

# Dent Marine DM-15V Vacuum Gauge

## Frequently Asked Questions

Q: What is the application of the **DM-15V** Vacuum Gauge?

A: Vacuum gauges are used to provide an “early warning” of fuel filter health on diesel engines. The gauge is placed between the engine and the primary (off engine) fuel filter. As the filter begins to clog, the engine fuel pump will begin to draw a vacuum and the more the filter is restricted the more vacuum will be created. The **DM-15V** vacuum gauge is used to indicate when the filter should be changed.



Q: Can the **DM-15V** vacuum gauge be used on other diesel engines besides the main engine?

A: Yes. Any diesel engine that has an off-engine fuel filter, including generators and wing engines, can benefit from a **DM-15V** vacuum gauge.

Q: How accurate is the **DM-15V**?

A: The **DM-15V** meets the ASME B40.1 Grade A accuracy standard of:  $\pm 1\%$  from 4-11 in Hg and  $\pm 2\%$  from 0-4 in Hg and 11-15 in Hg. The gauge is calibrated at 5 different pressures during manufacture.

Q: Why is the **DM-15V** more durable than other gauges?

A: The **DM-15V** is built to Industrial grade standards and meets standards ASME B.40.100-2005 and EN-837-1.

Q: How is the Dent Marine gauge different from the Racor gauge?

A: The Dent gauge differs from the Racor gauge in a number of important ways. Here are three:

**Size:** The face of the Dent gauge is almost 60% larger. The Racor gauge is 2” (5 cm) in diameter and the Dent gauge is 2 ½” (6.3 cm). The larger gauge makes reading the exact position of the indicator needle much easier

**Range:** The range of the Dent gauge is better suited to the application of marine fuel filter diagnostics. Fuel filters are beginning to clog at about 4 in Hg and should be changed at 8 in Hg or less<sup>1</sup> and certainly before reaching 10 in Hg. The range of the Dent Marine **DM-15V** is 0 to -15 in. Hg where the Racor gauge is 0 – 30 in. Hg meaning that a full 2/3 of the scale on the Racor gauge is not useful.

**Accuracy:** The range of the **DM-15V** was specifically designed so that the vacuum of greatest interest, -5 to -10 inches of Hg, occurs in the *middle* of the gauge where it is most accurate. The reason is bourdon tube-type pressure gauges *are the most accurate in the center half* of the range. Because the span of the Racor gauge is from 0 to 30 in Hg the range of greatest interest occurs in the first quarter of the scale *where the accuracy is typically half* of what it is in the middle of the range.

<sup>1</sup>Per Bob Senter of Northern Lights/Lugger. Always check your engine manual.

Q: Does the thread match the common Racor gauge?

A: Yes. The threaded end of the gauge is standard ¼" NPT fitting and is interchangeable with Racor vacuum gauges.

Q: Is the red needle a "following needle" to record the highest vacuum?

A: Yes. The Dent Marine vacuum gauge has two indicator needles. The black needle shows instantaneous gauge vacuum. The red needle is the "drag needle" and indicates the highest vacuum attained since the last time the needle was reset. The drag needle allows you to run high power tests from the pilot house and later view how high the vacuum got without being in the engine room during the test.

Q: What is the little knob on the face for? How do I reset the drag needle?

A: The knob is used to reset the drag needle after a filter change. Simply turn the knurled knob with your fingers clock-wise until the drag needle rests next to the black needle on the 0 peg.

Q: Is the gauge oil filled? Can it leak?

A: No to both questions. Oil (or glycerin) filled gauges are used in vibrating applications. In most marine fuel applications, the gauges are mounted off the engine and are not subject to vibration so an oil fill is not needed.

Q: What about fuel pulsations?

A: The **DM-15V** gauge includes an integral 300 micron flow restrictor that dampens any pulsations in the fuel pressure providing steady readings even under variable flow rates.

Q: Can you explain how a vacuum gauge works and the effect of fuel tank quantity upon its indication?

A: Sure. Vacuum and Pressure gauges such as these rely on a sensing element called a Bourdon Tube (after Eugene Bourdon ca. 1849). The element is a flattened tube bent into the shape of a "C." One end of the tube is open to the pressure (or vacuum) to be measured through a hole in the gauge stem. The other end is closed and connected to the gauge pointer through a geared system. As the pressure in the tube rises, the tube tries to straighten. That change moves the gearing that in turn, moves the needle. A vacuum gauge works the same way except in a vacuum the "C" tries to close, moving the needle the other way. That is why in a pressure gauge the 0 is usually on the left side and the needle rotates clockwise as the pressure goes up, but on a vacuum gauge the 0 is on the right side and the needle rotates counter-clockwise as the vacuum increases!

The effect of fuel tank level on the gauge reading is not zero but is small and may usually be ignored. The density of diesel is about 6.9 lb/gal (.83 kg/l). Jumping ahead a bit with the math, that means that if your vacuum gauge is located about midway up a fuel tank that is approximately 40 inches (1m) high, the net impact is about 0.8 in Hg under-indicating with full tanks and 0.8 in Hg over-indicating on a nearly empty tank. Pretty much negligible effect for this example.

Q: How do I get one (or three)? What is the cost?

A: Easy! Go to the **www.DentMarine.com** website with secure, on-line ordering. Gauges are US\$145 each.

Q: And if I have more questions?

A: Just send an email to Christopher Dent at [FlyFast2002@yahoo.com](mailto:FlyFast2002@yahoo.com).