

# METRIC CONVERSIONS

## Article Text

1987 Volkswagen Quantum/Quantum Syncro

For Volkswagen Technical Site

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## ARTICLE BEGINNING

### GENERAL INFORMATION

## METRIC CONVERSIONS

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Metric conversions are making life more difficult for the mechanic. In addition to doubling the number of tools required, metric-dimensioned nuts and bolts are used alongside English components in many new vehicles. The mechanic has to decide which tool to use, slowing down the job. The tool problem can be solved by trial and error, but some metric conversions aren't so simple. Converting temperature, lengths or volumes requires a calculator and conversion charts, or else a very nimble mind. Conversion charts are only part of the answer though, because they don't help you "think" metric, or "visualize" what you are converting. The following examples are intended to help you "see" metric sizes:

### LENGTH

Meters are the standard unit of length in the metric system. The smaller units are 10ths (decimeter), 100ths (centimeter), and 1000ths (millimeter) of a meter. These common examples might help you to visualize the metric units:

- \* A meter is slightly longer than a yard (about 40 inches).
- \* An aspirin tablet is about one centimeter across (.4 inches).
- \* A millimeter is about the thickness of a dime.

### VOLUME

Cubic meters and centimeters are used to measure volume, just as we normally think of cubic feet and inches. Liquid volume measurements include the liter and milliliter, like the English quarts or ounces.

- \* One teaspoon is about 4 cubic centimeters.
- \* A liter is about one quart.
- \* A liter is about 61 cubic inches.

### WEIGHT

The metric weight system is based on the gram, with the most common unit being the kilogram (1000 grams). Our comparable units are ounces and pounds:

- \* A kilogram is about 2.2 pounds.
- \* An ounce is about 28 grams.

### TORQUE

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### Article Text (p. 2)

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Torque is somewhat complicated. The term describes the amount of effort exerted to turn something. A chosen unit of weight or force is applied to a lever of standard length. The resulting leverage is called torque. In our standard system, we use the weight of one pound applied to a lever a foot long, resulting in the unit called a foot-pound. A smaller unit is the inch-pound (the lever is one inch long).

Metric units include the meter kilogram (lever one meter long with a kilogram of weight applied) and the Newton-meter (lever one meter long with force of one Newton applied). Some conversions are:

- \* A meter kilogram is about 7.2 foot pounds.
- \* A foot pound is about 1.4 Newton-meters.
- \* A centimeter kilogram (cmkg) is equal to .9 inch pounds.

## PRESSURE

Pressure is another complicated measurement. Pressure is described as a force or weight applied to a given area. Our common unit is pounds per square inch. Metric units can be expressed in several ways. One is the kilogram per square centimeter (kg/cm<sup>2</sup>). Another unit of pressure is the Pascal (force of one Newton on an area of one square meter), which equals about 4 ounces on a square yard. Since this is a very small amount of pressure, we usually see the kiloPascal, or kPa (1000 Pascals). Another common automotive term for pressure is the bar (used by German manufacturers), which equals 10 Pascals. Thoroughly confused? Try the examples below:

- \* Atmospheric pressure at sea level is about 14.7 psi.
- \* Atmospheric pressure at sea level is about 1 bar.
- \* Atmospheric pressure at sea level is about 1 kg/cm<sup>2</sup>.
- \* One pound per square inch is about 7 kPa.

## CONVERSION FACTORS

### CONVERSION FACTORS

TO CONVERT				TO				MULTIPLY BY			
LENGTH											
Millimeters (mm)				Inches				.03937			
Inches				Millimeters				25.4			
Meters (M)				Feet				3.28084			
Feet				Meters				.3048			
Kilometers (Km)				Miles				.62137			
AREA											
Square Centimeters (cm <sup>2</sup> )				Square Inches				.155			
Square Inches				Square Centimeters				6.45159			
VOLUME											
Cubic Centimeters				Cubic Inches				.06103			

## Article Text (p. 3)

For Volkswagen Technical Site

Sunday, March 19, 2000 01:47AM

### CONVERSION FACTORS (Cont.)

<sup>3</sup> INCHES	DECIMALS	mm <sup>3</sup>
1	0.03125	0.79375
2	0.0625	1.5875
3	0.09375	2.38125
4	0.125	3.175
5	0.15625	3.96875
6	0.1875	4.7625
7	0.21875	5.55625
8	0.25	6.35
9	0.28125	7.14375
10	0.3125	7.9375
11	0.34375	8.73125
12	0.375	9.525
13	0.40625	10.31875
14	0.4375	11.1125
15	0.46875	11.90625
16	0.5	12.7
17	0.53125	13.49375
18	0.5625	14.2875
19	0.59375	15.08125
20	0.625	15.875
21	0.65625	16.66875
22	0.6875	17.4625
23	0.71875	18.25625
24	0.75	19.05
25	0.78125	19.84375
26	0.8125	20.6375
27	0.84375	21.43125
28	0.875	22.225
29	0.90625	23.01875
30	0.9375	23.8125
31	0.96875	24.60625
32	1.0	25.4

[illegible]

## Article Text (p. 4)

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**END OF ARTICLE**