

## ★ Liquid Expander / Dense Fluid Expander with generator brake and oil lubricated bearings LTG

## ★ Liquid Expander with oil pump brake LTP



### ★ Typical Application

Industrial Gas Industry (Air Separation Units) : to provide refrigeration and generate electricity (LTG) by replacing a Joule-Thomson Valve.

Oil and Gas Industry: Natural gas liquefaction plants (LNG service or mixed-refrigerant service) to replace a JT valve.

### ★ Usual Gases Handled

Air, Nitrogen, or waste gas from air with higher oxygen content  
Liquefied Natural Gas, mixed-refrigerants (propane, butane,...).  
Cryostar can accept gas at outlet due to its unique expander design experience (Flashing Liquid Expander).

### ★ References

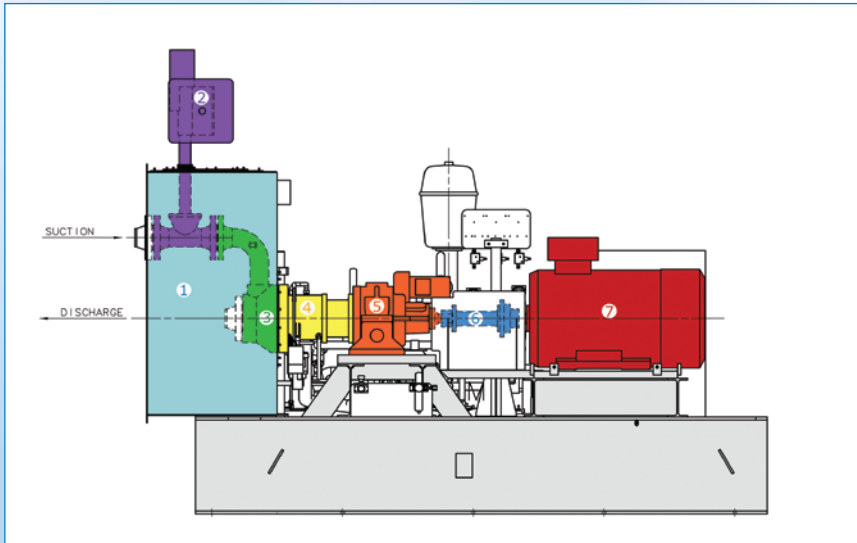
Cryostar has a long experience in the design of liquid expander for the cryogenic industry, with the first unit built in 1986 and more than 60 LTG and LTP in operation sold to major companies (Air Liquide, Linde, HOPM, ...).

### ★ Features and benefits

- ★ Turbo expander with low or high voltage generator and usually with gear box (LTG).
- ★ Turbo expander with oil pump brake on a common shaft (LTP).
- ★ The “cartridge” design of the expander allows access to the rotating element without removing the expander casing (and its cold box extension or annex plate).
- ★ For easy maintenance, a spare “plug-in unit” (expander without casings usually named cartridge) allows customer to change all internal parts within a minimum of time and with maximum reliability.
- ★ Diffuser design allows low radial loads at all operating flows.
- ★ A modular lube oil system is feeding the expander bearings and the oil pump brake (LTP) or gear box (LTG) as well as some large generator bearings (LTG).
- ★ The standard cost effective industrial expander package can be customized to meet the most stringent customer specifications or standards like API614.
- ★ A significant improvement of the refrigeration cycle efficiency and power savings between 1% and 3% of the total power consumption of the plant.



## ★ LTG 2D view



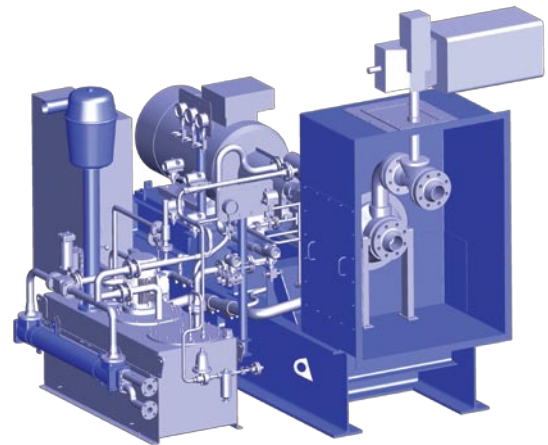
- 1 Cold Box Extension
- 2 Quick Closing Valve
- 3 Expander
- 4 High Speed Coupling
- 5 Gear Box
- 6 Low Speed Coupling
- 7 Generator

## ★ Sizes and type

Cryostar offers now LTP 70, LTP 90, LTG 70, LTG 90, LTG 120, LTG 200, LTG 300, LTG 400, LTG 500, LTG 600 depending on customer needs.

**LTG 200** → L: Liquid  
T: Turbine (expander)  
G: Generator  
200 is the expander wheel diameter in mm

**LTP 70** → L: Liquid  
T: Turbine (expander)  
P: Oil Pump brake  
70 is the expander wheel diameter in mm



## ★ Range of operation

- ★ Flow up to 2000 m<sup>3</sup>/h (1.6 million Nm<sup>3</sup>/h)
- ★ Pressure up to 200 bar
- ★ Expander temperature -200° C to +200° C
- ★ Power up to 7000 kW (9500 HP)

## ★ Other available Expander (for gases)

- ★ **TC**: Expander with process compressor and oil lubricated bearings
- ★ **TFC, TCC**: Cryogenic expander with cryogenic compressor and possible oil brake
- ★ **MTC**: Expander with process compressor and active magnetic bearings
- ★ **ECO, TP**: Expander with oil brake
- ★ **TG**: Expander with generator and oil lubricated bearings
- ★ **MTG**: Expander with high frequency generator and active magnetic bearings

