

# Type Approval Certificate



This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the GL Type Approval System.

Certificate No. 12 764 - 10 HH

Company SICK MAIHAK GmbH  
Dr.-Zimmermann-Str. 18  
88709 Meersburg, GERMANY

Product Description Exhaust gas measuring and monitoring device

Type MCS 100 E

Environmental Category A, H, EMC2

Technical Data / Exhaust gas monitoring device for NOx, CO, CO2, O2, CH4, SO2, HCl, NH3 and H2O

Range of Application

Component / Sensor type:	Smallest Range	Typical Range
NO / NDIR:	0-150 vol.-ppm	0-2000 vol.-ppm
NO2 / NDIR:	0-50 vol.-ppm	0-250 vol.-ppm
CO / NDIR:	0-60 vol. ppm	0-500 vol.-ppm
CO2 / NDIR:	0-5 vol.-%	0-15 vol.-%
O2 / ZRDO:	0-5 vol.-%	0-21 vol.-%
CH4 / NDIR:	0-150 vol.-ppm	0-500 vol.-ppm
SO2 / NDIR:	0-30 vol.-ppm	0-1000 vol.-ppm
HCl / NDIR:	0-15 vol.-ppm	0-100 vol.-ppm
NH3 / NDIR:	0-30 vol.-ppm	0-100 vol.-ppm
H2O / NDIR:	0-5 vol.-%	0-40 vol.-%

The measuring range is depending on the application and can be adjusted in accordance with the requirements of the NOx Technical Code 2008 Appendix III section 1.3 and Appendix VIII section 2.2.2.

Power supply: 3-ph 230V, +10/-15 %; 50/60 Hz; Software version: 1.43

Test Standard Guidelines for the Performance of Type Approvals, Chapter 2, Edition 2003  
Revised MARPOL 73/78 Annex VI and NOx Technical Code 2008

Documents Report no. 124/554/414: Nachweis über die Eignung des Analysensystems MSC 100E zur Messung und Bestimmung gasförmiger Emissionen von Schiffsmotoren (22.11.2010); Operating Instruction: MCS100E IR Analyzer (Part No.: 8009504, Version: 3.0, Release: 2009-07); Drawings, part lists acc. to submitted files.

Remarks In case ambient temperature is above 35°C MSC 100 E may only be operated in an air conditioned cabinet. Operating instruction must be advised.

Valid until 2016-02-20

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Type Approval Symbol



File No. I.A.02

Hamburg, 2011-02-21

Germanischer Lloyd

  
Hans-Joachim Götze

  
Dr.-Ing. Fabian Kock

This certificate is issued on the basis of "Guidelines for the Performance of Type Approvals Part 1, Procedure".

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The "MCS 100 E" is found to fulfil the requirements for a component of a complete monitoring system according to Revised MARPOL Annex VI and NOx Technical Code 2008.

In order to completely fulfil the requirements of Revised MARPOL Annex VI and NOx Technical Code 2008 for the On-board verification procedure "Direct measurement and monitoring method", additional equipment will have to be installed.

According to Revised MARPOL Annex VI and NOx Technical Code 2008 the "MCS 100 E" in combination with other equipment may be used in the context of:

- On-board simplified measurement method (NOx Technical Code 2008 6.3),
- On-Board Direct Measurement and Monitoring (NOx Technical Code 2008 6.4).
- Control and verification of exhaust gas cleaning systems in accordance with Scheme A and B of MEPC.184(59).

Equivalence of the alternative Sensors have been demonstrated under surveillance and to the satisfaction of GL in accordance with ISO 8178:2006 Part 1, Section 7 and Appendix D.

The "MCS 100 E" must be operated and calibrated in accordance with the requirements and intervals as specified in NOx Technical Code 2008 Appendix IV.

The "MCS 100 E" meets the following requirements of NOx Technical Code 2008:

- Principle of detection (NOx Technical Code 2008, Appendix VIII, 2.1): Equivalence tests for NO and NO<sub>2</sub> have been carried out.
- Accuracy (NOx Technical Code 2008, Appendix III, 1.6)
- Precision (NOx Technical Code 2008, Appendix III, 1.7).
- Noise (NOx Technical Code 2008, Appendix III, 1.8).
- Zero and span drift (NOx Technical Code 2008, Appendix III, 1.9 and 1.10).
- Interference effect (NOx Technical Code 2008, Appendix IV, 9).
- Leakage test (NOx Technical Code 2008, Appendix IV, 4).
- Calibration curve (NOx Technical Code 2008, Appendix IV, 5.5.1).

#### Environmental Category:

"H": Filter unit and heated probe (length 0.8m) was vibration tested with 4g (curve 2)  
Unheated probe (length 0.25m) was vibration tested with 10g (curve 3) for use near to the engine or turbo charger.

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