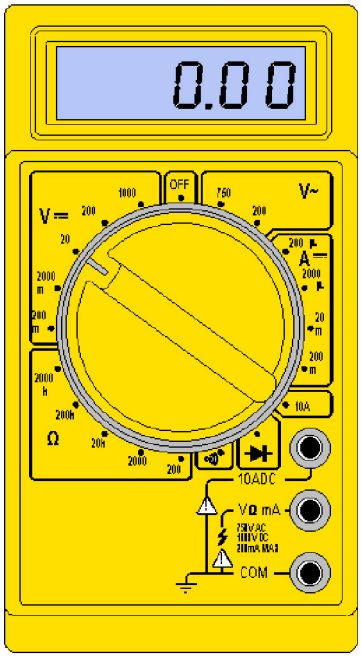
Profibus Troubleshooting

PROFIBUS
PROCESS FIELD BUS



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Technical data subject to change.

We have checked the contents of this manual for agreement with the hardware and software described. Since deviation cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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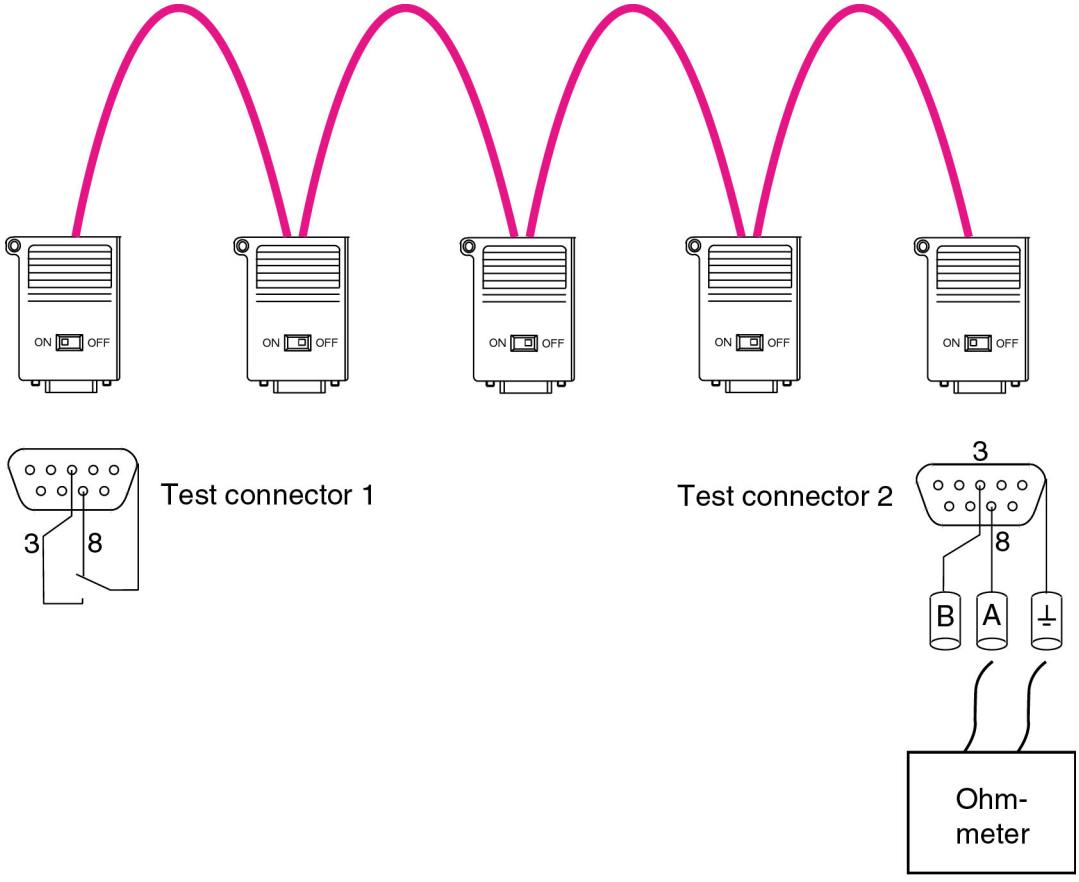
1. Troubleshooting network physics

The most normal failure when the diagnostic tool reports “nonsense” is physical errors on the network like cable connect errors, miss contact, wrong termination etc. Some simple ways to find these errors will be mentioned here.
Data errors can occur if the PROFIBUS cable is incorrectly attached to the bus connectors. Such basic errors can be detected and remedied with the simple test method described below. The test method shown schematically in figure below allows you to detect data wires which are swapped over in the connectors. During the test, the bus connectors must not be connected to any PROFIBUS devices. In addition, all bus terminating resistors should be removed or disabled. The tests require two 9 pin female Sub-D test connectors. Test connector 1 is provided with a single pole changeover switch, the moving contact of which is connected to the shield (case) of the test connector. The two fixed contacts are connected to pin 3 (data wire B) and pin 8 (data wire A), respectively. Test connector 2 is used to connect an Ohmmeter to the bus. During the cable tests, the two test connectors 1 and 2 are initially plugged into the two bus connectors at each end of the bus segment. The following test can be made by taking measurements between the contacts 3 and 8 and the shield of test connector 2 while operating the changeover switch on test connector 1:

- Data cable swapped over
- Open circuit of one of the data cables
- Open circuit of the cable shield
- Short circuit between the data cables
- Short circuit between the data cables and the shield
- Additional bus terminating resistors inserted unintentionally

2. Test configuration

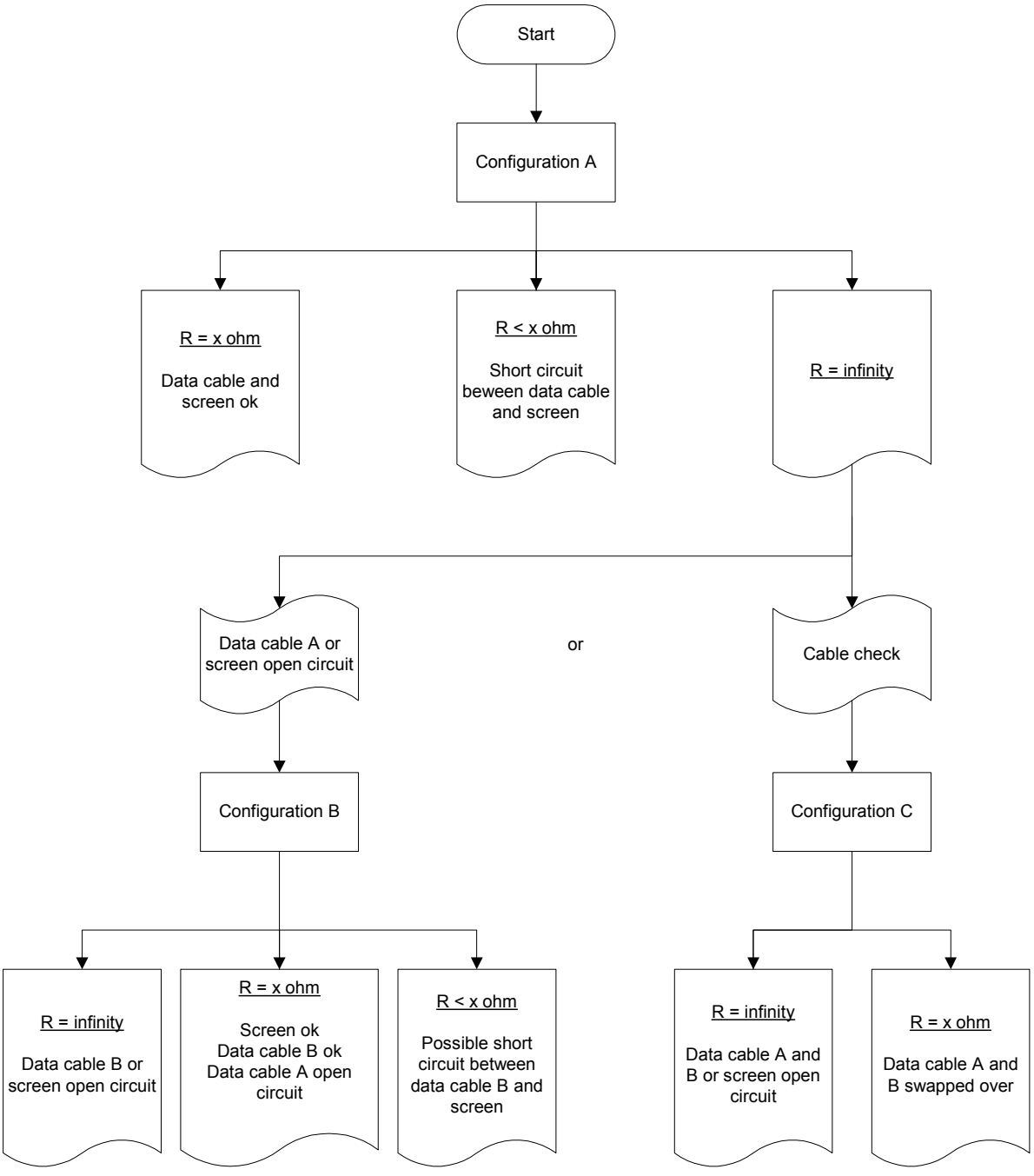


Carrying out the tests

- Configuration A: Set switch of test connector 1 to position 3 (connects pin 3 to screen). Connect ohmmeter to test connector 2 between pin 3 and the screen.
- Configuration B: Set switch of test connector 1 to position 8 (connects pin 8 to screen). Connect ohmmeter to test connector 2 between pin 8 and the screen.
- Configuration C: Set switch of test connector 1 to position 3 (connects pin 3 to screen). Connect ohmmeter to test connector 2 between pin 8 and the screen.
- Configuration D: Switch position of test connector 1 is not important. Connect ohmmeter to test connector 2 between pin 3 and pin 8.

Warning: The measured value can be falsified if the ohmmeter connection are touched.

3. Test 1



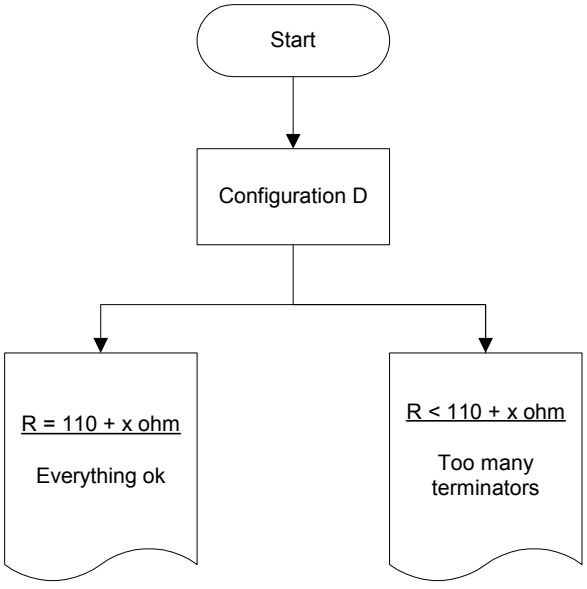
x = 110 ohm/km

4. Test 2

Same as test 1 except configuration A and configuration B are exchanged, i.e. start with configuration B.

5. Test 3

Too many bus terminating resistors inserted.



x = 110 ohm/km

In order to assess the measurements you make, it is necessary to know the loop resistance of the bus cable segment. This is dependent on the cable type used and the installed cable length. The locaton of a fault can be determinated without opening up the bus connectors by unplugging test connector 1 and plugging it into another bus connector which is closer to test connector 2 while carrying out repeated Ohmmeter measurements at test connector 2.