

# Vehicle Control Unit MS 50.4



- ▶ 667 MHz Dual Core Processor exclusively for vehicle control functionality (MATLAB based)
- ▶ Identical, dedicated 667 MHz Dual Core Processor exclusively for logging purposes
- ▶ High Speed Logging 200 kHz of 6 analog inputs (optional)
- ▶ Event logging, Configurable pre-event logging

The VCU MS 50.4 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.

## Application

Processor for customer code      667 MHz Dual Core

Processor for logger                667 MHz Dual Core

Configurable math channels

User configurable CAN in/out messages

Online data compression

### Internal logger

- 1,500 channels
- FULL\_LOG\_1 (4 GB memory on Recording 1) enabled
- PERF\_LOG\_1 (16 GB memory on Partition 1) optional
- FULL\_LOG\_2 (4 GB memory on Recording 2) enabled
- High Speed Logging Package (Sampling rate 5 µs) optional
- DATA\_USB (Data copy to USB flash drive) enabled

### Logging rates

- Usage of all features: 600 kB/s
- Primary logging use case: >1,200 kB/s
- Logging data download rate: up to 6.2 MB/s

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
3 motorsport connectors, 198 pins in total	
Max. vibration	Vibration profile 1 (see Downloads or <a href="http://www.bosch-motorsport.com">www.bosch-motorsport.com</a> )
Operating temperature internal	-20 to 80°C

### Electrical Data

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

### Inputs

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

8 x Digital PWM inputs  $f_{max}=30$  kHz Hall-type speed measurement possible, Switchable pullup 2.15 kOhm, (required for Hall), Tooth count differential\*

4 x Digital PWM inputs  $f_{max}=30$  kHz Hall- and DF11 type speed measurement possible, Fixed pullup 2.15 kOhm (required for Hall), Tooth count differential\*

4 x universal Thermocouple

1 x Bosch Laptrigger

1 x TimeSync master and slave (specific to Bosch measurement system)

Internal measurements:

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

### Outputs

2\* x 7.5 A each, PWM High side, 50 Hz  
 4\* x 2.2 A each, PWM Low side, 10 kHz  
 \*can be enhanced by Upgrade I/O Package

### Sensor Supplies and Screens

5\* x 12 V, 400 mA each  
 5\* x Switchable 5 V/12 V, 400 mA each  
 4 A max overall current on all 12 V  
 2 A max overall current on all 5 V  
 12 V  $\pm$  1 % precision on the pin  
 5 V  $\pm$  0.1 % precision on the pin  
 20 x Sensor ground  
 \*can be enhanced by Upgrade I/O Package

### 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

### Connectors

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

### Communication

3 Ethernet 100 Mbit  
 4 CAN\*  
 1 LIN  
 1 USB  
 1 RS232 interface for GPS or Telemetry, switchable depending on SW version  
 1 Time sync synchronization Ethernet  
 \*can be enhanced by Upgrade I/O Package

### Installation Notes

Maintenance Interval: 220 h or a maximum of two years

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

### Legal Restrictions

The sale of this product in Mexico is prohibited. Due to embargo restrictions, sale of this product in Russia, Belarus, Iran, Syria, and North Korea is prohibited.

### Upgrades

#### CCA Hardware Upgrade per device

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

#### Multi CCA Hardware Upgrade per device

Enables the use of an extra core to utilize more computing power in the device

### 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 to measure e.g., shaft torsion.

### High Speed Logging Package

6 ANA 0 to 5 V, 200 kHz logging rate

**CCP/XCP\_MASTER**

Enables CCP/XCP master functionality to request data from foreign devices via CAN/CCP protocol, XCP over Ethernet (UDP) or XCP via CAN.  
(ASAP2 file from ECU manufacturer required)

**Ordering Information**

**Vehicle Control Unit MS 50.4**  
Order number **F02U.V02.965-02**

**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**

**Vehicle Control Unit MS 50.4 incl. CCA Hardware Upgrade**  
Order number **F02U.V03.012-01**

**Software Options**

**CCA Hardware Upgrade per device**

Order number **F02U.V02.137-01**

**Multi CCA Hardware Upgrade VCU per device**  
Order number **F02U.V03.222-01**

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

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

**CCP/XCP\_MASTER**  
Order number **F02U.V02.213-01**

**Accessories**

**Rugged USB flash drive**  
Order number **F02U.V03.534-01**

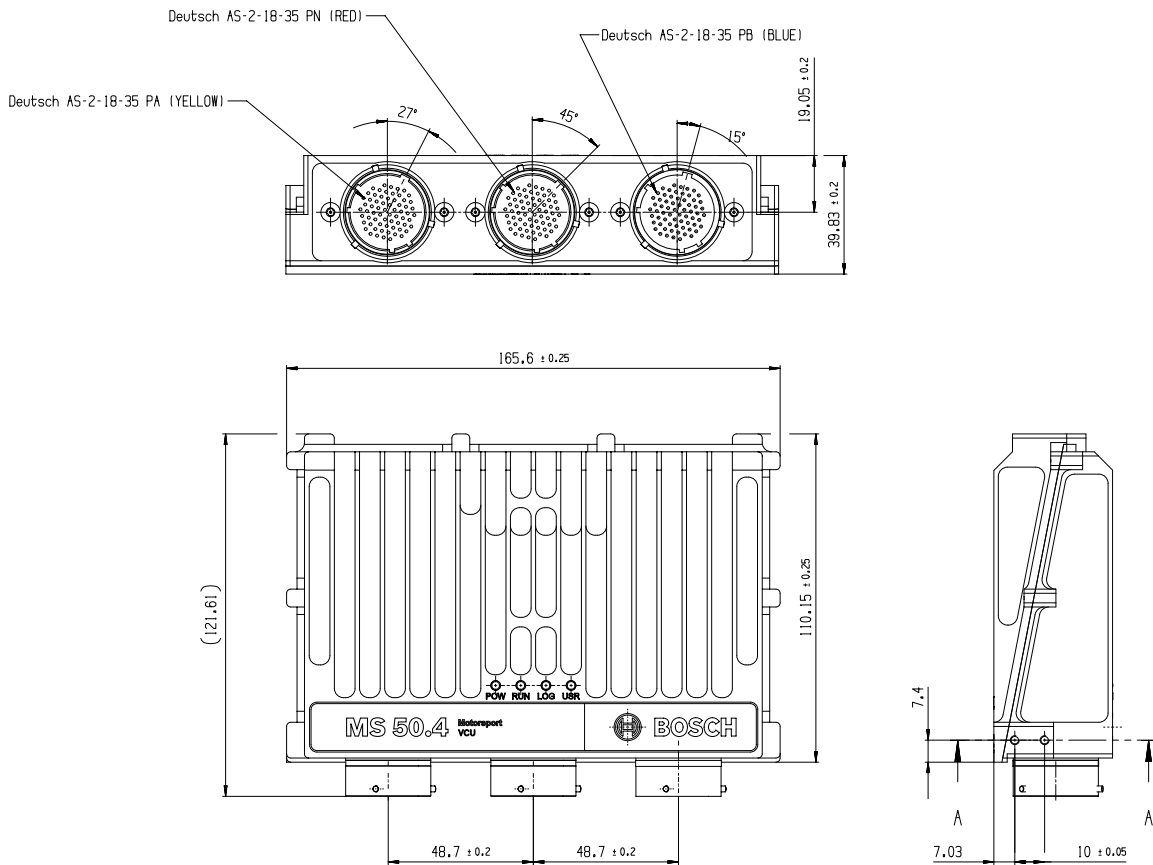
**Connector for USB flash drive on car loom side**  
Order number **F02U.002.996-01**

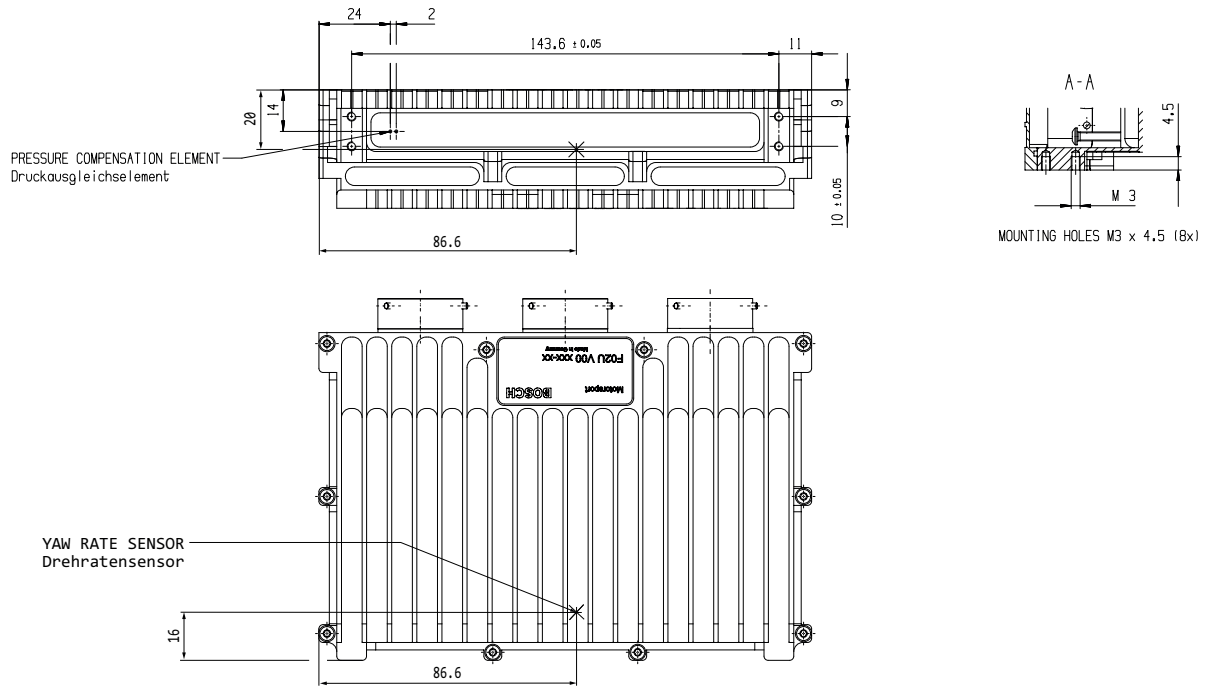
**Adapter cable to PC USB-Port**  
Order number **F02U.V01.343-01**

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

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

**Dimensions**





**Represented by:**

**Europe:**  
 Bosch Engineering GmbH  
 Motorsport  
 Robert-Bosch-Allee 1  
 74232 Abstatt  
 Germany  
 Tel.: +49 7062 911 9101  
 Fax: +49 7062 911 79104  
 motorsport@bosch.com  
 www.bosch-motorsport.de

**North America:**  
 Bosch Engineering North America  
 Motorsport  
 38000 Hills Tech Drive  
 Farmington Hills, MI 48331-3417  
 United States of America  
 Tel.: +1 248 876 2977  
 Fax: +1 248 876 7373  
 motorsport@bosch.com  
 www.bosch-motorsport.com

**Asia-Pacific:**  
 Bosch Engineering Japan K.K.  
 Motorsport  
 18F Queen's Tower C, 2-3-5 Minato  
 Mirai Nishi-ku, Yokohama-shi  
 Kanagawa 220-6218  
 Japan  
 Tel.: +81 45 650 5610  
 Fax: +81 45 650 5611  
 www.bosch-motorsport.jp

**Australia, New Zealand and South Africa:**  
 Robert Bosch Pty. Ltd  
 Motorsport  
 1555 Centre Road  
 Clayton, Victoria, 3168  
 Australia  
 Tel.: +61 (3) 9541 3901  
 motor.sport@au.bosch.com