Conversion Tables

Conversion Between Systems of Measurement

	Technical system and CGS system	Multipy by →	International system	Multiply by ←	British system
Length	m	1	m	0,0254	in(inch)
			m	0,3048	ft(foot)
Time	s	1	s	1	s
Area	m^2	1	m^2	0,000645	in^2
			m^2	0,0929	ft^2
Volume	m^3	1	m^3	$1.639 \cdot 10^{-5}$	in^3
			m^3	0,02832	ft^3
Speed	m/s^{-1}	1	m/s^{-1}	0,3048	ft/s
Acceleration	m/s^{-2}	1	m/s^{-2}	0.3048	ft/s
Mass	$kg/s^2/m^{-1}$	9,81	kg	0,4536	lb (pound)
Force	kg o kp	9,81	N	4,4483	lb f (pound)
	kg	0,981	da N = 10 N		
Torque	kgm	9,81	Nm	1,356	lb f .ft
Density	$kg.s^2.m^{-1}$	9,81	$kg.m^{-3}$	16,02	$lb.ft^{-3}$
Specific weight	$kg.m^{-1}$	9,81	$N.m^{-3}$	157,16	$lb\ f\ .ft^{-3}$
Work, engergy	kgm^2/s^{-2}	9,81	J	1,356	lb f .ft
			KWH=3,6.10^6J		
Heat	Cal	4186	J	1055,1	BTU
Power	$kg.m.s^{-1}$	9,81	W	1,3558	lb f .ft/s
	CV	735	W	745,7	HP
Pressure	$kg.m^{-2}$	9,81	Pa	$6.895 \cdot 10^3$	$p.s.i.=lb\ f\ /in^{-2}$
	kg/cm^{-2}	0,981	bar = 10^5Pa		
Mass flow	$kg.s.m^{-1}$	9,81	kg/s	0,4536	lb/s
Volume flow	m^3/s	1	m^3/s	0,02832	ft^3/s
	Nl/min^{-1}	0,0000167	Nm^3/S	0,000472	SCFM
Dynamic viscosity	$kg.s.m^{-2}$	9,81	Pa.s	6,896	$lb\ f\ .s.in^{-2}$
Kinematic viscosity	Po (poise-system CGS)	0,1	Pa.s		
	$m^2.s^{-2}$	1	m^2/s^{-2}	0.0929	ft^2/s
	St (stokes-system CGS)	10^{-4}	m^2/s^{-2}		

Technical system and CGS system	Divide by ←	International system	Divide by →	British system

Temperature Conversion

°F = [1,8 · c} + 32
°C = [F - 32] · 0,55
°K = C + 273

°C = degrees Celsius

°K = degrees Kelvin

°F = degrees Fahrenheit

Multiples and Sub-Multiples

Name	Symbol	Value
tera	T	10^{12}
giga	G	10^9
mega	M	10^6
kilo	k	10^3
etto	h	10^2
deca	da	10
deci	d	10^{-1}
centi	c	10^{-2}
milli	m	10^{-3}
micro	µ	10^{-6}
nano	n	10^{-9}
pico	p	10^{-12}

Pressure Unit Conversion Factors

To obtain the pressure for the following units, multiply the number given for the source units by the coefficient shown

Source Units	Pa	kPa	MPa	bar	mbar	kp/cm²	cmH²O	mm H²O	mmHg	p.s.i
Pa	1	10^{-3}	10^{-5}	10^{-5}	10^{-2}	$10,1972 \cdot 10^{-6}$	$10,1972 \cdot 10^{-3}$	$101,972 \cdot 10^{-3}$	$7,5006 \cdot 10^{-3}$	$0,145038 \cdot 10^{-3}$
kPa	10^3	1	10^{-3}	10^{-2}	10	$10,1972 \cdot 10^{-3}$	10,1972	101,972	7,50062	0,145038
MPa	10^6	10^3	1	10	10^4	10,1972	$10,1972 \cdot 10^3$	$101,972 \cdot 10^3$	$7,5006 \cdot 10^3$	$0,145038 \cdot 10^3$
bar	10^5	10^2	10^{-1}	1	10^3	1,01972	$1,01972 \cdot 10^3$	$10,1972 \cdot 10^3$	750,062	14,5038
mbar	100	0,1	10^{-4}	10^{-3}	1	$1,01972 \cdot 10^{-3}$	1,01972	10,1972	0,750062	$14,5038 \cdot 10^{-3}$
kp/cm²	98.066,5	98,0665	$98,0665 \cdot 10^{-3}$	0,989665	980,665	1	1000	10.000	735,559	14,2233
cm H_2O	98,0665	$98,0665 \cdot 10^{-3}$	$98,0665 \cdot 10^{-6}$	$0,98665 \cdot 10^{-3}$	0,98665	10^{-3}	1	10	0,735559	$14,2233 \cdot 10^{-3}$
mm H_2O	9,80665	$9,80665 \cdot 10^{-3}$	$9,80665 \cdot 10^{-6}$	$98,0665 \cdot 10^{-6}$	$98,0665 \cdot 10^{-3}$	10^{-4}	0,1	1	$73,5559 \cdot 10^{-3}$	$14,2233 \cdot 10^{-3}$
mm Hg	133,322	$133,322 \cdot 10^{-3}$	$133,322 \cdot 10^{-3}$	$1,33322 \cdot 10^{-3}$	1,33322	$1,35951 \cdot 10^{-3}$	1,35951	135951	1	$19,3368 \cdot 10^{-3}$
p.s.i	6.894,76	6,89476	$6,89476 \cdot 10^{-3}$	$68,9476 \cdot 10^{-3}$	68,9476	$70,307 \cdot 10^{-3}$	70,307	703,07	51,7149	1

Air Constants @ 20°C

Entity	Symbol	Value	
Dynamic viscosity	μ	$17,89.10^{-6}$	Pa s
Kinematic viscosity	γ	$14,61.10^{-6}$	m^2s^{-1}
Density	ρ	1,225	kgm^{-3}
Specific heat at constant pressure	Cp	1,004	KJ kg^{-1} K^{-1}
Speed of sound	α	340,29	m s^{-1}
Gas constant	R	287,1	J kg^{-1} K^{-}

[1]

Content of Water Vapour in Saturated Compressed Air

Grams of water vapour per cubic metre ($g/m^{3)}$) of air at ambient atmospheric pressure 1.013 bar (0 bar gauge pressure), saturated and compressed at the given pressures and temperatures

	Pressure - Bar												
Temperature °C	0	0,4	0,63	1	1,6	2,5	4	6,3	8	10	12,5	16	20
0	4,82	3,45	2,97	2,42	1,87	1,39	0,97	0,67	0,54	0,44	0,36	0,29	0,23
5	6,88	4,93	4,24	3,46	2,68	1,99	1,39	0,95	0,77	0,63	0,52	0,41	0,33
10	9,41	6,74	5,80	4,73	3,66	2,72	1,90	1,30	1,06	0,87	0,70	0,56	0,45
15	12,7	9,08	7,83	6,39	4,94	3,67	2,56	1,76	1,43	1,17	0,95	0,76	0,61
20	17,4	12,5	10,7	8,75	6,77	5,02	3,51	2,41	1,95	1,60	1,30	1,04	0,84
25	23,6	16,9	14,6	11,9	9,18	6,82	4,77	3,27	2,65	2,17	1,77	1,40	1,14
30	30,5	21,8	18,8	15,3	11,9	8,81	6,16	4,22	3,43	2,81	2,29	1,81	1,47
35	39	27,9	24	19,6	15,2	11,3	7,87	5,40	4,38	3,59	2,92	2,32	1,88
40	49,6	35,5	30,6	24,9	19,3	14,3	10	6,87	5,57	4,55	3,72	2,95	2,39
45	63,5	45,45	39,2	31,9	24,7	18,3	12,8	8,79	7,13	5,84	4,76	3,77	3,06
50	81	58	49,9	40,7	31,5	23,4	16,4	11,2	9,10	7,45	6,07	4,82	3,90

Volume Flow Unit Conversion Factors

To obtain volume flow for the following units, multiply the number given for the source units by the coefficient shown

Source Units	m3/s	l/s	cm^3/s	m^3/h	m^3/min	l/h	l/min	ft^3/min (scfm)	gallon/ min UK	gallon/ min USA
m^3/s	1	10^3	10^6	3600	60	$3,6\,10^3$	$60\,10^3$	$2,1188\,10^3$	$13,198\,10^3$	$15,850\,10^3$
l/s	10^{-3}	1	10^3	3,6	$60\,10^{-3}$	$3,6\,10^3$	60	2,1188	13,198	15,850
cm^3/s	10^{-6}	10^{-3}	1	$3600\,10^{-6}$	$60\,10^{-6}$	3,6	$60\,10^{-3}$	$2,1188\,10^{-3}$	$13,198\,10^{-3}$	$15,850\,10^{-3}$
m^3/h	$0,27777\,8\,10^{-3}$	0,27778	$0,27777\,8\,10^3$	1	$16,667\,10^{-3}$	10^3	16,667	0,58856	3,6661	4,4028
m^3/min	$16,667\,10^{-3}$	16,667	$16,667\,10^3$	60	1	$6\,10^4$	10^3	35,313	219,97	$264,17^3$
l/h	$0,27778\,10^{-6}$	$0,27778\,10^{-3}$	0,27778	10^{-3}	$16,667\,10^{-6}$	1	$16,667\,10^{-3}$	$0,58856\,10^{-3}$	$3,6661\,10^{-3}$	$4,4028\,10^{-3}$
l/min	$16,667\,10^{-6}$	$16,667\,10^{-3}$	$16,667^{-6}$	$60\,10^{-3}$	10^{-3}	60^{-3}	1	$35,313\,10^{-3}$	$219,97\,10^{-3}$	$264,17\,10^{-3}$
ft^3/min	$0,47195\,10^{-3}$	0,47195	$0,47195\,10^3$	1,6990	$28,317\,10^{-3}$	$1,6990\,10^3$	28,317	1	6,2288	7,4804
UK gallon/min	$75,768\,10^{-6}$	$75,768^{-3}$	75,768	0,27276	$4,5461\,10^{-3}$	272,76	4,5461	0,16054	1	1,2009
US gallon/min	$63,090\,10^{-6}$	$63,090\,10^{-3}$	63,090	0,22712	$3,7854\,10^{-3}$	227,12	3,7854	0,13368	0,83266	1

Recommended Flow Rate

Maximum recommended flow rate in **Nl/min** for pneumatic circuit piping. Flow rate values are calculated as follows:
- pipes Ø 2 to Ø 12 with a pressure drop equal to 0.3% of operating pressure per metre of pipe
- pipes Ø 15 to Ø 40 with a pressure drop equal to 0.15% of the operating pressure per metre of pipe

Inside diameter in mm - Nominal diameter in inches

Pressure			1/8"	1/4"	3/8"		1/2"	3/4"	1"	1 1/4"	1 1/2"
Bar	Ø2	Ø4	Ø6	Ø8	Ø10	Ø12	Ø15	Ø20	Ø25	Ø32	Ø40
2	3,5	19	53	110	190	300	370	750	1350	2500	4300
4	6,2	35	97	200	350	550	700	1400	2400	4500	7800
6	9	50	140	290	500	800	1000	2000	3500	6500	11500
8	11,8	66	185	380	660	1050	1300	2600	4500	8500	15000
10	14,5	82	230	470	820	1300	1600	3250	5700	10500	18500

Indicative Air Consumption for Different Types of Equipment

Type of Equipment	Consumption at full load Nl/min.	Type of Equipment	Consumption at full load Nl/min
6 mm Ø drill	300	Bench tamper	350
12mm Ø drill	500	8 kg tamper	700
20mm Ø drill	1150	10mm Ø riveting machine	450
45mm Ø drill	1650	20mm Ø riveting machine	1000
M6 screwdriver or bolt screwer	300	4 kg chisel	380
M10 screwdriver or bolt screwer	400	6 kg chisel	500
M16 impulse screwer	1150	Small spray paint gun	160
M25 impulse screwer	1650	Industrial spray pain gun	500
1" Ø wheel grinder	350	1mm Ø cleaning bellows	65
6" Ø disk grinder	1500	2mm Ø cleaning bellows	250
9" Ø disk grinder	2100	5mm Ø nozzle sandblasting machine	1600
Polishing machine	1200	8mm Ø nozzle sandblasting machine	4200
1000kg hoist	2150	Plaster sprayer	500
Spot welder	300	Heavy-duty concrete vibrator	2500
		35 kg concrete breaker	1650
		18kg breaker	1850
		30kg breaker	2850

Degree of Protection

According to BS EN 60529 and CEI 529

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Degree of protection against the penetration of liquids

Degree of protection against the penetration of foreign bodies coming into contact with live parts

1st No.	Description	2nd No.	Description
0	Not Protected	0	Not Protected
1	Protected against solid bodies greater than Ø 50 mm	1	Protected against water falling vertically (condensate)
2	Protected against solid bodies greater than Ø 12 mm	2	Protected against drops of water falling up to 15° off the vertical
3	Protected against solid bodies greater than Ø 2.5mm	3	Protected against rain water up to 60° off the vertical
4	Protected against solid bodies greater than Ø 1mm	4	Protected against sprays of water from any direction
5	Protected against dust	5	Protected against jets of water fired from any direction
6	Totally protected against dust	6	Protected against sea waves or the like
		7	Protected against the effects of immersion