PCAN-Repeater

User Manual

Relevant Products

Product name	Model	Part number
PCAN-Repeater	Industry	IPEH-004039

PEAK-System Technik GmbH
Leydheckerstraße 10
64293 Darmstadt
Germany

Phone: +49 6151 8173-20
Fax: +49 6151 8173-29

www.peak-system.com
info.peak@hms-networks.com

Document version 1.0.0 (2026-04-30)

Contents

1 Introduction

1.1 Description and Intended Use

The PCAN-Repeater features two CAN ports with 5 kV galvanic isolation between each other and the power supply. It supports both, CAN CC and CAN FD buses, using bit rates from 14 kbit/s up to 8 Mbit/s. With its DIN rail housing and extended temperature range support, it is suitable for applications in industrial environments.

The PCAN-Repeater requires no configuration. All CAN messages and error frames are forwarded 1:1 between both ports, enhancing the quality of the CAN signals. From the perspective of the CAN bus, the repeater is transparent, just like a cable.

The PCAN-Repeater allows the galvanic isolation of two CAN bus segments and the realization of long stub lines, even with multiple CAN nodes.

Please note: Due to the CAN protocol, the maximum length of a CAN bus depends on the bit rate. Therefore, a bus cannot be extended with the PCAN-Repeater. The physical total length of the CAN bus is reduced with each built-in PCAN-Repeater according to its transit delay.

1.2 Properties at a Glance

- Two High-speed CAN ports (ISO 11898-2)
  - Comply with CAN specifications CAN CC (classic CAN 2.0) and CAN FD (ISO and non-ISO)
  - CAN bit rates from 14 kbit/s up to 1 Mbit/s
  - CAN FD bit rates for the data field (64 bytes max.) from 14 kbit/s to 8 Mbit/s
  - CAN transceiver TI TCAN1044 or compatible
- Connections for CAN via 4-pin and power supply via 3-pin push-in spring terminal blocks (Phoenix)
- Galvanic isolation rated up to 5 kV according to IEC 60601-1, between both CAN ports and between CAN and power supply
- Each CAN port can be selectively terminated via switches at the housing front
- LEDs indicate power supply, CAN traffic, and transmission errors on physical level
- Automatic disconnection of a defective CAN segment and reconnection once the fault has been resolved; for example, due to a short circuit or a CAN node with broken transceiver
- Transit delay about 175 ns, which corresponds to a cable length of approximately 35 m
- Voltage supply from 10 to 30 V
- Plastic housing (width: 27 mm) for mounting on a DIN rail (EN 50022 standard)
- Extended operating temperature range from -40 to +85 °C (-40 to +185 °F)

1.3 Operation Requirements

- Power supply in the range of 10 to 30 V

1.4 Scope of Supply

- PCAN-Repeater in DIN rail plastic casing
- 2 mating connectors, 4-pin for CAN connections
  (Phoenix Contact: FKC 2,5/ 4-ST GY - 1756260)
- 1 mating connector, 3-pin for power supply connection
  (Phoenix Contact: FKC 2,5/ 3-ST GY - 1857772)
- Manual in PDF format
- Printed quick start guide

2 Connectors

The connectors for CAN and power supply can be plugged in and plugged out. They feature a spring clamp mechanism that allows wires to be inserted directly into the spring terminals and to be removed again without screws (push-in).

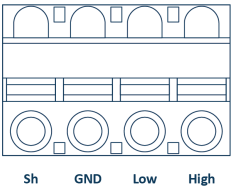
Attention! The plugs should only be inserted and operated within a temperature range of -5 °C to +70 °C.

Connection capacity of the plugs

Rigid wire cross-section	0.2 mm² ... 2.5 mm²
Flexible wire cross-section	0.2 mm² ... 2.5 mm²
AWG wire cross-section	24 ... 12
Flexible wire cross-section, with end ferrule, without plastic sleeve	0.25 mm² ... 2.5 mm²
Flexible wire cross-section, with end ferrule, with plastic sleeve	0.25 mm² ... 2.5 mm²
Stripping length	10 mm

2.1 CAN

Both CAN ports CAN 1 and CAN 2 are located on the front of the housing.

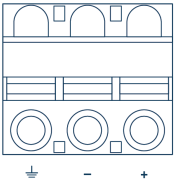


Pin	Assignment
Sh	CAN-Shield
GND	CAN-GND
Low	CAN-Low
High	CAN-High

- The shield of the CAN connectors is connected to the functional earth via a 4.7 nF capacitor and a 10 MOhm resistor in parallel (RC circuit).
- The functional earth of the device is connected to the DIN rail if it is mounted to a DIN rail.
- CAN ground is connected to the functional earth via a 10 MOhm resistor.

2.2 Power Supply

The power supply connector is located on the top of the housing.



Pin	Assignment
⏚	Functional Earth
-	GND
+	10 to 30 V

3 Hardware Configuration

The configuration does not require any software installation. The PCAN-Repeater is configured via DIP switches.

3.1 CAN Termination

The termination for each CAN port can be separately activated and deactivated with DIP switches on the front of the housing. At delivery, the termination is activated.

A High-speed CAN bus (ISO 11898-2) must be terminated on both cable ends with 120 Ohms, otherwise, malfunctions will arise. Both CAN bus segments that are coupled by the PCAN-Repeater must be fully terminated.

3.2 Configuring the Lock Time

The CAN transceiver transmits data and receives this data after a certain delay, the so-called loop delay. For example, if the transceiver sends a dominant bit and then a recessive bit, the transceiver only sees the recessive bit in its receive output after the loop delay.

To avoid bit errors due to this delay, the lock time must be higher than the loop delay. The duration of the loop delay depends on several factors, such as the number and capacity of CAN nodes in the network. The higher the capacitive load, the higher the loop delay.

The lock time can be configured via the DIP switches 1 and 2 on the top of the housing using a screwdriver or similar tool.

Lock time combinations:

DIP switch 1	DIP switch 2	Lock time
Off	Off	200 ns (default)
On	Off	400 ns
Off	On	800 ns
On	On	1600 ns

Reference values:

The lock time setting depends on the bit rate and capacitive load. The higher the capacitive load, the higher the value.

- For networks with less than 32 nodes the lock time is about 200 ns
- For networks between 32 and 64 nodes the lock time is about 400 ns
- For networks with more than 64 nodes the lock time is about 800 ns. With this setting the bit rate is limited to a maximum of 500 kbit/s

3.3 Extending the Recessive Bit

Due to the internal structure, the CAN transceiver shortens recessive bits on the network, and thus dominant bits are extended. At high bit rates this might cause errors.

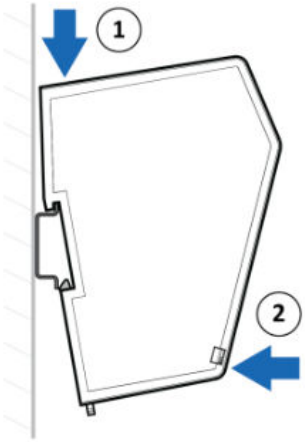
Extending the recessive bits may improve the error rate, as the bits then are closer to their nominal value on the network. If the recessive bits are extended, the extension is made independently of the bit rate, also at low bit rates.

Extending the recessive bit can be configured via the DIP switch 3 on the top of the housing using a screwdriver or similar tool.

DIP switch 3	Recessive bit extension
Off	0 ns (default)
On	15 ns

4 Installation

To integrate the PCAN-Repeater into your CAN bus, proceed as follows:

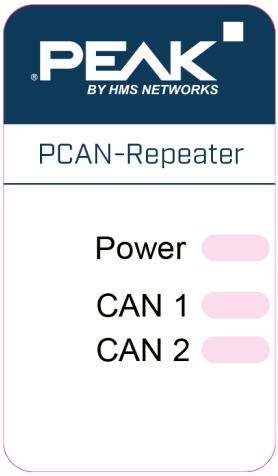


1. Mount the PCAN-Repeater at the appropriate position on the DIN rail by hanging it in at the top of the rail (1) and snapping it to the bottom (2).
2. Connect each of the two CAN ports with the corresponding CAN bus segment. Make sure that the same bit rate is used on both CAN bus segments.
3. Connect the PCAN-Repeater to a power supply (10 to 30 V DC).

The PCAN-Repeater now forwards the CAN messages 1 to 1.

5 Operation

5.1 Status LEDs



5.1.1 Power LED

The Power LED indicates the status of the power supply.

LED state	Description	Comments
Off	No power	Device not connected to power supply, or fuses of device or internal power supply damaged
Green	Power ok	Device fully functional
Red	Device is reset	After power-up the device is set into reset, LEDs are red during reset (normal duration: about 200 ms). Or power supply is damaged, internal voltage is below necessary level.

5.1.2 CAN LEDs

The LEDs CAN 1 and 2 indicate the status of the CAN connections.

LED state	Description	Comments
Off	No CAN communication	No CAN communication, device not connected to CAN
Green or green flashing	CAN communication	LED is triggered when a dominant bit is received at the respective CAN port.
Red flashing	CAN communication, but errors	Each CAN circuit transmits and reads back the transmitted bits. An error occurs, if the repeater transmits a dominant bit, but measures a recessive bit.
Red	Dominant-lock	External device applies a permanent dominant level to the CAN.

5.2 Influence on Maximum Bus Length

The PCAN-Repeater has a transit delay of 175 ns. This corresponds to a cable length of 35 m which reduces the maximum bus length.

Due to the characteristics of the CAN protocol, the maximum bus length depends on the bit rate.

Bit rate	Maximum bus length	Bus length with repeater
1 Mbit/s	40 m	5 m
500 kbit/s	110 m	75 m
250 kbit/s	240 m	205 m
125 kbit/s	500 m	Using these bit rates, the transit delay of a repeater can be disregarded.
50 kbit/s	1.3 km	
20 kbit/s	3.3 km	
10 kbit/s	6.6 km	
5 kbit/s	13.0 km	

The listed values have been determined on the basis of an idealized system and can differ from reality.

> **Note**: The PCAN-Repeater cannot be used to extend the length of a CAN bus beyond the maximum bus length.

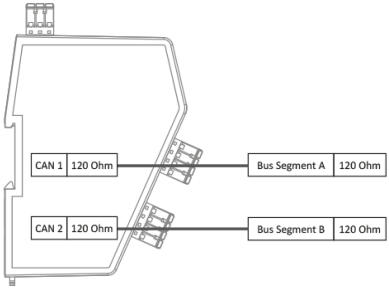
6 Application Examples

This section describes two application examples for the PCAN-Repeater:

- Decoupling of two bus segments (below)
- Implementation of a long stub line on page 18

> **Note**: The PCAN-Repeater cannot be used to extend the length of a CAN bus beyond the maximum distance of two nodes.

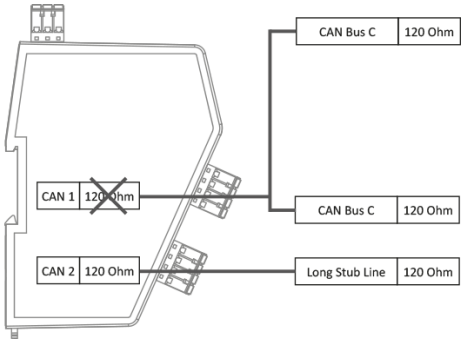
6.1 Decoupling of Two Bus Segments



The PCAN-Repeater is used to establish a galvanic isolation between two bus segments (A and B).

Both new bus segments must each be terminated with two 120 Ohm resistors. Since the PCAN-Repeater is delivered with internal 120-ohm termination activated on both CAN ports, no further action is required during installation.

6.2 Implementation of a Long Stub Line

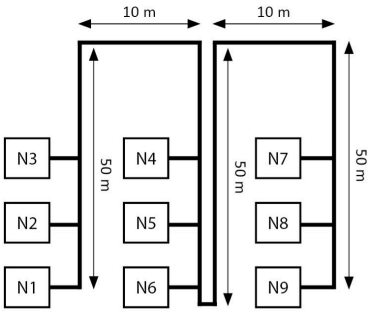
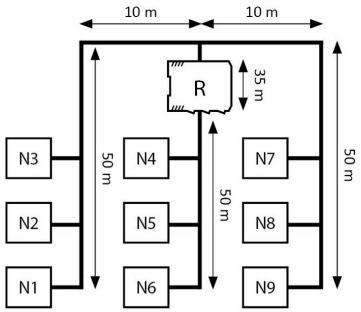


The CAN bus fundamentally requires a line topology. To prevent disruptive reflections of high-frequency signals, stub lines (connections to individual nodes) must be kept as short as possible. A star topology should be avoided, as it can significantly impair signal integrity.

The PCAN-Repeater can be used to implement a long stub line, even with multiple CAN nodes.

Since a fully terminated CAN bus C is assumed, the internal termination for CAN port 1 must be deactivated (activated on delivery). Because the PCAN-Repeater is the end of the long stub line, the termination remains active at CAN port 2.

In certain applications, the CAN bus topology can be optimized using a star topology as shown below.

Conventional bus structure	Extended structure with long stub line
	
The distace between the two nodes furtherst apart (1/9) is 220 meters.	The distace between the two nodes furtherst apart (1/6 or 6/9) is 145 meters.

7 Technical Specifications

Connectors	
CAN	2 x Phoenix push-in connector 4-pin Mating connector: Phoenix Contact type FKC 2,5/ 4-ST GY - 1756260
Power	Phoenix push-in connector 3-pin Mating connector: Phoenix Contact type FKC 2,5/ 3-ST GY - 1857772

CAN	
Specification	High-speed CAN channel (ISO 11898-2) complies with CAN specifications 2.0 A/B and FD
Bit rates	Nominal: 14 kbit/s to 1 Mbit/s CAN FD data: 14 kbit/s to 8 Mbit/s
Transceiver	TI TCAN1044 or compatible
Internal termination	120 Ohm, switchable via piano switches for each CAN port, activated at delivery
Galvanic isolation	CAN-CAN and CAN-Power – at least 5 kV for 1 minute; CAN-Shield to Earth and Power to Earth – at least 2 kV for 1 minute
Transit delay	175 ns (corresponds to about 35 m cable length)

Power supply	
Supply voltage	10 to 30 V
Current consumption	< 1 W

Measures	
Size	108 x 149 x 27 mm (length x height x width) See also Appendix C *Dimension Drawing* on page 24
Weight	135 g

Environment	
Operating temperature	-40 to +85 °C (-40 to +185 °F)
Temperature for storage and transport	-40 to +85 °C (-40 to +185 °F)
Relative humidity	15 to 90 %, not condensing
Ingress protection (IEC 60529)	IP20

Conformity	
RoHS	EU Directive 2011/65/EU (RoHS 2) + 2015/863/EU
EMC	EU Directive 2014/30/EU Extended interference immunity: DIN EN IEC 61000-6-2:2019 DIN EN IEC 61000-6-3:2022
Safety	EU Directive 2014/35/EU DIN EN IEC 61010-2-201:2019

Appendix A Conformity

EU Declaration of Conformity

This declaration applies to the following product:

Product name:	**PCAN-Repeater**
Item number(s):	**IPEH-004039**
Manufacturer:	PEAK-System Technik GmbH Leydheckerstraße 10 64293 Darmstadt Germany

CE We declare under our sole responsibility that the mentioned product is in conformity with the following directives and the affiliated harmonized standards:

EU Directive 2011/65/EU (RoHS 2) + 2015/863/EU (amended list of restricted substances)

DIN EN IEC 63000:2019-05
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances (IEC 63000:2016);
German version of EN IEC 63000:2018

EU Directive 2014/30/EU (Electromagnetic Compatibility)

DIN EN IEC 61000-6-2:2019-11
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments (IEC 61000-6-2:2016);
German version of EN IEC 61000-6-2:2019

DIN EN IEC 61000-6-3:2022-06
Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments (IEC 61000-6-3:2020);
German version of EN IEC 61000-6-3:2021

EU Directive 2014/35/EU (Low Voltage Directive)

DIN EN IEC 61010-2-201:2025-11
Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-201: Particular requirements for control equipment (IEC 61010-2-201:2024);
German version of EN IEC 61010-2-201:2024

Darmstadt, 23 April 2026

Andreas Staat, Engineering Manager Hardware

Appendix B FCC-Conformity

Docusign Envelope ID: 1BB6FCBC-FC2D-8D98-8153-9642458B9F93

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

Responsible Party:
HMS Industrial Networks Inc.
35 E Wacker Dr, Suite 1900
Chicago, IL 60601
USA
www.hms-networks.com
Phone: +1 312 829 0601

Type of product	**CAN FD Repeater**

Model(s)	**Item Code / Part No.**
PCAN-Repeater	IPEH-004039

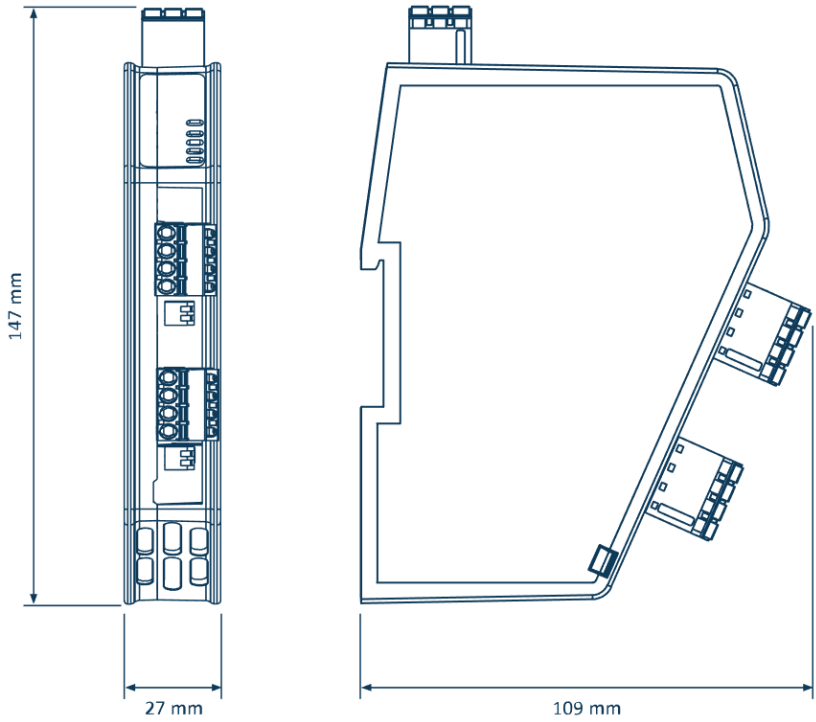
We declare under our sole responsibility that the product(s) are in conformity with essential requirements of the FCC standards with 47 CFR Part 15 - Subpart B.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CHICAGO, April 21, 2026

Signed by:
Jennifer Prisco
85F79878794948F...
Jennifer Prisco, Vice President & General Counsel

Appendix C Dimension Drawing



The figure does not show the actual size of the product.

Appendix D Disposal and Recycling

You must dispose of this product properly according to local laws and regulations. Because this product contains electronic components, it must be disposed of separately from household waste. When this product reaches its end of life, contact local authorities to learn about disposal and recycling options, or simply drop it off at your local HMS office or return it to HMS.

For more information, see www.hms-networks.com.