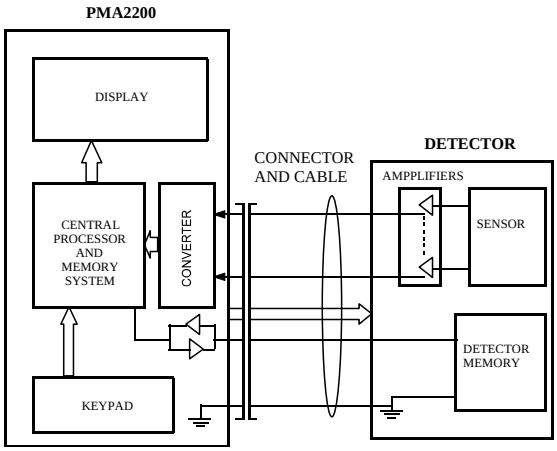
PMA Meter Operation

APPLICATION NOTE 112

Overview

The PMA family of meters are designed to save customers the time and cost of finding, purchasing, learning, and utilizing meters which are dedicated to one operation. The PMA meters incorporate a patented technology which allows the user to interchange detectors without sacrificing the functionality of a dedicated meter. At present, Solar Light Company offers over 30 different detectors for radiation measurement (light measurement), plus additional detectors for temperature and humidity. However, the PMA's flexibility allows other manufacturers' detectors to be integrated quickly and inexpensively.

PMA Meter Diagram



Description of Meter Operation

The PMA family of instruments utilize a highly accurate A/D converter (18 to 22 bits) to measure voltage inputs from the detector. The PMA has a series of analog inputs (the number varies between meters) which are multiplexed together before being applied to the Analog to Digital converter. The problem with just measuring the voltage is that the meter must be able to convert the voltage into usable units. This is accomplished using Solar Light's patented intelligent sensor technology. By storing the conversion algorithms (along with other data) in a memory module contained in the detector itself, the PMA can download this program and execute it as necessary. This capability demonstrates the unlimited number of different kinds of detectors the PMA can handle.

Sensor Technology

Dedicated meters with built in sensors become expensive and bulky when more than one parameter must be measured. The PMA family reduces this awkwardness by using the interchangeable intelligent detector technology. It incorporates many detectors which measure different parameters in a single handheld instrument. This not only reduces size, weight and cost, but also shortens the learning curve for using multiple meters simultaneously.

The memory module incorporated into the detector itself holds the voltage- to-units conversion routines, all calibration factors, and the name, type and serial number of the detector as well as other data.

User Selectable Units

Since multiple voltage conversion routines can be stored in the detector memory, multiple units for the same measurement are also possible. For instance, to measure a UV irradiance, the detector can display units of mW/cm2, µW/cm2, W/m2, etc. Each of the units which were programmed into the detector can be viewed on the meter one at a time by cycling though them using the UNITS key (F1 softkey on the PMA2100). Programs which use more than one analog input can also be run. For instance, the PMA2170 detector is a temperature and humidity probe. In this case, one analog voltage input is a voltage which represents the temperature, and a second analog voltage represents humidity.

By cycling through the units, the user can see readings of temperature in °C or °F and humidity can be displayed in %RH. In addition to temperature and humidity, Dew Point can be calculated by measuring both temperature and humidity and combining them in an algorithm which is stored like any other algorithm in the memory module. The units for dew point are DP°C and DP°F. Therefore, for the PMA2170 pressing the UNITS key will cycle through units of °C, °F, %RH, DP°C, DP°F.

Detector Inputs

All PMA meters can accept at least one detector with multiple analog inputs for each detector. A description follows:

Meter	Max Detector inputs	Analog inputs
PMA2100	2	4 (Max 2 per det)
PMA2200	1	4 (Max 4 per det)
PMA2300	4	8 (Max 4 per det)
	(adapter required after 2)	

Dose Integration

Dose integration is the process which calculates the accumulated dose over time. Dose is derived by integrating the intensity of the parameter being measured over time. For instance, the intensity is added to the dose once every second. This feature is very valuable for integrating a dose of energy especially if the source being measured is not continuous or stable.

Min/Max

The Min/Max feature displays a record of the minimum and maximum reading which has been observed since the Min/Max feature was enabled. Min/Max is useful in situations where continuous observation of the meter is not possible, and minimum or maximum readings are necessary.

Average

The average feature displays a record of the average reading since the average feature was enabled. The Average feature is useful in situation where an unstable source needs to be monitored. The average function will smooth out all of the noise generated by the source.

SOLAR® LIGHT

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