OL 730D
Programmable DSP Radiometer



- **Characterize light sources and materials over all or part of the entire UV/VIS/IR region (200 nm to 30 μm)**
- **Measure true RMS intensities of AC, pulsed or modulated sources**
- **Measure total, peak, average, apparent intensities and time profiles of pulsed and navigation lights**
- **Eliminate noise from sources and detectors**
- **Attain the ultimate in sensitivity, down to and including counting individual photons**
- **Computer control for integration into existing measurement procedures or custom data analysis**

The OL 730D is an extremely versatile radiometer utilizing state-of-the-art digital signal processing (DSP) technology. When used with a wide range of optional photodetectors and input optics, a multitude of high accuracy radiometric and photometric measurements can be made over all or part of the entire ultraviolet, visible and infrared spectrum.

The OL 730D features several modes of operation. It can be operated as:

- ***a high sensitivity DC amplifier, typically used in photometric or radiometric measurements in the UV/VIS/NIR regions***
- ***an AC lock-in amplifier, typically used for measurements in the IR (1.8 to 30 μm) and highly modulated source applications***
- ***a photon counter for extremely low-light-level measurements.***

Ultra high-speed data acquisition is another important feature of DSP technology. This means that the OL 730D can measure the output of pulsed or rapidly changing sources in addition to performing source profiling.

The OL 730D is a completely microprocessor controlled, multi-functional radiometer/photometer, which can be programmed to read directly in any user specified radiometric or photometric optical quantity. The OL 730D is virtually ideal for all types of measurement and features high sensitivity, autoranging, auto-zeroing, highly accurate readout and range-to-range linearity, 4½ digit (6½ digit via computer) plus exponent display, user variable response time, an extremely large dynamic range and RS-232-Interface (IEEE-488 optional) for computer control.

Multiple calibration factors for different detector/filter/input optic configurations can be stored in memory. Once the desired configuration and associated calibration factor is selected, the OL 730D will measure and read directly in the designated optical units.

OL 730D Operation

The high performance and versatility of the OL 730D is achieved through the use of the latest DSP (Digital Signal Processing) technology. A 16-bit precision analog-to-digital converter is used to generate highly accurate values of signal every 10 microseconds. This combination of accurate measurements and high sampling rate allows an exact analysis of how the signal varies with time and, consequently, enables the OL 730D to function as a high sensitivity DC amplifier, as an AC lock-in-amplifier, and as a photon counter. External analysis of time variations also permits the OL 730D to be used in intensity profiling or in integrating and differential amplification applications.

DC Radiometer/Photometer Mode - The high accuracy and high conversion rate of the OL 730D electronics combined with DSP low-pass filtering enables the OL 730D to accurately measure the current generated by DC operated detectors. Thus, when configured with the appropriate detector/filter/input optics, the OL 730D operates as an extremely sensitive radiometer or photometer capable of measuring detector signals from 1 x 10^{-14} to 2 x 10^{-3} amperes. The actual photometric and radiometric sensitivities are, of course, dependent on the choice of detector, filter(s), and input optics.

AC Radiometer/Photometer Mode - When used in the AC Mode, the OL 730D is a complete dual-phase lock-in amplifier that uses DSP to perform the "synchronous rectification" which is central to the operation of all lock-in amplifiers. The digital techniques employed in the OL 730D significantly reduce errors such as non-linearity, offset and drift, harmonic distortion, and temperature effects that are inherent in classical analog lock-in amplifiers. However, the greatest benefit to the user is the performance enhancement at the lower signal levels.

The OL 730D features a built-in, variable frequency, optical chopper controller. The OL 730D-CH Programmable Variable Speed Optical Chopper is available as a stand-alone option.

The ability to measure AC voltage or current enables the OL 730D to be used with a wide range of ultraviolet, visible, or infrared sensitive detectors. Although most ultraviolet, visible and near infrared detectors can be operated in either DC or AC modes of amplification, the majority of infrared detectors must be operated in the AC mode.

Photon Counting Radiometer/Photometer Mode (optional) - By utilizing and enhancing some rarely used inherent features of the DSP chip, the OL 730D can be used with photon counting photomultipliers to achieve the ultimate photometric or radiometric sensitivity. The photon counting option provides excellent sensitivity and linearity in the count range of 1 to 1,000,000 counts per second.

OL 730D Options

The basic OL 730D is furnished with DC and AC lock-in capabilities. The following features are available as options:

- **OL 730D-PC Photon Counting Option -** When used with the appropriate photon counting photodetector, the OL 730D-PC provides the ultimate sensitivity with excellent inearity from 1 to 1,000,000 counts per second.
- **OL 730D-HV High Voltage DC Power Supply -** A programmable, high voltage DC power supply for use with photomultiplier detectors. DC voltage can be varied from 0 to -1500 VDC with ultra low ripple and drift.
- **OL 730D-CH Optical Chopper -** The OL 730D-CH consists of integrated control electronics and chopper enclosure along with a control cable. A precision DC motor assembly with an integrated optical encoder is mounted in a machined, metal enclosure that can easily be mounted to an optical bench. The standard 4-slot blade provides chopper frequencies from 10 to 350 Hz. An optional 18-slot blade extends the frequency range from 180 to 1200Hz.
- **OL 730D-IEEE4888 Communication Interface -** An IEEE-488 Interface supplements the standard RS232.

OL 730D Accessories

A large selection of accessories is available for use with the OL 730D. These accessories include:

- **Detectors -** A wide range of high sensitivity detectors is available for use with the OL730D. These detectors allow the user to measure over all or a portion of the entire wavelength range of 200 nm in the ultraviolet to 30 μm in the infrared. Each detector is mounted in a rugged, metal housing and low noise connectors and components are used to maximize sensitivity.
- **Optical Filters -** A range of filters to provide single wavelength isolation, radiometric and photopic correction to the responses of OL detectors is available. Contact OL for specific requirements.
- **Input Optics -** A wide range of telescopes, microscopes, integrating spheres, transmissive diffusers, baffle tubes etc. are available to make any type of measurement. (see OL 730C Bulletin or contact OL for details)

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