DDW-10 Dual Wavelength Detector

A Common Sense Approach to Dual Wavelength Detection.

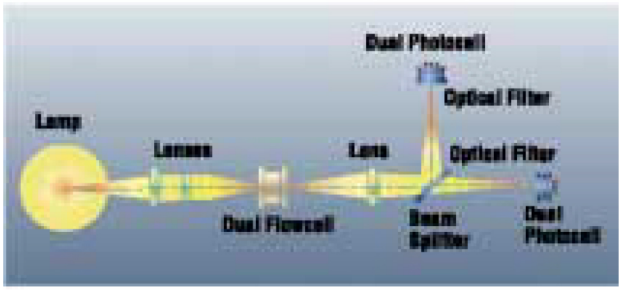
D-Star Instruments' **DDW-10 Dual Wavelength Detector** combines the specificity of dual wavelength detection with the sensitivity and price of a single wavelength detector.

The development of the **DDW-10** was a direct result of discussions with our customers, particularly in the bio-tech applications market. These customers told us that practically 90% of their analyses using dual wavelength detectors were performed at the same consistent 2 or 3 wavelengths.

However, in order to achieve dual wavelength detection they purchased available expensive dual wavelength detectors, and in some cases even more expensive diode array instruments for routine dual wavelength analysis. Until the introduction of the D-Star **DDW-10** there was no other choice.

Important DDW-10 Features

- Complete UV-VIS operation from 195nm to 800nm.
- Double beam optics (Reference and Sample Paths).
- All wettable components are constructed of PEEK, Teflon, Tefzel, and quartz, making the detector totally compatible with biochemical systems; stainless steel is an option with no difference in price.
- Flowcells are also available for prep and microbore in PEEK construction.
- Eight absorbance ranges via scrolling up and down controls.
- Sensitivity levels available for over 95% of all applications.
- Digital read-out of absorbance.
- Analog outputs for absorbance available at rear of instrument.
- Absorbance autozero remote control available via rear connector contact closures.
- An analytical flowcell is standard and included in the instrument price. Stainless Steel option is also available.



Schematic of Dual Wavelength Detector Optical System

Principles of Operation

The double beam optical system consists of a continuum spectral energy source (Deuterium for UV operation; Tungsten for visible operation), beam shaping optics, dual path length flowcell (Prep cell is standard), broad spectrum beam splitter, two wavelength selection filters, and two dual channel UV-VIS silicon photodiodes.

The measurement electronics are composed of two high performance log converters and two signal processors. The front panel display provides continuous read-out of the absorbance measurement from both channels. Autozero for both channels is also located on the front panel. Absorbance range selection (for use with a chart recorder) is also on the front panel. Remote selection of absorbance range and autozero is available. An output of 1V/AU for each channel is similarly available for data systems such as ***Star-Chrom*** ™ , a dual channel software package.

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Applications

In chromatographic analyses, the appearance of minor impurities in relation to the major component is a common problem. Since most compounds separated via chromatographic techniques are similar in nature, these compounds may have wavelength absorbance maxima that are similar. Also, since many of these compounds have relatively broad spectral absorbance peaks, nearby wavelengths produce almost identical absorbance charac-teristics for many compounds. More meaningful informa-tion can be obtained from the mixture by analyzing the sample at two distinctly different, but relevant, wavelengths.

Prime examples of this function are the analysis of proteins, peptides, and other analytes where dual wavelength analysis is commonly carried out at 214nm for the aliphatic amino acid moieties and 280nm for the aromatic moieties. Other common analyses include Ninhydrin Amino Acid analysis at 440nm and 570nm respectively.

It is the 214nm requirement that presents a problem for both the user and the instrument company developing a suitable instrument for dual wavelength detection. The most desirable source of energy for 214nm absorbance has historically been the Zinc lamp which has a strong energy emission at 214nm. However, the relative instability of the lamp, and just as impor-tant, the cost of the lamp and its power supply created a problem for users needing the 214nm function. The user had to consider a variable wavelength detector instead of the fixed 214 detector. As the dual wavelength requirement became defined it was natural to convert the variable wavelength detector into an even more expensive dual wavelength detector.

The **DDW-10** provides simultaneous absorbance information from two factory set wavelengths. This information is available at the rear of the instrument as two separate analog signals. To econo-mize the system we chose not to burden the cost with internal firmware which can easily be accommodated by the many types of competent chromatography software packages available in today's market. Most data acquisition systems provide a means for producing suitable absorbance difference graphical output with ease, and with program choices to allow the user to manipu-late the data post run. With a hardware only system, such as the DDW-10, data is processed in real time. This means the scale factor has to be determined from testing and that identical experimental conditions must be reproduced in succeeding runs, which is exactly what is done in preparative chromatography and quality control.

DDW-10 Specifications

Wavelengths	Selectable Filters
Lamps	195-360 D2, 360-800 W
Flowcells	
	Analytical 7mm/ 10µl Volume; PEEK or SS Body, Quartz Window
	Preparative 2.0mm/ 4.0ul Volume, PEEK or SS Body, Quartz Window
	Microbore 5.0mm/ 1.5ul Volume PEEK
Spectral Resolution	Dependent on Filter Selection
Linearity	Better than 2%
Wavelength Accuracy	N/A
Wavelength Reproducibility	N/A
Drift	< 5.0 x 10-4 AU/Hour
Noise	1.0 x 10-5 AU @254nm
Recorder Ranges	0.005, 0.01, 0.02, 0.05, 0.10, 0.20, 0.50and 1.0 AU Full Scale
Recorder Output	10mV
Integrator Output	1.00VDC per 1.00 AU
Display	Absorbance 3.5 digits each channel
Dimensions	14.3 in (L) x 9.4 in (W) x 7.1 in (H)
Weight	22 lb. (10Kg)
Power	115, 230 VAC, 50/60 Hz

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