Integrated controller guide

Specifications:

Size:	37 x 29 x 7 mm
Power supply:	12 VDC
Axis:	1
Control:	Open loop
Communication:	USB-C 2.0, Digital IO, Analog IO, UART Rx, UART Tx All available from the ZIF connector

The pinout for the ZIF-connector is shown below. We also have a breakout board available. This way you can plug-and-play with our XLA integrated controller. On our breakout board a USB-C connector is available, together with UART Rx and Tx. Also the digital and analog IO pins are accessible from that PCB.
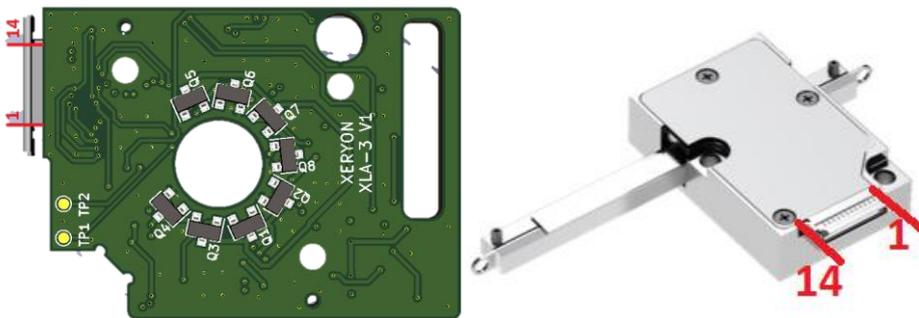
Pin	Symbol	Function	In/Out	Pin	Symbol	Function	In/Out
1	+12V	+12V	In	2	+12V	+12V	In
3	DIR	Digital IO: Direction	In	4	SPE	Analog IO/PWM: Speed	In
5	LIM-	Digital IO: Left limit	Out	6	LIM+	Digital IO: Right limit	Out
7	Tx	UART Tx*	Out	4	Rx	UART Rx*	In
9	SWDIO			10	SWCLK		
11	GND		In	12	D-	USB negative data signal	In/Out
13	D+	USB positive data signal	In/Out	14	GND		In

*Rx and Tx work on 3.3V. If you want to connect with RS232, higher voltages are needed. In this case a voltage convertor (buffer) should be added.

Software commands

These commands can be send over a serial connection to the integrated controller. You can request the value of a command by sending the command with "=?" after it. For example: "FREQ=?" returns "FREQ=84000".

Command	Explanation
FREQ	Set the frequency of the excitation signals. The unit is Hz. If a single frequency is set, then LFRQ and HFRQ are set equal to this value. The same frequency will be used for all speeds.
LFRQ	Set the lowest frequency to be use in the speed control. The unit is Hz. Default: 84000 Hz.
HFRQ	Set the highest frequency to be used in the speed control. The unit is Hz. Default: 88000 Hz.
PHAS	Set the phase offset between the excitation signals. The unit is degree. A value ranging from 0 to 90° can be set. Default: 0
LPHS	Set the lowest phase offset to be used in the speed control. The unit is degree. Default: 0.
HPHS	Set the highest phase offset to be used in the speed control. The unit is degree. Default: 90.
VOLT	Set the voltage that is used to drive the motor. The unit is mV. A value ranging from 12 000 mV to 72 000 mV can be used. Default: 48 000 mV.
DICF	Select a way to change direction. A value of "0" means that the direction can be controlled using the "MOVE" command (default). A value of "1" means that the direction can be controlled using the "DIR" pin.
SPCF	Select a way to control the speed. A value of "0" means that the speed can be controlled using the "SSPD" command (default). A value of "1" means that the speed can be controlled using a PWM signal on the "SPD" pin. A value of "2" means that the speed can be controlled using an analog signal on the "SPD" pin.
OSPD	Set the speed. This can be a value ranging from 0 (standstill) to 100 (full power).
MOVE	This command can be used to move the stage. By sending "MOVE=1" or "MOVE=-1" you move the stage. The "-1" and "1" determine the direction. By sending "MOVE=0" you stop the movements of the stage.
LDCF	Enable of disable the limit switches. LDCF=0: disable the limit switches, the stage will keep going. LDCF=1: enable the limit switches, the stage will stop at the limit.
SOFT	You can request the software number with this command by sending "SOFT=?"
SNRO	You can request the serial number with this command by sending "SNRO=?".
RSET	You can reset the device by sending "RSET".
UART	You can enable UART communication by sending the baudrate with this command. For example, UART=9600 enables UART communication and the baudrate is 9600.

Speed control

The speed can be controlled in three different ways: by changing the phase offset of the excitation signals, by changing the frequency of the excitation signals or using a combination of both frequency and phase.

The frequency is set to a value between LFRQ and HFRQ depending on the value of "OSPD".
The phase is set to a value between LPSD and HPSD depending on the value of "OSPD".
This way, the speed is controlled. By sending a value ranging from 0 to 100 using the "OSPD", the speed of the stage changes.

To only control the speed using the phase, set the LFRQ and HFRQ to the same value. This can be done using the "FREQ=" command.

To only control the speed using the frequency, set the LPSD and HPSD to the same value. This can be done using the "PHAS=" command.

Hardware control

You can also control the stage using it's hardware IO. Pin 5 and pin 6 (see p1) are digital outputs. They become high if the stage is at one of its limits.

To move the stage with the "DIR" and "SPE" pins, you should first configure the software correctly. This can be done with the commands "DICF" and "SPCF", for more information see the page above.

Once this is configured correctly, you can select the direction of the movement by setting the digital pin 3 to high or low. You can control the speed of the stage by using either an analog signal to pin 4 or a PWM signal to pin 4. This depends on what you selected in "SPCF". By setting this pin to ground you stop the movements of the stage.