

Testing of the CAN-Bus system

Termination

The termination is used to match impedance of a node to the impedance of the transmission line being used. When impedance is mismatched, the transmitted signal is not completely absorbed by the load and a portion is reflected back into the transmission line. If the source, transmission line and load impedance are equal these reflections are eliminated. This test measures the series resistance of the CAN data pair conductors and the attached terminating resistors.

To test it, please

1. Turn off all power supplies of the attached CAN nodes.
2. Measure the DC resistance between CANH and CANL at the middle and ends of the network.

Normally the measured value should be between 50 and 70 ohms.

If the value is below 50 ohms, please make sure that there is no short circuit between CANH and CANL Wiring, that there are more than two terminating resistor or that the nodes has faulty transceiver.

If the value is higher than 70 ohms, please make sure that there are no open circuits in CANH or CANL wiring or that your bus system has two terminating resistors and that they have 120 ohms.

Ground

The shield of the cable system is grounded at only one single location. This test will indicate if multiple grounds are connected.

To test it, please

1. Disconnect the shield wire from the ground.
2. Measure the DC resistance between Shield and ground.
3. Connect Shield wire to ground.

Normally it should be higher than 1 Mohm. If it is lower, please search for additional grounded Shield wires.

CANH/CANL Voltage

Each node contains a CAN transceiver that generates differential Signals onto the data conductors. When the network communication is idle the CANH and CANL voltages are approximately 2.5 volts. Faulty Transceivers can cause the idle voltages to vary and disrupt network communication.

To test for faulty transceivers, please

1. Turn on all supplies.
2. Stop all network Communication.
3. Measure the DC voltage between CANH and Ground
4. Measure the DC voltage between CANL and Ground

Normally the voltage should be between 2.0 V and 4.0 V. If it is lower than 2.0 V or higher than 4.0 V, it is possible that one or more nodes have faulty transceivers. For a voltage lower than 2.0 V please check CANH and CANL conductors for continuity. For a voltage higher than 4.0 V, please check for excessive voltage

To find out the node with a faulty transceiver please test CAN transceiver resistance.

CAN Transceiver Resistance Test

The CAN transceivers have one circuit that controls CANH and another circuit that controls CANL. Experience has shown us that electrical damage to one or both of the circuits may increase the leakage current in these circuits.

To measure the current leakage through the CAN circuits, please use an ohmmeter and:

1. Disconnect the node from the network. Leave the node unpowered.
2. Measure the DC resistance between CANH and CAN-Ground.
3. Measure the DC resistance between CANL and CAN-Ground.

Normally the resistance should be between 1 Mohm and 4 Mohms. If it is not within this range, the CAN transceiver is probably faulty.