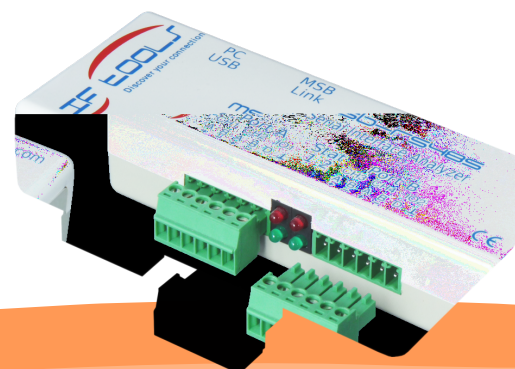# MSB-RS485

**recording
exploring
visualizing**

"The perfect combination of sophisticated hardware and software analysis"

- OS independent real time resolution of 1µs
- Supports any baudrate from 1 Baud to 1 MBaud
- Automatic detection of baudrate and protocol
- Supports protocols with 9 data bits
- Detects invalid levels (tristate)
- Correct time relationship between all lines
- Display of real level changes RxD, TxD
- Signal switching/rerouting, data injection
- Availiable for Windows and Linux

An essential tool for RS422/485 analysis/optimizing

As an autonomous device the analyzer gathers exact informations about every line change with micro second precision, independent from the PC and its operating system and mandatory for time relevant protocols like Modbus RTU, Profibus or others.

Equipped with a multitude of visualization tools it allows a detailed view in every RS422/485 communication and detects errors coming from bus enabling, timeouts or wrong / double addressing.

Features & Benefits

Simultaneous sampling of all lines by external hardware
Exact measurement of all EIA-422/485 signals with a precision of 1µsec and a maximum sampling rate of 16 MHz, independent from the PC operating system.

Scope-like display of the data lines
Simultaneous display of the Tri-State signals as well as the transferred data. That makes the error analysis and search easy for transmission errors, i.e. improper bit rates (jitter) or wrong data formats.

Any baudrate with FLEXUART
High-precise set and measurement of standard and non-standard baudrates in the range from 1 Baud up to 500 kBaud with a resolution of 0.1% of value. Recording and analysis with any, even unusual, baudrates. Detection of asynchronous or drifting baudrates between sender and receiver.

Segment-Analysing
Direction specific analysis of single bus segments or bus participants and therewith isolating of erroneous send devices by transparent bus disconnection.

Detection of inactive bus states
Detecting of Tri-State bus states (RS485) and data direction in 2-wire bus systems.

Detection of invalid line states
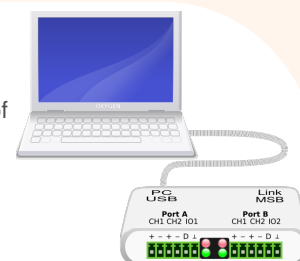Detecting of open lines, invalid Tri-States and bus conflicts.

Automatic protocol detection
Simple check and analysis of any communication with unknown connection parameters.

Versatile usage

Multiple connection modes allow the complete logging of all bus activities as well as the purposeful recording of data sent from selected bus participants.
Two additional auxiliary in/outputs serves for the correlation to further application signals.

2 digital input/output channels
Recording of two additional control lines (signals), output of the bus direction or bus state (active/inactive) for triggering of external measuring equipment.

Protocol templates
Define own rules how your data shall be displayed or visualize any application specific protocols.

Integrated script language Lua
Any computing, converting and visualization of the recorded data. Automatic marking of frame-sections (e.g. address, function, data, valid/invalid checksum etc.)

Pattern search with regular expressions
Makes the search for any data sequences possible with wild card characters and time distances or pauses between data strings.

Integrated LevelFinder
Finds any static level, level change, level with a given duration, error conditions and all combinations of them.

Data analysis in realtime
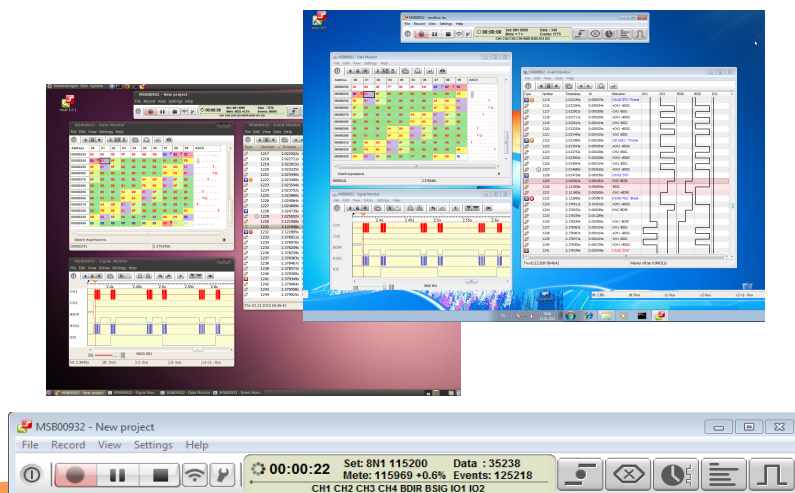Examination of the connection already while recording the data.

Future-proof by modern FPGA technology
Integrated state of the art gate array technology allows permanent advancements and adaption to different applications. The updating is done simply at start of the software.

Compact housing with USB connector
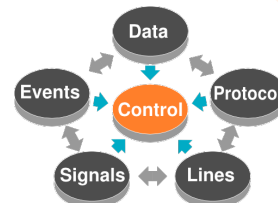No additional power supply necessary. Mobile operation even with laptop.

Technical changes and improvements can be done without prior notice. January 2011

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Analyzer Software

The MSB-RS485 analyzer software uses a multi-process architecture to guarantee a high maximum in stability and scalability.
Already while recording the data can be displayed at different points in time, in different formats, and with different time resolutions (scope view). We call this concept MultiView, the actors Views.

Whether you like to compare two different points of time in your recording, or simply show the physical data signal according to the data byte sequences, just open the kind and quantity of views for your need.

Easy to use

Views are autonomous programs which link into a current running recording and visualize data in a certain format.

The MSB-RS232 analyzer software follows the concept to offer a specially optimized display tool for each kind of examination.

Each view provides functions which represents its kind of data interpretation. Thereby the handling stays easy and clear, multiline toolbars and overload menus are avoided.

Data export

Simple copy and paste of recorded protocol or data sequences into other applications for further evaluation or documentation purposes.
Or export the data as CSV for further evaluation of the logged data in Microsoft Excel or other spread sheet programs. That makes the full toolset of these programs available for statistic examination, sorting and other calculations.

Integrated Lua Script language

for complexe computations (checksum), conversions and data visualisations.
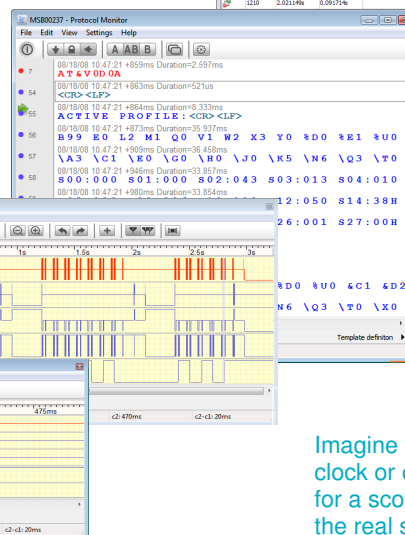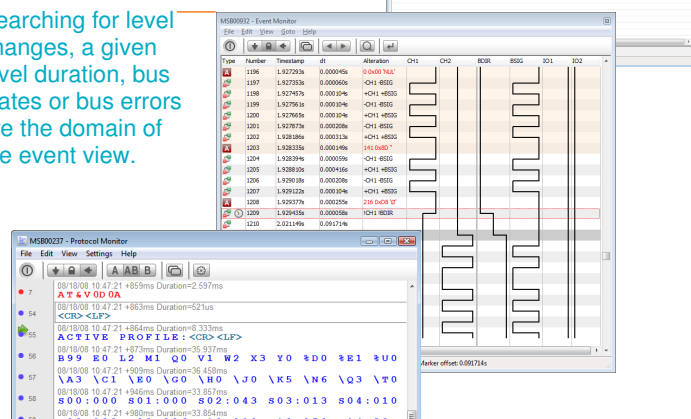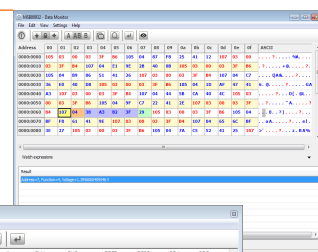
Supports several OS

Run it on your favorite OS - it's your choice!
The MSB-RS232 software is delivered as 'native binary' for Microsoft Windows and Linux. No emulation, no additional libraries, noinstallation of .NET ® or Java ®.

Multi language

German and English language support.

Visualize the data with Lua scripts, convert it in other formats or search for determined sequences like CMD??. Spot on to the data view.

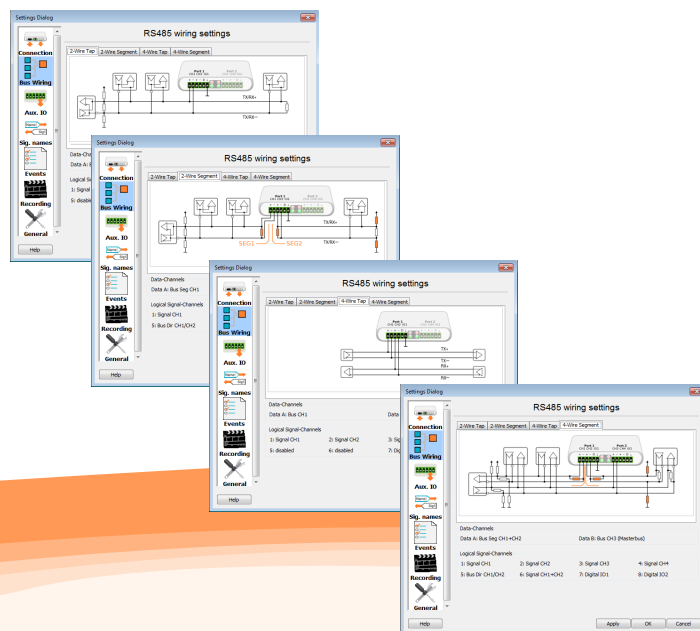Searching for level changes, a given level duration, bus states or bus errors are the domain of the event view.

Define your own rules how you like to display the single data sequences and visualize any protocol for your own matter.

Imagine you have a jittering baudrate clock or odd data errors. This is a job for a scope like tool, examinating the real signal.

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What a pure software solution cannot provide

An innovative concept for various bus connections

makes it easy to analyse different bus systems like EIA-422 point-to-point connections (with or without handshake), 2-wire half duplex EIA-485 and 4-wire full duplex bus systems. Direction specific analysis of single bus segments or bus participants and therewith isolating of erroneous send devices by transparent bus disconnection.
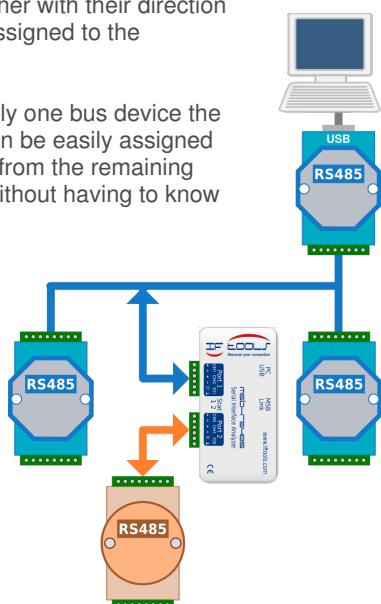
Plain tapping

Easy connected provides this mode the recording of all signals and transfered data, in case of 4-wire full duplex connections also separated into sending and receiving channel. The data maping of individual bus devices is only possible with the knowledge of the used protocol (device address).

Segment analysis

In contrast to the plain tapping of the data signal the MSB-RS485 is inserted into the bus. In doing so the bus is split into two bus segments and the analyzer becomes the interface between the two segments. The data, flowing through this interface, are collected together with their direction so that they can be clearly assigned to the corresponding segment.

If the segment consists of only one bus device the data sent from this device can be easily assigned to this device independently from the remaining bus communication - even without having to know the used protocol.

This variation allows the selective monitoring of individual bus participants both in 2-wire half duplex connections (like Modbus, Profibus) and 4-wire full duplex bus systems like the Din-Messbus.

Automatically protokoll scanner and 9 bit data word support

The MSB-RS485 analyzer contains a so called FLEXUART core, an in-house developed decoder for serial data transmissions with 9 bit data word support which allows not only the measuring of any baudrate in the range of 1 Baud bis 500 kBaud but also the detection of the used protocol.

How can it help?

Sometimes the real data format is not known if you have older devices for which the interface descriptions got lost.

Or you are not sure if the sender really adds the correct parity bit. You always should verify the data structure before starting the examination of the communication.

Simply insert the analyzer into the active connection, press 'scan' and after having decoded some characters you will get information about the probable data format.
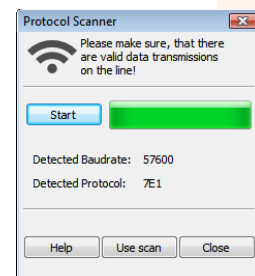
Working with any baudrate

By the feature to log data at any baudrate you can also check connections at uncommon transmission rates which sometimes are used inside systems, where the available system clock is directly divided to the baud clock.
The resulting baud rate is not a multiple of 9600, but any other, which can not be correctly decoded by PC communication ports.

9 Bit data word support

Some kind of bus protocols are using the parity bit as a 9th bit to differ between an address and the user data (for instance a Multi-Drop bus).

With the 9N1 setting you are able to turn the analyzer in a pure 9 bit recorder. All data are now collected, displayed and processed in the range 0...511.
You can split the sequences by the 9th bit and examinate the data as usual 8 bit values.

9N1

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Optional extensions

ISO485

The isolating USB to RS485/422 comes with a lot of setup possibilities to cover a wide range of bus applications: RS422/485 mode, echo on/off, full/halfduplex bus, independent applicable termination resistors for RXD, TXD.
High isolating capability, ESD protection and support of any baud rates from 300 Baud to 500 kBaud is its recomendation for all PC to bus connections.

Availability and price

This article is exclusively available at www.iftools.com.
Complete price MSB-RS485 analyzer including CDROM, USB cable to connect with PC and connection kit: **349 €**

ISO485 USB to RS422/485 converter: **89 €**

An additional (second) connection kit (see description technical data): **8,80€**

Technical data

Baudrates	High-precise setting and measuring of standard and non-standard baudrates in the range of 1 Baud to 500 kBaud with a resolution of 0.1% of the set. resp. measured value (FLEXUART).
Data formats	Parameter for serial data transmission: 5 to 9 data bits; parity off, even, odd, constant 0 or constant 1.
Logical line states	Logical level (A-B): 1 (V+), 0 (V-), invalid (-0.7V < In < +0.7V).
Time resolutions	All lines are exactly sampled and marked with 1µs time stamps, independent of the operating system of the PC.
Signal levels	Standard EIA-422/485 level ±0.2V bis ±12V, ESD protected inputs 12kOhm, Common Mode ±7V. Detection of the Tri-State level of differential signals below ±0.7V
Bus connectors	Connector: 2x Phoenix MC 1,5/6ST-3,5 with 2mm screw connectors, 6 pins each.
Internal wiring	All connections from Port 1 and Port 2 are connected through high speed transceivers and are automatically switched in correspondence to the selected connection mode and data direction.
Auxiliary In-Outputs	Two additional terminals, each individual switchable for recording of external signals or for outputting of bus status signals. Input: 0-5V, Trigger level 1.65V, 25 kOhm pull down, Output: 0/5V ca. 10mA.
Cache	Internal cache memory of 512 kB for buffering of measuring data when recording data with high transfer rates.
Status LEDs	Leds for displaying of: red: recording status and buffer load, green: bus data flow.
Power supply	Directly supplied via USB cable, consumption about 200mA, USB Ground is the same as EIA-422/485 Ground.
Operating Systems	Windows 2000, XP, Vista, Windows 7, Linux with kernel from 2.4.18 and GLIBC 2.4. All systems 32 or 64 bit.
Dimension	100mm x 50mm x 25mm (length, width, height, weight ca. 100g.

Requirements

Graphical display	Graphics board and monitor with at least 1024x768 pixel resolution and 16 bit color depth or more.
Disk space	100 MByte empty space for software installation plus additional space for the recording fles.
Memory	256 MByte or more.
USB connector	One empty USB 1.1 or 2.0 connector (full speed).

Scope of delivery

Analyzer set	MSB-RS485 analyzer device, CDROM and 2m USB cable for connection to PC.
Connection set	Connection set consists of: 2x 6-pin Phoenix screw connector, 1 screw driver for Phoenix connectors, 4x terminal resistors 120 Ohm if analyzer is end device, 4x short circuit wires for various connection variants.
Software	CDROM for Windows and Linux, manual as online help and PDF document in German and English.

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