

TYTRONICS® FPA 1000/1100 SERIES

PROCESS SPECTROPHOTOMETERS

FIELD PROGRAMMABLE ANALYZERS

FPA 1000
PROCESS VISIBLE
SPECTROPHOTOMETERS



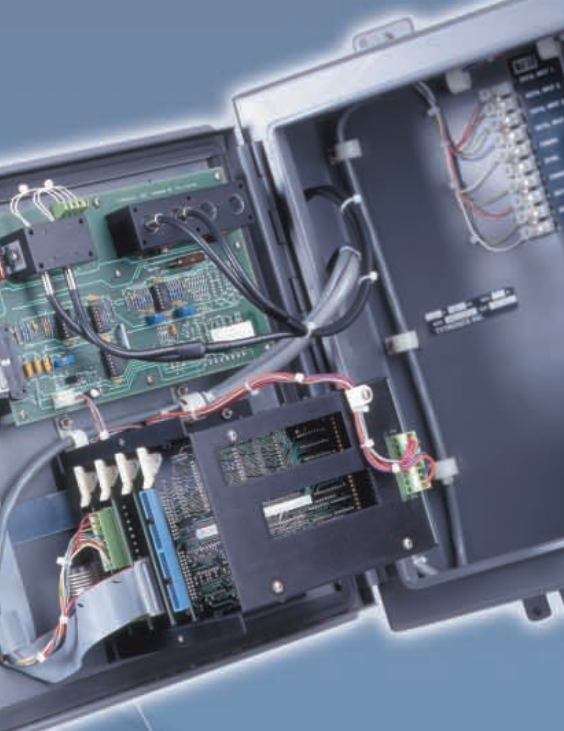
FPA 1100
PROCESS UV
SPECTROPHOTOMETERS

FPA 1000/1100



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FPA 1000/1100 Series UV/VIS SPECTROPHOTOMETERS

The FPA 1000/1100 series uses a design that separates the electronics from the measurement cell. Fiberoptics are used to transmit light to and from the measurement cell.

The use of fiberoptics simplifies installation and reduces maintenance costs. The measurement cell mounts directly into the process stream which avoids the need for a separate sampling system in many applications. There are no electrical connections at the cell, avoiding explosion-proof requirements at the sample point. The cell requires no optical alignment at time of installation or after routine maintenance. This further aids rapid installation and greatly eases maintenance by plant personnel.

A single beam, dual wavelength, optical configuration corrects for window coating, sample turbidity or light intensity changes from interfering with the instrument's results. Automatic calibration insures instrument accuracy.

The electronics are microprocessor-controlled with full on-board diagnostics. With these features process engineers can now choose an on-line spectrophotometer which is simple to install and gives reproducible and accurate result over a wide range of process conditions. By design, these instruments are virtually maintenance-free.

ON-LINE SPECTROPHOTOMETERS

INSTRUMENT

The FPA Spectrophotometer Series uses well-established spectrophotometric techniques of analysis. Energy from a source lamp (Tungsten for VIS and VNIR, and a suitable arc source such as a Mercury Pen-ray lamp for UV; other UV sources available, dependent on application) is transmitted to the sample cell via a multi-stranded fiberoptics bundle. The return is bifurcated to facilitate the dual wavelength operation. The electronics and photometric assemblies are contained in a purgeable NEMA-12 enclosure. For the UV analyzer, the light source is housed in a separate attached enclosure. This enclosure can be upgraded to NEMA 4 and NEMA 4X stainless steel. Enclosures can also be purged to meet Class 1, Division I or II requirements, as well as ATEX Zone 1 and 2.

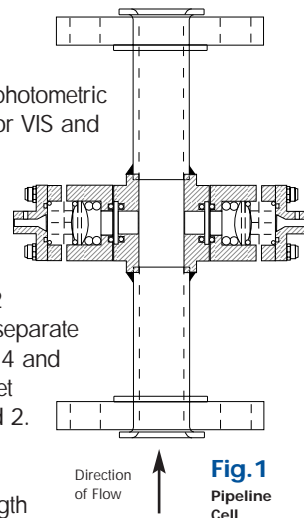


Fig. 1
Pipeline Cell

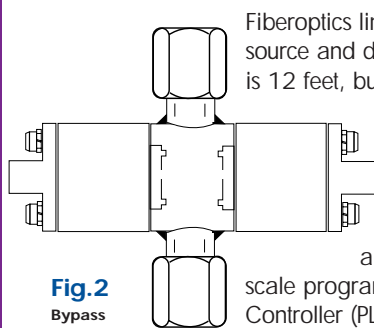


Fig. 2
Bypass Cell

Fiberoptics link the sample cell to the light source and detectors. Standard cable length is 12 feet, but optional extension is possible.

Two types of sample cells can be provided - a pipeline (Fig. 1) and a fast loop by-pass cell (Fig. 2).

The standard signal outputs include 3 isolated 4-20mA and RS-232C printer ports. Concentration alarms are full-scale programmable. Remote control via a Programmable Logic Controller (PLC) is possible either through bi-directional RS-232C port or digital inputs.

The analyzers can be combined with a sample system to provide many additional features such as automatic calibration of zero and span, as well as wash cycle. Automatic control of external calibration devices may be achieved with our optional digital interface relay card.

WAVELENGTH

The instrument uses two band pass filters for wavelength selection, one for measure wavelength and the second for reference wavelength. The measure wavelength is selected in a region in which the component being analyzed absorbs strongly. The reference wavelength is selected in a region where the sample absorbs weakly or not at all. The analyzer measures the light intensity at two wavelengths to calculate the concentration using Beer's Law¹ expression.

¹ BEER'S LAW: The absorbance of a homogenous sample containing an absorbing substance is directly proportional to the concentration of the absorbing substance.

APPLICATIONS:

FPA 1000 Series (VIS/NIR)

- Copper
- Nickel
- Cobalt
- Hazen Color
- Saybolt Color
- Water in Organics
- Organic Solvents

FPA 1100 Series (UV)

- Chlorine
 - Hypochlorite
 - Benzene
 - Aromatics in Water
 - Nitrate
 - Dowtherms
 - Formaldehyde
 - Phenols
 - UV254 TOC/COD
- ...and more...

FPA 1000/1100

CELL

The analyzer may be configured to operate with two types of optical cells (see Figs. 1 and 2), pipeline or a fast loop by-pass. The by-pass cell can be constructed of Kynar® or 316 stainless steel. These standard cells are pressure and temperature rated for 350 psig and 200°C. Cells can be engineered for higher temperatures, pressure ratings, and chemically compatible materials.

Cell pressure and temperature sensors are options that allow the instrument to automatically compensate for changes in the sample gas pressure and temperature. The optical cell can be mounted in an oven to heat the sample to avoid condensation or crystallization of sample, or to simply stabilize sample temperature.

Pipeline cells can be supplied with flanges to fit 1/2", 1", or 2" sample lines. The pipeline cell can be provided with pathlengths from 0.5 to 10 cm. The by-pass cell can be provided with pathlengths from 0.25 cm to 50 cm.

DETECTOR

The detector circuitry is designed to achieve maximum reliability and performance at an affordable price. The detectors are silicon photodiodes, are unaffected by external vibrations, and require no alignment during installation or maintenance. They are also thermostatically controlled to provide a stable measurement by eliminating drift.

REMOTE SENSING FOR SIMPLE INSTALLATION

The pipeline cell mounts directly into the process which avoids the need for a separate sampling system in many applications. The fast loop by-pass cell is rated for the sample temperature and pressure. There are no electrical connections at the cell avoiding explosion-proof requirements at the sample point. The cells require no optical alignment at installation or after routine maintenance. This further aids rapid installation and greatly eases maintenance by plant personnel.

OPTICS DESIGN FOR MAXIMUM STABILITY

The photometer is based on a single beam, dual wavelength technique whereby the measure wavelength is directly compared to a reference wavelength. Dual wavelength design automatically compensates for bubbles, particulate matter, turbidity, and variations in light intensity. Sample conditioning may be required for special applications such as oil-in-water; where particulates may absorb the oil it is necessary to homogenize the sample using a static mixer.

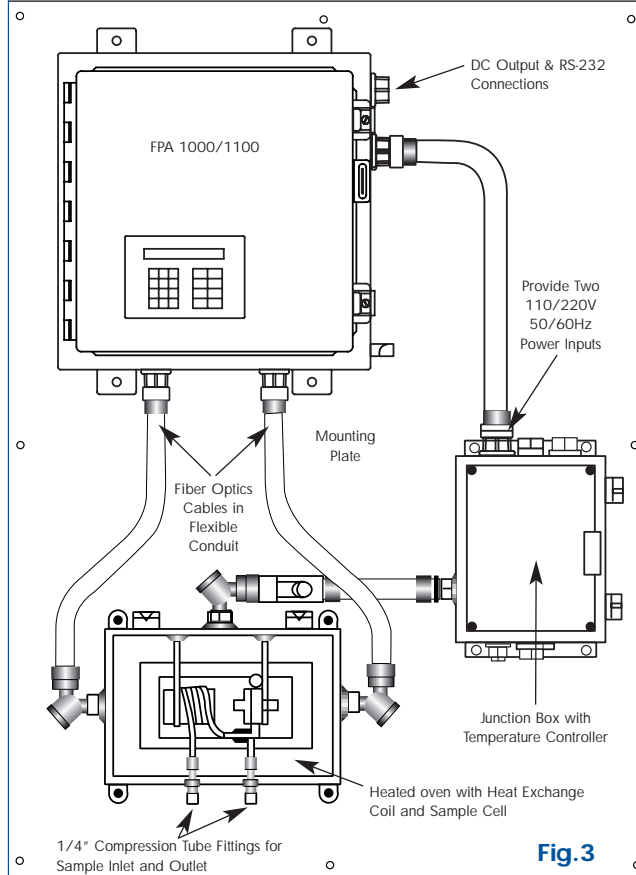
LOW MAINTENANCE/HIGH RELIABILITY

No moving parts are used in the photometer design, assuring high reliability and exceptionally low maintenance, thereby achieving uptime efficiencies of greater than 98%. The optical windows can normally be cleaned by passing an appropriate solvent through the sample cell.

Automatic calibration may be implemented using external standards; the instrument may be programmed to execute periodic calibrations, further guaranteeing continuous accuracy and, where required, meeting environmental agency requirements. Automatic lamp failure detection is flagged on the front panel and can also be transmitted via serial and digital output or 4-20mA current loop. The result is that operators stay informed and in control, leading to greater operational time and cost savings.



SAMPLING SYSTEM: Figure 3 shows a representative sampling system complete with oven and temperature controller. Please contact the factory if your application requires special sample conditioning.



FPA 1000/1100



TYPICAL SPECTROPHOTOMETRIC APPLICATIONS

FPA 1000 SERIES: VIS, VNIR 400nm-1.0 μ

Copper in plating baths and ore extraction
Nickel in electrowinning baths and ore extraction
Cobalt in electrowinning and ore extraction
Hazen Color of water or solvents
Color of oils and chemical products
Water, 0 to 0.5% (minimum) and higher in organic products

FPA 1100 SERIES UV 210nm-600nm

Chlorine, 0 to 250 ppm to 0 to 100%
Chlorine, 0 to 500 ppm in phosgene
Chlorine, 0 to 100 ppm in ethylene dichloride
Hypochlorite in water, 0 to 100 to 1000 ppm
Hydrogen and sulfide, 5 ppm and up
Aromatics in water, 0 to 1 ppm and up
Nitrate in water, 0 to 20 ppm and up
Dowtherms in water, 0 to 1 ppm and up
Formaldehyde in water, 0 to 1% and up
Phenols in water, 0 to 50 ppm and up
Furfuraldehyde in water, 0 to 2 ppm and up
Fluorine in air, 0.5% and up
Aromatics in air, 100 ppm and up
Iodine in air
Color of hydrochloric acid
Hydrazine in solution, 25 ppm and up
UV₂₅₄ for COD measurement

DESIGN FEATURES

SEPARATE ELECTRONICS/OPTICS AND MEASUREMENT CELL FOR:

No electrical connections at cell
Smaller enclosure for explosion proof applications
Less space requirements
Minimum sample system needed

OPTICS DESIGNED FOR:

No interference from sample turbidity
No effects of lamp aging
No effects of optics coating
No alignment required

SIMPLE OPERATION CONCEPT FOR:

Minimum operator attention
Short training time
Rapid installation and startup

SYSTEM REQUIREMENTS:

115/240 VAC, 50/60 Hz, consumption 50 watts
Wall or panel mount

ENVIRONMENT: 5° to 50°C

DIMENSIONS: FPA 1000 (W x H x D) 16" x 16" x 7" or 40.7cm x 40.7cm x 17.8cm
FPA 1100 (W x H x D) 16" x 23" x 7" or 40.7cm x 58.5cm x 17.8cm

WEIGHT: FPA 1000~approx. 35lb or 15.9kg, FPA 1100~approx. 45lb or 20.5kg

SIGNAL OUTPUT: Analog outputs, RS-232C data loop and digital outputs

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