User manual

CO2 CALIBRATOR

General

CO2 CALIBRATOR is used to zero calibrate carbon dioxide sensors. The unit produces carbon dioxide free air from the ambient air.

The main process is that soda lime is used to absorb the carbon dioxide in the air. Carbon dioxide reacts chemically with the calcium hydroxide and sodium hydroxide in soda lime to form calcium carbonate and sodium carbonate. The air that has passed through soda lime contains much less carbon dioxide.

If the soda lime has a violet colour it has lost much of its absorbing capability and can no longer be used to produce carbon dioxide free air. Several tests show that this colour indicator cannot be trusted. The colour indication disappears after a short time so the absorption power of the cartridge can easily be overvalued. If a sensor is zero calibrated with air containing to much carbon dioxide the readings of the sensor will be too low. Tests have shown that a cartridge with 5 ml of soda lime has an average absorption time of about 9 hours.

Function parameters

Battery charging
The red LED is lit with a fixed light when the battery is charged (no indications of any alarm)

Change CO_2 absorber
The CO_2 absorbent cartridge needs to be replaced when red LED is flashing evenly. (The CO_2 absorbent cartridge has been used more than 8.5 hours)

Pump on
The green LED is lit with a fixed light when the pump is working (no indications of any alarm)

Prealarm
The unit is operating and after 21 min the green LED starts to flash with long pulses. This indicates that the unit will shut down automatically within 4 min if operated on battery.

The unit will continue to operate if the charger is used. The green LED will flash with long pulses but the unit will continue to operate.

Low battery
The unit is operating and the green LED starts to flash with short pulses. This indicates that the battery voltage is below 7,1V.

Technical data

Weight	258 grams included absorbent cartridge (8 grams)
Length	156mm
Width	89mm
Thickness	26mm
Gas flow out	320-340ml/min

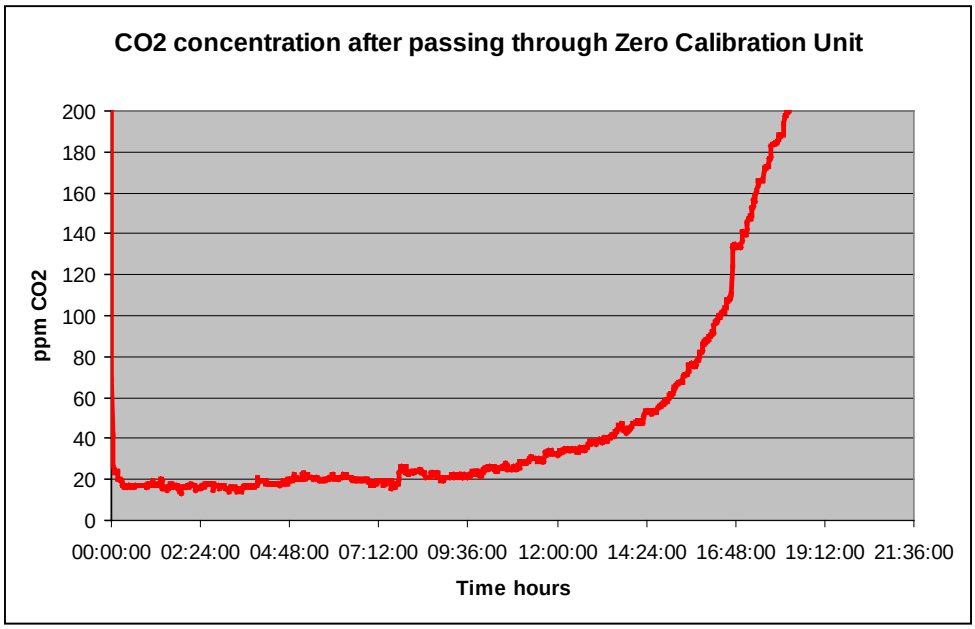
(Gas flow can be changed between 50ml-350ml/min by hard ware)

Volume of CO_2 absorbent cartridge
The volume with maximum filling = 7ml (marked size 5ml length=72.2 mm outer diameter =13.7 mm)

The absorbent power of the absorbent cartridge is dependent of several factors, but the minimum operational time is 8.5 hours with soda lime from Scarlau.
(Factors that affect the absorbent power is type of chemicals, packing density of chemicals the tilt of the unit and the suction/pressure of the pump)
The average flow of the pump through an OBA8 sensor is 320ml/min

Verification of absorbent by high CO2 concentration

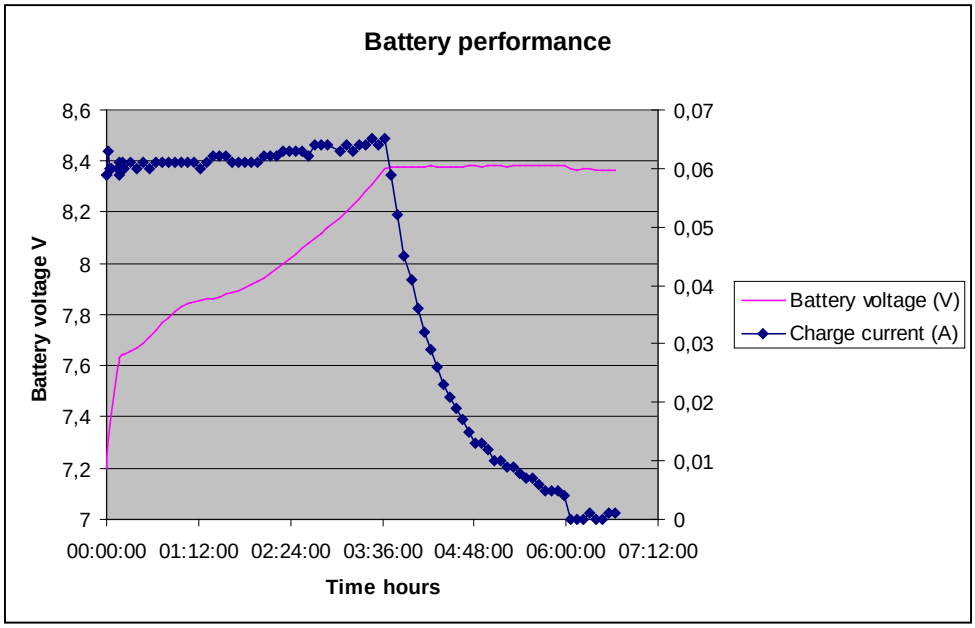
The CO_2 concentration of incoming air is 3000 ppm.



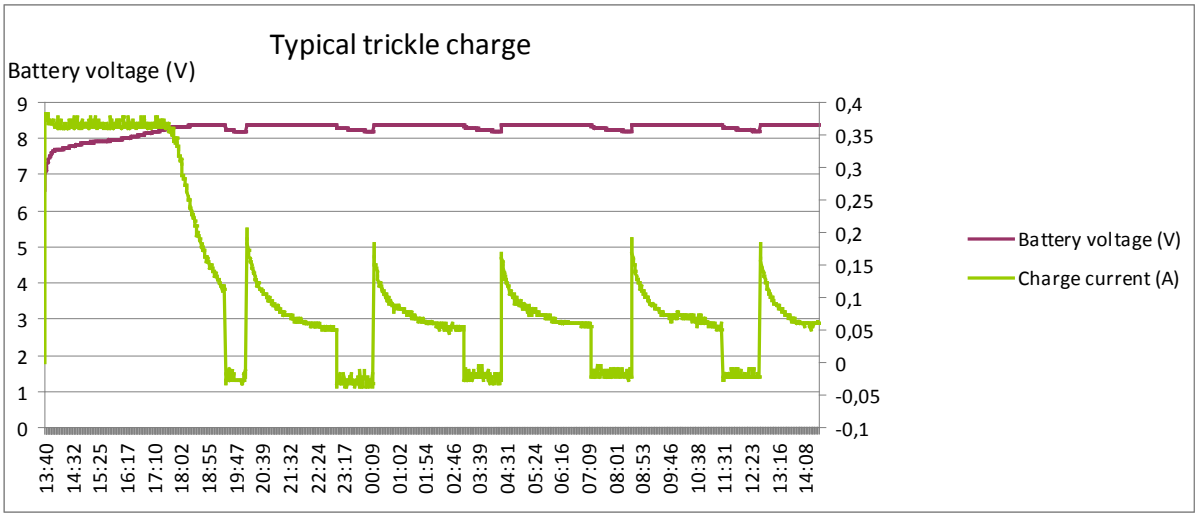
For best result the Zero Calibration Kit should be in operation a while after changing the CO_2 absorbent cartridge so that the cartridge will stabilise.

Battery performance

Battery type Li Ion 2/2S1-LP103450AR/SR 7,4V 1550mAh. 11,47Wh
Charging time is about 5.2-6 hours.



The battery is charged during operation



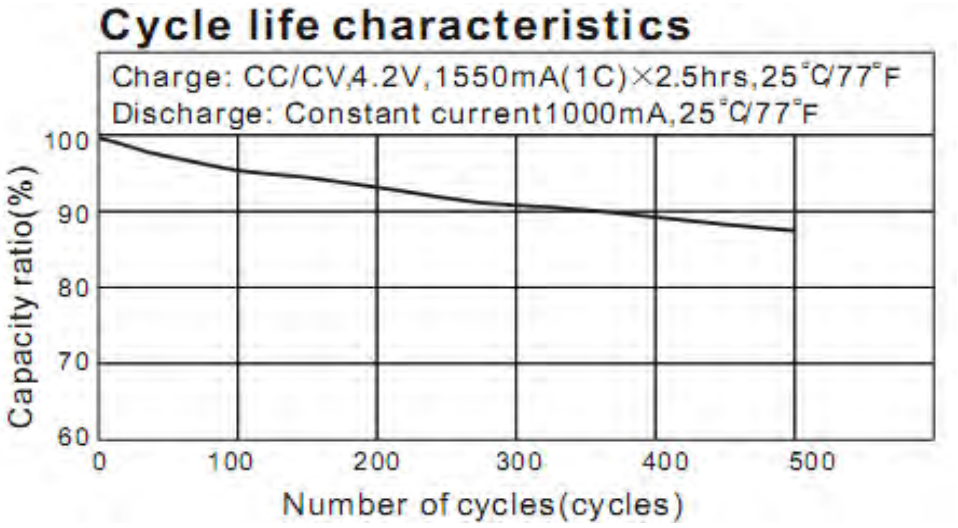
Operation time of the battery

Operation time by normal operation is 15 hours before the low battery alarm is activated. The battery will shut down automatically when the battery voltage is below 5,0V.

Service life of the battery

The service life of the battery is dependent of its discharging and charging cycles. The service life of the battery should be 1000 cycles before the capacity is below 85% if the charging current is 400mA and the discharging current is 80mA.

The battery will last about four years with three cycles of discharges and recharges a week. (High storage temperatures or frequent cycles of discharges and charges may shorten the battery life)



If the Zero Calibration Kit is in standby mode the battery should be charged at least once in a month. Before longer storage the battery should only be charged to about 75 %, four hours charging time.