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Application Note AN144: K30 Sensor Lockups with Arduino

Troubleshooting K30 Sensor Issues

Customers using the Senseair K30 1% and 3% CO2 sensors with the Arduino MCU and the supported library occasionally see “lockup” of the sensor. It appears that the sensor sends negative data and quits working. After unplugging the sensor from power momentarily, it works again. This seems to be a random problem.

Fortunately, we have been able to recreate the problem, and have several solutions:

The most common issue is power. 5V is the required minimum voltage. If you are powering from a USB port, the nominal 5.25V might drop with other USB devices on the circuit, causing an error. If the sensor detects low voltage when it enables the source lamp (peak current about 150mA), it terminates the measurement cycle and reports 32767/7FFF or negative data as the measurement value. We have been able to see this using an oscilloscope.

The solution is to check for consistent 5V or more power. If you verify you have enough power, the second solution is to add a 47uF capacitor at the power input of the sensor.

Another reason we have seen sensors lock up is if the software does not test for or know how to handle exceptions when the request for the measured value return an incorrect CRC. These errors are generally the result of software timing or intermittent spikes caused by faulty wiring.

The third reason we have seen lockups is polling too often. Note that while you can poll the sensor as often as you want, measurements on the K30 are made every 2 seconds. Polling the device more than this will not make more accurate readings, and can result in lockups if the software does not have proper error handling.

Another reason for lockups is that the host device may have conditioning (pull ups or lack of pull ups) that make the RX or TX signal swing marginal. You can use an oscilloscope to verify that the signals have good highs and lows.

Finally, in this case of the transient potential, look for unclamped radiated noise from inductive switching, i.e. motors or solenoids. You may have to install clamps on the sensor power and or communications lines if you cannot control the source.