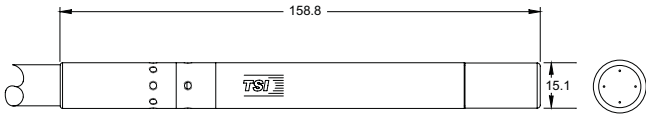


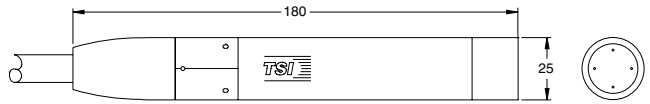


*Fiber Optic Probes
for PDPA/LDV Systems*

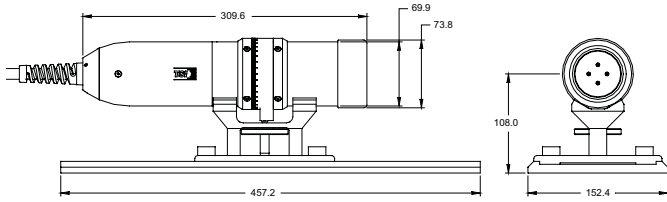
TRx10 Transceiver Probe



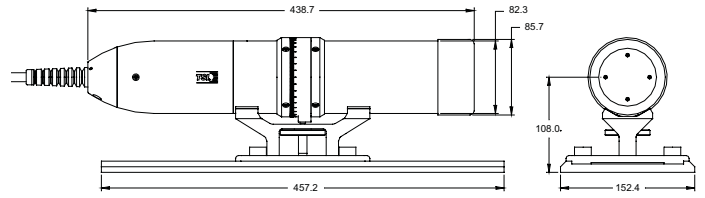
TRx20 Transceiver Probe



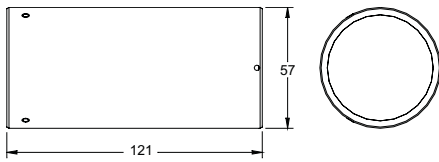
TMx50 Transmitting Probe



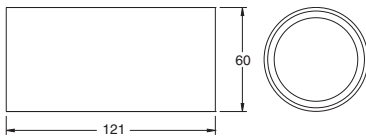
TRx60 Transceiver Probe



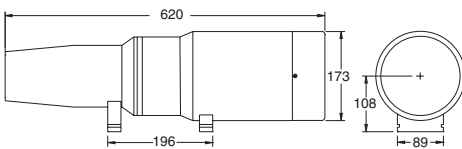
XPDN50-I Beam Expander



XPD50-I Beam Expander

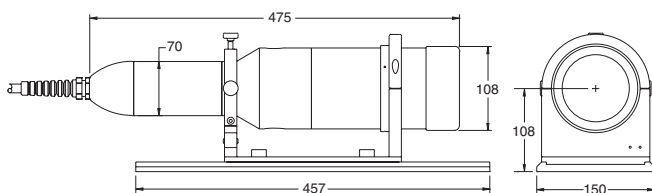


XPD60 Beam Expander

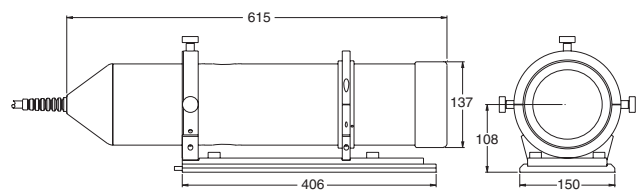


XPD-50-I

RVx070 Receiving Probe



RVx100 Receiving Probe



Specifications for Fiberoptic Probes

Probe Series	TRx10			TRx20		
Maximum Outside Diameter (mm)	15.1			25		
Clear Aperture (mm)	10			20		
Fiber Cable Length (m)	8			8		
Length (mm)	158.8			180		
Weight (kg)**	0.2			0.4		
Optical Axis Height (mm)	-			-		
Std. Beam Diameter (mm)	0.47			1.06		
Std. Lens Focal Length (mm)	60			110		
Lens Series	TLN01-[Focal Length]			TLN02-[Focal Length]		
Beam Expansion Options	-			-		
	Probe Only			Probe Only		
Lens Focal Length (mm)	60	80	120	110	144	
Beam Spacing (mm)	7.5	7.5	7.5	15	15	
Fringe Spacing (μm)	4.1	5.5	8.2	3.78	4.94	
Meas. Volume Diameter (μm)	83	110	166	68	89	
Meas. Volume Length (mm)	1.3	2.4	5.3	1.1	1.8	

Lens Focal Length (mm)
 Beam Spacing (mm)
 Fringe Spacing (μm)
 Meas. Volume Diameter (μm)
 Meas. Volume Length (mm)

Lens Focal Length (mm)
 Beam Spacing (mm)
 Fringe Spacing (μm)
 Meas. Volume Diameter (μm)
 Meas. Volume Length (mm)

* Indicates values for 514.5 nm/488 nm/476 nm ** XPDN50-I and XPD50-I add 0.4kg, XPD60 adds 7.5kg
 Measuring volume values for TRx10, TRx20, TMx50 and TRx60 probes are for 514.5 nm, unless indicated otherwise.

Specifications for Fiberoptic PDPA Receiver Probes

Probe Series	RVx070					RVx100				
Maximum Outside Diameter (mm)	108					137				
Clear Aperture (mm)	72					106				
Fiber Cable Length (m)	10					10				
Length (mm)	475					615				
Weight (kg)	9.5					13				
Optical Axis Height (mm)	108					108				
Standard. Lens Focal Length (mm)	300					500				
Lens Series	TLN07-[Focal Length]					TLN10-[Focal Length]				
Standard. Slit Width (μm)	150					150				
Phase Ratio (nominal)	3.5:1					3.5:1				
Lens Focal Length (mm)	300	500	750	1000	1500	238	500	750	1000	1500
Nominal Minimum Diameter(μm)	0.5	0.7	1.1	1.4	2.1	0.5	0.5	0.7	1	1.5
Nominal Maximum Diameter(μm)	175	291	437	583	874	94	198	297	396	594

Notes: For nominal diameters, water at 30 degrees refraction, and 5μm fringe spacing assumed. Fringe spacing is controlled by the transmitter optics.
 10 meter cable is standard, custom lengths are available at extra cost. Body OD is measured at OD of lens retainer. Weight includes baseplate & rotating mount.

TMx50					TRx60						TR 360		
74					86						86		
50					61						61		
8					8						8		
310					440						584		
3.5 (with rotating mount and baseplate)					5.5 (with rotating mount and baseplate)						6		
108					108						108		
1.77					2.65						2.82		
250					363						261		
TLN05-[Focal Length]					TLN06-[Focal Length]						TLN06-[Focal Length]		
0.5x or 2x using XPDN50-I or XPD50-I					2.6x using XPD60						2.6x using XPD60		
Probe Only					Probe Only						Probe Only		
100	250	500	750	1000	135	261	363	512	610	762	261		
20	20	20	20	20	50	50	50	50	50	50	25/50/25*		
2.6	6.4	12.9	19.3	25.7	1.4	2.7	3.7	5.3	6.3	7.8	5.4/2.6/5.0*		
37	93	185	278	370	33	64	90	127	151	188	65/62/60*		
0.4	2.3	9.3	20.8	37.0	0.2	0.7	1.3	2.6	3.7	5.7	1.4/0.6/1.3*		
Using 0.5x Beam Expander					Using 2.6x Beam Expander XPD60						Using 2.6x Beam Expander XPD60		
100	250	500	750	1000	480	758	1139		480	758	1139		
10	10	10	10	10	130	130	130		65/130/65*	65/130/65*	65/130/65*		
5.1	12.9	25.7	38.6	51.4	1.9	3.0	4.5		3.8/1.8/3.5*	6.0/2.9/5.6*	9.1/4.4/8.4*		
74	185	370	555	740	45.6	72.0	108.3		46/44/42*	73/69/67*	109/104/100*		
1.48	9.25	37	83.3	148	0.3	0.8	1.9		0.7/0.6/0.6*	1.7/1.6/1.68	3.8/3.6/3.5*		
Using 2x Beam Expander													
100	250	500	750	1000									
40	40	40	40	40									
1.3	3.2	6.4	9.6	12.9									
19	46	92	139	185									
0.09	0.58	2.3	5.2	9.3									



Transmitting Probes

Probe Model	Description
TRx10	Smallest probe offered, does not come standard with a mount. Is a transmitting/receiving probe, for use in air or water.
TRx20	Compact sealed stainless steel probe for measurements in water or air. Does not come with a mount. Is a transmitting/receiving probe.
TMx50	Transmitter probe for PDPA, and is compatible with the XPDN50-I expander/contractor module. Thus, it is very versatile with respect to fringe spacing and probe volume size at a given stand-off.
TRx60	Standard transmitting/receiving probe. Is compatible with the XPD60 unit if increased stand-off is required.

	Clear Aperture	Beam Spacing	Std. Beam Dia.	Std. Focal Length	Cable Length ¹	Available Lenses ³	Weight	Body OD ^{4,5}	Length ⁶
TRx10	10 mm	7.5 mm	0.47 mm	60 mm	8 m	TLN01 Series	0.2kg	15.1 mm	158 mm
TRx20	20 mm	15 mm	1.06 mm	110 mm	8 m	TLN02 Series	0.4kg	25 mm	180 mm
TMx50	50 mm	20 mm	1.77 mm	250 mm	8 m	TLN05 Series	3.5kg ⁷	74 mm	310 mm
TRx60	61 mm	50 mm	2.65 mm	363 mm	8 m	TLN06 Series	5.5kg ⁷	86 mm	440 mm

Beam Expanders

Expander Model	Description
XPDN50-I	Expander/Contractor module for use with TMx50 series probes sold after 2006 (pictured in this brochure). Fits inside the probe. Can be used as a 2.0:1 expander or a 0.5:1 contractor.
XPD50-I	Expander/Contractor module for use with the TMx50 series probes sold prior to 2007. Fits inside the probe. Can be used as a 2.0:1 expander or a 0.5:1 contractor.
XPD60	Beam expander for use with the TRx60 series probes. Attaches to the outside of the probe. Provides a fixed 2.6:1 expansion ratio.

	Clear Aperture	Expansion Ratio	Additional Lenses ³	Weight	Length ⁶
XPD50-I XPDN50-I	50 mm	2:1 and 0.5:1	None	0.4kg	120 mm
XPD60	153 mm	2.6:1	TLN15 Series	7.5 kg	620 mm

Receiving Probes

Probe Model	Description
RVx070	Optimized 3-detector fiber optic receiving probe for particle sizing applications.
RVx100	Optimized 3-detector fiber optic receiving probe for particle sizing applications. Has a larger clear aperture than the RVx070 series receivers, making it ideal for small diameter measurements.

	Clear Aperture	Std. Focal Length	Cable Length ²	Available Lenses ³	Weight	Body OD ^{4,5}	Length ⁴
RVx070	72 mm	300 mm	10 m	TLN07 Series	9.5kg ⁷	108 mm	475 mm
RVx100	106 mm	500 mm	10 m	TLN10 Series	13kg ⁷	137 mm	615 mm

Receiver Slits	Description
SLT025	25µm wide for very dense sprays
SLT050	50µm wide for dense sprays
SLT150	150µm wide, standard slit for general purpose usage

¹ 8-meter cable is standard. 15 m, 20 m, and custom lengths are available at extra cost.

² 10-meter cable is standard. Custom lengths are available at extra cost.

³ XPDN50-I and XPD50-I use the focusing lens of TM probes and do not need additional lenses.

⁴ TMx50, TRx60, RVx070, and RVx100 probes come with mounts for an optical axis at 108 mm, including a 457 mm by 152 mm baseplate.

⁵ Body OD is measured at OD of lens retainer.

⁶ Length of TRx60 probe with XPD60 beam expander is 875 mm. XPD50-I and XPDN50-I are internal beam expanders. Use of this does not add extra length to the probe.

⁷ Weight includes baseplate & rotating mount.

TSI PDPA/LDV Systems

TSI Phase Doppler Particle Analyzer/Laser Doppler Velocimeter (PDPA/LDV) systems have introduced a broad array of technical innovations that revolutionized particle size and velocity measurements. We originated the single-receiver, three-detector scheme; launched optical fiber technology for transmitter and receiver systems; and offered the first digital signal processors for accurate particle size and velocity measurement.



TR260 and TR160 Probes mounted on a traverse

The four patented concepts incorporated in TSI's current PDPA/LDV systems are an indication of the unique capabilities of these systems. In addition, the fiberoptic transmitter and receiver probes provide a convenient way to rotate the plane of the beams, access to ensure precise beam crossing and scattered light collection from the measuring region, even when the beams go through complex wall geometries. The unique fiber bundle arrangement, including the "non-integer" ratio spacing, combined with an easy and accurate way to set up the receiver characterize the optimized PDPA receiver probe system.



3-D PDPA System



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