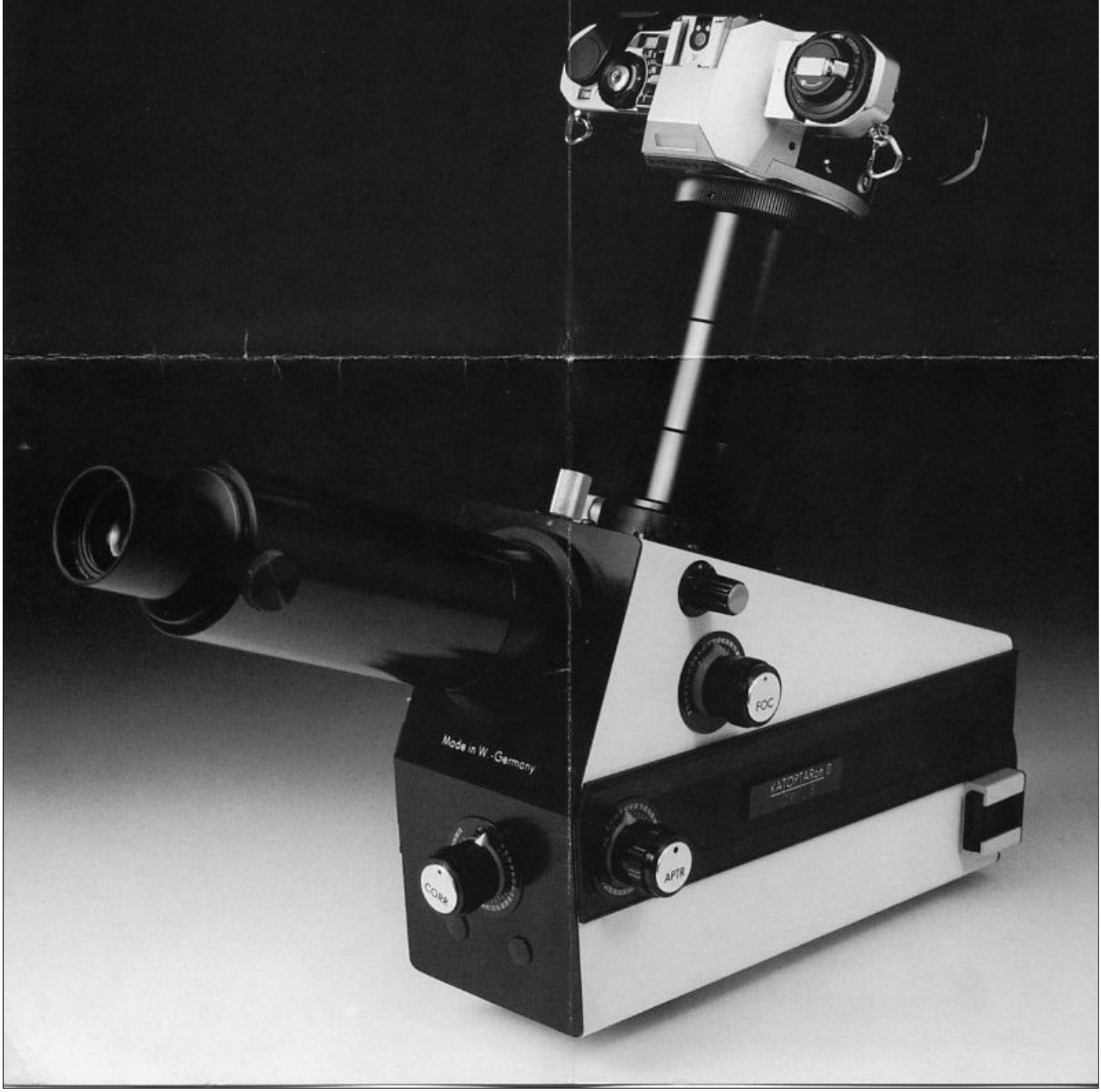
INFINITY

LDM-1/S

KATOPTARon®
Long-Distance Microscope



LDM-1/S

The increasing sophistication of technology has made it ever more important to observe and document materials and manufacturing processes by means heretofore beyond conventional microscopical methods. Often, it is impossible or even undesirable for the observer to gain too close an access to the subject. Other times, observations must be carried out within arm's reach so that a subject can be conveniently manipulated. In response to these needs, the Katoptaron LDM-1/S was developed.

The versatile LDM-1/S lends itself conveniently to a myriad of applications. Easily integrated into machines and assembly lines, the LDM-1/S may be used for real-time inspection and quality control as well as high-speed automated image processing. Microcircuits and wire bonds may be checked even during the manufacturing process. The LDM-1/S is ideally suited for observing the critical reactions inside of vacuum ovens, box coaters and environmental simulation chambers. For example, it may be used to observe crystal growth, coating deposition, aero- and hydro-dynamic particle flows, radioactive samples, corrosives and explosives. Laser experiments, as well as stress tests in metals, plastics, glasses and ceramics may be performed at safe distances. It is even possible for the LDM-1/S to focus and illuminate coaxially, through bores and masking apertures as small as 0.25mm in diameter—from seven inches or more working distance.

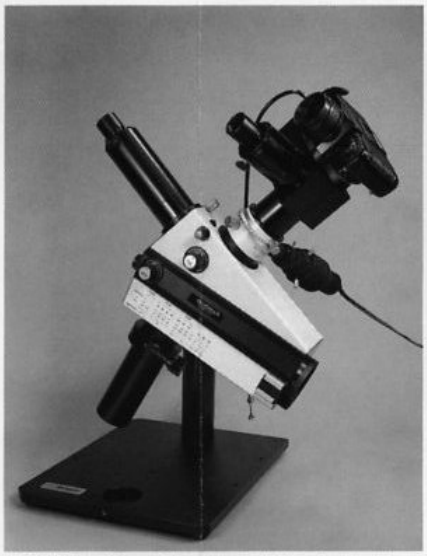
Precision built in West Germany, this extraordinary instrument has widespread uses in industry, research, forensics, biology, chemistry and medicine. Regardless of the application, whatever the discipline or task assigned, the LDM-1/S may be used as near as 6.3 inches—or as far away as infinity.

The Katoptaron System

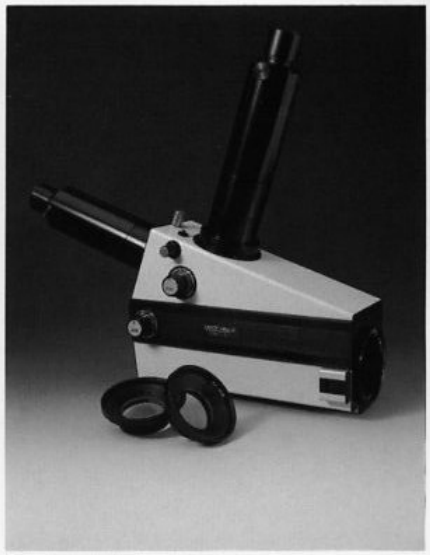
At the heart of the LDM-1/S is a specially patented *off-axis* "floating mirror" design—the Katoptaron System. Not to be confused with on-axis catadioptric systems, the LDM-1/S's optical path has *no* disc obstruction of any kind; light enters and goes directly through to form an image at the film plane. The Katoptaron System utilizes Zerodur temperature-stable mirrors figured to one-tenth wavelength of light. By turning a dial at the rear of the instrument, the primary mirror can be offset to any focus—at any distance—eliminating spherical aberration, coma and astigmatism to an unprecedented degree.

Resolution and Magnification

The LDM-1/S can provide true microscopical magnification well in excess of 175x and resolve detail separations of 1.75 micrometers. Putting this in proper perspective, at *any equal distance*, the LDM-1/S has *four times* more resolution than a stereomicroscope. Rated at 0.50x primary objective power at 5 feet, the LDM-1/S has the same magnification and field of view as a normal compound microscope would have at the same rated power. Higher magnifications (to 3.5x primary objective power) are possible by attaching the auxiliary "AP" (planapochromatic) lenses. Technically, the LDM-1/S then becomes an off-axis *catadioptric* system, but all its advantages remain. The LR accessory tube yields an additional 2x to the total system magnification. Eyepieces up to 25x power may be used to further increase the magnification.



LDM-1/S with Mirror Diverter, coaxial illuminator and Pentax LX.



Standard model with AP lenses.

LDM-1/S in Use

The LDM-1/S is an extremely simple instrument to use. At 5 feet and beyond, the LDM-1/S is set up directly. It is then a pure mirror system (*catoptric*) with no refracting/transmitting objective lenses whatsoever. This results in absolutely perfect color correction, suitable for most applications at all wavelengths from UV through IR.

Once a working distance is chosen, the LDM-1/S is easily focused by means of its *internal focusing control*. The corrector dial is then turned to the setting for the working distance, eliminating the aberrations which would otherwise impair image quality. Depth-of-field is then adjusted by turning the *aperture control* which activates a true iris diaphragm.

A Complete Instrument

The LDM-1/S has two viewing ports for mounting observation tubes and direct connectors for 35mm or cine/video cameras. The standard models come equipped with observation tubes for each port, (eyepieces extra). A flip-mirror directs the incoming light to either port. The top port provides an erect image and can be parfocaled with the rear port. Parfocal operation is maintained in recording modes if Infinity's Unipar™ photo/video adapter is utilized. The Unipar contains an optical system which equalizes visual and recording focal points.

The Vari-Focuser™ accessory can be attached to either port for "optically sectioning" through bores and apertures from a *fixed* position without refocusing the LDM-1/S itself. For even greater versatility, the Mirror Diverter (essentially a photomonocular) may be used to double the photo/video/visual capacity of either port. Thus, up to four cameras or visual tubes may be mounted on the LDM-1/S.

Perhaps the most significant LDM-1/S accessory is the AZ Coaxial Illuminator. Beyond 5 feet, it acts as a targeting light. From 6.3 to 26.8 inches (with AP lenses), the AZ is a *true coaxial illuminator*. For creative light control, a polarizer or other 67mm filter can be screwed onto the front of the LDM-1/S.

Custom Applications

Upon special request, the LDM-1/S can be supplied with AP lenses for specific working distances other than those attained with the standard AP lenses. The LDM-1/S can also be equipped with an all-mirror accessory for totally unattenuated UV through IR use as close as 31.5 inches. Gold and other mirror coatings are also available on special order.

Your authorized Infinity/Katoptaron dealer will be pleased to acquaint you with the LDM-1/S and all the other unique Infinity products for long-distance observation, macroscopy and microscopy.

TECHNICAL DATA

Resolution: to 1.75 micrometers
Numerical Aperture: 0.19 N.A. @ 6.3 in.; 0.09 N.A. @ 5 ft.
Coma: None
Astigmatism: None
Chromatic Aberration: Lateral: None; Longitudinal: None
Spherical Aberration: None
Curvature of Field: Flat over 43mm field
Vignetting: None
Mirror Figuring: Better than 0.1 Lambda
Infrared Range: Better than 4 micrometers (additional range by gold mirrors and/or all-mirror accessory)
Weight: (LDM-1/S alone): 2.2 lbs., 35 oz., (1.0 kg.)
Dimensions: (L×W×H): 10 in. × 3.5 in. × 9 in. (254mm × 89mm × 229mm) includes allowances for AP lens and control protrusions

Printed in U.S.A.