SAVE THE PLANET
WITH US
MIRAI INTEX is an engineering company dedicated to the environmental protection through the implementation of innovative technologies.

Our core competence is turbo compression equipment of own design. Using the years of experience and expertise in refrigeration our engineering team has created the most environmentally friendly refrigeration machine for ultra-low temperature conditions.
WE OFFER

Development and production of centrifugal compressors for refrigeration, commercial air cooling and heat pumps, as well as for other industries.

OUR MISSION

We aim to prove that the future of industrial refrigeration lies through the implementation of ecological and efficient solutions.
Having come across the problem of global warming, the global community has united in attempts to prevent the climate change on our planet.

In order to reach such an ambitious goal, most countries signed international agreements restricting manufacture and use of dangerous substances, including toxic and chemical refrigerants.

- Montreal Protocol on Substances That Deplete the Ozone Layer, 1989
- Framework Convention on Climate Change, 1992
- Kyoto Protocol, 1997
- Paris Agreement, 2015
- Kigali Amendment (enter into force in 2019)

Implementing air as the most accessible and safest refrigerant contributes to the reduction of greenhouse gases emissions, which makes “MIRAI Cold“ an eco-friendly solution compliant with all international standards and regulations.
AIR CYCLE REFRIGERATION MACHINE “MIRAI COLD”

Air as a refrigerant
- No need in refilling
- Environmentally friendly

Energy efficiency
- Reduced power consumption up to 30%

Oil Free
- No oils in the system due to air bearings
- No fire risk
- Reduced costs

Humidity 0-2%
- Innovative humidity extraction system prevents from ice-build up
- No need in defrostation
Low operating costs
- Long lifecycle of equipment due to the lack of contacting pairs and chemically active substances
- Easy service reduces maintenance costs

Low vibration and noise
- Turbo-module design reduces noise and vibration

Temperature accuracy of 0.5°C
- Frequency inverter allows maintaining 0.5°C temperature accuracy

Legislation Compliance
- Compliance with all international standards and regulations
AIR CYCLE TECHNOLOGY

The technology is based on the heating capability of air during compression and cooling down during the expansion process at turbo-expander.

Repetition of compression and expansion cycles allows reaching and maintaining ultra-low temperatures down to -110°C.

KEY DESIGN FEATURE

A key technological feature is that turbo-expander and compressor are located on the same shaft.

The energy produced during the expansion process is transferred through the shaft to the compressor, which allows to reduce energy consumption up to 30% in comparison to standard vapor compression systems.
**TECHNICAL FEATURES**

1. Turbo module (functioning both as compressor and expander)
2. End cooler
3. Recuperative heat-exchange unit

Turbo-expander unit is available in various configurations: closed and open refrigeration cycles, water-cooled and air-cooled. Refrigeration machines are available in: 10 kW, 15 kW, 22 kW models.

**15 kW**

<table>
<thead>
<tr>
<th>Spec</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigerant</td>
<td>Natural air</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40°C to -110°C</td>
</tr>
<tr>
<td>Refrigerating capacity</td>
<td>Up to 8 kW</td>
</tr>
<tr>
<td>Energy consumption</td>
<td>15 kW</td>
</tr>
<tr>
<td>COP (-60°C/-80°C)</td>
<td>≥0.6/0.5</td>
</tr>
<tr>
<td>Noise level</td>
<td>70 dB (50 dB optional)</td>
</tr>
<tr>
<td>Maximum current</td>
<td>28 A</td>
</tr>
<tr>
<td>Motor rotation speed</td>
<td>49,000 rpm</td>
</tr>
<tr>
<td>Dimensions (LxWxH)</td>
<td>1500x1850x2000 mm</td>
</tr>
</tbody>
</table>
Easy and quick on-site installation

- connecting air intake/supply pipes
- air distribution ducts inside the chamber
- exhaust air outlet pipe
HEALTHCARE AND BIOTECHNOLOGY

OBJECTS

- Biobanks
- Blood service organizations
- Research organizations
- Medical and biotech businesses

TYPES OF BIOMATERIALS STORED AT ULTRA-LOW TEMPERATURES

- Blood components (FFP, erythrocytes)
- Tissue samples and cell lines
- Pharmaceutical substances
- DNA / RNA / Body fluids

PURPOSE

- Development of drugs
- Scientific research
- Clinical trials
- Personalized medicine
- Biotechnological projects
Global food industry is widely using ultra-low temperatures in freezing and storage of premium fish and seafood, fruits and berries:

- Slowdown of oxidative and biochemical processes in cells and tissues
- Preservation of the vitamins and micronutrients, proteins and fats
- Increased shelf life
- Preservation of vitamins, micronutrients, proteins and fats

Using ultra-low temperatures makes it possible to achieve a uniform microcrystal product structure during freezing, and also to avoid cell damage during storage.
CLIMATE TESTING

“MIRAI Cold” refrigeration machine helps to provide necessary environmental conditions for testing various materials and products as well as equipment designed for extreme climate conditions.

Special-purpose equipment
- Wind turbines components
- Off-road vehicles
- Construction and mining machinery
- Grid Infrastructure
- Aerospace equipment

Vehicle manufacturing industry
- Vehicle sensors
- Secondary batteries
- LEDs
- Power devices
- Vehicle navigation systems

IT
- Optical modules / Optical devices
- Semiconductor devices
- Personal computers
- Capacitors
- Cell phones

Digital and consumer electronics
- LCD / PDP
- DVD / HDD / Storage
- Digital cameras
- Printers / Copiers
- Printed circuit boards (PCB)
"MIRAI COLD" is regulated by an adaptive control system, which ensures a stable maintenance of necessary temperature.
Control
- Color touch-screen control panel with user-friendly interface
- Real-time remote monitoring and control from any device
- Smooth temperature regulation provided by frequency inverter
- Integration and connection of equipment to the existing network at the customer’s site

Data handling
- Chamber visits logbook
- USB port for data export / import
- Printing mode
- Real-time graphic data displayed on the operator touch screen
- Data archiving for up to 10 years

Safety system
- Appointment of access rights to the chamber and control system
- Emergency sound-and-light alarm, as well as e-mail and SMS-alerts in case of emergency situations
- Emergency button «Man in the chamber»
- Emergency power backup system
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