

NEMA 34-42 high voltage Closed Loop Stepper systems

(8Nm-12Nm-20Nm)
(only for 3 phase systems!)

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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 Male 9 pole connector (DamenCNC artikel nr 1510)


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 3 phase system	Function 2 phase system	Cable colors of the PUR Cable
1	Red	U	A+	1
2	Blue	V	A-	2
3	Black	W	B+	3
4	Yellow	Shield/PE/Earth	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 stepper motor, 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.

Inverting the rotation direction

In some cases for example a Portal Milling machine with a bridge, the rotation directions of the Left and Right motor need to be inverted. Otherwise when both motors would rotate in the same direction, the bridge would be pulled apart. So basically, what needs to be done, is that one of the drives/motors needs to run CCW while the other motor runs CW, while receiving the same step/dir input.

It can be done in 3 ways.

1. In Mach 3/ Linux software is possible to invert the dir signal of a slaved axis. In USB CNC this is not possible. It is in this manner on purpose, in software its very easy to change a setting by accident. This setting could destroy a machine, for that reason it needs to be set in hardware or electronics.

2. With the Leadshine Protuner software a setting can be changed in the drive which inverts the rotation direction.
3. Another option is to change the way the cable is made for one of the motors.

Making the cable for inverted rotation of 2 phase system

(soon also a description for 3 phase systems)

In an open loop system, just switching A+ and A- would be the solution. In this case that would cause the stepperdrive to go into error. Also the encoder cable needs to be changed. Below we describe the correct procedure.

In the procedure we assume the A axis is a slave of the X axis.

Step1. Check by hand if you push/pull one side of the bridge, if the other side follows. On some machines you will need to remove the gearbox and motor on the slave side. If the bridge does not follow, stop the procedure, continuing will cause damage to the machine.

Step 2 Connect only the cables for the X-axis, disconnect cables for the slave (@CNC controller). In USBCNC software, set the A axis as a rotation axis. If you leave it as slave X, with cables unconnected, system will go into error.

Step 3 Using the jogpad very slowly move the machine. If the machine moves wiring is made correctly. If it does not move, check wiring. Write down in which direction the bridge moves, when pressing the right arrow key.

Step 4 Disconnect wiring

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	Cable	Function	Cable colors of the PUR Cable
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Number	Colors Motor		
1	Red	Power Input +5V	Pink
2	White	Ground (+5v)	Red
3	Yellow	Encoder Channel A+	Green
4	Green	Encoder Channel A-	Blue
5	Black	Encoder Channel B+	White
6	Blue	Encoder Channel B-	Grey
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+	2
2	Red	A-	1
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.