

HARP-5

Multibus simulation handheld device with display and keyboard



Product description

The HARP-5 is a PC independent **handheld unit** for rest bus simulations of LIN and CAN buses. By using the full range of equipment, it is possible to control up to 4 buses at the same time (2x LIN bus, 1x CAN-HS, 1x CAN-LS).

The interface hardware for all 4 bus interfaces is already included in the device. As a part of the basic system one LIN bus (SDF-V2 format) is immediately available. The second LIN-Bus interface, both CAN-Bus interfaces and the SDF-V3 support for the first LIN interface are going to be activated by separately orderable voucher codes. Devices with serial number 2xxxxxx upwards are automatically enabled for SDF-V3 support. So you will only pay for what you really need, and if your requirements change, you can easily upgrade anytime.

The HARP-5 features a monochrome **graphical LCD display** with 128x64 characters, dimmable backlight and adjustable contrast. Additional display contents can be defined in the SDF. Apart from displaying signals as raw values or as a converted physical values, it is possible to position macros and macro selections on the display.

The **keyboard** menu offers up to 10 function keys. The keys can be configured to execute macros or to trigger other actions like signal changes or bus start and stop operations. Additionally the keyboard menu allows displaying up to 5 signal values.

Multiple SDF files can be stored on the system's **SD card**. The user can choose via an on-screen menu which one is used for the current operation. Therefore it is possible to set up a device to operate various nodes which need different SDF files.

The HARP-5 can be powered by the 6 included **rechargeable batteries**, the included power supply or the LIN-Bus supply. It can operate up to 16 hours with fully loaded batteries. The HARP-5 has a charging circuit on-board, so therefore the batteries can be charged with the included power supply without removing them. The charging time to fully load the batteries is about 8 hours.

The integrated switchable **12 Volt generator** can be used to supply connected bus nodes with up to 150 mA. This 12V supply can be turned on/off via a SDF system variable. If nodes with larger power requirements such as motors, pumps, etc. are connected, an external power supply with sufficient amperage must be connected.

Data logger functions allow for recording of bus frames on the SD card or via the USB interface on the connected PC. Optional signal filtering and trigger thresholds can be configured.

A single shared **digital input/output** is available. Additionally a switched LIN supply output is available which can be used to switch the LIN bus supply on and off.

Using the PC mode the HARP-5 acts like a common Baby-LIN device and can be remotely controlled by the **LINWorks** software or by customer applications using the Baby-LIN-DLL.

The HARP-5 can handle LIN-Bus voltages in the range of 8-26VDC.

The USB interface is **galvanically isolated** from all other interfaces, eliminating interferences between the PC and the board electronics with its communication participants.

The HARP-5 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.

The HARP-5 can be enabled to support **SDF-V3** if an optional voucher code is purchased, or already supports SDF-V3 if the serial number is 2xxxxxx upwards.

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 mode

Any situation that requires communication with a LIN or CAN device is a potential field of application for a HARP-5. It is a versatile tool that can be used in research laboratories, test departments and production (EOL applications).

The HARP-5 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 HARP-5 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.

The maximum supported signal cable length of the LIN- and CAN-Bus is 30m but can be less, depending on the bus assembly.

Simulation modes

The HARP-5 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 HARP-5. 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 1 kOhm, if the master node is emulated and to 30 kOhm, if only slave nodes are emulated.

One CAN-Bus of the HARP-5 is designed as a high-speed interface according to ISO-11898 with a SN65HVD251 driver.

One CAN-Bus of the HARP-5 utilizes a fault tolerant low-speed physical layer according to ISO-11519 with a TJA1055T driver.

LINWorks suite

The purchase of a HARP-5 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).

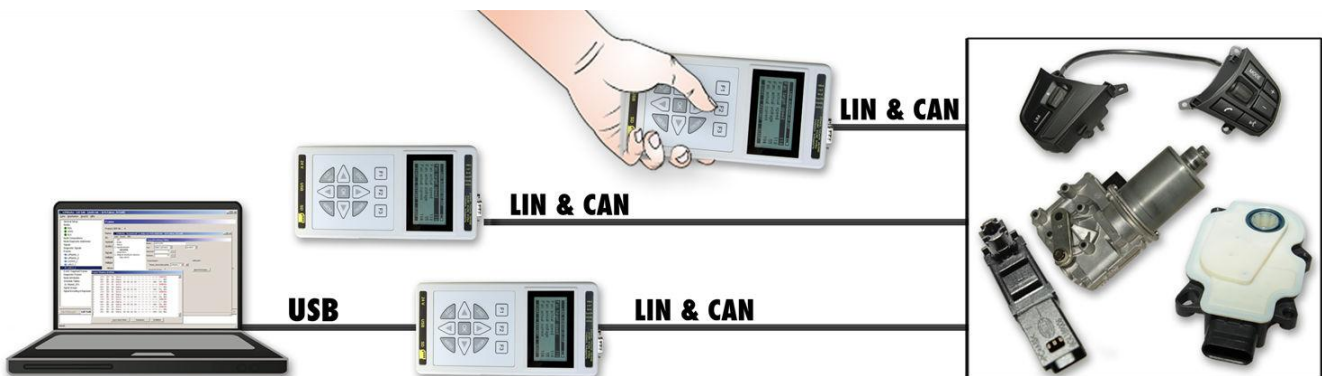
The **SessionConf** allows the inspection, creation and edit of a SDFfile (Session Description File) and features a file import for LDFfiles (for LIN-Bus simulation) and DBC files (for CAN-Bus simulation). It defines everything needed for a complete simulation of each available bus, e.g. which nodes on each bus are available and which nodes should be simulated by the HARP-5. Moreover it allows defining an application logic. This programming ability is available for each device out of the box.

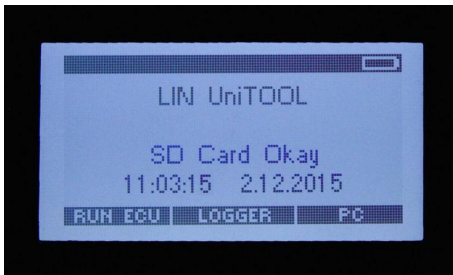
The **SimpleMenu** is used to establish a connection to the HARP-5 and upload SDFfiles, change the device target configuration, control the bus and monitor the frames and signals on the bus. Even without a LDFfile, DBC file or SDFfile the bus can be monitored and the frames can be logged.

The **Baby-LIN-DLL** allows customers to create their own application and use all features of the HARP-5 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.

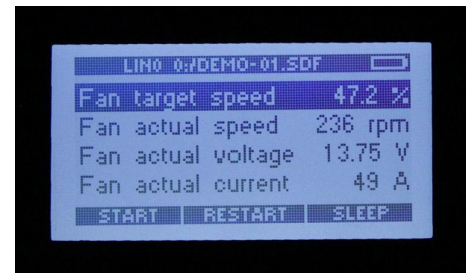
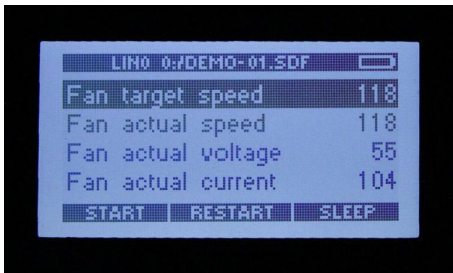
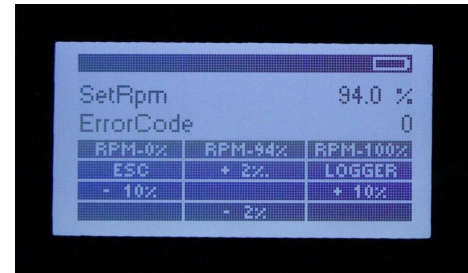
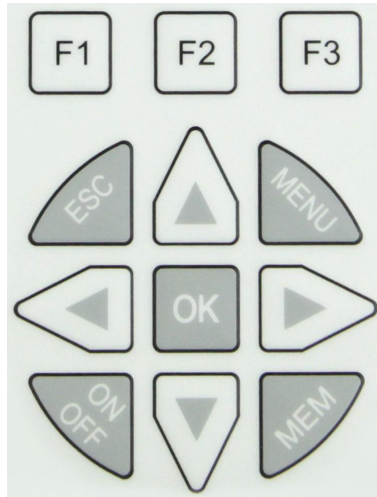
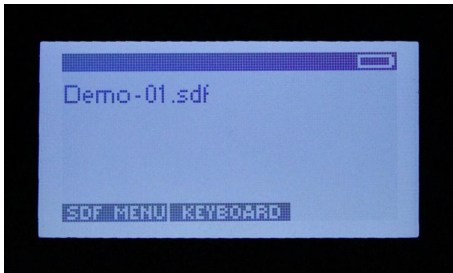
The **LogViewer** can show and convert the log files of the HARP-5 as well as the SimpleMenu.

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





Screenshots of different HARP-5 menus and the 12 key keypad to navigate through them.



Technical Specifications

Device

- CPU: ARM Cortex-M4, 168 MHz
- Memory: 1 MB SRAM
- Graphical LCD display (128x64 characters) with dimmable backlight
- Integrated membrane keyboard with 12 keys
- Acoustic signal generator (controllable via SDF)
- Real-time clock (battery-backed)
- Integrated 12 Volt generator (150 mA) used for node supply
- Powered by 6 rechargeable batteries, the included power supply or the LIN-Bus supply
- Battery based runtime: up to 16 hours (*)
- Battery recharge time: up to 8 hours
- Continuous operation via power supply possible
- Power supply: 9-30 VDC and 14-30V for charging batteries
- Maximum current consumption: 60 mA @ 24 VDC and 700mA while charging batteries

Interface: LIN

- Up to 2 LIN-Bus interfaces available
- 1 LIN-Bus interface available by default
- 1 LIN-Bus interface optionally available on hardware but not activated, voucher code required
- 1 LIN-Bus connection via 6 pin connector (MC 1,5/ 6-ST-3,81)
- Both LIN-Bus connection via 9 pin Sub-D 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-Bus as high speed interface (CAN-HS) according to ISO-11898 available on hardware but not activated, voucher code required
- Used CAN-Bus driver for CAN-HS: SN65HVD251
- 1 CAN-Bus as fault tolerant low speed interface (CAN-LS) according to ISO-11519 available on hardware but not activated, voucher code required
- Used CAN-Bus driver for CAN-LS: TJA1055T
- CAN-LS-Bus connection via 6 pin connector (MC 1,5/ 6-ST-3,81) or 3 pin connector (MC 1,5/ 3-ST-3,81)
- CAN-HS-Bus connection via 9 pin Sub-D connector (Pin assignment as recommended by CiA DS102)
- Maximum baudrate: CAN-HS: 1 MBit/s, CAN-LS: 125 kBit/s
- Maximum signal cable length for CAN-Bus: 30m

Interface: USB Device

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

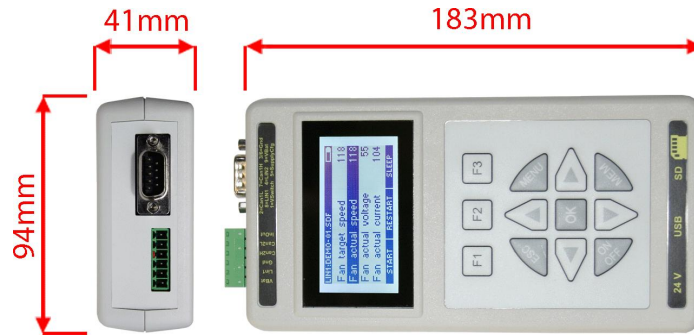
Interface: SD card

- Supported card type: SD cards, SDHC cards
- Supported file system: FAT-32, FAT-16
- Maximum card size: 32 GB

Case

- Degree of protection: IP20
- Operating temperature: Operation: -20° - +50° Celsius, Charging: 0°- +45°Celsius
- Weight: 580 g
- Case dimensions [mm]: 94 x 183 x 41 (L x W x H) Elements like connectors are not included.

(*1) This time is reduced by using the display's backlight, logging to the SD card, using the 12 V generator and other features.



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
- SDFFile description
- Migration information
- Electrical characteristics
- Software description
- FAQ

The user manual can be found in our LINWorks download package.

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 for the PC mode in which the device is controlled by the SimpleMenu or the Baby-LIN-DLL. Required for firmware updates.
A SDHC reader	Required to transfer SDFiles to the HARP-5's SDHC.

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)



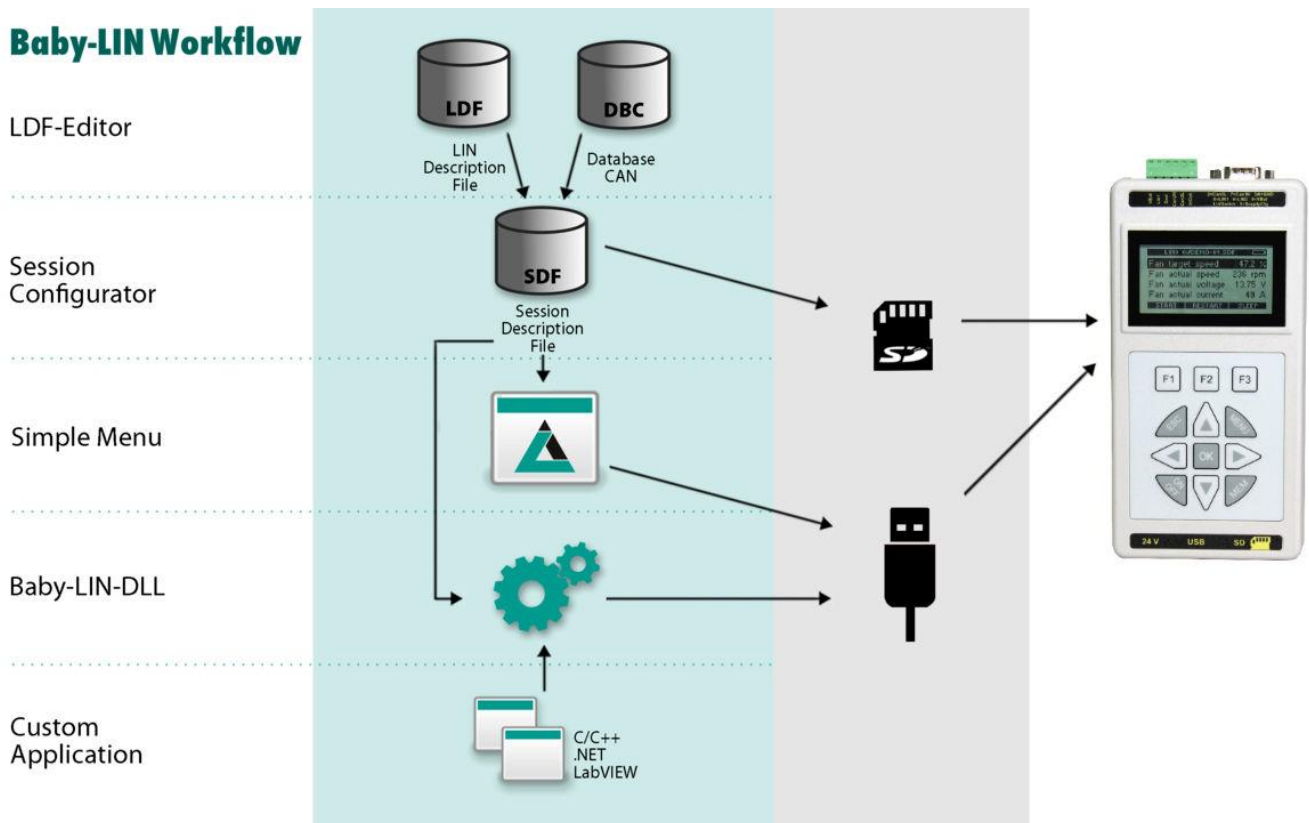
Version compatibility

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 HARP-5 systems includes the following components:

- HARP-5 device
- 8 GB SDHC card (already installed in the device)
- Set of 6 rechargeable batteries (already installed in the device)
- Charging power supply (24 V, 1.25 A), with Schuko connection for the EU
- One 6-pin plug with screw connection (MC 1,5/ 6-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
8000849	HARP-5-Unitool Kompletgerät	Multibus simulation handheld device with display and keyboard.



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



Tip

Country of origin:
Customs tariff number:

Germany
90308900

Optional hardware components

Item number	Item	Description
8000132	IF-CAN-BC	CAN-Bus high-low speed converter, without termination resistor on CAN high speed side. Pin assignment as recommended by CiA DS102. The adapter needs to be powered by the CAN-Bus low speed side or the HARP-5's integrated 12 V generator has to be switched on.
2900500	2600-2700 mAh 1.2V NiMH AA Mignon rechargeable battery	6 of these rechargeable batteries can be used to replace the batteries that were delivered with the HARP-5. This battery type was tested by us to fulfill the requirements.
2900150	3V CR2430 Lithium button cell	This button cell is used to power the RTC clock of the HARP-5. A fresh cell can power the RTC clock for over 9Years years.
3000680	16 GB SDHC card	This SDHC card can be used to store SDFiles and write log files to. The HARP-5 is already delivered with one SD card.
3500701	USB 2.0 cable, 1.5m Type A to type B-Mini	This cable connects the HARP-5 to a PC.
3021306	MC 1,5/ 6-ST-3,81	6-pin plug component, screw connection with tension sleeve. Cable outlet parallel to plugin direction. Screw direction vertical to plugin direction.

Optional voucher codes

Item number	Item	Description
8000800	Option BL-SDFV3	License code for HARP-5 to activate enhanced SDF-V3 functions for the LIN channel. (Devices with serial number 2.xx upwards are automatically enabled for SDF-V3 support.)
8000853	Option BL-LIN-2	License code for HARP-5 to activate the second LIN bus interface.
8000810	Option BL-CAN-1-HS	License code for HARP-5 to activate the CAN-HS (High-Speed) bus interface.
8000820	Option BL-CAN-2-LS	License code for HARP-5 to activate the CAN-LS (Low-Speed) bus interface.



Advice

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 SDFFile 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).

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



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