

# Baby-LIN-RM

## Multibus simulation device with I/O interface



### Product description

The Baby-LIN-RM allows controlling LIN- and CAN-Bus equipped devices by using a standard personal computer. After installation of the supplied **LINWorks** software, you can connect the Baby-LIN-RM to a free USB port, and access the LIN- and CAN-Bus devices via LINWorks or custom programs by using the Baby-LIN-DLL.

In addition LIN and CAN devices can be controlled and evaluated using **digital inputs and outputs** only. This enhances testing facilities based on a **PLC** (Programmable Logic Controller) by a LIN- or CAN-Bus without much effort. This can be extremely beneficial for facilities with long term testing.

**8 digital inputs and 4 digital outputs** are available.

Two of the digital inputs can read, scale and map **PWM** (Pulse-width modulation) signals to bus signals. Furthermore the modules digital outputs can be controlled by the values of the bus signals. For instance an output can be set if a signal equals, unequals, is greater or less than a reference value. It also can be tested, if a certain signal value is within a given area or not. All digital outputs can be configured to output **PWM** (Pulse-width modulation) signals as well.

In addition the Baby-LIN-RM offers two **programmable buttons**. They may for example be used to start and stop the LIN- or CAN-Bus communication. Furthermore they can be used for many more functions.

The Baby-LIN-RM supports the CAN-Bus in a reduced way. Certain signal mappings features are available.

The Baby-LIN-RM can handle LIN-Bus voltages in the range of 8-36 VDC.

All communication interfaces (LIN- and CAN-Bus, Digital inputs, USB) are **galvanically isolated**, eliminating interferences between the PC and the board electronics. Only the digital outputs use the ground of the board's logic supply.

The Baby-LIN-RM unit includes its own 32-bit microcontroller, which takes care of all **time critical** tasks of the LIN- and CAN-Bus protocol.

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

### Operation modes

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

The Baby-LIN-RM 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.
- **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-RM 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-RM 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-Bus: Simulate **all nodes** and therefore the complete communication on the bus.
- CAN-Bus: Simulate any number of **CAN-Bus nodes**.
- LIN- and CAN-Bus: Simulate all but one node and realize a **residual bus simulation**.
- 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 8-36 VDC and can be used to up to 200 kBaud. That way even nodes that operate outside the standard limits of the LIN specifications can be controlled with the Baby-LIN-RM. 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.

Both CAN-Busses of the Baby-LIN-RM are designed as high-speed interfaces 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-RM 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 LDFfile (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-RM. 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-RM 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-RM like controlling and monitoring the LIN- and CAN-Bus interfaces. The **Baby-LIN-DLL** is a native C/C++ DLL.

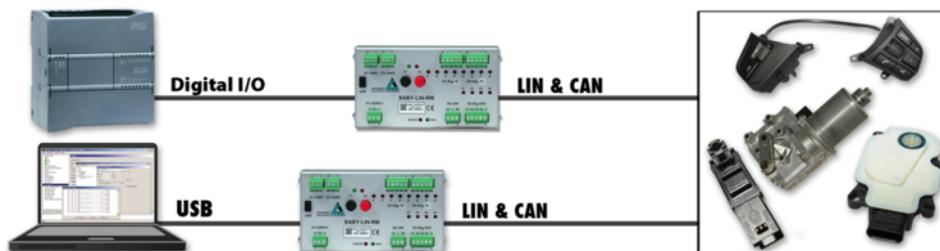
It is available for **Windows, Linux** and **RaspberryPi**. Wrapper for **.NET, Python, VB6** and **LabView** are available. Of course we provide examples for all supported languages.

The **LogViewer** can show and convert the log files of the SimpleMenu.

The **FrameBlaster** is a script interpreter, that gives you access to the features of the Baby-LIN-RM 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 any customer can quickly create complex user interfaces based on your requirements. A graphical editor to create the configuration of the graphical user interface is included.

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



## Technical Specifications

### Device

- CPU: ARM7, 60 MHz
- Memory: 512 kB RAM
- 2 LEDs: Signal device states
- 2 LEDs: Used as switch button indicator or freely programmable
- 12 LEDs: Used as signal indicator for digital input and outputs
- 2 freely programmable push buttons
- Power supply: 8-32 VDC
- Power supply via 3 pin connector (MC 1,5/ 3-ST-3,81)
- Maximum current consumption: 350 mA @ 24 VDC
- Galvanic isolation of all communication interfaces (LIN- and CAN-Bus, Digital inputs, USB, Exception: Digital outputs)

### Interface: LIN

- 1 LIN-Bus interface available
- LIN-Bus connection via 3 pin connector (MCVR 1,5/ 3-ST-3,81)
- LIN-Bus supply voltage: 8-36 VDC
- LIN-Bus baud rate: up to 200 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

- 2 CAN-Bus as high speed interface (CAN-HS) according to ISO-11898
- CAN-HS-Bus connection via 3 pin connector (MCVR 1,5/ 3-ST-3,81)
- Maximum baudrate: CAN-HS: 1 MBit/s
- Maximum signal cable length for CAN-Bus: 30m

### Interface: USB Device

- USB 2.0 interface
- Connection via USB type B-Mini

### Interface: Digital I/O

- 8 digital inputs
- 4 digital low-side outputs
- Digital I/O available via 3 5 pin connectors (MCVR 1,5/ 5-ST-3,81)
- 2 digital inputs can be used to read PWM signals
- All digital outputs can be used to output PWM signals

### Case

- Degree of protection: IP20
- Operating temperature: -20° - +60° Celsius
- Weight: 250 g
- Case dimensions [mm]: 136 x 76 x 36 (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
- Electrical characteristics
- Block diagrams
- Firmware description
- SDFFile description
- Software description
- Protocol information
- Migration information
- 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 USB port	Required to transfer SDFiles to the Baby-LIN-RM.
	Required for firmware updates.
Power supply: 8-32 VDC	Voltage supply of the Baby-LIN-RM.

**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 incompatibility**

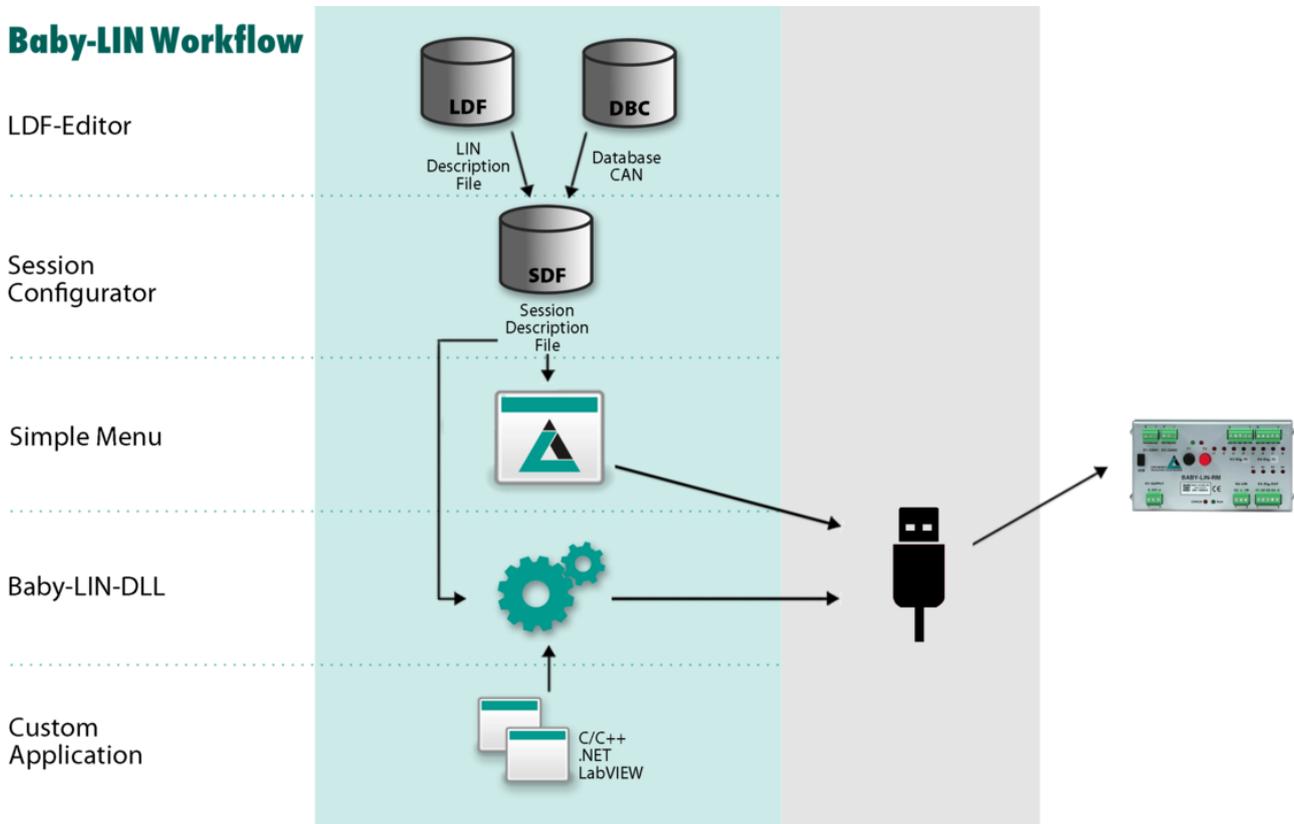
The Baby-LIN-DLL is available for Linux. The exact requirements are available upon request.

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

### Baby-LIN Workflow



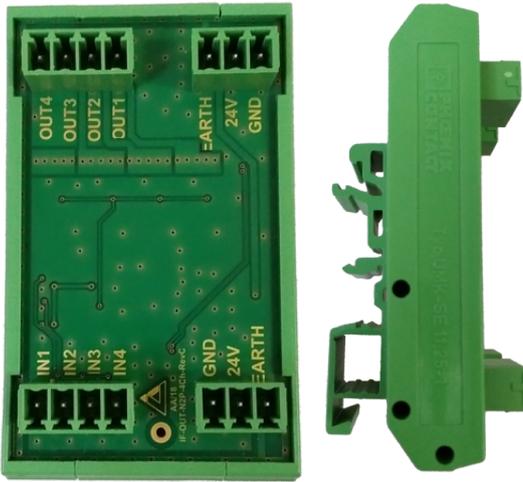
### Scope of delivery

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

- Baby-LIN-RM device
- USB 2.0 cable, 1.5m, Type A to type B-Mini
- Plug components for all terminals:
  - 4 3-pin plugs with screw connection (MCVR 1,5/ 3-ST-3,81)
  - 3 5-pin plugs with screw connection (MCVR 1,5/ 5-ST-3,81)
- Download license for the LINWorks Suite (includes LINWorks PC software, USB-driver, example files and documentations)

### Additional hardware recommendation

Item number	Item	Description
8000960	IF-OUT-N2P-4Ch	Adapter for 4 galvanically isolated high side outputs for the Baby-LIN-RM.



This output adapter converts the low-side digital outputs of the Baby-LIN-RM to high-side digital outputs. These high-side outputs are usually required by PLCs.

Level	Baby-LIN-RM	Baby-LIN-RM output adapter
Logic 0	High impedance	High impedance
Logic 1	0 VDC	24 VDC

The power supply of the Baby-LIN-RM can also be used to power the Baby-LIN-RM output adapter. Therefore the power supply can be passed through. Since Rev. C the PWM signals are converted without any distortion.

### Typical applications

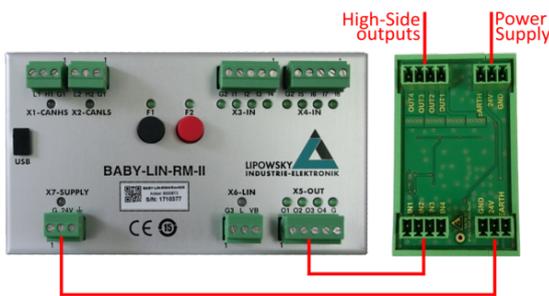
- Connection with a PLC. No additional resistors are required.
- Connection of loads, that must be switched against 24 VDC.
- Current application up to 4 A on a single output (if only one output is used).

### Electrical characteristics

- Power supply: 8-33 VDC
- Current consumption without load: 11 mA @ 12 VDC, 22 mA @ 24VDC
- Max current output for all outputs: 4 A

### Case

- Operating temperature: -20° - +65° Celsius
- Weight: 39 g
- Case dimensions [mm]: 45 x 77 x 23 (L x W x H)



Picture may differ from original product.

## Ordering information



### Attention

This device is replaced by a successor and can not be ordered anymore. Please refer to the datasheet of the Baby-LIN-RM-II for updated ordering information.

### Main device

Item number	Item	Description
3410273	Baby-LIN-RM	Multibus simulation device with I/O interface



### Advice

Each device includes a download license for the LINWorks application suite. This PC software can be downloaded using our client portal: [portal.lipowsky.de](http://portal.lipowsky.de)



### Tip

Country of origin: Germany  
 Customs tariff number: 90308930

### Optional hardware components

Item number	Item	Description
8000960	IF-OUT-N2P-4Ch	Adapter for 4 galvanically isolated high side outputs for the Baby-LIN-RM.

Optional hardware components		
Item number	Item	Description
3500701	USB 2.0 cable, 1.5m Type A to type B-Mini	This cable connects the Baby-LIN-RM to a PC. Such a cable is already within the scope of delivery.
3021130	MCVR 1,5/ 3-ST-3,81	3-pin plug component, screw connection with tension sleeve. Cable outlet vertical to plugin direction. Screw direction parallel to plugin direction.
3021140	MCVR 1,5/ 4-ST-3,81	4-pin plug component, screw connection with tension sleeve. Cable outlet vertical to plugin direction. Screw direction parallel to plugin direction. Used only by the IF-OUT-N2P-4Ch adapter, not by the Baby-LIN-RM itself.
3021150	MCVR 1,5/ 5-ST-3,81	5-pin plug component, screw connection with tension sleeve. Cable outlet vertical to plugin direction. Screw direction parallel to plugin direction.



### Advice

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

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).



### Tip

You can order the Baby-LIN-RM as test device. Try it for one week and convince yourself. Please contact us over [info@lipowsky.de](mailto:info@lipowsky.de).

## Distributors

Area	Country	Distributor	Website	Phone	E-Mail
Asia		Hongke Technology Co. LTD	<a href="http://www.hkaco.com">www.hkaco.com</a>	+86 20 3874 4538	<a href="mailto:sales@hkaco.com">sales@hkaco.com</a>
		Microport Computer Electronics Inc.	<a href="http://www.microport.com.tw">www.microport.com.tw</a>	+886 6 330 3000	<a href="mailto:inquiry.microport@gmail.com">inquiry.microport@gmail.com</a>
	 	KMDATA Inc.	<a href="http://www.kmd.co.kr">www.kmd.co.kr</a>	+82 2 3281 0333	<a href="mailto:daniel@kmd.co.kr">daniel@kmd.co.kr</a>
North America	 	FEV North America Inc.	<a href="http://www.fev.com">www.fev.com</a>	+1 248 724 2830	<a href="mailto:marketing_fev@fev.com">marketing_fev@fev.com</a>
	 	Círculo SEI S.A. de C.V.	<a href="http://www.circulo-sei.com">www.circulo-sei.com</a>	+52 473 1030459	<a href="mailto:sales@circulo-sei.com">sales@circulo-sei.com</a>
Europe	 	ISIT	<a href="http://www.isit.fr">www.isit.fr</a>	+33 561 306 900	<a href="mailto:contact@isit.fr">contact@isit.fr</a>
	  	The Debug Store	<a href="http://www.thedebugstore.com">www.thedebugstore.com</a>	+44 1490 430526	<a href="mailto:sales@TheDebugStore.com">sales@TheDebugStore.com</a>
		LMH Engineering Services Ltd	<a href="http://www.lmh-engineering-services.co.uk">www.lmh-engineering-services.co.uk</a>	+44 7542 725 765	<a href="mailto:info@lmh-engineering-services.co.uk">info@lmh-engineering-services.co.uk</a>
Worldwide		Lipowsky Industrie-Elektronik GmbH	<a href="http://www.lipowsky.com">www.lipowsky.com</a>	+49 (0) 6151 / 93591 - 0	<a href="mailto:info@lipowsky.de">info@lipowsky.de</a>

More details about our distributors can be found on our website under the heading [contact/distributors](#).