

## Mitsuboshi Knife-edge Focuser Precision Calibration Procedure

This document describes the procedure for calibrating the Mitsuboshi knife-edge focuser. The basic goal is to set the focuser's flange-to-knife-edge distance equal to the camera's flange-to-film distance. To achieve a high level of accuracy, a digital depth gage, capable of reading to 1 micron is recommended. An example of a suitable depth gage is the Mitutoyo unit shown in the photo at right.

Shown below the depth gage in the photo at right are the other required pieces for the calibration – the Mitsuboshi focuser and camera to be used.



The Mitsuboshi knife-edge focuser consists of three pieces – the knife-edge holder, lock ring, and a Kenko C-mount adapter specific to your camera. Pentax 67 medium format camera users also will find a fourth part – a Kenko Pentax 35mm-to-medium format adapter. The standard pieces for a 35mm focuser are shown below (left).

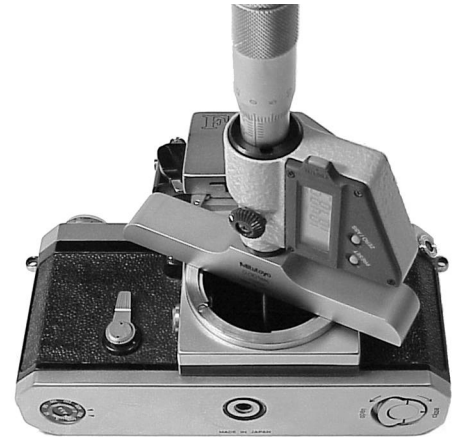


As shown at right, the locking ring and knife-edge focuser screw onto the C-mount section of the Kenko adapter. To adjust the flange-to-knife-edge distance, the knife-edge holder is screwed in or out, and the locking ring is tightened against the holder once the correct position has been set.



## Precision Calibration Procedure

To precisely calibrate the focuser, the camera's flange-to-film distance must be measured first. With the camera's lens removed, the shutter must be kept open (use the 'B' or 'T') during the measuring step. Close the camera's rear cover so that the pressure plate can be seen through the lens opening. Now the depth micrometer can be used to measure the distance from the camera flange to the pressure plate. Some practice may be required get a feel for when the micrometer's probe just touches the pressure plate. Excessive pressure will cause the pressure plate to spring backwards and give an incorrect reading. The average of several readings taken at different positions should be used as the final value. Nine measurements are suggested to sample all parts of the pressure plate.



To get the distance for which the knife-edge focuser must be set, the thickness of the film to be used must be subtracted from the camera measurement above. The film thickness specifications from several manufacturers are:

Manufacturer	Film	Thickness (microns)
Kodak	E100 (35mm)	130
	E100 (120/220)	100
	E100 (4x5)	205
	E200 (35mm)	130
	E200 (120/220)	100
	Tech Pan 2415 (35mm)	100
	Tech Pan 6415 (120)	91
	Tech Pan 4415 (4x5)	180
	Fuji	Provia 100F (35mm)
Provia 100F (120/220)		105
Provia 100F (4x5)		205
Provia 400F (35mm)		127
Provia 400F (120)		104
Neopan Acros (35mm)		122
Neopan Acros (120)		104
Neopan Acros (4x5)		180

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Once the camera measurements have been taken, the focuser must be adjusted to match. The flange-to-knife-edge distance must be adjusted until the measured distance matches the distance derived above. Note that the action of locking the knife-edge in place may cause a slight shift in the final distance, so taking several measurements after locking the position of the knife-edge holder is recommended.

Once the position has been set properly, some small dabs of glue or thread lock may be used to secure the lock ring and knife-edge holder in place.