

# ibaBM-SLM

Monitor for Siemens Simolink Bus



## Manual

Issue 2.0

Measurement and Automation Systems



## Manufacturer

iba AG  
Koenigswarterstr. 44  
90762 Fuerth  
Germany

## Contacts

Main office	+49 911 97282-0
Fax	+49 911 97282-33
Support	+49 911 97282-14
Engineering	+49 911 97282-13

E-Mail: [iba@iba-ag.com](mailto:iba@iba-ag.com)

Web: [www.iba-ag.com](http://www.iba-ag.com)

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The content of this publication has been checked for compliance with the described hardware and software. Nevertheless, deviations cannot be excluded completely, therefore full compliance is not guaranteed. However, the information in this publication is updated regularly. Required corrections are contained in the following regulations or can be downloaded on the Internet.

The current version is available for download on our web site <http://www.iba-ag.com>.

## Protection note

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## Certification

The device is certified according to the European standards and directives. This device corresponds to the general safety and health requirements. Further international customary standards and directives have been observed.



Issue	Date	Revision	Chapter	Author	Version HW / FW

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# 1 About this manual

This manual describes the construction, use and operation of the device ibaBM-SLM.

## 1.1 Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her special training, knowledge and experience and knowledge of the standard regulations.

## 1.2 Notations

The following designations are used in this manual:

Action	Notations
Menu command	Menu „Logic diagram“
Call of menu command	„Step 1 – Step 2 – Step 3 – Step x“ Example: Select menu „Logic diagram – Add – New logic diagram“
Keys	<Key name> Example: <Alt>; <F1>
Press keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	„File name“, „Path“ Example: „Test.doc“

## 1.3 Used symbols

If safety instructions or other notes are used in this manual, they mean:

---

### **DANGER**

The non-observance of this safety information may result in an imminent risk of death or severe injury:

- By an electric shock!
  - Due to the improper handling of software products which are coupled to input and output procedures with control function!
- 

---

### **WARNING**

The non-observance of this safety information may result in a potential risk of death or severe injury!

---

---

### **CAUTION**

The non-observance of this safety information may result in a potential risk of injury or material damage!

---



#### **Note**

A note specifies special requirements or actions to be observed.

---



#### **Important note**

Note if some special features must be observed, for example exceptions from the rule.

---



#### **Tip**

Tip or example as a helpful note or insider tip to make the work a little bit easier.

---



#### **Other documentation**

Reference to additional documentation or further reading.

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## 2 Scope of delivery

After unpacking check the completeness and intactness of the delivery.

The scope of delivery includes:

- Device with 2-pole Phoenix screw terminal
- Documentation for the device (iba)
- SLB SIMOLINK Board Documentation (Siemens) as well as extended information to this document
- SIMOLINK fiber-optic cable with 2 SC connectors and an auxiliary power connector for buffering the SIMOLINK SLB module power
- Additional equipment, that is not included in the scope of delivery, see [www.iba-ag.com](http://www.iba-ag.com).

## 3 System requirements iba system

### 3.1 Hardware

- IBM-compatible PC with an ibaFOB-D card
  - ibaNet FO cable
- or
- Notebook computer with ibaPCMCIA-F card
  - spiral cable

### 3.2 Software

- ibaPDA-V6 for capturing and recording
- ibaAnalyzer for analyzing

## 4 Supported Siemens Drive and Automation Systems

- SIMOVERT Masterdrive MC
- SIMOREG 6RA70 (DC Drive)
- S7-400 FM: FM458 SIMOLINK Master (SIMADYN D)
- SIMADYN D
- M7 Motion Control System

## 5 Further Manuals

- ibaPDA-V6 manual
- ibaAnalyzer manual
- System and communication configuration D7-SYS - SIMADYN D
- Operating instructions SLB SIMOLINK Board
- D7-SYS „Hardware“ manual
- „STEP 7“ Hardware configuration manual

## 6 Product description

### 6.1 Application

The ibaBM-SLM device can be used to capture data from one or more frequency converters of the SIMOVERT masterdrive series. The SIMOLINK Board (SLB) is integrated in the SIMOVERT Masterdrive in order to guarantee the communication via the SIMOLINK bus. The same board is inserted in the ibaBM-SLM device and hence enables the connection of the device to a SIMOLINK system.

The SIMOLINK board is a participant within the SIMOLINK ring. In a closed ring all participants work with the same system cycle.

The SIMOLINK board reads all telegrams on the SIMOLINK and saves the selected telegrams in a reception memory.

ibaBM-SLM was developed to capture and analyze the data of the SIMOVERT Masterdrives with an iba system. The central parts of the device are the iba technology and the integrated SIMOLINK board (SLB).

➤ For further information refer to Operating instructions SLB SIMOLINK Board

The goals of the ibaBM-SLM diagnostic unit are

- Fast identification of errors from frequency converters (drives)
- Quantification of drive regulator tuning and estimation of motor condition from voltage/current signals
- Motor control optimization

Applications for the ibaBM-SLM are foreseen for the following purposes.

- Permanent interface to an ibaPDA data acquisition system in a SIMOLINK topology
- Intermediate use for troubleshooting and commissioning purposes
- Short-term interface via a portable PC or notebook PC (if necessary, also as an addition to a fixed installation).

### 6.2 Advantages

The ibaPDA software is optimized for large-scale process monitoring. Up to 2048 analog and binary signals can be visualized and recorded synchronously. Specifically for the ibaBM-SLM Simolink Monitor, the ibaPDA software has been extended to support sample resolutions in steps of 100  $\mu$ sec. This provides for bus update cycle matching integer multiples of the Simolink bus cycle rate (min. 1.6 milliseconds per cycle). Settings from 1.6 ms in steps of 100  $\mu$ s are also possible (e.g. bus cycle time of 1.8 ms)

Apart from the ibaBM-SLM, additional I/O interfaces and software components exist for multiple PLC systems (SIMATIC S5, SIMATIC S7, MMC216, SIMADYN D). ibaPDA supports these interfaces in parallel. It should be noted, that the number of values must not exceed the licensed number of signals.



## 6.3 ibaBM-SLM

### 6.3.1 Properties

- Rugged metal housing for DIN rail mounting
- 1 SIMOLINK bus connection, can be buffered against voltage failure (SIEMENS SLM module)
- SIMOLINK module address of the diagnostic unit is adjustable within ibaPDA
- Two uni-directional fiber-optic links (3.3 Mbps) with ST fiber optic connections to ibaPDA computer
- 2 wired connections (RS422 on RJ11 socket) for Notebook PC
- Transfer of up to 128 analog (INT or DINT) + 128 binary signals. Each fiber-optic or RS422 connection can transmit 64 Float and 64 binary signals.
- Data transfer on fiber-optic links synchronous to SIMOLINK bus cycle
- Parallel data transfer on fiber optic link and RS422, whereas only one RS422 interface of an ibaCom-PCMCIA-F card can be used on the notebook side.
- Unregulated 24 V DC power supply
- Unregulated 24 V DC SIMOLINK buffer supply
- Configuration is stored permanently in the device

### 6.3.2 Data types

The data to be measured from the SIMOLINK bus is defined by using a setup dialog within ibaPDA. The following data types may be measured.

- 16 bit integer (INTLOW and INTHIGH: -LOW indicates lower word, -HIGH indicates upper word of 32-bit data word)
- 32 bit integer (DINT)
- bit; via ibaPDA packed binary input through bit selection from 16-bit status words

Each data type corresponds to a measuring value. Up to 128 analog (INT16; DINT) and 128 packed binary signals per ibaBM-SLM device can be transmitted to ibaPDA.



#### Note

Regardless of selected data types, all data are transmitted as 32-bit IEEE floating point values.

Due to the conversion from 24 bit measuring resolution to 32 bit format, inaccuracy may occur when using DINT data format.

### 6.3.3 Overview device configuration

- ❑ The data to be measured are selected in the I/O Manager of ibaPDA-V6. The definition of the measuring data to be recorded in measuring files is done in the “Configuration - Data storage” menu in ibaPDA-V6. You can define profiles which are available for several data stores and the number and the names of the data stores.
- ❑ The configuration defined in ibaPDA is transmitted from the ibaPDA computer to ibaBM-SLM via the serial interface.

## 7 Device Design

Two circuit boards encased in a robust iba metal housing provide the circuitry necessary for interfacing with the Siemens Simolink bus. A basic circuit board handles the iba technology and the SLB module handles the Siemens SLB technology.

### 7.1 Base Circuit Board

- Device power supply (unregulated 24 V DC) with 3 status LEDs (Run, Link, Error)
- Microprocessor with firmware for control of data transfer to ibaPDA
- RAM and flash EPROM storage of data, code and parameter sets
- Control of two uni-directional fiber-optic (3.3 Mbit/s) and two RS422 (RJ11) external interfaces
- 9-pin Sub-D interface for configuration
- Internal interface for integration of Siemens SLB module
- Permanent storage of SIMOLINK addresses, conversion tables and Profibus parameters in the device

### 7.2 SIMOLINK Board (SLB Module)

The standard SIEMENS SLB module features:

- Bi-directional fiber-optic interface to connect the SIMOLINK bus
- Microprocessor with firmware for control of data transfer to/from SIMOLINK bus
- Flash-EPROM code storage
- Dual port RAM for transfer of data to base circuit board
- Terminals for 24 V DC buffered power to SLB; can be used to maintain SIMOLINK bus integrity in the event that the ibaBM-SLM device is not powered
- 3 LEDs (Link, Run, DPR)



### 7.3 Device view, Connections and Displays

#### 7.3.1 Device views

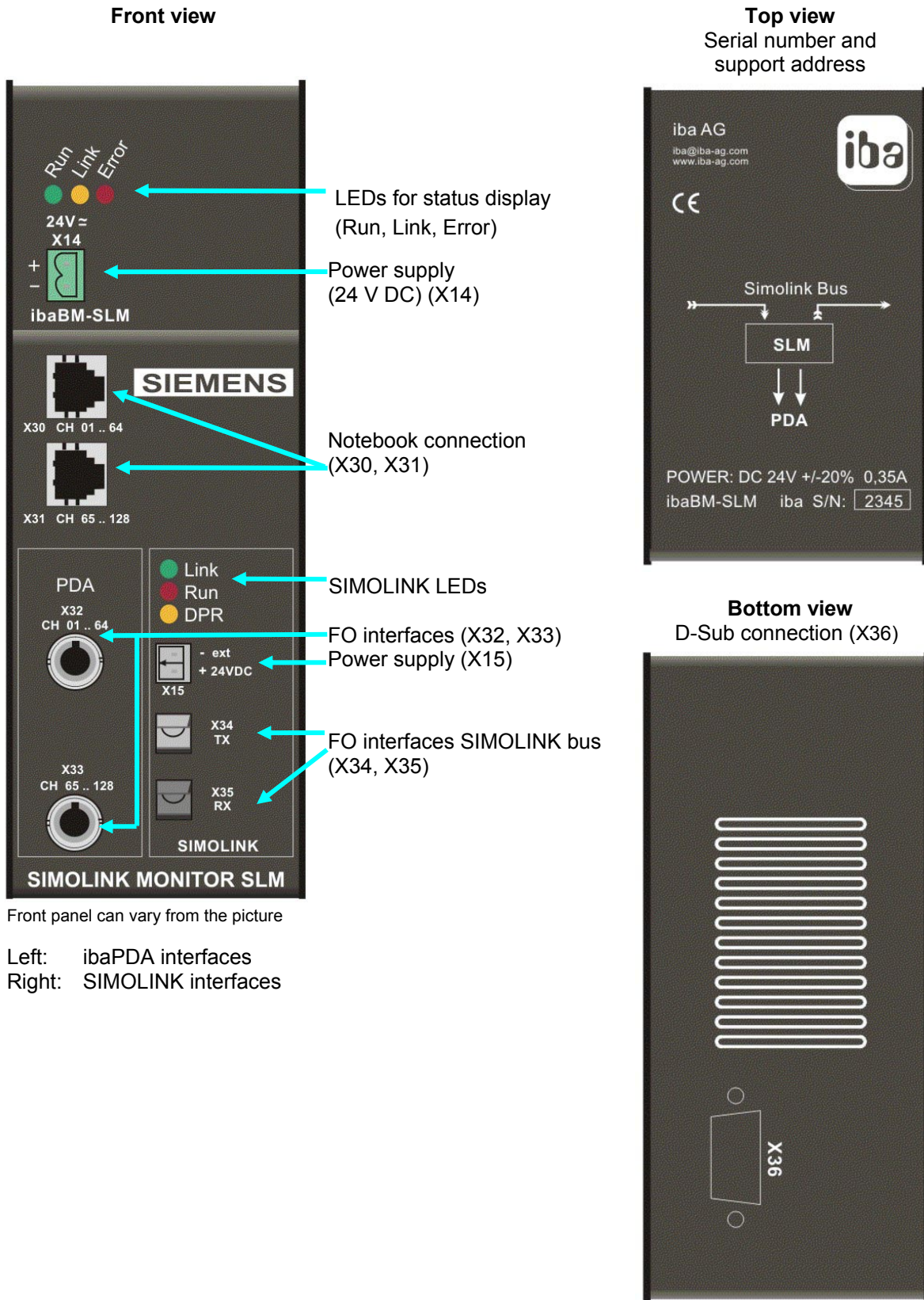


Figure 1: Device views

## 7.4 Status Display

Run, Link and Errors LEDs indicate the operational state.

LED	Status	Indication
L1: Run (green)	blinking	power on and device functioning properly
	off	no power
L2: Link (yellow)	on	telegrams received into dual-port-RAM from integrated SLB module
	off	no telegrams received (either ibaBM-SLM bus inactive or SLB defect)
	fast blinking	simulated telegrams received; (commissioning mode)
L3: Err (red)	on	internal error in the device / no conversion table loaded / error in dual-port-RAM
	off	normal state; after resolution of error LED automatically resets

## 7.5 24 V DC Power Supply (X14)

The ibaBM-SLM device is powered by an external, unregulated 24 V DC (20-30 V DC) with approx. 350 mA. Connect the +/-24 V DC terminal from the power supply to the 2-pole Phoenix connector (supplied with device).

Please contact iba for additional DIN-rail or power supply requirements.

## 7.6 Fiber Optic connections (X32, X33) for ibaNet

The two fiber-optic interfaces connect the ibaBM-SLM with the ibaFOB-4i card in the computer via fiber optic links.

62.5/125  $\mu\text{m}$  multi-mode fiber cables with ST termination are available from iba.

## 7.7 Notebook connections (X30, X31)

The two RJ11 connectors (X30, X31) provide a connection from ibaBM-SLM to a notebook.

Each interface transports up to 64 analog +64 binary signals (CH 01...64, CH 65...128).

## 7.8 Status LEDs SIMOLINK bus

SIMOLINK LED	Status	Indication
Link (green)	blinking	Simolink Bus OK
Run (red)	blinking	Device OK
DPR (orange)	blinking	Dual-port-RAM OK with respect to ibaBM-SLM Simolink Monitor device

➤ For further information see the attached documentation "SLB SIMOLINK Board"

## 7.9 Power Supply Connectors for SIMOLINK Bus (X15)

A 24 VDC power supply can be connected here to provide buffered power to the SIMOLINK Bus. When this voltage is applied, the SIMOLINK bus continues to operate even when the ibaBM-SLM is switched off.



### Important note

Connection or disconnection of the power supply during normal operation leads to disturbances on the device!

## 7.10 Fiber-Optic Interface to the SIMOLINK Bus (X34, X35)

You must terminate the TX (transmit) and RX (receive) fiber-optic cable connections according to the included SLB SIMOLINK Board Documentation.



### Important note

When a single ibaBM-SLM device is in service, always connect this device at the end of the ring (ibaBM-SLM TX with RX of Busmaster). Should a second ibaBM-SLM device be installed, position the device at the beginning of the ring. This is also necessary when no global messages are to be measured.

## 7.11 Interface for loading of the ibaPDA parameters sets

On the underside of the device, you will find one 9-pin Sub-D connector for loading the ibaPDA parameter set into the device.



### Important note

Only pins 2, 3 and 5 may be connected! The cable must be 1:1; i.e. pins 2, 3 and 5 must provide continuity on both connector ends of the cable.

## 8 ibaBM-SLM functionality on the SIMOLINK Bus

The following section provides a short, summary description of the properties and the parameters of the SIMOLINK bus.

### 8.1 Bus Topology

A fiber-optic ring, operating at 11 Mbps defines the basic SIMOLINK bus topology. A Siemens SLB (SIMOLINK Board) is integrated in the ibaBM-SLM device to physically couple it to the SIMOLINK bus. The module supports uninterrupted operation of the SIMOLINK bus, even when the local ibaBM-SLM CPU fails (optional auxiliary power).

Data received from and transmitted to the SIMOLINK bus is stored in the SLB dual-port-RAM, where it is read by the ibaBM-SLM CPU, converted into floating point format and forwarded to ibaPDA, saved as measuring files and analyzed by ibaAnalyzer.

### 8.2 SIMOLINK Bus Characteristics:

- Each 32-bit word corresponds to a telegram  
8 individual telegrams per participant (slave) are possible
- each slave can read all telegrams
- a master can read and write all slave telegrams
- slaves write to the bus by changing the contents of messages in their address range
- If a telegram is sent to a non-existent slave address (global telegram) it can be read by all bus participants. This telegram cannot be changed when a slave answers to it.
- addresses are two-fold : <Address(1...200)> + <Sub address (1...8)> + <data> + <check bits>
- all addresses > 200 are reserved for special telegrams
- single master/multi-slave and multi-master/multi-slave modes supported
- At the end of a transfer cycle, synchronization of bus nodes occurs via a sync. telegram with individual correction capability for cycle times on each node
- bus cycle time of 1.6...3.2 milliseconds



#### Note

Depending on the selected bus addresses and telegrams to be monitored (individual or global), either one or two ibaBM-SLM devices will be required. If only global telegrams are sent over the bus, a single ibaBM-SLM module is sufficient. This single module must be placed directly before the master in the bus ring (end of the ring).

Otherwise, two devices are recommended: one directly after the master (beginning of ring) and one directly before the master in the bus ring. Only then it is possible to measure all values sent over the bus.

### 8.3 Topology example ibaBM-SLM with ibaPDA-V6

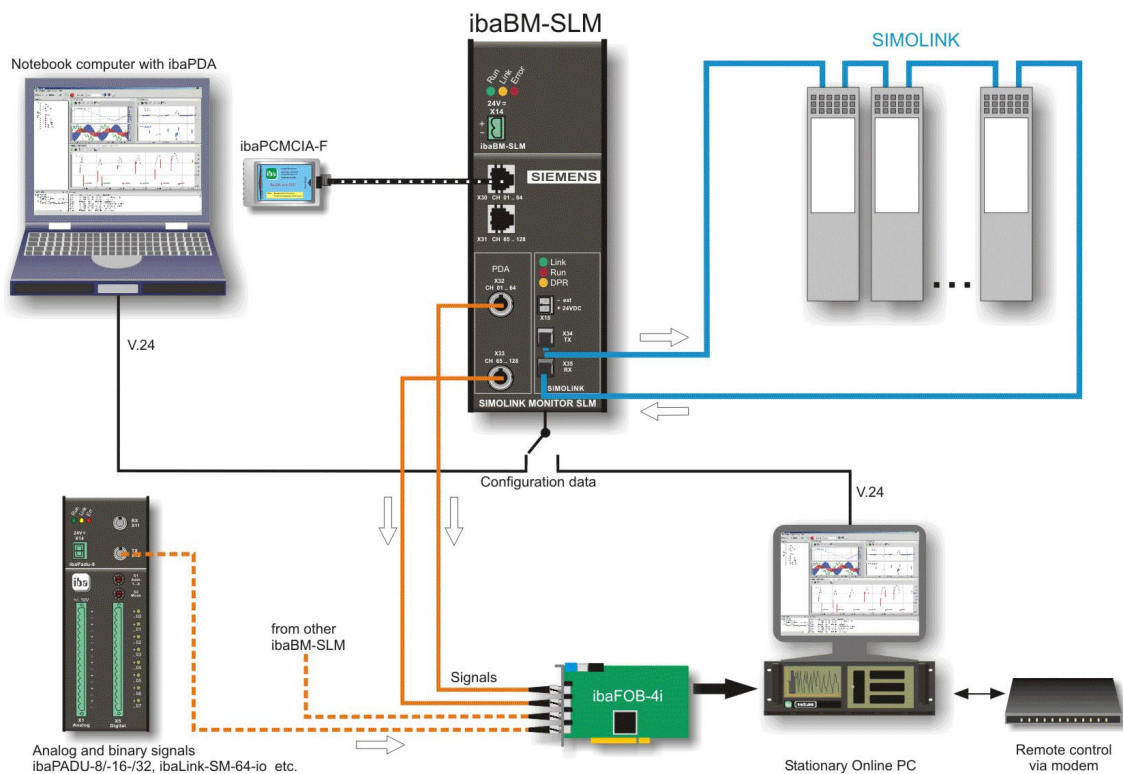


Figure 2: ibaBM-SLM with ibaPDA-V6

- The ibaBM-SLM device is integrated in the SIMOLINK bus.
- The ibaNet fiber optic cables are connected to the ibaPDA computer. 64 analog and 64 digital data can be transmitted via each FO link.
- One FO connection occupies one module with 64 analog and 64 digital signals each in ibaPDA.
- Additional optional iba data capturing devices can be connected to the free FO inputs of the ibaFOB card, as well as further ibaBM-SLM devices.
- A notebook PC with ibaPDA can be used in parallel.
- The ibaPDA computer or the notebook PC must be connected to ibaBM-SLM via a serial cable in order to transmit configuration data before measuring. This connection is not required during measurement.



## **9 Mounting and dismounting**

### **9.1 Mounting and connecting**

1. Place the device on the DIN-rail so that the top part the mounting clip engages the top part of the rail appropriately.
2. Slowly push down and in so that the bottom part of the mounting clips snaps onto the bottom part of the rail and firmly fixes the device to the DIN-rail.
3. Once fixed, connect the 24 VDC power supply to the termination. Finally, connect the required cables according to the SIMOLINK bus topology.

### **9.2 Dismounting**

1. Disconnect the power supply and all external connections from the ibaBM-SLM device.
2. Grasp the device with one hand firmly on the top side. With your free hand, grasp the bottom of the device so that your index and pointer fingers rest on the grounding screw.
3. Lightly push down with the hand on the top side of the device and simultaneously pull forward with your other hand. With this action, the device should free itself from the DIN-rail.

## 10 Initial operation

### 10.1 Basic Steps

For initial operation proceed as follows:

1. Mount the ibaBM-SLM device
2. Prepare the ibaPDA computer (insert the ibaFOB card, install ibaPDA-V6 software)
3. Integrate ibaBM-SLM into the SIMOLINK bus (establish the connections)
4. Connect the device to the ibaPDA computer via the serial interface with a V.24 interface cable.
5. Establish the FO connection to the ibaPDA computer.
6. Connect the 24V power supply, and if required, connect also the SIMOLINK module to a 24V power supply.
7. Switch on the power supply.
8. Start ibaPDA.
9. Configure all required settings in ibaPDA.
10. If you want to test whether the device is sending data to the ibaPDA computer, you can use the simulation function of the device.
11. Remove all serial connections when signal recording is active.

➤ The following chapters describe the basic steps and the required settings for configuration in ibaPDA and ibaAnalyzer in a more detailed way.

➤ For further information please refer to the further manuals.

### 10.2 Configuration in ibaPDA

#### 10.2.1 Hardware Configuration

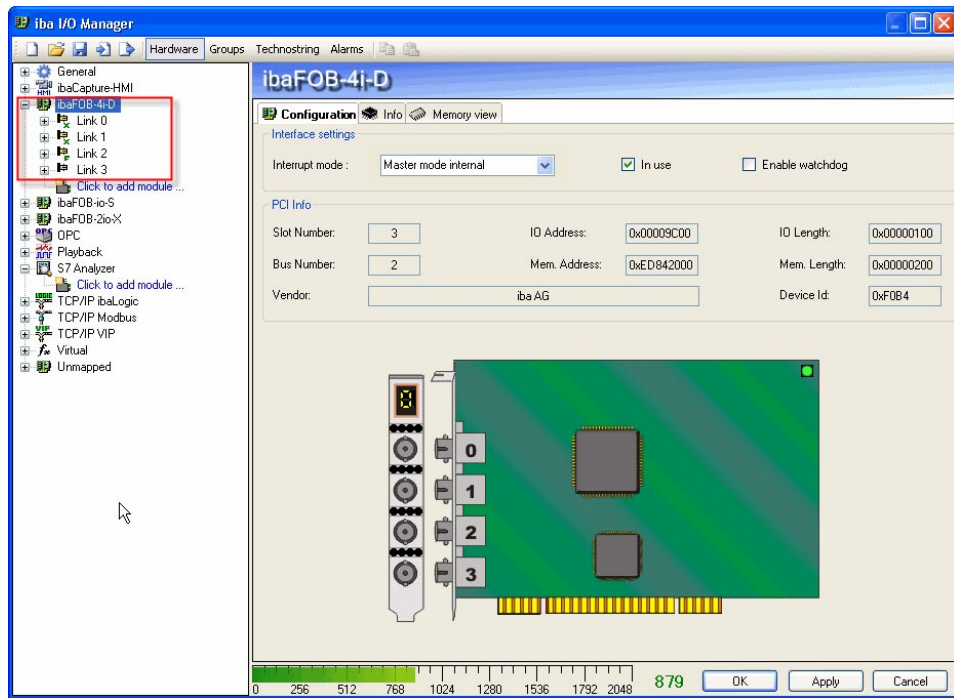
##### 10.2.1.1 Interfaces and input signals

The I/O Manager is the central dialog for the connection of the device to the ibaPDA computer (ibaFOB-D card) and all settings of the input signals and the interfaces.

➤ For further information refer to ibaPDA manual.

#### Proceeding

1. Open the I/O Manager
2. Select the "Hardware" menu.
3. In the left module tree mark the ibaFOB-D card, the device is connected to.



4 links are available in this example to connect the device (module).

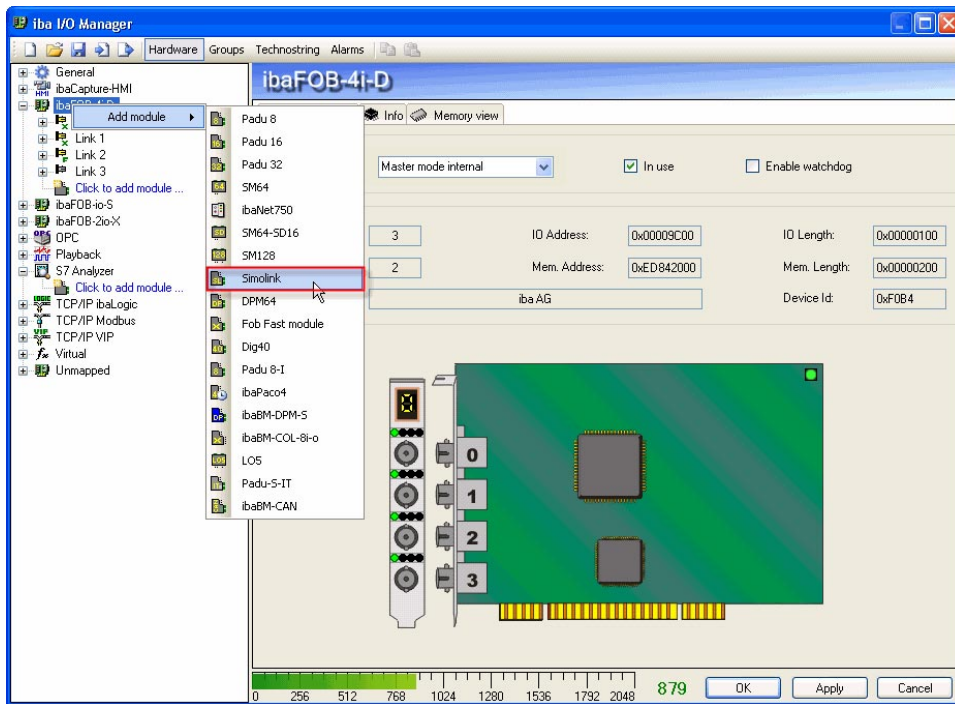
If the device should use the SIMOLINK interrupt, use at least the first link (Link 0).



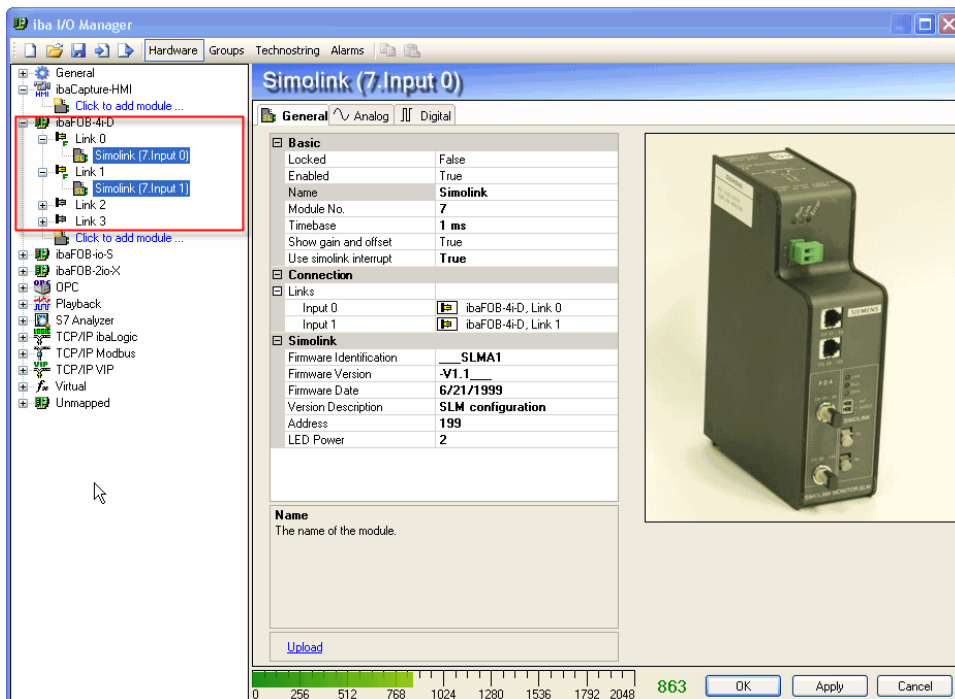
### Note

SIMOLINK interrupt can only be used, when an ibaBM-SLM device is connected to the 1. link (Link 0), because the card works as interrupt master / external. The SIMOLINK interrupt must be used when measuring synchronously to SLB.

4. If you want to measure synchronously to the SIMOLINK bus, you have to use the SIMOLINK interrupt. Set the interrupt mode to "Master mode external" and the timebase (in the General tab) to the SIMOLINK cycle (1.3 ms or an integer multiple of 1.3 ms).
5. When the ibaFOB-D card should generate the interrupt (no synchronous measurement), set the interrupt mode to "Master mode internal".
6. Right-click on the 1. link (Link 0) and select the "Simolink" module from the list.



The SIMOLINK module will be displayed at Link 0 in the module tree on the left side.



The “General” tab contains information about the basic settings of the device, the SIMOLINK module and which link is in use.

### 10.2.1.2 Basic settings

You can make the following basic settings:

- Show gain and offset
- Use SIMOLINK interrupt

To enable/disable the SIMOLINK module as interrupt master, select:

False: not enabled

True: enabled

If you want the SIMOLINK module to give the interrupts to be used, select “True”.

### 10.2.1.3 COM port configuration

Here you should specify:

- The COM port, which should be used for loading the parameter set
- The settings for uploading the parameter set

The COM parameter must be set to:

- 9600 Bd
- 8 databits
- Parity EVEN
- with 1 stopbit

### 10.2.1.4 Settings for parameter loading

The settings for parameter set loading are:

- Load with reset of SLM module (checkbox is selected)  
With a click on <Upload> the new parameters will be loaded and then the SIMOLINK module will be reset.  
Activating this option can be necessary in exceptional cases, if there are problems while the SIMOLINK module is booting. The reason can be disturbances, which are not eliminated due to an applied auxiliary voltage.  
Recommended setting: Disabled



#### Important note

A reset of the SIMOLINK module can lead to disturbances on the SIMOLINK bus.  
Flash erase unconditional (Checkbox selected)

- Flash erase unconditional (checkbox is selected)  
When this option is selected, the Flash-Eprom will be reprogrammed with every upload.  
When this option is disabled, first the new and the old parameters will be compared. Only when they are different, the Flash-Eprom will be reprogrammed.  
Recommended setting: Disabled
- Simulation active (checkbox is selected)  
In order to test the device and the connection of the device to ibaPDA, ibaPDA provides simulation parameters. If you want to test the device with this simulation, select this option. The device works only with simulated data. If you want to work with real data, disable this option.

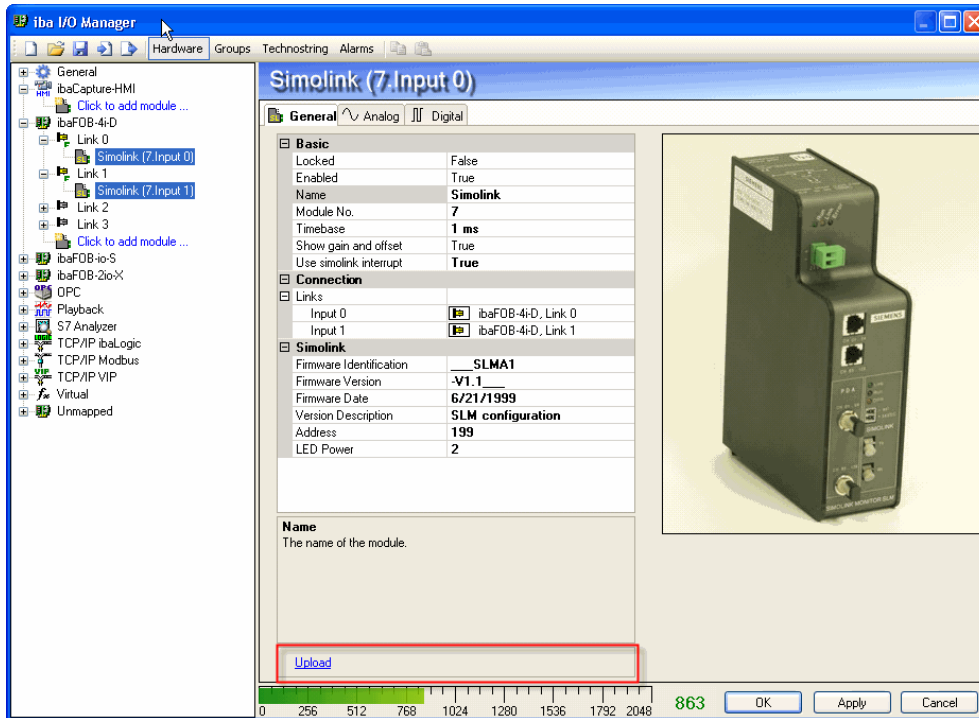
## Proceeding



### Note

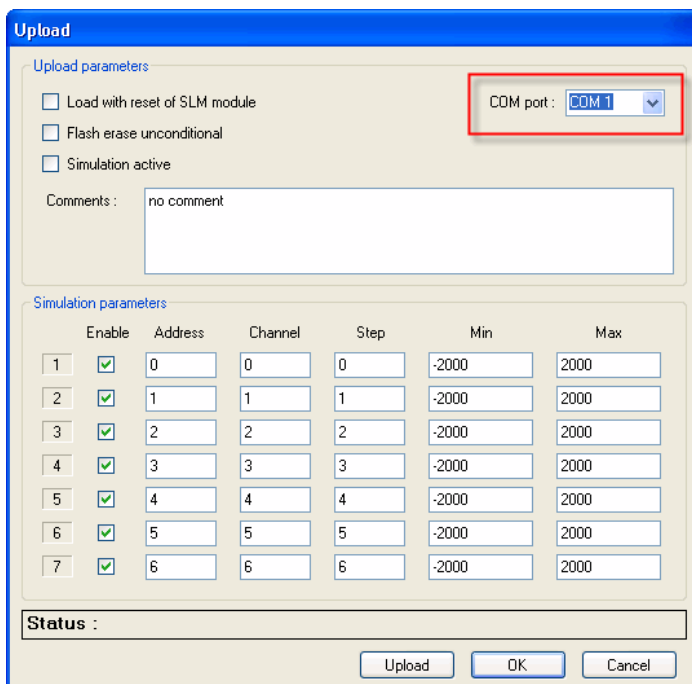
The device and ibaPDA must be connected via a serial cable.

1. Click on the “Upload” link.



The “Upload” window will be opened.

2. Select the COM port of the ibaPDA computer to which the device is connected via the serial interface.



- Then define the conditions, how the device should upload the parameters from ibaPDA or if you want to work with simulated data.

Working with simulated data:

You can specify, how many simulated parameters (up to 7 are possible) the parameter set should contain.

You can change the values for each simulated parameter.

- Finally click on <Upload>. The parameter set (real or simulated) will be uploaded into the device.


### 10.2.2 Reference to simulated parameters (simulation mode)

In simulation mode, a bus cycle of 1.6 ms is simulated, where up to 7 independent saw tooth signals can be defined in DINT format. They can be released individually. Their shape can be modified and each signal can be assigned to an individual virtual SIMOLINK address/channel.

**Address:** address of the participant (0 to 200)

**Channel:** channel number (0 to 7)

**Step:** increment (+) or decrement (-) by which the signal should change for each bus cycle

**Min./Max.:** lower/upper limit of the saw tooth signal 



#### Note

A blinking LED “Link” (yellow) shows the simulation mode.

The device remains in simulation mode until configured otherwise.

## 11 Working with SIMOLINK signals in ibaPDA

### 11.1 Analog signal table

In order to capture SIMOLINK signals, it is necessary to complete the signal table in ibaPDA. The signal table contains all analog signals to be captured from the SIMOLINK bus.



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#### Important note

Make sure, that the parameter set of SIMOLINK is identical to the parameter set of the ibaBM-SLM device.

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Assign unique parameters to the signals. These parameters are:

- Signal name
- Unit (e. g. °C or °F, Ampere, Volt, N etc.)
- Gain and Offset (The values „Gain“ and „Offset“ (signal value at zero point) determine the inclination and position of a linear characteristic curve for scaling).
- Address (SLB slave address; address of the signal source in the SIMOLINK network, possible values: 0 to 204).
- Channel (signal channel of the corresponding address in the SIMOLINK network, possible values 0 to 7).
- Data Type (Data type of the signal in SIMOLINK, possible types INT LOW, INT HIGH, DINT, FLOAT).
- Activate the channels (acquisition channels)
- Actual (Actual value of the signal or actual signal value from a data base)

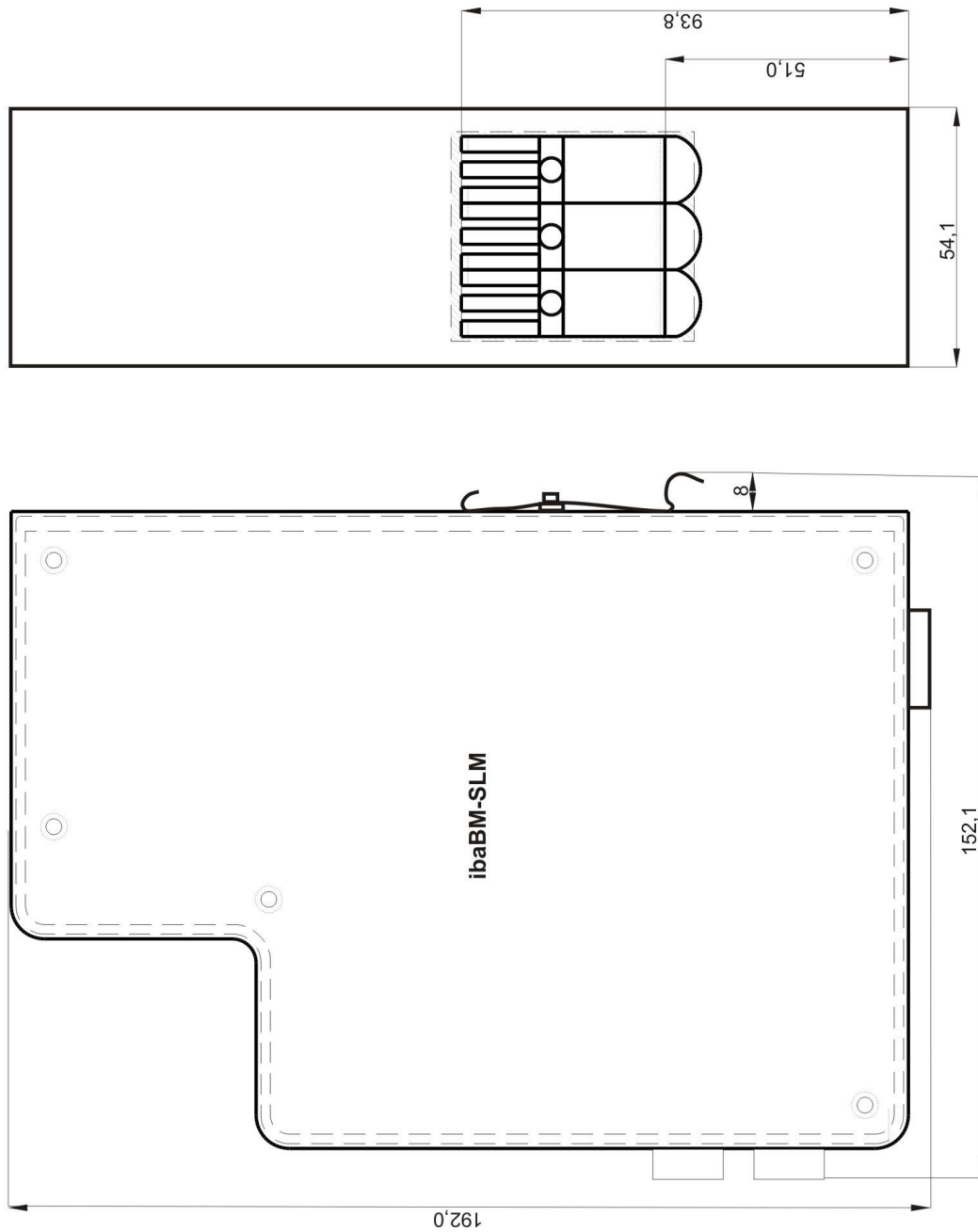


## 12 Technical Data and Environmental Conditions

Order No. at iba	13.120600
Order No. at SIEMENS	6SX 7005-0AF00
Mechanical	DIN IEC 68-2-6 (with properly mounted device and DIN Rail)
Operating Temperature	32 °F to 122 °F (0 °C to 50 °C)
Storage Temperature	-13 °F to 158 °F (-25 °C to 70 °C)
Transport Temperature	-13 °F to 158 °F (-25 °C to 70 °C)
Cooling	passive
Mounting	Snap on DIN Rail
Humidity Class	F
Protection Class	IP20
Power Supply	24 V DC +/-20 % unregulated
Current consumption	350 mA max.
FO cable	62,5/125 µm
FO coupling	ST Lean
Distance from ibaBM-SLM to ibaPDA System	up to 2000 m (6,560 ft)
Dimensions (W x H x D) in mm	54 x 194 x 155 (incl. DIN Rail Clip)
inches	2.13 x 7.64 x 6.10
Weight (incl. Packaging and Documentation)	1000 g

➤ For current consumption and specification of SLB module refer to the original SLB documentation.

## 12.1 Dimension sheet



(Dimensions in mm)

## 13 Support and contact

### Support

Phone: +49 911 97282-14  
Fax: +49 911 97282-33  
E-Mail: [support@iba-ag.com](mailto:support@iba-ag.com)



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### Note

If you require support, specify the serial number (iba-S/N) of the product.

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### Contact

#### Headquarters

iba AG  
Koenigswarterstr. 44  
90762 Fuerth  
Germany  
Phone: +49 911 97282-0  
Fax: +49 911 97282-33  
Email: [iba@iba-ag.com](mailto:iba@iba-ag.com)  
Contact: Mr. Harald Opel

#### Regional and Worldwide

For contact data of your regional iba office or representative please refer to our web site

[www.iba-ag.com](http://www.iba-ag.com).