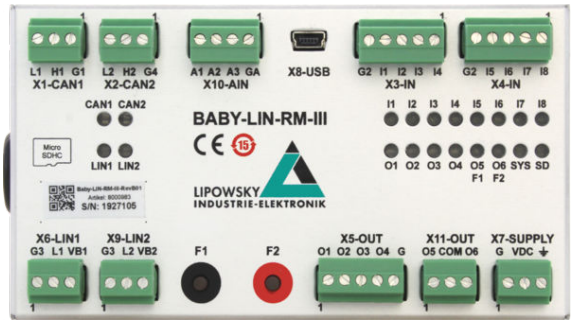
Baby-LIN-RM-III

Multibus simulation device with I/O interface



The Baby-LIN-RM-III 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-III to a free USB port, and access the LIN- and CAN-Bus devices via LINWorksor custom programs by using the Baby-LIN-DLL.

In addition LIN and CAN devices can be controlled and evaluated using **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, 3 analog inputs and **6 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 out-puts 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** signals as well.

In addition the Baby-LIN-RM-III 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 CAN-Bus interfaces [(1)]of the Baby-LIN-RM-III support **CAN-FD** and a recompatible to **CAN-HS**. Both CAN-Bus interfaces can use a switchable termination resistor. One of the interfaces can be switched into a fault tolerant **CAN-LS** interface

The Baby-LIN-RM-III has a microSD card slot [(1)] that may be used for logging purposes in the future. The associated LED is used to show the logging status as well as the firmware update and boot state.

The Baby-LIN-RM-III can handle LIN-Bus voltages in the range of 8-26VDC.

All communication interfaces (LIN- and CAN-Bus, USB) are galvanic isolated, eliminating interference between the PC and the board electronics. Only four digital outputs use the ground of the board's logic supply. Two are galvanic isolated.

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

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

The Baby-LIN-RM-III 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.

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

Operation mode

Any situation that requires communication with a LIN or CAN device is a potential field of application for a Baby-LIN-RM-III . 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-RM-III 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-III 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-RM-III . 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.

Both CAN-Bus interfaces of the Baby-LIN-RM-III are designed as CAN-FD interfaces according to ISO-11898-1:2015 with a MCP2562FD driver. They support data baudrates up to 8 MBit.

Both CAN-Bus interfaces can be used as CAN high speed interfaces according to ISO-11898.

The second CAN-Bus interface can be switched into a fault tolerant low speed physical layer according to ISO-11519 with a TJA1055 driver.

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

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LINWorks suite

The purchase of a Baby-LIN-RM-III 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).

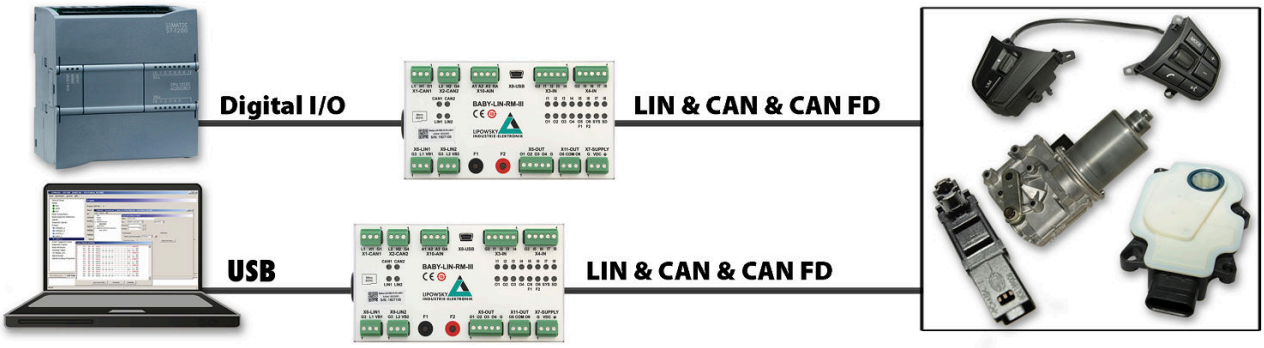
The **SessionConf** allows the inspection, creation and edit of a SDFile (Session Description File) and features a file import for LDFiles (for LIN-Bus simulation) and DBC files (for CAN-Bus simulation). It defines everything needed for a complete simulation of each available bus, e.g. which nodes on each bus are available and which nodes should be simulated by the Baby-LIN-RM-III . 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-III 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-RM-III 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-RM-III as well as the SimpleMenu.

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



Technical Specifications

Device

- CPU: ARM Cortex-M7, 300 MHz
- Memory: 32 MB RAM
- 6 red/green multi colored LED: Signal device, microSD card and LIN and CAN-Bus states
- 2 LEDs: Used as digital output indicator, switch button indicator or freely programmable
- 12 LEDs: Used as signal indicator for digital input and outputs
- 2 freely programmable push buttons
- Real-time clock (battery-backed)
- Power supply: 7-32 VDC
- Power supply via 3 pin connector (MC 1,5/ 3-ST-3,81)
- Maximum current consumption: 70 mA @ 24 VDC
- Galvanic isolation of all communication interfaces (LIN- and CAN-Bus, USB, Exception: 4 of the 6 digital outputs)

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
- LIN-Bus connection via 3 pin connector (MCVR 1,5/ 3-ST-3,81)
- 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

- 2 CAN-FD-Bus interfaces according to ISO-11898-1:2015 with data baudrates up to 8 MBit/s available on hardware but not activated, voucher code required
- Both CAN-FD-Bus interfaces usable as high speed interfaces (CAN-HS) according to ISO-11898
- Used CAN-Bus driver for CAN-FD and CAN-HS: MCP2562FD
- One CAN-FD-Bus interface usable as fault tolerant low speed interface (CAN-LS) according to ISO-11519, voucher code required
- Used CAN-Bus driver for CAN-LS: TJA1055
- CAN-FD-Bus connection via 3 pin connector (MCVR 1,5/ 3-ST-3,81)
- Maximum baudrate: CAN-FD: 8 MBit/s, CAN-HS: 1 MBit/s, CAN-LS: 125 kBit/s
- Maximum signal cable length for CAN-Bus: 30m

Interface: Digital I/O

- 8 digital inputs

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

Interface: Analog I/O

- 3 electrically isolated analog inputs
- Measuring range up to 25 V, Voltage tolerance up to 33 V
- Analog I/O available via 4 pin connector (MC 1,5/ 4-ST-3,81)

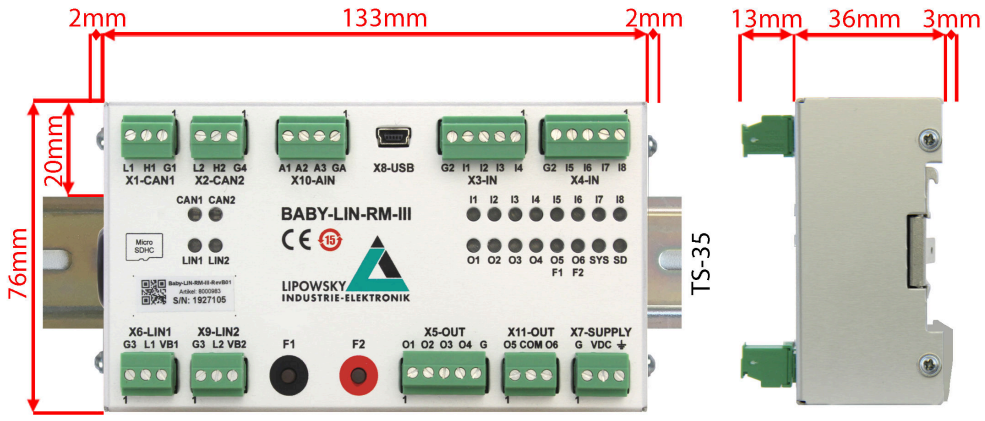
Interface: microSD card

- Supported card types: microSD cards, microSDHC cards
- Supported file system: FAT-32, FAT-16
- Maximum card size: 32 GB
- It is planned to use the microSD card slot for logging purposes in the future. Right now it is without function.

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):

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-RM-III :

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-III and for firmware updates.
Power supply: 7-32 VDC, min. 2A	Voltage supply of the Baby-LIN-RM-III .

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Software requirements

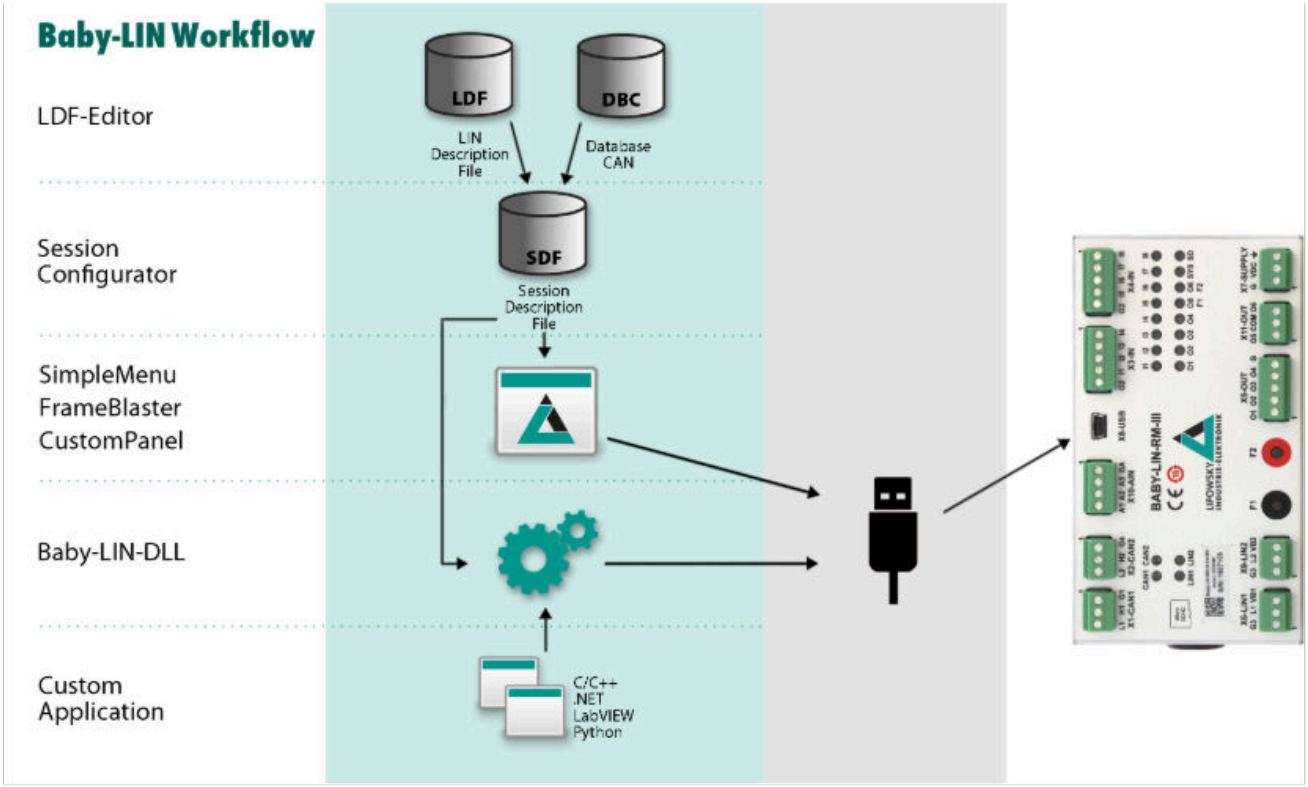
The LINWorks software requires one of the following operating systems:

- 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)
- Windows 11 (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



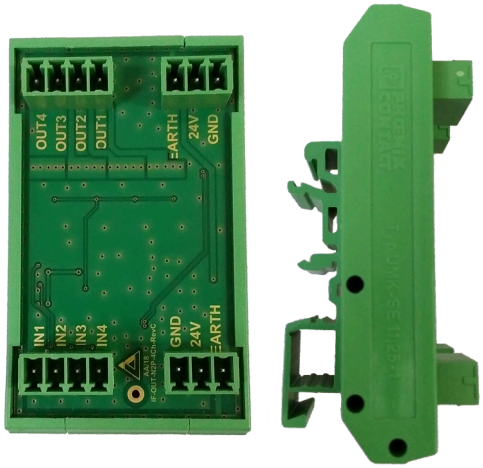
Scope of delivery

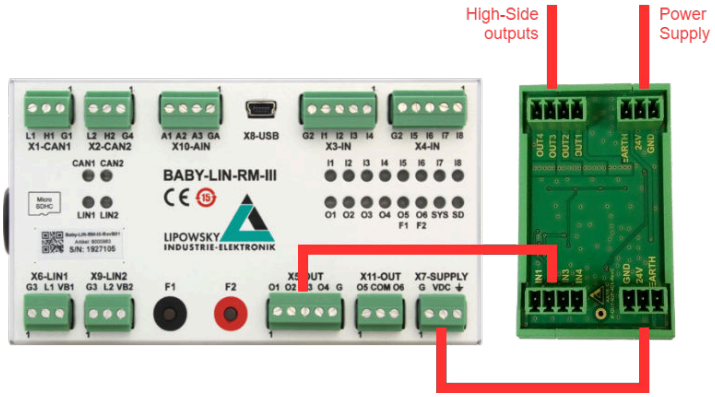
The delivery of a Baby-LIN-RM-III systems includes the following components:

- Baby-LIN-RM-III device
- USB 2.0 cable, 1.5m, Type A to type B-Mini
- Plug components:
  - 6 3-pin plugs with screw connection (MCVR 1,5/ 3-ST-3,81)
  - 1 4-pin plugs with screw connection (MCVR 1,5/ 4-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 to convert the 4 Low side Outputs (NPN) into high side outputs (PNP).





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

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

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

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 comsumption without load: 11 mA @ 12 VDC, 22 mA @ 24VDC
- Max current output for all outputs: 4 A (internal protected)

Case

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

Advice
Please note, that the Baby-LIN-RM-III output adapter does not support the 2 electrically isolated digital outputs of the Baby-LIN-RM-III.

Ordering information

Item number	Item	Description
8000983	Baby-LIN-RM-III	Multibus simulation device with I/O 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
8000960	IF-OUT-N2P-4Ch	4 channel low to high side converter for the Baby-LIN-RM-III.
2900130	3V CR1220 Lithium button cell	This button cell is used to power the RTC clock of the Baby-LIN-RM-III. A fresh cell can power the RTC clock for over 9Years years.
3500701	USB 2.0 cable, 1.5m Type A to type B-Mini	This cable connects the Baby-LIN-RM-III to a PC.
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-III 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.

Optional voucher codes

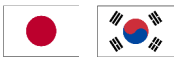
Item number	Item	Description
8002150	Option BL-Security-Access-Gateway	License code for the Security Access Gateway Application to connect Security DLL's to SDF executed on a Baby-LIN-RM-III .
8000891	Option BL-Webasto KLine	License code for software activation of special function of Webasto K-Line Protocol, need a written approval of Webasto.
8000853	Option BL-LIN-2	License code for Baby-LIN-RM-III to activate the second LIN bus interface.
8000810	Option BL-CAN-1-HS	License code for Baby-LIN-RM-III to activate CAN-HS (High-Speed) support for the first CAN-Bus interface.
8000991	Option BL-CAN-1-FD	License code for Baby-LIN-RM-III 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-RM-III to activate CAN-HS (High-Speed) support for the second CAN-Bus interface.
8000992	Option BL-CAN-2-FD	License code for Baby-LIN-RM-III to activate CAN-FD (Flexible Data Rate) support for the second CAN-Bus interface.
8000820	Option BL-CAN-2-LS	License code for Baby-LIN-RM-III to activate CAN-LS (Low-Speed) support for the second CAN-Bus interface.
8000943	Option BL-microSD-Card	License code for Baby-LIN-RM-III to activate logging to the microSD card.

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