Pao's Universal Self-calibrating Nitrox Analyzer ver. 3.1

Materials:

Oxygen Sensor: PSR-11-39-JD (https://www.divegearexpress.com/specialty-oxygen-sensors - 80$)

Arduino Nano (get the one with unsoldered pins)

Analog to Digital Converter 16-bit 4-Channel – ADS1115

0.96" 128 x 64 I2C OLED Display

5v step-up power module w/ lithium battery charging protection board 134n3p – All in one battery protection and 5V boost converter module (https://www.makerlab-electronics.com/product/5v-step-up-power-module-lithium-battery-charging-protection-board-usb-134n3p/ or https://www.amazon.com/Onyehn-Lithium-Battery-Protection-Charger/dp/B07D3SQYKJ/ref=sr_1_2?keywords=5V+Step-Up+Power+Module+Lithium+Battery+Charging+Protection+Board+USB+134N3P&qid=1555124286&s=gateway&sr=8-2). There seems to be two versions, one with a holding current of 20 mA and the other with 50-60 mA, get the 20 mA version or bodge a 150 ohm resistor across the output if you got the 60 mA flavor – there is an alternate method that you can use which I will explain later)

18650 Lithium battery and holder

Rocker switch SPST or any latching switch you like

Push-button switch, NO, non-latching

3.5 mm mono jack

3.5 mm mono plug

3.5 mm mono or stereo Male to Male cord

Hook-up wire (I prefer 24AWG stranded wire w/ silicone insulator)

Case – any will do but I like this one: 100 x 68 x 50mm IP65 sealed ABS enclosure with clear top (https://www.amazon.com/gp/product/B07FKN8SZG/ref=ox_sc_act_title_1?smid=A1THAZDOWP300U&psc=1 – 7.66$)

1 inch PVC pipe cap (unthreaded)

Assembly:

Only five pins will be used on the Arduino Nano:

A3 – configured as an input w/ the internal pull-up resistor enabled

A4 – I2C Data line (SDA)

A5 – I2C Clock line (SCL)

5V – Supplied via the boost converter

GND - Ground

I stacked the OLED display and ADC using pin headers and just wired the rest point to point.

A3 is connected to ground via the NO push-button switch and is used for on demand calibration

I used short lengths of wire with the insulation stripped at the midpoint to connect the Arduino's 5v and GND pins to the stacked OLED/ADS1115 VDD and GND pins then connected the other end of the wire to the power switch (5V wire) and push-button (GND wire)

5V from the boost converter is connected to the other side of the power switch while ground from the boost converter is connected to the ground terminal of the NO pus-button switch (connected to the GND pin of the OLED/ADS1115 and the Arduino)

The sensor connects via a 3.5 mm jack. The outer connector/sleeve/ring is "+" while the tip/signal/central connector is "-", reversed from the usual convention.

AO on the ADS115 is connected to the "ring" or ground side of the 3.5 mm mono plug or jack, respectively

A1 on the ADS115 is connected to the "tip" or "signal" side of the 3.5 mm mono plug or jack, respectively

Alternate power source if you cannot find the low holding current 5V all in one module:

You can use a USB DC-DC 0.9-5V 600mA Boost Converter connected to a 3V (2 x AA) battery (https://www.makerlab-electronics.com/product/usb-dc-dc-0-9-5v-600ma-boost-converter/ or https://www.amazon.com/Control-Converter-Module-Charger-0-9V-5V/dp/B01FDD3AYQ/ref=sr_1_2?keywords=USB+DC-DC+0.9-5V+600mA+Boost+Converter&qid=1555124065&s=gateway&sr=8-2). However, this is an "always on" device so the switch will be placed between the battery and boost converter and the converter will be always connected to the circuit.

Case:

Feel free to use any case you want, the only critical thing is if you can fit all the components in. The sensor uses an oddball M16 x 1 mm metric thread, but a 3/8” NPT thread is a good enough fit.

Sampler:

1” PVC pipe cap drilled with 1 1.2 mm hole at the center and four 1/8” inch at the sides, near the base. Just superglue it over the hole you drilled and tapped for the sensor.

Included as a JPEG file is a Fritzing schematic, minus the power switch.

Enjoy! :-D