NARISHIGE WEB NEWS

No.015 (May 15, 2008)

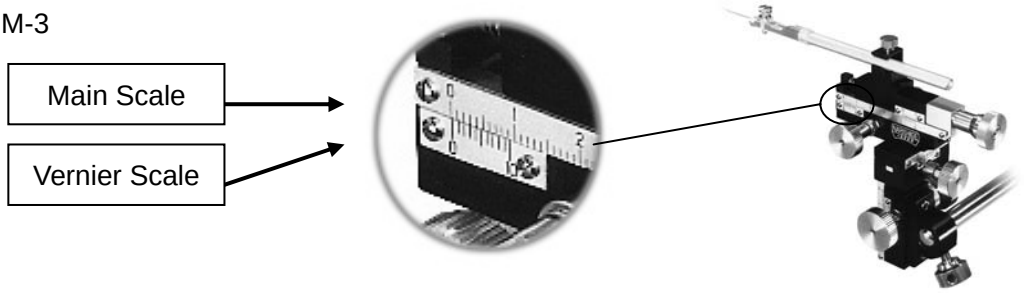
How to Read the Vernier Scale

The Vernier Scale is equipped to manually operate micromanipulators. It is simple in mechanism yet very useful in function. We will discuss how to read the vernier scale so as to make good use of it.

◇◆What is the “Vernier Scale?”◆◇

The vernier scale is an auxiliary scale that is attached to the main scale and allows readings in sub-millimeters. The main scale indicates measurement in 1 mm units, but the vernier scale indicates measurement in 0.1mm units when read in combination with the main scale. It is the same mechanism as calipers.

EX） MM-3

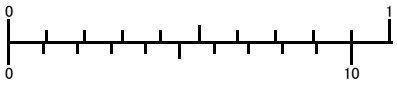


◇◆How to Read the Vernier Scale◆◇

- The vernier scale is <u>not read by itself.</u> It is always read in combination with the main scale.
- You find out which line on the vernier scale is in alignment with a line on the main scale to read a value. The value in sub-millimeters is calculated by multiplying the value of the aligned point on the vernier scale by 0.1mm.

Now, look at the following examples.

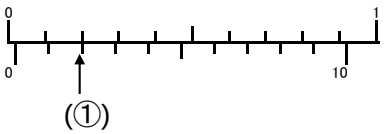
<Fig.1>



・Align the vernier “0” line to the main “0” line.
At this moment, since the vernier “0” line is in alignment with the main “0” line, the value is 0.0mm.

※If the scale has moved to the point in Fig.2…

<Fig.2>



・Check which line is in alignment with the main scale.
At this moment, since the second line on the vernier scale (①) is in alignment, the value is 0.2mm.

The above is the basic concept of the vernier scale. Based on this, we will now discuss how to learn distance of movement by applying the concept of the vernier scale.

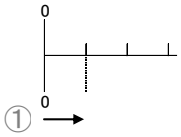
NARISHIGE Customer Support Center
E-MAIL: sales@narishige.co.jp

NARISHIGE WEB NEWS

No.015 (May 15, 2008)

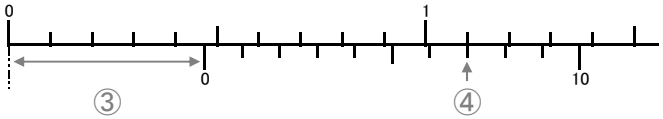
◇◆Reading Distance of Movement◆◇

☆Basics: How to read the main scale.



Align the vernier “0” line to the main “0” line. When you rotate the control knob and the vernier scale has moved to the first line in the main scale (①), the distance of movement is 1mm since the main scale refers to 1mm.

☆Now read the distance of movement below, referencing the main “0” line.



※In this instance, the distance of movement you want to know is the distance of ③.

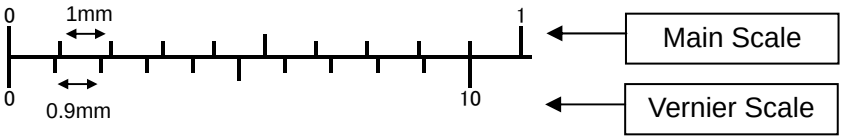
1. First, check the main scale that shows how many millimeters have moved. Since vernier “0” line is located between fourth and fifth line on the main scale, you know it has moved more than 4mm.

2. Second, check which line of the vernier scale is in alignment with the main scale. Since the seventh line (④) on the vernier scale is in alignment, you know it has moved by 0.7mm.

3. As a result, you see the distance of movement is 4.7mm by calculating the values found in 1 and 2.

＜Bits of Knowledge＞

For those of you who are interested in more of the workings.



The main scale is designed to divide 10mm into 10 units while vernier scale divides 9mm into 10 units. It means one unit of the main scale refers to 1mm while that of the vernier scale refers to 0.9mm. The vernier scale is 0.1mm off of the main scale at the first line. The second line includes two of the 0.1mm errors which turns out to be 0.2mm off of the main scale. Following this way, the third will be 0.3mm off, the fourth will be 0.4mm off of the main scale.

Now you move the scale. If you have moved by 0.1mm, the first line on the vernier scale which was 0.1mm off the line meets on the main scale. If you have moved by 0.2mm, the second line on the vernier scale which was 0.2mm off the line meets on the main scale. In this way, when the tenth line on the vernier scale which was 1.0mm off the line meets the main scale, the vernier “0” line also meets the first line on the main scale.

Based on this principle, it has moved by amount of distance that a line on the vernier scale meets a line on the main scale.

NARISHIGE Customer Support Center
E-MAIL: sales@narishige.co.jp