PCAN-Ethernet Gateway FD DR

CAN FD to LAN Gateway in DIN Rail Plastic Casing

User Manual

Document version 1.0.0 (2021-01-13)

Relevant Products

Product Name	Software Version	Part Number
PCAN-Ethernet Gateway FD DR	1.0	IPEH-004012

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Contents

1 Introduction

The PCAN-Ethernet Gateway FD DR allows access to classic CAN or modern CAN FD buses via an IP network. On top of that, CAN buses can be connected to each other via IP using multiple devices. CAN frames are wrapped in TCP or UDP message packets and then forwarded via the IP network from one device to another. The PCAN-Ethernet Gateway FD DR provides a LAN interface and two CAN FD interfaces that allow bit rates up to 10 Mbit/s. For this, an AM5716 Sitara processor provides the needed performance.

The PCAN Gateway product family is configured via a convenient web interface. Alternatively, the JSON interface allows access via software. Both options provide status information and settings of the devices, the various communication interfaces, message forwarding, and filters.

1.1 Properties at a Glance

- AM5716 Sitara with Arm® Cortex® M15 core
- 2 GByte Flash and 1 GByte DDR3 RAM
- Linux operating system (version 4.19)
- Two High-speed CAN channels (ISO 11898-2)
  - Comply with CAN specifications 2.0 A/B and FD
  - CAN FD bit rates for the data field (64 bytes max.) from 20 kbit/s up to 10 Mbit/s
  - CAN bit rates from 20 kbit/s up to 1 Mbit/s
  - Microchip MCP2558FD CAN transceiver

- Galvanic isolation of the CAN channels up to 500 V against each other, against RS-232, and the power supply
- Connections for CAN, RS-232, and power supply via 4-pole screw-terminal strips (Phoenix)
- LAN interface
  - Data transmission using TCP or UDP
  - 10/100/1000 Mbit/s bit rate
  - RJ-45 connector with status LEDs
- Monitoring and configuration of the devices via the web interface or JSON interface
- Software update via the web interface
- Reboot or reset of the device to a previous software version with a reset button
- Plastic casing (width: 45.2 mm) for mounting on a DIN rail (DIN EN 60715 TH35)
- LEDs for device status and power supply
- PCI Express Mini slot, USB port, and a RS-232 connector for future use
- Voltage supply from 8 to 30 V
- Operating temperature range from -40 to 70 °C (-40 to 158 °F)
- Fan for active cooling when a temperature limit is exceeded

1.2 Prerequisites for Operation

- Voltage supply in the range of 8 to 30 V

1.3 Scope of Supply

- PCAN-Ethernet Gateway FD DR in DIN rail plastic casing
- Mating connectors for both CAN channels, RS-232, and power supply
- RJ-45 network patch cord (2 m)
- Manual in PDF format

2 Connectors and Operating Elements

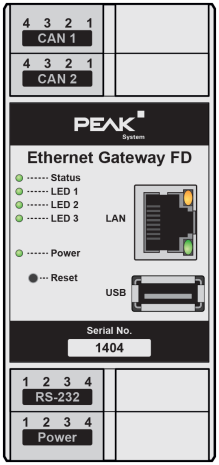


Figure 1: Position of the connectors and operating elements (front view)

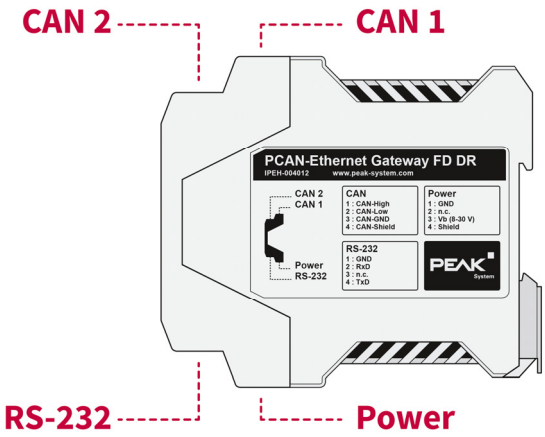


Figure 2: Position of the connectors (side view)

2.1 CAN1/CAN2

The CAN connectors are located on the upper side of the casing.

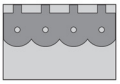


Figure 3: Pin assignment
CAN connector 1 + 2

Pin	Function
1	CAN-High
2	CAN-Low
3	CAN-GND
4	CAN-Shield

The mating connectors (Phoenix Contact MSTB 2,5 / 4-ST BK - 1756298) are included in the scope of supply.

2.1.1 Activating the Internal Termination

A termination of 120 Ohm can be activated for each CAN channel via solder bridges on the board. A High-speed CAN bus (ISO 11898-2) must be terminated at both cable ends with 120 Ohm each, otherwise interference will occur. The termination is not activated at delivery.

Tip: We recommend adding termination at the CAN cabling, for example with termination adapters (e.g. PCAN-Term). Thus, CAN nodes can be flexibly connected to the bus.

Do the following to activate the internal CAN termination:

Risk of short circuit! Take great care when soldering to avoid unwanted short circuits.

Attention! Electrostatic discharge (ESD) can damage or destroy components on the card. Take precautions to avoid ESD.

1. Disconnect the power supply (Power).

2. Use a screwdriver (or something similar) to press lightly into the notches of the four snap locks on the top and bottom of the housing.

   The snap locks are unlocked.

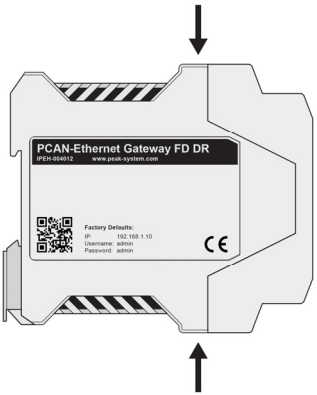


Figure 4: Housing with the connection front on the right side

3. Pull the two casing sections apart.

Figure 5: Open housing with the back of the board to activate the internal termination

4. Set the solder bridge(s) on the circuit board according to the desired settings

   Figure 6 shows the position of the solder fields.

The following table contains the possible settings.

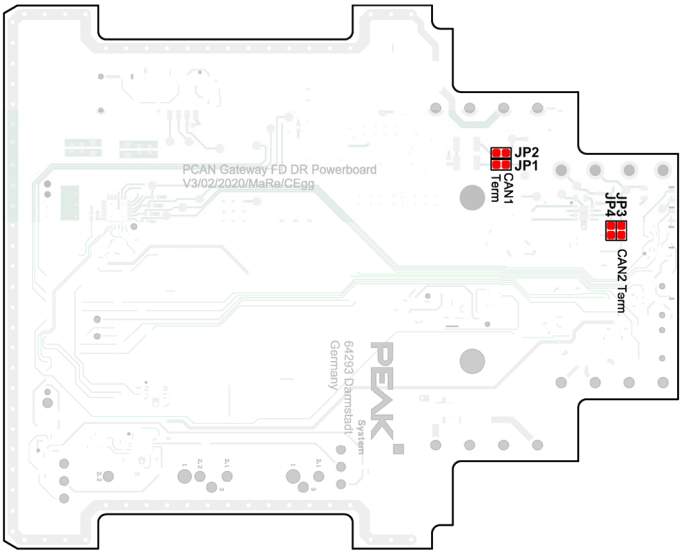


Figure 6: Bottom side of the power board with the solder fields to activate the internal termination

Connector	Soldering Fields	Internal Termination	
		Without (standard)	Active
CAN 1	JP1 and JP2		
CAN 2	JP3 and JP4		

5. Re-insert the circuit board into the guide slot of the counterpart of the housing and push both parts together until the snap locks engage with a clicking sound.

2.2 RS-232

The RS-232 connector is located on the lower side of the casing.

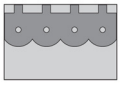


Figure 7: Pin assignment RS-232 connector

Pin	Function
1	GND
2	RxD
3	not connected
4	TxD

The mating connector (Phoenix Contact MSTB 2,5 / 4-ST BK - 1756298) is included in the scope of supply.

2.3 Power Supply

The connection for the power supply is located on the lower side of the casing.

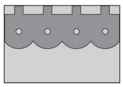


Figure 8: Pin assignment Power connector

Pin	Function
1	GND
2	not connected
3	Vbat (8 - 30 V)
4	Shield (top hat rail potential)

The mating connector (Phoenix Contact MSTB 2,5 / 4-ST BK - 1756298) is included in the scope of supply.

2.4 LAN

The RJ-45 connector for connecting to a LAN network is centered on the front of the casing.

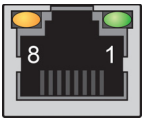


Figure 9: Pin assignment
RJ-45 connector

Pin	Function
1	TxD
2	TxD
3	RxD
4	not connected
5	not connected
6	RxD
7	not connected
8	not connected

2.5 USB

The USB downstream port is used to connect additional USB devices to the PCAN-Ethernet Gateway FD DR.

Figure 10: USB port

2.6 Reset Button

The PCAN-Ethernet Gateway FD DR can be restarted or reset with the Reset button. You can find more information in chapter 4.2 *Reboot and Restore* on page 23.

2.7 LEDs

The PCAN-Ethernet Gateway FD DR has LEDs for the device status and power supply, two LAN LEDs, and LED 1 to 3. For more information, see section 4.1 *Status LEDs* on page 22.

3 Putting into Operation

The PCAN-Ethernet Gateway FD DR is configured via a web interface. Therefore, the module must be connected via LAN to a computer, located in the same logical network as your gateway (192.168.1.xxx).

3.1 First Connection to the PCAN-Gateway

During initial operation or after resetting to factory defaults, you must pre-configure the PCAN-Gateway for your LAN. The default login data is written on the label on the left side of the PCAN-Gateway. Proceed as described in the following subsections:

3.1.1 Preparing the Computer

Your computer must be configured with an appropriate IP address to connect to the device via LAN.

Do the following to determine your IP address:

1. Open the Windows Start menu.
2. Type **ncpa.cpl** and press Enter.

   The overview of the network adapters appears.
3. Do a right-click on the adapter that will be used for the connection to the PCAN-Gateway and select **Properties**.
4. Open the properties of **Internet Protocol Version 4 (TCP/IPv4)**.

- Do the following to change your IP address:

  1. Make a note of the current settings in order to reset the computer later on.
  2. Select **Use the following IP address**.
  3. Enter an **IP address** in the range from 192.168.1.1 to 192.168.1.254 (but not the PCAN-Gateway's own address which is indicated on the left casing side).
  4. Click on **Subnet mask**. 255.255.255.0 is shown. Leave this entry unchanged.
  5. Confirm the entries with **OK**.

3.1.2 Establishing the Connection

- Do the following to establish a connection:

  1. Connect the RJ-45 connector of the PCAN-Gateway via a LAN cable (included in the scope of supply) directly to the computer.
  2. Connect the device to a suitable power supply (8 - 30 V).
  3. Wait until the PCAN-Gateway is ready (Status LED is blinking green).
  4. Open a web browser on the computer.
  5. In the browser's address bar, enter the address of the PCAN-Gateway (see the label on the left side of the device).

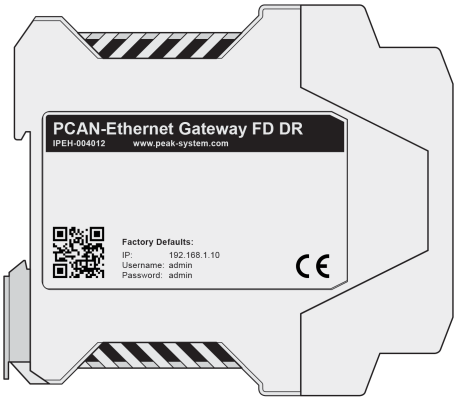


Figure 11: IP and access information on the left side of the device

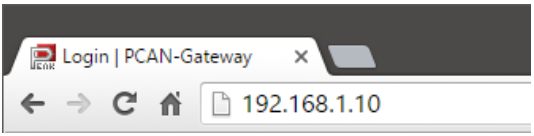


Figure 12: Address bar of the web browser

This opens the configuration website.

6. In the upper right area of the configuration website you can find the login.
7. Enter “admin“ for each the username and the password and confirm with **Enter**.

   The restricted area appears and you can start setting up the PCAN-Ethernet Gateway FD DR. You can find a description of the basic configurations in the following section 3.2.

Note: Afterwards, reset the computers IP address to the previously noted address.

3.2 Basic Configuration

Change your login data first and then set up the PCAN-Gateway connection to CAN and the LAN network.

3.2.1 Change Login Data

1. Open the page **Device** > **User Management**.
2. Change the login data on this page. Create a new username and a new password.

   To ensure a minimum level of security, the password should have at least 8 characters. If possible, use letters, numbers, and special characters.

Important notice: **Login data is confidential!** Do not act carelessly and leave your system open to attack. Never deposit the login data in any form on the Internet or make it easily accessible. Do not give the new login data carelessly to third parties nor send it by e-mail.

3.2.2 Setting up CAN Channels

Do the following to configure the CAN channels:

1. Open the page **Network** > **CAN**.
2. **Nominal Bit Rate**: For setting the nominal bit rate, click the drop-down menu and select the value that is used on the CAN bus to be connected.
3. **CAN FD**: If the CAN bus to be connected uses the new standard CAN FD, activate the checkbox CAN FD. The form for selecting the data bit rate appears.
4. **Data Bit Rate**: For setting the data bit rate, click the drop-down menu and select the value that is used on the CAN bus to be connected.

5. **Listen-Only-Mode**: If the PCAN-Gateway should act as a pure observer, not affecting the data traffic, Listen-Only-Mode must be enabled. Activate Listen-Only-Mode with a click on the checkbox.
6. Confirm the entries with **Save Settings**.

3.2.3 Connecting to a LAN Network

Do the following to configure the IP address data of the PCAN-Gateway for the LAN network to be connected:

Manual Address Assignment (Recommended)

1. Open the page **Network** > **LAN**.
2. If automatic address assignment via DHCP is not used, enter the IP address and Subnet mask that the PCAN-Gateway should use in the LAN network at the bottom of the page. The gateway address can optionally be set.
3. Confirm the entered data with **Save Settings**.

   You are automatically forwarded to the new IP address. The basic setup of the device is now completed.

Automatic Address Assignment via DHCP

Note: DHCP is not recommended, because it is necessary to know the IP address of the device to access the configuration website. Furthermore, the IP address may change after a restart of the device or the DHCP server. In this case the existing routes won't work.

1. Open the page **Network** > **LAN**.
2. If the future LAN network uses DHCP (Dynamic Host Configuration Protocol), the PCAN-Gateway IP address and

Subnet mask are assigned automatically. Enable DHCP to use this feature.

3. Confirm the entered data with **Save Settings**.

   You are automatically logged out and the basic setup of the device is now completed. When the PCAN-Gateway is installed in the LAN, it automatically receives its new address data via DHCP.

3.3 Installing the PCAN-Gateway

Do the following to connect the device to an IP network (Ethernet):

1. Mount the PCAN-Ethernet Gateway FD DR at the appropriate position on the DIN rail by placing it at the top of the rail and snapping it to the bottom.

Note: Please consider the recommended installation distances to ensure a suitable air flow for cooling. When a temperature limit is exceeded, the device is actively cooled with a fan.

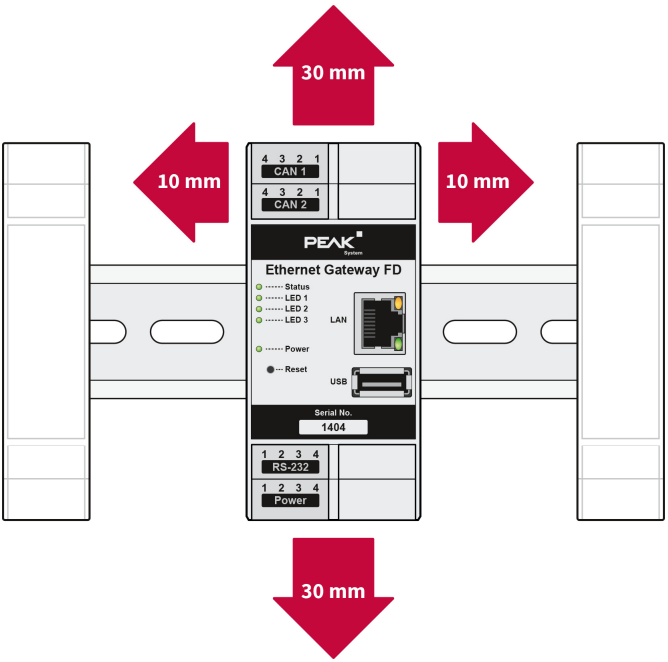


Figure 13: Recommended installation distances

2. Connect each of the two CAN ports with the affiliated CAN network.

Note: A High-speed CAN bus needs to be electrically terminated on both ends using resistors of 120 Ω.

3. Connect the RJ-45 connector using a LAN cable to the IP network.
4. Connect the PCAN-Ethernet Gateway FD DR to a suitable power supply (8 - 30 V).

The PCAN-Ethernet Gateway FD starts automatically. When the status LED is blinking green, the device is ready and the current configuration is executed.

Note: In case of a dynamic address assignment via DHCP, the new IP address must first be determined. Commercial routers list all connected devices with their current IP address.

4 Operation

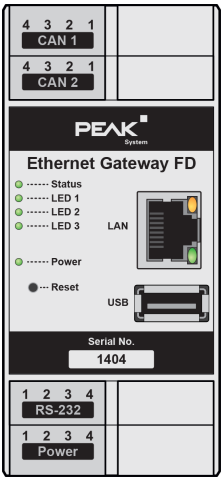


Figure 14: Front side with LEDs and Reset button

4.1 Status LEDs

The PCAN-Ethernet Gateway FD DR has LEDs for device status and power supply as well as two LAN LEDs, which indicate the following conditions:

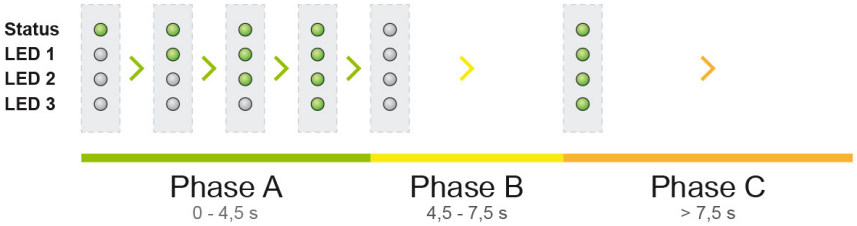
LED	Condition	Meaning
Status	Green on	System start
	Green blinking	Ready for operation
LAN	Yellow on	Data is transmitting
	Green on	Connection is established
Power	Green on	Power supply is applied

In addition, there are the LEDs 1 to 3, which are also used when restoring the device.

4.2 Reboot and Restore

The PCAN-Ethernet Gateway FD DR can be rebooted or restored using the reset button.

The reset button is located behind a small hole on the front of the device and can be pressed with a paper clip, for example. If the button is kept pressed, the status LED and LEDs 1 to 3 show a blinking sequence.



Depending on the phase or time in which the reset button is released, different functions are triggered.

Phase A: Reboot

Press the reset button for a short time and the device reboots with the current configuration.

Phase B: Restoring the Active Partition

The PCAN-Ethernet Gateway FD DR uses two partitions for storing the software. One of these partitions is active and is started when the device is put into operation.

In case of an update, the new software is installed on the inactive partition. The inactive partition is activated and the device is rebooted.

If problems occur afterwards or the active partition does not work for other reasons, the partition can be swapped with the reset button.

- Do the following to swap the active partition:

  1. Press the **Reset** button and keep it pressed.
  2. Release the **Reset** button during phase B (4.5 to 7.5 s - all LEDs are off).

     The active partition is swapped. The device reboots.

Note: If the boot process cannot be executed completely 10 times in a row or is interrupted by voltage loss, the PCAN-Ethernet Gateway FD DR automatically activates the other partition.

Phase C: Restoring with the Restore Partition

If both partitions are not working, the device is no longer accessible. In this case the Restore partition can be started. This partition is not affected by a software update and is therefore permanently available.

- Do the following to change to the Restore partition:

  1. Press the **Reset** button and keep it pressed.
  2. Release the **Reset** button during phase C (after 7.5 s - all LEDs are on again).

     The device reboots with the Restore partition.

When the restore partition is activated, the IP address is reset to **192.168.1.10** and DHCP is additionally activated. If a DHCP server is available, an **additional IP address** is automatically assigned to the device, via which it can be reached too.

3. Connect the device to your computer (described in chapter 3.1 on page 14).
4. Open the IP address in a browser.

   The Restore website appears.

Note: If the boot process on both partitions cannot be executed completely 10 times in a row or is interrupted by voltage loss, the PCAN-Ethernet Gateway FD DR automatically activates the restore partition.

Functionality of the Restore Website:

The Restore website offers various functions for analyzing the partitions or for restoring the device:

- Indicating the software version and IP connection information
- Downloading the configuration file
- Activating and rebooting of a partition
- Installing new software and resetting to factory defaults

Note: When a new software is installed, it is applied to both partitions. The IP address and the login data are reset to the initial values (see the label on the left side of the PCAN-Gateway). Afterwards, you can perform a reconfiguration of the PCAN-Gateway (see chapter 3 on page 14).

4.3 Signal Delay

The signal delay between the CAN connection and LAN may vary. The transmit time of the signal in the IP network depends on the expansion and structure of the network as well as the configuration of the message forwarding. Therefore, a fixed value cannot be specified.

5 Configuration

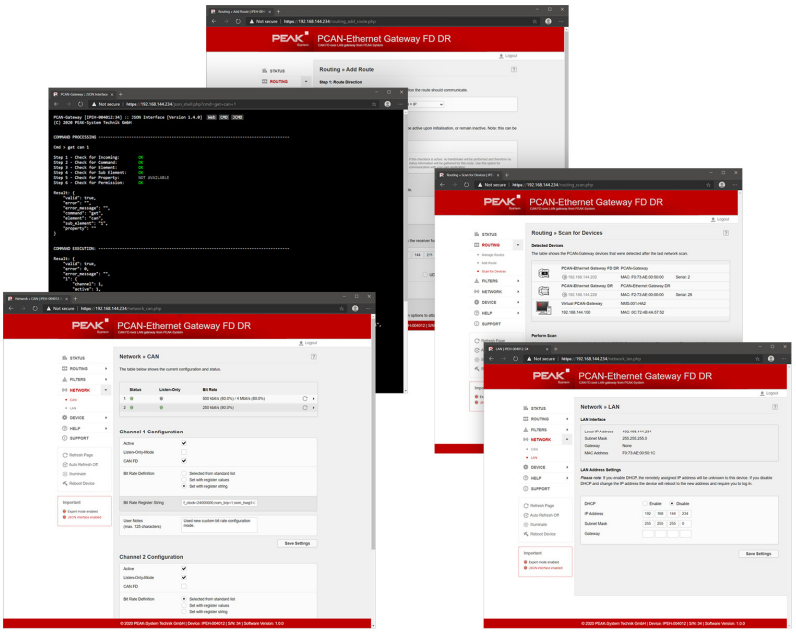


Figure 15: Configuration Website

The configuration of the device can be done via a comfortable web interface. Enter the IP address of your PCAN-Gateway into the address bar of your browser.

Afterwards, the configuration website opens. Besides providing a variety of status information, the website can be used to manage settings for the device, communication interfaces, message routing, and filters.

The information that is visible to non logged in users (Public Dashboard) can be set on the page *Device > User Management* (see section 5.6.2 on page 57). The login area can be found at the upper right of the website.

Enter your username and password, then press Enter. After logging in, you will have access to the 7 main areas of the website: Status, Routing, Filters, Network, Device, Help, and Support.

Note: For full functionality and an optimal representation of the website, we recommend one of the following Internet browsers: Google Chrome, Mozilla Firefox, Microsoft Edge, Internet Explorer 11, Safari, or Opera.

The storing of cookies by the browser is required to access the website.

Some features of this website require JavaScript. Please enable support for this scripting language if a prompt appears on the website.

5.1 Structure of the Website

5.1.1 Header

The header area of the website displays the product name, as well as a user defined name and description that can be set on the *Device > Configuration* page. This information is used to identify the device.

5.1.2 Navigation

On the left side is the main navigation menu:

- The main pages (Status, Routing, Filters, Network, Device, Help, and Support) display general information
- The subpages of *Network* and *Device* provide configuration options for the communication interfaces and the device
- The subpages of *Routing* can be used to add, manage, edit, or delete routes, as well as to search for other devices in the network
- The subpages of *Filters* can be used to add, edit, or delete filters

The links in the control box (below the menu) perform additional website and device functions.

- **Refresh:** Clicking Refresh will perform a page reload, for example to update the current route status

Note: The information displayed on the website is not updated automatically by default.

- **Auto Refresh On / Off:** When you activate this function by left clicking the link, the website will begin to automatically update the information on the page every 10 seconds. You can manually turn this function off by left clicking the link again. Navigating away from the current page will automatically deactivate this function too
- **Illuminate:** One or more LEDs on the device will light up for approximately 10 seconds. This function can be used to identify the device
- **Reboot Device:** Use this link to restart the device. During this process, the PCAN-Gateway is unreachable

The red framed Info box at the end of the navigation lists important information about the current configuration.

5.1.3 General Symbols

The configuration website uses a variety of different symbols and icons to convey general information that is valid for many situations.

In some cases, additional information is displayed as a tooltip when you hover the mouse cursor over the icon.

LED Symbol	Meaning
	ON / active
	OFF / inactive
	Warning! The execution / function is prevented. The problem is well known and can be eliminated.
	Attention! An error prevents the execution / function.

5.2 Status

On the *Status* page the current device configuration is displayed.

Device Information:

In this box the product name, the order number, and the serial number of the device are displayed. This information can be used to uniquely identify the device.

- On the *Device* page you will find detailed information about the device

CAN Interfaces:

For each CAN channel the status, bit rates, and the setting of the Listen-Only-Mode are displayed.

- The CAN interfaces can be configured on the *Network > CAN* page. In addition, this page provides detailed information about the interfaces

LAN Interface:

This box displays the LAN interface settings. IP address, Subnet mask, and gateway are adjustable. The MAC address cannot be changed. Each device receives a unique MAC address during the manufacturing process, which can be used for identification.

- The LAN interface can be configured on the *Network > LAN* page

Defined Routes:

Here the message forwarding is displayed with the following information: index, status, used transmission protocol, source, destination, used filters, and user notes.

- On the *Routing > Manage Routes* page, existing routes can be managed, edited, and deleted
- On the *Routing > Add Route* page, new routes can be created

Defined Filters:

This box contains an overview of all defined filters with basic information. Starting with the index, every filter is displayed with its usage, user notes, name, type, and mode.

- On the *Filter > Manage Filters* page, existing filters can be managed, edited, and deleted
- On the *Filter > Add Filter* page, new filters can be created

5.3 Routing

Routing displays basic information about the created routes and PCAN-Gateways detected on the network.

Defined Routes:

Here, each message forwarding is displayed with its basic information. For each message, the index, the status, the used transmission protocol, the source and destination, used filters, as well as user notes are specified.

- On the *Routing > Manage Routes* page, existing routes can be managed, edited, and deleted
- On the *Routing > Add Route* page, new routes can be created

Detected Devices:

This table shows all PEAK-System gateways that were detected during the last network broadcast scan. If no other devices are currently in the network or no scan has been performed, this table will not be shown.

Each PCAN-Gateway is displayed with its product name, the custom device name, MAC address, and serial number. This information can be used to identify the device. In addition, the IP address and a small icon of the device are displayed. With a left-click the configuration website of this device can be opened in a new tab.

- On the *Routing > Scan for Devices* page, a search for available devices on the network can be performed

Note: When changing the network topology, the list is not updated automatically. If a device is removed from the network, it will remain visible in the list of detected devices until the scan is performed again and the list is updated.

5.3.1 Manage Routes

On the page *Routing > Manage Routes* the message forwarding instances are listed with basic information and control options. For each of these, the index, the status, the used transmission protocol, the source and destination, used filters, as well as user notes are specified.

Index: For saving routes, the PCAN-Gateway uses a table with 16 rows that are addressed with the unique index.

Status: The LED indicates the status of a route.

LED Symbol	Meaning
	The route is inactive.
	For send routes: The route is active.
	For receive routes: The route is active and connected with the remote site.
	Warning! The route is active but not connected with the remote site.
	Warning! More than one remote site tries to connect to this route.
	The PCAN-Gateway handshake is inactive. No status information is gathered for this route.

Filter: Hover the filter icon  with the mouse cursor to display a list of the attached filters. The list refers to the indices of the filters. Perform a left-click on the icon to open the page *Filters > Manage Filters* with the corresponding rows highlighted. The icon is not visible if no filter was set.

Notes: Hover this icon  with the mouse cursor to display the user notes of this route. The icon is not visible if no user notes are available.

Source / Destination: The source and the destination depend on the direction of the message forwarding.

With a Receive route the PCAN-Gateway receives data via the IP interface and forwards it to a CAN channel. The IP address is displayed in this case as "Local IP".

With a Send route the data of a CAN channel is forwarded over the IP interface. By left-clicking the IP address of the receiver, its configuration website can be opened.

Protocol: Routes can use TCP or UDP as transmission protocol in the IP network.

TCP (Transmission Control Protocol) establishes a connection between two participants and monitors their communication. If data packets are lost for example, they are retransmitted.

UDP (User Datagram Protocol) sends the data packets directly into the network without establishing a connection. With this protocol, error free transmission is not guaranteed. The advantage UDP has over TCP is the lower demand on performance.

Control Elements:

Symbol	Meaning
	Switch ON / Switch OFF (depending on the current state)
	Delete
	Edit

ON/OFF: Use the "ON / OFF" switch to activate or deactivate a route.

Delete: Click on the trash can icon to remove the route.

Edit: Click on the pencil icon to edit the route. The route is loaded into the forms of the page *Routing > Add Route*. The same input and configuration options are available there. Detailed information can be found in the following chapter 5.3.2.

Add Route: This button opens the *Routing > Add Route* page on which you can set up a new message forwarding instance.

Additional information:

Each route is provided with additional information about its connection and data transfer status. This additional information can be viewed by clicking on the triangle icon located on the right edge of the route.

In Expert mode (see chapter 5.6.2 *Device> User Management*) detailed connection status information are displayed. With the Reset button you can reset the values of the route to 0.

5.3.2 Add / Edit Route

On the *Routing > Add Route* page you can set up a new route. Similarly, an existing route can be edited via the form displayed. For this, the current settings are loaded into the form fields. Editing a route is done via the page *Routing > Manage Routes*.

For saving routes, the PCAN-Gateway uses a table with 16 rows that are addressed with a unique index. If a new route is to be set up, the lowest free index will be assigned. Because of that, only up to 16 routes can be created regardless of the status. Then the *Add Route* function is no longer available.

Route Direction:

When you create a route, you should start with the selection of direction since the following input and output fields are determined by this.

Receive IP > CAN: With a Receive route the PCAN-Gateway receives data via the IP interface and forwards it to a CAN channel. The IP address shown in this case is "Local IP". The configuration of the local IP interface is done on the *Network > LAN* page.

Send CAN > IP: With a Send route the data of a CAN channel is forwarded over the IP interface. If other PCAN-Gateways were discovered during a broadcast scan, they can be selected for the destination of the route. On the page *Routing > Scan for Devices* you can search for other PCAN-Gateways in the network.

Status:

Use this setting to determine the state of the route after it is created. Ticking the checkbox will have the effect of immediately activating the route after the completed form is saved. Port 45321 is required for the transmission of status information.

PCAN-Gateway handshake off: (Expert mode only) If this checkbox is active, no handshake will be performed and therefore no status information will be gathered for this route. Use this option for communication with your own application[1].

CAN Interface:

Choose one of the available CAN channels. The configuration of the CAN interfaces is done on the page *Network > CAN*.

IP Interface:

IP Address Source: This field only appears when PCAN-Gateways were detected during a network broadcast scan and the direction “Send CAN> IP" is selected.

Select the desired device from this drop-down menu. The following IP address is automatically set to the appropriate value. If you prefer to enter the IP address yourself, select "Manual Input".

[1] For information about the data protocol see the PCAN-Gateway developer documentation.

IP Address: Enter the IP address (IPv4) of the destination device. It should be noted that only values from 0 to 255 may be used and certain address ranges are reserved.

- In the first field, enter a value less than 224, since addresses starting from this value are reserved for Multicast messages
- Depending on the Subnet mask, the highest device address is reserved for broadcast messages. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.255
- Depending on the Subnet mask, the lowest device address is reserved for messages that are addressed to the entire network. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.0

Port: Enter a port between 1024 and 65535. Values below 1024 are reserved for various system services and must therefore not be used. Port 45321 is reserved for the transmission of status information and to perform a handshake between PCAN-Gateways.

Protocol: Select which transmission protocol should be used by the route in the IP network.

TCP (Transmission Control Protocol) establishes a connection between two participants and monitors their communication. If data packets are lost for example, they are retransmitted.

UDP (User Datagram Protocol) sends the data packets directly into the network without establishing a connection. With this protocol, error free transmission is not guaranteed. The advantage UDP has over TCP is the lower demand on performance.

Note: Any combination of the IP address, port, and protocol can only be used once.

Frames per Packet: This value specifies how many CAN frames are transmitted per IP packet. The higher the value, the greater the delay in the transmission of CAN messages. However, the demand on performance is lower in this case. This selection is only available for Send routes when using the UDP protocol.

TCP Delay: (Expert mode only) If this checkbox is active, TCP delay is enabled. In this case, the transmission of data packets via TCP might be delayed to lower the demand on performance. If this option is disabled, every CAN frame is transmitted as fast as possible.

Filter:

The defined filters are listed in this form. A single one can be attached or detached to Send routes via the radio buttons. If Expert mode is active, the radio buttons will be replaced with checkboxes and multiple filters can be selected.

Filters are joined with: This property specifies how multiple filters are linked. If you use several Whitelist filter, you should choose Logical OR. If you attach multiple Blacklist filter to a single route, the selection Logical AND is recommended.

Note: A single *Range* filter is realized with a composition of multiple *Mask* filters. The Joined Filters property will also affect this.

User Notes:

Additional information with a length of 125 characters can be entered for each route. This text is available on the page *Routing > Manage Routes*.

Finally you can create a new route with the Add Route button or save the changes after editing with the Save Settings button.

Note: Transferring data between 2 PCAN-Gateways always consists of a Send and a Receive route. Note that both should use the same transmission protocol (TCP or UDP) and the same port.

5.3.3 Scan for Devices

Using the *Routing > Scan for Devices* page a broadcast message can be sent to the IP network, to which all PCAN-Gateway products report. From the obtained information, a list of available devices is created. The detected devices can then be used as target destinations while creating or editing routes.

Note: When changing the network topology, the list is not updated automatically. If a device is removed from the network, it will remain visible in the list of detected devices until the scan is performed again and the list is updated.

Detected Devices:

This table shows all PEAK-System gateways that were detected during the last network broadcast scan. If no other devices are currently in the network or no scan has been performed, this table will not be shown.

Each PCAN-Gateway is displayed with its product name, the custom device name, MAC address, and serial number. This information can be used to identify the device. In addition, the IP address and a small icon of the device are displayed. With a left-click the configuration website of this device can be opened in a new tab.

Perform Scan: By clicking on the Perform Scan button, the list of available devices is updated. The scan takes a short time. Please wait until you are forwarded.

5.4 Filters

Filters are used to filter CAN messages by their ID. It is possible to create up to 32 of them. Each filter can be attached to multiple Send routes via the page *Add Route* or *Edit Route*.

The page *Filters* displays basic information about the created filters.

Defined Filters:

This box contains an overview of all defined filters with basic information. Starting with the index, every filter is displayed with its usage, user notes, name, type, and mode.

- On the *Filter > Manage Filters* page, existing filters can be managed, edited, and deleted
- On the *Filter > Add Filter* page, new filters can be created

5.4.1 Manage Filters

On the page *Filters > Manage Filters* the existing filters are listed with basic information and control options. Each of them is specified with its index, usage, user notes, name, type, and mode.

Index: For saving filters, the PCAN-Gateway uses a table with 32 rows that are addressed with this unique index.

Usage: The badge on the left shows how many times the filter is used. The information to which routes it is attached to, is displayed as a tooltip when hovering with the mouse cursor. The list refers to the indices of the routes. If you click on the badge, the page *Manage Routes* will be opened with the corresponding routes highlighted.

Notes: Hover this icon with the mouse cursor to display the user notes of this filter. The icon is not visible if no user notes are available.

Name: While creation a name can be assign to a filter. It can be used for identification while managing the filters or attaching them to routes.

Type: This column displays the filter type (*Range* or *Mask*) and the used CAN ID mode (11 or 29 Bit). Detailed information can be found in chapter *5.4.2 Add / Edit Filter*.

Mode: The filter mode (*Blacklist* or *Whitelist*) indicates if the defined filter is inverted or not.

Control Elements:

Symbol	Meaning
	Delete: Click the trash icon to remove the filter. If it is attached to one or more routes, it will be automatically detached
	Edit: Click on the pencil icon to edit the filter. The filter is loaded into the forms of the page *Filters > Add Filter*. The same input and configuration options are available there. Detailed information can be found in chapter *5.4.2 Add / Edit Filter*

Add Filter: The button below the information table opens the *Filters > Add Filter* page on which you can set up a new filter. It is not available if the limit of 32 filters is reached.

Detailed Information:

The filters are provided with detailed information. This additional information can be viewed by clicking on the triangle icon located on the right edge of the filter.

5.4.2 Add / Edit Filter

On this page you can set up a new filter. Similarly, an existing one can be edited via the form displayed. For this, the current settings are loaded into the form fields. Editing a filter is done via the page *Filters > Manage Filters*.

For saving filters, the PCAN-Gateway uses a table with 32 rows that are addressed with a unique index. If a new filter is to be set up, the lowest free index will be assigned. Because of that, only up to 32 filters can be created regardless of their status. If the limit is reached, the *Add Filter* function is no longer available.

Type and ID Mode:

When you create a filter, you should start with the selection of the type and ID mode since the following input and output fields are determined by this. The filter types *Range* and *Mask* specify how the CAN IDs, to be filtered, are defined.

The ID modes specify if the CAN message will be a Standard frame with an 11 Bit identifier or an Extended frame with a 29 Bit identifier. This changes the ID value range that can be entered in the following forms.

Mode:

The mode indicates how the defined filter is interpreted.

- **Whitelist**: A filter using this mode will transmit every CAN message whose ID matches the filter specifications
- **Blacklist**: If this mode is selected, the filter will be inverted. That means every message with a CAN ID that matches the filter specifications will not be transmitted

Type Range:

If the filter type *Range* was chosen, a lower and an upper limit have to be specified to set the range. This can be done via the slider (JavaScript support required) or with the input forms.

From: This value marks the lower limit of the filter range.

To: This value marks the upper limit of the filter range.

While entering the values the following should be considered:

- The values are entered in hexadecimal format
- The *From* value has to be lower than the *To* value

Type Mask:

The working principle of this acceptance filtering is based on the SJA1000 CAN controller. Detailed information can be found in the NXP Application Note *AN97076 - SJA1000 Stand-alone CAN controller* chapter 4.1.2.

The ID of the CAN message to be transmitted is compared bitwise with the *Acceptance Code* value. The *Acceptance Mask* specifies which bit positions are relevant.

- 0 = relevant. The CAN ID at the corresponding bit position has to match the value of the Acceptance Code
- 1 = not relevant. The CAN ID at the corresponding bit position does not matter

In contrast to the original implementation, the PCAN-Gateway *Mask* filter only looks at the CAN ID. It cannot process any data bytes or the RTR flag.

The size of the *Acceptance Mask* and *Acceptance Code* depends on the ID mode selection above and can be 11 Bit for Standard with a range of 0 to 7FF or 29 Bit for Extended with a range of 0 to 1FFFFFFF.

Example for 11 Bit identifiers:

IDs											Meaning
0	1	1	1	1	0	1	1	1	1	1	Acceptance Code
1	1	1	0	0	0	0	1	1	0	1	Acceptance Mask

IDs											Meaning
X	X	X	**1**	**1**	**0**	**1**	X	X	**1**	X	CAN messages with an ID matching this binary value, are accepted. X means that this bit position does not matter.
MSB										LSB	

Name:

A name with up to 50 characters can be assign to a filter. It can be used for identification while managing filters or attaching them to routes.

User Notes:

Additional information with a length of 200 characters can be entered for each filter. Besides the pages *Status, Filters, Filters > Add / Edit Filter,* and *Filters > Manage Filters* this text is available while route creation or editing.

Finally you can create the new filter with the Add Filter button or save the changes after editing with the Save Settings button.

5.5 Network

The *Network* page provides information about the current configuration of available communication interfaces.

CAN Interfaces:

For each CAN channel the status, the bit rates, and the setting of the Listen-Only-Mode are displayed.

- The CAN interfaces can be configured on the *Network > CAN* page. In addition, this page provides detailed information about the interfaces

LAN Interfaces:

This box displays the LAN interface settings. IP address, Subnet mask, and gateway are adjustable. The MAC address cannot be changed. Each device receives a unique MAC address during the manufacturing process, which can be used for identification.

- The LAN interface can be configured on the *Network > LAN* page

5.5.1 CAN

The *Network > CAN* page displays the current settings of the CAN interfaces as well as options to configure them. Information about the status, Listen-Only-Mode, and the bit rates is displayed for each CAN channel.

Channel: The channel number of the CAN interface. This number is used to select the intended interface while creating a route.

Status: The LED indicates the state of the CAN channel.

LED Symbol	Status	Meaning
	Active	The CAN interface is active and the error counter is lower than 96 (Error Active).
	Inactive	The channel is inactive or sleeping.
	Error Warning	Errors were detected on the bus. The error counter reached the threshold of 96.
	Error Passive	Errors were detected on the bus. The error counter reached the threshold of 128. Please check the CAN connection and the configured bit rates. The values should match the bit rates of the connected CAN bus.

LED Symbol	Status	Meaning
	Bus Off	The CAN controller was switched off. The error counter is higher than 255. A possible cause can be a short circuit on the bus.

Listen-Only: The state of the Listen-Only-Mode is represented by an LED.

LED Symbol	Meaning
	Active. The CAN channel is not sending messages, nor is it answering incoming messages (Acknowledge).
	Inactive

Bit Rate: The nominal bit rate and if defined the data bit rate of this CAN channel. These values should match the bit rates of the connected CAN bus.

Additional Information: Furthermore, status information and user defined notes are available for each channel. Click the triangle icon on the right edge of the list item to view the information. With the **Reset** button ↻ you can reset the CAN channel.

In **Expert** mode, (see chapter 5.6.2 *Device > User Management*) further detailed information is displayed.

CAN Channel Configuration:

Each channel is handled and configured by a separate form. Settings can be saved by clicking the Save Settings button located underneath the form.

Active: (Expert mode only) Use the checkbox to activate or deactivate the CAN channel.

Listen-Only-Mode: If the PCAN-Gateway should act as a pure observer, not affecting the data traffic, Listen-Only-Mode must be enabled. Activate Listen-Only-Mode with a click on the checkbox.

CAN FD: Use the checkbox to activate or deactivate the CAN FD support. With this, the setting for the data bit rate is enabled or disabled.

Bit Rate Definition: (Expert mode only) With this selection you can determine the mode to be used to set bit rates.

- Selected from standard list: This is the default mode which is used if the Expert mode is switched off. The bit rates can be selected from standard selection lists
- Set with register values: This is an option to set custom bit rates. If selected, forms with input fields for the register values of the nominal bit rate and the data bit rate appear. For details, see the following section *Configuring Custom Bit Rates with Register Values*
- Set with register string: This is an option to set custom bit rates. If selected, a single input form for a register string appears. For details, see the following section *Configuring Custom Bit Rates with a Register String*

Clock Frequency: Select the CPI clock frequency for this CAN channel from the selection list.

This selection affects the available bit rates when using the first bit rate definition mode *Selected from standard list* and the custom bit rate calculation when using the second bit rate definition mode *Set with register values*.

Nominal Bit Rate: For setting the nominal bit rate, click the drop-down menu and select the value that is used on the connected CAN bus.

Data Bit Rate: For setting the data bit rate, click the drop-down menu and select the value that is used on the connected CAN bus. This selection is only available if CAN FD is enabled.

User Notes: Additional information with a length of 125 characters can be entered for each CAN channel. This text is available while adding and editing routes.

Configuring Custom Bit Rates with Register Values

In Expert mode, you can configure custom bit rates and sample points with the bit rate definition mode *Set with register values*.

If this mode is selected, input fields for the nominal and data bit rate are provided to enter the register values of the CAN controller. The previously selected clock frequency is used for both bit rates.

Bit Rate Prescaler: With this input field, the radio of CPI clock and serial clock frequency is set. For a custom nominal bit rate, it accepts values from 1 to 1024 and for a custom data bit rate, it accepts values from 1 to 1024.

Propagation Segment: This time segment is used to compensate the signal delays over the network. For a custom nominal bit rate, it accepts values from 1 to 128 and for a custom data bit rate, it accepts values from 1 to 16.

Phase Segment 1 & 2: The phase segments are used to compensate edge phase errors at the beginning and end of the bit. For a custom nominal bit rate, Phase Segment 1 accepts values from 1 to 128 and Phase Segment 2 accepts values from 1 to 128. For a custom data bit rate, Phase Segment 1 accepts values from 1 to 16 and Phase Segment 2 accepts values from 1 to 16.

Re-Synch. Jump Width: The Resynchronization Jump Width defines the maximum extension or shortening of the Phase Segments for the signal resynchronization. This value has no impact on the bit rate and sample point calculation. For a custom nominal bit rate, it

accepts values from 1 to 128 and for a custom data bit rate, it accepts values from 1 to 16.

Calculated bit rate: The form checks your entries and calculates the bit rates using the following formula:

$$\text{Bit Rate} = \frac{\text{CPI clock / Bit Rate Prescaler}}{\text{Sync Seg. + Time Seg.1 + Time Seg. 2}}$$

The Synchronization segment is always 1 and is used for the synchronization of each bus node. The sampling time (sample point) is determined via Time Segments 1 and 2. Time Segment 1 consists of Phase Segment 1 and the Propagation Segment. Time Segment 2 is defined by Phase Segment 2.

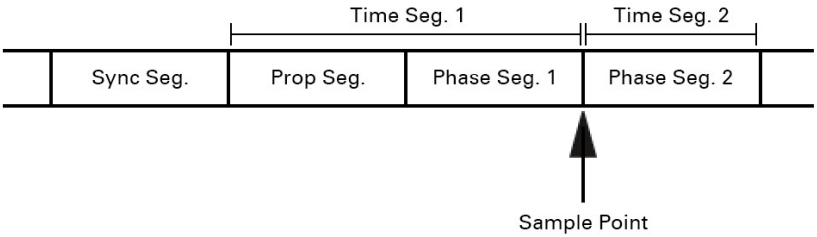


Figure 16: Bit Timing

Note: When entering values, the resulting bit rates are automatically calculated in real time. If the values are incorrect, or the calculated bit rates are beyond the limits of the CAN transceiver, the data cannot be saved. For the nominal bit rate, the limits are 20 kbit/s to 1 Mbit/s. For the data bit rate, the limits are 20 kbit/s to 10 Mbit/s. The data bit rate must be equal or higher than the nominal bit rate.

Configuring Custom Bit Rates with a Register String

In Expert mode, you can configure custom bit rates and sample points with the bit rate definition mode *Set with register string*.

If this mode is selected, a single input field is provided to enter the register string. This string specifies the clock frequency and the register values of the nominal and data bit rates. In contrast to configuring custom bit rates with register values, the register string indicates the Time segment values instead of the Phase and Propagation segment values.

The bit rate register string can be generated with the free applications Bit Rate Calculation Tool or PCAN-View from PEAK-System. Examples:

500 kbit/s Nominal BR, 80% Sample Point =

```
f_clock=80000000, nom_brp=1, nom_tseg1=127, nom_tseg2=32,
nom_sjw=32
```

500 kbit/s Nominal BR, 4 Mbit/s Data BR, 75% Sample Point =

```
f_clock=80000000, nom_brp=5, nom_tseg1=23, nom_tseg2=8,
nom_sjw=8, data_brp=5, data_tseg1=2, data_tseg2=1, data_sjw=1
```

1 Mbit/s Nominal BR, 4 Mbit/s Data BR, 80% Sample Point =

```
f_clock=80000000, nom_brp=1, nom_tseg1=63, nom_tseg2=16,
nom_sjw=16, data_brp=1, data_tseg1=15, data_tseg2=4, data_sjw=4
```

Note: The submitted values and the resulting bit rates are checked. If the values are incorrect, or the calculated bit rates are beyond the limits of the CAN transceiver, the data cannot be saved.

The limits of the register values and bit rates are documented in the previous section *Configuring Custom Bit Rates with Register Values*.

By clicking on the Save Settings button you can save your previously defined bit rates.

5.5.2 LAN

The *Network > LAN* page displays the current settings of the LAN interface and provides options for configuration.

LAN Interface

In this box the settings of the LAN interface will be displayed. IP address, Subnet mask, and gateway are adjustable. The MAC address cannot be changed. Each device receives a unique MAC address during the manufacturing process, which can be used for identification.

LAN Address Settings

The LAN interface can be configured by using the form underneath the general information overview. Settings can be saved by clicking the Save Settings button located below the form.

DHCP: If the IP network uses DHCP (Dynamic Host Configuration Protocol), the PCAN-Gateway IP address, Subnet mask, and gateway address are assigned automatically. Otherwise, you must manually enter the information. Switch DHCP on if required (Enable).

Note: DHCP is not recommended, because it is necessary to know the IP address of the PCAN-Gateway to access the configuration website. Furthermore the IP address may change after a restart of the device or the DHCP server. In this case the existing routes won't work.

IP Address: Enter the IP address (IPv4) of the LAN interface. It should be noted that only values from 0 to 255 may be used and certain address ranges are reserved.

- In the first field, enter a value less than 224, since addresses starting from this value are reserved for Multicast messages
- Depending on the Subnet mask, the highest device address is reserved for broadcast messages. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.255
- Depending on the Subnet mask, the lowest device address is reserved for messages that are addressed to the entire network. For the Subnet mask 255.255.255.0 and the network address 192.168.1.xxx, the reserved address would be: 192.168.1.0

Subnet mask: The Subnet mask indicates which part of the IP address represents the network, and which part represents the device. This subdivision is achieved by filling in the (binary) Subnet mask from left to right with the number "1". The resulting values for the individual fields are: 0, 128, 192, 224, 240, 248, 252, 254 and 255.

While entering values from left to right, as soon as a value smaller than "255" is entered, a "0" must follow. For example 255.255.128.0 is valid, while 255.128.255.0 is false.

Gateway: Enter the IP address (IPv4) of the gateway that manages the IP network. Proceed with the same guidelines as outlined for local IP address entry. Entering a gateway address is optional.

Note: After modifying these settings, the device may not be reachable. Possible causes for this are:

- You have activated DHCP. The IP address of the device is not known, because it has been acquired dynamically from the gateway. The address can often be found on a list provided by the gateway.
- You have changed the part of the address assigned to the network (see Subnet mask information). In this case the device is now part of a different network than the one your computer is a part of. Connecting to the device is only

possible by respectively adapting your computer's IP address to the different network that the device is in.

5.6 Device

The *Device* page displays detailed information about your PCAN-Gateway.

General Product Information: In this area, the product name, order number, and the serial number of the device are displayed. This information can be used to uniquely identify the device.

User defined Device Information: The information displayed here can be defined by the user on the *Device > Configuration* page. This information can be used to uniquely identify the device.

Interface Information: This area lists all available communication interfaces regardless of their state.

Version Information: This area shows different information concerning versions:

- Hardware Version: The hardware version indicates the revision of the circuit board
- Software Version: This version number indicates the version of the installed software package. This, additionally to the software, includes the firmware, website, and JSON interface. The software package can be updated on the page *Device > Software Update*
- Website version: This number indicates the version of the configuration website that you are currently using. The website is updated automatically when a software update is processed
- JSON Interface Version: This number indicates the version of the JSON interface, which is an alternative way to access the

status information and configuration of the PCAN-Gateways. The JSON interface is updated automatically when a software update is processed

5.6.1 Device Configuration

On the *Device > Configuration* page it is possible to assign a custom name and description to the device. In addition to that, different import and export options are available.

Custom Device Name and Description:

Use this form to assign a name and description to the PCAN-Gateway. This will aid in identifying the device among other similar devices. The name and description will be shown in the header of the website and other areas.

Name: Enter a name for the device in this field. The maximum length allowed is 50 characters. Please note: This name is separate from the product name that is also displayed in the header area of the website.

Depending on the IP network, it is possible to access the website of the device by typing this name with a previous **http://** in the address bar of the browser.

Description: Enter a description for the device in this field. The maximum length allowed is 200 characters.

The entries can be saved by clicking the Save Settings button located beneath the form.

Import Configuration:

This form allows the importing of locally saved configuration files. After an import, all communication interfaces and device settings,

as well as the routes and filters are restored. The current configuration is overwritten within that process.

Use the button on the left side to select a configuration file (`*. ini`). To start the restoration process, click the Import button located on the right.

Note: If you import a configuration file from another PCAN-Gateway device that is in the same network, its IP address will also be imported and loaded. Both devices would then have the same IP address. This would cause an address conflict and would result in both devices being non accessible. In such a case, separate one device from the power supply. The other device will then become accessible again and its IP address can be changed manually. This will resolve the address conflict and both devices can be used again.

Export Configuration:

With the Export button, you can download the current device configuration and the defined routes and filters in the form of an ini file.

The file can be freely renamed, the contents of the file however should not be altered. Importing altered configuration files can lead to failures during the import process. Only valid configuration files can be used for device restoration.

Reload Default Settings:

With the Reload button, you can restore the device to its factory defaults. During this process the login settings, all device and communication interface settings along with existing routes will be restored to the states they were in at the time of product delivery. The current configuration is overwritten within that process. In addition, the access data will be reset to the default values (see the

label on the left side of the device). The PCAN-Gateway is then reachable under the default IP address.

JSON Interface Configuration (Expert mode only):

The JSON interface is an alternative way to access the status information and configuration of the PCAN-Gateways.

A specific request is then transmitted as a GET parameter of a URL and the PCAN-Gateway returns a JSON-formatted response. Based on this, it is possible to monitor and configure the PCAN-Gateway product family via software.

The JSON interface is activated at delivery but cannot be used for configuration. It can be set up or deactivated via the configuration website.

Enable JSON Interface: If active, the JSON interface can be used.

Enable Configuration: If active, the device can be configured via the JSON interface. This includes the commands set, reset, reboot, and delete.

Enable Shell View: If active, the Shell view can be used. It is primarily intended for development and familiarization.

Respect Public Display: If active, access is only allowed to elements that have been activated on the page *Device > User Management* in the Public Dashboard form.

Save your settings with Save Settings.

Note: In the current version there is no access protection for the JSON interface. Once you have activated the interface and **Enable Configuration**, the PCAN-Gateway can be configured without logging in.

Detailed information about the JSON interface is included in the PCAN-Gateway developer documentation.

5.6.2 User Management

The *Device > User Management* page provides options for entering new login credentials, changing and defining the display mode, and determining what information should be visible on the login page.

Login Settings:

Enter your current login details in the upper part of the form. In the lower part you can enter a new username and a new password. The new password must be confirmed in order to exclude accidental input.

To ensure a minimum level of security, the password should have at least 8 characters. If possible, use letters, numbers, and special characters.

Save your inputs with the Save Settings button.

Important notice: **Login data is confidential!** Do not act carelessly and leave your system open to attack. Never deposit the login data in any form on the Internet or make it easily accessible. Do not give the new login data carelessly to third parties nor send it by e-mail.

Display Mode Setting:

This form provides the opportunity to change the display mode. Expert mode enables access to more detailed information and professional settings. Interpreting this information and using these features requires advanced knowledge of TCP/IP, CAN, and the message forwarding of the PCAN-Gateways.

Click on the drop-down menu and choose one of the two modes. This setting only applies for the current session and will be reset with your next login.

Reset after Login: If you deactivate this checkbox, the display mode is not reset after a new login.

Save the settings by clicking the Save Settings button.

Public Dashboard:

This form is responsible for defining what information is visible on the website to non-logged in users. This basic status information can be made visible, configuration options cannot be unlocked publicly. In addition, the Public Dashboard can be used to determine which elements can be accessed via the JSON.

Activate or deactivate the checkboxes to toggle the accessibility of their corresponding information. Confirm your choices with the Save Settings button.

5.6.3 Device Monitoring

The *Device > Monitoring* page displays information and graphs for monitoring the resources and temperatures of your PCAN-Gateway.

The page is only available if the Expert display mode is active. Please note that the page and the displayed values are not updated automatically.

Resources

This section lists the uptime in hours and minutes, the CPU load, and the applied input voltage. In addition, the CPU load is presented in a graph over time.

Temperatures

The PCAN-Gateway provides several sensors for monitoring the operating temperatures, in particular the temperatures of the CPU, the CPU board, and the power board.

A fan is built in between both circuit boards which is activated if the temperatures exceed the upper operating temperature limit.

In addition, graphs are presented for the temperatures, if the fan is switched on or off as well as the fan speed.

Configuration

Select a time from one minute to 24 hours to set the time range for all graphs. Click the button to reload the page with updated images.

5.6.4 Software Update

Initiating a software update will update the firmware, software, configuration website, and JSON interface. The currently installed software package version is indicated by the software version number. This number can be found on the pages *Device > Software Update* and *Device* in the footer of the website.

Current product updates can be downloaded on the PEAK-System website (www.peak-system.com). Please make sure to download the correct package for your device. Every version of the PCAN-Gateway product family has a separate download package.

It's recommended to backup the current configuration before performing a software update or downgrade. The current settings may get lost if they are not supported by the software package to be installed or if a failure like a power cut happens.

Perform a software update:

1. Please select the software update package (`*.raucb`) with the button on the left.
2. Click the button on the right to upload the file and update your device. Please note: All routes and CAN interfaces will be switched to standby for that operation.
3. After a successful software update, the device will reboot. You will be forwarded to the login page and all routes and CAN interfaces are reactivated.

Note: If the update process was interrupted, you will have to restart the device in order to reactivate the routes and CAN channels. Use the **Reboot Device** link located near the bottom of the main navigation. Alternatively you can use the physical **Reset button** located on the device itself.

Note: Export your current configuration, if you like to downgrade to an older software package. The current settings, routes, and filters may get lost.

Partition Information

The software packages are installed on this PCAN-Gateway alternately on two partitions. With this, it is possible to go back to the previous installation in case of problems.

The forms show the version number of the installed software package and the IP connection settings from the config file for each partition. The currently active partition is marked red. Each form provides buttons to download the config file or to activate and reboot the currently not active partition.

5.7 Help

The *Help* page contains the complete help information available for your Gateway's Configuration web site. It is nearly identical to chapter 5 of the PDF documentation.

Question mark icons are located next to every page title, clicking on one will open a corresponding help page.

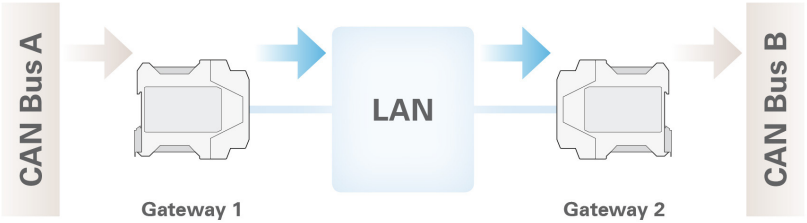
5.8 Support

On the *Support* page you will find useful links and contact information of PEAK-System Technik GmbH.

6 Application Examples

The PCAN-Ethernet Gateway FD DR allows the connection of different CAN buses over IP networks. CAN frames are wrapped in TCP or UDP message packets and then forwarded via the IP network from one device to the other. This makes it possible for CAN networks to connect to each other over large distances.

6.1 Unidirectional Data Transmission



For unidirectional data transmission the message traffic from CAN bus A is to be forwarded to CAN bus B via a LAN network. Necessary for this are two PCAN-Ethernet Gateways DR and the creation of a route on each device.

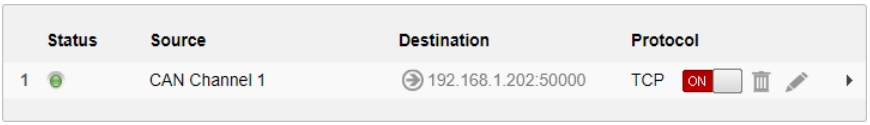
In this example Gateway 1's IP address is 192.168.1.201 and it is connected to CAN bus A via CAN channel 1. Gateway 2's IP address is 192.168.1.202 and it is connected to CAN bus B via CAN channel 2.

Creating a Send Route:

Incoming messages from Gateway 1 are to be transferred into the LAN network. For this, a Send route with the following values must be created.

Gateway 1 > Send Route		
Route Direction	Send: CAN > IP	
Status	Activate	
CAN	Channel 1 (connected to CAN bus A)	
IP Interface	IP-Address	192.168.1.202 (address of Gateway 2)
	Port	50000
	Protocol	TCP

After saving, the route on Gateway 1 will be displayed on the *Routing > Manage Routes* page as follows.



Creating a Receive Route

Gateway 2 is to accept the data packets sent via LAN network by Gateway 1, and pass the containing CAN messages through CAN channel 2 into CAN bus B. For this, a Receive route with the following values must be created.

Gateway 2 > Receive Route		
Route Direction	Receive: IP > CAN	
Status	Activate	
IP Interface	Port	50000 (like the Send route)
	Protocol	TCP (like the Send route)
CAN	Channel 2 (connected to CAN bus B)	

Transferring data between 2 PCAN-Gateways always consists of a Send and a Receive route. Note that both should use the same transfer protocol (TCP or UDP) and the same port.

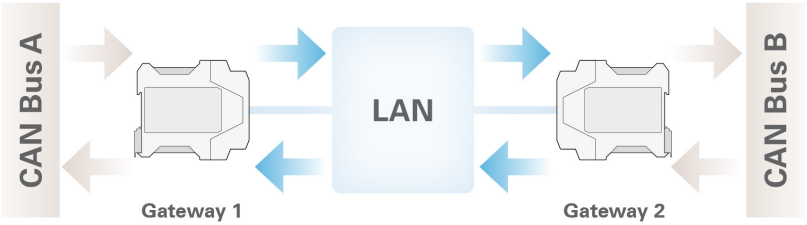
After saving, the route on Gateway 2 will be displayed on the *Routing > Manage Routes* page as follows.

	Status	Source	Destination	Protocol
1		Local IP - Port:50000	CAN Channel 2	TCP ON

A short time after both routes have been created and activated, the connection will establish. You can interrupt the connection by deactivating or erasing one of the routes on the *Routing > Manages Routes* page.

Note: The putting into operation of a PCAN-Ethernet Gateway FD DR is described in detail in chapter 3 *Putting into Operation*. Detailed information concerning the creation of routes, as well as input and selection options, can be found in chapter 5.3.2 *Add / Edit Route*.

6.2 Bidirectional Data Transmission



For bidirectional data transmission the message traffic occurring between CAN buses A and B is to be forwarded via the LAN network. For this two PCAN-Ethernet Gateways DR are needed, where for each one, a Send and Receive route must be created.

In this example Gateway 1's IP address is 192.168.1.201 and it is connected via CAN channel 1 to CAN bus A. Gateway 2's IP address is 192.168.1.202 and it is connected via CAN channel 2 to CAN bus B.

The difference here, when compared with the example in chapter 6.1, is solely that the opposite message forwarding from CAN bus B to CAN bus A must also be realized.

The Routes on Gateway 1:

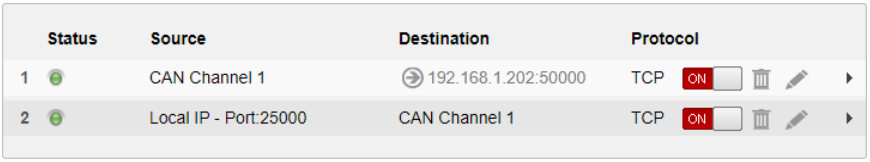
Incoming messages from Gateway 1 are to be transferred into the LAN network. For this, a Send route with the following values must be created.

Gateway 1 > Send Route A		
Route Direction	Send: CAN > IP	
Status	Activate	
CAN	Channel 1 (connected to CAN bus A)	
IP Interface	IP-Address	192.168.1.202 (address of Gateway 2)
	Port	50000
	Protocol	TCP

Gateway 1 is to accept the data packets sent via LAN network by Gateway 2, and pass the containing CAN messages through CAN channel 1 into CAN bus A. For this, a Receive route with the following values must be created.

Gateway 1 > Receive Route B		
Route Direction	Receive: IP > CAN	
Status	Activate	
IP Interface	Port	25000 (like the Send route B)
	Protocol	TCP (like the Send route B)
CAN	Channel 1 (connected to CAN bus A)	

After saving, the routes on Gateway 1 will be displayed on the *Routing > Manage Routes* page as follows.



The Routes on Gateway 2:

Gateway 2 is to accept the data packets sent via LAN network by Gateway 1, and pass the containing CAN messages through CAN channel 2 into CAN bus B. For this, a Receive route with the following values must be created.

Gateway 2 > Receive Route A		
Route Direction	Receive: IP > CAN	
Status	Activate	
IP Interface	Port	50000 (like the Send route A)
	Protocol	TCP (like the Send route A)
CAN	Channel 2 (connected to CAN bus B)	

Gateway 2 should transmit incoming message traffic from CAN bus B into the LAN network. For this a Send route with the following values must be created.

Gateway 2 > Send Route B		
Route Direction	Send: CAN > IP	
Status	Activate	
CAN	Channel 2 (connected to CAN bus B)	
IP Interface	IP-Address	192.168.1.201 (address of Gateway 1)
	Port	25000
	Protocol	TCP

Transferring data between 2 PCAN-Gateways always consists of a Send and a Receive route. Note that both should use the same transfer protocol (TCP or UDP) and the same port.

After saving, the routes on Gateway 2 will be displayed on the *Routing > Manage Routes* page as follows.

A short time after all routes have been created and activated, the bidirectional connection will establish. You can interrupt the connection by deactivating or erasing one of the routes on the *Routing > Manages Routes* page.

Note: The putting into operation of a PCAN-Ethernet Gateway FD DR is described in detail in chapter 3 *Putting into Operation*. Detailed information concerning the creation of routes, as well as input and selection options, can be found in chapter 5.3.2 *Add / Edit Route*.

6.3 Filtering Single CAN IDs

The outgoing CAN messages of a Send route can be filtered. Filters of the type Range cover a range of at least two CAN IDs. If a single message with a specific CAN ID is to be filtered, a Mask filter is used.

In this example a Send route has already been set up on the PCAN-Gateway. This Send route is to be configured with two filters that only allow messages with the 11-bit IDs 0x100 and 0x200 to pass.

Creating the Filters

Open the page *Filters > Add Filter* and create the filter for ID **0x100** with the following settings.

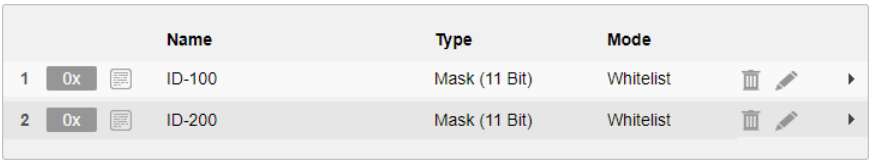
Filter 0x100	
Filter Type	Mask
CAN ID Mode	Standard (11 Bit)
Filter Mode	Whitelist
Acceptance Code	100
Acceptance Mask	000
Name	ID-100
User Notes	Only ID 0x100 can pass.

After saving, continue with the filter for ID **0x200**.

Filter 0x200	
Filter Type	Mask
CAN ID Mode	Standard (11 Bit)
Filter Mode	Whitelist
Acceptance Code	200
Acceptance Mask	000
Name	ID-200
User Notes	Only ID 0x200 can pass.

The Acceptance Code specifies the CAN ID that should pass the filter. The Acceptance Mask **000** causes every digit of the three-digit CAN-ID to be checked.

After saving, the filters are displayed on the *Filters > Manage Filters* page as follows:



Assigning the Filters

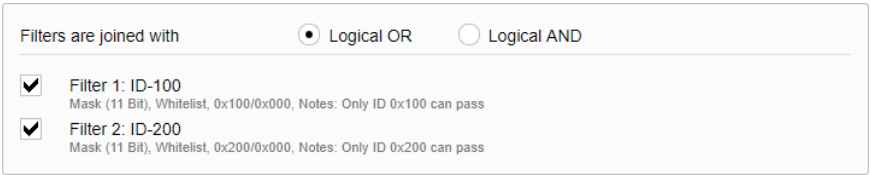
The two filters must now be assigned to the Send route. However, in Normal display mode only a single filter can be used per send route. In Expert mode several filters can be assigned.

This is how you switch to Expert mode:

1. Open the page *Device > User Management*.
2. Choose in the form **Display Mode Setting** the display mode **Expert**.
3. Confirm your changes with **Save Settings**.

This is how you assign a filtert o a Send route:

1. Open the page *Routing > Manage Routes*.
2. Open the desired Send route with the pencil symbol for editing.
3. Choose **Logical OR** for **Filters are joined with** in the filter form.
4. Activate the checkboxes of the filters **ID-100** and **ID-200**.



5. Confirm your changes with **Save Settings**.

   Now the outgoing messages of the Send route are filtered as desired.

7 Technical Specifications

Connectors	
Power	Phoenix connector 4-pin[2]
CAN	2 x Phoenix connector 4-pin[2]
LAN	RJ-45 socket
RS-232	Phoenix connector 4-pin[2]
USB downstream	USB port type A 3.0 High-speed USB 2.0 downstream (compatible with USB 1.1 and USB 3.0) Max. current output 1.5 A
MiniPCIe	Slot for an expansion card in MiniPCie format

Power Supply	
Operating voltage	8 – 30 V DC
Supply type	External supply unit
Current consumption	800 mA at 8 V 300 mA at 12 V 250 mA at 30 V
Protection	Overvoltage protection: ± 32.5 V surge Reverse polarity protection: 35 V
RTC backup supply	Goldcap

CAN (FD)	
Protocols on OSI layer 2	CAN FD ISO 11898-1:2015, CAN FD non-ISO, CAN 2.0 A/B
Physical transmission	ISO 11898-2 (High-speed CAN)
Transceiver	MCP2558FD
CAN bit rates	Nominal: 20 kbit/s - 1 Mbit/s
CAN FD bit rates	Nominal: 20 kbit/s - 1 Mbit/s Data: 20 kbit/s - 10 Mbit/s[3]
Controller	FPGA implementation

[2] Mating Connector Phoenix Contact MSTB 2,5/4-ST BK - 1756298

[3] According to the CAN transceiver data sheet, only CAN FD transfer rates up to 8 Mbit/s are guaranteed with the specified timing.

CAN (FD)			
Supported clock frequencies	80 MHz		
Supported bit timing values		Nominal	Data
	Bit Rate Prescaler (BRP)	1 - 1024	1 - 1024
	Propagation Segment (PROPSEG)	1-128	1 - 16
	Phase Segment 1 (PSEG1)	1 - 128	1 - 16
	Phase Segment 2 (PSEG2)	1 - 128	1 - 16
	Synch. Jump Width (SJW)	1 - 128	1 - 16
Galvanic isolation	Up to 500 V		
Internal termination	Via solder bridges, not activated at delivery		
Electric strength	±20 V		
Listen-only mode	For both CAN channels separately adjustable		
Time stamp resolution	1 µs		

LAN	
Protocols	TCP, UDP
Standard	IEEE 802.3
Bit rates	10/100/1000 Mbit/s
Reserved ports	45321: Use for transferring status information and for executing the handshake between PCAN-Gateways
Additional features	Auto-Sensing with 10/100/1000 Mbit/s Auto-Crossover

RS-232	
Bit rates	Max. 115200 bit/s
Signal level	Max. ±5.4 V typ.
Dielectric strength	±15 V

Microcontroller	
CPU	AM5716 Sitara with Arm®-Cortex®-A15-Core; Digital signal processor (DSP); C66x Floating-Point VLIW DSP max. 750 MHz

Microcontroller	
Clock frequency	1 to 1.5 GHz
RAM	1 GByte DDR3-1333 (667 MHz)
Firmware upload	Via web interface

Memory	
Type	Internal, eMMC
Memory size	2 GByte

Dimensions	
Size	45.2 x 99 x 114.5 mm (B x H x T)
Weight	250 g

Environment	
Operating temperature	-40 - 70 °C (-40 – 158 F)
Cooling	Fan of the SEPA® MF20C05 series, activation when a temperature limit is exceeded
Temperature for storage and transport	-55 - 125 °C (-67 – 257 F)
Relative air humidity	15 - 90 %, non-condensing
Ingress protection (DIN EN 60529)	IP20

Conformity	
EMV	EU Directive 2014/30/EU DIN EN 61326-1:2013-07
RoHS 2	EU Directive 2011/65/EU DIN EN 50581 VDE 0042-12:2013-02

Appendix A CE Certificate

EU Declaration of Conformity

This declaration applies to the following product:

Product name: **PCAN-Ethernet Gateway FD DR**

Item number(s): **IPEH-004012**

Manufacturer: PEAK-System Technik GmbH
Otto-Roehm-Strasse 69
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;VDE 0042-12:2019-05
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances (IEC 63000:2016); German version EN 63000:2018

EU Directive 2014/30/EU (Electromagnetic Compatibility)

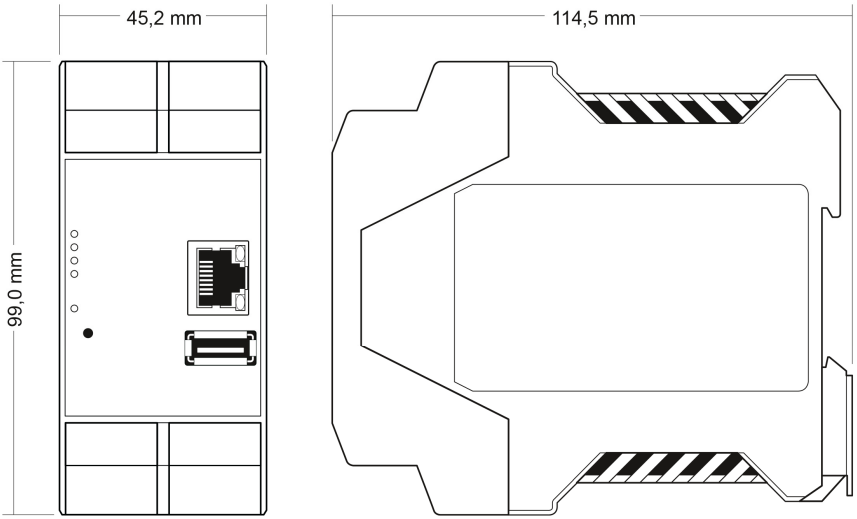
DIN EN 55024:2016-05;VDE 0878-24:2016-05
Information technology equipment – Immunity characteristics – Limits and methods of measurement (CISPR 24:2010 + Cor.:2011 + A1:2015); German version EN 55024:2010 + A1:2015

DIN EN 55032:2016-02;VDE 0878-32:2016-02
Electromagnetic compatibility of multimedia equipment - Emission Requirements (CISPR 32:2015); German version EN 55032:2015

Darmstadt, 8 January 2021

Uwe Wilhelm, Managing Director

Appendix B Dimension Drawing



The figure doesn't show the actual size of the product.