MIRAI Cold 80 T

MIRAI Cold 80 T operates in a closed cycle configuration with air working indirectly inside of the refrigeration system. Closed cycle machines are most commonly used for process cooling applications such as freeze-drying, gas liquification, and solvent recovery.

ADDITIONAL HEAT EXCHANGER

Our closed cycle machines are supplied with an additional heat exchanger. With use of industry-standard heat transfer fluids, MIRAI Cold machines are the ideal plug & play refrigeration solution for new systems as well as for retrofits.

AIR CYCLE TECHNOLOGY

The technology is based on the heating capability of air (R729) during compression and cooling down during the expansion process. Repetition of compression and expansion cycles allows to reach and maintain ultra-low temperatures down to -110 °C.

MAIN ADVANTAGES

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

OIL FREE
- No oil in the system
- Reduced maintenance costs
- Reduced operation costs

SAFE SOLUTION
- No chemically active substances
- No risk of fire or explosion
- Low system pressure

TEMPERATURE STABILITY
- Frequency inverter allows maintaining 0.5 K accuracy
- Temperature uniformity

OPERATING STABILITY
- Stable continuous operation
- Stable loads on cooling water and power grid

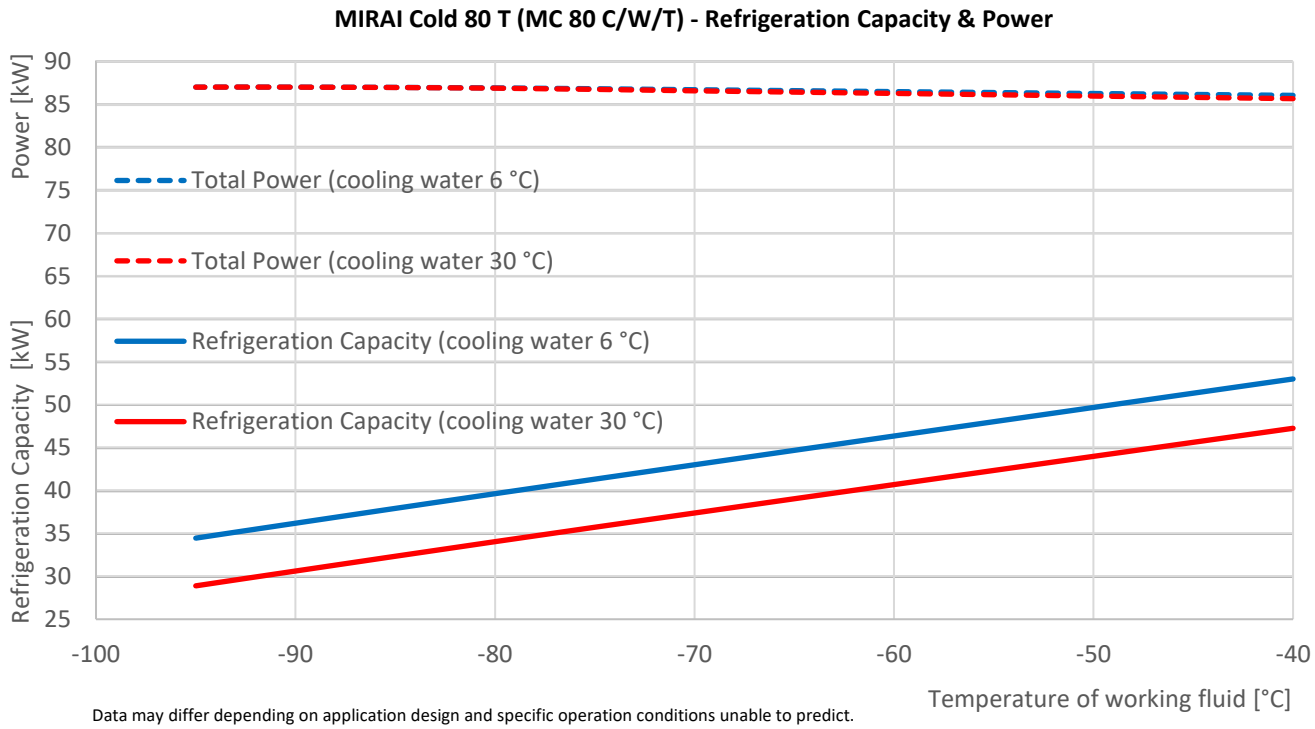
LEGISLATIVE COMPLIANCE
- Compliance with all international standards / regulations
- No special safety requirements

ENERGY EFFICIENCY
- Energy recovery
- Automatic RPM control

REDUCED OPERATING COSTS
- Long equipment lifecycle
- Low maintenance

NO VIBRATION OR NOISE
- Turbo-compressor design reduces noise and vibrations

TECHNICAL DATA



Data may differ depending on application design and specific operation conditions unable to predict.

TECHNICAL SPECIFICATIONS

TEMPERATURE RANGE		from -40 °C to -110 °C
MAINTAINED HEAT TRANSFER FLUID TEMPERATURE*		from -40 °C to -95 °C*
REFRIGERATION CAPACITY		Up to 53.0 kW
REFRIGERANT		Natural Air (R729)
COMPRESSOR		Mirai Turbo-Compressor (water-cooled)
MAXIMUM ROTATION SPEED		45 000 rpm
RATED MOTOR POWER		80 kW
MAXIMUM OPERATING PRESSURE		10 bar
POWER SUPPLY		~3 PE+N, 400 V, 50 Hz
NOMINAL CURRENT		150 A
CONNECTION SIZE COOLING WATER END-COOLER in | out		DN80 | DN80
CONNECTION SIZE COOLING WATER MACHINE COOLING in | out		DN25 | DN25
CONNECTION SIZE COOLING WATER INVERTER COOLING in | out		Ø13 | Ø13
COOLING WATER MASS FLOW RATE END-COOLER		from 12 000 to 18 000 kg/h (for water temp. from +6 °C to +30 °C)
COOLING WATER MASS FLOW RATE MACHINE COOLING		from 2 500 to 5 000 kg/h
COOLING WATER MASS FLOW RATE INVERTER COOLING		from 600 to 1 200 kg/h
COOLING WATER PRESSURE DROP		20 kPa (END-COOLER) | 100 kPa (MACHINE COOLING) | 125 kPa (INVERTER COOLING)
CONNECTION SIZE HEAT TRANSFER FLUID in | out		DN80 | DN80
OIL MASS FLOW RATE (Tout = 90 °C | ΔT in /out 5K)		nominal 12 860 kg/h
OIL PRESSURE DROP		no more than 20 kPa
NOISE LEVEL		75 dB
CONTROL PANEL		7" color touch screen display, data record, temperature control
CONTROL SYSTEM		KEB system compatible with digital communication protocols ProfiNET, EtherCAT, EtherNET/IP, and Powerlink
SAFETY PROTECTION		High pressure protection, water supply cut-off protection, over-current protection, sequential and phase failure protection, high temperature protection, sensor failure protection
PIPING MATERIAL		Stainless steel
CASE MATERIAL		Steel
MACHINE | ELECTRICAL CABINET DIMENSIONS (L x W x H)		228 x 288 x 192 cm (± 1.5 cm) | 72.5 x 87.5 x 190.5 cm (± 0.5 cm)
MACHINE | ELECTRICAL CABINET WEIGHT		4 340 kg | 360 kg
TECHNICAL REQUIREMENTS FOR OPERATION		Ambient temperature limits in mechanical room +5 °C to +35 °C
		Connection with a cooling water circuit, pressure max 6 barg
		2 or 3 separate cooling water circuits (depends on the config.)
		Inverter cooling water temperature must be higher than dew point in the mechanical room, but maximum +40 °C
OPTIONAL ACCESSORIES		Remote monitoring system
STANDARD MAINTENANCE PLAN (for each repeating cycle of operating hours)	Every day	Visual inspection, check of alarms and alerts
	Every month	Check of electrical cabinet air filters and fans
	9 000 h	Electrical cabinet air filters replacement
	Recommended 9 000 h or once a year Mandatory 18 000 h	Visual checks of electrical cabinet, machine parameters, torques, grounding, etc.
	36 000 h	Electrical cabinet cooling fans replacement
	90 000 h	General inspection

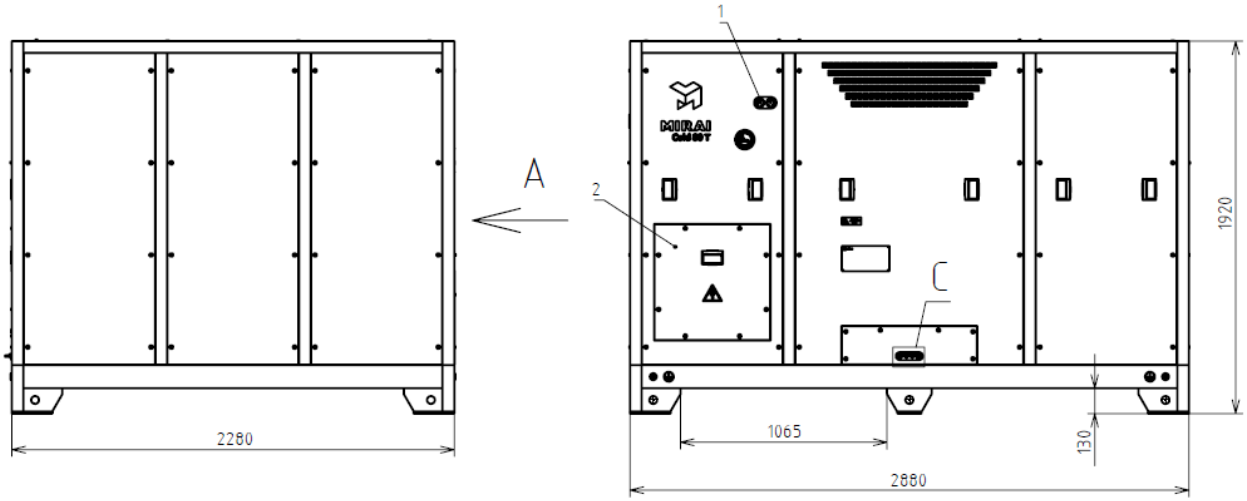
* range for recommended heat transfer fluids Fragoltherm X-T9-A and DOW Syltherm XLT
(possible to use other heat transfer fluids upon request when approved)

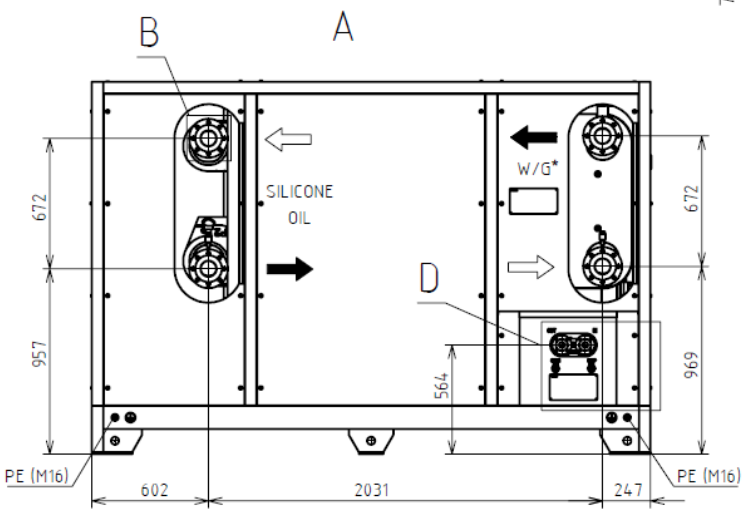
CERTIFICATION

MIRAI Cold 80 T is CE certified by respected European certification organization. CE certification covers:

- **Pressure equipment directive** (PED) 2017/68/EU, Module A2 Certificate
- **Low voltage directive** (LVD) 2014/35/EU Certificate
- **Electromagnetic compatibility directive** (EMC) Directive 2014/30/EU Certificate
- **Machinery directive** (MD) 2006/42/EC

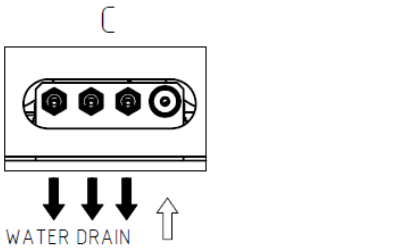
DIMENSIONS AND CONNECTIONS OF THE MACHINE

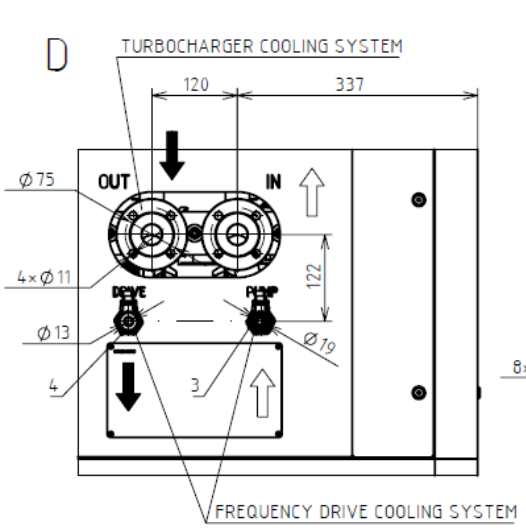


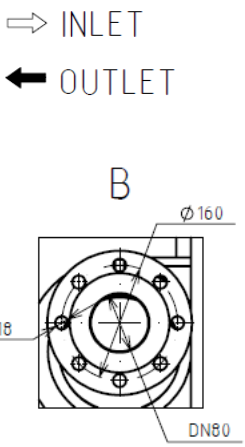


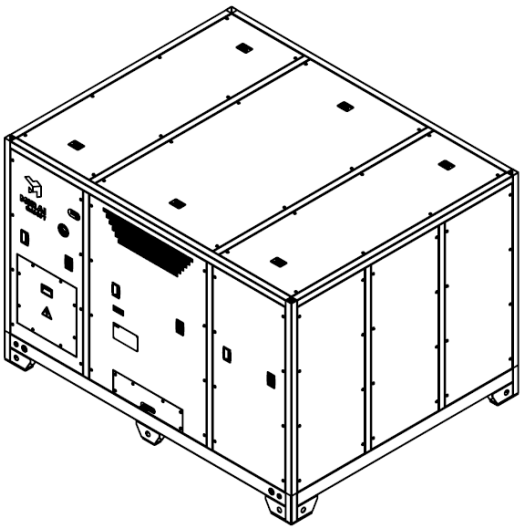
1 – PRESSURE GAUGE
2 – ELECTRICAL CONNECTIONS
3 – NIPPLE FOR CONNECTING THE PUMP
4 – NIPPLE FOR CONNECTING AN ELECTRICAL CABINET

* COOLING WATER/GLYCOL MIXTURE









ELECTRICAL CABINET

MIRAI Cold 80 T is equipped with separate electrical cabinet with control system touchscreen. Electrical cabinet can be located according to customer's requirements in different area than the refrigeration machine (possible only with MIRAI Cold 80 T). Electrical cabinet could have a separate cooling circuit (Ø13) or could be connected to the same cooling circuit required for machine cooling (DN25) with water / glycol mixture – see details in Technical Specification above. Signal cable included (length 5 m). Power cable not included.