

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Cylinder Monitoring System**with type designation(s)
E2PRECON-M, E2KNOCKCON-M, ICPM

Issued to

AVAT Automation GmbH
Tübingen, Baden-Württemberg, Germany

is found to comply with

DNV GL rules for classification – Ships, offshore units, and high speed and light craft**Application :****Location classes:****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

Temperature	D
Humidity	B
Vibration	B
EMC	A
Enclosure	B (IP 66)

Issued at **Hamburg** on **2018-12-03**This Certificate is valid until **2023-12-02**.for **DNV GL**DNV GL local station: **Augsburg**Approval Engineer: **Jens Dietrich**

Joannis Papanuskas
Head of Section

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.



Product description

E²PRECON-M, ICPM: Calculation of combustion characteristics from cylinder pressure signals for engine control, monitoring and diagnostics.

12 x cylinder pressure, 4..20 mA incl. sensor power supply (E²PRECON-M)

10 x cylinder pressure, 4..20 mA incl. sensor power supply (ICPM)

2 x speed/timing signals (active or passive)

Interfaces: CAN/SAE-J1939, Ethernet for service tool

Software version: xxP1xx

Power supply: 24VDC, max. 30 W, Degree of protection: IP66

E²KNOCKCON-M: Calculation of knock levels and diagnostic information from sound signals for engine control, monitoring and diagnostics.

12 x piezoelectric acceleration sensors

2 x speed/timing signals (active or passive)

Interfaces: CAN/SAE-J1939, Ethernet for service tool

Software version: xxK1xx

Power supply: 24VDC, max. 15 W, Degree of protection: IP66.

Application/Limitation

-Knock detection is only validated for use in gas operation.

-Alarm handling of knock detection or other characteristics (presentation, acknowledge, etc) is not part of the system.

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

- Reference to this Type Approval Certificate
- System block diagram
- Power supply arrangement (may be part of the System block diagram)
- Test program for certification
- Software version used in the specific delivery

The Type Approval covers hardware listed under Product Description and software design principles. Suitability of the detecting characteristics for the individual engine type needs aligned with the respective engine maker.

When the software is revised (affecting all future deliveries) DNV GL 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, preferably at the engine maker performing the integration test as referenced in Pt.4, Ch.3, Sec.1. After the certification the clause for application software control will be put into force.

Tests carried out

Applicable tests according to DNV GL CG-0339, Nov. 2016

System test performed at AVAT Automation GmbH, Tübingen, Germany, dated 2014-05-14.

Marking of product

Unique serial number

Part number (as listed under Product description)

Power supply ratings

IP rating

Manufacturer AVAT Automation GmbH

Job Id: **262.1-015899-2**
Certificate No: **TAA0000242**

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