Parts of the Lensometer

Eyepiece – The part of the instrument into which the user looks.

Lens holder – A spring-loaded arm that holds the lens securely for reading and marking.

Lens table – Adjustable straight metal shelf on which the frame rests and which ensures the axis reading is correct.

Power drum – The large wheel used to find the power of the lens. It is marked with power ranging from –20 to + 20 diopters. Black numbers represent plus power, red numbers represent minus power.

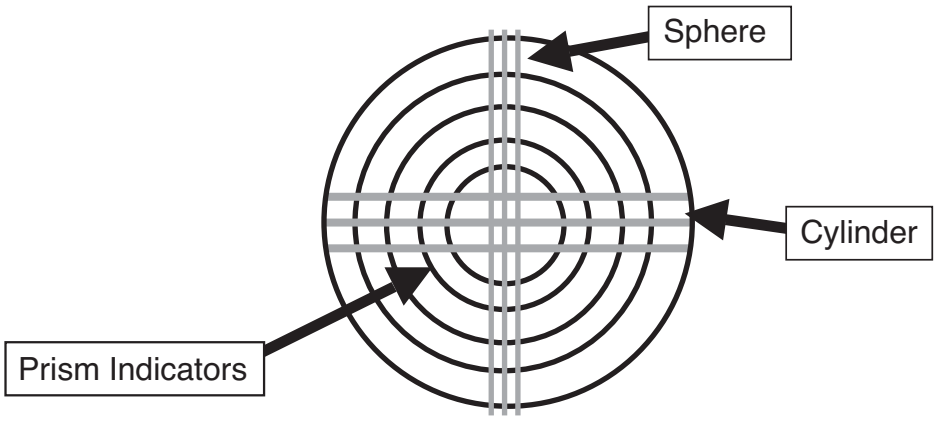
Axis drum – The large wheel marked from 0° to 180° that is used to find the axis location on the lens.

The first step in using the lensometer is to focus the eyepiece. This is mandatory before attempting to read a lens.

- Set the power drum to plano (0).
- Look through the eyepiece and rotate it until the mires (the target in the lensometer) become clear.

Following are the markings you must identify as you look through the eyepiece:

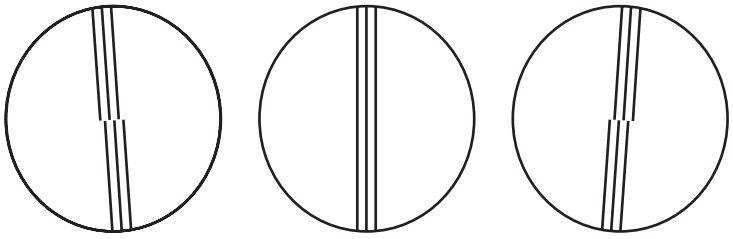
- **Reticle** – a prism scale on which mires are focused and which are marked with a series of circles. The reticle is used to center the lens for marking or verification of power.
- **Mires** – these are lines projected through the reticle. Three thin lines spaced close together denotes the sphere power and three thick lines spaced farther apart denotes the cylinder power.



To read a prescription off of a lens, follow the procedures below. Practice them until you are comfortable reading prescriptions off lenses.

How to read a single vision lens Rx:

- Focus the eyepiece.
- Adjust the lens table so the right lens is centered against the lens stop both vertically and horizontally. To avoid damaging the lens, do not slide across the lens stop, and slightly lift the lens holder whenever you move the lens.
- Look through the eyepiece and observe the reticle. Move the lens table until the optical center of the lens is in the center of the reticle.
- Move the power drum until the sphere lines are in sharp focus at the most plus power.
- Record the reading. If the lens is a sphere-only power, all 6 lines will be in sharp focus as you move the axis wheel.
- For compound lenses, adjust the power wheel until the cylinder lines become clear. Because we work in minus cylinder form, you will always adjust the power wheel to less plus power. If you find that you must move to more plus power to focus the cylinder lines, turn the axis drum by 90 degrees.
- Confirm that all of the cylinder lines are completely straight, without any breaks. If they are, the lens is on axis. If any lines have breaks, adjust the axis wheel until the lines are straight and unbroken.



Incorrect Axis Correct Axis Incorrect Axis

- As soon as the three wide lines are straight and in sharp focus, record the power on the power drum. The difference between the sphere reading and the cylinder reading is the amount of cylinder power in the lens.
- Record the axis indicated on the axis drum.
- Use the marking device to dot the optical center.
- Check the opposite lens by moving the frame so the left lens is centered against the lens stop and with the optical center in the middle of the reticle. Do not adjust the lens table.
- Repeat the procedure above for the left lens.
- Remove the glasses. With a PD stick, measure the distance between the center dots to determine your lens PD.

How to read a bifocal lens Rx:

- Read the distance portion of the lens as though it were a single vision lens, confirming that the optical center is in the middle of the reticle.
- Remove the glasses from the lensometer and turn the frame around so that the temples face you.
- Check the distance power. The power on the back surface of the lens may vary from the power on the front surface. Record the power when the sphere lines are in sharp focus and straight.
- Move the lens up, placing the bifocal segment against the lens stop. Bring the sphere lines into focus, read the sphere power through the segment. The difference between the two readings (distance and near) on the back of the lens is the bifocal power.

Examples:

Rx: +2.00 -1.50 x 165

+1.50 -1.75 x 180 /+2.00 add

The sphere lines will become clear at:

- +2.00 OD
- +1.50 OS

The cylinder lines will become clear when:

- The power drum is turned back to +0.50 and the axis wheel is turned to 165 on the right lens.
  - +2.00 -1.50 = +0.50
- The power drum is turned back to –0.25 and the axis wheel is turned to 180 for the left lens.
  - +1.50 -1.75 = -0.25

From the back side of the lens the

- Sphere lines would become clear at +2.00 OD and +1.50 OS
- Through the bifocal segment, the sphere lines would become clear at +4.00 OD and +3.50 OS.
- To determine the add power:
  - +4.00 - +2.00 = +2.00
  - +3.50 - +1.50 = +2.00

Rx: -1.00 -1.25 x 065

-2.00 -2.00 x 080 /+2.25 add

The sphere lines would become clear on the power wheel at:

- -1.00 OD
- -2.00 OS

The cylinder lines would become clear when:

- the power wheel read -2.25 and the axis wheel read 65 for the right lens
  - –1.00 -1.25 = -2.25
- the power wheel read -4.00 and the axis wheel read 80 for the left lens
  - –2.00 -2.00 = -4.00

From the back surface of the lens, the readings of the sphere lines on the power drum would be:

- -1.00 distance and +1.25 in the bifocal
  - -1.25 -(-1.00) = +1.25 +1.00 = +2.25
- -2.00 distance and +0.25 in the bifocal
  - +0.25 -(-2.00) = +0.25 +2.00 = +2.25

Note: in each case the power wheel was turned by +2.25 diopters.

How to read a progressive lens Rx:

Follow the same steps as for a bifocal Rx, with the following additions:

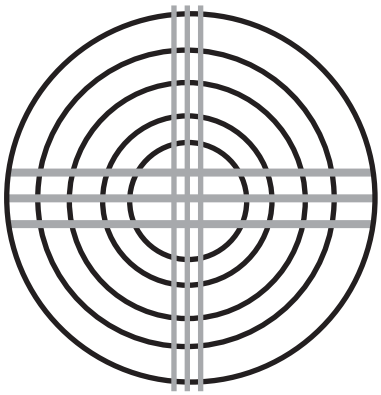
- Remark the lenses using the manufacturer's engravings on the lens. Find and mark the engravings, then match your markings to the manufacturer's lens layout chart. Trace:
  - the fitting cross
  - the 180° line
  - the distance power verification circle
  - the near power verification circle
- Read the distance power through the distance power verification circle
- Turn the glasses around and read the add power through the near power verification circle
- Check for prescribed or unwanted prism 2 mm below the fitting cross

(Checking for prism is explained in the next section.)

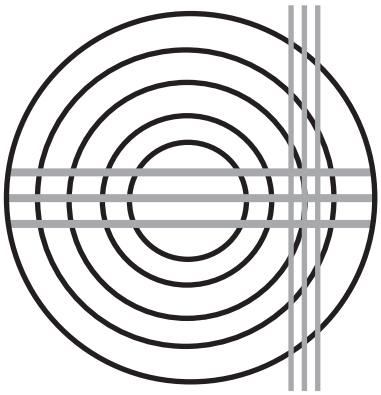
Checking for Prism

Use the lensometer to check for prescribed prism as well as for unwanted prism that should not be in the lens. When checking for prism, remember:

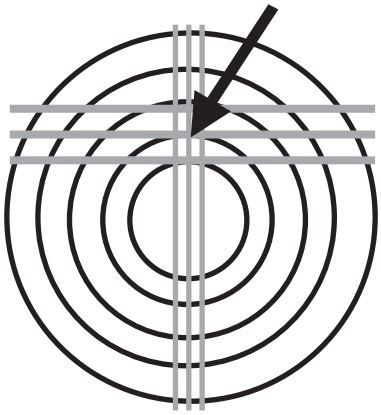
- Always start with the strongest lens power
- Don't adjust the lens table as you move from one lens to the other
- The circles of the reticle represent prism diopters of power. Often the four inner circles are in 0.50 prism diopter steps, but the outer larger circles will be in 1.00 prism diopter steps.
- Prism has direction according to its base:
  - Base-up prism will present in the upper circles.
  - Base-down prism will present in the lower circles.
  - Base-in prism will present in the nasal section of the circles.
  - Base-out prism will present in the temporal section of the circles.



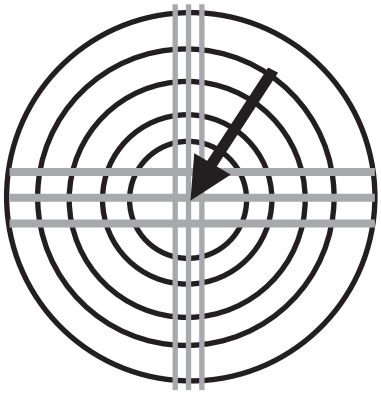
If there is no prescribed prism, the target should be centered or within tolerance. The illustration above shows a reading for a lens with no prism ground in.



This is an illustration of a right lens. This lens has 1.50 prism diopters base-in prism.



OD LENS: 1.00^ BU



OS LENS: 0.00^

RESULT: 1.00^ Vertical Imbalance
Remake right lens

Self-Test: Lensometry

Determine the following lens powers by using the lensometer:

1. First reading: +2.00
   Second reading: -1.00
   Axis reading: 180

   Rx _____

2. First reading: -2.25
   Second reading: -4.25
   Axis reading: 065

   Rx _____

3. First reading: +2.00
   Add reading: +3.00

   Rx _____

4. First reading: +1.25
   Second reading: -0.75
   Axis reading: 125
   Add reading: +3.25

   Rx _____

5. First reading: -2.50
   Second reading: -4.00
   Axis reading: 085
   Add reading: -1.25

   Rx _____