LIPOWSKY
INDUSTRIE-ELEKTRONIK



Baby-LIN

Product guide V1.5

Lipowsky Industrie-Elektronik GmbH
Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0 | Fax: +49 (0) 6151 / 93591 - 28
Website: www.lipowsky.com | E-Mail: info@lipowsky.de

1 Contents

1 Contents....2
2 Support information....3
3 Introduction....4
4 Use cases....5
5 LINWorks and workflow....6
6 Products....8
7 FAQ - Frequently asked questions....10
7.1 Can I get help, if I get stuck?....10
7.2 Do Baby-LIN products only speak LIN?....10
7.3 Do Baby-LIN products support higher baud rates than 20 kBaud on the LIN-Bus?....10
7.4 Do Baby-LIN products support SAE J2602?....10
7.5 Can I use any Baby-LIN product without being a LIN/CAN expert?....11
7.6 Can I use any Baby-LIN product to monitor LIN/CAN communication?....11
7.7 I need a commander to operate a LIN/CAN device during production, e.g. a sunroof. Which Baby-LIN product should I use?....11
7.8 Can Baby-LIN products help me realising an endurance test for a LIN/CAN device, e.g. a window lifter?....12
7.9 Can the Baby-LIN products be operated without the need for a PC?....12
7.10 Can I control the LIN- or CAN-Bus from within my own PC software?....12
7.11 Can I connect multiple Baby-LIN products to one PC?....12
7.12 What to do, if I don't have a LDF/DBC?....13
7.13 Which LIN versions are supported by the Baby-LIN products?....13
7.14 Are the Baby-LIN products supplied with software?....13
7.15 Which operating system can be used with the Baby-LIN products and the LINWorks software?....14
7.16 What are the system requirements for my PC?....14
7.17 What about the LINWorks download licence? Where can I download LinWorks?....15
7.18 Which service comes with the Baby-LIN products?....15
7.19 Are software and firmware updates free of charge?....15

© 2018 Lipowsky Industrie-Elektronik GmbH
Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0
Website: www.lipowsky.com

2 Support information

In case of any questions you can get technical support by e-mail or phone. We can use TeamViewer to give you direct support and help on your own PC. This way we are able to sort out problems fast and direct. We have sample code and application notes available, which will help you to make your job.

Lipowsky Industrie-Elektronik GmbH realized many successful LIN and CAN related projects and therefor we can draw upon many years of experience in these fields. We also provide turn key solutions for specific applications like EOL (End of Line) testers or programming stations.

Lipowsky Industrie-Elektronik GmbH designs, produces and applies the Baby-LIN products, so you can always expect qualified and fast support.

Contact information			
Website:	www.lipowsky.com	E-Mail:	info@lipowsky.de
Customer portal:	portal.lipowsky.de	Telephone:	+49 (0) 6151 / 93591 - 0
Shipping address:	Lipowsky Industrie-Elektronik GmbH, Römerstraße 57, 64291 Darmstadt, Germany		

3 Introduction

Any situation that requires communication with a LIN or CAN device is a potential field of application for a Baby-LIN product. It is a versatile tool that can be used in research laboratories, test departments and production (EOL applications).

All Baby-LIN products allow for different operation modes to support typical use cases like:

- **Monitor** and log all frames on the bus without the need for a SDF. If a SDF is available signal values can also be monitored.
- **Control** the bus via the **LINWorks** software or customer specific applications by using the **Baby-LIN-DLL**.
- **Program** and store free programmable command sequences in the Baby-LIN product to run it as a **stand-alone** device without the need for a PC. Thus you can run a bus driven ECU in a **durability test** or **EOL applications** without any PC connected.

All Baby-LIN products are able to simulate different configurations of LIN- and CAN-Bus nodes. It is possible to **simulate any number of nodes** ranging from none to all. These are some typical configurations:

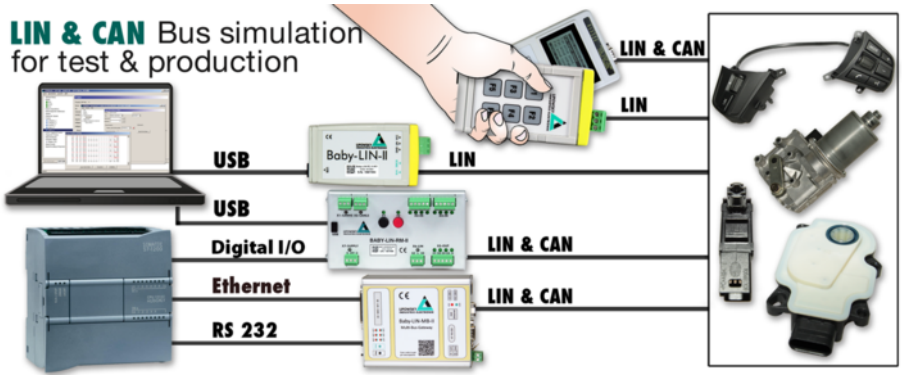
- LIN-Bus: Simulate the **LIN-Bus master** to operate slave nodes.
- LIN-Bus: Simulate any number of **LIN-Bus slave** nodes.
- LIN- and CAN-Bus: Simulate all but one node and realize a **residual bus simulation**.
- LIN- and CAN-Bus: Simulate **all nodes** and therefor the complete communication on the bus.
- LIN- and CAN-Bus: Simulate no node to **monitor** the bus communication only.

Simulations for the LIN- and CAN-Bus can be done simultaneously.

The different Baby-LIN products mainly vary in the type and amount of interfaces and the possibilities to interact without a PC. The following guide is designed to help you find the ideal Baby-LIN product for your use cases.

4 Use cases

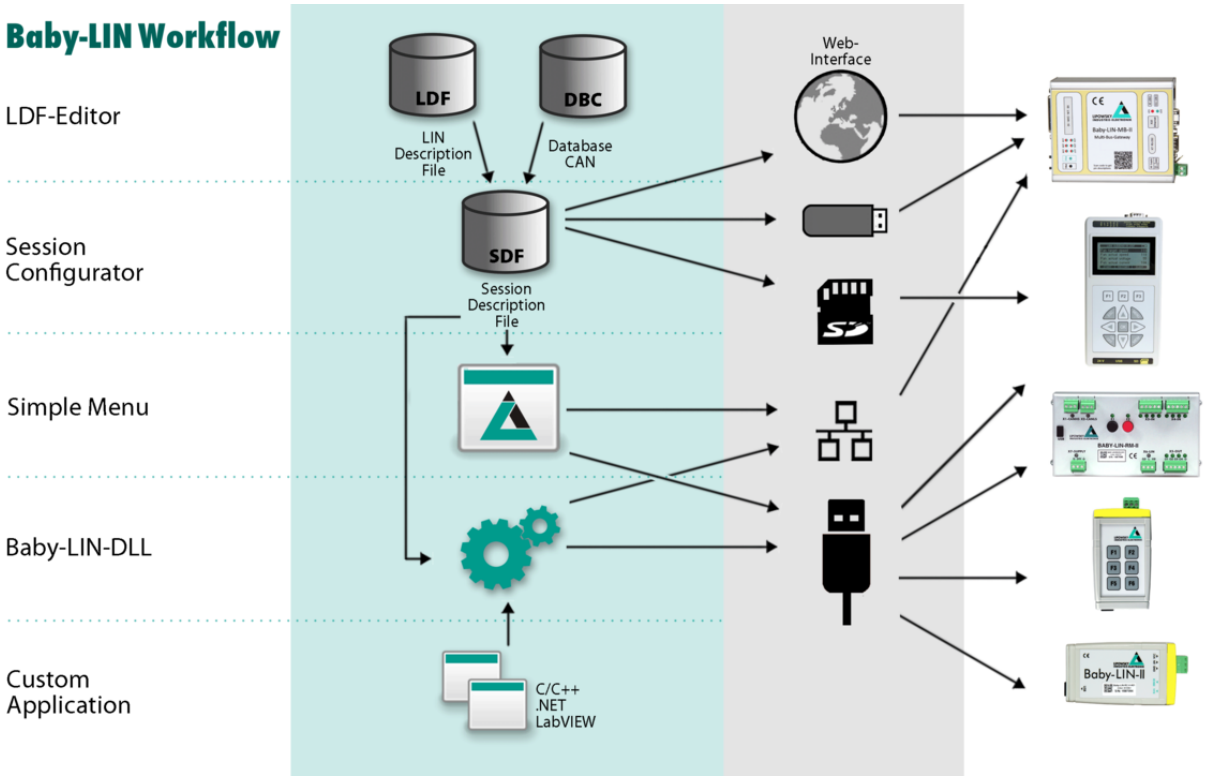
Each Baby-LIN product is designed to comply with certain requirements of typical use cases:



No matter if you want a PC coupled device, a handheld device, a stand alone device without a PC or a PLC coupled device, there is always a Baby-LIN product for you.

5 LINWorks and workflow

All the different software components of the **LINWorks** suite are designed to support the customer during specific steps of the workflow. The worklfow starts with a **LDF** (for LIN-Bus) or **DBC** (for CAN-Bus) which will be embedded in a **SDF** using the **Session Configurator**. This SDF contains all the informations the Baby-LIN product needs. Depending on your device and use case you can transfer the SDF via Web-Interface, USB mass storage device, SDHC card or the **Simple Menu**. It is also the base for your custom application using the **Baby-LIN-DLL**.



The purchase of a Baby-LIN product includes the license to download the **LINWorks** suite. This suite is a collection of PC software that supports you during the whole workflow.

The **LDFEdit** allows the inspection, creation and edit of a LDFile (LIN Description File).

The **SessionConf** allows the inspection, creation and edit of a SDFile (Session Description File) and features a file import for LDFiles (for LIN-Bus simulation) and DBC files. It defines everything needed for a complete simulation of each available bus, e.g. which nodes on each bus are available and which nodes should be simulated by the Baby-LIN product. Moreover it allows defining an application logic. This programming ability is available for each device out of the box.

The **SimpleMenu** is used to establish a connection to the Baby-LIN product and upload SDFiles, change the device target configuration, control the bus and monitor the frames and signals on the bus. Even without a LDFile/DBC file/SDFile the bus can be monitored and the frames can be logged.

The **Baby-LIN-DLL** allows customers to create their own application and use all features of the Baby-LIN product like controlling and monitoring the LIN- and CAN-Bus interfaces. The **Baby-LIN-DLL** is a native **C/C++** DLL. A wrapper for **.NET** applications is also provided as **LabView** files. Examples are available for all supported languages.

The **LogViewer** can show and convert the log files of the Baby-LIN products as well as the SimpleMenu.

© 2018 Lipowsky Industrie-Elektronik GmbH
Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0
Website: www.lipowsky.com

The **FrameBlaster** is a script interpreter, that gives you access to the features of the Baby-LIN from within a JavaScript. The Script can be developed and executed in an integrated development environment, but also executed by a command line tool to allow batch execution.

The **CustomPanel** is a graphical user interface, whose layout is stored in a configuration file. The controls allow you to show and control LIN and CAN based signals from a SDFile. With this tool the Lipowsky Industrie-Elektronik GmbH can quickly create complex user interfaces based on your requirements. A configuration editor is planned.

The **LINWorks** software runs on 32 and 64 bit Windows versions. The Baby-LIN-DLL is also available as **Linux version** upon request.

© 2018 Lipowsky Industrie-Elektronik GmbH
Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0
Website: www.lipowsky.com

6 Products

Features					
	Baby-LIN-II	**Baby-LIN-RC-II**	**Baby-LIN-RM-II**	**HARP-5**	**Baby-LIN-MB-II**
Download license for the LINWorks Suite	yes	yes	yes	yes	yes
Host interface	USB 2.0	USB 2.0	USB 2.0	• USB 2.0 • SDF management via SDHC card	• Ethernet • RS-232 • SDF import and firmware updates via the USB 2.0 host interface • SDF import via web interface
LIN-Bus interfaces	1	1	1	1	1
Optional LIN-Bus interfaces(*1)	0	0	0	1	5(*2)(*3)
Optional CAN-Bus interfaces(*1)	0	0	• 1 CAN-HS • 1 CAN-LS	• 1 CAN-HS • 1 CAN-LS	• 1 CAN-HS
Digital inputs / digital outputs	0 / 0	0 / 0	8 / 4	0 / 0	1 / 2(*2)(*4)
Optional digital inputs / digital outputs(*1)	0 / 0	0 / 0	0 / 0	0 / 0	6 / 6(*2)(*5)
SDF Format V3	yes	yes	Activation required(*1)	Activation required(*1)	yes
Multiple SDF capable	no	no	no	yes	yes

*1 These features require an activation via voucher codes.

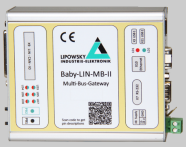
*2 Some of the Baby-LIN-MB-II interfaces require piggyback MIF extensions. 2x MIF-LIN and 1 MIF-DIO can be added at most. Therefor it is not possible to use all optional digital I/Os and LIN-Bus channels with the same device.

*3 The second LIN-Bus interface only requires an activation via a voucher codes. The next LIN-Bus interfaces come in pairs with each piggyback MIF-LIN extension. Therefor the possible number of LIN-Bus channels may be: 1, 2, 4, 6

*4 The first output is a semiconductor relay output. The second output is usually used as a switchable output for the LIN bus voltage. With the correct wiring it can act as digital output.

*5 The 6 digital inputs and outputs share the same pins. Therefor each individual pin can be used either as input or output.

© 2018 Lipowsky Industrie-Elektronik GmbH
Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0
Website: www.lipowsky.com

Features					
	Baby-LIN-II	**Baby-LIN-RC-II**	**Baby-LIN-RM-II**	**HARP-5**	**Baby-LIN-MB-II**

Additional features		• Keyboard with 6 keys
		• MicroSD card slot for bus logging(*1)
			• 2 freely programmable push buttons
			• PWM (pulse width modulation)
			  ○ 2 of the digital inputs can be configured as PWM inputs
			  ○ All 4 digital outputs can be configured as PWM outputs
				• Graphical LCD display (128x64 characters) with switchable backlight
				• Keyboard with 12 keys
				• Acoustic signal generator
				• Real-time clock (battery-backed)
				• SD card slot
				• Battery powered operation
				• Integrated 12 Volt generator (150 mA) used for node supply
					• RS-232 interface
					• Ethernet interface
					• USB 2.0 host interface
					• Switched LIN supply output
					• Real-time clock (battery-backed)
					• Integrated UPS for save system shutdowns
					• Plug-in system to implement custom features
					• Web interface

Mounting	-	-	Top hat rail (TS 35)	-	Top hat rail (TS 35)
Typical applications	• PC interface • Stand-alone device	• Handheld commander • PC interface • Stand-alone Bus-Logger	• PLC coupling via digital I/O • PC interface • Stand-alone device • Autonomous LIN/CAN gateway	• Handheld commander • Handheld analyzer • Stand-alone Bus-Logger	• PLC coupling via LAN, RS-232 or Digital I/O • PC interface via LAN or RS-232 • Autonomous LIN/CAN gateway • Multi-LIN-Bus applications

*1 These features require an activation via voucher codes.

*2 Some of the Baby-LIN-MB-II interfaces require piggyback MIF extensions. 2x MIF-LIN and 1 MIF-DIO can be added at most. Therefor it is not possible to use all optional digital I/Os and LIN-Bus channels with the same device.

*3 The second LIN-Bus interface only requires an activation via a voucher codes. The next LIN-Bus interfaces come in pairs with each piggyback MIF-LIN extension. Therefor the possible number of LIN-Bus channels may be: 1, 2, 4, 6

*4 The first output is a semiconductor relay output. The second output is usually used as a switchable output for the LIN bus voltage. With the correct wiring it can act as digital output.

*5 The 6 digital inputs and outputs share the same pins. Therefor each individual pin can be used either as input or output.

© 2018 Lipowsky Industrie-Elektronik GmbH
Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0
Website: www.lipowsky.com

7 FAQ - Frequently asked questions

7.1 Can I get help, if I get stuck?

Definitely yes!

In case of any questions you can get technical support by e-mail or phone. We can use TeamViewer to give you direct support and help on your own PC. This way we are able to sort out problems fast and direct. We have sample code and application notes available, which will help you to make your job.

Lipowsky Industrie-Elektronik GmbH realized many successful LIN and CAN related projects and therefor we can draw upon many years of experience in these fields. We also provide turn key solutions for specific applications like EOL (End of Line) testers or programming stations.

Lipowsky Industrie-Elektronik GmbH designs, produces and applies the Baby-LIN products, so you can always expect qualified and fast support.

Contact information			
Website:	www.lipowsky.com	E-Mail:	info@lipowsky.de
Customer portal:	portal.lipowsky.de	Telephone:	+49 (0) 6151 / 93591 - 0
Shipping address:	Lipowsky Industrie-Elektronik GmbH, Römerstraße 57, 64291 Darmstadt, Germany		

7.2 Do Baby-LIN products only speak LIN?

Definitely no!

Only our compact entry-level devices, the Baby-LIN-II and Baby-LIN-RC-II are limited to LIN.

The Baby-LIN-RM-II, Baby-LIN-MB-II and HARP-5 are prepared for CAN-Bus communication, but require an activation via an optional voucher code, which can be bought separately.

7.3 Do Baby-LIN products support higher baud rates than 20 kBaud on the LIN-Bus?

Yes, they do.

Although the LIN specification defines a maximum value of 20,000 Baud for the LIN communication line, some applications require higher baud rates. Therefor all Baby-LIN products are equipped with a LIN transceiver, which can be switched into a high speed communication mode. In this mode, the maximum available baud rate on the LIN communication line is 115,000 Baud. This can be useful for special protocols with high data transfer volumes like ECU flashing.

7.4 Do Baby-LIN products support SAE J2602?

Yes, they do.

All Baby-LIN products can be used to simulate a J2602 node (master and/or slave).The current LinWorks Session Configurator should be able to import your LDF file describing a J2602 network.

The J2602 specification is based on LIN 2.0. J2602 uses a fixed baud rate of 10,417 Baud.

7.5 Can I use any Baby-LIN product without being a LIN/CAN expert?

Yes, you can. If you have to operate a LIN/CAN device (e.g. wiper motor, window lifter etc.), you only need to have access to the LDF (LIN-Description-File) respectively the DBC (Database CAN) for that device. This LDF/ DBC can directly be imported by the LINWorks software. So the minimal setup after importing the LDF/DBC is to define, which nodes should be simulated and which nodes are actually available. Transfer the SDF to one of the Baby-LIN products and you are done and can start running the bus, watching or modifying signals on the fly. It is really that easy!

7.6 Can I use any Baby-LIN product to monitor LIN/CAN communication?

Yes, you can. In case you want to retrieve details about the information exchanged on a LIN- or CAN-Bus, by monitoring the data transferred, all Baby-LIN products can help with specific monitor functions.

- First you connect the Baby-LIN product to the LIN- or CAN-Bus, that shall be monitored.
- The Baby-LIN product automatically detects the LIN- or CAN-Bus speed and adapts to that speed.
- All Baby-LIN products can monitor the complete data transferred with identifiers, data bytes, checksum and a time stamp. The Baby-LIN-II, Baby-LIN-RC-II, Baby-LIN-RM-II and HARP-5 can display and log them to a file using the LINWorks software. The HARP-5 can log these data to its SDHC card and the Baby-LIN-MB-II to a USB mass storage device.

7.7 I need a commander to operate a LIN/CAN device during production, e.g. a sun-roof. Which Baby-LIN product should I use?



For LIN-Bus devices the Baby-LIN-RC-II (on the left) will be a good and economic choice for this application. The integrated keypad allows to take control of LIN-Bus devices and command them by simply pressing buttons. It can be operated stand alone and does not need a connection to a PC.
If you want to command CAN-Bus(*) devices or prefer to also watch signal values during the operation the HARP-5 (on the right) fits your needs. It is battery driven and can display signals and further information using a configurable user interface. The integrated SD-card can be used for data logging.



* The CAN-Bus support must be enabled via an optional voucher code.

7.8 Can Baby-LIN products help me realising an endurance test for a LIN/CAN device, e.g. a window lifter?

Yes, they can. The Baby-LIN products can be easily utilized in such endurance test applications. They can provide all the necessary LIN/CAN communications and furthermore provide the signal events to realize the intended test sequence. For example:

1 Command close window

2 Wait for 5 seconds

3 Command open window

4 Wait for 5 seconds

5 Repeat the loop with first step

Such a test can be defined by the macro feature. Any Baby-LIN product can be configured to automatically start this sequence and run it autonomously without a PC connection. If a control by the user, via digital I/O, RS-232 or Ethernet is required, one of the Baby-LIN products surely matches your requirements.

7.9 Can the Baby-LIN products be operated without the need for a PC?

Yes, they can. The Baby-LIN products are designed to run complete independent from the PC. The PC is only used for configuration and if requested to show and change any signal values or other commuication related parameters.

Many applications need to run continuously 24 hours a day. If you don't want to have your PC powered on for all that time, the Baby-LIN products solve that problem.

7.10 Can I control the LIN- or CAN-Bus from within my own PC software?

Yes, you can. All Baby-LIN products are deliverd with a download license for the LINWorks software which contains the Baby-LIN-DLL. With this DLL you can create custom applications that use Baby-LIN product to access the LIN- and CAN-Bus. For example you can read and write signals values in real time.

The Baby-LIN-DLL is available as 32 and 64 bit Windows-DLLs which can be used directly with C/C++. For Linux a SO version is available on request. A wrapper for .NET is available and supports all .NET languages like C# and VisualBasic.NET. Even LabView is supported with a wrapper.

Programming examples are available for each language.

7.11 Can I connect multiple Baby-LIN products to one PC?

Yes, you can. The LINWorks software and the Baby-LIN-DLL can handle multiple Baby-LIN products connected to the same PC.

One use case would be if you have to run multiple identical LIN/CAN devices at the same time. Then you would need to supply a separate restbus simulation to each device. This can be achieved by using multiple Baby-LIN products.

7.12 What to do, if I don't have a LDF/DBC?

If you have a LIN job and there is no LDF available, then the LDF Editor can help. The LDF Editor is part of the LINWorks software and allows you to create LDFs from scratch. In that case, you need to have comprehensive information about that LIN device, to be able to make all the necessary entries in the LDF-Editor.

If you need a DBC or have not enough information to create your own LDF simply try to contact us ("Support information"). During numerous LIN and CAN projects, we gathered a lot of information about all kind of ECU's. So there might be a good chance, that we can help.

7.13 Which LIN versions are supported by the Baby-LIN products?

All Baby-LIN products supports all current LIN versions (V.1.2, V.1.3, V.2.0, V2.1 and V2.2). It is also possible to use the Baby-LIN products with devices, using the LIN related protocol variants Cooling and SAE J2602.

7.14 Are the Baby-LIN products supplied with software?

Yes, they are. All Baby-LIN products are delivered with a download license for the LINWorks suite The LINWorks suite contains the following tools:

LINWorks tool	Description
Windows driver	The **Baby-LIN driver** is necessary to connect a Baby-LIN product to a windows PC via USB. The Baby-LIN product will be available as **virtual COM port**.
LDF Editor	The **LDFEdit** allows the inspection, creation and edit of a LDFile (LIN Description File).
Session Configurator	The **SessionConf** allows the inspection, creation and edit of a SDFile (Session Description File) and features a file import for LDFiles (for LIN-Bus simulation) and DBC files. It defines everything needed for a complete simulation of each available bus, e.g. which nodes on each bus are available and which nodes should be simulated by the Baby-LIN product. Moreover it allows defining an application logic. This programming ability is available for each device out of the box.
Simple Menu	The **SimpleMenu** is used to establish a connection to the Baby-LIN product and upload SDFiles, change the device target configuration, control the bus and monitor the frames and signals on the bus. Even without a LDFile/DBC file/SDFile the bus can be monitored and the frames can be logged.
BabyLIN-DLL	The **Baby-LIN-DLL** allows customers to create their own application and use all features of the Baby-LIN product like controlling and monitoring the LIN- and CAN-Bus interfaces. The **Baby-LIN-DLL** is a native **C/C++** DLL. A wrapper for **.NET** applications is also provided as **LabView** files. Examples are available for all supported languages.
BLProg	The **BLProg** is used to update the **firmware** of a Baby-LIN product. If you download a firmware package from our customer portal (portal.lipowsky.de) a current version of the **BLProg** will always be included.

LINWorks tool	Description
Baby-LIN Serial Writer	The **Serial writer** is used to change the **serial number**, that is stored within the persistent memory of a Baby-LIN product. This serial number influences the allocation of the **virtual COM port** number, the Baby-LIN product is available under.
Baby-LIN-MB-Tool	The **Baby-LIN-MB-Tool** allows to access many features of the Baby-LIN. It can help to search and identify Baby-LINs, change the **network configuration** and select different modes. Scripts using the **ASCII command protocol** can be executed, debugged and logged. The simulation mode allows to **simulate** certain behaviours of the Baby-LIN to test custom applications. Additionally the Baby-LIN-MB-Tool features many different **logging** capabilities.

So you get everything you need to start working with the your Baby-LIN!

7.15 Which operating system can be used with the Baby-LIN products and the LINWorks software?

The LINWorks software requires one of the following operating systems:

- Windows XP
- Windows Vista (32 and 64 Bit)
- Windows 7 (32 and 64 Bit)
- Windows 8 (32 and 64 Bit)
- Windows 10 (32 and 64 Bit)



Version incompatitbility

For Linux only the Baby-LIN-DLL is available upon request. Right now we are not releasing a Linux version regularly.

This allows writing your own custom applications on Linux. All other LINWorks components are only available on Windows operating systems.

Some additional tools available in the LINWorks software suite require an installed .NET Framework v4.0.

To install LINWorks components administration privileges are required.

7.16 What are the system requirements for my PC?

The following hardware is required to operate the Baby-LIN:

Requirement	Purpose	Baby-LIN product
A PC with about 200 MB free hard drive space	Required for the installation of the LINWorks software. Please check the software requirements and use cases.	All Baby-LIN products

Requirement	Purpose	Baby-LIN product
A free USB port	Required to transfer SDFiles to the Baby-LIN product.	Baby-LIN(-II) Baby-LIN-RC(-II) Baby-LIN-RM(-II)
	Required for the PC mode in which the device is controlled by the SimpleMenu.	HARP-4/5
	Required for firmware updates.	Baby-LIN(-II) Baby-LIN-RC(-II) Baby-LIN-RM(-II) HARP-4/5
A SDHC reader	Required to transfer SDFiles to the HARP's SDHC.	HARP-4/5
A USB mass storage device	Required to transfer SDFiles and firmware updates to the Baby-LIN-MB.	Baby-LIN-MB(-II)
Power supply	Voltage supply of the Baby-LIN.	Baby-LIN-RM(-II) Baby-LIN-MB(-II)

7.17 What about the LINWorks download licence? Where can I download LinWorks?

By purchasing a Baby-LIN product you get the license to download the LINWorks software. This means you are allowed to register yourself in our customer portal (portal.lipowsky.de). After your account has been activated by us you will be able to download the LINWorks software as well as other packages e.g. the current firmware.

7.18 Which service comes with the Baby-LIN products?

When you buy a Baby-LIN product from Lipowsky Industrie-Elektronik GmbH you get a robust high quality product backed with a 2 year warranty. The device firmware and the LINWorks software is steadily improved based on our customer feedback and our own experiences in project work. Firmware and software updates are available free of charge via our customer portal (portal.lipowsky.de), so you can always keep your product up to date without any additional costs.

7.19 Are software and firmware updates free of charge?

Yes, all our firmware and software updates are available free of charge and remain that way.

The LINWorks PC software can be installed on any number of PC's and can be used by any number of users, as long it is used together with a Lipowsky Baby-LIN device.

Only certain hardware features, like e.g. additional LIN- or CAN-Bus interfaces may require the purchase of a voucher code or the installation of piggy-back modules. Please refer to the chapter "Products" or the datasheets of our products.

They are available via our customer portal (portal.lipowsky.de), so you can always keep your product up to date without any additional costs.