

## How to Use a Refractometer to Determine Concentration

Some fluids utilized in the manufacturing industry are water-dilutable coolants, which are oil-in-water dilutions used for machining. Coolants must operate within a specific concentration window to maintain the right amount of lubricity and additive content.

Refractometers are instruments used to obtain a °Brix reading, which measures the oil content present in a coolant mixture. Additionally, each coolant refracts light differently and therefore has its own specific multiplier, called a refractometer factor. The °Brix reading can be multiplied by the coolant's refractometer factor to determine the coolant concentration.

### Hand Refractometer

Hand refractometers are the traditional method for obtaining a °Brix reading. They are generally inexpensive and can be purchased from Lube-Tech.



### Calibration

1. Clean the sample lens underneath the window using DI water
2. Add a few drops of DI water onto the lens and close the lens
3. Look through the viewing lens. If the line is not reading zero, use the adjustment screw to adjust this reading to zero
4. Clean off the lens

### Procedure

1. Place a drop of sample on the sample lens beneath the clear window
2. Look through the viewing lens to obtain a reading. If the line is clear and crisp, the coolant is in great condition. If the line is hazy, the coolant may be dirty and unstable
3. Clean off the lens with DI water

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## Digital Refractometer

Digital refractometers are becoming more and more common to the industry. They rely on digital optics to obtain a °Brix reading. These can also be purchased from Lube-Tech.



### Calibration

1. Clean the lens using DI water.
2. Place a few drops of DI water on the lens to cover the seeing eye, then close the cover.
3. Press the GO button to turn on the refractometer. Press the MENU button on the display panel until "Set Zero ?" appears on the screen. Press the GO button.
4. Wait until the display reads "Ready". At this point the calibration is complete. Clean off the lens.

### Procedure

1. Place a drop of sample on the sample lens to cover the seeing eye, then close the cover.
2. Press the MENU button until "Brix" appears on the screen. Press the GO button.
3. The LED will display a number on the screen. This is the °Brix reading. Record this value. Clean off the lens with DI water.

## Converting from °Brix Reading to Concentration

Each coolant has its own refractometer factor which can be found on a product data sheet or determined using known sample concentrations. This refractometer factor can be multiplied by the °Brix reading taken from the refractometer to ultimately obtain the coolant concentration.

$$\% \text{ Concentration} = (\text{°Brix Reading}) \times (\text{Refractometer Factor})$$

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