



# Tetra Pak<sup>®</sup> Continuous Freezer 2000 A2



The freezer is supplied with butterfly valves (as shown). In 3A execution optional seat valves are supplied in lieu of butterfly valves.

## Application

Continuous freezing and whipping of ice cream mix with air to produce ice cream and other frozen desserts. Scraped-surface freezing of other products.

## Highlights

- Uniform product quality
- Low product loss
- Reduced energy consumption
- Low maintenance
- Smaller footprint
- Lowest production cost per ice cream product

## Working principle

The ice cream mix is metered into the freezing cylinder by a gear pump. A constant airflow is fed into the cylinder together with the mix. During the passage through the cylinder, the air is whipped into the mix by a dasher and inner beater. Refrigerant surrounding the cylinder provides the freezing. Stainless steel blades scrape the frozen ice cream from the inside wall of the cylinder, and a second gear pump pushes the ice cream forward for filling or extrusion.

# Standard design

The frame, sheeting and refrigeration system of Tetra Pak® Continuous Freezer 2000 A2 are constructed from stainless steel. All parts coming into contact with the ice cream are manufactured from stainless materials to facilitate cleaning and reduce maintenance. The freezers comply with EHEDG sanitary standards and are authorized to display the 3-A sanitary standards symbol when supplied with seat valves in lieu of butterfly valves

## Installation

The freezer units are ready to be connected to power, refrigerant air, mix and ice cream piping.

## The freezing cylinder

This is made of pure nickel and the inside surface is hard chromium-plated to a mirror finish.

## Drive

Power is transferred from the main motor directly to the dasher by V-belts. Easy access is secured by a swing-away electrical enclosure.

## Dasher and inner beater

Open style multi-dasher with stationary inner beater. Shaft seal is externally mounted for easy and effective cleaning.

## The refrigeration system

This system ensures stable cooling, which is essential to keep consistent viscosity or temperature of the ice cream. Hot gas is used to prevent freezing up during production and, if necessary, during stop periods, e.g. in connection with instant stop. The liquid NH<sub>3</sub> supply must be vapour-free and have a minimum absolute pressure of 4 bar (58 psi). The suction pressure in the Tetra Pak Continuous Freezer must be corresponding to -34°C (-29.2°F) or colder to achieve the nominal capacity. (except for option ICM valve - see description under heading Optional equipment.)



## Pumps

Both inlet and outlet pumps are direct-driven gear pumps and can be adjusted to compensate for normal wear. The design and the materials are carefully chosen to minimize wear.

## Fast start-up

An automatic start-up sequence ensures fast start-up with minimum product loss.

## Instant stop/hold

This function allows a temporary stop in production with minimal loss of ice cream and impact on ice cream quality.

## Control

The control panel, which consists of a touchscreen, provides easy operation and monitoring of the freezing process.

All functions of the machine are operated from the panel. Refrigeration, air and mix flows are controlled according to computer calculations and advanced control loops, based on the operator's pre-selected values for ice cream viscosity or temperature, overrun and capacity. The control panel provides clear and easy-to-understand information to the operator by means of graphic displays and written text. Full production data for up to 100 products can be stored in the computer memory, facilitating start-up and enabling optimum production conditions to be attained quickly.

Essential production data (e.g. ice cream flow, viscosity and overrun) are displayed constantly during production, and at the touchscreen the operator is able to call up other data on the screen, e.g. mix and ice cream temperature, accumulated mix and ice cream flow, pump speed etc.

Production values can be altered both before and during production. A manual operation mode is available if desired. If disturbances occur during production, these will be indicated on the screen so that action can be taken. In the case of serious disturbances, the instant stop procedure will automatically be activated.

For easy maintenance, a service screen appears automatically to indicate what service work has to be done according to the pre-set schedule. As standard, the Tetra Pak Continuous Freezer 2000 A2 is equipped with either Siemens or Allen Bradley CompactLogix PLC.

## Pump guard

If the discharge pressure in the ice cream piping exceeds a pre-set value, "Instant Stop/Hold" will be activated and fault information will be displayed.

### **Air metering system**

This system is based on mass flow metering. The airflow is automatically metered into the mix, which means that the overrun of frozen ice cream is kept at a predetermined value. The airflow meter is highly accurate, and together with compensation of the overrun for barometric air pressure changes, superior overrun accuracy is achieved. Water content of less than 0.8 g/m<sup>3</sup> (0.02 g/ cu.ft.) is secured by a built-in air-drying unit.

### **Freeze-up guard**

If the main motor load exceeds the pre-set value by more than 10%, the refrigeration will be turned off, the evaporation pressure will increase and the information displayed on the screen. This prevents damage to the dasher.

### **Mix metering**

In addition to the normal regulation of the mix flow via the speed of the positive displacement gear pump, highly accurate regulation is achieved by means of an advanced magnetic flow-metering device. The computer compensates automatically for the volumetric loss caused by internal backflow in the mix pump by regulating the speed of the mix pump.

### **Inlet pressure control**

Inlet pressure control for preventing running dry of mix.

### **Stepless variable cylinder pressure**

The ratio between the mix pump speed and the cream pump speed is automatically adjusted to maintain the desired pre-set cylinder pressure.

### **Automatic viscosity control**

The chosen viscosity is maintained automatically by regulating the cooling temperature. Maintaining a constant viscosity means a uniform end-product for filling or extrusion.

### **Control of ice cream temperature**

For certain production conditions, e.g. when producing a low-viscosity ice cream, it is advantageous to control the cooling by the ice cream temperature to achieve a uniform end-product.

### **CIP (cleaning-in-place)**

All parts of the freezer coming into contact with the product are cleaned without dismantling. When activating CIP from the control panel, the pumps disengage and allow a strong flow of detergent. Pumps and dasher are automatically activated at certain intervals during the cleaning process. The dimensions of the mix pipes and ice cream pipes, as well as the hygienic design of flow, pressure and temperature sensors enables easy cleaning.

### **Automatic hot-gas defrosting**

The freezer will automatically be defrosted by means of hot gas after freezing-up or when "emergency stop" has been activated.

### **Pump drive**

Two gear motors drive the inlet and outlet pumps, steplessly variable from 10 to 100% capacities. Mix pump capacity: 125-1250 litres (33-330 US gallons) per hour.

### **Standard accessories**

These include a set of tools, and a pulley for reducing the dasher speed.

### **Nominal output**

2500 litres (660 US gallons) per hour.

The output capacity is based on the following conditions:

- Inlet of mix +5°C (+41°F)
- Outlet of ice cream -5°C (+23°F)
- Suction temperature -34°C (-29°F)

### **Mix type**

Ice cream mix containing 38% total solids and 100% overrun is used for capacity calculation.

- Inlet of mix +5°C (+41°F)
- Oil content in ammoniamax. 30 ppm
- Overrun 100%

Upon receipt of customer's mix recipe, the precise capacity and outlet temperatures can be determined.



# Optional equipment

- An integral pull-out tray device enables easy service and inspection of the dasher assembly.
- Three-way valve with fittings for ice cream outlet piping
- Continuous mini-aerator (built-in) for pre-aeration of ice cream mix
- Double, trippel, quadouble or penta outlet pumps and control for dividing the outlet flow in up to five lines with individual controlled flow-rates.
- Recirculation pump and controls for re-circulating part of the ice cream back to the freezing cylinder
- Variable frequency drive (VFD) for stepless variable dasher speed
- Dynamic beater
- Water icekit
- Solid cage beater
- Stop-valves for refrigerant
- Automatic drain valve (butterfly or seat valve)
- Designed for certain types of HFC refrigerants such as R404 or R507
- Designed for connection to CO<sub>2</sub> refrigerant
- Safety valve, TÜV-approved (Note! Local regulations may require approval from other authorities than TÜV)
- 3-A approved seat valve (instead of butterfly valve)
- ICM main suction valve with minimized pressure drop allowing a suction pressure corresponding to -31°C (-23.8°F) instead of -34°C (-29.2°F)
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- ASME approval of the cooling system
- Sets of spares for 1000, 3 000, 6 000 or 12 000 hours
- 2 freezer units built together for greater capacity in a small footprint
- Modem option for easy remote support
- 200-230 V power supply
- Analog 4-20mA communication of ice cream flow rate e.g. for synchronizing of ingredient doser
- Active ethernet communication package for shared recipe collection, hold, re-start, CIP and synchronizing with Tetra Pak® Ingredient Doser 4000 A2
- Digital Ice Cream Data Gateway solution enables data exchange between Ice cream production equipment and centralised control systems (Scada, Plant Supervisory System or Line Control Units).
- Low voltage detection, to protect freezer in case of frequent main power losses
- Trolley for dasher

## Technical data

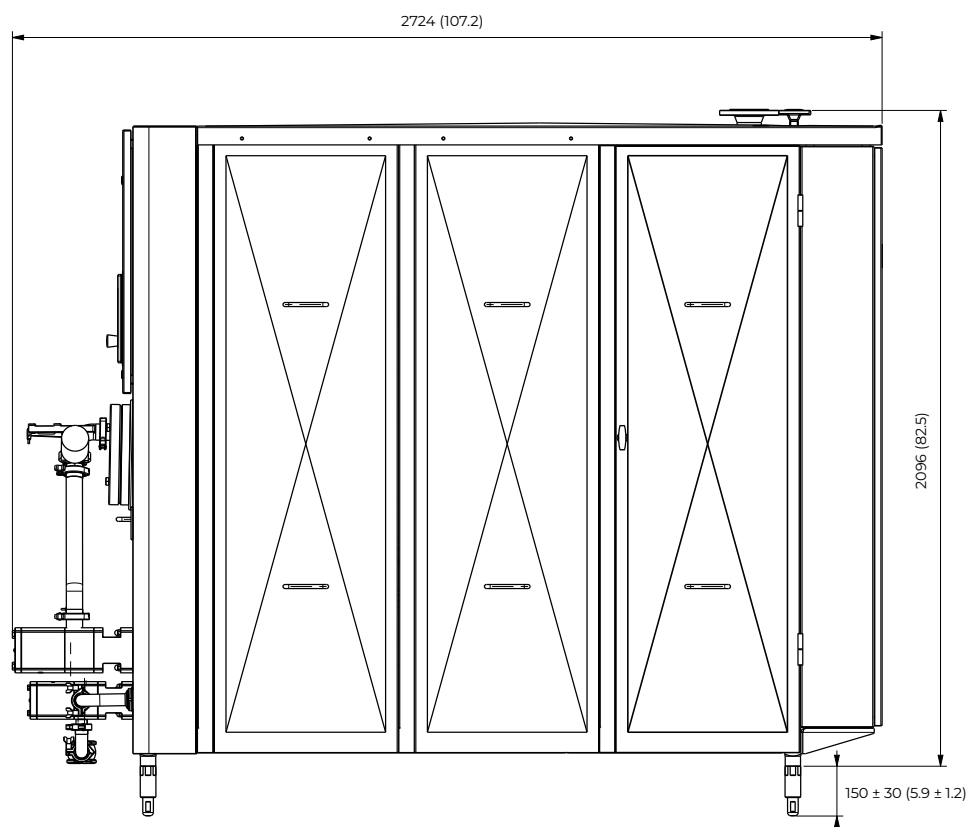
- Maximum refrigeration load 56,000 kcal/h 19TR  
(-34°C/-29°F at external 65 kW connection to suction line)
- Electric main motor 22 kW 30 HP
- Electric pump motor 2x0.75 kW 1.0 HP
- Power connection, standard 3 x 400 V 50 Hz (cps)
- Built-in main breaker 70 Amps (st 3 x 400V, 50Hz).

## Shipping data

- Net weight 1 500 kg (3 300 lbs)
- Gross weight 1 900 kg (4 180 lbs)
- Volume 7m<sup>3</sup> (250 cu.ft.)

## Dimensions

Measurements in mm (inches)



## Ammonia piping

- Suction line, outside diameter 76.1 mm
- Liquid line, outside diameter 21.3 mm
- Hot gas line, outside diameter 21.3 mm
- Drain line, outside diameter 21.3 mm
- Safety line, outside diameter 26.9 mm
- Mix inlet piping, outside diameter 38.1 mm
- Ice cream outlet piping, outside diameter 51 mm
- Air inlet piping, outside diameter ½" (½" RG)
- Air consumption 3.5 m<sup>3</sup>/h (124 cu.ft./h)
- Required air quality: no oil, maximum water content 2.5 g/m<sup>3</sup> (0.07 g/cu.ft.)
- Required air pressure, minimum 6 bar (87 psi)
- Ammonia content 24 kg (53 lbs)