Liquid Nitrogen Generators line

LabTech product range

Product Features

PSA N2 Generator

The nitrogen gas generator built into every LN model is a PSA (Pressure Swing Adsorption) design in order to separate the nitrogen from oxygen and other constituent gases / particles. The main advantage of a PSA nitrogen gas generator over membrane is the ability to process the nitrogen gas down to a dew-point of -70°c to prevent moisture in the gas from icing up the LIN storage dewar. This compares to a membrane which may typically provide -40°c dew-point and over time deteriorates in performance as the pores become blocked. The CMS (Carbon Molecular Sieve) used in PSA systems is completely regenerating and will last for the life of the generator without the need for replacing it.

N2 Gas Pre-Cooling

All water cooled models have an air or nitrogen gas pre-cooler incorporated into the system to use external helium compressor cooling water to also pre-cool either warm compressed air or nitrogen gas prior to entering the liquefaction process. This has an advantage in both normal and higher ambient temperature environments to ensure the N2 gas is pre-cooled and assists in maintaining the full expected daily production rate of the system.

Product Features

Oxygen Analyser

For Liquid Nitrogen Generation it is extremely important to monitor the purity of nitrogen coming from your PSA generator or external nitrogen gas source. Failing to monitor and control this could result in large amounts of liquid oxygen becoming present in the your storage dewar, something that is potentially dangerous. The oxygen sensor displays the concentration of oxygen on the color graphic touch screen.

Liquid Dewar Certification

All of our vacuum insulated liquid nitrogen dewars are manufactured by a well known dewar fabrication company. All the dewars are fully certified to the following standards and you should not accept any pressurized liquid nitrogen container that fails to meet these or an equivalent country standard.

Product Features

Vacuum Protection System

When a cold-head is running it will demand a certain flow and pressure of nitrogen gas which is quickly turns to a liquid. If the nitrogen gas flow to the cold-head process drops below the level required then the cold-head will quickly turn any remaining gas in the dewar to liquid nitrogen which in turn lowers the tank pressure. It is possible that this could result in a negative pressure (vacuum) becoming present in the dewar. Failure to notice this when dispensing liquid results in moist ambient air being drawn into the dewar which ices up inside which requires a lengthy de-frost and purging process to resolve.

Dispensing Valve and Hose

All parts used on the cryogenic side of the system are vacuum insulated, not only does this reduce boil-off losses but prevents the build up of frost or ice when dispensing the liquid. From a health and Safety standpoint this is extremely important and gives peace of mind that dispensing is both safe and easy.

Product Features

Pressure Boost Dispensing
There are 2 parts to the pressure boost system:

1. Nitrogen gas from the PSA is pushed into the dewar in order to create a positive pressure to dispense the liquid nitrogen. This avoids the need for wasteful pressure building circuits within the dewar.

2. Liquid nitrogen is produced at 1.5 bar within the dewar but a BOOST button allows this pressure to be increased up to 4.0 bar which produces more LN2 at no extra cost to the user.

Dewar Level Control
A battery operated level display is located on the top of every dewar with a analogue feedback signal sent to the control system to monitor liquid level. Within the HMI control system is a level control screen allowing the user to determine the maximum and minimum levels to stop and re-start production. This can be used to determine optimum liquid level and efficiency.

Product Features

N2 Gas Filtration Standards

Nitrogen gas from the PSA is filtered prior to entering the cold-head and liquid process, this is to ensure that the gas particulate is to an extremely high standard in order to maintain high quality product. The filter and element provides <0.01 micron particulate standard and purity suitable for the Health Technical memorandum (HTM) 02-01 Guidance – gas quality in a medical pipe line.

Control System & Communications

The Touch screen, PLC controller and software are fully supported by our in-house control systems department giving us full control and ability to make changes and upgrades if required. The system has various features for remote communications:-

Safety and security

Safety and Security

Liquid nitrogen as an extremely cold fluid can cause serious burns (frost bite) along with the liquid expanding to 700 times its liquid state can deplete the oxygen in a room to unsafe levels.

Whether built into a locked enclosure or skid base, safety features and warning signs have been fitted to reduce hazardous to a minimum. Warning signs and vacuum insulated cryogenic equipment ensures little to no liquid exposure to personnel.

When working with a liquid nitrogen dewar you are faced with a large amount of stored gas of 700 times its liquid volume. If this is vented into a small non-ventilated space there is a risk of a serious oxygen depletion situation. With a PSA nitrogen generator onboard which vents waste oxygen into the room, this mixes with vent off nitrogen gas to help maintain an equal atmosphere and greatly reduce an oxygen depletion situation. We always recommend and offer one of our Oxygen depletion monitors (shown below) which can be easily mounted close to the generator and connected to an alarm and ventilation fan for emergency venting of a room.

Generators VS Deliveries

Generating your own liquid nitrogen on-site has many advantages over on-going deliveries. Once the capital expenditure is made and the system installed you can take advantage of its quality, reliability and efficiency savings for years to come.

Quality
How clean is your liquid nitrogen delivery ? It is impossible to see inside the dewar and everyone assumes the internals of the dewar are clean, and when supplied by a tanker, are the transfer hoses clean ? With a generator the dewar and transfer hose are cleaned to an exacting standard ensuring a pure end product. The PSA, nitrogen medical filter and vacuum protection software ensures the risk of dewar contamination is to an absolute minimum.

Efficiency
Once purchased your only cost is power and annual maintenance, this normally works out to be one third of the cost you buy LN2 is for, from tank rental, price per litre, delivery, environmental charges and internal costs of processing and paying monthly orders and invoices all add up. The payback period is generally 12-24 months then years of saving on your liquid supply. Losses from delivered LN2 up to 20%, losses from an LN2 generator <1% due to the innovative design - generating your own LIN in Worlds apart from waiting for your delivery

Example installations

NMR (Nuclear Magnetic Resonance)

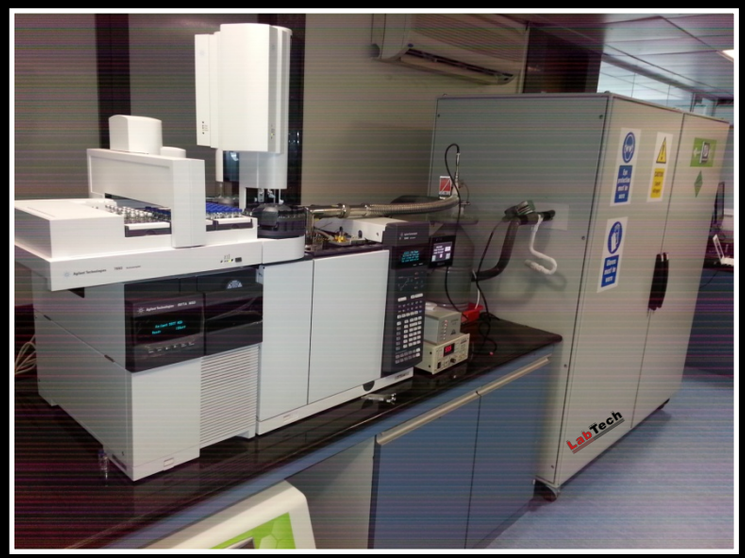
LabTech worked closely with a World renowned instrument manufacture in the design of a purpose built LN2 system to automatically top up the NMR when the level dropped to a predetermined figure. The normal filling method was to either stand on a ladder and pour LN2 into the machine or attach a hose from a static dewar. The advantages of the LN2 Generator to there to see, feedback from the NMR to the generator opened a solenoid valve to top up the NMR with no need for personnel to be in contact with any LN2.

Example installations

Biological Sample Freezing (outside installation)

A UK NHS hospital Trust chose an on-site liquid nitrogen generation plant over delivered LN2. This system had a fast payback period, fixed their LN2 costs and made a significant saving to the Trust. The space restrictions within the building allowed us to offer an outside installation with extra pipe-work to take the LN2 from the ground to the first floor. We also were given the cryo-room internal pipe-work to install and commission including our oxygen depletion sensor and push button (dead-mans switch) for dispensing.

Example installations



LN40 + Gas N2 Generator

Location: India – this LN40 system was installed to feed cold nitrogen gas into an Agilent Thermal GCxGC system which also required an additional LN40 nitrogen gas generator to supply a flow of inert gas into the instrument.

Example installations

Research Centre

The International Institute for Tropical Agriculture (IITA) in Nigeria took delivery of an LN60 with water chiller and oxygen depletion alarm connected to an extractor fan. Due to the unreliable service and high cost of delivering LN2 in the region the Institute chose an on-site generation system which was easily installed and commissioned by site staff.

Questions?