

DPM46

Dioptric power meter



Fig. 1. Photo of DPM46 meter

WHY DIOPTRIC POWER IS IMPORTANT?

A long series of electro-optical devices (telescopic sights, night vision monoculars/goggles/binoculars, thermal sights) project image of scenery of interest into direction of an eye of the observer using an optical ocular. Human observer should perceive a sharp image even when having refractive eye defects (short-sightedness or long-sightedness). This ability is achieved by regulation of dioptric power of the ocular using typically a simple rotation mechanism with a dioptric scale. This scale gives indication on diopter power of refractive eye defect of human observer that can be corrected typically in range from +4D to -6D (typical range of refractive eye defect of humans) or in range +6D to -6D (expanded range of refractive eye defect of humans).

The most natural method to determine proper dioptric scale on focusing mechanism of the ocular is to use a group of people having different refractive eye defects to determine what is optical rotation of the ocular for a specific level of eye defect. However, this method is difficult to implement (it is not easy to get required group of at least 11 people having different eye defects: +4D, +3D, +2D, +1D, 0D, -1D, -2D, -3D, -4D, -5D, -6D), costly (payment for all group) and time consuming (time for experiment for every observer). At the same time typical dioptric meters capable to measure dioptric power of lenses used for glasses are useless for measuring dioptric power of optical oculars used as image projectors. In this situation optical manufactures commonly use a method of glasses of variable dioptric power. In detail, an observer having no refractive eye defects use a set of glasses of different refractive power in ranger from +6D to -6D and check when he can see sharp image. This method is based on assumption that perfect observer using glasses of positive refractive power +4 D can simulate human observer having refractive defect at level -4D. The problem is that this assumption is relatively accurate only at low values of refraction defects. Next, test results depends also on distance between human eye and the glasses. The effect of earlier described situation is that it is quite common to find on international market electro-optical devices with non-proper dioptric scale even in case of highly reputable vendors. The consequences are quite serious. Users of direct view electro-optical devices having refractive eye defects cannot trust the dioptric scale and determine optimal rotation of the ocular by themselves losing time or have increased discomfort of observation when using recommended but improper ocular position.

WHAT IS DPM46?

DPM46 is a meter of dioptric power of oculars of electro-optical devices. In detail, DPM46 meter determines diopter power of refractive eye defect of human observer that can be corrected for current position of tested ocular or determines what ocular position is needed to correct a certain level of refractive eye defect of human observer.

From design point of view DPM46 can be treated as electronic simulator of human eye of variable refractive eye defects. Its user can regulate level of simulated refractive eye defect of the observer in range from +6D to -6D using manual rotation knob on a sidewall and a scale on the top of this device. DPM46 generates electronic copy of image projected by tested ocular at USB2.0 output. User can see image perceived by DPM46 meter when the meter is connected to any tablet/laptop/PC having USB input port. Image sharpness can evaluated subjectively by human observer or with support of Inframet software.

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BLOCKS OF DPM46

DPM46 is delivered as a set of blocks:

1. DPM46 meter
2. USB cable
3. SHARP computer program.

SHARP is a computer program working under Windows operating system that:

1. enables visualization of image perceived by DPM46 meter
2. works as evaluator of sharpness of image perceived by DPM46 meter.

TECHNICAL SPECIFICATIONS

Parameter	Value
Range of measurement of diopter power of optical oculars	+6D to -6D +4D to -6D (high accuracy range) +6D to +4D (low accuracy range)
Measurement uncertainty	0.2D at +4D to -6D range 0.4D at +6D to +4D range
Output port	USB2.0
Software operating system	Windows 7/10
Operating temperature range	+5°C to +35°C
Storage temperature range	-5°C to +55°C
Mass	1kg
Dimension	190x83x74mm

WHY DPM46?

DPM46 meter is the first commercially available professional meter of optical power of oculars of electro-optical systems offered on international market. Its accuracy significantly exceeds accuracy of typically used method based on glasses of variable dioptric power. DPM46 can significantly improve comfort of use of electro-optical systems manufactured for direct view by human observers having refractive eye defects.

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Version 2.2