

ROTOFLOW TURBOMACHINERY

Energy-dissipating Turboexpanders



World-Class Performance

Rotoflow's energy-dissipating turbo expanders deliver high value to our customers because they offer world-class efficiency, high reliability, and low cost. Energy dissipation is achieved through loading the expander with an oil brake or atmospheric blower (ETAO and ETAB series). Our proven designs have millions of successful hours of operation, where they are simple to operate and maintain. Energy-dissipating expanders are commonly found providing low-cost refrigeration options for the most efficient air separation and liquefaction facilities around the world.

Design/build expertise, operational insight, and unrivaled experience work together to create Rotoflow's comprehensive line of turboexpanders, serving the full spectrum of turbomachinery markets and applications.

Typical Design Capabilities

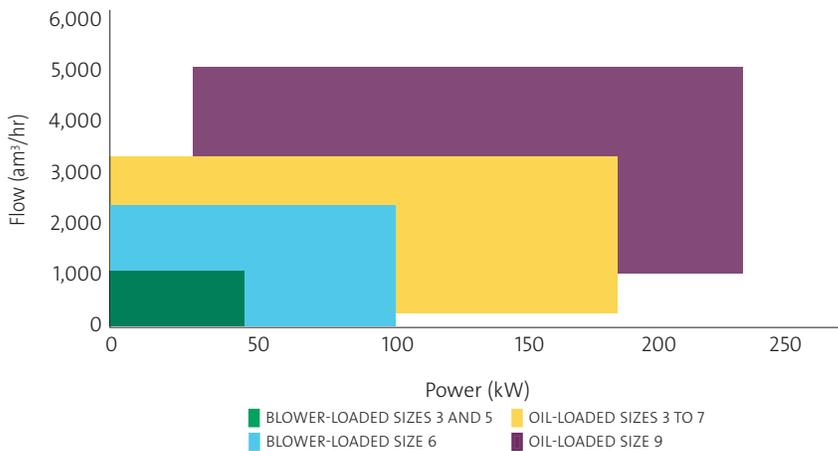
	ASU	Hydrocarbon
Power	6 to 29 kW (8 to 308 hp)	3 to 6,249 kW (4 to 8,380 hp)
Speed	Up to 95,000 rpm	Up to 105,000 rpm
Inlet Pressure	1.5 to 41.5 barg (22 to 600 psig)	1.7 to 210 barg (25 to 3,045 psig)
Temperature	-200 to +150°C (-320 to +300°F)	-270 to +340°C (-454 to +644°F)
Outlet Flow	40 to 4984 am ³ /hr (24 to 2,933 ACFM)	24 to 90,199 am ³ /hr (14 to 53,089 ACFM)
Impellers	53 to 214 mm (2.1 to 8.4 in.)	32 to 828 mm (1.25 to 33 in.)

Benefits

- Broad operating ranges from a portfolio spanning over 70 years
- Robust oil bearing design eliminates the need for additional active thrust control components
- Fully skidded or unskidded packages can be supplied for customer-specific conditions
- Equipment aerodynamically optimized to the customer's process
- Simplified design eliminates tuning or controlling instantaneous variables through a separate control system
- Robust rotor assembly, extensive rotor-dynamic analysis for all operating speeds
- Zero clearance inlet guide vanes generate accurate flows and efficiencies
- Compliance with safe area or hazardous area conditions
- Foil gas bearings for some blower-loaded applications can significantly reduce cost
- Speed throttle valves, filters, and silencers for blower-loaded applications
- ISO 9001 certified since 1997 (currently ISO 9001:2015)

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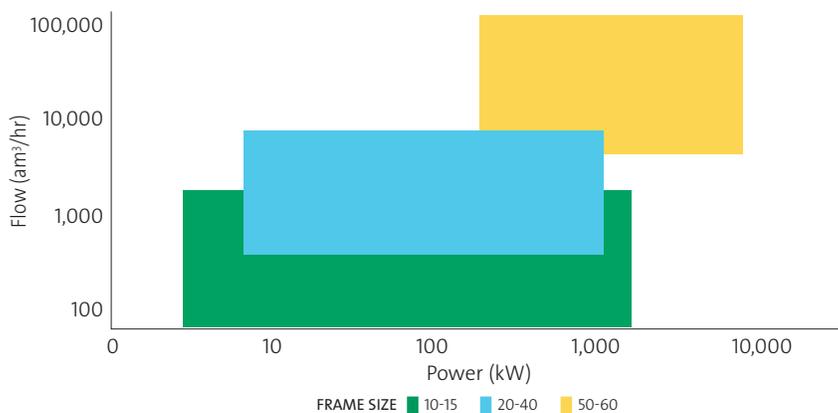
ASU Product Operating Range



Technical Highlights

- Proven bearing designs handle steady-state and transient thrust loads
- Blower-loaded models can use compliant foil gas or ball bearings with mist lubrication
- Robust impellers, stiff shaft rotor design, and torque transmission design for high reliability
- Pneumatic actuator controlled inlet nozzle guide vanes for precise flow control through the expander with peak efficiency over wide operating conditions

Hydrocarbon Product Operating Range



Options

- Automated speed controls
- International code compliance
- Spare plug-in section
- Compliance with hazardous area conditions
- Package control system
- API compliant on request

Engineered to order for customer-specific applications. Represented is an overview of our turbomachinery capabilities. Please contact us to discuss your specific needs.

Rotoflow, an Air Products business, combines one of the industry's most trusted names in turbomachinery with world-leading industrial gas expertise. We're transforming the hydrocarbon, LNG, petrochemical, and industrial gas markets with superior equipment performance and unrivaled reliability, safety, and value. Our combined capabilities are the key to this new level of quality. Technological innovations expertly integrated with decades of know-how are the foundation for Rotoflow's valued products, proven performance, and world-class service. This synergy helps customers around the world reach their unique technology and operational targets more efficiently than ever before.

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