# Baby-LIN-3-Dual

## LIN- & CAN-Bus simulation device with USB interface




### 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-Dual . It is a versatile tool that can be used in research laboratories, test departments and production (EOL applications).

- **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-3-Dual 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.

### Product description

The Baby-LIN-3-Dual is part of the third generation of Baby-LINs introducing new and more powerful features.

All devices are powered by a 480MHz Cortex M7 core increasing the possible speed by 60% in comparison to the previous generation, allowing faster SDF execution and leaving reserves for new software features. To emphasize this performance leap the devices are also now equipped with a native high-speed (480MBit/s) USB connection and a USB-C connector, making it more convenient and reliable to use. We also further improve the usability of our devices by offering a male SUB-D9 connector for all bus signals, allowing the user to secure the connector to the device and giving more flexibility for upgrades from one device to another. Of course, we are upholding our compatibility guidelines for previous generations so all devices have still the established three pin plug for the LIN bus.

The power for the Baby-LIN-3-Dual can be supplied either from the USB or the LIN-Bus side. If the device is powered by the LIN-Bus it can be operated without the need for a PC. All communication interfaces (LIN- and CAN-Bus and USB) are galvanic isolated, eliminating interference between the PC and the board electronics.

The Baby-LIN-3-Dual 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-3-Dual to a free USB port, and access the LIN- and CAN-Bus devices via LINWorks or custom programs by using the Baby-LIN-DLL.

Two red/green colored LEDs on the side show device information but can also be utilized by the user for other needs.

Besides one LIN interface the Baby-LIN-3-Dual also includes one already activated **CAN-HS** bus with a switchable termination resistor. The signals on the SUB-D9 connector are placed in accordance with CiA DS102. The CAN interface also supports **CAN-FD** with up to 8MBit/s [(1)].

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-Dual supports **SDF-V3** and is prepared for **SDF-V4**.

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

### Simulation modes

The Baby-LIN-3-Dual 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 therefor 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 8-26 VDC and can be used up to 115200 Baud. That way even nodes that operate outside the standard limits of the LIN specifications can be controlled with the Baby-LIN-3-Dual . Supported LIN-versions are V.1.2 to V.2.2. The pull-up resistor of the LIN-Bus driver is internally switched to 1 kOhm, if the master node is emulated.

The CAN-Bus interfaces of the Baby-LIN-3-Dual are designed as CAN-FD interfaces according to ISO-11898-1:2015. They support data baudrates up to 8 MBit/s. A internal 120 Ω termination resistor can be turned on and off by software.

## LINWorks suite

The purchase of a Baby-LIN-3-Dual includes the license to download the **LINWorks** suite. This suite is a collection of PC software that supports you during the whole workflow.

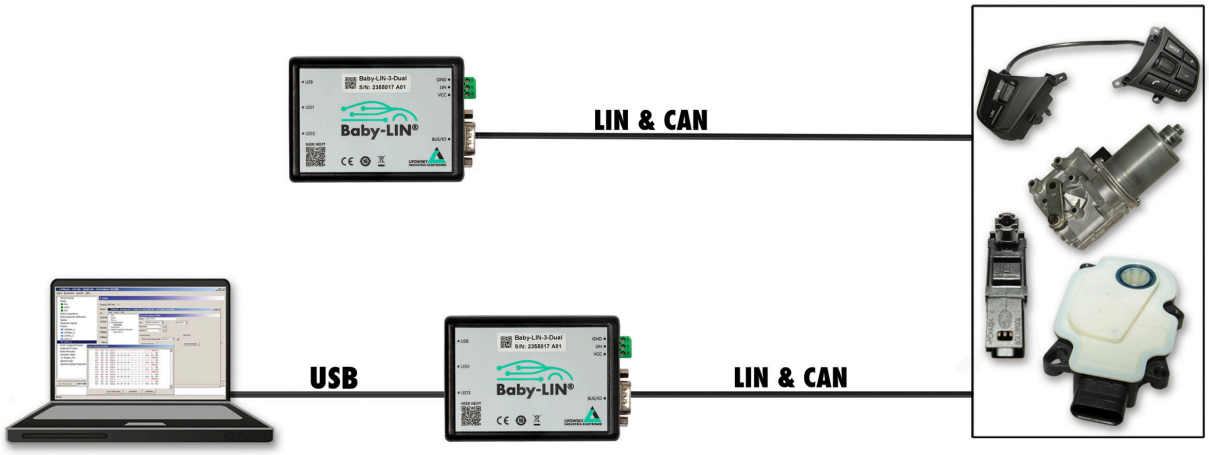
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The **LDFEdit** allows the inspection, creation and edit of a LDFile (LIN Description File).
The **SessionConf** allows the inspection, creation and edit of a SDFile (Session Description File) and features a file import for LDFiles (for LIN-Bus simulation) 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-Dual . 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-Dual 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-Dual 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-Dual as well as the SimpleMenu.

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



# Technical Specifications

**Device**

- Power supply: 8-26 VDC
- Power supply via 3 pin connector (MC 1,5/ 3-ST-3,81) or male SUB-D9 connector
- Galvanic isolation of the communication interfaces and USB plug side
- CPU: ARM Cortex-M7, 480 MHz
- Memory: 32 MB RAM

**Interface: USB Device**

- USB 2.0 high-speed (480Mbit/s) interface
- Connection via USB-C plug

**Interface: LIN**

- 1 LIN-Bus interface available
- 1 Red/green LED (LED1) to show state of the LIN-Bus and the supply voltage
- LIN-Bus connection via 3 pin connector (MCVR 1,5/ 3-ST-3,81) or 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, 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-HS-Bus interfaces according to ISO-11898 with up to 1Mbit/s.
- Upgradeable to CAN-FD-Bus according to ISO-11898-1:2015 with data baudrates up to 8 MBit/s, voucher code required.
- CAN-Bus connection via SUB-D9 connector, pin layout according to CiA DS102
- 1 Red/green LED (LED2) to show state of the CAN-Bus
- Internal switchable 120R termination resistor
- Galvanic isolation from LIN-Bus and USB
- Maximum signal cable length for CAN-Bus: 30m

**Case:**

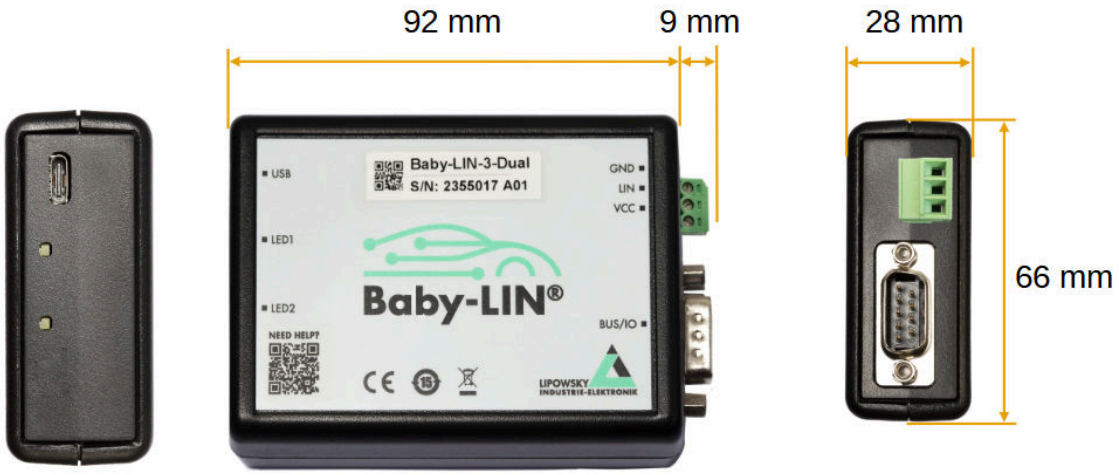
- Degree of protection: IP20
- Operating temperature: -20° - +80° Celsius
- Weight: 95 g
- Case dimensions [mm]: 92 x 66 x 28 (L x W x H), external connectors not included.

# Pin description




| Pin | Signal | Description |
|---|---|---|
| 1 | n.c. | no connection, leave unconnected |
| 2 | CAN-L | Low line of the CAN interface |
| 3 | CAN-GND | Ground for CAN interface |
| 4 | 1.LIN | First LIN-Bus |
| 5 | n.c. | no connection, leave unconnected |
| 6 | GND | Common ground |
| 7 | CAN-H | High line of the CAN interface |
| 8 | 1.LIN | First LIN-Bus |
| 9 | VCC | Supply input for the device |

# 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-Dual :

| 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-3-Dual and for firmware updates. |

## Software requirements

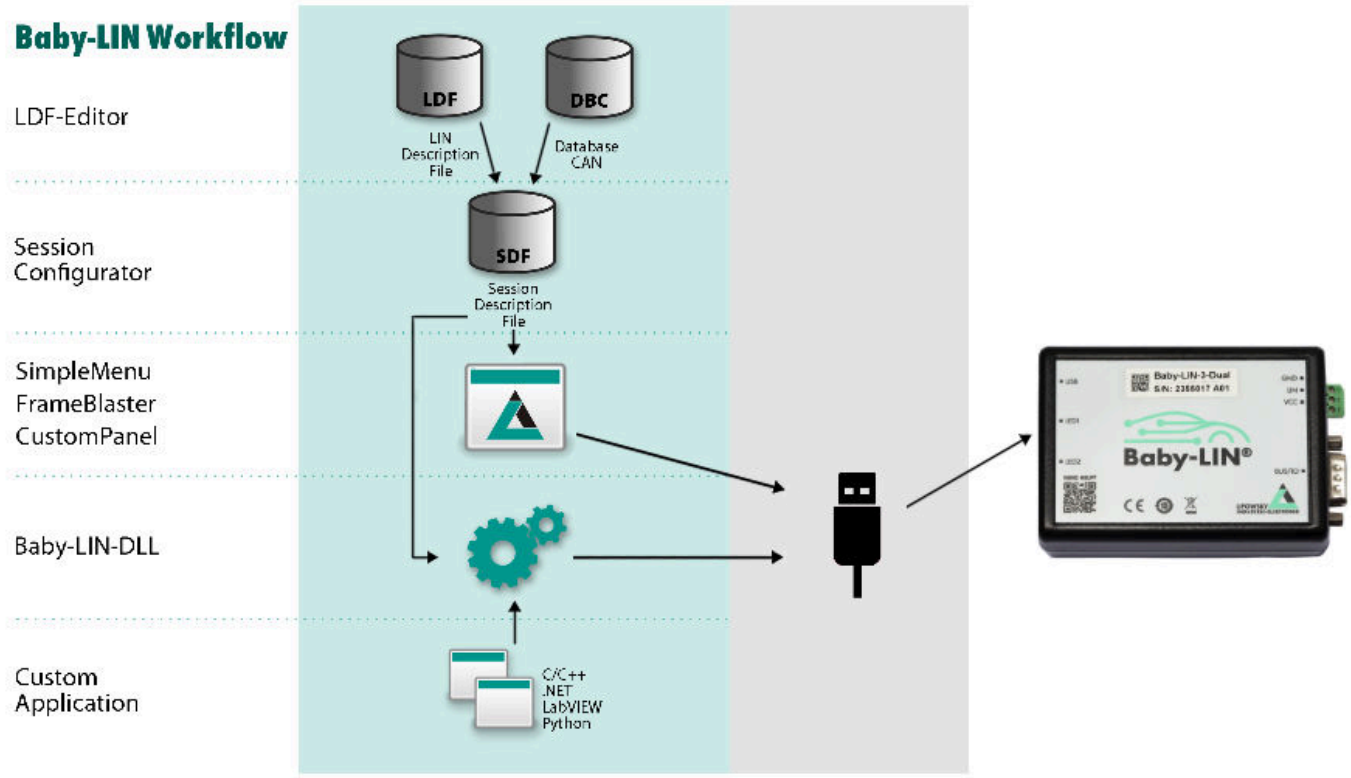
The LINWorks software requires one of the following operating systems:

- 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-Dual systems includes the following components:

- Baby-LIN-3-Dual device
- USB-C 2.0 cable, 1m, Type A to type C
- One 3-pin plug with screw connection (MC 1,5/3-ST-3,81)
- One SUB-D9 female plug with solder cups
- Download license for the LINWorks Suite (includes LINWorks PC software, USB-driver, example files and documentations)

## Ordering information

| Item number | Item | Description |
|---|---|---|
| 8001023 | Baby-LIN-3-Dual | LIN- and CAN-Bus simulation device with USB interface |

**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 |
|---|---|---|
| 3500720 | USB 2.0 cable, 1m Type A to type C | This cable connects the Baby-LIN-3 to a PC. |
| 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. |
| 3040330 | Female SUB-D9 plug | SUB-D9 female plug with solder cups to connector the male SUB-D9 plug of the Baby-LIN-3. |

## 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-Dual . |
| 8000891 | Option BL-Webasto KLine | License code for software activation of special function of Webasto K-Line Protocol, need a written approval of Webasto. |
| 8000991 | Option BL-CAN-1-FD | License code for Baby-LIN-3 to activate CAN-FD (Flexible Data Rate) support for the 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 |
|---|---|---|---|---|---|
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| 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 |
|---|---|---|---|
| 1.1 | Initial Version | | |
| 1.2 | Added Abex-Global as distributor | Distributors | |