

Calculating and Setting the SENSING Function of PMA Detectors with the PMA2100 Dose Control System

APPLICATION NOTE 116

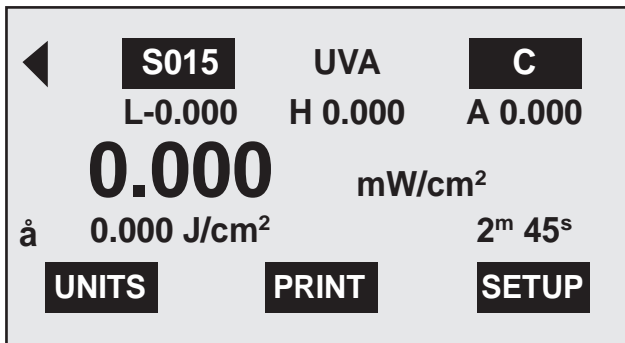
Introduction

The Personal Measurement Assistant (PMA2100) in conjunction with a suitable detector can monitor and control the delivered exposure in time or dose from a light source. Any detector whose signal can be integrated with respect to time can operate either in the "Meter" mode or in the "Dose Control System" (DCS) mode. A simple menu allows switching between modes. When used with properly configured equipment the dose integration is started automatically when the shutter of the light source is opened. The shutter is automatically closed when the predetermined dose has been delivered.

In certain cases a beam-splitter is used to direct a small percentage of the output beam of a light source to a detector in a fixed position. To ensure accurate readings the detector calibration has to be adjusted so that it displays an intensity value that corresponds with the light intensity irradiating the sample. In the DCS mode, the PMA2100 automatically applies the correction if the Sensing parameter is set to the ratio of the irradiance of the reference beam to the output of the light source in percent as outlined below.

Selecting the Detector's Operating Mode

Any light detector attached to the PMA2100 can operate in either the DCS mode or the Meter mode. Refer to Figure 1. In the Meter mode the detector can be used for general purpose measurements displaying the intensity, minimum/maximum/average values, dose integration and dose



delivery time. For detailed descriptions of the operation in the Meter mode refer to the PMA2100 User's Guide.

Figure 1 UVA Detector in Meter Mode

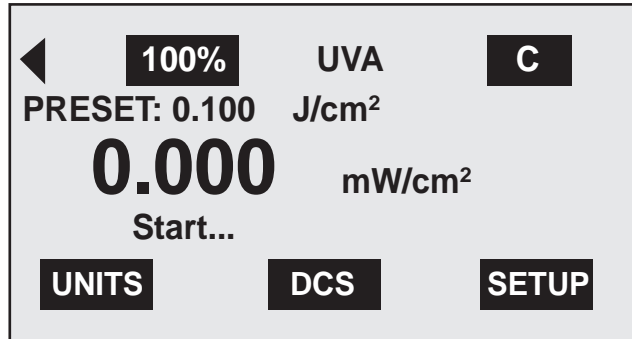


Figure 2 UVA Detector in DCS Mode with min/max and dose integration enabled.

Refer to Figure 2. In the DCS mode the detector modifies the functionality of the PMA2100 converting it to a Dose Control System.

SENSING Calculations and Adjustment

When a beam-splitter is used, the detector Sensing has to be adjusted to accurately display the intensity of the light irradiating the sample. This is done by measuring the intensity of the light delivered to the detector through the beam splitter and then measuring the intensity of the light delivered to the sample. The ratio of these two values is used to determine the Sensing parameter used to configure the detector in the DCS mode.

To measure the reference and output intensity for setting the Sensing perform the following:

- 1] Turn the PMA2100 on and connect a selected detector to either input.
- 2] Make sure the detector is in Meter mode. (See figure 3)
- 3] Position the detector in the reference light path and record the light intensity. This is the REFERENCE BEAM INTENSITY.
- 4] Position the detector in the output beam and record the light intensity. The diffuser of the detector should be over-filled and in the same position that the exposed sample will be. This is the OUTPUT INTENSITY.
- 5] Perform the calculation below for the Sensing setting:

$$\text{Sensing} = \frac{\text{Reference beam intensity}}{\text{Output intensity}} \cdot 100\%$$

Calculating and Setting the SENSING Function of PMA Detectors with the PMA2100 Dose Control System

APPLICATION NOTE 116

The detector is now ready to be set to the DCS mode, perform the following steps:

- 1] Turn the PMA2100 on and attach the selected detector to either detector input. The mode and settings at which the detector were last used will automatically be restored.
- 2] Press the SETUP key F3. The detector setup menu will appear as in Figure 3.
- 3] The Mode heading in the right hand column selects the mode of operation. Use the arrow keys to select the Mode item and press Enter to toggle between Meter and DCS.
- 4] Press the Esc key to return the main display shown in Figure 2. Notice the function of the F2 key has changed from PRINT to DCS.
- 5] Press the DCS key F2. The detector setup menu will appear as in Figure 4.
- 6] Use the arrow keys to select the Sensing item and press Enter. The display will appear as in Figure 5.
- 7] A blinking underline “_” cursor can be moved left and right with the ◀▶ keys and the value of the underlined digit can be increased or decreased by pressing the ▲▼ keys. The cursor skips the decimal point. Pressing **Enter** (↵) or **Esc** ends the editing and the control returns to the previous menu. Pressing **Esc** again brings back the main screen.

Now with the PMA2100 in the DCS mode the current Sensing of the detector is displayed in the upper left hand corner of the display in inverse text. Place the detector in the reference beam. The displayed intensity should read the same as when the detector was in the output beam. The PMA2100 will now display the intensity seen by the test sample and perform all of the integration calculations accurately.

Note that in some instances where the beam is being monitored directly (sunlight for example) the Sensing parameter should be set to 100% since the detector is exposed to the same light intensity as the sample being exposed.

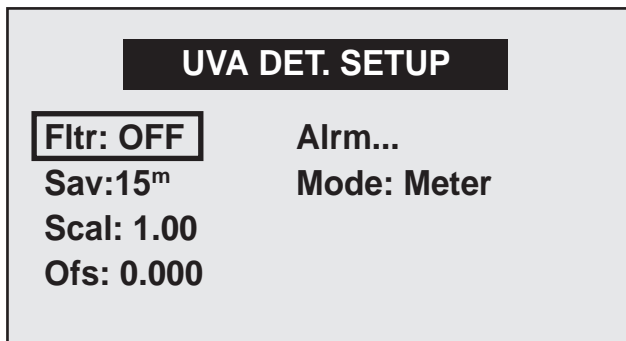


Figure 3 Meter Setup Menu

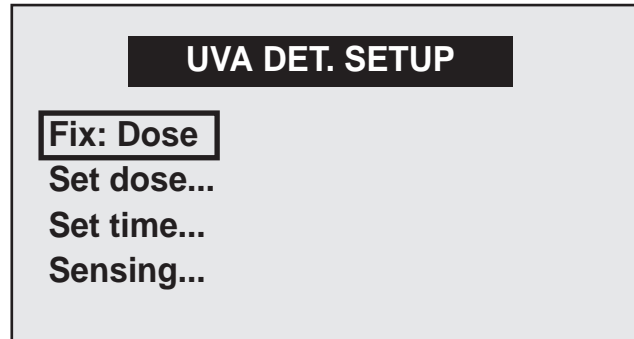


Figure 4 DCS Setup Mode

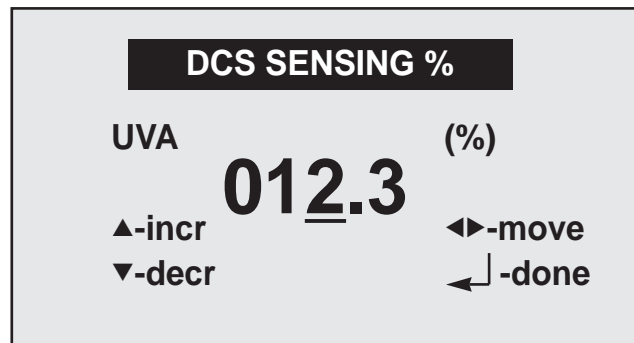


Figure 5. SENSING Setup



721 Oak Lane • Philadelphia, PA 19126-3342
 Tel: (215) 927-4206 • Fax: (215) 927-6347
 E-mail: info@solar.com • Internet: www.solar.com