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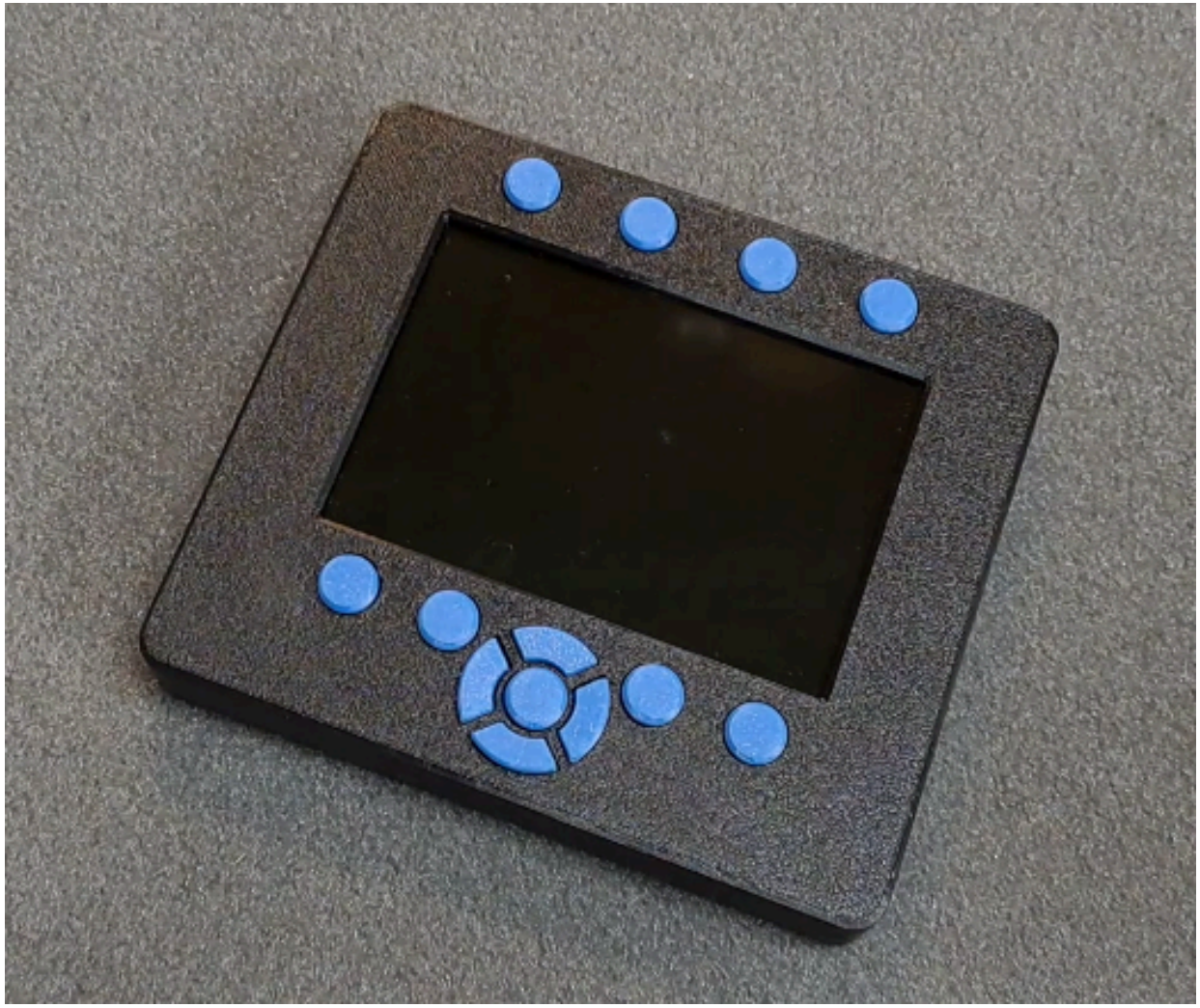
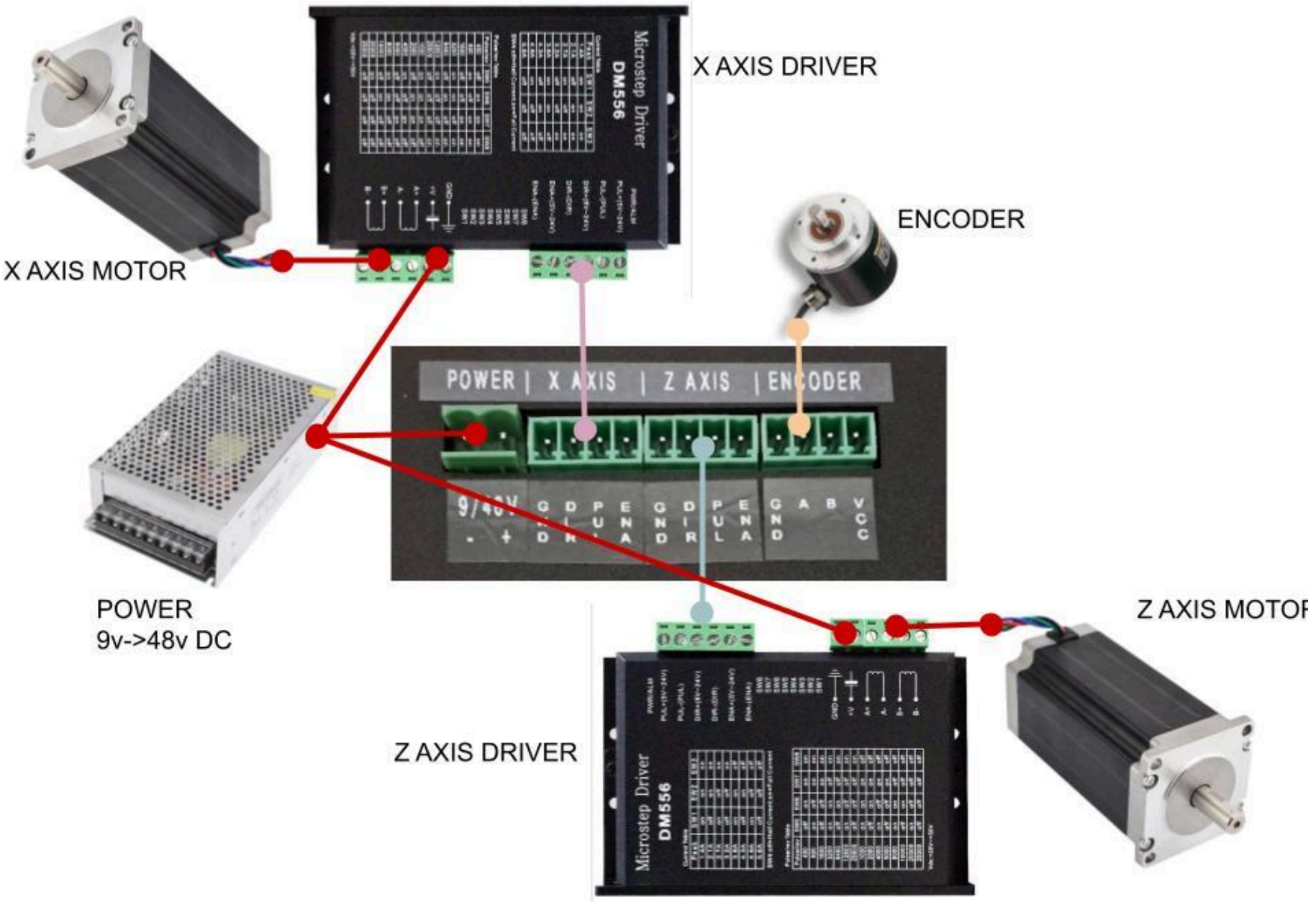
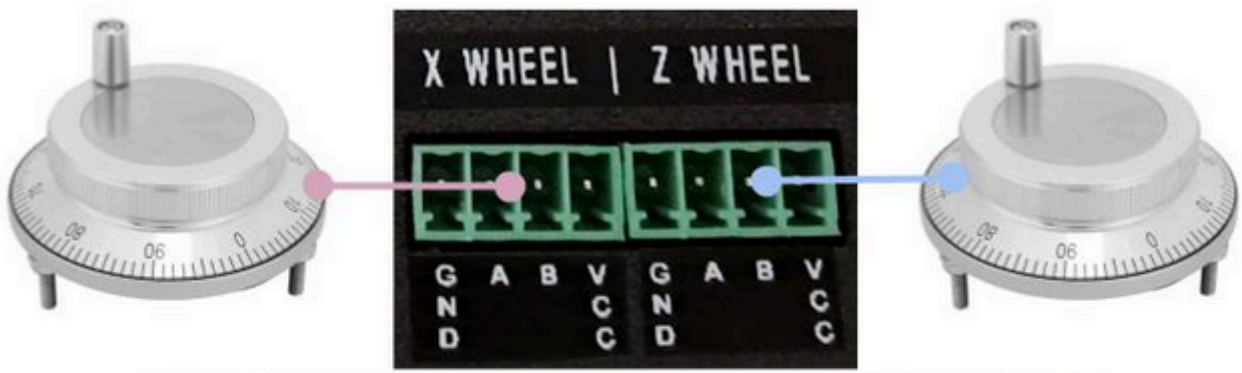
2 AXIS ELS User Manual - English
V3.5

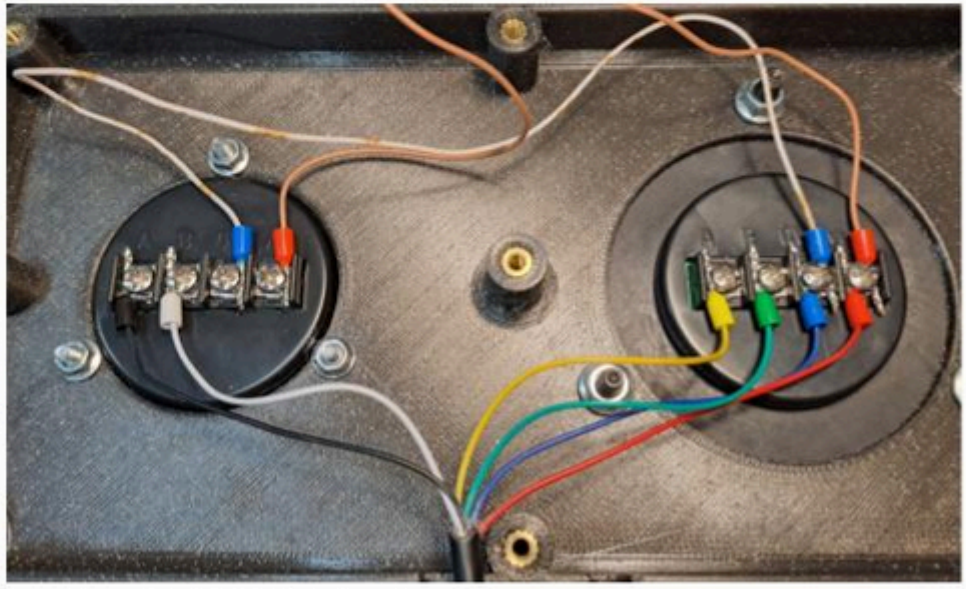


Wiring - Main


X AXIS DRIVER
ENCODER
X AXIS MOTOR
POWER | X AXIS | Z AXIS | ENCODER
POWER
9v->48v DC
Z AXIS MOTOR
Z AXIS DRIVER
Microstep Driver
DM556

Wiring - Hand Wheel





You can use a 6 wire cable by bridging the GND and +5v of the hand wheel. You do not need to cable GND and +5V for both of them on the ELS side, just one is enough.If the direction is different from the lathe wheel, you just need to invert the A and B cable.

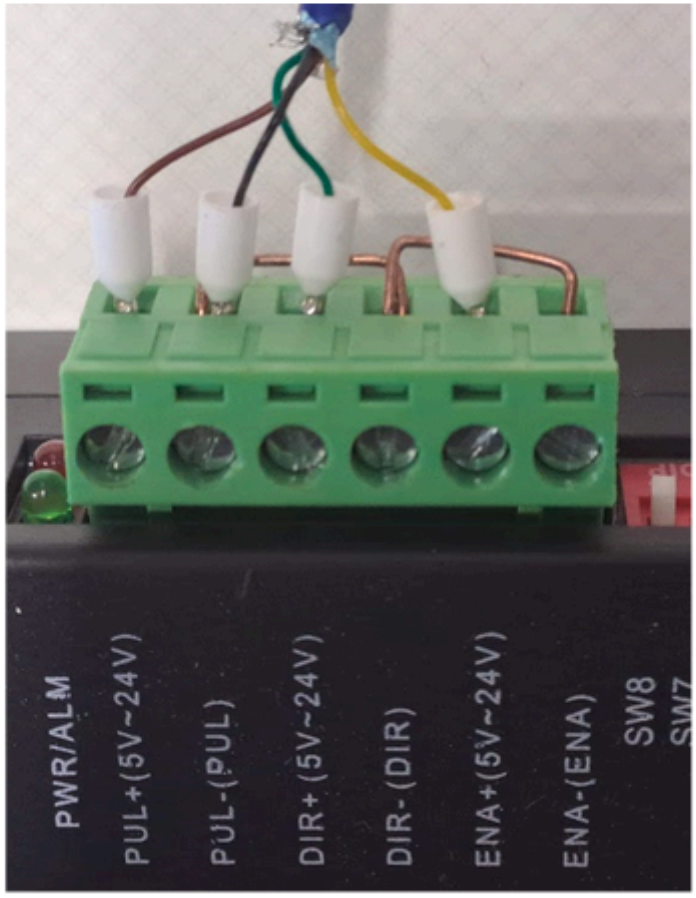
Wiring details

The encoder

It is very important to connect the shield with the ground, or you could lose precision at high speed

The driver

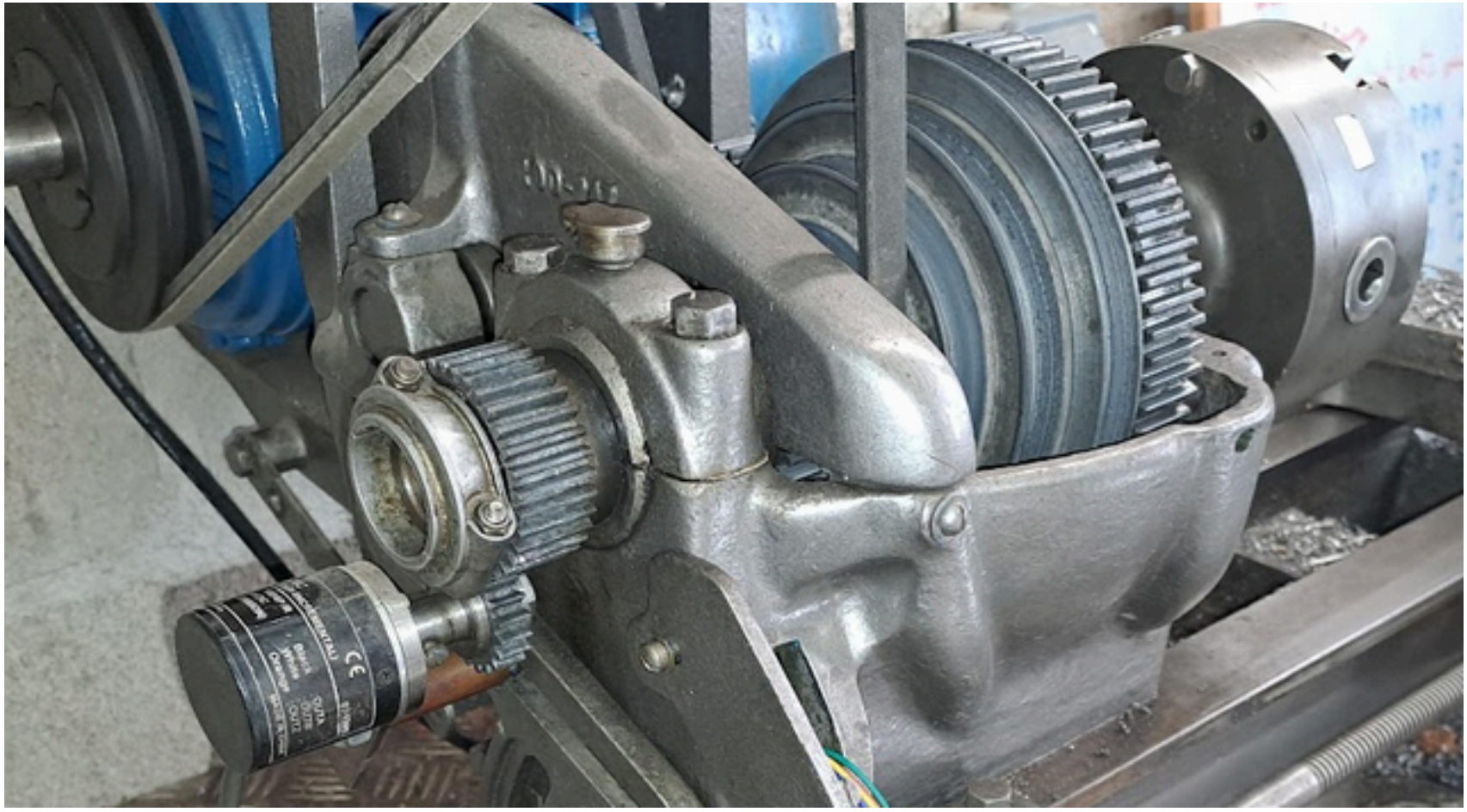
The ground must be bridged on the driver side



Axis convention

The DRO use this X and Z axis convention:

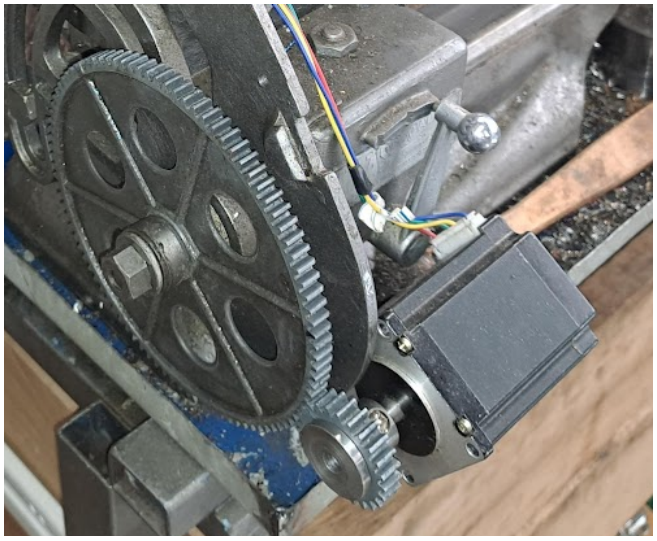
Installation of the encoder on the lathe

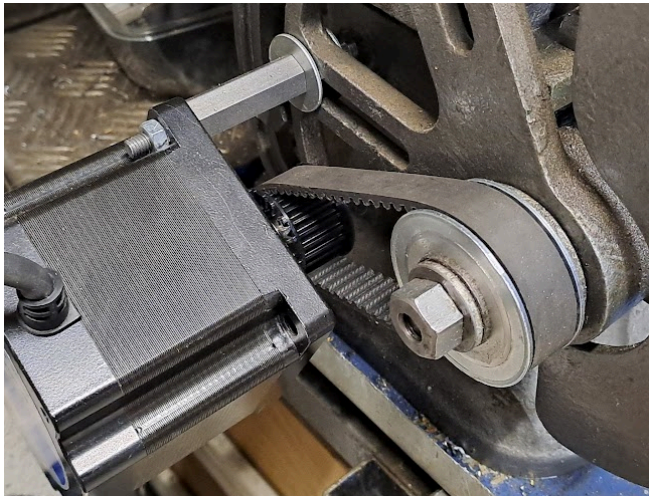


The encoder is linked to the shaft with gears or pulleys and belt.
Any size of gear is possible but it is better to have a ratio closed to 1.
A precision of 600 P/R is a good choice.

Installation of the encoder on the lathe

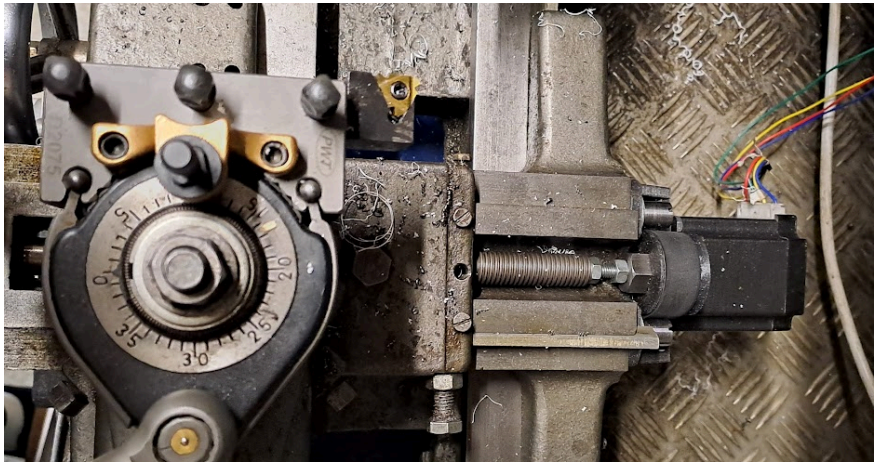
Z Axis





The stepper motor is linked to the lead screw with gears or pulleys and belt. Any ratio can be used but ⅓ or ½ is a good balance between speed and torque.

X Axis

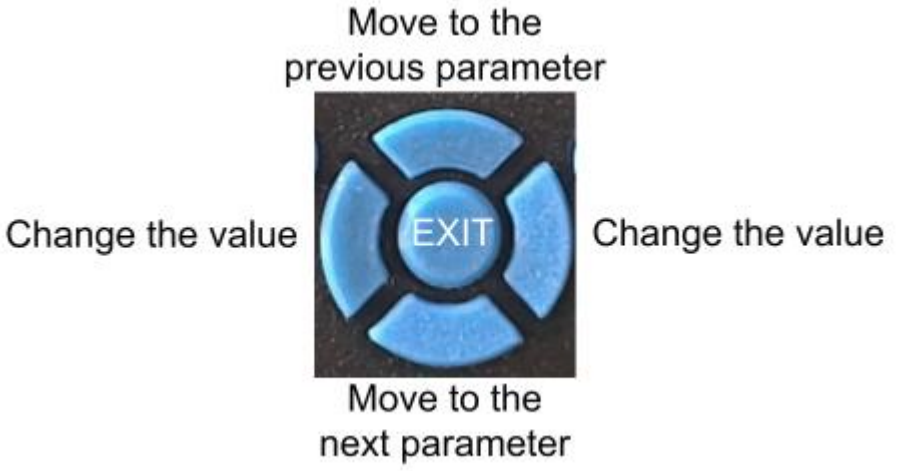


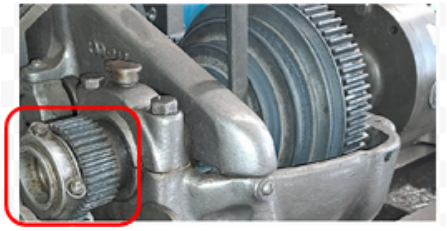
The stepper motor is linked to the lead screw with gears or pulleys and belt. It can be mounted on the back as shown in the picture or at the front.
The torque needed is much lower than for the Z axis, you can use a smaller motor.

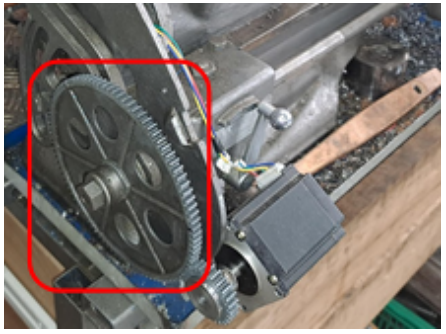
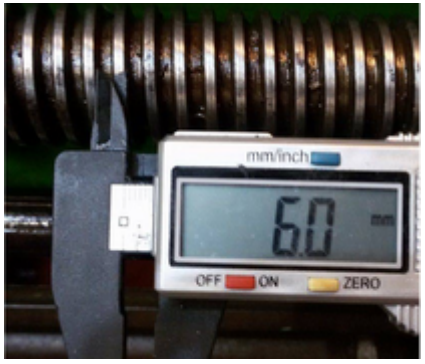
Configuring the parameters

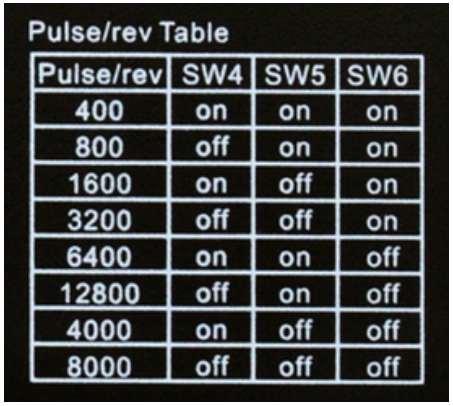
The first time you start the ELS, you need to enter all the parameters, you just need to do this once.
Go to Param:

To change the parameter value, go left or right.
To navigate to the previous/next parameter, go up or down.
To exit the parameter configuration screen, press the middle button of the arrow



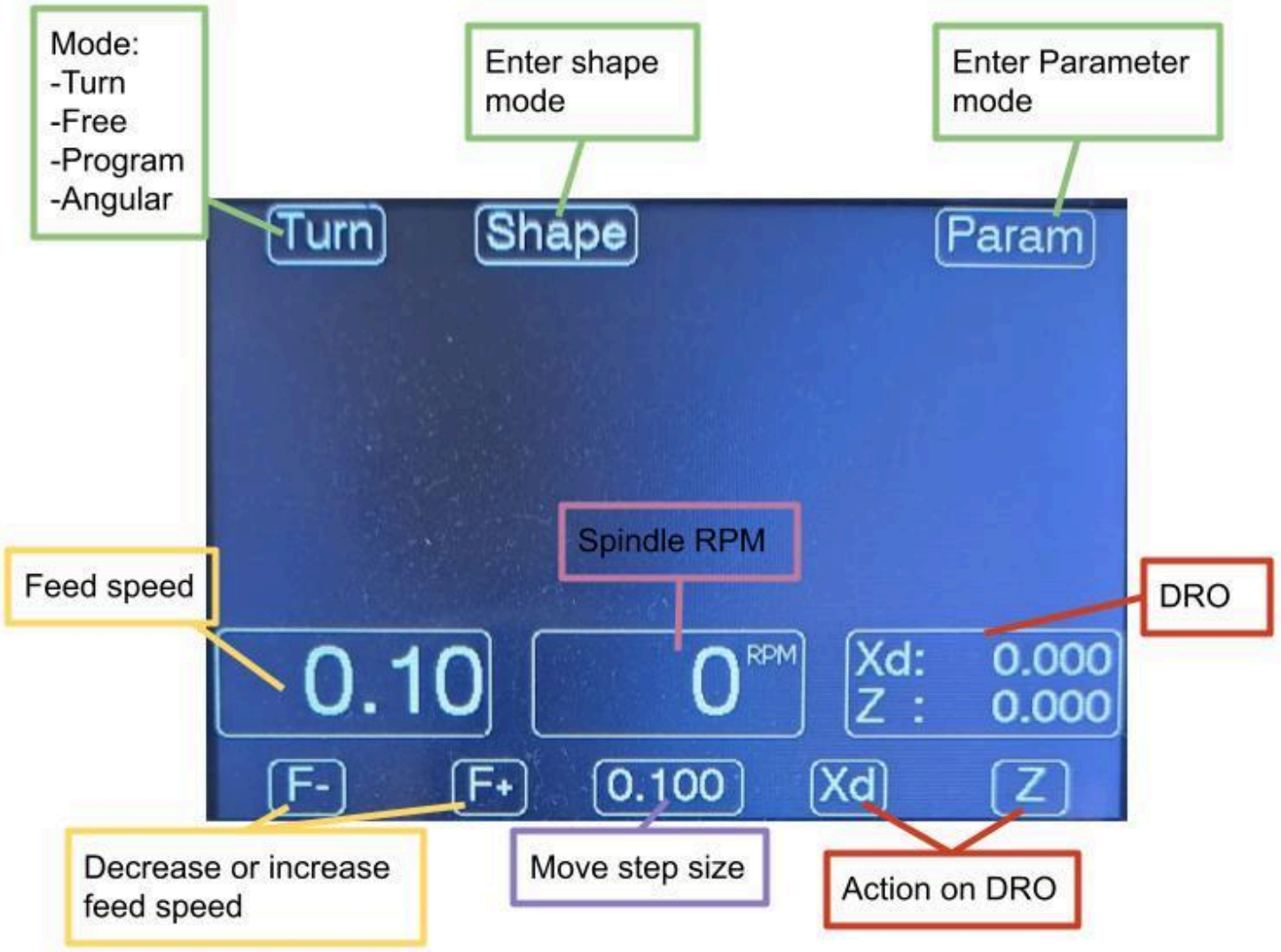
Parameter		Choice	Purpose
UNITS		MM / INCHES	The general unit of the ELS. It affects all the measurements except the feed speed.
FEED UNITS		MM / INCHES / TPI / 1/100 MM	The unit of the feed speed. MM has progressive increment whereas 1/100 MM allows you to choose very precise feed speed.
CHUCK TEETH		Integer	The number of teeth of the gear that is linked with the spindle.
ENCODER TEETH		Integer	The number of teeth of the gear on the encoder. With the chuck teeth parameter, it provides the ratio between the spindle and the encoder. Only the ratio is important, if you have for example 20 and 30 teeth, you can enter 2 and 3.
ENCODER STEPS		360,400,500,600,720,1000,1024,1200,1250,1800,2000,2500	The number of pulses per revolution of the encoder.

Z INVERT DIRECTION		Yes/No	If you ask to go on the left or right and it goes in the opposite direction, modify this parameter. See troubleshooting #1 at the end of this document.
Z MOTOR TEETH		Integer	The number of teeth of the gear attached to the Z axis motor.
Z LEAD SCREW TEETH		Integer	The number of teeth of the gear attached to the lead screw.
Z LEAD SCREW TYPE		MM/TPI	The type of pitch of the Z axis lead screw.
Z LEAD SCREW PITCH		Integer	The pitch of the Z axis lead screw.

Z DRIVER PUL/REV		400,500,800,1000,1024,1600,2000,3200,4000,5000,6400	The resolution of the Z axis driver, in pulse per revolution. It must be the same as the one set up on the driver with the switch configuration.
X INVERT DIRECTION			Same as Z on the X axis
X MOTOR TEETH			Same as Z on the X axis
X LEAD SCREW TEETH			Same as Z on the X axis
X LEAD SCREW TYPE			Same as Z on the X axis
X LEAD SCREW PITCH			Same as Z on the X axis
X DRIVER PUL/REV			Same as Z on the X axis
Z TRAVEL SPEED		1 to 10	the speed of the Z axis when it is not synchronized with the encoder: pushing the left or right arrow, using optional Z hand wheel or during program movements. 1 slower -> 10 faster
Z ACCELERATION		1 to 10	the acceleration/deceleration of the motor. 1 slower -> 10 faster
Z BACKLASH		1/100mm or 1/1000”	The backlash of the Z axis
X TRAVEL SPEED			Same as Z on the X axis
X ACCELERATION			Same as Z on the X axis
X BACKLASH			Same as Z on the X axis

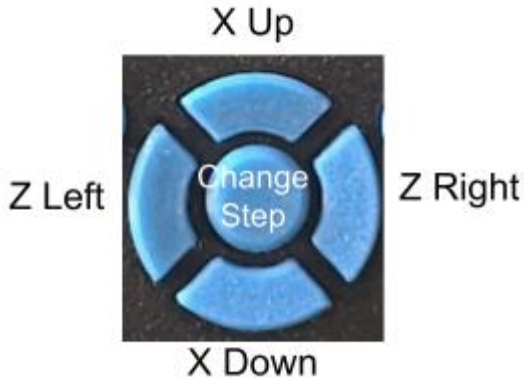
Z ONE TURN		1 to 10 mm 1/10” (1) to 1” (10)	Displacement of one turn of the optional Z hand wheel.
X ONE TURN		1 to 10 mm 1/10” (1) to 1” (10)	Displacement of one turn of the optional X hand wheel.

Main Screen


Mode:
-Turn
-Free
-Program
-Angular
Enter shape mode
Enter Parameter mode
Turn
Shape
Param
Spindle RPM
Feed speed
DRO
0.10
0 RPM
Xd: 0.000
Z : 0.000
F-
F+
0.100
Xd
Z
Decrease or increase feed speed
Move step size
Action on DRO

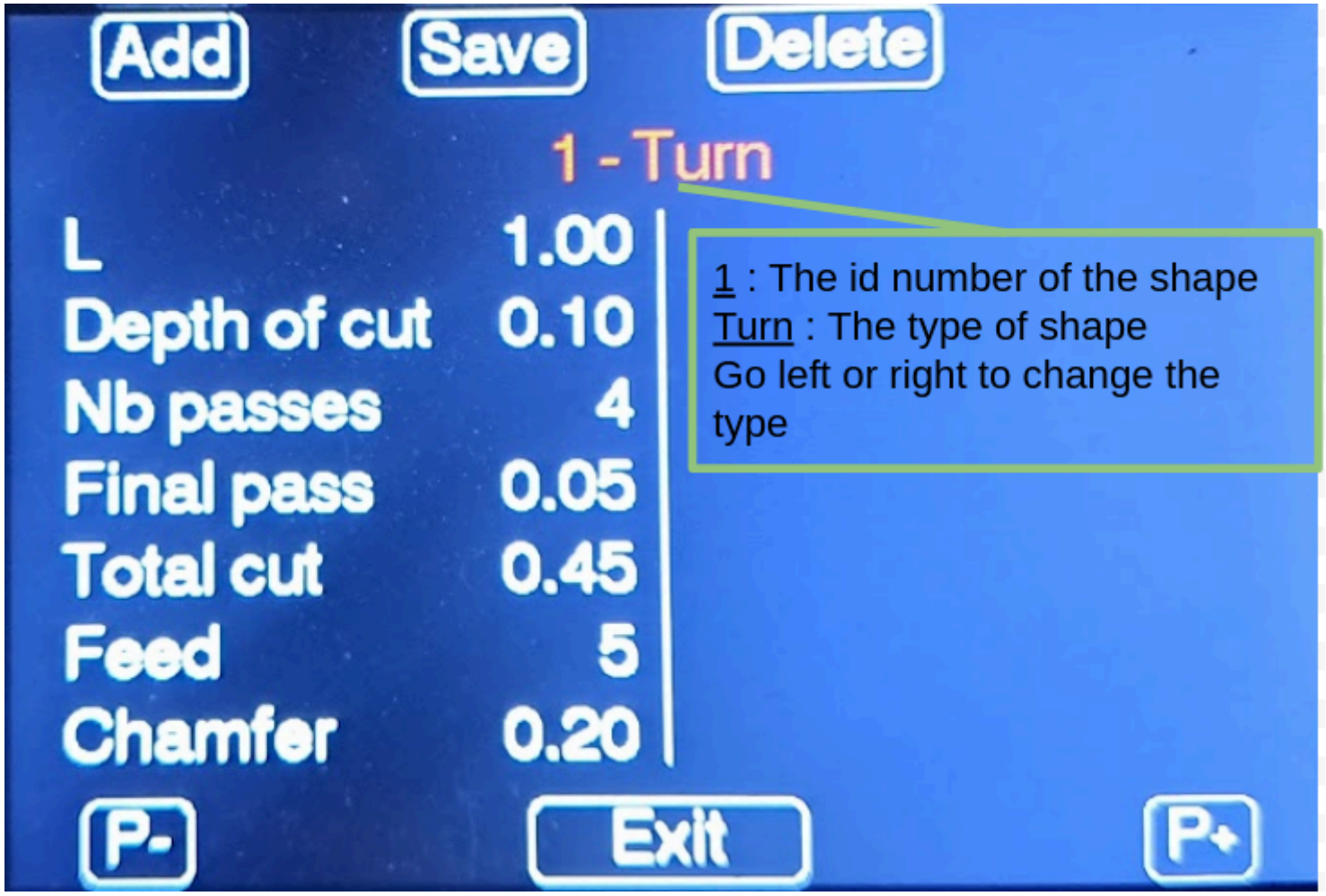
Moving the carriage

You can move the carriage with the arrow.
The middle button change the step:
Metric: 0.01 , 0.1, 1, 10 mm
Inches: 0.001, 0.01, 0.1, 1 “



Shape

In this menu, you can manage the shapes.



Add: add a new shape, the number is incremented automatically

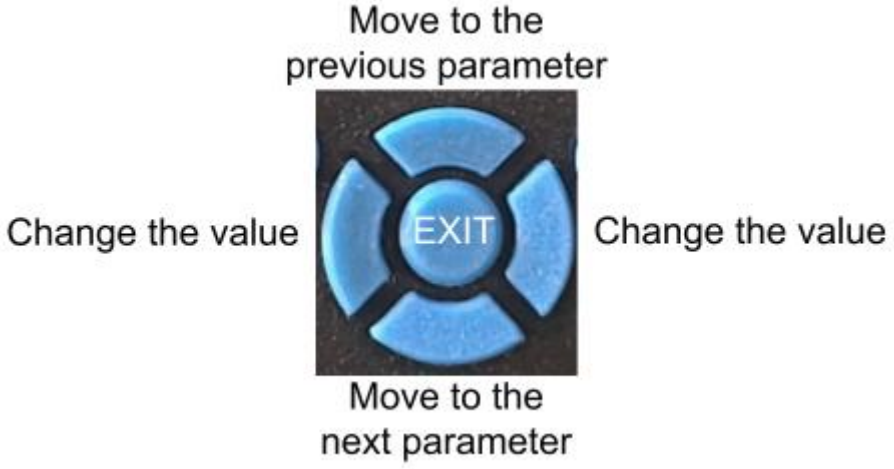
Save: save the shape. If you do not press this button, you can use the shape but it will be lost at the next restart of the ELS

Delete: Delete the program that is currently shown

P-: Go to the previous shape

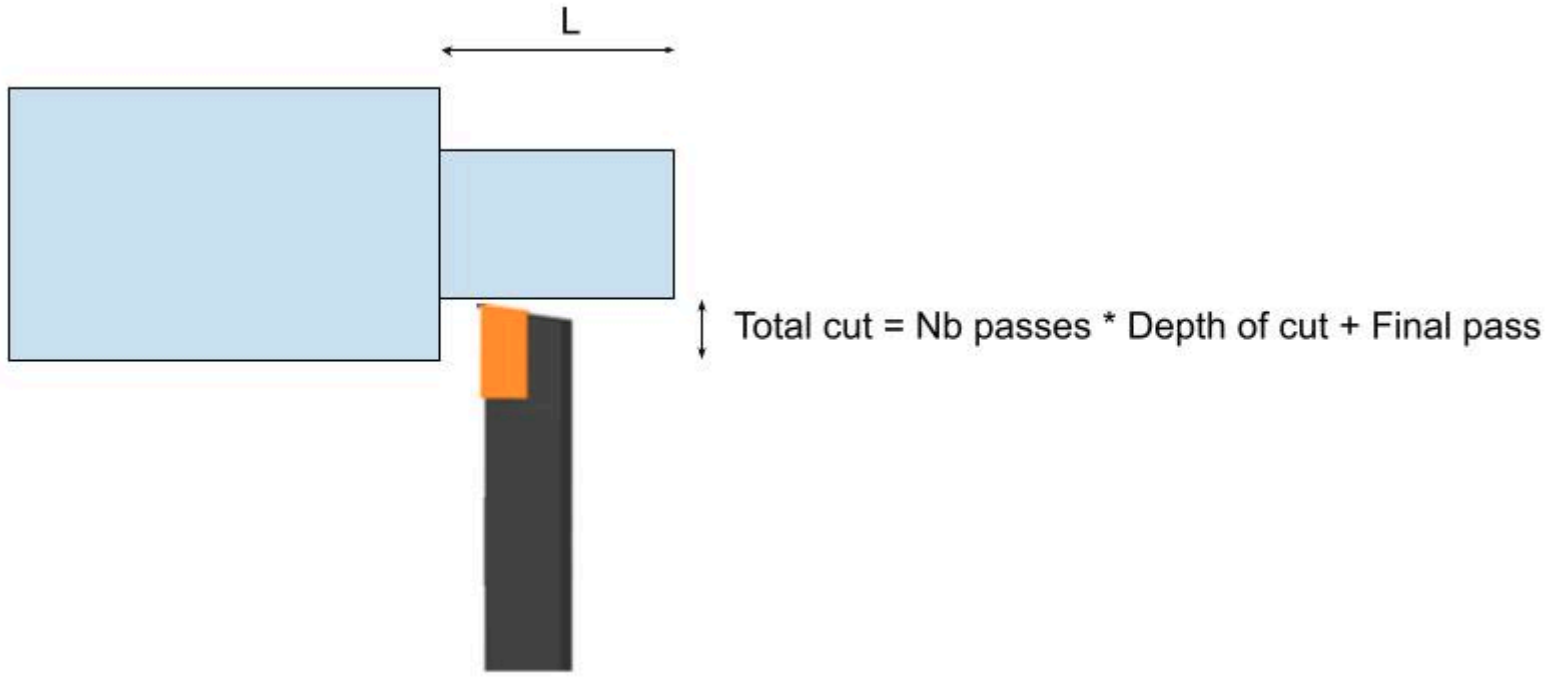
P+: Go to the next shape

The navigation is the same as in the parameter screen:



Shape “Turn” or “Int Turn”

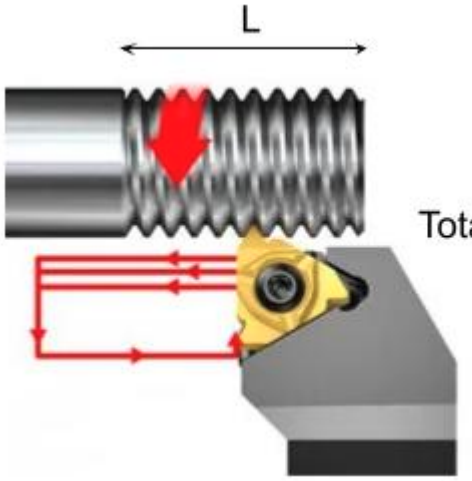
This is the regular turning process.



L: length of the cut (mandatory)
Depth of cut: depth of cut of one pass (mandatory)
Nb passes: Number of passes (mandatory)
Final pass: depth of cut of the final pass (optional)
Total cut: the sum of the overall cut (automatic, for display only)
Feed: Feed speed, can be changed live when cutting (optional)
Chamfer: Will make a chamfer of this size at the end (optional)

Shape: “1Axis Thread”, “Thread”, “Int Thread” or “Left Thread”

To create right or left hand thread

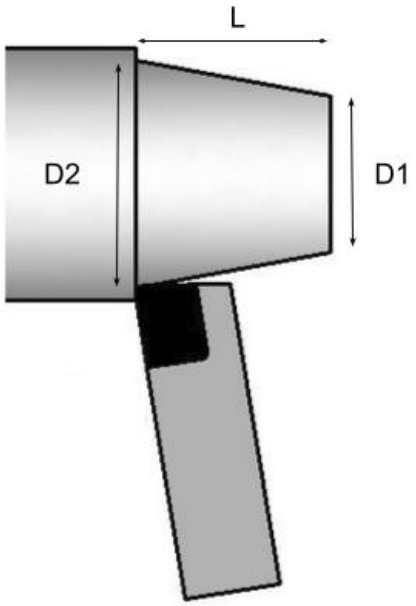


Total cut = Nb passes * Depth of cut + Final pass

L: length of the cut (mandatory)
Depth of cut: depth of cut of one pass (mandatory)
Nb passes: Number of passes (mandatory)
Final pass: depth of cut of the final pass (optional)
Total cut: the sum of the overall cut (automatic, for display only)
Feed: the size of the pitch, can be changed BEFORE cutting (optional)
Feed unit: the unit of the pitch (optional)

Shape: Taper

To form a taper



L: length of the cut (mandatory)
D1: diameter of the external face of the taper (mandatory)
D2: diameter of the inner face of the taper (mandatory)
Angle: angle of the taper (mandatory)
Depth of cut: depth of cut of one pass (mandatory)
Nb passes: Number of passes (mandatory)
Final pass: depth of cut of the final pass (optional)
Total cut: the sum of the overall cut (automatic, for display only)
Feed: Feed speed, can be changed live when cutting (optional)

Mode

- ## Turn:

The ELS acts as a regular gearbox, the Z axis moves synchronized with the encoder and the feed speed. You can change it and use the hand wheel.
Note the Z DRO is deactivated.

- ## Free:

The ELS acts as a stepper motor movement controller. It does not take into account the spindle movement nor the feed speed. It may be used on the lathe or any other machinery tools, like a milling machine.

- ## Program:

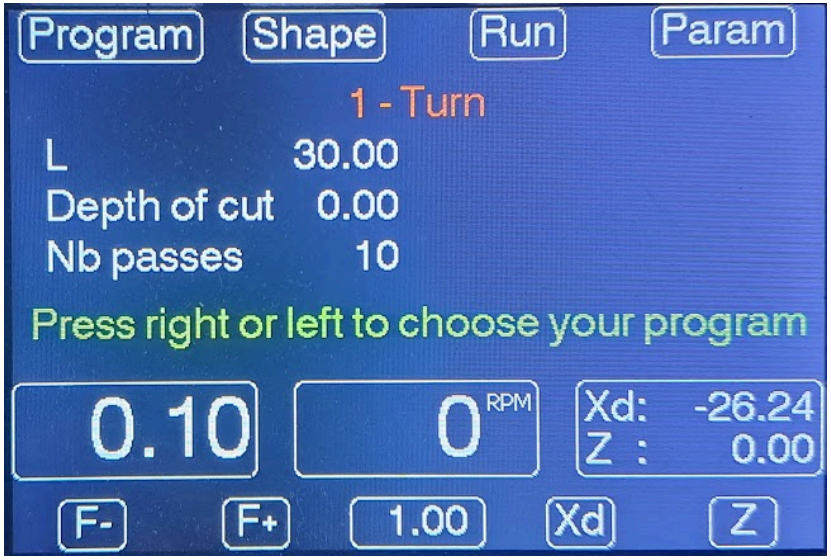
This is where you run a program corresponding to a shape you already configured.

- ## Angular:

This unit shows the angular movement of the spindle.

Program Mode

Step 1: Choose your shape. Press left or right to browse the shape you created. Then press **Run**



Step 2: You need to set the 0 of the Z axis. If it is already set, press **Continue.** Move the X and Z axis to touch the workpiece on the Z face and press **Z**

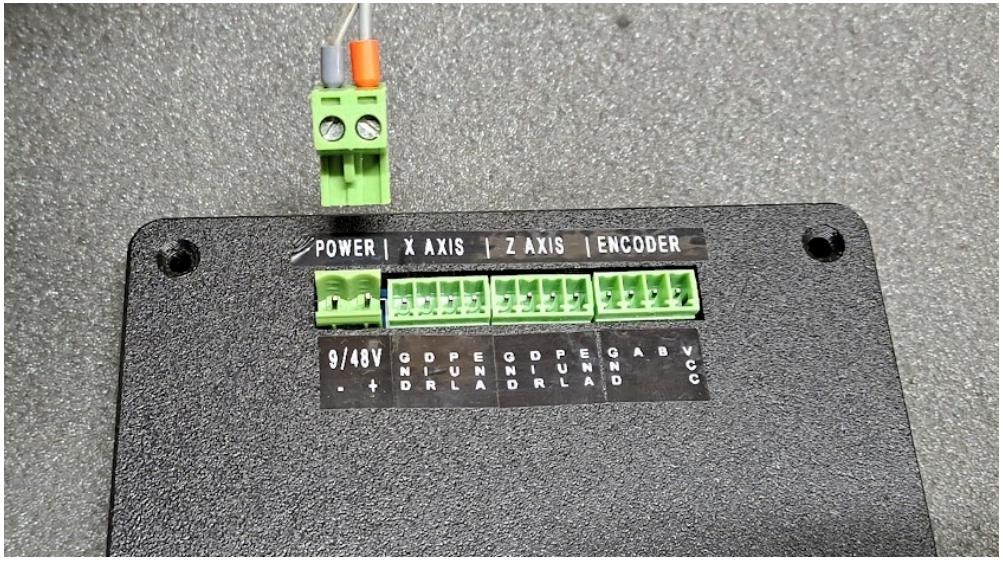
Step 3: You need to set the 0 of the X axis. If it is already set, press Continue.
Move the X and Z axis to touch the workpiece on the X face and press Xd

Step 4: Press Start when ready, the program starts.
You can press on Stop anytime to stop the program. Be careful, it is not possible to finish the program in that case.
You can press on Pause anytime (except special cases like when threading) to pause the program. Press Resume to start again where it was stopped.

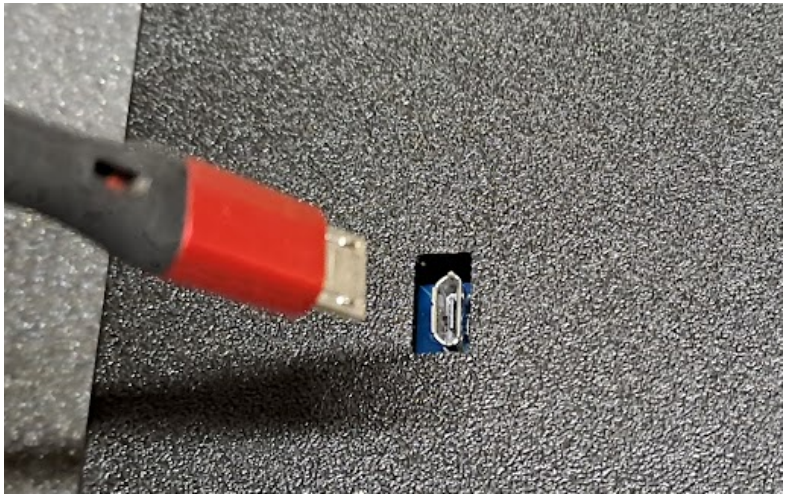
Step 5: At the end of the program, you can run another pass by pressing One More. You can change the depth of the cut with the up and down arrow. This is very useful if you want to have a very precise diameter or to test a thread.

Firmware Upgrade

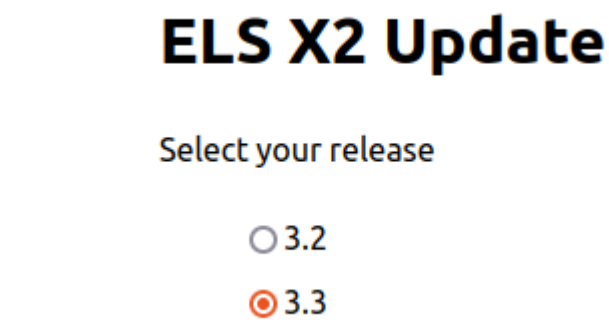
This procedure describes the steps for upgrading the ELS firmware.
IMPORTANT: UNPLUG the power of the unit first.



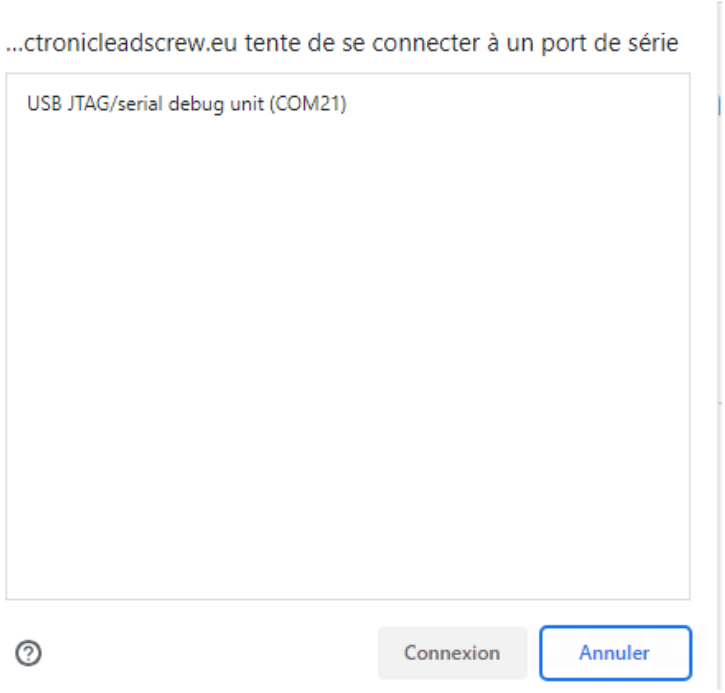
Plug the unit with a micro USB cable to your computer.



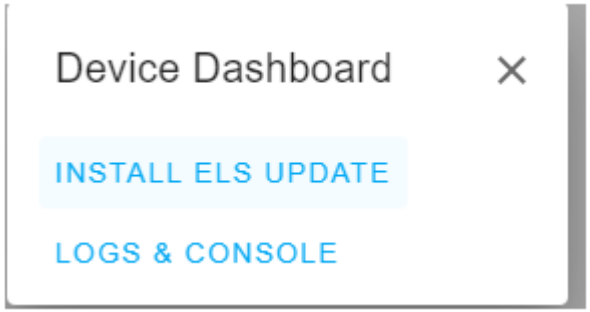
You need to use **google chrome** (no other web browser), go to
https://electronicleadscrew.eu/ELSX2Firmware/



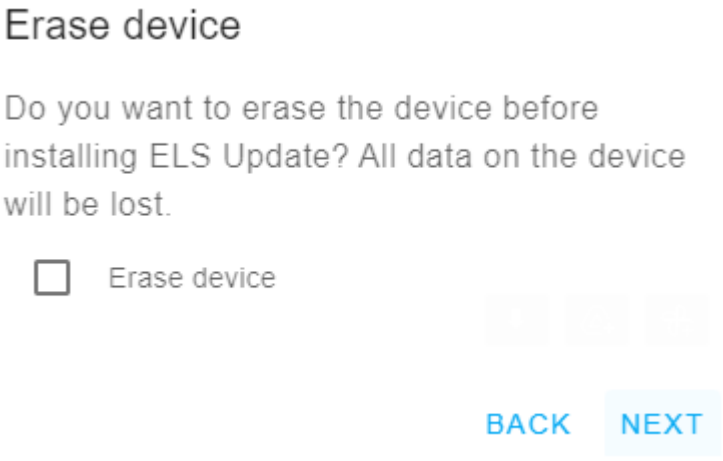
Choose the last release.
Plug in your ELS to your computer using the micro USB on the ELS side and a regular USB to your computer.
Click on Connect, choose the USB JTAG/serial... and 'Connexion'

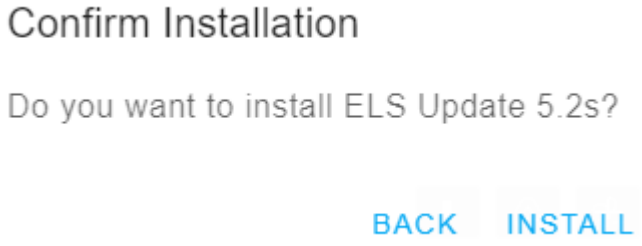


Choose 'INSTALL ELS UPDATE'

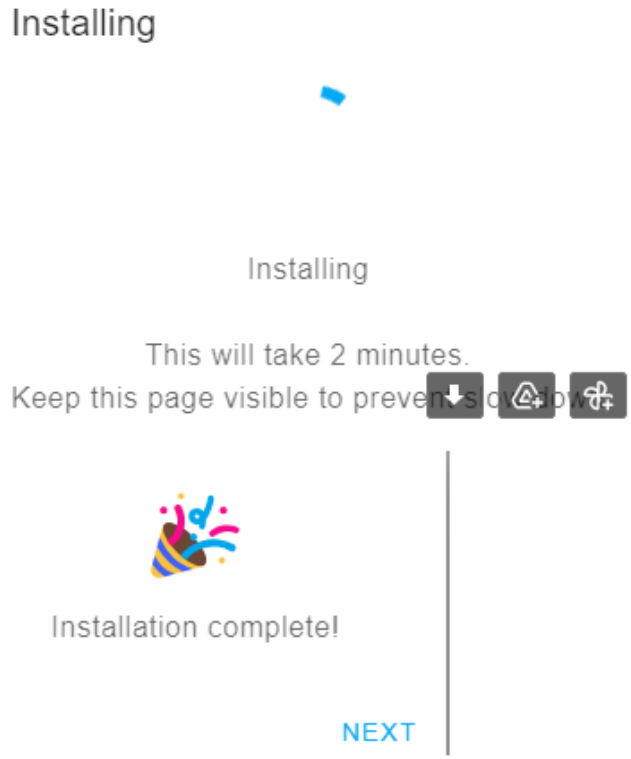


Do not check Erase device, and then NEXT



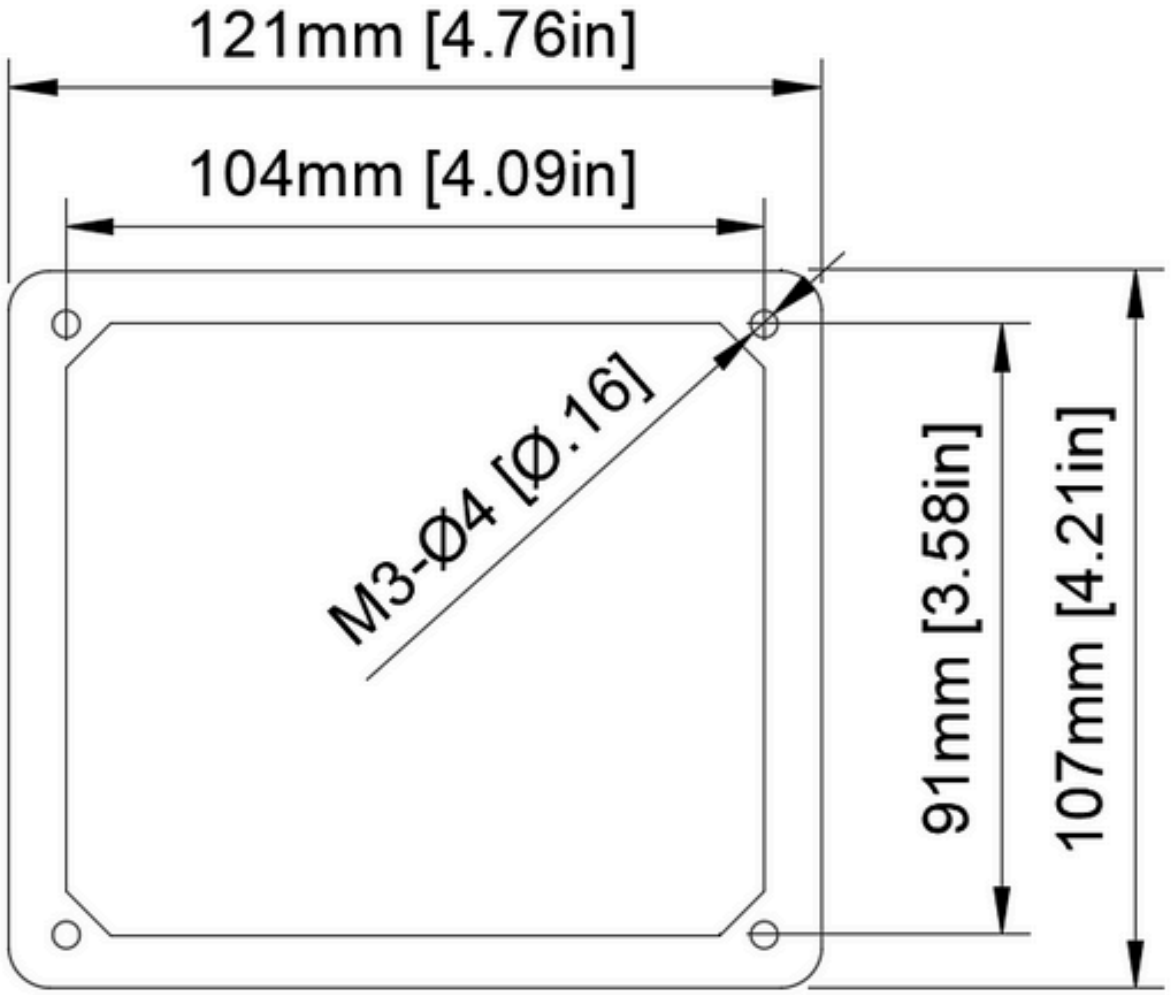


INSTALL



After a few seconds, it should be upgraded to the last release, you can check the version on the ELS on the menu 'Lathe Parameter', it is the last one.

Mounting

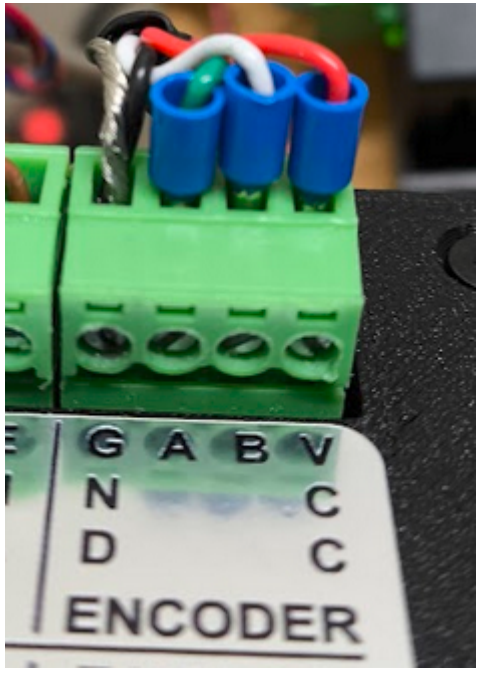


You can replace the M3 screws to fix the unit.
WARNING, the screw length should not be over 16mm+mounting plate thickness.

Troubleshooting

1. When running a program, the carriage goes right and never ends

In that case, you need to invert the encoder signal by swapping the A and B wires:



And to compensate, you need to change this parameter from YES to NO or NO to YES:

To check the direction on the Z axis is ok, use the left and right arrow and verify the carriage moves to the corresponding directions.

2. Everything looks fine but the motor does not move, I have a 5v/24v switch on my driver

On some drivers, like the DM556T, input signals can be 5v or 24v. You need to toggle the switch to 5v.