

Carbon Monoxide

Like icing, T-storms and cancer, the only ‘safe’ amount of CO (Carbon Monoxide) is zero. CO is the byproduct of the combustions of fuel in your engine, which can leak into the cockpit. It can leak into the cockpit because planes use the exhaust manifold/piping as a radiator pipe and direct the surrounding, heated air into the cockpit and if any of that piping is cracked or in any way leaking, the actual exhaust gas (laden with CO) gets sent into the cockpit.

CO is called the ‘silent killer’ because it is odorless and ‘sneaks up on you’, not unlike hypoxia. Carbon monoxide is dangerous because it bonds onto the hemoglobin (red blood cells) better than oxygen so the oxygen gets ‘pushed out of the way’ in your blood stream.

Fortunately, we can buy carbon monoxide detectors that will detect and warn us of this silent killer. Unfortunately, they vary widely in price and sensitivity and are obtuse when informing the consumer of ‘how much is too much?’. Fortunately, this article will fix that.

Unlike ‘smoke detectors’ that detect the presence of an open fire and sound immediately (there is no ‘safe level’ of an open fire in your house), the bad effects of CO are cumulative such that a low amount over a short time is as toxic as a higher concentration in a shorter time. Concentration is measured in parts per million (ppm) and we will talk about levels from 30ppm up to 400ppm

How much is too much? Depends who you ask, and what the circumstances are. Underwriter Laboratories (UL) has a 2034 standard for home use while Industrial Gas detectors use the T90 standards. The short version is that the “\$30 Home Depot versions will only sound if the CO is very high for very long (150-400ppm over 15-50 minutes), vs the “\$120+ industrial versions that will start screaming as low as 35ppm in 20 seconds.” The assumption is that in a home, exhaust fumes leaking in from the garage or such for short periods of times do not warrant an alarm. But if you get CO in a cockpit, the prognosis is much more dire. Here’s a table of what you can expect, then we’ll describe “what you can buy, where, and for how much”

Why spend the extra money (over \$100 more) for an ‘industrial’ CO detector over the simple \$30 Home Depot one? The simple answer is to look at the concentration/response times of a sample “Amazon/HomeDepot” unit, compared to the followin table. Home units won’t even display anything until they hit 35ppm and would have to be at 70ppm for over an hour before sounding an alarm.

PPM	Symptoms	UL 2034 warning levels (home)
30-35	Headaches and dizziness in 6-8 hrs	Minimum alert level
50	Maximum allowed by OSHA for 8 hour exposure. Most fire departments require an air pack above 50 ppm This the typical threshold for industrial (cockpit) sensors.	
70		60 - 240 minutes
100	Slight headache in 2-3 hrs	
150		10 - 50 minutes
200	Headache and loss of judgement in 2-3 hrs	
400	Frontal headaches within 1-2 hrs	4 - 15 minutes (1)
800	Dizziness, nausea within 45 minutes	

As you can see, the industrial and professional folks (e.g., Fire Departments) take action at levels much, much lower than you will see anywhere else. So unless you have a digital readout of the larger “Home Depot” units

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right in front of you (e.g., not relying on the audio/visual alarms), they are pretty useless in a cockpit. Also note that apparently to avoid ‘false alarms’ the home version won’t budge past 0 ppm until 30ppm or more.

The industrial unit I have will sound a ‘silence-able’ alert at 35ppm and a ‘permanent’ one at 50ppm, with a response time under 1 minute. My feeling here is that if I am getting any appreciable CO, I want to know about it immediately so I can have it fixed before it reaches a more serious level.




The importance of these was driven home by a pilot buddy here at CEA who resides in the North East T-Hangars, who started out complaining that “the dumb detector was going off needlessly” - until his mechanic confirmed that a crack had developed in his exhaust heating system and the detector was correct – and possibly saved his life.

One more expense is that these higher-sensitivity devices will typically have only a 2-3 year life at which point they are either discarded or some can be sent back for a initialization for a sizeable portion of the original purchase price.

If CO is detected, immediate action is appropriate. Vent fresh air into the cockpit, use onboard oxygen if available and appropriate, and obviously land as soon as practical.

So, where do you buy “the good ones” and how much do they cost??? Here’s a sampling of two popular sources.

Sporty's

 <p>Carbon Monoxide Detector 4116A \$4.95 AS LOW AS \$3.95 ★★★★★</p>	 <p>Carbon Monoxide Cockpit Monitor 7761A \$169.95 ★★★★★</p>	 <p>dSense Portable Carbon Monoxide Meter 2742A \$99.95 \$75.00 ★★★★★</p>
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Aircraft Spruce

 <p>MODEL 300 POCKET CO \$138.75</p>	 <p>GASALERT CLIP EXTREME II CARBON MONOXIDE MONITOR - 2 YR BATTERY \$159.95</p>	 <p>DRAEGER PAC SINGLE GAS MONITOR From \$226.95</p>
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