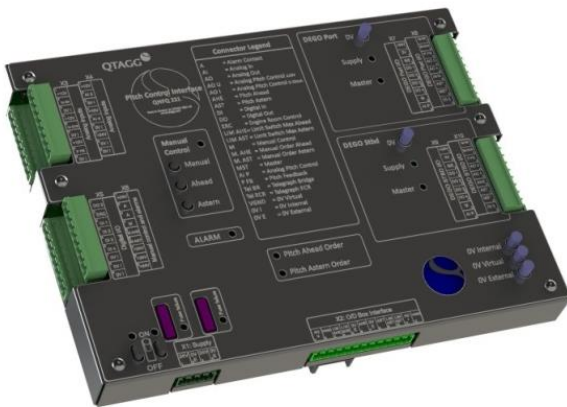


Concept

The **Q-TAGG Propulsion Control System** is an expansion of the Diesel Engine Governor System DEGO IV. In conjunction with the Pitch Control Interface (PCI) a versatile pitch control system is configured that covers all typical propulsion arrangements such as:

- Single engine with CPP
- Twin engine with one CPP
- 2 x twin engine with two CPPs

The controller interfaces with all major CPP manufacturers hydraulic systems.



Pitch Control Interface (PCI)

Control Modes

The system has three modes of operation that are selected from the bridge using the Touch Control Panels:

- Combinator with Load Control
- Constant RPM Mode
- Constant Power Mode

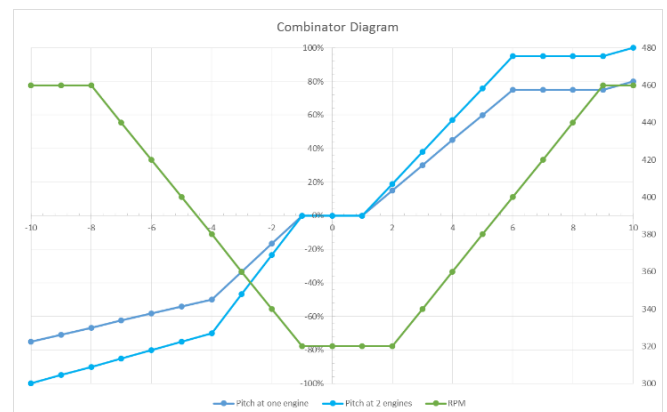
Combinator with Load Control

In Combinator mode the telegraph position is translated into engine speed- and propeller pitch set points. The engine(s) are controlled to the speed set point by the governor and the propeller pitch is regulated to the pitch set point according to the combinator curve. If the engine reaches a load limitation, the Load Controller takes over and reduces the pitch until the set-point for the load control is obtained.



Touch Control Panel

The combinator curves that belong to the different modes of operation are configured via the graphical user interface (DegoAid) with click and drag functionality.



Combinator Curves

Constant Power Mode

In this mode the Pitch/RPM working point is controlled to a max allowed propeller slip. This means acceleration without propeller cavitation and running the propeller at its best operational point for all sea- and weather conditions.

The propeller RPM and Pitch is optimized for the chosen kg/hour set-point, i.e. maximizing the nautical miles per kilowatt hour.

The power set-point is entered in the Touch Panel.

How does it work?

The control goals of the system are:

- To keep the engine and the CPP within safe operational margins
- To keep the engine and CPP at the optimum working point

For the power control mode the controller needs information from the ship's speed log (speed through water) or the GPS-position in order to optimize the propeller efficiency.

The controller has an integrated real-time fuel metering feature, i.e. no external fuel meter is needed for the optimization process.

The relationship between propeller pitch and RPM to kilowatt is initially calculated from the factory test records. After running the system for some weeks, the system is tuned using the stored data logs.

Loading on and off program

When clutching in the first engine to the propeller shaft, the load, using the pitch, is ramped up according to the time dependent loading program and limits the propeller slip to avoid cavitation.

When the second engine is clutched in, it is ramped up according to the time controlled program, picking up load from the master engine or adding pitch load.

The unloading sequence of a second engine before clutching out is following a time controlled program.

Semi-Automatic clutch control (option)

In configurations with two engines on a common gearbox, the engine speeds can be automatically synchronized either to equal speed and phase or to slightly different speed for slide in clutches.

When one out of two engines shall be clutched out, the pitch, load distribution and speed are automatically controlled in the correct sequence.

Slow down and shut down

The pitch is automatically reduced in order to adapt the engine load as required

Windmilling protection

At a sudden pitch reduction at high ship speed, there is a risk that the propeller drives the engine to overspeed. The windmilling protection eliminates this risk.

Engine Stall Protection

Eliminates the risk of engine stall at a sudden load increase.

Propeller Phase-synchronization

On a twin-screw ship, the propellers can be kept in synchronism at a desired angular relationship. The actual angle difference can be read on an indicator.

Upgrade and retrofit

The system is designed for efficient retrofits of legacy pitch control systems with proportional valve or increase/decrease valve control.

Basic Technical Data PCI unit

Supply in

Two redundant inputs 18-32VDC with indiv. alarms + fuses.

Supply Out

5 pce outputs 10V short circuit proof (pot. supply)

4 pce 24V outputs stabilized (I/O supply)

Galvanic Isolation:

4 pce isolated circuits: DEGO1, DEGO2, Process I/O and outputs to valves

Analog Inputs: 5 pce 0-10V, 0-20mA or potentiometer

Digital inputs: 5 pce 24V

Digital Output 1 pce 24V

O/D box interface

Valve Control:

24V 2A outputs for AH/AST valves

0-10V alt $\pm 10V$ for analog control valve

Position Feedback:

0-20mA alt. $\pm 10V$

Class Approvals:



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