

# FFV SERIES

## Fiber-Optic Coupled Transmission Cells

*Variable and fixed path cells for  
demanding applications*

*... Near-IR, Visible, UV.*



FFV Series transmission cells are designed to provide uncompromising performance for a wide variety of process development and on-line applications. They combine high optical transmission with an unimpeded flow path and a wide range of available pathlengths -- which can be set to a desired value with a high degree of accuracy. These capabilities are made possible by the use of a pair of precisely engineered optical plungers which face each other across the flow path. These are mounted on a choice of four different cell bodies, providing features such as pathlengths ranging from 0.5 mm to 20 cm, flow diameters to 25 mm, temperature control capability, and a clean-out port. Each of the models is available in versions optimized for near-IR, visible, or UV operation.

### **Choice of Variable or Factory Calibrated Pathlength**

The pathlength of each FFV series cell is determined by the dimensions of its cell body and by the depth of penetration of its two plungers. The latter is controlled by a pair of knurled adjustment collars having a pitch of 1 mm per rotation. Cells having the suffix "VP" are provided with fully adjustable collars, allowing the user to set the pathlength. Once set, the position of each collar can be locked by tightening four clamping screws.

The pathlength can be made "permanent" by applying locking adhesive to the threads. FFV Series cells can also be obtained with pre-calibrated and locked pathlengths. In this case the model number suffix is X where X designates the pathlength in mm increments.

### **FFV-310 Basic Cell**

Model FFV-310 provides the fundamental FFV features in a basic package. It provides a straight-through 12.5 mm diameter flow path and a range of pathlengths from 0.5 to 15 mm.

### **FFV-315 Long Path Cell**

This model uses the same plunger design as the FFV-310 but with a cell body which provides for standard pathlengths of 25, 50, 100, or 200 mm. The adjustment collar allows the pathlength to be varied around these lengths for fine pathlength calibration. The flow path of the FFV-315 enters and exits at right angles to the optical path.

### **FFV-320 Temperature Controlled Cell**

The FFV-320 features the same flow characteristics and pathlength selection as the FFV-310 but with the addition a channel for either a cartridge heater or fluid temperature control, a temperature sensor fitting, and a clean-out port at right angles to both optical and flow paths.

### **FFV-330 Large Flow Path Cell**

This model is similar to the FFV-320 but features a 25 mm diameter flow path and optical pathlengths ranging from 15 to 30 mm.

## **Accessories**

### **FCH Series Conduit Termination Housings**

Model FCH-21 encloses the fiber optic connectors while providing a purge output fitting and a 3/4 NPT female fitting for proper termination of a protective conduit. It also provides heat sinking of the fiber-optic collimators, allowing a cell to be operated at elevated temperature.

### **FOI-5RXY Fiber-Optic Sample Compartment Interface**

For use with FT-NIR spectrometers and other spectrometers with internal sample compartments. Includes pick-off and return optics, purge shrouds, SMA connectors, and a mounting plate to match a user specified spectrometer. "XY" designates spectrometer make and model. "R" designates spectral range. Inquire with Axiom for specifics.

## **FFV Series Features:**

- Robust construction
- High transmission
- Unrestricted flow path
- Variable or factory-set pathlength
- Pathlengths from 0.5 mm to 200 mm
- Near-IR, Visible, or UV spectral range
- Choice of SMA or FC connectors



## Available Options

Specifications for standard model FFV cells are given in the accompanying table. In addition to these, a number of options are available. These include materials of construction such as Hastelloy C-276, non-standard pathlengths and higher temperature operation. Inquire with Axiom regarding specifics.

## Multiplexing

FMX Series Fiber-optic Multiplexers enable up to sixteen FFV cells to be coupled to a single spectrometer. (See Data Sheet: PS-FMX)

## FFV Series Transmission Cell Specifications

Model Designations:	FFV-310R-X	FFV-320R-X	FFV-330R-X	FFV-315R-X
Standard Pathlengths (Fixed pathlength models):	X = 0.5, 1, 2, 5, 10, or 12 mm	X = 0.5, 1, 2, 5, 10, or 12 mm	X = 15, 20, 25, or 30 mm	X = 25, 50, 100, or 200 mm
Pathlength Range (Variable pathlength models, X = VP)	0.5 to 12 mm	0.5 to 12 mm	15 to 30 mm	NA
Seal Type:	Kalrez® 6375	Kalrez® 6375	Kalrez® 6375	Kalrez® 6375
Window Material (Note 2):	Sapphire	Sapphire	Sapphire	Sapphire
Wetted Metal:	316L Stainless steel	316L Stainless steel	316L Stainless steel	316L Stainless steel
Optical Transmission:	25-30%	25-30%	25-30%	(See Note 3)
Maximum Temp. (Note 4):	180°C	180°C	180°C	180°C
Maximum Pressure:	30 bar	30 bar	30 bar	30 bar
Flow Path Diameter:	12.5 mm	12.5 mm	25 mm	12.5 mm
Temperature Control (Note 5):	No	Yes	Yes	No
Clean-out Port:	No	Yes	Yes	No
Fiber-Optic Connectors:	SMA-905 female, std., FC Optional	SMA-905 female, std., FC Optional	SMA-905 female, std., FC Optional	SMA-905 female, std., FC Optional
Fittings:	Swagelok S-600-1-OR "O-seal"	Swagelok S-600-1-OR "O-seal"	Swagelok S-600-1-OR "O-seal"	Swagelok S-600-1-OR "O-seal"

Spectral Range: Specify R = N (800 – 4500 nm), R = V (350 – 2000 nm), R = U (200 – 800 nm, optimized for 230 – 250 nm)

## Notes:

1. Other pathlengths are available.
2. Window material for the UV range is UV grade fused silica.
3. Transmission is pathlength dependent.
4. Operation above 120°C requires the use of FCH Series conduit termination housings or comparable heat-sinks. Modified cells are available for operation above 180°C.
5. Provision for temperature control consists of one channel for fluid or cartridge heating and a fitting for an RTD or thermocouple temperature sensor.