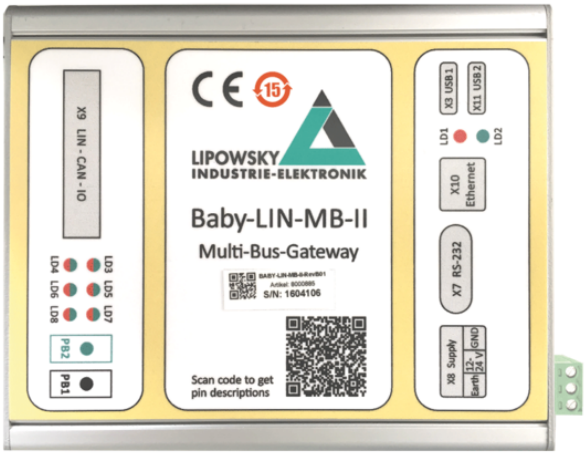
Baby-LIN-MB-II

Multibus simulation device with multi interface options



Product description

The Baby-LIN-MB-II is a modular RS-232/Ethernet to LIN- and CAN-Bus **gateway**, which allows to control LIN- or CAN-Bus driven ECU's from any host (e.g. PLC) equipped with RS232, Ethernet.

The Baby-LIN-MB-II features slots for up to 2 piggyback extensions. These MIF (mounted interface) extensions allow for a **modularisation** of the device. Therefor the device can meet strongly varying requirements (e.g. up to 6 independant LIN-Bus interfaces). The following MIF modules are available:

- MIF-LIN: adds 2 additional LIN-Bus interfaces
- MIF-DIO: adds 6 shared digital inputs/outputs

More MIF interfaces are in development but not yet available for purchase.

The basic version of the Baby-LIN-MB-II hardware is delivered with:

- 1 LIN-Bus interface
- 1 additional LIN-Bus available on hardware (requires actvation via voucher code)
- 1 CAN-HS-Bus available on hardware (requires actvation via voucher code)
- 1 digital input
- 1 digital output
- 1 switchable LIN bus power output (with the correct wiring, it can be used as digital output as well)
- 2 free MIF slots

Please do not hesitate to request **custom configurations** of the base device and MIF extensions.

The LIN- and CAN-Bus configurations are defined in a custom SDF. The process can be controlled by a simple **ASCII command protocol**, issued via the built-in RS-232 or Ethernet interface. The command protocol uses an extensible **plug-in system**. Therefor new plug-ins can be purchased with special new features or customer specific commands.

A Linux driven host CPU allows for easy adaption of network protocols and remote support options.

A modern **web interface** is available and accessible with any browser as long as the device is connected to the local network. Amongst others is provides the following features:

- Information about the installed components
- Easy upload and deletion of SDFs
- View and edit the system configuration
- Online manual

Multiple SDF's can be stored on the **internal flash drive**. At least 50 MB of the 4 GB flash drive are reserved for user specific SDF's.

An **USB 2.0 host** interface is integrated in the device. USB drives and USB card readers with FAT file systems can be used. This allows for easy update and SDF upload mechanisms. Additionally log data can be written and easily transferred the PC.

The basic configuration of the device already integrates 1 digital input and 1 electrically isolated digital output. Additionally a switched LIN supply output is available which can be used to switch the LIN bus supply on and off.

An integrated **UPS** (uninterruptible power supply) allows the save shut down of the system during power fail events or keeps the system running on short power drops.

A compatibility adapter is separately available to convert the new Sub-D-25 connector pinning to the old 2 * Sub-D-9 connector pinning of the old Baby-LIN-MB.

The Baby-LIN-MB-II can handle bus voltages in the range of 8-26 VDC.

All communication interfaces (LIN- and CAN-Bus, Ethernet, RS-232) are **galvanically isolated**, eliminating interferences between the PC and the board electronics.

The Baby-LIN-MB-II unit includes its own 32-bit microcontroller, which takes care of all **time critical** tasks of the LIN- and CAN-Bus protocol. Each pair of LIN-Bus interfaces is additionally supported by another dedicated microcontroller.

The device firmware is field updateable, so the changes of bus specification or upcoming new system features can be adapted easy.

The Baby-LIN-MB-II supports **SDF-V3**. This new generation of SDF allows new features like multiple bus sections, conditional macro commands, new system variables, new CRC functions and sub macro calls.

Operation modes

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

The Baby-LIN-MB-II allows 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.
- **Monitor** and log all frames to a USB mass storage device.

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- **Control** the bus via the **LINWorks** software or customer specific applications by using the **Baby-LIN-DLL**.
- **Control** the bus via customer specific applications by communicating over LAN or RS-232.
- **Program** and store free programmable command sequences in the Baby-LIN-MB-II 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.

Simulation modes

The Baby-LIN-MB-II is 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.

LIN- and CAN-Bus properties

The used LIN driver supports bus voltages of 8-26 VDC and can be used to up to 125 kBaud. That way even nodes that operate outside the standard limits of the LIN specifications can be controlled with the Baby-LIN-MB-II. Supported LIN-versions are V.1.2, V.1.3,...V.2.2. The pull-up resistor of the LIN-Bus driver is switched to 30 kΩ, if the master node is emulated and to 1 kΩ, if only slave nodes are emulated.

The CAN-Bus of the Baby-LIN-MB-II is designed as a high-speed interface according to ISO-11898 with a SN65HVD251 driver.

The maximum supported signal cable length of the LIN- and CAN-Bus is 30m.

LinWorks suite

The purchase of a Baby-LIN-MB-II 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-MB-II. 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-MB-II 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-MB-II like controlling and monitoring the LIN- and CAN-Bus interfaces. The **Baby-LIN-DLL** is a native **C/C++** DLL. It is available for **Windows**, **Linux** and **RaspberryPi**. Wrapper for **.NET**, **Python**, **VB6** and **LabView** are available. Of course we provide examples for all supported languages.

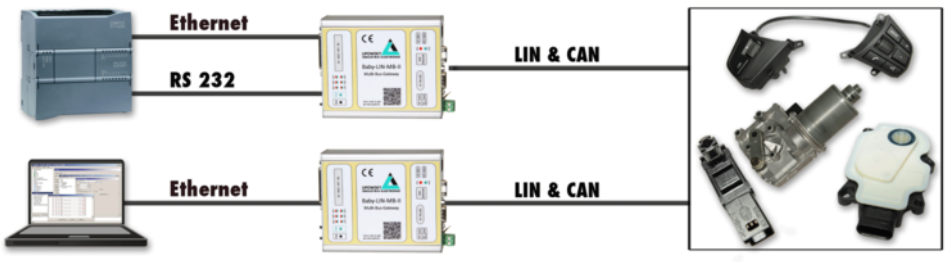
The **LogViewer** can show and convert the log files of the Baby-LIN-MB-II as well as the SimpleMenu.

The **FrameBlaster** is a script interpreter, that gives you access to the features of the Baby-LIN-MB-II 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 **Baby-LIN-MB-Tool** allows to access many features of the Baby-LIN-MB-II. It can help to search and identify Baby-LIN-MB-IIs, 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-MB-II to test custom applications. Additionally the Baby-LIN-MB-Tool features many different **logging** capabilities.

The **LINWorks** software runs on 32 and 64 bit Windows versions.



Technical Specifications

Device

- CPU: ARM Cortex-A5, 528 MHz
- Memory: 256 MB DDR-RAM
- 2 LEDs: Signal device states
- 6 bicolor LEDs: Signal bus and error states
- 2 device specific push buttons
- Switched LIN supply output
- Real-time clock (battery-backed)
- Power supply: 8-32 VDC
- Power supply via 3 pin connector (MC 1,5/ 3-ST-3,81)(*1)
- Maximum current consumption: 420 mA @ 24 VDC
- Integrated UPS (uninterruptible power supply)
- UPS charge duration: about 22 seconds

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- UPS discharge duration: about 19 seconds
- Inrush current: 1,22 A
- Galvanic isolation of all communication interfaces (LIN- and CAN-Bus, Ethernet, RS-232)

  Exception: The supply and ground lines of all LIN-Channels are connected respectively with each other to reduce the number of lines. This configuration can be changed via jumpers.

(*1) The hardware revision A used a 2-pin plug (MSTB 2,5/ 2-ST-5,08) and the earth connection was available via a 6,3 mm earth pin.

Interface: LIN

- 1 LIN-Bus interface
- 1 additional LIN-Bus interface available on hardware but not activated, voucher code required
- LIN-Bus connection via 25 pin Sub-D connector
- LIN-Bus supply voltage: 8-26 VDC
- LIN-Bus baud rate: up to 125 kBaud (Support of protocols outside of the LIN specification)
- Supported LIN versions: V1.2, V1.3,...V2.2
- Supported LIN related protocols: Cooling and SAE J2602
- Maximum signal cable length for LIN-Bus: 30 m

Interface: CAN

- 1 CAN-Bus as high speed interface (CAN-HS) according to ISO-11898 available on hardware but not activated, voucher code required
- CAN-HS-Bus connection via 25 pin Sub-D connector
- Maximum signal cable length for CAN-Bus: 30m

Interface: USB Host

- USB 2.0 interface via USB 2.0 type A connector
- Max current: 500 mA
- Supported file system: FAT-32, FAT-16

Interface: Ethernet

- Ethernet via RJ-45 connector
- Transfer rate: 10/100 MBit
- Auto MDI-X feature
- Command protocol: TCP-IP socket on port 10002
- Web interface for device events, system information as well as easy SDF upload

Interface: RS232

- Serial connection via Sub-D-9 female connector
- Data rate: 9600 Baud
- Data bits, parity bit, stop bit: 8-N-1

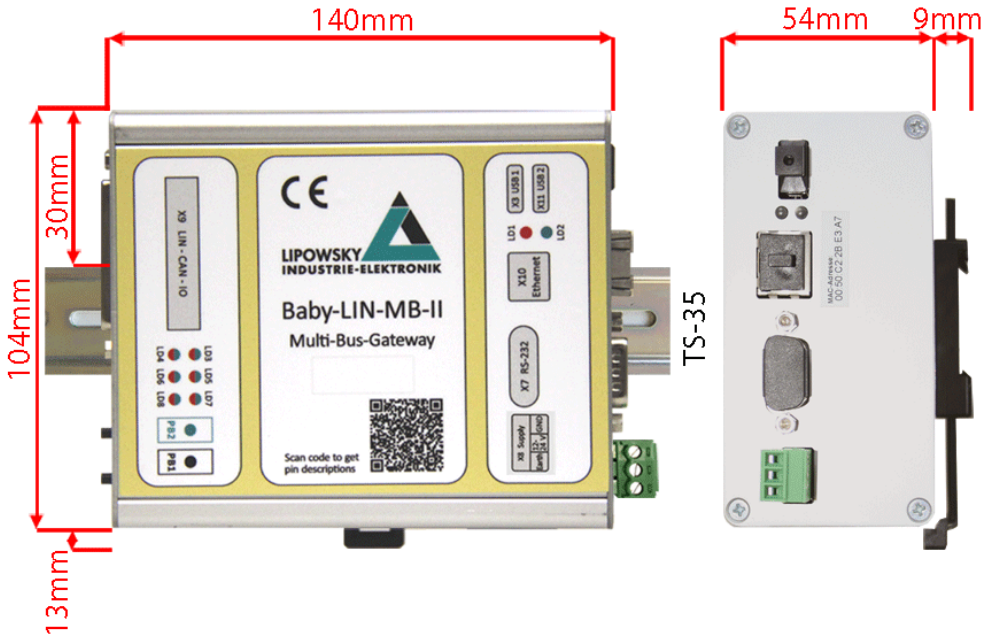
Interface: Digital I/O

- 1 digital input
- 1 electrically isolated digital output
- 1 switchable power output (12 V- 30 V, Max. 700 mA)
- Digital I/O available via Sub-D-25 female connector

Case

- Degree of protection: IP20
- Operating temperature: -20° - +60° Celsius
- Weight: 440 g
- Case dimensions [mm]: 124 x 104 x 54 (L x W x H)

  Elements like connectors, buttons, and the top hat rail mounting adapter are not included.
- Mounting: Top hat rail (TS 35):



Advice
The complete technical specifications can be found in our user manual. It contains amongst other details the following information:

- Connector pin assignment
- Firmware description
- Protocol information
- Electrical characteristics
- SDFile description
- Migration information
- Block diagrams
- Software description
- FAQ

The user manual can be found in our LINWorks archive.

Hardware requirements

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

Requirement	Purpose
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.
A free COM port	Required only, if the Baby-LIN-MB-II is controlled using the ASCII command protocol via the RS-232 interface.
Access to the local network	Required only, if the Baby-LIN-MB-II is controlled using the ASCII command protocol via the Ethernet interface or it is controlled by the SimpleMenu or the Baby-LIN-DLL.
A USB mass storage device	Required to transfer SDFiles and firmware updates to the Baby-LIN-MB-II. Can be used to log frames.
Power supply: 8-32 VDC	Voltage supply of the Baby-LIN-MB-II.

Software requirements

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
The Baby-LIN-DLL is available for Linux. The exact requirements are available upon request.

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

To install LINWorks components administration privileges are required.

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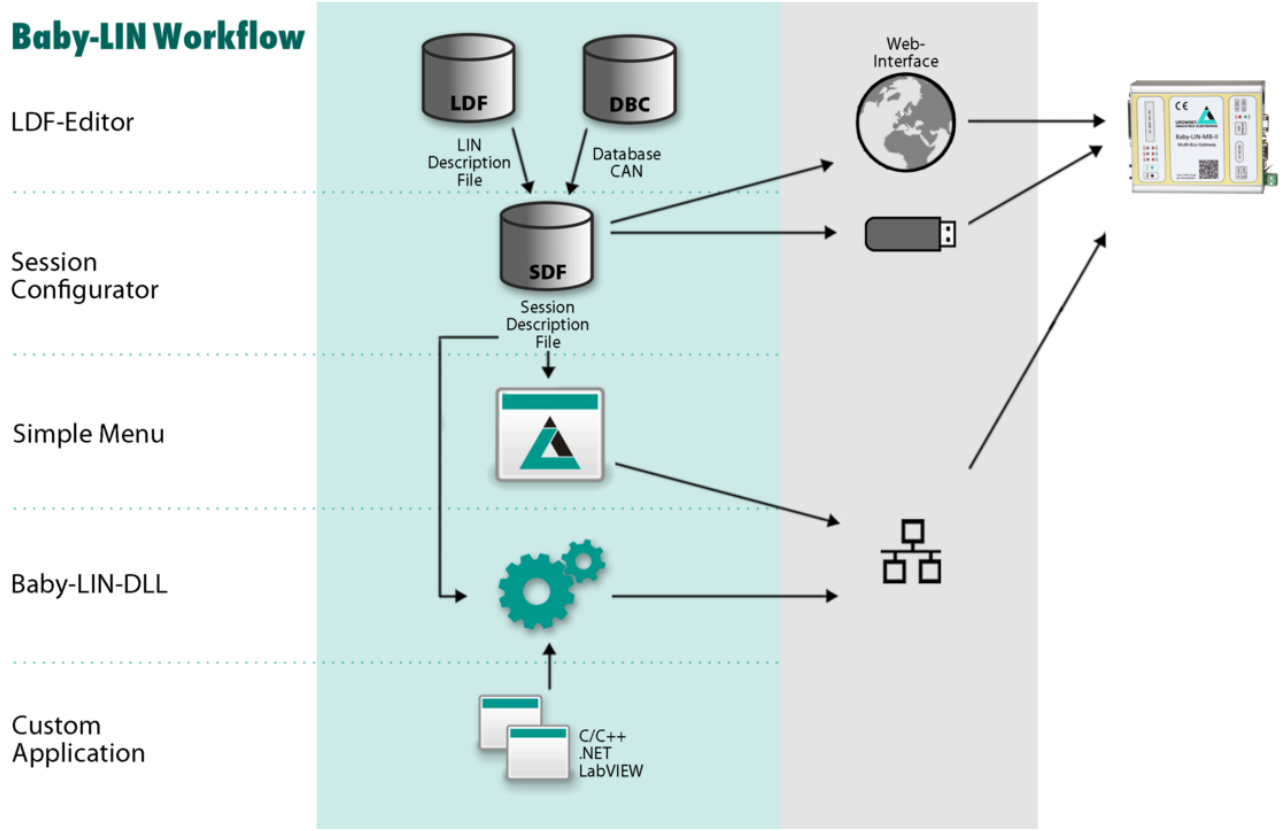
LINWorks workflow



Scope of delivery

The delivery of a Baby-LIN-MB-II systems includes the following components:

- Baby-LIN-MB-II device
- Plug components for all terminals:
  - 1 3-pin plug with screw connection (MC 1,5/ 3-ST-3,81)(*1)
- Download license for the LINWorks Suite (includes LINWorks PC software, example files and documentations)

(*1) The hardware revision A used a 2-pin plug (MSTB 2,5/ 2-ST-5,08) and the earth connection was available via a 6,3 mm earth pin.

Ordering information

Main device		
Item number	**Item**	**Description**
8000949	Baby-LIN-MB-II	Multibus simulation device with multi interface options. Features: 1 LIN channel, 1 digital input, 2 digital outputs.
8000930	Baby-LIN-MB-II-4L	Multibus simulation device with multi interface options and pre-installed components. The LIN2 option and the MIF-LIN increase the number of LIN channels to a total number of 4. Features: 4 LIN channel, 1 digital input, 2 digital outputs. Content: 1 x 8000897 (Baby-LIN-MB-II), 1 x 8000870 (Option BL-MB-II LIN2), 1 x 8000872 (MIF-LIN)
8000931	Baby-LIN-MB-II-D	Multibus simulation device with multi interface options and pre-installed components. The MIF-DIO adds 6 shared digital inputs/outputs. Features: 1 LIN channel, 1 digital input, 2 digital outputs, 6 shared digital inputs/outputs. Content: 1 x 8000897 (Baby-LIN-MB-II), 1 x 8000890 (MIF-DIO)

Main device		
Item number	**Item**	**Description**
8000932	Baby-LIN-MB-II-6L	Multibus simulation device with multi interface options and pre-installed components. The LIN2 option and the two MIF-LIN increase the number of LIN channels to a total number of 6. Features: 6 LIN channel, 1 digital input, 2 digital outputs. Content: 1 x 8000897 (Baby-LIN-MB-II), 1 x 8000870 (Option BL-MB-II LIN2), 2 x 8000872 (MIF-LIN)
8000933	Baby-LIN-MB-II-4LD	Multibus simulation device with multi interface options and pre-installed components. The LIN2 option and the MIF-LIN increase the number of LIN channels to a total number of 4. The MIF-DIO adds 6 shared digital inputs/outputs. Features: 4 LIN channel, 1 digital input, 2 digital outputs, 6 shared digital inputs/outputs. Content: 1 x 8000897 (Baby-LIN-MB-II), 1 x 8000870 (Option BL-MB-II LIN2), 1 x 8000872 (MIF-LIN), 1 x 8000890 (MIF-DIO)

Advice
Each device includes a download license for the LINWorks application suite.

Tip

Country of origin: Germany
Customs tariff number: 90308930

Optional hardware components		
Item number	**Item**	**Description**
8000872	Option BL-MB-II MIF-LIN as upgrade module	MIF-Module for Baby-LIN-MB-II to add 2 LIN interfaces including SDF-V3 support.
8000890	Option-BL-MB-II-MIF-DIO as upgrade module	MIF-Module for Baby-LIN-MB-II to add 6 shared digital inputs/outputs. **Warning** If the MIF-DIO is installed, the LIN supply detection lines of the first two LIN channels can not be used anymore. Their connector pins are used by the MIF-DIO. **Version incompatitbility** The MIF-DIO module for Baby-LIN-MB-II Rev. C or later can be installed by the customer. The installation for Baby-LIN-MB-II Rev. A or B can only be executed by Lipowsky Industrie-Elektronik GmbH. Please contact us to prepare the mailing of your Baby-LIN-MB-II.
8000916	BLMB-II-Dual-SUB-D9	Compatibility adapter to offer 2 Sub-D-9 connectors on the Baby-LIN-MB-II to recover the origianl Baby-LIN-MB pinning. Includes mouting materials. **Warning** The basic version of the Baby-LIN-MB did only offer one LIN-bus interface, one digital input and one digital output. It is not possible to use the additional LIN- or CAN-Bus interfaces or I/Os of the Baby-LIN-MB-II or any MIF extensions, if you use this adapter.
2900150	3V CR2430 Li-Mn button cell	This button cell is used to power the RTC clock of the Baby-LIN-MB-II. A fresh cell can power the RTC clock for over 7Years years.
3020795	MSTB 2,5/ 2-ST-5,08	2-pin plug component, screw connection with tension sleeve. Cable outlet parallel to plugin direction. Screw direction vertical to plugin direction. Used by hardware revision A of the Baby-LIN-MB-II.
3021303	MC 1,5/ 3-ST-3,81	3-pin plug component, screw connection with tension sleeve. Cable outlet parallel to plugin direction. Screw direction vertical to plugin direction. Used since hardware revision B of the Baby-LIN-MB-II.

Advice
All devices are delivered with a full set of plug components. An extra order is necessary for replacement or configuration purposes only.

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Optional voucher codes		
Item number	**Item**	**Description**
8000870	Option BL-MB-II LIN-2	License code for Baby-LIN-MB-II to support the second LIN bus interface. **Warning** The second LIN bus channel shares the same memory with the first LIN bus channel. A SDFile that can be used for a single LIN bus channel may be to big to be used for both.
8000871	Option BL-MB-II CAN-HS	License code for Baby-LIN-MB-II to support the CAN-High-Speed bus interface.
8000831	Option BL-HARP-Jumbo-Frames	License code for Baby-LIN-MB-II to support the jumbo frame feature (frames with more than 8 data bytes).

Optional software components		
Item number	**Item**	**Description**
9004210	Customer specific installation.	Installation of customer specific SDFile version and/or installation of license activation key.
9103010	LINWorks CD	The LINWorks archive with PC software for all Baby-LIN products on a physical medium (CD).