# Tips for NEMA 23 and NEMA 34

# Closed Loop Stepper systems

(2Nm 4Nm 8Nm)
(only for 2 phase systems!)

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Date:        14-3-2013
Version:     V1.0

At DamenCNC we replace the Leadshine 3Meter encoder cable with PUR cable(DamenCNC artikel nr 1676). The reason is that the cable Leadshine supplies is not a type that can be used in a moving cable chain, it only works for stationary systems. In most CNC system, a cable chain is used. Also we replace the Encoder connector by an industrial type from Phoenix Contact, which has much better shielding. This will prevent EMC errors and incorrect feedback on the encoder signal.

STEP 1. Cut off the 15 pole connector. (attached to motor)
STEP 2. Replace by Female 9 pole connector (DamenCNC artikel nr 1511)
Pin numbering is as follows



| Pin Number | Cable Colors Motor | Function | Cable colors of the PUR Cable |
|---|---|---|---|
| 1 | Red | Power Input +5V | Pink |
| 2 | White | Ground (+5v) | Red |
| 3 | Yellow | Encoder Channel B+ | White |
| 4 | Green | Encoder Channel B- | Grey |
| 5 | Black | Encoder Channel A+ | Green |
| 6 | Blue | Encoder Channel A- | Blue |
| 7 | | Not connected | Not connected |
| 8 | | Not connected | Brown |
| 9 | | Not connected | Yellow |
| | | | |

| Shield | | | Shield | |
|---|---|---|---|---|

STEP 3: Remove the 4 pole pluggable connector. Replace with a Heavy Duty Circular Connector 3+PE Cable Male (DamenCNC artikel nr 1140)

Pin numbering is as follows



| Pin Number | Cable Colors Motor | Function | Cable colors of the PUR Cable |
|---|---|---|---|
| 1 | Black | A+ | 1 |
| 2 | Red | A- | 2 |
| 3 | Yellow | B+ | 3 |
| 4 | Blue (Green) | B- | 4 |
| | | | |

STEP 4. Connect the Purchased Cable set or make your own cables.

When making your own cables, please use the connectors that we recommend. Always use shielded cable for the encoder. The shield should be connected to star point Earth in your CNC controller.

**TIPS/FAQ**

**Incorrect Wiring**

The most common problem in a Closed Loop Stepper System, is that it goes into error directly after starting the system. Most likely cause is that there is a problem in the wiring. If an error has been made in the order of A+ A- B+B- for the steppermotor, the motor could be running in the wrong direction. What happens is that the encoder will read that it has lost a step, the drive will command the motor to move back a step, but since the wiring is reversed, it will move in the wrong direction, only increasing the step loss. Within one second it will be out of bounds. The same error can occur when an encoder cable wiring error has been made.

**Enable signal**

Unlike other Leadshine drives, the closed loop system needs to be enabled before it can run. Please don't forget to connect the enable signal! The drive will not work without it.

**Tuning of motor/drive**

When using 4Nm or 8Nm motors from Leadshine with the HBS86 drive, dip switches can be used to set which motor is being used. The 2 phase 2nm motor(MODEL:57HS20-EC-1000) can also be used with the HBS86 drive, no settings for this motor are in the drive. ProTuner software has to be downloaded and using the programming cable, you can change the gains/setting such that the motor runs smoothly. Do not try to run the motor with the 4nm or 8nm settings, it will work, but the settings are incorrect, and can cause damage to motor and drive. From testing we have found that it is sufficient, to only reduce the KP gain to 1000, then the motor will run ok, without vibrations or overheating.

**Setting the steploss**

The Closed Loop Stepper System will monitor the step loss and correct for it. If the step loss is greater than a certain value (1000) the system will go into error. As a user you can set this value using ProTuner software. Depending on your application this value needs to be set. Most often the standard value of 1000 is fine.