Baby-LIN-3-MB

Multibus simulation device with multi interface options, integrated keypad and display



The Baby-LIN-3-MB is a modular Ethernet/RS-232 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 or Ethernet.

The base version of the Baby-LIN-3-MB is delivered with:

- 1x LIN-Bus interface
- Up to 7x digital inputs and 5x digital outputs
  - 3x low-speed inputs
  - 4x PWM high-side outputs and inputs (on three the input and output are combined) with current measurement feature
  - 1x isolated switch contact
- 2x high-speed USB ports (USB-A and USB-C)
- 1x Gigabit Ethernet port
- 1x RS232 port
- 1x 1,54" TFT display and keyboard

Additional equipped hardware which requires activation codes [(1)]:

- 1x additional LIN-Bus
- 2x high-speed CAN-Bus, with CAN-FD capability and integrated switchable termination resistor

The devices and IO power supply is now also suitable for **48V board systems**.

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.

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. Among others it provides the following features:

- Information about the installed components
- Easy upload and deletion of SDFs
- View and edit the system configuration
- Upload, deletion and download of SDFs
- User permission management
- Easy access and download of log files
- Firmware update

Multiple SDF's can be stored on the **internal flash drive**. At least 1 GB of the 4 GB flash drive are reserved for user specific SDF's.

The integrated 1,54" display and the button keyboard can be used for an easy on-side setup of network parameters or SDF selection.

Both **USB 2.0 host** interfaces allow the use of USB drives and USB card readers formatted with FAT or exFAT.

Furthermore the USB-C connector can be uses to extend the Baby-LIN-3-MB with other devices of the Baby-LIN-3 family. [(3)]

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.

The Baby-LIN-3-MB features internal ports for up to 2 extension interfaces. These extension ports (ExPORT) allow a **modularization** of the device. Therefor the device can meet strongly varying requirements(e.g. up to 6 independent LIN-Bus interfaces). The following modules are available for now:

- BL-MB-ExPORT-LIN: adds 2 additional LIN-Bus interfaces and two digital IO interfaces. Up to two ExPORT-LIN per Baby-LIN-3-MB are possible. [(4)]

More ExPORT interfaces are in development but not yet available for purchase. Please do not hesitate to request **custom configurations** of the ExPORT interface.

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

The Baby-LIN-3-MB supports **SDF-V3** and is prepared for **SDF-V4**.

Operation mode

Any situation that requires communication with a LIN- and CAN-Bus device is a potential field of application for a Baby-LIN-3-MB . It is a versatile tool that can be used in research laboratories, test departments and production (EOL applications).

The Baby-LIN-3-MB can be used for different applications and has three dedicated running modes to fit the users needs:

- **PLC Mode** Program and store free programmable command sequences in the Baby-LIN-3-MB to run it 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.
- **SimpleMenu Mode**: Control the bus via the **LINWorks** software or customer specific applications by using the **Baby-LIN-DLL**.
- **TestRun Mode**: For endurance or long run testing and logging with the option for a user configurable GUI on the web interface and a more restrict user management. True **stand-alone** operation without the need for other devices.

The new **user management** allows via the web interface to create groups of users. Each group can have different permissions to e.g. disable or enable the SDF up/download, access to settings or mode changes.

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Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0
Website: www.lipowsky.com

LINWorks suite

The purchase of a Baby-LIN-3-MB 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 (for CAN-Bus simulation). 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-3-MB . 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-3-MB 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 or 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-3-MB 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-3-MB as well as the SimpleMenu.

The **LINWorks** software runs on 32 and 64 bit Windows 10 or higher versions.

Technical Specifications

Device

- Power supply: 8-50 VDC via 3 pin connector (MC 1,5/ 3-ST-3,81)
- Galvanic isolation of the communication interfaces to the power supply
- CPU: 650 MHz dual-core ARM Cortex-A7 with 512MB RAM for the Linux system and host applications plus 480MHz Cortex M7 for communication and IOs.
- Integrated membrane keyboard with 9 keys
- 1,54" IPS color display with 232x232 pixel resolution
- High precision RTC (real-time clock) with back-up battery
- Typical current consumption: 200 mA @ 24 VDC
- Integrated UPS (uninterruptible power source) to prevent data loss

Interface: LIN

- Up to 6 LIN-Bus interfaces available
- 1x LIN-Bus interface available by default
- 1x LIN-Bus interface optionally available on hardware but not activated, voucher code required [(1)]
- 4x LIN-Bus interfaces available through hardware modules, additional hardware extensions required [(4)]
- LIN-Bus connection via 25 pin Sub-D connector, extensions using there own SUB-D9 connector
- LIN-Bus supply voltage: 8-26 VDC
- LIN-Bus baud rate: up to 115200 Baud (Support of protocols outside of the LIN specification)
- Supported LIN versions: V1.2 to V2.2
- Supported LIN related protocols: Cooling and SAE J2602
- Internal switchable 1 kΩ resistor for master node emulation
- Maximum signal cable length for LIN-Bus: 30 m

Interface: CAN

- 2x CAN-HS-Bus interfaces according to ISO-11898 with up to 1Mbit/s available on hardware but not activated, voucher codes required.
- Upgradeable to CAN-FD-Bus according to ISO-11898-1:2015 with data baudrates up to 8 MBit/s, voucher codes required.
- Internal switchable 120 Ω termination resistor for each interface
- Second CAN bus is galvanic isolated from the other two buses and the rest of the system
- Maximum signal cable length for CAN-Bus: 30m

Interface: low-speed digital I/O

- 3x digital inputs
- 5V to 60V input voltage
- Galvanic isolated from the rest of the system
- 1x electrically isolated solid-state switch (max. 32V, max. 190mA)

Interface: high-speed digital I/O

- 4x high-speed digital inputs and high-side outputs, on three the input and output are combined
- Capable of PWM frequencies up to 20kHz with 0,1% duty-cycle steps [(5)]
- Galvanic isolated from the rest of the system with own power supply
- Supply voltage from 7V - 50V, can be as low as 1V for the outputs alone
- Maximum of 2,2A for all four or one output
- Current measurement (10Bit, 3% accuracy) for the combined output current

Interface: USB Host

- 2x USB 2.0 high-speed (480MBit/s) interfaces via one USB-A and one USB-C connector
- Max current for each port: 500 mA
- Supported file system: FAT-32, FAT-16 and exFAT
- USB-C can be used to add additional Baby-LIN-3 devices [(3)]

Interface: Ethernet

- Ethernet via RJ-45 connector
- Transfer rate: 10/100/1000 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
- EEE (Energy Efficient Ethernet) is possible

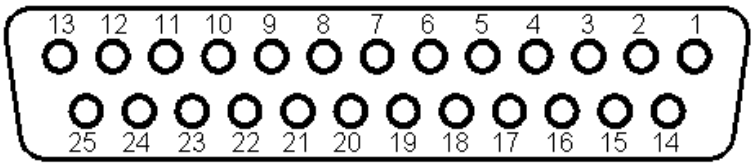
Interface: RS232

- Serial connection via Sub-D-9 female connector
- Data rate: 9600 Baud (default) to 115,2 kBaud
- Data bits, parity bit, stop bit: 8-N-1

Case

- Degree of protection: IP20
- Operating temperature: -20 °- +60 °Celsius
- Weight: 410 g
- Case dimensions [mm]: 126 x 122 x 42 (L x W x H)
- Mounting: Top hat rail (TS 35)

Pin description



Pin	Signal	Description		Pin	Signal	Description
1	GND-DIN	Common ground for DIN-5 to 7		14	DIN-7	Low-speed input
2	DIN-6	Low-speed input		15	DIN-5	Low-speed input
3	CAN2-L			16	CAN2-H	
4	GND-CAN2	Ground for the second CAN bus		17	VDIO	Supply voltage for high-speed IOs
5	DOUT-5	High-speed output		18	DIN-1	High-speed input
6	DIO-4	High-speed IO		19	GND-IO	Common ground for high-speed IOs
7	DIO-3	High-speed IO		20	GND-LIN	Common ground for 1.LIN & 2.LIN
8	LIN-1	First LIN-Bus		21	LIN-2	Second LIN-Bus
9	VLIN	Supply voltage for 1.LIN & 2.LIN		22	DIO-2	High-speed IO
10	CAN1-L			23	CAN1-H	
11	GND-CAN	Common ground for 1.CAN & 3.CAN		24	OUT1-P2	Port2 of switch contact
12	OUT1-P1	Port1 of switch contact		25	CAN3-L	(2)
13	CAN3-H	(2)				

Notes

(1) Function requires additional software license(s). See Ordering information for more details.

(2) Third CAN is available in hardware, but not supported yet. Please check our homepage for new information.

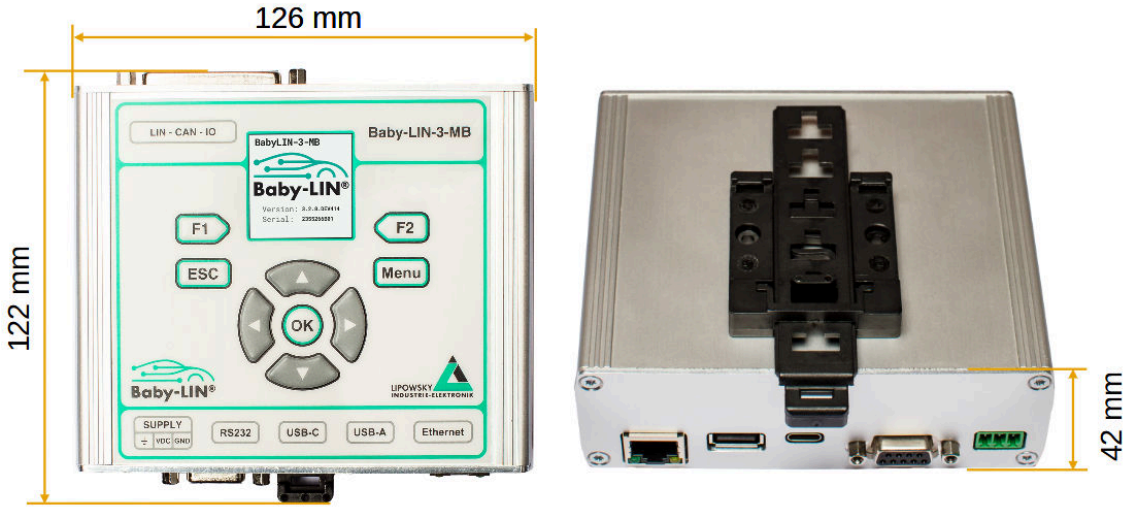
(3) Function is implemented but not available yet. Please check our homepage for new information.

(4) BL-MB-ExPORT-LIN is available as upgrade or directly installed at the factory. Please check the order information.

(5) PWM **input** functionality will no be available at launch and is supplied by an update two or three weeks later. The PWM outputs and the normal input function will work as intended.

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Römerstraße 57 | 64291 Darmstadt | Germany
Phone: +49 (0) 6151 / 93591 - 0
Website: www.lipowsky.com

Dimension drawing



Information
The complete technical specifications can be found in our user manual. It contains among other details the following:
- Connector pin assignment
- Electrical characteristics
- Firmware description
- Software description
- Protocol information
- Migration information

The user manual can be found in our LINWorks download package: *https://lipowsky.de/downloads*

Hardware requirements

The following hardware is required to operate the Baby-LIN-3-MB :

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-3-MB is controlled using the ASCII command protocol via the RS-232 interface.
Access to the local network	Required only, if the Baby-LIN-3-MB is controlled using the ASCII command protocol via the Ethernet interface or it is controlled by the SimpleMenu or the Baby-LIN-DLL.
Power supply: 8-50 VDC, min. 2A	Voltage supply of the Baby-LIN-3-MB .

Software requirements

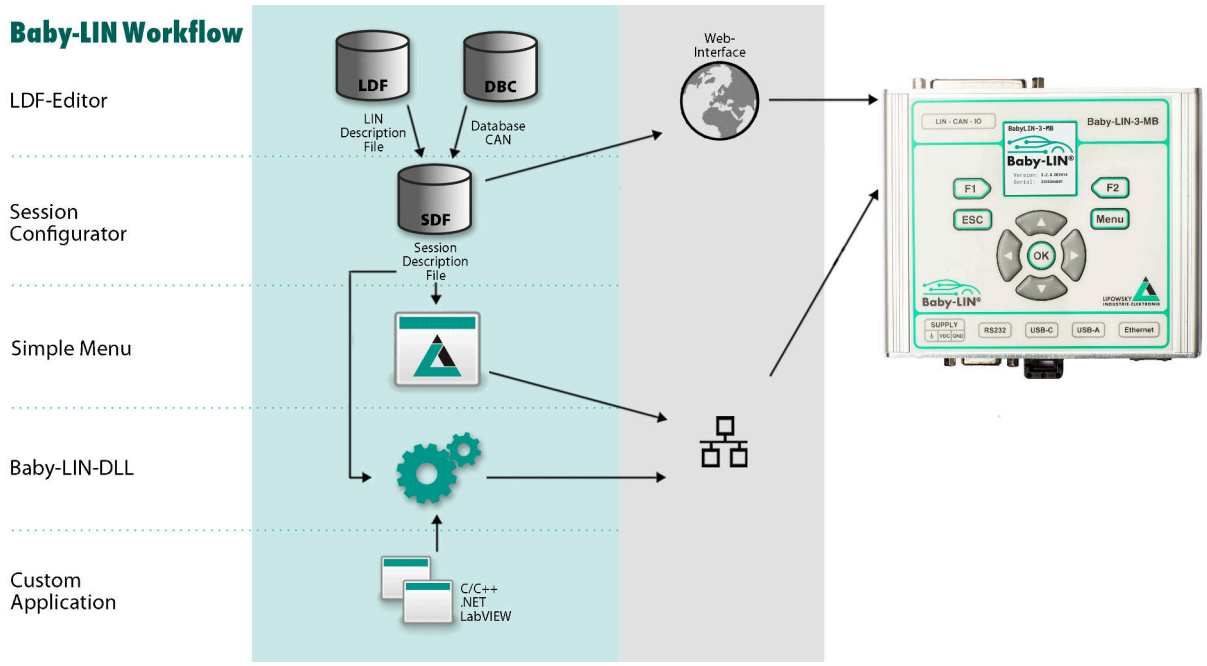
The LINWorks software requires one of the following operating systems:

- Windows 10 (32 and 64 Bit)
- Windows 11 (x86 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.

LINWorks workflow



Scope of delivery

The delivery of a Baby-LIN-3-MB systems includes the following components:

- Baby-LIN-3-MB device
- One 3-pin plug with screw connection (MC 1,5/3-ST-3,81)
- Download license for the LINWorks Suite (includes LINWorks PC software, USB-driver, example files and documentations)

Ordering information

Item number	Item	Description
8001060	Baby-LIN-3-MB	Multibus simulation device with multi interface options. Features: 1 LIN channel
8001071	Baby-LIN-3-MB-4L	Same as Baby-LIN-3-MB, but the 2.LIN option and one installed ExPORT-LIN are increasing the number of LIN channels to a total of 4 LIN buses. Also adds two additional digital IOs to the base version.
8001072	Baby-LIN-3-MB-6L	Same as Baby-LIN-3-MB-4L, but a second ExPORT-LIN increase the number of LIN channels to a total of 6 LIN buses. Also adds four additional digital IOs to the base version.
8001073	Baby-LIN-3-MB-3L	Same Baby-LIN-3-MB-4L, but without the pre-installed option code for the second LIN channel for a total number of 3 buses.
8001074	Baby-LIN-3-MB-5L	Same Baby-LIN-3-MB-6L, but without the pre-installed option code for the second LIN channel for a total number of 5 buses.

Information
Each device includes a download license for the LINWorks application suite. This PC software can be downloaded here:
https://lipowsky.de/downloads

Tip
Country of origin: Germany
Customs tariff number: 90308900

Optional hardware components

Item number	Item	Description
3021303	MC1,5/3-ST-3,81	3-pin plug component, screw connection with tension sleeve. Cable outlet parallel to plugin direction. Screw direction vertical to plugin direction.
3040100	Male SUB-D25 plug	SUB-D25 male plug with solder cups
8003030	Upgrade BL-MB-ExPORT-LIN	Upgrade a device with one additional ExPORT-LIN module to gain two more LIN channels and digital IOs. Can be ordered two times to get a six LIN channel version. Device have to be send back to us or one of our distributors for the upgrade.

Optional voucher codes

Item number	Item	Description
8002150	Option BL-Security-Access-Gateway	License code for the Security Access Gateway Application to connect Security DLL's to SDF executed on a Baby-LIN-3-MB .
8000891	Option BL-Webasto KLine	License code for software activation of special function of Webasto K-Line Protocol, need a written approval of Webasto.
8000853	Option BL-LIN-2	License code for Baby-LIN-3-MB to activate the second LIN bus interface.
8000810	Option BL-CAN-1-HS	License code for Baby-LIN-3-MB to activate CAN-HS (High-Speed) support for the first CAN-Bus interface.
8000991	Option BL-CAN-1-FD	License code for Baby-LIN-3-MB to activate CAN-FD (Flexible Data Rate) support for the first CAN-Bus interface.
8000990	Option BL-CAN-2-HS	License code for Baby-LIN-3-MB to activate CAN-HS (High-Speed) support for the second CAN-Bus interface.
8000992	Option BL-CAN-2-FD	License code for Baby-LIN-3-MB to activate CAN-FD (Flexible Data Rate) support for the second CAN-Bus interface.

Information
All voucher codes can be converted using the option shop: www.optionshop.de/lipowsky

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).

Distributors

Area	Country	Distributor	Website	Phone	E-Mail
Asia		Hongke Technology Co. LTD	*www.hkaco.com*	+86 20 3874 4538	*sales@hkaco.com*
		Honghong Technology Co., Ltd.	*www.hongtronics.com*	+886-2-85015332	*sales@hongtronics.com*
		Kyoko Co.,Ltd.	*www.kyokotec.com*		*sales@kyokotec.com*
		HAE HONG Co.,Ltd.	*www.haehongtec.com*	+82 010-2601-9622	*sales@haehongtec.com*
		Microport Computer Electronics Inc.	*www.microport.com.tw*	+886 6 330 3000	*inquiry.microport@gmail.com*
		KMDATA Inc.	*www.kmd.co.kr*	+82 2 3281 0333	*daniel@kmd.co.kr*
		ITHandel Inc.	*www.ithandel.modoo.at*	+82 10 4616 7079	*ithandel01@naver.com*
		Abex-Global	*www.abexengineering.com*	+91 20 67440038	*info@abexengineering.com*
America		FEV North America Inc.	*www.fev.com*	+1 248 724 2830	*marketing_fev@fev.com*
		Círculo SEI S.A. de C.V.	*www.circulo-sei.com*	+52 473 1030459	*sales@circulo-sei.com*
		Círculo SEI North America LLC	*www.circulo-sei.com*		*sales-usa@circulo-sei.com*
Europe		ISIT	*www.isit.fr*	+33 561 306 900	*contact@isit.fr*
		The Debug Store	*www.thedebugstore.com*	+44 1490 430526	*sales@TheDebugStore.com*
Worldwide		Lipowsky Industrie-Elektronik GmbH	*www.lipowsky.com*	+49 6151 935910	*info@lipowsky.de*

More details about our distributors can be found on our website under the heading `Distributors`.

Product disposal



After the product is no longer used, it must be disposed of separately from household waste at a designated recycling site. All kind of batteries must be removed from the device and disposed separately. Furthermore, you can also return the device to us for proper disposal, you only have to bear for the shipping costs. Please use this address:

Lipowsky Industrie-Elektronik GmbH
Device disposal
Römerstr. 57
64291 Darmstadt
Germany

Version history

Version	Change	Chapter	Details
1.0	Initial Version		
1.1	IO Signal names on SUB-D25	Pin description	The internal numbering of the IOs were changed so the migration from the old MB-II to the new Baby-LIN-3-MB can be done without changing the @@SYSDIGxx variables for DigIn, PWR-Switch and Switch Contact in a SDF.
	PWM functionality	Technical Specifications	PWM input functionality is not available at launch, see [5]
1.2	ExPORTs availability date		Changed from March to Mai
1.3	ExPORTs availability date		Changed to available, added order information.
1.4	Added Abex-Global as distributor	Distributors	