Certificate no.:
TAA00003VN

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Monitoring System

with type designation(s)
Crankpin Temperature Monitoring - Software

issued to
AIX MONITORING SYSTEMS LTDA
Rio de Janeiro, RJ, Brazil

is found to comply with
DNV rules for classification – Ships

Application:

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

Location classes:

Temperature	**n/a**
Humidity	**n/a**
Vibration	**n/a**
EMC	**n/a**
Enclosure	**n/a**

Issued at **Hamburg** on **2026-04-21**
This Certificate is valid until **2031-04-16**.
DNV local unit: **Station Rio de Janeiro, NB/CMC/Approval**

for **DNV**

Approval Engineer: **Dariusz Lesniewski**

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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

Crankpin Temperature Monitoring (CTM) System Application Software.
The CTM system software is intended for continuous real-time temperature monitoring of crankpins of diesel engines.
Associated hardware is not scope of this type approval certification.

Hardware platform reference information (only for information):
- Power Supply
- CPU
- HMI
- Remote IO
- IO-Link Temperature Transmitters (Crankpin Sensors)
- Redundancy Module

CTM System software main features:
- Data acquisition
- Displaying of crankpins temperature by numerical and bar graph indication
- Monitoring of crankpins temperature
- Generate temperature alarms (Shut-down/Slow-down) and pre-alarms (Warnings)
- Displaying of temperature trend graphs, deviation bar graphs
- Set points adjustment
- Manual reset and maintenance functions
- Event log with date and time, event description, event status
- Continuous sensor and system diagnostic
- Remote parametrization of devices (temperature transmitters)

Software Version (by development):	**V17** (Siemens S7-1200 CPU, HMI TP700)
Software Versions (by delivery):	6-cylinder version **/** 12-cylinder (“V” engine) version **66 55 40 06 66 E0 44 BF**
	8-cylinder version **/** 16-cylinder (“V” engine) version **0B D9 A3 FC 99 6D 8A 76**
	9-cylinder version **C6 5F B3 6C 7F 56 9C A3**
	10-cylinder version / 12-cylinder (“V” engine) version **77 27 7A 49 6F 42 88 39**

Approval conditions

The following documentation of the actual application is to be submitted for approval in each case:

- Reference to this Type Approval Certificate
- Functional description
- System block diagram
- Power supply arrangement (may be part of the System block diagram)
- List of control and monitored points
- Circuit diagrams
- Test program for certification

The Type Approval covers software listed under Product description.

When the type approved software is revised (affecting all future deliveries) DNV is to be informed by forwarding updated software version documentation. If the changes are judged to affect functionality for which rule requirements apply a new functional type test may be required and the certificate may have to be renewed to identify the new software version.

Product certificate
Each delivery of the application system is to be certified according to Pt.4 Ch.9 Sec.1. The certification test is to be performed at the manufacturer of the application system before the system is shipped to the yard. After the certification the clause for application software control will be put into force.

Application software control
All changes in software are to be recorded as long as the system is in use on board. Documentation of major changes is to be forwarded to DNV for evaluation and approval before implemented on board.

Application/Limitation

The system supports thermal condition monitoring and protection signals in accordance with the approved engine control and safety philosophy.

The system is to be considered as a complementary monitoring and protection system and does not replace mandatory engine safety system as per applicable Classification Society rules.

Approval by DNV Class of the interface drawing defining the signal path between the CTM system and the engine shutdown device.

Attendance and witnessing by DNV Class during commissioning tests of the shutdown function for each cylinder

Type Approval documentation

Tests carried out
Software functional and verification tests performed by DNV approval engineer in the period 2025/2026 - acc. to DNV rules for classification of ships Pt.4 Ch.9.

Marking of product
- Siemens SIMATIC HMI
- Vessel Name
- AIX Crankpin Temp. Monitoring
- Software Version (by separate read out)

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 (software related only).

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

A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE