

Motronic MS 1.10

The MS 1.10 is a highly sophisticated engine management system for high performance engines. The system contains 12 ignition power stages and 24 independent injection power stages. All internal power stages are short circuit protected and most of them are designed with a diagnosis interface. Various engine and chassis parameters can be measured with the different input channels and logged in the integrated flash card memory. Eight vibration sensor inputs allow knock detection and knock control. Four independent wide range lambda circuits allow lambda closed loop engine control.



Functionality

Injection timing
Ignition timing
Lambda control
Boost control (option)
Knock control
Data acquisition
Telemetry

Mechanical data

Dust and waterproof aluminium housing	
4 connectors in military technology	
264 pins, each pin individually filtered	
Vibration damped circuit boards	
8 flexible housing fixation points	
Size	192 x 200 x 49 mm
Weight	2200 g

Conditions for use

ECU temperature	-40 ... 75°C
Max. power consumption	30 W at 14 V
Max. vibration	15 g sinus at 20 Hz ... 2 kHz for t < 5 h

Electronic design

In general

8 microcontrollers with 32 bit organisation
2 DSPs with 16 bit organisation
Calculation capacity 530 MIPS
Internal memory up to 1,8 GB
Real time clock

Inputs

2 inputs for Ni-Cr-Ni exhaust gas temperature sensors
4 lambda interfaces LSM or LSU
8 inputs for inductive or Hall effect wheel speed sensors
2 inputs for inductive or Hall effect crankshaft sensors
2 inputs for inductive or Hall effect camshaft sensors
30 universal inputs 0 to 5 V
8 inputs for vibration knock sensors
32 ESIB-inputs, 4 slots for microboards
External data logger lockable via 100 MBit Ethernet



Electronic design (Continuation)

Outputs

- 24 injection power stages (peak and hold)
- 12 ignition power stages
- 2 high current power stages (12 A, low-side)
- 13 power stages (2 A, low-side)
- 4 power stages (4 A, lambda-heater)
- 9 H-bridges (5A)
- 3 sensor supply 5 V/250 mA
- 3 sensor supply 10 V/250 mA

Communication interfaces

- 2 RS232 serial interfaces
- 1 K-line serial interface
- 6 CAN interfaces for ext. communication
- 2 Ethernet TCP/IP 100 Mbps
- 1 Burst telemetry 11 Mbps internal

Memory

- Internal memory up to 1,8 GB for data acquisition, 2 PC-card slots for memory and other peripherals

Software Functions

Injection timing

- Injection timing based on cylinder charge model
- Minimum 3 sets of lambda mappings as a function of engine charge and engine revolution, selectable by a dashboard switch
- Correction of injection time during engine operation as a function of cylinder number, air temperature, water temperature, ambient pressure, fuel pressure and fuel temperature
- Load transient compensation
- Fuel cut-off as a function of throttle position and engine revolution
- Fuel cut-in algorithm
- Engine start parameter for injection time as a function of water temperature, number of ignitions after first crankshaft rotation and revolution
- Post start enrichment
- Injection position timing as a function of engine charge and engine revolution
- Altitude correction as a function of ambient pressure, charge and revolution

Lambda control

- 4 independent circuits for wide range lambda control
- Lambda control with adaptation

Ignition timing

- Engine start parameters for ignition angle as a function of water temperature, intake air temperature and revolution
- Basic ignition maps as a function of engine charge and engine revolution
- Correction of ignition angle during engine operation as a function of cylinder number, air and water temperature and ambient pressure
- Unequal fire intervals
- Solutions for any vee angle, firing order and number of cylinders

Knock control

- Knock detection based on eight independent vibration sensor circuits
- Knock control maps as a function of cylinder number, engine load and revolution
- Adaptation maps for steady-state and transient operation and revolution

Speed limitation

- Different realisations of soft or/and hard engine revolution limiters
- Pit lane speed limiter



Data acquisition

Compact flash card memory
Complete chassis and engine data acquisition
Engine logbook function
Lap time, time differences, lap distance calculation
Fuel consumption calculation

Boost control (option)

Boost pressure control with min. 12 nominal pressure maps as a function of throttle position and engine revolution, selectable by a dashboard switch
Closed loop wastegate control
Self learning adaptation for boost pressure
Overshoot function
Undershoot function

Gear box control (option)

Gear change activated by hydraulic MOOG-valves
Closed loop clutch control
Hydraulic activated throttle blip
Hydraulic locked reverse gear
Up and downshift with calibratable spark and fuel cut

Slip control (option)

Measurement of four wheelspeeds
Gear and track based functionality
Minimum two nominal slip maps as a function of load and car speed, selectable by a dashboard switch
PID closed loop controller with gear individual parameter sets
Self learning adaptation
Engine torque control as a function of current load, PID controller and adaptation
Torque reduction by reduced spark advance or/and individual cylinder fuel cut off

Additional engine control functions (option)

Trumpet control
Further customer-specific functions on request

Motronic MS 2.9

The MS 2.9 engine management system contains 12 ignition power stages and 24 independent injection power stages. All internal power stages are designed with a diagnosis interface. Various engine and chassis parameters can be measured and logged in the integrated flash card memory. Eight vibration sensor inputs allow knock detection and knock control. Four independent wide range lambda circuits allow lambda closed loop engine control.



Functionality	
Injection timing	
Ignition timing	
Lambda control	
Boost control (option)	
Knock control	
Data acquisition	
Telemetry	

Mechanical data	
Dust and waterproof aluminium housing	
Connectors in military technology	
Each pin individually filtered	
Vibration damped circuit boards	
Flexible housing fixation points	
Size	194 x 245x 72,1 mm
Weight	2280 g

Conditions for use	
ECU temperature	-40 ... 65°C
Max. power consumption	18 W at 14 V
Max. vibration	15 g sinus at 20 Hz ... 2 kHz for t < 5 h

Electronic data	
In general	
9 microcontrollers with 16 bit organisation, calculator capacity 70 MIPS	
Real time clock	

Inputs	
4 inputs for Ni-Cr-Ni exhaust gas temperature sensors	
4 lambda LSM 11 interfaces	
4 inputs for inductive wheel speed sensors (Hall optional)	
42 universal inputs 0 ... 5 V	
6 differential inputs ± 5 V	
1 input for inductive or Hall crankshaft sensor	
1 input for inductive or Hall camshaft sensor	
8 knock sensor inputs	
Outputs	
All power stages short circuit protected	
12 peak and hold injection power stages with diagnosis interface	
12 switched injection power stages with diagnosis interface	
12 ignition power stages with diagnosis interface	
3 high current power stages (12 A)	
12 high speed power stages (2 A)	
3 sensor supply 5 V/100 mA	
3 sensor supply 10 V/200 mA	
Communication interfaces	
2 RS232 interface for telemetry and laptrigger	
1 2-Mbaud interface for memory and data read out or high speed telemetry	
3 CAN interfaces	
Memory	
Compact Flash Card memory for data acquisition	

Motronic MS 2.9.1

The MS 2.9.1 engine management system contains 12 ignition power stages and 12 independent injection power stages. All internal power stages are designed with a diagnosis interface. Various engine and chassis parameters can be measured and logged in the integrated flash card memory. Four vibration sensor inputs allow knock detection and knock control. Four independent wide range lambda circuits allow lambda closed loop engine control.



Functionality

- Injection timing
- Ignition timing
- Lambda control
- Boost control (option)
- Knock control
- Data acquisition
- Telemetry

Mechanical data

- Dust and waterproof aluminium housing
- Connectors in military technology
- Each pin individually filtered
- Vibration damped circuit boards
- Flexible housing fixation points
- Size 194 x 245x 72,1 mm
- Weight 2280 g

Conditions for use

- ECU temperature -40 ... 65°C
- Max. power consumption 18 W at 14 V
- Max. vibration 15 g sinus at 20 Hz ... 2 kHz for t < 5 h

Electronic data

In general

- 8 microcontrollers with 16 bit organisation, calculator capacity 50 MIPS
- Real time clock

Inputs

- 4 inputs for Ni-Cr-Ni exhaust gas temperature sensors
- 4 lambda LSM 11 interfaces
- 4 inputs for inductive wheel speed sensors (Hall optional)
- 42 universal inputs 0 ... 5 V
- 6 differential inputs ± 5 V
- 1 input for inductive or Hall crankshaft sensor
- 1 input for inductive or Hall camshaft sensor
- 4 knock sensor inputs

Outputs

- All power stages short circuit protected
- 12 peak and hold injection power stages with diagnosis interface
- 12 ignition power stages with diagnoses interface
- 3 high current power stages (12 A)
- 3 sensor supply 5 V/100 mA
- 3 sensor supply 10 V/200 mA

Communication interfaces

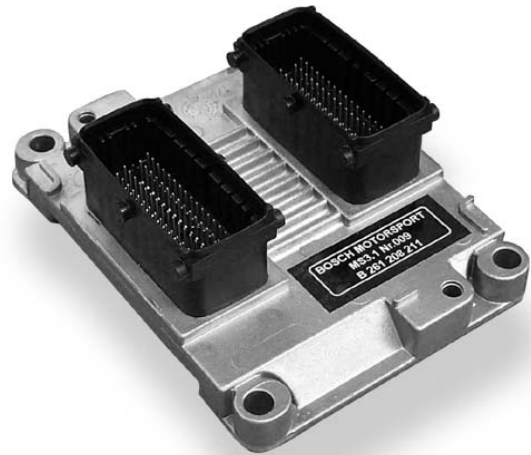
- 2 RS232 interface for telemetry and laptrigger
- 1 2-Mbaud interface for memory and data read out or high speed telemetry
- 3 CAN interfaces

Memory

- Compact Flash Card memory for data acquisition

Motronic MS 3.1

The MS 3.1 is the first Bosch engine management system in full hybrid technique and for engines up to 6 cylinders. Two independent circuits are available for vibration knock detection and knock control. Injection time, injection end timing and ignition timing are calculated from basic maps and can be corrected by different engine parameters. Also two closed loop wide range lambda circuits are available. Various engine parameters can be measured with different input channels and transferred via CAN interface to an optional flash card data logger.



Functionality

Engine management system for 4- and 6-cylinder engines
Sequential fuel injection
Ignition timing
Lambda control
Knock control
Fuel cut off
Component diagnosis

Mechanical data

Extremely small and flat aluminium pressure casting housing	
Connectors with high pin density	
Extremely shock and vibration proof hybrid technology	
Four housing fixation points	
Size	120 x 90 x 40 mm
Weight	250 g

Conditions for use

ECU temperature	-40 ... 125°C
Max. power consumption	10 W at 14 V
Max. vibration	50 g sinus at 20 Hz ... 2 kHz for t < 5 h

Electronic data

In general

2 microcontrollers with 16 bit organisation
calculation capacity 20 MIPS

Inputs

- 2 lambda LSU4 interfaces
- 3 analogous inputs 0 ... 5 V for water temperature, oil temperature, intake air temperature
- 3 analogous inputs 0 ... 5 V for oil pressure, fuel pressure, ambient pressure
- 1 analogous input 0 ... 5 V for throttle position sensor
- 1 digital input for lap trigger
- 1 digital input for wheel speed sensor
- 1 input for inductive crankshaft sensor
- 1 input for hall camshaft sensor
- 2 knock sensor interfaces

Outputs

- 6 injection power stages with diagnosis interface
- 2 high current power stages (8 A) with diagnosis interface for LSU heating
- 6 ignition power stages
- Sensors supply output 5 V/100 mA || Separate supply output for throttle position sensor | 5 V/100 mA |
| 2 power stages (1 A) for main relay and fuel pump relay control |



Communication interfaces

1 CAN interface

1 K-Line interface

Necessary equipment

KIC2-standard connector **B 261 206 859**

KIC2-diagnosis connector with
ignition bridge **B 261 206 866**

KIC2-diagnosis connector without
ignition bridge **B 261 206 867**

Cable harness connectors

Order numbers: **D 261 205 139**

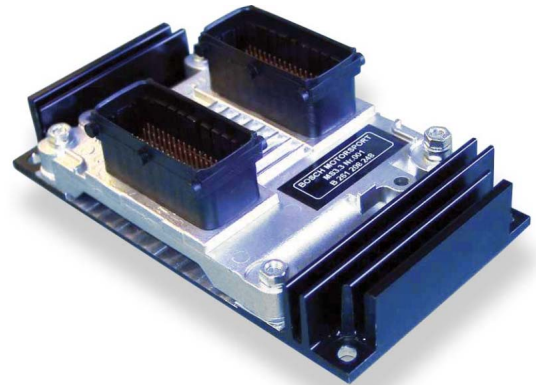
D 261 205 140

Order numbers

MS 3.1 incl. Modas for notebook **B 261 208 245**

Motronic MS 3.3

The MS 3.3 is an engine management system in full hybrid technique and for engines up to 8 cylinders. Two independent circuits are available for vibration knock detection and knock control. Injection time, injection end timing and ignition timing are calculated from basic maps and can be corrected by different engine parameters. Also two closed loop wide range lambda circuits are available. Various engine parameters can be measured with different input channels and transferred via CAN interface to an optional flash card data logger.



Functionality

Engine management system for 8-cylinder engines
Sequential fuel injection
Ignition timing
Lambda control
Knock control
Fuel cut off
Component diagnosis

Mechanical data

Extremely small and flat aluminium pressure casting housing	
Connectors with high pin density	
Extremely shock and vibration proof hybrid technology	
Four housing fixation points	
Size	162 x 90 x 44 mm
Weight	450 g

Conditions for use

ECU temperature	-40 ... 75°C
Max. power consumption	10 W at 14 V
Max. vibration	50 g sinus at 20 Hz ... 2 kHz for t < 5 h

Electronic data

In general

2 microcontrollers with 16 bit organisation
calculation capacity 20 MIPS

Inputs

- 2 lambda LSU4 interfaces
- 3 analogous inputs 0 ... 5 V for water temperature, oil temperature, intake air temperature
- 3 analogous inputs 0 ... 5 V for oil pressure, fuel pressure, ambient pressure
- 1 analogous input 0 ... 5 V for throttle position sensor
- 1 digital input for lap trigger
- 1 digital input for wheel speed sensor
- 1 input for inductive crankshaft sensor
- 1 input for hall camshaft sensor
- 2 knock sensor interfaces

Outputs

- 8 injection power stages with diagnosis interface
 - 2 high current power stages (8 A) with diagnosis interface for LSU heating
 - 4 ignition power stages
 - Sensors supply output
 - Separate supply output for throttle position sensor
 - 2 power stages (1 A) for main relay and fuel pump relay control
- | | |
|---|------------|
| Sensors supply output | 5 V/100 mA |
| Separate supply output for throttle position sensor | 5 V/100 mA |



Communication interfaces

1 CAN interface

1 K-Line interface

Necessary equipment

KIC2-standard connector **B 261 206 859**

KIC2-diagnosis connector with ignition bridge **B 261 206 866**

KIC2-diagnosis connector without ignition bridge **B 261 206 867**

Cable harness connectors

Order numbers: **D 261 205 139**

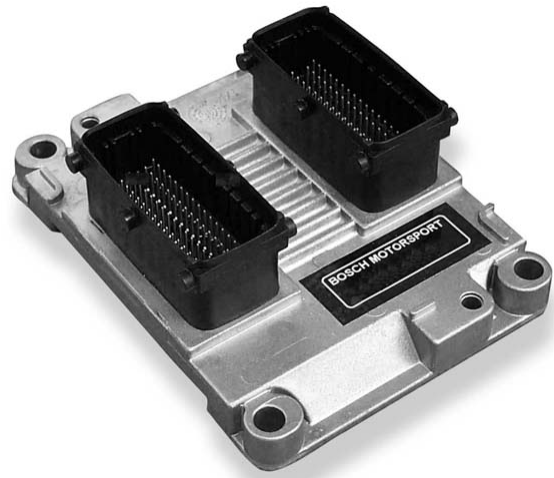
D 261 205 140

Order numbers

MS 3.3 incl. Modas for notebook **B 261 208 250**

Motronic MS 3.4

The MS 3.4 is an engine management system in full hybrid technique and specially adapted for motorbikes. It allows engine speeds up to 20.000 rpm. Two independent circuits are available for vibration knock detection and knock control. Injection time, injection end timing and ignition timing are calculated from basic maps and can be corrected by different engine parameters. Also two closed loop wide range lambda circuits are available. Various engine parameters can be measured with different input channels and transferred via CAN interface to an optional flash card data logger.



Functionality

Engine management system for 4-cylinder engines
Sequential fuel injection
Ignition timing
Lambda control
Knock control
Fuel cut off
Component diagnosis
Engine speed up to 20.000 rpm
Variable firing order

Mechanical data

Extremely small and flat aluminium pressure casting housing	
Connectors with high pin density	
Extremely shock vibration proof hybrid technology	
Four housing fixation points	
Size	120 x 90 x 40 mm
Weight	250 g

Conditions for use

ECU temperature	-40 ... 125°C
Max. power consumption	10 W at 14 V
Max. vibration	50 g sinus at 20 Hz ... 2 kHz for t < 5 h

Electronic data

In general

2 microcontrollers with 16 bit organisation, calculation capacity 20 MIPS

Inputs

- 2 lambda LSU4 interfaces
- 3 analogous inputs 0 ... 5 V for water temperature, oil temperature, intake air temperature
- 3 analogous inputs 0 ... 5 V for oil pressure, fuel pressure, ambient pressure
- 1 analogous input 0 ... 5 V for throttle position sensor
- 1 digital input for lap trigger
- 1 digital input for wheel speed sensor
- 1 input for inductive crankshaft sensor
- 1 input for hall camshaft sensor
- 2 knock sensor interfaces

Outputs

- 4 injection power stages with diagnosis interface
- 2 high current power stages (8 A) with diagnosis interface for LSU heating
- 4 ignition power stages
- Sensors supply output 5 V/100 mA
- Separate supply output for throttle position sensor 5 V/100 mA
- 2 power stages (1 A) for main relay and fuel pump relay control



Communication interfaces

1 CAN interface

1 K-Line interface

Necessary equipment

KIC2-standard connector **B 261 206 859**

KIC2-diagnosis connector with
ignition bridge **B 261 206 866**

KIC2-diagnosis connector without
ignition bridge **B 261 206 867**

Cable harness connectors

Order numbers: **D 261 205 139**

D 261 205 140

Order numbers

MS 3.4 incl. Modas **B 261 208 276**

Motronic MS 4.0

The MS 4.0 is a highly sophisticated engine management system for high performance engines. The system contains 8 ignition drivers for external power stages and 8 independent injection power stages. Two vibration sensor inputs allow knock detection and knock control. Two independent wide range lambda circuits allow lambda closed loop engine control. Various engine parameters can be measured with different input channels and transferred via CAN interface to an optional flash card data logger.



Mechanical data

Sheet-metal housing	
Each connector pin individually filtered	
Vibration damped circuit boards	
Size	180 x 162 x 46 mm
Weight	430 g

Functionality

Injection timing	
Ignition timing	
Lambda control	
Knock control	
Traction control	
Turbo functionality	

Conditions for use

Temperature range	-40 ... 75°C
Max. power consumption	30 W at 14 V
Max. vibration	15 g sinus at 20 Hz ...2 kHz for t < 5 h

Electronic design

Inputs

2 inputs for exhaust gas temperature sensors
2 lambda interfaces LSU
4 inputs for Hall effect wheel speed sensors
1 input for inductive or Hall effect crankshaft sensor
16 universal inputs 0 ... 5 V
2 inputs for vibration knock sensors
7 digital inputs

Outputs

8 injection power stages
8 ignition drivers
20 power stages (2,7 A/0,6 A; low side; PWM)
2 power stages for lambda heater
1 H-bridge (5 A)
2 sensor supply 5 V/100 mA

Communication interfaces

1 K-line serial interfaces
2 CAN interfaces for external communication

Order number

MS 4.0 incl. Modas	B 261 208 300
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Motronic MS 4.2

The MS 4.2 is a highly sophisticated engine management system for high performance engines. The system contains 8 ignition drivers for external power stages and 16 independent injection power stages. Various engine and chassis parameters can be measured with the different input channels and logged on the compact flash card data logger. Two vibration sensor inputs allow knock detection and knock control. Two independent wide range lambda circuits allow lambda closed loop engine control.



Mechanical data

Dust and waterproof aluminium housing	
3 connectors in military technology with high pin density	
165 pins, each pin individually filtered	
Vibration damped circuit boards	
8 flexible housing fixation points	
Size	192 x 162 x 52 mm
Weight	1240 g

Conditions for use

Temperature range	-40 ... 75°C
Max. power consumption	30 W at 14 V
Max. vibration	15 g sinus at 20 Hz ... 2 kHz for t < 5 h

Functionality

Injection timing
Ignition timing
Lambda control
Knock control
Data acquisition
Telemetry
Traction control
Turbo functionality

Electronic design

Inputs

2 inputs for exhaust gas temperature sensors
2 lambda interfaces LSU
4 inputs for Hall effect wheel speed sensors
1 input for inductive or Hall effect crankshaft sensor
31 universal inputs 0 ... 5 V
2 inputs for vibration knock sensors
7 digital inputs

Outputs

16 injection power stages
8 ignition drivers
26 power stages (2,7 A/0,6 A; low side; PWM)
2 power stages for lambda heater
1 H-bridge (5 A)
2 sensor supply 5 V/100 mA

Communication interfaces

1 RS232 serial interface
2 K-line serial interfaces
2 CAN interfaces for external communication
1 SPI
Compact Flash Card memory for data acquisition

Order number

MS 4.2 incl. Modas

F 01E B01 638