Relevant products

Product Name	Model	Part number
PCAN-LIN	High-speed CAN (HS-CAN)	IPEH-002025
PCAN-LIN	Low-speed CAN (LS-CAN)	IPEH-002028
PCAN-LIN	High-speed CAN, opto-decoupled (opto)	IPEH-002029

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Contents

1 Introduction

Tip: At the end of this manual (Appendix D) you can find a **Quick Reference** with brief information about the installation and operation of the PCAN-LIN module.

The PCAN-LIN module enables CAN, LIN, and serial participants to communicate. The module is supplied in a plastic casing and includes firmware which enables data to be exchanged between the different bus systems. Various modes can be set up with the aid of configuration software. Then for instance the module acting as the LIN master can request data and route the incoming LIN data to the CAN bus and/or the serial interface. Data can be routed between CAN and LIN with an ID offset.

This user manual covers the use of the PCAN-LIN hardware. The software supplied on DVD is described in the corresponding help. Information about the protocol for the communication via the RS-232 interface can be found in the separate document "PCAN-LIN – Protocol Definitions Documentation".

1.1 Properties at a Glance

- Transmission/reception LIN 1.x and 2.x frames
- LIN bit rates of 1 - 20 kbit/s
- CAN bit rates up to 1 Mbit/s
- Available for use as LIN master or slave

- General-purpose gateway (or router when using Acceptance Code / Acceptance Mask feature) from:
  - RS-232 to LIN (and back)
  - RS-232 to CAN (limited bandwidth)
  - CAN to LIN (and back)
- Simulation of LIN slaves. Data can be changed via CAN frames
- Processing a user-definable LIN ID list (scheduler with limited number of entries, cyclic handling if required)
- Individual LIN frames can be initiated via CAN or RS-232
- High-speed (ISO 11898-2) or Low-speed (ISO 11898-3) CAN transceiver module
- Galvanic isolation between RS-232 and CAN/LIN up to 1 kV (only for High-speed CAN)
- Voltage supply from 9 to 30 V
- Extended operating temperature range from -40 to 85 °C (-40 to 185 °F)

1.2 Operation Requirements

- Voltage supply:
  - Modules up to ser. no. 999: 8 - 18 V DC
  - Modules from ser. no. 1000: 9 - 30 V DC
- For the connection to the computer: RS-232 extension cable D-Sub 9-pin, RS-232 connector on the computer
- For the supplied configuration software:
  Windows 10, 8.1, 7, Vista (32/64-bit)

1.3 Scope of Supply

- PCAN-LIN in plastic casing
- Configuration and monitoring tool PCAN-LIN Config for Windows
- Manual in PDF format

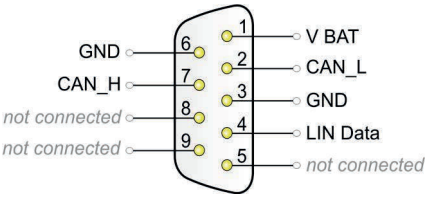
2 Connectors

The PCAN-LIN module has two 9-pin D-Sub connectors:

- Male: LIN, CAN, and voltage supply
- Female: RS-232

2.1 D-Sub Male Connector for LIN, CAN, and Voltage Supply

The field busses and the voltage supply (e.g. a car battery) are connected together via the D-Sub male connector on the PCAN-LIN module.



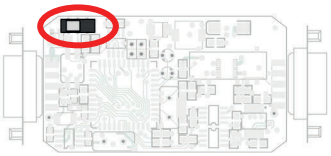
V BAT (up to ser. no. 999): 8 - 18 V DC
V BAT (from ser. no. 1000): 9 - 30 V DC

2.1.1 CAN Termination

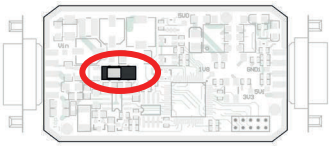
PCAN-LIN model	Termination	Comment
High-speed CAN (opto)	none	
Low-speed CAN	5.66 kΩ (default) / 560 Ω	Change between resistance values with switch on the circuit board; low resistance setting only necessary if few CAN nodes are connected to the Low-speed CAN bus.

- Do the following to change the resistance value of the **Low-speed CAN** termination:

1. Open the plastic casing of the PCAN-LIN module by cautiously pushing in the two latches on both sides, e.g. with a flat tip screwdriver.
2. On the PCAN-LIN circuit board there is a switch for the Low-speed CAN termination.



PCAN-LIN modules up to ser. no. 999



PCAN-LIN modules from ser. no. 1000

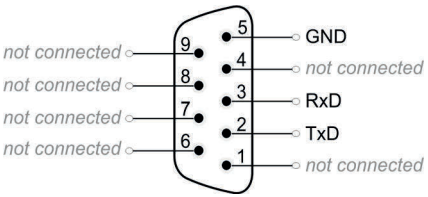
Set the switch according to the desired resistance value. Setting possibilities:

5.66 kΩ (default)	560 Ω
 (left)	 (right)

2.2 D-Sub Female Connector for RS-232

Via the RS-232 interface the PCAN-LIN module is linked to a computer or another monitoring or control unit. A computer can be connected to the PCAN-LIN module via a normal RS-232 extension cable with 9-pin D-Sub connectors (no null modem cable).

For the serial communication only the two data lines and the ground connection are required; handshake lines are not used.



The RS-232 connection of the **opto-decoupled PCAN-LIN model** is galvanically separated from the other electronic circuits in the module. The maximum separation voltage is 1 kV.

3 Software Installation

The scope of supply contains the PCAN-LIN Configuration Tool for Windows and the program Flash Magic that is needed for transfer of a new firmware to the PCAN-LIN module. The setup program installs both programs consecutively.

To start the setup procedure of the software, do the following:

1. Insert the supplied DVD into a drive and start the navigation program `Intro.exe`.
2. In the category **Tools** of the navigation program, you'll find the entry **PCAN-LIN Configuration Tool**. Click on **Install** in order to start the setup program. If requested, grant administrator privileges.
3. Follow the instructions of the setup program.

After the software setup you can access the PCAN-LIN Configuration Tool via Windows' Start menu. You can find further information about the use of the PCAN-LIN Configuration Tool in the help which you can invoke in the program.

4 Operation

As soon as a supply voltage is applied via the D-Sub male connector (see section 2.1 on page 8), the PCAN-LIN module is ready for use. This is indicated by a short blink of both LEDs (Status LED: green, Transmission/Error LED: green and red).

4.1 Module Configuration

The PCAN-LIN module does not have any hardware switches. It is solely configured via the RS-232 interface. To do so, either the supplied Windows software PCAN-LIN Configuration Tool or self-developed software can be used.

Configurations for **basic use cases** are presented and explained in chapter 5 starting on page 14.

In a separate document, information about the **protocol definitions** related to the RS-232 interface can be found.

4.2 LEDs

The top of the PCAN-LIN module has two LEDs in the middle. These status indicators are mainly related to the LIN interface during operation and have following meanings:

Status (green)

If a LIN frame timeout occurs, e.g. because of an “slave not responding error”, the LED is toggled (on/off).

Transmission/Error (two-color)

For the duration of the transmission of a LIN frame the LED is lit green.

If an error occurs during the transmission (checksum error / transmitted data byte does not correlate to the received one at LIN Request Frames) the LED flashes red.

Further possibilities for a red LED flash are:

- CAN bus error (PCAN-LIN modules with Low-speed CAN transceiver only)
- The receive and transmit error counter has exceeded a limit

5 Configuration Examples

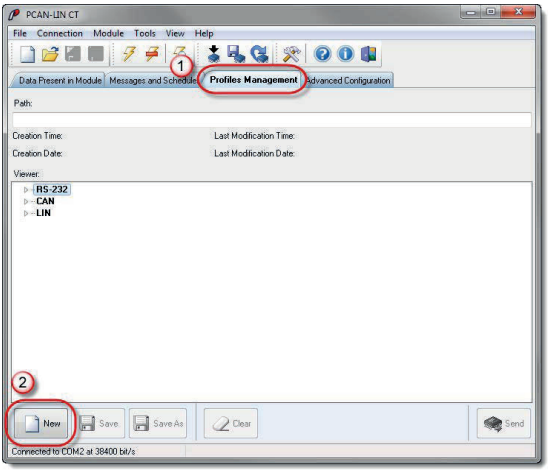
The chapter covers configuration examples for basic use cases.

LIN mode	Use case	See
Master	Gateway LIN - CAN	5.1 on page 16
	Master with Schedule Table	5.2 on page 18
	Gateway LIN - RS-232	5.3 on page 20
Slave	Gateway LIN - CAN (LIN Monitor)	5.4 on page 21
	LIN Slave	5.5 on page 23
No LIN	Gateway CAN - RS-232	5.6 on page 25

A configuration is created with the supplied Windows program PCAN-LIN Configuration Tool (version 3) and afterwards sent to the PCAN-LIN module via the RS-232 interface.

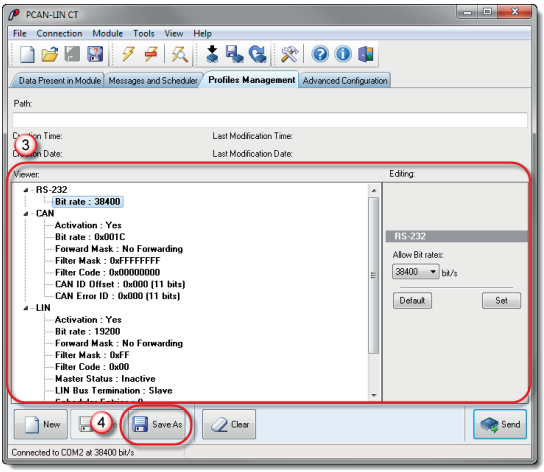
Do the following to create a new profile:

1. In the Configuration Tool, select the **Profiles Management** tab.



2. Click the **New** button in the lower window area.

   The parameters of the PCAN-LIN function units shown in the list are now provided with default values.



3. The configuration examples in the following manual sections contain tables with parameters for the corresponding profile. In the Configuration Tool, select a parameter in the tree view on the left and change its value on the right, according to the declaration in the table. Use the **Set** button during this procedure.

4. When finished the modifications, you can save the profile (**Save as** button).

- Do the following to send the configuration to the PCAN-LIN module:

1. Establish the communication to the connected PCAN-LIN module (menu command **Connection** > **Connect**).

2. On the Profiles Management tab, click on the **Send** button on the lower right.

3. Confirm the questions. In this context, the configuration is permanently saved in the module and the module is reset in order to activate the new configuration.

5.1 Gateway LIN - CAN

Properties

- LIN master
- Monitoring of the LIN bus via CAN
- CAN frames initiate the transmission of LIN frames
- Transmission of a data frame on the LIN bus by transmitting a CAN data frame
- Request of a data frame on the LIN bus by transmitting a CAN remote frame

Profile in the Configuration Tool

Inter-face	Parameter	Setting	Comment
RS-232	Bit rate		
CAN	Activation	Yes	
	Bit rate	*Application-specific*	
	Forward Mask	LIN	
		LIN & RS-232	RS-232 for diagnostic purposes
	Filter Mask	0xFFFFFFFF	All CAN frames are received
	Filter Code	0x00000000	
	CAN ID Offset	0x000 (11 bits)	CAN ID = CAN ID Offset + LIN ID LIN ID = CAN ID - CAN ID Offset
	CAN Error ID	*CAN ID*	For transmission of error and status messages. Is activated via LIN > Forward Mask > CAN Error.

Inter-face	Parameter	Setting	Comment
LIN	Activation	Yes	
	Bit rate	*Application-specific*	
	Forward Mask	CAN / CAN & RS-232	RS-232 for diagnostic purposes
	Filter Mask	0xFF	All LIN frames are received
	Filter Code	0x00	
	Master Status	Inactive	Schedule table not processed
	LIN Bus Termination	Master	
	Scheduler Entries		Not relevant (see Master Status)
	Slave ID + Data Configuration	Disabled	
	Frame Configuration	*Application-specific*	
	CAN ID for Slave Activation	Disabled	

Bold = required modification compared to the default setting

5.2 Master with Schedule Table

Properties

- LIN master
- Schedule table is processed autonomously
- Optional: forwarding of LIN data to CAN/RS-232
- Optional: module itself transmits additional data, dynamical update of the data via CAN/RS-232

Profile in the Configuration Tool

Inter-face	Parameter	Setting	Comment
RS-232	Bit rate		
CAN	Activation	Yes	
	Bit rate	*Application-specific*	
	Forward Mask	No Forwarding	
	Filter Mask	0xFFFFFFFF	All CAN frames are received
	Filter Code	0x00000000	
	CAN ID Offset	0x000 (11 bits)	CAN ID = CAN ID Offset + LIN ID LIN ID = CAN ID - CAN ID Offset
	CAN Error ID	*CAN ID*	For transmission of error and status messages. Is activated via LIN > Forward Mask > CAN Error.

Inter-face	Parameter	Setting	Comment
LIN	Activation	Yes	
	Bit rate	*Application-specific*	
	Forward Mask	none	
	Filter Mask	0xFF	All LIN frames are received
	Filter Code	0x00	
	Master Status	Active	Schedule table is processed automatically after module start
		Inactive	Processing of schedule table must be started manually
	LIN Bus Termination	Master	
	Scheduler Entries	*Application-specific*	
	Slave ID + Data Configuration	Disabled	
	Frame Configuration	*Application-specific*	
	CAN ID for Slave Activation	Disabled	

Bold = required modification compared to the default setting

5.3 Gateway LIN - RS-232

Properties

- LIN master
- Controlling of LIN bus via RS-232
- Data is transmitted to LIN slaves or requested from them via RS-232 command

Profile in the Configuration Tool

Inter-face	Parameter	Setting	Comment
RS-232	**Bit rate**	*Application-specific*	
CAN	**Activation**	No	
LIN	Activation	Yes	
	Bit rate	*Application-specific*	
	Forward Mask	RS-232	
	Filter Mask	0xFF	All LIN frames are received
	Filter Code	0x00	
	Master Status	Inactive	Schedule table not processed
	LIN Bus Termination	Master	
	Scheduler Entries		Not relevant (see Master Status)
	Slave ID + Data Configuration	Disabled	
	Frame Configuration	*Application-specific*	
	CAN ID for Slave Activation	Disabled	

Bold = required modification compared to the default setting

5.4 Gateway LIN - CAN (LIN Monitor)

Properties

- Only listener on the LIN bus
- No sending of LIN data
- Forwarding of LIN data to CAN/RS-232

Profile in the Configuration Tool

Inter-face	Parameter	Setting	Comment
RS-232	**Bit rate**	*Application-specific*	
CAN	Activation	Yes	
	Bit rate	*Application-specific*	
	Forward Mask	No Forwarding	
		RS-232	For diagnostic purposes
	Filter Mask		Not relevant
	Filter Code		
	CAN ID Offset	0x000 (11 bits)	CAN ID = CAN ID Offset + LIN ID LIN ID = CAN ID - CAN ID Offset
	CAN Error ID	*CAN ID*	For transmission of error and status messages. Is activated via LIN > Forward Mask > CAN Error.