

TYPE APPROVAL CERTIFICATE

Certificate No:
TAA000025R
Revision No:
4

This is to certify:

That the Remote Control System, Propulsion, Thruster and Steering

with type designation(s)
K-Thrust 720

Issued to

Kongsberg Maritime AS
Kongsberg, Norway

is found to comply with

DNV rules for classification – Ships
DNV rules for classification – Ships Pt.6 Ch.5 Sec.21 Cyber security

Application :

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

The Type Approval applies to system design principle and programmed functions.

The Type Approval covers security capabilities in accordance with DNV security profile 1 and IACS UR E27 Rev.1, subject to conditions stated in this certificate.

Location classes are listed in the certificate.

Issued at **Høvik** on **2024-12-04**

This Certificate is valid until **2026-12-03**.

DNV local unit: **Sandefjord**

Approval Engineer: **Knut Omberg**



for **DNV**

Digitally signed by: Jarle Coll Blomhoff
Location: DNV Høvik, Norway

Jarle Coll Blomhoff
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

K-Thrust 720 RCS system is a flexible and scalable thruster remote control system that can be tailored to suit a variety of different vessel requirements with regards to system segregation and redundancy.

Each propulsion unit, steering gear or thruster has its own separate remote control sub system. A complete remote control system (RCS) for a propulsion plant consists of several parallel RCS'. Common functions for command transfer and control mode selection at each control position synchronise the parallel sub systems.

The Type Approval is valid for the following main modes and functions:

Modes:

- Manual Lever control
- Auto Pilot mode with input from external auto pilot
- Speed Pilot mode with input from external speed pilot
- Manual Heading (Wheel) mode with input from wheel/tiller/miniwheel/rudder lever
- DP mode with input from dynamic positioning control system
- IJS mode with input from independent joystick control system

Functions:

- Remote control of propulsion, thruster and steering gear
- Command responsibility transfer between control positions and individual transfer between ECR and Bridge
- Command change-over between control systems (as listed above under modes)
- Alarm indication

Optional modes and functions:

- Power Mode / Torque mode
- Load Control Sharing mode
- Bumpless transfer between control positions and to Lever control from other control systems.
- Synchronous Control between two or more propulsion units, steering gears or thrusters.
- RCS Steering Gear Alarm System

Additional information related to modes and functions can be found in K-Thrust 720 Propulsion and Thruster Remote Control System Product Description.

Software:

Current software version is 4.2.z. The release label is constructed by three digits; x.y.z,

- x denotes major release
- y denotes minor release
- z denotes update

K-Thrust 720 consists of hardware components specified in TAA00003DA.

Approval conditions

Product certificate

Each delivery of the type approved system is to be certified according to DNV Pt 4. Ch 9 Sec.1 and Pt.6 Ch.5 Sec.21. Project-specific documentation shall be submitted for approval as per the table below and a certification test shall be performed at the manufacturer of the application system before the system is shipped to the yard. Certification test is not required for cyber security capabilities as long as the system is correctly represented by this type approval.

Clause for application software control

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

Major changes to the type approved system affecting future deliveries shall be informed to DNV. If the changes are considered 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 version. Minor changes are covered by this type approval.

This type approval certificate confirms compliance with requirements as specified in the table below.

This TA certificate covers:	For each delivery of the type approved system(s), the following documents shall be submitted:
Type approval of hardware components in accordance with: <ul style="list-style-type: none"> - DNV-RU-SHIP Pt.4 Ch.9 Sec.5 	<ul style="list-style-type: none"> - Equipment list (Z090), including reference to type approval certificate for each hardware device. This document may be common with F071 below.
Type approval of capabilities for control, monitoring, alarm, and safety functions in accordance with: <ul style="list-style-type: none"> - DNV-RU-SHIP Pt.4 Ch.9 	<ul style="list-style-type: none"> - Functional description (I020). - System topology (I030). This document may be common with F030. - List of alarms and control and monitored points (I110), including data transferred on communication links). - Test program for product certification (Z252). - Power supply arrangement (I050). This document may be common with I030.
Type approval of cyber security capabilities and system architecture in accordance with security profile 1 (SP1): <ul style="list-style-type: none"> - DNV-RU-SHIP Pt.6 Ch.5 Sec.21 	<ul style="list-style-type: none"> - System topology (F030), illustrating system architecture and interfaces with other systems. Including consistency with document K-Thrust CS Topology 110-0053616 - Inventory/equipment list (F071), demonstrating consistency with asset inventory 110-0053615. This document may be common with Z090. - Signed delivery checklist (F262) demonstrating configuration of security capabilities as per document 110-0094608
In addition to the documents above, any modifications in the delivered system compared with the type approved system shall be documented and submitted for approval.	

Power supplies, monitors and indicators are not covered by this certificate or TAA00003DA and shall be documented for compliance with environmental requirements as per document Z090.

For newbuilding projects, identical deliveries to sister vessels with the same DNV project ID are to be documented and submitted in one common transmittal.

The manufacturer will generate release/update notes for each new software revision. The current basis software version is listed under Product Description and KM document Release Notes K-Thrust 4.2.0.

Application/Limitation

“RCS Steering Gear Alarm System” is an optional function and hence it might not be KM scope of supply on a specific delivery. This will then have to be addressed case by case.

Rules for additional class notation(s) (Redundant Propulsion, Dynamic Positioning, etc.) and craft category (if high speed craft) will be addressed case by case.

K-Thrust 720 may be integrated with other systems and equipment as per below:

- Kongsberg systems in the same security zone may connect directly to the K-Thrust Process network A and B.
- Kongsberg systems in other security zones may connect to the K-Thrust Process network A and B via the K-Thrust firewalls or via firewalls supplied with the other Kongsberg system.
- Third party systems, sensors and actuators may connect to K-Thrust Fieldnet via the K-Thrust firewalls, alternatively via hardwired signals or serial communication directly to the K-Thrust controllers.

All the above connected systems and equipment shall be allocated to a security zone on board.

K-Thrust 720 may also be integrated with the below systems and equipment:

- Kongsberg Remote Services may connect to K-Thrust firewall(s) as per type approval TAA00003F4
- Kongsberg Information Management System (K-IMS) may connect to K-Thrust firewall(s) as per type approval TAA00003F4 and TAA00003F5 .
- Third party remote access or information management solutions may connect to K-GSN firewall as per type approval TAA00003F4.

K-Thrust 720 must include at least one Kongsberg operator station for alarming purposes, either delivered as part of the K-Thrust 720 system or provided by the integration with other Kongsberg systems in the same security zone.

Connected systems and equipment shall be described and illustrated in the System topology (F030/I030) and the integration is subject to testing on board in accordance with applicable requirements in DNV rules.

Type Approval documentation

Please note that the list below only includes selected documentation with the status approved and retrieved online from Kongsberg Maritime web solutions in CDQM-0016 Rev. E TA-K-THRUST-RBUS and CDQM-0016 Rev. F TA K-THRUST 720.

Hardware module descriptions:

- Moxa SFP module. Doc. No. 440212/A
- Direct Wiring Panel and IO Controller. Doc. No. 334102/F
- Thruster Command panel. Doc. No. 412460/B
- Redundancy module YR40.24. Doc. No. 410028/A
- Panel PC 7" 5:3 J1900. Doc. No. 405546/B
- CC100A / CC100B. Doc. No. 396515/B
- CS100. Doc. No. 396509/B
- Display Indicator (Deif), XDi. Doc. No. 393992/C
- Panel PC 12.1". Doc. No. 416808/A
- Trio Diode Module, 12-24VDC 2x10A/1x20A. Doc. No. 391243/A
- INELTEH Emergency Engine Telegraph Type EET1. Doc. No. 361104/D
- K-Master Touch Control Panel 13.3"HD 13T21 KMD-DR1-CORx. Doc. No. 349793/D
- K-Master Alarm Panel. Doc. No. 348019/B
- K-Master I/O controller. Doc. No. 348029/C
- Kwant Controls Rudder Angle Indicators. Doc. No. 345098/B
- DEIF Indicators XL72, XL96 and XL144. Doc. No. 340980/A
- RCU502i. Doc. No. 429804/D
- RCU602. Doc. No. 408644/C
- RMP201-8. Doc. No. 330111/C
- Lever K-Thrust. Doc. No. 412948/B
- Moxa Switch EDS-205A series. Doc. No. 343879/D
- Moxa Switch EDS-208A Series. Doc. No. 470973/B
- Moxa Switch EDS-305. Doc. No. 472197/A
- Moxa Switch EDS-308. Doc. No. 178001/E
- Moxa Port Interface IM-6700A. Doc. No. 439061/B
- Moxa IKS-6726A/6728A series. Doc. No. 439059/A
- Switch Cisco 2960. Doc. No. 463194/A
- SFP 10/100/1000Mb, RJ45, Cisco. Doc. No. 466703/A

- SFP 1000Mb, 1310nm, SM/MM, Cisco. Doc. No. 466704/A
- SFP 1000Mb, 850nm, MM, Cisco. Doc. No. 466706/A
- Phoenix Contact QUINT-PS/1AC/24DC/20. Doc. No. 327446/A
- Phoenix Contact QUINT-PS/1AC/24DC/10. Doc. No. 326403/B
- EFI-16 - Earth Fault Indicator 16A. Doc. No. 324876/I
- RMP420. Doc. No. 311165/E
- Indicator Panorama TRI-2. Doc. No. 441530/B
- RSER200-4. Doc. No. 300993/J
- RHUB200-5. Doc. No. 300994/G
- RDIOR420. Doc. No. 311163/D
- Kwant Controls KC 06-K Joysticks. Doc. No. 307003/B
- Computer NEO CE-HW-01. Doc. No. 409277/B
- MC330 Computer [ThinkStation P330 Tiny] Maintenance Manual. Doc. No. 450174/B
- Deif Panorama Rudder Angle Indicator TRI-2. Doc. No. 178712/G
- MC340 Computer [ThinkStation P340 Tiny] Maintenance Manual. Doc. No. 479386/B

Datasheets:

- AutoChief® 600, Pushbutton Telegraph (PBT). Doc. No. 330199/B
- L2C, LAN to CAN Gateway. Doc. No. 409453/C
- Remote Input/Output (RIO-C2). Doc. No. 330189/A
- Main Engine Interface (MEI). Doc. No. 330153/A
- Lever Telegraph Unit (LTU11 and LTU11 ME). Doc. No. 367938/D
- Display 15" FHD XT MK1. Doc. No. 480747/B
- Switch Cisco C1000. Doc. No. 489196/B
- PSS Process Segment Star Coupler (8 CAN) Doc. No. 330194/A
- Power Quint-PS 24DC/24DC/5A. Doc. No. 482507/A
- PROTOP1 Power 24V 10A. Doc. No. 110-0020568/B
- PROTOP1 Power 24V 20A. Doc. No. 110-0020569/B
- Red.Module 2x10A, PRO RM 10. Doc. No. 110-0019904/B
- Red.Module 2x20A, PRO RM 10. Doc. No. 110-0019908/B
- PB4. Doc. No. 405886/A

Test reports:

- Test Report K-Master Panel System Report No. E11024.03. Doc. No. 357261/B (Nemko)
- Nemko Test Report Bridge Workstation (Report No. E12059.00). Doc. No. 370398/A
- Type approval testing of additional Distributed Processing Units. Doc. No. DANAK-194874
- Type approval testing of ACP, PBT, MPP and MPD modules for New AutoChief C20: Doc. No. DANAK-197329
- Test Report Additional type approval testing of AutoChief AC-C20 Units. Doc. No. DANAK-197561
- Test Report Conducted low frequency interference immunity testing of AutoChief AC-C20 Units. Doc. No. DANAK-197724
- Type approval testing Earth Failure Indicator (EFI). Doc. No. DANAK-1910264
- Supplementary Type approval testing of EFI-16. Doc. No. DANAK-1910281/1
- Test for Marine Type Approval of RMP420 Rev.2. Doc. No. DANAK-1911658/1
- Test for Marine Type Approval of DuraPANEL 7", DuraPANEL 12.1" and DuraMON 7". Doc. No. DANAK-19/15434/A
- Test Report K-Thrust Modules. Doc. No. E16203_00 (Nemko)
- Test Report CAN Distribution Unit (CDU) CS100/CC100A/CC100B/CR100. Doc. No. E15157.02 (Nemko)
- Environmental Test Report Vibration Test of Eldon MAS 120830X KM01. Doc. No. 3010-08-0107 (TI)
- Type approval testing of RMP420 and RDIOR420 (DANAK-198696). Doc. No. 310806/A
- Test Report RCU502i. Doc. No. E18081.00 (Nemko)
- Test for Marine Type Approval of STG Panel and STG Panel Controller (DANAK-1910900/A). Doc. No. 354809/-
- Test for Marine Type Approval of L2C. Doc. No. DANAK-19/16085/A
- Environmental tests for RMP201-8 based upon RMP200-8. Doc. No. 332991/A
- EMC and Environmental Testing of Maritime Display (HD13T21 KMD-DR1-CORP). DNV Report No. 2011-3416, Rev.01. Doc. No. 368647/A
- ENV Report for KM Modules up to IACS E10 rev. 8. Doc. No. NEMKO-21088.03

K-Thrust 720 system:

- K-Thrust 720 Control Position Cabinet CAN. Doc. No. 425804/B
- Engine Telegraph System. Doc. No. 435241/B
- K-Thrust 720 INELTEH Emergency Telegraph. Doc. No. 425806/B
- K-Thrust 720 Control Position Accessories. Doc. No. 425798/B

- K-Thrust 720 Control Positions Fire Topology. Doc. No. 425799/B
- K-Thrust 720 Control Position. Doc. No. 425797/B
- K-Thrust 720 Propulsion and Thruster Remote Control System Product Description. Doc. No. 409587/C
- FMECA K-Thrust 720 Failure mode, effect, and criticality analysis. Doc. No. 384154/A
- Kongsberg K-Thrust 720 RCS Control Position Maintenance Manual. Doc No. 412924/B
- K-Thrust 720 RCS KFDD Kongsberg Functional Design Document "Vessel Name". Doc. No. 378068/C
- Release Notes K-Thrust 4.1.0. Doc. No. 440099/A
- Update Notes K-Thrust 4.1.1 Doc. No. 470067/A
- FAT procedure K-Thrust 720. Doc. No. 412879/D
- K-Thrust 720 Emergency Stop Levers. Doc. No. 388324/C
- K-Thrust 720 Emergency Stop Levers with thermal fuse. Doc. No. 419426/B
- K-Thrust 720 Thruster, Propulsion and Steering Remote Control System Operator Manual Release 4.1.1 Doc. No. 441551/D
- K-Thrust 720 – System topology. Doc. No. 110-0053616/D
- K-Thrust 720 - Asset Inventory. Doc. No. 110-0053615/C
- K-Thrust 720 - Description of Security Capabilities. Doc. No. 110-0053617/B
- K-Thrust 720 – Test procedure cyber security IACS UR E27. Doc. No. 110-0053618/A
- K-Thrust 720 – Security Configuration Guideline IACS UR E27. Doc. No. 110-0094608/A

Tests carried out

Applicable tests according to class guideline DNV-CG-0339, August 2021.
Type approval FAT procedure K-Thrust 720. Doc. No. 412879/C_FTR, 2019-01-09.
Type approval assessment report, DNV Sandefjord 2023-03-15.
FAT K-Thrust HW 5267831 – Rev A – Id 3446108
FAT K-Thrust SW 5267898 – Rev A – Id 3446111
FAT Procedure K-Thrust, doc no. 532295 Rev.B, dated 2023-02-02 DNV ID 43576
Test of cyber security capabilities as per document 110-0066078/C (K-Chief) and 110-0056698/F (AutoChief 600)

Place of manufacture

- Kongsberg Maritime Kirkegårdsveien 45, 3616 Kongsberg, Norway
- Kongsberg Maritime AS Bekkajordet 8A 3189 Horten, Norway
- Kongsberg Maritime Inc., New Orleans, USA
- Kongsberg Maritime China Ltd., No. 136 North Fute Road, China (Shanghai) Pilot Free Trade Zone, 200131, China
- Kongsberg Maritime 9-7, Sandan 3-ro, Jeonggwan-Eup, Gijang-gun, 46027, Busan, Korea
- Kongsberg Maritime 81 Toh Guan Rd East, #04-01/02 Secom Centre608606 Singapore, Singapore

Marking of product

The products to be marked with:
- manufacturer name
- model name
- product 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
- Review documented evidence of adherence to Secure Development Lifecycle processes

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

END OF CERTIFICATE