



CRYOblock system

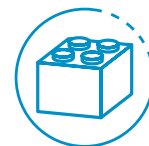
Vaccine preservation at -80 °C



Quick installation in new installation or adaptation of an existing cold room



High reliability and operational safety



Modular and expandable system

CRYOblock system - Vaccine preservation at -80 °C

Pfizer vaccine packaging and distribution

The Pfizer vaccine against COVID-19 needs to be conserved at extremely low temperature, between -80 and -60 °C.

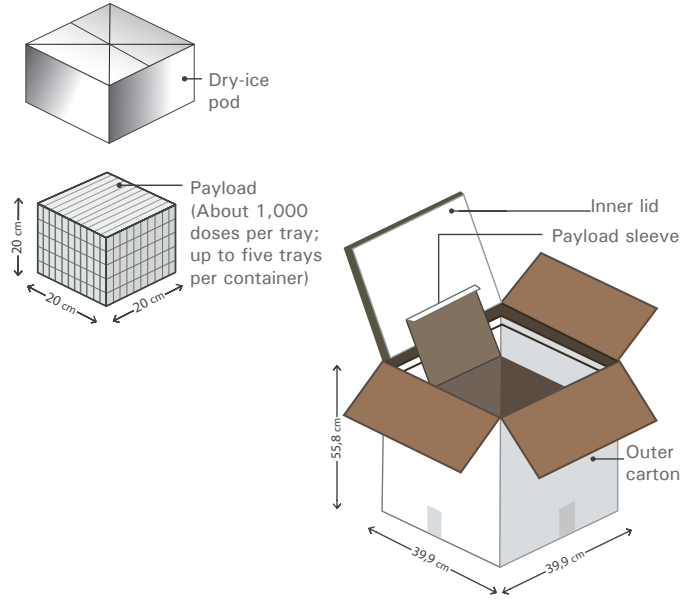
To ensure that the vaccine reaches the vaccination centers in good condition, Pfizer has designed special containers under controlled temperature.

Each container, in dimensions 400 x 400 x 560 mm and weight of about 36 kg, may contain a maximum of five trays of 975 doses each. A vial contains 5 doses and they are grouped in trays of 195 vials each. Each container would therefore contain between 1,000 and 5,000 doses of vaccine.

The container is thermally insulated with vacuum panels, with very low thermal transmission, and equipped with 23 kg of dry ice inside, which is slowly consumed to keep the temperature between -80 and -60 °C.

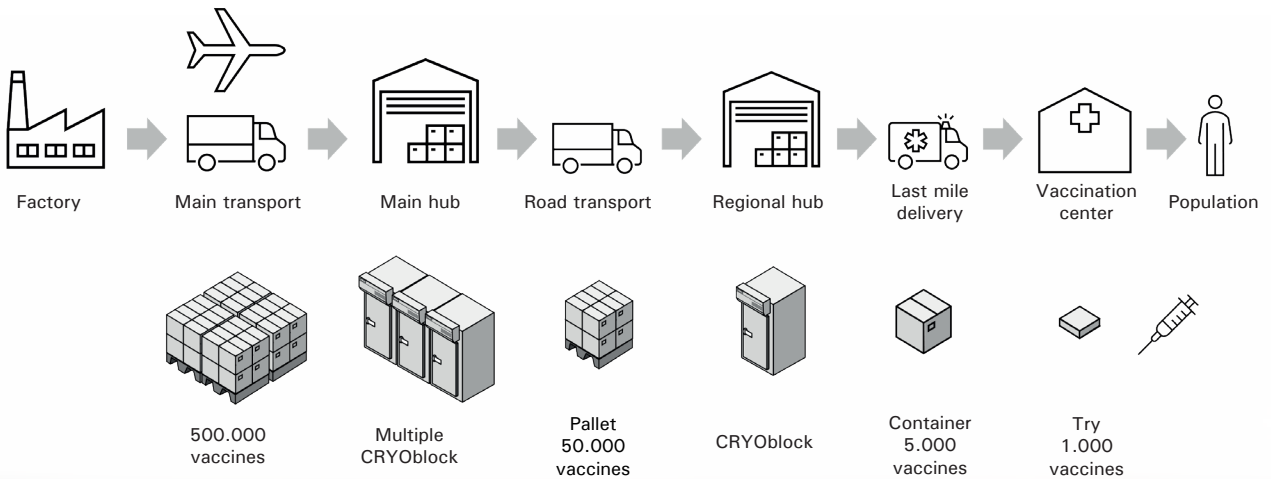
Ideally, the dry ice load maintains the low temperature of the content for up to 10 days in an unopen container. By adding new dry ice, this container may be reused as temporary storage for up to 30 days, with only two daily openings.

Afterwards, the vaccine can be kept for five days in refrigerators at 2 to 8 °C.



Note: -70 °C = -94 °F
Source: Pfizer

With these limitations, vaccine containers should be considered as a perishable product, with a maximum transport time of around one week. To avoid loss of vaccine, logistic hubs must be equipped with very low temperature refrigeration systems that allow the storage of containers at -70 °C.



The CRYOblock system developed by **INTARCON** is an extremely low temperature storage system, specifically designed to provide a solution for the preservation of vaccines in logistics hubs.

Following Pfizer's announcement about the availability of its vaccine for distribution at the end of 2020 and beginning of 2021, **INTARCON** has developed a refrigeration solution that allows the rapid execution of an adequate logistics infrastructure.

The CRYOblock system is therefore a refrigeration system for conservation at -80 °C characterized by:

- ▶ Quick installation in new installation or adaptation of an existing cold room.
- ▶ High reliability and operational safety.
- ▶ Modular and expandable system.



CRYOblock system for vaccine preservation

The innovative CRYOblock system allows a rapid deployment of a logistics infrastructure for vaccine preservation at -80 °C, either as cold rooms of new installation and rapid execution, or by reacquiring existing conservation facilities at -20 °C.

The CRYOblock system consists of a set of ultra-freezing cabinets at -80 °C within a cold room at -20 °C. Each ultra-freezing cabinet can accommodate a pharmaceutical pallet, and is equipped with a plug & play CRYOblock refrigeration unit installed over the door. The operator always works safely from the pre-room at -20 °C to insert or remove the product into the ultrafreezing cabinet.

The CRYOblock unit allows to maintain an extremely low temperature of down to -80 °C inside the ultrafreezing cabinet, evacuating the condensation heat into the room at -20 °C, which in turn is used as a pre-room to minimize cold losses and to avoid humid air infiltrations into the cabinet. The -20 °C room is equipped with conventional cooling equipment.

The CRYOblock system is therefore a compact refrigeration system, which does not require a cooling connection on site, and that can be installed easily and quickly taking advantage of existing infrastructures.



CRYOblock units

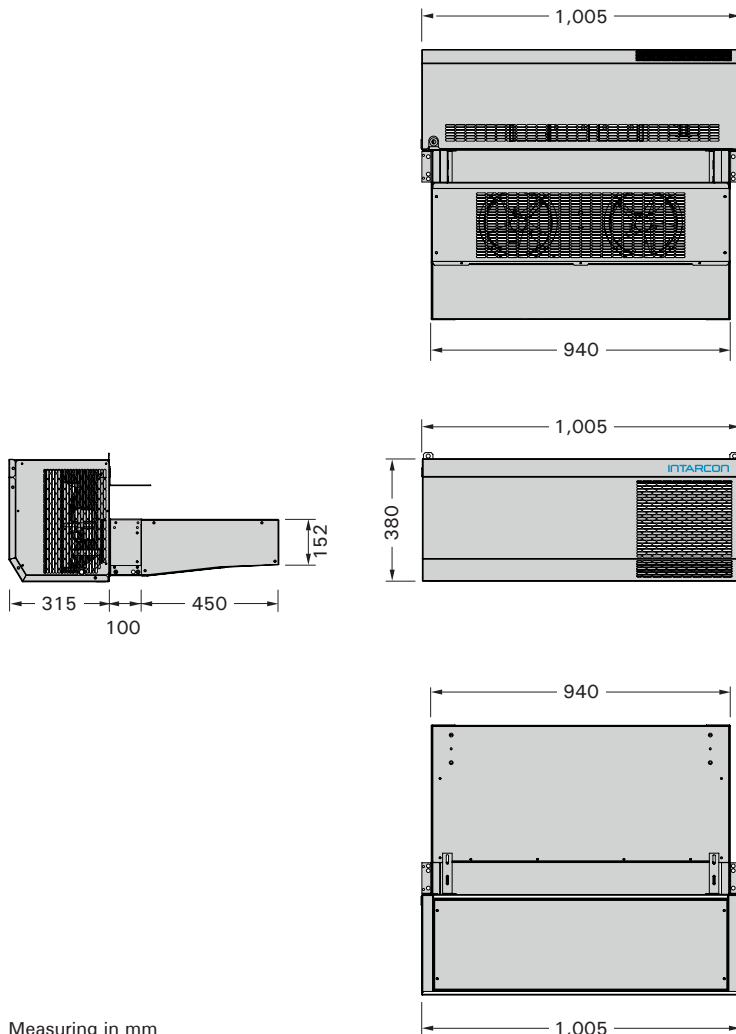
The CRYOblock unit is compact monoblock refrigeration unit for mini-cold rooms or ultrafreezing cabinets at extremely low temperature, down to -80 °C. It has been designed to be installed over the door of the ultrafreezing cabinet, inside a cold room at -20 °C. They have the following characteristics:

- ▶ Cooling equipment in accordance with UNE-EN 378.
- ▶ Hermetically sealed compact refrigeration system, built in copper tube, preloaded with R-170 refrigerant, with expansion vessel, internal heat exchanger, dehydrating filter, and pressure switch.
- ▶ Reciprocating hermetic compressor with thermal protection and oil separator.
- ▶ Condenser in copper tube and aluminum fins with EC fan.
- ▶ Evaporator in copper tube and aluminum fins with EC fan and expansion by electronic valve.
- ▶ Integrated electrical panel with electronic control unit, at controlled temperature.
- ▶ Manually operated electric defrosting system.
- ▶ Door heater power cable.
- ▶ Door switch.

230 V-I-50 Hz | Ultrafreezing temperature | R-170

Model	Cooling power at -80°C (W)	Nominal input power (kW)	Maximum absorbed current (A)	Refrigerant charge (g)	Operating indoor temperature range	Operating outdoor temperature range
UCP-NR-1 034	650	0.65	9.5	250	-80 °C to -60 °C	-30 °C to -10 °C

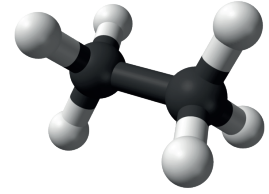
Dimensions



Measuring in mm

Ethane

Ethane, with the designation ASHRAE R-170, is a very low temperature refrigerant, an environmentally friendly alternative to R-23, which allows the production of cold down to -80 °C in a cascade cycle.



- ▶ Global-warming potential (GWP): 6
- ▶ Boiling point at 1,013 bar (°C): -88.6 °C
- ▶ Safety classification: A3. Not toxic but extremely flammable.

Control pad

CRYOblock units feature XM670K electronic control as standard.



- ▶ PT1000 probe to detect RTD temperature (resistance temperature detector).
- ▶ Audible temperature alarm.
- ▶ Digital control with multifunction remote control.
- ▶ Electronic board integrated in the condensing unit for 6 control relays for: compressor, condensing fan, evaporator fan, defrost, light and alarm.
- ▶ Possibility of interconnection and synchronization of up to 8 devices by LAN, managed from a single control.

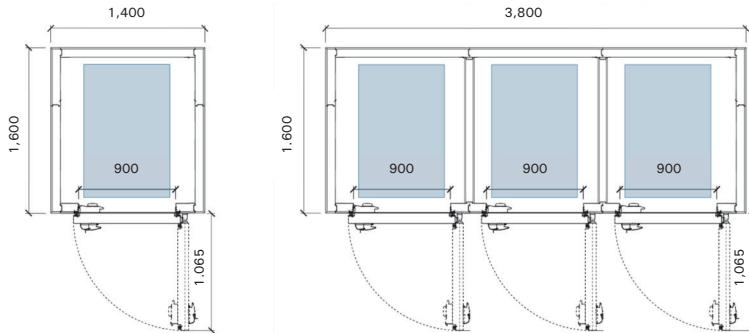
CRYOblock Cabinets

CRYOblock single-pallet cabinet are built in 100 mm thick modular panel of high density polyurethane foam, with the following characteristics:

- ▶ Interior dimensions: 1,100 mm x 1,400 mm x 1,920 mm high.
- ▶ Insulated door panel in non-slip phenolic finish.
- ▶ 900 x 1,500 mm door, with door frame heater.
- ▶ Internal volume: 3.0 m³.
- ▶ Rated cooling needs: 400 W.



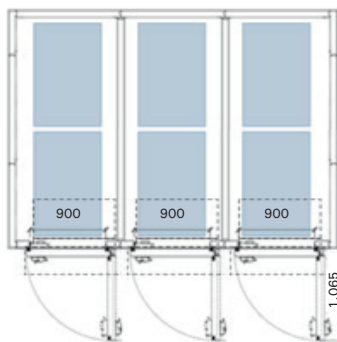
One-pallet cabinets:



Two pallet cabinets:

For higher large capacity at -70 °C, the CRYOblock unit is capable to maintain a maximum of 2 pallets per room.

- ▶ Interior dimensions: 1,100 x 2,600 mm x 1,920 mm high.
- ▶ Insulated floor panel in non-slip phenolic finish.
- ▶ 900 x 1,500 mm door, with door frame heater.
- ▶ Internal volume: 6.0 m³
- ▶ Rated cooling needs: 800 W.



Safety considerations

The ultrafreezing cabinets have a capacity of less than 10 m³ and do not require a refrigerant leak detector according to EN-378.

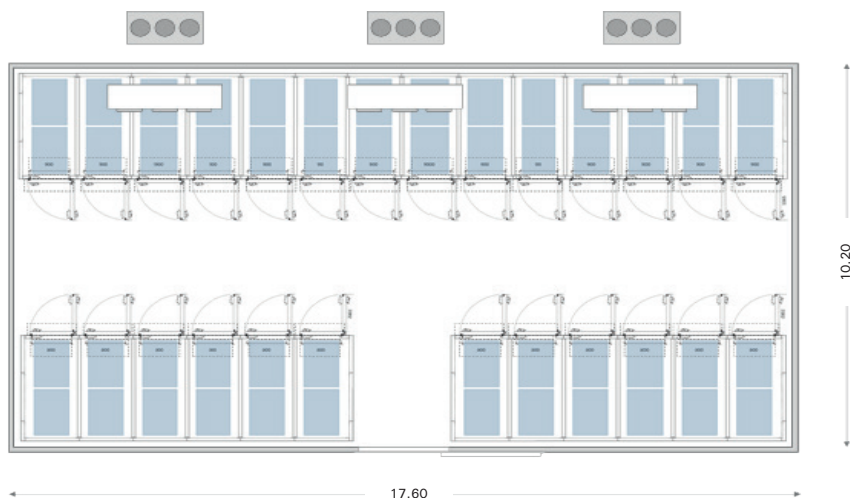
The load of R-170 on each CRYOblock unit is very small, so that ATEX measures are not necessary (according to RD 552/2019 IF-12 3.1), and in case of refrigerant leakage, the resulting concentration in the cold room is much lower than the practical limit. In any case, the monitoring system detects a refrigerant leak and reports an alarm.

All refrigeration doors should be equipped with an opening mechanism from the inside. The cold room will also incorporate the appropriate safety mechanisms, emergency lighting, locked man alarm, axe, etc.

Main distribution hub

As an example, the following distribution hub can accommodate 50 pallets or 3 million doses of vaccine. It would have the following configuration with 26 two-pallet cabinets:

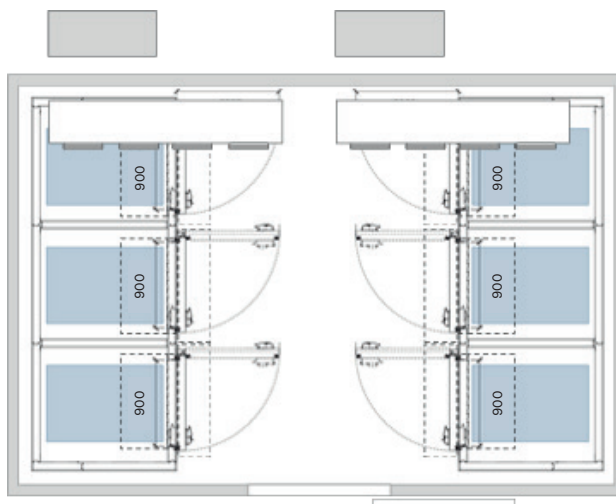
- ▶ 26x two-pallet cabinets with interior dimensions 1,100 mm x 2,600 mm x 2,120 mm high.
- ▶ Total storage volume at -70 °C: 158 m³.
- ▶ 26x ultrafreeze refrigeration units at -70 °C.
- ▶ Cold room at -20 °C, dimensions 17.6 x 10.2 x 4.0 m with insulation 150 mm thick.
- ▶ 3x cooling units at -20 °C (evaporator BKH-NG-2 350 + Condensing unit BDV-SG-70 682)
- ▶ Remote control and monitoring system.



Regional hub, 18 m³ (300,000 doses)

As an example, a regional hub for 18 m³ storage would have the following composition:

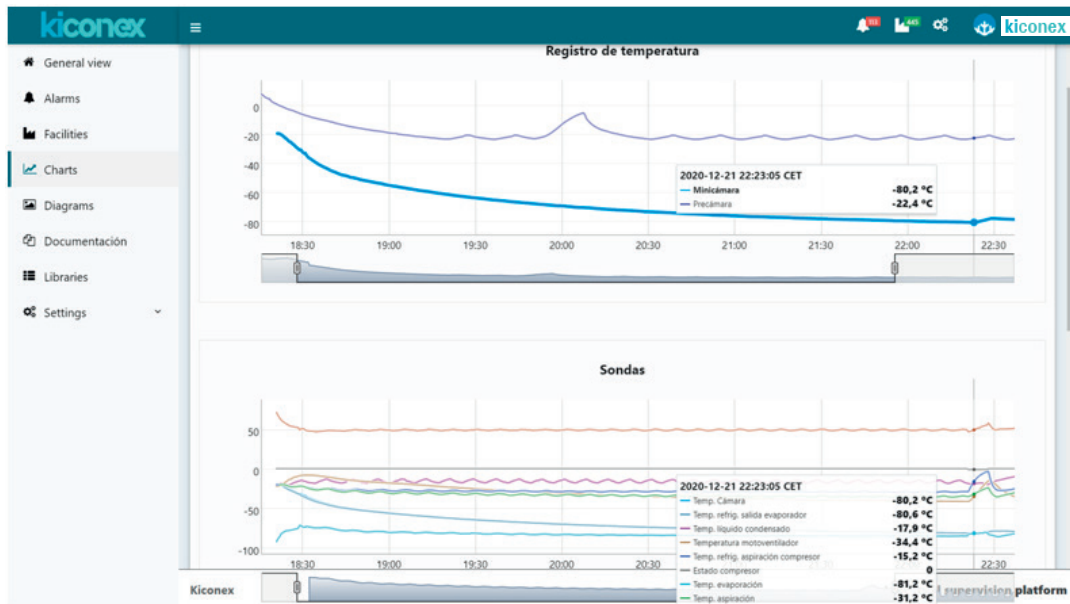
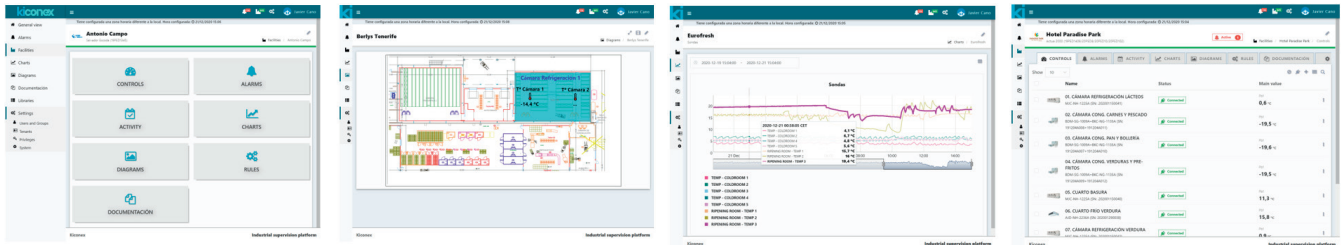
- ▶ 6x one-pallet cabinets with internal dimensions 1,100 x 1,400 x 1,920 mm high.
- ▶ Total storage volume at -80 °C: 18 m³.
- ▶ 6x ultra-freezing refrigeration units at -80 °C.
- ▶ Cold room at -20 °C with dimensions 6,6 x 4,3 x 3,0 m = 85 m³.
- ▶ 2x cooling units BSF-QG-34 271.
- ▶ Remote control and monitoring system.



Monitoring and control system

The cooling installation is equipped with **kiconex** monitoring and control system using industry 4.0 technology: hyper-connectivity to the internet (Ethernet, Wifi, 4G ...), web and real-time control from PC or mobile devices, storage of historical data and cloud computing, smart programming, self-learning and predictive analysis.

The control system includes dedicated functions for alarm detection and warning via email, and programmable backup functions in the event of a breakdown.





Industrias de Tecnologías Aplicadas de Refrigeración y Conservación, S.L.
+34 957 50 92 93 | commercial@intarcon.com

www.intarcon.com