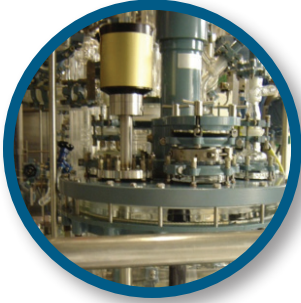




# Pilot™-E Raman Probe for Process Analytics

The Pilot™ series of Raman probes has been developed for optimal performance with all the Raman analyzers in the **RAMANRXN SYSTEMS™** suite. The **RAMANRXN SYSTEMS™** suite of analyzers is ideal for analyzing, monitoring, and controlling chemical processes. The combination of the Pilot™ line of Raman probes and the **RAMANRXN3™** analyzer for classified locations yields both a powerful Process Analytical Chemistry (PAC) and Process Analytical Technology (PAT) analyzer for *in situ* analysis or control, from the safety or optimization laboratory to the manufacturing reactor or pipeline.

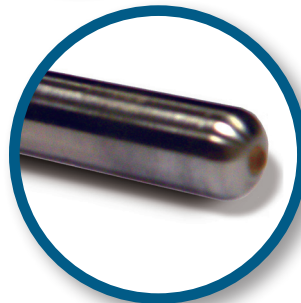


Pilot™-E probes can be used with glass-lined reactors commonly found in pharmaceutical manufacturing facilities, without reactor modification. The modular design of the Pilot™ series of probes allows the sampling point to be customized for each customer's reactor, thus removing the need for sampling slip streams. This in turn may reduce maintenance cost, eliminate a potential failure mechanism, improve process safety, and reduce initial installation cost.



All Pilot™ probes utilize a single fiber for excitation and another for collection. For laboratory equipment, this provides a robust interface and sampling versatility. For process equipment, single fibers allow reduced cost for long runs of fiber as compared to multi-fiber collection designs. Single collection fibers also permit simultaneous multi-channel operation on a single analyzer. Standard telecommunication fiber diameters (<100 microns) are used to increase mechanical stability and minimizes the cost per meter for deployment over long-cable runs.

The Pilot™-E probe line has been designed and is manufactured to meet Category I pressure equipment safety standards as defined by the Pressure Equipment Directive (PED). Pilot™-E probes can be supplied, marked, and certified to the European ATEX safety requirements as part of a **RAMANRXN3™** process solution.



## Probe Features & Specifications

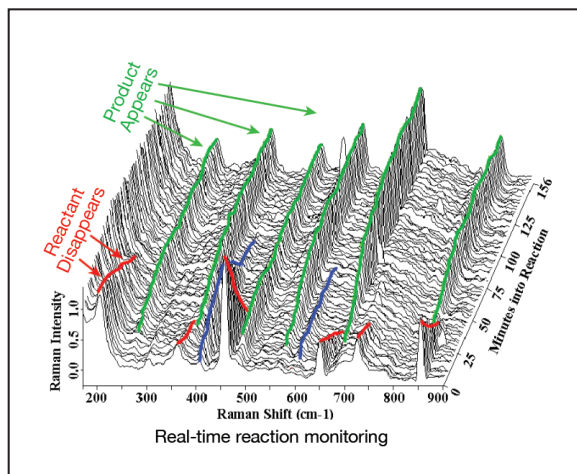
- Design and manufacturing methodology approved
- Alloy C-276 as standard (other materials of construction available)
- Materials of construction certification (for wetted components)
- Sealed probe design
- Integrated "laser on" indicator
- One in / one out fiber optics
- FC connectors specifications
- Length: 12 inches to 15 feet
- Up to 200° C and 3000 PSI for Pilot™-E probes
- Immersion optics 1/2" to 2 3/8" outer diameter, short or long focus
- Purge options
- Flange (ANSI/DIN) or compression mount options
- Protective enclosure
- Cable enclosure, conduit-ready
- ATEX Certification option (with ATEX certifiable analyzer)



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# Advantages of Process Raman Spectroscopy...

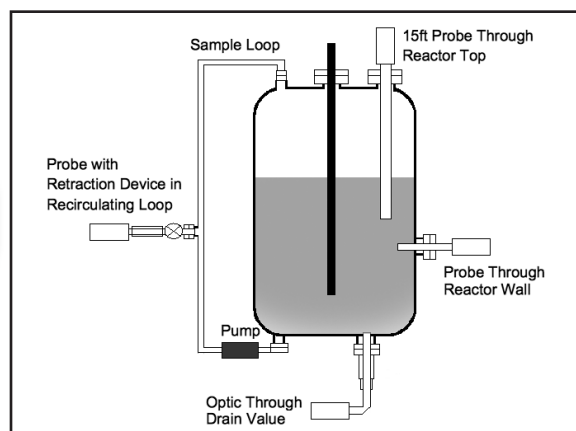


## Pilot™ Probe for:

- On-line monitoring
- Process-line control
- Increased product output
- Accurate on-line endpoint determination
- Lower process changeover downtime
- Increased process safety
- Methods development / reaction monitoring
- Increased process understanding
- Improved product consistency and quality

## Raman Analysis of Numerous Chemistries

- Pharmaceutical API development
- Crystallization / polymorphs
- Grignard reagent monitoring
- Aqueous-based chemistries
- Heterogeneous matrices
- Hydrogenations
- Polymerization
- Residual monomer analysis
- Catalytic chemistry
- Organometallic chemistry
- Sensitive to organics, inorganics, and polymers



## Pilot™-E Probes – Custom fitted to your Process

- Probes constructed to your process format
  - Length - 1 to 15 ft
  - Diameter 1 or 2.375"
  - Flange or compression mount
  - Finish specification
  - Metal – alloy C276 (Std), SS 316, or titanium
- Probes certified to and marked for ATEX for installations requiring ATEX
- Mounting / installation flexibility

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