# Vehicle Control Unit VCU MS 50.4P


- 866 MHz Dual Core Processor exclusively for vehicle control functionality (MATLAB based)
- Identical, dedicated 866 MHz Dual Core Processor exclusively for logging purposes
- High Speed Logging 200 kHz of 6 analogue inputs (optional)
- Real time Ethernet SERCOS 3
- Event logging, Configurable pre-event logging

The VCU MS 50.4P (Performance) is a highly powerful processing / logging unit for race applications.
Based on our broad base of platform function, we support you with customized VCU functions for a tailor-made solution.
In addition, you can quickly develop your individual customer software based on MATLAB/Simulink to significantly speed up algorithm development (automatic code and documentation generation, requires CCA package) – including extensive simulation capabilities.
The device offers real time Ethernet functionality to exchange e.g. data used in control algorithms between devices (guaranteed latency time 1 ms).

## Application

| | |
|---|---|
| Processor for customer code | 866 MHz Dual Core |
| Processor for logger | 866 MHz Dual Core |
| Configurable math channels | |
| User configurable CAN in/out messages | |
| Sampling rate logger | 1 ms |
| Optional: Sampling rate high speed logger | 5 µs |
| Online data compression | |
| Logging rate | > 800 kB/s |
| Internal storage capacity | 6 GB |
| LTE Ethernet telemetry support | |
| RS232 interface for GPS | |

## Technical Specifications

### Mechanical Data

| | |
|---|---|
| Size | 166 x 121 x 41 mm |
| Weight | ≤ 660 g |
| Protection classification | IP67 |
| Operating temperature internal | 0 to 80°C |
| 3 motorsport connectors, 198 pins in total | |
| Max. vibration | Vibration profile 1 (see www.bosch-motorsport.com) |

### Electrical Data

| | |
|---|---|
| Supply voltage | 5 to 18 V |

### Inputs

| |
|---|
| 20 Analog channels 0 to 5 V, 0.5 % precision between 0.2 and 4.8 V, switchable pull-up |
| 8 Digital PWM inputs f_max=30 kHz Hall-type speed measurement possible,<br>Switchable pullup 2.15 kOhm, (required for Hall), Tooth count differential* |
| 4 Digital PWM inputs f_max=30 kHz Hall- and DF11 type speed measurement possible,<br>Fixed pullup 2.15 kOhm (required for Hall), Tooth count differential* |
| 4 universal Thermocouple |
| 1 Bosch Laptrigger |
| 1 TimeSync master and slave (specific to Bosch measurement system) |
| Internal measurements: |

1 ambient pressure
1 ECU temperature
20 supply voltage
20 supply current
1 battery voltage (external VCU supply)
1 external VCU supply current
4 HS output current
3-axis acceleration plus roll/pitch/yaw rate

### Outputs

| | |
|---|---|
| PWM High side | 2*; 7.5 A each, PWM, 50 Hz |
| PWM Low side | 4*; 2.2 A each, PWM, 10 kHz |

*can be enhanced by Upgrade I/O Package, see below

### Power Supplies

| | |
|---|---|
| 12 V, 400 mA each | 5* |
| Switchable 5 V/12 V, 400 mA each | 5* |
| Max overall current | 4 A on all 12 V<br>2 A on all 5 V |
| Precision 12 V ± 1 % on the pin<br>Precision 5 V ± 0.1 % on the pin | |
| Sensor ground | 20 |

*can be enhanced by Upgrade I/O Package, see below

### Adaptation and Documentation

| | |
|---|---|
| Function documentation | Automatically created during code generation |
| MatLab code generation | Support for customer own MatLab function development |

### Software Tools (free download)

| | |
|---|---|
| Data Analysis tool WinDarab 7 | |
| System Configuration tool RaceCon | Logger configuration, calibration and online measurement |

### Upgrade Customer Code Area CCA

Provides the option to run customer developed software code on Bosch ECU

### Upgrade I/O Package

**Communication**

4 CAN

**Inputs**

4 Analog channels
0 to 5 V,
0.5 % precision between 0.2 and 4.8 V, switchable pull-up

4 Digital PWM inputs
f_max=30 kHz
Hall-type speed measurement possible,
Fixed pullup 2.15 kOhm (required for Hall),
Tooth count differential**

4 LVDT, 5 pin configuration,
excitation frequency 1 to 20 kHz,
excitation voltage 0 to 5 V (rms)

**Outputs**

4 “TTL” Digital output, 10 kHz, PWM, 25 mA each

2 PWM High side; 7.5 A each, PWM, 50 Hz

4 PWM Low side; 2.2 A each, PWM, 10 kHz

**Power Supplies**

5 x12 V, 400 mA each

5 switchable 5 V/12 V, 400 mA each

** The tooth count differential between any two of the PWM inputs is available two measure e.g. shaft torsion.

### Upgrade High Speed Logging Package

| | |
|---|---|
| 6 ANA | 0 to 5 V, 200 kHz logging rate |

### Upgrade CCP Master

Enables CCP master functionality to request data from foreign devices via CAN/CCP protocol.

### Upgrade Real Time Ethernet

Enables the VCU to operate as a real time Ethernet master or slave. Guaranteed latency time of 1 ms. Ideal for time critical data transfer as needed in online control algorithms involving data from different devices.
Two interfaces allow for a ring topology (redundancy in case the RTE line experiences damage).
The VCU features a reasonable set of SERCOS3 instructions although not the full SERCOS3 standard is implemented. The ECU side can act as a SERCOS3 master; the logger side can act as a SERCOS3 slave.

### USB Accessories

Rugged USB flash drive

Mating connector for USB flash drive on car loom side

Adapter cable to PC USB-port

### Connectors

| | |
|---|---|
| Connector LIFE (red)<br>AS018-35PN | Mating connector<br>AS618-35SN (not included) |
| Connector SENS-A (yellow)<br>AS018-35PA | Mating connector<br>AS618-35SA (not included) |
| Connector SENS-B (blue)<br>AS018-35PB | Mating connector<br>AS618-35SB (not included) |

## Communication

3 Ethernet 100 Mbit

2 Realtime Ethernet SERCOS3

4 CAN*

1 LIN

1 USB

1 RS232 interface for GPS

1 Time sync synchronization Ethernet

*can be enhanced by Upgrade I/O Package, see below

## Installation Notes

Inspection services recommended after 220 h or 2 years, no components to replace.

Please remember that the mating connectors and the programming interface MSA-Box II are not included and must be ordered separately.

## Ordering Information

**Vehicle Control Unit VCU MS 50.4P**
Order number **F02U.V02.966-02**

**Vehicle Control Unit VCU MS 50.4P + CCA**
Order number **F02U.V03.014-01**

**Vehicle Control Unit VCU MS 50.4P + I/O_PACK + CCA**
Order number **F02U.V03.015-01**

### Software Options

**Customer Code Area CCA**
Order number **F02U.V02.137-01**

**I/0 Package**
Order number **F02U.V02.777-01**

**High Speed Logging Package**
Order number **F02U.V02.779-01**

**CCP Master**
Order number **F02U.V02.213-01**

**Real Time Ethernet**
Order number **F02U.V02.782-01**

### Accessories

**Rugged USB flash drive**
Order number **F02U.V01.342-03**

**Mating connector for USB flash drive on car loom side**
Order number **F02U.002.996-01**

**Adapter cable to PC USB-Port**
Order number **F02U.V01.343-01**

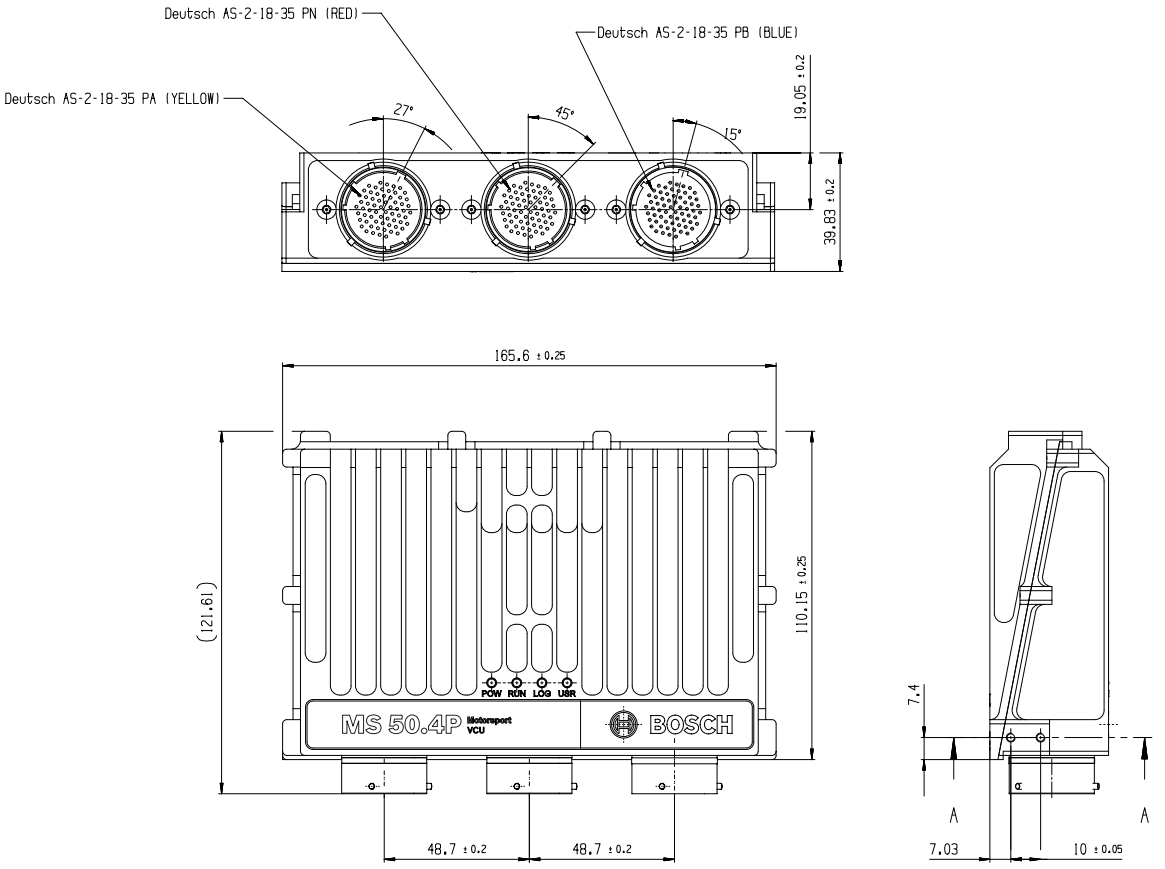
**Opening tool for shellsize 18**
Order number **F02U.V01.394-01**

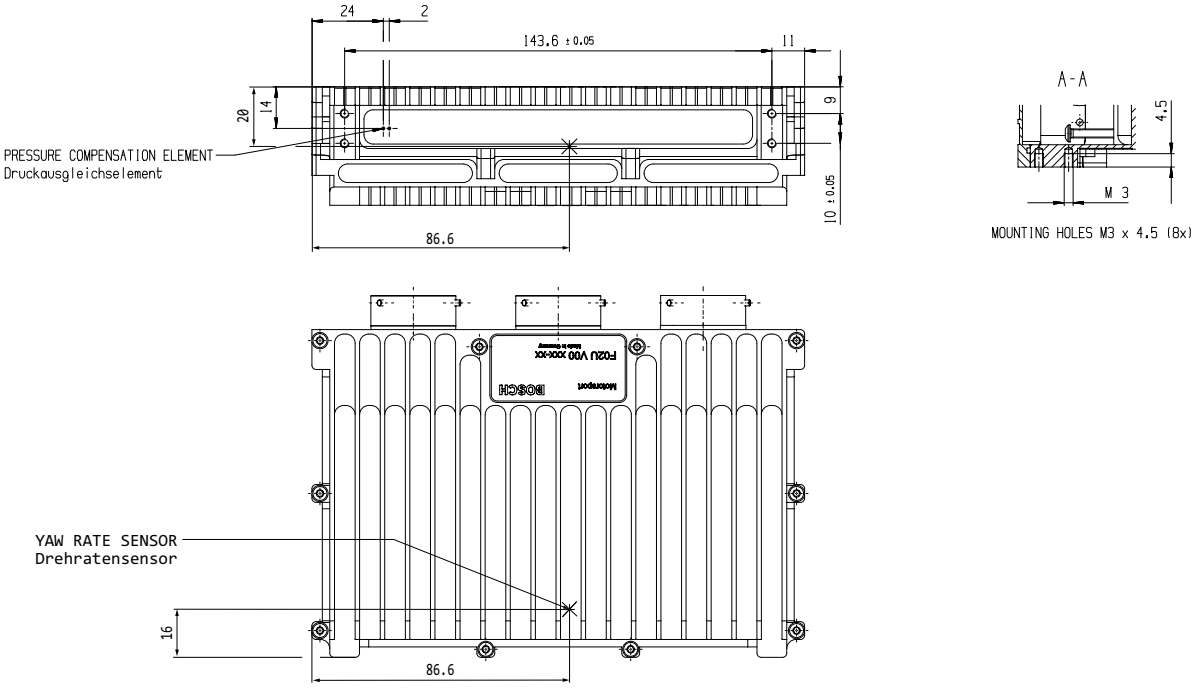
**Breakout Box BOB 66-pole**
Connector code: blue
Order number **F02U.V02.295-01**

**Breakout Box BOB 66-pole**
Connector code: yellow
Order number **F02U.V02.298-01**

**Breakout Box BOB MS 7**
Connector code: red
Order number **F02U.V02.293-01**

## Dimensions



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