SBC3060 Single Board Computer

Wilke Techno Logy

Version of Product:1.1

1 Introduction

This single board computer is composed of a high speed multitasking controller ECONO-Tiger™.

Two PT1000 sensor inputs in 4-wire technology can be used for measuring temperatures between -40 and 110ºC.
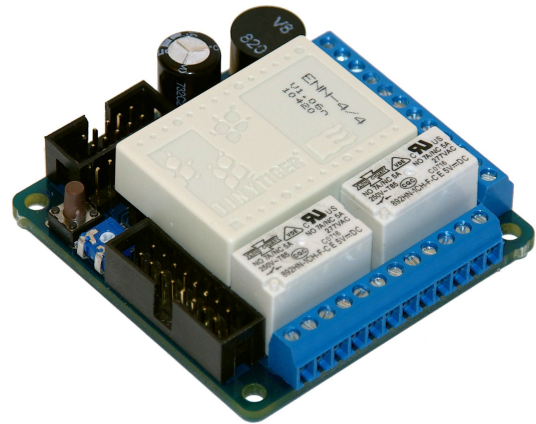
The SBC3060 has included two relays and two powerful open drain FETs. It can be used for switching external high power devices.

A text display can be plugged in to visualize informations. The back light make sure reading the display in dark rooms, as well.

Two different serial ports can be used to communicate with other devices. The RS485 interface is designed to use the SBC3060 in a network. So you can connect several **SBCs** with each other.
For comfortable controlling your network of single board computers we recommend our **TP1000**.

The ECONO-Tiger™ can be programmed in system over the RS232 port with the powerful, well known and easy to learn Tiger-Basic™.
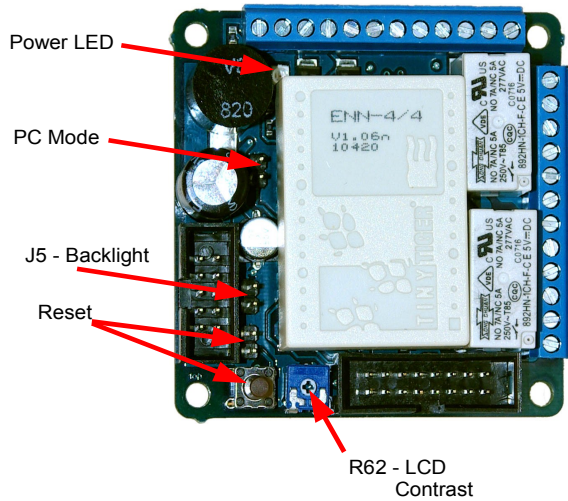
2 Applications

- Local temperature measurement and controlling.

- Bus line operation for central data storage and analyses.

- Multiple board mode via RS485 bus available.

3 Features

- In circuit programmable ECONO-Tiger™ multitasking controller

- Power supply 8...30V DC

- Connector for text LCD with back light

- RS232 port

- RS485 port

- two PT1000 4-wire analog inputs

- two relay outputs

- two open drain FET outputs

- RESET button and PC-Mode jumper

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4 Contents

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Power LED

PC Mode

J5 - Backlight

Reset

R62 - LCD Contrast

5 Control Elements

5.1 Contrast Adjustment for Text LCD

You can adjust the contrast of the text LC display at R62.

Note: You can reduce the contrast of the display down to no contrast. If you can't see your outputs at the display increase the contrast. If the screen is too black, reduce the contrast.

5.2 Back light jumper J5

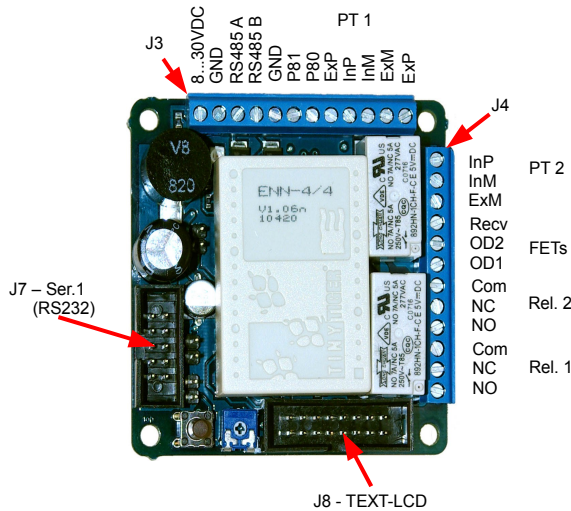Close jumper J5 to enable the back light of the text LCD on connector J8. For disable the back light open this jumper.

5.3 RESET Button and RUN/PC Mode Jumper

Pressing the RESET button will restart the user program if the „PC" Mode Jumper is absend. If the mode Jumper „PC" is connected then the TINY Tiger™ will enter PC mode after pressing the RESET button.
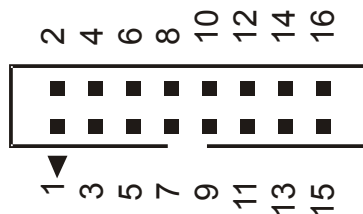An external beset button can be plugged in to connector J6, as well.

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J8 - TEXT-LCD

6 Connectors

6.1 Text LCD

Connect your text LCD on Connector J8. Use the device driver LCD1.tdd.
You may use the text LCD together with one of the graphic LCDs. The cable length connected here must not exceed 0.5m.

Connector J8

Pin	Signal	Description
1	Vss	power supply (GND)
2	Vdd	power supply (+)
3	Vo	contrast adjust
4	RS	register select
5	R/W	read /write
6	E	enable
7	D0	data bus line
8	D1	data bus line
9	D2	data bus line

Pin	Signal	Description
10	D3	data bus line
11	D4	data bus line
12	D5	data bus line
13	D6	data bus line
14	D7	data bus line
15	BLA	back light anode
16	BLK	back light cathode

6.2 Serial ports

The SBC3060 includes two different serial ports for communication with other devices. Please use our latest serial device driver and include the following source code in your application:

```
INSTALL_DEVICE #SER, "SER1B_K1.TDD", &
  BD_38_400, DP_8N, YES, &    'SER0
  BD_38_400, DP_8N, YES, &    'SER1
  0AAh, 00110011b, &          'dis.CTS0+RTS0
  01000000b, 8, 0             'L86 = RTS0
```

6.3 Ser1: RS232

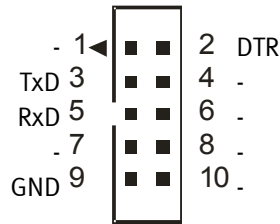On RS232 port you can have a full duplex point to point connection to another device.

If the SBC3060 is started in PC Mode then this RS232 port can used as download and debug port.

To connect two SBC3060 boards you have to use a cross linked cable with male connectors.
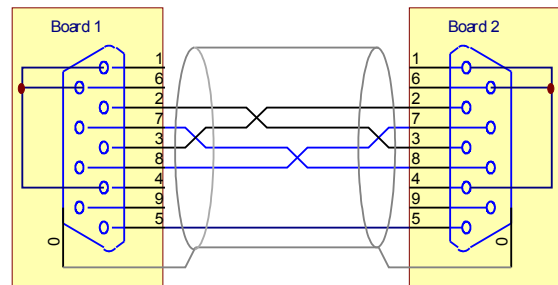
Cross linked cable for RS232

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Connector J7 (male)

6.3.1 Ser 0: RS485

The serial port 0 of the ECONO-Tiger™ is used as RS485 port. Bit 6 of port 8 is used as transmit enable pin of the RS485 bus driver. With print/put or get you can easily send or receive messages from the RS485 bus. For example send 'Hello World' to an other device:

```
PRINT #SER, #0, "Hello World"
```

The RS485 signals are available at the connector J3 pin 10 (A *positive RS485 signal*) and 9 (B *negative RS485 signal*).

With the RS485 port a bus connection of multiple boards is possible. You should implement a software protocol to prevent that more than one circuit is writing to the bus at the same time. All circuits must use the same baud rate.
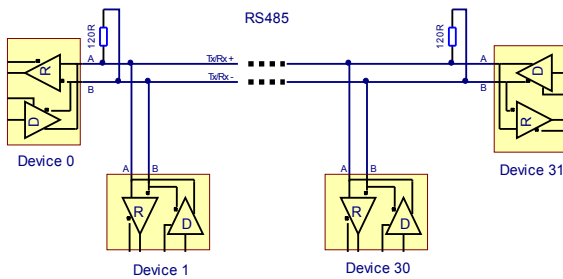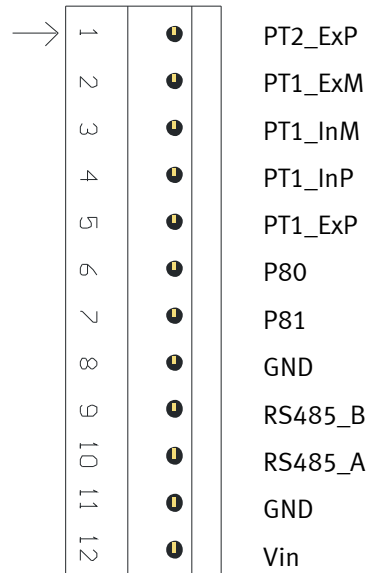

Note: The line should terminated at both ends in it characteristic impedance. Stub lengths off the main line should be kept as short as possible.
You have to connect GND to each module if a separate power supply is used!

6.4 Inputs and Outputs on Connector J3, J4

Most features of the SBC3060 are available on connector J3 and J4. For details see following text.

Pin	Signal
1	PT2_ExP
2	PT1_ExM
3	PT1_InM
4	PT1_InP
5	PT1_ExP
6	P80
7	P81
8	GND
9	RS485_B
10	RS485_A
11	GND
12	Vin

Connector J3

Pin	Signal
1	Rel1_NO
2	Rel1_NC
3	Rel1_Com
4	Rel2_NO
5	Rel2_NC
6	Rel2_Com
7	FET1_OD
8	FET2_OD
9	FET_Recv
10	PT2_ExM
11	PT2_InM
12	PT2_InP
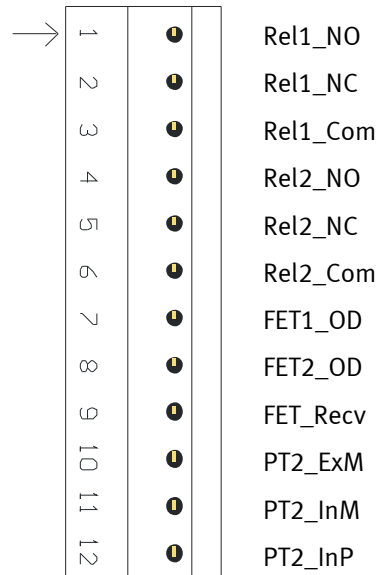
Connector J4

6.4.1 Power supply

Connect a power supply 8...30V DC to connector J3 pin 12 (8...30VDC) and 11 (GND). The green LED will light, if power is detected.

Note: Please notice this power input is unfused! You have to use a fused power supply.

6.4.2 Digital I/Os

On connector J3 pin 6 (P80) and 7 (P81) are two digital I/Os available. This 5V TTL inputs are directly connected to the ECONO-Tiger™ port 8 bit 0 and 1. This inputs are protected up to 24VDC.

6.4.3 PT1000 temperature sensor inputs

The SBC3060 provides two PT1000 temperature sensors in 4-wire technology. The first sensor can plugged in to connector J3 pin 2...5. The second one can plugged in to connector J3 pin 1 and J4 pin 10...12. The following table shows the pin definition:

signal	discription
PTx_ExP	measurement current pin
PTx_InP	voltage measurement pin, positive
PTx_InM	voltage measurement pin, negative
PTx_ExM	measurement current pin

Note: For 2-wire measurement technology connect ExP with InP, ExM with InM and your PT1000 between InP and InM.

The PT1 can read out on analog input 0 of ECONO-Tiger™. PT2 is available on analog input 1 of ECONO-Tiger™.
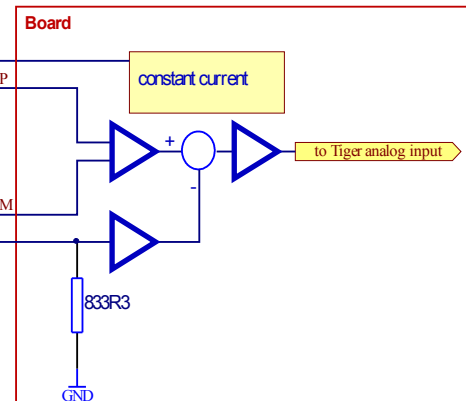
The PT1000 is powered by a constant current source and the voltage at the PT1000 can be measured through a differential amplifier. The constant current also flows over a 833.3Ω resistor and the voltage drop over this resistor is subtracted from the voltage of the differential amplifier. Resistor values down to 833.3Ω can be detected at your PT1000.

On the SBC3060, the possible temperature measurement range is -40 to +110°C.

Resistance of PT1000	Temperature	Analog value
842.47Ω	-40°C	17
1422,93 Ω	+110°C	1005

The relation between the resistance of the PT1000 and the temperature in this measurement range is nearly linear (failure 0,02%).

Using the device driver „ANALOG1.TDD" you'll get values which can be calculated with the following formula:

T = -40° C + ((X – 17 dig) * (150° C / 988 dig))

T: temperature [°C]

X: analog value [dig]

6.4.4 FET open drain outputs

The SBC3060 included two open drain output. A recovery diode protect the FET, if a inductive load is used.

FET open drain output 1 is controlled by bit 2 port 8 and output 2 is controlled by bit 3 port 8. A high signal on this pin turns the device on and a low signal turn it off again.

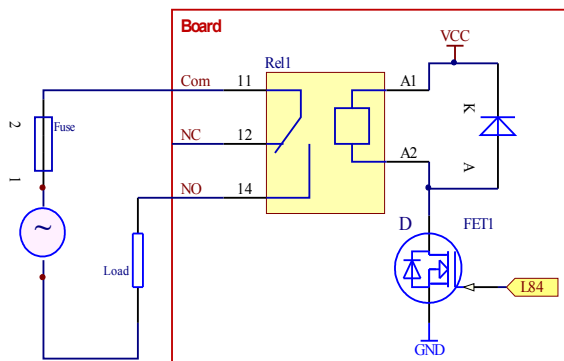The FET outputs are available on connector J4 pin 7 to 9.
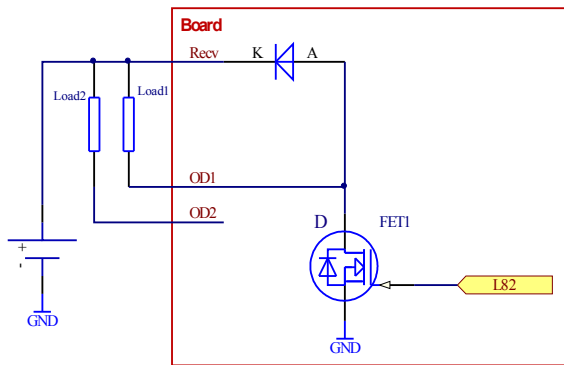
6.4.5 Relay outputs

On connector J4 pin 1 to 5 are two relay outputs available.

A fuse is NOT mounted on the SBC3060. So it is important to use a external fuse to protect the relays.

The relays can be controlled by port 8 bit 4 for relay 1 and bit 5 for relay 2. A high signal connect *Com* to *NO.* A low signal connect *Com* to *NC.*

7 Used Tiger Pins

ECONO-Tigers I/O	used for:
L36	enable signal for text LCD *high active output*
L37	register select for text LCD
L41	PC mode jumper input.
L60 to L67	data lines used by text LCD
L80	Digital Input 1
L81	Digital Input 2
L82	FET 1
L83	FET 2
L84	Relay 1
L85	Relay 2
L86/L92	Transmit enable Ser0: RS485
L87/L91	RxD0 (RS485)
L90	TxD0 (RS485)
L93	TxD1 (RS232)
L94	RxD1 (RS232)

8 Used Analog Inputs

ECONO-Tigers analog inputs	used for:
A/D Ref Low	GND
A/D Ref High	5V
Analog in 0	PT1
Analog in 1	PT2

9 Technical Specification

9.1 Absolute maximum Ratings

(beyond which permanent damage may occur)

supply voltage U_in (screw terminal 1 in respect of GND)	8...30V DC
maximum current at each relay output	4A
maximum voltage at relay outputs	60V AC
maximum current at each FET output	220mA
maximum voltage at FET outputs	33V DC
input voltage at digital inputs	-0.3...30V DC
operating temperature	0...70°C

Do not connect any signal connector of the SBC3060 directly to wires which are outside a building.
Replace fuses only with fuses which have the same technical characteristics.
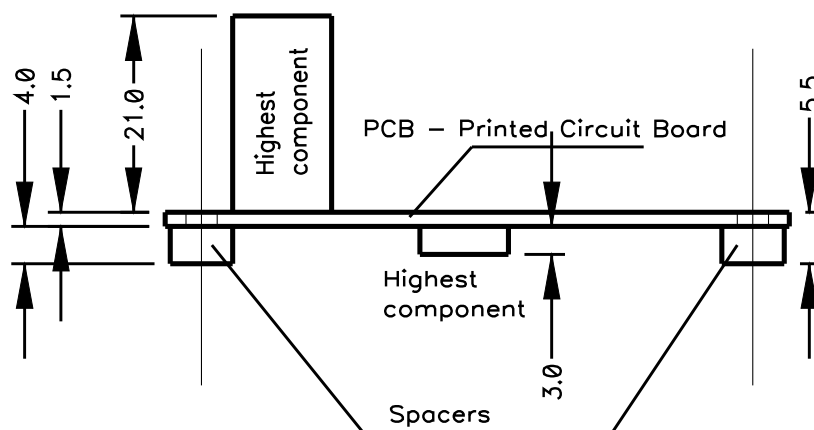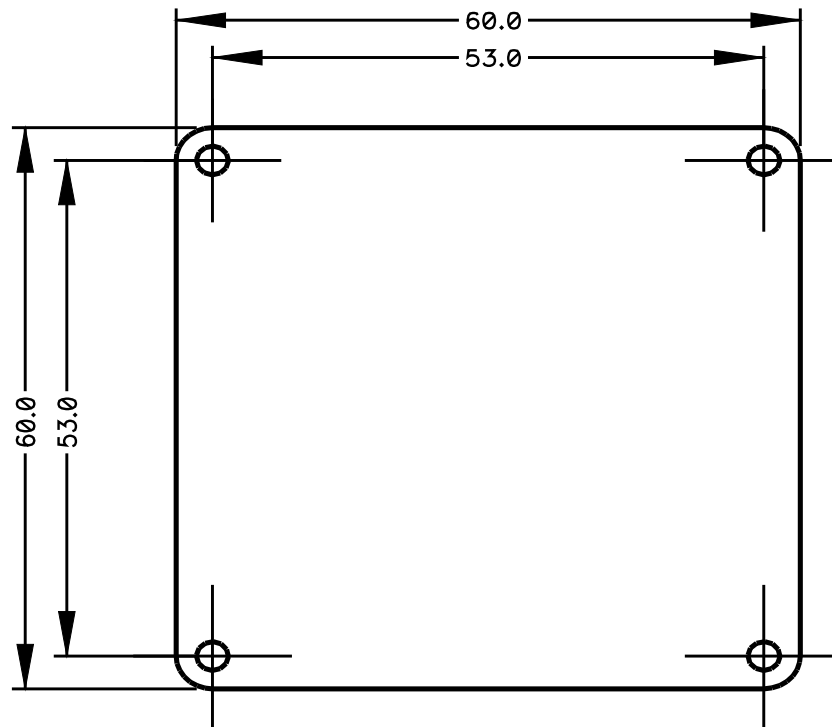
9.2 Electrical Specifications

supply voltage U_in	8V...30V DC
supply current at 8V input voltage at 30V input voltage at 8V input voltage with text LCD connected at 30V input voltage with text LCD connected	120mA 50mA 220mA 70mA
Tolerances of analog inputs at 25°C temperature drift	< 1.0% *NOTE 1 < 50ppm/°C *NOTE 1

*NOTE 1: refered to the maximum input value, plus input tolerance of ECONO-Tiger^{TM}.

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9.3 Mechanical Specifications

The PCB has dimensions of width = 60mm, long = 60mm and height = 30mm. It can be mounted with four screws M3x8 (min) considering thickness of the board 1.6mm and spacers between the board and the mounting pad of at least 4mm.

All dimensions in mm

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10 Document History

Version of Documentation	Board Version	Description / Changes
V001	V1.0	preliminary version
V002	V1.0	preliminary version
V003	V1.1	preliminary version
V004	V1.1	add pictures
V005	V1.1	correction and update of PT1000 documentation

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