



made by



**Instruction manual for the
digital ignition switch *m-Lock***

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Please read the following information and recommendations thoroughly and follow these instructions during installation and use of the device.

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CAUTION: IF YOU ARE NOT A CERTIFIED MOTORCYCLE TECHNICIAN PLEASE STOP HERE AND ASK YOUR LOCAL MOTORCYCLE SHOP FOR PROFESSIONAL INSTALLATION!

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Contact:

motogadget GmbH
Köpenicker Str.145
DE- 10997 Berlin
Germany

fon +49-30-27 59 19 20

fax +49-30-27 59 19 22

www.motogadget.com
info@motogadget.de

Version 1.2

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2.1 Duty of registration

The m-Lock does not have to be registered.

Please consider the most modern motorcycle ignition switches already have the handle bar key lock included. In some countries a handle bar key lock is required by registration regulatory.

3 Technical data

Diameter and height	30mm / 14 mm
Weight incl. cable	30g
Treated fastening bores	2 x M3, 5mm deep
Current consumption	2mA stand by 100mA in operation
Operating voltage	7 – 18V (protected against voltage spikes)
Switching power	500mA
Switching distances	Tear Drop Key (20 – 40mm) Glas Tube Key (5 – 10mm; only the transparent end where you can see a tiny coil will switching the m-Lock)
Operating voltage	-20 ... + 80°C

4 Preparation for installing and connecting the m-Lock

4.1 Required knowledge and abilities

Installing and connecting the m-Lock requires knowledge and abilities in electrical installation and connection. The device can be installed on a wide range of different vehicles with different specifications and equipment. For this reason it is not possible to cover all special cases within this description. In cases of doubt, please consult the information supplied on our web site. A second possibility is an installation in a professional shop.

4.2 Required materials for installing and connecting the device

Since the m-Lock is suitable for a variety of vehicles, **additional materials** might be necessary in order to mount the instrument to an individual vehicle. Such materials can include:

- mounting bracket for the m-Lock and fitting screws for the bracket
- cables or cable extensions for voltage-supply and relay
- assembly materials such as cable ties, plug connectors, shrink hose, soldering iron, solder etc.

The use of the original wiring diagram is recommended.

In case you do not use the motogadget mounting accessories, you have to make your own mounting bracket.

5 Installation

5.1 General Safety instructions

- For safety reasons the vehicle **battery must be disconnected** prior to the installation.
- Take particular care that all delivered parts are fastened securely to your vehicle. This is extremely important for your own and other peoples' safety.
- Make sure that your vehicle is equipped with **interference suppressing spark plugs or high tension cables!** Use of with non-suppressed ignition systems can lead to serious damage to the devie.
- You must not machine the plastic housing (sawing, filing and drilling).

5.2 Location of attachment

The maximal distance between m-Lock and key should not greater than 40mm. Any kind of non conductive material, like carbon fibre, plastic or other can be located in between. This fact makes a hidden installation of the m-Lock possible. The device can be placed behind side covers or at other spots, invisible from outside. The area of attachment should be 30cm away from ignition coils, high tension cables and hot engine or exhaust parts.

5.3 Attachment

Make sure the mounting surface is planar. To ensure correct fastening two metric fastening screws must be used (M3). In order to avoid distortions of the threaded bores, the fastening bolts must be screwed into the instrument housing to a minimum depth of 3 mm and a maximum depth of 4 mm. It is therefore important to select screws appropriate to the thickness of the used 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 4 Nm

6 Connection

6.1 Cable routing recommendations

Before routing cables look for suitable cable paths. The cables should be as far away as possible from hot parts of the engine. Look for a suitable place for the respective cables to meet with their plugs and for the plugs to be connected with one another. Make sure you take note of the required lengths of cables before cutting them for best fit. All cables should be routed free of kinks and should not be subject to any tension. In addition, the cables have to be properly isolated, especially in places where mechanical wear can take place. For fastening the cables we recommend cable ties of synthetic material.

6.2 Cable colours, functions, and connections

cable colour	function	connection
Red	Power supply m-Lcok	Plus (+) directly from battery via 1A Fuse
Black	Power supply m-Lock	vehicle earth
Brown	Switching output (drain to +12V)	connect to the relay coil (second coil terminal connect to vehicle earth)

6.3 Battery and voltage supply

The m-Lock requires 12V directly from vehicle battery. Make sure this connection is fused with a 1A fuse. The device can operate in a voltage range from 7 V to 18 V DC. Operating the instrument without a battery, for example, using a direct connection to the vehicle's generator is not possible. Please ensure that the polarity of the voltage supply is correct.

The switching output drain to +12V and can switch loads up to 0,5A. The active output is displayed by an internal LED which is located between the mounting bolts on the rear side. The switching output can only operate a relay.

The delivered relay can switch a maximal current of 50A. The cable diameter for connecting the relay contact 87 and 30 to switch the vehicles power system must dimensioned depending on the maximal switching current. For example switching a current of 50A the least wire cross section must 8mm².

If a high compressed engine is cranked with a pure lead battery the high current flow will cause a voltage drop and the relay may release. Further cranking the engine is not possible. In this particular case is an additional backing capacitor necessary. This capacitor will supply the relay coil in the moment of high current flow. This part has to be ordered separately. Please see the connection scheme for installation; observe polarity.

ATTENTION!

THE LEAST CROSS SECTION OF THE M-LOCK VOLTAGE SUPPLY CABLE IS 0,5MM² (RED CABLE OF THE M-LOCK). YOU MUST FUSE THIS CABLE WITH A 1A FUSE. IF DEVICE WILL BE USED WITHOUT FUSE, DAMAGE AT THE CONNECTING CABLE OR THE M-LOCK ITSELF CAN CAUSE A SHORTCUT AND A CABLE FIRE.

THE MAIN VEHICLE POWER SYSTEM CABLE IS SWITCHED BY THE RELAY. THIS CABLE MUST BE DIMENSIONED AND FUSED IN A PROPPER WAY. IF THE DELIVERED RELAY IS USED THE MAXIMAL SWITCHING CURRENT OF 40A MUST NOT EXCEED. THE DELIVERED RELAY CONNECTORS MUST CONNECT WITH THE CABLE PROPERLY. THE RELAY CONECTORS MUST SOLDER TO THE RELAY CONTACTS. A PERFECT ELECTRICAL CONNECTION OF ALL CONNECTING CABLES MUST ENSURED IN ANY CASE. HIGH CONTACT RESISTANCE AT FAULTY CONNECTION POINTS WILL LEAD TO EXTREME HEAT GENERATION AT THESE POINTS IF HIGH CURRENT IS FLOWING. YOU MUST MAKE SURE THE INSULATION OF ALL CONNECTION CABLES AND CONTACT POINTS IN PARTICULAR THE BATTERY CABLE IS DONE IN A PROPPER WAY. A SHORT CIRCUIT WILL LEAD TO A CABLE FIRE AND TO THE EXPLOSION OF THE VEHICLES BATTERY.

NON COMPLIANCE WITH THESE INSTRUCTIONS WILL LEAD TO SERIUS OR LETHAL INJURIES. YOU MUST CARRY OUT ALL WIRING, CONNECTING, CHRIMPING, SOLDERING AND INSULATING WORK PROPERLY. IF YOU ARE NOT SURE TO ACCOMPLISH THE CONNCETION AND INSTALATION PROPERLY LET THE PROFFESIONAL GARAGE DO THE JOB!

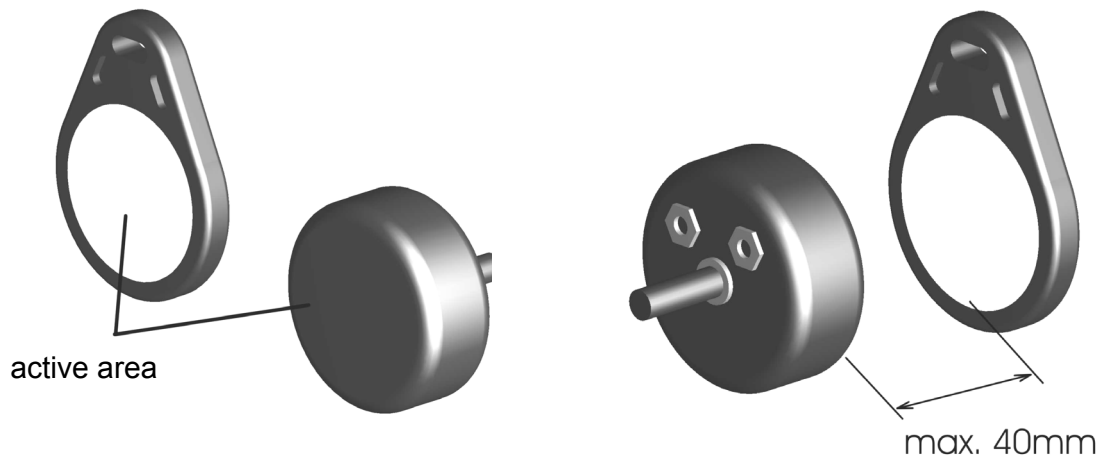
7 How it works

The functional principle is based on cutting edge RFID (Radio Frequency Identification) technology. The m-Lock is sending electromagnetic pulses from a certain frequency. These pulses induct a voltage inside a coil which is integrated in the key. A tiny micro chip is connected to this coil and powered by this coil. The chip is now able to send its signature back to the m-Lock. Each Key in the world has a unique signature. The vehicle power will be switched only if the m-Lock recognizes the right key signature. The big advantage at this technology it its reliability because no batteries inside the key are necessary. The electromagnetic pulses can penetrate any non conductive material. This fact makes it possible to install the m-Lock invisible from outside behind plastic materials. Also the key itself can be hidden, e.g. sewn in a glove finger tip or inside a key fob.

The m-lock stand by current is 2mA. This means a battery of a capacity of 10Ah is empty after 7 months. We recommend to disconnect the battery from vehicles power system and m-Lock in periods of not using the motorcycle longer than 5 months (winter).

8 Operation

For switching the vehicles power system the active area of the key must approximate to the active area of the m-Lock. For safety reasons the maximum operation distance between key and m-Lock is limited is to 40mm (this distance is varying on key shape and type). Furthermore a switching delay is existing. Once the power is switched on it can be switched off only after a delay of 2 seconds.



9 Keys

Part of delivery are two keys in tear drop shape:

- Master key
- User key.

9.1 Master key

The master key is used to teach other user keys to the m-Lock. This key is marked with a red sticker. This key has to be remaining in safe place at home.

9.1.1 Apply the master key

If approximating the master key to the m-Lock the vehicle power will be switched on and after 1 second off again. This is the signal to start the teach procedure. Now the new key(s) have to be approximate to the m-Lock one by one. At each new recognized key the vehicle power will be switched on and off shortly. If the teach procedure is once started all former keys will be deleted. This means all keys which will be used with the m-Lock must teach during one procedure. Maximum three keys can be teach to the m-Lock.

The teaching procedure will be finished if:

- maximum amount of tree keys has been reached
- approximate the master key again to the m-Lock
- if no more key will approximate within 60 seconds.

If the teach procedure is finished successfully the vehicle voltage is switched on for 3 seconds and off again. The teach process can be repeated as often as required.

9.2 User key

The user key is used to switch the vehicles power on and of.
All user keys can swap without restriction.

9.2.1 Apply the user key

If approximate the active area of the user key to the active area of the m-Lock closer than 40mm the vehicle power will be switched on and if approximate again it will switch the power off.

For safety reasons a time delay of 2 seconds is between both switching activities.

If the m-Lock is not used for 48 hours it will activate the current save modus. This means switching vehicles power the first time after a rest longer than 48 hours requires an approximation time from key to m-Lock of 2 seconds.

10 Troubleshooting

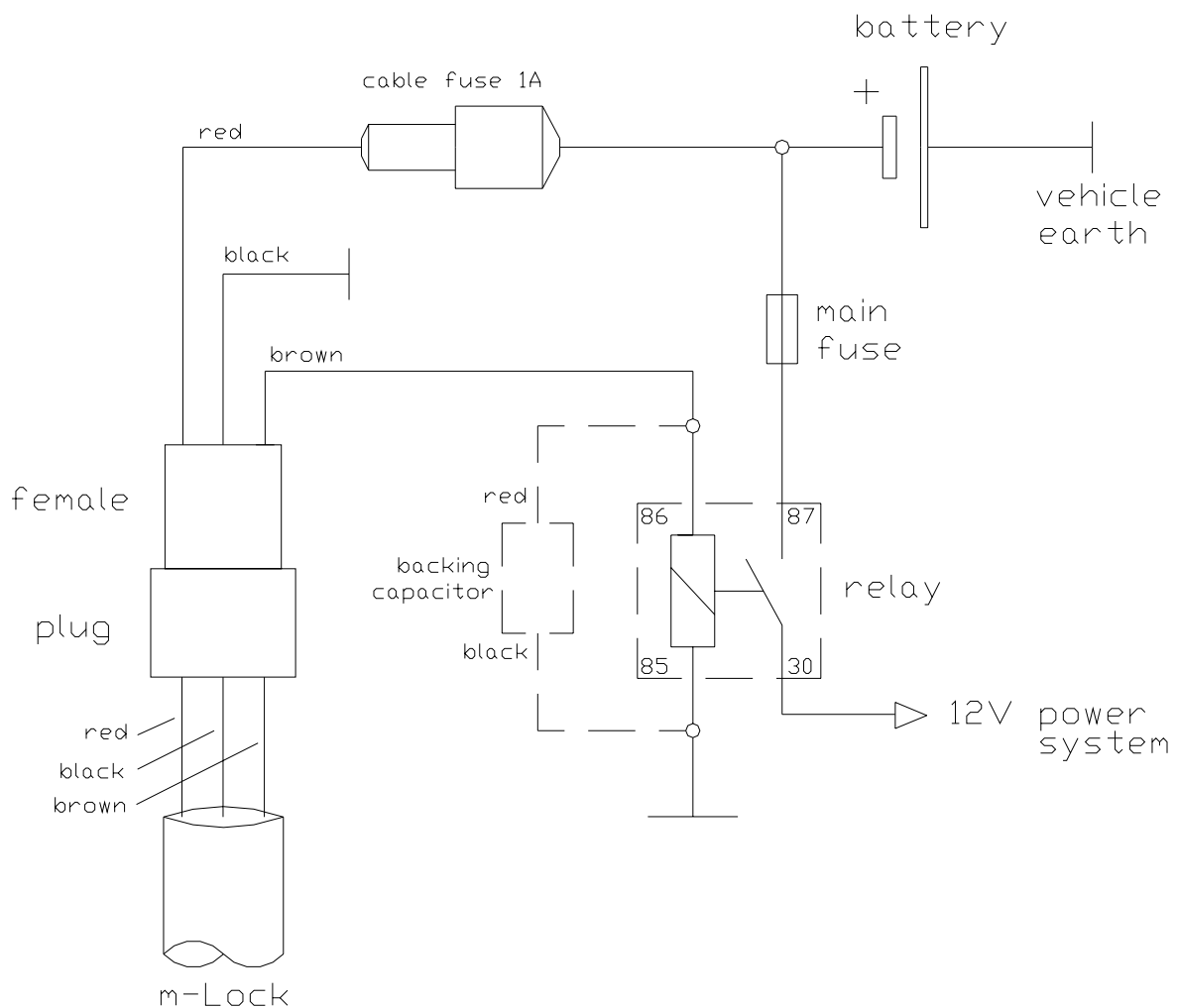
10.1 After Installation

- The vehicle voltage should be larger than 9V. If during cranking the engine the vehicle voltages drop below 6V the relay will release and causes a vehicle power shut down. Therefore make sure the battery is in a good condition and fully loaded.
- Check all cables and connections for correct connection and proper contact.
- Check all cables for reverse polarity and short circuit.
- Make sure your vehicle is equipped with interference suppressing spark plugs or high tension cables. Use of the m-Lock with non-suppressed ignition systems can lead to serious damage to the device!

10.2 Malfunctions in general

- If the above listed recommendations are not solve the problem you will find additional information at our website (support).
- If you need further help, please contact us by email support@motogadget.de.

11 Connection scheme



The *motogadget* team wishes you pleasant and safe riding, and lots of fun with your new m-Lock.