

FUB-HIL-HI-610016-K10 Energy diagnosis

ISTA system version	3.53.13.15645	Data version	R--	Programming data	-
VIN		Vehicle	4/F82/COUPE/M4/S55/MANUAL/USA/LL/2015/06		
Integration level factory	-	Integration level (current)	-	Integration level (target)	-
Mileage	0 km				

Energy diagnosis procedure

The electrical system of BMW vehicles has been subject to an ongoing development process over the last few years. This has led to increased demands being placed on the battery. A breakdown due to a drained battery or problems in the vehicle energy system can have a wide range of causes which, in most cases, are not caused by the battery itself. For that reason, replacing the battery will only very rarely provide a permanent solution to the problem. The energy diagnosis procedure helps find the cause of the problem.

Result of the energy diagnosis

The aim of the energy diagnosis is to identify the fault cause as precisely as possible. The procedure reads all the necessary data from the corresponding control units (see below). After evaluating this data, it displays the following information:

- **Possible fault causes for a drained battery or problem with the vehicle energy system:**
The number of information items varies.
If there are several possible fault causes, they are listed in order of the kilometre reading at which they occurred (most recent first).
For example: vehicle system does not go into sleep mode (sleep mode inhibited); vehicle system is repeatedly woken up or side lights were switched on for too long, etc.
- **General information:**
This information can always be displayed (results of the last closed-circuit current monitoring, information about battery such as charging state over the last 5 days, battery test(charge acceptance/start drops), state of charging state histogram, average trip overview, stand profile, history of the test module changes).

Based on the information displayed, a decision can be made as to what the actual cause of the fault is.

Overview of possible causes

A breakdown due to a drained battery or a problem in the vehicle energy system is not necessarily the result of a faulty battery. The various causes of battery discharge can be placed in two main categories:

- Vehicle faults:
 - Vehicle does not assume sleep mode.
 - The vehicle keeps being woken up.
 - Standby current too high in rest state.
 - Faulty alternator (poor alternator charge balance).
 - Faulty battery.
- Unfavourable effect of customer benefits:
 - Side lights, parking light or hazard warning flashers were switched on for too long.
 - Terminal R or Terminal 15 switched on for too long
 - Long immobilisation period.
 - Average trips unfavourable (short-distance driving).
 - Frequent or extended use of auxiliary consumers when engine is not running (e.g. radio or rear seat entertainment system), which can also result in inhibited sleep mode and higher power consumption.

Data from the vehicle that is read and evaluated

This data in detail:

- Fault memory on central gateway module
The central gateway module monitors the vehicle condition, registers if sleep mode is prevented or if the system is woken up when it shouldn't be and sends a message requesting a reset or that terminal 30F is switched off.
- Fault memory and diagnosis requests on terminal control unit
 - Fault code entry when terminal 30F is reset or switched off.
 - Fault entry on automatic switch-off of Terminal 15 or Terminal 30B due to startability limit being reached
 - Fault code entry when side lights or parking light are switched off: With terminal R off, the side lights or parking lights are switched off via the terminal control unit if the measured electrical system voltage falls below 10.6 V for at least 2 min or if the startability limit is reached.
 - History of last extensions of Terminal 30B after-running period (auxiliary consumers that operate when engine is off)
- Energy history memory
The energy history memory (NB: do not confuse with the history memory for fault entries) stores various bits of information that can assist in establishing the cause of problems with the vehicle energy system. The stored information of the energy history memory in detail:
 - The trip overview of the last 5 weeks.
The trip overview is stored in the energy history memory with 6 data records. Each data record contains the following information: Starting time of record the data record, distance travelled in km during recording, number of journeys in different ranges.
A new data record is started as soon as the time difference between the current time and starting time of recording of the current data record is greater than 7 days. This means the time span of the evaluation is usually approx. 35 days if the vehicle was not immobilised for a longer period without being awakened.
When all 6 data records in the data memory are full, the oldest data record is overwritten.
 - The maximum number of wake-ups during a rest phase (Terminal R off) within the last 5 weeks
- Diagnosis requests of the engine electronics
The engine electronics store various data that is used for energy diagnosis:
 - The results of the last 24 closed-circuit current monitoring
 - The last registered battery replacement
 - The state of charge of the battery for each of the last 5 days
 - The kilometre readings from the last 5 days
 - Time and duration of the last 4 instances of reducing power consumption or switching off electrical devices
 - Measured data for monitoring the battery condition: faulty battery cell detection, remaining capacity
- Fault memory in the engine electronics
The engine electronics (power management) store a fault code entry in the event of a standby current violation, total discharge, faulty battery and a reduction or deactivation of electrical consumers.

Events and measures in the event of inhibited sleep mode or unauthorised wake-up

In the event of inhibited sleep mode or unauthorised wake-up, various measures, such as switching off terminals, take effect in succession in order to prevent from total discharge and to ensure the vehicle's starting capability.

Inhibited sleeping:

1. Terminal R off.
2. If there are at least 2 minutes of bus communication before switching off terminal 30B, this is recognised as inhibited sleep mode. The central gateway module then transmits the Power-down command 1 minute before terminal 30B is switched off and registers the cause or causes.
3. Deactivation of terminal 30B.
4. If the vehicle is still not in sleep mode 2 minutes after terminal 30B is switched off, the central gateway module transmits the Power-down command and registers the cause or causes.
5. If the vehicle is still not in sleep mode 2 minutes after transmitting the Power-down command, the central gateway module requests a reset of terminal 30F and registers the cause or causes.
6. 1 min after the request from the central gateway module, the terminal control unit resets terminal 30F.

7. If the vehicle is still not in sleep mode 2 minutes after the terminal 30F reset, the central gateway module requests switching off terminal 30F and registers the cause or causes.
8. 1 min after the request from the central gateway module, the terminal control unit switches off terminal 30F.

Unauthorised wake-up:

1. Terminal R off.
2. Deactivation of terminal 30B.
3. After terminal 30B is switched off, the central gateway module registers the same wake-up cause five times or 16 wake ups. The central gateway module then requests a terminal 30F reset.
4. The terminal control unit resets Terminal 30F.
5. After terminal 30F is reset, the central gateway module registers a wake up that is already active, or has registered 16 wake ups since terminal 30B was switched off. The central gateway module then requests switching off terminal 30F.
6. Terminal control unit switches off terminal 30F.