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Baby-LIN-3-MB

Migration-Guide V1.0

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1 Introduction Baby-LIN-3-MB **2**

2 New features and improvements **3**

2.1 Extended input and output capability . . . 3
2.2 Current measurement . . . 3
2.3 Display and buttons . . . 4
2.4 User management . . . 4
2.5 TestRun mode . . . 4
2.6 Time synchronization . . . 4
2.7 Native CAN-FD support . . . 4
2.8 Gigabit LAN . . . 4
2.9 USB . . . 5
2.10 Isolated Gateway . . . 5
2.11 Web interface . . . 5

3 Migration **6**

3.1 General commonalities . . . 6
3.1.1 Communication interfaces . . . 6
3.1.2 Power supply . . . 6
3.2 General Differences . . . 6
3.2.1 Enclosure . . . 6
3.2.2 User interface . . . 6
3.2.3 VLIN-Detect signals . . . 6
3.3 Signals on SUB-D25 . . . 7
3.3.1 LIN . . . 7
3.3.2 CAN . . . 8
3.3.3 Digital IOs . . . 9
3.4 Software . . . 11
3.4.1 General commonalities . . . 11
3.4.2 Operation mode renaming . . . 11
3.4.3 Plugins . . . 12
3.4.4 UDP push logger . . . 12
3.4.5 IO signal distribution . . . 12

4 Support information **14**

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1 Introduction Baby-LIN-3-MB

This migration guide will show you how to switch from a current 2.Generation Baby-LIN devices to a new 3.Generation device, depending on your current devices and it's used features.



Information
This guide assumes you are already using a Baby-LIN product. If you are a new user please read the getting started and product guide.



Attention
This guide is only for the discontinued devices of the Baby-LIN Family. The Baby-LIN-RM-III is not affected nor discussed here.

For this purpose check:

- What device you are currently using, wanted to buy again or replace.
- Which features you are using or need.

2 New features and improvements

With the new Baby-LIN-3-MB comes a bunch of new features and general improvements which will be shortly explained here.

2.1 Extended input and output capability

The new MB not only have more inputs and outputs, without any need for additional hardware, but also offer a wider voltage range, PWM and more current capability. All IOs are separated in three galvanic isolated domains:

1) high-speed IOs (3 combined IOs, 1 input & 1 output)

2) low-speed inputs (3 inputs)

3) switch contact

The switch contact is already known from the MB-II. Also the low-speed inputs, but the new MB has now three of them with a higher voltage rating.

New are the high-speed IOs. A total of four inputs and four high-side outputs are available, on three the input and output are combined. These pins are capable of in- & output PWM frequencies up to 20kHz with 0,1% duty-cycle, voltages up to 50V and can deliver 2,2A per channel or in total.

Information
PWM **input** functionality is not available at launch in February, see Datasheet for more information.

The table shows a comparison for both basic device versions:

	Baby-LIN-3-MB	Baby-LIN-MB-II
Number of inputs	Up to 7	Up to 3 (including VLIN-Detect)
Number of outputs	Up to 5	2
IO frequency	Up to 20kHz	< 100Hz
Maximal switch current	2,2A	0,5A
Maximal input voltage	62V	44V
Maximal output voltage	50V	32V

The power supply for the high-speed IOs is separate so they can be used for 48V applications or for different applications than the LIN bus supply is used for.

With the soon coming ExPORT-LIN modules each extensions add two additional digital IOs with the same characteristics as the one from the Baby-LIN-3-RCplus (PWM capable, output type configurable and own supply voltage).

2.2 Current measurement

To further improve the IO capability the Baby-LIN-3-MB is the first Baby-LIN device to offer a current measurement feature. This function allows to measure the total current of the four outputs with a 10Bit resolution and an accuracy of 3% or better. The internal filtering can be influenced with a separate system signal to account for noise environment.

The user can read this current in the SDF and therefore can improve testing sequences, e.g. check if a device enters sleep mode (if the current difference is large enough) or test plain devices like non intelligent LED lamps and solenoids which was not easily possible yet.

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2.3 Display and buttons

Like the RC models of the Baby-LIN-3 family, the MB now also has a 1,54" IPS color display to show device information and allow all kind of settings directly on the device, together with the 9 buttons of the new keyboard.
The old MB had six dual color LEDs to show the state of the LIN buses. These bus states together with the states of the CAN buses are now shown in the display, together with information about the loaded SDF section.

To improve the usability it's now also easy to change or show the network settings, like the IP address, or the working mode directly at the device without the need of a prior network connection.

The two action buttons F1 & F2 are user configurable to allow quick access to the most needed settings without menu navigation.

Furthermore many helpful information are now directly shown like the serial number, MAC address, software version, and many more.

2.4 User management

This new software features allows detailed permission management for specific users or groups. This allows the possibility to create groups of users, with different permissions like SDF up- or download or to show individual pages. All is set by an admin account.

Default this feature is active to behave like the old MB-II and has to be activated in the settings.

2.5 TestRun mode

With the new MB there is also new working mode called TestRun mode intended to truly running stand-alone and is designed for endurance tests and test with custom user interface.

This mode can only be controlled through the web interface of the device making full use of the user management and the new web GUI, because different users can see and change different settings.

To accommodate the possible amount of logging data every start of a SDF file creates a test run folder where the used SDF file, the meta data and logfiles will be stored and a special binary log format for long endurance test (weeks to months) is supported which can be exported as CSV file.

2.6 Time synchronization

The Baby-LIN-3-MB incooparets a high precision internal clock which synchronize all components (MPU, MCU, extension boards) in the system via a pps signal allowing the timestamps of all internal devices and therefore all logged bus frames to be in sync.

2.7 Native CAN-FD support

The Baby-LIN-3-MB offers now native CAN-FD support up to 8 MBit/s and also has two CAN buses directly implemented in the hardware so no additional hardware is needed anymore to get these features.

2.8 Gigabit LAN

The Ethernet interface is now supporting data rates up to 1000Mbit/s in comparison to the 100MBit/s of the MB-II, so updates and log data transfer is faster now.

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2.9 USB

Now two high-speed USB ports are available, the new one as USB-C type.
With the USB-C type it will be possible in the future to extend the new MB with other devices of the Baby-LIN-3-MB. Check our website when this feature will be available.

2.10 Isolated Gateway

With the new concept of extension boards having their own connector and therefore an additional supply it is now possible to implement LIN to LIN and CAN to CAN gateways to isolate the communication for e.g. 48V systems.

Translation of LIN to CAN and vice versa is also possible though it was already possible with the MB-II.

2.11 Web interface

We have update the web interface of the device to support https (own certificate, singed by us) for increased safety. Also the configuration and registry variables were merged together for easier setup of the device. The new user permission management (support for SDF download if configured) is integrated as part of the interface. Non the last the system update now shows the progress.

3 Migration

Our company police is to keep differences between device iterations as small as possible to facilitate the upgrade to a new device. With the new Baby-LIN-3-MB having new features and most of the features of the old MB-II, some features need a few changes in hardware and/or software to be restored and others are delete without substitution. In the following chapters we will guide you which features were unchanged, what changes have to be made to restore functions of the MB-II or substitute them and which functions are not available anymore.

3.1 General commonalities

3.1.1 Communication interfaces

The following standardized communication interfaces were kept the same in there function and pin-out or were improved but are still downward compatible:

1) Ethernet

2) RS232

3) USB

3.1.2 Power supply

The three pin power plug has still the same pin-out as before, only the working voltage range was increased up to 50V.

The option to supply through the SUB-D25 connector was omitted, see Power Supply Pins.

3.2 General Differences

Some differences are unavoidable with a new Generation so keep an eye on the following points.

3.2.1 Enclosure

An often communicated inconvenience of the MB-II were connectors in line with the top hat rail needing more valuable horizontal space in electric cabinets. So for the new Baby-LIN-3-MB we decided to rotate the whole design so the now the cables are perpendicular to the top hat rail.

The overall area kept the same between the devices but the height was decreased.

	Baby-LIN-3-MB	Baby-LIN-MB-II
Width in mm	126	132
Length in mm	112	104
Height in mm	42	54

3.2.2 User interface

The MB-II had 6 dual-color LEDs for the LIN bus states, two system LEDs and two push button to update from a USB stick or to safe logfiles.

All these functions are now moved to the screen and can be controlled with the keyboard.

3.2.3 VLIN-Detect signals

One feature often causing irritation were the separate VLIN-Detect signal lines for each LIN bus which were required for the proper function of the bus but could easily be forgotten.

The Baby-LIN-3-MB doesn't have dedicated lines anymore and the @@SYSBUSSTATE variable in the first and second LIN section is now monitoring the common LIN supply voltage on pin 9. If a LIN bus is running is still reported independently per section though.

The two LIN buses of each extension module behave in the same manor.

The following table gives an overview on how @@SYSBUSSTATE behaves in each LIN section.

Section	Monitored voltage		Reported bus state	
	New MB	Old MB-II	New MB	Old MB
1.LIN	VLIN-IN on pin 9	VLIN-Detect-1 on pin X9-18	State of LIN-1	State of LIN-1
2.LIN	VLIN-IN on pin 9	VLIN-Detect-2 on pin X9-6	State of LIN-2	State of LIN-2
3.LIN	VCC on pin 9 of ExPORT1	VLIN-Detect-3 on pin X9-17	State of LIN-3	State of LIN-3
4.LIN	VCC on pin 9 of ExPORT1	VLIN-Detect-4 on pin X9-5	State of LIN-4	State of LIN-4
5.LIN	VCC on pin 9 of ExPORT2	VLIN-Detect-5 on pin X9-16	State of LIN-5	State of LIN-5
6.LIN	VCC on pin 9 of ExPORT2	VLIN-Detect-6 on pin X9-2	State of LIN-6	State of LIN-6

Attention
The digital inputs of the new MB can be used to replace the VLIN-Detect signals but **always** require changes of the SDF file.

3.3 Signals on SUB-D25

3.3.1 LIN

Version incompatibility
If you used the VLIN-Detect signals please read the chapter VLIN-Detect signals first.

3.3.1.1 LIN-1 and LIN-2

The 1.LIN and 2.LIN together with the supply voltage use the same pins and same software signals like the MB-II. Without VLIN-Detect here is no need to change the hard- or software.

Pin on SUB-D25	Signal on new MB	Signal on old MB	Description
8	LIN-1	LIN-1	1. LIN bus
9	VLIN-IN	VLIN-IN	Supply voltage for 1. & 2. LIN bus
20	LIN-GND	LIN-GND	Common ground for 1. & 2. LIN bus
21	LIN-2	LIN-2	2. LIN bus

In case the VLIN-Detect signals were used for sequences control, the following pins have to be routed too and the **SDF has to be changed**, see VLIN-Detect signals.

Pin on SUB-D25	Signal on new MB	Signal on old MB	Description
6	DIO-4	VLIN-Detect-2	DIN-4 can partially replace @@SYSBUSSTATE of 2.LIN section
18	DIN-1	VLIN-Detect-1	DIN-1 can partially replace @@SYSBUSSTATE of 1.LIN section

Attention
The high-speed IO group has to be supplied with 7V-50V through pin 19 (GND-IO) and pin 17 (VDIO) to use the DIN signals.

3.3.1.2 MIF-LIN for more than two LINs

The Baby-LIN-3-MB has still the ability to control up to 6 different LIN channels and detect their voltage level. But with the new concept those signals are not an the SUB-D25 plug anymore but spread out on two additional SUB-D9 plugs of the extension modules.



Tip
The pin layout of the extension modules is equal to the layout of the other Baby-LIN-3 devices.

For the same functionality the following connections have to be made:

Signal	Pin on new MB	Pin on MB-II	Description
LIN-3	ExPORT1-4	X9-19	
LIN-4	ExPORT1-8	X9-7	
LIN-5	ExPORT2-4	X9-3	
LIN-6	ExPORT2-8	X9-15	
VLIN-IN for LIN-3 & LIN-4	ExPORT1-9	X9-9	ExPORTs have there own VLIN supply which has to be connected to the VLIN-IN & GND-LIN of the SUB-D25.
GND-LIN for LIN-3 & LIN-4	ExPORT1-6	X9-20	
VLIN-IN for LIN-3 & LIN-4	ExPORT2-9	X9-9	
GND-LIN for LIN-3 & LIN-4	ExPORT2-6	X9-20	

In case the VLIN-Detect signals were used for sequences control, the following pins have to be routed too and the **SDF has to be changed**, see VLIN-Detect signals.

Signal	Pin on new MB	Pin on MB-II	Description
VLIN-Detect-3	ExPORT1-1	X9-17	DIO1 of ExPORT1
VLIN-Detect-4	ExPORT1-5	X9-5	DIO2 of ExPORT1
VLIN-Detect-5	ExPORT2-1	X9-16	DIO1 of ExPORT2
VLIN-Detect-6	ExPORT2-5	X9-2	DIO2 of ExPORT2

3.3.2 CAN

3.3.2.1 CAN-HS of MB-II

The internal CAN-HS, now named CAN-1 and capable of CAN-FD, uses still the same pins and signals as before. No need to change the hard- or software.

Pin on SUB-D25	Signal on new MB	Signal on old MB	Description
10	CAN1-L	CAN-HS-L	Low line of 1. CAN bus
11	CAN-GND	CAN-GND	Ground for 1. CAN
23	CAN1-H	CAN-HS-H	High line of 1. CAN bus

3.3.2.2 MIF-CAN-FD signals

With the new MB the functionality of the MIF-CAN-FD was integrated into the base device and are now isolated from each other. Therefore the pin arrangement had to be different and the following pins are now used for the signals of the 2.CAN bus. Please also note that both CAN grounds, pin 4 and pin 11 of the new MB, have to be connected for comparability to the old MB-II.

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Signal on new MB	Pin on new MB	Signal on old MB-II	Pin on old MB-II	Description
CAN2-H	23	CAN1-H	X9-3	
CAN2-L	10	CAN1-L	X9-15	
CAN3-H	16	CAN2-H	X9-2	Not available yet, see info box below
CAN3-L	3	CAN2-L	X9-16	
GND-CAN	11	MIF-CAN-FD-GND	X9-20	Both CAN buses have a separate ground now. For compatibility they have to be connected together.
GND-CAN2	4	MIF-CAN-FD-GND	X9-20	

Information
If you used both CAN-FD buses from the MIF-CAN-FD and the onboard CAN-HS in your application please contact us for support.

Version incompatitbility
MIF-CAN-FD-GND and LIN-GND shared the same pin X9-20 on the MB-II. The new MB has a fully isolated CAN now. If your application needed the CAN and LIN ground to be connected please also connect pin 20 of the new MB to pin 11 and pin 4.

3.3.3 Digital IOs

Version incompatitbility
Although some IO pins are on the same pin position as before, the general mapping of the @@SYSDIGIN/OUT variables has changed.

3.3.3.1 Switch contact

The internal switch contact uses the same pin-out and virtual signal (SYSDIGOUT1) as the Baby-LIN-MB-II. **Your SDF can doesn't needed to be changed.**

Because the switch is bi-directional and not referenced to any potential we swapped the pin numbers for a more consistent numbering scheme, which has no effect on your old installation.

Pin on SUB-D25	Signal on new MB	Signal on old MB	Description
12	OUT1-P1	Switch-Port-2	Second pin of internal switch contact
24	OUT1-P2	Switch-Port-1	First pin of internal switch contact

3.3.3.2 DigIn

An isolated digital input, like the DigIn of the MB-II, is still available on the Baby-LIN-3-MB but on different pins of the SUB-D25 connector.

Depending of your setup there are two possible options. If you don't need a separated ground (pin X9-25 of the MB-II) we recommend to replace DigIn with DIN-1 of the new MB as shown in the table below, so you don't have to change your SDF file. If you used a separated ground please refer to the second table.

Separate ground **not** used:

Signal	Pin on new MB	Pin on MB-II	Description
DigIn	18	X9-13	DIN-1 of the Baby-LIN-3-MB
DigIn-GND	19	X9-25	Common ground of DIN-1

Attention
To use DIN-1 the high-speed IO group has to be supplied with 7V-50V through pin 19 (GND-IO) and pin 17 (VDIO).

Separate ground used:

Signal	Pin on new MB	Pin on MB-II	Description
DigIn	15	X9-13	DIN-7 of the Baby-LIN-3-MB
DigIn-GND	14	X9-25	Isolated Ground

Version incompatibility
@@SYSDIGIN1 has to be replaced with the @@SYSDIGIN variable of the used DIN-x pin of the new MB, in the recommend case with @@SYSDIGIN7.

3.3.3.3 PWR-Switch

The PWR-Switch on the MB-II could switch VLIN to a load. The new Baby-LIN-3-MB has DIO-2 routed to this position to replace this function. To get the same functionality the supply voltage for the high-speed IO group has to be connected to the LIN supply voltage. For this please connect on the SUB-D25 pin 19 (GND-IO) to pin 20 (GND-LIN) and pin 17 (VDIO) to pin 9 (VLIN-IN). **Your SDF can doesn't needed to be changed.**

Pin on SUB-D25	Signal on new MB	Signal on old MB-II	Description
22	DIO-2	PWR-Switch	

3.3.3.4 Power Supply Pins

To get more space for all the features it is no longer possible to supply the device via pin 1 and 14. Only the green three pin plug can be used, which has the same pin out as before.

If you used these connection please remove the cables from pin 1 and pin 14 of the X9 connector of the MB-II and connect the cable of pin 1 to GND and pin 14 to VDC on the green plug as marked on the device.

3.3.3.5 MIF-DIO input signals

Like with the MIF-CAN-FD the functionality of the MIF-DIO was mostly integrated into the base device.

Attention
To use DIO-x pins the high-speed IO group has to be supplied with 7V-50V through pin 19 (GND-IO) and pin 17 (VDIO).

For only the digital inputs the new MB can replace the old MB-II completely if the VLIN-Detect signals are not needed. The following table shows the mapping.

Signal	Pin on new MB	Virtual signal new MB	Pin on old MB-II	Virtual signal old MB-II
MIF-DIO-IN-1	22	@@SYSDIGIN2	X9-5	@@SYSDIGIN2
MIF-DIO-IN-2	7	@@SYSDIGIN3	X9-4	@@SYSDIGIN3
MIF-DIO-IN-3	6	@@SYSDIGIN4	X9-7	@@SYSDIGIN4
MIF-DIO-IN-4	15	@@SYSDIGIN5	X9-19	@@SYSDIGIN5
MIF-DIO-IN-5	2	@@SYSDIGIN6	X9-6	@@SYSDIGIN6
MIF-DIO-IN-6	14	@@SYSDIGIN7	X9-18	@@SYSDIGIN7
MIF-DIO-GND	1 & 19		X9-17	

The common ground of the MIF-DIO, MIF-DIO-GND on pin X9-17 of the old MB-II, is now shared between the high-speed and low-speed IO domain. You have to connect the ground to pin 1 (GND-DIN, low-speed domain) **and** pin 19 (GND-DIO, high-speed domain) of the new Baby-LIN-3-MB.

3.3.3.6 MIF-DIO output signals



Version incompatibility
For the output signals the new MB doesn't have a direct replacement, because it has less output pins and now uses high-side switches instead of low-side switches.

You can replace some of the outputs of the MIF-DIO by the outputs of the new MB with the use of pull-down resistor (recommend 1k, wattage depending on the output voltage):

Signal	Pin on new MB	Virtual signal new MB	Pin on old MB-II	Virtual signal old MB-II
MIF-DIO-OUT-1	22	@@SYSDIGOUT1	X9-5	@@SYSDIGOUT6
MIF-DIO-OUT-2	7	@@SYSDIGOUT2	X9-4	@@SYSDIGOUT7
MIF-DIO-OUT-3	6	@@SYSDIGOUT3	X9-7	@@SYSDIGOUT8
MIF-DIO-OUT-4	18	@@SYSDIGOUT4	X9-19	@@SYSDIGOUT3

3.4 Software

3.4.1 General commonalities

Most of your software can stay at it is because things like the ASCII commands, section numbering or virtual signals are kept the same. The necessary changes related to hardware differences are explained in chapter Signals on SUB-D25.

Nevertheless there are some software related changes which have to be addressed.



Information
If you are using one of the following features and need help with the migration please contact us.

3.4.2 Operation mode renaming

With the new TestRun mode the other modes were renamed to have a better differentiation between them and make it more obvious that they should be used for.

With the new mode the old stand-alone mode was renamed to PLC mode (ASCII).

New name	Old name	Intended function
PLC-Mode (ASCII)	Stand-alone mode	Device is controlled through one of the ASCII interfaces by an other instance, usually a PLC.
SimpleMenu-Mode (DLL)	SimpleMenu mode	The SimpleMenu or a self written application using the BabyLIN DLL is used.
TestRun-Mode (Web GUI)	Not available	True stand-alone mode without any other devices. Monitoring through web interface

3.4.3 Plugins

The BabyLIN-3-MB firmware didn't support standard or customer plugins anymore because most plugins can be realized as SDF file with the SDF protocol feature.

3.4.4 UDP push logger

The deprecated UDP push logger is now removed. This feature will not be available anymore. To log frames continuous, use the integrated background logging feature (stores logfiles on the integrated micro SD card).

3.4.5 IO signal distribution

With the new concept on how internal extensions are communicating and how the device is handling the digital IOs the distribution of input- and output variables (@@SYSDIGIN and @@SYSDIGOUT) had to be changed. These variables will not be shared between internal devices anymore and are exclusive to the device domain (bus sections) itself.

For example the BabyLIN-3-MB has internal extension modules for 4 LIN bus interfaces this modules have also additional inputs. These inputs are available as @@SYSDIGIN1 & 2 in the specific sections of the extension (3.LIN and 4.LIN), but they are not available on 1.LIN and 2.LIN. The @@SYSDIGIN1 & 2 variables of the first two section are still handled by DIO-1 and DIO-2.

The following table shows the mapping of which signal is available in which section.

Section	Available @@SYS signal	Corresponding IO pins
1.LIN	DIGIN1-7 & DIGOUT1-5	On SUB-D25: DIO-2 to 4, DOUT5, DIN-1 & DIN-5 to 7
2.LIN	DIGIN1-7 & DIGOUT1-5	On SUB-D25: DIO-2 to 4, DOUT5, DIN-1 & DIN-5 to 7
3.LIN	DIGIN1-2 & DIGOUT1-2	On SUB-D9 of ExPORT1: DIO-1 & DIO-2
4.LIN	DIGIN1-2 & DIGOUT1-2	On SUB-D9 of ExPORT1: DIO-1 & DIO-2
5.LIN	DIGIN1-2 & DIGOUT1-2	On SUB-D9 of ExPORT2: DIO-1 & DIO-2
6.LIN	DIGIN1-2 & DIGOUT1-2	On SUB-D9 of ExPORT2: DIO-1 & DIO-2
1.CAN	DIGIN1-7 & DIGOUT1-5	On SUB-D25: DIO-2 to 4, DOUT5, DIN-1 & DIN-5 to 7
2.CAN	DIGIN1-4	On SUB-D25: DIO-2 to 4 (Only DIN function) & DIN-1



Information
There will be an alternative way to access the IO variables from other sections in the future named SDF CrossSection Communication which is not implemented yet. Check the latest release notes of LINWorks package on our homepage for current information.

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4 Support information

In case of any questions you can get technical support by email or phone. We can use TeamViewer to give you direct support and help on your own PC. This way we are able to sort out problems fast and direct. We have sample code and application notes available, which will help you to make your job.

Lipowsky Industrie-Elektronik GmbH realized many successful LIN and CAN related projects and therefor we can draw upon many years of experience in these fields. We also provide turn key solutions for specific applications like EOL (End of Line) testers or programming stations.

Lipowsky Industrie-Elektronik GmbH designs, produces and applies the Baby-LIN products, so you can always expect qualified and fast support.

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