

Freshline[®] LIN-IS (Liquid Nitrogen Injection Solution)



A tailor-made temperature control system for coating, mixing and forming applications

Advantages of Freshline LIN-IS

- Consistent and repeatable cooling process
- Prevention of microbial growth
- Reduced aroma and flavour loss
- Improved visual appearance
- Optimum Liquid Nitrogen usage
- Simple to operate, clean and maintain
- Cost effective
- Designed to your specifications
- Complies with latest hygienic design standards
- CIP option available
- Designed in accordance with Air Products' Global Engineering Standards

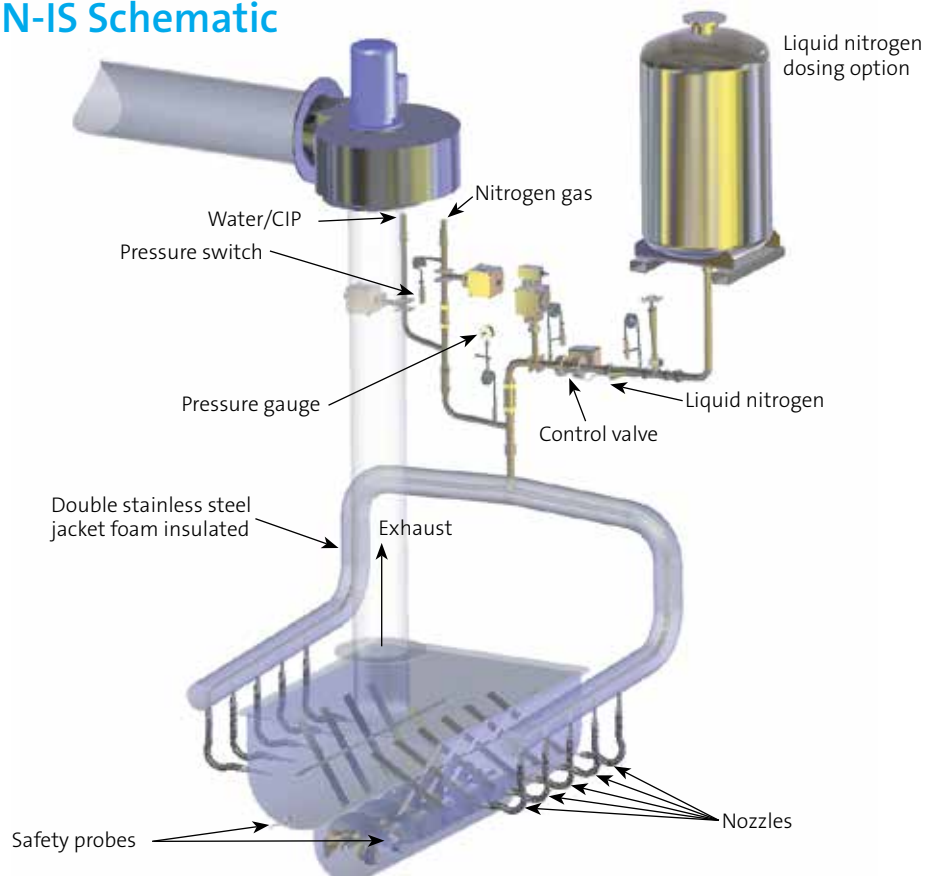


Consumers today want convenient, high quality, easy to prepare dishes. In order to meet these demands, food processors are finding new ways to innovate. One particular trend is towards coating, mixing and forming of frozen and chilled products.

Benefits of liquid nitrogen

Compared with traditional mechanical equipment, liquid nitrogen systems reduce moisture loss, individually quick freeze products (so no clumping) and avoid water crystal formation, leaving a much higher quality end product. Liquid nitrogen systems can bring about a rapid drop in temperature and thus a very efficient chilling solution. This can be used effectively to control temperature, giving you high quality products and repeatable and reliable processes. This is why we have developed a specially designed liquid nitrogen injection solution which can be retrofitted to new or existing mixers, buffers and any type of stainless steel vessel.

Freshline LIN-IS Schematic



N₂ versus CO₂ – dispelling the myths

There have been many claims over the years that compared with liquid nitrogen, the use of carbon dioxide as a refrigerant for the cooling and mixing of meat products can have certain effects on microbial shelf-life, colouration and dehydration.

Recent research carried out by Air Products has ascertained that although the uptake of carbon dioxide by meats is rapid, if it is then removed from a carbon dioxide atmosphere, then the desorption of the dissolved gas is equally rapid. For this reason it seems highly unlikely that a chill process using carbon dioxide, on its

own and without subsequent MAP packing, would have any effect on the shelf-life of meat products.

Similarly the treatment of meat with carbon dioxide has no known effects on the pigmentation of the meat. Carbon dioxide and nitrogen can both lead to the loss of oxygen from the surface reducing oxymyoglobin to myoglobin. Chilling in a carbon dioxide atmosphere would lower the pH of the meat and lead to some lightening of the colour. This is unlikely to be significant in comparison to other MAP techniques and will again revert to the pre chilling condition as carbon dioxide evolves from the meat after chilling.

Comparing dehydration rates between the two refrigerants is difficult because the processes employed are not identical. However based on the rate of change of the surface temperature of the product alone, similar chilling equipment will produce less dehydration with a nitrogen refrigerant because of the faster reduction of the surface temperature. The refrigerant gas employed would not affect the amount of vapour that can be carried away from the surface.

Research carried out on behalf of Air Products by Dr. C.J. Kennedy of Nutrifreeze Ltd August 2006.

A complete solution

We don't just supply the injection only; we work closely with our customers to create a complete customised solution, meeting the highest safety and hygiene standards. This can include:

- liquid nitrogen network from control valve to injectors

- liquid nitrogen supply to control valve
- control systems
- mechanical and electrical modifications
- exhaust systems
- process support

Air Products has over 15 years of experience retrofitting nitrogen on many types of mixers and grinders. We can also work with your vessel supplier to make the modifications prior to delivery to your site in order to save time and money.

Case study: Controlling temperatures in the meat industry

In recent times, an increasing number of high capacity meat mincing machines are being used to deliver the growing demand for burgers and other formed products. However the heat generated by these machines during the mincing process often means that subsequent forming of the meat product can be difficult.

Currently this problem can be addressed by mixing in frozen meat product with the fresh but the results are not always reliable. In addition, the quality of the minced product is considerably reduced because the frozen meat does not provide enough cold to even out the temperature.

The Freshline LIN-IS can be used to control the temperature of the meat itself through controlled injection of liquid nitrogen (LIN) into the product during mincing. The nitrogen injection is regulated, providing the cold that is required at all times and adjusting the gas consumption to the requirements of the process. This results in improvements in the quality of the minced meat as the fat is not broken up and the cuts are regular and even.

- The mixes are more even as the time taken to make them does not need to be shortened as the temperature increases
- Bacteria are inhibited by changing the contact atmosphere of the meat (no oxygen)

- The appearance of the meat is improved by avoiding the formation of metamyoglobin, resulting from excessive exposure to oxygen in the air

The system ensures repeatable and consistent product for forming

This is just one industry example of where the Freshline LIN-IS can enhance your process. This solution is also suitable for soups, sauces, mixed vegetables, fish, chicken and many other products.



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