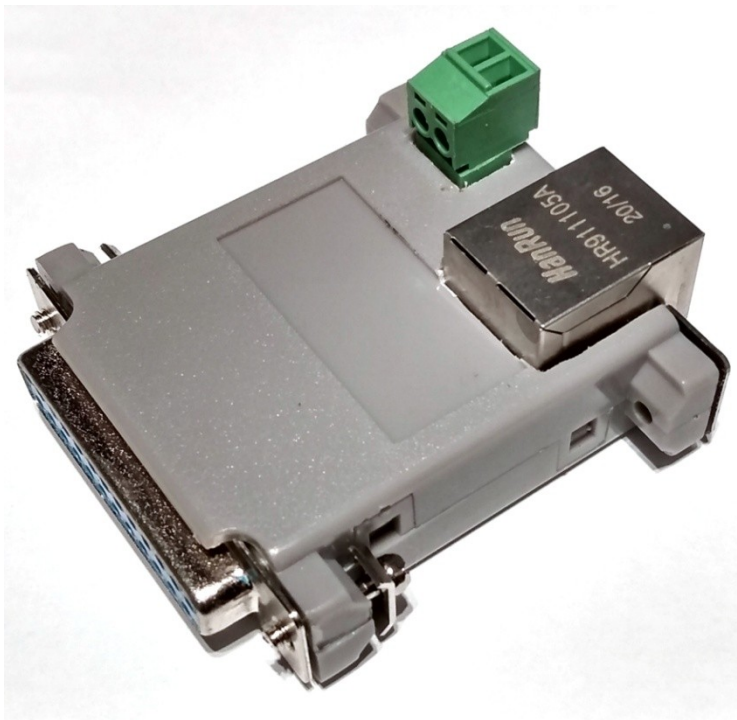


Beamicon2Basic Micropod

Interface module for CNC control with up to 4 axes Adapter from Ethernet to LPT port

Installation Guide

Version 1



Product short description

The interface module allows the operation of up to four stepper motor or servo output stages with the Beamicon2 CNC software. A normal network connection with RJ45 cable is used for data transfer from the PC. The 25-pin SUBD connector can be connected to a conventional breakout board, the TripleBeast or any other controller with LPT port, allowing control of up to 4 axes.

Since no parallel port is needed on the PC, the well-known limitations of the step frequency and problems with timing are a thing of the past. All signals are galvanically isolated from the PC, so that a maximum of noise immunity is achieved.

The MicroPod is ideal, if an existing controller, which was previously operated with LPT port, is to be upgraded for the Beamicon2 software with network operation, or if the maximum 4 axes of the breakout board with integrated network interface (NETBOB1) is not sufficient.

1. Safety Instructions

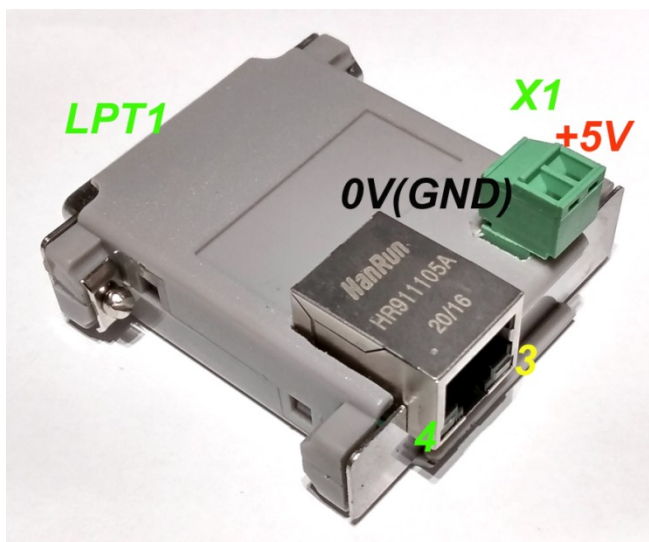
The interface module may only be installed and put into operation by qualified personnel.



Please read the operating instructions carefully and follow all instructions exactly. Improper installation or operation of the device can lead to damage to the electronics or the machine and can be dangerous for the health of the operating personnel.

Depending on the danger potential of the machine, additional safety measures may be required, e.g. door interlock and standstill monitoring. As a rule, such safety functions must be implemented purely electromechanically with external circuits (not included in the scope of delivery) and must not depend solely on software and PC hardware. The system manufacturer, who assembles the interface board and other components to form the overall system, and the system operator are responsible for compliance with the legal regulations. Reversed polarity of the operating voltage of 5V at X1 can cause permanent damage to the module and is not a warranty case.

2. Connections



Status LEDs

No.

Description

network traffic

Network Carrier (connected)

Other connections:

- Network / PC
- LPT1 (SUBD-25)

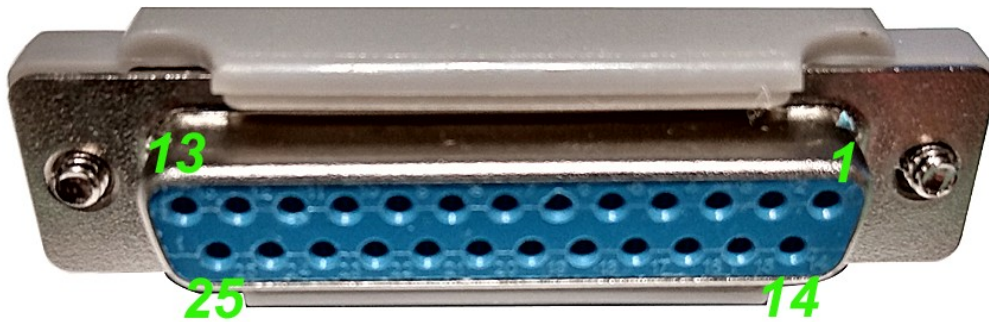
Supply

(terminal X1 left)

voltage

<i>No.</i>	<i>Description</i>
1	Signal Ground
2	+5V ATTENTION! no reverse polarity protection!

LPT1 port



(SUBD25)

No.	Description	No.	Description
1	free programmable output	14	free programmable output
2	Direction X	15	freely programmable input
3	Step X	16	free programmable output
4	Direction Y	17	free programmable output
5	Step Y	18	Signal Ground
6	Direction Z	19	
7	Step Z	20	
8	Direction 4th axis	21	
9	Step 4th axis	22	
10	freely programmable input	23	
11	Emergency stop entrance	24	
12	freely programmable input	25	
13	freely programmable input		

3. Functional description

The MicroPod is in a way an "intelligent external LPT interface card". Unlike PCI cards with LPT ports or LPT interfaces integrated on the PC motherboard, the MicroPod has a built-in, powerful 8-core 32-bit processor that is optimized for generating step/direction signals and also calculates S-shaped acceleration ramps. This is otherwise only known from expensive industrial controllers. The PC is not burdened with this task, but only has to send coordinates to the MicroPod at regular intervals via a network interface (Ethernet IEEE802, 10MBit/s). All time-critical operations run in the MicroPod, so that the PC is relieved and is only needed for the user interface.

Much higher step frequencies (1.6MHz) are possible than with LPT port-based solutions, and the timing is precise and reliable. Compromises in the choice of resolution in connection with the maximum possible speed are therefore no longer necessary. Even servo drives can be operated with high resolution and high speed. Step losses due to short "dropouts" of the PC or too "low performance" PC are impossible. Also errors of the operating system, such as Windows, do not influence the speed or precision.

Even for the user difficult to understand setting of the pulse duration and the distance is completely omitted. The MicroPod always generates the step signals with a perfect duty cycle of 50%. Direction changes are always made exactly in the middle of the pauses between clock pulses. This ensures that the maximum pulse duration is always output according to the frequency. Violations of the setup and hold time by simultaneous changes of step and direction signal state are avoided.

PC / network connection

The data transfer from the PC software to the MicroPod is done via an Ethernet network connection (IEEE802.3 10BASE-T). The connection can be made with standard patch cables at the ST1 RJ45 socket.

In contrast to similar products from competitors (e.g. Smoothstepper or Eding-CNC) no exclusive interface has to be reserved on the PC, but the infrastructure of an existing network with switches can be used. There is also no need to change IP addresses or otherwise intervene in the Windows control panel. The Beamicon2 software automatically detects the MicroPod, even if it is connected "somewhere" in the network. However, to ensure reliable operation, the following rules must be observed:

- The MicroPod must be connected either directly to the PC or to the first switch after the PC. A further switch may only be added if the second switch is connected exclusively to devices of the machine, e.g. inside the machine's control cabinet. All devices not involved in the machine control (Internet router, printer, NAS etc.) must be connected to the first switch or to further switches after the first one.
- The transmission speed between the PC and the first switch must be higher than the maximum data rate of any existing Internet routers (DSL modem etc.). For home networks with few PCs 100MBit is recommended, for larger networks Gigabit-Ethernet is recommended.
- Since no TCP/IP is used but a separate protocol, this cannot be forwarded by routers, external firewalls, proxies etc. Therefore only so-called "unmanaged switches" may be used between the control PC and the MicroPod.
- Switches must support Fast Forward and Store-and-Forward (virtually all modern switches meet this criterion)
- Hubs are also allowed for test purposes (listening with diagnostic tools on taps), but are not recommended.
- The data traffic of the press controls must not be routed over slow (DSL modem) or unreliable (wireless) connections (WLAN). All wireless interfaces are therefore intentionally hidden.

If the MicroPod is connected directly to the PC and the PC interface does not support automatic crossover, a crossover cable must be used (usually marked with a red plug or "X"). The network interface is galvanically isolated from the PC. Power-over-Ethernet (PoE) is not supported.

Power supply

The MicroPod can be supplied with an operating voltage of 4.5 to 6V DC.

The input is not protected against accidental reverse polarity.

It is recommended to use a voltage source independent from the PC and not to use a USB charging cable, as this would cancel the galvanic isolation and make the data transfer unnecessarily susceptible to interference.

When using a breakout board or a TripleBeast from Benezan Electronics, its 5V output can be used for power supply. Otherwise, a 5V plug-in power supply or top hat rail power supply can be used.

4. Configuration

The assignment of the inputs and outputs is done in the Beamicon2Basic software. The installation and operation of the software as well as the setting of the machine parameters is described in detail in the Beamicon2Basic software manuals. Therefore only the special features of the MicroPod are described here. The easiest way to configure the MicroPod is to select the default parameter set "Default_MicroPod" at the first start of the software. Then you do not have to make all settings again, but only enter the deviations from the default values. You can also load the default values afterwards by selecting "File -> Import settings" in the menu and clicking "Default parameters".

After the first start the MicroPod must be connected first. If the hardware dialog does not open automatically, you can do this in the menu under "Configuration -> Hardware". Select the module and then click on "connect" and "save".

The step and direction signals for up to 4 axes are automatically assigned to pins 2 to 9 of the SUBD connector for LPT1. No settings have to be made for this. Especially no pulse time has to be set, because the step signal always has 50% duty cycle. A reversal of the direction of movement is possible in the machine parameters (Menu -> Configuration -> Machine) on the page "Axis parameters" with the button "Direction inverted".

To assign the signals, switch to the "Inputs/Outputs" page. If you are using the Breakoutboard or TripleBeast, you usually do not need to change any settings. If necessary, the assignment of most input and output signals can also be adjusted, with the following exceptions:

- LPT1 pin 11 is permanently reserved for the emergency stop input.
- The PWM output can only be assigned to either LPT1 Pin1 or LPT1 Pin 17.
- The charge pump output can only be assigned to LPT1 pin 16.
- The step/direction outputs cannot be changed (on request for larger quantities)

Input signals can be used multiple times if required. For example, the same switch input can be used simultaneously as reference and limit switch.

Output signals can not be inverted (active low/hi), because otherwise the safe off-state would not be defined.

If the number of available outputs or inputs is not sufficient for the application, they can be extended with an extension module I/O-Ext from Benezan-Electronics.

5. Technical data

Absolute limit values

The following parameters must not be exceeded under any circumstances to prevent damage to the device:

Parameters	min.	max.	Unit
Operating voltage	-0.7	13	V
Storage temperature	-40	+70	°C
Operating temperature	0	+70	°C
Voltage at digital inputs	-0,5	+5,5	V
Voltage at digital outputs	-0,5	+5,5	V
Current at any pin of LPT1	-20	+20	mA

Electrical connection values:

Parameters	min.	max.	Unit
Operating voltage (nominal 5V)	+4,5	+6	V
Power consumption (without external consumers)	0,85	1,5	W
Ambient temperature	0	+50	°C
Level for logical 0 at inputs	-0,3	+0,8	V
Level for logical 1 at inputs	2,0	5,5	V
Level for logical 0 at outputs	0	0,5	V
Level for logical 1 at outputs	2,5	3,5	V
Driver Power Step/Dir Outputs	8	-	mA

Dimensions:

Description	Width	Length	Height	Unit
Overall dimensions	54	61	22	mm