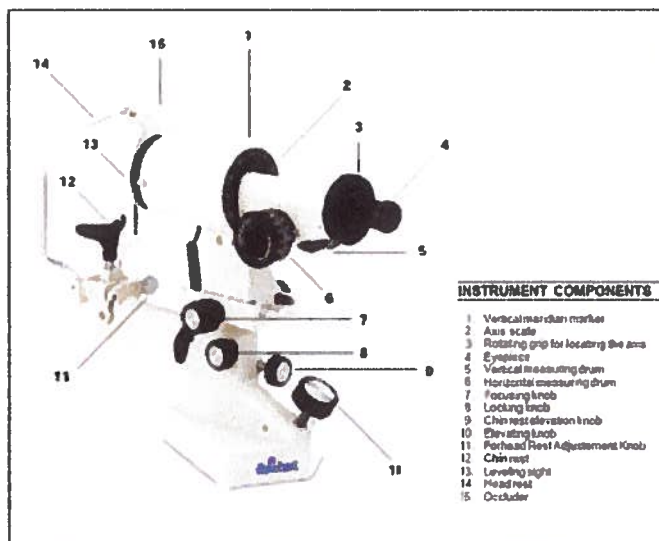


# How to Use an Ophthalmometer

The keratometer is another piece of equipment that was created to try and determine the actual refractive error of the eye, but due to lenticular astigmatism and other factors it is not a clinically effective tool for that purpose.

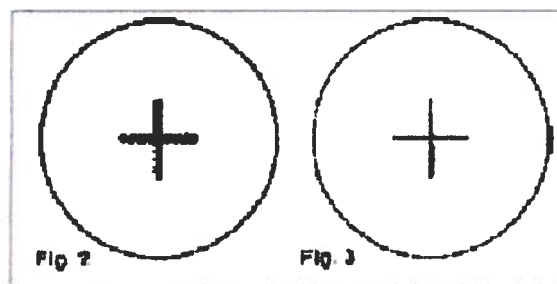
In modern times this tool has become indispensable in the opticians arsenal for selection and fit of both soft and rigid gas permeable contact lenses. First let's take a look at how and why a keratometer works then we will discuss its calibration and use.



The principle behind the keratometer is that the anterior surface of the cornea acts as a concave mirror. The keratometer uses a target, also known as mires; of a known size at a known distance from the cornea. The mires are then reflected off of the cornea and the image is measured inside of the keratometer for image size and distance. With these known values the only thing needed is the index of refraction of the cornea. Most keratometers have the average index of the cornea calibrated to 1.3375 which is considered the combined refractive index of the cornea and aqueous humor. There are many manufacturers of keratometers and they don't all agree that this is the correct value for their model machines, so the index may vary. Some of the more common indices used are 1.332, 1.336, and 1.3375. How do I know which index my machine is calibrated for? It is best to consult your equipment manufacturers' manual for this information, however; if your machines drum reads Diopters and radius then you can find out the index of refraction by using some simple optical equations.

Now let's get into the nitty gritty, how do I operate the keratometer? The operation is very simple and the fact that you know the mechanics behind the machine should give you the confidence you would need to operate the keratometer.

The first step involves the calibration of the machine and should be done in the morning before patients arrive. The eyepiece should be adjusted to proper focus. This is done by placing the occluder (part 15) directly in front of the instrument. Then turn the eyepiece (part 4) counter clockwise as far as possible. Now while you are looking through the eyepiece turn the eyepiece clockwise until the crosshairs go from unfocused (fig 2) to focused (fig 3).



Make sure to take this measure 2 to 3 times to verify that the eyepiece is correctly focused then mark the cylinder and the eyepiece so that in the future this step is easier to perform.

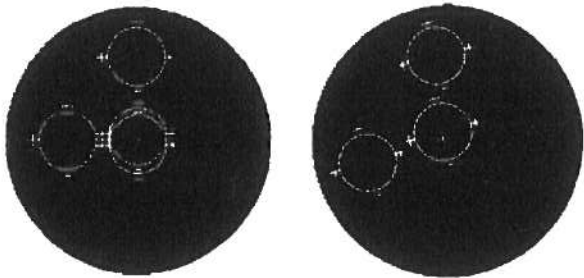
The next step in keratometry involves the patient. Ask your patient to have a seat in front of the instrument and to press their chin and forehead firmly against the chin and headrest (part 12 and 14). Instruct the patient that they may grasp the horizontal bars attached to the headrest. In this step it is important to make sure that the patient understands the importance of being

firmly seated in the chin and headrest.

You must then get the keratometer into the correct position for measuring. You will want to start with the axis scale aligned to 90° and 180°. Make sure the keratometer swings freely from left to right by releasing the locking knob (part 8). Make sure to raise or lower the keratometer to the correct measuring height by lining up the leveling sight (part 13) with the patients inner or outer canthus, this is accomplished by adjusting the height with the elevating knob (part 10). Swing the barrel of the keratometer until the light reflects off of the center of the cornea. Then occlude the eye not being measured with the occluder (part 15).

The next part is instrument dependant. Have the patient fixate on the fixation light inside the keratometer barrel, or if your instrument is not equipped with a fixation light have the patient fixate on the reflection of their eye.

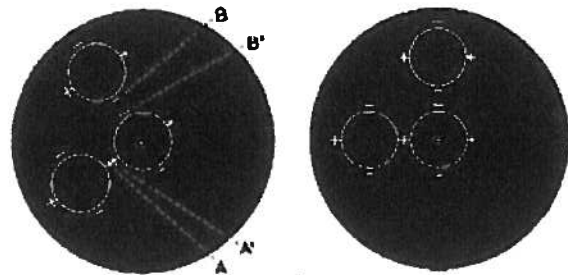
Now we focus the machine. Look through the keratometer and find the target or mires inside the machine, they may be slightly blurry. Place the black crosshairs (figures 3 and 4) in the center of the bottom right hand mire (below left).



To clear the mires, you will need to adjust the focusing knob (part 7) until the focusing circle is superimposed (above left). Now we lock the keratometer into place with the locking knob (part 8).

Now that we have everything in place we will measure the corneal surfaces. The first step in the measuring is to locate the axis of the cylinder by lining up the two crosses on the circles (below left A and A'). This is done by rotating the barrel with the axis grip (part 3). Once this is accomplished we will focus the horizontal meridian by turning the horizontal measuring drum until the double crosses are superimposed (below) .

Now we can measure the vertical meridian by rotating the vertical measuring drum until the double minuses are superimposed. Pretty simple, we have now measured both meridians on the cornea for their curvature and are ready to note the patients chart with the correct measurements.



The readings should be taken off of the drum and put in the chart, but how do we write this you ask? Let's take a look at a common way of writing your measurements: (see blue box)

<b>Hk x Ha</b>	
-----	
<b>Vk x Va</b>	<b>Hk = Horizontal power reading</b>
	<b>Ha = Horizontal axis reading</b>
	<b>Vk = Vertical power reading</b>
	<b>Va = Vertical axis reading</b>
<b>Example:</b>	
<b>43.25 x 125</b>	<b>These measurements should be</b>
-----	<b>taken for both eyes.</b>
<b>46.50 x 035</b>	