MIRAI X CRYO

WHERE HEAT MEETS COLD

PROCESS COOLING FOR

SEMICONDUCTOR MANUFACTURING

MIRAI XS CRYO 20 PRODUCT SPECIFICATIONS

- **ZERO GWP**
  With the air cycle technology
  Not a subject of F-Gas Regulation
- **THE WIDEST TEMPERATURE RANGE**
  From -160 °C to +90 °C*
  Accuracy ± 0.025 °C at idle
  Accuracy ±0.5°C under changing load
- **FAST COOL DOWN SPEED**
  From +20 °C to -100 °C in 30 seconds
- **COOLING CAPACITY**
  At - 70 °C up to 8.5 kW
- **EASY CONNECTIVITY**
  Plug and Play system, configurable connections
- **COMPACT AND NARROW DESIGN**
- **FAST RETURN OF INVESTMENT**

*The temperature range varies according to the type of HTF used.

MIRAI

FEATURES

The **MIRAI XS CRYO** is the ideal solution for the semiconductor market. In addition to safe and environmentally friendly cooling, it represents the latest solution in technology, providing highly-precise temperature and process control for dramatic changes in temperature and machine load.

AIR AS REFRIGERANT
0 GWP, 0 ODP, and 0 TFA
Environmentally friendly
Refrigerant free of charge

NO VIBRATION
Turbo-compressor design
eliminates vibration

LOW OPERATING COSTS
Long equipment lifecycle
Low maintenance

SERVICEABILITY
No leak checks
No refrigerant recovery

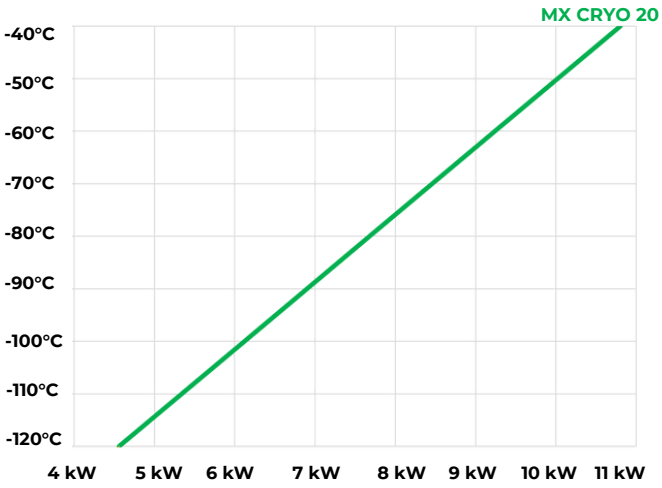
ENERGY EFFICIENCY
High cycle efficiency
Inverter driven motor

TEMPERATURE ACCURACY
0.025°C accuracy at idle
± 0.5°C under changing load

GRAPHS

COOLING CAPACITY

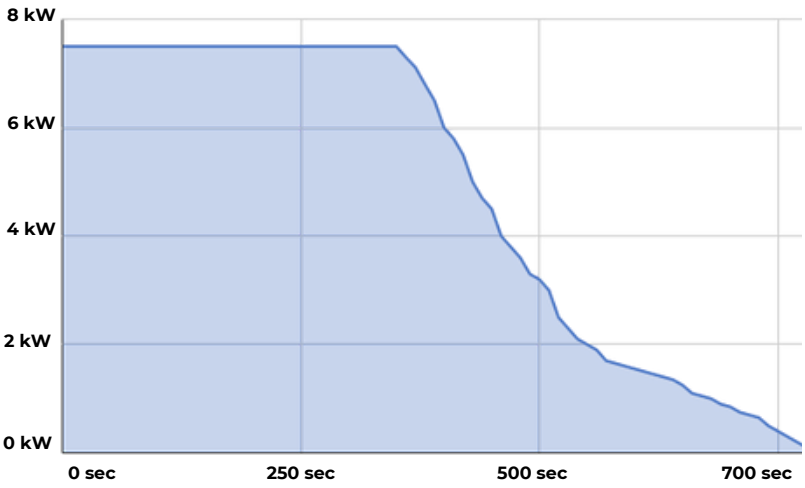
Cooling capacity of the **MIRAI XS CRYO** over a temperature range of -40 °C to -120°C. At cooling water temperature +10 °C.



BOOST MODE

This mode allows to boost cooling capacity of the system up to 7.5 kW additional cooling capacity for 5 minutes.

*+Cooling capacity of machine



CONTROL PANEL

The control panel is a tool for setting the operating modes of the machine, there are 3 modes in total:

- **Cooling mode**
- **Heating mode**
- **Standby mode**

This control panel allows you to easily change settings without any additional intervention in the machine, simply by using the touch screen or by sending a command signal via high-level control.

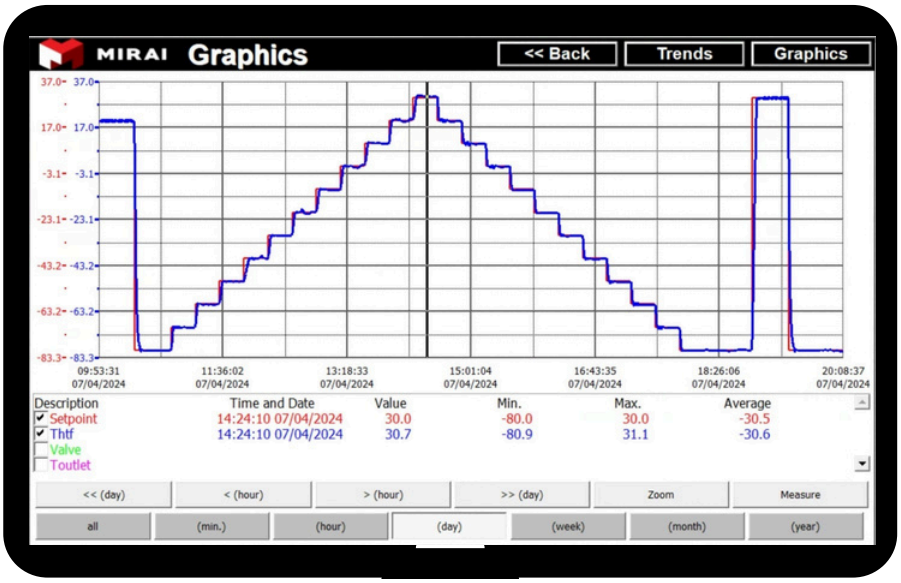
Allows to use industrial protocols:

- **ProfiNET**
- **EtherCAT**
- **EtherNET/IP**
- **Powerlink**

*Another protocols by request.

TESTS

The following section focuses on the various tests of the **MIRAI XS CRYO** machine, which are very important and decisive for use in various applications in different markets. Temperature accuracy and machine control are very important aspects in selecting the right machine for production.



PROCESS CONTROL ACCURACY TEST

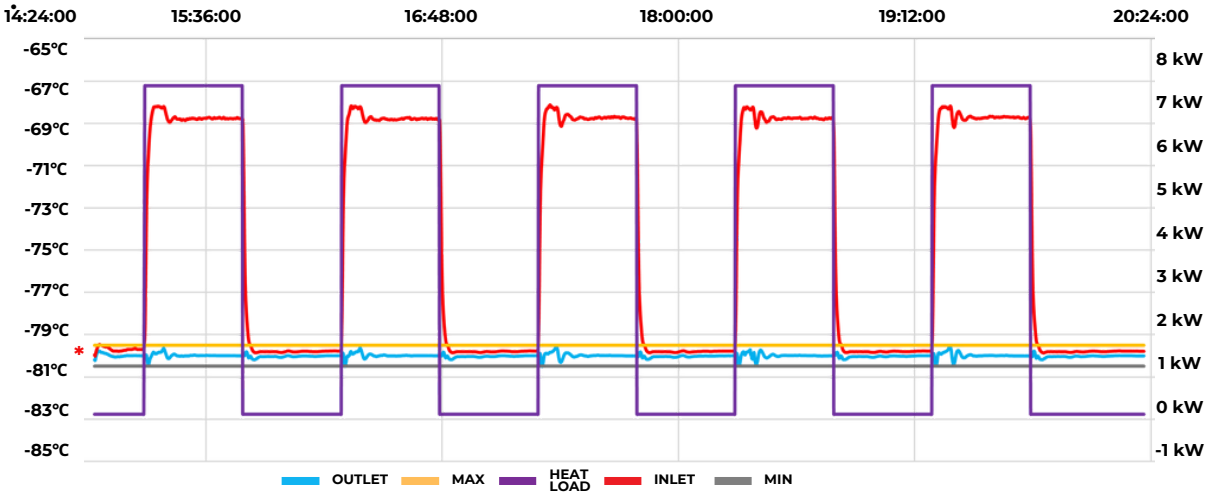
This screenshot from the machine system control screen shows the results of a heat-up and cool-down process with high-precision temperature control, at 10°C intervals every 20 minutes. This screenshot demonstrates that the temperature control accuracy of the **MIRAI XS CRYO** is very precise.

CHANGING LOAD TEST

This test focuses on temperature maintenance when the heat load on the machine is changing. Specifically in this case, the test was conducted at a change from 0 kW to 7 kW. The results showed that **temperature control under changing load is ± 0.5°.**

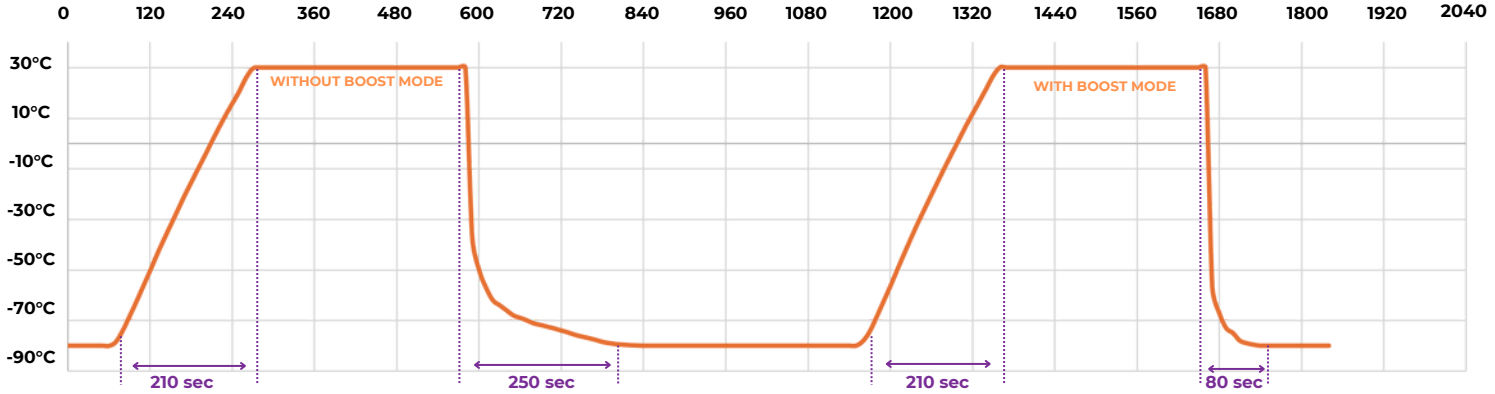
Above the graph is the time interval when the test started and ended, how long the loads were measured for.

The mark [*] - indicates the location where the temperature change was measured.



RATE OF TEMPERATURE CHANGE

The **MIRAI XS CRYO** is also equipped with a boost mode.
This test was aimed at measuring the rate of rapid temperature change in normal and boost modes.
The temperature range for test was from -80°C to +30°C.
The graph shows that boost mode allows to achieve a rapid temperature transition much faster, which gives the machine an additional advantage in markets where this feature is crucial.
Temperature accuracy during this test is **± 0.7°**



INSTALLATION

PLUG AND PLAY SOLUTION

The **MIRAI XS CRYO** machine is the ideal solution for retrofitting in existing installation and is easy to implement in new projects due to its Plug and Play design, compatible with multiple industry standard connection types.

BOOST CHARGING TIME
6 min (during waiting or heating mode)
MACHINE AVAILABILITY TIME AFTER SWITCHING ON
Standard - **25 min** With boost mode - **35 min**
CONSUMER COOLING RATE +40°C/-100°C
Standard up to **5 min** With boost mode up to **2 min**
CONSUMER HEATING RATE -100°C/+40°C
Standard up to **5 min**

OPTIONS

REMOTE MONITORING
Available remote monitoring or remote access systems

MACHINE WHEELS
For convenience transportation of machine in manufacture

VARIOUS HIGH-LEVEL COMMUNICATION PROTOCOLS

INDIVIDUAL WATER CONNECTION

EXTENDED WARRANTY
Up to 3 years

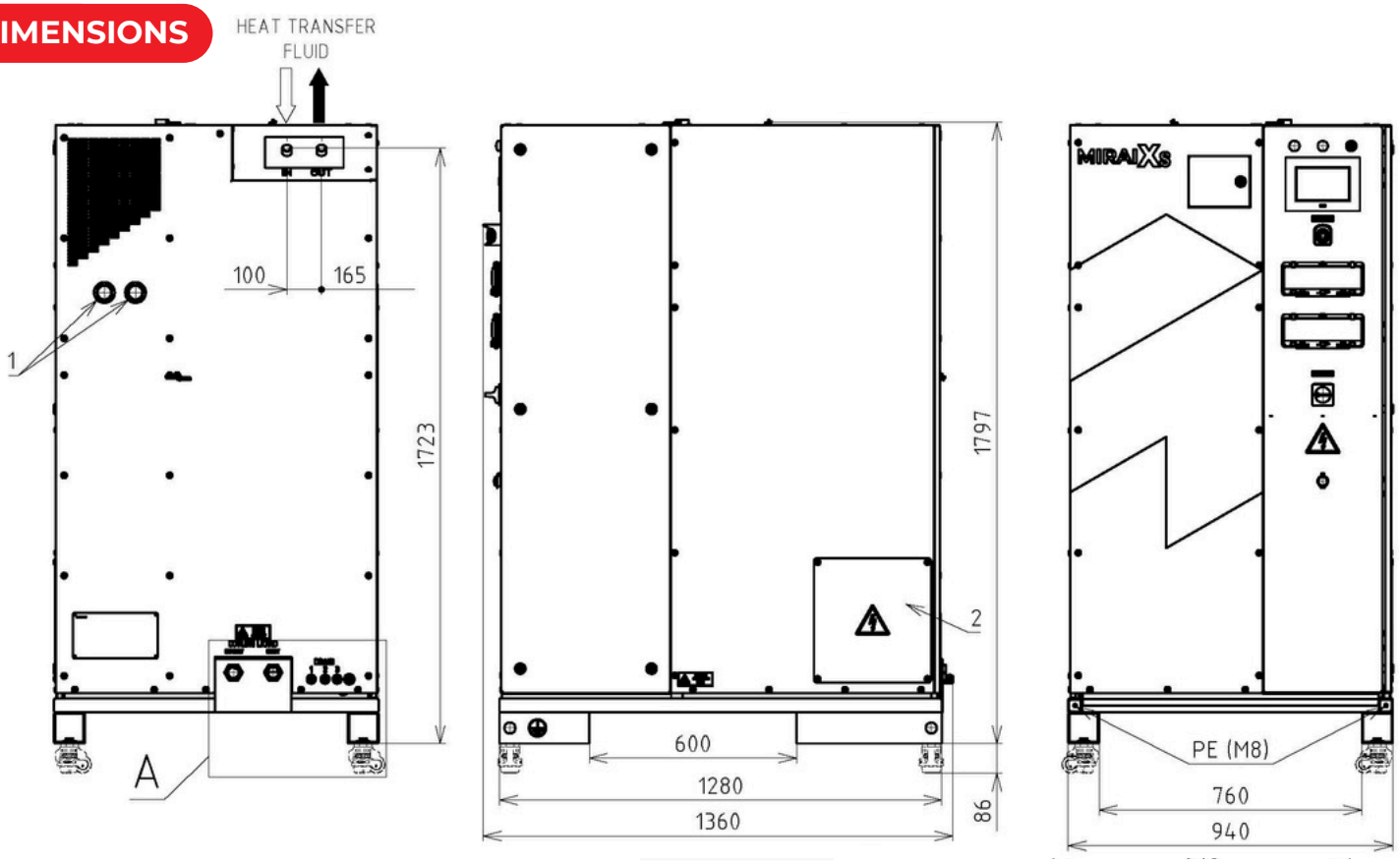
SPECIFICATIONS MIRAI XS CRYO

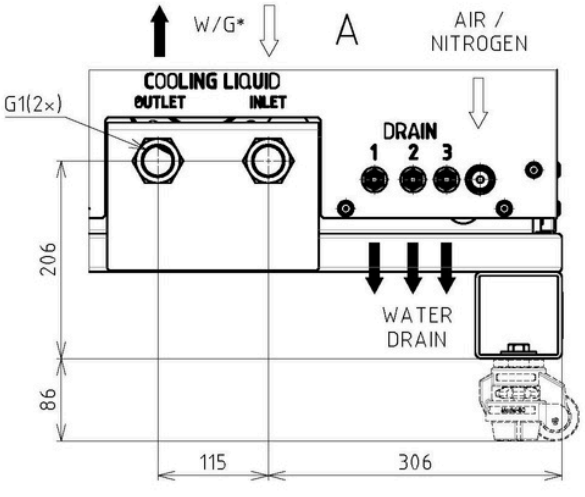
MIRAI Intex is not responsible for potential mistakes in the provided data.

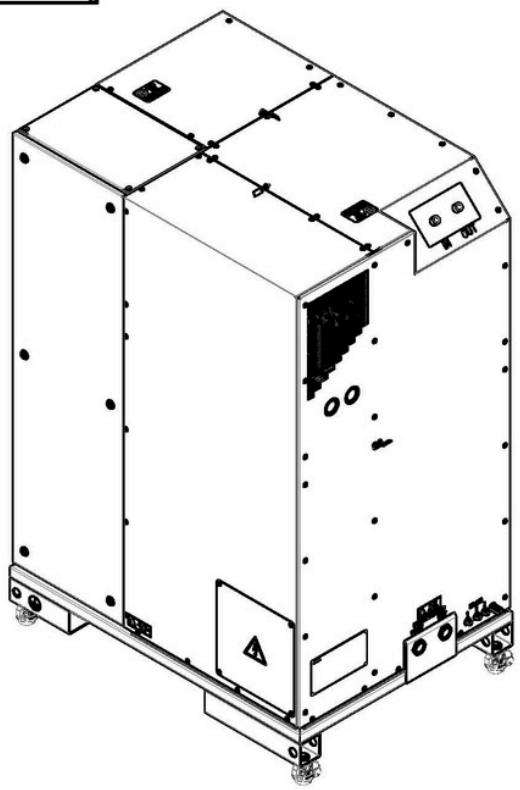
TECHNICAL DATA	MXS CRYO 20
AIR-CYCLE	
TEMPERATURE RANGE*	from -160°C up to +90°C *The temperature range varies according to the type of HTF used.
RATED MOTOR POWER (kW)	20
REFRIGERATION CAPACITY (-80°C)* (kW)	7,7
TEMPERATURE ACCURACY AT IDLE	±0.025°C
REFRIGERANT	Natural Air (R729)
COMPRESSOR	Mirai Turbo-Compressor (water-cooled)
HTF PARAMETERS	
MIN PRESSURE (bar)	1
MAX PRESSURE (bar)	10
NOMINAL*/MAX ALLOWED PROCESS PRESSURE DROP (kPa)**	20/50
MIN HTF FLOW (l/h)	810
NOMINAL HTF FLOW (l/h)*	1620
MAX HTF FLOW (l/h)	2000
WATER COOLING	
WATER CONNECTION	DN 15
PRESSURE DROP, NOMINAL (bar)	1,2
MAXIMUM ALLOWED PRESSURE ON WATER INLET (bar)	10
MIN WATER FLOW (kg/h)	2000
NOMINAL COOLING WATER MASS FLOW (kg/h)	2500
MAX WATER FLOW (kg/h)	4000
COOLING WATER TEMPERATURE RANGE	From +6 °C to +30 °C (other temperatures are possible on request)
GENERAL TECHNICAL SPECIFICATION	
SAFETY PROTECTION	High pressure protection, water supply cut-off protection, over-current protection, sequential and phase failure protection, high temperature protection, sensor failure protection, Heater protection
SOUND PRESSURE, AT A DISTANCE OF 1M FROM RM (dB)	Up to 75
CONTROL SYSTEM	KEB system compatible with digital communication protocols ProfiNET, EtherCAT, EtherNET/IP, and Powerlink. Another protocols by request
HTF CONNECTION	Any, upon customer specifications
POWER REQUIRMENTS	
POWER SUPPLY	~3 PE+N/3PE, 400 V/440V/480V , 50HZ/60 Hz
REFRIGERATION (kW)	22
TOTAL CONSUMPTION (kW)	36.2
HEATING (kW)	12
PUMP (kW)	2.2
DIMENSIONS	
DIMENSIONS (HxLxW) ±5 mm	1797x940x1360
WEIGHT (kg)	860
MAX VOLUME HTF CIRCUIT MIRAI (l)	~10

*DATA ARE SPECIFIED FOR FRAGOLTERM X-T9-A OIL (INLET=-70 °C / OUTLET=-80 °C) AT COOLING WATER +10°C
**COOLING CAPACITY WILL REDUCE BY 600 W

DIMENSIONS







* COOLING WATER /GLYCOL MIXTURE

INLET

OUTLET

1 – PRESSURE GAUGE
2 – ELECTRICAL CONNECTIONS