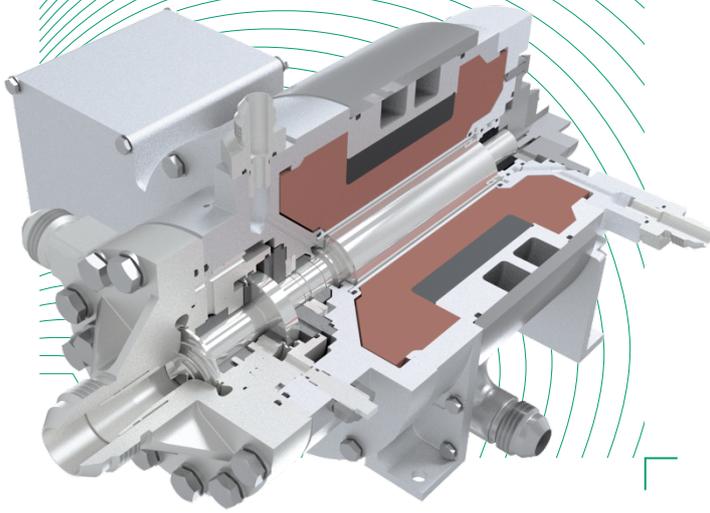


ELECTRONICS

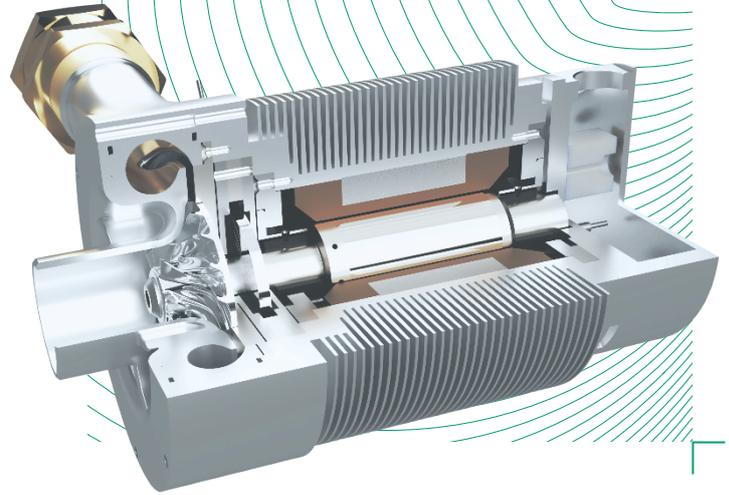


SPECIAL BEARINGS

[PROPELLANT PUMP FOR DEEP-THROTTLEABLE ROCKET ENGINE]



[HIGH PURITY AIR ELECTRIC COMPRESSOR]



# Fluid Pumps & Compressors

## › HIGH-SPEED PUMPS FOR PROPELLANT FEED & ENVIRONMENTAL CONTROL

Electrically driven high-speed pumps for low-viscosity fluids use gas-lubricated drives to combine low-friction advantages with hermetic sealing and integrated centrifugal pumps, creating a maintenance-free system. These pumps excel in critical applications, including radioactive environments, toxic substance processing, ultra-clean conditions, and high-reliability, long-lasting usage scenarios.

### PARAMETERS

- + Rotational speed: 10 000 – 80 000 rpm
- + Rail voltage: 100 – 135 V
- + Shaft torque: 0.7 N·m
- + Motor unit efficiency at nominal speed: > 90 %
- + Input power: 150 W – 20 kW

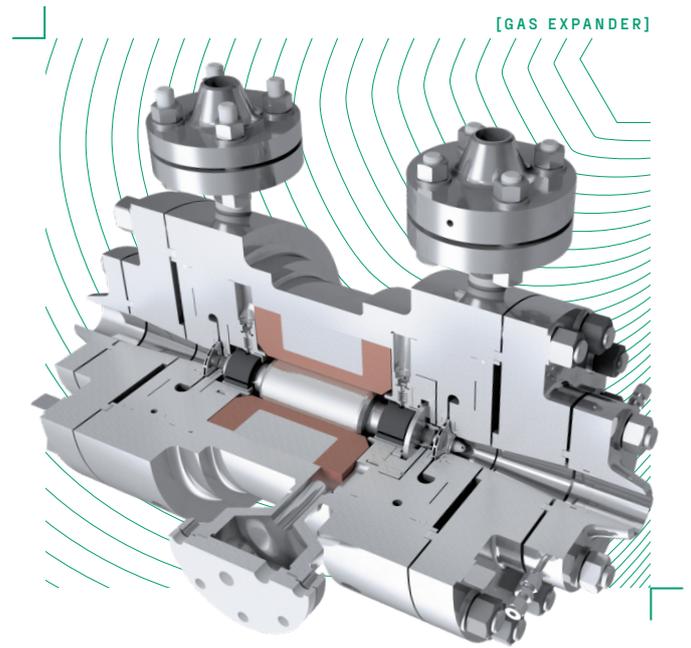
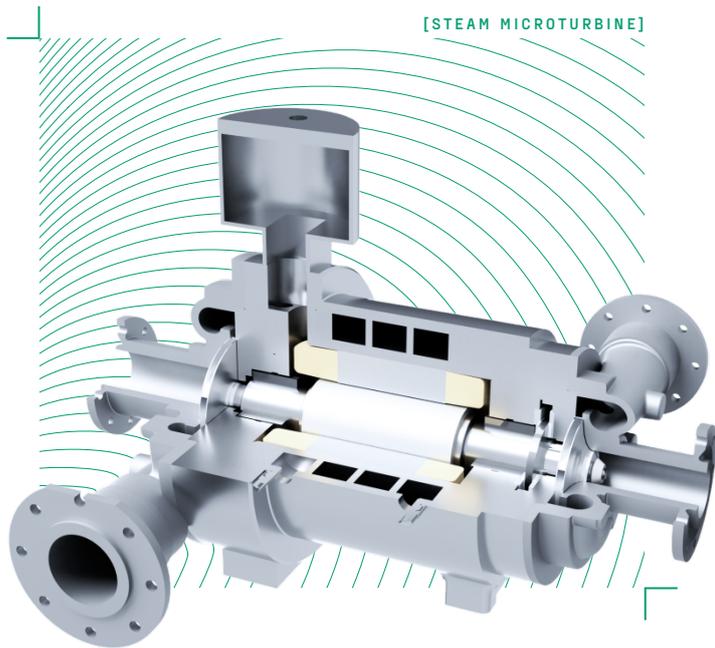
## › HIGH PURITY AIR SYSTEMS FOR FUEL CELLS & HVAC SYSTEMS

Electrically driven turbochargers and compressors offer versatile and hermetically sealed operation across a broad temperature spectrum, ranging from cryogenic to high-temperature applications. They demonstrate exceptional performance as standalone systems or when seamlessly integrated into vacuum or high-pressure machines, owing to their ultra-low friction and high reliability.

### PARAMETERS

- + Pressure ratio: 2.3
- + Mass flow: 125 g/s
- + Input power: 10 kW
- + Rotational speed: 160 krpm
- + Isentropic overall efficiency: > 70 %
- + Operating voltage: 400 V





# Turbines, Generators & Expanders

## › STEAM TURBINES & HIGH-FREQUENCY GENERATORS

High-speed electric turbines, coupled with high-frequency generators, produce electricity at extremely high speeds in hermetically sealed applications. Their direct-drive design simplifies systems, reducing complexity and friction losses. These turbines endure a wide temperature range, from cryogenic to supercritical high-temperature conditions, ensuring long lifetime and reliability.

### PARAMETERS

- + Rotational speed: 82 000 rpm
- + Rail voltage: 400 V
- + Shaft torque: 3.6 N·m
- + Output power: 30 kW
- + Motor unit efficiency at nominal speed: > 90 %

## › GAS EXPANDERS

Gas expanders designed for power outputs ranging from 1 kW to 400 kW. These gas expanders prioritize energy recovery from high-pressure gas streams, ensuring efficiency, reliability, and cost-effectiveness. The system design allows for minimal downtime and extended operational lifespans. With scalability from small to large devices, they offer a versatile solution for diverse energy recovery needs.

### PARAMETERS

- + Gas flow: 3 000 Nm<sup>3</sup>/h
- + Input power: 100 kW
- + Rotational speed: 77 500 rpm
- + Working stage diameters: 75 – 95 mm
- + Operating voltage: 590 V / 700 V

# Special Fluid Bearings

## LOW-VISCOSITY HYDRODYNAMIC BEARINGS & GAS AERODYNAMIC AND AEROSTATIC BEARINGS

### CHARACTERISTICS

- + Applicable gaseous lubricants such as air, ammonia, oxygen, helium, water steam, and more
- + Applicable liquid lubricants such as water, ammonia, H<sub>2</sub>O<sub>2</sub>, kerosene, LOX, ethanol, and more
- + Theoretically unlimited lifetime and exceptional operating precision and stability
- + Elimination of the risk of contamination of the liquid or gaseous process media or external environment with oil lubricants

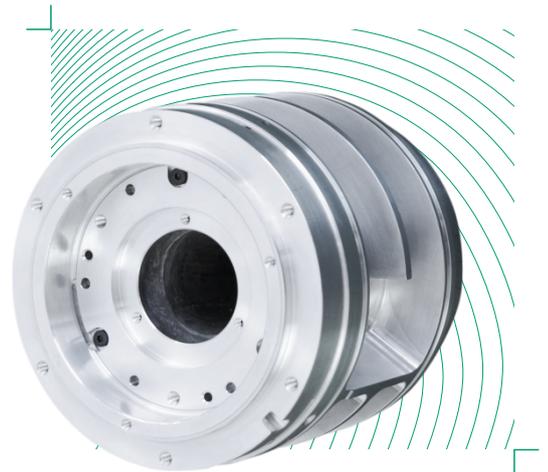


# Stators

## ELECTRIC MOTOR STATORS FOR HIGH-SPEED APPLICATIONS

### DESIGN OPTIONS [FEATURES CAN BE COMBINED AS DESIRED]

- + Hermetically isolated winding
- + Thermally optimised design with fluid-cooled housing
- + Single point failure free winding
- + Standard cost-optimized design
- + Stator cooling and heat recovery via liquid/gas flow



# VFD Inverters

## MOTOR INVERTERS FOR HIGH-SPEED SYNCHRONOUS MOTORS

### CHARACTERISTICS

- + Sensor controlled and sensorless technology
- + FOC control, six-step control, PAM control
- + Motor speeds up to ~ 480 000 rpm [output frequency up to 8 kHz]
- + Motor power up to 30 kW
- + High-reliability applications [space]
- + Industrial applications [energy, research]

