

A flow cell can be installed within flowing reaction pipeline or a sampling loop. It can be coupled with a PR100 optical probe to achieve online monitoring. Raman scattering light from flowing liquid can be collected through viewport within a few seconds. It is well-suited for continuous flow reactors or reaction kettles with automatic sampler.

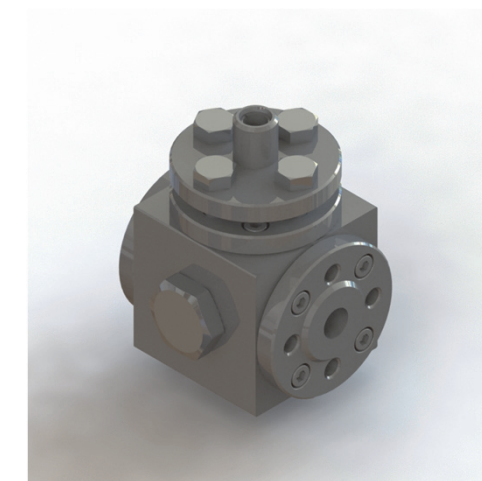
Technical Highlights:

- A variety of materials are available as options. Flow cells are suitable for processes under high temperature, high pressure, or with strong acid/alkali, etc.
- With different specifications of interface, flow cells can be coupled with pipelines of different specifications
- Special optical design to maximize collection efficiency and Raman intensities.
- Good sealing and convenient connection



	FC100 flow cell	FC200 flow cell	FC300 industrial flow cell
Application	FC100 is a small-sized flow cell for online reaction monitoring in laboratory. it can be connected to a microchannel reactor via a sampling loop.	FC200 is a medium-sized flow cell for online reaction monitoring in laboratory. It can be connected to a flow reactor via a sampling loop.	FC300 can be used for online reaction monitoring in large-scale production. Flanged connection mode makes it applicable to pipeline reactors or continuous flow reactors.
Inner diameter of flow	3 mm (contact Sales for other options)	8 mm (contact Sales for other options)	15 mm (contact Sales for other options)
Material	C276 alloy, 304 stainless steel, 316L stainless steel, Monel alloy, TA2, or PTFE optional		
Interface	Φ6, 1/8", 1/4", or 1/16" optional tube fitting (steel tubing) or barbed fittings (hose) optional	Φ6, Φ8, Φ10, 1/8", or 1/4" optional	DN10, DN15, or DN20 optional
Temperature range	-40 ~ 200 °C	-40 ~ 200 °C	-60 ~ 300 °C
Maximum pressure	1 MPa	4 MPa	4 MPa
Anti-corrosion	Resistant to strong acid/alkali, hydrofluoric acid (HF), and organic solution		

PR/FC series Raman Probes & Flow Cells



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- **Raman Probes**
 - Off-line probe
 - Corrosion-resistant probe
 - Pressure-resistant probe
 - Biological probe
 - Industrial probe
- **Flow Cells**
 - Laboratory flow cell
 - Industrial flow cell

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Off-line probe

PR100 optical probe is an off-line Raman probe for laboratory Raman spectrometer.

PR100



It can be coupled with a standard sample cell for routine analysis of liquid and solid samples or with a microscope for micro-analysis. PR100 can also perform on-line monitoring of chemical processes by connecting to a flow cell or a side-window reaction kettle.

Sampling cell



Microscope



Side window



Flow cell



Corrosion-resistant / Pressure-resistant / Biological probe

PR200/PR201/PR202 immersion probe is used for *in situ* process analysis in lab research. They can be flexibly installed in different types of reaction vessels, with probe tube in direct contact with the sample. Optimized version for suspension/semi-solids analysis is also available, which can effectively reduce optical interference from solid components.



PR200/PR201 probes are corrosion-resistant and suitable for monitoring chemical reactions in extreme environments. PR200 is designed to interface with small ports, while PR201 is designed for medium ports on chemical reactors.

PR202 probes are suitable for biological process monitoring. The probe tube can be removed for sterilization. PR202 is designed to interface with a PG13.5 threaded port on the bioreactor.



PR200

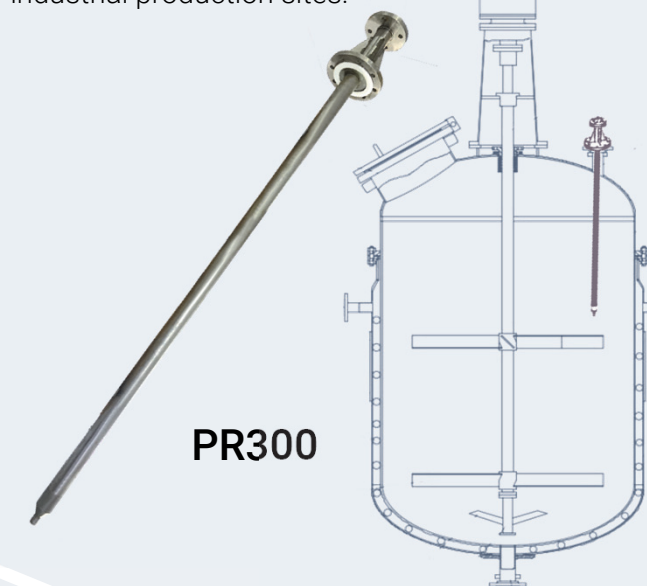
PR201

PR202

Industrial probe

PR300 industrial immersion probe is suitable for most industrial applications. It can withstand extreme high temperatures and pressures and protect optical components from extreme environments.

PR300 can be directly connected to the reactor and process line with a flange. Probe tube length, diameter, and optical fiber length can be customized according to specific requirements, effectively fulfilling the demands of various industrial production sites.



PR300

	PR100 optical probe	PR200 immersion probe	PR201 immersion probe	PR202 immersion probe	PR300 industrial immersion probe
Probe tube material	304 stainless steel	C276 alloy, 304 stainless steel, 316L stainless steel, Monel alloy, or TA2 optional	C276 alloy, 304 stainless steel, 316L stainless steel, Monel alloy, or TA2 optional	316L stainless steel, resistant to SIP/CIP sterilization	C276 alloy, 304 stainless steel, 316L stainless steel, Monel alloy, or TA2 optional
Outer diameter	10 mm	10 mm	16 mm	12 mm	60 mm (contact Sales for other options)
Probe tube length	80 mm	350 mm (contact Sales for other customized length of 100 mm ~ 350 mm)	270 mm (contact Sales for other customized length of 100 mm ~ 1000 mm)	120 mm (contact Sales for other customized length of 120 mm ~ 320 mm)	1.9 m (contact Sales for other customized length of 1 m ~ 3 m)
Spectral range	200 ~ 3900 cm ⁻¹ (532 nm or 785 nm excitation wavelength) or 230 ~ 3100 cm ⁻¹ (1064 nm excitation wavelength)				
Sample type	Any sample type	L (clear liquid) or S (opaque or turbid liquid) or C (slurries or semi-solids)			
Fiber optic cable	1.3 m PVC jacketed as standard, 3 m or 5 m length are optional	5 m as standard, 10 m, 50 m or 100 m length are optional; PVC jacket as standard, TPU or silica gel jacket are optional			50 m (contact Sales for other options)
Temperature range	0 ~ 100 °C	-40 ~ 200 °C	-40 ~ 150 °C	-30 ~ 200 °C	-60 ~ 200 °C
Maximum pressure	ambient condition	30 MPa	30 MPa	1 MPa	30 MPa
Corrosion resistance	Not resistant to corrosive liquid	Resistant to strong acid/alkali, hydrofluoric acid (HF), and organic solution	Resistant to strong acid/alkali, hydrofluoric acid (HF), and organic solution	pH range: 1-14	Resistant to strong acid/alkali, hydrofluoric acid (HF), and organic solution
Optical fiber configuration	100 μm excitation fiber, 200 μm collection fiber, N.A. 0.22				
Filter efficiency	OD6 (contact Sales for other options)				
Connection interface	FC and SMA				