



Ignition Control Upgrade

For ROLLS ROYCE® K-Series Gas Engines



MOTORTECH System Upgrades
reliable • efficient • worldwide

General Information

Ignition Control Upgrade For ROLLS ROYCE® K-Series Gas Engines

MOTORTECH's ignition control upgrades with MIC5 series state-of-the-art ignition controllers are specially designed for a complete and simple conversion of ROLLS ROYCE® K-series gas engines. Prefabricated and prewired components make the conversion easier and reduce costs based on engine downtime. Don't go Low-Tech and take the risk of engine down time because of failing equipment and eliminate the need for constant exchange of parts or rewiring.

Upgrade your engine to the latest systems and increase reliability and efficiency.

Benefits

- More powerful and reliable MIC5 ignition controller
- PowerView3 HMI module for visualization of ignition control data and adjustment of various parameters
- High performance ignition coils
- Enables optimized starting behaviour and engine performance
- Enhanced spark plug life
- Kits include all necessary components for a quick and successful upgrade



- Prefabricated components guarantee easy installation
- High quality materials and design last longer
- Upgrade kits can be extended with detonation or temperature control individually

Optional

- DetCon20 detonation control system for professional detection and elimination of detonation
- TempScan20 temperature module for monitoring up to 20 thermocouples

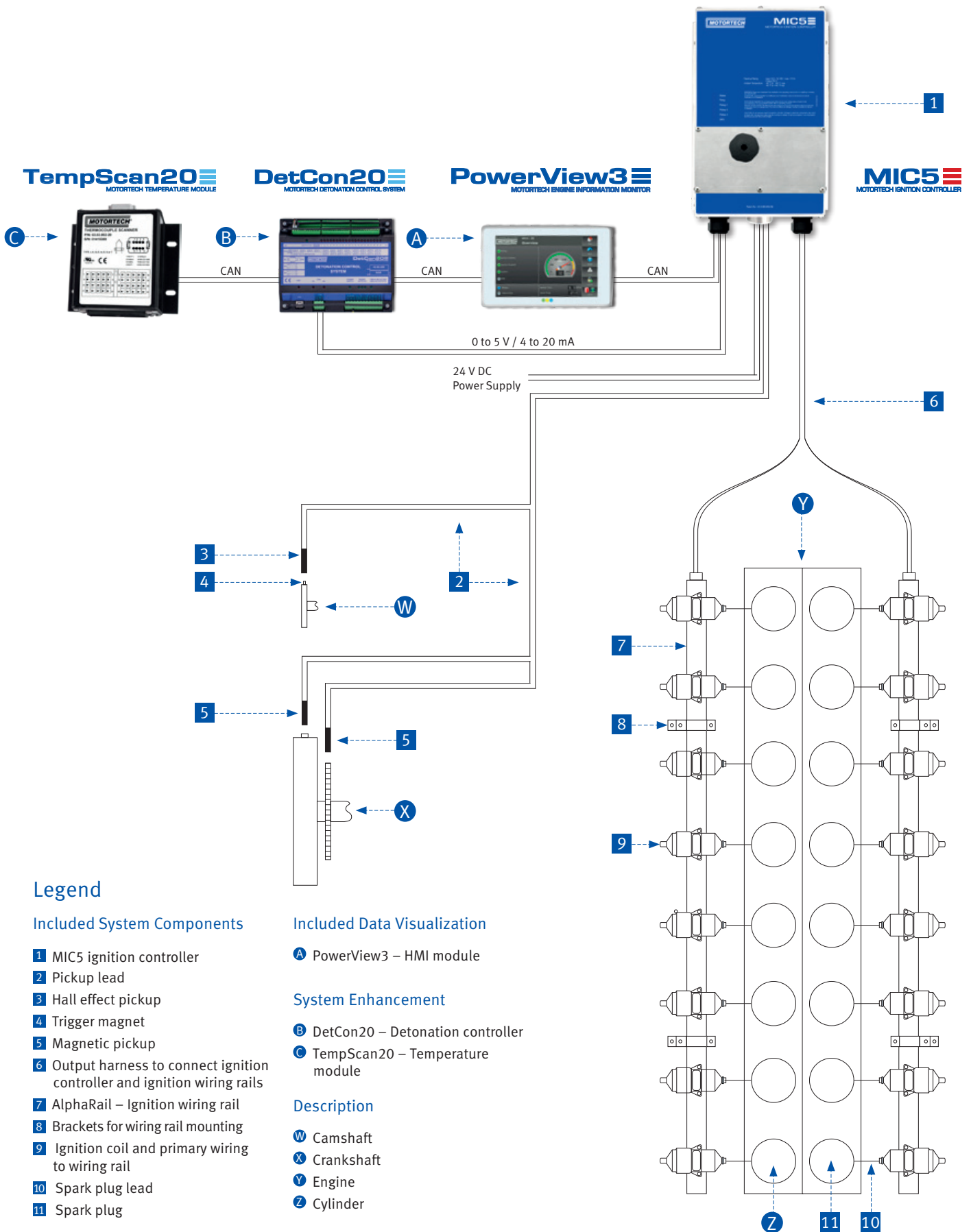
Equipment Comparison

Feature	MOTORTECH Equipment	OEM Equipment
Ignition Controller	MIC5 (Micro Processor based)	ALTRONIC® CPU-95 (Digital)
Ignition technology	pulse width modulated (MOST ¹⁾)	Capacitor Discharge Ignition System (CDI)
Max. primary voltage	250 V DC	180 V DC
Max. ignition energy	500 mJ (600 mJ boost for start phase) – freely programmable	125 mJ – 3 selectable energy levels
Max. programmable spark duration	100 to 1500 µsec	300 to 600 µsec
Ignition Control Visualization	PowerView3 HMI Module	ALTRONIC® CPU-95 Display
Screen diagonal	7 inch (178 mm)	2.4 inch (60 mm)
Navigation/Display technology	via TFT TN (touch)	via keypad
Backlight unit	LED	LCD (back-lit)
Resolution	800 x 480 pixels	alphanumeric 16-character x 2-line
Color depth	18 bit (262.144 colors)	monochrome
Spark Plugs	DENSO® GE3-5 (DDI – DENSO® Double Iridium)	BOSCH® W3DDPOR
Thread size	M14x1.25	M14x1.25
Thread reach	0.750 inch (19.0 mm)	0.750 inch (19.0 mm)
HEX	13/16 inch (20.8 mm)	13/16 inch (20.8 mm)
Electrode design	J-type	Double J-type
Alloy center electrode	Iridium (Ir)	Platinum (Pt)
Alloy ground electrode	Iridium (Ir)	Platinum (Pt)
Experienced running hours ²⁾	2000 h	400 h

¹⁾ Patent No.: US 8,893,692 B2

²⁾ Please note: running hours may vary due to application type.

System Overview



Legend

Included System Components

- 1 MIC5 ignition controller
- 2 Pickup lead
- 3 Hall effect pickup
- 4 Trigger magnet
- 5 Magnetic pickup
- 6 Output harness to connect ignition controller and ignition wiring rails
- 7 AlphaRail – Ignition wiring rail
- 8 Brackets for wiring rail mounting
- 9 Ignition coil and primary wiring to wiring rail
- 10 Spark plug lead
- 11 Spark plug

Included Data Visualization

- A PowerView3 – HMI module

System Enhancement

- B DetCon20 – Detonation controller
- C TempScan20 – Temperature module

Description

- W Camshaft
- X Crankshaft
- Y Engine
- Z Cylinder

Ignition Upgrade Components



MIC5 Ignition Controller

With 500 mJ primary energy, the MIC5 series provides a reliable combustion on engines with up to 20 cylinders even with weakest or fluctuating calorific values of the gas. Next to high variable ignition energy (MOST – MOTORTECH Output Stage Technology*) an 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.

Features

- Adjustable spark duration and intensity
- Constant spark intensity via adjusted duration
- 500 mJ primary energy (600 mJ boost)
- Ignition diagnostics (primary and secondary)
- Fault memory with trend data
- Integrated CANBus and RS485 interface
- Easy access via USB port
- 2 programmable schedules for dual fuel operation



Technical Data

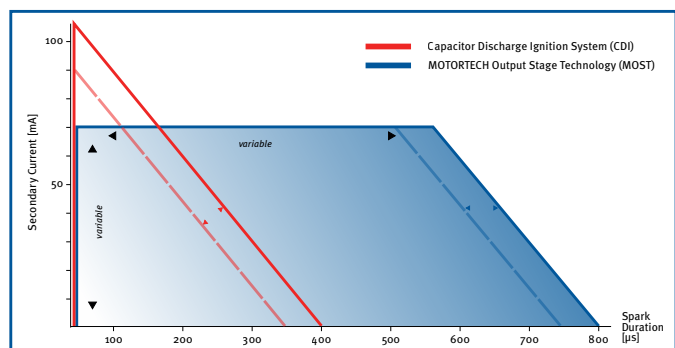
General	Max. number of ignition outputs	20
	Max. number of pickups	3
	Power supply	16.8 to 32 VDC
	Permitted housing surface temperature	-40 °C to + 60 °C / -40 °F to +140 °F
Output	Max. primary voltage	250 VDC
	Max. ignition energy	500 mJ (600 mJ boost for start phase)
	Max. programmable spark duration	100 to 1500 µsec
Housing	Available housing versions	Heavy Duty (HD)
	Dimensions (length x width x height)	371 x 240 x 114.5 mm / 14.61 x 9.45 x 4.51 inch
	Protection class	IP65
	Number of potentiometers for manual timing adjustment	2 (continuous)
	Input connection	terminal strip (standard)
	Output connection	MIL, 35 pole, socket
	Number of status LEDs	6



MOST* works with the following principles:

- adjustable ignition spark duration with different available ignition voltages
- constant spark intensity via adjusted ignition spark duration

* Patented Technology US 8,893,692 B2



Ignition Upgrade Components

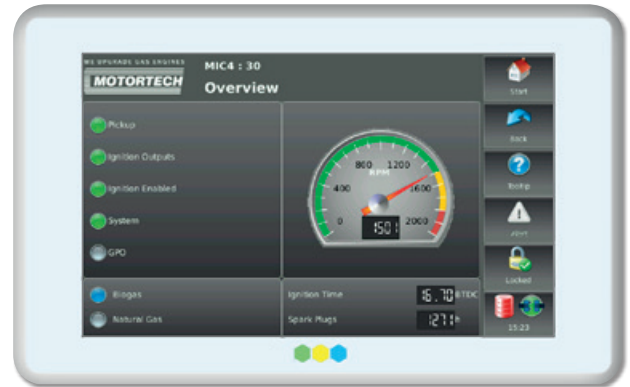


PowerView3 MOTORTECH ENGINE INFORMATION MONITOR

Ignition Control Visualization

The operating data of the MIC5 series ignition controller will be completely visualized via HMI module (Human Machine Interface). The overview screen shows the relevant information as engine speed, ignition timing and status of pickups, ignition outputs or active parameter set.

The PowerView3 also allows adjustment of various ignition parameters such as ignition timing and energy. Functions as the self-test for error diagnostics can also be executed via HMI module. The control keys guarantee simple navigation through different display pages and menus. All in all the PowerView3 HMI module is also able to provide error diagnostics on-site without requiring a laptop!



The PowerView3 is also available for data visualization of:

- DetCon Detonation Control
- TempScan20 Temperature Module

General Features

- Visualization of ignition, detonation and temperature control via CAN bus
- Access control
- Display of CAN connection status
- Several display configurations (languages, date, display calibration, etc.)
- For assembly in control panels
- Day and night mode
- CSA® certified (Class I, Division 2, Group C, D; T4)

Ignition Control

- Overview with status indication for
 - Pickup signals
 - Active schedule
 - Analog display of engine speed
 - Ignition timing
 - Spark plugs (operating hours)
- Display of global ignition timing dependent on
 - Base ignition timing
 - Potentiometer adjustment
 - Analog current and voltage input
 - Speed curve
- Displays the ignition of each cylinder
 - Ignition voltage
 - Misfires

- Display of misfires
 - Primary and secondary sided wiring errors
 - Type of error (no connection/short circuit)
- Display and adjustment of energy
 - Spark duration
 - Spark intensity
- Display and adjustment of firing angles and ignition energy
- Self-test activation
- Warning, alarm and error messages

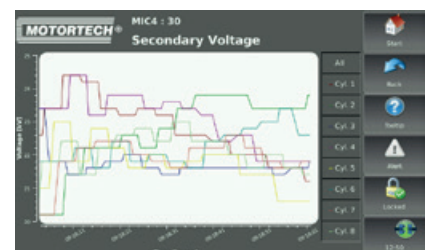
MIC Overview



Ignition

Cyl.	Secondary Voltage [kV]	Misfire	Cyl.	Secondary Voltage [kV]	Misfire
1	17.2		12	18.0	
5	17.4		8	19.2	
3	20.4		10	18.4	
6	17.6		7	21.2	
2	17.8		11	18.6	
4	18.6		9	18.6	

Secondary Voltage



Ignition Upgrade Components



Wiring Rail System for Ignition Control

MOTORTECH stainless steel, vibration resistant rail assembly will withstand any harsh environment commonly found in the oil & gas industry. The proven design is made for engine manufacturers and the global aftermarket. Do not go Low-Tech and take the risk of engine down time because of equipment being under repair. Eliminate the need for constant rewiring, connector exchanges or straightening out weak and bent aluminum wiring rails.



- Made of stainless steel
- Rigid military style connectors
- Rails are filled with special foam to ensure that all wires are separated from ground and will not vibrate
- Water-proof design – built to last in uncovered environment
- Repairable by MOTORTECH's assigned distributors in the event of mechanically damage
- Wiring rails can be used for shielded and unshielded applications

- Due to base rail structure easy for stocking
- Quick service access with quick-disconnect connections



Ignition Coils

Ignition coils are becoming more and more important in modern, state of the art ignition systems. MOTORTECH offers a series of high performance ignition coils produced in its European facilities which are specially designed for use with newest technologies of MOTORTECH ignitions controllers:

- MOST – MOTORTECH Output Stage Technology of MOTORTECH ignition controllers
- Ideally suited for ignition of alternative fuels such as biogas

PolyMot™ Spark Plug Leads

MOTORTECH's PolyMot™ spark plug lead was globally patented in 1996. Since then more than one million leads were manufactured to this design. These spark plug leads are unique and offer several advantages when being compared to the aftermarket competition. The unique structure has achieved tremendous reliability records in the field.

DENSO® Double Iridium Spark Plugs

DENSO's latest generation of hardwearing spark plugs – the DENSO DOUBLE IRIDIUM (DDI) spark plug. DDI spark plug technology improves and extends the spark plug's lifespan and requires significantly less maintenance than competitor spark plugs. The DDI spark plug is particularly effective when used in special gas engines. A unique, high welding point „Iridium alloy“ developed and patented by DENSO®, dramatically improves wear resistance compared to other Iridium spark plugs. Iridium pads both on center electrode and on ground electrode minimize spark gap expansion.

Optional Components

DetCon

MOTORTECH DETONATION CONTROL SYSTEM

The gas engine operators are calling for increased power output from their engines. More load means higher temperatures, pressures and tougher operation. This mostly ends in catastrophic engine damages due to detonation or pre-ignition.

As MOTORTECH has proven for years, detonation can be detected professionally with the DetCon20. Single cylinder sensors constantly monitor the sound level of the combustion chamber. If detonation is detected the system will take steps to eliminate detonation immediately.

Upgrade your engines and increase availability of the equipment!



Function

Once the controller detects soft detonation on one of the sensors (this is a specific stage before real detonation occurs), several steps will take place:

- Alarm signal turns on
- Ignition retard by 0 to 5 V or 4 to 20 mA analog output.
- If this action does not cure the detonation, the load reduction output will be activated.
- If the load drop does not stop the engine from detonating the engine STOP output will be activated.

TempScan20

MOTORTECH TEMPERATURE MODULE

Temperature Module with 20 Channels

The TempScan20 temperature module monitors up to 20 thermocouples and provides the temperature information to the PowerView3 HMI module via CANopen.

- Channels are independently configurable as Type J, K, B, E, N, R, S or T thermocouples
- Temperature information can include
 - ▶ Exhaust temperature
 - ▶ Winding temperature
 - ▶ Fluid temperature
- No additional programming or configuration required
- Integral diagnostics determine thermocouple integrity
- All channels are fully isolated from the CAN line and from the power supply
- The temperature module features rugged packaging and watertight connectors for an IP65 rating



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MOTORTECH GmbH

Hogrevestr. 21-23
29223 Celle
Germany
Phone: +49 (5141) 93 99 0
Fax: +49 (5141) 93 99 99
www.motortech.de
sales@motortech.de

MOTORTECH Americas, LLC

1400 Dealers Avenue, Suite A
New Orleans, LA 70123
USA
Phone: +1 (504) 355 4212
Fax: +1 (504) 355 4217
www.motortechamericas.com
info@motortechamericas.com

MOTORTECH Shanghai Co. Ltd.

Room 1018 Enterprise Square,
No. 228 Meiyuan Road,
Zhabei District, 200070 Shanghai
China
Phone: +86 (21) 6380 7338
www.motortechshanghai.com
info@motortechshanghai.com

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