

Blue Melon
BlueStep
BM1001 / BM1002
Connecting Motors or CNC

Blue Melon v.o.f.

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Chapter 1

Introduction

This document describes how you can connect your own motors or CNC to a BlueStep. This document is meant as an example case only, Blue Melon does not give support in case of problems or damage to your motors, CNC or BlueStep/BluePower.

1.0.1 Contacting Blue Melon

If you still have questions or comments after reading the manual you can contact Blue Melon. This document is meant as an example case only, Blue Melon does not give any support in case of problems or damage to your motors, CNC or BlueStep/BluePower.

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Chapter 2

Safety Regulations

WARNING!

Chance of electrical shocks

At all times one should observe the basic safety regulations for the use of this product. This reduces the chance of damage or injury through fire or an electrical shock.

1. Carefully read all of the instructions in this manual.
2. Exclusively use Blue Melon's power supply cable BM5113 for connecting the BlueStep to the power supply voltage.
3. Exclusively use a Blue Melon power supply series BluePower in combination with the BlueStep.
4. Never touch the BlueStep's port terminals or the terminals of the power supply cable. Immediately replace damaged cables.
5. Never install the wiring during a thunderstorm.
6. Please observe all warnings placed on the device.
7. Remove all of the product's plugs before cleaning the device.
8. Never use or install this product in a wet environment or when you are wet yourself.
9. The ambient temperature of the product ought to be between 5 °C and 35 °C.

10. Safely place the product on a solid undergound or place it in a 19 inch rack.
11. Install the product in a safe place where no one may tread on the wires or trip over them and where the power supply cable cannot be damaged.
12. Do not cover the ventilation gaps.
13. Never place the product near devices which may cause electro magnetic interference.
14. Do not use the device when it shows any signs of possible damage.
15. Consult Appendix ?? ("Problem Solving")
16. Consult acknowledged technicians for all maintenance issues.

Chapter 3

Hardware

3.1 Connecting your own CNC / stepper motor to the BlueStep.

To connect a stepper motor you use one of the connectors from section A, numbers 1-4 (figure ??). See figure 3.1 for the pin layout of the motor connectors. See figure 3.2 for an image of the plug.

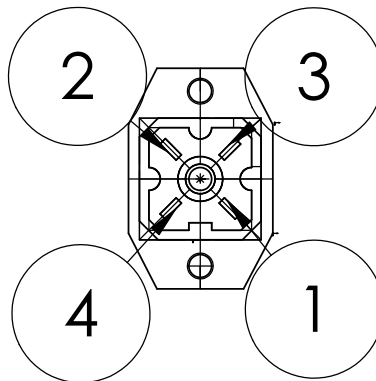


Figure 3.1: **Stepper motor** connector.

To connect your stepper motor exclusively use the Blue Melon BM5001 plug. The plug consists of a plastic case sealed by rubber. You may insert a cable with a maximum width of 7.7 mm into the plug. If your stepper motor cable does not fit or if you do not have one, use the Blue Melon BM5106/BM5111/BM5112 cable.

3.1.1 Dissecting the connector

See figure 3.3 for an overview of the plug parts. To dissect the plug you should first pull the screw (1) from the plug. The plug does not contain a thread so you can carefully retract the screw from the plug with a small screwdriver. Next you loosen the gasket (2). Please note that a metal ring (6) and a rubber (7) are placed behind the gasket, they can now fall out. Finally you may pull the plug contact (2) from the hull (1). When you are finished do not forget to place the isolation rubber (5) over the plug contact (2).

3.1.2 Determining the stepper motor type

The BlueStep is able to drive a two-phase stepper motor. There are various kinds of two-phase stepper motors available. A two-phase stepper motor can be recognised by the number of attached wires. You may find examples with 4,5,6 or 8 wires. Whenever you come across a 4-wire motor it is not necessary a stepper motor. A simple test to find out whether you are dealing with a stepper motor is by twisting the motor's spindle. If while twisting you are able to feel regular steps, chances are it is in fact a stepper motor.

The BlueStep is designed to drive bipolar stepper motors. An uni-polar connection is not possible nor desirable because a bi-polarly connected stepper motor is more powerful than a uni-polar one. If you have a stepper motor with 4,5,6 or 8 wires coming from the motor you can go through the relevant



Figure 3.2: Stepper motor plug.

paragraph below to determine how it should be connected. **Always read through the stepper motor's data sheet carefully.**

Four wire stepper motors With a 4 wire stepper motor it is quite easy to determine which conductors make up a phase pair. Hence the term two-phase stepper motor. Each phase is represented by a coil and each coil requires two conductors to allow power to run through it. In order for it to work the coils should not be inter-linked. So with a multi-meter adjusted to measuring the least of resistance one is able to find out which wires constitute a phase pair. In short, you should find two pairs and these pairs should not make contact with each other.



Figure 3.3: **Parts** stepper motor plug.

Five wire stepper motors In some cases, with 5 conductors coming from the stepper motor, the motor can only operate in uni-polar mode and can therefore not be used. It is also possible that the fifth wire is an earth wire and is thus connected to the motor's casing, in which case the motor can be controlled in a bi-polar fashion. First determine whether there is an earth wire and which one it is. You can do this by setting a multi meter in the lowest resistance measuring mode and determining which wire is connected to the motor's casing. If there is none, you have an uni polar motor which cannot be connected to the BlueStep. If there is in fact an earth wire present then you may continue reading paragraph [3.1.2](#) and ignore this wire.

Six wire stepper motors Six conductor stepper motors require a bit more work. You are advised to have pen and paper handy. Take a multi meter and set it to measuring the least of resistance. Subsequently measure the resistance between a large number of wires. Separate the wires in two groups in such a way that only those wires which have measured resistance with respect to each other belong to the same group. The wires which are according to the measurements are not connected (and for which the resistance thus cannot be determined) **do not** belong to the same group.

This will result in a list comparable to [3.1](#). From the table you see that the red conductor is related twice to a low resistance, this wire is not used because it is related to the coil's central branch. In uni-polar connection this is useful, in a bipolar connection redundant. Cut off the wire. Yellow and black now make up the phase. Do the same with the other three wires. Eventually you will end up with the two phases of your two phase stepper motor. From the example it can be concluded that yellow and black represent the wires of one of the phases.

Eight wire stepper motors Contrary to the 4 conductor stepper motor the 8 conductor stepper motor usually lets you choose the coil's configuration (parallel or serial) yourself. Follow the same course of action as with the 4 wire motors. So with a multi meter set to measuring the least of resistance one can determine which conductors form a pair. You should find 4 pairs. The found pairs should not have any mutual contact. You will need the motor's data sheet to determine which two pairs belong together, offering you the choice of either connecting these pairs in series or parallel. With each option comes a maximum amount of power which the motor can handle!

Table 3.1: Example values obtained from measuring

Red	Black	20 ohm
Red	Yellow	20 ohm
Yellow	Black	40 ohm

3.1.3 Soldering the cable

See figure 3.3 for the parts of the plug. Strip the cable and slip the gasket (2) over the cable. Then push the cable through the hull's (1) gap in such a way that the ring and rubber stay in their place and the gasket can be secured later on. The previously determined phases (3.1.2) can now be soldered to the plug contact (2). Make sure that when finished the plug contact (2) is placed in the hull (1) as in figure 3.4, by placing the broader cut-out (5) at the bottom. The upper two pins 4 and 1 make up a phase, the two bottom pins 2 and 3 make up the other phase. **These numbers are also placed on the back of the plug contact (2) itself!** It does not matter now how you connect the phase, though it does affect the rotational direction. The rotational direction can be reversed by either using the BlueStep configuration utility or any other proper CNC package. However, it is advisable to do this in the same fashion for all of you motors (axes); this will make it easier for you to focus while using your CNC software.



Figure 3.4: Stepper motor plug contact part 2, broader cut-out 5 at the bottom.

Appendix A

Connector pin layout and dimensions

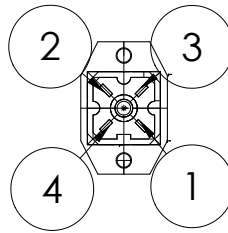


Figure A.1: **Stepper motor** connector.

Pin 1	Phase A
Pin 2	Phase B
Pin 3	Phase B
Pin 4	Phase A

Table A.1: Pin description **Stepper motor** connector.