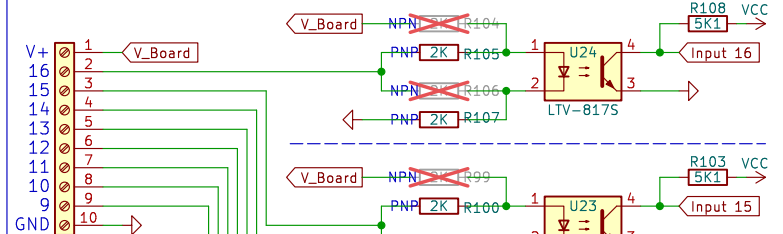


# Estlcam Terminal Adapter "XL"

- Check the "Main Schematic" folder to learn more about all possible features and options.
- Make sure to program AVR64DB64 Flash, EEPROM and Fuses with the files and instructions provided in the "Bootloader" folder!

Digital Inputs:  
By changing the resistor population the input logic can be changed to suit most common sensor types:  
NPN / switching against GND  
PNP / switching against board supply voltage "V\_Board" (+24V)

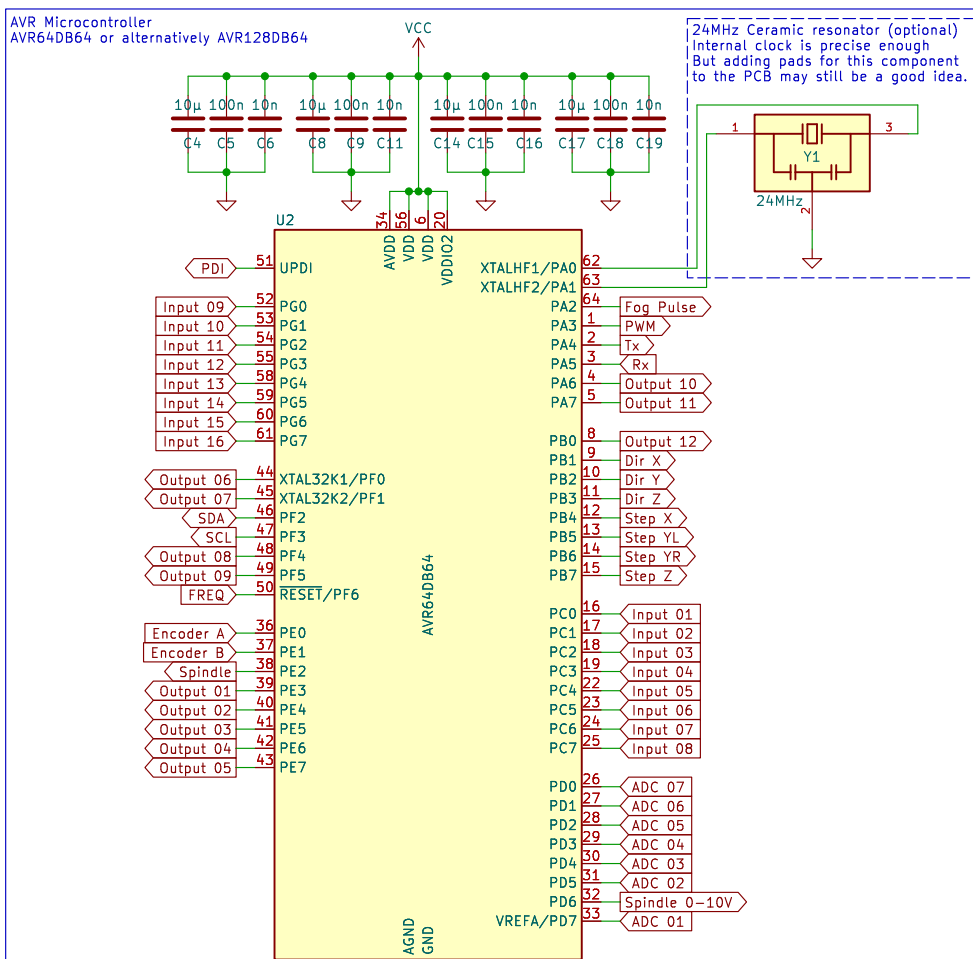
My default is:  
Inputs 1 to 8 are NPN logic  
Inputs 9 to 16 are PNP logic  
Please update EEPROM if you customize the inputs and provide information to your customers.



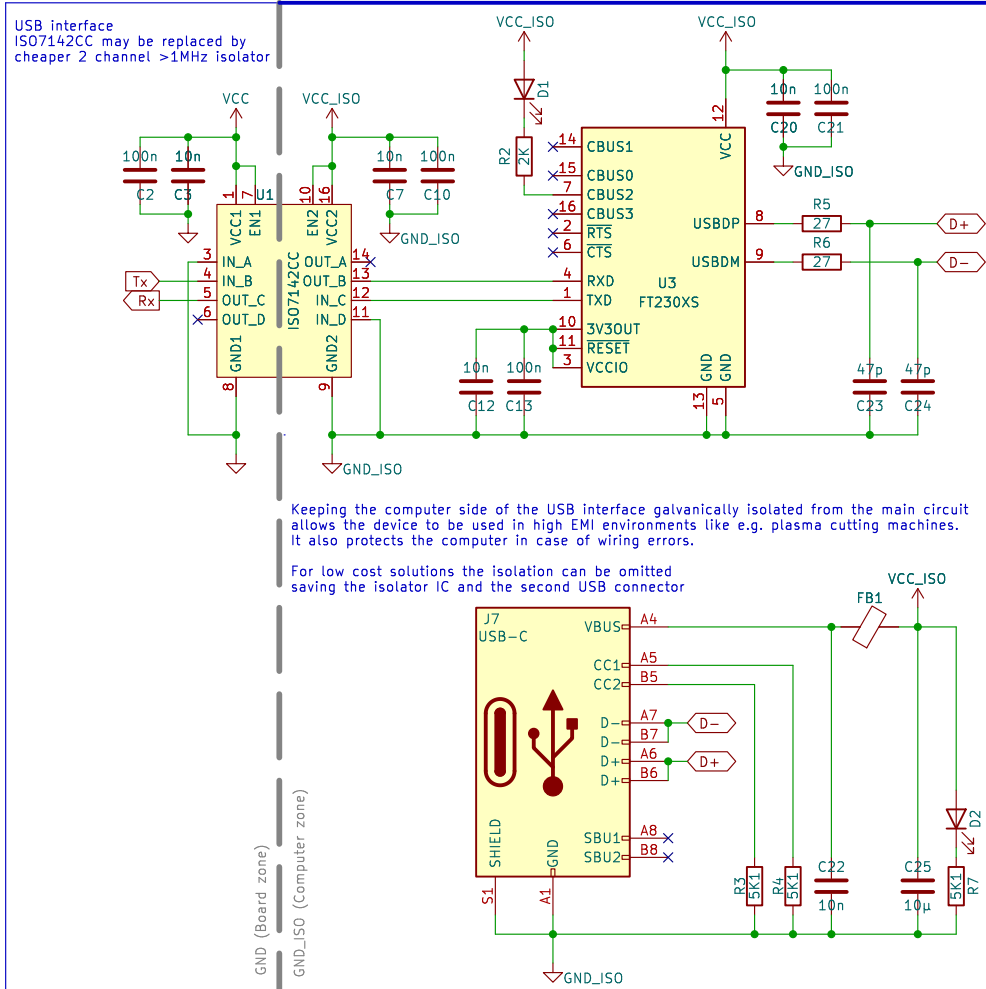
Step / Dir outputs / Terminal Adapter only



Step & direction logic for machines with 2 Y-axis motors:  
– VL for left Y-axis motor  
– VR for right Y-axis motor  
– Dir signal is shared for both sides.  
– This makes wire routing of the gantry possible while homing.  
For machines with only 1 motor it does not matter which step output is used.  
If your product has only 1 Y-axis output please update the EEPROM accordingly.

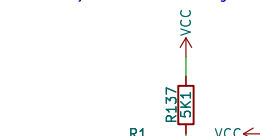


Note:  
– There can be up to 20 output pins.  
– Unused pins can alternatively be used as output pins (except PPS / PPS / PPS).  
– You can e.g. sacrifice some of the higher input pins in favour of output pins.  
– Also the order of the pins defined output pins can be changed to ease PCB routing.  
– If changes to the default output configurations are made the device EEPROM needs to be updated accordingly.  
– All other pin functions are fixed and cannot be changed.



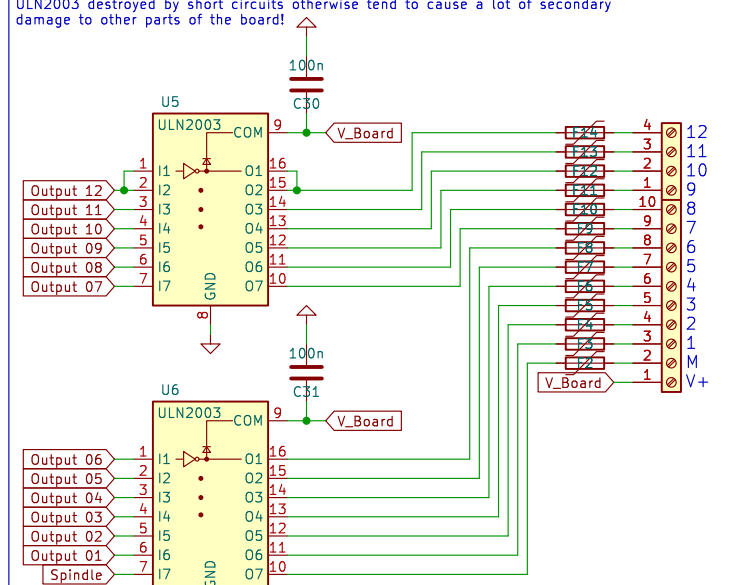
Keeping the computer side of the USB interface galvanically isolated from the main circuit allows the device to be used in high EMI environments like e.g. plasma cutting machines. It also protects the computer in case of wiring errors.  
For low cost solutions the isolation can be omitted saving the isolator IC and the second USB connector

Frequency / pulse counter input (5V TTL)  
Add 10k Resistor to protect the board from accidentally connected 24V signals.

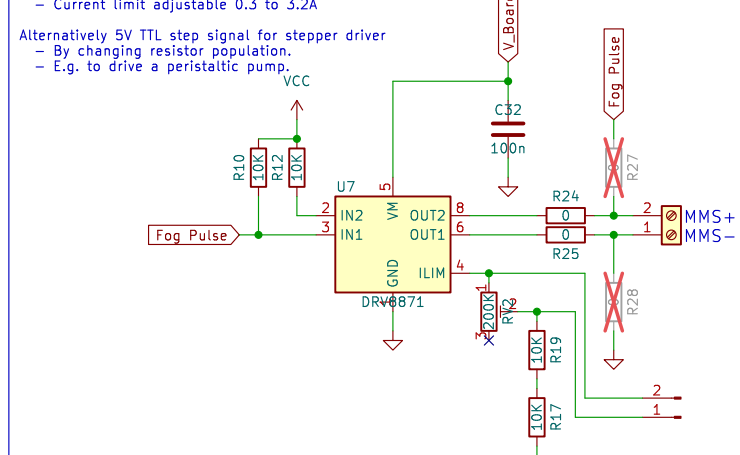


E.g. for spindle coolant flow monitoring with turbine flow meter.

Relay driver outputs  
Add PTC fuses 100-150mA to each output.  
ULN2003 destroyed by short circuits otherwise tend to cause a lot of secondary damage to other parts of the board!

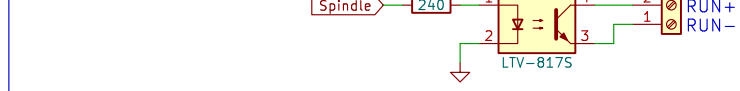


Fog coolant solenoid injector valve output:  
Current limit adjustable 0.3 to 3.2A  
By changing resistor population

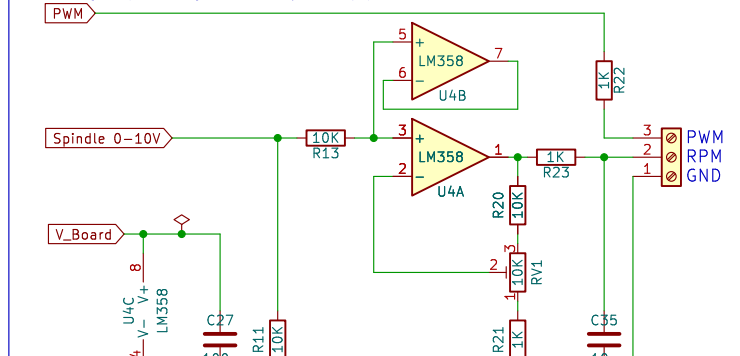


This output creates precisely timed pulses.  
E.g. for fog coating with injector valves.  
Or central lubrication solenoid dosing pumps.

VFD RUN output  
Can be used to switch a VFDs Run signal without need for an external relay

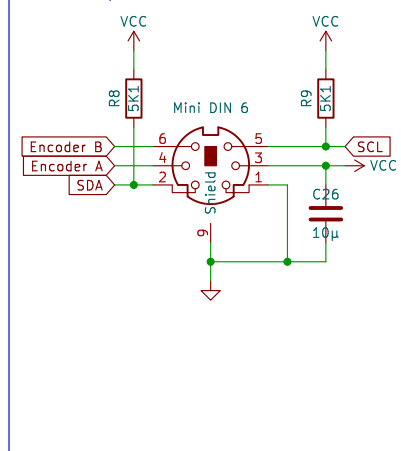


PNM and 0-10V RPM outputs  
10V analog output voltage can be adjusted by potentiometer

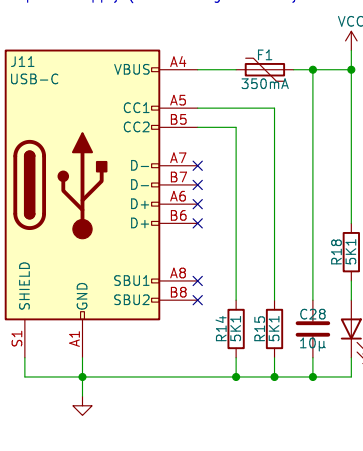


For VFD spindle motor speed control

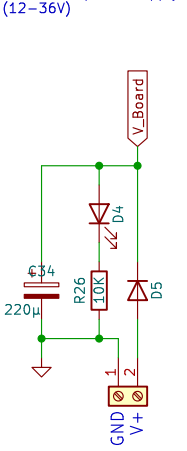
Hand wheel pendant connector



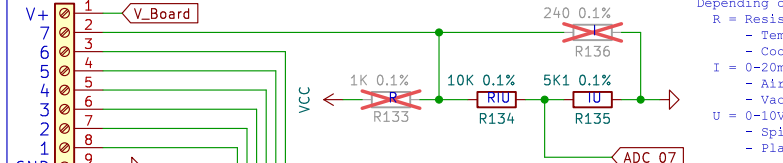
5V power supply (if USB 1st galvanically isolated)



24V board power supply (12-30V)



Analog Sensor Inputs:  
Depending on resistor population sensor inputs ADC 01-07 can measure:  
R = Resistance = e.g. 1  
I = Current = e.g. 10mA / 100mA / 1000mA (1A)  
U = Voltage = e.g. 0-10V / 0-20V / 0-5V

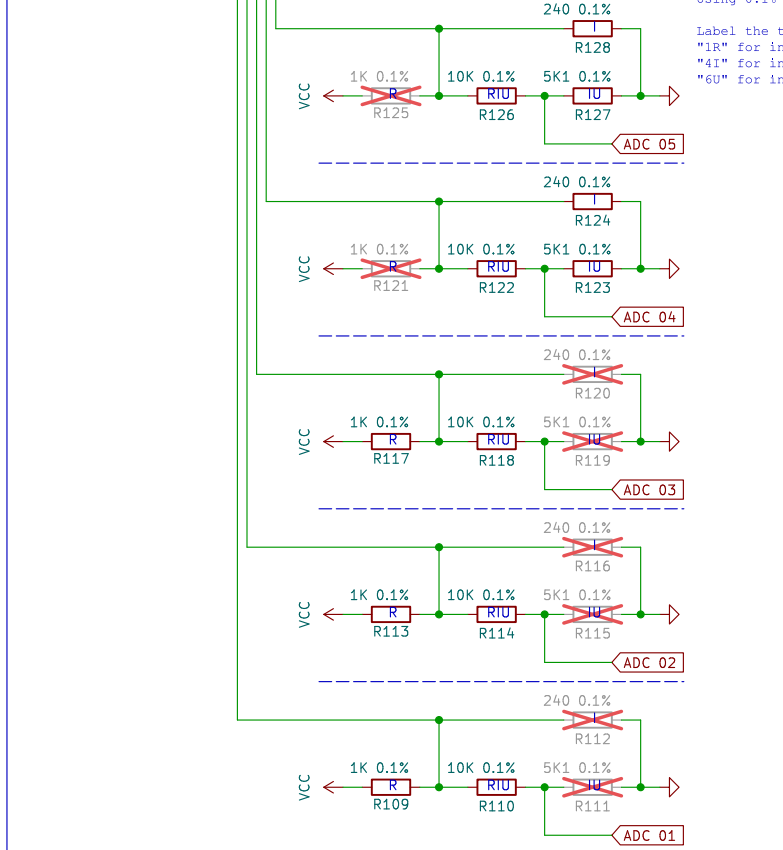


Default population:  
ADC 01: Resistance / Populate Resistors "R10" \*n  
ADC 02: Resistance / Populate Resistors "R11" \*n  
ADC 03: Resistance / Populate Resistors "R12" \*n  
ADC 04: 0-20mA Current / Populate Resistors "R13" \*n  
ADC 05: 0-20mA Current / Populate Resistors "R14" \*n  
ADC 06: 0-10V Voltage / Populate Resistors "R15" \*n  
ADC 07: 0-10V Voltage / Populate Resistors "R16" \*n

Please update EEPROM if you customize the inputs and provide information to your customers.

Using 0.1% precision resistors is recommended to get accurate readings.

Label the terminals appropriately as the customer knows what type to expect e.g.  
\*R\* for input 1 / resistance  
\*A1\* for input 4 / 0-20mA current  
\*U1\* for input 6 / 0-10V voltage



The Estlcam hardware designs are free:  
– You are allowed to manufacture and sell Estlcam compatible hardware.  
– Actually I really appreciate it if you do so:  
– I'm a hardware and software development guy and get my income from the Estlcam software license sales.  
– I'm not much interested in manufacturing and hardware sales, especially not internationally.

There are only 2 conditions:  
1: Your product = your responsibility.  
– Do everything at your own risk and don't hold me liable.  
– Ensuring the products compliance to your intended markets laws and regulations is up to you.  
2: Put your company name and address on the finished product:  
– Customers must be able to tell who manufactured the product.  
– You are allowed to use the Estlcam logo – this is OK.

Please keep in mind that while personal use and modifications are welcome I simply don't have enough time to assist with personal projects if you run into issues.  
This project is mainly for commercial manufacturing and sales.

Programming interface:

The PCB exposes 3 pads for on board Bootloader Flash / EEPROM / Fuse programming labeled VCC / GND / PDI  
Connect e.g. with spring loaded push pins  
A PDI compatible programmer is needed e.g. Microchip / Atmel ICE

If you use this programmer:  
– Use the right 10 pin connector  
– And connect:  
– Pin 2 to the GND Pad  
– Pin 3 to the PDI Pad  
– Pin 4 to the VCC Pad

