

Dealer Operation/ General Manager	Sales- Motorcycles	Sales - Used Motorcycles	Business Manager (F&I)	Service	Parts & Accessories	Administration
Date: January 2006 Bulletin # 61 001 06 (003) R		Source: 61 59/2005 BMW Motorrad USA Service and Technical			Revised May 2015	



# BMW Motorrad

## USA

### Service Information Bulletin

**Subject:** Idle current measurement

**Model:** All Models

**Details:** If a customer complains of a “flat battery” after the motorcycle has been standing for only a short period of time or a few days, the first step in diagnosing the issue is to measure the idle current of the battery.

**NOTE:** Idle current measurements are taken when the engine is not running. The key positions are off, run and steering lock.

The following information is outlined throughout the bulletin:

- Time the control units remain ‘On’ after the ignition is switched ‘Off’
- Acceptable idle current for each model
- How to properly connect a multimeter to measure the idle current

**Time period  
control units  
remain active:**

After the ignition is switched off on K2x<sup>1)</sup> and K4x<sup>2)</sup> models, the following control units remain active under normal circumstances

Control unit (K2x and K4x)	Time period
ZFE (Central Frame Electronics)	60 seconds (this is the time the hazard warning flasher button remains lit, if equipped <sup>5)</sup> )
Instrument panel w/o alarm system (R 1200 GS/K25)	5 seconds (0 seconds as of model year 2006 - Terminal ‘R’ no longer present)
Instrument Panel w/o alarm system (R 1200 RT / K26)	0 seconds
BMS K	3 seconds
Alarm system (deactivated)	0 seconds
Alarm system/LED activated	3/7/10 days or indefinitely
FGR <sup>3)</sup> (R 1200 RT / K26 only)	0 seconds
RBT <sup>4)</sup> / radio (R 1200 RT / K26 only)	20 minutes

**Acceptable idle current:** The following tables provide the acceptable idle current for each model with-out an alarm system fitted. **Table 1: Idle current for Non- CAN bus Bikes. Table 2: Idle current for CAN Bus bikes.**

The values specified in the table can vary by +/- 15% on motorcycles of the same model.

For reference: 1A = 1000 mA  
1mA = 0.001 A

**Table 1 Guide values for idle current (no CAN bus) UPDATE 09/2011**

Models	Ignition "RUN" Position	Ignition "OFF" Position
R 1150 GS (R21)(0415/0495)	2.7 mA	2.7 mA
R 1150 RT (R22)(0419/0499)	3.1 mA	2.6 mA
R 1150 RS (R22)(0447/0498)	3.0 mA	3.0 mA
R 1150 R (R28)(0429/0439)	1.9 mA	1.9 mA
R 1150 Rockster (R28)(0308/0318)	1.9 mA	1.9 mA
R 1100 S (R259S)(0422/0432)	1.9 mA	1.9 mA
R 1200 C (R259C)(0424/0434)	1.9 mA	1.9mA
R 1200 Montauk (R259C/02)(0309/0319)	2.6mA	2.6 mA
R 1200 CL (K30)(0442/0496)	4.7 mA	3.9 mA
K 1200 LT (K589/03)(0549/0559)	4.8 mA	3.9 mA
K 1200 RS (K41)(0547/0557)	2.2 mA	2.2 mA
K 1200 GT (K41)(0548/0558)	2.2 mA	2.2 mA
F 650 GS Facelift (R13)(0175-0185)	0.9 mA	0.9 mA
F 650 Dakar (R13)(0176/0186)	0.9 mA	0.9 mA
F 650 CS (K14)(0174/0184)	1.1 mA	1.1 mA
C1, C1-200 (0191/0192)	99.0 mA	1.7 mA
G 650 Xcountry (K15)(0164/0194/0414/0151)	0.3 mA	0.3 mA
G 650 Xchallenge (K15)(0165/0195)	0.3 mA	0.3 mA
G 650 Xmoto (K15)(0167/0197)	0.3 mA	0.3 mA
G 450 X (K16)(0145)	0.1µA	0.1µA
G 650 GS (R13/31)(0171/0778/0179/0180)	0.9 mA	0.9 mA
G 650 GS (R13/40)(0188/0189/0135)	0.9 mA	0.9 mA

1)Equipment: With BC VOICE 1, with CD changer, DWA 5.0, without BMW Motorrad Navigator, without two-way radio

2)Idle current is significantly higher within a one-hour period, because the radio operating panel is active during this time

3)Equipment: With FUN audio, ABS

**Possible configurations:**

- All motorcycles except K 1200 LT (K589/03, 0549/0559) are WITHOUT anti-theft alarm (DWA) - The idle currents were measured without electrical optional accessories (e.g. satnav) connected

**Table 2 Guide values for idle current (CAN bus) UPDATE 09/2011**

Model	Year	Ignition "OFF"	Ignition "Steering lock"
R 1200 GS (K25)(0307/0317)	2004-2005	3.8 mA	2.5 mA
R 1200 GS (K25)(0307/0317)	1 <sup>st</sup> half of 2006	2.5 mA	2.5 mA
R 1200 GS (K25)(0307/0317)	2 <sup>nd</sup> half of 2006	1.6 mA	1.6 mA
R 1200 GS (K25)(0307/0317)	2007	0.7 mA	0.7 mA
R 1200 GS Adventure (K25/02)(0382/0397)	1 <sup>st</sup> half of 2006	2.5 mA	2.5 mA
R 1200 GS Adventure (K25/02)(0382/0397)	2 <sup>nd</sup> half of 2006	1.6 mA	1.6 mA
R 1200 GS Adventure (K25/02)(0382/0397)	2007	0.7 mA	0.7 mA
R 1200 GS (K25/11)(0303/0313)	2008	0.8 mA	0.8 mA
R 1200 GS (K25/11)(0303/0313)	2009	0.7 mA	0.7 mA
R 1200 GS Adventure (K25/12)(0380/0390)	2008	0.8 mA	0.8 mA
R 1200 GS Adventure (K25/12)(0380/0390)	2009	0.7 mA	0.7 mA
<b>R 1200 GS (K25/31) (0450/0460)</b>	<b>2010-2011</b>	0.7 mA	0.7 mA
<b>R 1200 GS Adventure (K25/32) (0470/0480)</b>	<b>2010-2011</b>	0.7 mA	0.7 mA
HP2 Enduro (K25/HP)(0369/0389)	2006	1.8 mA	1.8 mA
HP2 Megamoto (K25/03) (0310/0320)	2008	0.6 mA	0.6 mA
R 900 RT /1200 RT (K26)(0368/0367, 0388/0387)	2005-2006	4.9 mA	2.5 mA
R 900 RT /1200 RT (K26)(0368/0367, 0388/0387)	2007	4.2 mA	2.0 mA
R 900 RT /1200 RT (K26)(0368/0367, 0388/0387)	2008	2.0 mA	2.0 mA
R 900 RT /1200 RT (K26)(0368/0367, 0388/0387)	2009	1.7 mA	1.7 mA
Second battery for Special Vehicle R 900 RT /1200 RT (K26)(0368/0367, 0388/0387)	2007-2009	1.0 mA	1.0 mA
<b>R 900 RT / R 1200 RT (K26/11) (0330/430, 0340/0440)</b>	<b>2010-2011</b>	0.55 mA	0.55 mA
<b>Second battery for Special Vehicle R 900 RT /1200 RT (K26/11)(0330/430, 340/0440)</b>	<b>2010-2011</b>	0.55 mA	0.55 mA
R 1200 R (K27)(378/0398)	2006-2010	1.5 mA	1.5 mA
<b>R 1200 R (K27/11)(0400/0490)</b>	<b>2011</b>	0.5 mA	0.5 mA
R 1200 ST (K28)(0328/0338)	2005-2006	2.5 mA	2.5 mA
R 1200 ST(K28)(0328/0338)	2007	0.7 mA	0.7 mA
R 1200 S (K29)(0366/0396)	2006	1.6 mA	1.6 mA
R 1200 S (K29)(0366/0396)	2007	0.7 mA	0.7 mA
HP2 Sport (K29/HP)(0458/0468)	2008-2010	0.7 mA	0.7 mA
K 1200 S (K40)(0581/0591)	2004-2005	3.8 mA	2.5 mA
K 1200 S (K40)(0581/0591)	1 <sup>st</sup> half of 2006	2.5 mA	2.5 mA
K 1200 S (K40)(0581/0591)	2 <sup>nd</sup> half of 2006	1.6 mA	1.6 mA
K 1200 S (K40)(0581/0591)	2007	0.8 mA	0.8 mA
K 1200 S (K40)(0581/0591)	2008	0.7 mA	0.7 mA
K 1300 S (K40/11)(0508/0509)	2009-2011	0.7 mA	0.7 mA
K 1200 R (K43)(0584/0594)	2004-2005	3.8 mA	2.5 mA
K 1200 R (K43)(0584/0594)	1 <sup>st</sup> half of 2006	2.5 mA	2.5 mA
K 1200 R (K43)(0584/0594)	2 <sup>nd</sup> half of 2006	1.6 mA	1.6 mA
K 1200 R (K43)(0584/0594)	2007	0.8 mA	0.8 mA
K 1200 R (K43)(0584/0594)	2008	0.7 mA	0.7 mA
K 1300 R (K43/11)(0518/0519)	2009-2011	0.7 mA	0.7 mA
K 1200 R Sport (K43HV) (0585/0595)	2007	0.8 mA	0.8 mA
K 1200 GT (K44) (0587/0597)	2006	2.6 mA	2.6 mA
K 1200 GT (K44) (0587/0597)	2007-2008	2.2 mA	2.2 mA
K 1300 GT (K44/31) (0538/0539)	2009-2010	2.3 mA	2.3 mA
<b>S 1000 RR (K46) (0507, 0517)</b>	<b>2010-2011</b>	0.04 mA	0.04 mA

**Table 2 Continued**

Model	Year	Ignition “OFF”	Ignition “Steering lock”
<b>K 1600 GT (K48) (0601, 0611)</b>	<b>2011</b>	0.3 mA	0.3 mA
<b>K 1600 GTL (K48) (0602, 0612)</b>	<b>2011</b>	0.3 mA	0.3 mA
F 800 S (K71) (0216/0226)	2006- <b>2010</b>	1.3 mA	1.3 mA
F 800 ST (K71) (0234/0244)	2006- <b>2011</b>	1.3 mA	1.3 mA
F 800 GS (K72) 0219, 0229, <b>0225</b> )	2008	1.4 mA	1.4 mA
F 800 GS (K72) 0219, 0229, <b>0225</b> )	2009- <b>2011</b>	1.3 mA	1.3 mA
F 650 GS (K72) (0218/0228)	2008	1.4 mA	1.4 mA
F 650 GS (K72) (0218/0228)	2009- <b>2011</b>	1.3 mA	1.3 mA
F 800 R (K73) (0217, 0227, <b>0215</b> )	2009- <b>2011</b>	1.3 mA	1.3 mA

<sup>1</sup> **LED strobe marker light and two-way radio (manufacturer: GCD)**

**Note:**

If other-make electrical accessories are installed, it is very important to proceed in accordance with PuMA measure 11596813. The values can vary ± 15 % from those stated.

**Possible configurations:**

- All motorcycles are WITHOUT anti-theft alarm (DWA)
- All motorcycles except the HP2 have BMW Motorrad Integral ABS Generation I up to model year 2005 - BMW Motorrad Integral ABS Generation II was available from model year 2007 onward
- R 1200 RT is equipped with radio and cruise-control system
- The idle currents were measured without electrical optional accessories (e.g. satnav) connected

**Important Note:** If an alarm is fitted, the idle current pulsates. The tables below show the average level for the pulsating idle current in each case. **Table 1: Guide values for idle current (DWA). Table 2: Guide values for idle current, BMW Motorrad with / without anti-theft alarm system (DWA).**

For motorcycles equipped with an alarm, add the values of the two tables together to come up with the acceptable idle current.

**Table 1** Guide values for idle current (DWA)

	Valid <b>up to</b> CIP 12.0 = 37th I-stage K024-08-08-500			
	not active		active	
CAN bus DWA 6.0	Max. current)*	Average current	Max. current)*	Average current
	11.2 mA	1.5 mA	17.5 mA	1.8 mA
DWA LED in the instrument panel			Max. current)*	Average current
			60.0 mA	0.5 mA
	Valid <b>as of</b> CIP 13.0 = 43rd I-stage K024-09-02-500			
	Following a 1h delay after ignition is		Following a 1h delay after ignition is	
CAN bus DWA 6.0	Current		Current	
	0.06 mA		0.06 mA	
DWA LED in the instrument panel			Max. current)*	Average current
			60.0 mA	0.5 mA
	1 hour after the ignition has been switched off, the radio-control standby function for the remote control unit in the DWA control unit is deactivated. This means that from then on, the <b>ONLY</b> way of deactivating the anti-theft alarm (DWA) is to switch on the ignition!!!			

**Note:**

If after market electrical accessories are installed, it is very important to proceed in accordance with PuMA measures 11596813 and 24084897. The values can vary  $\pm 15\%$  from those stated.

**)\* Note:**

It is not possible to measure these maximum currents with a digital multimeter. The current fluctuates and the maximum is achieved for only a few milliseconds. On account of its "measuring inertia", a digital multimeter cannot show these values on its display.

## Appendix 4: Guide values, idle current update 2015.

### Guide values for idle current, BMW Motorrad with / without anti-theft alarm system (DWA) **UPDATE 01/2015**

Model	Ignition switch OFF & steering lock		
	DWA active	without DWA	
R 1200 GS (K25) (0450, 0460)	1.63 mA	0.60 mA	DWA6
R 1200 GS Adventure (K25) (0470, 0480)	1.63 mA	0.60 mA	
R 900 RT / R 1200 RT (K26) (0330, 0430, 0340, 0440)	1.74 mA	0.66 mA	
R 1200 R (K27) (0400, 0490)	1.63 mA	0.60 mA	
R 1200 GS (K50) (0A01, 0A11)	1.22 mA	0.06 mA	DWA8
R 1200 GS Adventure (K51) (0A02, 0A12)	1.22 mA	0.06 mA	
R 1200 RT (K52) (0A03, 0A13)	1.51 mA	0.09 mA	
R 1200 R (K53) (0A04, 0A14)	1.22 mA	0.06 mA	
R 1200 RS (K54) (0A05, 0A15)	1.22 mA	0.06 mA	
HP 4 (K42) (0D01, 0D11)	0.64 mA	0.05 mA	DWA6
S 1000 RR (K46) (0524, 0534, 0507, 0517)	0.64 mA	0.05 mA	
S 1000 RR (K46) (0D10, 0D21)	0.76 mA	0.06 mA	DWA8
S 1000 R (K47) (0D02, 0D12)	0.76 mA	0.06 mA	
S 1000 XR (K49) (0D03, 0D13)	0.76 mA	0.06 mA	
K 1600 GT (K48) (0601, 0611)	1.14 mA	0.90 mA	DWA8
K 1600 GTL (K48) (0602, 0612)	1.14 mA	0.90 mA	
K 1600 GTL Excl. (K48) (0603, 0613)	1.14 mA	0.90 mA	
F 700 GS (K70) (0B01, 0B11)	2.29 mA	1.28 mA	DWA6
F 800 GT (K71) (0B03, 0B13)	2.29 mA	1.28 mA	
F 800 S (K71) (0216, 0226)	2.29 mA	1.28 mA	
F 800 ST (K71) (0234, 0244)	2.29 mA	1.28 mA	
F 800 GS (K72) (0219, 0229, 0B02, 0B12)	2.29 mA	1.28 mA	
F 800 R (K73) (0217, 0227, 0B04, 0B14)	2.29 mA	1.28 mA	
F 800 R (K75) (0B05, 0B15)	2.29 mA	1.28 mA	
G 650 GS (R13) (0188, 0189)	4.40 mA	0.90 mA	DWA5.1
G 650 GS Sertao (R13) (0136, 0146)	4.40 mA	0.90 mA	

#### Comment:

- 1) Vehicles with **Keyless Ride** have an idle-current consumption that is higher by approx. 0.55 mA.
- 2) M-Box is **not** suitable for this measurement. (Because the current probe is designed for a higher measuring range)
- 3) Multimeters often have only 2 mA as the lowest measuring range for current measurement; accuracy in this range is approximately 2.5% of the measuring range. Therefore: measured current can deviate from the true value by as much as  $\pm 0.05$  mA.
- 4) When measuring with a multimeter, brief current peaks have to be ignored. This in turn leads to a deviation between measured values and this table (measured value often turns out to be lower).
- 5) Measured current with DWA installed but not active is slightly lower than is the case with DWA active.

**Preconditions to  
Measuring idle  
current:**

Before performing the idle current measurement the following preconditions must be reviewed:

1. If the customer/dealer has disconnected and then reconnected the flat battery, the software in the control units will have been 'reset' and any possible software errors deleted. In that case, the idle current measurement will not provide any usable results.

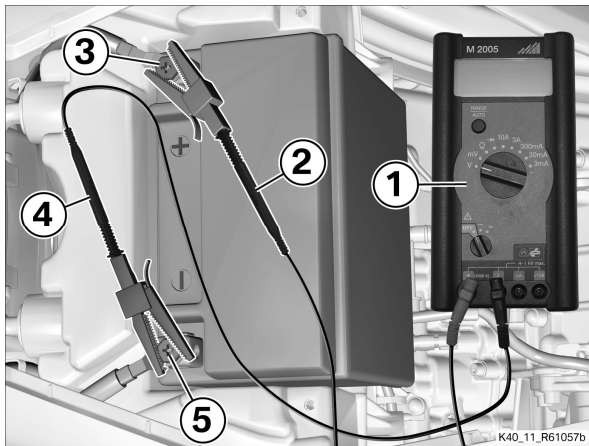
Before starting any electrical diagnosis, always verify the current battery voltage - age to ensure that a good battery is installed in the motorcycle.

### Measuring battery voltage

Set the correct voltage measurement range on the multimeter.

**Example:** always select the smallest possible measurement range for the voltage being measured, i.e. if the expected voltage is 14.4V, set the measurement range to 20V DC, not 200V DC.

Record battery voltage on the measured data sheet.



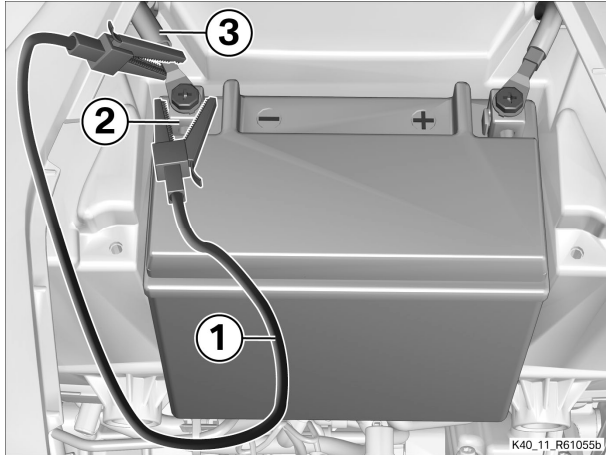
- ♦ **Set meter 1 to the appropriate voltage range.**
- ♦ **Hold probe tip 2 against positive terminal 3 of the battery and probe tip 4 against negative terminal 5 of the battery.**

### Measuring idle current:

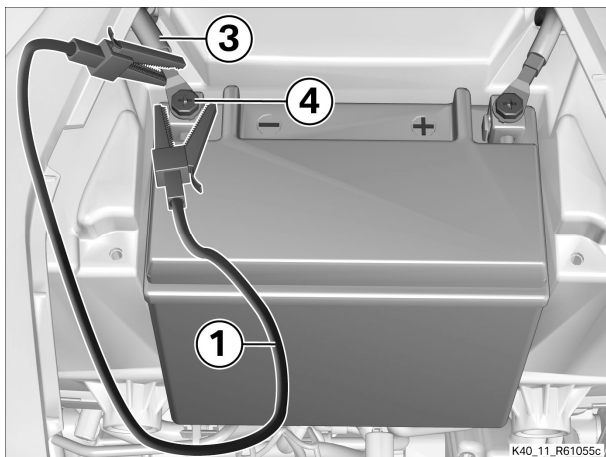
The following instructions outline the steps to measure the idle current using a conventional multimeter. The accompanying photos are in color, therefore, we recommend printing the bulletin from a color printer for better understanding.

These instructions are outlined in a video. **That is soon to be released in TMSI.**

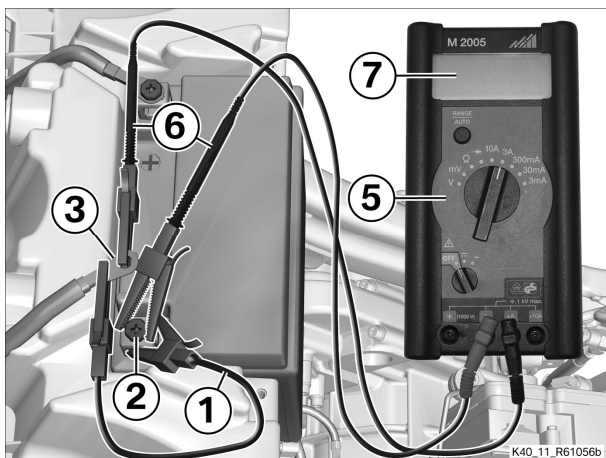
### Idle-current measurement



- ♦ **Connect jumper 1 to negative terminal of battery 2 and to cable shoe of wiring harness 3.**
- » **This is to prevent a reset of the electronic control units when the battery is disconnected.**



- ♦ **Remove screw 4 and remove cable 3.**



- ♦ **Set multimeter 5 to the highest measuring range, connect clips 6 to battery negative terminal 2 and cable shoe of wiring harness 3. It is very important to check that the cables are correctly connected to the multimeter and the battery.**
- ♦ **Disconnect jumper 1 and read the current from scale 7.**
- ♦ **Perform two**
  - **measurements: with ignition OFF**
  - **with ignition switch/steering lock locked**

**Note: If multimeter shows a measured current of 0.0 A. Then check the fuse in the multimeter; replace if necessary and repeat the measurement.**

**Record all measured currents on the measured data sheet.**



**PuMA Case:** If a motorcycle is found to have an excessive idle current draw, please create a PuMA case including [ISTA](#) diagnosis results and the measured data sheet. In the PuMA case, mention [all](#) optional accessories [or after-market accessories](#) that have been fitted by BMW and/or third-party providers, e.g. CD changer, BC VOICE, navigation system, additional headlights, [Fuel and Ignition management systems](#), etc.

**Warranty:** The terms of the new motorcycle warranty apply.

**Warranty Information:** If a motorcycle is found to have a defective electrical system and the idle current measurement is a relative test in diagnosing the problem, the labor involved in performing the test can be claimed through warranty.

A completed Idle Current Measurement sheet ([Appendix 1](#)) must be attached to the repair order and filed in the Vehicle History File.

An Idle Current Measurement Sheet ([Appendix 1](#)) is attached to the bulletin, or can be found on Centernet following the path below:

Centernet > Service > Forms and Checklists

**NOTE:** If, on account of after market electrical accessories (not genuine BMW Motorrad accessories), idle current is higher than the value stated in the idle current table, the discharged state of the battery is due to this and is not covered by the terms and conditions of warranty.

Use the following [Defect and](#) labor codes when entering a warranty claim:

Defect code	61 21 00 12 00 = Battery Failed
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FRU Codes [Please refer to the RSD for the most current FRU Times.](#)

K2X Models	61 21 005 (main job)	2 FRU, Idle current test.
K4X Models	+61 21 505 (associated work)	1 FRU, Idle current test.
K7X Models	62 21 005 (main job)	3 FRU, Idle current test.
	+61 21 505 (associated work)	2 FRU, Idle current test.
K46 Models	62 21 005 (main job)	3 FRU, Idle current test.
	+61 21 505 (associated work)	1 FRU, Idle current test.

K2X = All R 1200 models with CAN bus, e.g. K25 (R 1200 GS), K25HP (HP2), K26 (R 1200 RT), K28 (R 1200ST), [K27 \(R 1200 R\)](#), [K29 \(R 1200 S\)](#), [K21 \(R nine T\)](#),

K4X = All K 1200/1300 models with CAN bus, e.g. K40 ([/11](#)) (K 1200 S)([K 1300 S](#)), K43 ([/11](#)) (K 1200 R)([K 1300 R](#)), [K44 \(/31\)](#) (K 1200 GT)([K 1300 GT](#)),[K43 \(K 1200 R Sport\)](#), [K48 \(K 1600 GT/GTL/GTLE\)](#)

K7X = All F 800/700/650 models with CAN bus, e.g. K70/11 (F 700 GS), K71 (F 800 S/ST), K71/11 (F 800 GT), K72(/11) (F 800 GS), K73/02 (/11) (F 800 R), K75 (F 800 GSA).

[Appendix 1: Measured-data record: Idle current measurement](#)

[Appendix 2: Measured-data record: Long-term measurement, Idle voltage and idle current](#)

## Measured-data record: idle-current measurement

Vehicle identification number	Motorcycle type	Odometer reading	Date

### 1. Battery voltage

Ignition switch 'OFF'
V

### 2. Total idle current

Terminal 'R'	Ignition switch 'OFF'
mA	mA

### 3. Procedure if idle current at No. 2. is higher than specified

- While measuring current, disconnect the plugs of the control units one after the other
- Note the new idle-current reading for each disconnected control unit in succession in the table.
- Continue successively disconnecting the plugs from the control units until the idle current drops below the limit specified in Table 2 of SI Supplement 59/2005 CG 61.

Control unit	Idle current	
	Terminal 'R'	Ignition switch 'OFF'
ZFE <sup>1</sup>	mA	mA
Instrument panel	mA	mA
ABS (if installed)	mA	mA
BMS-K <sup>2</sup>	mA	mA
ESA <sup>3</sup> (if installed)	mA	mA
DWA (if installed)	mA	mA
Radio (if installed)	mA	mA
RBT <sup>4</sup> (if installed)	mA	mA
RDC <sup>5)</sup> (if installed)	mA	mA
Starter	mA	mA
Alternator	mA	mA
Starter relay	mA	mA

Electrical BMW OA		mA		mA
Electrical other-make OA				mA

- 1 Central frame and suspension electronics
- 2 BMW electronic engine management unit (R models and K models)
- 3 Electronic Suspension Adjustment
- 4 Radio operating panel
- 5 RDC = Tyre pressure monitoring system
- 6 RBT = Radio operating panel

**4. Use the ISTA Diagnostics to read out the entries in fault memory and, if necessary, use "Interactive Diagnosis" to process the faults.**

## Measured-data record for long-term measurement, idle voltage and idle current

Use this measured-data record to check for possible battery discharge after relatively short lay-ups of 1 to 4 weeks.

Vehicle identification number	Motorcycle type	Odometer reading

Note: Perform long-term measurement with the optional accessories and other-make accessories connected.

### Procedure

1. Fully charge the battery.
2. Perform the battery load test.
  - If the outcome of the test is successful, again fully recharge the battery.
  - If the battery test aborts, replace the defective battery.
3. Leave the motorcycle standing only for the period of time to which the complaint refers (at least 1 week, maximum 4 weeks) for the test and during this lay-up period **do not** switch on the ignition.
4. On the next day and on each subsequent day and always at the same time, measure the battery's idle voltage and idle current and enter the measured values in the table below.
  - Note: When measuring idle current, make sure that the battery is not briefly disconnected for a short time in the process of connecting the multimeter. Briefly disconnecting the battery triggers a RESET in the control units, which means that if a fault occurred beforehand it will be deleted from memory.

After one week, the idle voltage should not have dropped below 12.5 V.

### Measured-values log, week 1

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Date							
Idle voltage	V	V	V	V	V	V	V
Idle current	mA	mA	mA	mA	mA	mA	mA

### Measured-values log, week 2

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Date							
Idle voltage	V	V	V	V	V	V	V
Idle current	mA	mA	mA	mA	mA	mA	mA

### Measured-values log, week 3

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Date							
Idle voltage	V	V	V	V	V	V	V
Idle current	mA	mA	mA	mA	mA	mA	mA

### Measured-values log, week 4

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Date							
Idle voltage	V	V	V	V	V	V	V
Idle current	mA	mA	mA	mA	mA	mA	mA

