

AIR DENSITY GAUGE

★ WORKS EQUALLY WELL WITH
FUEL INJECTION OR CARBS

★ GIVES READINGS TO COMPENSATE FOR
CHANGES IN ALTITUDE AND WEATHER

- 6016 Air density gauge, Kinsler brand, 60% to 110% scale
- 6017 Labor to qualify and calibrate new gauge. **Critically important**...no other brand on the market is calibrated
- 6018 Labor to qualify and SPECIAL calibrate new gauge for COLD WEATHER USE ONLY, for snowmobiles
- 6019 Labor to qualify and re-calibrate customer's gauge (does NOT include extensive rebuilding)
- 6028 Labor to qualify and re-calibrate customer's gauge for COLD WEATHER (does NOT include extensive rebuilding)
- 6029 Replacement bezel and lens, for #6016 air density gauge



WHY YOU NEED TO MEASURE AIR DENSITY

The power output of an engine is directly related to the density of the air that it consumes. Air density is mainly affected by barometric pressure and air temperature.

Each time a piston goes down in your engine, it draws in the same volume of air, but the weight of that volume will vary from day to day. If the atmospheric pressure increases (higher barometer), the air becomes compressed slightly... denser. If the temperature cools, the air shrinks slightly, which also makes it denser. The denser air makes the same volume weigh more, so more power will be produced.

The challenge is to measure the density change so the correct adjustment to the fuel rate can be made to keep a proper air-fuel mixture... best power is obtained with just the right mixture... richer or leaner gives less power. For gasoline this ratio is about twelve pounds of air to one pound of fuel, or 12:1.

Since neither mechanical injection nor carbs automatically change the fuel rate when the air density changes, the fuel system needs to be re-jetted to keep the mixture correct.

If density increases but the fuel is not increased, the mixture will be lean. This will cause a power loss and could damage the engine. Adding fuel to get the proper mixture will give us a power increase.

Lower air density can hurt power output in two ways. Example : the car was running good; the air density was 96% and the vehicle was jetted just right. Now the air density has dropped to 87%, a loss of 9%. See "UNDERSTANDING PERCENTAGE" on Page #194.

- 1) Since there is 9% less air to burn, there has to be a 9% loss of power... there is no way of correcting anything to get that back. Of course, if the engine is supercharged or turbocharged, adjusting the overdrive or wastegate is a way to compensate.
- 2) Even though there was a loss of 9% of air density, the constant flow metering system doesn't sense it, so it puts in the same amount of fuel as it did before. This makes the mixture too rich, which costs about another 5% of the power, making the total loss 14% (9% + 5%)!!! If the fuel system is leaned out to the proper air/fuel ratio, the 5% will be recovered, so there is only the 9% basic loss.

Everyone at the track will be affected the same way. It's just a matter of who can properly adjust for it.

HOW DOES THE AIR DENSITY GAUGE WORK

The gauge has a metal bellows with air sealed inside. Higher atmospheric pressure compresses the bellows and moves the needle higher. Cooler temperature shrinks the air in the bellows, which pulls the bellows together and also moves the needle higher. Thus the gauge will give one needle reading to show the affect of atmospheric pressure and temperature change on the air density.

CALIBRATION IS OPTIONAL The gauges we calibrate are done to read 100% at 59°F and 29.92 inches of mercury pressure (by international agreement, these are the conditions for one standard atmosphere, STP). Some brands of gauges are calibrated differently, and some gauges get abused, so they will read differently than yours.
Use only your gauge to take readings!

It doesn't matter if two gauges don't read exactly the same, since the readings are relative.... as long as you use the same gauge you should get good results. If you have a problem with your gauge we can test and possibly repair it.



© 2008

**Internal workings of an
air density gauge**