_moto_gadget

**Operating manual
for multifunctional instrument**

motoscope PRO <u>starting at serial 00004416</u>

Suchen Sie die deutsche Bedienungsanleitung?

http://motogadget.com/media/downloads/manual/msp_manual_de_3.4_ab_serial_00004416.pdf

ABE
KBA 91261

 $C\epsilon$

TÜV

00000273   **HW V1.2   SW V1.54   Manual V3.5**

Thank you very much for purchasing a high quality product from *motogadget*.

Please read the following information and recommendations carefully and follow these instructions for installation and usage of the instrument. No liability is assumed by *motogadget* for damage or defects resulting from negligence or failure due to following the operating manual.

For further product information e.g. measurements, 2D or 3D drawings, surveys, TÜV approval, etc. visit:

http://motogadget.com/en/digital-instruments/digital-dashboard-pro/downloads.html

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1 Review of delivery

All products from *motogadget* are thoroughly checked to ensure that they are faultless when dispatched. Please check received goods for possible transport damage. If you find any damage or other deficiencies please contact us immediately.

For returns or replacements we refer to our general terms of business and delivery published on www.*motogadget*.com. Should we agree to a return or replacements of the instrument please note that we only accept goods in their original packaging. The instrument and accessories must be returned within the legal time limit and without any traces of use. We do not assume any liability for returns which are insufficiently insured or packaged.

2 Exclusion of liability

INSTRUMENT CASINGS AND ALL OTHER PARTS MUST NOT BE OPENED OR DISMANTLED. IN CASE OF NON-COMPLIANCE ALL WARRANTY CLAIMS BECOME INVALID.

THE DISPLAY IS MADE OF 722 SINGLE LED. A PRODUCT IS CONSIDERED DEFECTIVE AND IS COVERED UNDER WARANTY IF THERE IS TWO OR MORE LEDS NOT FUCTIONING.

THE USAGE OF INSTRUMENTS, SENSORS AND ACCESSORY PARTS FOR RACING OR OTHER COMPETITIONS, AS WELL AS USAGE WHICH DOES NOT COMPLY WITH RECOMMENDED APPLICATION RENDERS ALL WARRANTY CLAIMS INVALID. MOTOGADGET ACCEPTS NO LIABILITY FOR DIRECT OR INDIRECT DAMAGE OR SUBSEQUENT DAMAGE OF ANY KIND RESULTING FROM USAGE, INSTALLATION OR CONNECTION OF INSTRUMENTS, SENSORS OR OTHER DELIVERED EQUIPMENT. THIS EXCLUSION OF LIABILITY INCLUDES DAMAGE TO PEOPLE, DAMAGE TO MATERIAL AND FINANCIAL DAMAGE. USAGE ON PUBLIC ROADS IS UNDERTAKEN AT USER'S OWN RISK.

2.1 Duty of registration

The *motoscope PRO* has a General Operating Permit (ABE) and therefore does not have to be entered into the vehicle documents. The device is identifiable as having a General Operating Permit by a special label with the code "KBA 91261" on the back side of the device.

THE GENERAL OPERATING PERMIT (ABE) IS ONLY VALID WHEN THE DEVICE IS INSTALLED IN TWO- OR THREE-WHEELED VEHICLES AND THE WHEEL CIRCUMFERENCE WHICH HAS BEEN ENTERED INTO SETUP CORRESPONDS TO THE ROLLING TIRE CIRCUMFERENCE GIVEN (TABLE IN APPENDIX).

THE USER IS PERSONALLY RESPONSIBLE FOR CORRECT CALCULATIONS AND ADJUSTMENTS CONCERNING TIRE CIRCUMFERENCE, IMPULSES PER WHEEL ROTATION AND CORRECT INSTALLATION OF THE SPEEDOMETER SENSOR.

3 Technical data

length/width/height	47 mm x 109 mm x 11 mm
weight without cables	ca. 100 g
mounting holes	2 x M3, 4 mm deep
operating voltage	9–16 V
current consumption	max. 200 mA
standby current	400µA
operating temperature	-15 – +70 ℃

4 Preparation for installation and connection of the instrument

4.1 Required knowledge and abilities

Installing and connecting the *motoscope PRO* and its additional equipment requires basic knowledge in vehicle electronics. Because the *motoscope PRO* can be installed on a wide range of vehicles with different specifications and equipment it is not possible to cover all cases in this manual. In case of doubt please consult our web site (Support and FAQ). The instrument might also be installed by a garage.

4.2 Required equipment for installation and connection

Since the *motoscope PRO* is suitable for a variety of vehicles additional equipment might be required to mount the instrument to a particular vehicle, for example:

- mounting bracket for instrument plus fitting screws
- mounting bracket for speedometer sensor and push button
- cables or cable extensions for power supply, ignition signal and push button connection
- assembly equipment such as cable ties, plug connectors, shrink tubing, soldering iron, solder etc.

We recommend use of wiring diagrams for electrical connection.

If you don't use the *motogadget* all-purpose bracket you will need a stable mounting bracket for the instrument. The speedometer sensor is already equipped with a connecting cable (length 1.5 meters) so that the sensor can be connected to the front or rear wheel. For positioning of the speedometer sensor you might – depending on the position – also require a self-made holding bracket.

5 Quick start

This section provides a guide to quick installation and connection of the *motoscope mini*

a) Have all the required equipment like mounting brackets, push buttons, fitting screws and nuts, screw adhesive (medium-strength), cables, cable ties, plug connectors, shrink tubing and soldering tin ready before you start. Tools required are screwdrivers, wrenches, an Allen key for M3 metric Allen screws, a side cutter, small pliers, soldering iron, a voltmeter and a crimping tool. Make sure that you have got the wiring diagrams of your vehicle.

b) make sure the vehicle stand save and can not tilt during installation. Disconnect at first battery ground cable and then battery plus cable.

c) Choose suitable positions for installing the *motoscope PRO* and the speedometer sensor. Attach the *motogadget* mounting bracket to your vehicle or make your own bracket. Attach the speedometer senor bracket.

d) Decide at which point all wires will be brought together in order to connect the *motoscope Pro* with the power supply, speedometer sensor, ignition signal cable and the push button. Make sure there is sufficient space for the connections.

e) Mount the instrument, the speedometer sensor and the push button to the vehicle.

f) Locate "switched plus" on the wiring of your vehicle by using a voltmeter ("switched plus" means electricity only flows when ignition is switched on). Connect the delivered cable fuse to switched plus and route a wire from the other end of the fuse to the chosen terminal point.

g) Connect a wire to the negative terminal of the ignition coil (coil terminal no 1 - which leads to ignition box) and route the wire to the terminal point you have chosen in step c).

   In case of a CDI ignition = Capacitor Discharge Ignition (used for quad, scooter, trail bikes) you must use a motogadget ignition signal pickup unit (article no 9000001)

h) Connect all wires which meet in the terminal point (motoscope, power supply, speed sensor, ignition coil and push button) according to the circuit diagram provided in the appendix. Use the delivered connector kit for easy unplug of the instrument if necessary.

i) Re-connect vehicle battery plus and then battery ground. Switch ignition on.

j) Navigate to the setup menu (see Chapter 12) and adjust all necessary parameters for engine speed, the rev. counter scale and the speedometer.

k) Start the engine and watch the rev. counter. If it works correctly, ride carefully and slowly for a while and check the speedometer. If you do not detect any electrical or mechanical problems continue the test drive.

6 General safety instructions for mounting and connection

- Disconnect vehicle battery prior to installation.

- In the interest of your own and other peoples' safety attach all parts securely to your vehicle.

- Make sure that your vehicle is equipped with **interference suppressing spark plugs and connector cables!** Use of the *motoscope PRO* with non-suppressed ignition systems can lead to serious damage of the device.

7 Installation of the *motoscope PRO*

To ensure correct fastening two metric fastening screws must be used (M3). In order to avoid distortions of the thread, the fastening bolts must be screwed into the instrument casing to a minimum depth of 2. Choose screws that fit to the mounting bracket. We also recommend the use of additional washers and screw adhesive (e.g. Loctite medium-strength). Furthermore, the **maximum torque** applied to the M3 fastening screws must not exceed **2 Nm**.

8 Connecting the *motoscope PRO*

8.1 Recommendations for wiring

Before connecting wires look for suitable cable paths. The cables should be as far away as possible from hot engine parts. Look for a suitable place to connect wires and plugs. Similar connection points can already be found at the headlights, underneath the gas tank or at the dash board. Make sure you take note of required lengths of cables before cutting them to fit. It is important to consider the full lock of the handlebars as well as pitch of the front and rear suspension. All wires should be free of kinks and should not be subject to any pull and should be well isolated especially in places of mechanical wear. We recommend to use the delivered crimping sleeves. For securing wires we recommend cable ties made from plastic.

8.1.1 Cable colours, functions and connections

Cable colour	Function	Connection
Red	Power supply	Permanent Plus (+) **1A fused** voltage directly from battery
Black	Power supply	Minus (vehicle earth)
Brown	Power supply	Plus (+) "switched" and **1A fused** voltage of the wiring harness
White	Input speedometer sensor	Leads to the signal cable of the OEM speed sensor, or delivered sensor that switch to vehicle earth
Green	Input menu push button	Leads to the push button that switches to earth
Orange	motogadget BUS	Connection of motogadget devices (breakoutbox)
Yellow	Input Engine Speed **THIS WIRE MUST NEVER BE CONNECTED TO THE HIGH-VOLTAGE PARTS OF THE IGNITION!**	Leads to the negative pole (clamp 1 or -) at one ignition coil. *In case of a CDI ignition you must use motogadget ignition signal pickup unit (article no 9000001)*
Purple	CAN BUS	Not connected
Blue	CAN BUS	Not connected

8.2 Battery and power supply

The *motoscope PRO* requires "**switched plus**" for the power supply that means electricity will only flow if the ignition is switched on. The instrument can operate within a voltage range of 9 V to 15 V DC. Using the instrument without a vehicle battery is not intended or recommended! Please ensure that the polarity of the power supply is correct.

CAUTION! **THE MINIMUM CONNECTION CABLE WIDTH IS 0,5MM². YOU MUST FUSE THE RED AND BROWN +12 V POWER SUPPLY CABLES WITH THE DELIVERED 1A CABLE FUSE. IF THE INSTRUMENT IS USED WITHOUT FUSE, DAMAGE TO THE CONNECTION CABLE OR THE MOTOSCOPE CAN CAUSE A SHORT CIRCUIT AND A CABLE FIRE. CAUTION! YOUR LIFE MIGHT BE IN DANGER! IF YOU DON'T HAVE THE SPECIALIST KNOWLEDGE REQUIRED PLEASE ASK A GARAGE TO INSTALL THE MOTOSCOPE!**

9 Installation and connection of sensors and push button

9.1 The push button

A push button is required to operate the instrument. Connect one of the push button terminals to the green *motoscope PRO* wire and the other one to vehicle ground. Polarity of the push button is not relevant (see diagram in Chapter 15.4).

A second method is the operation of the instrument with the touch-sensitive display. This requires the enabling of the TOUCH function in setup menu. In this case a separate menu push button is not required.

9.2 Rev counter sensor cable

The instrument can be connected to all conventional ignition systems that work with ignition coils. Connect the yellow cable to the negative terminal of one ignition coil or to the corresponding terminal of the ignition box [clamp 1 or earth].

*In case of a CDI ignition (**C**apacitor **D**ischarge **I**gnition - used for quad, scooter, trail bike) you must use the motogadget ignition signal pickup unit (article no 9000001)*

We assume that your vehicle is equipped with an interference suppressing ignition system. For accurate functioning of the instrument preferences in the setup menu of the instrument have to be changed. Please see directions in the relevant chapter.

CAUTION! **THE REV COUNTER CONNECTION SHOULD NEVER BE CONNECTED TO THE HIGH VOLTAGE OUTPUT OF THE IGNITION.**

9.3 Installation and connection of the speedometer sensor

9.3.1 Use of original speedometer sensor

If your vehicle comes with a three wire OEM speedometer sensor which provides an earth signal you can use the sensor with the instrument. Two wire hall sensors are not compatible with the *motoscope PRO.*

Connect the white cable of the *motoscope Pro* directly to the speed sensor signal output. You will have to use the supplied motogadget speedometer sensor if no speed signal is detected.

9.3.2 Use of motogadget speedometer sensor

The speedometer sensor supplied is a dry reed contact, which is triggered by a magnetic field. Therefore the magnet supplied should be attached to the wheel with epoxy glue. The distance between the magnet and the wheel centre is irrelevant. The speedometer sensor has to be attached to the vehicle by using a self made holding bracket. The sensor tip has to be fastened parallel to the magnet. The distance between magnet and sensor should not exceed 4 mm and the sensor should not touch the magnet or any other moving parts. The sensor holding bracket has to be sufficiently stable in order to prevent shifting of the sensor while driving. The maximum mounting torque of the sensor nuts is 1.6 Nm. We recommend thread lock (medium strength) for secure mounting. Connect one cable of the speedometer sensor to earth and the other one to the white cable of the *motoscope Pro.*

CAUTION! **THE MAGNET WILL BE DAMAGED IF IT IS EXPOSED TO TEMPERATURES HIGHER THAN 100 °C OR 212 °F (I.E. HOT BRAKES).**

10 First use of the instrument

When all parts are installed securely and all wires are connected, re-connect the vehicle battery and switch on the ignition or power supply. The display has to become illuminated and the "motogadget" logo will appear. If this doesn't happen turn off the ignition and double-check all connections and wires.

11 Operation and display of functions

Operation of the device will be achieved by use of a menu push-button or by touching the lower left display corner (right beside scale value 0 of rev scale). The touch will be detected via infrared sensor. The sensitivity is designed for glove operation. The device may possibly not respond to direct finger touch. The device may be actuated by raindrops. In case of a blocked touch sensor (e.g. by rain drops) the device will disable the sensor. In this case the sensor has to be re-activated in setup menu after removal of the obstruction.

For entering the different levels of display and setup menus, the push-button has to be actuated four different time periods.

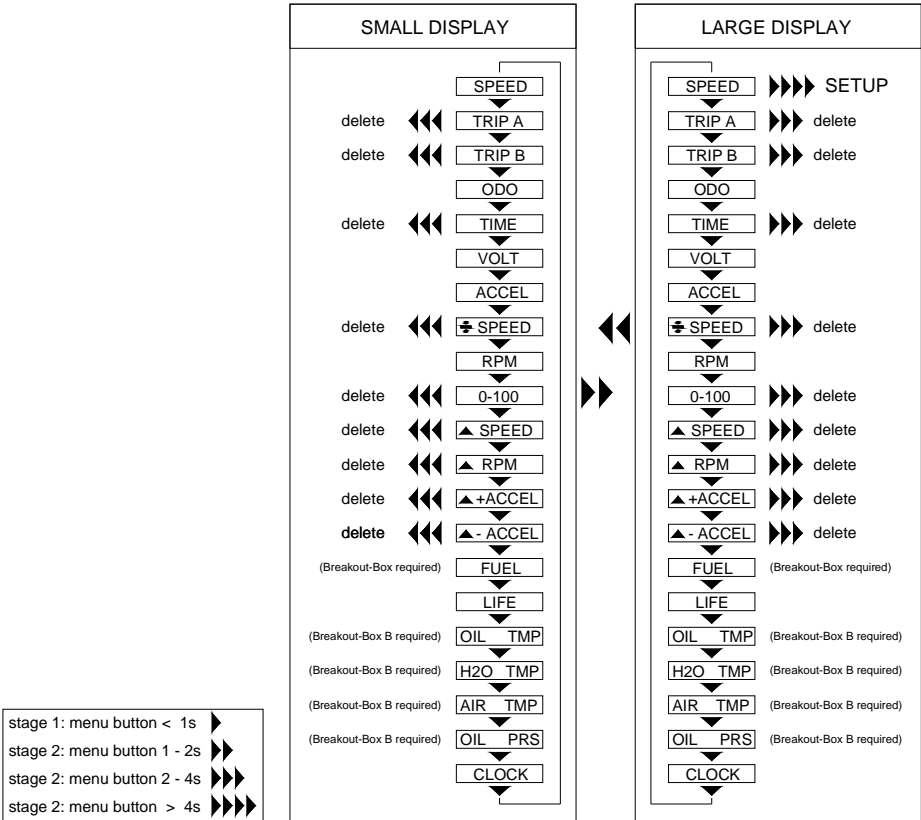There are 4 different push-button actuation times:

- **Level 1**: < 1s
  Function: Selection of next/different option or increase of digits.
- **Level 2**: 1s - 2s
  Function: Switching between displays.
- **Level 3**: 2s - 4s
  Function: Deletion of stored values (e.g. maximum values, trip mileage, etc.)
- **Level 4**: > 4s
  Function: Setup menu access, setup menu exit

The instrument is equipped with a large main display and a small secondary display. The gear display is located on the right side of the small display. There are also 4 warning lights: Turn signals (green), high beam (blue), neutral (green) and general warning light (red). The engine speed is displayed in the rev counter bargraph. The set scaling is displayed in tick marks and digits at the start, middle and end position of graph. In case of present error messages or warning alerts (e.g. oil pressure, low fuel) the message is shown on the small display; the warning light continues flashing.
.
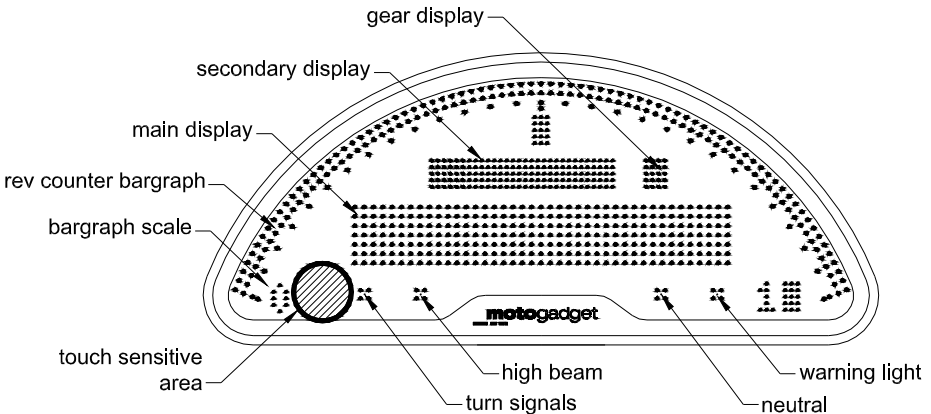
Push-button level 1 is used for access to the next display value of the corresponding display.
Push-button level 2 is used for switching between the two displays; at the same time the actual selected display is illuminated for a short time indicating confirmation.
A display value is deleted by holding the push-button for the time of level 3. At the same time the other display is illuminated for a short time without being selected.

The menu structure is as follows:

SMALL DISPLAY	LARGE DISPLAY
SPEED	SPEED ▶▶▶▶ SETUP
delete ◀◀◀ TRIP A	TRIP A ▶▶▶ delete
delete ◀◀◀ TRIP B	TRIP B ▶▶▶ delete
ODO	ODO
delete ◀◀◀ TIME	TIME ▶▶▶ delete
VOLT	VOLT
ACCEL	ACCEL
delete ◀◀◀ ⬓ SPEED	⬓ SPEED ▶▶▶ delete
RPM	RPM
delete ◀◀◀ 0-100	0-100 ▶▶▶ delete
delete ◀◀◀ ▲ SPEED	▲ SPEED ▶▶▶ delete
delete ◀◀◀ ▲ RPM	▲ RPM ▶▶▶ delete
delete ◀◀◀ ▲ +ACCEL	▲ +ACCEL ▶▶▶ delete
delete ◀◀◀ ▲ - ACCEL	▲ - ACCEL ▶▶▶ delete
(Breakout-Box required) FUEL	FUEL (Breakout-Box required)
LIFE	LIFE
(Breakout-Box B required) OIL TMP	OIL TMP (Breakout-Box B required)
(Breakout-Box B required) H2O TMP	H2O TMP (Breakout-Box B required)
(Breakout-Box B required) AIR TMP	AIR TMP (Breakout-Box B required)
(Breakout-Box B required) OIL PRS	OIL PRS (Breakout-Box B required)
CLOCK	CLOCK

Between the two displays: ◀◀ and ▶▶

stage 1: menu button < 1s ▶
stage 2: menu button 1 - 2s ▶▶
stage 2: menu button 2 - 4s ▶▶▶
stage 2: menu button > 4s ▶▶▶▶

11.1 Display values

SPEED

Ground speed display in the range of 0 to 999 km/h or mph.
When switching to a different display value on the large display with the vehicle in motion, the display will automatically switch back to the SPEED display after a given time. For this feature to work, the ABACK function (autoback) must be enabled in the setup menu. When ABACK is activated, the large display will show the SPEED value by default when powering on the instrument.

TRIP A

Trip mileage display up to 999.9 km or ml. Reset the value with push-button level 3.

TRIP B

Trip mileage display up to 999.9 km or ml. Reset the value with push-button level 3.

ODO   (odometer)

Total mileage up to 999999 km or ml. This value can be edited in the setup menu.

TIME

Travel time display in time format 59min:59s:99; when measured travel time is exceeding one hour, display in time format 99h.59min:59s. Measurement of time from first occurrence of a speed signal to vehicle stop.

VOLT

On-board voltage display in the range 9-16V.

In case of voltage drop below a set value, a warning message LOW VOLTAGE can be prompted (see chapter 12.5).

ACCEL   (acceleration)

Actual acceleration display in G. The value 9,81 m/s² equals one G.
Negative acceleration values (Braking) will display a ‚minus' in front of the value.

% SPEED

Average speed display. This value will be reset using push-button level 3.

RPM   (revolutions per minute)

Numerical speed display up to 19999 1/min.

0-100

Time measurement of 0-100 km/h acceleration (0-60 mph respectively).
The actual displayed value has to be deleted using push-button level 3 to enable the time measurement. The instrument is ready for measurement with the vehicle at standstill. The measurement will start automatically with the first speed signal. The measurement will be stopped when reaching 100 km/h.

max. SPEED

Display of maximum reached speed. This value will be reset using push-button level 3.

max. RPM

Display of maximum engine speed reached. This value will be reset by using push-button level 3.

max. +ACCEL

Display of maximum reached positive acceleration. This value will be reset by using push-button level 3.

max. -ACCEL

Display of maximum reached negative acceleration. This value will be reset by using push-button level 3.

FUEL

This function requires the motogadget Breakoutbox A or B (article no. 1005040 or 1005041) and a vehicle built-in fuel sensor with a 0-500 ohms measurement range.

Fuel tank capacity in the range 0 – 100%.

Deactivate this readout on both displays if the vehicle has no fuel sensor or if it is equipped with a float switch or a thermal resistor.

When falling below a set value, a warning message LOW FUEL can be prompted

(see chapter 12.5).

LIFE

Operating hours meter up to 9999.5h. The operating hours meter is active when the instrument is switched on. This feature can be reset in the setup menu.

When exceeding a set value, a warning message SERVICE can be prompted

(see chapter 12.5).

OIL TMP

This function requires the motogadget Breakoutbox B (article no. 1005041) and the temperature sensor (article no. 9001002).
Oil temperature display in the range of +40 to +150 ℃. "Cold" will be displayed with a temperature below +40 ℃. The temperature can also be displayed in ℉.

When exceeding a set value, a warning message OIL HOT can be prompted

(see chapter 12.5).

H2O TMP

This function requires the motogadget Breakoutbox B (article no. 1005041) and the temperature sensor (article no. 9001002).
Water temperature display in the range of +40 to +120 ℃. "Cold" will be displayed with a temperature below +40 ℃. The temperature can also be displayed in ℉.

When exceeding a set value, a warning message H2O HOT can be prompted

(see chapter 12.5).

AIR TMP

This function requires the motogadget Breakoutbox B (article no. 1005041) and the temperature sensor (article no. 1005090).
Air temperature display in the range of -20 to +80 ℃. The temperature can also be displayed in ℉.

When underrun a set value, a warning message AIR COLD can be prompted

(see chapter 12.5).

OIL PRS

This function requires the motogadget Breakoutbox B (article no. 1005041) and the oil pressure sensor (article no. 9001020).
Oil pressure display in the range of 0,5 to 8 bar. The pressure can also be displayed in PSI.

When underrun a set value, a warning message OIL PRS can be prompted

(see chapter 12.5).

CLOCK
Time display in format 24h.

12 Setup

In order to modify the settings of the instrument, the setup menu has to be used. It is activated by selecting SPEED on the main display and pressing the push-button for level 4. The menu diagram is found in chapter 15.4.

The setup is divided in 6 main menus: SCREEN1, SCREEN2, PARAM, CONFIG, MESSAGE and SYSTEM. The engine speed section acts as indicator for navigation. The illuminated part of the engine speed section indicates the selected menu.

The push-button level 1-3 are used for navigation. Level 1 changes the value of a given parameter, level 2 activates the selected menu and switches between digits and level 3 exits the menu.

12.1 SCREEN1

This main menu is used for configuration of the large display. All parameters can be activated/deactivated by pressing level 2 of the push-button. Level 1 switches to the next parameter and level 3 exits this main menu.

12.2 SCREEN2

This main menu is used for the configuration of the small display. All parameters can be activated/deactivated by pressing level 2 of the push-button. Level 1 switches to the next parameter and level 3 exits this main menu.

12.3 PARAM

This main menu is used for configuration of all vehicle related parameters. Level 1 switches between parameters. Level 2 activates the desired parameter for new settings. Level 3 exits this menu to the main menu.

The following parameters can be configured by the user:

CLOCK

Setting the time. Push button level 1 increases the activated digit, level 2 switches between digits and level 3 exits the menu to the main menu PARAM.

CIRC (circumference)

This function allows the user to set the wheel circumference in millimeters. Level 1 increases the activated digit, level 2 switches between digits and level 3 exits the menu to the main menu PARAM.

The outer circumference of the tire is found in the table in the appendix (alternative download: www.motogadget.com). The ABE („Allgemeine Betriebserlaubnis"; general operating permit) is only valid with the corresponding value from this table.

If your tire is not listed in the table, measure your circumference of the wheel with the speedometer sensor attached with a string. Add the safety margin of 5 % by multiplying the measured value by 1.05.

If the function SPEED TEACH is used, nothing has to be changed or set in this menu.

ImpW (input wheel)

Setting the speedometer impulses per wheel revolution from 1-99. Push-button level 1 increases the activated digit, level 2 switches between digits and level 3 exits the menu to the main menu PARAM.
When using one magnet, nothing has to be changed or set (factory setting is 1). When using more than one magnet, set according to the number of magnets. If the original speedometer sensor is used, set the number of output impulses per wheel revolution.

When teaching the speedometer sensor via the SPEED TEACH feature, the ImpW parameter must not be set or changed.

ImpE (input engine)

This feature sets the number of ignitions per crankshaft revolution. Push-button level 1 increases the activated digit and level 3 exits the menu to the main menu PARAM.

If your vehicle features several ignition coils, only those impulses from the coil with the signal cable attached are relevant (i.e. the one that is actually measured).

Example:

1 cylinder, 4 stroke motor, 1 ignition coil	ImpE= 0.5	(SR 500, XT 500)
4 cylinders, 4 stroke motor, 2 ignition coils	ImpE= 1	(GSXR 1000)
2 cylinders, 4 stroke motor, 1 ignition coil	ImpE= 1	(Harley Davidson, dual fire)
2 cylinders, 4 stroke motor, 2 ignition coils	ImpE= 0.5	(Harley Davidson, single fire)

How do I find out my setting option?

The correct setting for 99% of motorbikes is 0.5 or 1.

Please select setting option 1. Exit the setup and start the engine. If the displayed engine speed is only half of the actual idle speed, please choose setting option 0.5.

ImpF   (input filter)

This feature sets the input filter for the engine speed meter. Push-button level 1 switches between parameters A, B, C and D. Level 3 exits the menu and switches to the main menu PARAM. If selecting filter B does not provide the expected result, please try one of the other filters.

SCAL

Setting the speed bargraph in the ranges 0 - 2000, 4000, 6000, 8000, 10,000, 14,000 and 16,000 rpm. Push-button level 1 switches to the next scale, level 3 exits the menu and switches to the main menu PARAM.

UNIT

Sets the unit systems for length (Kilometre or Miles), temperature (° Celsius or ° Fahrenheit) and pressure (Bar or PSI). Push-button level 1 switches between length, temperature and pressure. Push-button level 2 is choosing the unit, which can now can be changed with push-button level 1. Push-button level 3 changes back to unit choice. Pressing push-button level 3 again exits the menu and switches to the main menu PARAM.

FLASH

Sets the engine speed threshold for the gear shift flash (red zone). If the threshold is passed, the display will flash red. The engine speed threshold can be set in increments of 100 from 100-19,900 rpm. This feature will be deactivated if all digits are set to zero. Push-button level 1 increases the activated digit, level 2 switches between digits and level 3 exits the menu to the main menu PARAM.

12.4 CONFIG

In this main menu all device-specific parameters are set. Push-button level 1 switches between parameters to configure. Level 2 activates the parameter and level 3 exits the menu to the main menu.

The following parameters can be configured:

BRIGHT

This feature can be set to automatic brightness control or a fixed value from 1-15. We recommend to keep the automatic brightness control (factory setting). Push-button level 1 switches to the next brightness increment, level 3 exits the menu to the main menu CONFIG.

TOUCH

This feature activates or deactivates the internal touch sensor for the instrument control (instead of the push-button). Push-button level 2 switches between activation/deactivation, level 1 cycles through the menu points in the CONFIG main menu.

DRZ SLP

Activates or deactivates the drag indicator for the engine speed band. Push-button level 2 switches between both options, level 1 cycles through the menu points in the CONFIG main menu.

TEACH FUEL (please consider chapter 15.3)

This feature „teaches" the fuel sensor. The feature FUEL SET is activated by pressing push-button level 2. Level 1 allows you to choose between teaching a full or empty fuel tank.

It is recommended to start the teaching process at a service station. The procedure starts with an empty tank (indicated by a triangle pointing downwards); choose the feature option accordingly by pushing level 2 of the push-button. A successful learning process is indicated by a digit showing the fuel sensor resistance value next to the triangle.

After filling the tank, wait 10 minutes. The option for teaching the full tank (triangle pointing upwards) has to be selected by pushing level 2 of the push-button. If the teaching has been successful, the fuel sensor resistance value is shown next to the triangle.

Metering a full or empty tank can also be done independently and at any time.

Level 3 exits the menu to the main menu CONFIG.

TEACH SPEED

This feature is used for the automatic calibration of ground speed (e.g. if the wheel circumference or the number of impulses per revolution are unknown).

Drive at constant speed of 50 km/h (check with second vehicle or the original device). Start SPEED TEACH by pressing push-button level 2. The calibration takes 5 seconds and is indicated by a slowly gaining LED bargraph. After the calibration has finished, the device jumps back to the standard display.

TEACH GEAR

This menu „teaches" the gear shift display. Push-button level 2 accesses the menu and **Gear1** is displayed. Level 1 cycles through gear 1-6, level 2 starts the measuring process of each gear respectively - **IMPORTANT:** The gear has to be already in use. During measurement a 10s-countdown is displayed; during this time no gear shift or clutch engagement must occur. Slight acceleration or deceleration are permitted but the wheels must not slip or lock.

Test the gear shift display for accurate display of the engaged gear. When operating close to thresholds, a wrong gear can be displayed temporarily. If the overall result does not match, the teaching process has to be repeated. If any gear fails to be displayed properly, its teaching can be started over at any time.

If gear ratio, tire size or impulse count of the speedometer sensor is changed, all gears have to be thought again.

Please do not attempt to teach your gears on public roads but on an appropriately closed road. Measurement is at your own risk.

ABACK   (auto back)

This feature determines after which amount of time the large display switches back to the speedometer. Ex factory, ABACK is deactivated (00s). Only in this case the current display will be shown after power cycling the device. Push-button level 1 chooses between 00, 10, 20, 30s, level 3 exits to the CONFIG main menu.

BOB   (Break-out Box)

Toggle between Break-out Box software version V1.x and V2.x. Please do not change anything unless your Break-out Box is not working properly.

12.5 MESSAGE

This menu is used for configuration of all warning and error messages. All messages are prompted in the small display and the warning light is flashing. Push-button level 2 is for confirmation of the displayed error message. In this case, ACKN (acknowledge) is shortly displayed and the message disappears; in the following the warning light shows a continuous light.

When re-starting, all error messages are shown again. After fixing the error, the warning light is switched off and the message is deleted.

OIL SW

The message OIL PRS is displayed if the oil pressure switch remains activated with an engine speed of more than 1000 rpm. In this menu, the message is activated/deactivated with push-button level 2, and push-button level 3 exits the menu.

OIL SNR

When using an oil pressure sensor in combination with the Breakoutbox B, this menu is used to set a specific oil pressure; when falling below this pressure with an engine speed of more than 1000 rpm, an OIL PRS message is displayed. In this menu, push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits the menu. The value '0.0 bar' deactivates the message.

OIL TMP

When using an oil temperature sensor in combination with the Breakoutbox B, this menu is used to set a specific temperature; when exceeding this temperature, an OIL HOT message is displayed. In this menu, push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits the menu. The value '000 °C' deactiva tes the message.

H2O TMP

When using an water temperature sensor in combination with the Breakoutbox B, this menu is used to set a specific temperature; when exceeding this temperature, an H2O HOT message is displayed. In this menu, push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits the menu. The value '000 °C ' deactivates the message.

VOLTAGE

This menu is used to set a specific voltage; when falling below this voltage with an engine speed of more than 1000 rpm, an LOW VOLTAGE message is displayed. In this menu, push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits the menu. The value '00.0 V' deactivates the message.

ENGINE

If the ERROR input is energized with 12V when driving with an engine speed of more than 1000 rpm, a CHECK ENGINE message is displayed. In this menu, push-button level 2 activates/deactivates the message.

FUEL

This menu is used to set a specific fuel level; when falling below this level, a LOW FUEL message is displayed. In this menu, push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits the menu. The value '00 %' deactivates the message.

If the vehicle is equipped with a float-switch or a thermal resistor, this value has to be set to 25%.

AIR TMP

When using an air temperature sensor in combination with the Breakoutbox B, this menu is used to set a specific temperature; when falling below this temperature, a COLD AIR message is displayed. In this menu, push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits the menu. The value '00.0 °C' deactivates the message.

SERVICE

This menu is used to set a specific operating hours value; when exceeding this value, a CHECK SERVICE message is displayed. In this menu, push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits the menu. The value '00000 h' deactivates the message.

12.6 SYSTEM

This main menu determines all system-specific parameters. Push-button level 1 cycles parameters while level 2 selects the parameter to configure. Level 3 exits to the main menu.

All parameters below can be changed:

ODO

Setting the total mileage. Push-button level 1 increases the selected digit, level 2 cycles to the next digit and level 3 exits to the SYSTEM main menu.

RESET

With this feature, all parameters can be reset to factory values. This means that both operating hours and total mileage will be set back to zero. Push-button level 2 activates this menu (reset to factory settings), pressing it a second time deletes all settings. Pressing push-button level 1 or 3 exits this menu without deleting any setting.

VERSION

This sub-menu shows the hard - and software version of instrument and connected accessories (if applicable). These information's are important for technical support.

12.7 CAN - BUS

This menu is used for configuration of the CAN-BUS interface. Push-button level 1 change between **OFF** and the **vehicle brand**. Button level 2 start the menu of the displayed vehicle brand. Within this menu the vehicle model and year can be chosen by push-button level 1. Exit this menu with push-button level 3.

following parameters can be changed:

TRIUMPH

SPD2006 = Speed Triple year 2006
STD2010 = Street Triple year 2010
etc...

IMPORTANT! If no CAN-BUS interface is connected this main menu must set to option OFF. Settings within this menu will be active after leaving the setup menu and disconnect the instrument black cable for 10s from wiring loom.

13 Safety instructions

The *motoscope* provides a lot of information at one time. Users consequently require a certain "training" period in order to recognise all the given information quickly and correctly. Please take this into account, particularly during your first rides with the *motoscope* and do not distract yourself by watching the instrument in public traffic. The user of the instrument is responsible for the correct entry of all relevant data as well as for the adjustment of the speedometer and all other functions.

In particular, the fitting of the speed sensor as well as the input of all calculation factors for speed determination must do with great care. The user is also responsible for mounting the instrument, the sensors, and all other accessory parts to the vehicle correctly and securely.

CAUTION! **DO NOT OPERATE THE INSTRUMENT WHILE DRIVING! THIS MAY CAUSE LOOSING CONTROL OVER THE VEHICLE AND WILL RESULT TO A ACCIDENT WITH SERIOUS INJURIES OR DEATH.**

14 Troubleshooting

14.1 After completing installation and at first operation

- Make sure a sufficient device power supply with at least 9V is provided. Please check the proper operation of the vehicle battery.
- The operational test of device with a battery charger is not allowed.
- Check all cables for proper connection and electrical continuity.
- Check all cables for correct polarity, short circuit or short to ground.
- In case of an unstable gear display, check if the stability of the speedometer sensor bracket is sufficient and the clearance between speedometer sensor and magnet is less than 4 mm. Check all rev filters.

- **Test procedure for all device inputs:**
    - Disconnect all connections to the instrument
    - Connect +12V to the brown and red cable plus ground to the black cable only
    - The display should become illuminated showing "motogadget" now. If this is not the case, check the power source and proper polarity.
    - Tip the green cable at the ground contact in a series of short impulses – this input works properly, if different menus are accessed on the LED display
    - Now tip the white cable to vehicle earth for several quick impulses – this input works properly, if there is a display of numbers for SPEED now.
    - Now tip the yellow cable at the ground contact for several quick impulses – this input works properly, if the rev counter bargraph is illuminated
    - When this test has been completed successfully, the device works properly. Please check the device wiring. When this test has not been successfully, please return the device.

## 14.2 Return and complains

If you like to return a defective instrument for repair or change please observes following issues:

- Make sure again there is no connection failure. In doubt use a different voltage source to recheck.
- print and fill the repair return form (refer link below) and attach it http://motogadget.com/media/downloads/support/form_return_repair.pdf
- Not prepaid shipments will be rejected.
- The Shipment to motogadget is carried out by your own risk - you are responsible for a sufficient insurance.
- Make sure the package is adequate.
- If you are located outside the EU, you have to declare "repair item" and value 1 Euro in shipment custom declaration.
- Service provided for all not instrument related malfunctions (i.e. defective connection joints, wrong parameter settings and other vehicle related problems) will be charged with 20 EUR.
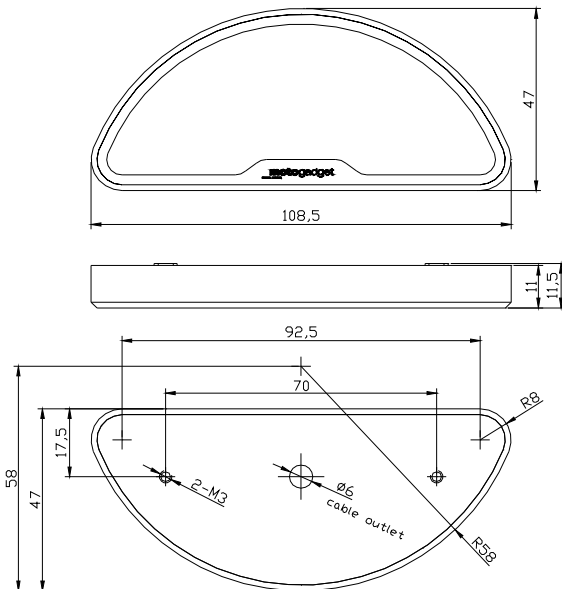- Software updates for extending functionality will be charged with 25 EUR.

The motogadget team wishes you a pleasant and safe ride.
Enjoy your new motoscope PRO.

15 Appendix

15.1 Wiring schematics – motoscope PRO
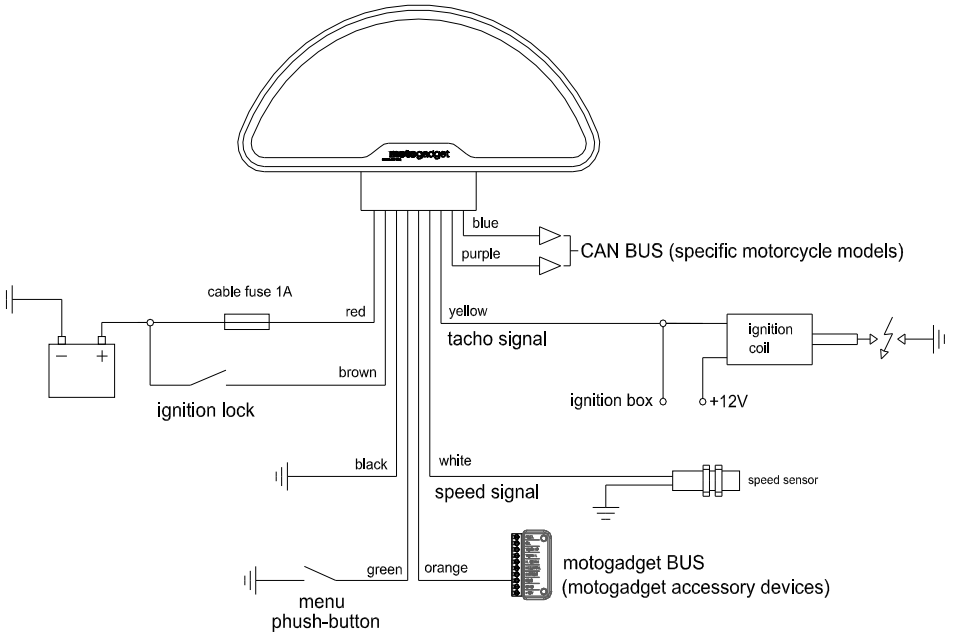
15.2 Dimensions

15.3 Wiring schematics – Breakoutbox for warning lights and fuel sensor (optional accessory)

Mount the Breakoutbox at a spray water protected spot by using two cable ties. Protect the terminals with terminal grease against corrosion. Remove 3mm of wire insulation. Bend-over the cable end and pull a cable sleeve over. Insert the cable sleeve with cable inside into the terminal and tighten the terminal screw.
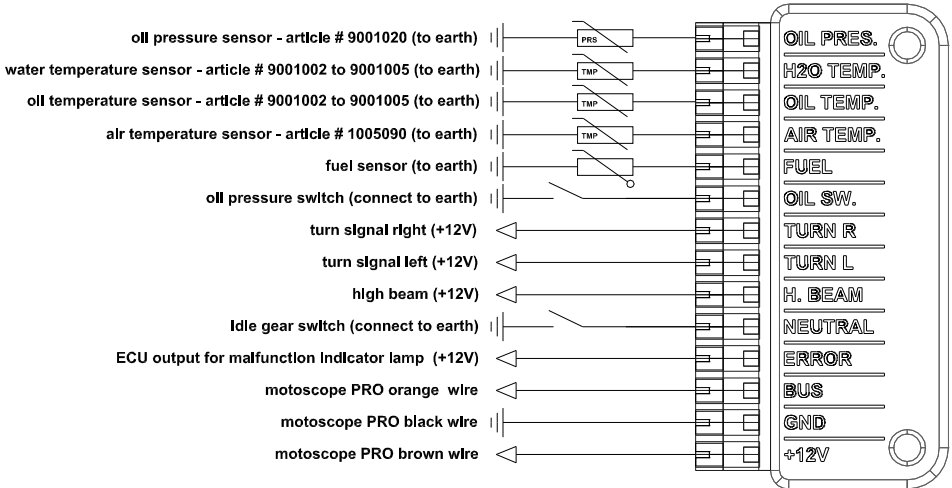
Additional information's for used vehicle fuel sender:

In general there are 3 common types of fuel sender:

1) thermal Resistors (NTC) (i.e. Cagiva, Japanese brands) - low fuel light on/off
2) float switch (i.e. HD Sportster) - low fuel light on/off
3) float Resistor (i.e. HD Softail) - continuous measurement

Sensor type 2 and 3 can be connected directly to breakout-box input FUEL.

Connecting a Thermal resistor fuel sender:

Go to setup menu MESSAGE and set option FUEL to 50%. Furthermore set at SCREEN1 and SCREEN2 option FUEL to OFF.
A additional relay with a coil resistance between 70 and 150 Ohm has to be connected as shown below (left). Alternatively the motogadget m-relay with the motogadget load resistor can connected as shown below (right). Thermal resistor fuel senders need a long time for switching. When teaching the gas tank low and high level please wait in between for 10 minutes. If the installation was successful the message "LOW FUEL" will appear if the low fuel level is reached. To display the fuel tank capacity is not possible.

15.4 Setup menu diagram
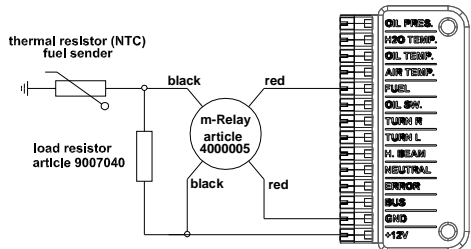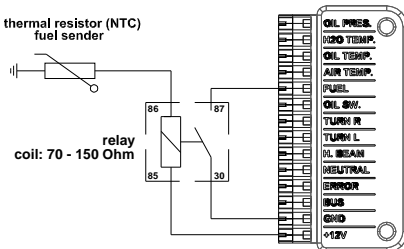
15.5 Table of tire circumferences

front wheel	tire sizes and circumference settings		

16´´ tire inner diameter

tire size	circumference (mm)	tire size	circumference (mm)
100/90-16	1770	130/70-16	1776
110/90-16	1824	130/90-16	1933
120/80-16	1806	150/80-16	1951
120/90-16	1878		

17´´ tire inner diameter

tire size	circumference (mm)	tire size	circumference (mm)
100/80-17	1788	120/70-17	1812
110/70-17	1770	120/80-17	1884
110/80-17	1836	130/60-17	1776
120/60-17	1740	130/70-17	1854

18´´ tire inner diameter

tire size	Abrollumfang (mm)	tire size	circumference (mm)
3.00-18	1894	110/80-18	1912
3.25-18	1930	110/90-18	1978
3.50-18	1960	120/70-18	1888
90/90-18	1869	120/80-18	1960
100/80-18	1863	120/90-18	2032
100/90-18	1924	130/70-18	1930

19´´ tire inner diameter

tire size	circumference (mm)	tire size	circumference (mm)
3.00-19	1972	100/90-19	2002
3.25-19	2008	110/90-19	2057
3.50-19	2038		

21´´ tire inner diameter

tire size	Abrollumfang (mm)	tire size	circumference (mm)
80/90-21	2045	90/90-21	2099

rear wheel	tire sizes and circumference settings		

15´´ tire inner diameter

tire size	circumference (mm)	Reifengröße	circumference (mm)
100/90-15	1770	140/80-15	1827
110/90-15	1824	140/90-15	1912
120/80-15	1806	170/80-15	1972
120/90-15	1878	180/70-15	1912
130/70-15	1776	200/70-15	1996
130/90-15	1933		

16´´ tire inner diameter

tire size	circumference (mm)	tire size	circumference (mm)
100/90-16	1770	150/80-16	1951
110/90-16	1824	160/80-16	1999
120/80-16	1806	180/60-16	1878
120/90-16	1957	180/70-16	1987
130/70-16	1776	200/60-16	1924
130/90-16	1933	240/50-16	1951
140/90-16	1987		

17´´ tire inner diameter

tire size	circumference (mm)	tire size	circumference (mm)
120/90-17	1957	160/60-17	1884
130/70-17	1854	160/70-17	1981
130/80-17	1933	170/60-17	1921
130/90-17	2011	180/55-17	1903
140/80-17	1981	190/50-17	1878
150/60-17	1848	200/50-17	1919
150/70-17	1939	210/50-17	1919
150/80-17	2029		

18´´ tire inner diameter

tire size	circumference (mm)	tire size	circumference (mm)
110/80-18	1912	150/70-18	2014
110/90-18	1978	160/60-18	1960
110/100-18	2099	170/60-18	1996
120/90-18	2032	180/55-18	1981
130/80-18	2008	200/50-18	1951
140/80-18	2057	240/40-18	1960