Standard Operating Procedure:

Install safety cover on high-volume integrated $^{14}CO_2$ sampler

1. Purpose

Install safety cover that automatically connects/interrupts power supply for motor of the high-volume integrated $^{14}CO_2$ sampler to avoid any potential interference/accidents with the moving Raschig tube of the $^{14}CO_2$ sampler. At the same time the cover prevents NaOH splashing out of the sampler.

2. Scope

This SOP shall assist the station personnel to install the magnetic switch for connection/interruption of the power supply to the motor of the high-volume integrated $^{14}CO_2$ sampler.

3. Prerequisites

Screwdriver
Grey plastic stand with one part of the magnetic switch to be mounted on the sampler plate (Fig.1 left lower corner)
Plexiglass cover with the counterpart of the magnetic switch (Fig. 1 right)

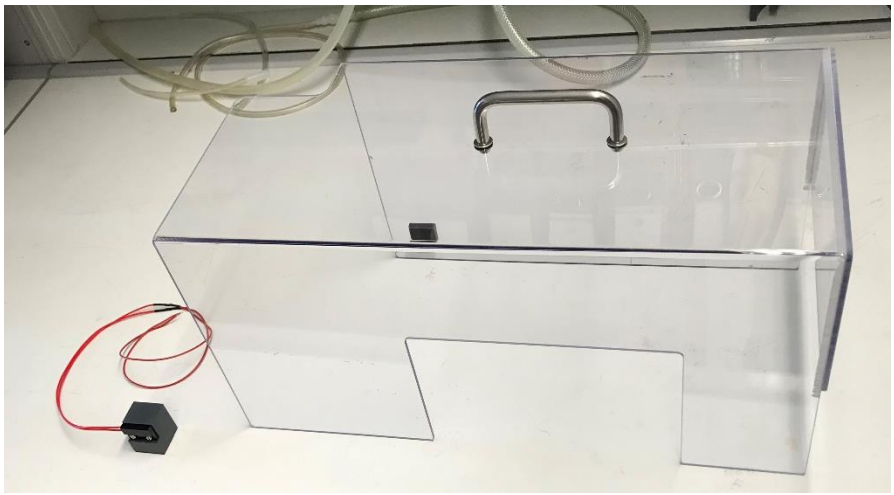
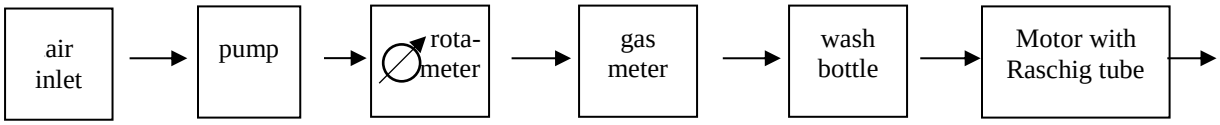


Figure 1: Plexiglass cover with one part of the magnetic switch on the back together with the plastic stand with the counterpart and red cables

4. Description of the sampling system

Schematic set-up of the sampler:



From the air inlet atmospheric air is sampled by a membrane pump and pumped through a rotameter, which allows adjusting the air flow. For a high-volume ^{14}C analysis about 25 m^3 air is necessary, thus the mean flow rate for a sample time of two weeks is about 75 l/h. After the rotameter the air passes a gas meter to monitor the integrated gas volume. The air then gets humidified in a wash bottle to prevent dehydration of the NaOH solution. Thereafter, the air is directed through the glass Raschig tube where the CO_2 is absorbed by the NaOH. The Raschig tube is slowly rotating to renew the absorbing NaOH film on the Raschig rings. The motor of the Raschig tube is an evaporator drive (230 V), which acts also as a vacuum rotary feedthrough.

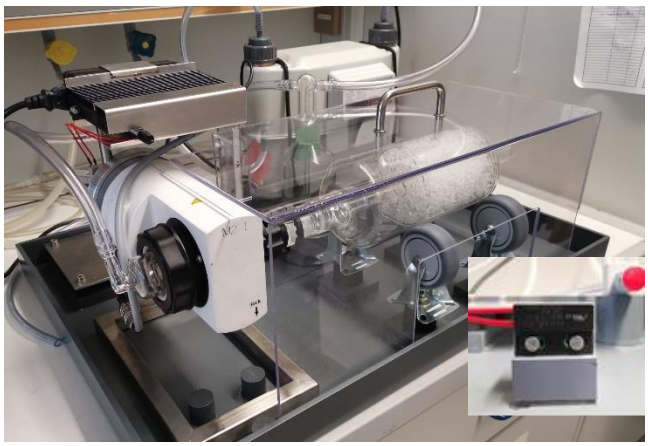


Figure 2: Sampler with plexiglass cover

In order that the motor is supplied with electric power - for safety reasons - a plexiglass cover needs to be put over part of the motor and the Raschig tube. A small magnetic switch is mounted at the back side of the plexiglass cover. Once this switch is approaching its counter-part that is mounted on the plastic tablet, the switch is closed and the motor is connected to its power supply. Taking off the cover immediately stops the motor and thus the rotation of the Raschig tube.

5. Procedure

In order to install the magnetic switch, the grey plastic holder that keeps the fixed part of the switch needs to be glued (double-sided tape) on the plastic tablet and the two red wires need to be introduced into the power supply of the motor replacing the bridging green wire.

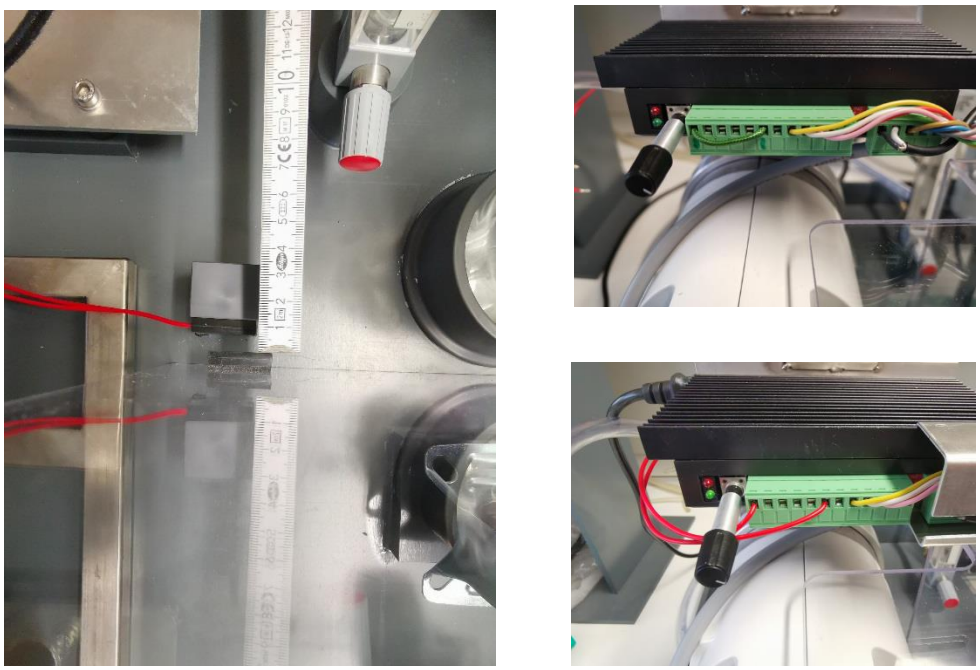
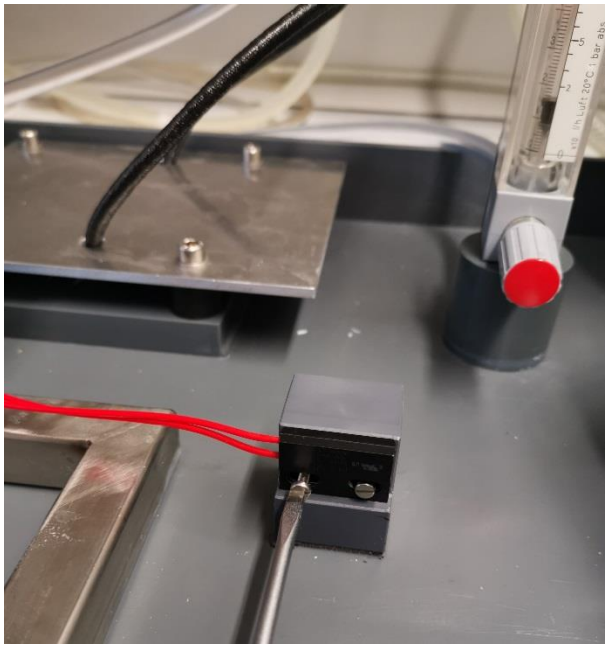


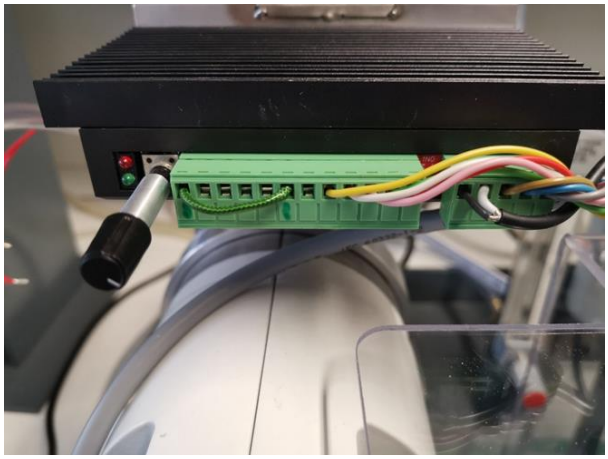
Figure 3: Detail of the magnetic switch and its counterpart on the plexiglass cover (left), original wiring of the power supply of the motor (upper right), new wiring with the red cables from the magnetic switch mounted (lower right)

The correct position of the plastic holder for the fixed part of the switch on the tablet can be marked when the plexiglass cover is put over the motor and Raschig tube as shown in Fig. 1 or Fig.3 left. The counterpart of the magnetic switch is already mounted in the left back corner of the plexiglass cover. The switch will work and connect the power supply of the motor as long as the distance between the two parts of the switch is smaller than about 1 – 1.5 cm. If the plexiglass cover is removed, the switch will immediately interrupt the power supply and the motor will stop.

First find the correct position for the plastic holder of the magnetic switch as approximately shown in the Figure below, check the position by putting the plexiglass cover on the tablet. Fix the holder by removing the green tape on the plastic mount.

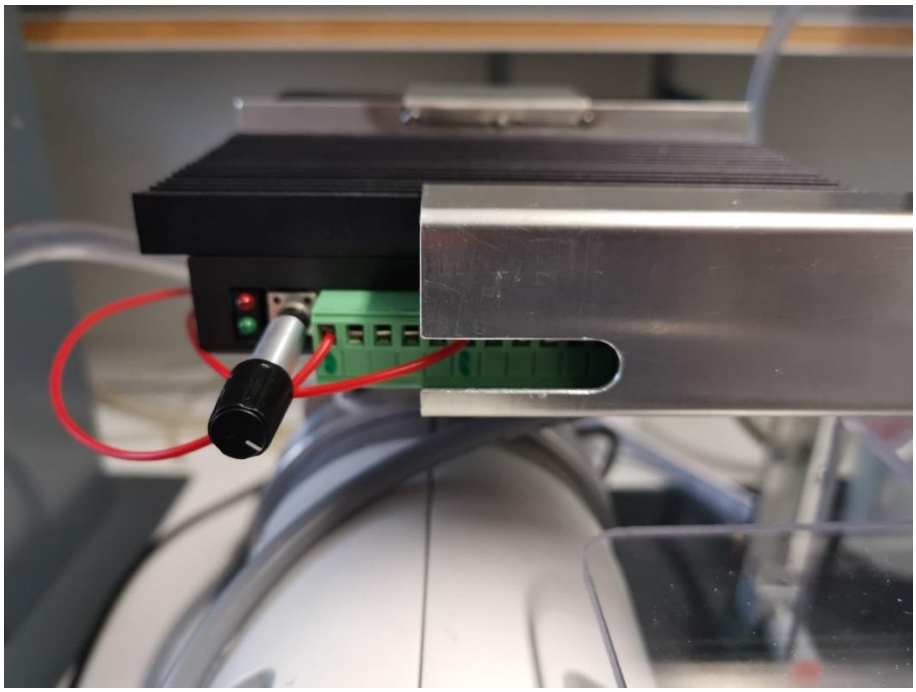


Now disconnect the 230 V power supply from the motor power supply and move the metal shielding on the motor power supply to get access to the wiring.



Take off the green connector strip and remove the green wire bridge.

Now introduce the two red wires of the magnetic switch into the wire bridge and put it back to the power supply. Move the metal shielding back over the wiring and re-connect the 230 V power supply. Fix the red cables in the back of the motor stand.



6. References

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7. Acronyms

ICOS: Integrated Carbon Observation System
SOP: Standard operating procedures
CRL: Central Radiocarbon Laboratory