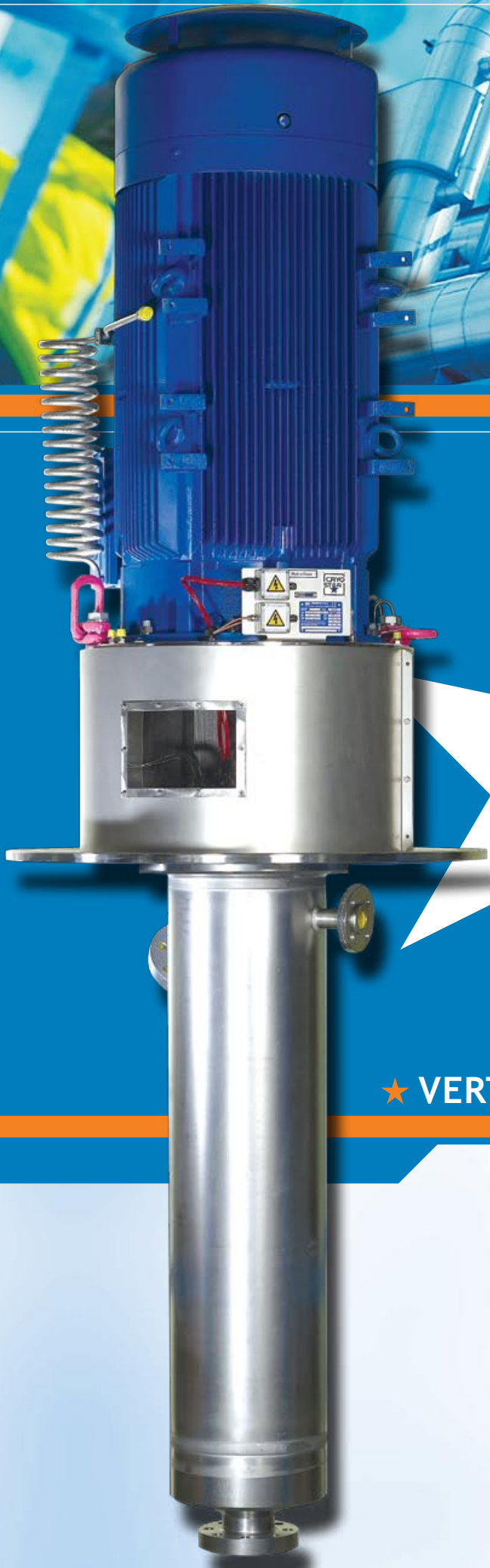




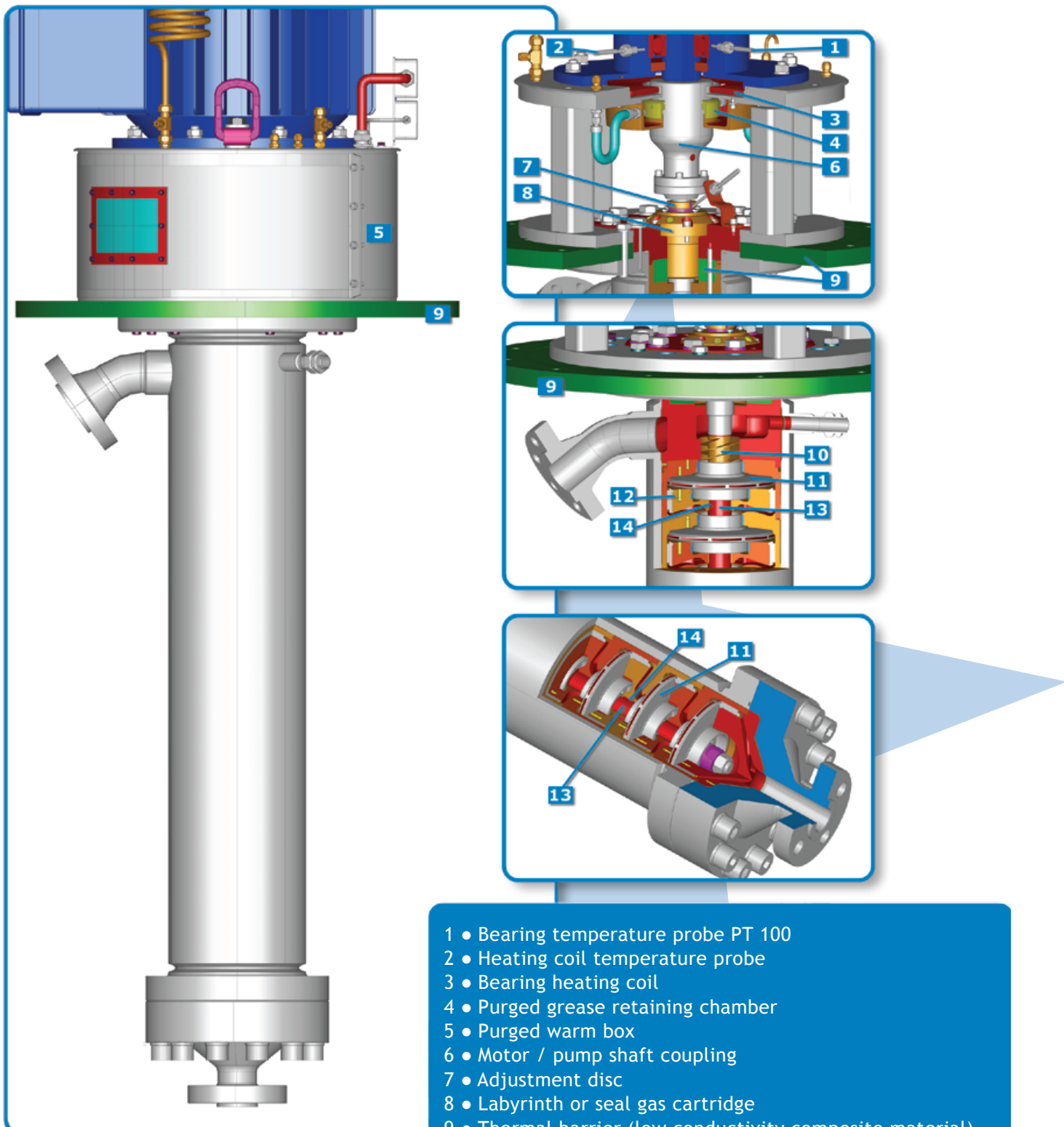
★ **PROCESS**
CRYOSTAR



★ **VERTICAL MULTISTAGE PROCESS PUMP**



TYPE VP



- 1 • Bearing temperature probe PT 100
- 2 • Heating coil temperature probe
- 3 • Bearing heating coil
- 4 • Purged grease retaining chamber
- 5 • Purged warm box
- 6 • Motor / pump shaft coupling
- 7 • Adjustment disc
- 8 • Labyrinth or seal gas cartridge
- 9 • Thermal barrier (low conductivity composite material)
- 10 • Inducer
- 11 • Modular impeller
- 12 • Modular diffuser
- 13 • Pump shaft
- 14 • DU Bush

GENERAL CHARACTERISTIC

- The VP pump is a multistage cryogenic Vertical Process Pump designed for continuous operations with all liquefied air gases.
- First heavy duty pump of this technology built in the early 90's; the VP pump is today the reference for the world wide Air gas industry.
- The VP Pump can be kept in permanent cold stand-by, ready for an immediate start.
- The construction is the result of more than 40 years of CRYOSTAR experience in the field of cryogenic pumps, and the latest developments in low temperature materials & technologies.
- The VP pump is oxygen compatible and made of tin bronze; all parts are enclosed in a stainless steel barrel. Thanks to a unique modular multi-stage design, the pump model is adjusted to any particular duty point; the VP pump can be driven by means of a frequency inverter to achieve several speeds and duty points.
- Thanks to the various sizes of VP pumps (from 115 to 330 mm) and the modular multi-stage design, the range of flow rates is extended from 25 to 5000 L/min (1350 gpm), up to 130 bar (1900 psig).

- The VP pumps are equipped with a standard choice of sealing systems, interchangeable according to the process: 2 or 3 chambers Labyrinth or Dry gas seal.

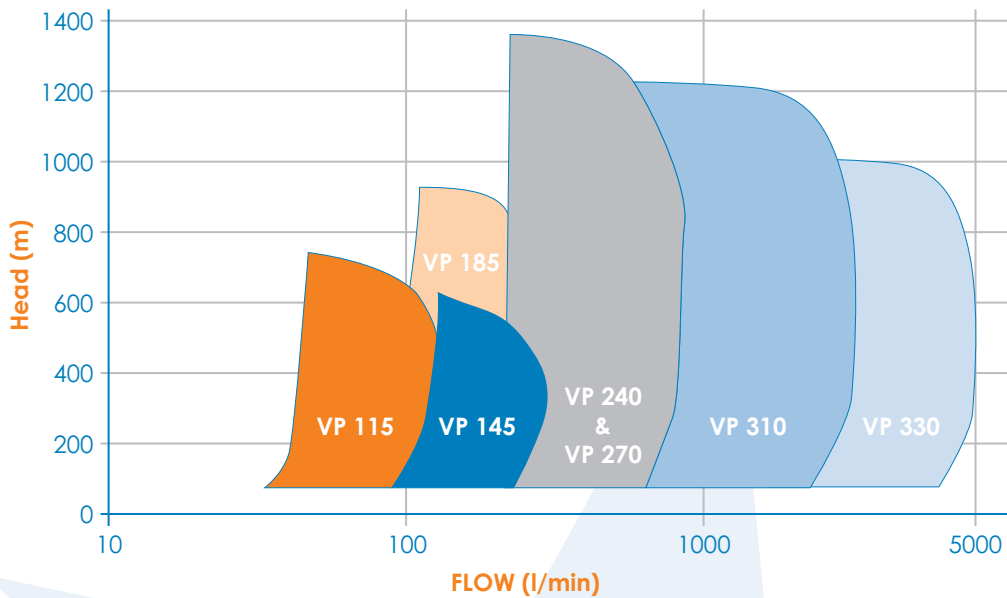
- The VP pump is supplied with a rigid and insulating flange to mount on the Cold Box, including all necessary devices to ensure safe, irreproachable and, today, legendary reliability.

- The High-Tech quality of each pump is guaranteed through a complete performance test in cryogenic conditions, on the Cryostar's unique test facility in liquid nitrogen.

- Application: Essential in Air Separation Units. The VP pumps are generally used for internal compression, recycling, send out, back-up (O₂/N₂/Ar) and in methane wash or LNG applications.



PERFORMANCE DATA



MODELS AND SIZES

- VP X/115/: up to 12 stages
- VP X/145/: up to 12 stages
- VP X/185/: up to 12 stages
- VP X/240/: up to 12 stages
- VP X/270/: up to 8 stages
- VP X/310/: up to 7 stages
- VP X/330/: up to 6 stages



HIGHLIGHTS

Continuous duty:

More than 600 references on the five continents running continuously.

Legendary reliability:

Preferred high duty, high performance process pumps by all major industrial gas companies

Temperature insulation and stability:

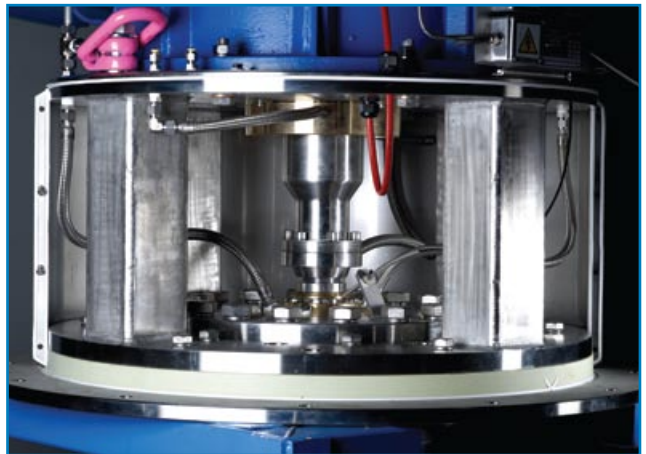
The VP is mounted on its “COLD BOX FLANGE” with a unique isolating flange in a “Composite” material for rigid mounting of the complete machine on the cold box and an efficient temperature break.

Continuous cold stand-by:

Closed and purged distance piece; this is the “Warm Box” execution avoiding any humidity penetration and ice building

Permanent standby in cold conditions with the bearing heating system. The pump is kept ready for an immediate restart any time.

High technology sealing systems: for maximum life time



No risk of contamination by sealing gas

A suction inducer provides Minimal NPSH Requirement = easy to prime

Easy Maintenance:

A special coupling system enables the motor to be easily dismantled, making the seal available for direct inspection. The sealing system is designed as an interchangeable cartridge. All the rotating parts can be drawn out of the casing from the top; the casing and the piping remain in place.

Safety in oxygen operations:

- **Materials** (mainly bronze) used in accordance with the recommendations of EIGA and CGA like IGC11/82,
- All VP pumps degreased for oxygen use.

- “Warm Box” and grease retaining chamber purged with gaseous nitrogen.

Control & Temperature safety devices:

- 2X PT100 to control and monitor the front bearing temperature
- SEAL gas leakage detection: PT 100 Temperature probe in the Warm box.

Seal Gas Control Panels of High Precision

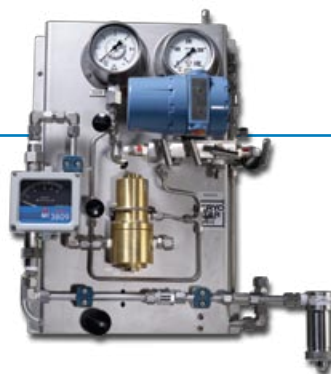
Purge Gas Control Panels simple and easy to operate

HIGHTECH MOTORS

VP Pumps are driven by HIGHTECH MOTORS designed by selected manufacturers, and according to rigorous specifications of Cryostar, concerning bearings, balancing, tolerances, flange precision, combining safety, reliability, quiet operation and high performance.

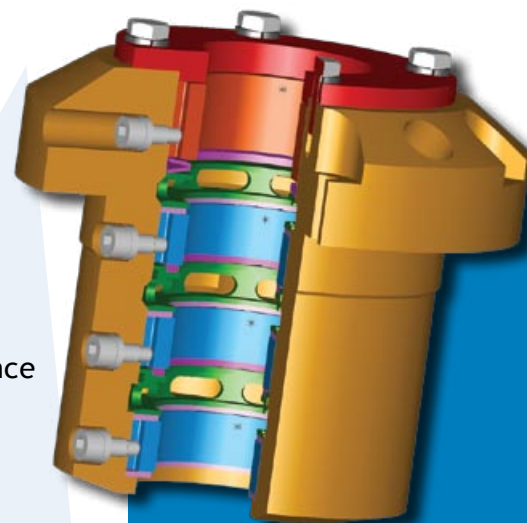
VP SEALING SYSTEMS

- 2 or 3 chambers Labyrinths
- Dry gas seal: single or dual executions
- Mechanical seal in composite material



LABYRINTH SEAL

- Dedicated to process applications
- Special design labyrinth to allow shaft contact in case of cavitations.
- Designed as a cartridge exchangeable with the other sealing system
- 3 chamber labyrinth standard design ensures a tight tolerance and high efficiency
- A low consumption of sealing gas
- Anti rotation system
- The Cartridge Design, easily removable, facilitates maintenance without dismounting the pump cold end.



DRY GAS SEAL

- Dedicated to process applications.
- Designed as a cartridge exchangeable with the other sealing system
- Single seal as standard execution, or Double seal execution for special applications such as Methane Wash.
 - A very high tightness efficiency
 - Bi-directional concept of the ring avoiding any damage in case of reverse rotation
 - Purge gas instead of seal gas (negligible consumption and low pressure)
 - Easy and simple regulation of purge gas
 - The Cartridge Design, easily removable, facilitates maintenance without dismounting the pump cold end.



STANDARD MECHANICAL SEAL

- Used for intermittent or temporary operations of short periods
- Long life composite execution
- The Cartridge Design, easily removable, facilitates maintenance without dismounting the pump cold end.

PERFORMANCE TEST in Liquid Nitrogen

Each Cryostar pump is effectively tested at the required duty point with Liquid Nitrogen on Cryostar's unique test facility (up to 5000 l/min in high pressure), which guarantees the compliance of pump performance

