

Wärtsilä UNIC engine control system for gas and dual fuel engines

PRODUCT LEAFLET



Owners are facing challenges in extending the lifetime of their installation and reducing unplanned downtime. In response to this, Wärtsilä offers the UNIC engine control system for gas and dual fuel engines as a retrofit based on the latest technology and fully supported by our global service network.

The solution is available for all marine and power plant applications equipped with Wärtsilä dual-fuel or spark ignited gas engines.

Aging of electronics and the ever shortening lifecycle of electronic components represents a risk to power availability. The aging of components increases the risk of unplanned shutdowns, and obsolescence problems can make these shutdowns more severe and expensive. The financial losses, in terms of lost operation, resulting from the failure of a simple component, may be quite out of proportion to its relatively inexpensive cost. It is, therefore, a clear economic risk to neglect the actual and potential problems caused by old and obsolete electronics.

By optimising to the UNIC common control platform, you ensure long-term product/part lifecycle support. With fewer components you minimise spare part storage since the parts are interchangeable between Wärtsilä UNIC applications. Common maintenance tools and technical expertise from Wärtsilä ensures continuous engine support.

OBSOLESCENCE MANAGEMENT

Upgrading old engines to latest Wärtsilä automation standards will provide benefits such as safe and reliable

operation, lower operation and maintenance costs and extended installation lifetime.

When upgrading the automation systems in order to optimise their performance and fulfilling new requirements, efforts should also be put on securing the continuous operation of the plant.

UNIC FUNCTIONALITY

Engine control: start/stop management, including start block handling, load reduction, LT/HT-thermostat, waste-gate and by-pass control. Speed and load control through an electronic controller with various operation modes. Ignition control and EFIC (Electronic Fuel Injection Control) technology.

Engine safety: (alarms, shutdowns, emergency stops, load reductions) including fully hardwired safety for engine overspeed (redundant), lube oil pressure, cooling water temperature and external shutdowns.

Engine monitoring: Temperatures, pressures, speed, torsional vibration and load estimation.

KEY BENEFITS:

- More stable engine operation
- More even and balanced running
- Improved starting behaviour
- Only a few modules used thus the need for spare parts is limited
- Proven system used on over 6000 engines



IMPROVED STARTING BEHAVIOUR

Improved engine performance can be achieved in terms of response times – load ramping, load-steps, off-loading, start-sequences etc. Especially for improving start behaviour UNIC handles the following functionalities:

Cold Cylinder Operation™. In case of single cylinder component failure this function allows the engine to run on partial load (up to 15 hours) with the gas supply cut off for the concerned cylinder. This gives the operator the opportunity to prepare the plant for the stop and plan the service works in advance.

Multispark function allows one or more sparks during ignition cycle for more stable combustion. The multispark is also used when the engine is operated at lower load levels. During start sequence multisparks clear the spark plug from oxides and other contaminations.

Cylinder balancing control. At engine start, cylinders with poor combustion are boosted with “wake up” functionality that ensures exhaust temperatures to stay balanced within an acceptable temperature range.

Optimised pilot gas pressure control during the start sequence provides an optimised air/fuel mixture in the prechamber. The control of individual cylinders' demand for pilot fuel is improved by amplifying the control signal to the electrically operated PCC valves. This reduces valve malfunctions and secures a more reliable start behaviour.

IMPROVED RELIABILITY AND BALANCED RUNNING

More even and balanced running by improved control algorithms for charge air pressure, gas pressures and exhaust gas temperature gives less vibrations and emissions can be reduced by upgrading the control system.

Knock control function: In case of knocking, the engine will respond fast and adjust the parameters to maintain optimal operating conditions. Increased control of the knocking characteristics enables faster control of the engine and improves efficiency.



Wärtsilä UNIC engine control system for gas and dual fuel engines is a durable, all-inclusive, automation system specially designed for the harsh environment in which engines operate.



Load reduction: Instead of shutdown in case of excessive knocking, the improved knock control with added instant de-rating function automatically tunes the engine for optimal operation. The generating set can be kept in operation on a reduced load level until the cause of the problem is remedied. If high knocking persists a stop is activated.

Cylinder balancing control: Adaptive cylinder balancing control procedure achieves a more efficient running by making the load of all cylinders equal. Improved control algorithm evens the wear and increases the engine safety by reduction of torsional vibrations as well as helping in the emission reduction. With an optional cylinder peak pressure measurement more advanced balancing control can be achieved.

LOCAL OPERATOR'S INTERFACE

Engine mounted graphical display (LDU) provides stand-alone monitoring and troubleshooting of the engine without special equipment.

Integrated diagnostics and event display, possibility for tuning and program loading to exchange modules eases the maintenance operations.

COMMUNICATIONS

The Ethernet gateway with TCP/IP-Modbus protocol is available to share process measurement data (events, alarms) to local PLC or HMI systems. The data can be time stamped through the OPC server to facilitate better troubleshooting, investigation and fault finding.

UNIC SCOPE OF SUPPLY

The UNIC system is designed to meet very high reliability targets. This includes special measures for redundancy, fault tolerance and mechanical and electrical design. All hardware is verified and tested through Highly Accelerated Life Test (HALT) to ensure reliable operation in extreme environments.

Sensors and actuators are easy to maintain and to calibrate. "Flying lead" sensor design is used to avoid failure prone connectors.

The main scope of supply includes:

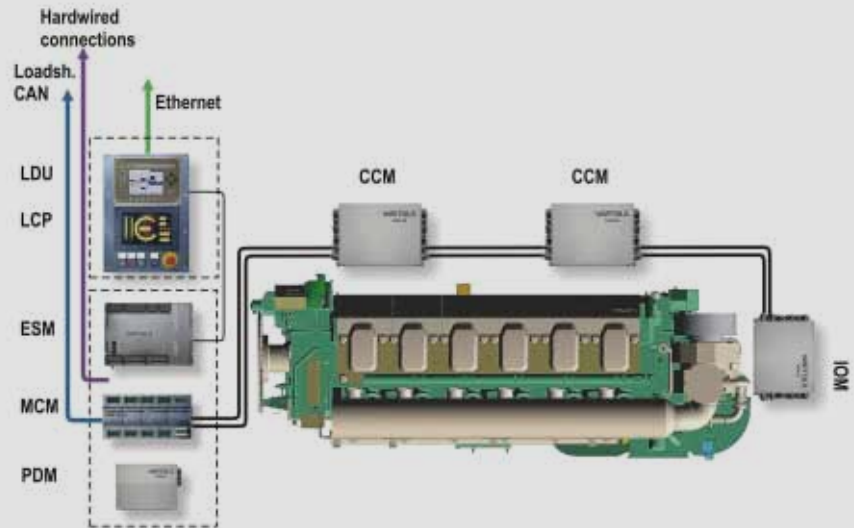
- New hardware modules, including local operator interface
- New software architecture with improved functionalities
- New engine instrumentation with "flying lead" connections
- Single maintenance tool.

Plant automation system and Human-Machine Interface (HMI) will be modified in order to take advantage of the new functions and data.

Wärtsilä supports its customers throughout the lifecycle of their installations. As an OEM equipment and service supplier Wärtsilä guarantees reliable project execution and product lifecycle support.

We offer a turn-key upgrade package which includes design, engineering, hardware, installation, commissioning and training. Delivery and execution of the upgrade project is done by our project management which has decades of experience and proven track records of turnkey projects on marine and power plant applications.

GENERAL LAYOUT OF THE UNIC SYSTEM



LDU (Local Display Unit)

- External Ethernet communication
- Local parameter display
- Engine tuning and software download

ESM (Engine Safety Module)

- Safety functions
- Shutdown latching
- Signal conversion

MCM (Main Control Module)

- Speed/load control
- Engine management

PDM (Power Distribution Module)

- Filtering
- Protection
- Earth fault detection

CCM (Cylinder Control Module)

- Injection control
- Cylinder measurements
- Fast measurements (knock, pressure)

IOM (Input Output Module) freely configurable in- and outputs

- mA, V, TC, PT100, frequency