

## Electronic Battery Disconnecting Switch

The E38 with M73 TU features a two-battery system consisting of an electrical system battery (DME supply), a starter battery (supply for the starter and electrically heated catalytic converter) and the disconnecting switch.

### 1. Start reliability

The voltage of the battery for the electrical system is checked on recognition of the key contact or terminal 15. If the voltage values of the system battery  $U_{BB}$  are  $< 9\text{ V}$  and of the starter battery  $U_{SB} > 9\text{ V}$  the electronic battery disconnecting switch for supplying all control units of the vehicle electrical system is closed for 30 seconds even if terminal 15 is deactivated during this period of time. The electronic disconnecting switch is opened again if no start attempt is made within this 30 second period. The switch can close again on renewed recognition of the key contact or of terminal 15.

### 2. Starting

After the engine has been started the "engine running" signal is detected and operation of the electrically heated catalytic converter (E-cat) is triggered by the E-cat control unit. The electrical power required for this purpose is supplied by the starter battery. The maximum operating time of the electrically heated converter is 30 seconds. At normal voltage levels, the electronic disconnecting switch remains open during this period of time. Once the E-cat heating period has elapsed, the disconnecting switch is closed thus connecting the system battery and starter battery.

If a voltage value for the system battery  $U_{BB}$  of  $< 9\text{ V}$  is detected the electronic disconnecting switch will remain closed until E-cat operation is detected.

In the event of a break in the "E-cat ON" line or a short to  $U_B$  the disconnecting switch will always be closed 4 seconds after detecting the engine speed signal.

In the case of a short in the "E-cat ON" line to ground the electronic disconnecting switch will always be closed 60 seconds after detecting the engine speed signal.

### 3. Driving

The electronic disconnecting switch is closed during vehicle operation to ensure the starter battery has a high charge level at all times. The starter battery and the system battery are charged by the alternator.

If an excessively high alternator current is detected, the disconnecting switch will be opened to prevent the alternator overloading. The alternator now only charges the system battery. The disconnecting switch is not closed again before the voltage of the system battery  $U_{BB}$  is higher than the voltage of the starter battery  $U_{SB}$ .

However, if the system voltage  $U_{BB}$  drops below  $9\text{ V}$  the disconnecting switch will be closed in order to ensure vehicle operation can continue. If  $U_{BB} < 9\text{ V}$  is detected three times within 1 minute during vehicle operation, in order to maintain vehicle operation, the electronic disconnecting switch is closed permanently and only opened again after "ignition OFF".

### 4. Safety functions

The following safety functions serve the purpose of protecting the electronic disconnecting switch from overloading:

The electronic disconnecting switch opens if the preset limit current is exceeded. A check for this fault is carried out at 10 second intervals.

If the temperature in the electronic disconnecting switch exceeds the permissible limit the switch is opened until the temperature drops again.

The module is permanently switched off under overvoltage conditions.

If the voltages of the system battery  $U_{BB}$  are  $< 1\text{ V}$  or starter battery  $< 1\text{ V}$  this is interpreted as a short-circuit. The electronic disconnecting switch remains open.