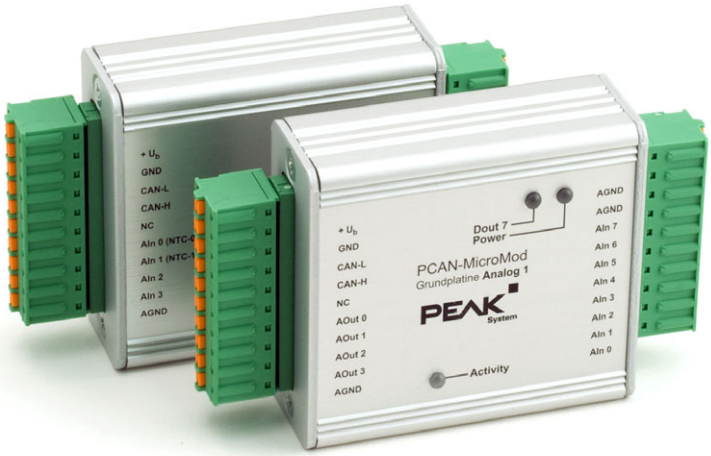
Mix 2

Motherboard for the PCAN-MicroMod

User Manual



PEAK System

Products taken into account

Product Name	Model	Item Number
PCAN-MicroMod Motherboard Mix 2	Including casing and PCAN-MicroMod	IPEH-002203

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.

PEAK-System Technik GmbH
Otto-Roehm-Strasse 69
64293 Darmstadt
Germany

Phone: +49 (0)6151-8173-20
Fax: +49 (0)6151-8173-29

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

Issued 2008-09-23

Contents

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 2 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

- 2 digital inputs with following properties:
  - Pull-up or pull-down circuit selectable (for both together)
  - High state at 5 to 18 V input voltage
  - Schmitt trigger behavior, inverting
  - Low-pass behavior
  - Parallel connection of a frequency input each (alternative use, e.g. for quick changes of state or countings)
- 2 temperature inputs for connection of an NTC thermistor and a platinum sensor PT1000, measuring range each 0 to 70 °C (32 to 158 °F)

- 3 analog inputs with following properties:
  - Pull-down circuit
  - Measuring range unipolar, 0 to 4.1 V
  - Measuring range extension possible
  - Low-pass behavior
  - Protection against undervoltage and overvoltage
- 1 digital output with following properties:
  - Fast low-side switch, max. 55 V, 0.75 A
  - Short circuit protection
- 1 analog output with following properties:
  - Voltage range 0 to 10 V based on PWM
  - Load ability: 15 mA, short-circuit proof
- 1 analog output with current intensity 0 to 20 mA based on PWM
- 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).

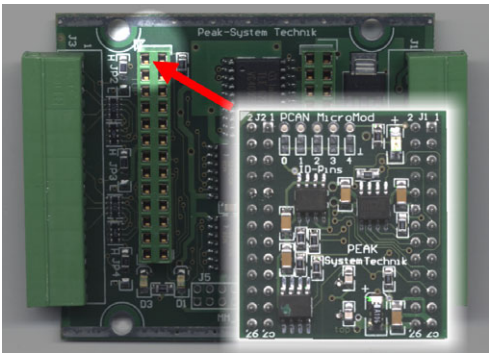


Figure 1: Positioning of the MicroMod

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

At delivery the digital inputs are set to pull-up circuits. You can set them to pull-down circuit. This is done by repositioning a 0-Ohm resistor. The assignment is as follows:

Digital inputs	Pull-up ($+U_b$)*	Pull-down (GND)
DI 0 and DI 1	R73 (0 Ω)	R74 (0 Ω)

* Default setting

Attention! Double-check for an inadvertent short circuit after altering the setup.

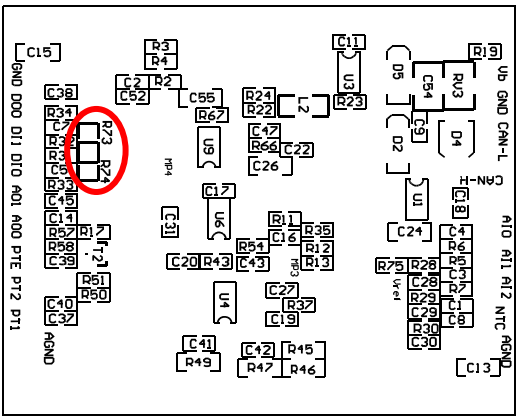


Figure 2: Position R73/R74 (bottom side of the PCB)

2.2 Measuring Range Extension of the Analog Inputs

You can extend the measuring range of each analog input to a higher maximum voltage than 4.1 Volts by using a voltage divider. On shipment of the motherboard the resistor positions R28 to R30 on the bottom side of the PCB (see Figure 3) 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}.

$$R_x = \frac{2.4\,k\Omega}{\frac{U_{MB}}{4.1V} - 1} \quad (U_{MB} > 4.1V)$$

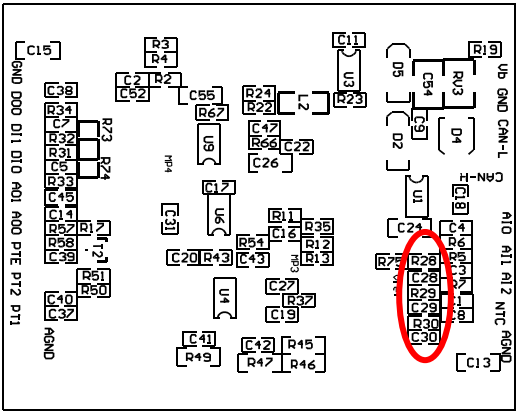


Figure 3: Position R28 to R30 (bottom side of the PCB)

2.3 Using a PT1000 with Three-Wire Connection

At shipment the motherboard Mix 2 is configured to be used with a PT1000 thermistor with two-wire connection. If you would like to use a PT1000 with three-wire connection instead (e.g. in case of a long connection cable), you must remove the 0-Ohm resistor on the PCB located at position R76 (directly at connector J3, see Figure 4).

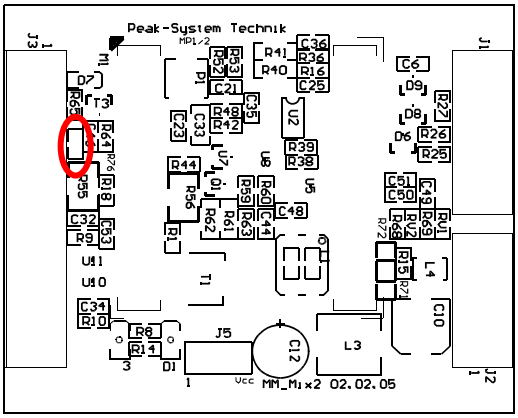


Figure 4: Position R76

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:

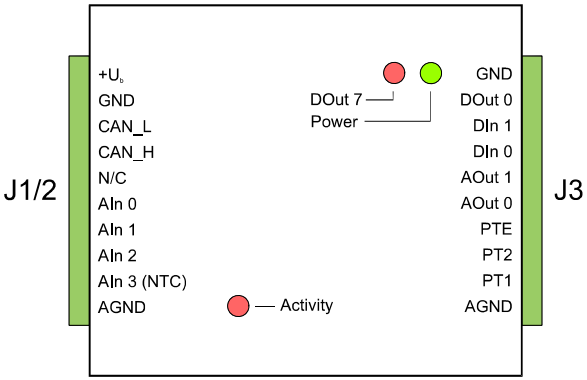


Figure 5: Connectors of the motherboard Mix 2

Function label J1/2	Function
$+U_b$	Operating voltage 12 - 24 V DC
GND	Digital ground
CAN_L	Differential CAN signal
CAN_H	
N/C	Not connected
AIn 0	Analog input
AIn 1	
AIn 2	
AIn 3 (NTC)	Temperature measurement NTC (connection against AGND)
AGND	Analog ground

Function label J3		
GND	Digital ground	
DOut 0	Digital output	
DIn 1	Digital input	
DIn 0		
AOut 1	Analog output for current (PWM)	
AOut 0	Analog output for voltage (PWM)	
PTE	Temperature measurement PT1000	Reference point
PT2		Input
PT1		Input
AGND	Analog ground	

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	DIn 0, DIn 1	DI 0, DI 1	Digital Input Digital Function Rotary Encoder	
Digital output	DOut 0	DO 0	Digital Output	Higher-frequent state changes are not possible
Temperature measurement NTC	AIn 3 (NTC)	AI 3	Analog Input Curve	See also table in section 3.3

Function on motherboard	Function label	MicroMod channels	MicroMod service(s)	Remark
Temperature measurement PT1000	PTx	AI 4	Analog Input Curve	
Analog input	AIn 2, AIn 3	AI 2, AI 3	Analog Input Curve Analog Hysteresis	See also table in section 3.3
Analog output for voltage	AOut 0	FO 0	PWM and Frequency Output	
Analog output for current	AOut 1	FO 2	PWM and Frequency Output	Inverting

3.3 Relation Temperature/Digits

Since the NTC thermistor doesn't provide a linear assignment between temperature and the resulting voltage, the use of interpolation values can be expedient. With these values you can create an assignment curve with the corresponding MicroMod service. For the PT1000 this procedure is not necessarily needed, because it works almost linear in the defined temperature range.

The following table provides the assignment between a temperature and the resulting voltage or the digits respectively.

Temperature (°C)	Digits* NTC	Digits* PT1000
0	1023	2
2	1010	
5	974	89
10	911	164
15	841	235

Temperature (°C)	Digits* NTC	Digits* PT1000
20	765	310
25	683	380
30	602	455
35	516	424
40	432	598
45	348	558
50	268	742
55	192	812
60	121	886
65	57	956
70	3	1023

* 1 digit ≡ 4 mV

3.4 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 $+U_b$	12 - 24 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

Analog inputs	
Measuring range	0 to 4.1 V, extendable
Resolution	10 bits
Source impedance	< 5 kΩ
Overvoltage protection	±30 V
Low-pass	f_g = 300 Hz

Analog outputs	
Type	PWM based
Voltage AOut 0	0 to 10 V
Resolution	Full percentage steps (0 to 100 %)
Load ability AOut 0	15 mA
Current AOut 1	0 to 20 mA (inverting)
Load ability AOut 1	≤ 100 Ω

Temperature measurement NTC	
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 4.1 to 0 V (antiproportional)[1]
Resolution	±1.0 °C (due to sensor)

Temperature measurement PT1000	
Sensor type	PT1000, two- or three-wire connection
Measuring range	0 to 70 °C (32 to 158 °F) corresponding 0 to 4.1 V
Resolution	10 bits
Resolution	±0,5 °C

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
Overvoltage protection	±30 V
Low-pass	f_g = 7 kHz
Special feature	Frequency inputs of the PCAN-MicroMod parallel

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

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

[1] Other sensor type and measuring range on request

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 19)
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

[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:

PEAK-System Technik GmbH
Mr. Wilhelm
Otto-Röhm-Str. 69
D-64293 Darmstadt
Germany

phone: +49 6151 81 73-20
fax.: +49 6151 81 73-29
info@peak-system.com

Signed this 12th day of September 2004

Appendix B Dimension Drawing

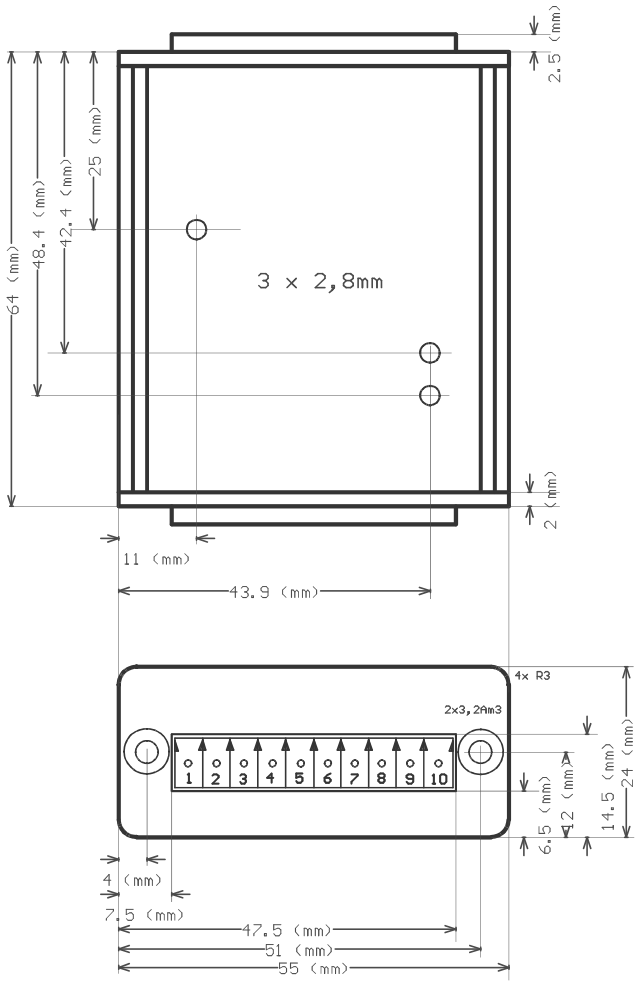


Figure 6: Top view and view of front side with connector

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