

TYPE APPROVAL CERTIFICATE

Certificate no.:
TAA00001CN
Revision No:
6

This is to certify:

that the **Exhaust Gas Measuring and Monitoring Device**

with type designation(s)
MARSIC300

issued to

Endress+Hauser SICK GmbH+Co. KG
Ottendorf-Okrilla, Germany

is found to comply with

DNV rules for classification – Ships, offshore units, and high speed and light craft

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Location classes:

Temperature	A / B* / D*
Humidity	B
Vibration	A / B*
EMC	A
Enclosure	A / B* / C*

Issued at **Hamburg** on **2025-04-15**

This Certificate is valid until **2030-03-10**.

DNV local unit: **Augsburg**

Approval Engineer: **Dariusz Lesniewski**



for **DNV**

This document has been digitally signed and will
therefore not have handwritten signature

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to USD 300 000.

Product description

MARSIC300 is an analyzer system for the measurement of exhaust gas concentration of diesel engines of the following gas components: SO₂, CO₂, NO, NO₂, O₂, H₂O, CO, NH₃ and CH₄.

Component / Sensor type	Smallest range	Highest range
SO ₂ / NDIR	0-30 ppm	0-2000 ppm
CO ₂ / NDIR	-	0-25 vol.-%
NO ₂ / NDIR	0-200 ppm	0-500 ppm
NO / NDIR	0-300 ppm	0-2000 ppm
O ₂ / ZrO ₂	-	0-21 vol.-%
CO / NDIR	0-200ppm	0-2000ppm
NH ₃ / NDIR	0-50ppm	0-500ppm
CH ₄ / NDIR	0-500ppm	0-10000ppm

Power supply: 230V AC and 115V AC at 50/60Hz
 Firmware version: 1.1.xx (Id-No. 9220790)

The exhaust gas analyzer "MARSIC300" is found to be suitable as a component of a continuous monitoring system of NO_x- and SO_x emissions to comply with the requirements of MEPC.259(68) / MEPC.340(77) as well as with relevant requirements of Revised MARPOL Annex VI and NTC 2008.

The "MARSIC300", in combination with other equipment, may be used in the context of:

- Simplified measurement method (Chapter 6.3; NTC 2008),
- Direct Measurement and monitoring method (Chapter 6.4; NTC 2008),
- Continuous monitoring of SO_x emissions (Chapter 6; MEPC.259(68) / MEPC.340(77))
- Confirmation test for Scheme A and Scheme B for an engine system fitted with SCR acc. to MEPC.198(62) except HC
- Emission measurement on a test bed (Chapter 5; NTC2008) except HC

The "MARSIC300" meets the following requirements:

- Principle of detection for SO₂ (MEPC.259(68) / MEPC.340(77), 6.2)
- Principle of detection for CO₂ (MEPC.259(68) / MEPC.340(77), 6.2 and NTC 2008, Appendix III, 3)
- Principle of detection for O₂ (NTC 2008, Appendix III, 3)
- Principle of detection for CO (NTC 2008, Appendix III, 3)
- Analyzer performance for SO₂, CO₂, CO, NO, NO₂ and O₂:
 Accuracy (NTC 2008, Appendix III, 1.6)
 Precision (NTC 2008, Appendix III, 1.7)
 Noise (NTC 2008, Appendix III, 1.8)
 Zero and span drift (NTC 2008, Appendix III, 1.9 and 1.10)
 Calibration curve (NTC 2008, Appendix IV, 5.5.1)
 Interference effect (NTC 2008, Appendix IV, 9)
 The analyzer performance has not been tested for H₂O, NH₃ and CH₄ as these components are not required for fulfilling a. m. guidelines.
- The equivalence of the alternative sensors for NO_x (NO + NO₂) has been demonstrated under surveillance and to the satisfaction of DNV in accordance with ISO 8178:2006 Part 1, Annex D.

The "MARSIC300" shall be installed, calibrated and operated in compliance with the manufacturer's instructions and in accordance with the requirements and intervals as specified in Revised MARPOL Annex VI and NTC 2008.

According to MEPC.259(68) / MEPC.340(77), Appendix I, 6(e), both gas concentrations (CO₂ and SO₂) will be measured at the same residual water content in the sample (wet) and therefore no conversion factors are required in the calculation of the CO₂/SO₂ ratio.

This is to note

1. In order to completely fulfill the requirements for NO_x- and/or SO_x monitoring additional equipment (e. g. data recording, engine performance measurements) will have to be installed.
2. The "MARSIC300" shall be installed, calibrated and operated in compliance with the manufacturer's instructions.
3. The calibration of the "MARSIC300" can use the internal calibration filters for the components as listed above (except O₂, which is calibrated with instrument air).
 The calibration interval is defined as follows:
 - Zero point calibration will be done on daily base with instrument air automatically.
 - End point calibration will be done with internal filters on a monthly base automatically.
 The calibration needs to be checked with calibration gas latest after measurement relevant parts of the "MARSIC 300" have been replaced.

The MARSIC300 fulfills the requirements to be using the internal calibration filters for commissioning without calibration/span gases.

4. For simplified measurement method (Chapter 6.3; NTC 2008), direct Measurement and monitoring method (Chapter 6.4; NTC 2008) the "MARSIC 300" must be operated and calibrated in accordance with the requirements and intervals specified in NOX Technical Code 2008.

Following system variants are subject to the Type Approval

	Identification number	Specification
Sample tube	2058125	Unheated 0.25m (SFU-BF NI GL)
	2083525	Unheated 0.5m (SFU-BF NI GL)
	2083527	Unheated 0.8m (SFU-BF NI GL)
	2142889	Unheated 0.8m (SFU100/150)
	2142888	Unheated 0.5m (SFU100/150)
	2071307	Heated 0.5m 230V AC
	2071577	Heated 0.5m 115V AC
	2025125	Heated 0.8m 230V AC
	2028706	Heated 0.8m 115V AC
Gas sample probe	2058208	SFU-BF NI GL
	2121888+2142143+2122232	SFU100 (indoor)
	2137834+2142143+2122232	SFU150 (outdoor)
Bundle of pipes	6058993	Up to 40m
Heated sample line	Type AW 6031101 to 6031135	Heiz.-SHL. 230 ELH/AW 6/8 1H 1M N.LSP (1m) to 35M N.LSP (35m)
	Type AW 6061201 to 6061270	Heiz.-SHL. 230 ELH/AW-LC 6/8 1M N.LSP (1m) to 35M N.LSP (35m)
	Type AW 6074701 to 6074735	Heiz.-SHL. 230 ELH/AW 6/8 1H 1M N.LSP (1m) to 35M N.LSP (35m) Silicon free
	Type AD 6028701 to 6028735	Heiz.-SHL. 230 ELH/ADW 6/8 1H 1M N.LSP (1m) to 35M N.LSP (35m)
Analyzer	1076531	DeSOx (SO ₂ , CO ₂)
	1076532	DeNOx (NO, NO ₂)
	1076530	Emission complete (SO ₂ , CO ₂ , NO, NO ₂ , O ₂ , H ₂ O, CH ₄ , NH ₃ , CO)

Application/Limitation

The Type Approval covers hardware listed under Product description.

When the hardware is used in applications to be classed by DNV, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case.

Reference is made to DNV RU SHIP Pt.4 Ch.9 Sec. 1.

Vibration location class B*:

Sample tubes 0.5m and 0.8m and sample probe were vibration testes with 4g

Sample tube 0.25m unheated was vibration tested with 10g

Temperature location class: B* for SFU100, D* for SFU150

Enclosure location class: B* for SFU100, C* for SFU150

Type Approval documentation

Report no. MAGDE717 2015.139, Rev. 1.0 (02.02.2016)

Test Report no. E135389 00 (23.09.2015)

Note for Application: Change of material for the parts 2083525 and 2083527 (05.05.2017)

Note for Application: Development of the heated measuring lines (05.05.2017)

Rittal Data sheet Compact system enclosures CM-CM 5113.500 (05.04.2017)

Rittal Data sheet TopTherm fan-and-filter units-SK 3239.100 (05.0.2017)

Data sheet Hummel AG HSK-K

Type approval certificate TAE000007F

Sick confirmation letter of March 8th, 2022 - "MARSIC300: Deviation of FW Version listed in Type Approval"

Sick confirmation letter of April 7th, 2022 - "MARSIC300 – IACS E10 Rev7 Confirmation"

Eltherm confirmation letter of July 9th, 2020 - "Confirmation outer sheath. Reiku Typ PARAB"

Test Report no. E135389 00, dated 23.09.2015

System Design Requirement Specification SFU1X0 Doc.-ID: E398135 Ver. 00

SICK Corporate Test Center Test Report No. E406543 dated 2024-07-30

TREO Test Report no. 207-24 Issue 2, dated 2024-07-12

E-Drawings: 9360775 (V 02), 9401155 (V 02)
Operating Instructions MARSIC300 Doc. No. 8029898/175O/V4-0/2020-03
Operating Instructions SFU Doc. No. 8029819/YJ80/V3-0/2015-08
Technical Information MARSIC300 Doc. No. 8030681/YXD9/V3-1/2017-05
DNV type approval assessment report issued at Augsburg on 2025-04-09

Tests carried out

Applicable tests according to Class Guideline DNV-CG-0339, Edition August 2021.
Revised MARPOL 73/78 Annex VI and Nox Technical Code 2008 and MEPC.259(68) / MEPC.340(77).

Marking of product

- manufacturer name
- device name
- serial number

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.
The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of this certificate.

END OF CERTIFICATE