



TYPE APPROVAL CERTIFICATE

Certificate no.:
TAA00002CT
Revision No:
2

This is to certify:

that the **Gas Detectors for Exhaust Gas Emissions**

with type designation(s)

Marine Emission Sensors: MES1001 and MES1001 MARPOL

issued to

Danfoss Ixa A/S

Kolding, Denmark

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 | B |
| Humidity | B |
| Vibration | B |
| EMC | B |
| Enclosure | B / IP65 |

Issued at **Høvik** on **2024-08-27**

for **DNV**

This Certificate is valid until **2029-08-26**.

DNV local unit: **Denmark CMC**

Approval Engineer: **Ståle Sneen**

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 300,000 USD.



Form code: TA 251

Revision: 2023-09

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Product description

Marine Emission Sensors:

- MES1001 Prod. no. 100100
- MES1001 MARPOL Prod. no. 100101

| Supported gases: | Accuracy (when calibrated): |
|--------------------------------|---|
| NO 0 - 1500 [ppm] | ±2% of reading or ±0.3% fs, whichever is greatest |
| NO ₂ 0 - 500 [ppm] | ±2% of reading or ±5 ppm, whichever is greatest |
| SO ₂ 0 - 1000 [ppm] | ±2% of reading or ±0.3% fs, whichever is greatest |
| NH ₃ 0 - 100 [ppm] | ±2% of reading or ±1 ppm, whichever is greatest |

Application: In situ emission sensor
 Technology: UV absorption spectroscopy
 Mounting flange: circular, bolted connection - DIN 2633, NT 16
 Power supply: 24 VDC ±25%
 Inputs / Outputs:
 4 x analogue output: 4 - 20 mA
 Digital inputs: 2 (relay controlled)
 Digital outputs: 2 (relay controlled)
 Communication interfaces: Modbus TCP/IP, RS-422
 Local Control Panel: display, menu keys, navigation keys, operational key, status indication lights
 Software version: Refer to 100591-REP

Place of manufacture

Danfoss Ixa A/S
 Marsvej 5
 6000 Kolding, Denmark

Approval conditions

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 rules for classification of ships Pt.4 Ch.9 Control and monitoring systems.

Application/Limitation

The "MES1001 MARPOL" is found to be suitable as a NO_x measurement device to comply with the requirements of NTC 2008 and meets the following requirements:

- Accuracy (NTC 2008, Appendix III, Ch. 1.6)
- Precision (NTC 2008, Appendix III, Ch. 1.7)
- Noise (NTC 2008, Appendix III, Ch. 1.8)
- Zero and span drift (NTC 2008, Appendix III, Ch. 1.9 and Ch. 1.10)
- Calibration curve (NTC 2008, Appendix IV, Ch. 5.5.1)
- Interference effect (NTC 2008, Appendix IV, Ch. 9)
- The equivalence of the alternative sensors for NO_x (NO + NO₂) have been demonstrated under surveillance and to the satisfaction of DNV in accordance with paragraph 5.4.2 of the NTC 2008 and ISO 8178-1:2006, Annex D.

The "MES1001 MARPOL" 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.

In order to completely fulfil the requirements for NO_x- monitoring additional equipment (e.g. data recording, engine performance measurements) will have to be installed.

The operating ambient temperature should be 0 – 55°C for the sensor and the exhaust gas temperature max. 500°C at the probe.

Remark: The compliance with NO_x Technical Code 2008 is valid for sensor "MES1001 MARPOL", which is separately assessed and further described in Statement of Compliance No. 29668109/DNV Rev.0 dated 2022-04-19.

Type Approval documentation

| | | |
|----------------|---------------------|---|
| Data sheet: | 100300-DSH rev. H | MES1001 – Prod. no. 100100 |
| | 101222-DSH rev. A | MES1001 MARPOL – Prod. no. 100101 |
| Manuals: | 100310-MAN rev. E | MES1001 Installation Guide |
| | 100320-MAN rev. H | MES1001 User Guide |
| Test reports: | 100331-DOC rev. 1 | MES1001 Qualification Test Report |
| | 100343-REP rev. A | MES1001 Power supply variations tests |
| | 100344-REP rev. A | Addendum to T219140-2 DANAK 19/15872 |
| | 100345-DOC rev. B | Addendum to 100331 Qualification Test Report |
| | 100592-REP rev. A | MES1001 Resonance Search, January 2018 |
| | 100593-REP rev. A | Delta test report (DANAK-19/15872 rev. A dated 2016-03-15) |
| | 101163-REP rev. D | MES1001 MARPOL Compliance Report: Part 1 |
| | 101164-REP rev. A | MES1001 MARPOL Compliance Report: Part 2 – Equivalence Test |
| | 101232-REP rev. A | MES1001 EMC Test (120-32700-1 dated 2020-12-01) |
| | 101233-REP rev. A | MES1001 Vibration Test (120-34782 dated 2020-11-27) |
| | 101301-REP rev. A | DC/DC Converter Test, Model RSD-60G-24 |
| | 29668109/DNV rev. 0 | Statement of Compliance – Danfoss IXA MES1001 MARPOL – NTC 2008 |
| Drawings: | 100100-PRD rev. E3 | MES1001 (G.A. drawing) |
| Danfoss docs.: | 100591-REP rev. B | MES1001 Software Release Notes |
| | 100594-NTE rev. A | MES1001 Type Approval Update, 42 238 - 15 HH |
| | 101231-NTE rev. A | MES1001 Type Approval Update, TAA00002CT |
| | 101318-NTE rev. B | Type Approval of MES1001 MARPOL |

Type approval renewal assessment report for TAA00002CT, Denmark CMC 2024-08-26.

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.

Marking of product

The products to be marked with:

- manufacturer name
- model 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 the certificate.

END OF CERTIFICATE