NEW BEAM EXPANDER FOR TM TYPE PDPA PROBES

APPLICATION NOTE PDPA-005

The Phase Doppler Particle Analyzer (PDPA) has become the “Gold Standard” spray measurement technique. With TSI’s patented Intensity Validation, the PDPA yields reliable measurements of a huge variety of sprays, from tiny medical sprays to enormous fire-fighting sprays. The FSA signal processor provides automatic sampling rate selection, and TSI’s optimized three-detector receivers do not need any aperture masks, which complicate data taking (Which mask is correct? How do I know I am using the correct mask?) and reduce the dynamic diameter range. Fuel sprays, especially those from diesel injection equipment, are becoming more and more dense as injection pressures surpass 200 MPa. In these cases it is important to use a small measurement volume size. This acts to reduce the possibility of multiple particles being within the measurement region, and also to increase the laser light intensity.

Figure 1: New XPD50-E Beam Expander for TM series probes

The new XPD50-E beam expander, shown in Figure 1, provides a 2.11 beam expansion and attaches by simply screwing it on in place of the front lens retainer. No adjustment or beam steering are required. It uses all existing TLN10 series lenses, just like the RV100 series receivers. In this way, a symmetric arrangement can be used with both the transmitting side and receiving side having the same focal length lenses, e.g. 500mm for typical high pressure spray rigs. Moreover, the internal XPDN50-I beam expander can be used simultaneously with the XPD50-E to give an overall beam expansion of 4.22! As shown in Figure 2, this can result in a 44um beam waist with a 500mm TLN10-500 focusing lens, or a 20um beam waist with the 238mm TLN10-238 focusing lens. The new XPD50-E beam expander fits all TM series transmitter probes from TSI.

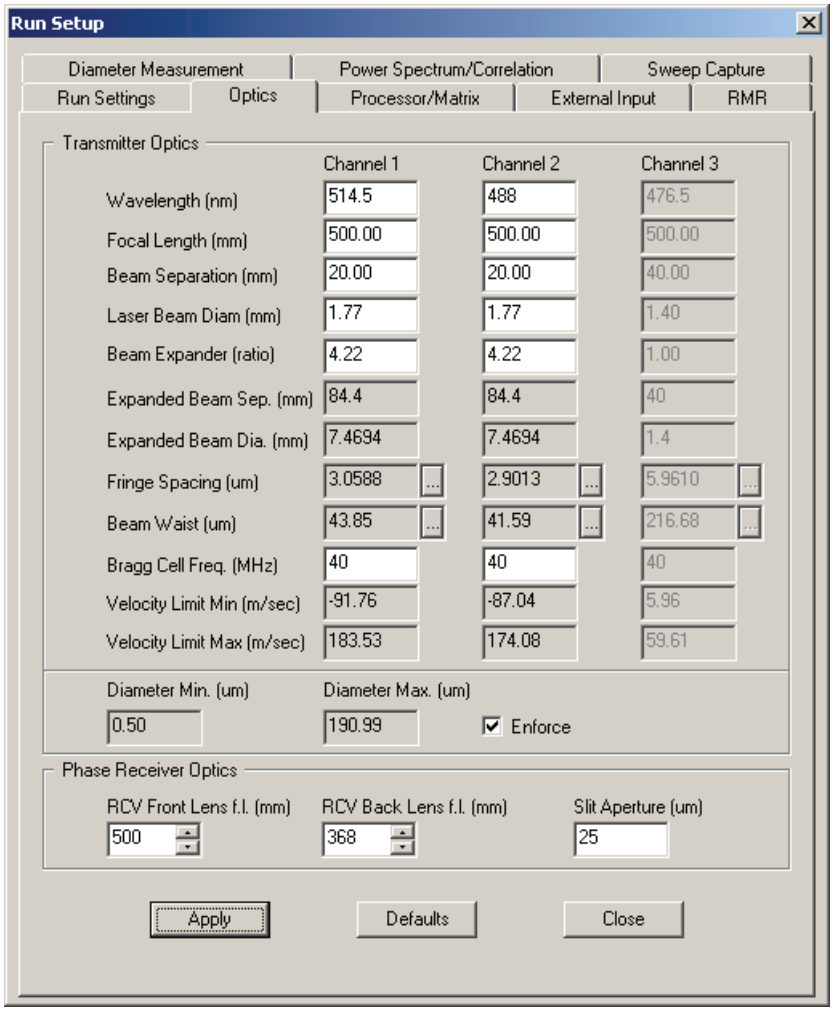

Figure 2: Optical properties for a PDPA system using both the internal XPDN50-I and external XPD50-E beam expanders.

UNDERSTANDING, ACCELERATED

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