Area of application
With hydrometers the density of liquids can be measured. The density is the ratio of mass to volume of a material and it is measured in g/ml or in g/cm3.

Transparent and non-transparent liquids must be measured with differently standardized hydrometers. Hydrometers for non-transparent liquids are marked with a green colored ring.

-Reference temperature for density measurements = 20°C.
-Hydrometers are adjusted to this temperature.
-Standard temperature measuring range from 0°C to +35°C.

Selection factors
Each hydrometer is designed for a special measuring situation. Factors of influence are:
-temperature
-surface tension
-density.

Select the hydrometers suitable for the liquid and the accuracy desired.

Factor: temperature
The density of the test liquid changes according to the temperature. Hydrometers are adjusted to a liquid temp. 20°C = reference temperature (exceptions: reference temperature = 15°C applies to mineral oil hydrometers referring to Baume).

The test liquid is to be adapted to the reference temperature if possible.

Factor: Surface tension
Surface tension and colour identification:

Surface tension	Density class	Density in g/ml	Colour ring marking
low	L (low)	0.600-1.000	yellow
medium	M (medium)		red
high	H (high)	1.000-2.000	blue

Hydrometers for measuring of non-transparent liquids, which are read “above” green

The surface tension affects:

-immersing of the hydrometers
-the hight of the bulge at the scale, and consequently the accuracy in reading.

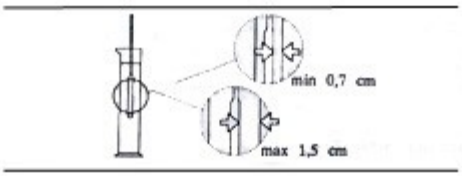
The surface tension of different liquids can be determined from tables.

Factory: Density
Hydrometers are adjusted to a density range = measuring range. In the case of a large measuring range the subdivision can only be rough.
For precise measurements a hydrometer with a smaller measuring range and finer subdivisions must be selected.

Preparations for measuring:
Selection of the measuring tub:
As measuring tubs are siutable: transparent cylinders of glass or plastic, material are suitable as measuring tubs.

-Height = min. Length of the hydrometer
-Diameters = min. hydrometer + 1.5cm = max. hydrometer + 3.0cm

Hydrometers must be able to swim freely and must not touch the cylinder. There will be difficulties in reading if you use measuring tubs being too wide.



Cleaning and drying:
Cleanliness increases the measuring accuracy. Fingerprints and smallest impurity can lead to wrong reading results.
Clean hydrometers and measuring cylinders with alcohol and dry them by help of a lint-free cloth.

Attention:
After the cleaning you can only touch the measuring instrument at the stack point above the scale reading.

Filling of the measuring cylinder:
-2/3 to 3/4 the measuring cylinder is tobe filled the volume of the hydrometer must be taken into consideration
-Please aviod air bubbles. If there are air bubbles, you can dissolve them by knocking at the cylinder

In the cose of overflow: a small quantity must overflow, the surface of the liquid is purified you can read out the values more accurately.

Warming up the liquid to reference temperature:
The temperature of the test liquid has to be warmed up to the reference temperature.

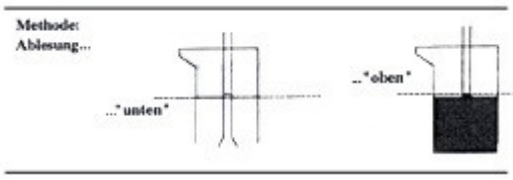
Agitating:
Please stir the liquid up and down with a ring agitator, so that there will bw no differences in temperature and density.

Measurement:
Please immers the hydrometer:
Please touch the hydrometer at the top of the stem with dry fingers.
Then you should immerse it into the liquid until it will be floating (about position of equilibrium).
The reading line should not immerse into the liquid more deeply than 3mm. Other wise the measuring value may be wrong because of adhesive liquid.

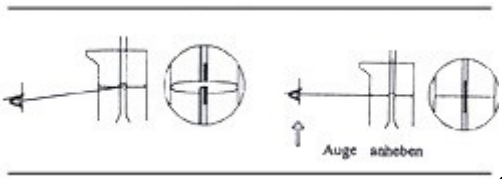
Then you should give the hydrometer a chance to rest.
Please verify that the hydrometer does not touch the vessel at any point.

Liquid transparent **non – transparent**

Level of measurement fluid level upper edge of bulge (meniscus)



Reading of the values
Transparent liquids
You should place your eyes in a position below the level of the level of the liquid. From below the surface has the shape of an ellipse. Then you should slowly go up with your eyes until the ellipse will “shrink” to a line. Line = level of measurement – Now you have to read the value at the scale in the liquid.

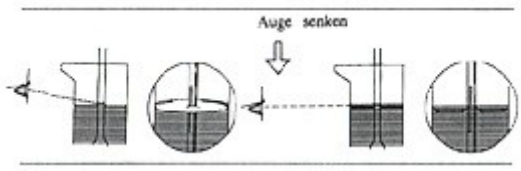


go up with your eyes

Non – transparent liquids

Put your eyes in a position that they are above the edge of the bulge. The surface as well as the bulge seem to have the shape of an ellipse from the top.
Then you should slowly go down with your eyes until the ellipse “shrinks” to a line. Line “ level of measurement then read the valueat the scale above the liquid.

go down with your eyes



Verification of the measurement
The measurement is correct if the bulge does not change after a disturbance. If there are changes, this means that there is an im purification. In that case the measurement has to be repeated.

Final – cleaning
After the measurement you have to clean the hydrometer of the test liquid, then you should dry it and store it at a place free of dust where it cannot easily break.

Safety requirements
In order to avoid in juries of yourself or of other persons as well as damages of the instruments, please observe the following rules.

Please protect the articles against heat
If the temperature exceeds 80°C, the ballast material can soften and there fore lead to errors in measuring
For this reason the products must not be stored on heaters or in the blazing sun, as for example behind windows to the south or in cars.

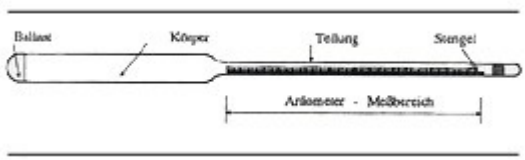
Please pack the instruments in such a way that they cannot easily break
Please put the instruments back into the packaging after each measurement. The delicate hydrometers are packed by us in individual casings and cases to avoid breakage. In the case of frequent application please use the support stand as place to keep it.

After breakage of a hydrometer
If a hydrometer did break please sweep the fragments carefully together with a hand brush. Please do not use any cloth and never use just your hands.

We advise you to be cautious with mercury, it is high – toxic !
If a hydrometer with a mercury thermometer broke, you must collect the mercury first. Never dispose of it with waste water. The mercury should be collected by help of mercury pliers or a mercury pipette. Cracks and corners should also be cleaned carefully. Remainders should be collected with absorbents.
Mercury collected must be kept under water in order to avoid evaporation. Mercury has to be disposed off as toxic waste.

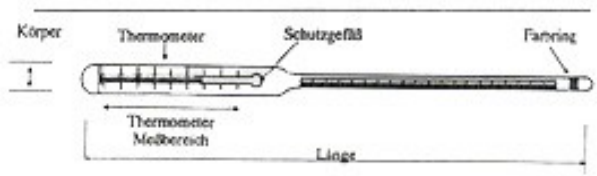
Description of the instrument

Ballast material body graduation stem



Hydrometer – measuring scale

Body thermometer measuring scale safety tub coloured ring



Length