

Blood Management Solutions

# Smart Plasma Storage Freezers from B Medical Systems



While a number of Plasma Storage Freezers on the market today have automatic defrost controls, there still exists a number of manual models as well. As frost and ice build-up can significantly influence the efficient functioning of a plasma storage freezer, the procurement decision of a Plasma Storage Freezer should carefully evaluate the performance parameters of the freezers, especially the temperature fluctuations during the defrost cycle and the energy consumption. This paper assesses the smart auto defrost technology used by B Medical System Plasma Storage Freezers' on the temperature deviation inside the chamber especially during the defrost cycle and also the operational efficiency.

Today in the market, there exists Plasma Storage Freezers that offer manual defrost options or auto defrost capabilities. Automatic defrost freezers contain heating elements and work by heating them at regular intervals routinely. Even though this increases convenience, often times there are concerns regarding the temperature fluctuations during the auto defrost cycle and the energy consumption of the auto defrost freezers. B Medical Systems offers Premium Line Plasma Storage Freezers for the safe storage of Fresh Frozen Plasma (FFP) with set point temperature ranging from -32°C to -41°C and are designed with smart auto defrost technology that intuitively defrosts the unit depending on the pre-set parameters. In this aspect, the core benefits offered by the plasma storage freezers from B Medical Systems are:

## 1 Smart auto defrost cycles driving a frost free operation and convenience

Ice build-up inside the freezer can result in longer compressor running times leading to higher operational expenditure. Icing around the gaskets and inner doors (Fig 1) also makes it difficult for proper closing of the doors leading to cold air loss that can eventually result in higher internal temperatures. However, in order to maintain the integrity and efficacy of the frozen plasma in long-term storage, the temperature inside the chamber should always be maintained at the mandated temperature range. B Medical Systems' Plasma Storage Freezers are designed with smart auto defrost technology that:

- Effectively maintains the temperature inside the cabinet during the defrost cycle
- Defrost the unit based on a pre-set time and/or the presence of moisture

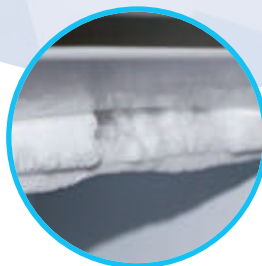
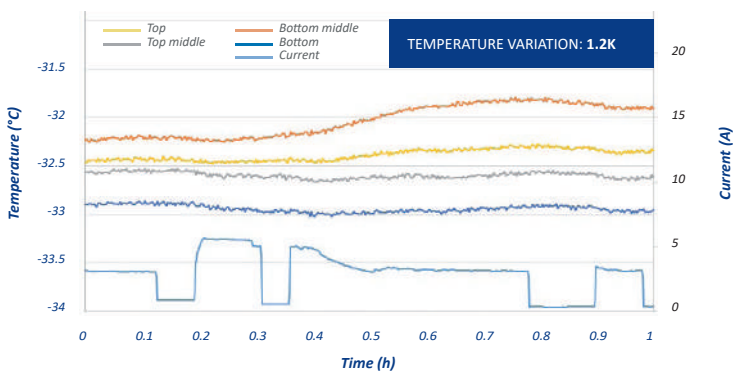


Fig 1: Ice formation in Freezers

Effectively maintains the temperature inside the cabinet during the defrost cycle. Smart auto defrost technology along with the superior refrigeration process helps to maintain even temperature distribution across the entire freezer chamber avoiding any temperature gradients. Fig 2 represents the temperature uniformity of B Medical Systems' Plasma Storage Freezer F701 and as represented by the chart, even during the defrost cycle, the defrost technology maintains a minimal temperature deviation within the chamber- only 1.2K from the warmest to the coldest point

Fig 2: Defrost Sequence of F701 at 25°C ambient with a set point of -32°C (loaded condition)



**B Medical Systems Plasma Storage Freezers are also designed with evaporators at the top (Fig 3) of the cabinet.** B medical Systems Plasma Storage Freezers are designed with heavy duty finned-tube evaporators placed at the top of the cabinet (Fig 3). During normal operation, the forced air circulation moves all the humid air inside the freezer towards the cold evaporator fins where the frost build-up takes place thereby avoiding ice formation inside the freezer. The evaporators are designed with wide spaced fins to allow for a stable operation even under heavy usage conditions. During the defrost cycles the accumulated frost on the evaporator coils is removed by an energy benign hot gas injection. The evaporator compartment is properly insulated, so that the temperature increase inside the freezer associated with the defrost cycles has a negligible effect on the temperature of the plasma bags.

Defrost the unit based on a pre-set time and/or the presence of moisture. The system detects the usage pattern of the freezer based on door openings, which is the major source of moisture intake to the freezer. The smart auto defrost technology can perform 0-4 defrost cycles per day enabling frost-free operation. The auto defrost parameters are pre-programmed but can be adapted upon end-user request to better fit their usage needs.



Fig 3: Airflow Ventilation of Plasma Storage Freezers from B Medical Systems with evaporator on top



In addition, the smart defrost capability also provides more convenience and ease of use by avoiding the hassles associated with a manual defrost freezer including the need to have an alternative freezer space during defrost operations and less maintenance thereby reducing the time and effort associated with manual defrosting process.

## 2 Energy efficient design driving operational efficiency

In recent years, the end users of medical refrigeration products worldwide have started focusing more on the energy efficiency of laboratories due to the increased costs of electricity, regulations and awareness related to environmental impact. This is relevant to Plasma Storage Freezers also as these are energy intensive devices and can create financial burden through operational expenditure especially if they use auto defrost technology. The defrost process requires not just a shutdown of the refrigeration system, but also activation of the heating coil, which is one of the key drivers of energy consumption.



## B Medical Systems' Plasma Storage Freezers use:

- **Smart auto defrost technology** that intuitively detects the presence of moisture/frost build-up and triggers the defrost cycle only if required thereby driving energy efficiency
- **Hot gas defrosting**, which is quicker and more energy efficient than electric defrost cycle
- **Two inner doors made of aluminum** that reduce cold air losses and heat conduction, when the outer door is open
- **Natural gas refrigerant R290 (Propane)** also known for its capabilities to yield more capacity with lower wattage, with its zero Ozone Depletion Potential (ODP) and a very low Global Warming Potential (GWP), increasing the overall cooling efficiency while at the same time minimizing environmental impact

The energy consumption values of B Medical Systems' Plasma Storage Freezers are shown in Fig 4.



Fig 4: Energy Consumption values of the Plasma Storage Freezers from B Medical Systems (230V / 50Hz Models)

Procurement decision between a manual plasma storage freezer vs auto defrost freezer should always be driven by the ability to maintain the safe storage conditions along with a consideration of the operational expenditure incurred. The smart defrosting technology used by the B Medical Systems' Plasma Storage Freezers adapt based on door openings providing not just an efficient operation but also enables a frost free environment. This along with the optimised refrigeration process, maintains temperature uniformity inside the freezers thereby providing a safe storage conditions for Fresh Frozen Plasma (FFP).

Want to know more about Plasma Storage Freezers developed by B Medical Systems?  
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