V.1/20

PCAN-MicroMod FD Digital 1/2

User Manual

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Relevant Products

Product name	Model	Part number
PCAN-MicroMod FD Digital 1		IPEH-003083
PCAN-MicroMod FD Digital 2		IPEH-003084
PCAN-MicroMod FD Configuration	Configuration software for Windows	

Imprint

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Document version 1.0.0 (2019-12-13)

Contents

Relevant Products **2**

Imprint **2**

Contents **3**

1 Introduction **4**

1.1 Properties at a Glance 4

1.2 Operation Requirements 5

1.3 Scope of Supply 6

2 Connectors **7**

2.1 Basic Connectivity (left connector) 7

2.2 I/O (right connector) 8

3 Status LEDs **10**

4 Optional Hardware Settings **11**

4.1 Set Device ID 11

4.2 Activate Internal CAN Bus Termination 13

5 Configuration Software **15**

5.1 Prerequisites for the Configuration Transfer 15

5.2 Installing the Configuration Program 15

6 Firmware Update **16**

6.1 System Requirements 16

6.2 Preparing the Software 16

6.3 Sending the Firmware 17

6.4 Activate Flash Mode by Hardware 21

7 Technical Specifications **22**

Appendix A CE Certificate **26**

Appendix B Dimension Drawings **27**

1 Introduction

The PCAN-MicroMod FD plug-in board can be purchased together with ready-to-use motherboards that provide peripherals for specific requirements. For the connection of CAN, I/O, and power supply, spring terminal connectors are used.

The motherboards PCAN-MicroMod FD Digital 1 and 2 put the emphasis on digital inputs and outputs which are provided with appropriate protective circuitry. The digital outputs of the Digital 1 are equipped with low-side switches and those of the Digital 2 with high-side switches.

The PCAN-MicroMod FD is configured using the supplied Windows software. In addition to simple I/O mapping to CAN IDs, function blocks are also available for processing the data. The configuration created on the computer is transferred via the CAN bus to the PCAN-MicroMod FD which then runs as an independent CAN node. Multiple modules can be configured independently on a CAN bus.

1.1 Properties at a Glance

Motherboard in General

- Board with plugged-on PCAN-MicroMod FD
- Aluminum casing with spring terminal connectors
- Operating voltage 8 to 30 V
- Extended operating temperature range from -40 to 85 °C (-40 to +185 °F)

- High-speed CAN channel (ISO 11898-2)
  - Complies with CAN specifications 2.0 A/B and FD
  - CAN bit rates from 20 kbit/s up to 1 Mbit/s
  - CAN FD bit rates for the data field (max. 64 bytes) from 20 kbit/s up to 10 Mbit/s
  - CAN termination switchable
- 1 analog input for voltage monitoring up to 30 V, resolution 12 bits
- 2 frequency outputs
  - Low-side switch
  - Adjustable frequency range 0 to 20 kHz
- Completely configurable using the Windows program PCAN-MicroMod FD Configuration
- 4-bit rotary encoder switch for setting the module ID (for configuration transfer)

I/O Digital 1 and 2 Motherboards

- 8 digital inputs
  - Pull-up, Pull-down, or open (configurable)
- 8 digital outputs
  - Digital 1: Low-side switch
  - Digital 2: High-side switch
  - PWM mode: adjustable frequency range 0 to 20 kHz
- 3 analog inputs:
  - Resolution 12 bits
  - Measuring range from 0 to 10 V

1.2 Operation Requirements

- Voltage source 8 to 30 V DC (connection via 10-pole spring terminal strip)

For transfer of the configuration to the MicroMod FD via CAN:

- Operating system Windows 10, 8.1, 7 (32/64-bit)
- PC-CAN interface from PEAK-System
- CAN cabling between the CAN interface and the PCAN-MicroMod FD Digital 1/2 with proper termination (120 Ω on each end of the CAN bus)

Note: The transfer of the configuration is done with CAN 2.0 messages. For this reason, all PC-CAN interfaces from PEAK-System work in principle for this purpose. We recommend the use of CAN-FD-capable interfaces in order to activate the configuration mode of the PCAN-MicroMod FD Digital 1/2 also during CAN FD operation in a simple way.

1.3 Scope of Supply

- PCAN-MicroMod FD
- Motherboard in aluminum casing
- One mating connector each for both connections
- PCAN-MicroMod FD Configuration for Windows
- Manual in PDF format

2 Connectors

The motherboard has two connector sockets.

Position on casing	Function	Type	Mating connector type
Left	Basic connectivity	10-pole, single-row, 3.81 mm pitch	Phoenix Contact FMC 1,5/10-ST-3,81
Right	I/O	22-pole, double-row, 3.5 mm pitch	Phoenix Contact DFMC 1,5/11-ST-3,5

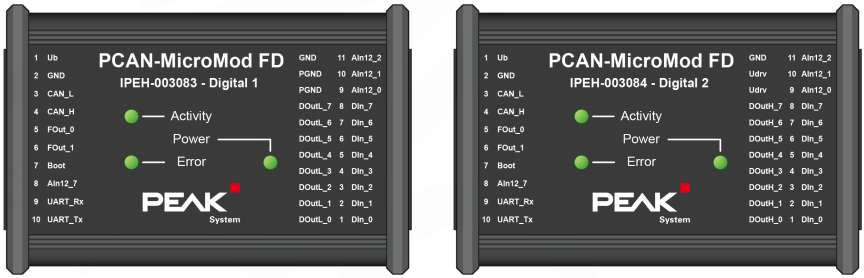


Figure 1: Top view PCAN-MicroMod FD Digital 1/2 with pin assignment

2.1 Basic Connectivity (left connector)

Figure 2: Connector left 10-pole

Pin	Identifier	Function	Comment
1	Ub	Voltage supply 8 - 30 V DC	*Power* LED is on when supply is present.
2	GND	Common Ground	

Pin	Identifier	Function	Comment
3	CAN_L	High-speed CAN connection (ISO 11898-2)	Internal termination resistor 120 Ω can be activated. See 4.2 *Activate Internal CAN Bus Termination* on page 13
4	CAN_H		
5	Fout_0	Frequency outputs (up to 10 kHz)	
6	Fout_1		
7	Boot	Start the CAN boot loader for a firmware update via CAN (High-active, connection to Ub during the start-up of the motherboard)	*Activity* LED quickly blinks orange when CAN bootloader is active
8	AIn12_7	Analog input 7 (0 - 30 V, resolution 12 bits)	General tasks, e.g. voltage monitoring or threshold switch
9	UART_Rx	Serial RS-232 interface	Currently no use
10	UART_Tx		

For the startup of the PCAN-MicroMod FD Digital 1/2 it is sufficient to connect a voltage source to pins 1 und 2. The configuration of the PCAN-MicroMod FD Digital 1/2 is done viar the CAN bus being connected to pins 3 and 4. Read more in 5 *Configuration Software* on page 15.

2.2 I/O (right connector)

Figure 3: Right connector 2 x 11 terminals

Function	A	Pin	B	Function
Ground	GND	11	AIn12_2	Analog inputs Resolution 12 bits Voltage range 0 – 10 V
Power ground (for digital outputs)	PGND	10	AIn12_1	
	PGND	9	AIn12_0	

Function	A	Pin	B	Function
Digital outputs L: Low-side outputs (Digital 1) H: High-side outputs (Digital 2) Static state or PWM mode configurable	DOutL_7 DOutH_7	8	DIn_7	Digital inputs Pull-up/Pull-down/Open configurable
	DOutL_6 DOutH_6	7	DIn_6	
	DOutL_5 DOutH_5	6	DIn_5	
	DOutL_4 DOutH_4	5	DIn_4	
	DOutL_3 DOutH_3	4	DIn_3	
	DOutL_2 DOutH_2	3	DIn_2	
	DOutL_1 DOutH_1	2	DIn_1	
	DOutL_0 DOutH_0	1	DIn_0	

3 Status LEDs

Figure 4: LEDs on the PCAN-MicroMod FD Digital 1/2

LED	LED indication	Device status	Comment
Activity	Green blinking (1 Hz)	Normal operation	
	Green faster blinking (2 Hz)	No configuration with the set module ID	The PCAN-MicroMod FD is ready for receiving a configuration with 500 kbit/s.
	Orange quick blinking (4 Hz)	CAN bootloader active	Ready for transfer of new firmware.*
	Red blinking	Configuration invalid	Specific parameters of the transmitted configuration are not supported, for example the bitrate
	Red on	No valid firmware*	
Power	Green on	Supply voltage present	
Error	No function		

* See also 6 *Firmware Update* on page 16.

4 Optional Hardware Settings

Two settings for special cases can be defined on the circuit board of the PCAN-MicroMod FD Digital 1/2:

- Several MicroMod-FD-based devices are to be configured on the same bus: 4.1 *Set Device ID* below
- The PCAN-MicroMod FD Digital 1/2 is to be used on one end of a CAN bus that is not fully terminated (for example, when two CAN nodes are connected directly): 4.2 *Activate Internal CAN Bus Termination* on page 13

4.1 Set Device ID

If you use several devices with PCAN-MicroMod FD on a single CAN bus and want to configure them there, a unique device ID must be assigned to each PCAN-MicroMod FD, so the configuration program can distinguish the modules. This is done by a rotary switch with 16 positions (0 to F, hexadecimal) on the board.

The device ID of a PCAN-MicroMod FD does not have an effect on the CAN communication.

Note: On a can bus, up to 16 PCAN-MicroMod FD can be configured. The operation of more than 16 modules is possible, as long as you do not want to configure them on that bus.

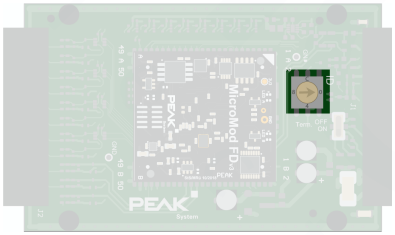
To open the casing and remove the circuit board:

Attention! Electrostatic discharge (ESD) can damage or destroy components on the circuit board. Take precautions to avoid ESD when handling the circuit board.

1. Remove the mating connectors from the device.
2. On one connection side of the casing, remove the two screws to the right and left of the connector and remove the plate including the rubber sleeve.
3. Pull the board out of the side of the casing.
4. For later assembly, proceed in reverse order.

Do the following to set the device ID:

1. Set the rotary switch next to the 10-pole connector J1 to the desired device ID (0 to 15, with positions A to F corresponding to numbers 10 to 15).



Note: A changed device ID only takes effect after the PCAN-MicroMod FD Digital 1/2 has been restarted.

4.2 Activate Internal CAN Bus Termination

For correct termination of a High-speed CAN bus (ISO 11898-2), a 120-ohm resistor must be inserted at both bus ends between the CAN-High and CAN-Low lines. If the PCAN-MicroMod FD Digital 1/2 is to be connected to one end of the High-speed CAN bus, the internal termination can be activated to take the termination on this side of the CAN bus. This is done with a switch on the board. For this you have to remove it from the casing.

Tip: We recommend terminating the CAN cabling directly, for example with termination resistors. This allows CAN nodes to be flexibly connected to the bus.

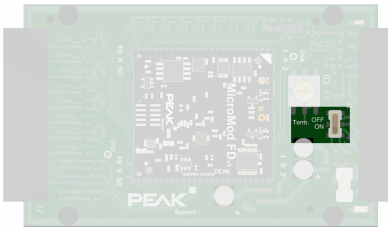
To open the casing and remove the circuit board:

Attention! Electrostatic discharge (ESD) can damage or destroy components on the circuit board. Take precautions to avoid ESD when handling the circuit board.

1. Remove the mating connectors from the device.
2. On one connection side of the casing, remove the two screws to the right and left of the connector and remove the plate including the rubber sleeve.
3. Pull the board out of the side of the casing.
4. For later assembly, proceed in reverse order.

Do the following to activate the internal termination:

1. Set the slide switch next to the 10-pole connector J1 to the “ON” position.



5 Configuration Software

With the enclosed configuration software PCAN-MicroMod FD Configuration for Windows, you can create, edit, and then transmit configurations via CAN to one or more CAN nodes with PCAN-MicroMod FD (for example the PCAN-MicroMod FD Digital 1/2).

5.1 Prerequisites for the Configuration Transfer

- Windows 10, 8.1, 7 (32/64-bit)
- PC-CAN interface from PEAK-System, e.g. PCAN-USB FD
- CAN bus connection between the CAN node with PCAN-MicroMod FD and the PC-CAN interface

5.2 Installing the Configuration Program

The installation program for PCAN-MicroMod FD Configuration is located on the supplied storage medium.

Steps of the software installation:

1. Start the navigation program `Intro.exe` (on the storage medium).
2. Klick on *English* > *Tools*.
3. In the list, scroll to the entry *PCAN-MicroMod FD Configuration*. Klick on *Install* there.
4. Follow the instructions of the installation program.

You can find further information about the use of the program PCAN-MicroMod FD Configuration in the help which you can invoke in the program (for example with the F1 key).

6 Firmware Update

The PCAN-MicroMod FD Digital 1/2 can receive a firmware update via CAN. This is done with the Windows program PCAN-Flash, located on the supplied storage medium.

Go through the following sections for a firmware update.

6.1 System Requirements

- Operating system Windows 10, 8.1, 7 (32/64-bit)
- PC-CAN interface from PEAK-System
- CAN cabling between the PC-CAN interface and the PCAN-MicroMod FD Digital 1/2 with proper termination (120 Ω on each end of the CAN bus).

6.2 Preparing the Software

PCAN-Flash is used for the transfer of the firmware via CAN. It is located on the supplied storage medium in the following directory:

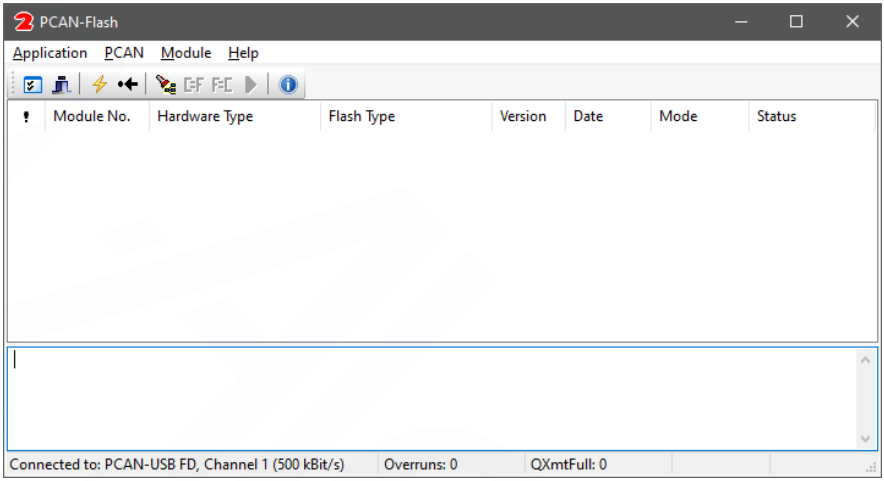
```
\Tools\PCAN-Flash
```

Copy the directory onto a storage medium of your computer.

6.3 Sending the Firmware

Do the following to update the firmware:

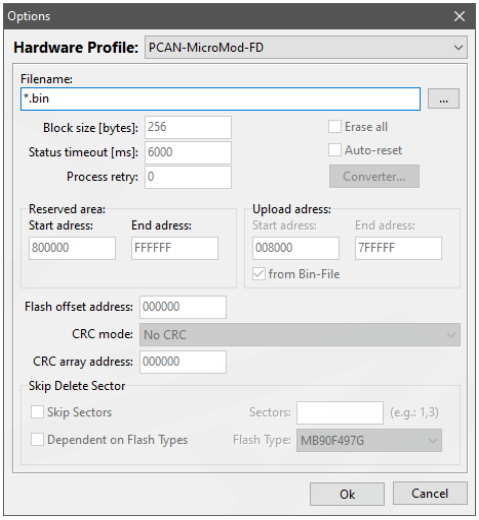
1. Start the program `PcanFlash.exe`.



2. Select *Application* > *Option* .

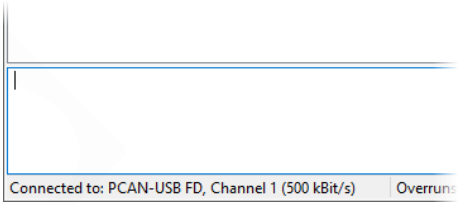
   The corresponding dialog window appears.

3. From the *Hardware Profile* dropdown list, select the *PCAN-MicroMod FD* entry.

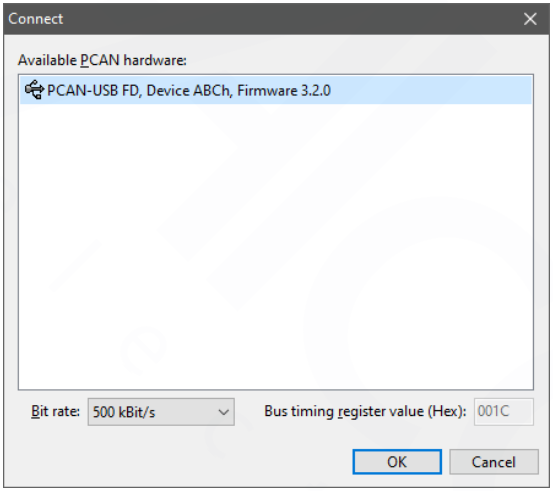


4. Click on dots button (…) next to the *File name* field in order to select the desired firmware file (`*.bin`) for the update.
5. Close the dialog box with *Ok*.

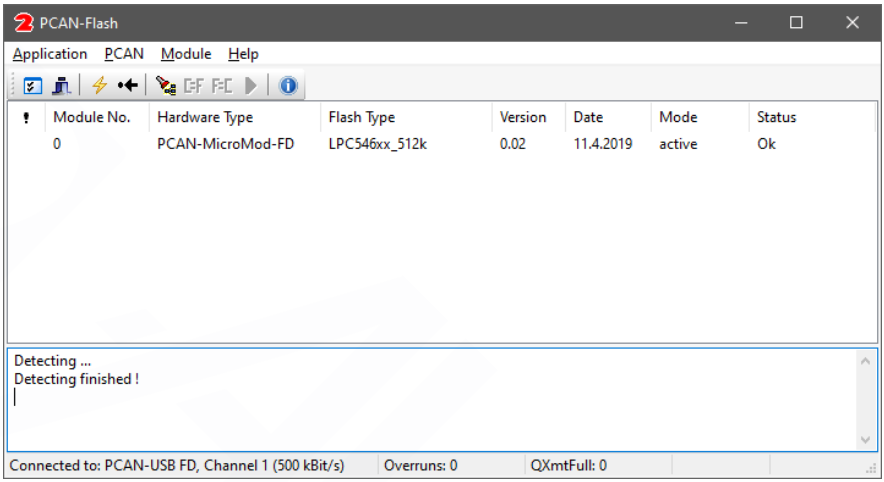
6. Make sure that the PCAN-Flash program is connected with 500 kbit/s to the available CAN interface at the computer.



If not, select *PCAN* > *Connect* in order to change the selection in the according dialog box.



7. Select *Module* > *Detect* in order to detect the PCAN-MicroMod FD being connected to the CAN bus. The main window shows a corresponding entry.



8. Select the entry for the PCAN-MicroMod FD.
9. Select *Module* > *Activate* in order to activate the flash mode of the PCAN-MicroMod FD Digital 1/2.

   The *Activity* blinks quickly orange and indicates that the flash mode for CAN is active.

10. Select *Module* > *Program* in order to start the update process.

    It was successful if in the status panel the last message to appear is “Flashing of module(s) finished!”.

11. Restart the PCAN-MicroMod FD Digital 1/2 by briefly interrupting the power supply.

6.4 Activate Flash Mode by Hardware

If the PCAN-MicroMod FD Digital 1/2 cannot be set to flash mode by PCAN-Flash, this can be alternatively done by hardware:

1. Disconnect the left 10-pin mating connector for the basic supply.
2. Make a connection between pin 1 *Ub* and pin 7 *Boot* at the mating connector.
3. Reconnect the mating connector to the PCAN-MicroMod FD Digital 1/2 and thus also reconnect the power supply.

   The *Activity* LED blinks quickly orange and indicates that the flash mode for CAN is active.

7 Technical Specifications

Digital inputs	
Count	8
Connectors	DIn_0 … DIn_7
Input voltage maximum	+50 V
Input impedance	69 kΩ (without Pull-up or Pull-down)
Input circuitry	Set per input by configuration: - Open - Pull-up: 4.7 kΩ to supply voltage - Pull-down: 4.7 kΩ to ground
Switching threshold Low → High	> 5.8 V typ. (4.5 V – 7.5 V)
Switching threshold High → Low	< 3.5 V typ. (2.2 V – 4.5 V)
Low-pass	f_g = 3 kHz

Digital outputs	**Digital 1**	**Digital 2**
Count	8	8
Connectors	DOutL_0 … DOutL_7	DoutH_0 … DOutH_7
Type	Low-side switch	High-side switch
Driver chip	Infineon AUIPS2052G	STMicroelectronics VN800PS-E
Voltage maximum	35 V on load	36 V (input)
Output current nominal	0.9 A	0.7 A
Output current maximum (current limiting)	1.2 A minimum 1.8 A typical 3.0 A maximum	2.0 A
PWM mode	Frequency range 0 to 20 kHz PWM resolution determined by internal timer with 10 MHz (e.g. 0.1 % at 10 kHz)	

Frequency outputs

Count	2
Connectors	FOut_0 … FOut_1
Frequency maximum	10 kHz
Type	Low-side switch
Driver chip	Infineon AUIPS2052G
Voltage maximum	35 V on load
Output current nominal	0.9 A
Output current maximum (current limiting)	1.2 A minimum 1.8 A typical 3.0 A maximum

CAN

Protocols	CAN FD ISO 11898-1:2015, CAN 2.0 A/B		
Physical transmission	ISO 11989-2 (High-speed CAN)		
Transceiver	Microchip MCP2558FD		
CAN bitrates	20 kbit/s – 1 Mbit/s		
CAN FD bitrates	20 kbit/s – 10 Mbit/s		
Supported Clock frequencies	20 MHz, 40 MHz, 80 MHz		
Supported bit timing values		Nominal	Data
	Prescaler (BRP)	1 – 512	1 – 32
	Time Segment 1 (TSEG1)	1 – 256	1 – 32
	Time Segment 2 (TSEG2)	1 – 128	1 – 16
	Synch. Jump Width (SJW)	1 – 128	1 – 16
Galvanic isolation	none		
Termination	switchable on board (120 Ω between CAN-High and CAN-Low)		
Voltage immunity	±20 V		
CAN ID reserved for configuration transfer	7E7h		

CAN bootloader

Connection	Boot
Activation	High-active (switching threshold 1.7 V) during reset

Serial RS-232 interface

Use	Currently no use
Connectors	UART_Rx, UART_Tx
Bit rates	max. 38,400 Baud
Signal level max.	±15 V

Power supply

Operating voltage Ub	8 – 30 V DC, 12 V nominal
Current consumption	max. 100 mA, typ. 45 mA at 12 V without load

Measures

Casing measures	Without mating connectors: 87 x 58 x 28 mm With mating connectors: 121 x 58 x 28 mm See also Appendix B *Dimension Drawings* on page 27
Weight	Without mating connectors: 115 g With mating connectors: 135 g

Connectors

Type	Spring terminal blocks
Mating connector for basic connectivity (left)	Phoenix Contact FMC 1,5/10-ST-3,81 (10-pole, single-row, 3.81 mm pitch)
Mating connector for I/O (right)	Phoenix Contact DFMC 1,5/11-ST-3,5 (22-pole, double-row, 3.5 mm pitch)

Environment

Operating temperature	−40 – +85 °C (−40 – +185 °F)
Temperature for storage and transport	−40 – +100 °C (−40 – +212 °F)
Relative humidity	15 – 90 %, not condensing
Ingress protection (IEC 60529)	IP20

Conformity	
EMC	EU directive 2014/30/EU DIN EN 61326-1:2013-07
RoHS 2	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-MicroMod FD Digital 1/2**

Item number(s): **IPEH-003083/84**

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)

DIN EN 50581 VDE 0042-12:2013-02
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances;
German version EN 50581:2012

EU Directive 2014/30/EU (Electromagnetic Compatibility)

DIN EN 61326-1:2013-07
Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements (IEC 61326-1:2012);
German version EN 61326-1:2013

Darmstadt, 12 December 2019

Uwe Wilhelm, Managing Director

Appendix B Dimension Drawings

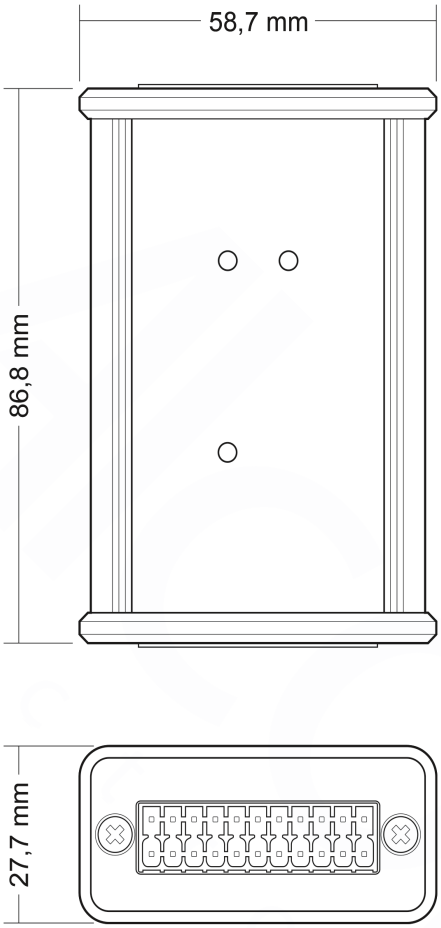


Figure 5: Dimension drawing with top view and side view.
The scale of the drawings differs from an 1-to-1 representation.