BOSCH

# ABS M4 Kit

## Manual

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# 2 Before Use

Read these instructions carefully and follow the recommendations for use step by step. We are happy to give you additional notes and explanations. Our contact information is on the back cover of this manual.

## 2.1 Safety Information

The Bosch Motorsport Kit was developed for use by professionals and requires in depth knowledge of automobile technology and experience in motorsport. Using the system does not come without its risks.

It is the duty of the customer to use the system for motor racing purposes only and not on public roads. We accept no responsibility for the reliability of the system on public roads. In the event that the system is used on public roads, we shall not be held responsible or liable for damages.

Any maintenance or repair must be performed by authorized and qualified personnel approved by Bosch Motorsport.

All system parts are designed to work together and may not be replaced with similar parts without our expressed permission (this includes the wiring harness). For first time purchases, each team or owner must purchase a complete kit which includes a wiring harness. Spare parts may be purchased after a complete kit has been purchased. The use of unauthorized parts or wiring harnesses will not be supported by Bosch Motorsport; additionally the system cannot be guaranteed to work properly and/or without limitations.

It is essential that the predefined Bosch Motorsport assembly guidelines are complied with, see section Assembling the Parts [▶ 19], the system to run properly. This applies above all for installing the MIL (malfunction indication lamp) within the driver's range of visibility.

## 2.2 ABS in Motorsport

The ABS function is a compromise between drivability and braking performance. Drivability is the primary focus for passenger based vehicles. The ABS is designed to keep the passenger vehicle maneuverable and stable under any circumstances and under any conceivable driving conditions.
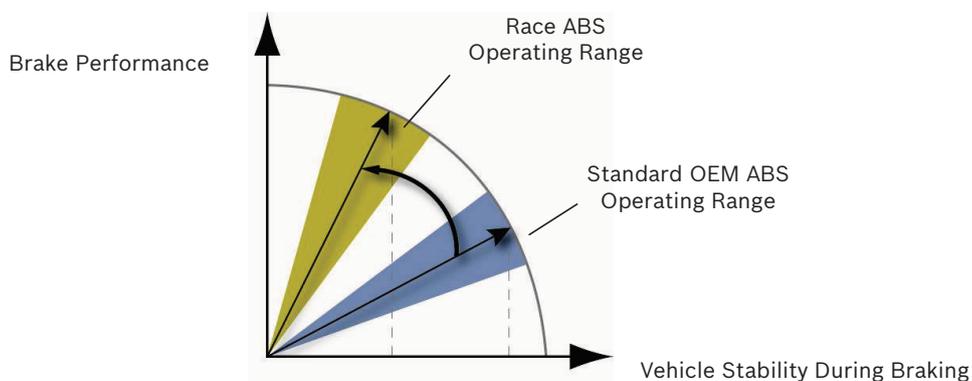


In a motorsport context, this compromise shifts towards braking performance, as experienced drivers can still control a slightly unstable vehicle. Together with different tire structures and higher braking potential, a racecar is capable of greatly

increased deceleration rates. To consider different chassis tuning and tires ABS M4 Kit has nine control settings. They differ from each other belonging start and process of control. With this, the driver can choose the best setting for his vehicle. Furthermore, the ABS provides the opportunity to program two individual control settings for you vehicle. For calibration drives, the ABS function can be deactivated separately, whereby all ABS sensor signals are transmitted and processed furthermore.

## 2.3 Principle of Operation

ABS M4 is suitable for **front-wheel, rear-wheel and four-wheel drive vehicles**. It is based on a series production ABS and adapted in years of development work to meet motorsport requirements.

The ABS prevents the wheels from locking during braking. It does this by constantly measuring the individual wheel speeds and comparing them with the wheel speeds predicted by the system. If, during braking, the measured wheel speed deviates from the system's predicted wheel speed, the ABS controller takes over, correcting the brake force to keep the wheel at the optimum slip level and so achieving the highest possible deceleration rate. This is carried out separately for each wheel.

When the brake force is reduced by the ABS, brake fluid is released from the brake caliper and fed into the pressure reservoir of the hydraulic power unit of the ABS. The hydraulic power unit then feeds the fluid back into the master cylinder via a piston pump driven by an electric motor. The driver can hear this return pumping of the brake fluid and feel the response of the brake pedal.

## 2.4 Features

**Note:** In the following, we only refer to the Standard ABS scale. The Alternative ABS scale is only used for DF11S, 1 Mbaut. You can use the Alternative ABS scale if your ABS M4 Kit is switched off in position 1.
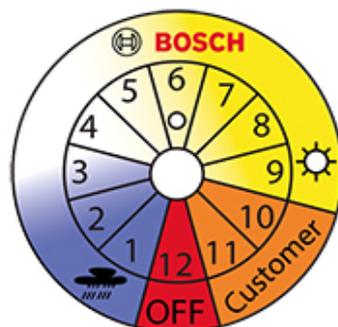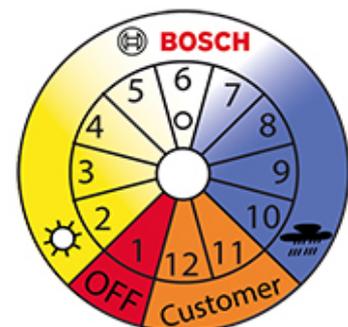


ABS scale standard                    ABS scale alternative

- Nine different control settings, selectable via a switch in the cockpit (position 1-9)
  The ABS map switch in the cockpit enables the driver to select various control settings stored in the control device. Using the standard ABS scale, it starts with switch position 1 for the most sensitive controller setting (e.g. heavy rain condition). The response characteristic gets more progressive from position to position. Finally, with switch position 9 the most progressive effect is ach-

ieved. With the different control settings, the driver can select the preferable map for the vehicle, the racetrack and weather. Comment: The most progressive braking characteristics leads not necessarily to best lap times. Rather the position that allows the driver to feel the most comfortable will be the most desirable position.

▪ Two additional vehicle-specific control maps storable (position 10 and 11)
Switch positions 10 and 11 are pre-dated with a copy of position 9. Bosch-Engineers can calibrate them individually for each customer.

▪ Switch off ABS functions for calibration drives (position 12).
You can switch off the ABS functions by switching to position 12. This can be very helpful, e.g. for calibration of the brake balance adjuster. All ABS sensor signals will still be communicated. Every older ABS M4 Kit Kit can be updated to this function. During warm-up we recommend to choose position 12. Since software status V1017 no error entry takes place any longer.

▪ Measuring vehicle dynamics
Due to specially-adapted chassis and tires, motor racing vehicles allow for significantly higher longitudinal and lateral acceleration rates than series production vehicles. The ABS M4 Kit is designed to intervene after a corresponding amount of time. Our ABS M4 Kit sensors constantly measure vehicle acceleration and rotation rates as well as the pressure of the front brake circuit. The ABS control algorithms at the front brake circuit rely on the measurements of acceleration and pressure.

▪ Programming and diagnosis software
Each ABS M4 Kit Kit is preprogrammed with specific data related to the vehicle, such as vehicle mass, wheelbase, track width, tire rolling circumference, etc. Should the vehicle data change at any time, you can adapt the system settings by using the RaceABS diagnostic software. You find the software for free download on our website www.bosch-motorsport.de.

▪ There are further features to the software:

▪ Performing a system function test
The system function test can diagnose the functional capability and professional assembly of any part, without having to move the vehicle.

▪ Reading data from the error log
Any missing part or incorrectly connected electrical connection is signaled by a lit MIL (Malfunction Indication Lamp). In the error log you can read and analyze what errors have set the MIL and then delete the errors after the issue has been resolved.

▪ Repair Bleeding Wizzard
Step-by-step instructions will guide you through bleeding the ABS unit.

▪ Connectivity for data loggers and display
You can connect a data logger (e.g. the C 50 from Bosch Motorsport) to the ABS-Wiring-Harness via CAN. The CAN Bus can give you wheelspeeds and other readings from the system. All ABS M4 Kit CAN messages can be displayed on any programmable, CAN-compatible display (e.g. the DDU 7 from Bosch Motorsport).

▪ Switch on and off the system with a switch in the cockpit
You can switch the system ON or OFF by moving the switch in the cockpit for one time.

- Reset the System with a switch in the cockpit
  You can reset the system by moving the switch to the position OFF and then directly again ON.

**See also**

▤ Repair Bleeding Wizzard [▶ 35]

# 3 Technical Data

## Mechanical Data

| **Hydraulic unit with attached ECU** | |
|---|---|
| Serial housing, dust- and damp-proof | |
| Vibration damped circuit board | |
| 38 pin connector | |
| 2 hydraulic valves per wheel | |
| 2 brake circuits (front and rear) | |
| 2 hydraulic high pressures pumps | |
| 2 hydraulic accumulators 3 cm³/each | |
| Standard fittings | 2 x master cylinders M12 x 1<br>4 x brake cylinders M10 x 1 |
| Size | 125 x 80.3 x 129.6 mm |
| Weight | about 1,850 g |
| Operating temperature | -30 to 130°C |
| Max. shock | 50 g less than 6 ms |

## Electrical Data

| | |
|---|---|
| Supply voltage | 8 to 16 V, max. 26 V for 5 min |
| Max. peak voltage | 35 V for 200 ms |
| Power consumption | 8 W stand-by, 230 W in operation |
| **Inputs** | |
| 4 active wheel speed DF11 | |
| Brake pressure (front brake circuit) | |
| Longitudinal acceleration, lateral acceleration, yaw rate | |
| 9 adjustment settings applicable for OEMSs (Pos. 1-9) | |
| 2 adjustment settings applicable for Temas (Pos. 10 and 11) | |
| ABS function can be deactivated (Pos. 12) | |
| Brake light switch | |
| **Outputs** | |
| ABS warning light (MIL) | |
| **Communication** | |
| CAN interface | |

## Content of Kit and Weights

| | |
|---|---|
| Hydraulic unit with attached ECU | About 1,850 g |
| Pressure sensor | About 40 g |
| Yaw/acceleration sensor | About 60 g |

| | |
|---|---|
| 12 position function switch | About 50 g |
| 4 wheel speed sensors DF11 standard | About 50 g/each |
| ABS warning light (MIL) | About 50 g |
| Vehicle specific wiring harness with motorsport connectors | Depends on version |
| Clubsport wiring harness | About 1,500 g |
| Mounting and vibration-damping boards | About 80 g |
| Mounting board for hydraulic unit | About 210 g |

## Optional Accessories

| | |
|---|---|
| Data logger C 50 | F 02U V01 164-01 |
| Data logger C 60 | F 02U V00 875-03 |
| Display DDU 7 | F 02U V01 130-04 |
| Communication interface MSA Box II | F 02U V00 327-02 |
| **Wheel speed signal splitters** | |
| Quad with 2 motorsport connectors | F 02U V00 203-03 |
| Quad with 1 motorsport connector | F 02U V00 335-03 |
| Porsche 991 with 1 motorsport connector | F 02U V01 928-01 |

## Field of application

| |
|---|
| ABS for front-wheel, rear-wheel or four-wheel drive racing cars |

## Part numbers

| | |
|---|---|
| ABS M4-Package 1 (incl. wiring harness with motorsport connectors, individual layout depending on customer requirements, wheel speed sensors with production-type connectors) | F 02UV00 289-01 |
| ABS M4-Package 2 (incl. wiring harness with motorsport connectors, individual layout depending on customer requirements, wheel speed sensors with motorsport connectors) | F02U V00 290-01 |
| ABS M4-Package Clubsport (incl. wiring harness with motorsport connectors, wheel speed sensors with serial connectors) | 1MBaud:<br>F 02U V01 289-49 (DF11S)<br>F 02U V00 543-13 (DF11i)<br><br>500 kBaud:<br>F 02U V01 289-48 (DF11S)<br>F 02U V00 543-12 (DF11i) |

# 4 Adaptations to Your Vehicle

## Physical vehicle data

For optimum brake performance, each M4 unit has to be customized to suit the vehicle in which it is to be used. To do this, the system can be programmed by the user with certain data, such as the vehicle weight, vehicle dimensions, wheel circumference, and wheel weight. The system then uses this data as basis for calculation. Bosch can also program this data ahead prior to delivery on request, however, it is very important that you calibrate or verify the data prior to operating the vehicle.

You can find a form to fill in your vehicle data on www.bosch-motorsport.com. This form should be provided to you by your dealer with the order of the kit, if the kit shall be programmed by Bosch.

## Wiring harness

Each ABS system is delivered with a wiring harness that we have specifically created in accordance with customer requests.

With every Clubsport ABS you receive an appropriate wiring harness, which is not specifically created. Please see --- MISSING LINK ---.

## System environment and related requirements

**Is the ABS system being used as a closed stand-alone system? Or is it networked with a control unit?**

If the system is networked with a standard control unit, we recommend that you use our speed/acceleration sensor with a CAN rate of 500 Kbaud/s to avoid compatibility issues.

If the system is networked with a motorsport control unit or used as self-sufficient stand-alone-system, we recommend that you use our speed/acceleration sensor with a CAN rate of 1 Mbaud/s. This version features a greater measuring range.

**Was or is the vehicle already fitted with an ABS system? Was or is it an old BOSCH ABS system?**

The requires signals from differential dual Hallsensors such as the Bosch DF11 or similar to function correctly. These sensor types are used in new vehicles for ABS and ESP® systems and can be carried over for the . The signal level of conventional speed sensors, as found in old series-production ABS systems for example, is not compatible with the ; it is therefore not possible to carry over conventional speed sensors as signal transmitters.

If your vehicle contains an older ABS system, you have to remove the wheel speed sensors and replace them by the sensors includes in the package to be able to use the .

If you are fitting your vehicle with an ABS system for the first time, you may need an encoder wheel for each wheel and a sensor mount to record the wheel speeds. Please pay attention to the fitting position of the wheel speed sensors.

**Do the wheel speed signals also need to be made available to other control units?**

We have developed a wheel speed signal splitter that converts the signals in such a way that they can also be processed by peripheral engine control units and data logging systems. The splitter provides an input signal like as it is shown in the diagram in chapter --- MISSING LINK ---. This module can be used, for traction control, display and gear units. For ordering information see also --- MISSING LINK ---.

**See also**

# 5 Included in the Kit

The following chapter introduces the contents of the different kits.

## 5.1 ABS M4 Kit 1

ABS M4 Kit 1 with part number F 02U V00 289-01 always includes a wiring harness. ABS M4 Kit 1 includes the following parts, which are also available as individual spare parts (Hydraulic power unit only in exchange):

| Description | Part Number |
| --- | --- |
| Hydraulic unit with attached ECU | Standard (for DF11S wheel speed sensors): F 02U V00 866-01<br>Alternativ (for DF11i wheel speed sensors): F 02U 002 487-01 |
| Mounting plate for hydraulic unit with attached ECU | 0 265 Y44 520-01 |
| Brake pressure sensor | 0 261 B08 072-08 |
| 4 wheel speed sensors DF11 | 0 265 008 022<br>0 285 007 871 (old model) |
| Yaw/acceleration sensor | Standard 1 MBaud/s: 0 265 005 838<br>Alternative 500 kBaud/s:<br>F 02U V00 049-02 |
| Damping plate for yaw/acceleration sensor | 1 271 032 390 |
| 12-position ABS map switch | F 02U V00 111-03 |
| ABS warning light (MIL) with electronic control module | Bulb: F 02U V00 112-01<br>LED: F 02U V00 112-02 |
| Incl. wiring harness with motorsport connectors, customer-specific layout, wheel speed sensors with production-type connectors. | Similar to connection diagram F 02U S00 043-09, see Wiring Diagram ABS M4 [▸ 50] |

## 5.2 ABS M4 Kit 2

ABS M4 Kit 2 includes all the parts from Kit 1, with the exception of a different wiring harness with motorsport connectors for the wheel speed sensors.

## 5.3 ABS M4 Kit Clubsport

There are a few variants of the ABS M4 Kit Clubsport available:

| Description | Part Number |
| --- | --- |
| ABS M4 Kit Clubsport (1 MBaud, DF11S) | F 02U V01 289-49 |
| ABS M4 Kit Clubsport (500 kBaud, DF11S) | F 02U V01 289-48 |
| ABS M4 Kit Clubsport (1 MBaud, for DF11i) | F 02U V00 543-13 |
| ABS M4 Kit Clubsport (500 kBaud, for DF11i) | F 02U V00 543-12 |

ABSM4 Kit includes all parts from Kit 1, but a different wiring harness, which cannot be modified. By default the wiring harness includes a 60 Ohm terminal resistance, which can be replaced customer specific by a 120 Ohm or deleted completely, see wiring diagram ABS M4 Clubsport.

| Description | Part Number |
| --- | --- |
| Wiring harness Clubsport | F 02U V01 917-01 |

**See also**

## 5.4 Connector Overview Kit 1

ABS M4 Kit 1 with part number F 02U V00 289-01 includes the following connectors, which are also available as individual spare parts:

| Connector for | Part Number |
| --- | --- |
| Attached control unit connector | Standard<br>wire departure on top: F 02U B00 238-01<br>wire departure on top 90°: F 02U B00 238-01<br><br>Alternativ<br>wire departure on bottom: F 02U B00 237-01<br>wire departure on bottom 90°: F 02U B00 237-01 |
| Brake pressure sensor Compact 3-pin connector | D 261 205 335-01 |
| 12-positon ABS map switch ASL 006-05SE-HE | F 02U 000 230-01 |
| ABS warning light (MIL) ASL 006-05SA-HE | F 02U 000 226-01 |

| Connector for | Part Number |
|---|---|
| Wheel speed sensor<br>Tyco 2-pin connector | F 02U B00 241-01 |
| Yaw/acceleration sensor<br>Tyco 4-pin connector | F 02U B00 435-01 |
| Diagnosis connector K-line | F 02U 000 258-01 |
| Wheel speed signal splitter ABS-sided<br>AS 612-35 SN | F 02U 000 443-01 |
| Jumper connector for wiring harness<br>without wheel speed module<br>AS 112-35 PN | F 02U 000 304-01<br>or<br>F 02U B00 354-01 |
| Data-logger intersection<br>ASL 006-05SD HE | F 02U 000 229-01 |

Mating connector overview ABS M4-Paket 1

| Connector for | Part Number |
|---|---|
| Brake pressure sensor | D 261 205 335-01 |
| 12-position ABS map switch | F 02U 000 230-01 |
| ABS warning light (MIL) | F 02U 000 226-01 |
| Wheel speed sensor | F 02U B00 241-01 |
| Yaw/acceleration sensor | F 02U B00 435-01 |

## 5.5 Connector Overview Kit 2

ABS M4 Kit 2 with part number F 02U V00 290-01 includes a harness with all the connectors from Kit 1, with the exception of different connectors for the wheel speed sensors:

| Connector for | Part Number |
|---|---|
| Wiring harness sided<br>ASL 006-05PN-HE | F 02U 000 342-01 |
| Sensor sided<br>ASL 606-05SN-HE | F 02U 000 416-01 |

## 5.6 Connector Overview Kit Clubsport

ABS M4-Kit Clubsport with part numbers F 02U V01 289-49, F 02U V01 289-48, F 02U V00 543-13 or F 02U V00 543-12 includes all connectors of Kit 1, but differently the encoding connector:

| Anschlussstecker für | Teilenummer |
|---|---|
| Encoding connector CAN wiring harness-sided<br>Super Seal 2-pole | F 02U B00 246-01 |

| Anschlussstecker für | Teilenummer |
|---|---|
| Encoding connector CAN with a 60 Ohm resistor<br>Super Seal 2-pole | F 02U B00 247-01 |

# 6 Optional Accessories

The following chapter introduces the optional accessories for the ABS Kit, which are not included in the kit.

## 6.1 MSA Box II

ABS M4 communicates with your laptop via the MSA Box II. It has a USB connection to the laptop and a motorsport connector to interface with the ABS M4 wire harness. Communication via K-line.

| Description | Part Number |
|---|---|
| MSA Box II | F 02U V00 327-03 |

## 6.2 Wheel Speed Signal Splitter

The from Bosch Motorsport relies on specifically-designed wheel speed signals, delivered exclusively from active speed sensors, e.g. from the Bosch DF11 family. These sensors are used in current ABS and ESP® systems. The four speed sensors included in the Kit meet this classification. The signal of a regular speed sensor, as found in older series production ABS applications, is not compatible with ; they could not be used as signal providers. It is an "open collector" signal which grounds the voltage at the ECU input with every flank. Bosch Motorsport has developed a wheel speed signal splitter that converts the sensor signals in such a way that they can be processed by peripheral ECUs and data recording systems. This signal splitter is available e.g. for measuring vehicle speed or traction control. The signals of the different wheel speed signal splitters:

|  | Input signal | Output signal |
|---|---|---|
| F 02U V00 203-03<br>F 02U V00 335-03 | 14 mA<br>7 mA | Ux V<br>0 V |
| F 02U V01 928-01 | 14 mA<br>7 mA | 14 mA<br>7 mA |

| Description | Part Number |
|---|---|
| Wheel speed signal splitter quad with 1 motorsport connector | F 02U V00 335-03 |
| Wheel speed signal splitter quad with 2 motorsport connectors | F 02U V00 203-03 |
| Wheel speed signal splitter Porsche 991 with 1 motorsport connector | F 02U V01 928-01 |

| Notice | **The wheel speed signal splitter with 1 connector cannot be used with the standard wiring loom design without changes in the layout.** |
|---|---|

## 6.3  Data Logger C 70

All data can be stored on a CAN-compatible data logger. We recommend to use our C 70 data logger for storing data.

Bosch Motorsport provides a standardized CAN log in DBC format for analyzing recorded CAN data, see chapter ABS_M4.dbc.

| Description | Part Number |
| --- | --- |
| Data Logger C 70 | F 02U V02 302-01 |

## 6.4  Display DDU 9

The display DDU 9 has an internal data store with a capacity of 3 GB and can substitute an external data logger. Therefore you need no additional data logger if you use DDU 9.

| Description | Part Number |
| --- | --- |
| Display DDU 9 | F 02U V02 300-022 |

# 7 Assembling the Parts

The following chapter introduces the parts of the ABS Kit.

## 7.1 Hydraulic Power Unit with attached Control Unit
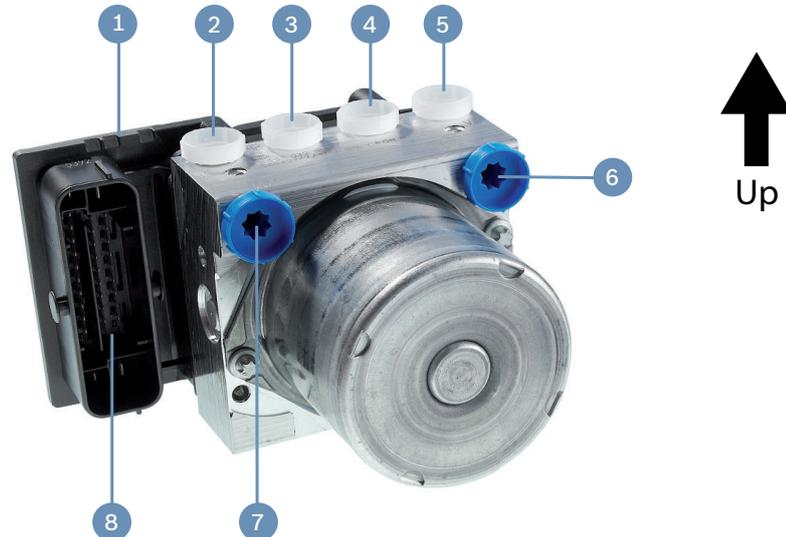


| | | | |
|---|---|---|---|
| 1 | Hydr. Power Unit with attached Control Unit | 5 | VL = Brake cylinder front left |
| 2 | HL = Brake cylinder rear left | 6 | HZ1 = Brake master cylinder front |
| 3 | HR = Brake cylinder rear right | 7 | HZ2 = rake master cylinder rear |
| 4 | VR = Brake cylinder front right | 8 | Connector |

The hydraulic power unit with attached control unit has six hydraulic connections — two for the two master cylinders (one each for the front and rear axles) and four for the brake lines.

| ⚠ Caution | **The hydraulic power unit is prefilled with brake fluid. During assembly, make sure as little brake fluid as possible is lost.** |
|---|---|

When installing the hydraulic power unit, make sure the brake line connections are facing upwards to ensure air can be bled out to the brakes. Secure the hydraulic power unit to the assembly plate supplied with the Kit using the three M6x1 screw threads on the underside of the casing. To reduce vibration, rubber pads should be fitted between the assembly plate and the vehicle chassis. To allow easy connection of the main ABS ECU connector, maintain a 10 mm distance between the vehicle chassis and the bottom of the assembly plate.

| | |
|---|---|
| **Notice** | **Correct position for installation – brake line connections should face upwards.**<br>**Install with rubber pads/blocks to reduce vibration.**<br>**Leave 10 mm or larger gap in between the vehicle chassis and bottom of assembly plate.**<br>**Hydraulic power unit is already filled with brake fluid.**<br>**For more on assembly: See** Offer Drawing: Hydraulic Power Unit with attached Control Unit [▷ 45]. |

| | |
|---|---|
| **Notice** | **Conform to FIA rules**<br>**With only 8 valves the ECU fulfills the FIA requirements for GT 3.** |

## 7.2 Brake Pressure Sensor



The brake pressure sensor is installed into the front axle brake circuit between the master cylinder and the hydraulic power unit. The sensor is metric thread, M10x1. Before assembly, fill the sensor with brake fluid, e.g. with a small medical syringe. So the brake system can be fully bled, the measuring hole of the brake pressure sensor should point upwards.

| | |
|---|---|
| **Notice** | **Only use the supplied brake pressure sensor, otherwise will be destroyed.**<br>**Install into the front axle brake circuit between the master cylinder and the hydraulic power unit as far away from the power unit as possible to avoid vibration-caused damages.**<br>**Fill sensor with brake fluid before installing.**<br>**For more on assembly: See** Offer Drawing: Brake Pressure Sensor [▷ 46]. |

## 7.3 Wheel Speed Sensors



Bosch Motorsport ABS M4 needs special edited wheel speed signals, which are supplied only from active speed sensors like e.g. from Bosch DF11-family. These double hall sensors operate on the differential principle. The ABS M4 needs all

four speed sensors to function; otherwise the system assumes there is an error and shuts down. You should therefore only use the speed sensors as supplied in the ABS M4-Kit (see section --- MISSING LINK ---).We can offer different DF11 versions on request for specific vehicle designs. Existing mounted wheel speed sensors can be tested and approved by us.

Pay attention to the polarity when you are connecting wheel speed sensors.

The sensor must be installed in the right direction, i.e. the encoder wheel and sensor must lie in the defined installation position (fixation screw in rotation position of the encoder wheel). The sensor will not work if it is installed in a position other than the recommended installation position. Make sure the sensor is mounted and secured as tight as possible to prevent sensor errors or failures from vibration. You can find the sensor's dimensions and how to install the sensor on --- MISSING LINK ---.

| **Notice** | **User only differential sensors, like Bosch DF11 or similar. Securely mount sensors and pay attention to correct mounting position (sensors direction sensitive). Sensor holder as stiff as possible.** |
| | **Sensor measures and implementation of sensor holder you can also find in the --- MISSING LINK ---.** |

**See also**

- 🗎 Wheel Speed Signal Splitter [▶ 17]
- 🗎 Offer Drawing: Wheel Speed Sensor [▶ 48]

## 7.4 Encoder Wheel

Encoder wheels usually have 48 teeth. The tooth/gap ratio should be approx. 50 % and the teeth should be approx. 3 mm in height. The encoder wheel must be made of a ferromagnetic material. If required, Bosch Motorsport can provide technical documentation on positioning the encoder wheel. See the back cover of this booklet for our contact information.

## 7.5 Distance between the Sensor and the Encoder Wheel

You can adjust the distance between the sensor and the encoder wheel to fit the encoder wheel's dimensions and other installation conditions, but gap is normally between 0.8 ± 0.1 mm.

| **Notice** | **User a ferromagnetic incremental wheel.** |
| | **Leave a 0.8 ± 0.1 mm gap between sensor and encoder wheel. For more on assembly: See the outline drawing on** Offer Drawing: Wheel Speed Sensor. [▶ 48] |

## 7.6 Gyro/Acceleration Sensor



The gyro/acceleration sensor is specific to the system and should be mounted as close as possible to the center of gravity of vehicle. The sensor should be assembled with the supplied damping plate. Position the sensor so that the connector is pointing towards the rear of the vehicle.

| **Notice** | **Only use the provided kit sensor.** |
|---|---|
| | **Use the damping plate.** |
| | **Make sure the sensor is facing the correct direction (see image above).** |
| | **For more on assembly: See the** Offer Drawing: Gyro/Acceleration Sensor [▶ 49]. |

## 7.7 ABS Map Switch



Max. tightening torque: 1-2 Nm!
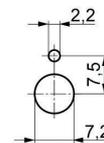
Front-panel cut out with locating lug

While driving, the driver can use the ABS map switch to select different control settings and find the optimum setting for his/her driving style. For this reason, make sure the switch is mounted within reach of the driver. Many have found it helpful to fit a diagram showing the current switch position, see also diagram on --- MISSING LINK ---. The switch position is also broadcast on the CAN Bus so it can be displayed with a dash (e. g. the DDU 7 from Bosch Motorsport).

| **Notice** | **Only use the supplied ABS Map Switch.** |
|---|---|
| | **Don´t exceed the max. tightening torque of 1-2 Nm. Higher torque will cause stiffness and damage.** |

**See also**

 Features [▶ 6]

## 7.8 ABS warning light (MIL)



Light bulb                   LED                 Front-panel cut

The included wiring harness is structured in such a way that the power supply to the ABS warning light (MIL) is branched off before the main switch for ABS M4 (terminal 30). This is the only way to ensure that the ABS warning light (MIL) is on when ABS M4 is not working.

Cable length connector to electronic board: 600 mm

| **Notice** | **Position the ABS warning light (MIL) so the driver can see it easily.** <br> **MIL is on permanent if ABS map switch is in position OFF or the diagnosis software is active.** |
|---|---|

## 7.9 Diagnosis Interface



You can connect the a laptop with the optional MSA Box II, see section --- MISSING LINK ---, via the "diagnosis interface" connector. The diagnosis interface connector should be placed so it is easily accessible. You can use programming and diagnosis software, see section --- MISSING LINK ---, to program settings specific to the vehicle and open/delete error messages.

Before using the MSA Box II for the first time you have to install a driver on your laptop, which you can find for free download on our homepage www.bosch-mo-torsport.de.

See also --- MISSING LINK ---

**See also**

- MSA Box II [▸ 17]
- Programming and Diagnosis Software [▸ 27]
- ABS M4-Laptop Communication [▸ 26]

## 7.10 Brake Light Switch

The brake light switch informs the when the driver wishes to brake and therefore functions as a means of plausibility certification for the ABS system. If the brake light switch signal is not available or incorrect, there may be a delay in ABS control.

▪ If a brake light switch is already fitted in your vehicle:

During braking, the brake light switch emits 12 Volts to pin 30 of the control unit; see the wiring diagram at the end of this manual (Wiring Diagram ABS M4 [▷ 50]). Terminal 15 on the brake light switch cable remains open.

▪ If a brake light switch has **not** yet been fitted in your vehicle:

Retrofit a brake light switch if your vehicle does not have one already. In this scenario, terminal 15 supplies the voltage for the brake light switch.

In all cases there must be 12 Volts on pin 30 of the control unit every time the brake light switch is active (driver is braking).

| Notice | **Pin 30 sends the braking signal to the ABS control unit – always make sure it is connected (12 Volt)!** |
|---|---|
| | **Terminal 15 remains open if the vehicle already has a brake light switch.** |
| | **Terminal 15 supplies the voltage to a retrofit brake light switch.** |

## 7.11 Brake Lines

Use rigid steel tubes for the brake lines. Use flexible lines only when you have no other option available. This keeps the volume consumption low and the ABS needs less controlling.

The hydraulic unit is secured in the vehicle on the provided mounting plate. During operation, the hydraulic unit will vibrate. These vibrations are then transferred to the brake lines. To prevent vibration-induced damage to the brake lines, they must not be secured at a distance of up to 20 cm from the hydraulic unit so that they can vibrate freely.

| Notice | **We recommend using rigid metal brake lines; use flexible lines only at points where they are necessary.** |
|---|---|
| | **Do not secure brake lines 0 to 20 cm from the hydraulic unit. The unit vibrates and would cause risk of damage to the lines. Please use brake lines with a minimum inside diameter of 3.2 mm.** |

## 7.12 General: Brake Calipers

Use brake calipers that are as stiff as possible. Any flexing will create higher fluid volume consumption. During ABS operation there will be a significantly higher load on the brake piston seals. For this reason, brake piston seals will require more frequent monitoring.

| Notice | **Monitor brake piston seals more often.** **Use brake calipers that are as rigid as possible.** **The higher the brake pressure is, the larger is the elasticity of the brake. A blocking pressure of max. 80 bar is optimal.** |
|---|---|

# 8 ABS M4-Laptop Communication

The MSA Box II from Bosch Motorsport is the communication interface between and the programming and diagnostic software on your laptop.

Before installing the programming and diagnostic software you need to install the MSA Box II driver.

## Installing the MSA Box II driver:

Before using the MSA Box II for the first time you need to install a specific driver on your laptop. Find the driver for free download on our website www.bosch-motorsport.de.

| Notice | **Please make sure that the MSA Box II is not connected to the laptop while you are installing the driver.** |
|---|---|

Connect the MSA Box II to the laptop after installing the driver. This will trigger the initial communication between the laptop and the MSA Box II. Follow any prompts that may follow to install the MSA Box II. Once you complete any prompts and computer recognizes the MSA Box II, the MSA Box II is ready for use.

**Steps:**

1. Unplug the MSA Box II from the laptop.

2. Install the driver.

3. Plug the MSA Box II into the laptop.

# 9 Programming and Diagnosis Software

The following chapter introduces the programming and diagnosis software.

## 9.1 Installing the Programming and Diagnosis Software

After installing the MSA Box II you need to install the programming and diagnostic software RaceABS 1.1.x. You can find the software including the installation for free download on our website: www.bosch-motorsport.de.

**Switch on the ignition**

Plug the MSA Box's USB connector into your laptop and its motorsport connector into the wire harness diagnostic interface to enable communication. A green status indicator shows when the connection is successful.

The installation will place an icon on your desktop to the RaceABS software. After the installation is complete, you can launch the application by clicking on the RaceABS icon. If you try to launch the software without the MSA Box II being connected to the laptop, the status indicator in Explorer flashes red and yellow and an error message appears in the status bar:
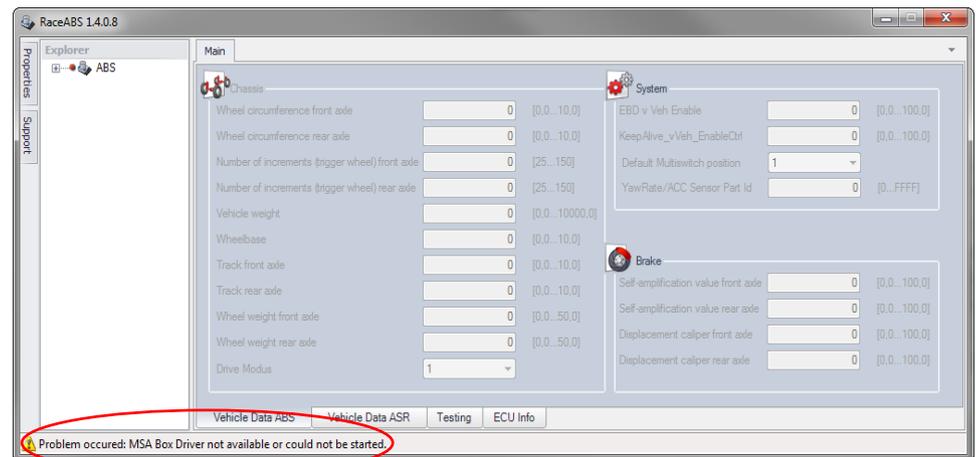


The following problem message pops up when either the ABS-ECU gets no power supply (e.g. ignition OFF) or the MSA Box II is not connected to the wiring harness. Please make sure that the connection between the diagnosis software and MSA Box II is assured:
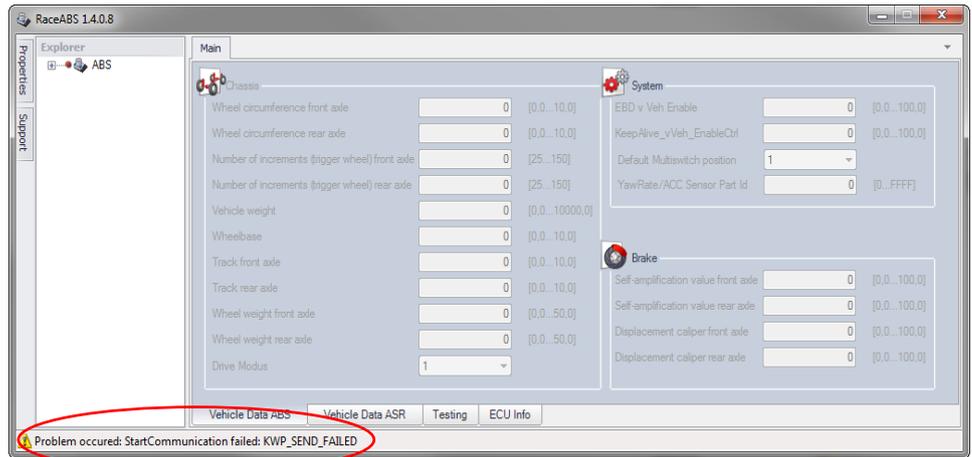
## Colors of the status indicator

In online mode, the status indicator can shine in the following colors:

| | |
|---|---|
| red | no connection |
| yellow | Connection in progress |
| | or |
| | MSA Box II cannot create a connection with the ABS (e.g. ABS switched off) |
| green | Connection successful |
| red-yellow flashing | MSA Box II is not connected to Laptop |

## Change between Online- and Offline-Mode

When no connection exists, it is easier to operate with the diagnosis software in online mode. Please click on the ABS-symbol with the right mouse button to choose between online and offline mode in the status indicator:
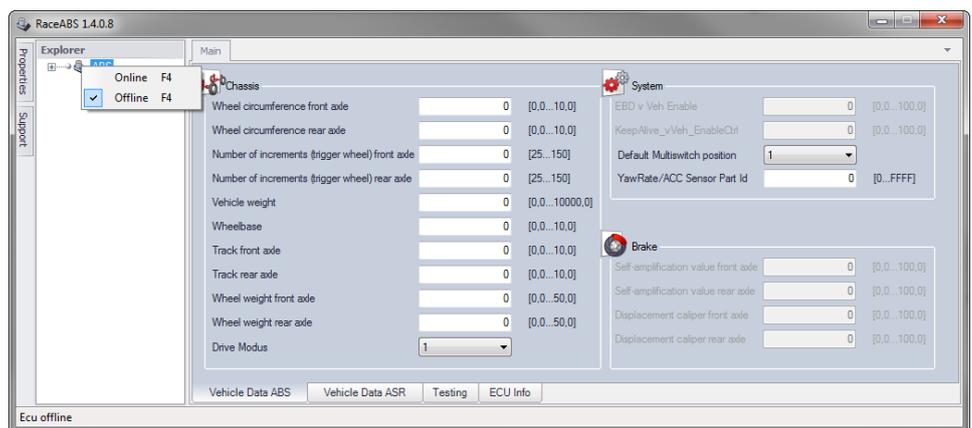


**Notice**     **You can only change the status when the ABS tree is closed.**

## 9.2 Features of the Programming and Diagnosis Software

The following chapter introduces features of the programming and diagnosis software.

### 9.2.1 Properties

The ABS-ECU sends coded data to the diagnosis software. The Fps-File decodes this information and describes the error message as plain text. If you install the software you get the right file, which shows the error message in plain text.

If you don´t see plain text or if there is a red colored warning, you do not have the suitable Fps-File to your software.
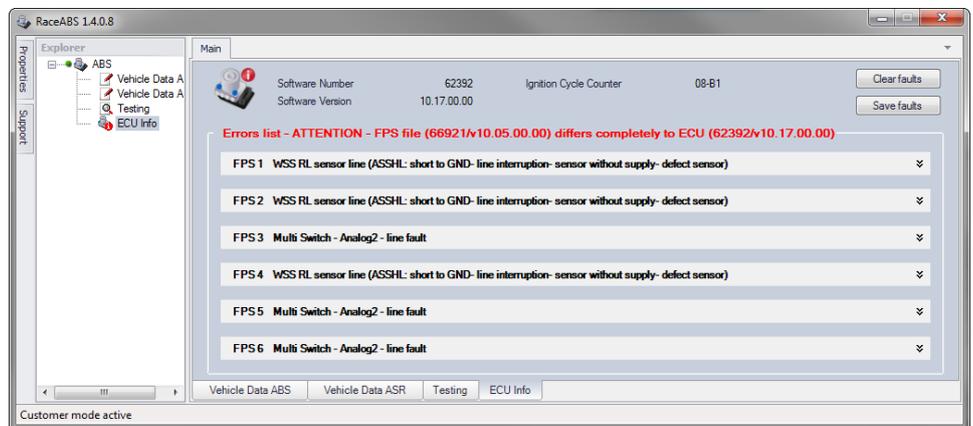


Please refer to the error message, which software and version of ABS is installed and download the appropriate Fps-File. You can download this at our Homepage, where you can find the most common versions.

If you need a changed and individual adapted version of the diagnosis software, please contact your dealer or the OEM customer service. After that we will deliver you the suitable Fps-File.

To select the file of the diagnosis software, please open the window "properties" on the left side and choose "LocationFPSFile". Click on the quadratic button beside and a new window will open. Allocate the file to the Fps-File.
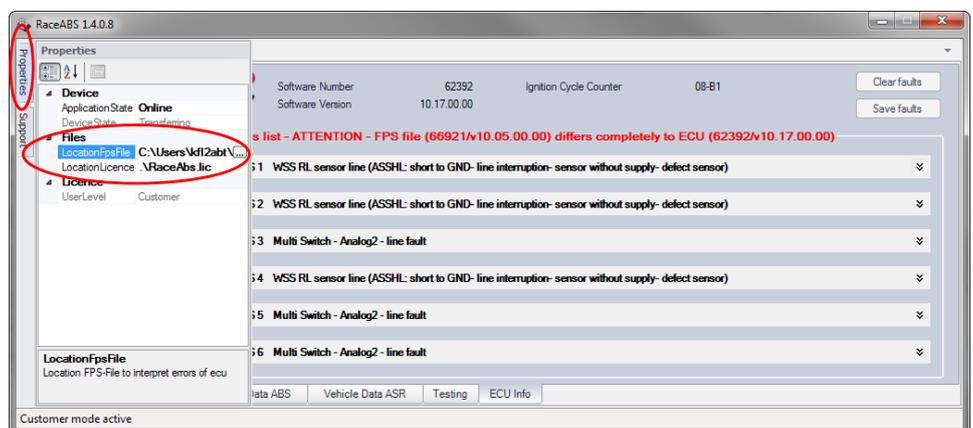
## 9.2.2  Support

The support section provides an easier handling of the management and the exchange of the ABS-data. To open the support-window, please click on the "Support" button on the left side.

You can execute the following features only in the online modus.

### Export

To save the whole settings and error messages (vehicle data ABS, vehicle data ASR, testing, ECU info) simultaneously, fill in a name and a comment in the given fields and click on the button "Save".

If there are problems, you can send the exported file to your dealer or OEM customer service.
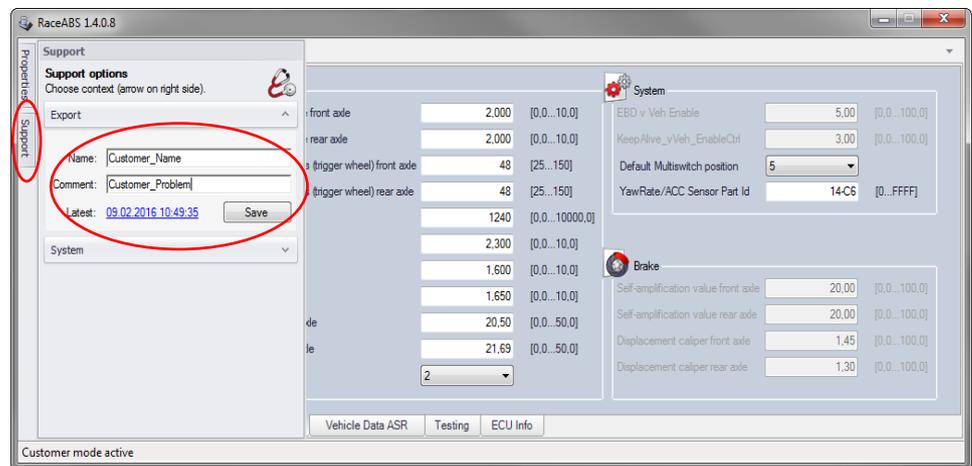


### System

Please contact your dealer or the OEM customer service if errors occur that you are not able to fix by yourself. In this case, please send a log- and export file. Click on the button "Open folder" to find the log file.
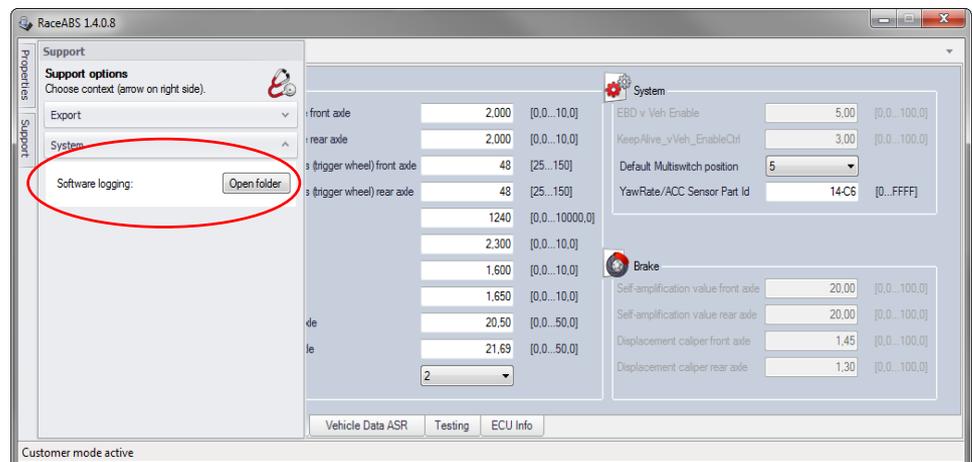
## 9.2.3 Vehicle Data

We preprogram each ABS-ECU before delivery. Basis for this preprogramming are the physical data of your vehicle. Prior to delivery, you send us your vehicle data and we will program them in the ABS.

If you need to replace the ECU or modify the programmed vehicle data, you can update the data in the software by yourself.

Within the windows "Vehicle Data ABS" and "Vehicle Data ASR" a short declaration or the measuring unit for each value can be shown. By holding the cursor over a data range, a small window with the declaration occurs.
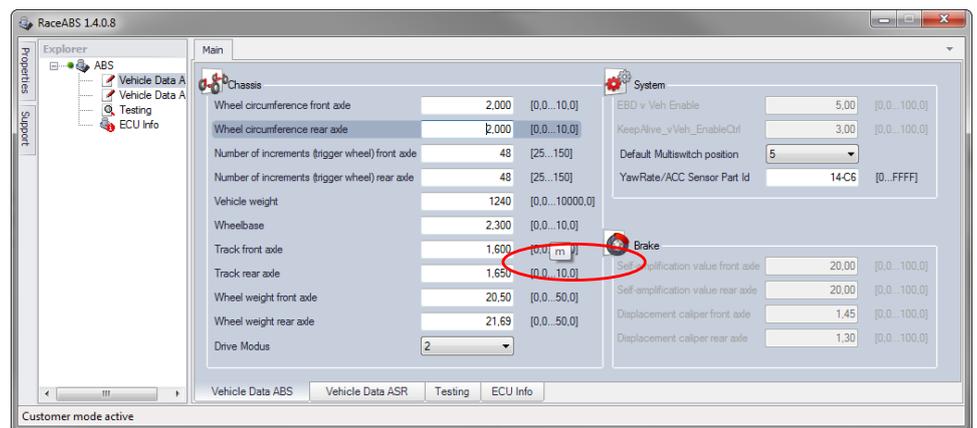


You can save and open the vehicle data of the windows "Vehicle Data ABS" and "Vehicle Data ASR" separately. Therefore, you click in the window with the right mouse. In this way a text file can be loaded into the system or the actual window can be saved.
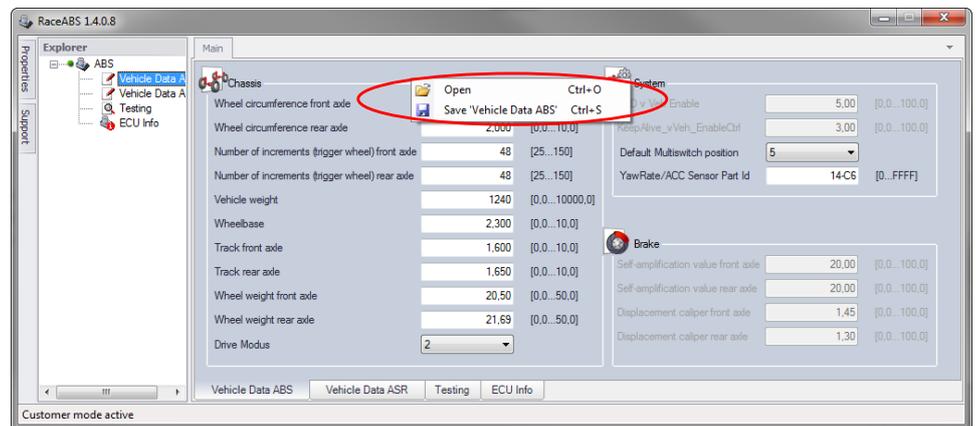


| **Notice** | **Only the active window will be saved.** |
|---|---|

Default value for the ABS map switch

For the 12-position ABS map switch, you can specify a default value. If the function switch breaks down, the switch automatically takes the position of the default value. To assign a position for the default value, select a number between one and twelve in the window "Default Multiswitch position":
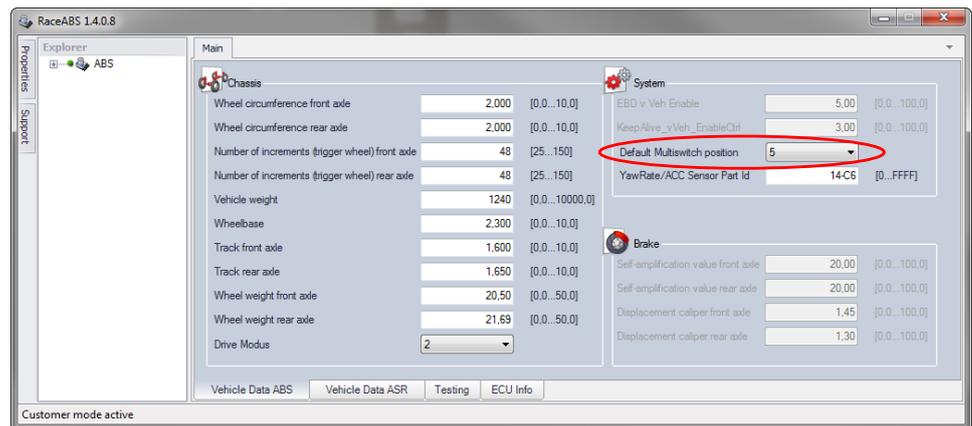
## YawRate/ACC Sensor Part Id

Each ABS-ECU communicates only with defined sensors. To connect the ABS-ECU with a different sensor, you have to fill in the number of the sensor in the field "YawRate/ACC Sensor Part Id":

From software number V00906 on you don´t have to fill in the sensor number anymore because with the latest software versions the ABS-ECU can adjust to the sensors automatically.
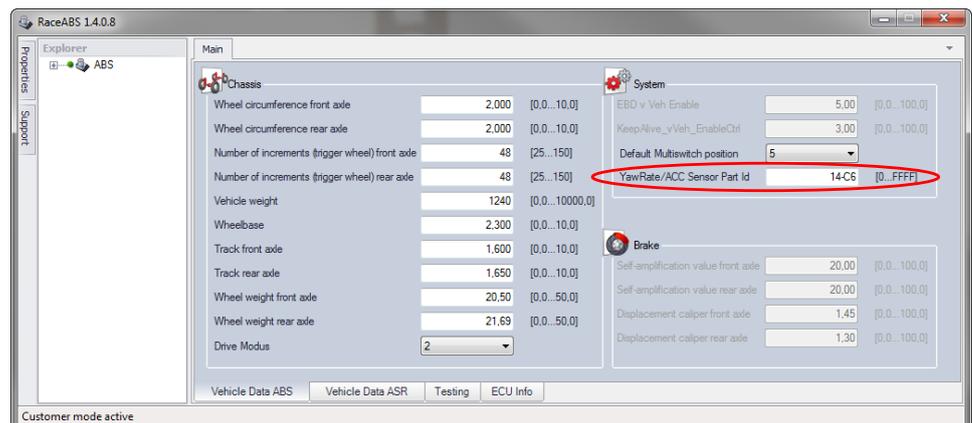


## 9.2.4 Testing

After assembling the system components you need to carry out a function test before the first test drive. This test will ensure all components (electrical and hydraulic) were assembled correctly and are functioning properly. The vehicle should be placed on four jack stands or on a hoist so that all four wheels can be moved freely. If there is no other option you can lift and test each wheel separately. You will need an assistant to help you check the hydraulic allocation of the wheels.

**Step 1: Testing the communication with the ECU**

See section ABS M4-Laptop Communication [▶ 26].

**Step 2: Testing the indication lamp SILA**

When you turn the ignition or on, the SILA light turns on briefly and then turns off again. The indication lamp SILA lightens permanently as soon as the RaceABS software is started; see also section ECU Info (Diagnostics) [▶ 36].

**Step 3: Testing the correct wheelspeed allocations**

With the vehicle jacked up, individually spin all four wheels clockwise and check for the proper front/back, left/right allocation. When you spin each wheel the corresponding position should show a value in the RaceABS software under the "Testing" tab:
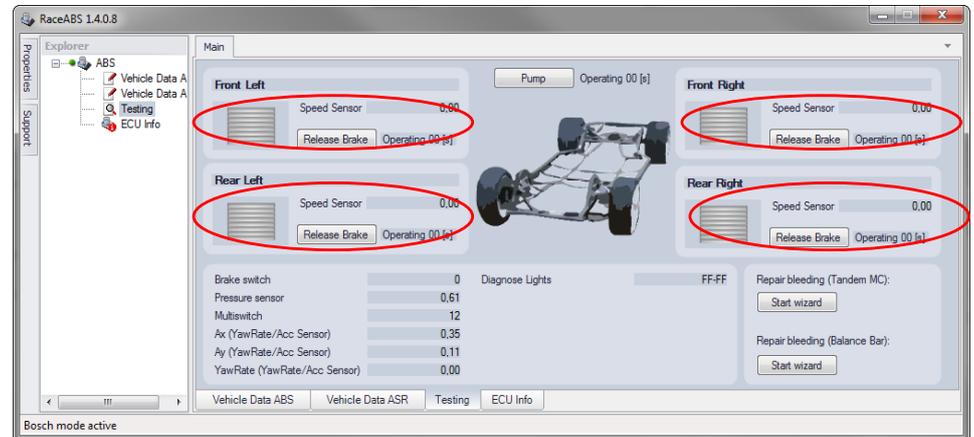


**Step 4: Testing the wheels' correct hydraulic allocation**

Have an assistant apply the brake pedal and maintain the brake pressure so all four wheels of the jacked up vehicle are locked. Therefore a brake pressure of 15 to 20 bar is sufficient. Unblock successively on wheel and brake after the other by clicking on "Release Brake". The selected wheel must then be able to spin.

| **Notice** | **For vehicles with a high blocking effect you have to provide a respectively higher torque to perform the test.** |
|---|---|

Check the hydraulic allocation for each wheel. Wait for the wheels to be fixed again before continuing with the next step:
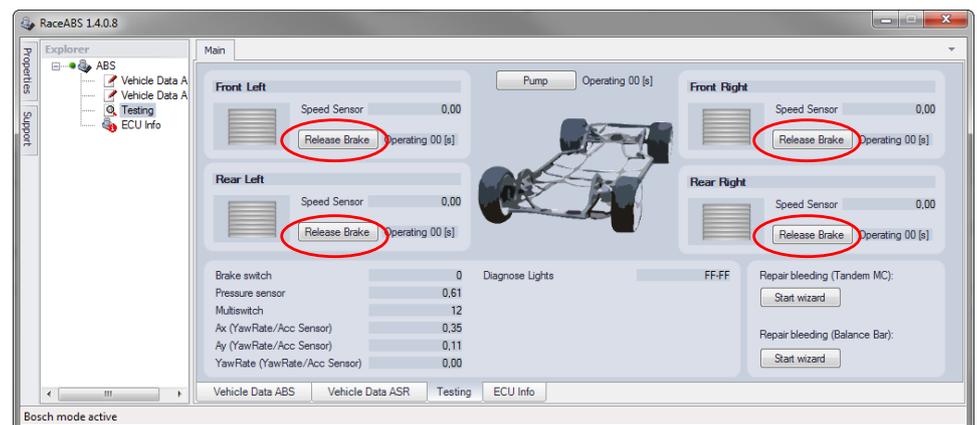


**Step 5: Testing the electrical pump motor**

If you click on the "Pump" button, the pump motor should run for 10 seconds or until the same button would be pressed again.
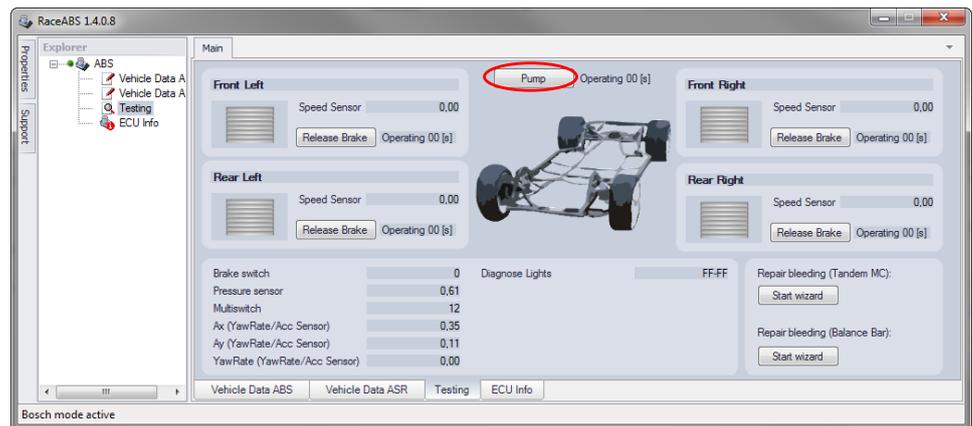
**Step 6: Testing the function of the brake pressure sensor and brake light switch**

Start the RaceABS with connection to the MSA Box II and press the brake pedal for a few seconds with slowly rising pressure. At a pressure value between 3 and 5 bar the digital display „Brake switch" bit should toggle from 0 to 1 (see graphic below). Please adjust the brake light switch in an adequate position. If the bit does not toggle, check the switch connection and ensure that it is connected properly, see section Brake Light Switch [▶ 24].

The digital display „Pressure sensor" should show a logical value, e.g. 3,87 in the screenshot below. If the software displays no value or an illogical value, open the "ECU Info" tab and check the error memory. Do you find errors relating to the brake pressure sensor? See section ECU Info (Diagnostics) [▶ 36] for more information regarding ECU diagnostic errors:
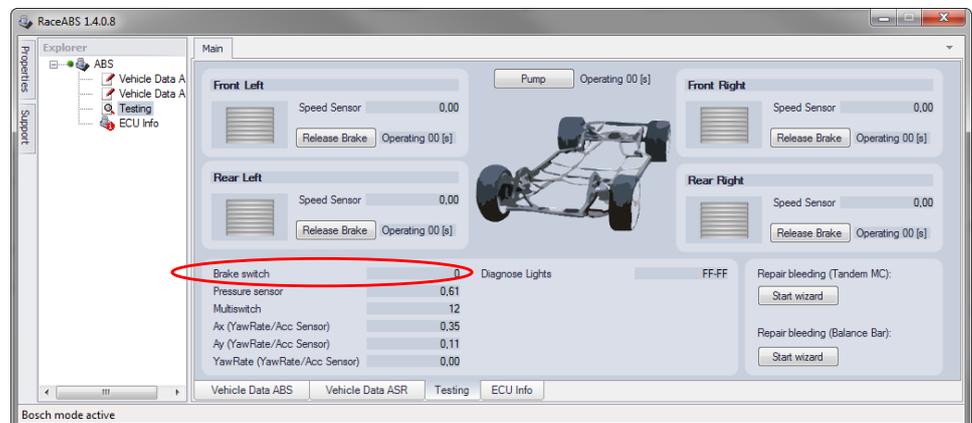


**Step 7: Testing the function of the ABS Map switch**

Turn the 12-position ABS Map switch through full rotation. Is the "Multiswitch"-Display showing a reaction for each rotary motion? With every clockwise rotation the number of measuring points should increase by 1.ABS warning light (MIL) should shine permanent in switch position 12 (OFF).

**Notice**

**MIL shines permanent in diagnosis mode.**
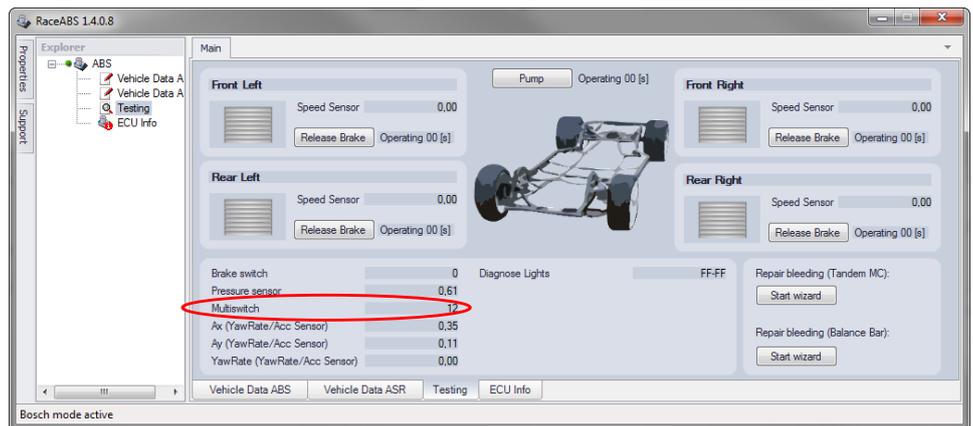
## 9.2.5 Repair Bleeding Wizzard

Under the "Testing" tab of the RaceABS software you will also find two buttons at the bottom right labeled "Repair bleeding" and "Repair bleeding (Balance Bar)" with the button "Start wizard".

While you bleed your brake system you can choose between the two programs "Repair bleeding" and "Repair bleeding (Balance Bar)":
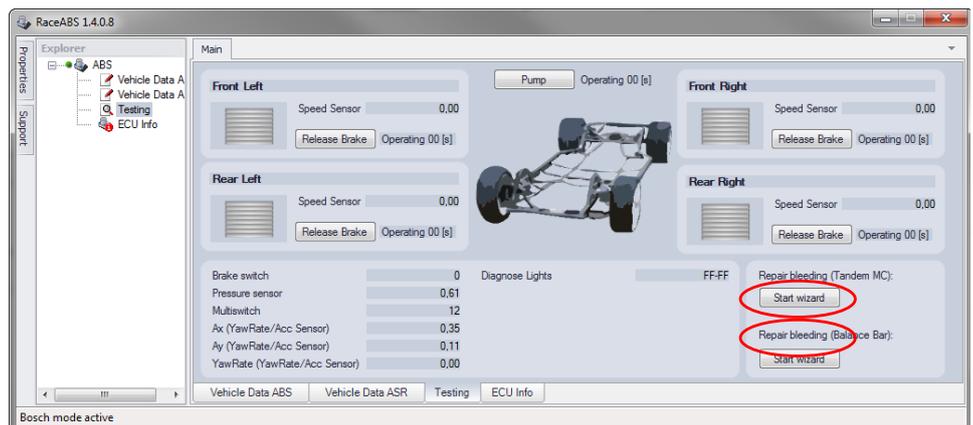


| Notice | The Bleeding Wizzard is only for bleeding the ABS hydraulic power unit. The Bleeding Wizzard is NOT to be used or substituted for bleeding the other parts of the brake system, like lines and brake cylinders. Make sure to bleed these other hydraulic parts of the brake system after bleeding the hydraulic aggregate with the Repair Bleeding Wizzard. During the ABS bleeding process the brake pedal should be actuated continuously except when opening or closing brake bleeder valves. |
|---|---|

### Repair bleeding (Tandem MC)

You choose "Repair bleeding (Tandem MC)" if your vehicle executes the same brake pressure to front and rear axle when you actuate the brake pedal.

Click on the button "Repair bleeding (Tandem MC)": a new window will open and leads you step by step through the instruction for bleeding the hydraulic aggregate. You will need an assistant to perform the ABS bleeding procedure.

### Repair bleeding (Balance Bar)

You choose "Repair bleeding (Balance Bar)" if you vehicle has a break balance bar and executes different brake pressure to front and rear axle when you actuate the brake pedal.

Click on the button "Repair bleeding (Balance Bar)": a new window will open and leads you step by step through the instruction for bleeding the hydraulic aggregate. You will need three persons to perform the instruction.

| Notice | **For vehicles with brake balance bar please open one front and one rear bleeder valve for proper function of the balance bar during the bleeding routine procedure.** |
|---|---|

## 9.2.6 ECU Info (Diagnostics)

### Indication lamp

When you turn the ignition or on, the ABS warning light (MIL) comes on briefly and then turns off again. This indicates the light's self-testing process. If the ABS warning light (MIL) does NOT light up when you turn the ignition or on, you must establish the reason for this before taking any further action or before driving the vehicle. Maybe the light bulb is not tightened firmly.

| **Notice** | **The ABS warning light (MIL) is on permanently as long as the diagnostic tool switched on.** |
|---|---|

## Error log

If the warning light (MIL) is on PERMANENTLY when you turn the ignition or on, or while driving, there is a system error. Extract the system's internal error log to analyze the error. You can access the log by clicking on "ECU Info" tab in the RaceABS software.



The following list shows the most common error log entries and their description:

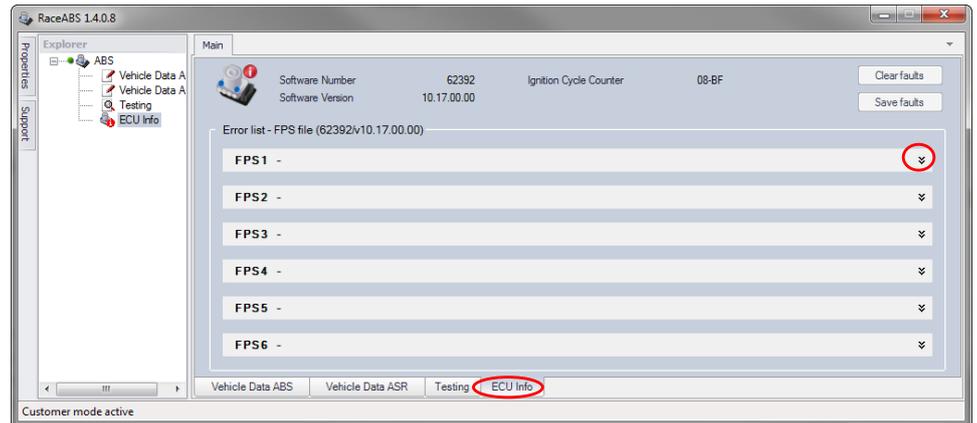| Fault Number | Fault Value | Failure Channel | Failure Description | Drive Cycle Fault |
|---|---|---|---|---|
| 0x04 | 0xB0 | Brake Light Switch (Bls) | Bls Line Interruption | |
| 0x03 | 0x16 | Ecu Voltage Supply (Uz) | Spike on Uz | |
| 0x15 | 0x31 | CAN System Failure | CANSys - BusOff Failure CAN 0 | |
| 0x26 | 0x50 | Yaw Rate Sensor Failure | SCMM3x: PSIP1_Signalfailure detected | |
| 0x26 | 0x51 | Yaw Rate Sensor Failure | SCMM3x: AY1_Signalfailure detected | |
| 0x26 | 0x52 | Yaw Rate Sensor Failure | SCMM3x: AX1_Signalfailure detected | |
| 0x30 | 0x30 | Hydraulic unit main cylinder1 | Channel 1 line error Pressure Sensor MC1 | |
| 0x30 | 0x50 | Hydraulic unit main cylinder1 | Power Supply error Main Cylinder 1 Pressure Sensor | |
| 0x42 | 0x90 | Multi Switch | Multi Switch - Analog2 - short to GND | |
| 0x02 | 0xC0 | Valve Relais (Vr) | Vr off- Relais does not turn on during FSA Test (Fuse def.?) | X |
| 0x06 | 0xB1 | Wheel Speed Sensor Front Left | WSS FL sensor line (ASSVL: short to GND- line interruption- sensor without supply- defect sensor) | X |
| 0x06 | 0xB2 | Wheel Speed Sensor Front Left | WSS FL sensor line (ASSVL: short to UBatt- defect sensor) | X |
| 0x06 | 0xC0 | Wheel Speed Sensor Front Left | WSS FL Supply line (ASPVL: short to GND or defect sensor) | X |
| 0x07 | 0xB1 | Wheel Speed Sensor Front Right | WSS FR sensor line (ASSVR: short to GND- line interruption- sensor without supply- defect sensor) | X |
| 0x07 | 0xB2 | Wheel Speed Sensor Front Right | WSS FR sensor line (ASSVR: short to UBatt- defect sensor) | X |
| 0x07 | 0xC0 | Wheel Speed Sensor Front Right | WSS FR Supply line (ASPVR: short to GND or defect sensor) | X |
| 0x08 | 0xB1 | Wheel Speed Sensor Rear Left | WSS RL sensor line (ASSHL: short to GND- line interruption- sensor without supply- defect sensor) | X |
| 0x08 | 0xB2 | Wheel Speed Sensor Rear Left | WSS RL sensor line (ASSHL: short to UBatt- defect sensor) | X |
| 0x08 | 0xC0 | Wheel Speed Sensor Rear Left | WSS RL Supply line (ASPHL: short to GND or defect sensor) | X |
| 0x09 | 0xB1 | Wheel Speed Sensor Rear Right | WSS RR sensor line (ASSHR: short to GND- line interruption- sensor without supply- defect sensor) | X |
| 0x09 | 0xB2 | Wheel Speed Sensor Rear Right | WSS RR sensor line (ASSHR: short to UBatt- defect sensor) | X |
| 0x09 | 0xC0 | Wheel Speed Sensor Rear Right | WSS RR Supply line (ASPHR: short to GND or defect sensor) | X |
| 0x15 | 0xA2 | CAN System Failure | CANSys - Message DRS_RX_ID0TimeOut | |
| 0x15 | 0xA9 | CAN System Failure | CANSys - Message BREMSE_6TimeOut | |
| 0x15 | 0xC0 | CAN System Failure | CANSys - Generic | |
| 0x26 | 0xA4 | Yaw Rate Sensor Failure | SCMM3x reports PSIP2 Sensor NotAvailable error | |
| 0x26 | 0xC5 | Yaw Rate Sensor Failure | Drs - InfoTimeout | |
| 0x26 | 0xD0 | Yaw Rate Sensor Failure | New SCMM3x sensor detected (Ser. Nbr. CAN <> Ser. Nbr. EEPROM) | |
| 0x42 | 0xA0 | Multi Switch | Multi Switch - Analog2 - line fault | |
| 0x42 | 0xB0 | Multi Switch | Multi Switch - Analog1 - short to GND | |
| 0x42 | 0xC0 | Multi Switch | Multi Switch - Analog1 - line fault | |
| 0x0A | 0x80 | WssGeneric | WssGeneric/generic WSS Fault due to Lamdba 6 Monitor (no wheel Specific Fault detection possible) | X |

| **Notice** | **Multi switch = ABS Map switch** |
|---|---|

| **Notice** | **System reset after drive cycle defaults.** |
|---|---|
| | **Drive cycle defaults, e.g. because of wheel speed sensor bug, need an ABS-ECU reset (Power off – Power on). After the reset, the car has to accelerate to more than 12 km/h for system check.** |

### Save error log entries

If any error log entries occur that are not listed above, please contact your dealer or the OEM customer service. Communication would be easier if you send also a copy of your error log entries. There are two possibilities to get the copy of the error log entry:

Click on the right button named "Save faults"

Click with your right mouse button into the FPS window and save the entries with click on „Save ECU-Info".

### Delete error log entries

After carrying out the problem-solving actions, delete the entry from the error log by clicking on the "Clear faults" button, as seen below:
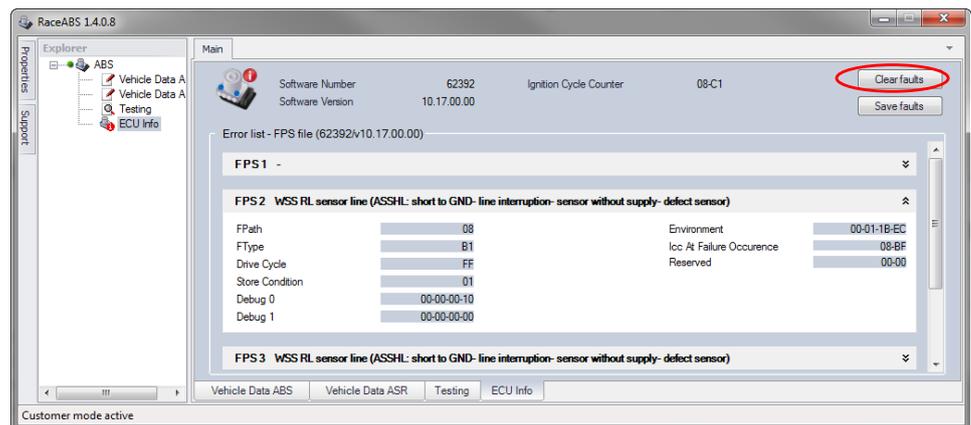


Then turn off and on again. After you deactivated the software, the indication lamp will no longer lit.

| **Notice** | **If not all the faults are described in clear text or if there is no error description, please check if you use the correct FPS-file or contact Bosch Motorsport for update.** |
|---|---|

### Ignition Cycle Counter

The ignition cycle counter shows how often you switched on the ignition. If you compare the values of the ignition cycle counter and ICC at Failure Occurrence you can trace back at what time the faults occurred. If both fields show the same values, it is an actual fault.

### RTA Function

The RTA is a tire-tolerance-adjustment.

Due to tire quality and tire pressure, the wheels have not the same rotation speed. To compensate these differences the ABS systems takes one wheel as reference and multiplies the wheel speed of each wheel with a factor so that all wheels have the same speed. By this, the ABS system can determine if the vehicle is in a curve or on straight road.

## RTA Reset

To reset the factors the ABS system assigned to the wheels (all factor 1), please right-click on the button "ECU Info" and then on the button "RTA Reset". This reset is necessary e.g. if the vehicle has driven in a circle for a long time. Then the system has adapted to the cornering and considers that you are driving on a straight road.
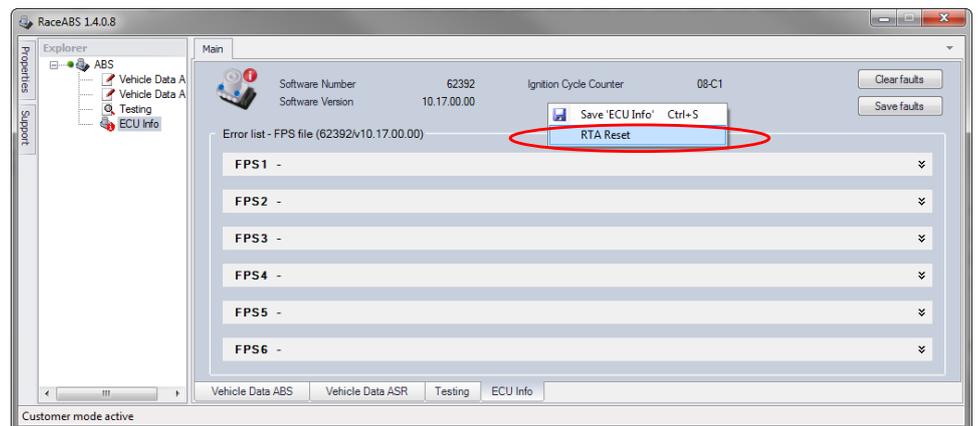


| **Notice** | **Only execute a RTA reset if the system has adjusted (e.g. after circular driving).** |
|---|---|

| **Notice** | **Please be aware that after the RTA reset the system has to relearn.** |
|---|---|
| | Drive after a RTA reset constantly with up to 100 km/h until the system has recalibrated. Drive without acceleration and without depressing the brake pedal. |

**See also**

📄 Properties [▶ 29]

# 10 Appendix

The following chapter introduces the Startup Checklist, the CAN Protocol and the ABS_M4.dbc.

## 10.1 Startup Checklist

This short checklist is intended to supplement the ABS M4 Kit's manual, not replace it. Prior to using this checklist the user/installer should read the ABS manual, especially section Assembling the Parts [▷ 19] to ABS M4-Laptop Communication [▷ 26].

### Basics

- Hydraulic unit with attached control unit mounted correctly (mounting plate used, brake lines facing upwards), see section Hydraulic Power Unit with attached Control Unit [▷ 19].

- Brake pressure sensor and Yaw/Acceleration sensor installed in proper locations? See section Brake Pressure Sensor [▷ 20] and Gyro/Acceleration Sensor [▷ 22].

- Everything plugged in to harness, power ring terminals connected to battery, ground ring terminals connected to solid and clean chassis ground, circuit breakers installed properly, ABS toggle switch turns off system. See section Brake Pressure Sensor [▷ 20] and Gyro/Acceleration Sensor [▷ 22].

### Software Tool and Error Checking

- Connect to the ABS M4 control unit with MSA Box II using RaceABS Software and ensure that all vehicle data has been entered correctly. The vehicle data can be saved and or loaded by right clicking in the screen.

| **Notice** | **Once the diagnosis software RaceABS is connected to the harness, the ABS warning light (MIL) will light up and remain lit until it is disconnected. See section** Testing **[▷ 32], Step 2. If the MSA Box II is not connected to the laptop the indication lamp lightens red-yellow.** |
|---|---|

- With the system on, switch to the "ECU Info" page and clear errors with clicking on Clear FPS. Wait a moment (system will self-refresh error stack). Reset the system by switching off/on. Check if any errors reappear in the error stack. If errors reappear, diagnose errors before proceeding. If anything was unplugged during the diagnostic process, errors will be present and need to be removed from the error stack. Next, cycle ABS on/off switch and verify no errors are present after cycling power, see section ECU Info (Diagnostics) [▷ 36].

### Error Notes

- CAN errors can occur if there are too many errors in the stack.

- If the wheel speed signal splitter is disconnected all four wheel speed sensors will have error entries.

Function Check

- While connected with the RaceABS software switch to the "Testing" page. Check all sensors for plausibility and proper function. Press brake pedal: brake switch bit should toggle (0->1) between 3 to 5 bar brake pressure, the display "Pressure sensor" should show a logical value. Rotate ABS map switch, the value "Multiswitch" should turn up clockwise. Manually move yaw/accelerometer sensor to the right and left as well as to the front and rear. The "Ax" and "Ay"-values should increase positive or negative analogue to the Tilt. See section Testing [▷ 32].

- Put the car on jack stands so all wheels can be freely rotated. While connected with the RaceABS software and viewing the "Testing" page, rotate each wheel and verify the correct wheel speed responds in the "Testing" page, see section Testing [▷ 32].

- Click "Pump On" button on the "Testing"-page. The pump now runs for 10 seconds or until you press the button again. After the pump shuts off, an assistant hold the brake pedal down (Please check: all wheels have to be locked!) Next, while the assistant still holds brake pedal down, click the "Release Brake" button for a given wheel (one at a time). Verify that brake releases at that wheel by rotating the wheel before clicking the next button. Repeat for each wheel.

| **Notice** | **During this release test, the pump may switch on repetitively.**<br>**See chapter:** Testing [▷ 32] |
|---|---|

- On the "Testing" page now decide between the "Repair Bleeding (Tandem MC)" and "Repair Bleeding (Balanced Bar)". Click on the button "Start wizard" at the bottom right. Follow the instructions listed in the sub window in order to bleed the ABS hydraulic unit.

| **Notice** | **This will bleed the ABS hydraulic unit only, not the brake lines or the wheel brake cylinders.**<br>**See chapter:** Repair Bleeding Wizzard [▷ 35] |
|---|---|

- Bleed brakes in normal fashion, starting with the furthest brake from the master cylinder and finishing with the nearest. Check errors one last time, diagnosis any errors present, then disconnect MSA Box II from ABS harness. Once MSA Box II is disconnected verify that MIL lamp turns off and stays off.

- Check for proper brake operation at low speeds first. Start with ABS map switch in a neutral position (position 5 to 7).

| **Notice** | **Refer to manual for more information regarding the ABS map switch position function. See chapter:** ABS in Motorsport [▷ 5] **and** Features [▷ 6]**.** |
|---|---|

- ABS warning light (MIL) on for a short time when you switch on the ignition, on permanent when map switch in position 12 (OFF).

## 10.2  CAN Protocol

| Name | Message | Startbit | Length (Bit) | Byte Order | Value Type | Initial Value |
|---|---|---|---|---|---|---|
| PSIP1 (Yaw) | 0x70 | 0 | 16 | Intel | Unsigned | -163,84 |
| AY1 | 0x70 | 32 | 16 | Intel | Unsigned | -4,1768 |
| PSIPP (YawAcc) | 0x80 | 0 | 16 | Intel | Unsigned | -4096 |
| AX1 | 0x80 | 32 | 16 | Intel | Unsigned | -4,1768 |
| WS_FL | 0x24A | 0 | 16 | Intel | Unsigned | 0 |
| WS_FR | 0x24A | 16 | 16 | Intel | Unsigned | 0 |
| WS_RL | 0x24A | 32 | 16 | Intel | Unsigned | 0 |
| WS_RR | 0x24A | 48 | 16 | Intel | Unsigned | 0 |
| SwitchState | 0x5C0 | 0 | | Intel | Unsigned | 0 |
| P_Hz | 0x5C0 | 8 | 16 | Intel | Signed | 0 |
| BLS | 0x5C0 | 24 | 1 | Intel | Unsigned | 0 |
| EBD Lamp | 0x5C0 | 30 | 1 | Intel | Unsigned | 0 |
| ABS Active | 0x5C0 | 29 | 1 | Intel | Unsigned | 0 |
| ABS Lamp | 0x5C0 | 31 | 1 | Intel | Unsigned | 0 |
| AX1_Bremse60 | 0x5C0 | 32 | 16 | Intel | Unsigned | -4,1768 |
| AY1_Bremse60 | 0x5C0 | 48 | 16 | Intel | Unsigned | -4,1768 |

Continuation:

| Name | Factor | Offset | Min | Max | Unit | Rate (ms) | Comment |
|---|---|---|---|---|---|---|---|
| PSIP1 (Yaw) | 0,005 | -163,84 | -163,84 | -163,83 | °/s | 10 | Yaw Rate |
| AY1 | 0,00012742 | -4,1768 | -4,1768 | -4,1765 | g | 10 | Lateral Acceleration (Ay) |
| PSIPP (YawAcc) | 0,125 | -4096 | -4096 | -4095 | °/s | 10 | Yaw Acceleration |
| AX1 | 0,00012742 | -4,1768 | -4,1768 | -4,1765 | g | 10 | Longitudinal Acceleration (Ax) |
| WS_FL | 0,015625 | 0 | 0 | 100 | m/s | 10 | Wheel Speed Front Left |
| WS_FR | 0,015625 | 0 | 0 | 100 | m/s | 10 | Wheel Speed Front Right |
| WS_RL | 0,015625 | 0 | 0 | 100 | m/s | 10 | Wheel Speed Rear Left |
| WS_RR | 0,015625 | 0 | 0 | 100 | m/s | 10 | Wheel Speed Rear Right |
| SwitchState | 1 | 0 | 0 | 12 | | 10 | ABS Map Switch Position |
| P_Hz | 0,0153 | 0 | -42,5 | 425 | bar | 10 | Brake Pressure |
| BLS | 1 | 0 | 0 | 1 | | | Brake Light Switch |
| EBD Lamp | 1 | 0 | 0 | 1 | | | EBD Fault Lamp |
| ABS Active | 1 | 0 | 0 | 1 | | | ABS Active Bit |
| ABS Lamp | 1 | 0 | 0 | 1 | | | ABS Fault Lamp |
| AX1_Bremse60 | 0,00012742 | -4,1768 | -4,1768 | -4,1765 | g | 10 | Longitudinal Acceleration (Ax) |
| AY1_Bremse | 0,00012742 | -4,1768 | -4,1768 | -4,1765 | g | 10 | Lateral Acceleration (Ay) |

To avoid redundant messages while connecting the ABS-CAN to the vehicle-CAN, please keep in mind that the ABS system sends further messages as follows:

| | | | |
|---|---|---|---|
| 0x140 | 0x340 | 0x542 | 0x75 |
| 0x141 | 0x341 | 0x560 | 0x80 |
| 0x142 | 0x342 | 0x576 | |
| 0x143 | 0x343 | 0x5C0 | |
| 0x24A | 0x541 | 0x70 | |

# 11 Offer Drawing: Hydraulic Power Unit with attached Control Unit

0 265 A40 497

*) Halterschnittstelle
siehe Einbauhinweis
/ BRACKET INSTALLATION
ACC. TO  Y 265 K30 162

Zulaessige Einbaulage
PERMISSIBLE MOUNTING POSITION

Steckverbindung
38-pol. nach
Angebotszeichnung
1 928 A00 289
CONNECTOR
38 PIN ACCORDING TO
OFFER DRAWING
1 928 A00 289

Moeglicher ECU-Ueberstand
POSSIBLE PROTRUSION OF ECU

Kundenkennzeichnung
CUSTOMER CODE

Herstellercode
MANUFACTURERS CODE

Bestell-Nr.RB
ORDER NO.RB

Werkskennzahl
PLANT CODE

Fertigungsdatum
und Exemplarnummer
PRODUCTION DATE
AND SERIAL NUMBER

DO NOT REPAIR!
- AS-DELIVERED STATE:
  NOT FILLED / OEM : NOT FOR SERVICE WORK.
  FILLED/SPARE PART: UNIT COMPLETELY FILLED. SERVICE PART.
- PORTS MUST BE CLOSED UNTIL ASSEMBLY.
- CONNECTING PORT THREADS:
  USE FITTING FOR PORT THREADS ACCORDING TO ISO 4038.
  RECOMMENDED TORQUE:   M_A = 16 ± 2 Nm
  RELEASE OF BRAKE TUBES AND ASSEMBLY PROCESS WITH TORQUE BY CUSTOMER.

Generelles Reparaturverbot!
- Lieferzustand:
  Nicht befuellt: Verwendung als Ersatzteil nicht zulaessig.
  Befuellt      : Aggregat vollstaendig mit Bremsfluessigkeit gefuellt.
                  Verwendung als Ersatzteil.
- Abdeckung fuer Bremszylinderanschluesse erst bei Montage der Brems-
  leitungen entfernen.
- Anschlussgewinde:
  Bremsleitungen fuer Gewindeanschluesse nach ISO 4038 verwenden.
  Empfohlenes Anzugsmoment:  M_A = 16 ± 2 Nm
  Freigabe von Bremsleitungen und Montageprozess mit Anzugsmoment erfolgt durch Kunde.

Montageraum fuer Stecker
SPACE RESERVED FOR CONNECTOR ASSEMBLY

(29) nach Montage /
AFTER ASSEMBLING

(81) vor Montage /
BEFORE ASSEMBLING

A-A 2:1  M6x1
B-B 2:1  M12x1(2x)
Z-Z 2:1  M10x1(4x)

| | | | M12x1 | MC1 | MASTER CYLINDER CIRCUIT 1 |
| HZ1 | Hauptzylinder Kreis 1 | | | | (PRESSURE ROD PISTON BRAKE CIRCUIT) |
| | (Druckstangenkolben-Bremskreis) | | | | |
| VL | Radzylinder vorne links | M10x1 | | FL | WHEEL CYLINDER FRONT LEFT |
| VR | Radzylinder vorne rechts | M10x1 | | FR | WHEEL CYLINDER FRONT RIGHT |
| HZ2 | Hauptzylinder Kreis 2 | M12x1 | | MC2 | MASTER CYLINDER CIRCUIT 2 |
| | (Zwischenkolben-Bremskreis) | | | | (INTERMEDIATE PISTON BRAKE CIRCUIT) |
| HL | Radzylinder hinten links | M10x1 | | RL | WHEEL CYLINDER REAR LEFT |
| HR | Radzylinder hinten rechts | M10x1 | | RR | WHEEL CYLINDER REAR RIGHT |

Dokumentenart/ DOCUMENT TYPE  AGZ
Nicht tol. Masse
NON TOLERANCED DIMENSIONS  ± 2 mm, ±.
ISO E
Massstab/ SCALE  [±]  [2:1]
Gewicht/ WEIGHT  col.7kg
Angebots-zeichnung  OFFER DRAWING

Hydroaggregat ABS8
HYDRAULIC MODULATOR

BOSCH

0 265 A40 497

| 0 265 232 180 | befuellt/FILLED (SPARE PART) | ··· | ·· | ONLY FOR RACE | diverse |
| Bestell-Nummer  ORDER NUMBER | Lieferzustand  AS-DELIVERED STATE | Kunden-Nummer  CUSTOMER PART NUMBER | Projekt TKU  PROJECT TCD | Kundenkennzeichnung  CUSTOMER CODE | Fahrzeug Typ  VEHICLE TYPE |

## 12 Offer Drawing: Brake Pressure Sensor



0 261 A04 407

Kabelbaumstecker: RB-Kompaktstecker 1.1a nach RB-Zeichnung
A 928 000 453, 3-polig, Kodierung I, BDK-Kontakte vergoldet,
0.5-1.0mm²

Am Sensor: RB-Kompaktstecker 1.1 nach RB-Zeichnung
D 928 002 69A in hochschuettelfester Ausfuehrung
3-polig, Kodierung I, Kontakte vergoldet
Werktoff: PBT GF30

WIRE HARNESS CONNECTOR : RB KOMPAKT CONECOR 1.1A
ACC. TO RB DRAWING A 928 000 453, 3 PINS, CODING I.
BDK TRMINALS GOLD-PLATED, 0.5-1.0 mm²

AT SENSOR: RB KOMPAKT CONNECTOR 1.1 IN HIGH VIBRATION
RESISTANT DESIGN ACC. TO RB DRAWING D 928 002 69A
3 PINS, CODING I, TERMINALS GOLD-PLATED
MATERIAL: PBT GF30

Pin 3: Versorgung (+)
Pin 3: SUPPLY VOLTAGE (+)
Pin 2: Ausgang
Pin 2: OUTPUT
Pin 1: Masse (-)
Pin 1: GROUND (-)

Werkstoff: 1.4104 (DIN Norm)
MATERIAL: 1.4104 (DIN Norm)

Herkunftsbezeichnung
MARKING OF ORIGIN

Auf der Rueckseite:
ON THE BACK:

Werksnummer
NUMBER OF PLANT

Typ-Aufschrift
TYPE DESIGNATION

Stanzeinzug max. 0.6
STAMP PULL-IN MAX. 0.6

Fertigungsdatum
nach Bosch-Norm
N41A4-2.3
und Seriennummer
DATE OF PRODUCTION
ACC. TO BOSCH
STANDARD N41A4-2.3
AND SERIAL NUMBER

SW 27

### Wichtige Hinweise:
-RB-Gewaehrleistung fuer die Funktion des Stecksystems nur bei Verwendung
 der in dieser Angebotszeichnung vorgeschriebenen Gegenstecker-Systemteile.
-Erste Abstuetzstelle des Kabels max. 150mm nach der Steckverbindung
 (gestreckte Kabellaenge). Sie muss auf dem Sensortraeger liegen.
-Abwicklung des Kabels (Abweichung von der geraden Linie) zwischen
 Kabelabgang am Sensor und erster Abstuetzstelle: 20...90°
-Zulaessiger Biegeradius des Kabels bis zur ersten Abstuetzstelle: R ≥50mm
-Einbauvorschrift siehe zugehoerige Railangebotszeichnung bzw. Rail-TKU
-Max. zulaessige Einschraubbelastung: 35Nm
-Montagehinweis siehe Y 261 F26 048

Zu beachten: Sensor ist durch aufgestecten Gegenstecker vor Eindringen von Wasser zu schuetzen.

### IMPORTANT NOTES
-RB WARRANTY WILL COVER THE FUNCTION OF THE CONNECTOR SYSTEM ONLY IN CASE
 OF COMBINATION WITH HARNESS CONNECTOR SYSTEM PARTS ACCORDING
 TO THIS OFFER DRAWING.
-FIRST CABLE MOUNTING POINT MAX. 150 MM AFTER THE PLUG (STRAIGHT CABLE LENGTH).
 IT MUST BE LOCATED ON THE SENSOR CARRIER.
-ANGLE OF BENING THE CABLE (DEVIATION FROM STRAIGHT LINE) BETWEEN CABLE EXIT
 AT SENSOR AND FIRST MOUNTING POINT: 20...90°.
-ADMISSIBLE BENDING RADIUS OF THE CABLE UP TO THE FIRST
 CABLE MOUNTING POINT: R ≥50MM.
-INSTALLATION INSTRUCTIONS SEE CORRESPONDING OFFER DRAWING RAIL RESPECTIVELY TKU RAIL
-MAX. AUTHORIZED STRESS TO SCREW IN: 35Nm
-ASSEMBLY INSTRUCTIONS SEE Y 61 F26 048

ATTENTION: USE HARNESS CONNECTOR FOR PROTECTION AGAINST WATER INGRESS.

Stutzen nach unten gerichtet.

Empfohlene Lage: 0...90°
in allen Richtungen zur Senkrechten.

ORIFICE DIRECTED DOWNWARDS.

RECOMMENDED POSITION: 0...90°
FROM VERTICAL.

1:1

| | Nicht tol. Masse | ISO E | Maßstab SCALE | 2:1 | 1:1 | Gewicht WEIGHT | 35,3 g |
| Dokumentenart/ DOCUMENT TYPE  AGZ | NON TOLERANCED DIMENSIONS ±1   mm,±5   ° | | Angebots- zeichnung | | | OFFER DRAWING | |

| | | | | | Gr.St. | Datum/ DATE | Name/ NAME | Benennung/ TITLE | |
| | | | | | VOLUME gez/DIN | 24.02.2005 | De | RAIL PRESSURE SENSOR | |
| | | | | | gep/CHK | | | DS-HD-KV4.2, 26 MPa | |
| | | | | | ges/APP | | | | |
| | | | | | Original/ GS-SI/ENS | | | | |
| 0 261 B08 072 06 | | 0 261 K00 109 | | DIN A2 | | N°./ NO. | | Blatt SHEET 1 |
| Entwicklungsnummer DEVELOPMENT NUMBER | Bestell - Nummer ORDER NUMBER | Typ - Aufschrift TYPE DESIGNATION | Datenblatt (TKU) DATA SHEET | | N° NO | Aenderung CHANGE | gez. DWN. | gueltig VALID | gepr CHK. | BOSCH | 0 261 A04 407 | de/en | 1 B1/9H |

# 13 Mounting Instructions: Brake Pressure Sensor

Bosch Gasoline Systems, P81 | 2703373053 DRW 001 03 | SAP-Status 40 | Labor F28 | Change F030GD000901



Ausdrucke und Kopien unterliegen nicht dem Änderungsdienst

Ausgedruckt am 13.02.2009  von ole2fe

# 14 Offer Drawing: Wheel Speed Sensor

# 15 Offer Drawing: Gyro/Acceleration Sensor



0 274 A00 305

**Steckerbelegung PIN CONFIGURATION**

| PIN 1 | GND |
|-------|------|
| PIN 2 | CANL |
| PIN 3 | CANH |
| PIN 4 | UBAT |

Einbauort: Nahe des Fahrzeugschwerpunktes. Anderer Einbauort
nach Zustimmung durch RB FDR-Systementwicklung moeglich.
MOUNTING LOCATION:
CLOSE TO CENTER OF GRAVITY OF VEHICLE. OTHER MOUNTING LOCATION
AFTER AUTHORISATION BY RB-FDR SYSTEM DEVELOPMENT POSSIBLE.

(Einbau entgegen der Fahrtrichtung oder Ueberkopf-Montage
nach Zustimmung durch RB FDR-Systementwicklung moeglich.
(MOUNTING OPPOSITE TO DRIVING DIRECTION OR OVERHEAD MOUNTING
AFTER AUTHORISATION BY RB-FDR SYSTEM DEVELOPMENT POSSIBLE.)

Zulaessige Abweichung der Referenzachse quer zur
Fahrtrichtung ±3°
PERMISSIBLE DEVIATION OF REFERENCE AXIS PERPENDICULAR
TO DRIVING DIRECTION±3°.

Zulaessige Abweichung von Fahrzeug Z-Achse zur
Referenzflaeche ±3°
PERMISSIBLE DEVIATION OF REFERENCE SURFACE TO VEHICLE
Z-AXIS ±3°.

Sensor in Einbaulage dargestellt
SENSOR SHOWN IN MOUNTING POSITION

Buchsenflaeche muss vollstaendig aufliegen.
BUSHING SURFACE MUST BEAR ON COMPLETELY.

Max. Winkelabweichung der Anschraubbolzen in x-
und y-Richtung: 2.2°
MAX. ANGULAR DEVIATION OF THE MOUNTING
BOLTS (X- AND Y-DIRECTION): 2.2°

Die Einbau- und Umgebungsbedingungen gemaess der technischen
Kundenunterlagen (TKU, siehe Tabelle) sind einzuhalten.
THE MOUNTING AND ENVIRONMENTAL CONDITIONS ACCORDING TO
THE TECHNICAL CUSTOMER DOCUMENTATION (TCD. SEE TABLE BELOW)
ARE TO BE FULFILLED.

Anziehdrehmoment fuer Mutter/Schraube M6 = 6Nm +2Nm / -1Nm
Max. zulaessige Axialkraft: 12 kN
FIXING-TORQUE FOR NUT/SCREW M6 = 6Nm +2Nm / -1Nm
MAX. PERMITTED AXIAL LOAD: 12 kN

Schraubpartner muessen ausreichende Anpressflaeche aufweisen. fuer
zul. Anziehdrehmoment ausgelegt sein und ausreichende
Korrosionsbestaendigkeit aufweisen.
FIXATION COUNTERPARTS MUST HAVE SUFFICIENT PRESSING SURFACE.
MUST BE DIMENSIONED FOR PERMISSIBLE FIXATION TORQUE AND MUST
HAVE SUFFICIENT CORROSION RESISTANCE.

Anschraubprozess des Sensors liegt in Kundenverantwortung.
Bei Fehlmontage keine RB-Gewaehrleistung.
FIXATION PROCESS OF THE SENSOR IS WITHIN CUSTOMERS
RESPONSIBILITY. IN CASE OF POOR MOUNTING NO RB-WARRANTY.

Gewaehr fuer die zuverlaessige Funktion des Stecksystems
nur bei Verwendung des von RB vorgeschriebenen Gegensteckers.
RB WARRANTY COVERS RELIABLE FUNCTION OF THE CONNECTOR
SYSTEM ONLY IF A WIRING HARNESS-SIDE CONNECTOR
SPECIFIED BY RB IS UTILIZED

Im Bereich der Auflageflaeche des Sensors [ ] 0.2
(Umriss Gehaeuse + Gegenstecker)
IN SUPPORTING SURFACE AREA OF THE SENSOR [ ] 0.2
(HOUSING + SOCKET HOUSING OUTLINE)

**Sonderzubehoer:** / **ADDITIONAL PARTS:**

| Sonderzubehoer: | ADDITIONAL PARTS: |
|---|---|
| Gehoert nicht zum Lieferumfang. muss gesondert bestellt werden. | NOT INCLUDED IN SCOPE OF DELIVERY. MUST BE ORDERED SEPERATELY. |
| Buchsengehaeuse | CONNECTOR HOUSING |
| TYCO/AMP Best.-Nr. 1-967640-1 | TYCO/AMP ORDER-No. 1-967640-1 |
| Buchsenkontakt (4 Stueck erforderlich) | TERMINAL (4 REQUIRED) |
| TYCO/AMP Best.-Nr. 965906-1 (DGB 0.75mm²) | TYCO/AMP ORDER-NO. 965906-1 (DGB 0.75mm²) |
| Einzeladerabdichtung (4 Stueck erforderlich) | WIRE SEAL (4 REQUIRED) |
| TYCO/AMP Best.-Nr. 967067-1 (fuer Ø1.4...1.9) | TYCO/AMP ORDER-NO. 967067-1 (fuer Ø1.4...1.9) |

Einzelheit Y
DETAIL Y
M 4:1

7.5
11±0.15x9±0.15
15.85x13.85
1±0.2
2.7±0.3

+Z Sensor
+X Sensor
+Ax
+Ω
+Ay
+Y Sensor

61.7
32.1
12
Steckermitte
CENTER OF CONNECTOR
X

PBT GF30 weiss/WHITE
PBT GF30 schwarz/BLACK
42.8
Produktionslabel mit Barcode
PRODUCTION LABEL
WITH BARCODE
Teilschnitt A-A
SECTION A-A
Y
Referenzflaeche
REFERENCE SURFACE

Fahrtrichtung
DRIVING DIRECTION

Einzelheit X
DETAIL X
M 4:1

4 2
3 1

Buchse. Edelstahl V2A (1.4301)
BUSHING. HIGH GRADE STEEL V2A (1.4301)
Typ-Aufschrift
TYP-DESIGNATION
Kundennummer
CUSTOMER PART NUMBER
Fertigungsdatum
MANUFACTURING DATE
Chargen-Nr.
NUMBER OF LOT

80
62±0.3
35
A
A
6.1⁺⁰·⁷ (2x)
8.2±0.1 (2x)
32.7
79.3

Referenzachse
(quer zur Fahrtrichtung)
REFERENCE AXIS
(PERPENDICULAR TO
DRIVING DIRECTION)

Stecker:
CONNECTOR:
AMP 114-18063-076
MQS Code A
Rev. A3/25.06.01
PIN AMP Spec.
MQS 114-18063
Rev. B6/03.05.02

Steckerverrastung:
CONNECTOR ENGAGEMENT:
TYCO C-208-15641
Rev. 0/25.04.03

| Einwurfs - Zeichnung DRAFT DRAWING NUMBER | Bestell - Nummer ORDER NUMBER | Typ TYPE | Kunden-Nummer CUSTOMER PN | Warenzeichen TRADE MARK | TCD |
|---|---|---|---|---|---|
| 0 274 800 754 (MM3.8k) | | | 27542FG000 | Ja | 0 265 K05 083e |

| SC MM3.xk | | | | Nicht tol. Masse NON TOLERANCED DIMENSIONS ± 1 mm. ± 1° | | Massstab SCALE 1:1 4:1 | Gewicht WEIGHT ~70g |
|---|---|---|---|---|---|---|---|
| Dokumentenart / DOCUMENT TYPE AGZ | | | | | Benennung / title | Angebots-zeichnung OFFER DRAWING | |

Drehratesensor MM3.8k
YAW RATE SENSOR MM3.8k

0 274 A00 305

BOSCH

# 16 Wiring Diagram ABS M4

**ABS M4**

ACHTUNG

Bei Wegfall von Steckern, die z.B. den CAN WIderstand enthalten, ist der an anderer, geeigneter Stelle zu verbauen

Achtung : - alle nicht bezeichneten Leitungen sind auf AWG22 ausgelegt
- kleine Buchstaben sind unterstrichen
- CAN Abschlusswiderstand 120Ω zwischen CAN-high und CAN-low am Steuergerätestecker und am intersection CAN (SP/CAN) Stecker einbauen

Attention : - all not marked wire´ are AWG22
- small letters are underlined
- please install 120Ω resistor between CAN-high and CAN-low at ECU and intersection CAN (SP/CAN) connector
- drain CAN shield to valve GND

Brake pressure sensor P/Br
notwendig und verbindlich necessary and mandatory

ABS function switch SW/ABS
notwendig und verbindlich necessary and mandatory

malfunction indicator lamp MIL/ABS
notwendig und verbindlich necessary and mandatory

life voltage S1 rc Ø6mm red Bat +
notwendig und verbindlich necessary and mandatory

life voltage S2 rc Ø6mm red Bat +
switched pos. voltage S3 rc Ø6mm red Kl.15
notwendig und verbindlich necessary and mandatory

yaw/acceleration sensor YAW
not wendig und verbindlich necessary and mandatory

gnd electrical motor rc Ø6mm blue GND _ M
notwendig und verbindlich necessary and mandatory

gnd electrical valve rc Ø6mm blue GND _ V
notwendig und verbindlich necessary and mandatory

intersection CAN SP/CAN
empfohlen für Datenübergabe recommended for datatransfer

intersection C Sport SP_CSport

brake light switch open end BLS
notwendig und verbindlich necessary and mandatory

diagnostic plug ABS M4 DIAG_ABS M4
notwendig und verbindlich necessary and mandatory

fuse 40A ETA F_40A S1
fuse 25A ETA F_25A S2
fuse 10A ETA F_10A S3

ABS on/off switch 886BK4 SW/on_off
notwendig und verbindlich necessary and mandatory
Kerbe => Off

wheel speed front left N/Wh_fl
wheel speed front right N/Wh_fr
wheel speed rear left N/Wh_rl
wheel speed rear right N/Wh_rr

Option ohne Drehzahlinterface / option without wheel speed interface outlet

Option mit Autosportsteckern / option with Autosport-connectors wheel speed sensor

intersection wheel speed interface outlet AS 6-08-35-SN (ABS harness side) (Pos.4) AS 0-08-35-PN (interface side) SP/Interface_outlet

intersection wheel speed interface AS 6-12-35-SN (ABS harness side) AS 0-12-35-PN (interface side) SP/wheel_interface

4-fach ABS Adapter M4 für die Aufbereitung der Raddrehzahlen
4-wheel speed interface for all four wheels
F 02U V00 203-03

Option mit Drehzahlinterface (2 Stecker Version)
option with wheel speed interface outlet (2 connector version)

F.02U.S00.043-09
ABS Basisanschlussplan

Bestell-Nummer order number
Entwurfszeichnung schematic
Benennung part number

Basisanschlussplan ABS M4
F02U.S00.043-09

BOSCH

## 17 Wiring Diagram ABS M4 Clubsport

**ABS M4**

Brake pressure sensor
P/Br
notwendig und verbindlich
necessary and mandatory

ABS function switch
SW/ABS
notwendig und verbindlich
necessary and mandatory

malfunction Indicator lamp
MIL/ABS
notwendig und verbindlich
necessary and mandatory

fuse 40A
ETA
F_40A
S1
life voltage S1
open end red
S1 FUSE 40A

fuse 25A
ETA
F_25A
S2
life voltage S2
open end red
S2 FUSE 25A

fuse 10A
ETA
F_10A
S3
switched pos. voltage S3
open end red
S3 FUSE 10A Kl.15

notwendig und verbindlich
necessary and mandatory

Anschluss an Sicherungen
connection to fusebox

yaw/acceleration sensor
YAW
not wendig und verbindlich
necessary and mandatory

gnd electrical motor/valve
rc Ø6mm blue
GND – M/V
notwendig und verbindlich
necessary and mandatory

Intersection CAN
SP/CAN
empfohlen für Datenübergabe
recommended for datatransfer

CAN Termination
60Ω
CAN TERMINATION 60Ω

diagnostic plug
ABS M4
DIAG_ABS M4
notwendig und verbindlich
necessary and mandatory

brake light switch
open end red
BLS
notwendig und verbindlich
necessary and mandatory

ABS M4
Anschlussstecker
F02U B00 238-01
notwendig und verbindlich
necessary and mandatory

ABS on/off switch
886864
SWion_off
notwendig und verbindlich
necessary and mandatory

Intersection
wheel speed interface
SP/rad_interface
notwendig zur Drehzahlausgabe
necessary for wheel speed output

wheel speed front left
N/Wh_fl

wheel speed front right
N/Wh_fr

wheel speed rear left
N/Wh_rl

wheel speed rear right
N/Wh_rr

Option ohne
Drehzahlinterface

option without
wheel speed interface outlet

intersection
wheel speed interface outlet
AS 608-355N (ABS harness side)
AS 008-35PN (interface side)
SP/interface_outlet

Intersection
wheel speed interface
AS 612-355N (ABS harness side)
AS 012-35PN (interface side)
SP/rad_interface

**4-fach ABS Adapter M4**
**für die Aufbereitung der**
**Raddrehzahlen**

F 02U V00 203-03

**4-wheel speed interface**
**for all four wheels**

Option mit
Drehzahlinterface
(2 Stecker Version)

option with
wheel speed interface outlet
(2 connector version)

Achtung :
- alle nicht bezeichneten Leitungen sind auf AWG22 ausgelegt
- kleine Buchstaben sind unterstrichen
- CAN Abschlusswiderstand als Gegenstecker CAN Termination 60Ω ausgeführt
- CAN Leitung als 44a AWG24 2adrig geschirmt ausführen

Attention :
- all not marked wire´ are AWG22
- small letters are underlined
- please install 60Ω CAN resistor as connector at "CAN TERMINATION 60Ω
- drain CAN shield to valve GND
- use 44a1121 AWG24 cable as CAN cable

F02U.V01,917-01
Bestell-Nummer
order number

F.02U.S00,452-01
Entwurfszeichnung
schematic

Clubsport Version
ABS Basisanschlussplan
Benennung
part number

Anschlussplan ABS M4 CS
F02U.S00,452-01

# 18 Wiring Harness in general



Wire length Map Switch ABS: 500 mm

Wire length MIL-electronic component to connector: 600 mm

Please select the required wire exit !!

Kabelabgang "TOP 90°"

Kabelabgang "TOP"

Wire Exit: top 90 deg
F02U.B00.238-01

Wire Exit: top straight
F02U.B00.238-01

Wire Exit: down 90 deg
F02U.B00.237-01

Wire Exit: down straight
F02U.B00.237-01

Kabelabgang "DOWN 90°"

Kabelabgang "DOWN"

TOP
DOWN

**Note(s):**
- Harness to be laid out as shown in the diagram to the left.
- ABS M4 connector can be oriented as shown on the far left.
- Please read ABS M4 Manual for mounting instructions of the ABS M4 unit
- All dimensions are in mm.

| F.02U.V00.xxx-05 | F.02U.S00.043-09 | ABS M4 Harness | | -Project Name- ABS M4 |
| Bestell-Nummer order number | Entwurfszeichnung schematic | Benennung part name | BOSCH | F.02U.V00.xxx-05 |

# 19 Wiring Harness Clubsport



Valid for:
headunit in engine(front) compartment

Note(s)

- shorten tail length of all boots 202D9XX-25 by half
- all transitions fixated with tape and overlapped
- all boots bonded at front and rear side or use -225 (w/ glue)
- all wires twisted
- all legs labeled
- all dimensions are metric
- boots with terminals must be sealed
- fully populate all connectors with pins and sockets
- all unterminated screens to be folded back and sealed
- please read ABS M4 Manual for mounting instruction of the ABS unit
- complete loom in Periflex N-SG tubing
- transitions made with tape
- due to install a boot make the cable exit with HTAT and than the boot / HTAT over this