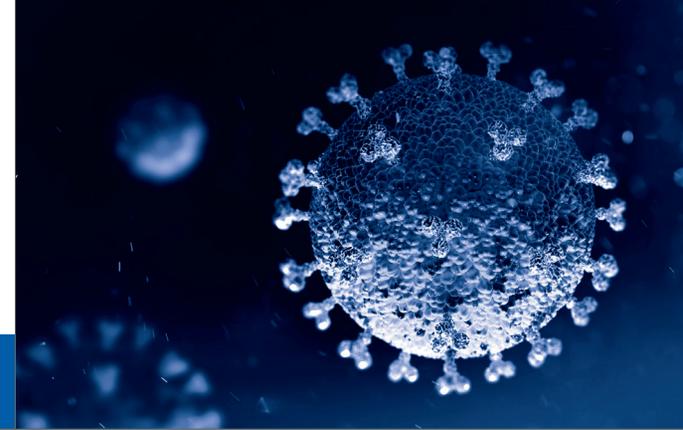


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## Calibrating UV-C Sources for COVID Decontamination

### The Challenge

Exposure to UV-C radiation has proven to be a viable means for killing many pathogens, including the COVID-19 virus. But, the effectiveness of this method is highly dependent upon the wavelength and total light exposure (in terms of energy) to which the virus is exposed. Because of the worldwide COVID pandemic, there is suddenly a tremendous need for UV-C sterilization systems. As a result, there are now a variety of products flooding the market, some of which do not have the necessary output characteristics to actually be effective. For those seeking to qualify these systems for practical use, the challenge is that accurately measuring UV-C light intensity has been difficult in the past, particularly for instruments based on photodiodes.

### The Solution

Photodiodes present problems for measuring UV-C light for two main reasons. First, their spectral response is not flat at those wavelengths. Thus, small changes in the output spectrum between sources, which are not at all uncommon, can lead to large apparent (but not real) differences in power readings. Second, the range of optical power output by the UV-C sources used in commercially available sterilization systems varies over several orders of magnitude. Photodiodes can't directly measure over this range without the use of filters. But, filters can introduce errors in calibration which reduce the absolute accuracy of the readings. The Coherent PowerMax USB-PS10 power sensor is based on thermopile technology rather than photodiode. Furthermore, the specific thermopile used is very thin, which enables it to measure very low power densities, while still maintaining a huge dynamic range. Also, the black coating employed on this sensor is quite flat (2%) over the entire UV-C spectral range.

### The Result

The Coherent PowerMax USB-PS10 power sensor has enabled Power and Controls Technology Inc., together with the University of West Florida's Laser Lab, to directly measure the actual energy dosage produced by several commercial UV-C sterilization systems. The measurement process is simple, because the sensor head is on a flexible USB cable, allowing it to be rapidly placed at various spots relative to the light source under test. Readings are then easily acquired which show how quickly the source warms up to full output, and how long it takes to deliver the necessary amount of light. Sadly, results indicate that only about 20-30% of current commercial products meet the guidelines for correct wavelength (254 nm), and even more importantly, sufficient output power to achieve sterilization in a reasonable timeframe. Without the Coherent calibrated power sensor, one would never know the required exposure time to assure that germicidal cleaning has been achieved.

*“The Coherent PowerMax power meter gives us a quick, reliable way to measure the power of UV-C sources. Plus, it’s calibrated and NIST traceable which gives us a high degree of confidence in the absolute accuracy of the readings it delivers.”*

—Daniel Patanjo, EE PE,  
Power and Controls Technology, Inc. (PCTI)