MIRAI COLD 150 LNG

MIRAI Cold 150 LNG - a refrigeration machine for the liquefaction of methane. A new development that provides revolutionary power. Modifications include but are not limited to:

- High pressure protection
- Water supply cut-off protection
- Over- current protection
- High-temperature protection
- Sensor failure protection

The **MIRAI Cold 150 LNG** is inverter-driven for peak part load performance. Works with a natural and environmentally friendly refrigerant – **Nitrogen**

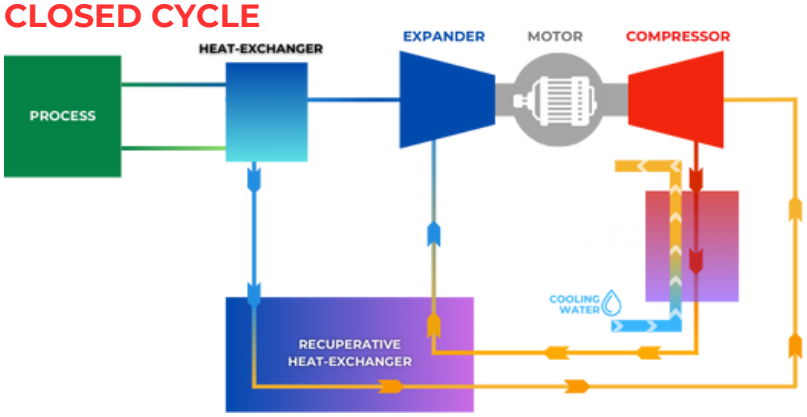
Key Feature of **MIRAI Cold 150 LNG** is flexibility and ability to be connected to any process of liquefaction without additional reworking of system. Can be used in a modular configuration for increasing liquefaction capacity.

AIR-CYCLE TECHNOLOGY*

The technology is based on the heating capability of nitrogen during compression and cooling down during the expansion process. Repetition of compression and expansion cycles allows to reach and maintain ultra-low temperatures. A key technological feature is that the turbo expander and compressor are located on the same shaft.

***Used Nitrogen instead of Air for LNG models*

CLOSED CYCLE



APPLICATIONS

- Medium scale BioLNG/LNG productions
- Reliquefication of BioLNG/LNG

MAIN ADVANTAGES

NITROGEN AS REFRIGERANT
·0 GWP, 0 ODP, and 0 TFA
· Environmentally friendly

REDUCED OPERATING COSTS
· Long equipment lifecycle
· Low maintenance

TEMPERATURE STABILITY
· Frequency inverter allows maintaining 0.5 K accuracy

SAFE SOLUTION
· No chemically active substances
· No risk of fire or explosion

ENERGY EFFICIENCY
· Energy recovery
· Automatic RPM control

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

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

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

TECHNICAL SPECIFICATIONS

REFRIGERANT	Nitrogen
COMPRESSOR	Mirai Turbo-Compressor (water-cooled)
MAXIMUM ROTATION SPEED	45 000 rpm
RATED MOTOR POWER	150 kW
MAXIMUM OPERATING PRESSURE	20 barg
POWER SUPPLY	~3 PE, 400 V, 50 Hz
NOMINAL CURRENT	280 A
TOTAL POWER	165 kW
CONNECTION SIZE COOLING/ CONDENSER in | out	DN150 | DN150
CONNECTION SIZE COOLING WATER END-COOLER in | out	DN100 | DN100
CONNECTION SIZE COOLING WATER MACHINE COOLING in | out	DN25 | DN25
CONNECTION SIZE COOLING WATER INVERTER COOLING in | out	Ø13 | Ø19
COOLING WATER MASS FLOW RATE END-COOLER	from 24 000 to 36 000 kg/h
COOLING WATER MASS FLOW RATE MACHINE	1 300 (3 300 if electrical enclosure connected to machine) kg/h
COOLING WATER MASS FLOW RATE ELECTRICAL ENCLOSURE	2000 kg/h
COOLING WATER PRESSURE DROP	<20 kPa (END-COOLER) | 150 kPa (MACHINE COOLING) | 300 kPa (ELECTRICAL ENCLOSURE)
NOISE LEVEL	80 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, high temperature protection, sensor failure protection
PIPING MATERIAL	Stainless steel
CASE MATERIAL	Steel
MACHINE | ELECTRICAL CABINET DIMENSIONS (L x W x H)	229 x 245 x 193 cm (± 1.5 cm) | 66 x 136 x 211 cm (± 0.5 cm)
MACHINE | ELECTRICAL CABINET WEIGHT	4 000 kg | 500 kg
TECHNICAL REQUIREMENTS FOR OPERATION REFRIGERANT	The machine must be installed under a shelter, operating temperature -20...+35 °C
	Connection with a cooling water circuit, pressure max 10 barg
	2 or 3 separate cooling water circuits (dependson the config.)
	Inverter cooling water temperature must be higher than dew point, but maximum +30 °C in case of separate water circuit for electrical enclosure
	Connection to nitrogen pressure 12-16 barg*1
OPTIONAL ACCESSORIES	Remote monitoring system

STANDARD MAINTENANCE PLAN (for each repeating cycle of operating hours)	Every day	Visual inspection, check of alarms and alerts
	Mandatory 9 000 h	Electrical cabinet desiccant replacement
	Recommended 9 000 h or once a year Mandatory 18 000 h	Visual inspection of the electrical cabinet and machine parameters. Check the tightening torques of the terminals and grounding points.
	36 000 h	Electrical cabinet cooler cooling fan replacement
	90 000 h	General inspection

HEAT EXCHANGER REQUIREMENTS (MACHINE SIDE, NOMINAL POINT*2)	
WORKING MEDIUM	Nitrogen
MASS FLOW	10 300 kg/h
WORKING PRESSURE (abs)	800 kPa
MEDIUM TEMPERATURE in | out	- 113*3 | -90 °C
PRESSURE DROP (no more) at mass flow 10300 kg/h, absolute pressure 820 kPa, temperature -80 °C	20 kPa
MAXIMUM ALLOWED PRESSURE (Ps)	20 bar or more

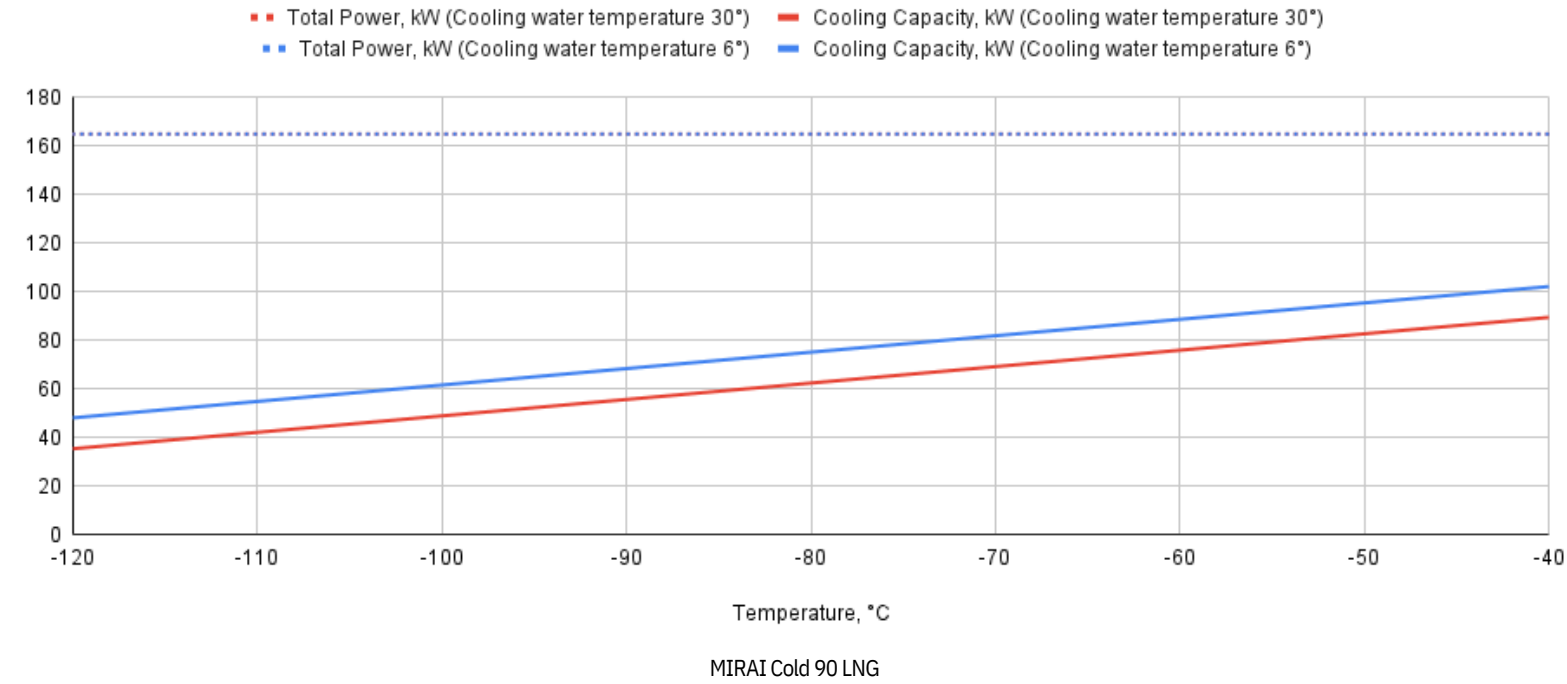
MIRAI Intex is not responsible for potential mistakes in the provided data.

***1** Purity class 5.0 or more. Average one 50-liter nitrogen cylinder per year
***2** Cooling water temperature 12 °C
***3** Machine inlet temperature range -80...-140 °C is selected based on customer requirements, outlet temperature is determined by cooling capacity of machine

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

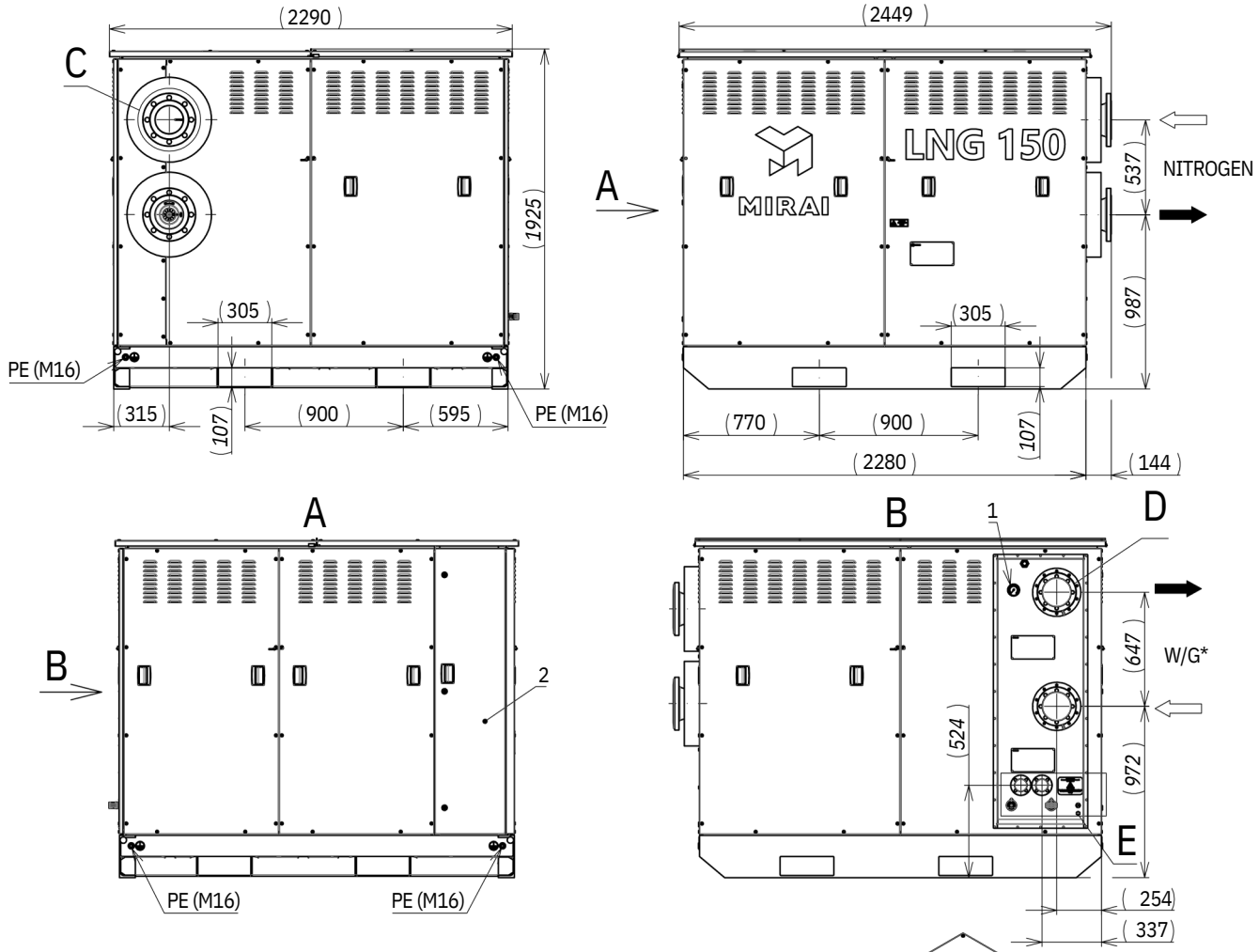
COOLING CAPACITY

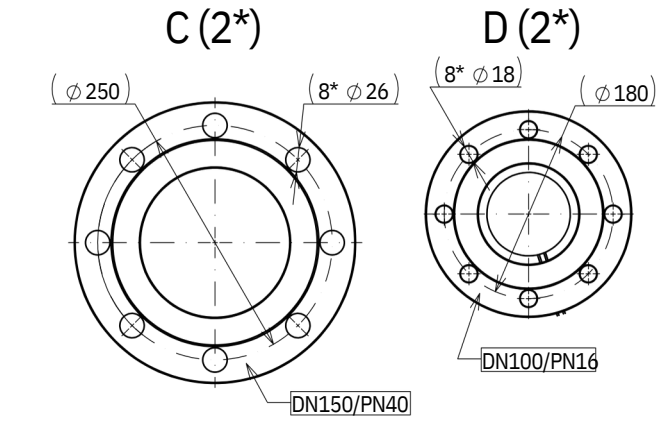
Cooling capacity of MIRAI Cold 150 LNG, at an inlet water temperature of 6°C and 30°C

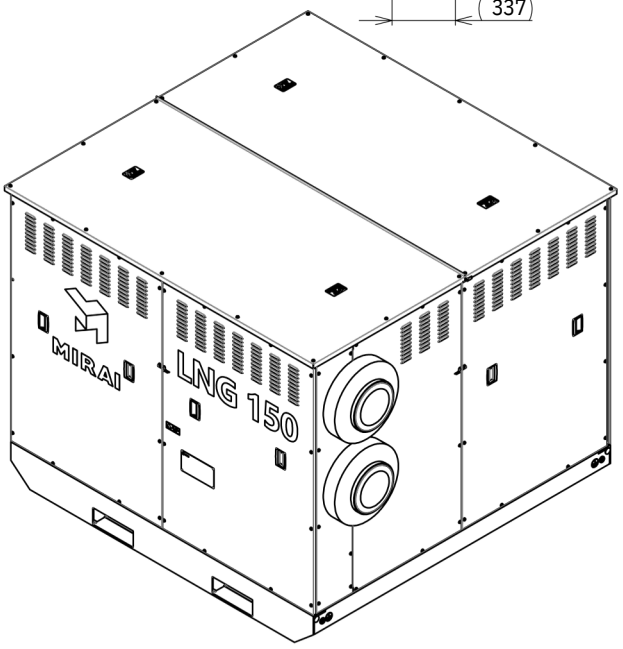


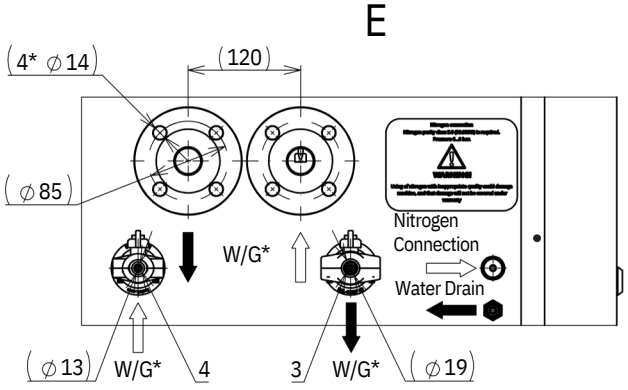
MIRAI Cold 90 LNG

DIMENSIONS









* COOLING WATER /GLYCOL MIXTURE

INLET
OUTLET

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

MC150 C/W/L-LNG