



IMR2000 Marine

Flue gas analyzer and gas conditioning system, the 2-in-1 model for industrial applications, fulfilling the MARPOL Annex VI and with GL approval.

PRODUCT ADVANTAGES FROM A-Z

- **Accumulator**
Rechargeable lead acid battery guarantees 6 hours of independence from main power. The accumulator is protected against over charging.
- **Case**
Built in a robust, protective case.
- **Data software**
IPC - data software for online data transfer to a personal computer. Data evaluation with Microsoft Excel. IPC is available as option for the IMR2000 Marine.
- **Display**
Illuminated 4 line display, operator guidance in clear text, display of all parameters simultaneously in ppm, mg or mg (O₂) ref.
- **Draft/pressure, different pressure measurement**
Integrated measurement of the draft /pressure in the flue.
- **Dust filter**
Particle filter 4 µm.
- **Flue gas probe**
Gas extraction probes with K-type thermocouple (NiCr-Ni), heat insulated handle, stainless steel fixture cone. Standard length: 300 mm; other lengths on request.
- **Fuels types**
18 pre programmed standard fuels, with the corresponding calculation factors, incl. O₂-ref. values. Pre-programmed fuel factors can be corrected by the operator.
- **Gas conditioning (option)**
Gas conditioning system with Peltier element powered heat exchanger built-in next to the flue gas analyser. Gas volume 150 l/h, outlet dew point 5 °C and operative/status indication by colored LED´s on the front panel. The gas conditioning system is maintenance free.
- **Interface**
RS 232 C serial interface.
- **Keyboard**
Easy to operate keyboard with self-explanatory markings.
- **Mean value calculation**
Integrated automatic calculation of mean values with automated printout to generate time related average emission values.
- **Memory**
Manual memory.
- **Power supply**
230 V/50 Hz mains power supply, 12 V from the built-in battery.
- **Printer**
integrated thermo printer.
- **Probe tubing**
Standard length 3.5 m. Extensions are available.
- **Protocol**
Print out with date and time. Automatic interval can be programmed (1-99 min.).
- **Service software**
Integrated service software, information such as operation time, battery capacity, sensor self-check, system-failures are displayed automatically on the display.
- **Zero calibration**
Automatic zero calibration with ambient air on every start of the system, optical and acoustical signal after finishing of calibration (3 min.).



THE BASICS

The MARPOL convention, compiled by the IMO, specifies the limit values for ship emissions in the Annex VI. From 2010, the NO_x emissions limit will be reduced drastically and will be lowered in three stages:

Tier 1, Tier 2, and Tier 3.

THE APPLICATION

It cannot be assumed that an engine, over its entire life span, can be operated within the emissions values which were measured on the engine manufacturer test bed.

The wear and tear and the changing of operating parameters will definitely lead to a change of emissions values and efficiency. The IMR2000 Marine has been designed to easily and efficiently measure these values to ensure your emissions are kept to acceptable levels.

THE PERFORMANCE DATA

Gentics uses electrochemical sensors for the measurement of O₂, CO, NO, NO₂, and SO₂. Non dispersive infrared absorption sen-

sors (NDIR) are used for monitoring CO₂ and Hydrocarbons (VOCs). Methane is used for calibration within the range of the lower explosion limit (LEL).

The IMR2000 Marine is an "all in one case" system and easy to operate. All measured gas components are shown simultaneously on the illuminated LCD display along with the selected fuel type for calculation of the CO₂ content as well as ambient temperature and flue gas temperature. (If the CO₂ is measured with an infrared sensor, the CO₂ calculation is not shown).

The oxygen content in the flue gas is used for the calculation of variables such as excess air.

The gas conditioning system in the IMR2000 Marine has an independent power supply circuit and can be activated separately for long term measurements. For short single measurements, the integrated lead acid battery offers 6 hours of duration.

Measuring results can be printed as standard protocol or as mean values on the integrated printer. Data can also be transferred to a personal computer, using the integrated RS 232 serial interface.

THE SOLUTION

The IMR2000 Marine, in combination with the integrated gas conditioning system, is the ideal flue gas analysis system for industrial and marine applications. The system guarantees high accurate measurements without losing the mobility advantage of a portable system. An extensive range of various flue gas probes completes this unique system. **Gentics** flue gas analyzers are used worldwide and comply with current German environmental regulations and many national standards.



TECHNICAL DATA

COMPONENT	METHOD	MEASURING RANGE	RESOLUTION	ACCURACY
O ₂ (Oxygen)	electrochem. sensor	0 ... 20,95 Vol.-%	0,01 Vol.-%	± 0,2% absolut
CO (Carbon monoxide)	electrochem. sensor	0 ... 3.000 ppm	1 ppm	respective MARPOL Annex VI or NO _x Technical Code
NO (Nitric oxide)		0 ... 3.000 ppm		
NO ₂ (Nitric dioxide)		0 ... 500 ppm		
SO ₂ (Sulfur dioxide)*		0 ... 3.000 ppm		
CO ₂ (Carbon dioxide)	Infrared sensor	0 ... 25 Vol.-%	0,1 Vol.-%	± 0,2% absolut
C _x H _y (Hydro Carbons)*	Infrared sensor	0 ... 100 Vol.-%	0,1 Vol.-%	± 2%
NO _x (Nitric oxide)	calculated	0 ... 3.000 ppm	1 ppm	± 2%
°C (flue gas temperature)	Thermocouple	-20° ... 1.000 °C	1 K	± 1 K
°C (Ambient temperature)	Semiconductor sensor	-20° ... 120 °C	1 K	± 1 K
pressure measurement*	Semiconductor sensor	20 ... 300 hPa	0,01 hPa	± 0,2%

The analyser complies with MARPOL 73/78 Annex VI, NO_x Technical Code and MEPC.103103(49) Germanischer Lloyd (GL), Certificate No. 11 206 - 14 HH



FURTHER TECHNICAL DATA

Weight	approx. 20 kg
Dimensions	600 x 430 x 260 mm (W x H x D)
Consistency	± 1% of full range
Linearity	± 1%
Drift (electro chem.sensor)	< 5%/year
Response time/T90	< 40 sec
Operating temperature	+5 °C to +40 °C
Pump capacity	120 l/h
max. draft	-0,3 bar
max. pressure	1,2 bar
Storage temperature	-20 °C to +50 °C
Protection class	IP40/IP67 (in the closed case)

* Option

