

Multi-Chek[®]

Automotive Fluid Tester

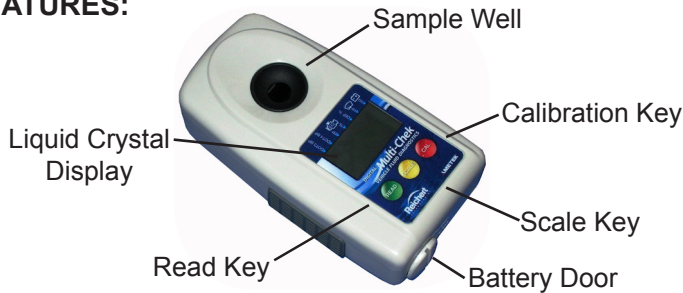
User Guide



INTRODUCTION:

We at Reichert Analytical Instruments would like to extend our appreciation to you for purchasing this instrument. It is our mission to provide a quality product at a very competitive price and we feel this instrument will prove its value time and again to you.

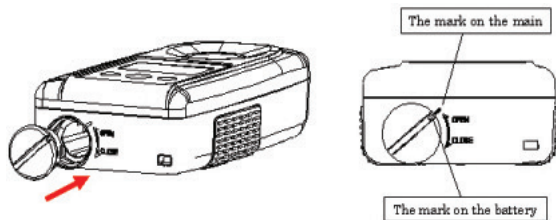
FEATURES:



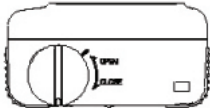
Using a Multi-Chek instrument to test automotive fluids will provide the needed precision to meet your vehicle manufacturers recommendations.

SIMPLE SET UP:

1. Insert the included batteries with positive side (+) facing outward.



2. Align small mark found on the battery cover with mark found on the instrument body and insert cover as shown above.
3. Rotate the cover in the clock wise direction until it is in the position shown to the right.



CLEANING:

Cleaning of the measurement surface and well should be performed immediately after each sample reading. Never immerse the instrument in any liquid. When the measurement surface and well have been completely cleaned no residue should be present.

To properly clean the sample well and glass measurement surface use a mild soap and water solution or Isopropyl Alcohol followed by a distilled water rinse and then thoroughly dry with a soft lint and residue free cloth or a product such as Kimwipes[®].

To clean the refractometer's body use a soft cloth with a mild cleaning solution like window cleaner applied to the cloth and follow by wiping the instrument dry.

CLEANING PRECAUTIONS:

1. Never use any harsh cleaning agents that will damage the instrument.
2. Strong solvents should never be used. Such chemicals will deteriorate the prism seal and attack individual component material which will adversely affect or destroy the instrument.

CALIBRATION:

1. Be sure that the measuring surface and well are clean as outlined under the "Cleaning" section.
2. Apply distilled water to the measurement surface.
3. Allow time for the distilled water sample to temperature equilibrate to that of the instrument.
4. Press and hold the "CAL" key until CAL is displayed. While still holding the "CAL" key press the "READ" key and then release both keys.
5. A series of dashed lines will appear and successful calibration will be indicated when the word END is displayed.

CAUTION:

1. Due to the nature of automotive fluids, to avoid possible injury, Reichert recommends that safety glasses and gloves be worn when removing the radiator cap and testing any acid or caustic solution from a battery.
2. The radiator cap should not be removed while the car is running or the engine is warm. Coolant fluid which is warm and under pressure in the radiator could cause personal injury.
3. Extreme caution is advised when testing any acid or caustic solution in the battery. These chemicals may cause personal injury if they come in contact with your skin or eyes.

SAMPLE ANALYSIS:

Before analyzing a sample, it should be noted that to attain the greatest accuracy the refractometer should be calibrated at the same temperature as the environment that it will be used in. As an example; if the environment that the instrument is being used in changes by five degrees, then the instrument should be re-calibrated.

1. Inspect the glass measuring surface and well to be sure that there is no residue remaining from a previous sample analysis. If the measuring surface and well does not appear to be clean, then refer to the cleaning section of this user guide before proceeding.
2. Extract the sample to be tested and apply adequate sample to the sample well to completely cover the glass measuring surface. Minimum sample size is 0.3 mL.
3. Allow the sample time to reach the same temperature as the instrument. Failure to do so will result in inaccurate measurement.
4. Press the "READ" key and note the displayed value and the position of the annunciator. The annunciator should be located below the fluid scale that you are attempting to attain a reading for. If the position of the annunciator is not located under the desired scale, then press the "SCALE" key until the annunciator position indicates the correct scale.

SCALES:

To change the reading mode scale between DOT3, DOT4, EG FP, EG %, DEF%, Windshield washer fluid FP and Batt SG, press the "SCALE" key to toggle through those choices. The annunciator displayed on the screen denotes the active scale.

DISPLAYING ACTUAL TEMPERATURE:

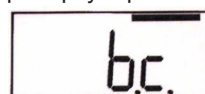
The option to display the actual temperature at the measuring surface exists. To do so momentarily press the "CAL" button while the sample value is displayed.

AUTOMATIC TEMPERATURE COMPENSATION:

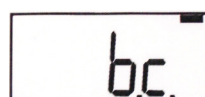
All Reichert refractometers are automatically temperature compensated assuring extremely accurate results. Automatic temperature compensation corrects readings over a range of temperatures. As an example; samples taken within the working temperature range of the instrument are corrected to a reference temperature of 20° C. Temperature compensation is essential because refractive index varies inversely with temperature. This feature is used in lieu of temperature control of the measuring surface and sample. For this feature to be effective however, it is necessary to allow the sample to temperature equilibrate to the ambient temperature of the measuring surface. Without allowing for temperature equilibration of the sample the read values will not be as accurate as they could be since the sample will be in a state of temperature and refractive index change.

BATTERY CONDITION:

The following display examples represent either a low battery condition or an extremely low battery condition where the instrument will no longer operate properly. In either case the batteries should be promptly replaced.



Battery condition low.
Replace Batteries.



Battery condition extremely low.
Replace Batteries.

BRAKE FLUID:

Brake Fluid Type	Water Content	Boiling Point, °F	Boiling Point, °C	Condition
DOT3	< 2%, Dry	> 356° F	> 180° C	OK
	> 3%, Wet	< 320° F	< 160° C	Change
DOT4	< 3%, Dry	> 356° F	> 180° C	OK
	> 4%, Wet	< 310° F	< 155° C	Change

The change levels indicated on this chart are guidelines only.

DRY AND WET BOILING POINTS:

The Society of Automotive Engineers (SAE), Department of Transportation (DOT) and the International Standards Organization have established dry and wet boiling point specifications for brake fluid. The dry and wet boiling points for the brake fluid classes are:

Fluid Type	Dry Boil Point	Wet Boil Point
DOT 3	401°F/205°C	284°F/140°C
DOT 4	446°F/230°C	311°F/155°C

The “dry” and “wet” boiling points indicated in the above table are intended to be used as a guide to judge the condition of the fluid. New fluid must meet the “dry” specification. As the service life of brake fluid increases, the boiling point will approach the “wet” point.

WHEN TO CHANGE BRAKE FLUID:

Many motor vehicle manufacturers recommend checking brake fluid every 12 months, or changing fluid every 24 months. The amount of moisture that brake fluid absorbs depends on a number of factors including the type of fluid, humidity, type of brake hoses, condition of the seals and mileage. Brake fluid will absorb 1% or more moisture per year of service life. A two year old vehicle will have 2 to 3% water in the brake fluid. 3% water reduces the boiling point of DOT 3 brake fluid by approximately 175°F (97°C). 3% water in DOT 4 brake fluid reduces the boiling point by 162°F (90°C).

Generally, the type of driving should influence when to change brake fluid. If the vehicle is used for towing, is driven in mountainous regions, or has an ABS system it would be best to change the fluid sooner. All vehicles should have the brake fluid changed when the water exceeds the minimum wet boil point. Motor vehicle manufacturers may recommend brake fluid changes at lower water content/ higher boiling point than shown on the chart. OEM service recommendations should be followed.

ANTIFREEZE:

Using this temperature compensated instrument to test freeze point protection, provides results that are precise to $\pm 1^\circ\text{F} (\pm 0.6^\circ\text{C})$ when reading a 50 % (vol) aqueous solution of ethylene glycol based antifreeze. By comparison, a hydrometer is only precise to $\pm 8^\circ\text{F} (\pm 4.4^\circ\text{C})$.

Note, that it is recommended that the vehicle manufacturers recommendations be followed concerning concentration for best heat transfer and component protection of the cooling system.

DIESEL EXHAUST FLUID:

Measurement of DEF/AdBlue™ indicates the percent urea content in diesel exhaust fluid. The instrument provides results that are precise to $\pm 0.1\%$ by weight. ISO 22241 requires diesel exhaust fluid to be between 31.8% and 33.2% concentration by weight.

WINDSHIELD WASHER FLUID:

The windshield washer fluid scale in this instrument is designed to measure the freeze point of methanol based washer fluids accurately to $\pm 2^\circ\text{F} (\pm 1^\circ\text{C})$.

European produced vehicles often arrive with windshield washer fluid that is ethanol based. Due to the differences between ethanol and methanol, this instrument will not display an accurate value for ethanol based washer fluids.

ERROR CODES:

- Err01 - No sample present. Add sample.
- Err02 - Inadequate sample. Add additional sample.
- Err03 - Sample exceeds the refractive index reading range.
- Err04 - Sample temperature has not equilibrated. Allow more time for temperature equilibration.
- Err05 - Excessive ambient light. Cover sample well when reading.
- Err06 - Excessive ambient light. Cover sample well when reading.
- Err07 - Positive calibration error. Re-calibrate with distilled water.
- Err08 - Negative calibration error. Re-calibrate with distilled water.
- Err09 - Poor sample condition. Sample may not be able to be read.
- Err10 - Sample type may not be able to be read.
- Err12 - Index of sample is out of range of instrument.
- Err5X - For any errors in this series contact Reichert Analytical Instruments for technical assistance.

SPECIFICATIONS:

Catalog 13940030, 13940031

Reading Scales -

- DOT3 BP = Boiling point
- DOT4 BP = Boiling point
- EG FP = Freeze point, ethylene glycol antifreeze
- EG % = Percent ethylene glycol antifreeze by volume
- DEF % = DEF/AdBlue™, Diesel exhaust fluid
- WW FP = Freeze point, (methanol) windshield washer fluid
- SG = Specific gravity, battery acid

Reading Ranges, Accuracy -

- DOT3 BP = 250°F - 500°F / 121°C - 260°C
- DOT4 BP = 257°F - 527°F / 125°C - 275°C
- EG FP = 32° thru -70°F / 0° thru -57°C, $\pm 0.5^\circ\text{F} / \pm 0.3^\circ\text{C}$
- EG % = 0 thru 95 percent, $\pm 0.2\%$
- DEF % = 0 - 50% w/w (weight), $\pm 0.1\%$
- WW FP = 32° thru -65°F / 0° thru -54°C, $\pm 2^\circ\text{F} / \pm 1^\circ\text{C}$
- SG = 1.000 - 1.463 SG, ± 0.003 SG

Calibration - Distilled Water

Automatic Temperature Compensation

The built in temperature compensation is based on the temperature coefficients that have been calculated for the individual solutions offered in this instrument.

Prism - Glass

Illumination - 589nm LED

Dimensions - 54 x 27 x 100 mm / 2.13 x 1.06 x 3.9 inches

Power - 2 AAA (LR3) Batteries, included.

Battery life - 10,000 readings, Auto Off Sleep Mode.

Ratings - IP65 Dustproof/Water Resistant, CE, RoHS, and WEEE compliant.

Warranty - One year against manufacturing defects. Evidence of tampering voids warranty.



Reichert Technologies
Analytical Instruments
3362 Walden Ave
Depew, NY 14043
USA

Toll Free: 888-849-8955
Phone: 716-686-4500
email: reichertai.refractometers@ametec.com
www.reichertai.com
AMETEK GmbH
Business Unit Reichert
Carl-von-Linde-Strasse 42
85716 Unterschleissheim
Munich, Germany
Tel: +49 (89) 315 8911 0
Fax: +49 (89) 315 891 99
ISO 13485 Certified
ISO 9001 Certified

