

TechNote: Selecting the Appropriate ProMetric® CCD Imaging Photometer for Your Application

Radiant Imaging ProMetric® imaging photometers are powerful, CCD-based light and colour measurement instruments that provide for vastly increased productivity compared with traditional “spot” photometers. Whereas a spot photometer can only measure the brightness and colour of one point on a display or light source at a time, a CCD-based ProMetric photometer can measure millions of points simultaneously. Moreover, because the ProMetric camera views the whole light source at once, localised luminance and colour differences can be easily detected – artefacts that simple spot meters would probably miss.

The ProMetric photometer line-up comprises a family of four generic cameras; the main differences between these models are shown in the table below. Following are useful selection criteria for choosing the best camera for your application. For help and guidance – please contact Pro-Lite.

ProMetric Family of CCD Imaging Photometers & Colorimeters

ProMetric Model:	PM-1000	PM-1200	PM-1400F	PM-1600F
CCD Type	Interline	Interline	Full Frame	Full Frame
CCD Pixels	1392 x 1040	1392 x 1040	768 x 512 1536 x 1024 3072 x 2048	512 x 512 1024 x 1024
Photopic Filter¹	CIE V(λ) matched			
Colour Filters²	Bayer RGB	CIE tristimulus matched on internal, motorized filter wheel		
Radiometric Response³	Optional on PM-1000-0 only ⁴	Optional – radiometric window in filter wheel		
ND Filters	Optional – screw-on ND filters available	Optional – ND0, 1 & 2 on internal, motorized filter wheel ⁵	Standard ND0, 1 & 2 on internal, motorized filter wheel Optional, additional screw-on ND filters	
Dynamic Range (Grey Level Resolution)	10-bit (1,024:1)	12-bit (4,096:1)	14-bit (16,384:1)	16-bit (65,536:1)
Shutter Type	Electronic exposure control		High speed electro-mechanical	
Cooling	Not cooled		2-stage TEC	
Minimum Sensitivity	0.1 cdm ⁻²	0.05 cdm ⁻²	0.01 cdm ⁻²	0.005 cdm ⁻²
Interface Type	USB 2.0			

¹ PM-xxxx-0 models only

² PM-xxxx-1 models only

³ A radiometric window can be fitted to most ProMetric cameras to allow for light source measurements between 350-1100nm

⁴ PM-1000-1 (colour) camera cannot accept a radiometric window

⁵ PM-1200N-1 is equipped with an internal, motorized ND filter wheel

Camera Selection Criteria

PM-1000

Key technology differentiator: interline CCD with Bayer colour filters

- ▶ Lowest cost – for cost-sensitive production and R&D applications
- ▶ Speed – fastest measurement time (NB – single exposure colour measurements)
- ▶ Reliability – no cooling, shutter or moving parts
- ▶ Best for: area uniformity measurements of luminaires, displays, backlights etc (but not LED-based sources for which the PM-1200 or PM-1400 are recommended)

PM-1200

Key technology differentiator: interline CCD with RGB colour wheel

- ▶ Lowest cost entry point for high CIE-matched colour accuracy – recommended for narrow spectrum light sources (e.g. LEDs, LCDs etc)
- ▶ Speed – faster than PM-1400/1600 (but note three exposures for colour measurements)
- ▶ Reliability – no cooling, no shutter
- ▶ Optional radiometric window
- ▶ Best for: area uniformity measurements of luminaires, displays, backlights, including LEDs

PM-1400F

Key technology differentiator: full frame CCD with RGB colour wheel

- ▶ High sensitivity
- ▶ High dynamic range – measures colour and luminance differences that lesser cameras can't resolve
- ▶ No gap between pixels – gives accurate measurements with small features (e.g. LEDs, LED arrays, pixel/line defects in displays)
- ▶ CIE-matched RGB filters – suitable for broad and narrow spectrum light sources
- ▶ Optional radiometric window
- ▶ Best for: detailed analysis of displays (e.g. pixel defects); automotive & avionics instrument panels; LED arrays & clusters; automotive headlamps; projectors; and display contrast measurements

PM-1600F

Key technology differentiator: highest sensitivity full frame CCD with RGB colour wheel

- ▶ The most sensitive cameras in the range
- ▶ Widest dynamic range – measures colour and luminance differences that lesser cameras can't resolve
- ▶ No gap between pixels – gives accurate measurements with small features (e.g. LEDs, LED arrays, pixel/line defects in displays)
- ▶ CIE-matched RGB filters – suitable for broad and narrow spectrum light sources
- ▶ Optional radiometric window
- ▶ Recommended for use with Radiant Imaging's Imaging Spheres
- ▶ Best for: detailed analysis of displays (e.g. pixel defects); automotive & avionics instrument panels; LED arrays & clusters; automotive headlamps; projectors; and display contrast measurements