



Turboexpander-compressors

Increased efficiency for refrigeration applications



Turboexpander-compressors

Turboexpanders are used in all segments of the oil and gas industry to produce cryogenic refrigeration, while increasing the facility's energy efficiency and reducing its CO₂ footprint. Alternative approaches include expansion of the gas stream through a valve, which does not recover energy, and external refrigeration, which consumes energy. A turboexpander, on the other hand, is a pressure let-down device that produces cryogenic temperatures while simultaneously recovering energy from a plant stream in the form of shaft power that can be used to drive other machinery such as a compressor. This approach avoids fuel consumption, improves overall process efficiency and reduces the plant's environmental impact.

How they work

A turboexpander expands process fluid from the inlet pressure to the discharge pressure in two steps: first through variable inlet guide vanes and then through the radial wheel. As the accelerated process fluid moves from the inlet guide vanes to the expander wheel, kinetic energy is converted into useful mechanical energy – extracting energy from the process fluid and cooling it down. The mechanical energy is available to drive other process equipment – in this case, a compressor.

Design & performance to rely on

GE Oil & Gas turboexpander-compressors are available in a wide selection of frame sizes to match virtually any application. Our high-efficiency designs are created with the most advanced computational tools to ensure optimal refrigeration and energy recovery. Over 60 years of turbomachinery experience and an operational database from the industry's largest installed fleet guarantee a robust design and a long mean time between maintenance.

Best match to the application

- Large portfolio of frame sizes including large-capacity machines
- Optimized footprint and weight for offshore applications

High performance

- State-of-the-art design and validation tools; large database of verified wheels
- Proven innovations from GE Engineering Centers of Excellence
- Optimal integration with other GE Oil & Gas equipment

High availability

- Robust, proven designs based on extensive installed base
- Worldwide, regional support through the GE Oil & Gas Global Services network

Coordinated project management

- Single point of contact for plant equipment and controls, installation, startup, commissioning and service
- Capability of full-load string testing with up- or downstream compressor



Typical applications

- Floating LNG: turboexpander-compressors offer lighter weight, more compact and more efficient refrigeration cycles for the liquefaction of natural gas
- Liquefied petroleum gas (LPG)/natural gas liquids (NGL): turboexpander-compressors provide energy-efficient cryogenic refrigeration for more complete removal of condensates (LPG or NGL) from hydrocarbon gas streams
- Ethylene: turboexpander-compressors increase the overall plant efficiency by tail gas refrigeration and subsequent fuel gas recompression
- Dew point control: turboexpander-compressors chill gas streams for the removal of moisture to provide dry gas or to control the heating value of fuel gases

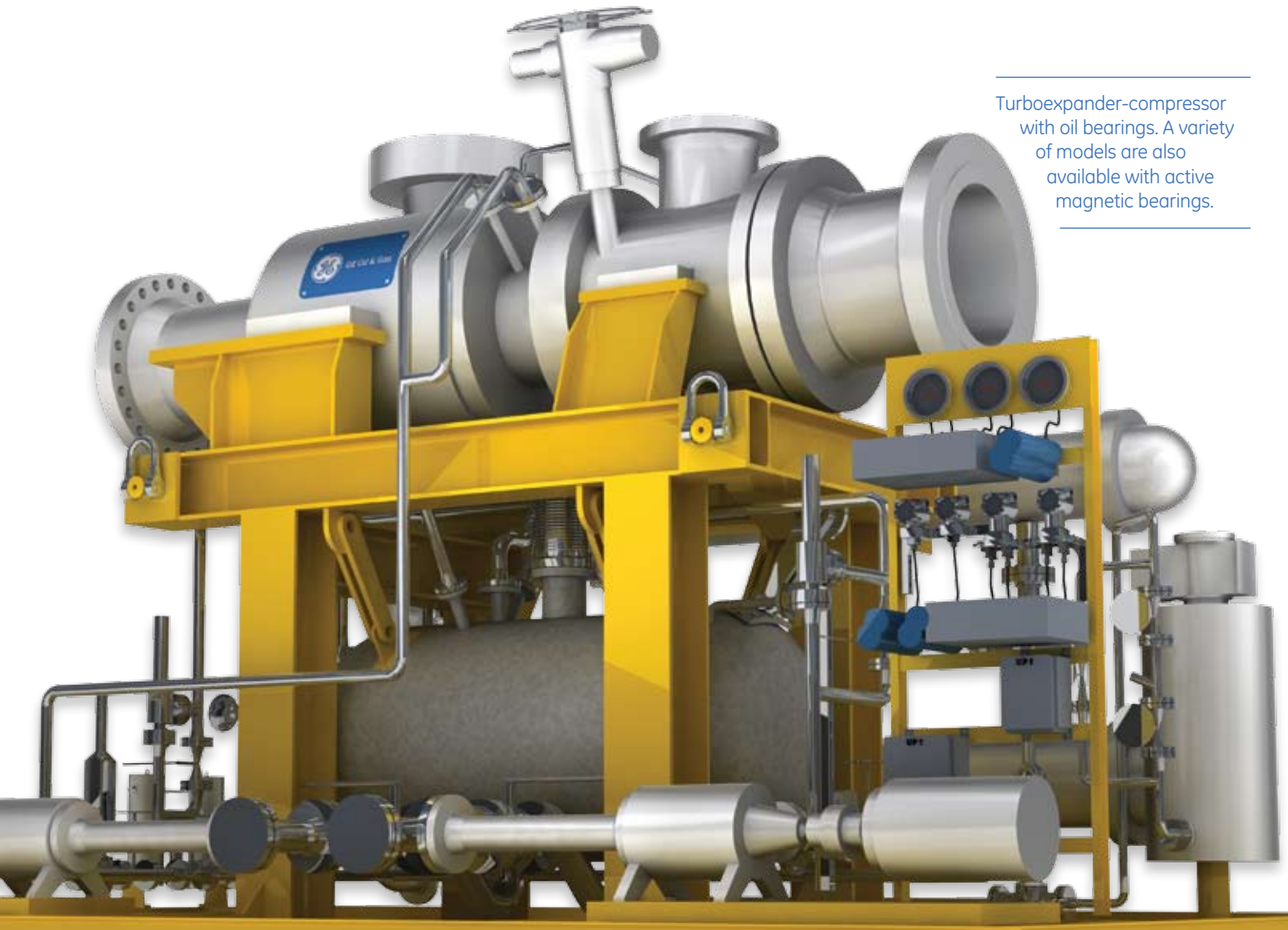
GE Oil & Gas key references

- Qatar Shell Pearl: first GTL turboexpander-compressor (Frame 60, 13,900 HP)
- Ras Laffan: highest power active magnetic bearing turboexpander-compressor (Frame 60, 15,100 HP)
- Qatar Petroleum (offshore): first NACE-compliant active magnetic bearing (Frame 50, 5,100 HP)
- N'kossa LPG: first active magnetic bearing installed on an FPSO (Frame 40, 4,900 HP)
- Tasnee Petrochemicals: two-stage tail gas machine for 1.0 Mtpa ethylene plant (Frame 40, 1,500 HP)
- BP Cusiana: high-pressure dew point control turboexpander-compressors (Frame 20S, 1,400 HP)

Technologies for extreme challenges

With over 900 turboexpander-compressors in operation worldwide, GE Oil & Gas has the largest installed base in the industry.

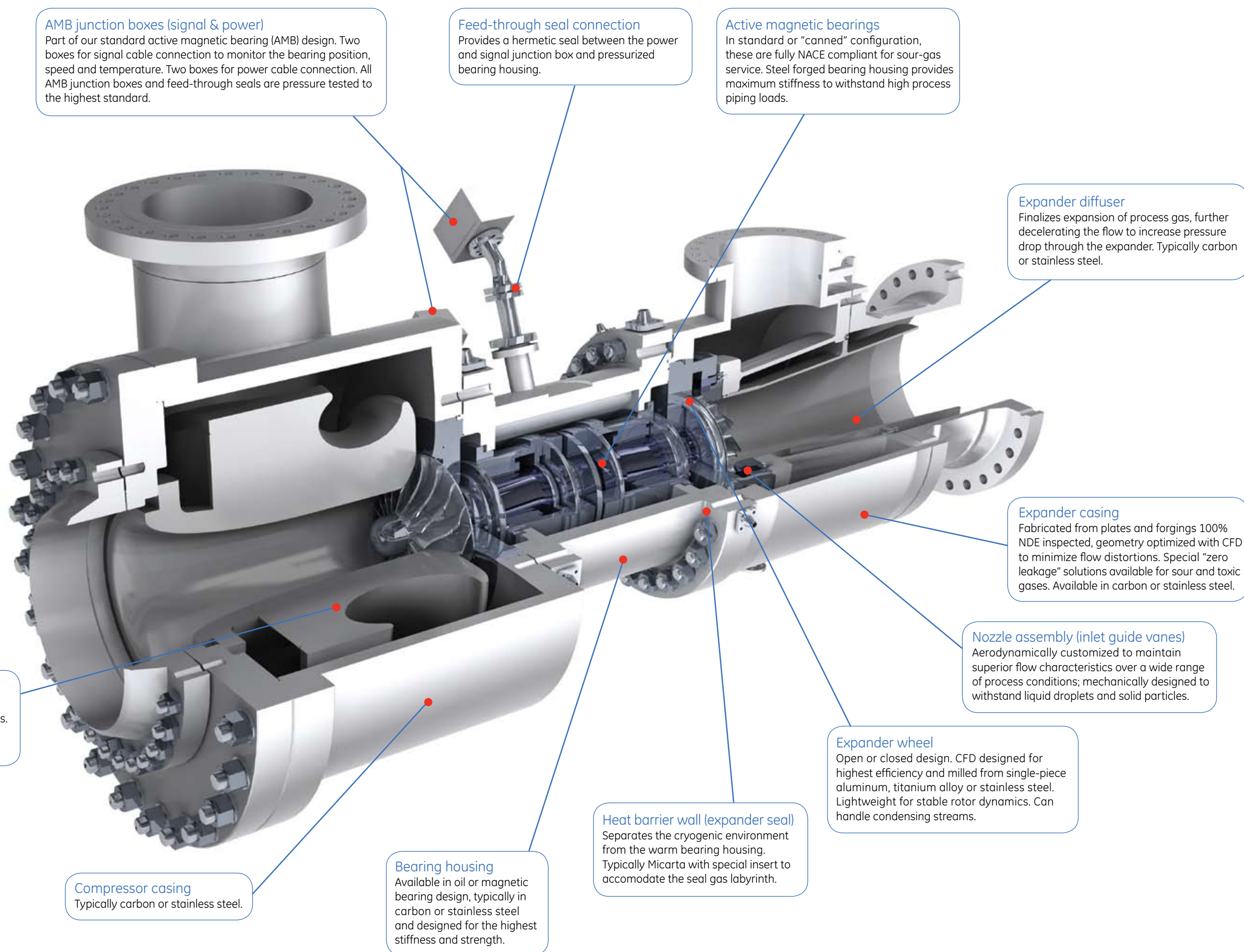
Turboexpander-compressor with oil bearings. A variety of models are also available with active magnetic bearings.



Turboexpander-compressors

Robust, smaller footprint & enhanced performance for the most demanding applications

Turboexpander-compressor with active magnetic bearings. A variety of models are also available with oil bearings.



FR50 with oil bearings



FR50 with active magnetic bearings

Smaller packages and bigger results for plants on land and at sea

Frame	Shaft power (kW)	Expander outlet flow max. (m ³ /h)	Expander inlet/outlet flange max. (in)	Compressor inlet/outlet flange max. (in)	Available casing ratings				
					150	300	600	900	1500
20	1,600	4,000	8 / 10	14 / 14		•	•	•	•
25	2,000	5,500	10 / 12	18 / 16		•	•	•	•
30	4,800	9,000	12 / 18	20 / 18	•	•	•	•	•
40	6,500	16,000	16 / 24	26 / 24	•	•	•	•	
50	10,000	25,000	20 / 30	32 / 28	•	•	•	•	
60	15,000	36,000	24 / 36	40 / 36	•	•	•	•	
80	20,000	45,000	26 / 40	42 / 38	•	•	•		



GE imagination at work

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GE imagination at work