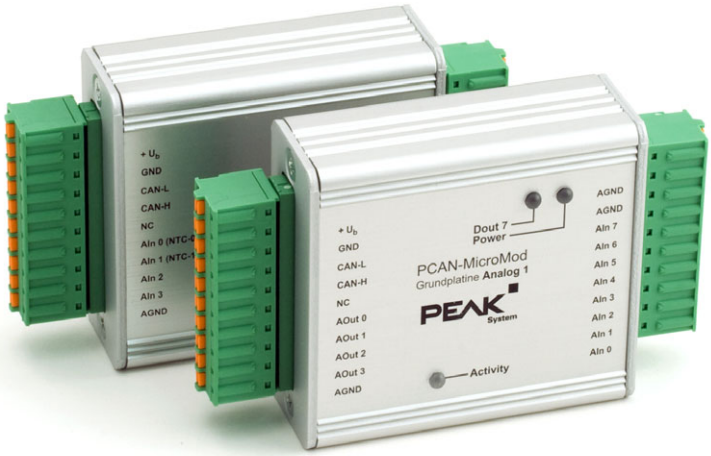
Mix 1

Motherboard for the PCAN-MicroMod

User Manual



PEAK System

Products taken into account

Product Name	Model	Item Number
PCAN-MicroMod Motherboard Mix 1	Including casing and PCAN-MicroMod	IPEH-002202

The picture on the front page shows the PCAN-MicroMod Motherboard Analog 1 in the foreground. All other Motherboards have the same design, but differ in port assignment and labeling.

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1 Introduction

The Motherboards from PEAK-System Technik provide an accommodated environment for the PCAN-MicroMod. This includes input and output circuits, an aluminum casing, and connectors. This way you can use the MicroMod e.g. at instrument manufacture, plant construction, or in the automotive industry.

The motherboard Mix 1 serves common analog and digital requirements and supports temperature measurement.

Note: This manual only refers to the motherboard itself as base for a PCAN-MicroMod. There is separate documentation regarding the hardware and the software of the PCAN-MicroMod.

1.1 Properties at a Glance

- 6 digital inputs with following properties:
  - Pull-up or pull-down circuit selectable (in 3 groups)
  - High state at 5 to 18 V input voltage
  - Schmitt trigger behavior, inverting
  - Low-pass behavior
  - Parallel connection of a frequency input (for each digital input 0 to 3) for alternative use (e.g. fast changes of state or countings)
- 2 temperature inputs for connection of thermistors, measuring range 0 to 70 °C (32 to 158 °F)

- 2 analog inputs with following properties:
  - Pull-down circuit
  - Measuring range unipolar, 0 to 5 V
  - Measuring range extension possible
  - Protection against undervoltage and overvoltage
- 2 digital outputs (“frequency outputs”) with following properties:
  - Fast low-side switches, max. 55 V, 0.75 A
  - Short circuit protection
- Status LEDs for power supply and digital output
- Spring-cage connectors (optionally with screw connection)

1.2 Special Prerequisites for the Operation

– None –

1.3 Scope of Supply

The scope of supply normally consists of the following parts:

- Module with following components: motherboard Mix 1, PCAN-MicroMod, metal casing
- Terminal block connectors for the motherboard
- User manual

2 Configuring the Module

You can customize the motherboard by modifying the hardware. The following subsections contain descriptions about possible modifications.

Accessing the Motherboard

In order to carry out the modifications described in the following you must unscrew the lids of the casing, remove the motherboard from the casing, and remove the MicroMod, if needed.

Remounting the MicroMod

When you remount the MicroMod, take notice of the white triangular marks on each the motherboard and the MicroMod (upper left corner, see Figure 1). These marks must align. Another help may be the orientation of the labeling. With a mounted MicroMod the labels have the same orientation on both PCBs (not upside down).

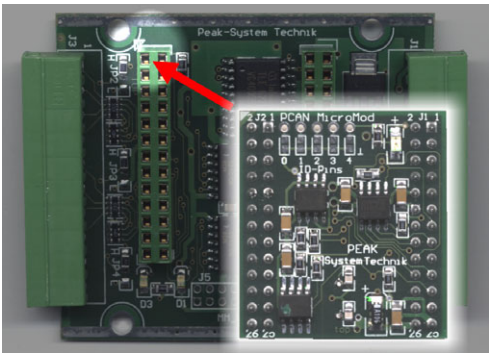

Figure 1: Positioning of the MicroMod

2.1 Modification on Nominal Supply Voltages > 12 V

If you want to supply the motherboard Mix 1 with a nominal voltage $+U_b$ > 12 V (usually 24 V), then you must do the following modification:

1. Equip the unpopulated position D6 (see Figure 2) with a reference diode BZV55C12.

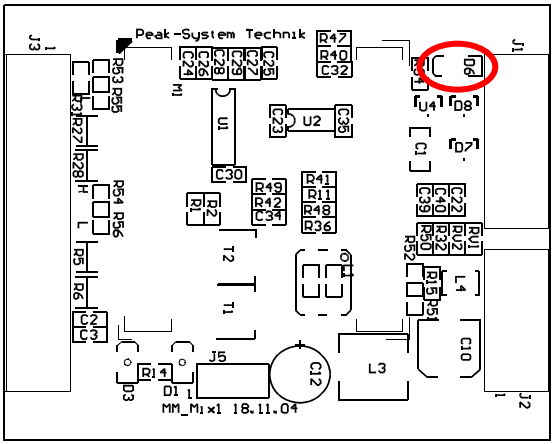

Figure 2: Position D6 (upper side of the PCB)

2. Replace the 0-Ohm resistor on position R33 (on bottom side of the PCB, see Figure 3) with a resistor of 1.6 kΩ.

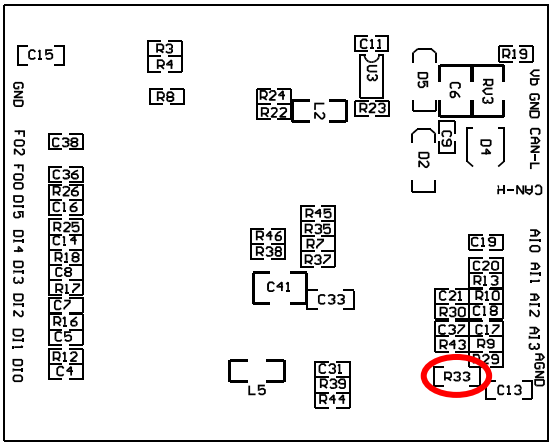

Figure 3: Position R33 (bottom side of the PCB)

Note: You don't need to consider voltage fluctuations that might occur. A modification isn't required in that case. Example: In the automotive field up to 18 V may arise at a nominal voltage of 12 V.

2.2 Pull-up/Pull-down Circuits of the Digital Inputs

At delivery all digital inputs are set to pull-up circuits. You can set them to pull-down circuit in groups. This is done by repositioning resistors. The assignment is as follows:

Digital inputs	Pull-up ($+U_b$)*	Pull-down (GND)
DI 0	R31 (2.7 kΩ)	R12 (2.7 kΩ)
DI 1 and DI 2	R53 (0 Ω)	R55 (0 Ω)
DI 3 to DI 5	R54 (0 Ω)	R56 (0 Ω)

* Default setting

Attention! Double-check for inadvertent short circuits after altering the setup, especially at positions R53/R55 and R54/R56.

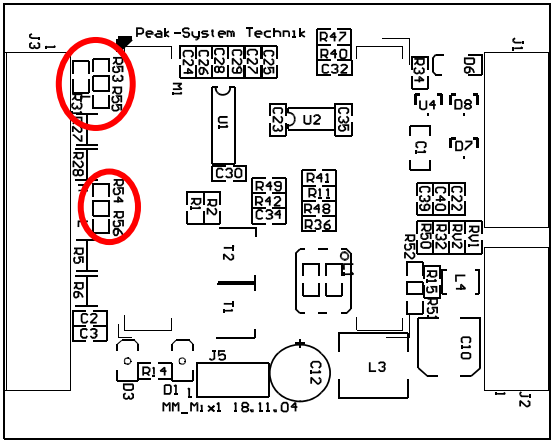

Figure 4: Positions R31, R53/R55, R54/R56

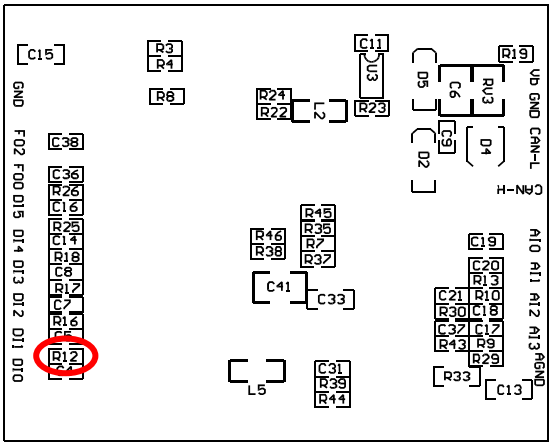

Figure 5: Position R12 (bottom side of the PCB)

2.3 Measuring Range Extension of the Analog Inputs

You can extend the measuring range of each analog input to a higher maximum voltage than 5 Volts by using a voltage divider. On shipment of the motherboard the resistor positions R30 and R43 on the bottom side of the PCB (see Figure 6) are not equipped. By inserting a resistor R_x with a value calculated with the following formula the measuring range is extended to the desired maximum voltage U_{MB}.

$$R_x = \frac{2.4\,k\Omega}{\frac{U_{MB}}{5\,V} - 1} \quad (U_{MB} > 5\,V)$$

Analog input	Insert R_x on position
AIn 2	R30
AIn 3	R43

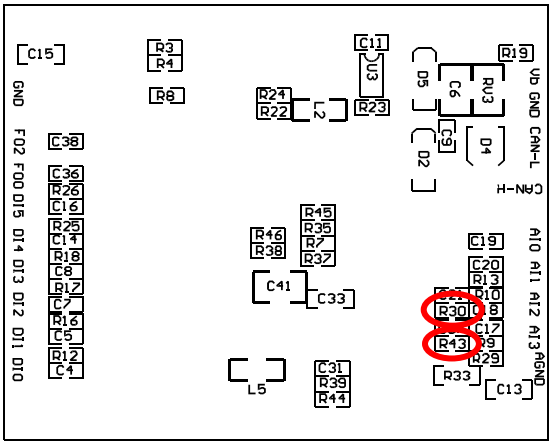

Figure 6: Positions R30 and R43 (bottom side of the PCB)

3 Operation

3.1 Pin Assignment

The motherboard has two connectors, J1/2 on the left and J3 on the right. The pin assignment is as follows:

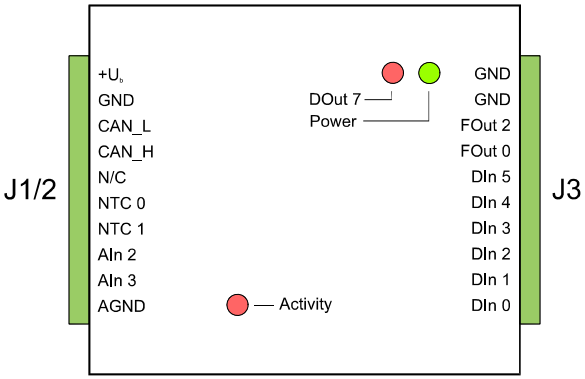

Figure 7: Pin assignment of the motherboard Mix 1

Function label J1/2	Function
$+U_b$	Operating voltage 8 - 30 V DC
GND	Digital ground
CAN_L	Differential CAN signal
CAN_H	
N/C	Not connected
NTC 0	Temperature measurement NTC (connection against AGND)
NTC 1	
AIn 2	Analog input
AIn 3	
AGND	Analog ground

Function label J3	Function
GND	Digital ground
GND	
FOut 2	Frequency output
FOut 0	
DIn 5	Digital input
DIn 4	
DIn 3	Digital input, frequency input parallel
DIn 2	
DIn 1	
DIn 0	

3.2 Assignment Functions/MicroMod Services

The motherboard's inputs and outputs are controlled by the services of the MicroMod. They are set up with PCAN-MicroMod Configuration, a Windows application coming with the PCAN-MicroMod. The following table shows the assignment of the motherboard functions to possible MicroMod services and indicates special settings (column “Remark”).

Function on motherboard	Function label	MicroMod channels	MicroMod service(s)	Remark
Digital input, frequency input	DIn 0 … DIn 5	DI 0 … DI 5	Digital Input Digital Function Rotary Encoder	
		FI 0 … FI 3	Frequency Input	Parallel to channels DI 0 to DI 3
Temperature measurement	NTC 0, NTC 1	AI 0, AI 1	Analog Input Curve	Input values are anti-proportional to the temperature

Function on motherboard	Function label	MicroMod channels	MicroMod service(s)	Remark
Analog input	AIn 2, AIn 3	AI 2, AI 3	 Analog Input  Curve  Analog Hysteresis	
Frequency output	FOut 0, FOut 2	FO 0, FO 2	 PWM and Frequency Output	For higher-frequency status changes

3.3 Status LEDs

The motherboard incl. MicroMod has three LEDs with the following status indications:

LED	Indication
Power (green)	Power is applied.
DOut 7 (red)	Is directly related to the digital output DO 7 of the MicroMod and can be configured freely in its function for status indication. For example, you could implement an error indication with help of the MicroMod service “Constant Value / Statistic Data”.
Activity (red)	Status of the MicroMod. During normal operation it blinks at a frequency of 1 Hz.

You can find further information about the MicroMod (configuration, status LED) in the corresponding documentation, e.g. the help for PCAN-MicroMod Configuration (Windows software).

4 Technical Specifications

Power supply	
Operating voltage $+U_b$	8 - 30 V DC (±5 %)
Current consumption	Max. 200 mA, typ. 35 mA at 12 V w/o load
Reverse polarity protection	Yes, ±30 V
Overvoltage protection	±30 V static, ±500 V surge
Ripple 5 V	< 50 mV (U_b = 12 V, 200 mA load)
Ripple analog	< 20 mV

Digital inputs	
Switching thresholds	UIH = 4 V; UIL = 3 V, contact or logic level
Input impedance	2.7 kΩ
Open input	Pull-up circuit, optional pull-down circuit (in groups)
Overvoltage protection	±30 V
Low-pass	f_g = 7 kHz
Special feature	Frequency inputs of the PCAN-MicroMod parallel (only DIn 0 to DIn 3)

Digital/frequency outputs	
Type	Low-side
Voltage proof	< 55 V
Output current	0.75 A (constant current)
Short circuit protection	Yes, short circuit currents: 1.2 A

Analog inputs	
Measuring range	0 to 5 V, extendable
Resolution	10 bits
Source impedance	< 5 kΩ
Overvoltage protection	±30 V
Low-pass	f_g = 300 Hz

Temperature measurement	
Reference sensor type	Thermistor EC95F103W (e.g. RS Components part no. 151-237, form factor: bead)[1]
Measuring range	0 to 70 °C (32 to 158 °F) corresponding 5 to 0 V (antiproportional)[1]
Resolution	±1.0 °C (due to sensor)

CAN	
Type	High-speed, typ. 500 kBit/s, setup with MicroMod Configuration Tool (Windows software)

Noise immunity	
Tests	According to IEC 61000 and DIN EN 61 326
Peculiarity surge	±500 V (specification industrial sector: ±1 kV)[2]
Peculiarity line-conducted HF compatibility	10 V_{eff} (specification: 3 V_{eff})

Measures	
Casing size (incl. connectors)	55 x 68 x 24 mm (3 1/16 x 1 5/8 x 13/16 Inches) (See also dimension drawing, Appendix B on page 17)
Weight	109 g (3.84 oz.)

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

[1] Other sensor type and measuring range on request

[2] This specification could only be fulfilled with ±500 V due to the available space. Therefore the motherboard should be used with a local power supply.

Appendix A Certificates

A.1 CE

PCAN-MicroMod Motherboard IPEH-002202/03
PEAK-System Technik GmbH

EC declaration of conformity

Notes on the CE Symbol CE

The following applies to the PCAN-MicroMod Motherboard product IPEH-002202/03.

EC Directive

This product fulfills the requirements of EC directive 89/336/EEC on "Electromagnetic Compatibility," and is designed for the following fields of application as per the CE marking:

Electromagnetic immunity/emmisson[1]
DIN EN 61326, Release: 2004-05
Electrical equipment for measurement, control and laboratory use – EMC requirements (IEC 61326-1:1997 + IEC 61326-1/A1:1998 + IEC 61326/A2:2000 + Annex E & F of IEC 61326:2002 + corrigendum: 2002);

German version: 61326:1997 + EN1326/A1:1998 + EN61326/A2:2001 + EN61326/A3:2003

Declarations of Conformity

In accordance with the above mentioned EU directives, the EC declarations of conformity and the associated documentation are held at the disposal of the competent authorities at the address below:

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Signed this 12th day of September 2004

Appendix B Dimension Drawing

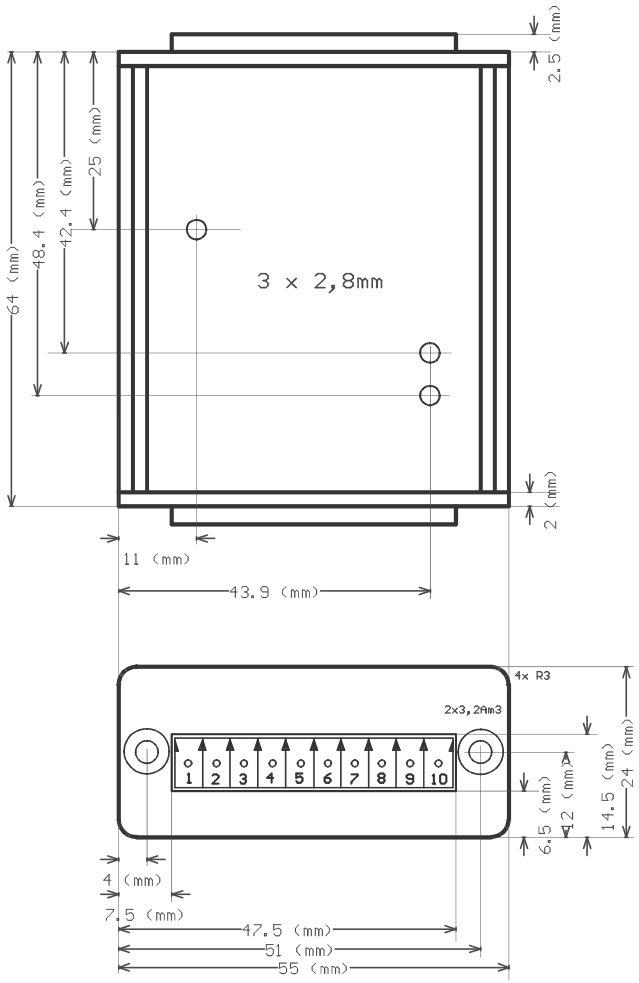

Figure 8: Top view and view of front side with connector

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