

# OPERATION MANUAL



## USB-I<sup>2</sup>C-adapter for B+B Temperature-module with I<sup>2</sup>C-output

### Description



USB-I2C-KAB, consisting of adapter-cable, USB-adapter, USB-connection cable and software on CD

### Characteristic features

- Universal USB on I<sup>2</sup>C Adapter
- For all B+B Temperature modules with I<sup>2</sup>C-output
- Simple serial ASCII-protocol
- Operation possible over terminal

### Areas of application

- Probe testing, product development
- Interface for own PC-based products
- Configuring I<sup>2</sup>C-Bus address
- Calibration of ASICs

### Technical data

PC-USB Schnittstellenadapter für I <sup>2</sup> C	
Interface	USB-interface, 1.1 and 2.0 compatible
Dimensions (B x H x T)	79 x 21 x 39 mm
Sensor connection	Over RJ11 plug, 6-pin
Serial communication	19200 Baud, 8N1, ASCII protocol
Operating voltage	8 V/10 mA for ASIC-module
Voltage source	Over USB-interface
Operating current	max. 80 mA
CC-conformance	2004/108/EG
EMV-noise emission:	EN 61000-6-3:2011
EMV-noise withstanding	EN 61000-6-2:2007
Scope of supply	USB-I <sup>2</sup> C-adapter, consisting of adapter-cable, USB-adapter, USB-connection cable and software on CD
Articleno.	USB-I2C-KAB

### Attention

Please avoid extreme mechanical and inappropriate exposure.

The device/product is not suitable for potential explosive areas and medical-technical applications.

### Description

In order to support the user for integration of own ASIC module with I<sup>2</sup>C-Interface, we have developed this easy to handle PC interface. The probe can be operated with a PC to test the functionality and capture the measured values of sensors.

In principle it is an USB on a I<sup>2</sup>C-converter, which is addressed by a simple ASCII sequence. The USB-driver software emulates a serial COMinterface.

The ASCII protocol of data communication is well documented. Hence, integration into own programs through standard communication routines of all the modern programming languages is possible.

The interface adapter is also suitable for accessing the ASIC, for example, to program another I<sup>2</sup>Caddress.

Further information on ASIC and programming can be obtained on request.



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Connection layout of plug module

6-pole multi-pin connector		
1	VDD	Supply voltage 6...12 V
2	GND	Ground
3	SDA	Serial Data I <sup>2</sup> C
4	SCL	Serial Clock I <sup>2</sup> C
5	VRH/OWI	RH Voltage Output/OWI
6	---	Not used



### Quick start with 'TERATERM'

TERATERM is an universal, efficient terminal program which you can find in the installation version on the enclosed CD. TERATERM is a free ware; you can find the license requirements and copyright note in the installation directory.

Connect the sensor module to the USB adapter. If necessary, use the adapter cable supplied with the adapter.

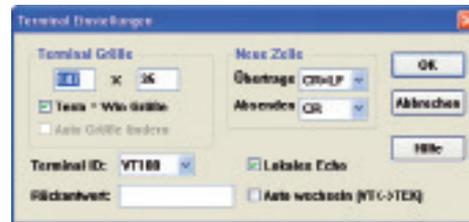
Now connect the USB adapter to the PC. The installation of the software should automatically take place in Windows XP. If driver files are required, these are available on the CD in the directory „Driver“ for different operating systems.

In rare cases, when the installation of hardware does not work at the first attempt, you can intervene in the control panel. Further hints on this can be found in the FAQs on the CD. After the hardware is operational, the message „The new hardware can now be used“ appears on the screen.

Now install the terminal program TERATERM from the enclosed CD and start the program. Select the interface under „Serial port“ where the device is connected and set the following communication parameters:



Then carry out the following settings under „Terminal settings“:



After this, the system should be operational.

### Reading the values

Note: <CR> means “pressing the carriage return key”.

First test the connection with the hardware: For each character sent, the red LED on the USB adapter shortly blinks. If the device answers a telegram, the green LED also blinks. First send the character V <CR>. In response, the USB adapter should reply back the version string:



As per the revision status of the software the contents can vary, if needed, but a response must come.

If you can not establish the connection here, then check the hardware in Windows control panel and also all other settings mentioned before. After the connection to the module is functional, first you must initialise the adapter:

**T11200 <CR>**

To start the reading, the operating voltage to the sensor must be switched on:

**IRT78004 <CR>**

After this command, the LED near the probe connection glows red and it shows that the operating voltage is present at the measuring probe. The sensor replies with 8 characters, in the example it is :3F3944C1. These are the first set of measured values.



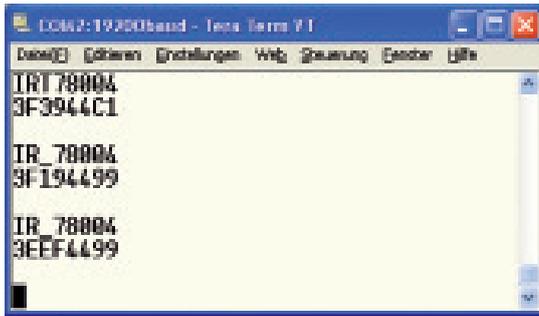
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Now, in order to fetch further measured values, every time you will have to enter:

IR\_78004 <CR>



Each time the USB-module replies with the current measured values.

### Interpretation of values

The left four hex numbers are the first channel (e.g. humidity or pressure) and the following four hex numbers are the values of second channel, usually for the temperature of the module, if used.

Module	Channel 1	Channel 2
Humidity module	rel. humidity	un-calibrated
Feuchte-		
Humidity-Temp. module	rel. humidity	Temperature
PT1000	PT1000	
PT1000 Temp. module	Temperature	un-calibrated
Thermoelemente		
Thermo element		Temperature
Temp. module	Thermovoltage	calibration point
Pressure module	Pressure	un-calibrated

### Conversion of measured values

The following example refers to the **Humidity-Temperature module** and the transmitted string ,3EEF4499 , in the answer:

The front four digits ,3EEF' are the humidity value, the following digits ,4499' are for the temperature value in hexadecimal format.

Now, first the **Humidity value** is converted from HEX to decimal (in example 16111) and then divided by 327,68 as per the data sheet. On rounding the two post comma places, the humidity value in decimal format comes out as 49.17 % RH.

The **Temperature value** is also first converted into decimal (17561) and then divided by 256 as per data sheet and 32 is subtracted from the result.

After rounding off the two post comma places, it results in the temperature value of 36.60 °C.

With the other modules under consideration. One has to proceed in the same way as per data sheet.

### Command overview for examples

The USB-adapter has a very extensive command set. Detailed description is available on the enclosed CD. The following explanations are only related to the commands used in the above examples:

#### ,V' Statement of version string

This command responds back with the version string of the controller Firmware.

#### ,T11200' Initialising

Definition of operating voltage and the time delay before the first communication. This command must be sent before the first I<sup>2</sup>C communication takes place. The last 3 digits are for the time delay after switching on the operating voltage and before the first reading of measured value.

#### ,IRT78004' I<sup>2</sup>C Read with on-timing

This command switches on the operating voltage, waits for the time delay as defined in the initialising sequence and then finishes reading over I<sup>2</sup>C at the address stated in the ASIC.

The first two digits (78) are the 7-bit I<sup>2</sup>C address of the ASIC. The following 3 digits (in example 004) determines the number of digits to be read.

The ASIC always responds to the address 78, however it can also be programmed at another address, so that it is possible to operate several ASICs at the same I<sup>2</sup>C-Bus.

The time delay enables the ASIC to carry out a measurement after feeding the operating voltage, before the measured values are read out first time.

The operating voltage remains switched on even afterwards. Hence, the IRT command is required only for the first time to switch on the operating voltage.

#### ,IR\_78004' I<sup>2</sup>C read

This command is identical to the previous one, however without switch on of the operating voltage and without time delay.

This I<sup>2</sup>C-read command is used for all further read operations in response.

For further information, visit our website:  
[www.bb-sensors.com](http://www.bb-sensors.com)



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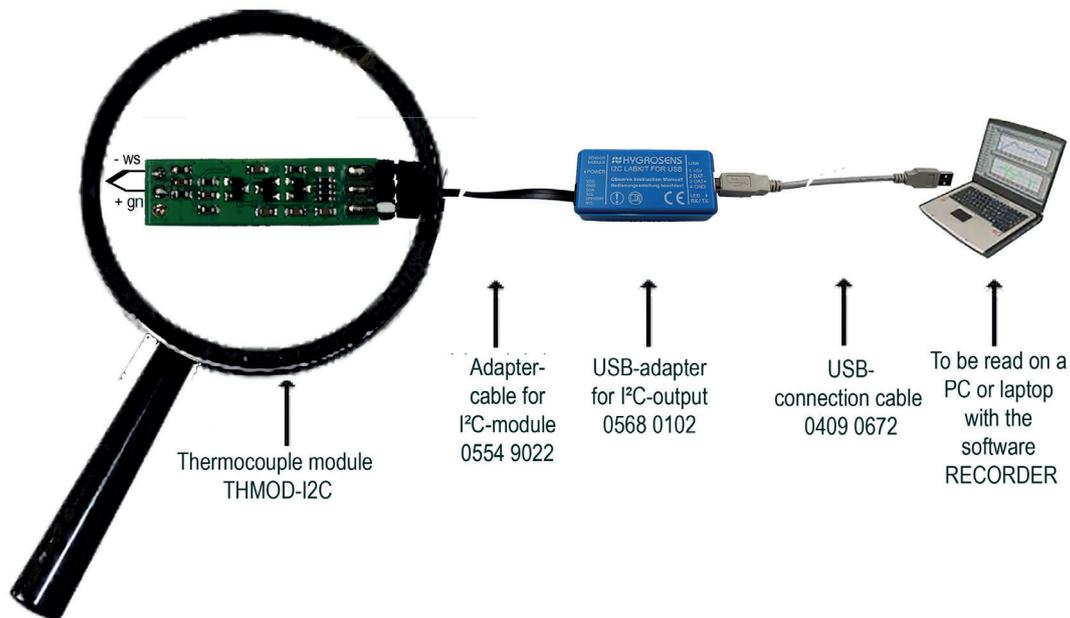


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### Accessories

Temperature-module Thermocouple, Scope of delivery: Module + Thermocouple type K

Article	Article no.
Measuring range -270...+300 °C	THMOD-I2C-300
Measuring range -270...+800 °C	THMOD-I2C-800
Measuring range -270...+1370 °C	THMOD-I2C-1370



Temperature-module Pt1000 with voltage output 0...5 V and I<sup>2</sup>C-bus

Artikel	Artikelnummer
Messbereich -32...+95,9961 °C	TEMOD-I2C-R1
Messbereich -32...+223,992 °C	TEMOD-I2C-R2
Messbereich -32...+479,984 °C	TEMOD-I2C-R3

