

Electronics and Optoelectronics



Ultra-high purity at your service

The ULTRAL™ range of cryogenic purifiers

ULTRAL is a product used for purifying vector gases (gaseous H₂, He or liquid N₂, Ar) for applications requiring very high levels of purity and high-technology industries such as semiconductors, aerospace or particle accelerators.

1. ULTRAL™ Hydrogen H₂ and Helium He cryogenic purifier

ULTRAL H₂ and He are cryogenic purifiers working at 5 to 1,000 Nm³/h, providing continuous and reversible purification of hydrogen or helium for applications with a very high level of purity (sub ppb).

Key benefits

- An easy to use automatic purifier (**tactile control screen**)
- **Continuous, automatic purification** 24 hours a day
- **Two purification columns** running in parallel
- Automatic regeneration of purification columns: **no cartridges to change**
- H₂ purification at **cryogenic temperature** (-196°C)
- Management of **output or impurity spikes** without changing performance
- One of the **lowest running costs on the market**

Main technical characteristics

- **Operating pressure:** 5 to 18 bar
- **Flow capacity:** 5 to 1,000 Nm³/h (depending on the range)
- **Pressure drop:** < 1.1* bar (for 16 bar input pressure)
- **Column regeneration:** hot nitrogen

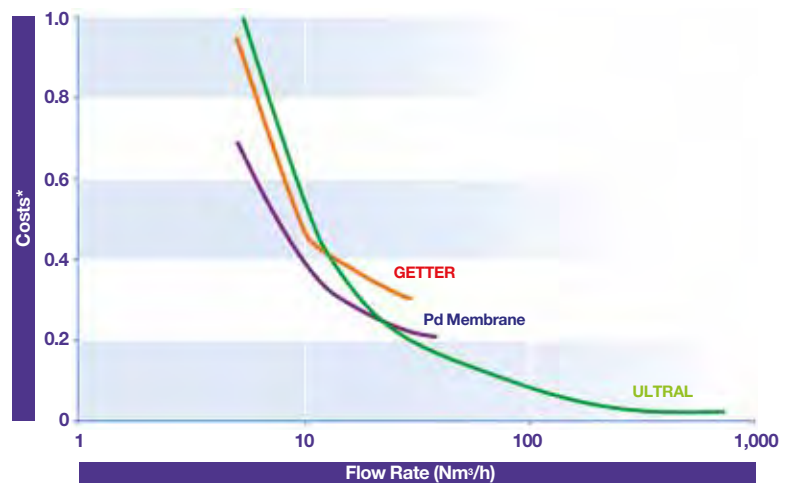
*Varies according to model



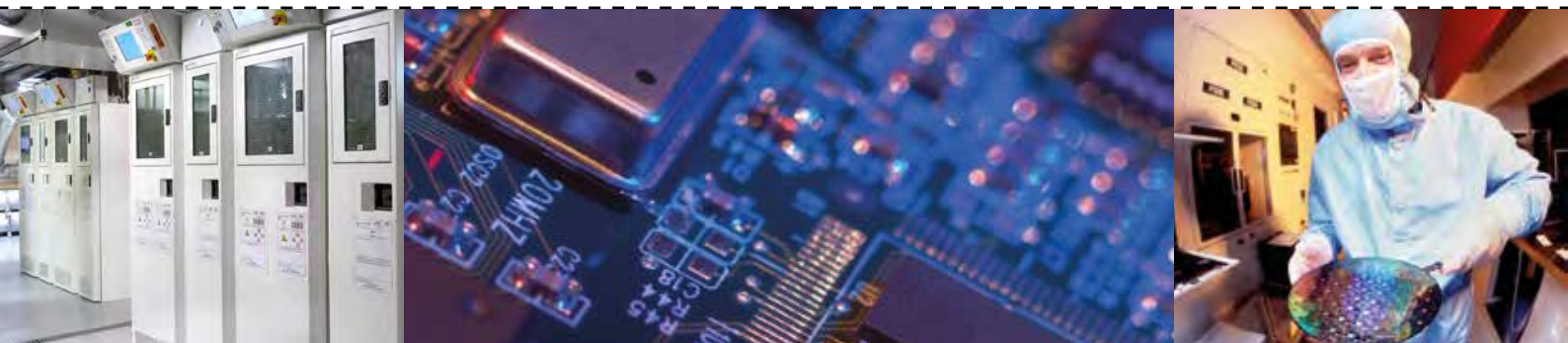
H₂ and He purifier performance

IMPURITIES	INPUT (ppm)	OUTPUT (ppb)
N ₂	500	< 1
O ₂	5	< 1
CO ₂	5	< 1
H ₂ O	5	< 1
CO	5	< 1
CH ₄	5	< 1

Graph of running costs



Low running costs for ULTRAL



2. ULTRAL™ Liquid nitrogen LN₂ and Liquid argon LAr cryogenic purifier

ULTRAL LN₂ and ULTRAL LAr are cryogenic purifiers used to purify liquid nitrogen and liquid argon directly at the output of a tanker truck or any other source. They are used for applications requiring very high purity (sub ppb).

Key benefits

- Economical solutions used to purify liquid nitrogen or argon directly
- Easy to use manual purifier: **you only need one operator**
- Adsorbent bed which can be regenerated in **only 9 h**
- Filtration of particles < 3 µm at the purifier output

Main technical characteristics

- **Operating pressure:** < 17.5 bar
- **Output:** up to 16,000 L/h
- **Autonomy:** depends on the level of purity
- **Automatic version** optional



LN₂ purifier performance

IMPURITIES	INPUT (ppm)	OUTPUT (ppb)
O ₂	500	< 1
CO	500	< 1
H ₂ *	50	< 1

* optional

LAr purifier performance

IMPURITIES	INPUT (ppm)	OUTPUT (ppb)
O ₂	500	< 2
N ₂	200	< 2
CH ₄	5	< 2

Japan Pionics Co. Ltd Ultra-pure purifiers

To meet all market requests for ultra-pure gases, in addition to its ULTRAL offer, Air Liquide also proposes purification systems produced by Japan Pionics Co. Ltd.

Depending on the applications, impurities to be eliminated or flow capacity to process, several technologies can be used to complete our ULTRAL range: UIP (adsorption), UOP (catalyst + adsorption), URT (Getter), JLS (Palladium membrane).

Key benefits

- A range of purifiers working from 5 Nm³/h to 8,000 Nm³/h depending on the gas (H₂, He, Ar, O₂, N₂)
- Easy to use automatic purifier (**tactile control screen**)
- **UIP models:** 2 or 3 purification columns running in parallel. Continuous, automatic purification 24 hours a day. Automatic regeneration
- **URT models:** extended life span for cartridges compared with traditional Getters: 20,000h under standard conditions



CQC™ and APIX™: analytical control solutions

Air Liquide offers two on-line analytical systems which guarantee the purity of purified vector gases:

- CQC (Continuous Quality Control), customised analytical system,
- APIX, unlike other CQC systems, is a standard analyser with its own automatic sampling and calibration system, specially designed for ppt analysis.

1. CQC™: a customised solution

CQC is a customised solution for real-time measurement of the concentration of certain major impurities and permanent production line monitoring. It consists of a Gas Cabinet including a set of very high purity analysers, a sampling system and a monitoring system.

Key benefits

- Specific **sampling system** using shared analysers
- **Optimisation** of costs and solutions proposed (expert engineering analysis)
- **Manual** or **automatic** version

Main technical characteristics

- **Analysis of principal impurities** (O₂, N₂, H₂O, CO, CO₂, THC) in vector gases (H₂, O₂, He, Ar, N₂)
- **Detection** typically < 1 ppb
- Particle **analysis** (up to 0.1 µm)



2. APIX™: a standard solution

APIX is a standard solution used throughout the world for network qualification or ultra-pure distribution, or to preserve the integrity of a semiconductor type production line. APIX is the reference CQC system for analysing vector gases at ppt level. It has its own automatic sampling and calibration system. It can be used for real-time monitoring of concentrations of several major impurities (O₂, CO, CO₂, H₂O, CH₂ etc.) at the same time, in one or more vector gases (N₂, H₂, Ar, He, O₂).

Key benefits

- **The global reference for ppt analysis** with a hundred units sold throughout the world
- **Up to 4 gases analysed in parallel** (with switch system)
- **Automatic calibration** incorporated (excluding gas)

Main technical characteristics

Limit of detection guaranteed (1 year analytical cycle to measure the following impurities for each vector gas)

IMPURITIES	N ₂	Ar	He	H ₂
O ₂	10 ppt	10 ppt	10 ppt	30 ppt
H ₂	150 ppt	100 ppt	50 ppt	-
CH ₄	10 ppt	10 ppt	10 ppt	10 ppt
CH ₃ + (total)	10 ppt	10 ppt	10 ppt	10 ppt
H ₂ O	30 ppt	30 ppt	30 ppt	30 ppt
CO	50 ppt	10 ppt	10 ppt	30 ppt
CO ₂	10 ppt	10 ppt	10 ppt	10 ppt
N ₂	-	-	10 ppt	150 ppt
Ar	-	-	10 ppt	-
Kr	10 ppt	10 ppt	10 ppt	10 ppt
Xe	10 ppt	10 ppt	10 ppt	10 ppt

Switch time to reach 1 ppb (minutes)

GAS	Ar	He	H ₂	N ₂
Ar	-	5 min	30 min	15 min
He	15 min	-	30 min	15 min
H ₂	15 min	15 min	-	15 min
N ₂	5 min	5 min	30 min	-



Ultra-high purity at your service

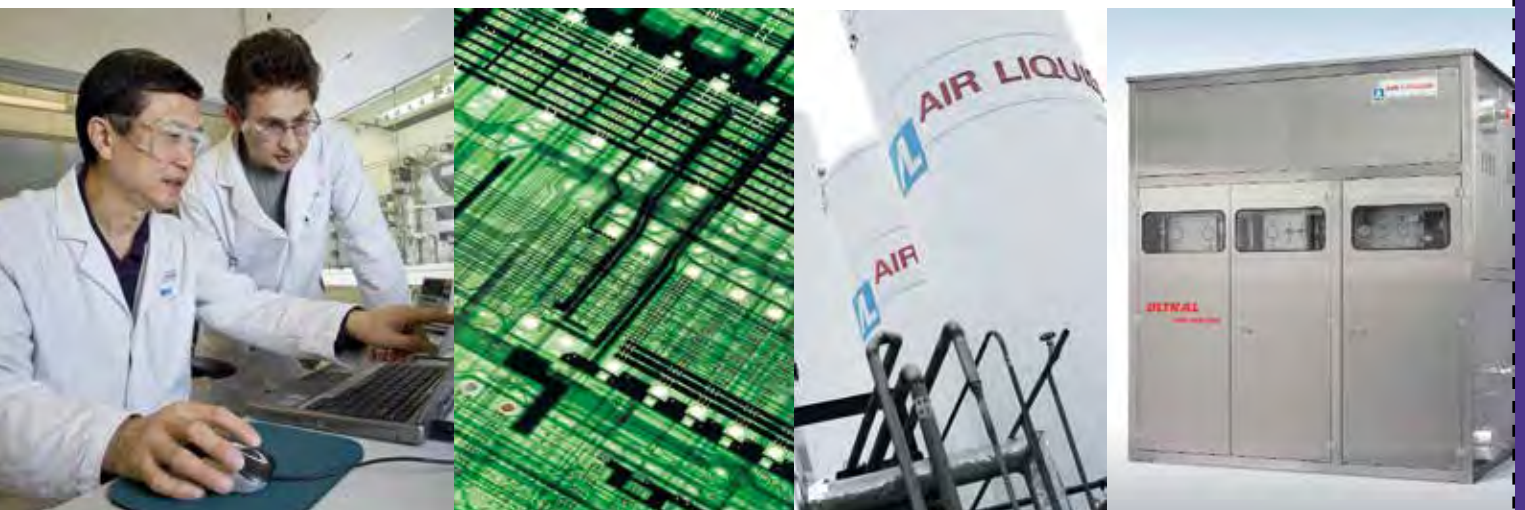
For more than 10 years, advanced Technologies has provided its customers with Electronic and Optoelectronic support throughout the world with leading-edge technologies. Our engineers and technicians satisfy your needs, proposing systems dedicated to the production and analysis of ultra-pure gases.

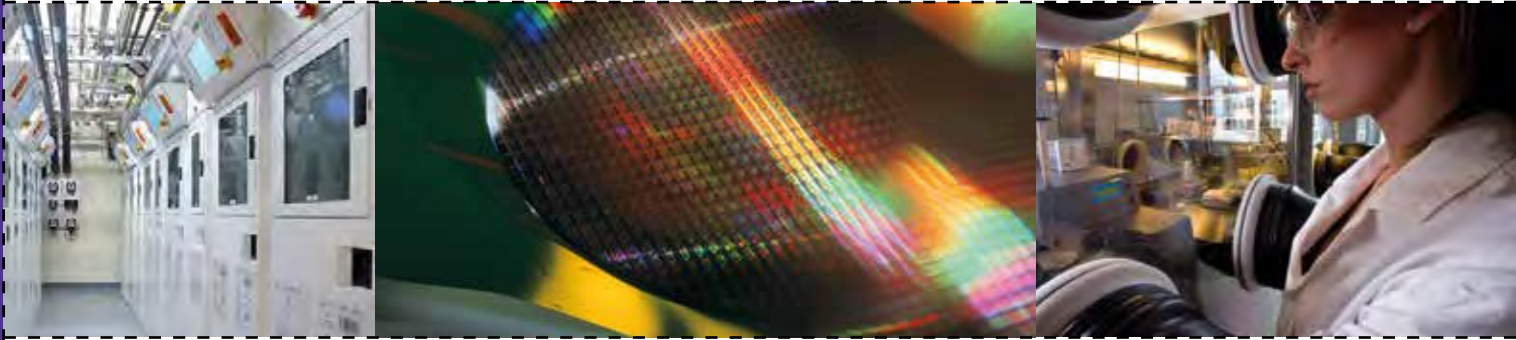
Our teams support you in your projects

- Assistance with specification and drafting the technical solution
- Design and execution
- Project steering
- Commissioning
- On-site training
- Operation (maintenance contract, up-grade...)
- Technical support (advice, spare parts...)

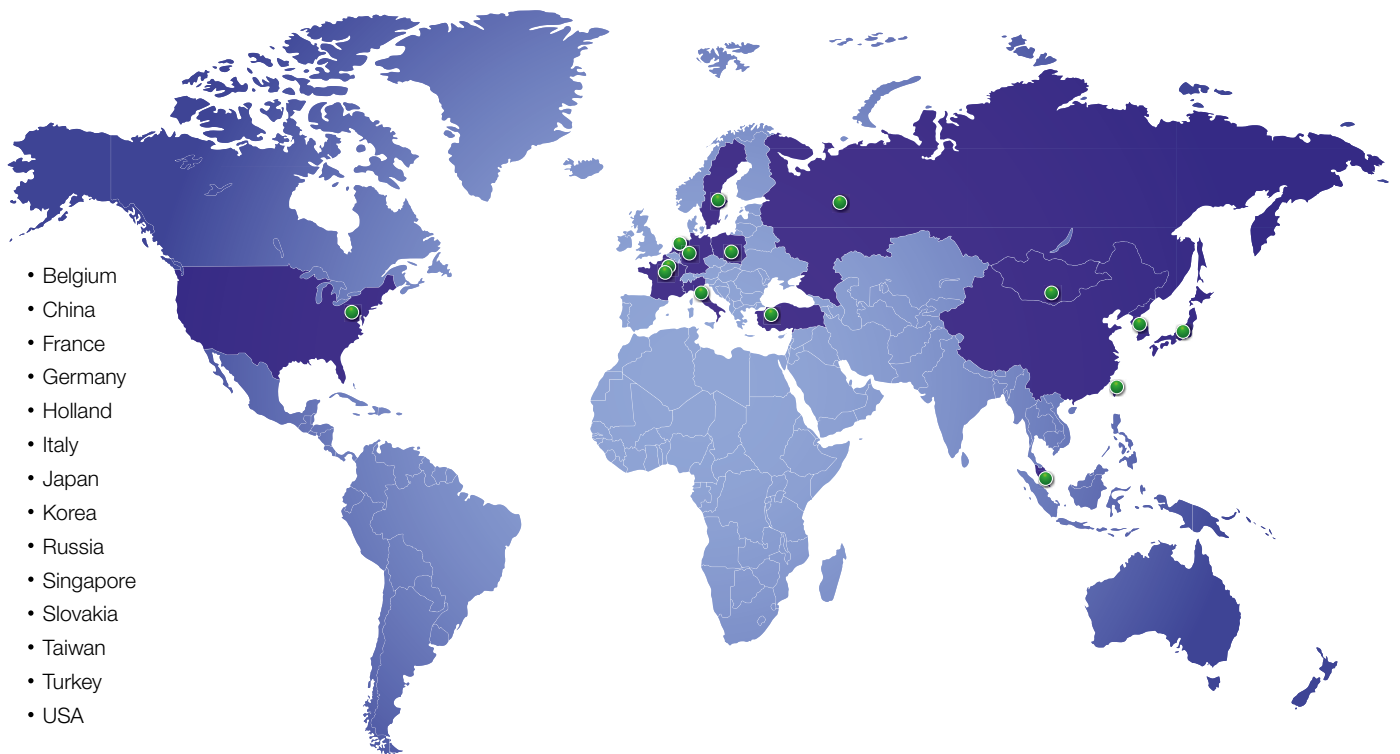
Benefits

- Recognised experience in the field of ultra-high purity
- Solid expertise in gas and cryogenic engineering
- Customised solutions to meet your specific needs
- Dedicated teams providing support
- Risk management
- The support of an international group





An international presence



Contacts

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The world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with approximately 68,000 employees and serves more than 3 million customers and patients*. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the core of the company's activities since its creation in 1902.

* Following the acquisition of Airgas on 23 May 2016