

June 30, 2005

## Pressure Terms and Conversion Factors

The following terms are significant in discussions of pressure and can be helpful discussions related to pressure. They are by no means inclusive of all there is to know about pressure, but you may find them useful.

**Absolute Pressure.** The pressure of a liquid or gas, measured relative to a vacuum (zero pressure). All absolute pressure measurements are therefore positive. Abbreviated as "psia" or "in. Hga".

**Accuracy.** The combined error of linearity, hysteresis, and repeatability.

**Ambient Conditions.** The conditions (pressure, temperature, etc.) of the medium surrounding the case of the transducer.

**Atmospheric Pressure.** The barometric pressure of air at a particular place on the Earth's surface. The nominal, or standard, value of atmospheric pressure is 760 mm Hg (14.7 psia).

**Differential Pressure.** The difference in pressure between two pressure sources, measured relative to each other where one is a reference pressure. Abbreviated as "psid" or "in. Hgd".

**Gauge or Gage Pressure.** The pressure of a liquid or gas, measured relative to the ambient atmospheric pressure. Transducer output is 0 when pressure is at local ambient. Abbreviated as "psig" or "in. Hgg". At sea level, 0 psig is ~ 14.7 psia, but in Denver is ~ 12.5 psia. It is possible to measure a gauge pressure of less than 0.

**Hysteresis.** The maximum difference in output, at any measured value within the specified range, when the value is approached first when increasing and then decreasing pressure.

**Linearity.** The maximum deviation of any calibration point on a specified straight line, during any one calibration cycle.

**Micron.** A unit used in measurement of very low pressures, equivalent to 0.01 mm Hg ( $10^{-6}$  m Hg) at 32°F.

**Overpressure.** Pressure greater than the full scale pressure rating of a pressure transducer.

**Pressure.** Force per unit area, commonly measured in psi or by the height of a column of water or mercury that it will support (in feet, inches, or centimeters).

**Pressure Sensing Element.** That part of a pressure transducer that converts the measured pressure into a mechanical motion. It is in contact with the medium being measured, and responds to changes in the medium.

**Pressure Transducer.** An instrument that converts a static or dynamic pressure input into a proportional electrical output.

**Proof Pressure.** The maximum overpressure to which a pressure transducer may be subjected without danger of permanently damaging the instrument (often mistakenly called overpressure rating).

**Repeatability.** The ability to reproduce output readings when the same pressure value is applied consecutively, under the same conditions, and in the same direction.

**Response Time.** The length of time required for the output to rise to a specified percentage of its final value as a result of a step change in pressure.

**Sensitivity.** The ratio of the change in output to a change in the value of the measured pressure.

**Submersionproof.** An instrument designed to continue to operate properly while completely submerged in water.

**Thermal Error.** The maximum change in output, at any pressure value within the specified range, when the temperature is changed from room temperature to specified temperature extremes.

**Vacuum.** Vacuum measured relative to ambient atmospheric pressure. Referred to as pounds per square inch (vacuum) or psiv.

**PRESSURE CONVERSION CHART**  
Multiplication Factors

| From:<br>To:              | PSI        | BAR        | MILLIBAR   | In. Hg<br>(@ 0C) | In. Water<br>(@ 4C) | mm Hg<br>(TORR)<br>(@ 0C) | mm<br>Water<br>(@ 4C) |
|---------------------------|------------|------------|------------|------------------|---------------------|---------------------------|-----------------------|
| PSI                       | 1          | 1.4504e+01 | 1.4504e-02 | 4.9116e-01       | 3.6127e-02          | 1.9337e-02                | 1.4223e-03            |
| BAR                       | 6.8947e-02 | 1          | 0.001      | 3.3865e-02       | 2.4908e-03          | 1.3332e-03                | 9.8068e-05            |
| MILLIBAR                  | 68.947     | 1000       | 1          | 3.3865e+01       | 2.4908              | 1.3332                    | 9.8068e-02            |
| In. HG<br>(@ 0C)          | 2.0360     | 29.529     | 2.9529e-02 | 1                | 7.3552e-02          | 3.9368e-02                | 2.8959e-03            |
| In. Water<br>(@4C)        | 27.680     | 4.0147e+02 | 4.0150e-01 | 1.3596e+01       | 1                   | 5.3525e-01                | 3.9372e-02            |
| mm Hg<br>(TORR)<br>(@ 0C) | 51.7149    | 6.7500e+03 | 7.5010e-01 | 2.5041e+01       | 1.8683              | 1                         | 7.3558e-02            |
| mm Water<br>(@ 4C)        | 7.0308e+02 | 1.0197e+04 | 1.0197e+01 | 3.4532e+02       | 2.5399e+01          | 1.3595e+01                | 1                     |

## Längenmaße

|            | cm                | m                    | km                    | Zoll                 | Fuß                  | mile                  |
|------------|-------------------|----------------------|-----------------------|----------------------|----------------------|-----------------------|
| cm         | 1                 | 0.01                 | 1x10 <sup>-5</sup>    | 0.3937               | 0.03281              | 6.21x10 <sup>-6</sup> |
| m          | 100               | 1                    | 0.001                 | 39.37                | 3.281                | 6.21x10 <sup>-4</sup> |
| km         | 1x10 <sup>5</sup> | 1000                 | 1                     | 3.94x10 <sup>4</sup> | 3281                 | 0.6214                |
| in. (Zoll) | 2.540             | 0.02540              | 2.54x10 <sup>-5</sup> | 1                    | 0.08333              | 1.58x10 <sup>-5</sup> |
| ft. (Fuß)  | 30.48             | 0.3048               | 3.05x10 <sup>-4</sup> | 12                   | 1                    | 1.89x10 <sup>-4</sup> |
| mile       |                   | 1.61x10 <sup>5</sup> | 1609                  | 1.609                | 6.34x10 <sup>4</sup> | 5280 1                |

## Umrechnungstabellen °C - °F

| °C   | °F   | °C | °F    | °C  | °F    | °C  | °F   | °C   | °F   |
|------|------|----|-------|-----|-------|-----|------|------|------|
| -100 | -148 | 32 | 89.6  | 74  | 165.2 | 260 | 500  | 680  | 1256 |
| -90  | -130 | 33 | 91.4  | 75  | 167.0 | 270 | 518  | 690  | 1274 |
| -80  | -112 | 34 | 93.2  | 76  | 168.8 | 280 | 536  | 700  | 1292 |
| -70  | -94  | 35 | 95.0  | 77  | 170.6 | 290 | 554  | 710  | 1310 |
| -60  | -76  | 36 | 96.8  | 78  | 172.4 | 300 | 572  | 720  | 1328 |
| -50  | -58  | 37 | 98.6  | 79  | 174.2 | 310 | 590  | 730  | 1346 |
| -40  | -40  | 38 | 100.4 | 80  | 176.0 | 320 | 608  | 740  | 1364 |
| -30  | -22  | 39 | 102.2 | 81  | 177.8 | 330 | 626  | 750  | 1382 |
| -20  | -4   | 40 | 104.0 | 82  | 179.6 | 340 | 644  | 760  | 1400 |
| -10  | 14   | 41 | 105.8 | 83  | 181.4 | 350 | 662  | 770  | 1418 |
| 0    | 32   | 42 | 107.6 | 84  | 183.2 | 360 | 680  | 780  | 1436 |
| 1    | 33.8 | 43 | 109.4 | 85  | 185.0 | 370 | 698  | 790  | 1454 |
| 2    | 35.6 | 44 | 111.2 | 86  | 186.8 | 380 | 716  | 800  | 1472 |
| 3    | 37.4 | 45 | 113.0 | 87  | 188.6 | 390 | 734  | 810  | 1490 |
| 4    | 39.2 | 46 | 114.8 | 88  | 190.4 | 400 | 752  | 820  | 1508 |
| 5    | 41.0 | 47 | 116.6 | 89  | 192.2 | 410 | 770  | 830  | 1526 |
| 6    | 42.8 | 48 | 118.4 | 90  | 194.0 | 420 | 788  | 840  | 1544 |
| 7    | 44.6 | 49 | 120.2 | 91  | 195.8 | 430 | 806  | 850  | 1562 |
| 8    | 46.4 | 50 | 122.0 | 92  | 197.6 | 440 | 824  | 860  | 1580 |
| 9    | 48.2 | 51 | 123.8 | 93  | 199.4 | 450 | 842  | 870  | 1598 |
| 10   | 50.0 | 52 | 125.6 | 94  | 201.2 | 460 | 860  | 880  | 1616 |
| 11   | 51.8 | 53 | 127.4 | 95  | 203.0 | 470 | 878  | 890  | 1634 |
| 12   | 53.6 | 54 | 129.2 | 96  | 204.8 | 480 | 896  | 900  | 1652 |
| 13   | 55.4 | 55 | 131.0 | 97  | 206.6 | 490 | 914  | 910  | 1670 |
| 14   | 57.2 | 56 | 132.8 | 98  | 208.4 | 500 | 932  | 920  | 1688 |
| 15   | 59.0 | 57 | 134.6 | 99  | 210.2 | 510 | 950  | 930  | 1706 |
| 16   | 60.8 | 58 | 136.4 | 100 | 212.0 | 520 | 968  | 940  | 1724 |
| 17   | 62.6 | 59 | 138.2 | 110 | 230.0 | 530 | 986  | 950  | 1742 |
| 18   | 64.4 | 60 | 140.0 | 120 | 248.0 | 540 | 1004 | 960  | 1760 |
| 19   | 66.2 | 61 | 141.8 | 130 | 266.0 | 550 | 1022 | 970  | 1778 |
| 20   | 68.0 | 62 | 143.6 | 140 | 284.0 | 560 | 1040 | 980  | 1796 |
| 21   | 69.8 | 63 | 145.4 | 150 | 302.0 | 570 | 1058 | 990  | 1814 |
| 22   | 71.6 | 64 | 147.2 | 160 | 320.0 | 580 | 1076 | 1000 | 1832 |
| 23   | 73.4 | 65 | 149.0 | 170 | 338.0 | 590 | 1094 | 1020 | 1868 |
| 24   | 75.2 | 66 | 150.8 | 180 | 356.0 | 600 | 1112 | 1050 | 1922 |
| 25   | 77.0 | 67 | 152.6 | 190 | 374.0 | 610 | 1130 | 1100 | 2012 |
| 26   | 78.8 | 68 | 154.4 | 200 | 392.0 | 620 | 1148 | 1150 | 2102 |
| 27   | 80.6 | 69 | 156.2 | 210 | 410.0 | 630 | 1166 | 1200 | 2192 |
| 28   | 82.4 | 70 | 158.0 | 220 | 428.0 | 640 | 1184 | 1250 | 2282 |
| 29   | 84.2 | 71 | 159.8 | 230 | 446.0 | 650 | 1202 | 1300 | 2372 |
| 30   | 86.0 | 72 | 161.6 | 240 | 464.0 | 660 | 1220 | 1350 | 2462 |
| 31   | 87.8 | 73 | 163.4 | 250 | 482.0 | 670 | 1238 | 1400 | 2552 |

## Flächenmaße

|                                     | cm <sup>2</sup>       | m <sup>2</sup>        | km <sup>2</sup>        | Zoll <sup>2</sup>    | Fuß <sup>2</sup>     | mile <sup>2</sup>      |
|-------------------------------------|-----------------------|-----------------------|------------------------|----------------------|----------------------|------------------------|
| cm <sup>2</sup>                     | 1                     | 0.0001                | 1x10 <sup>-10</sup>    | 0.1550               | 0.00108              | 3.86x10 <sup>-11</sup> |
| m <sup>2</sup>                      | 1x10 <sup>4</sup>     | 1                     | 1x10 <sup>-6</sup>     | 1550                 | 10.76                | 3.86x10 <sup>-7</sup>  |
| km <sup>2</sup>                     | 1x10 <sup>10</sup>    | 1x10 <sup>6</sup>     | 1                      | 1.55x10 <sup>9</sup> | 1.08x10 <sup>7</sup> | 0.3861                 |
| in <sup>2</sup> (Zoll) <sup>2</sup> | 6.452                 | 6.45x10 <sup>-4</sup> | 6.45x10 <sup>-10</sup> | 1                    | 0.00694              | 2.49x10 <sup>-10</sup> |
| ft <sup>2</sup> (Fuß) <sup>2</sup>  | 929.0                 | 0.09290               | 9.29x10 <sup>-8</sup>  | 144                  | 1                    | 3.59x10 <sup>-8</sup>  |
| mile <sup>2</sup>                   | 2.59x10 <sup>10</sup> | 2.59x10 <sup>6</sup>  | 2.590                  | 4.01x10 <sup>9</sup> | 2.79x10 <sup>7</sup> | 1                      |

## Volumenmaße

|                                     | cm <sup>3</sup>      | liter   | m <sup>3</sup>        | (Zoll) <sup>3</sup>  | (Fuß) <sup>3</sup>    | gal                   |
|-------------------------------------|----------------------|---------|-----------------------|----------------------|-----------------------|-----------------------|
| cm <sup>3</sup>                     | 1                    | 0.001   | 1x10 <sup>-6</sup>    | 0.06102              | 3.53x10 <sup>-5</sup> | 2.64x10 <sup>-4</sup> |
| liter                               | 1000                 | 1       | 0.0001                | 61.02                | 0.03532               | 0.2642                |
| m <sup>3</sup>                      | 1x10 <sup>6</sup>    | 1000    | 1                     | 6.10x10 <sup>4</sup> | 35.31                 | 264.2                 |
| in <sup>3</sup> (Zoll) <sup>3</sup> | 16.39                | 0.01639 | 1.64x10 <sup>-5</sup> | 1                    | 5.79x10 <sup>-4</sup> | 0.00433               |
| ft <sup>3</sup> (Fuß) <sup>3</sup>  | 2.83x10 <sup>4</sup> | 28.32   | 0.02832               | 1728                 | 1                     | 7.481                 |
| gal                                 | 3785                 | 3.785   | 0.00379               | 231.0                | 0.1337                | 1                     |

## Druckmaße

|                       | mm Hg | inch Hg | inch H <sub>2</sub> O | ft H <sub>2</sub> O | atm     | lb/in. <sup>2</sup> | kg/cm <sup>2</sup> |
|-----------------------|-------|---------|-----------------------|---------------------|---------|---------------------|--------------------|
| mm Hg                 | 1     | 0.03937 | 0.5353                | 0.04460             | 0.00132 | 0.01934             | 0.00136            |
| inch Hg               | 25.40 | 1       | 13.60                 | 1.133               | 0.03342 | 0.4912              | 0.03453            |
| inch H <sub>2</sub> O | 1.868 | 0.07355 | 1                     | 0.08333             | 0.00246 | 0.03613             | 0.00254            |
| ft H <sub>2</sub> O   | 22.42 | 0.8826  | 12                    | 1                   | 0.02950 | 0.4335              | 0.03048            |
| atm                   | 760   | 29.92   | 406.8                 | 33.90               | 1       | 14.70               | 1.033              |
| lb/in. <sup>2</sup>   | 51.71 | 2.036   | 27.67                 | 2.307               | 0.06805 | 1                   | 0.07031            |
| kg/cm <sup>2</sup>    | 735.6 | 28.96   | 393.7                 | 32.81               | 0.9678  | 14.22               | 1                  |

## Inch (Zoll) / mm

| Inch  | (Zoll) | Millimeter | Inch  | (Zoll) | Millimeter |
|-------|--------|------------|-------|--------|------------|
| 1/64  | .016   | .397       | 33/64 | .516   | 13.097     |
| 1/32  | .031   | .794       | 17/32 | .531   | 13.494     |
| 3/64  | .047   | 1.191      | 35/64 | .547   | 13.891     |
| 1/16  | .063   | 1.588      | 9/16  | .563   | 14.288     |
| 5/64  | .078   | 1.984      | 37/64 | .578   | 14.684     |
| 3/32  | .094   | 2.381      | 19/32 | .594   | 15.081     |
| 7/64  | .109   | 2.778      | 39/64 | .609   | 15.478     |
| 1/8   | .125   | 3.175      | 5/8   | .625   | 15.875     |
| 9/64  | .141   | 3.572      | 41/64 | .641   | 16.272     |
| 5/32  | .156   | 3.969      | 21/32 | .656   | 16.669     |
| 11/64 | .172   | 4.366      | 43/64 | .672   | 17.066     |
| 3/16  | .188   | 4.763      | 11/16 | .688   | 17.463     |
| 13/64 | .203   | 5.159      | 45/64 | .703   | 17.859     |
| 7/32  | .219   | 5.556      | 23/32 | .719   | 18.256     |
| 15/64 | .234   | 5.953      | 47/64 | .734   | 18.653     |
| 1/4   | .250   | 6.350      | 3/4   | .750   | 19.050     |
| 17/64 | .266   | 6.747      | 49/64 | .766   | 19.447     |
| 9/32  | .281   | 7.144      | 25/32 | .781   | 19.844     |
| 19/64 | .297   | 7.541      | 51/64 | .797   | 20.241     |
| 5/16  | .313   | 7.938      | 13/16 | .813   | 20.638     |
| 21/64 | .328   | 8.334      | 53/64 | .828   | 21.034     |
| 11/32 | .344   | 8.731      | 27/32 | .844   | 21.431     |
| 23/64 | .359   | 9.128      | 55/64 | .859   | 21.828     |
| 3/8   | .375   | 9.525      | 7/8   | .875   | 22.225     |
| 25/64 | .391   | 9.922      | 57/64 | .891   | 22.622     |
| 13/32 | .406   | 10.319     | 29/32 | .906   | 23.019     |
| 27/64 | .422   | 10.716     | 59/64 | .922   | 23.416     |
| 7/16  | .438   | 11.113     | 15/16 | .938   | 23.813     |
| 29/64 | .453   | 11.509     | 61/64 | .953   | 24.209     |
| 15/32 | .469   | 11.906     | 31/32 | .969   | 24.606     |
| 31/64 | .484   | 12.303     | 63/64 | .984   | 25.003     |
| 1/2   | .500   | 12.700     | 1     | 1.000  | 25.400     |

## psi~bar

| psi | bar    | psi | bar    | psi | bar   | psi | bar   | psi | bar   |
|-----|--------|-----|--------|-----|-------|-----|-------|-----|-------|
| 1   | 0,0689 | 41  | 2,82   | 81  | 5,58  | 205 | 14,12 | 510 | 35,14 |
| 2   | 0,14   | 42  | 2,89   | 82  | 5,65  | 210 | 14,47 | 520 | 35,83 |
| 3   | 0,21   | 43  | 2,96   | 83  | 5,72  | 215 | 14,81 | 530 | 36,52 |
| 4   | 0,28   | 44  | 3,03   | 84  | 5,79  | 220 | 15,16 | 540 | 37,21 |
| 5   | 0,35   | 45  | 3,10   | 85  | 5,86  | 225 | 15,50 | 550 | 37,90 |
| 6   | 0,42   | 46  | 3,17   | 86  | 5,93  | 230 | 15,85 | 560 | 38,58 |
| 7   | 0,49   | 47  | 3,24   | 87  | 5,99  | 235 | 16,19 | 570 | 39,27 |
| 8   | 0,55   | 48  | 3,31   | 88  | 6,06  | 240 | 16,54 | 580 | 39,96 |
| 9   | 0,62   | 49  | 3,38   | 89  | 6,13  | 245 | 16,88 | 590 | 40,65 |
| 10  | 0,69   | 50  | 3,45   | 90  | 6,20  | 250 | 17,22 | 600 | 41,34 |
| 11  | 0,76   | 51  | 3,51   | 91  | 6,27  | 255 | 17,57 | 610 | 42,03 |
| 12  | 0,83   | 52  | 3,58   | 92  | 6,34  | 260 | 17,91 | 620 | 42,72 |
| 13  | 0,90   | 53  | 3,65   | 93  | 6,41  | 265 | 18,26 | 630 | 43,41 |
| 14  | 0,97   | 54  | 3,72   | 94  | 6,48  | 270 | 18,60 | 640 | 44,10 |
| 15  | 1,04   | 55  | 3,79   | 95  | 6,55  | 275 | 18,95 | 650 | 44,79 |
| 16  | 1,10   | 56  | 3,86   | 96  | 6,61  | 280 | 19,29 | 660 | 45,48 |
| 17  | 1,17   | 57  | 3,93   | 97  | 6,68  | 285 | 19,64 | 670 | 46,17 |
| 18  | 1,24   | 58  | 4,00   | 98  | 6,75  | 290 | 19,98 | 680 | 46,86 |
| 19  | 1,31   | 59  | 4,07   | 99  | 6,82  | 295 | 20,33 | 690 | 47,55 |
| 20  | 1,38   | 60  | 4,13   | 100 | 6,89  | 300 | 20,67 | 700 | 48,24 |
| 21  | 1,45   | 61  | 4,20   | 105 | 7,23  | 310 | 21,36 | 710 | 48,92 |
| 22  | 1,52   | 62  | 4,27   | 110 | 7,58  | 320 | 22,05 | 720 | 49,61 |
| 23  | 1,59   | 63  | 4,34   | 115 | 7,92  | 330 | 22,74 | 730 | 50,30 |
| 24  | 1,65   | 64  | 4,41   | 120 | 8,27  | 340 | 23,43 | 740 | 50,99 |
| 25  | 1,72   | 65  | 4,48   | 125 | 8,61  | 350 | 24,12 | 750 | 51,68 |
| 26  | 1,79   | 66  | 4,55   | 130 | 8,96  | 360 | 24,80 | 760 | 52,36 |
| 27  | 1,86   | 67  | 4,62   | 135 | 9,30  | 370 | 25,49 | 770 | 53,05 |
| 28  | 1,93   | 68  | 4,69   | 140 | 9,65  | 380 | 26,18 | 780 | 53,74 |
| 29  | 2,00   | 69  | 4,75   | 145 | 9,99  | 390 | 26,87 | 790 | 54,43 |
| 30  | 2,07   | 70  | 4,82   | 150 | 10,34 | 400 | 27,56 | 800 | 55,12 |
| 31  | 2,14   | 71  | 4,89   | 155 | 10,68 | 410 | 28,25 | 810 | 55,81 |
| 32  | 2,20   | 72  | 4,96   | 160 | 11,02 | 420 | 28,94 | 820 | 56,50 |
| 33  | 2,27   | 73  | 5,03   | 165 | 11,37 | 430 | 29,63 | 830 | 57,19 |
| 34  | 2,34   | 74  | 5,10   | 170 | 11,71 | 440 | 30,32 | 840 | 57,88 |
| 35  | 2,41   | 75  | 5,17</ |     |       |     |       |     |       |