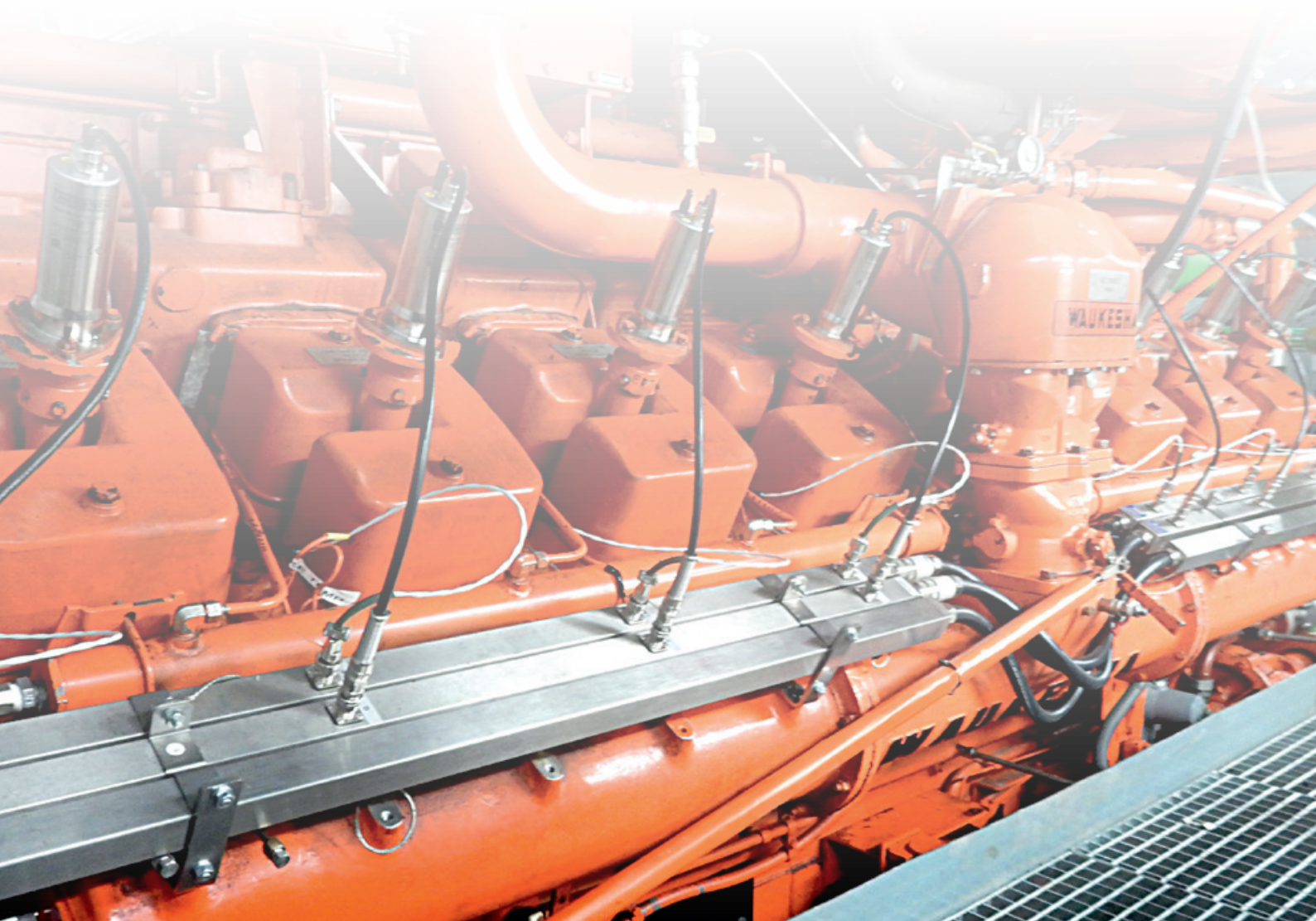




# WAUKESHA® VHP P9390 GL Repowering | MOTORTECH System Upgrade



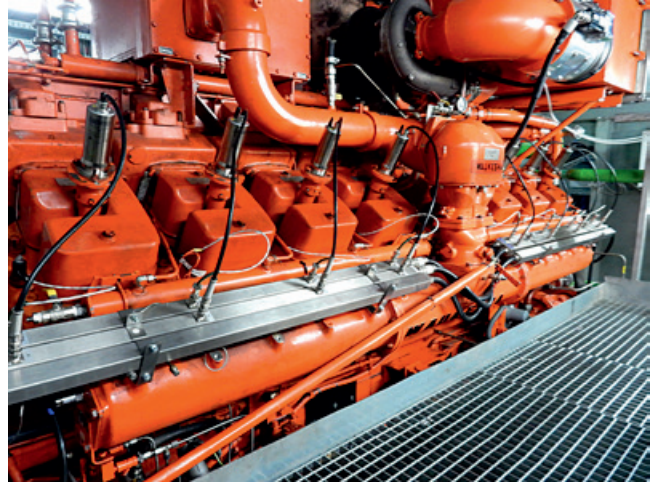
**MOTORTECH System Upgrades**  
reliable • efficient • worldwide

## ■ General Information

# WAUKESHA® VHP P9390 GL Repowering

MOTORTECH now offers complete system upgrade for the WAUKESHA® P9390 natural gas engine. Increase reliability and efficiency by adding the following components:

- State of the art MOTORTECH MIC4 series ignition controller
- Stainless steel shielded ignition coils with diagnostic interface for easy engine analyzing
- MOTORTECH MHP Plugs high performance spark plugs
- Easy to understand HMI module of the AIO controller
- All modules pre-mounted and wired in optional enclosure for easy installation
- DetCon20 detonation monitoring system for knock detection and control
- Exhaust and combustion temperature monitoring
- Precise mixture control with VariFuel2 air/gas mixer
- MOTORTECH's proven AlphaRail system for ignition, detonation and temperature



## Benefits of the upgrade at a glance

### Before

#### Ignition System: WAUKESHA® CEC

- Primary energy 130 mJ
- Set spark duration
- No connection to controller

#### Mixture Control: IMPCO® mixer (mechanical)

- Manual mixture control
- No free access
- No remote access

#### Detonation Control: none

- No knock detection

#### Wiring Rail: WAUKESHA®

- If ignition/knock regulation/temperature components are defective, entire rail must be changed, leading to high material costs

### After

#### Ignition System: Digital Ignition Controller MIC4

- Primary energy 300 mJ
- Spark duration can be freely customized
- Connection to controller and mixture control

#### Mixture Control: VariFuel2 Air/Gas Mixer

- Automated configuration of mixture control (reduces consumption)
- Free access to entire power range of mixture control in automatic operation
- Cylinder benches can be individually compared
- Quieter engine operation
- Remote access possible (lower maintenance costs)

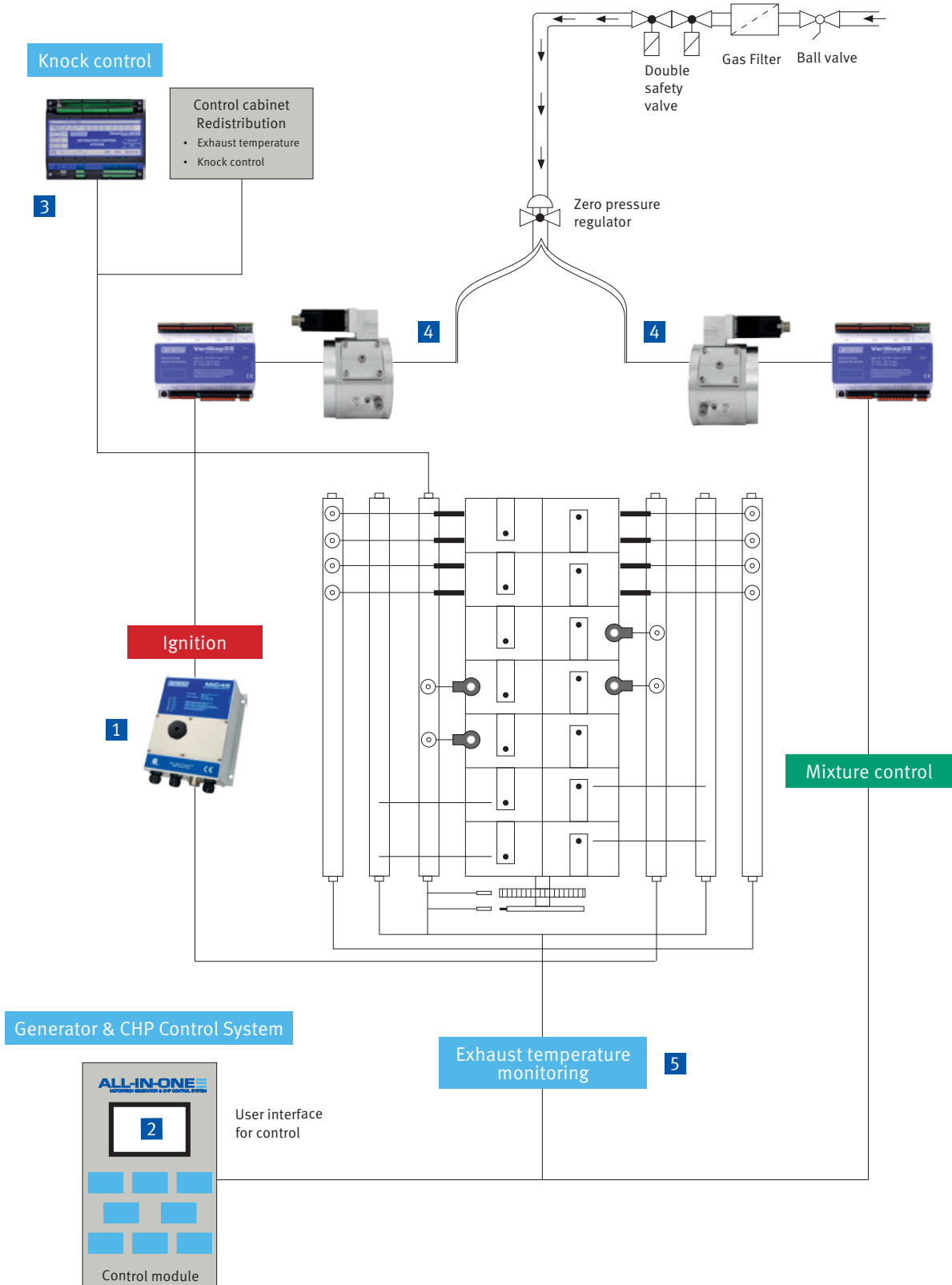
#### Detonation Control: DetCon20 Anti-Knock Controller with MIC4

- Delay of ignition time if knocking is detected (reduces engine damage)

#### Wiring Rail: AlphaRail

- It is possible to swap individual ignition/knock control/temperature components, resulting in material cost savings

# System Overview





# Components

## 1 MIC4 MOTORTECH IGNITION CONTROLLER

The ignition controllers of the MIC4 series convince with a future oriented electronical concept for morepower and a significantly higher degree of efficiency. High ignition energy, accurate spark timing and diversified online diagnostics help to improve engine efficiency, spark plug life and availability of the equipment under the strictest emission regulations. The controller is fully customer configurable via Laptop.

- Adjustable spark duration and intensity
- Constant spark intensity via adjusted duration
- 300mj primary energy
- Ignition diagnostics (primary and secondary)



- Fault memory with trend data
- Integrated CANopen and Modbus RTU interface
- Easy access per USB port

## 2 ALL-IN-ONE MOTORTECH GENERATOR & CHP CONTROL SYSTEM

ALL-IN-ONE is a complete gas engine management system (upper controller). It allows you to monitor, control, regulate and protect your entire system. This controller will open new cost reduction possibilities in the service sector, thanks to the remote data access and long distance data transmission features. All system parameters, performance and historical data can be transferred via modem, internet or SMS. These features will significantly increase your customer’s system availability.

- Engine monitoring (P, T, p, min-1, etc.)
- Lean Burn control
- Speed measurement and control
- CAN Bus Interface
- Extendable up to 32 modules
- Binary input (status LED on board)
- Binary output (status LED on board)
- Analog input (mA, PT100, NiCr-Ni, etc.)
- Analog output (mA, V)
- Alarm list records and historial data
- 7 levels of password protection
- Remote control via modem, internet, GMS connection
- SMS, e-mail, and warning call service



Sample image – Actual product may differ

### 3 **DetCon** MOTORTECH DETONATION CONTROL SYSTEM

The DetCon20 control device offers complete protection for gas, diesel, and dual fuel engines with 2 to 20 cylinders. It is microprocessor-controlled, recognizes any knocking early on and sends an analog signal (4-20 mA/0-5 V) to the ignition system to shift the ignition timing to “retard” in a linear function. A signal for load reduction or, ultimately, a stop signal is sent to the motor controller if the knocking cannot be eliminated. CAN Bus Interface included.



### 4 **VariFuel2** MOTORTECH AIR/GAS MIXER

VariFuel2 is a variable high-tech venturi air mixer that constantly adjusts to fuel changes and allows the engine to work at maximum efficiency. The series 100, 140, 200 and 250 are suitable for engines with an air requirement of up to 5,200 m<sup>3</sup>/h. Connected to a mixture controller — lean-burn or stoichiometric — it precisely regulates the mixture. It is particularly suited for applications with constant change in the calorific value of the fuel.

The VariFuel2 air/fuel ratio mixer is driven by a high-precision stepper motor. Different flow inhibitors and variable intake and outlet configurations allow for the air/fuel ratio mixer to be flexibly adjusted to the relevant requirements.

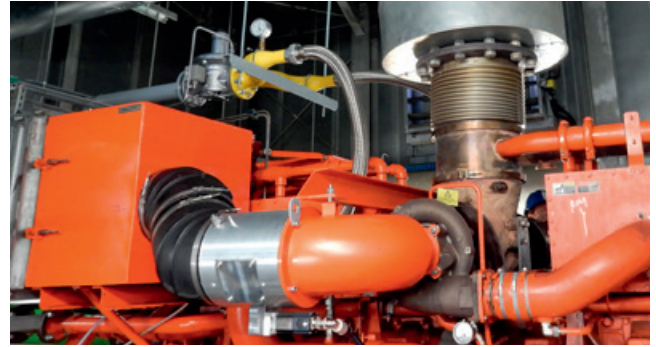
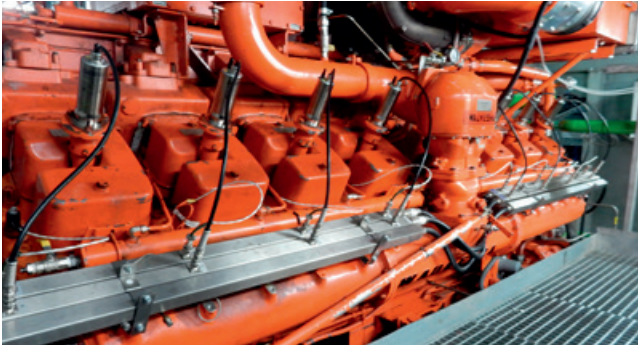


### 5 **Exhaust and Combustion Temperature Monitoring**

The use of thermal elements in conjunction with the MOTORTECH visualization allows the exact exhaust temperature to be determined.



## Accessories



### Flange Ignition Coils

Same winding configuration as in the standard epoxy coils but molded to a 3-hole steel flange. This allows installation directly on the valve cover. Flange ignition coils with the same winding configurations are also available as version with diagnostic interface. This enables the possibility to measure the high voltage via MOTORTECH SparkView or digital oscilloscope.



### High Performace Spark Plugs

MHP spark plugs are designed to meet the requirements, both of modern and common engine developments and reliably deliver highest voltages and thus a strong spark down into the combustion chamber. The J-type electrode design with IRIDIUM alloy discs on center and ground electrode provides reliable combustion and increased spark plug life and helps to reduce service costs due less spark plug changes.



### Primary Leads

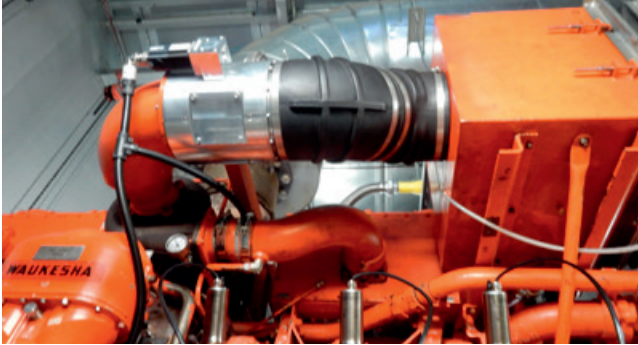
MOTORTECH primary leads are available as standard version or in new style that is produced with a special multilayer wire. The new primary leads offer a significant higher flexibility than conventional leads, shielded with braided steel, while being highly resistant to all kinds of environmental conditions. Primary leads are available with rigid terminations in several different configurations with durable 90° and 180° 2-pole and 3-pole connectors.



### Spark Plug Extensions

In applications where ignition coils are mounted right on top of the valve cover, a spark plug extension is required. PolyMot® Extensions outlast any OEM product. Made from a combination of Ceramic, Teflon® and Silicone, the patented design increases availability of equipment.





## VariStep3

MOTORTECH STEPPER MOTOR DRIVER

The stepper motor driver control developed by MOTORTECH guarantees the ideal control of the various types of MOTORTECH VariFuel2 air/gas mixers and throttle bodies with integrated stepper motor.

- Precise mixer and throttle adjustment due to microstep operation
- Very fast response times
- Increased power output provides high torque and quick movement even when driving big stepper motors
- Accelerated reference run
- LEDs displaying unit status and activity
- Combination of several units without signal amplifier/splitter
- Integrated CANopen and Modbus RTU interface
- Configuration via MICT software

### Gas Train

MOTORTECH supplies complete gas trains for use on optimized gas engines with different gas types. The customer receives a tailor-made system solution according to the application.

- Design according to motor type and performance data
- Vibration-tested multiple actuators
- Use of energy-efficient fittings
- Check for function and tightness
- Welding parts are tested for strength, sand blasted and fired



- Error data logging for improved diagnostic options
- Compact design
- Plug-in terminals
- Easy access to connectors and switches
- Switch board installation on DIN rail




- X-ray inspection of all welded joints and seams
- Electrical wiring
- Solutions for all gas types
- Ready-to-connect system



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Distribution partner for DENSO spark plugs



P/N 1.05.002-EN | Rev.02/2017

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