Micro CO-alerter for pilots

Small like an USB Stick

Innovative features developed by pilots for pilots

- the smallest and lightest CO-alerter on the market with two micro controllers on board. Fits into every pilots bag.
- CO-Warning with bright LED and Buzzer.
- Newest generation of CO-sensor which is temperature compensated. Checked at 50 and 100ppm before installation.
- Due to concept of USB-Stick no additional battery necessary. In this use case you will never see an empty battery.
- If there is no USB-socket available you can drive it also via power bank. Power consumption is very low at < 50mA (= 0.05A).
- You have three levels of sensitivity to be selected via switch:
  >1ppm, ~20ppm, ~50ppm.
- 20 CO Alarms are non volatile memorized (PPM-rate , time after power up and durance of Alarm)
- In addition the ppm rate is generally memorized every minute and stored in a 3h rolling non-volatile memory (= 180 measurements of ppm-rate).
- The Alarm memory and the "3h rolling memory" can be read out at every PC into a delivered Excel sheet (see slide 3 and 6)
- At every power up, an internal diagnosis routine checks that all components are working and signals are given to the user.
- Also during normal operation the sensor runs a self monitoring.
- Developed by pilots for pilots, and tested in several planes.
- Certification under investigation, but not yet available. (Product does not comply with UL2034)
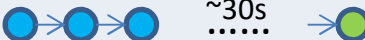
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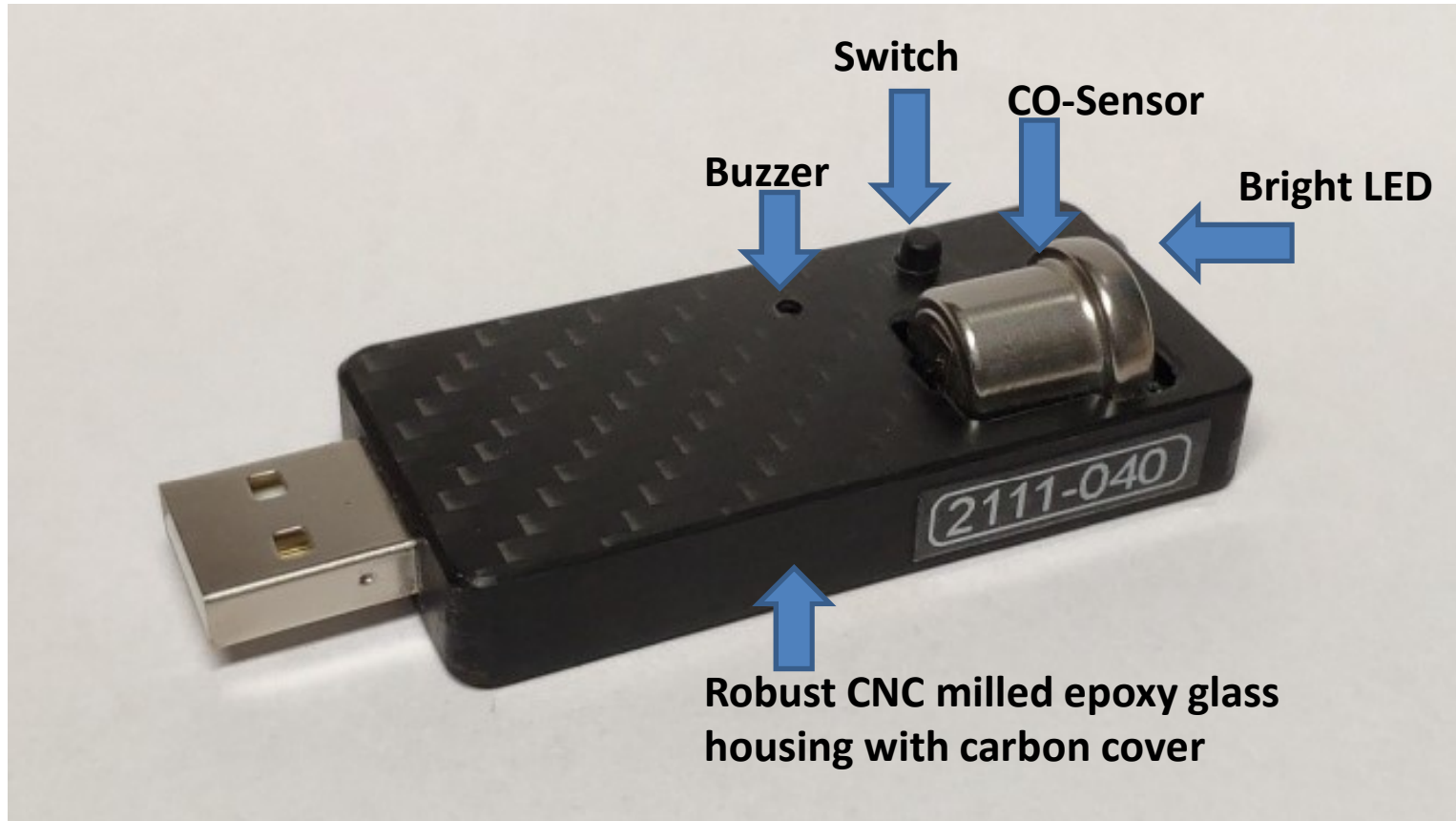
Switch: in Operation: Switch sensitivity >0ppm , 20pp, 50ppm
and "LEDs off" in case of no alarm, may be @ night VFR
connected @PC: start printout of Memory (Failiure and 3h rolling)

LED red/green/blue

Overview of operation:

1. Normal operation

Situation	Switch	LED	Buzzer
Power up, Self test	Not pressed	🔴➡️🔵➡️🟢	1 beep = all ok
Warming up, takes 30s	Not pressed	🔵➡️🔵➡️🔵 ~30s …… ➡️🟢	-
Continuous measurement	Not pressed	🟢 "glowing" 🟢 Dimms up every 9s	-
Alarm	Not pressed	🔴➡️🔴……	beeping Slow= less 50ppm Quick = more 50ppm
CO lower than sensitivity but **not zero**, Can be Deactivated by double click	Not pressed	🔴➡️🟢➡️🔴…..	-
Sensitivity 1: Alarm higher **~0ppm** = also default after power on	1 short click	🔵	1 beep
Sensitivity2: Alarm higher **~20ppm**	2 short clicks	🔵➡️🔵	2 beeps
Sensitivity3: Alarm higher **~50ppm**	3 short clicks	🔵➡️🔵➡️🔵	3 beeps
Nightmodus or "non disturb" -> automatically finished in case of Alarm.	Double click	⚪ LED off, but Alarm function remains active	-

Overview of operation:

2. Special modes:

Situation	Switch	LED	Buzzer
• Transfer of data: Connected with PC Load Excel template : "Dataframe_CO_Stick" Courser positioned at A1 = "Startpos"	Long click, 1-2s: starts copy of data. (works only once per power cycle)	●●● ..... takes a few seconds	Not relevant in this mode
• Erase stick memory: Connect stick with simultaneously pressed switch	Keep it pressed, until blue LED flickers	●●● ...... takes a few seconds	Not relevant in this mode
• Alerter has identified a problem. Restart it again. If it happens more often, it should be checked by ADK.	Not pressed	●●●●	Not relevant in this mode

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The Alarm memory

Startpos.	current Sensor lifetime:			95 [h]

Alarm No.	CO in ppm	Minutes after start	Durance in minutes	at sensorlifetime
0	34	10	1	76
1	500	1	2	76
2	78	1	1	76
3	106	2	1	76
4	60	2	1	76
5	40	3	1	76
6	144	4	2	76
7	74	0	2	76
8	74	1	1	76
9	90	1	2	76
10	214	67	2	77
11	284	215	2	80
12	500	44	50	92
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0

• 20 Alarms are non volatile memorized
• memory can be erased via connecting to USB and simultaneously pressed switch.
• "minutes after start" means minutes after powering the stick.
• Overall Sensor lifetime is tracked, but not limited. Minimum lifetime according to sensor supplier is 2 years.
• there are easy procedures to recheck the functionality of the sensor at any lifetime(see also manual).

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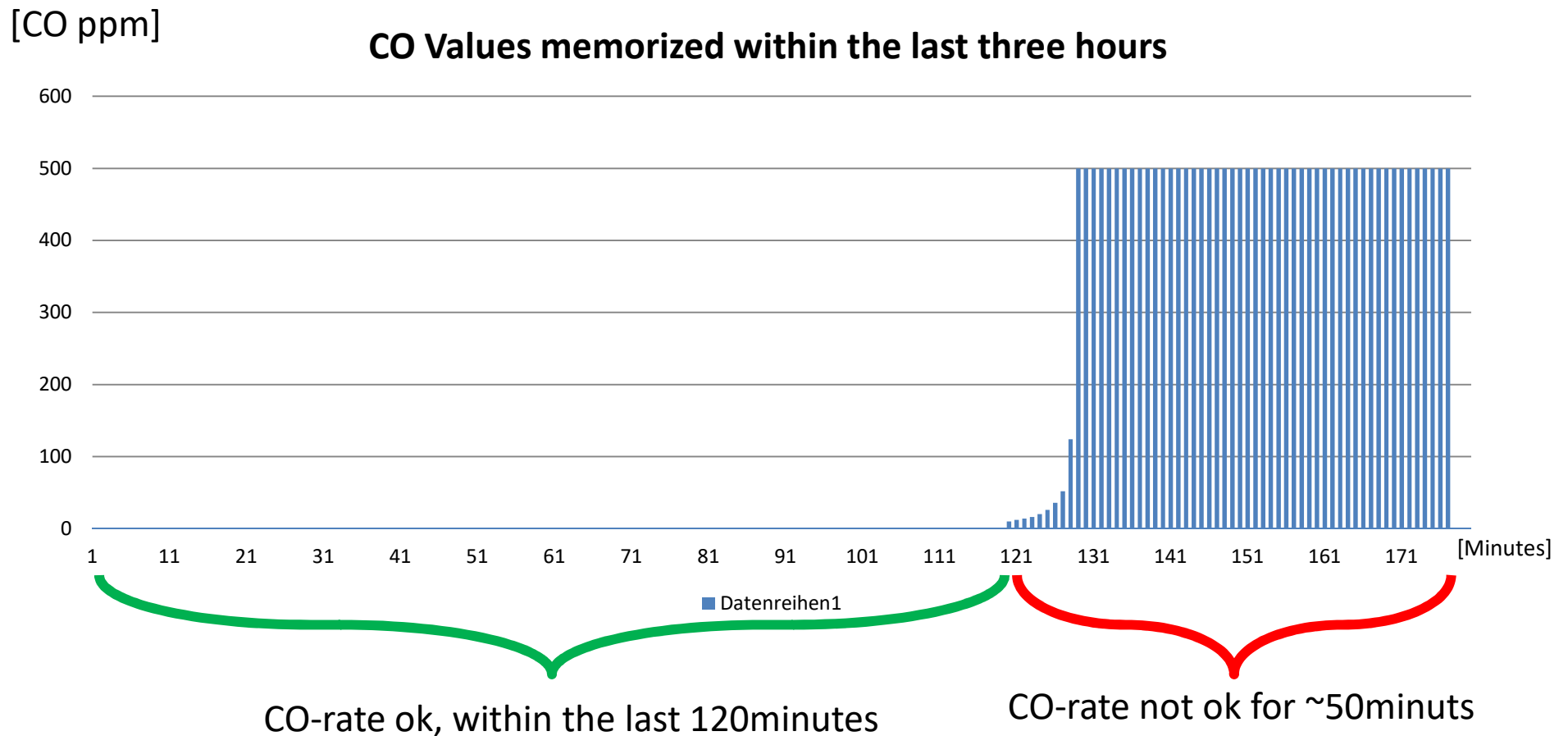
The 3h rolling memory in the table

CO Values memorized within the last three hours (this table is the base for the following graphic)								
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	10	12	14	16	20	26	36
52	124	500	500	500	500	500	500	500
500	500	500	500	500	500	500	500	500
500	500	500	500	500	500	500	500	500
500	500	500	500	500	500	500	500	500
500	500	500	500	500	500	500	500	500
500	500	500	500	500	500	0	0	0

- every minute the ppm rate is memorized in the 3h rolling memory
  - "rolling" means that if value 1 till 300 are written, it starts again with value 1.
  - this table shows a real measurement of a alarm No.12 (slide3)
    - This alarm happened 44minuts after power up. The duration was 50minutes and maximum ppm-rate was 500 (done at ground, otherwise …..).

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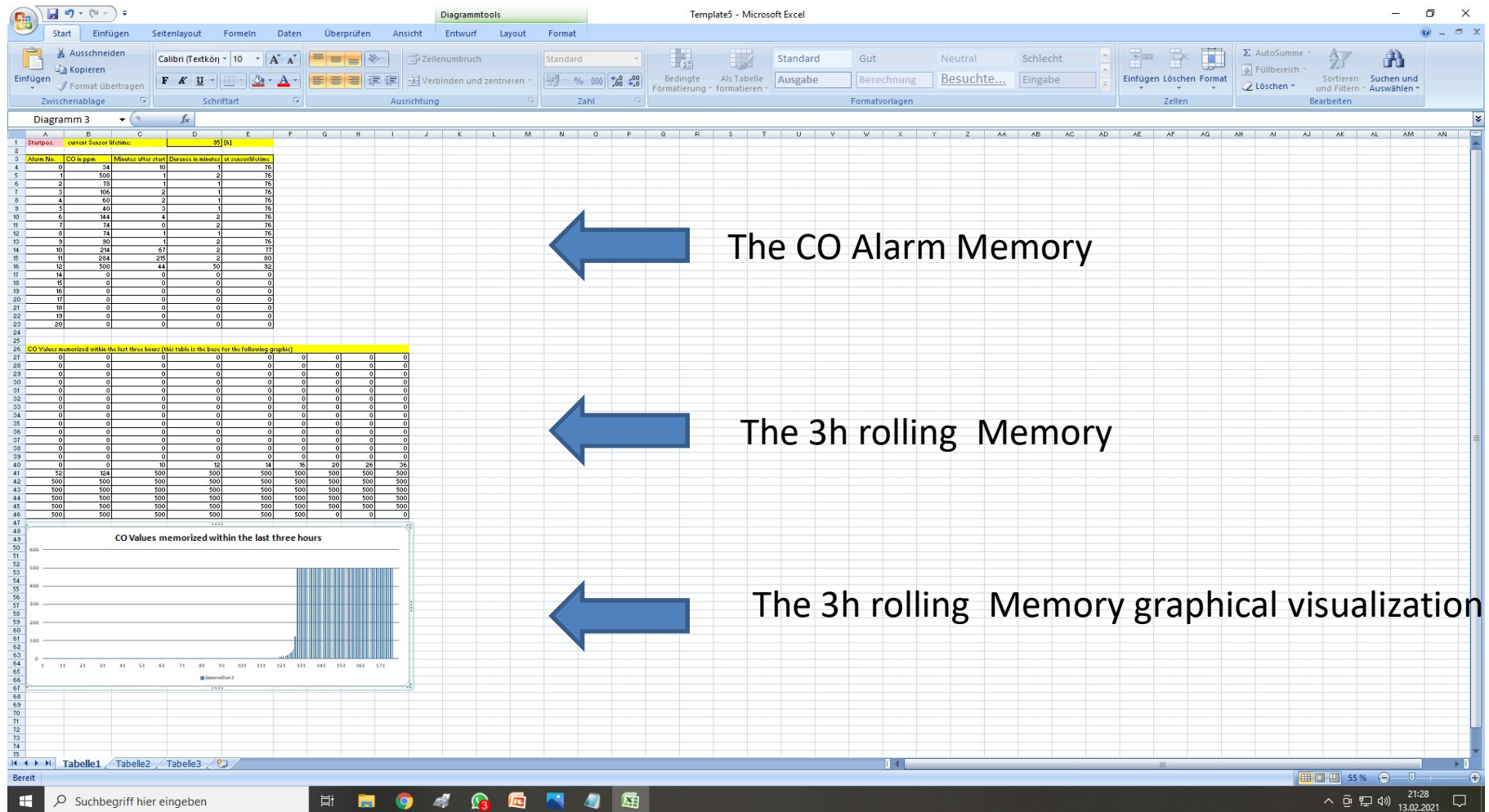
The 3h rolling memory visualized via graph

This graph shows the contend of the table in slide No.4

[CO ppm]

CO Values memorized within the last three hours

CO-rate ok, within the last 120minutes

CO-rate not ok for ~50minuts

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How it looks in Excel

The CO Alarm Memory

The 3h rolling Memory

The 3h rolling Memory graphical visualization

General Information about CO poisoning

CO poisoning Studies

- have shown that the severity of CO poisoning is based upon the concentration of CO in a victim's bloodstream. Symptoms may progress from a slight headache to nausea, dizziness, drowsiness, vomiting, collapse and ultimately death as carboxyhemoglobin (COHb) levels increase in the bloodstream and displace oxygen. The level of COHb in the bloodstream may increase relatively slowly due to exposure to low concentrations of CO or more quickly when higher CO concentrations are present.

What to do if a CO alarm sounds

- If a CO alarm in your plane sounds, immediately open your window and shut off the heating. If it´s an alarm higher than 50ppm (quick beeping) you should land and check out the root cause for the alarm. It's crucial that the source of the CO is determined and appropriate repairs are made. Remember, an alarm indicates elevated levels of CO in your cabin. Some people can be exposed to dangerous levels of CO and not feel any symptoms. Regardless of whether or not symptoms of CO poisoning are present, never ignore the alarm.

Liability and hints

- Liability IN NO EVENT. Seller WILL BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT.

Other hints:

- PRODUCT DOES NOT COMPLY WITH UL2034
- DO NOT EXPOSE PRODUCT TO HARSH ENVIRONMENTS nor CLEANING AGENTS
- ENSURE SENSOR HOLE IS NEVER BLOCKED
- CO ALARMING INDICATES PRESENCE OF CARBON MONOXIDE WHICH MAY KILL YOU
- IF UNIT ALARMS TAKE PRECAUTIONS AND SEEK CLEAN AIR. IF UNWELL, SEEK MEDICAL ATTENTION.
- IF UNIT ALARMS, DETERMINE CAUSATION AND REMEDY CO LEAKAGE ISSUES
- DO NOT ATTEMPT TO OPEN THE ALARM UNIT
- ENSURE DETECTOR IN LINE OF SIGHT FOR VISUAL ALARM IN CASE BUZZER ALARM CANNOT BE HEARD