

# **Chapter 2**

## **Network Diagnosis**

### **PROFIBUS**

- ▶ **PB-T3**
- ▶ **BC-400**
- ▶ **BC-502**

# PROFIBUS Tester

## PB-T3

Precise Analysis of Signal Quality and Configuration



PB-T3

The PB-T3 PROFIBUS Tester is a universal measuring instrument for analysis, monitoring, error finding and maintenance of PROFIBUS systems. Typical operating faults for plants running PROFIBUS, such as station failure,

communication errors or even plant shutdowns, are frequently due to the bus electrics and cabling. PB-T3 provides an overview of the signal conditions on the bus, thus helping users to quickly find and correct errors.

### Measured Data/Functions

- ▶ Disturbance-free voltage range  
Overview measurement, logger measurement
- ▶ Signal shape  
Station-specific measurement with built-in oscilloscope
- ▶ Signal edges  
Quality of rising and falling edges
- ▶ Bus status  
Detection of bus activity, measurement of differential voltage when idle
- ▶ Bus cycle time  
Token rotation time of a master
- ▶ Error counter  
Detection of erroneous frames
- ▶ Topology scan  
Measurement of the line lengths between stations
- ▶ Multiple address detection  
Detection of multiple identical PROFIBUS addresses
- ▶ Master simulator  
Permits measurement without bus master, automatic station scan
- ▶ Trigger output  
Station-specific trigger signal for controlling an oscilloscope
- ▶ Report generator  
Creates a user-configurable test report

### Technische Daten:

- ▶ Connection
  - PROFIBUS 2 x 9-pin female D-sub connector (also M12, via supplied adapter cable)
- ▶ Protocols
  - PROFIBUS DP and FMS
- ▶ Data transfer rates
  - 9.6 - 12000 kbits/s incl. 45.45 kbits/s, automatic recognition
- ▶ Measuring range
  - Typ. 0.4 ... 5 V, resolution: 50 mV, Signal sampling with 16 samples per bit
- ▶ Power supply
  - Via supplied wide-range power supply
- ▶ Dimensions in (W x H x D):
  - 109 x 35 x 143 in mm
- ▶ Temperature
  - Ambient: 5°C - +40°C
  - Storage: -20°C - +60°C



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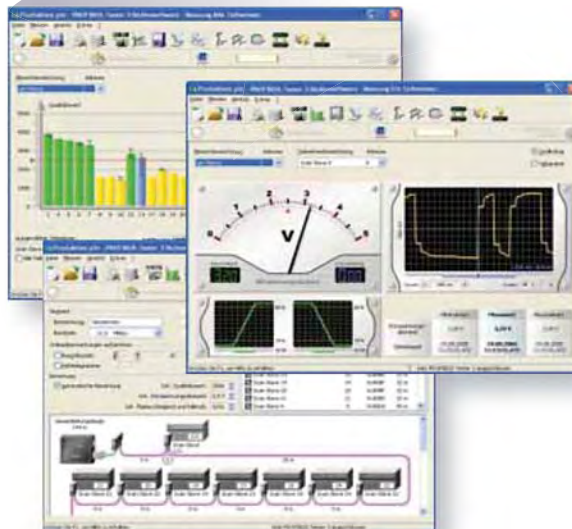
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## Find Errors Easily

PB-T3 is quickly connected to any PC via USB. Besides automatically detecting the baud rate and the individual devices of the system to be analyzed, it determines the signal quality of each device on the bus. Thereby it also shows the signal shape with its built-in storage oscilloscope. PB-T3 also provides a master simulator which permits checking the PROFIBUS installation even without having the actual bus master in operation.



PB-T3 determines signal quality and network topology

The detection of multiple identical station addresses and the determination of the bus cycle times help to ensure the correct configuration of the system. In addition, PB-T3 can determine the topology of a plant, thereby localizing sources of error with exact position information.

Other convenient features include the comprehensive, automatically generated test report and the possibility to export the measurement results as CSV files and graphics for further processing, for example in MS Office programs.

## Features:

- ▶ System Requirements
  - PC with Windows XP, Windows Server 2003, Windows 2000 or Windows ME/98
- ▶ PC Connection
  - USB 1.1
- ▶ Oscilloscope
  - Trigger output galvanically isolated, BNC jack



Everything is always at hand in the practical service case

## Scope of Delivery:

PB-T3 hardware, wide-range power supply, tester software on CD, user manual and a comprehensive range of accessories in a handy carrying case.

## Order Data:

PB-T3

Order no.: 500-PB-T3

# PROFIBUS Protocol Analyzer

Universal Tool for Analyzing PROFIBUS Networks



The bus✓check PROFIBUS Protocol Analyzer is an indispensable tool for analyzing and optimizing communication in PROFIBUS networks. It is ideally suited for continuously monitoring a network, detecting hidden errors early on, optimizing data throughput and analyzing configuration errors. The tool is connected to the PROFIBUS network via the PROFIBUS Probe

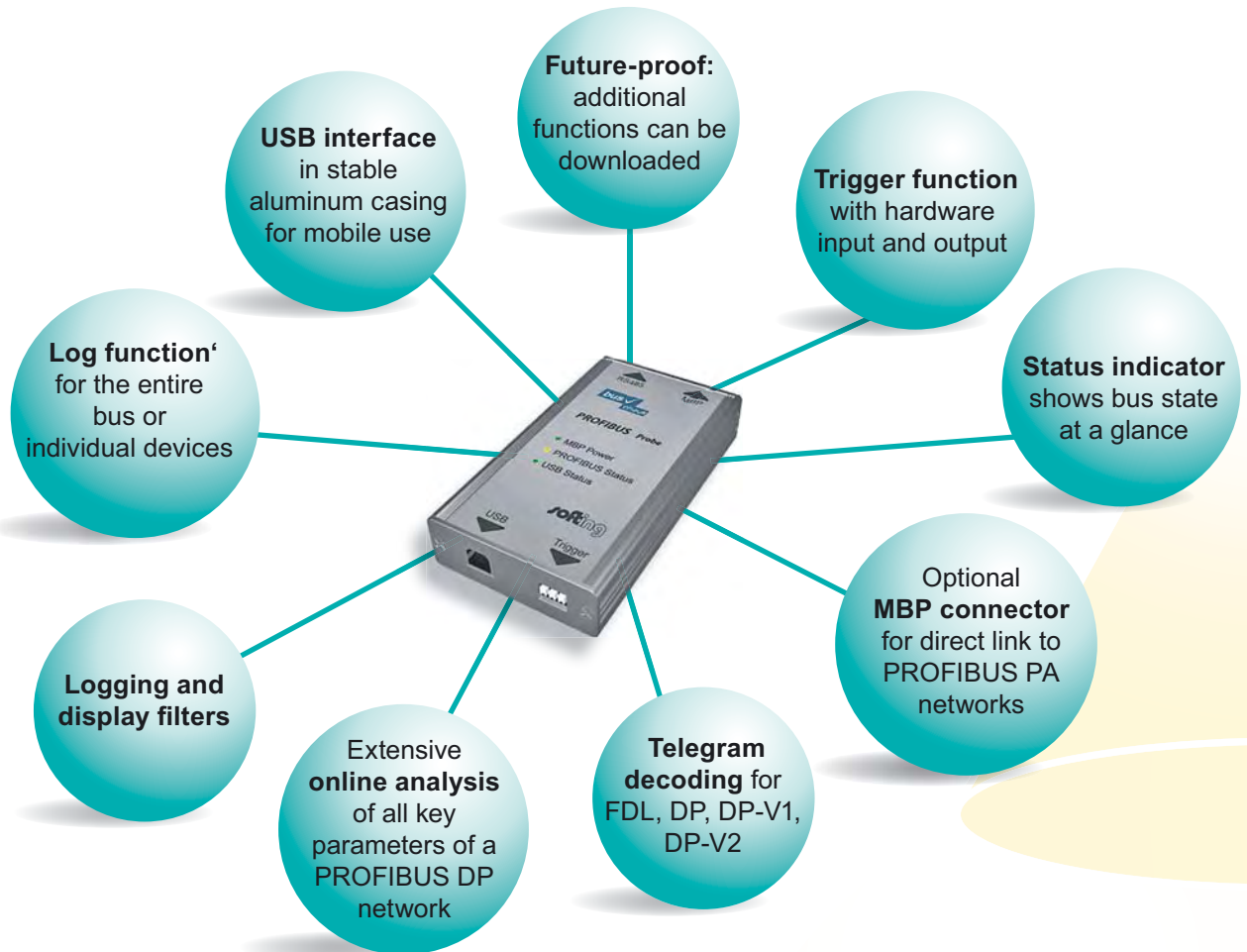
USB interface, which guarantees easy mobile use as well. An optional second connector for MBP physics enables a direct link to PROFIBUS PA networks. This means that both sides of a segment coupler can be analyzed and monitored at the same time. A receiver circuit which has been optimized for diagnostic purposes allows errors to be detected on the level of bits, bytes and telegrams.

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## Your Advantages:

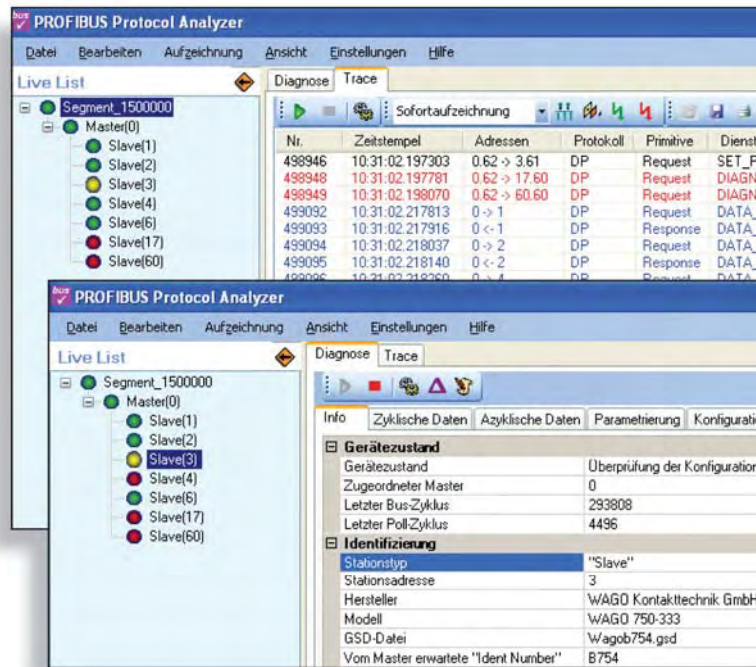


### PROFIBUS Protocol Analyzer

<b>Live List</b>	<ul style="list-style-type: none"> <li>• Live list displayed as tree with master-slave assignment</li> <li>• status indicator (traffic light) for clear view of communication status</li> <li>• matrix for displaying relevant parameters (e.g., repeat telegrams) for all devices</li> </ul>
<b>Online diagnosis</b>	<p>On the bus level:</p> <p>For each master:</p> <p>For each slave:</p> <ul style="list-style-type: none"> <li>• target rotation time, errors in bits, bytes and telegrams</li> <li>• duration of cyclic data exchange, idle time 1, idle time 2, slot time</li> <li>• communication status • assigned master • identification number</li> <li>• station delay time • I/O data with configured and actual length</li> <li>• parameterization data • configuration data</li> <li>• diagnosis messages (circular buffer)</li> <li>• statistics on DP-V0 services • negative and faulty responses</li> <li>• repeat telegrams for each polling cycle and overall</li> </ul>
<b>Telegram logging</b>	<ul style="list-style-type: none"> <li>• Immediate logging in circular buffer with storage capability</li> <li>• long-term logging in files</li> </ul>
<b>Logging filters, display filters</b>	<ul style="list-style-type: none"> <li>• Filtering by station addresses • FDL telegram formats • faulty telegrams</li> <li>• repeat telegrams • FDL services • DP, DP-V1 and DP-V2 services</li> </ul>
<b>Triggers</b>	<ul style="list-style-type: none"> <li>• Triggering by station addresses • FDL telegram formats</li> <li>• faulty telegrams • repeat telegrams • FDL services</li> <li>• DP, DP-V1 and DP-V2 services</li> <li>• hardware trigger input and trigger output (in preparation)</li> </ul>
<b>Telegram display</b>	<ul style="list-style-type: none"> <li>• Decoding for FDL, DP, DP-V1, DP-V2 • display color can be freely selected for each service • time stamp, either absolute or time since start of measurement as well as telegram intervals and telegram pauses</li> </ul>
<b>Languages</b>	<ul style="list-style-type: none"> <li>• English, German</li> </ul>
<b>System Requirements</b>	<ul style="list-style-type: none"> <li>• PC/notebook with Windows 2000 or Windows XP, at least 1 GHz</li> <li>• USB interface</li> </ul>

## Online Diagnosis

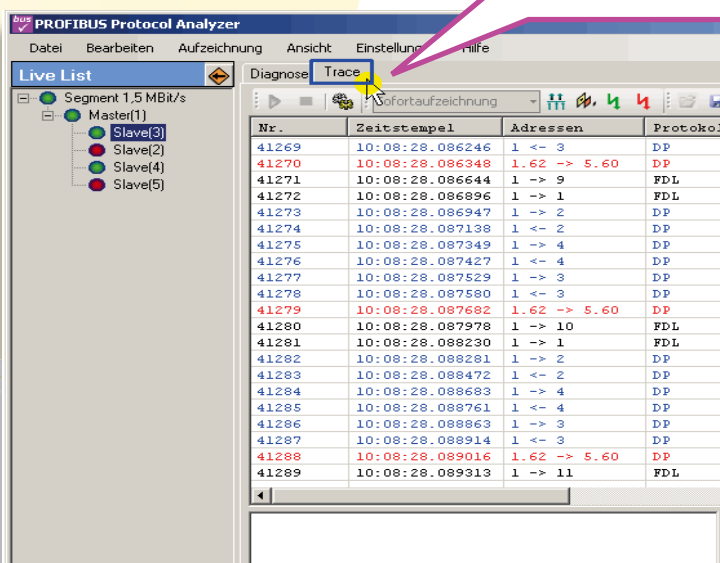
A live list (list of all active stations on the bus) in the form of a tree structure displays the communication status of each device on PROFIBUS using a status indicator (traffic light with red/yellow/green) so that the bus state can be evaluated at a glance. An expanded live list in matrix form displays a selectable parameter for every single device. The extensive online diagnosis function continually records all the significant parameters of a PROFIBUS DP system and displays them for each device. Important events are recorded in a log and displayed for the entire bus or individual devices.



## Telegram Logging

Of course, the Protocol Analyzer also offers „traditional“ telegram logging and display in two different modes of operation. With „immediate logging“, the logged telegrams are managed in the memory as a circular buffer so it is „possible to interact with them rapidly. With „long-term logging“, the telegrams are continuously stored in files to be analyzed later.

Complete telegram logging: In trace mode, telegrams are displayed as an overview (one telegram per line), as well as in completely decoded form.



## PROFIBUS Probe

<b>PROFIBUS RS485 interface</b>	9-pin D-sub connector, galvanic isolation, supply for active cable 9.6, 19.2, 45.45, 93.75, 187.5, 500, 750 KBit/s, 1.5, 3, 6, 12 MBit/s
<b>PROFIBUS MBP interface (BC-450-PB only)</b>	3-pin screw terminal, galvanic isolation, bus-powered Medium Attachment Unit 31,25 KBit/s
<b>USB interface</b>	Version 2.0, high-speed (480 Mbit/s) and full-speed (12 Mbit/s) with automatic detection Connector: USB Type B and USB cable A-B; Functionality: USB device
<b>External trigger interface</b>	Output: OpenCollector (active low); input: TTL, voltage-proof to 24 V
<b>Displays (LEDs)</b>	USB status, PROFIBUS status, MBP bus power (only with BC-450-PB)
<b>Power supply</b>	5 V (from USB), < 300 mA
<b>Temperature range</b>	Operation: 0 °C ... +55 °C // Storage: - 20 °C ... + 70 °C
<b>Casing, dimensions in mm, weight</b>	Aluminum, 69 x 24 x 124 (W x H x D), approx. 200 g
<b>Certifications</b>	CE, FCC
<b>Protection class</b>	IP20



### Order Data:

<b>BC-400-PB</b>	with RS485 interface	Order no.: 500-BC-400-PB
<b>BC-450-PB</b>	with RS485 interface and MBP interface	Order no.: 500-BC-450-PB

**Included in Package:** bus check PROFIBUS Probe with RS485 interface and optional MBP interface, USB cable (3 m), CD with bus check PROFIBUS Protocol Analyzer and manual

# PROFIBUS-Inspektor

Continuous Bus Monitoring, Condition-based Maintenance



bus ✓

check

BC-502-PB  
PROFIBUS Inspektor®

The **PROFIBUS Inspektor® BC-502-PB** is a powerful tool for early detection of developing problems on PROFIBUS networks. By continuously monitoring all traffic on the bus, it reliably detects even slow, initially uncritical deteriorations in the bus communication. If maintenance action is required, the tool automatically alerts the operational staff. This allows implementing a condition-based maintenance strategy that reduces operator intervention to when it is needed.



## Features:

- ▶ Based on protocol analyses, the BC-502-PB determines the bus cycle time and detects the following error events:
  - Device drop & add
  - Device errors/diagnostics
  - Error frames
  - Retransmissions
- ▶ When the number of error events exceeds the configured maximum limit per measuring period, the PROFIBUS Inspektor® sends an alarm to the PLC via signaling contact, or to a central server via network.
- ▶ Users can select specific error events for which they want to record snapshots of the entire frame traffic.
- ▶ The diagnostic details can be viewed either locally at the unit or remotely via network using a web browser. Thresholds are also configured in the same way.
- ▶ The BC-502-PB optionally comes with all the functionality of a full featured protocol analyzer.
- ▶ An optional network version is also available. Installed on the server, the PROManage® software manages all the alarms and events from up to 80 Inspektors in a central database and offers comprehensive analysis functions.

## Your Advantages:

- ▶ One Inspektor per bus line is all that is needed – no matter how many physical segments are to be monitored.
- ▶ The tool can be used on the live PROFIBUS without interfering with its operation. It can thus be installed anytime, even temporarily, without undesirable side effects.
- ▶ No bus address or changes to the PLC program are required.
- ▶ In addition, the tool's open functionality allows use across all controller and bus station types.
- ▶ The PROFIBUS Inspektor® BC-502-PB supports a condition-based maintenance strategy, improving staff utilization and effectiveness. Action is only taken when it is actually needed.
- ▶ By enhancing the operational reliability, the tool increases plant availability while making best use of the often scarce maintenance resources.
- ▶ It helps maximize productivity and minimize downtimes by permitting planned maintenance action.

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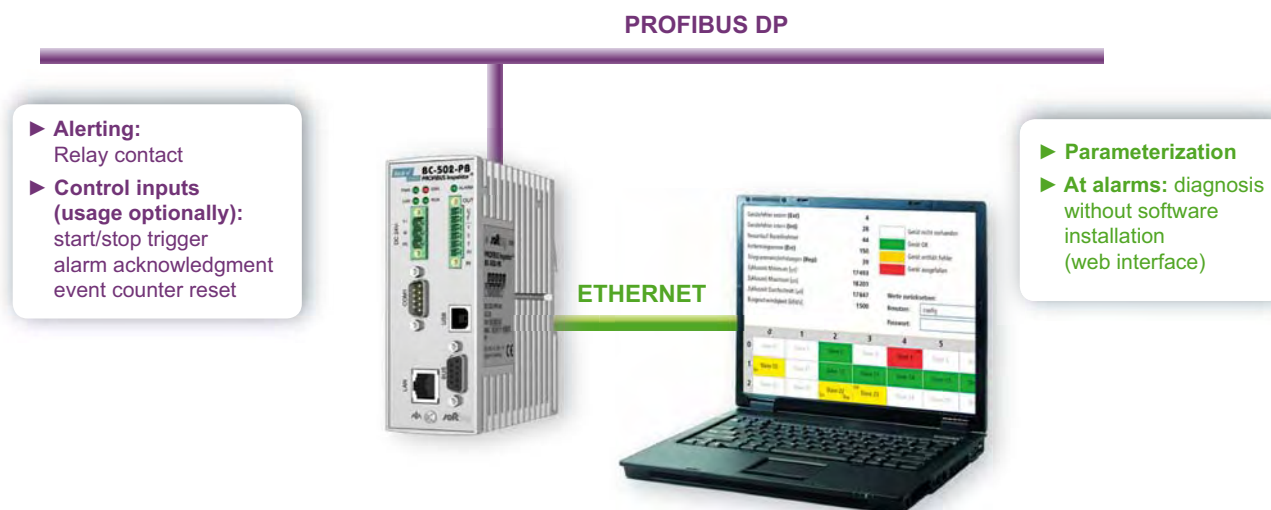
## Technical data:

<b>Power supply</b>	24 V DC +/- 20%, typ. 0,3 A, max. 1 A
<b>PROFIBUS</b>	<u>Protocols:</u> DP, DPV1, FMS, MPI <u>Connection:</u> 9-pin D-sub <u>Baud rates:</u> 9,6 kbps - 12 Mbps
<b>Ethernet</b>	100BASE-TX, 10BASE-T, Connection: RJ45
<b>RS232 / USB 2.0</b>	alternative / optional interface
<b>Control signals</b>	Potential-free contact, 3 inputs DC 24 V, active-high
<b>Dimensions</b>	H x W x D: 131 x 47 x 111 mm
<b>Weight</b>	approx. 0,4 kg
<b>Mounting</b>	35 mm DIN top hat rail
<b>Degree of protection</b>	IP20
<b>Operating temperature</b>	5 °C to 55 °C
<b>Storage temperature</b>	-20 °C to 70 °C
<b>Certifications</b>	CE, FCC, VCCI

## System Requirements:

- ▶ **For diagnostics and parameterization (basic version)**  
PC/Notebook with network adapter and up-to-date web browser, lokal connection using RJ45 patch cable or access via LAN
- ▶ **For protocol analysis (option)**  
PC/Notebook with either Windows 2000, XP or VISTA (32 Bit) and at least 1 GHz/500 MB RAM and USB 2.0 port
- ▶ **For network version (option)**  
SNMP manager or separate network data server with the ProManage® software

## Alerting via PLC/process controller



## Order data:

<b>BC-502-PB</b>	„Basic“ version incl. manual	Order no.: 500-BC-502-PB
<b>BC-502-PB/CL</b>	Software option „Comfort Line“: full featured DP protocol analyzer via USB incl. PC software on CD-ROM and manual	Order no.: 500-BC-502-PB/CL
<b>BC-131-PB</b>	Optional activ connection cable for hassle-free integration into existing or running installations: spur cable length 3 m, internal repeater bus powered	Order no.: 500-BC-131-PB
<b>BC-502-PB-START</b>	Start package consisting of BC-502-PB, BC-131-PB, power supply, patch/crossover cable and carrying case	Order no.: 500-BC-502-PB-START
<b>BC-502-PB-PMxx</b>	Central diagnosis management and data analysis for up to 80 Inspektors, comprising “Premium Line” licenses, PROmanage® server licence for xx=5/10/20/40/80 Inspektors, SW installation and commissioning at site and possibly network data server, cables, cabling etc. as to be agreed in detail	Order no.: 500-BC-502-PB-PMxx