



KONGSBERG

K-Thrust TC

Remote Control System for Propulsion and Thrusters



System overview

The KONGSBERG K-Thrust TC concept combines autonomous control systems for each propulsion and thruster unit into one system for mode selection and command responsibility transfer.

A Thruster Controller is the main unit of each control system. This cabinet is often located near the propulsion unit or its motor controller. From the Thruster Controller, a communication bus links operator panels on the bridge and in the ECR (where applicable) to the controller. The bus based communication between intelligent components simplifies installation and reduces overall cost.

K-Thrust TC can be configured for control of the following types of equipment:

- Azimuth propulsion units
- Retractable azimuth thrusters
- Electric-driven main propulsion
- Medium/high-speed diesel propulsion
- Side thrusters
- Rudder

Integrated manoeuvring concept

K-Thrust TC can be combined with the K-Pos DP/ joystick system, forming a complete manoeuvring system with both

manual and automated manoeuvre modes. This unparalleled constellation of systems provides functions ranging from individual control of each unit to automatic track control and position-keeping involving all units.

The integration, together with the general features of K-Thrust TC, contributes to safe and predictable system behaviour:

- Seamless integration of manual and automatic manoeuvring modes with simultaneous and bumpless transfer between various modes of operation
- Command transfer between bridge locations leaves operational mode unchanged
- Consistent and intuitive operation, identical for all propulsion units

K-Thrust TC can also be integrated with KONGSBERG K-Bridge navigation systems and K-Chief marine automation systems. The most evident benefits from this integration are that:

- All systems are implemented on common hardware and software platforms based on KONGSBERG technology
- A system-wide, dual communication network links all systems, enabling data exchange without additional cabling
- Remote control and equipment monitoring are combined in one integrated system



K-Thrust TC general features

Command responsibility transfer between bridge positions and between bridge and engine room is handled by synchronisation of the individual thruster controllers. Command transfer within the bridge is common to all units, while transfer to/from the ECR can be individual to each unit. Bumpless transfer between locations is either by manual alignment of the thruster levers following the guidance given on the panel, or automatically by the “electric shaft” option.

Command responsibility transfer between control systems is handled from *mode selection* panels that communicate with all Thruster Controllers. Possible modes are Manual, DP, Joystick and Auto Pilot. Steering thrusters can have additional modes for steering from mini wheel or a helmsman’s wheel.

Indication instruments for azimuth, pitch, rpm and power can be connected directly to the K-Thrust TC operator panel, using the panel communication bus and panel controller for signal transmission from the Thruster Controller.

The Thruster Controller performs all logics related to command responsibility and mode transfer. The unit can perform sequential start-up and stopping of main motor/frequency drive, auxiliary pumps and fans. Optionally, the K-Thrust systems can perform the servo control of hydraulic power systems for pitch and azimuth adjustments.

Control features for azimuth thrusters

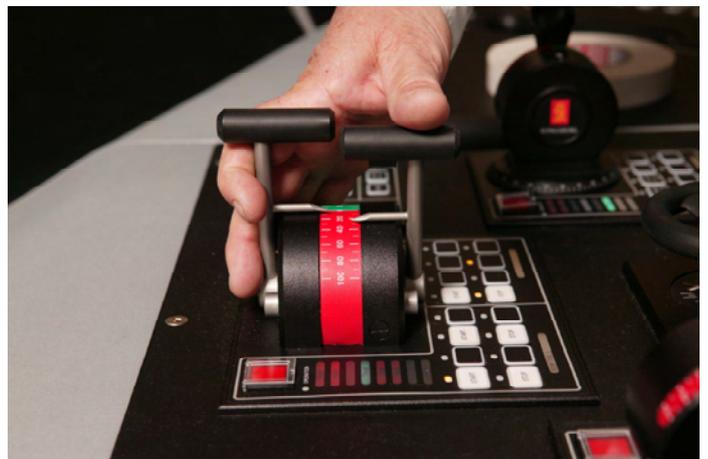
- For main propulsion or side thrusters
- Combined azimuth/thruster lever
- Power/rpm mode selection
- Individual or synchronised command in twin installations
- Hoist control for retractable thrusters
- Interface to helmsman’s wheel and autopilot

Control features for side thrusters

- For pitch- and/or speed-controlled thrusters
- Thruster control systems and electronics can be separate, but parallel side thrusters can have common levers. For instance, multiple bow thrusters can have individual start/stop but with all running thrusters commanded from the same lever.

Control features for diesel propulsion

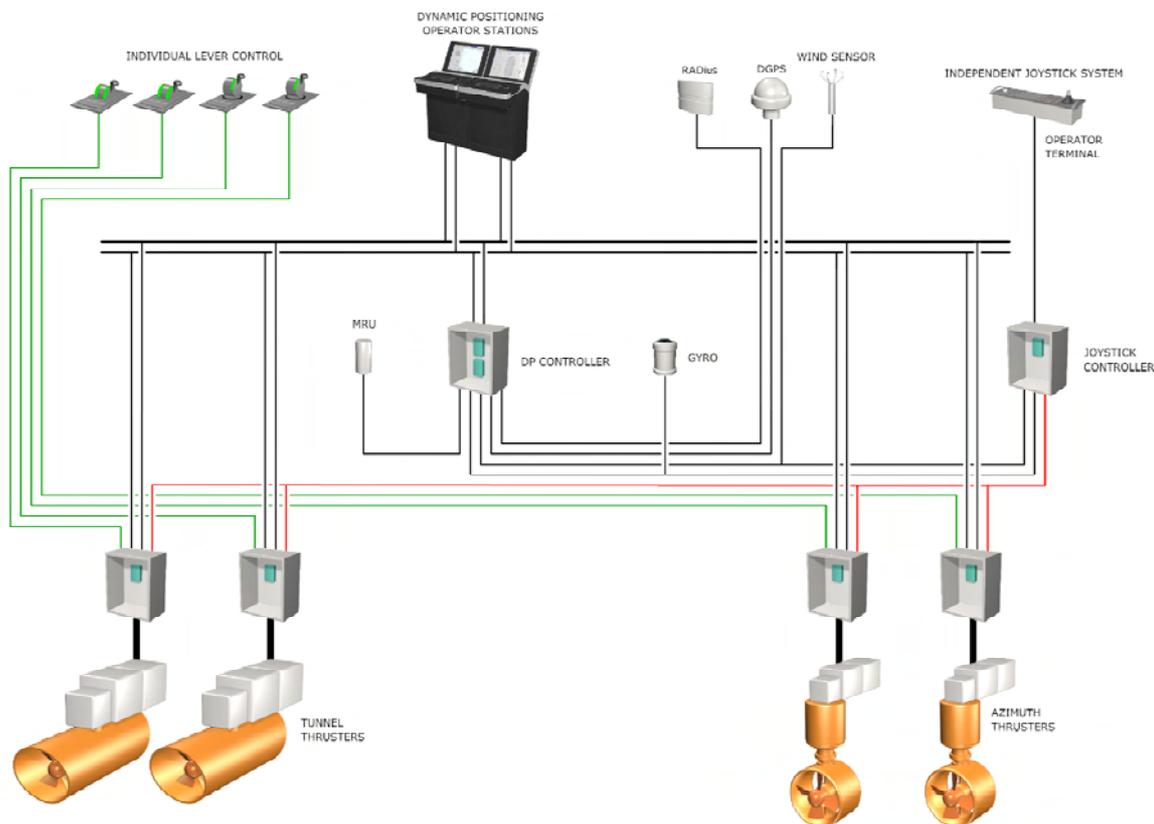
- For medium or high speed engines
- Also available for electric propulsion
- Available for single or dual engine configurations with reduction gear
- Combinator control
- Engine overload protection
- Engine, gear and shaft line safety protection
- Clutch controls and PTO



Topology

The Thruster Controller unit contains the control system processor(s). It interfaces the operator panel communication bus and serves as field interface to the servo actuators, servo controllers (applies to pitch and azimuth control), feedback units and drives.

Thruster Controllers receive commands from other control systems (e.g. DP controller) via a local area network or by direct wiring. Commands from the operator are read via the panel bus. Both the local area network and the panel bus are installed in a star topology ensuring that a single malfunction in communication does not affect more than a single node.



Thruster Controller unit

The Thruster Controller unit has the following characteristics:

- Enclosures for 32-240 I/O
- Standard with single processor
- Dual controller units (hot standby) and dual panel communication link available
- Dual network connections to Kongsberg K-Pos DP, K-Bridge Navigation and K-Chief Automation systems
- Hub for the panel communication link (provides galvanic isolation between ECR/bridge panels and also between bridge panels where required)
- RS-232/485 serial communication and ProfiBus connection (optional)

