Certificate No:
TAA000036H

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Monitoring System

with type designation(s)
Kyma ShaPoLi solution, SPS-100 Shaft Power Sensor, KDU-220.1 / KDU-220.2, TS-1, TS-2

Issued to
Kyma AS
Ulset, **Norway**

is found to comply with
IACS Recommendation No. 172 (June 2022) EEXI Implementation Guidelines
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:

Type	Temperature	Humidity	Vibration	EMC	Enclosure
SPS-100 Shaft Power Sensor	**D**	**B**	**A**	**B**	**B**
KDU-220.1 / KDU-220.2	**B**	**B**	**A**	**B**	**A**
TS-1, TS-2	**D**	**B**	**A**	**B**	**Required protection according to the Rules shall be provided upon installation on board.**

Issued at **Høvik** on **2022-10-13**
This Certificate is valid until **2024-10-12**.
DNV local station: **Bergen**

for **DNV**

Approval Engineer: **Thorbjørn Hansen**

Jan Tore Grimsrud
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.

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.

Product description

The Kyma ShaPoLi solution is a separate part within the Kyma Delfini performance monitoring system, designed to comply with the ShaPoLi approach as outlined in IACS Rec.172 (section 6.6, first bullet) of June 2022. The complete Kyma ShaPoLi solution comprises the following main parts (detailed HW listed in Table 2).

1. SPS-100: A shaft power sensor that continuous measure the propeller shaft(s) torque and RPM.
2. KDU-220.1: A recording, processing, and calculation module interfacing the shaft power meter. The KDU-220.1 shall be installed in ER/ECR.
3. KDU-220.2: A control unit that informs the ship's master or OICNW clearly and conspicuously when the ship's shaft power exceeds the EEXI power limit. The KDU-220.2 shall be installed in WH.

The Kyma ShaPoLi solution may be arranged without KDU-220.1 in ER/ECR. In such applications its functionality is maintained by the KDU-220.2 in WH, which then also interface the torque meter(s).

The KDU-220.2 in WH may alternatively to the SPS-100 interface torque meter(s) supplied by other manufacturers.

Functionality specified by MEPC.335(76) concerning EPL/ShaPoLi are listed in Table 1. Which of these functions that are covered by the subject Type Approval Certificate are identified in column no. 3. When the system shall be used onboard DNV classed vessels, the vessel-specific configuration shall be reflected in Annex 1.

Table 1: Functions defined in MEPC.335(76)

No	Function	Covered by the subject TAC	SW No	DNV HW TAC
1	**Power limitation**			
1a	EPL - Power limitation	N/A		
1b	ShaPoLi - Power limitation	Yes Note 1		
2	**Override**			
2a	Override power limitation	Yes Note 1		
3	**Alarming**			
3a	Alarming relevant failures on bridge	Yes		
4	**Indication (on the bridge)**			
4a	Activation of un-limiting mode	Yes Note 1		
4b	Power limit exceeded (visual and audible)	Yes		
4c	Indication of shaft speed, -torque and -power Note 2	Yes		
5	**Recording**			
5a	Shaft speed, -torque and -power recorded in un-limiting mode Note 1	Yes		
5b	Power limit exceeded	Yes		
5c	Activation of override Note 3	N/A		
6	**Tamper-proofing**			
6a	The following measures are taken to arrange the Kyma system tamper proof: Event log, covering: • Changes made to the EEXI power limit (pw protected on admin level). • System powered off • Actual power exceeding the EEXI limit above 60 seconds. • Alarm acknowledge. Detailed log with 15 s. average data per event the available power is exceeded: • Timestamp (UTC) • Shaft rotational speed • Shaft torque • Shaft power (total shaft power in case of multiple shafts) • GPS position (if connected)	Yes		
Note 1	The subject system is arranged independent of the engine automation system and provides alarm, indication and recording necessary for the navigator to manually limit the power as specified in IACS Rec. 172, Section 6.6. If the subject system shall be applied in ShaPoLi-arrangements with automatic power limitation as specified MEPC.335(76), such use is subject to case-by-case approval.			
Note 2	Required when power limitation is arranged as specified in 1b.			
Note 3	Required when power limitation is arranged as specified in 1a.			

Table 2: Kyma ShaPoLi HW

Component		SW no	Physical location	DNV TA certificate
Name	**Description**			
KDU-220.1	Display, recording, processing and calculation unit	2.xx.x Note 1	ECR	TAA000036H
KDU-220.2	Control unit	2.xx.x Note 1	WH	TAA000036H
SPS-100	Shaft Power Sensor, comprising:	N/A	ER	TAA000036H
	• Shaft ring	N/A	ER	TAA000036H
	• Stationary unit (Transducer Unit / TR-30C & Pickup Unit / PU-310)	N/A	ER	TAA000036H
	• Junction box SPS-JB1	N/A	ER	TAA000036H
TS-2	Terminal strip, comprising:	N/A	WH	
	• X12/24RCEo Siemens LOGO logic module	N/A	WH	TAA00001AS & TAA000036H
	• EDS-205A Moxa Ethernet switch	N/A	WH	TAA000021N
	• Weidmüller PROmax 120W 24V 5A, Power supply	N/A	WH	TAA00000TT
TS-1	Terminal strip, comprising:	N/A	ECR	
	• FN2090-1-06, Schaffner EMI Filter	N/A	ECR	TAA000036H
	• MDR-60-12, Power supply	N/A	ECR	TAA000036H
CB1-620B	ABB Buzzer	N/A	WH	TAE00000W4

Note 1: SW numbering strategy – SW no. 2.xx.x
"2" indicates the SW concerns ShaPoLi functionality in the Kyma Delfini system
"xx" indicates concerns Kyma Delfini system
"x" concerns bug fixes and minor modifications
This TA certificate covers software versions 2.xx.x from 2.12.0 and upwards.

Table 3: Optional external interfaces

Parameter	Signal type
GPS position	NMEA0183 or Modbus
System alive	NMEA0183 or Modbus

Approval conditions

This Type Approval certificate covers hardware and software as listed in Table 2.

Kyma shall ensure that the DNV Type Approval certificates for the components listed in Table 2 are valid, and that any application/limitations in these are complied with prior to installation onboard.

Whenever any of the functions listed in Table 1 are implemented on a DNV classed vessel, a signed copy of Annex 1 in this TAC shall be filled in and submitted to DNV.

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.

Application/Limitation

The Kyma ShaPoLi solution is approved for use on DNV classed vessels subject to EEXI overridable power limitation provided the vessel's Flag Administration have accepted the ShaPoLi approach as outlined in IACS Rec.172 (section 6.6, first bullet) of June 2022.

Except from the recording functionality, the system is not approved for use in ShaPoLi systems with functionality for automatic power limitation.

Equipment installed in the wheelhouse shall not be placed nearer than 5 m to the standard compass or the steering compass, as defined by ISO 694:2000 / ISO 25862:2019.

Type Approval documentation

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.
Function tests according to document “ShaPoLi IACS EEXI compliance test specification (Testdokument Kyma U-24, SHaPoLi)” of September 26th 2022.

Marking of product

Kyma ShaPoLi Display unit in WH: KDU-220.2
SPS / Shaft Power Sensor: SPS-100, comprising

- Kyma Ring Unit: RU-90
- Kyma Transducer Unit: TR-30C
- Kyma Pickup Unit: PU-310

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 at least every second year and at renewal of this certificate.

END OF CERTIFICATE

Annex 1: Ship specific configuration