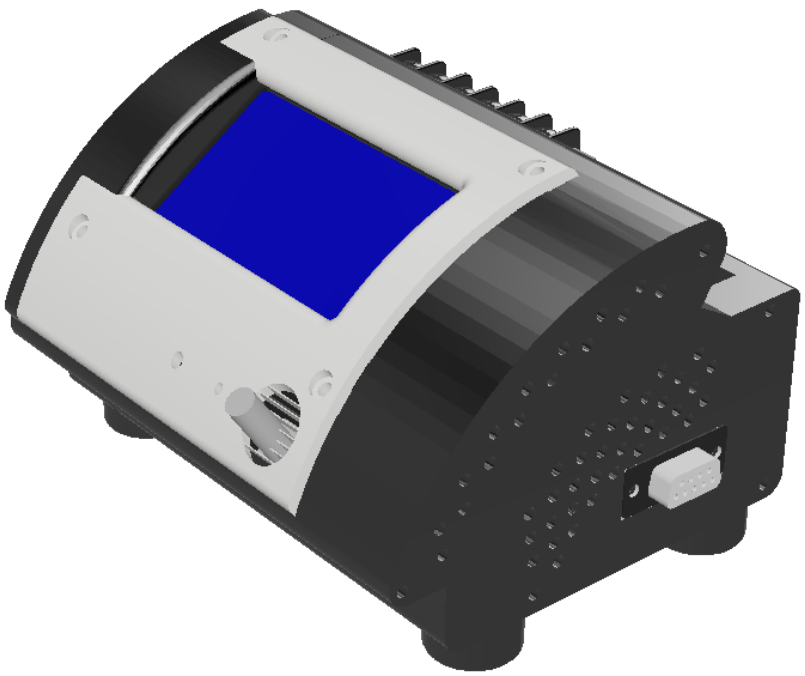
Manatee Controller Build Manual

Manatee
FLUIDICS



v1.0

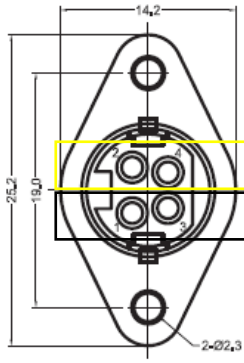
Csaba Konrad

Tools

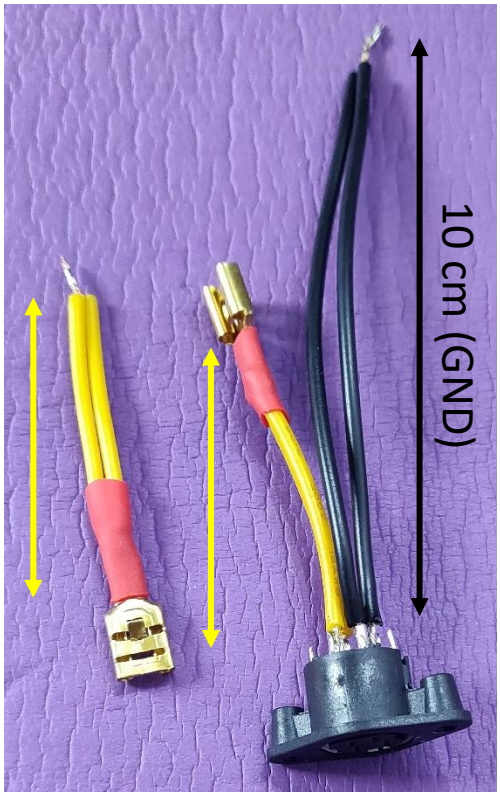
- Hex keys
- Soldering iron
- Crimping tools
- Ruler
- Phillips screwdriver

Parts for 1-5 channels

- 3D printed:
  - Body
  - Cap
  - Face
  - Port seal (for each unused channel)
- Electronics:
  - Arduino Mega R3
  - Ramps 1.4
  - Intelligent Digital LCD 12864 Display
  - SilentStep TMC2100 (one per channel)
  - 40mm fan
  - 25mm fan x2
  - Power switch
  - GST120A12-R7B power supply
- Cables, connectors
  - 9pin D-sub female (one + one per channel)
  - Power connector
  - Flat connector x2
  - 6 pin terminal block
  - 9 chribbon cable (8cm + 15cm for each channel)
  - power cable (76 cm total)
  - USB cable
- Screws, nuts
  - D-sub nut (2 + 2 for each channel)
  - M3x16mm x4
  - M3x20mm x2
  - M3x25mm x4
  - M3x16mm x2
  - M2.5x12mm x2

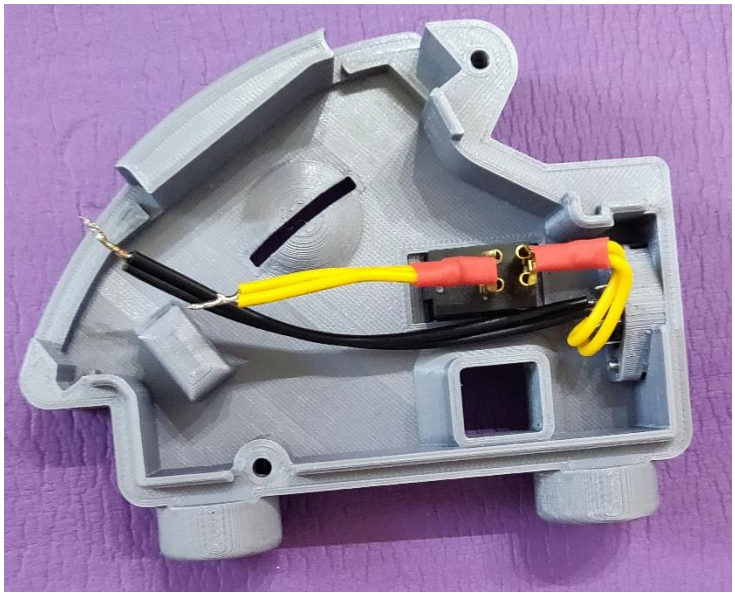


KPJX-PM-4S

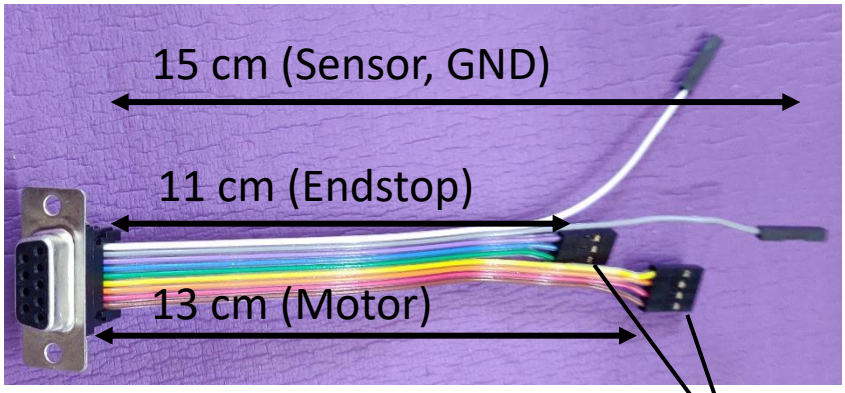


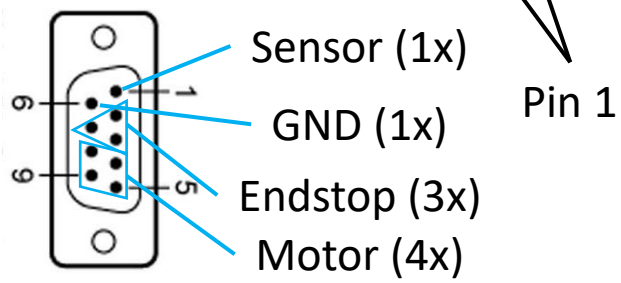
Power connector: Solder a 5cm cable to pins 2 and 4 (+12V) and crimp a flat connector on the other end. Solder a 10 cm wire to pins 1 and 3 (GND). Crimp another 5 cm cable with a flat connector.

Cap assembly: Install the power connector with 2x M2.5x12mm screws. Install the power switch by popping it in. Connect the flat connectors (+12V) to the switch

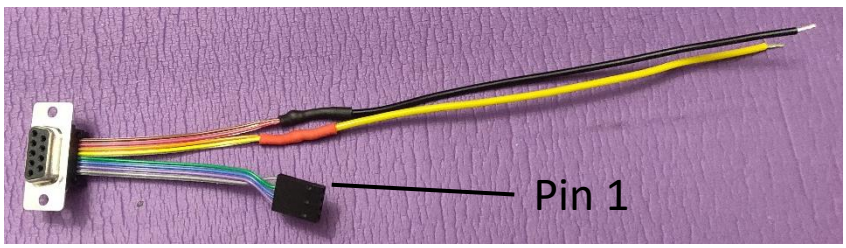


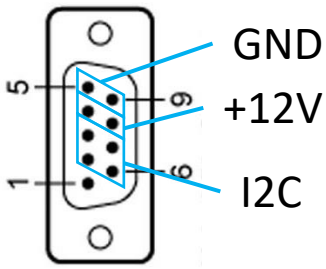
Channel connector assembly: For each channel (1-5) cut a 15cm ribbon cable. Shorten endstop cables to 11 and motor cables to 13cm. Crimp wires and assemble pinhead connectors, crimp D-sub connector. Note ribbon cable exits towards the top (row with pins 1-5). Check Table 2 for reference.





I2C connector assembly: cut a 8cm piece of ribbon cabe. Crimp it to a D-sub connector. Note ribbon cable exits towards the bottom (row with pins 6-9). Cut two 13cm cables for power, solder them to pins 5+9 (GND) and 4+8 (+12V). Cut off cable from pin 1. Crimp cables from 2,3,6 and 7 and assemble pinhead connector. Note the order of the cables, see Table 1 for reference.

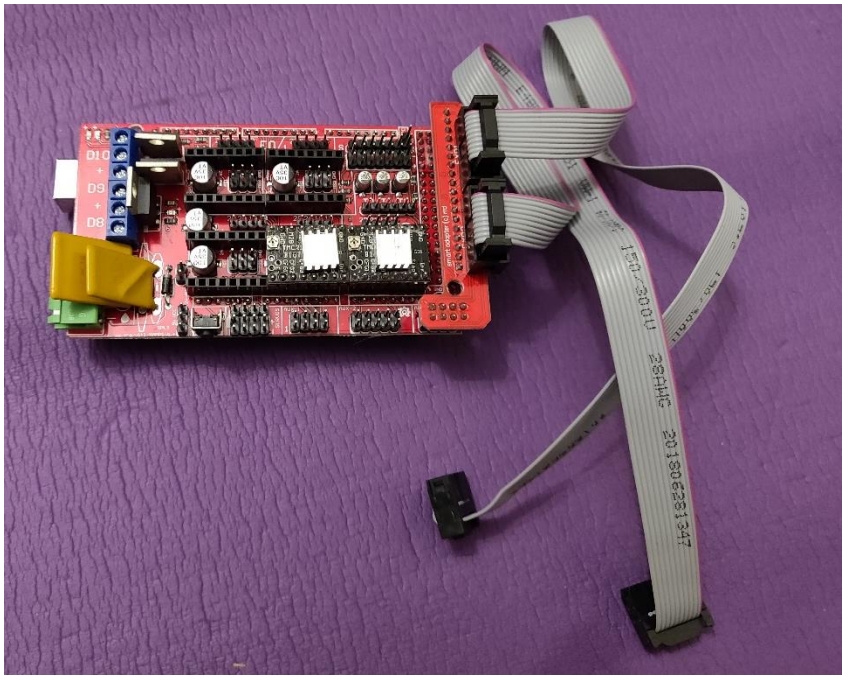




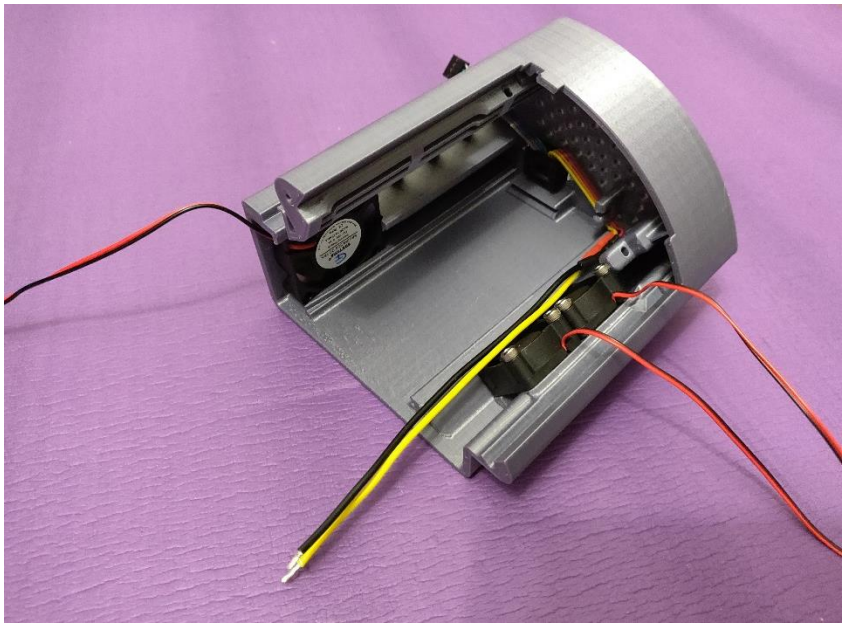
female D-Sub	RAMPS connection	Pinhead
pin 1	No connection	
pin 6	I2C 21	Pin 1
pin 2	I2C +5V	Pin 4
pin 7	I2C GND	Pin 3
pin 3	I2C 20	Pin 2
pin 8	Power +	
pin 4		
pin 9	Power -	
pin 5		

Table 1 I2C connector

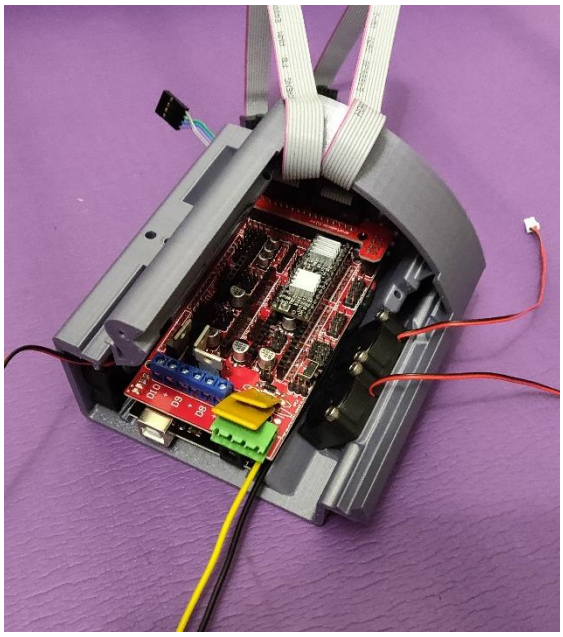
RAMPS 1.4 assembly: Install the RAMPS shield on the Arduino Mega board. Install the LCD 12864 smart adapter on the RAMPS, connect the two ribbon cables. Install stepper motor drivers and heatsinks. For the TMC2100 no jumpers for the steppers are needed.



Fan installation: Slide the 40mm fan into it's slot. Install the two 12mm fans with two M3x16mm screws each. Install the I2C connector with 2 D-sub nuts. Note cable alignment leaving the RAMPS slot free.



Slide in the RAMPS assembly.



Connect the I2C pinhead connector to the ramps board. See RAMPS pinout and Table 1 for reference.

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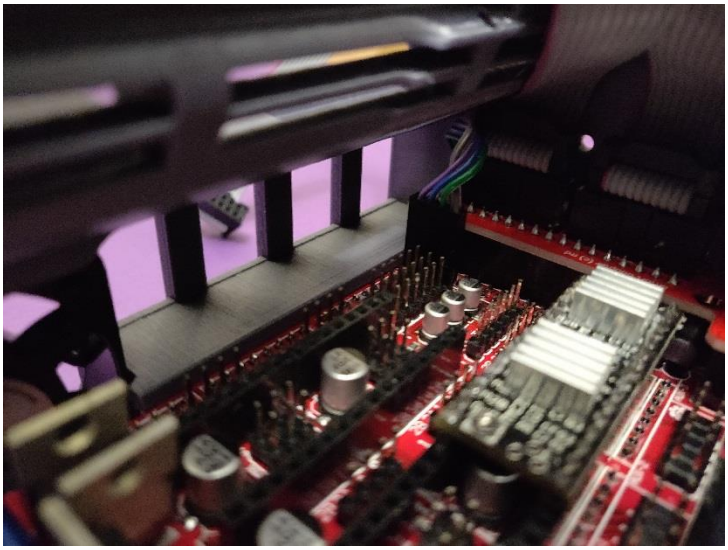
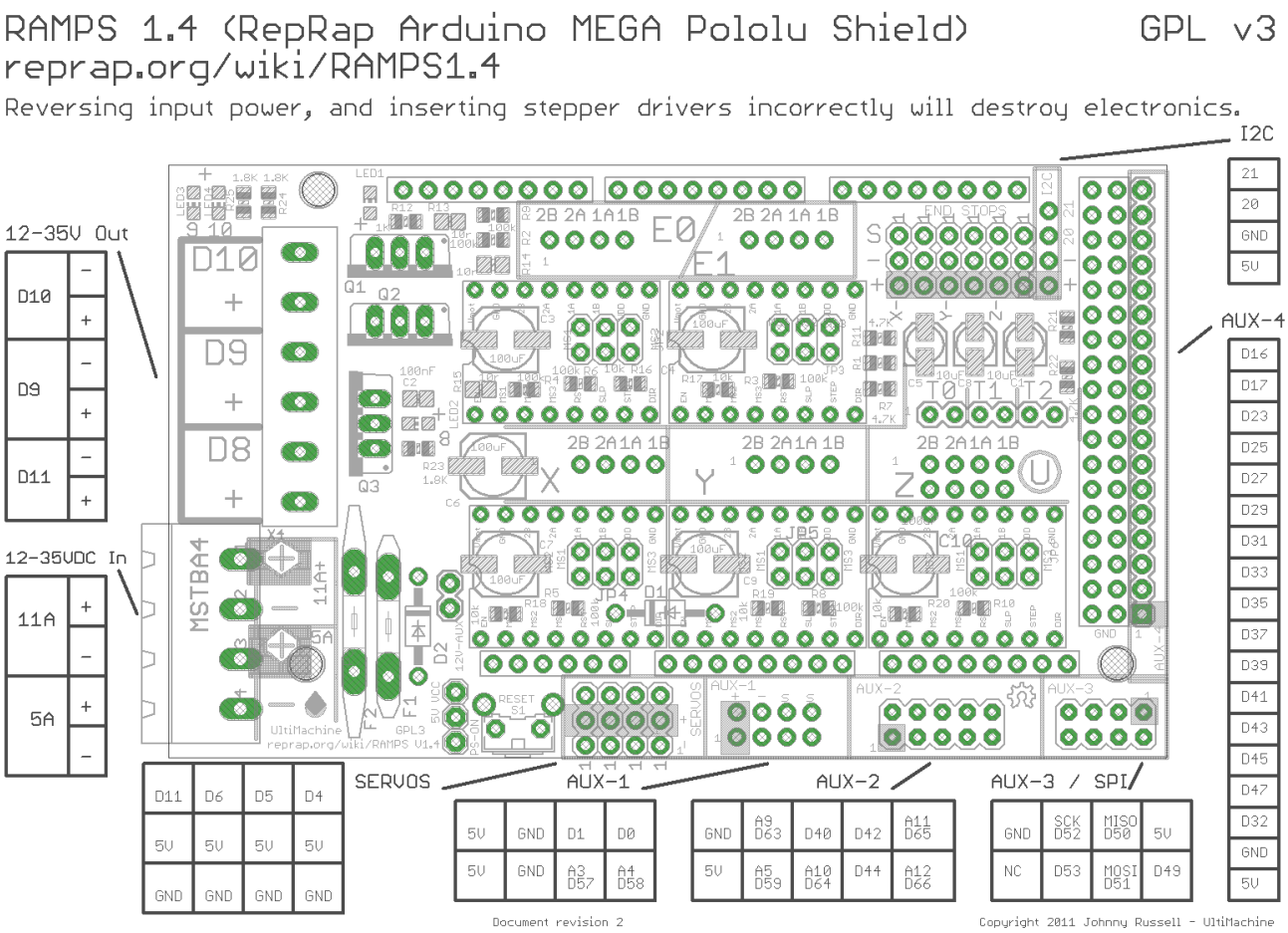
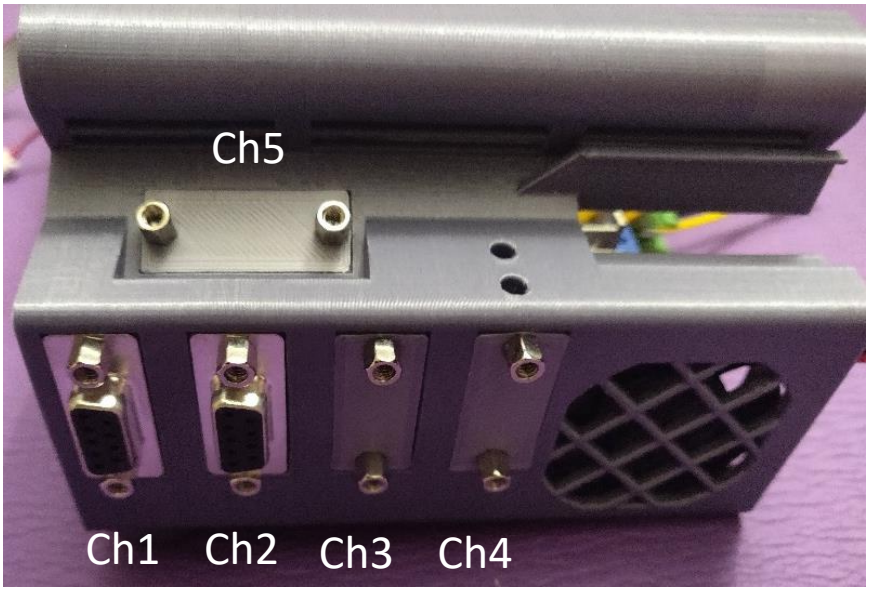




RAMPS 1.4 pinout

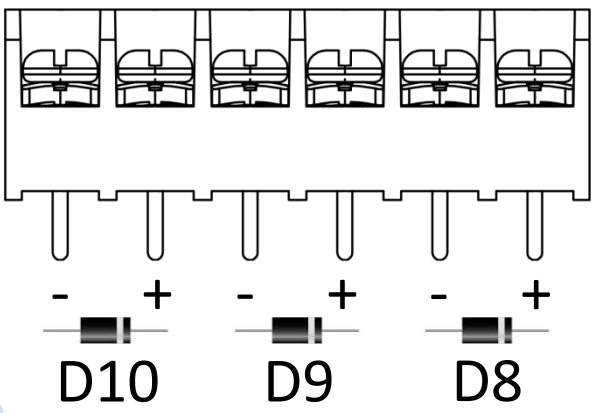
Install channel connectors to the case using D-sub nuts. Start with Ch1, connect pin headers to the RAMPS before installing the next channel. See Table 2 and RAMPS pinout for reference. If there are unused channels install cover plates.

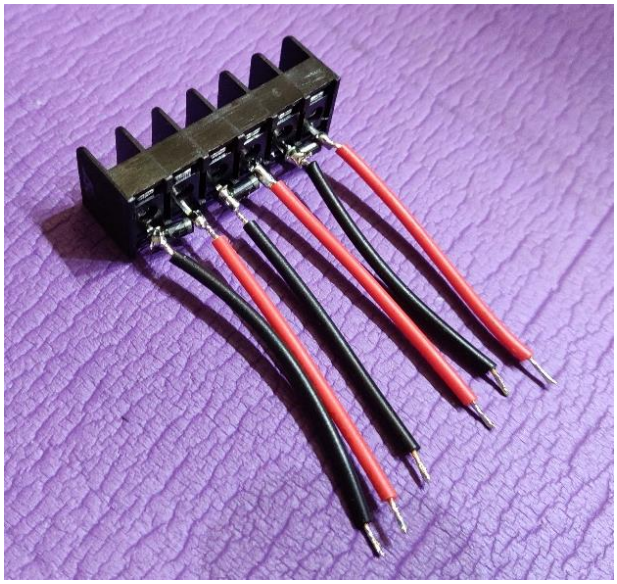


female D-Sub	Pinhead	Function	RAMPS channel 1	RAMPS channel 2	RAMPS channel 3	RAMPS channel 4	RAMPS channel 5
pin 1	1x, pin 1	Sensor read	A9	A5	A10	A11	A12
pin 6	1x, pin 1	Sensor GND	any GNDs on servo or Aux 1-3				
pin 2	3x, pin 3	Sensor +5V	Endstop Z1	Endstop Y2	Endstop Y1	Endstop X2	Endstop X1
pin 7	3x, pin 2	Endstop GND					
pin 3	3x, pin 1	Endstop read					
pin 8	4x, pin 4	Motor 2B	Motor Z	Motor Y	Motor X	Motor E1	Motor E0
pin 4	4x, pin 3	Motor 2A					
pin 9	4x, pin 2	Motor 1A					
pin 5	4x, pin 1	Motor 1B					

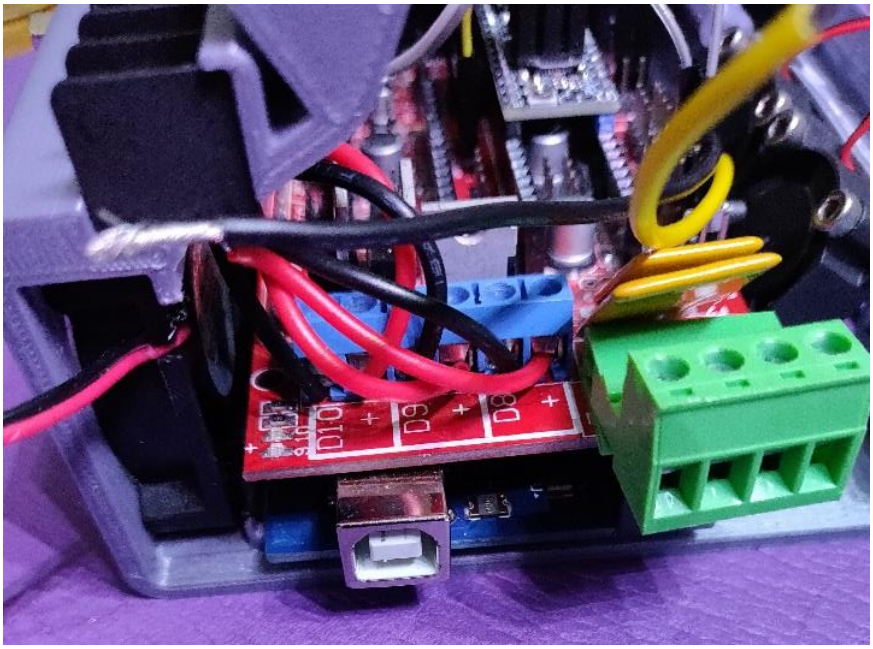
Table 2 Channel connectors to RAMPS wiring

Solenoid ports: Solder 5cm cables and protection diodes to the screw terminal.

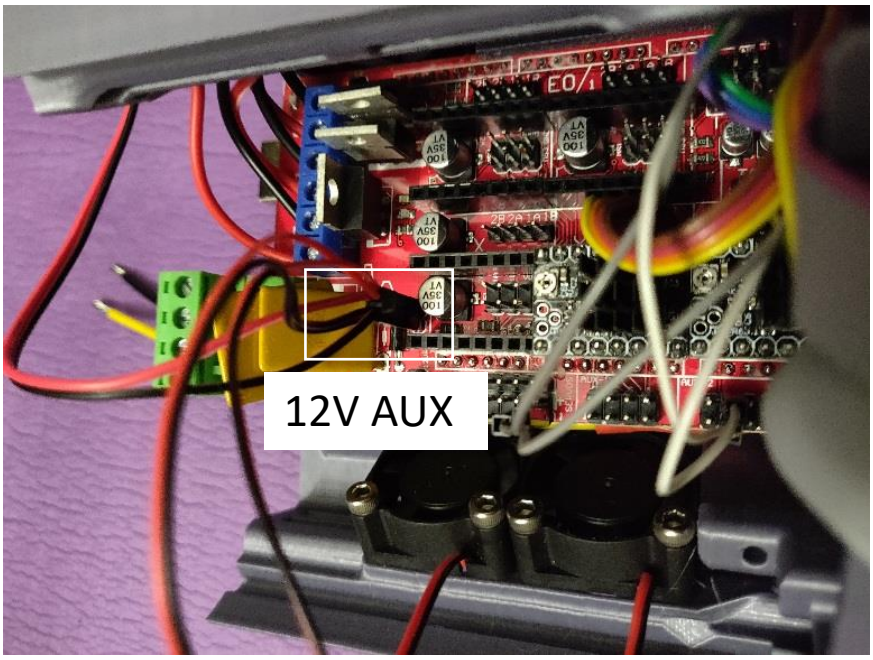




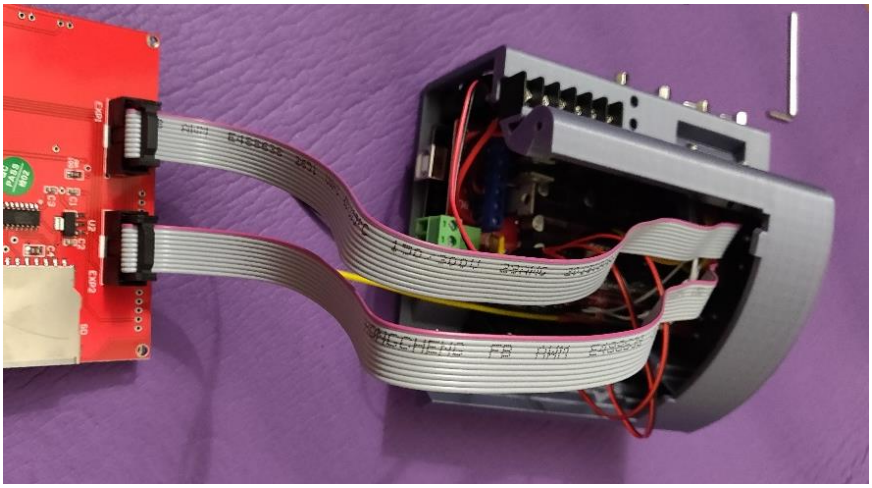
Slide the screw terminal into the case. Connect them to D8 (solenoid 1), D9 and D10 (solenoid 3).



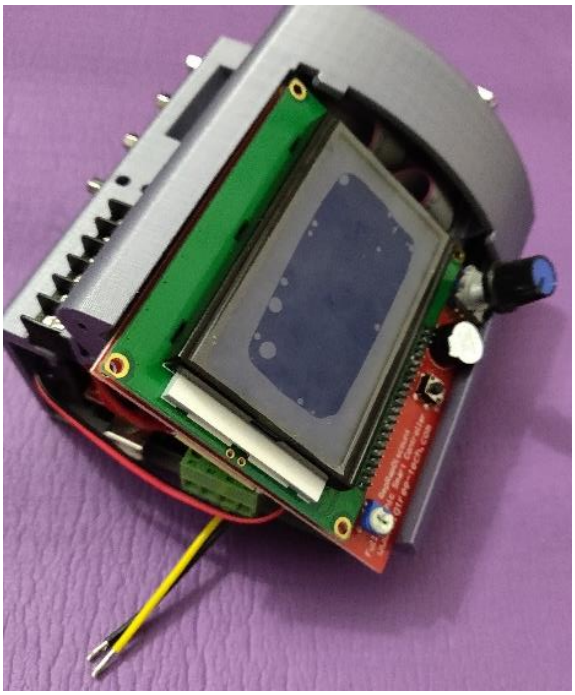
Combine the three positive and negative wires from the 3 fans, crimp them and connect them to the 12V AUX on the RAMPS. Note polarity.



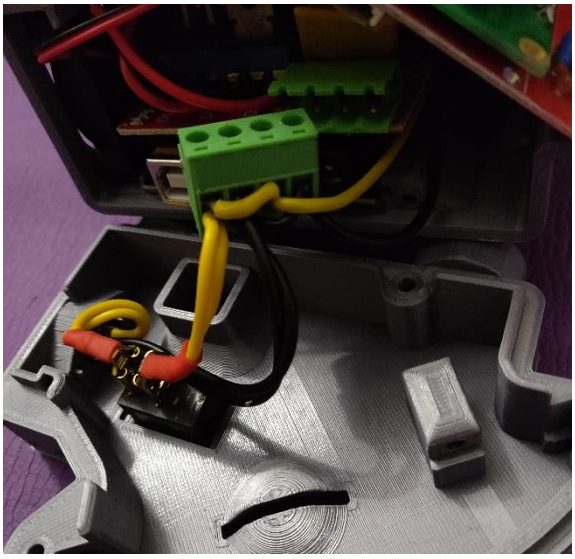
Connect the Exp1 and Exp2 ribbon cables to the Graphic LCD controller

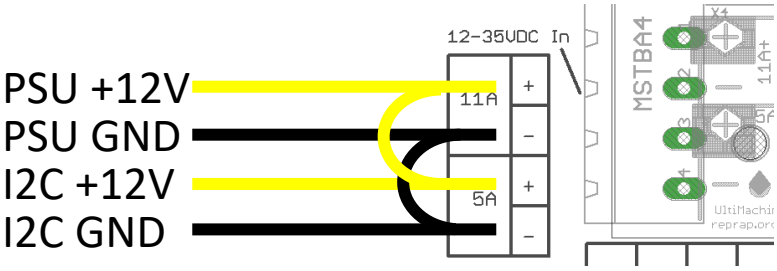


Arrange cables inside and place display in position.

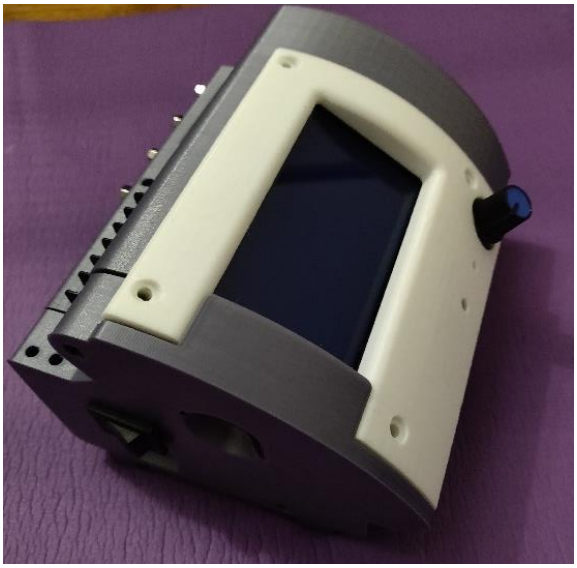


Connect power cables from power supply and the I2C connector to the screw terminal of the ramps. Connect the two positive and negative terminals with short cables.





Assemble the case using M3x20mm x2 (face top holes) and M3x25mm x4 (face bottom holes, cap holes). Install the rubber feet.



Firmware installation

1. Download and install Arduino IDE: https://www.arduino.cc/en/main/software
2. Connect controller via USB, download and install driver for Arduino USB to serial chip if necessary (depends on clone)
3. Download eeprom flash and controller firmware from github: https://github.com/manatee-fluidics/Manatee/tree/master/Firmware
4. Upload eepromflash to the controller, this will write the basic eeprom settings
5. Upload controller firmware to the controller