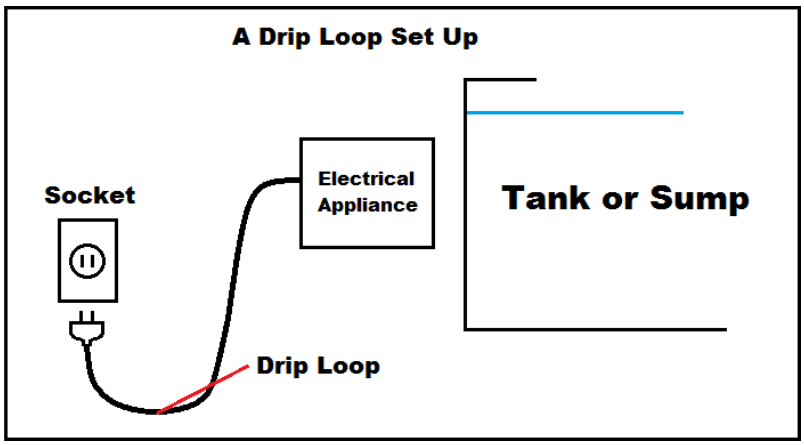
Deluxe Controller Wiring Diagrams



Safety Reminder

- **READ & FOLLOW ALL SAFETY INSTRUCTIONS**
- **DANGER**
  - Never handle electrical equipment with wet hands
  - special care should be taken since water is employed in the use of aquarium equipment
  - Do not attempt repairs to commercial equipment yourself, return to place of purchase or the manufacturer's authorized service facility
- Ensure all components (power adapters, power boards, controllers, wires, etc.) are properly set up according to manufacturer's recommendations, to prevent accidental damage
- If an appliance shows any signs of abnormal water leakage, immediately unplug it from its power source
- If an appliance falls into the water, **DO NOT** reach for it, first unplug it from its source of power
- Carefully examine the appliance(s) after installation. It should **NOT** be plugged in, if there is any sign of water on parts not intended to be wet.
- Do not operate any appliance if it has a damaged cord or plug, or it is malfunctioning or has been dropped or damaged in any manner
- Avoid the possibility of the appliance plug or receptacle getting wet, position the aquarium stand and tank or sump, to one side of a wall-mounted socket or power board, to prevent water from dripping onto the socket, plug or power board
- A "drip loop", shown in the diagram below, should be set up by the user, for each electrical cord connected to an aquarium appliance to a socket. The "drip loop" is that part of the electrical cord below the level of the socket, or the connector of an extension lead, if used, and the socket or power board, to prevent water travelling along the cord and coming in contact with the socket.

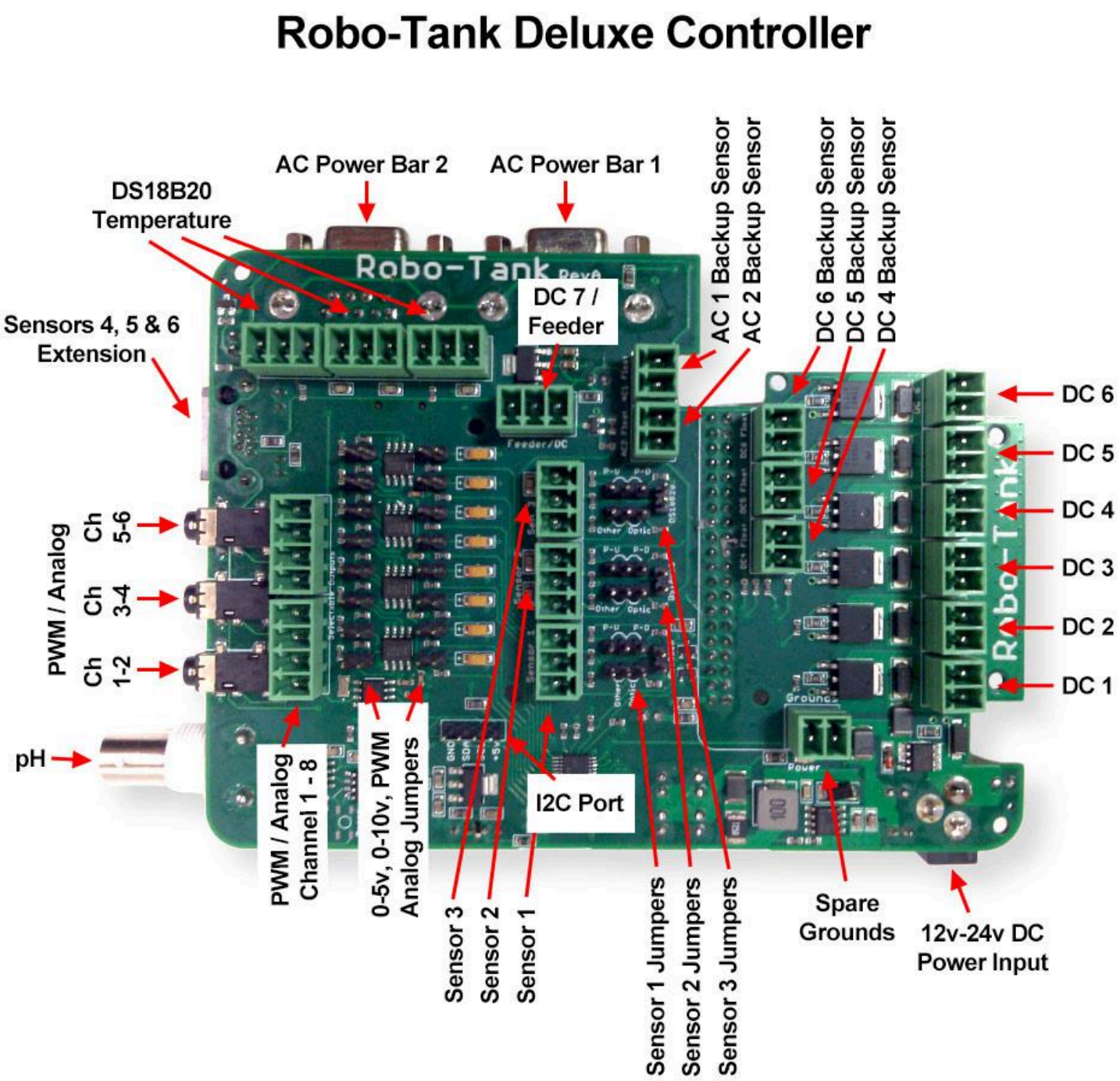


- If the plug, socket or power board does get wet, **DON'T** unplug the cord. Disconnect the fuse or circuit breaker that supplies power to the appliance, then, and **ONLY** then unplug the appliance and examine the socket or power board for the presence of water
- Always unplug an appliance from the outlet, when not in use, before putting on or taking off parts, and before cleaning
- Never yank the cord to pull plug from outlet, grasp the plug firmly to remove
- Read and observe all important notices on the appliance
- If an extension cord is necessary, a cord with the proper rating should be used. Care should be taken to arrange cords, such that they are not a trip hazard
- Indoor use **ONLY**
- For Calcium reactor operation, refer to the manufacturer's instructions, as per it's manual
- For Robo-Tank operation, refer to the operating instructions, as per it's manual
- Keep controller cool and dry, do not expose to direct sunlight or heat

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1. Deluxe Controller Ports



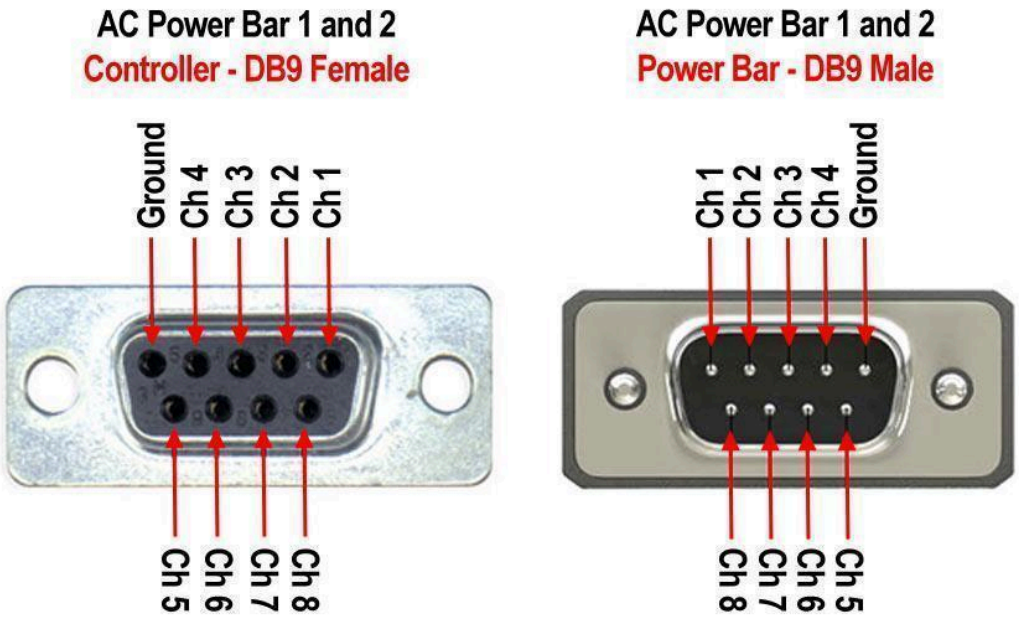
The port names above are blue in the section titles below for cross reference.

2. AC Power Bar Ports

The controller has two DB9 female sockets to connect two 8 outlet AC power bars. The Robo-Tank power bars plug right in but you can also use an Arduino relay module, this is the pinouts to do that.

Note: Each of the 16 outlets can be configured for sensors or DC equipment using resistors and other components. If you search the web for "Arduino" and what you want to do you'll find wiring diagrams. These 16 pins can be viewed as digital outputs on any Arduino.

Note: Make sure the cable used is NOT a null cable, it must be straight through. If it is, channel 1 will likely be damaged as it will be shorted to Ground.



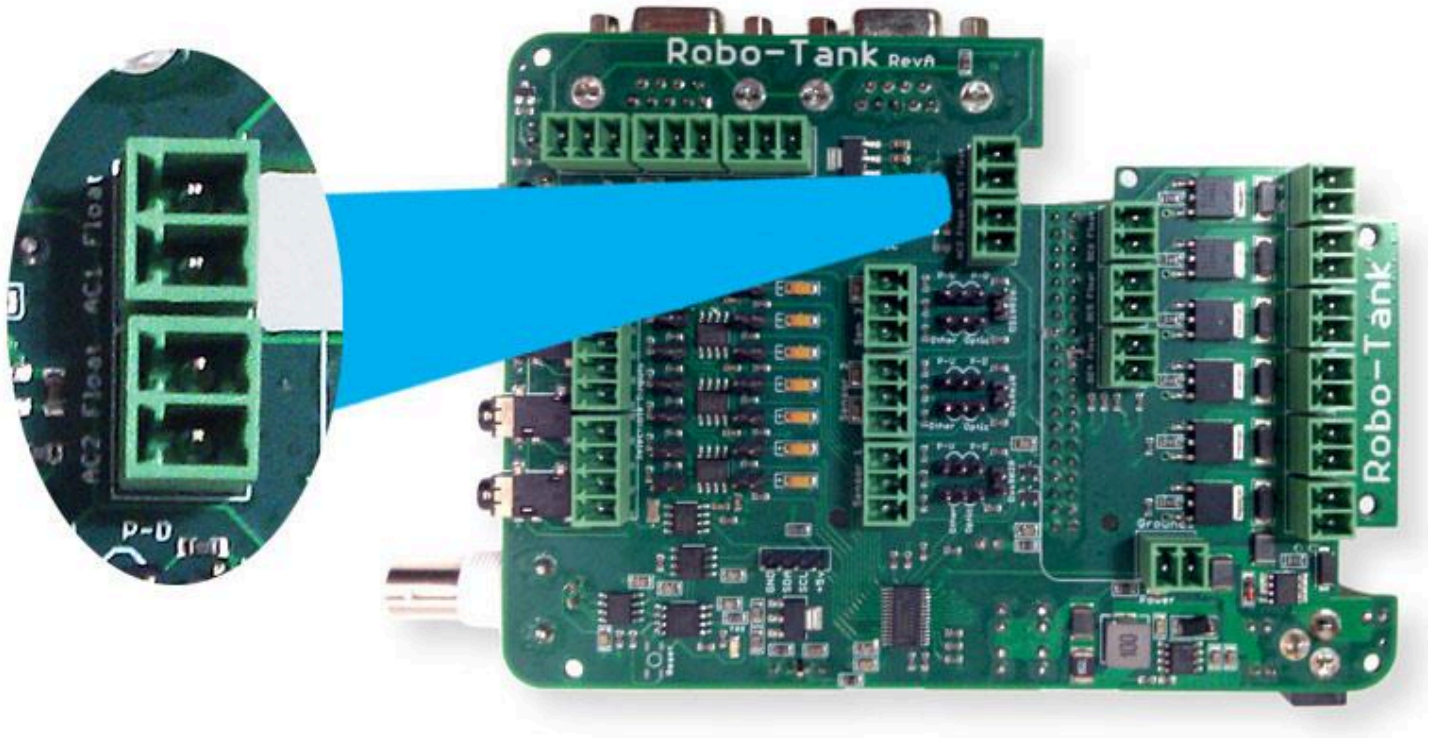
The following list is the pin number and driver to set up each outlet connector in Reef-pi, for more information see the user manual.

Outlet	Pin	Driver
Power Bar 1 – Outlet 1	26	Raspberry Pi
Power Bar 1 – Outlet 2	16	Raspberry Pi
Power Bar 1 – Outlet 3	13	Raspberry Pi
Power Bar 1 – Outlet 4	12	Raspberry Pi
Power Bar 1 – Outlet 5	21	Raspberry Pi
Power Bar 1 – Outlet 6	6	Raspberry Pi
Power Bar 1 – Outlet 7	19	Raspberry Pi
Power Bar 1 – Outlet 8	20	Raspberry Pi
Power Bar 2 – Outlet 1	25	Raspberry Pi
Power Bar 2 – Outlet 2	10	Raspberry Pi
Power Bar 2 – Outlet 3	24	Raspberry Pi
Power Bar 2 – Outlet 4	22	Raspberry Pi
Power Bar 2 – Outlet 5	5	Raspberry Pi
Power Bar 2 – Outlet 6	7	Raspberry Pi
Power Bar 2 – Outlet 7	11	Raspberry Pi
Power Bar 2 – Outlet 8	9	Raspberry Pi

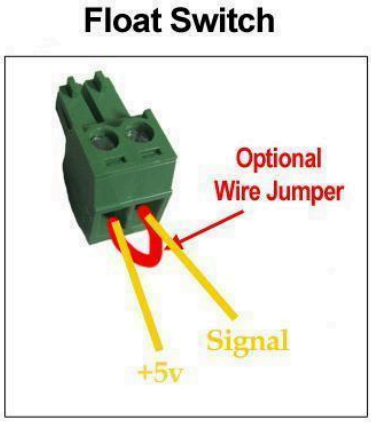
3. AC Power Bar Outlet 1 and 2 Backup Sensor Port

These ports are emergency backups for AC power bar 1 outlet 1 and 2, they bypass the Raspberry Pi and electronics. Only a float switch or any other type of switch will work. When the float switch is open power is cut to the respected port, when the float is closed the power can flow if Reef-pi sees fit.

Using this feature is optional, if you don't need an extra backup you can add a jumper to the green pluggable screw terminal connector and it'll be left enabled and Reef-pi will continue to control the port as normal. If you don't add this jumper the corresponding AC outlets won't work.



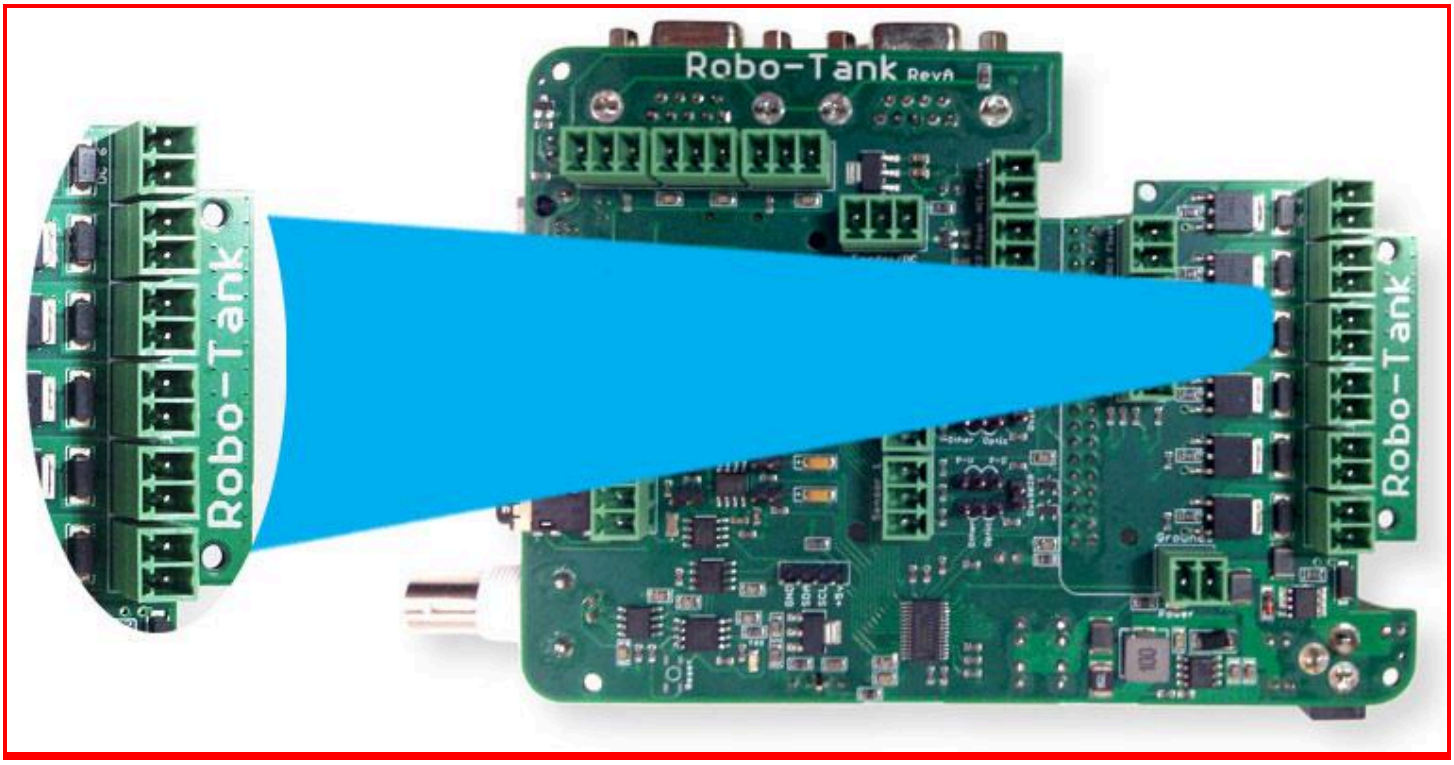




4. DC 1 – DC 6 Ports

DC devices can be anything that runs on DC power ranging from 6-24v. These 7 ports are able to handle up to 4 amps between them.

The maximum output voltage on each port is dependent on the DC power supply plugged into the controller, if your power supply is 12v the ports will be max 12v, if you use a 24v power supply the ports will have a max of 24v. If your device is less than 12v connect a DC-DC converter inline to drop the voltage.



Note: The Ground pin on each DC port is switched on/off, if the port is turned off you won't have any voltage.



The following list is the pin number and driver to set up each DC port in Reef-pi, for more information see the user manual.

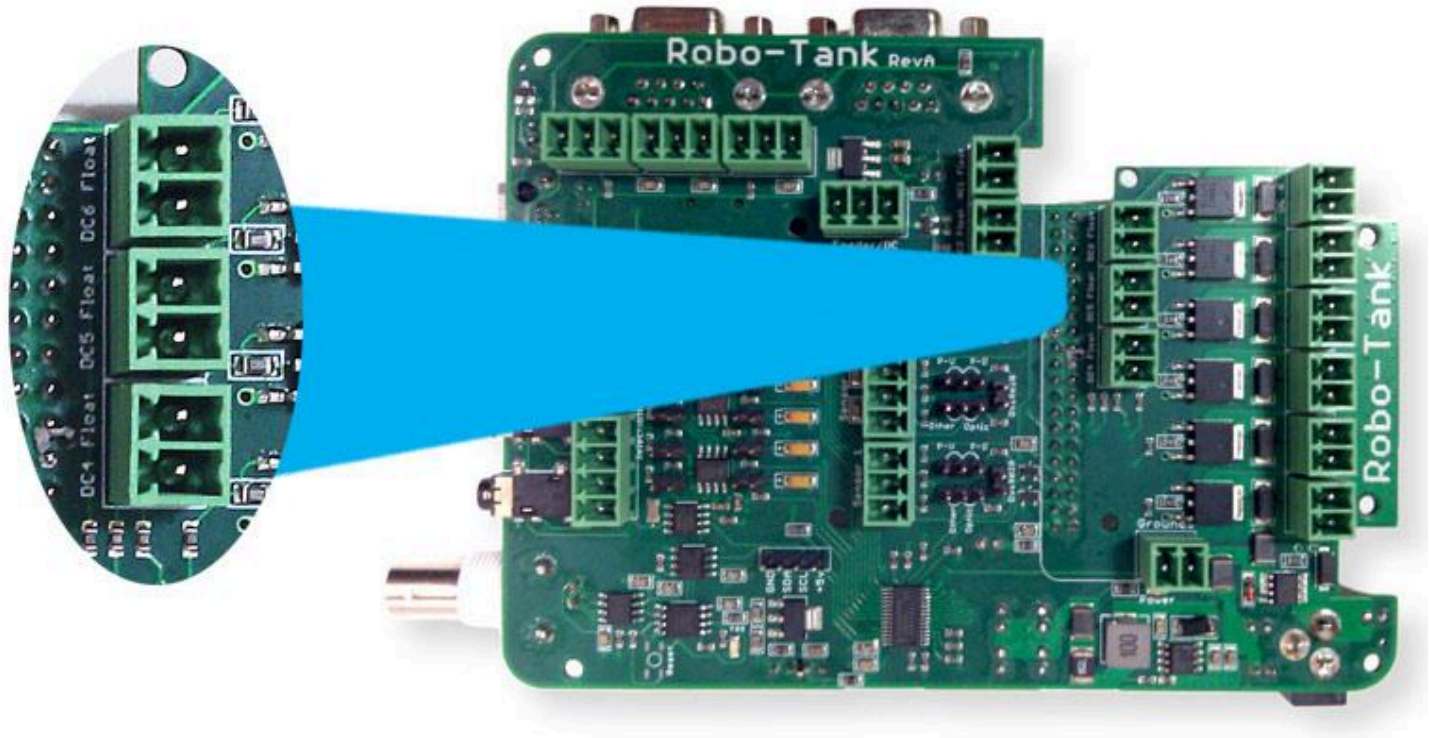
Outlet	Pin	Driver
DC Port 1	1	Extra Ports - PCA9685
DC Port 2	2	Extra Ports - PCA9685
DC Port 3	3	Extra Ports - PCA9685
*DC Port 4**	4	Extra Ports - PCA9685
*DC Port 5**	5	Extra Ports - PCA9685
*DC Port 6**	6	Extra Ports - PCA9685

***Note:** DC Port 4, 5 and 6 have a backup float port wired in series, see section 6. DC Backup Sensor ports

5. DC 4, 5 and 6 Backup Sensor Port

These ports are emergency backups for DC 4, 5 and 6 ports, they bypass the Raspberry Pi and electronics. Only a float switch or any other type of switch will work. When the float switch is open power is cut to the respected port, when the float is closed the power can flow if Reef-pi sees fit.

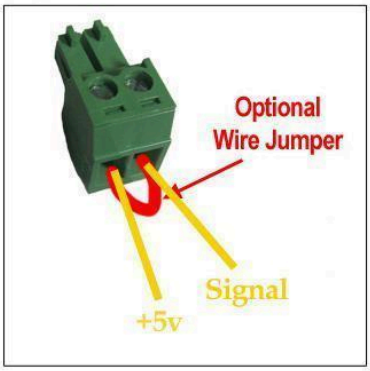
Using this feature is optional, if you don't need an extra backup you can add a jumper to the green pluggable screw terminal connector and it'll be left enabled and Reef-pi will continue to control the port as normal. If you don't add this jumper the corresponding DC port won't work.





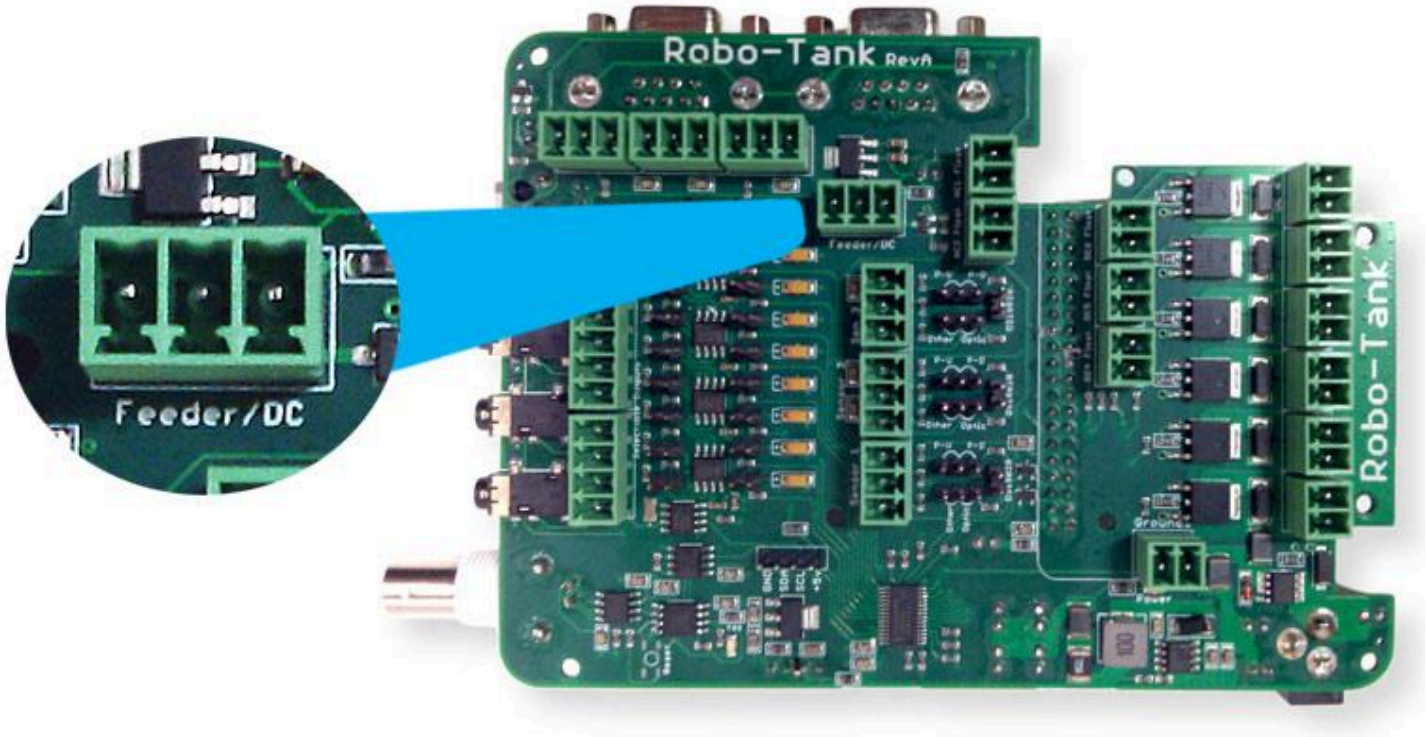
Polarity doesn't matter

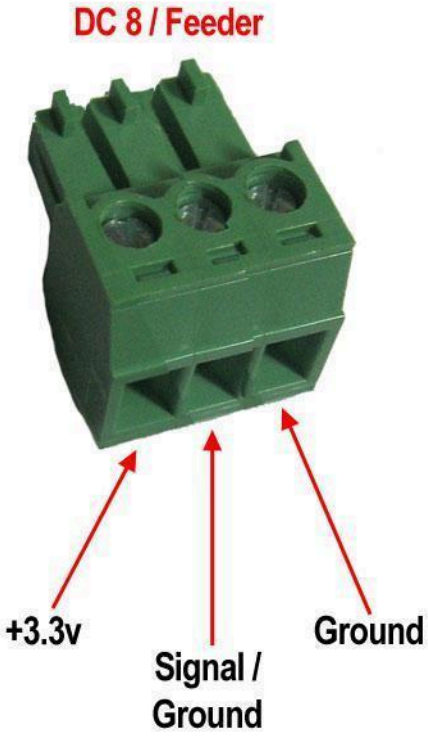
Float Switch



6. DC 7 / Feeder Port

DC port 7 is the same as all the other DC ports however it's fitted with a +3.3v pin and common Ground pin. It's common to run an automatic fish feeder so this was laid out for that but can be used for anything. If you need 12v use a 12v pin from a different port. This port only supports devices under 200mA.

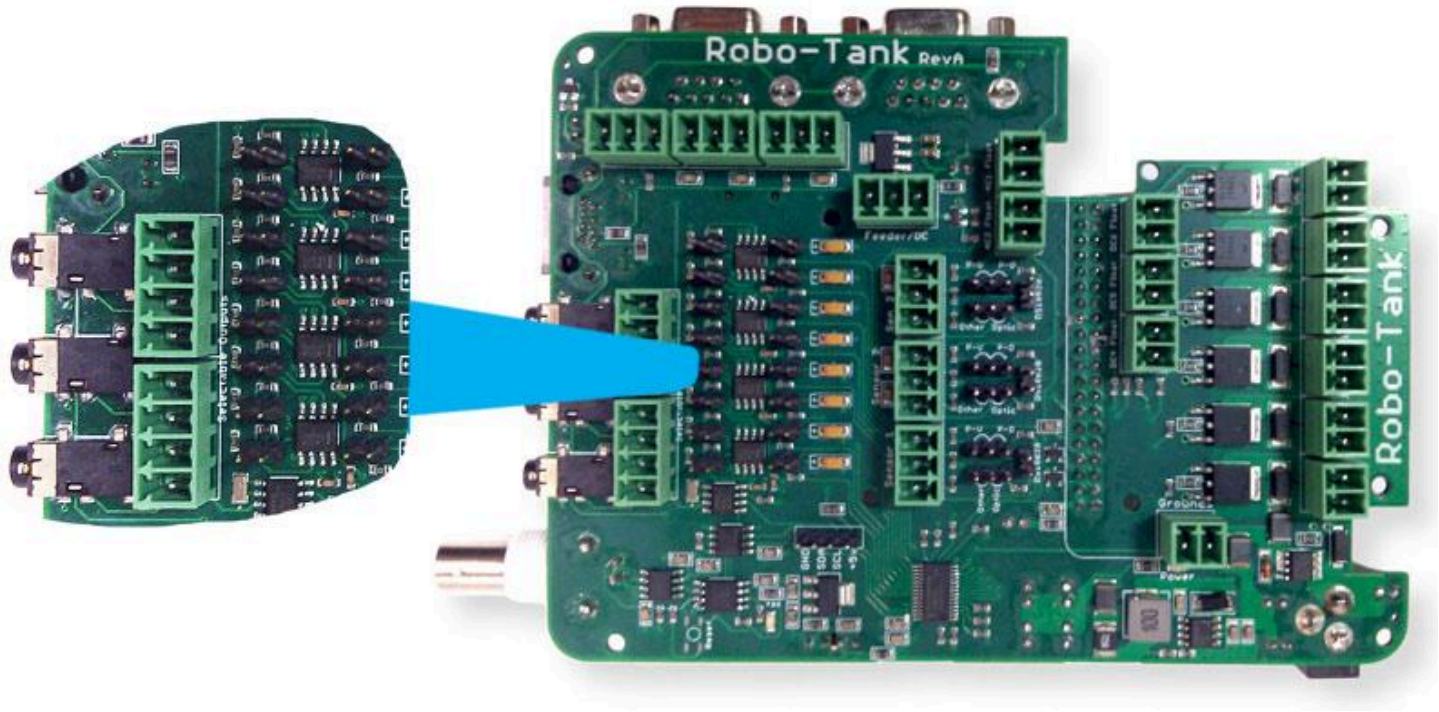




The following list is the pin number and driver to set up the feeder port in Reef-pi, for more information see the user manual.

Outlet	Pin	Driver
DC Port 7 / Feeder	7	Extra Ports - PCA9685

7. PWM / Analog Channel 1 - 8 Ports



The controller has 8 controllable ports that can put out different signals based on the corresponding jumpers. The markings on the board show how to set the jumpers for the respective signal type.

- 0-5v PWM
- 0-10v PWM
- 0-5v Analog
- 0-10v Analog

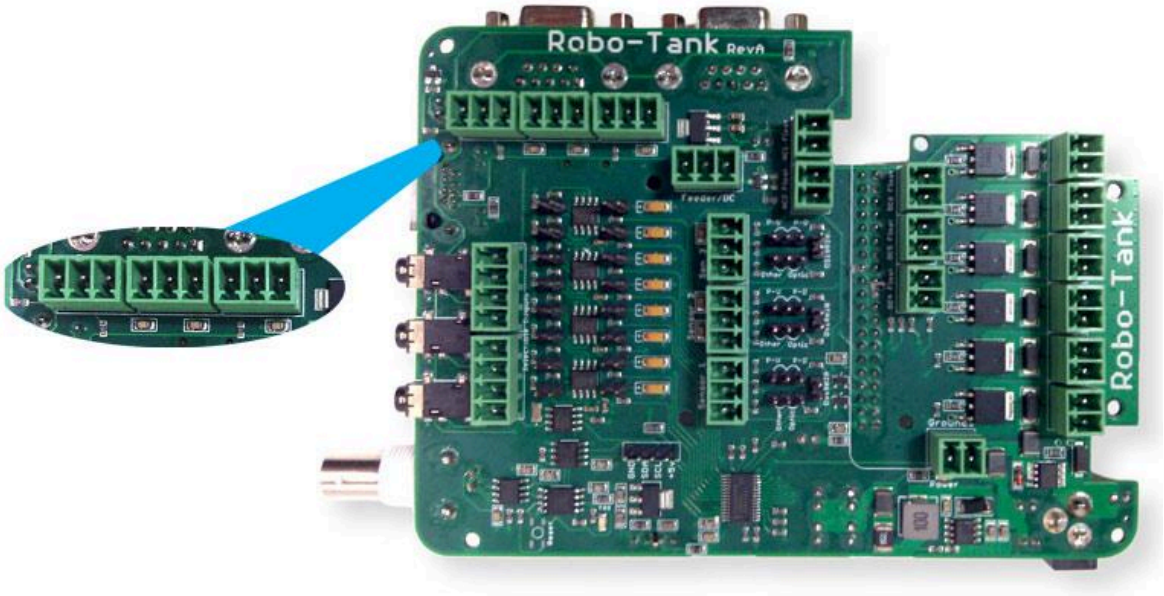
These ports can be used to control LED drivers or other equipment.

Note: Remember to run a common Ground between your device and the controller. The controller has a couple spare Ground pins that can be used

Port	Pin	Driver
LED Port 1	15	Extra Ports - PCA9685
LED Port 2	14	Extra Ports - PCA9685
LED Port 3	13	Extra Ports - PCA9685
LED Port 4	12	Extra Ports - PCA9685
LED Port 5	11	Extra Ports - PCA9685
LED Port 6	10	Extra Ports - PCA9685
LED Port 7	9	Extra Ports - PCA9685
LED Port 8	8	Extra Ports - PCA9685

.

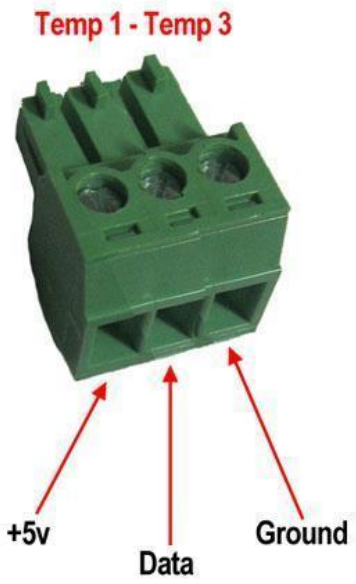
8. DS18B20 Temperature 1 - 3 Ports

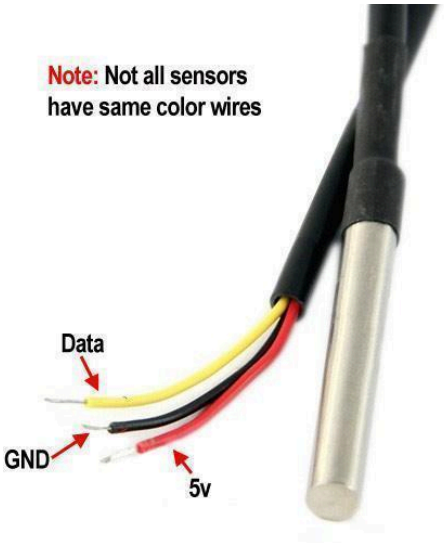


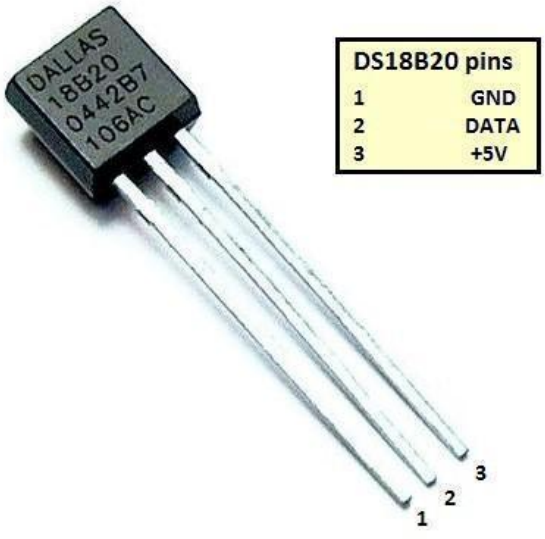
The controller has three DS18B20 temperature sensor ports, Temp 1 uses a separate GPIO Pin on the Raspberry Pi. If you didn't use the Robo-Tank installation script to install reef-pi you need to edit the **/boot/config.txt** file on your Raspberry Pi SD card before Temp 2 and Temp 3 ports will work.

1. Run the following command in your Raspberry Pi terminal window.
   sudo nano /boot/config.txt
2. Once the text editor loads the file, scroll down and locate the following line.
   dtoverlay=w1-gpio
3. Delete this line and replace it with the following two lines.
   dtoverlay=w1-gpio,gpiopin=4
   dtoverlay=w1-gpio,gpiopin=23
4. Now press **CTRL + S** on your keyboard to save the file and then press **CTRL + X** to exit.
5. Unplug power from the controller, wait a few seconds and power back up.

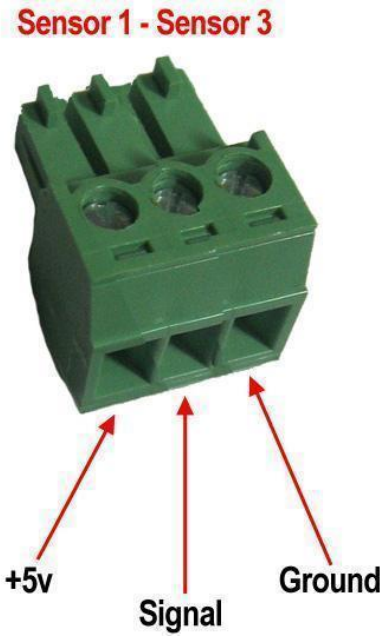
Note: The limiting factor is the overall length of cable, if you add an extra sensor and it stops reading the others try shortening the cable.







9. Sensor 1 – Sensor 3 Ports

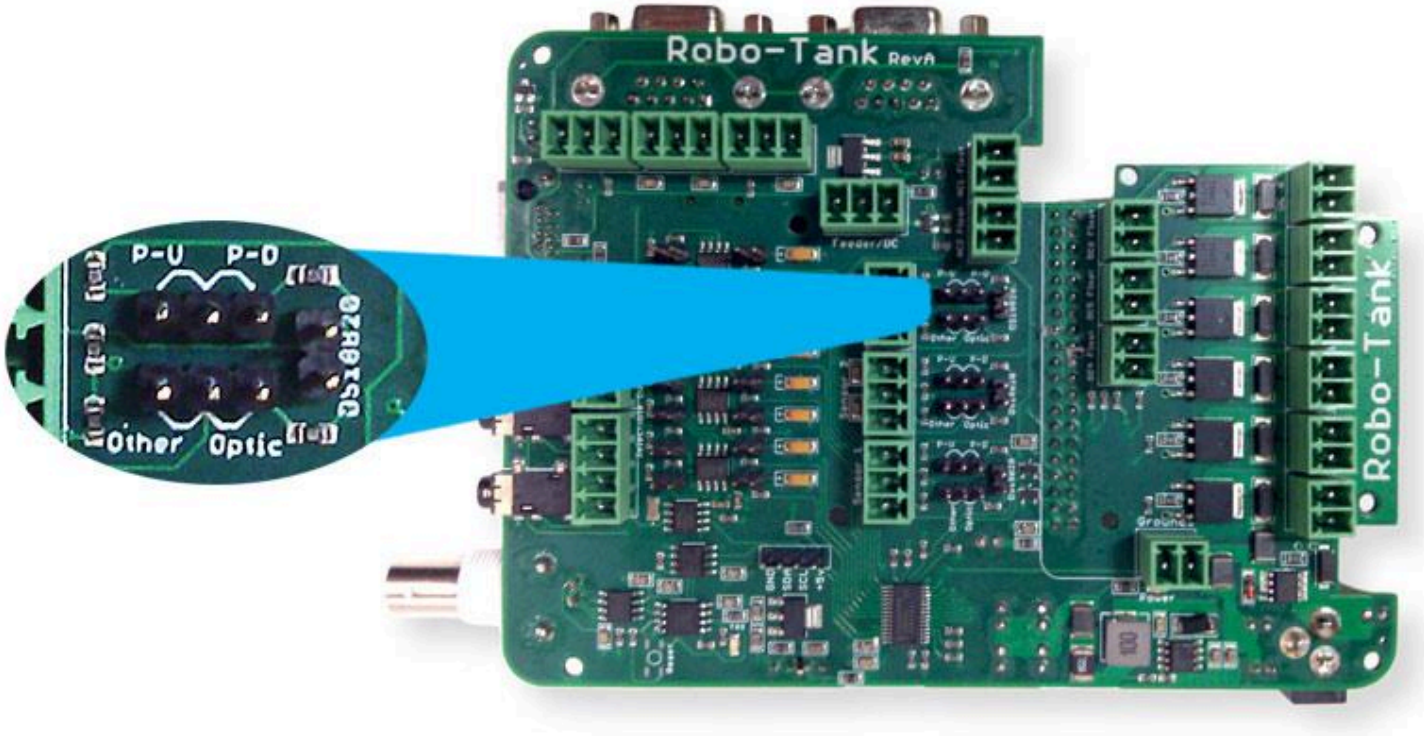


The controller has 6 sensor ports, 3 of which use the pluggable green screw terminal connectors.



Beside each sensor port there's a set of 3 pin headers that are used to set the port to match your sensor using the included jumpers. There is also a 2 pin header for each port to enable the port for DS18B20 temperature sensors.

- **NOTE: Bottom 3 Pin Header**
  - **Optical** side – The jumper **must** be on the '**Optical**' side if you connect an optical water sensor, if the jumper is set to '**Other**' the sensor **will be damaged**.



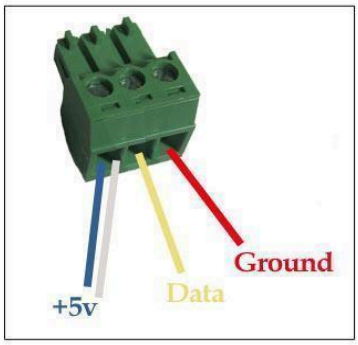
The following are the 3 most used sensors and the table shows how to set the jumpers accordingly.

	Optical Sensor	Non-Contact Sensor	DS18B20 Temperature
Top 3 Pin Jumper	P-D	P-U	Other
Bottom 3 Pin Jumper	Optical	Other	P-U
Right 2 Pin Jumper	Not Attached	Not Attached	Jumper Plugged In

Continued on next page



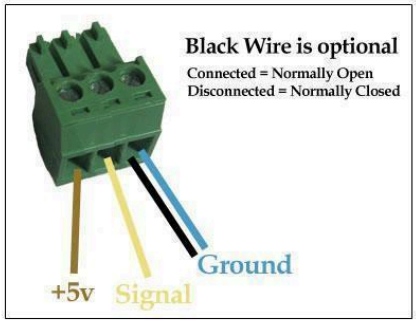
Optical Water Sensor



It's very important that you set the Top Jumper to 'Optical' before attaching an optical sensor to Sensor Port 1, 2 or 3 otherwise it WILL BE PERMANENTLY DAMAGED! The non-contact and float switches will not be damaged if Jumper 2 is not set correctly however they won't function as intended.



Non Contact Water Sensor

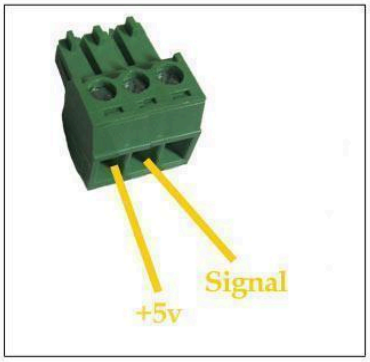


If your sensor is XKC-Y25-V the black wire needs to be connected to Ground, if your sensor is XKC-Y25-12V the black wire isn't connected.

Float Switch



Polarity doesn't matter

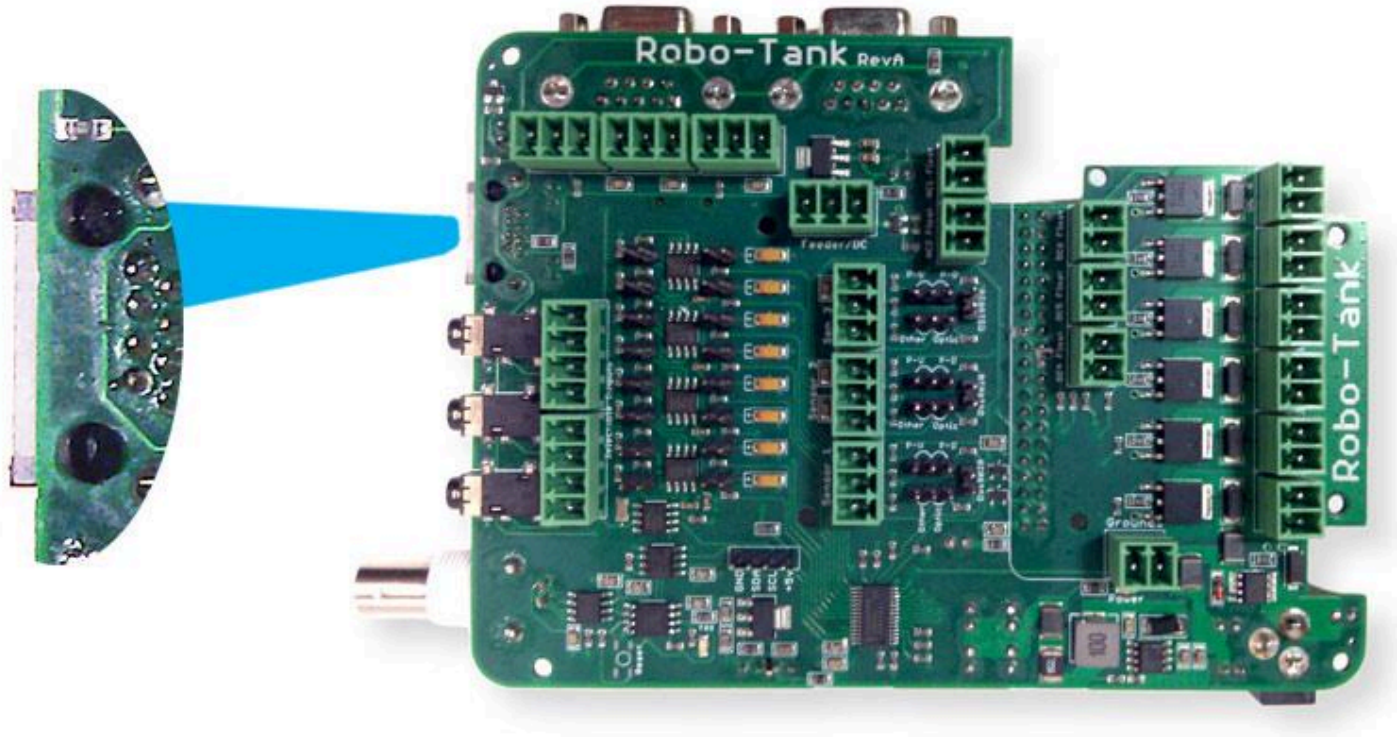


The following list is the pin number and driver to set up each sensor port connector in reef-pi, for more information see the user manual.

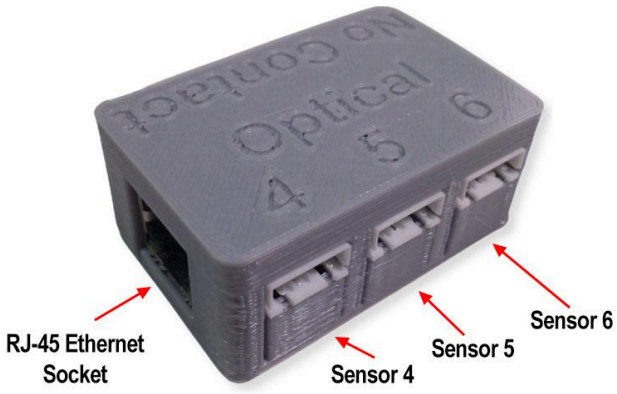
Port	**Pin**	**Driver**
Sensor *Port 1*	14	Raspberry Pi
Sensor *Port 2*	27	Raspberry Pi
Sensor *Port 3*	8	Raspberry Pi

10. Sensor Port 4, 5 and 6 Extension Ports

The deluxe controller comes with an Optical Sensor Extension module, this makes it easier to connect optical sensors and doesn't require you to cut off the connector. The USB-A female socket on the side of the controller, not to be confused with the USB-A ports on the Raspberry Pi, is used to connect the Optical Sensor Extension module.



Note: There are other sensors on the market with the same 4 pin connector as the optical sensors, do not plug them in otherwise the sensor could be damaged.





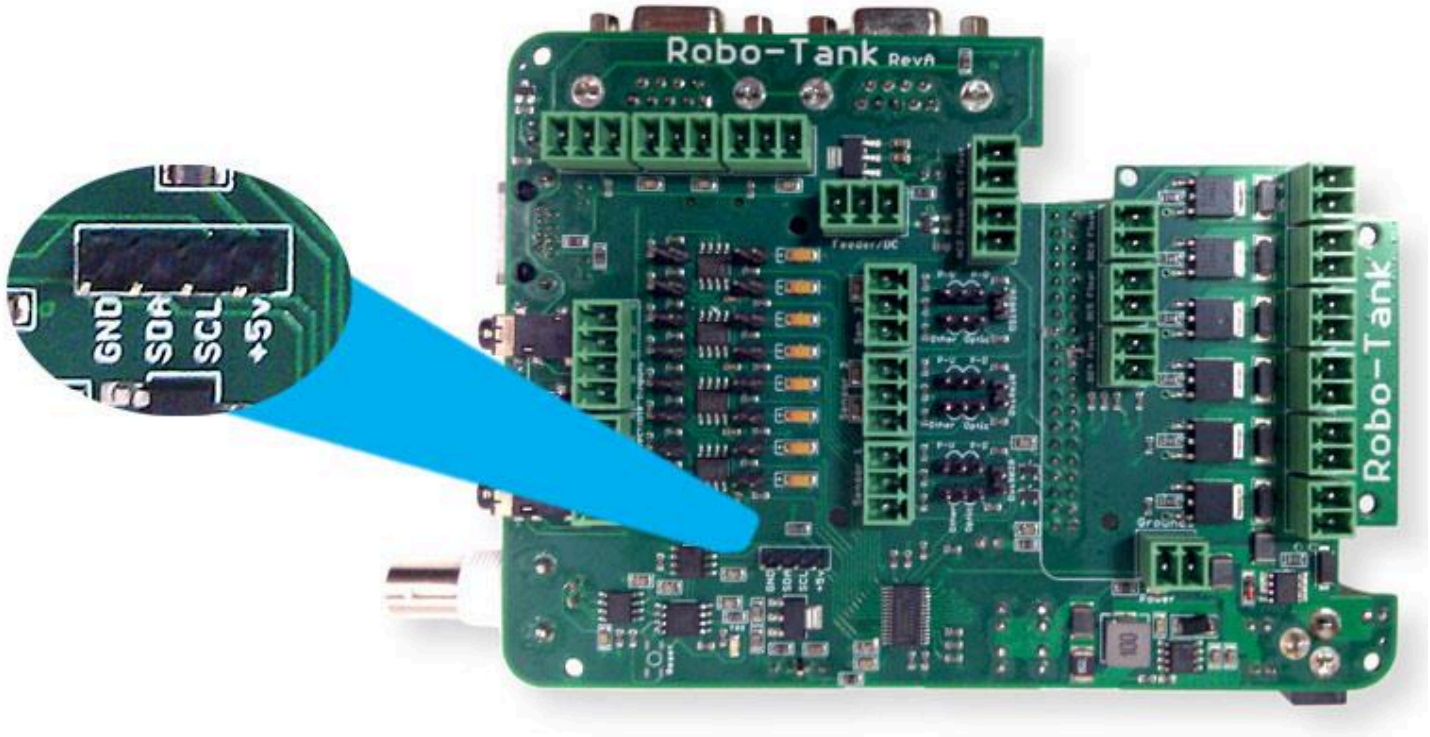
The optical extension module has 3 ports, '**Sensor 4**', '**Sensor 5**' and '**Sensor 6**' and it's configured for the optical sensors.

The following list is the pin number and driver to set up each sensor port connector in Reef-pi, for more information see the user manual. Note, if using an optical sensor you need to tick the 'reverse' setting when you add the connector in reef-pi.

Inlet	Pin	Driver
Sensor 4	17	Raspberry Pi
Sensor 5	18	Raspberry Pi
Sensor 6	15	Raspberry Pi

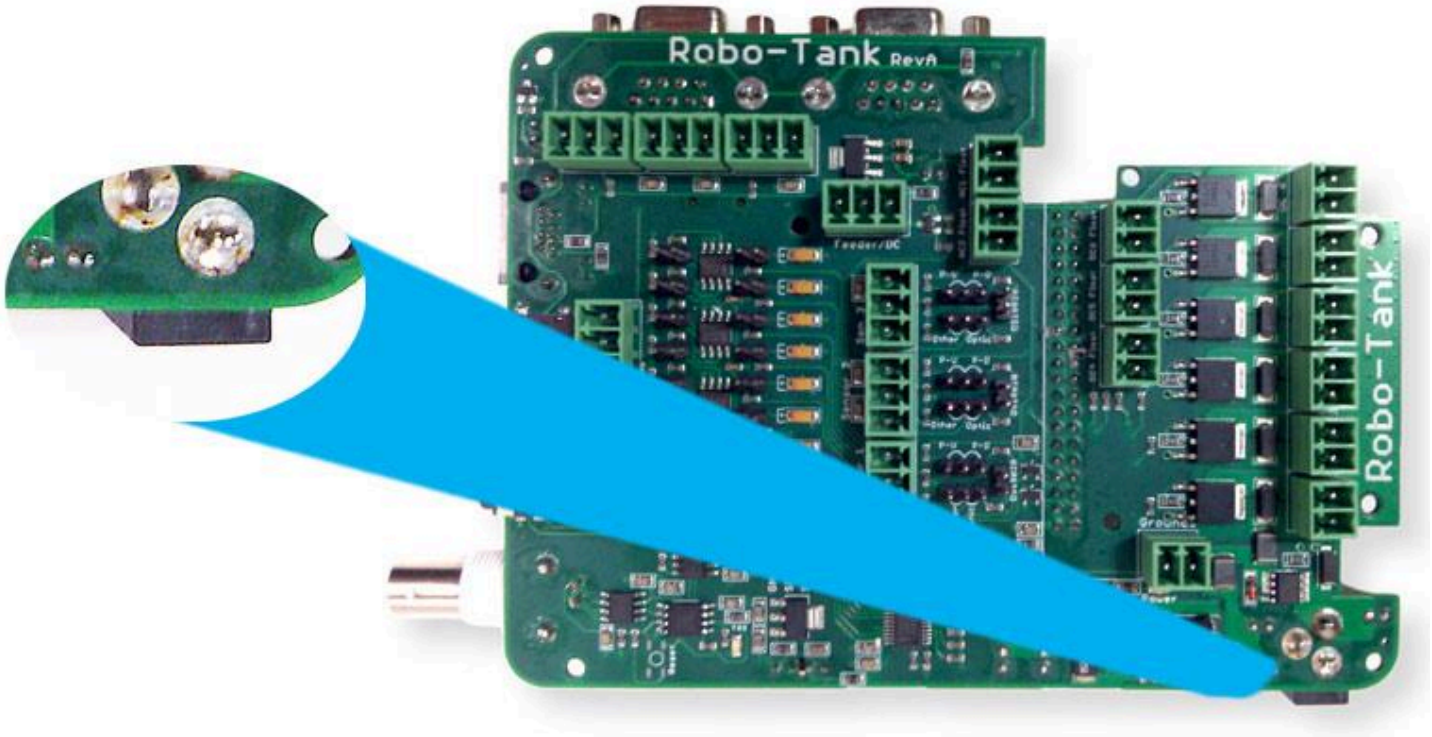
11. I2C Port

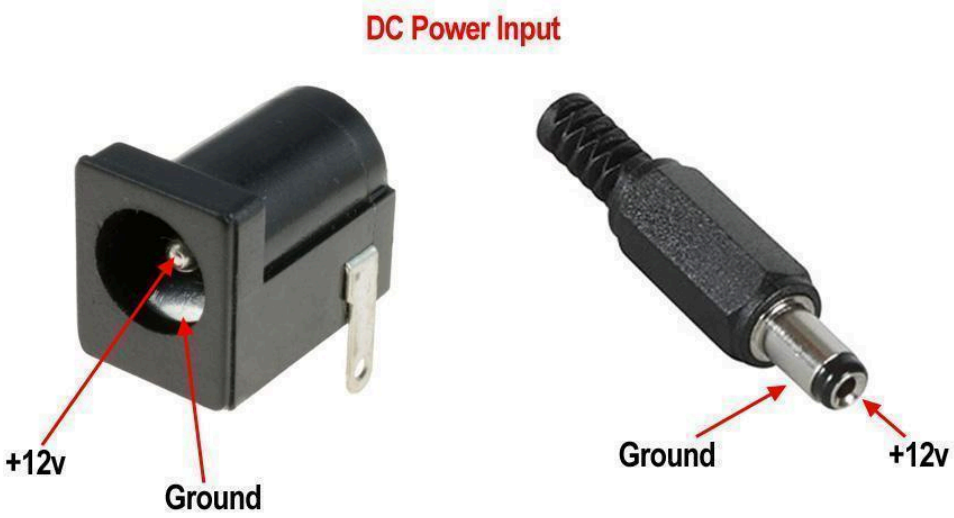
The I2C port is used to add extra pH circuits or other expansions. It's important to keep cable length between the controller and device as short as possible, ideally 6-12 inches.



12. DC Power Input Port

The controller has a 2.1mm x 5.5mm DC power plug to power up the controller. Input voltage must be 12v-24v DC and capable of at least 1 amp. The Raspberry Pi will be powered through the controller board.





Thank-you again for your purchase and I hope you enjoy your Robo-Tank controller.

Questions or comments contact me, Rob Fowler at info@robo-tank.ca

Last Updated October 23, 2021