Components/Materials

- Variable Orifice Flowmeter
- Mp3v5010 differential pressure sensor
- Nodemcu ESP 8266
- Power Supply regulator (board with AMS1117-5.0 and AMS1117-3.3)
- 9V-12V power supply
- Adafruit OLED Display 128x64
- ADS1115 converter
- LED
- Buzzer
- Buttons → 2 (preferably in different colors, to enable easy distinction between volume selection and alarm disabling functionalities)
- 0.1uF capacitor
- 0.22 μF capacitor
- 0.022 μF capacitors → 2
- 220 Ohm resistors
- 100 Ohm resistor
- 10k Ohm resistors → 4
- wires
- breadboard

Guidelines for Utilization

Set value of target volume:

- Hold "Selection Button" for 4 seconds to enable selection.
- Press and release the same button repeatedly, until the required volume is shown.
- Available volumes are programmed to be [0, 300, 350, 400, 450, 500, 550, 600] ml per inspiratory cycle. These may be modified according to need, but must be done in the algorithm itself by changing the "volumeOptions" array.

Display

- last VT: Tidal volume received by the patient during the latest inspiratory cycle. Value is integrated from the flow in the pneumotachograph and displayed next to "last VT". It is updated when each cycle is completed, and held on screen until the next volume is available.
- target VT: targeted tidal volume. Minimum volume of gas to be received by the patient in each inspiratory cycle. This value must be set by using the selection button, according to the patient's conditions and the settings chosen on the common mechanical ventilator. It must be calculated that this given volume will be supplied to the corresponding patient under the pressure conditions chosen on the mechanical ventilator. May be adjusted at any time. Setting to 0ml will disable the entire alarm system.
- The word "ALARM" will show on top of the screen, while the alarm is activated, and disappear when it is deactivated.

Alarm system:

- Alarm is triggered at the end of each inspiratory cycle, if the volume supplied to the patient during that cycle (Tidal Volume - VT) fails to achieve the programmed target tidal volume.
- consists of a buzzer, or sound alarm, and an LED for visual confirmation. Both will be turned on while the alarm is active.
- The display will also show "ALARM" on top of the screen while the alarm is active, as described above.
- After triggered, the whole alarm system can only be disabled at the same time, and only by pressing and holding the Stop Alarm Button for 6 seconds.
- To disable the system indefinitely, set target volume to 0ml, as described on the previous section.
- Alarm will sound again whenever triggered by the volume. This may be as soon as the end of the next cycle.

3,3V
+ −

5V
+ −

0,3μF

MP3V5050DP

VDD
GND
OUT

VDD
GND
SCL
SDA
ADDR
ALRT
A0
A1

ADS1115

LED

220Ω

BUZZER

100Ω

OLED DISPLAY

SDA
SCL
VDD
GND

D0
D1   10KΩ
D2   10KΩ
D3
D4
3V3
GND
D5
D6
D7
D8
Rx
Tx
GND
3V3

10KΩ

10KΩ

NODEMCU