External closed-circuit current measurement

All series

Situation: Intermittently, increased closed-circuit current may occur in the vehicle. This may be caused by faulty control units.

Effect: Increased closed-circuit current could cause the battery to discharge. A poor battery charge balance, especially in conjunction with an unfavourable driving profile with frequent short journeys and/or lengthy periods spent parked, will enhance this process.

Affected vehicles: All series

Action: To evaluate possible faults in the vehicle electrical system, the closed-circuit current must be recorded over a lengthy period of time.

Procedure: **Closed-circuit current measurement with 50-amp clip-on probe**

For reasons of safety, adapter 61 2 300 should no longer be used for closed-circuit current measurement. The time necessary to install the adapter is not needed if the 50-amp clip-on probe is used. This is used in conjunction with a Group Tester One (GT1) or DISplus tester.

The GT1 or DISplus tester in "Recorder mode" is extremely well suited for prolonged measurement of the closed-circuit current.

Note for E60, E61, E63, E64:

For internal closed-circuit current measurement within the DIS (Diagnosis and Information System), run the following test module under "Function selection":

"Service functions" > "Body" > "Power supply" > "Closed-circuit current"

Important:

The control units can be reset by disconnecting the battery so that any closed-circuit current which was previously present is eliminated. This is particularly important if the vehicle has broken down due to a discharged battery.

In such cases, the true cause of the customer complaint cannot be found and rectified, with the result that the customer may have to make several visits to the workshop.

Vehicle preparation

- The battery must be sufficiently charged (at least 12 volts). If necessary, recharge the battery.
- Uncover the battery negative wire in the vehicle.

  E65, E66 only:

  Uncover the battery positive wire to the power module in the vehicle.
- Activate all items of equipment which are active when the vehicle is not in use, e.g. rodent protection, anti-theft alarm system.
- Switch off all other electrical consumers, paying particular attention to the telephone and any retrofitted special equipment.
- Battery in engine compartment:

  Close and lock the luggage compartment. Then open the engine bonnet and pull the engine bonnet contact switch fully up and lock it into place (workshop position, simulates the engine bonnet being closed).
- Battery in luggage compartment:

Close the engine bonnet. Then open the luggage compartment and turn the lock to the locked position with the rear lid still open using a screwdriver or similar (simulates the luggage compartment being closed).

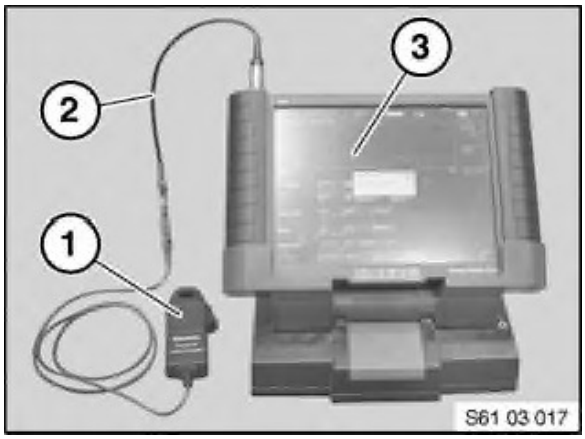
- Depending on the installation location of the battery, either the front lid or the rear lid will remain open.
- Open the driver's door and close it again (simulates somebody getting in).
- Switch the ignition on for at least 5 seconds and then switch it off again (simulates driving).
- Open and close the driver's door again (simulates somebody getting out).
- Lock the vehicle.

Connecting the 50-amp clip-on probe to the GT1 or DISplus tester

Connecting to GT1:

Note:

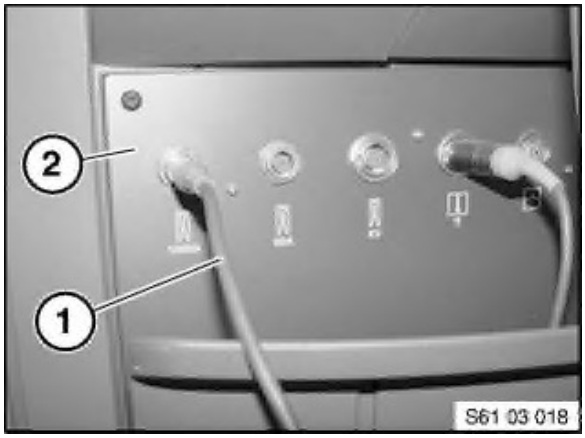
The Group Tester One (GT1) must be connected to the docking station for all prolonged measurements.



Connect cable from 50-amp clip-on probe (1) to the 2/3 adapter (2).

Connect the 2/3 adapter (2) to the Group Tester One (GT1) (3).

Connecting to DISplus tester:



Connect cable from 50-amp clip-on probe (1) directly to the DISplus tester (2).

Note:

The 50-amp clip-on probe is calibrated according to the instructions on the screen of the diagnosis system used as the settings are made. As this happens, the 50-amp clip-on probe must not be connected to the vehicle.

Setting the GT1 and DISplus tester for prolonged measurements

Note:

If problems or fault messages should occur while the settings are being made,

briefly exit and re-enter the measuring technology program.

Perform the following settings on the screen:

- Select the **Measuring technology** menu.

  (The standard setting on measuring cable "MFK1" will give a fault message. Ignore this by pressing "Cancel")
- Select the **Oscilloscope setting** mask.
- Activate **Recorder mode**.
- Select current **50 A** .
- Select measuring range **+10 A** .
- Select frequency range according to the following examples.

Set frequency range (with respect to displayed page)	**Number of measurements** (500 per displayed page)	**Maximum duration of recording** (maximum 10 pages capacity)
2 MHz	1 per second	83 minutes
1 MHz	1 every 2 seconds	2,7-hour
0,4 MHz	1 every 5 seconds	5,5-hour
0,1 MHz	1 every 20 seconds	27,7-hour

Note:

The duration and frequency with which the measured values are recorded are defined with the frequency range. The larger the frequency set, the more frequently a measured value is recorded and the shorter the stored recording duration.

- Select **Oscilloscope display**.

  (confirm calibration of clip-on probe with "OK")
- Select **LOG scale**.

Connecting the 50-amp clip-on probe to the vehicle

Important:

Incorrect measurement!
When connecting the 50-amp clip-on probe, make sure the jaws of the probe are closed.

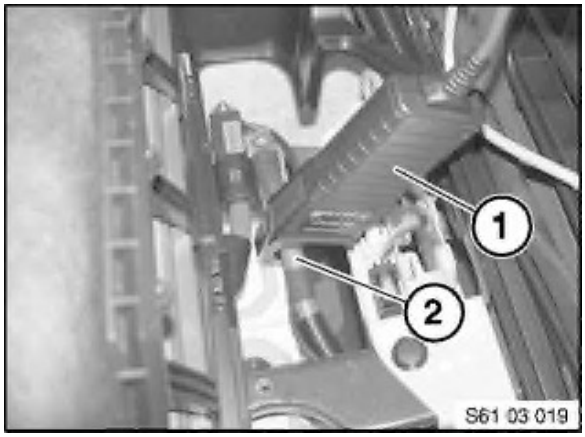
Note:

To make sure the process of going into "sleep mode" is also recorded, the 50-amp clip-on probe must be connected before "sleep mode" is initiated. If necessary, open the vehicle and close it again to restart the process of going into sleep mode.

Connections in general for all model series except E65, E66:

Connect the 50-amp clip-on probe to the battery negative wire.

Connection on E65, E66 only:



Connect the 50-amp clip-on probe (1) to the battery positive wire (2) to the power module.

Note for E65, E66:

The following consumers are not recorded via the battery positive wire to the power module:

- Alternator
- Starter motor
- Variable valve gear (spark-ignition engine)
- Electric fan
- Secondary air pump
- Common rail (diesel engine)

This compromise is advisable because the battery negative wire that is usually used is only accessible with difficulty.

If no increased closed-circuit current can be measured using this method, the measurement must be repeated using the battery negative wire.

Starting and executing closed-circuit current measurement

At least 16 minutes after the vehicle is locked (process of going into sleep mode), the load cutoff system will switch off all electrical consumers. Only then will the closed-circuit current settle to its regular value.

To make sure that the process of going into sleep mode is also recorded, the measurement must be started shortly before the vehicle is locked.

If the vehicle is equipped with a telephone, it may take up to 70 minutes before the closed-circuit current has settled to its regular value.

Only E60, E61, E63, E64, E65, E66 / E87 / E90, E91, E92 / E70 / R56:

On vehicles of these model series, it usually takes up to 70 minutes before the closed-circuit current has settled to its regular value

The recording of the measured values is restarted by selecting the screen button **Freeze image** twice.

Evaluating long-duration measurements

Important:

When the screen button "Oscilloscope setting" is pressed, all previous recordings are cleared.

Prolonged recording is ended by selecting the screen button **Freeze image once**.

Important:

If the screen button "Freeze image" is pressed again, the measured values stored will immediately be deleted and a new measurement started.

The recorded data can then be called up by selecting the screen button **Save** and the

"arrow keys" on the upper edge of the mask. When using the maximum recording duration, measured values can be called up for a total of 10 display units.

The closed-circuit current should settle to the following maximum values, depending on the vehicle's equipment:

E31:	50 milliamperes
E32:	50 milliamperes
E34:	40 milliamperes
E36:	40 milliamperes
E38:	50 milliamperes
E39:	40 milliamperes
E46:	40 milliamperes
E60, E61, E63, E64 and E65, E66:	50 milliamperes
E53:	40 milliamperes
E83:	40 milliamperes
E85:	40 milliamperes
R50/R53:	40 milliamperes
E86:	40 milliamperes
E87, E90, E91, E92	40 milliamperes

Note for E65, E66:

Further information on the subject of closed-circuit current characteristics can be found in DIS (diagnosis and information system) under "Function selection":

>Complete vehicle > Body > Voltage supply > Voltage and current monitoring > Closed-circuit current characteristics

An increased closed-circuit current may intermittently be measured for a few seconds due to radio-control keys of other vehicles, or other radio transmitters in the frequency range 433 MHz (USA/Japan = 315 MHz), for example independent heating remote control. In such cases, no fault has developed.

If increased closed-circuit current is measured:

If a control unit is replaced due to an excessively high closed-circuit current, the closed-circuit current measured should be noted on the warranty parts tag.

After measuring closed-circuit current

Disconnect the 50-amp clip-on probe and reassemble any parts that have been removed.

Note:

If the battery terminals have had to be disconnected, the ignition must be switched on and off again for at least 5 seconds to prevent faults due to non-initialised control units.