

Sterile In-situ Fermentation/Bioreactor Sampling Probes

FISP®



Withdraws sterile,
cell-free samples
from fermentors,
bioreactors or other
vessel types

Flownamics® has developed the FISP, which is a sampling probe capable of withdrawing sterile, cell-free samples from fermentors and bioreactors. FISP allows direct on-line sample transfer to a variety of analyzers, such as biochemistry and HPLC systems, as well as collection for off-line analysis. FISP is a small, tube-shaped, sterilizable 316 stainless steel carrier which is surrounded by a tubular, micro-porous membrane. FISP probes are available for 12, 19 and 25 mm port sizes, and are designed for laboratory, pilot and industrial scale use. FISP has been and continues to be widely utilized in the fermentation and cell culture fields since its introduction to the market in 1996.

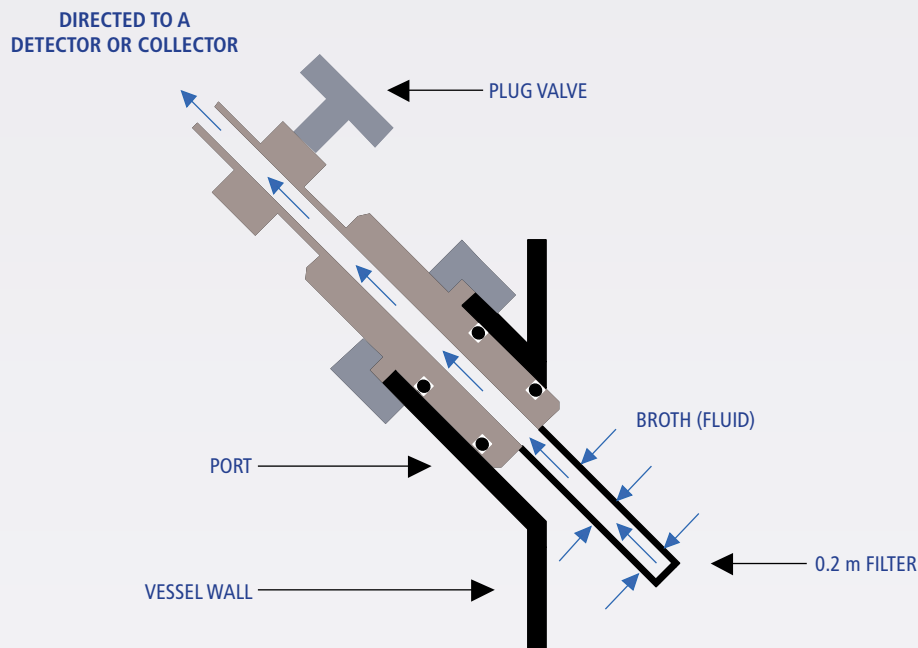
Microbial and Mammalian Sampling:

FISP will perform well whether the process is a microbial fermentation requiring multiple samples per hour or a mammalian cell culture requiring less frequent sampling. Sampling with FISP provides an excellent means of providing on-line nutrient and metabolite monitoring of bacterial, yeast, fungal and mammalian cell cultures. Data obtained from using the FISP increases process understanding while improving process monitoring and control.



Operation of the FISP®:

The FISP is inserted into a side or top port of the vessel. It is immersed into the fermentation broth or culture media and sterilized in-situ. A peristaltic pump (or the vessel's own hydrostatic pressure) withdraws a sample through the tubular membrane and into the probe's stainless steel network of grooves. The sample flows through the network of grooves into a central channel where the cell-free sample can be directed to an on-line analyzer, fraction collector or sample container. Fluid flow rate is dependent on the viscosity of the media.



Features of the FISP®:

- Sterile, cell-free sampling for on-line or off-line analysis
- Autoclave or sterilize in-place (SIP)
- Risk free sampling with 0.2 micron filter (sterile barrier)
- Fits small laboratory to large full-scale production vessels
- Collect and store samples for off-line analysis
- Directly interfaces the fermentor or bioreactor with:

Biochemistry analyzers
 Fractions collectors, Autosamplers
 Flow Injection Analysis (FIA) systems
 HPLC systems
 Biosensors
 Methanol analyzers



- Minimal dead volume for consistent and accurate sampling, which reduces flush time
- Withstands the temperatures, pressures, viscosities, shear forces and chemicals typical of fermentation environments
- Use with aerobic or anaerobic bacteria, yeast, fungi, algae, insect and mammalian cell cultures
- Easy to use and maintain; no operator training required
- Interfaces with our **SegFlow® Sampling System** (additional information available)

Application Examples:

Organism	Fermentation Period (hr)	Flow Rate (ml/min)
BACTERIA		
E. Coli K12	24 to 72	0.75
E. Coli Recomb.	40	1.5
Strepto coccus Pheu.	9	1.0
YEAST		
Sacch. cerevisiae	48	1.0
Sacch. cerevisiae	24 to 150	0.75
FUNGAL		
Acremonium chrysogenum	160	1.0
Spodoptera frugi	200	0.80
CELL CULTURE		
BHK 21, CHO	42 (Days)	0.50
NSO	37 (Days)	0.75



D-SERIES

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- Available for 19 & 25 mm ports
- Fits into the fermentors/bioreactors side port
- Membrane: 1.850" long ceramic (tubular)
- Pore sizes: 0.2 micron
- Dead volume: Approximately 0.19 ml
- Flow rate: Up to 2 ml/min
- Immersion depths: 90 & 110 mm
- Used in fermentation and cell culture

F-SERIES

- Available for 12 & 19 mm ports
- Fits into the fermentors/bioreactors top port
- Membrane: 1.850" long ceramic (tubular)
- Pore sizes: 0.2 micron
- Dead volume: Approximately 0.24 to 0.44 ml
- Flow rate: Up to 2 ml/min
- Immersion depths: 120, 200, 310 & 410 mm
- Used in fermentation and cell culture



F-SERIES



Custom Solutions

- Configurable D-Series probes to fit standard and safety port depths
- Custom F-Series probe lengths available upon request.
- Membrane pore size, diameter and materials can be tailored for unique applications.

WETTED MATERIALS:

Probes:	316 stainless steel
Fittings:	316 stainless steel
O-rings:	Ethylene Propylene (EPDM)
Membranes:	Ceramic