CRYOGEN SERIES

ON-DEMAND LIQUID NITROGEN GENERATORS

Meeting Your Cryogenic Needs, Safely and Conveniently

MAKE YOUR OWN LIQUID NITROGEN, ANYWHERE, ANYTIME!

F·DGSi
Innovative Gas System Company

The Expert in Liquid Nitrogen Generator Solutions

WWW.F-DGS.COM

WHO WE ARE

Founded in 2006, F-DGSi is a dynamic, family-owned French company specialized in manufacturing gas and liquid generators. Our Headquarters are located near Paris (France), where all our products are **designed and manufactured 100% in-house** by our own Research & Development centre. This ensures the reliability and quality of our products.

Our Commitment

At F-DGSi, we put **customer satisfaction first**. With a solid understanding of laboratory needs, we focus on delivering **innovative, high quality** solutions and a responsive support. Our technical engineering team and trained global distributor network are available to support you, ensuring you get the service and expertise you need. You are in **safe** hands with F-DGSi.

When you invest in an F-DGSi generator, you are buying more than just a generator. Throughout the generator lifetime we guarantee its performance with our [F-DGSi Care] service plans.

The values of F-DGSi

Know-how

The passion we share

Customer satisfaction

Is our top priority

Innovation

Is part of our DNA

Quality

A commitment that continues

Design

Because performance is not enough

Safety

You are in safe hands

WHAT WE DO

With the **know-how of our French engineering teams**, we provide laboratories around the world with a safer, more convenient and sustainable alternative to gas cylinders. Our generators produce your required supply for **Nitrogen, Hydrogen or Zero air on-demand** with a constant purity. Located closely to your analytical instrument eliminating the need for long gas lines in your lab or regular changing of gas cylinders.

F-DGSi has a **wide range of gas generators** products to meet the requirements of all your analytical instruments. Our high quality products, combined with **French technology and design**, provides you with absolute peace of mind and helps to reduce your operating costs, environmental impact and eliminates inconvenience of cylinder supply. **Don't buy your gas, make it!**

We manufacture liquid Nitrogen generators for various applications providing safety and on-demand production for laboratories, medical and other cryogenic industries. As our gas generators, this range is a sustainable and more convenient solution compared to conventional cylinder and bulk liquid supplies.

MAKE YOUR OWN LIQUID NITROGEN, **ANYWHERE, ANYTIME!**

CRYOGEN SERIES

Reliable, safe and plug-and-play supply for your cryogenic needs

Liquid nitrogen finds its applications across a spectrum of industries, from medical and scientific research to metal treatment and dermatology where ultra-low temperatures are critical. However, handling dewars of liquid Nitrogen can be challenging, with safety risks, logistical hassles, and purity concerns.

The solution? On-site, on-demand liquid Nitrogen production. The CRYOGEN series developed by F-DGSi allows you to generate your own liquid Nitrogen—anytime, anywhere! Just connect it to a power supply, press start, and produce 8 up to 960 liters per day automatically.

CRYOGEN Models for 10-80 L/Day

CRYOGEN Skid for 130-960 L/Day

Take control of your cryogenic production costs!

An on-site generator from F-DGSi is the **best practical, secured and cost-effective** alternative to dewars or bulk storage of liquid nitrogen. Traditional sources of LN_2 incur on-going delivery, administrative and rental costs, all of which have an impact on business revenue or facility budgets.

Thanks to our system, you will be completely independant from a third party supply!

See the full range: www.f-dgs.com/cryogen

KEY FEATURES

Why choose an F-DGSi Liquid Nitrogen Generator?

On-Demand Production
Generate liquid Nitrogen on-demand from ambient air.

Convenience
Eliminate the inconvenience from delivery delays and reliance on external suppliers.

Flexible Output
Produce **8 up to 960 L/Day** (higher capacities available).

High-purity LN_2
Produce liquid Nitrogen with 99% purity (Oxygen < 1%).

Remote control
Monitor and control via USB or internet access.

Low maintenance
Require minimal servicing and ensure maximum uptime.

Economical Performance
On-site generation is cost-effective and delivers a fast return on investment.

Safe Operation
Designed with a robust cabinet, certified built-in dewar, safety valves, and advanced electronics for secure use.

Easy to operate and dispense
Control via intelligent, intuitive touch screen to start/stop, monitor real-time process, set all parameters and schedule maintenance. Use the insulated cryogenic hose to easily dispense the liquid Nitrogen once the built-in dewar is filled.

Energy efficient & sustainable
Automatically switches to economy mode when not in use, reducing energy consumption, while sustainable on-site production eliminates the need for truck deliveries.

O_2 analyser with alarm
Built-in Oxygen sensor alerts the staff when Oxygen levels become critical.

“ Just plug in, press start, and the CRYOGEN automatically generates liquid Nitrogen on-demand! ”

ON-DEMAND LIQUID NITROGEN GENERATION

The liquid Nitrogen generation process of the CRYOGEN series starts with producing Nitrogen gas from ambient air, cooling and liquefaction, and ends with dispensing liquid Nitrogen directly from a built-in dewar.

The most reliable, efficient and proven technology available

At the core of the CRYOGEN Liquid Nitrogen generator lies the **Gifford-McMahon technique**, which uses a cold-head design to compress and expand Helium, achieving low temperature cooling of the gaseous Nitrogen.

A Cryo-Refrigerator mounted on the built-in dewar converts the generated gaseous Nitrogen into liquid Nitrogen at –196°C (-321°F). The cooling of the CRYOGEN system is possible either by Air or Water depending on your cryogenic requirements.

The liquefied Nitrogen drops down into a built-in certified dewar and can be dispensed easily through an insulated cryogenic hose. A dedicated sensor monitors the produced liquid Nitrogen levels, and the touch screen control allows real-time process management and liquid level monitoring. It also gives access to the service menu to check the running hours, schedule maintenance or review the logged events. Remote operation is possible via USB or internet connectivity.

The CRYOGEN system **delivers from 8 L/day up to 960 L/day** to meet the needs of most applications requiring liquid Nitrogen. Higher capacities available upon request.

Reliable Gifford-McMahon Technology

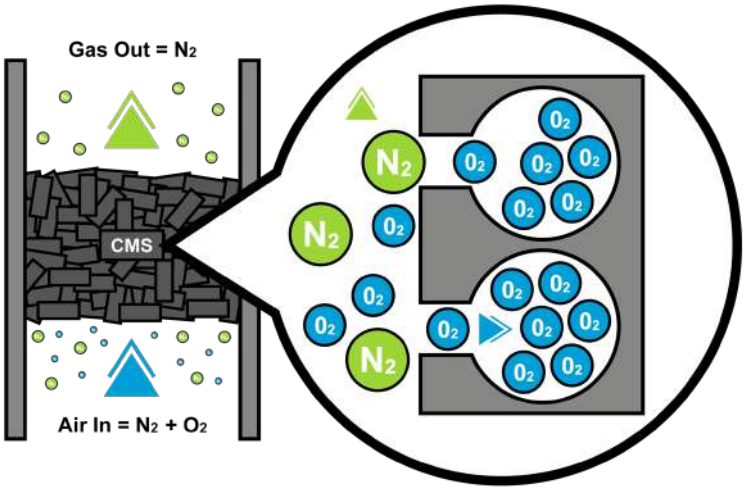
Watch the video on-line: www.youtube.com/watch?v=r67p8youHVo

Technology Pressure Swing Adsorption (PSA)

Nitrogen gas generators using **Pressure Swing Adsorption** (PSA) rely on **Carbon Molecular Sieve** (CMS) to produce high-purity Nitrogen from compressed air. CMS adsorbs smaller molecules like Oxygen and moisture, while Nitrogen passes through unadsorbed.
This process is used in our liquid Nitrogen generators to produce high-purity Nitrogen gas efficiently.

The process has two stages: adsorption, where O_2, H_2O, and CO_2 are captured by CMS while Nitrogen is collected, and regeneration, where pressure is released to vent the captured molecules, resetting the CMS for the next cycle.

Reliable and Robust **PSA technology**



Easy Dispensing of Liquid Nitrogen

TECHNICAL SPECIFICATIONS

As standard, our generators feature a fully automated system, combining oil-free air compression, PSA Nitrogen generation, cryo-cooling, and Helium compression.
All controlled via a user-friendly touchscreen.
The helium compressor can be cooled using two primary methods: water cooling or air cooling.

Water cooled Liquid Nitrogen Generator with Helium compressor

	Max L/Day	Max L/Hour	LN2 Dewar Capacity	LN2 Pressure	Power Consumption	Dimensions	Cooling Water requirement	Air Comp.	Electrical supply
CRYOGEN.20	20	0.84	60 L	Up to 1.5 bar*	4.2 kW	1	4.5 kW	0.6 kW	Type B or C
CRYOGEN.20+	20	0.84	210 L		4.2 kW	2	4.5 kW	0.6 kW	
CRYOGEN.30	30	1.25	210 L		4.2 kW	3	5.0 kW	1.2 kW	
CRYOGEN.40	40	1.67	210 L		4.2 kW	3	5.0 kW	1.2 kW	
CRYOGEN.65	65	2.7	210 L		6.9 kW	4	7.2 kW	1.2 kW	
CRYOGEN.80	80	3.33	210 L		6.9 kW	4	7.2 kW	1.2 kW	
CRYOGEN.130	130	5.42	300 L		13.8 kW	6	13.8 kW	4.0 kW	
CRYOGEN.240	240	10	500 L		13.8 kW	7	13.8 kW	4.0 kW	
CRYOGEN.480	480	20	1000 L		27.6 kW	8	30 kW	7.5 kW	
CRYOGEN.720	720	30	1000 L		41 kW	8	42 kW	7.5 kW	
CRYOGEN.960	960	40	2000 L		55 kW	9	55 kW	13.5 kW	

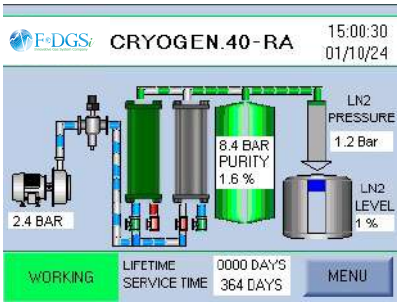
Air cooled Liquid Nitrogen Generator with Helium compressor

	Max L/Day	Max L/Hour	LN2 Dewar Capacity	LN2 Pressure	Power Consumption	Dimensions	Electrical supply
CRYOGEN.FLASK.08-RA	8	0.33	60 L	Up to 1.5 bar*	1.3 kW	1	Type A
CRYOGEN.10-RA	10	0.41	60 L		1.3 kW	1	
CRYOGEN.16-RA	16	0.66	60 L		2.7 kW	1	
CRYOGEN.20-RA	20	0.84	60 L		4.2 kW	2	Type B or C
CRYOGEN.30-RA	30	1.25	210 L		4.2 kW	3	
CRYOGEN.40-RA	40	1.67	210 L		4.2 kW	3	
CRYOGEN.65-RA	65	2.70	210 L		6.9 kW	5	
CRYOGEN.80-RA	80	3.34	210 L		6.9 kW	5	

Cryogen production rate at + 25°C and < 2000 meters altitude at 50Hz.
* boost mode up to 4 bar to increase liquid N2 production.

Control CRYOGEN via user-friendly touchscreen to start, monitor and set all parameters

The in-house developed software ensures full control for easy upgrades. It offers a user-friendly interface displaying all vital parameters (N_2 flow rate, pressure, purity, LN_2 production %, air inlet pressure, operating hours, date, time) and system status (operation, service alarm, economy, shutdown mode).



Helium Compressor Cooling

The difference lies in the method used to dissipate the heat generated during the liquefaction process.
A water-cooled system uses a water circuit to absorb heat through a heat exchanger. The heated water is then cooled in an external system. This type of cooling is more efficient in hot environments.
Chiller system in option (see page 13).
An air-cooled system uses fans to circulate air around a heat exchanger to dissipate the heat into the atmosphere. This method is simpler to install and does not require water, but it is less efficient in hot environments.
The choice depends on the environment, performance, and installation constraints: water-cooled systems offer optimal efficiency, while air-cooled systems suit simpler installations or areas with limited water access.

OTHER SPECIFICATIONS		
Liquid N_2 Purity		> 99% (< 1% O2)
Built-in O_2 analyser with alarm		Yes
Temperature range		7 - 25°C (45 - 77°F)
Type of Electrical supply	**A**	100 - 240 V ac / 1 ph + neutral and earth / 50 - 60 Hz
	B	200 V ac / 3 ph + neutral and earth / 50 - 60 Hz
	C	380 - 440 V ac / 3 ph + neutral and earth / 50 - 60 Hz
Noise level		Between 52 and 65 dBA (depends models)
USB/PC Control		In series

DIMENSIONS & WEIGHT			
Type	N°	W x H x D	kg / lbs
1 door cabinet on wheels	**1**	80 x 196 x 80 cm (31" x 77" x31")	320 / 705
2 doors cabinet on wheels	**2**	180 x 196 x 80 cm (71" x 77" x 31")	450 / 992
2 doors cabinet on wheels	**3**	180 x 196 x 80 cm (71" x 77" x 31")	506 / 1115
2 doors cabinet on wheels	**4**	180 x 196 x 80 cm (71» x 77» x 31»)	600 / 1322
2 doors cabinet on wheels with remote cooling unit	**5**	180 x 196 x 80 cm (71" x 77" x 31") + unit 100 x 95 x 34 cm	600 / 1322 (unit 120 / 264)
Skid platform (without chiller & comp.)	**6**	200 x 170 x 200 cm (78.7" x 67" x 78.7")	1250 / 2755.7
Skid platform (without chiller & comp.)	**7**	160 x 180 x 280 cm (63" x 70.8" x 110")	1770 / 3902
Skid platform (without chiller & comp.)	**8**	200 x 250 x 300 cm (78.7" x 98" x 118")	2500 / 5511.5
Skid platform (without chiller & comp.)	**9**	200 x 250 x 300 cm (78.7" x 98" x 118")	3000 / 6613.8

OPTIONAL ACCESSORIES

The Cabinet generators design have a built-in oil-free air compressor, our own Pressure Swing Adsorption (PSA) Nitrogen gas generator, which goes through a medical filter and is liquefied by a cryocooler integrated with a storage dewar. The full colour HMI touch screen user interface allows automated production with customisable options. We offer different options, which are listed below:

Cryogenic Safety Equipment

Personal safety is crucial when working with cryogenic liquids. F-DGSi offers a range of personal protective equipments, including cryogenic gloves, visors, and aprons.

Insulated Cryogenic Hoses / Isolation valves

The perfect solution for safely dispensing liquid Nitrogen or transferring it from one Dewar to another, ensuring optimal performance at extremely low temperatures.

Range of dewars

To suit individual laboratory storage and liquid Nitrogen handling requirements.

Aluminum Dewars: The vacuum-insulated, double-walled aluminum containers are therefore ideally suited for use in medical institutes, biological laboratories, institutes for artificial insemination and pharmaceutical facilities.

Cryogenics Liquid Cylinders: They are specially designed for safe and economical long-term storage of larger sample quantities and are therefore used in medical, pharmaceutical and research fields.

Oxygen depletion alarm

The alarm monitors continuously Oxygen levels in a defined space. It can control third party systems and provide audible and visual alerts in case of an incident. If the Oxygen level in the air drops below a preset value, the alarm warns occupants to ensure safety.

Water chiller

Recirculating water chillers ensure accurate and constant cooling conditions of instruments (for Helium compressor water cooled version).

Emergency stop button

Allows the generator to be immediately stopped. It plays a crucial role in enabling a quick response to unexpected situations, while reducing risks to both people and equipment.

Ethernet communication

Connect your generator to your network for remote controle everywhere.

LN_2 recovery tray

A tray designed to collect liquid nitrogen overflow from a dewar, protecting the floor from damage.

Different dispensing method

- **Front Flask Dispense System:** is designed to enhance safety during liquid Nitrogen (LN_2) dispensing.

- **External Distribution System with insulated Hose:** Dispensing is streamlined with an external valve and hose, eliminating the need to open the cabinet door. Both the valve and hose can be positioned outside the unit for added convenience and safety.

- **Automatic Dispense Filling:** No need to fill manually your dewars, this system allows an automatic filling from the liquid Nitrogen production.

Need another dispensing method? Just contact us!

INSTALLATION AT CUSTOMER SITES

The CRYOGEN.65 filling an external dewar with liquid Nitrogen.

The customer *Institut Pasteur du Cambodge* fills another dewar safely.

The customer fills a small aluminum dewar to transport it elsewhere.

> Their system is extremely robust. I use the CRYOGEN.40-RA model, and the team customized it perfectly to meet my needs. Thanks to their modifications, filling my electron microscope cooling Dewar, located 1.8 meters high, has become much easier and more efficient.

Philippe Chan
University of Rouen

> *We are using a CRYOGEN (40L/day) from F-DGSi France since now 3 years for Cryotherapy. We are really happy of the performance of the unit, the remote connectivity of the system and the support of F-DGSi.*
>
> *We recommend strongly to work with F-DGSi for all cryogenic applications.*

Oliver Sommer
Art Physio Dresden, Germany

CRYOGENIC APPLICATION RANGE

Liquid Nitrogen generators for laboratories, medical and other cryogenic industries

Liquid nitrogen plays a key role across multiple sectors, offering essential cooling and preservation capabilities that are crucial for a wide range for differents applications.

Industry and Technology

Cryogenic grinding

Cryogenic grinding with liquid Nitrogen cools substance to a defined and controlled temperature for easier and less energy-intensive processing. This technique reduces heat generation and oxidation while preserving aromas or active pharmaceutical compound. It's increasingly used for recycling materials that are difficult to grind.

www.f-dgs.com/applications/cryogenic-grinding

Metal Treatment

Metals like steel, iron, copper and aluminium are often heat treated to improve their physical properties. The metal is heated and then cooled. Thanks to cryogenic process using liquid Nitrogen to freeze metal.

www.f-dgs.com/applications/metal-treatment

Cryogenic insulation in oil industry

Liquid Nitrogen freezes water and oil pipes when a valve is unavailable to block the fluid flow. This facilitates intervention without stopping the flow. It also reduces thermal losses in cryogenic systems, such as LNG pipelines.

www.f-dgs.com/applications/cryogenic-insulation

Superconductivity coolant

Liquid Nitrogen is used as a superconductivity coolant due to its ability to reach extremely low temperatures, efficient heat transfer, and safe handling, making it ideal for enabling high-temperature superconductors.

www.f-dgs.com/applications/superconductivity coolant

Medical and Healthcare

Cryopreservation

Biological materials like oocytes, embryos, tissues, and organs need ultra-low temperatures to remain viable and intact over time during storage. Liquid Nitrogen is essential for this cryopreservation as it cools the biological materials to -196°C (-321°F).

www.f-dgs.com/applications/cryopreservation

Cryotherapy

Known as cold therapy, is used in medical therapy to treat a variety of tissue lesions or skin abnormalities (cryosurgery) with liquid Nitrogen. It is also an effort to relieve muscle pain, sprains and swelling after soft tissue damage (especially athletes) by applying liquid Nitrogen to the skin or targeted areas.

www.f-dgs.com/applications/cryotherapy

In-Vitro Fertilization (IVF)

IVF involves complex procedures to aid fertility, prevent genetic issues, and support conception. Liquid Nitrogen is vital for storing embryos, sperm and eggs, ensuring the success of this fertility process.

www.f-dgs.com/applications/ivf

MRI (Magnetic Resonance Imaging) systems

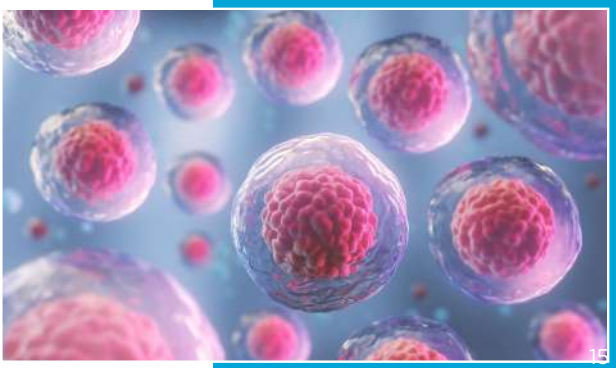
Liquid Nitrogen is used in MRI to thermally insulate superconducting magnets, reduce helium losses, maintain superconductivity, and lower operational costs.

www.f-dgs.com/applications/mri

Cell Preservation

Liquid Nitrogen preserves cells but is also used to apply a source of cold to tumor lesions (cryosurgery). Liquid Nitrogen can freeze several types of cells: graft while waiting for transplant, hematopoietic stem cells while awaiting reinjection.

www.f-dgs.com/applications/cells



Dermatology

Liquid Nitrogen in dermatology destroys certain skin lesions. Heat shock causes crystallization of the water contained in the cells. The freezing and heating phases constitute a freeze-thaw cycle. Many lesions can be treated: acne, scars, warts or skin cancer.

www.f-dgs.com/applications/dermatology

Scientific Research and Laboratory

Nuclear magnetic resonance (NMR)

NMR Spectroscopy is used to analyse the physical and chemical composition of materials. Liquid Helium is required to cool down the magnet of NMR and liquid Nitrogen is used to absorb heat from outside the magnet.

www.f-dgs.com/applications/nmr

Two-Dimensional Gas Chromatography (GC-2D)

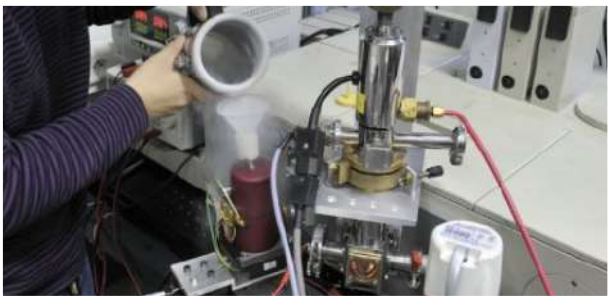
GC-2D is a technique for analysing complex samples which require several columns used in series. Liquid Nitrogen traps the molecules of the first dimension.

www.f-dgs.com/applications/gc-2d

Infrared

LN_2 is crucial for infrared applications, offering efficient cooling for detectors to reduce thermal noise. It plays a key role in optimizing the performance of infrared systems, ensuring improved accuracy and reliability.

www.f-dgs.com/applications/infrared



Cryo Crystallizer

Uses liquid Nitrogen to rapidly cool solutions, precisely controlling temperature to promote the constitution of pure, stable crystals at low temperatures.

www.f-dgs.com/applications/cryo-crystallizer

Cold traps

Cold traps use liquid Nitrogen to rapidly condense vapors thereby trapping them and protecting vacuum pumps from moisture and solvent vapors.

www.f-dgs.com/applications/cold-traps

Agriculture, Agri-food and Environment

Animal husbandry

Liquid Nitrogen is vital in animal husbandry for cryopreserving genetic material like sperm, ova, and embryos, aiding in genetic improvement, species conservation, and international transport. It also preserves tissues and organs for research. Animal husbandry is breeding animals for food and work.

www.f-dgs.com/applications/animal-husbandry

Agro Food Preservation

For rapid freezing, liquid Nitrogen ensures the preservation of food textures, flavors, and nutritional value. This process helps to maintain the original quality of the products. Additionally, it extends the shelf life of food by significantly reducing microbial activity, making it ideal for long-term storage and maintaining food safety.

www.f-dgs.com/applications/agro-food

Marine biology

Liquid Nitrogen is used to preserve Breton marine specimen samples, ensuring the integrity of DNA and proteins for future analysis. This method guarantees the preservation of the samples for research and ecological studies, maintaining their quality for scientific use over time.

www.f-dgs.com/applications/marine-biology

Beverage and Drinking water

Beverage and drinking water manufacturers utilize liquid Nitrogen dosing in their bottles and cans to create internal pressure. This process reduces the need for excessive plastic, enhances the ability to stack products efficiently, prevents oxidation, and extends the shelf life of the products.

www.f-dgs.com/applications/beverage

Gastronomy

Liquid Nitrogen is often used in modern cuisine to produce frozen foams and ice cream. After freezing food, nitrogen boils away creating a thick fog. Liquid Nitrogen is also appreciated by chefs for molecular gastronomy and food preservation.

www.f-dgs.com/applications/gastronomy

ALL BENEFITS

WORLD-CLASS BENEFITS IN ORDER TO MAINTAIN YOUR SUPPLY OF GAS & LIQUID NITROGEN

With F-DGSi generators, it is a new partnership that begins. Whether it is for an installation, an unforeseen breakdown or any other service, our teams of engineers and technical assistants are at your disposal to answer your questions related to our generators, wherever you are in the world.

F-DGSi expertise: What do we cover?

In order to be as close as possible to our customers, we have a wide range of services and benefits to meet your expectations. Installation, maintenance and qualification of your products, we strive to help and advise you in the implementation of your F-DGSi products. For special requests other than the one below, please contact us, we will be happy to find solutions.

Installation
Installing the products to meet your needs

Re-location
Relocation service for your products

Rent or lease sale
Rental of a wide range of equipment

Advice
Your expert in gas supply by your side

Parts Service / Consumables
A hotline to guarantee you a 48h deadline

Maintenance
Service plans and maintenance contracts

Repairs
Repair on customer site or F-DGSi office

4Q Qualifications
CQ / IQ / OQ / PQ Qualifications

Customized training
Training by our technical experts F-DGSi

Learn more on www.f-dgs.com/benefits

[F-DGSi Care]

GET PEACE OF MIND WITH OUR WORLD-CLASS GENERATOR SERVICE PLANS

When you invest in an F-DGSi generator, you are buying more than just a generator. Throughout the generator lifetime we guarantee its performance with our [F-DGSi Care] service plans.

5 types of service plans for your generator

With on-site repairs and regularly scheduled maintenance, our various contracts will help you to reduce disruptions to your laboratory operations and to improve efficiency and productivity, with no hidden or unexpected costs.

Hotline Contract Do the maintenance yourself with our unlimited support by telephone	**Day Ticket Contract** Peace of mind for your maintenance budget	**Basic Preventive Contract** Includes preventive visit, travel and labor without parts
Silver Preventive Contract Includes preventative maintenance visit, travel, labor and parts	**Gold Contract** Contract Premium: Total peace of mind	

The benefits to take one of our FrenchCare Contracts

Cost Control

Preventive maintenance by experienced professionals of F-DGSi will reveal any wear and tear at an early stage. This avoids unexpected expenses and allows you to better control the costs of using the device.

Reduced downtime

Reduce your risk of breakdowns and unscheduled downtime! Remote access to your equipment allows to analyze critical equipment parameters and identify pending failures before they affect your lab operations.

Priority

With a Service Contract, you are our priority. We guarantee a quick maintenance response in case of emergency.

Flexibility

At the point of equipment sale, different payment options are available (Annual, Bi-annual, Quarterly, ...)

Get more details for contracts on www.f-dgs.com/service-plans

F-DGSi
Innovative Gas System Company

INNOVATIVE GAS & LIQUID GENERATORS

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