Technical Note – TN0106
SprayVIEW Laser Verification

The Proveris Scientific SprayVIEW® Measurement System helped to establish the industry standard for automated spray pattern and plume geometry measurements for orally inhaled and nasal drug products (OINDP). We have since worked to expand the platform's capabilities to include Plume Front Velocity (PFV) measurement, as well as Evaporation Fraction measurement. At its core, the SprayVIEW consists of a Vereo® Automated Actuator used to fire the device in testing, a laser light source used to illuminate the spray from the device, and a high speed camera used to capture a series of images from the spray event. Those images are then analyzed using proprietary algorithms in order to produce data for the measurement in question. Just like in any other form of photography, lighting is everything!

In order to properly illuminate the spray from a particular device, the SprayVIEW uses a specially selected semiconductor laser with custom optics in order to create a fanned planar beam that allows for illuminating cross sections of a spray (see Figure 1). In order to produce repeatable and accurate data, it is essential that the laser continues to operate within spec with the key factor to be measured being the power of the laser across the field of illumination. Since the data generated is dependent on the pixel intensity seen by the camera at different points on the spray pattern or plume, illuminating the entire spray with constant, uniform power is necessary to be able to draw conclusions from the data.

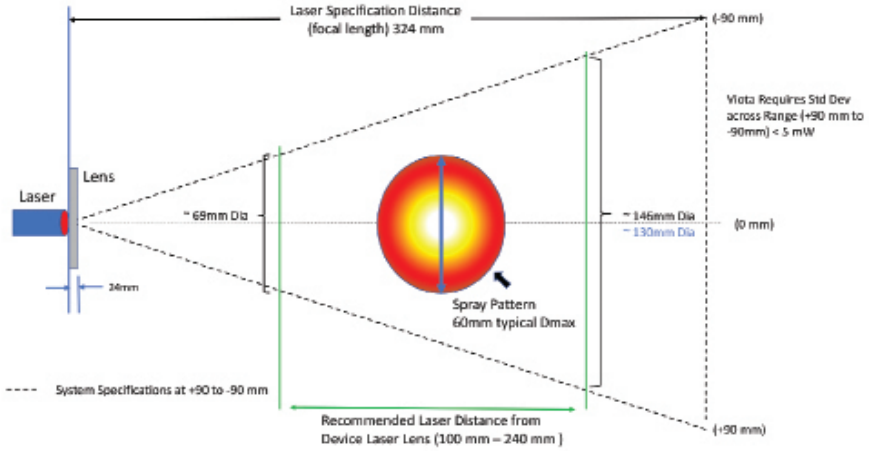

Figure 1. Diagram showing the laser fan angle created by the internal optics and the width of the beam at different distances specified for usage.

Proveris offers a Laser Verification Kit to ensure that users have the tools needed to regularly check laser performance and to anticipate any potential failures before they happen. Pictured below in Figure 2 is the kit itself which consists of:

1) A calibrated laser power sensor (used to measure the power of the laser at various points along the width of the beam at a specified distance from the source).

2) A digital laser power meter which connects to the sensor and displays the values read.

3) The SprayVIEW verification tool which is used to mount the power sensor at a specified distance away from the laser source and is used to move the sensor to different positions across the beam (from -90mm to +90mm from the center line).

Figure 2. SprayVIEW Laser Verification Kit

As with other verification and calibration routines performed on the actuator within the SprayVIEW (i.e., actuator movement verification and load cell calibration), Proveris recommends that the Laser Verification be performed at a regular interval of at least monthly. However, it is up to the quality assurance team at your organization to determine if a higher frequency is deemed necessary based on the throughput generally seen on the system. When the routine is run through the Viota software, all power values are automatically recorded, and the standard deviation is calculated. In order for the system to be considered operable and within spec, the average power of each measurement must be above 18mW and the standard deviation be less than 5mW.

Please note that the digital meter is a calibrated tool and must be recalibrated annually by the manufacturer. Proveris can facilitate this calibration service and we generally recommend sending the meter back to us for calibration immediately before any annual maintenance on the system is performed by a Proveris engineer. Since laser verification is performed as part of the preventative maintenance procedure, the meter can be sent back to us prior to its scheduling and will be returned to the user in a few weeks, leaving plenty of time to perform the next verification as per the recommended frequency.

Finally, it is also important to note that the records of the laser verification are saved into the database and can be used by a Proveris engineer to determine if there are any indications that the laser may be degrading. If the SprayVIEW system is covered under a complete support plan from Proveris the following will always be covered:

1) Annual preventative maintenance which includes laser verification and reviewing the data generated from the previous year.

2) Calibration of your digital laser power meter

3) Replacement of the laser should any issues occur (e.g., failure of the laser diode).

If you have questions regarding the laser verification or need any additional information, please don't hesitate to contact a Proveris engineer at support@proveris.com.

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