FPT Series
Fiber-Optic Coupled Transmission Probes

Hellma® Analytics
Axiom Technology

High performance spectroscopic probes for laboratory and process analysis ... Near-IR, Visible, UV.

FPT Series transmission probes provide the optimum combination of photometric accuracy and robust reliability for a wide range of laboratory and process applications. The two models in this series provide a choice of economy for lab applications (FPT-750) or extreme robustness for the most demanding process applications (FPT-850). These probes employ a single pass through the sample gap. This pro-vides two important advantages compared to double pass "transflectance" probes. First, it eliminates the possibility of stray light offset caused by backscatter from either the sample or the probe windows. Second, it provides twice the window separation for a given optical path length, greatly enhancing sample flow between the windows.

A second distinguishing characteristic of FPT Series probes is the fact that they do not use internal optical fibers[1]. This has two significant performance benefits. First it eliminates performance variations which result when critical optical components are subjected to varying temperatures. Second, it eliminates the fringing which results from fiber-to-fiber connections. Furthermore, a significant maintenance benefit results from the fact that the probe is not compromised by any damage that might occur to the optical fibers connecting it to the spectrometer.

FPT-850 EXTREME DUTY PROBE

taking the risk out of spectroscopic process analysis.

The FPT-850 was developed to provide maximum long term reliability under the extreme conditions of high temperature, thermal shock, and aggressive chemistries encountered in many on-line process applications[2].

The key element of this design is a patented sapphire to metal sealing technique employing high nickel alloy seals captured in an electron–beam welded structure[3, 4, 5]. This approach provides significant advantages over other sealing techniques. A high degree of chemical resistance is assured by the fact that the only materials in contact with the process are the probe body (316L stainless steel or Hastelloy), sapphire, the nickel alloy seals, and a thin flash of either gold or PTFE on the seals (application dependent). The compliance required to withstand extreme temperature cycling is provided by the nickel alloy seal which is precisely compressed prior to welding. This approach eliminates the fatigue and stress failures common with brazed seals. Finally, the elimination of elastomeric seals provides for reliable long term operation at extreme temperatures.

FPT-750 VERSATILE, LABORATORY PROBES

convenience and economy for chemical and process development.

The optical design of the FPT-750 is essentially identical to that of the FPT-850. However, the FPT-750 design reduces size and weight by excluding the 850's secondary containment and the conduit termination housing. As a result, the FPT-750 is less expensive while being more convenient for many laboratory applications. In addition, the welded-in metal seals are coated with PTFE rather than gold. The FPT-750 is thus the ideal device for general purpose chemical analysis as well as the development of process applications to be deployed on-line using the FPT-850.

SPECIALIZED CAPABILITIES AND EQUIPMENT:

In addition to its standard transmission probes, We offer specialized capabilities for specific process applications.

PROCESS PROBE RETRACTION MECHANISMS:

The PRM series heavy duty retraction mechanisms provide a reliable means for retracting a probe from a process line or vessel through an appropriate pressure fitting. With a PRM, the probe can be withdrawn for cleaning and referencing without interrupting the process.

FEATURES:

- Extreme chemical resistance
- Resistant to extreme temperatures and thermal shock
- NEMA-4 classification (FPT-850)
- Freedom from stray light and fringing
- Standard pressure ratings to 250 bar
- High photometric accuracy

LARGE-SCALE PROBES:

We can provide large scale transmission probes (FPT-1850 Series) for process batch reaction vessels involving high temperatures and very high shear forces. Probes have already been provided with lengths to two meters and a wall thickness of approximately 12 mm.

OPTIONS:

OPTION FPP, EXTENDED PATHLENGTHS:

FPT-750 and 850 probes are available with Path lengths of greater than 10 mm. Inquire with us for price and delivery.

OPTION FPL, CUSTOM PROBE LENGTHS:

FPT-750 and 850 probes can be provided in non-standard lengths. Inquire with us for price and delivery.

ALTERNATIVE MATERIALS:

The standard body material of the FPT-750 is 316L stainless steel. Standard FPT-850 probes are fabricated from either 316L stainless steel or Hastelloy C-276. Other materials are available on special order.

VESSEL ATTACHMENT:

FPT Series probes can be provided with a variety of means for attachment to a reaction vessel, including welded-on flanges, pipe fittings, or port connectors. Inquire with us for price and availability.

REFERENCES:

1. U. S. Patent No. 5,418,615
2. Tech. Note AN-918, Process Analysis Without Sample Conditioning
3. U. S. Patent No. 6,586.195 B
4. Tech. Note AN-919, Welded Metal Pressure Seals for Process Spectroscopy
5. Tech. Note AN-921, Qualification of Spectroscopic Probe Designs to Industry Standards for Process Piping and Vessels
6. Tech. Note AN-925, ATEX Considerations

SPECIFICATIONS:

Model Designations:	FPT-850MR-xx	FPT-750R-xx
Spectral Ranges:	R = N (800 - 2500 nm) R = V (400 – 2200 nm) R = U (230 – 800 nm, Optimized for 250 nm)	R = N (800 - 2500 nm) R = V (400 – 2200 nm)
Standard Optical Pathlengths:	xx = 02 (2 mm) xx = 05 (5 mm) xx = 10 (10 mm)	xx = 02 (2 mm) xx = 05 (5 mm) xx = 10 (10 mm)
Wetted Material of Construction:	M = S (316 stainless steel) M = H (Hastelloy C-276)	316 stainless steel
Window Seal Type:	Coated High-Nickel Alloy C-ring in permanent welded structure	Coated High-Nickel Alloy C-ring in permanent welded structure
Seal Coating:	Gold standard, PTFE	PTFE
Window Material:	Sapphire or Fused Silica (UV range)	Sapphire
Secondary Containment:	Standard	Not Included
Conduit Termination Housing:	Standard	Not included
Optical Transmission:	> 20%	> 20%
Maximum Temperature:	400 °C at 200 bar Gold / 200 °C PTFE	200 °C
Maximum Pressure:	300 bar up to 150 °C, 230 bar at 300 °C	100 bar
Probe Body Diameter:	27 mm	27 mm
Max. Immersion Length (to top of gap):	28 cm, std.	28 cm, std.
Max Flange/Fitting Weld Location, Tip of Probe to Rear Surface of Flange:	X = 02: 296.1 mm (11.67") X = 05: 299.5 mm (11.79") X = 10: 304.5 mm (11.99")	NA
Fiber-Optic Connections:	SMA-905 female, std. FC Optional	SMA-905 female, std. FC Optional

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