MİKROİŞLEMCİLİ VE TÜM ELEKTRONİK CİHAZLARIN UYGULAMALARI İLE İLGİLİ ÖNEMLİ NOTLAR

Elektronik cihazların özellikle mikroişlemcili cihazların yoğun olarak endüstride kullanılmaları ile birlikte klasik anlamda monte edilen panolarda çeşitli sorunlar yaşanmaktadır. Bu tür cihazların performanslarının yüksek olmasına yönelik cihazların monte edildiği panolarda bazı önlemlerin alınması zorunluluk haline gelmiştir. Aşağıda çok çeşitli dünya markası firmaların pano montajında önerdiği yöntemler sizlere sunulmaktadır.

LÜTFEN BU NOKTALARA UYMAYA ÇALIŞINIZ!

1. Termokupl, Rezistans Termometre ve diğer sensör elemanlarında cihaz girişlerine gelen kablolar, besleme ve kumanda kablolarından olabildiğince uzak ve ayrı kanallarda taşınmalıdır.

2. Elektronik ölçü ve kontrol cihazlarının beslemeleri ekranlı bir izolasyon trafosu ile alınmalı, doğrudan hattan alınmamalıdır. Aynı pano içerisinde güç devreleri yer alıyor ise bunların kumanda gerilimi ekranlı ayrı bir izolasyon trafosundan alınmalıdır. Trafo ekranları topraklanmalı, izolasyon trafoları girişleri ayrı fazlardan alınmalıdır.

3. Birden çok elektronik cihaz kullanılıyorsa her cihazın besleme hattı ayrı ayrı çekilmelidir. Elektriksel gürültünün çok olduğu yerlerde besleme hattı üzerine ekranlı izolasyon trafosu ve hat filtresi konmalıdır.

4. Cihaz besleme hattına hiçbir kumanda devresi bağlanmamalıdır. Son kontrol elemanlarının besleme hattı mümkünse cihazın besleme fazından farklı fazdan alınmalıdır.

5. Röle, kontaktör selenoid vana, aşırı elektriksel gürültü üreten elemanların cihazlardan olabildiğince uzak yerleştirilmesine özen gösterilmelidir. Gerekiyorsa bunların bobinleri üzerine gürültüyü bastıracak RC devreler eklenmelidir.

6. AC Motor hız kontrol birimi kullanılan uygulamalarda, hız kontrol biriminden motora giden kablo mutlaka çelik boru veya çelik spiral içinde taşınmalı ya da ekranlı kablo kullanılmalıdır. Aksi takdirde bu kablonun sinyal hatlarının yakınından taşınması tüm uygulamalarda sorun yaratacaktır.

NOT: Yukarıdaki yaklaşımlar sadece ELİMKO cihazları için değil, TÜM ELEKTRONİK CİHAZLAR için geçerlidir.

DOYMUŞ BUHAR VE DOYMUŞ SU ÖZELLİKLERİ

Press.	Temp.	Volume, ft³/lbm			Enthalpy, Btu/lbm			Entropy, Btu/lbm x F			Energy, Btu/lbm	
psia	F	Water	Evap.	Steam	Water	Evap.	Steam	Water	Evap.	Steam	Water	Steam
		v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g	u_f	u_g
3208.2	705.47	0.05078	0.00000	0.05078	906.0	0.0	906.0	1.0612	0.0000	1.0612	875.9	875.9
3094.3	700.0	0.03662	0.03857	0.07519	822.4	172.7	995.2	0.9901	0.1490	1.1390	801.5	952.2
3000.0	695.33	0.03428	0.05073	0.08500	801.8	218.4	1020.3	0.9728	0.1891	1.1619	782.8	973.1
2708.6	680.0	0.03037	0.08080	0.11117	758.5	310.1	1068.5	0.9365	0.2720	1.2086	743.2	1012.8
2500.0	668.11	0.02859	0.10209	0.13068	731.7	361.6	1093.3	0.9139	0.3206	1.2345	718.5	1032.9
2365.7	660.0	0.02768	0.11663	0.14431	714.9	392.1	1107.0	0.8995	0.3502	1.2498	702.8	1043.9
2059.9	640.0	0.02595	0.15427	0.18021	679.1	454.6	1133.7	0.8686	0.4134	1.2821	669.2	1065.0
2000.0	635.80	0.02565	0.16266	0.18831	672.1	466.2	1138.3	0.8625	0.4256	1.2881	662.6	1068.6
1786.9	620.0	0.02466	0.19615	0.22081	646.9	506.3	1153.2	0.8403	0.4689	1.3092	638.8	1080.2
1543.2	600.0	0.02364	0.24384	0.26747	617.1	550.6	1167.7	0.8134	0.5196	1.3330	610.4	1091.4
1500.0	596.20	0.02346	0.25372	0.27719	611.7	558.4	1170.1	0.8085	0.5288	1.3373	605.2	1093.1
1326.17	580.0	0.02279	0.29937	0.32216	589.1	589.9	1179.0	0.7876	0.5673	1.3550	583.5	1099.9
1200.0	567.19	0.02232	0.34013	0.36245	571.9	613.0	1184.8	0.7714	0.5969	1.3683	566.9	1104.3
1133.38	560.0	0.02207	0.36507	0.38714	562.4	625.3	1187.7	0.7625	0.6132	1.3757	557.8	1106.5
1000.0	544.58	0.02159	0.42436	0.44596	542.6	650.4	1192.9	0.7434	0.6476	1.3910	538.6	1110.4
962.79	540.0	0.02146	0.44367	0.46513	536.8	657.5	1194.3	0.7378	0.6577	1.3954	532.9	1111.4
812.53	520.0	0.02091	0.53864	0.55956	512.0	687.0	1199.0	0.7133	0.7013	1.4146	508.8	1115.0
800.0	518.21	0.02087	0.54809	0.56896	509.8	689.6	1199.4	0.7111	0.7051	1.4163	506.7	1115.2
680.86	500.0	0.02043	0.65448	0.67492	487.9	714.3	1202.2	0.6890	0.7443	1.4333	485.4	1117.2
600.0	486.20	0.02013	0.74962	0.76975	471.7	732.0	1203.7	0.6723	0.7738	1.4461	469.5	1118.2
566.15	480.0	0.02000	0.79716	0.81717	464.5	739.6	1204.1	0.6648	0.7871	1.4518	462.4	1118.5
500.0	467.01	0.01975	0.90787	0.92762	449.5	755.1	1204.7	0.6490	0.8148	1.4639	447.7	1118.8
466.87	460.0	0.01961	0.97463	0.99424	441.5	763.2	1204.8	0.6405	0.8299	1.4704	439.8	1118.9
400.0	444.6	0.01934	1.1416	1.610	424.2	780.4	1204.6	0.6217	0.8630	1.4847	422.7	1118.7
381.54	440.0	0.01926	1.1976	1.2169	419.0	785.4	1204.4	0.6161	0.8729	1.4890	417.6	1118.5
308.780	420.0	0.01894	1.4808	1.4997	396.9	806.2	1203.1	0.5915	0.9165	1.5080	395.8	1117.5
300.0	417.35	0.01889	1.5238	1.5427	394.0	808.9	1202.9	0.5882	0.9223	1.5105	392.9	1117.2
250.0	400.97	0.01865	1.8245	1.8432	376.1	825.0	1201.1	0.5679	0.9585	1.5264	375.3	1115.8
247.259	400.0	0.01864	1.8444	1.8630	375.1	825.9	1201.0	0.5667	0.9607	1.5274	374.3	1115.7
200.0	381.80	0.01839	2.2689	2.2873	355.5	842.8	1198.3	0.5438	1.0016	1.5454	354.8	1113.7
195.729	380.0	0.01836	2.3170	2.3353	353.6	844.5	1198.0	0.5416	1.0057	1.5473	352.9	1113.5
153.010	360.0	0.01811	2.9392	2.9573	332.3	862.1	1194.4	0.5161	1.0517	1.5678	331.8	1110.6
150.0	358.43	0.01809	2.9958	3.0139	330.6	863.4	1194.1	0.5141	1.0554	1.5695	330.1	1110.4
120.0	341.27	0.01789	3.7097	3.7275	312.6	877.8	1190.4	0.4919	1.0960	1.5879	312.2	1107.6
117.992	340.0	0.01787	3.7699	3.7878	311.3	878.8	1190.1	0.4902	1.0990	1.5892	310.9	1107.4
100.0	327.82	0.01774	4.4133	4.4310	298.5	888.6	1187.2	0.4743	1.1284	1.6027	298.2	1105.2
89.643	320.0	0.01766	4.8961	4.9138	290.4	894.8	1185.2	0.4640	1.1477	1.6116	290.1	1103.7
80.0	312.04	0.01757	5.4536	5.4711	282.1	900.9	1183.1	0.4534	1.1675	1.6208	281.9	1102.1
70.0	302.93	0.01748	6.1875	6.2050	272.7	907.8	1180.6	0.4411	1.1905	1.6316	272.5	1100.2
67.005	300.0	0.01745	6.4483	6.4658	269.7	910.0	1179.7	0.4372	1.1979	1.6351	269.5	1099.6
60.0	292.71	0.017383	7.1562	7.1736	262.2	915.4	1177.6	0.4273	1.2167	1.6440	262.0	1098.0
50.0	281.02	0.017274	8.4967	8.5140	250.2	923.9	1174.1	0.4112	1.2474	1.6586	250.1	1095.3
49.200	280.0	0.017264	8.6267	8.6439	249.2	924.6	1173.8	0.4098	1.2501	1.6599	249.1	1095.1
40.0	267.25	0.017151	10.479	10.496	236.1	933.6	1169.8	0.3921	1.2844	1.6765	236.0	1092.1
35.427	260.0	0.017089	11.745	11.762	228.8	938.6	1167.4	0.3819	1.3043	1.6862	228.6	1090.3
30.0	250.34	0.017009	13.727	13.744	218.9	945.2	1164.1	0.3682	1.3313	1.6995	218.8	1087.9
25.0	240.07	0.016927	16.284	16.301	208.52	952.1	1160.6	0.3535	1.3607	1.7141	208.4	1085.2
24.968	240.0	0.016926	16.304	16.321	208.45	952.1	1160.6	0.3533	1.3609	1.7142	208.3	1085.2
20.0	227.96	0.016834	20.070	20.087	196.27	960.1	1156.3	0.3358	1.3962	1.7320	196.21	1082.0
17.186	220.0	0.016775	23.131	23.148	188.23	965.2	1153.4	0.3241	1.4201	1.7442	188.18	1079.8
15.0	213.03	0.016726	26.274	26.290	181.21	969.7	1150.9	0.3137	1.4415	1.7552	181.16	1077.9
14.696	212.00	0.016719	26.782	26.799	180.17	970.3	1150.5	0.3121	1.4447	1.7568	180.12	1077.6
11.526	200.0	0.016637	33.622	33.639	168.09	977.9	1146.0	0.2940	1.4824	1.7764	168.05	1074.2
10.0	193.21	0.016592	38.404	38.420	161.26	982.1	1143.3	0.2836	1.5043	1.7879	161.23	1072.3
8.0	182.86	0.016527	47.328	47.345	150.87	988.5	1139.3	0.2676	1.5384	1.8060	150.84	1069.2
7.5110	180.0	0.016510	50.208	50.225	148.00	990.2	1138.2	0.2631	1.5480	1.8111	147.98	1068.4
6.0	170.05	0.016451	61.967	61.984	138.03	996.2	1134.2	0.2474	1.5820	1.8294	138.01	1065.4
5.0	162.24	0.016407	73.515	73.532	130.20	1000.9	1131.1	0.2349	1.6094	1.8443	130.18	1063.1
4.7414	160.0	0.016395	77.27	77.29	127.96	1002.2	1130.2	0.2313	1.6174	1.8487	127.94	1062.4
4.0	152.96	0.016358	90.63	90.64	120.92	1006.4	1127.3	0.2199	1.6428	1.8626	120.90	1060.2
3.0	141.47	0.016300	118.71	118.73	109.42	1013.2	1122.6	0.2009	1.6854	1.8864	109.41	1056.7
2.8892	140.0	0.016293	122.98	123.00	107.95	1014.0	1122.0	0.1985	1.6910	1.8895	107.94	1056.2
2.0	126.07	0.016230	173.74	173.76	94.03	1022.1	1116.2	0.1750	1.7450	1.9200	94.03	1051.8
1.6927	120.0	0.016204	203.25	203.26	87.97	1025.6	1113.6	0.1646	1.7693	1.9339	87.96	1049.9
1.0	101.74	0.016136	333.59	333.60	69.732	1036.1	1105.8	0.1326	1.8455	1.9781	69.73	1044.1
0.94924	100.0	0.016130	350.4	350.4	67.999	1037.1	1105.1	0.1295	1.8530	1.9825	68.00	1043.5
0.50683	80.0	0.016072	633.3	633.3	48.037	1048.4	1096.4	0.0932	1.9426	2.0359	48.036	1037.0
0.25611	60.0	0.016033	1207.6	1207.6	28.060	1059.7	1087.7	0.0555	2.0391	2.0946	28.060	1030.5
0.12163	40.0	0.016019	2445.8	2445.8	8.027	1071.0	1079.0	0.0162	2.1432	2.1594	8.027	1024.0
0.08865	32.018	0.016022	3302.4	3302.4	0.0003	1075.5	1075.5	0.0000	2.1872	2.1872	0.000	1021.3

Derived and Abridged from the 1967 ASME Steam Tables. Copyright 1967 by the American Society of Mechanical Engineers.

KORUYUCU MALZEMELERİN KİMYASAL DAYANIKLIĞI

Corrosives	Concentration	Temp. (℃)	304SS	321SS	316SS	316LSS	316JILSS	310S SS	347SS	Carpenter 20	Inconel 600	Nimonic	Hastelloy B	Hastelloy C-276	Hastelloy X	Titanium	Monel	Tantalum	Teflon	Copper	Zirconium	Nickel	PVC	Cupro-nickel	Aluminium	Brass	Lead	Common steel	50Co-30Cr	Haynes alloy 25
H_2SO_4	5 %	30	B	B	B	B	B	B	B	A	B	B	A	A	One of the Hastelloy series and excellent in heat resistance.	B	B	A	A	B	A	B	A	B	C	C	A	C	Cobalt-base alloy and excellent in heat and abrasion resistance.	A
	〃	B.P	C	C	C	C	C	C	C	B	C	C	A	B		C	C	A		C	A	C		C	C	C	A	C		B
	10%	30	B	B	B	B	B	B	B	A	B	B	A	A		B	B	A	A	B		B	A	B	C	C	A	C		A
	〃	B.P	C	C	C	C	C	C	C	A	C	C	A	B		C	C	A		C		B		C	C	C	A	C		B
	50%	30	C	C	C	C	C	C	C	A	B	B	A	A		B	B	A	A	B		B	A	B	C	C	A	C		A
	〃	B.P	C	C	C	C	C	C	C	A	C	C	A	B		C	C	A		C		B		C	C	C	B	C		B
	90%	30	B	B	B	B	B	B	B	A	B	B	A	A		B	B	A	A	B	B	B	A	B	C	C	A	C		A
	〃	B.P	C	C	C	C	C	C	C	A	C	C	A			C	C	A		C	B	B		C	C	C	B	C		B
2HCL	5 %	30	C	C	C	C	C	C	C	B	B	B	A	A		A	B	A	A	B	B		A	C	C	C	B	C		B
	〃	B.P	C	C	C	C	C	C	C	C	B	B	A	A		B	B	A						C	C	C	B	C		C
	10%	30	C	C	C	C	C	C	C	B	B	B	A	A		A	B	A	A	B	B		A	C	C	C	B	C		B
	〃	B.P	C	C	C	C	C	C	C	C	B	B	A	A		B	B	A						C	C	C	B	C		C
	20%	30	C	C	C	C	C	C	C	B	B	B	A	A		A	B	A	A	B	B		A	C	C	C	B	C		B
	〃	B.P	C	C	C	C	C	C	C	C	B	B	A	A		B	B	A						C	C	C	B	C		C
HNO_3	20%	30	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A	B	C		C	B	C	B	C	C	C		B
	〃	B.P	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A		C		C		C	C	C	C	C		C
	40%	30	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A	A	C		C	B	C	B	C	C	C		B
	〃	B.P	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A		C		C		C	C	C	C	C		C
	75%	30	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A	A	C		C	B	C	B	C	C	C		B
	〃	B.P	A	A	A	A	A	A	A	A	A	A	C	A		A	C	A		C		C		C	C	C	C	C		C
CH_3CO_2H	10%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	B	A	B	A	B	B	C		A
	〃	B.P	A	A	A	A	A	A	A	A	A	A	A	A		A	B	A	A	B	A	B		B	B	B	B	C		A
	50%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	B	A	A	B	A	B	A	B	A	B	B	C		A
	〃	B.P	B	A	A	A	A	A	A	B	A	A	A	A		A	B	A	A	B	A	B		B	B	C	B	C		A
	80%	30	B	A	A	A	A	A	A	A	B	A	A	A		A	B	A	A	B	A	B	A	B	A	C	B	C		A
	〃	B.P	B	A	A	A	A	A	A	A	B	A	A	A		A	B	A	A	B	A	B		B	B	C	B	C		A
H_3PO_4	5 %	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	B	A	B	C	C	B	A		A
	〃	B.P	B	B	A	A	A	A	A	A	B	A	A	A		A	A	A	A	B	A	B		B	C	C	B	A		A
	50%	30	B	B	B	B	B	B	B	A	A	A	A	A		A	A	A	A	B	A	B	A	B	C	C	B	A		A
	〃	B.P	B	B	B	B	B	B	B	A	B	B	A	A		A	B	A	A	B	A	B		C	C	C	B	A		B
	85%	30	B	B	B	B	B	B	B	A	B	B	A	A		A	A	A	A	B	A	B	A	B	C	C	B	A		B
	〃	B.P	B	B	B	B	B	B	B	A	B	B	A	A		A	B	A	A	B	A	B		C	C	C	B	A		B
H_2F_2	30%	30	C	C	C	C	C	C	C	C	A		A	A		C	A			A		A	A	C	C	B	B	C		C
	〃	B.P	C	C	C	C	C	C	C	C	B		C	C		C	B			C		C		C	C	C	B	C		C
	70%	B.P	C	C	C	C	C	C	C	C	B		C	C		C	B			C		C		C	C	C	C	C		C
HCl		30	B	B	B	B	B	B	B	B	B	B	A	A					A		A							A		A
		200	B	B	B	B	B	B	B	B	B	B	A	A					A		A							A		A
		400	B	B	B	B	B	B	B	B	B	B	A	A							A							A		B
NaOH	10%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	A	A	A	B	B	B	B		
	〃	B.P	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A		B	A	A		A	B	B	B	B		
	50%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	A	A	A	B	B	B	B		
	〃	B.P	B	B	B	B	B	B	B	A	A	A	A	A		A	A	A		B	A	A		B	B	B	B	B		
	70%	30	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A	A	B	A	A	A	B	B	B	B	B		
	〃	B.P	B	B	B	B	B	B	B	A	A	A	A	A		A	A	A		B	A	A		B	B	B	B	B		
KOH	25%	B.P	A	A	A	A	A	A	A	A	A	A	A	A		C	A	C		C	A	B		B	C	C	B	B		
	50%	B.P	B	B	B	B	B	B	B	A	A	A	A	A		C	A	C		C	A	B		B	C	C	B	B		
HCl (dry)		30	C	C	C	C	C	C	C	A			A	A		A	A		A	A				A	A	C	B	C		A
〃 (wet)		30	C	C	C	C	C	C	C	C			C	C		A	A		A	C				C	C	C	B	C		A
HCl vapor			C	C	C	C	C	C	C	B									A						C	C	B	C		
HF			C	C	C	C	C	C	C	A	C						B	C	A			B	A	C	C	C	B	C		C
$H_2(SiF_6)$	5 %	20	C	C	C	C	C	C	C	A	A		A	A			B	C	A			C	A	C	C	C	B	C		
F	10%	30	C	C	C	C	C	C	C	A	A		A	A			B	C	A			C	A	C	C	C	B	C		
NaOH	10%	B.P	B	A	A	A	A	A	A	A									A					A	C	C	B	C		
	75%	100	B	A	A	A	A	A	A	A									A					A	C	C	B	C		
CO_2	10%	200	A	A	A	A	A	A	A	A			A	A			A	A	A											
SO_2			A	A	A	A	A	A	A	A						A	A	A	A			A		A		C		C		
$Na_5P_3O^{10}$	10%	30	B	B	B	B	B	B	B	B	C	C	C	A			C			C	B	C	C					C		
CHCl		30	C	C	C	C	C	C	C							C				C				B	C	C		C		
AlF_3	50%	30	B		B												B			A		B		A	C					
Fatty Acids		100	A	A	A	A	A	A	A	A	A		A	A		A	A	A				A		A						
NH_3			A	A	A	A	A	A	A	A									A											
NaCl			A	A	A	A	A	A	A	A	A									B		A		A	C	B		B		
CrO_4										A									A											
H_2O_2			A	A	A	A	A	A	A	A	A		A	A		A	A	A												
S (liguid)			A	A	A	A	A	A	A	A	A					A	A		A						A					
$CaCl_2$			A	A	A	A	A	A	A	A	A		A	A		A	A		A	B		A	A	A		B		B		

A = Aşınma hemen hemen yok
B = Aşınma var, kabul edilebilir miktarda
C = Aşınma çok, uygun değil

SIVILARIN VE GAZLARIN ÖZGÜL AĞIRLIKLARI

LIQUID	SG
Acetic Acid	1.06
Alcohol, Commercial	0.83
Alcohol, Pure	0.79
Ammonia	0.89
Benzine	0.69
Carbolic Acid	0.96
Carbon Disulphide	1.26
Fluoric Acid	1.50
Gasoline	0.70
Kerosene	0.80
Linseed Oil	0.94
Mineral Oil	0.92
Muriatic Acid	1.20
Naphtha	0.76
Nitric Acid	1.50
Petroleum Oil	0.82
Phosphoric Acid	1.78
Sulphuric Acid	1.84
Turpentine Oil	0.87
Vinegar	1.08
Water, Sea	1.03

GAS	SG
Acetylene	0.92
Air	1.0
Alcohol Vapor	1.60
Ammonia	0.59
Carbon Dioxide	1.52
Carbon Monoxide	0.97
Chlorine	2.42
Ether Vapor	2.59
Ethylene	0.97
Hydrochloric Acid	1.26
Hydrofluoric Acid	2.37
Hydrogen	0.07
Nitric Oxide	1.04
Nitrogen	0.97
Nitrous Oxide	1.53
Oxygen	1.11
Sulphur Dioxide	2.25
Water Vapor	0.62

SICAKLIK DÖNÜŞÜM TABLOLARI

FAHRENHAYT (Fahrenheit) VE SANTİGRAD (Centigrade)

BU TABLOYU NASIL KULLANABİLİRSİNİZ?

Çevirmek istediğiniz sıcaklığı orta kolonda bulunuz. Eğer, bu sıcaklık santigrad derece ise, bu sıcaklığın Fahrenhayt değerini bulmak istiyorsanız, sağındaki değer Fahrenhayt'tır. Eğer bu sıcaklık Fahrenhayt derece ise, bu sıcaklığın Santigrad değerini bulmak istiyorsanız, solundaki değer Santigrad'dır.

ÖRNEK= 430°C → 806 Fahrenhayt
430°F → 221 Santigrad'dır.

C	★	F
221	430	806

C	*	F	C	*	F	C	*	F	C	*	F	C	*	F
—273.15	—459.67		—17.2	1	33.8	10.6	51	123.8	43	110	230	266	510	950
—268	—450		—16.7	2	35.6	11.1	52	125.6	49	120	248	271	520	968
—262	—440		—16.1	3	37.4	11.7	53	127.4	54	130	266	277	530	986
—257	—430		—15.6	4	39.2	12.2	54	129.2	60	140	284	282	540	1004
—251	—420		—15.0	5	41.0	12.8	55	131.0	66	150	302	288	550	1022
—246	—410		—14.4	6	42.8	13.3	56	132.8	71	160	320	293	560	1040
—240	—400		—13.9	7	44.6	13.9	57	134.6	77	170	338	299	570	1058
—234	—390		—13.3	8	46.4	14.4	58	136.4	82	180	356	304	580	1076
—229	—380		—12.8	9	48.2	15.0	59	138.2	88	190	374	310	590	1094
—223	—370		—12.2	10	50.0	15.6	60	140.0	93	200	392	316	600	1112
—218	—360		—11.7	11	51.8	16.1	61	141.8	99	210	410	321	610	1130
—212	—350		—11.1	12	53.6	16.7	62	143.6				327	620	1148
—207	—340		—10.6	13	55.4	17.2	63	145.4				332	630	1166
—201	—330		—10.0	14	57.2	17.8	64	147.2				338	640	1184
—196	—320		—9.4	15	59.0	18.3	65	149.0				343	650	1202
—190	—310		—8.9	16	60.8	18.9	66	150.8	100	212	413	349	660	1220
—184	—300		—8.3	17	62.6	19.4	67	152.6				354	670	1238
—179	—290		—7.8	18	64.4	20.0	68	154.4				360	680	1256
—173	—280		—7.2	19	66.2	20.6	69	156.2				366	690	1274
—169	—273	—459.4	—6.7	20	68.0	21.1	70	158.0				371	700	1292
—168	—270	—454	—6.1	21	69.8	21.7	71	159.8				377	710	1310
—162	—260	—436	—5.6	22	71.6	22.2	72	161.6	104	220	428	382	720	1328
—157	—250	—418	—5.0	23	73.4	22.8	73	163.4	110	230	446	388	730	1346
—151	—240	—400	—4.4	24	75.2	23.3	74	165.2	116	240	464	393	740	1364
—146	—230	—382	—3.9	25	77.0	23.9	75	167.0	121	250	482	399	750	1382

—140	—220	—364	—3.3	26	78.8	24.4	76	168.8	127	260	500	404	760	1400
—134	—210	—346	—2.8	27	80.6	25.0	77	170.6	132	270	518	410	770	1418
—129	—200	—328	—2.2	28	82.4	25.6	78	172.4	138	280	536	416	780	1436
—123	—190	—310	—1.7	29	84.2	26.1	79	174.9	143	290	554	421	790	1454
—118	—180	—292	—1.1	30	86.0	26.7	80	176.0	149	300	572	427	800	1472
—112	—170	—274	—0.6	31	87.8	27.2	81	177.8	154	310	590	432	810	1490
—107	—160	—256	0	32	89.6	27.8	82	179.6	160	320	608	438	820	1508
—101	—150	—238	0.6	33	91.4	28.3	83	181.4	166	330	626	443	830	1526
—95.6	—140	—220	1.1	34	93.2	28.9	84	183.2	171	340	644	449	840	1544
—90.0	—130	—202	1.7	35	95.0	29.4	85	185.0	177	350	662	454	850	1562
—84.4	—120	—184	2.2	36	96.8	30.0	86	186.8	182	360	680	460	860	1580
—78.9	—110	—166	2.8	37	98.6	30.6	87	188.6	188	370	698	466	870	1598
—73.3	—100	—148	3.3	38	100.4	31.1	88	190.4	193	380	716	471	880	1616
—67.8	—90	—130	3.9	39	102.2	31.7	89	192.2	199	390	734	477	890	1634
—62.2	—80	—112	4.4	40	104.0	32.2	90	194.0	204	400	752	482	900	1652
—56.7	—70	—94	5.0	41	105.8	32.8	91	195.8	210	410	770	488	910	1670
—51.1	—60	—76	5.6	42	107.6	33.3	92	197.6	216	420	788	493	920	1688
—45.6	—50	—58	6.1	43	109.4	33.9	93	199.4	221	430	806	499	930	1706
—40.0	—40	—40	6.7	44	111.2	34.4	94	201.2	227	440	824	504	940	1724
—34.4	—30	—22	7.2	45	113.0	35.0	95	203.0	232	450	842	510	950	1742
—28.9	—20	—4	7.8	46	114.8	35.6	96	204.8	238	460	860	516	960	1760
—23.3	—10	14	8.3	47	116.6	36.1	97	206.6	243	470	878	521	970	1778
—17.8	0	32	8.9	48	118.4	36.7	98	208.4	249	480	896	527	980	1796
			9.4	49	120.2	37.2	99	210.2	254	490	914	532	990	1814
			10.0	50	122.0	37.8	100	212.0	260	500	932	538	1000	1832

C	*	F	C	*	F	C	*	F	C	*	F
543	1010	1850	821	1510	2750	1099	2010	3650	1377	2510	4550
549	1020	1868	827	1520	2768	1104	2020	3668	1382	2520	4568
554	1030	1886	832	1530	2786	1110	2030	3686	1388	2530	4586
560	1040	1904	838	1540	2804	1116	2040	3704	1393	2540	4604
566	1050	1922	843	1550	2822	1121	2050	3722	1399	2550	4622
571	1060	1940	849	1560	2840	1127	2060	3740	1404	2560	4640
577	1070	1958	854	1570	2858	1132	2070	3758	1410	2570	4658
582	1080	1976	860	1580	2876	1138	2080	3776	1416	2580	4676
588	1090	1994	866	1590	2894	1143	2090	3794	1421	2590	4694
593	1100	2012	871	1600	2912	1149	2100	3812	1427	2600	4712
599	1110	2030	877	1610	2930	1154	2110	3830	1432	2610	4730
604	1120	2048	882	1620	2948	1160	2120	3848	1438	2620	4748
610	1130	2066	888	1630	2966	1166	2130	3866	1443	2630	4766
616	1140	2084	893	1640	2984	1171	2140	3884	1449	2640	4784
621	1150	2102	899	1650	3002	1177	2150	3902	1454	2650	4802
627	1160	2120	904	1660	3020	1182	2160	3920	1460	2660	4820
632	1170	2138	910	1670	3038	1188	2170	3938	1466	2670	4838
638	1180	2156	916	1680	3056	1193	2180	3956	1471	2680	4856
643	1190	2174	921	1690	3074	1199	2190	3974	1477	2690	4874
649	1200	2192	927	1700	3092	1204	2200	3992	1482	2700	4892
654	1210	2210	932	1710	3110	1210	2210	4010	1488	2710	4910
660	1220	2228	938	1720	3128	1216	2220	4028	1493	2720	4928
666	1230	2246	943	1730	3146	1221	2230	4046	1499	2730	4946
671	1240	2264	949	1740	3164	1227	2240	4064	1504	2740	4964
677	1250	2282	954	1750	3182	1232	2250	4082	1510	2750	4982
682	1260	2300	960	1760	3200	1238	2260	4100	1516	2760	5000
688	1270	2318	966	1770	3218	1243	2270	4118	1521	2770	5018
693	1280	2336	971	1780	3236	1249	2280	4136	1527	2780	5036
699	1290	2354	977	1790	3254	1254	2290	4154	1532	2790	5054
704	1300	2372	982	1800	3272	1260	2300	4172	1538	2800	5072
710	1310	2390	988	1810	3290	1266	2310	4190	1543	2810	5090
716	1320	2408	993	1820	3308	1271	2320	4208	1549	2820	5108
721	1330	2426	999	1830	3326	1277	2330	4226	1554	2830	5126
727	1340	2444	1004	1840	3344	1282	2340	4244	1560	2840	5144
732	1350	2462	1010	1850	3362	1288	2350	4262	1566	2850	5162
738	1360	2480	1016	1860	3380	1293	2360	4280	1571	2860	5180
743	1370	2498	1021	1870	3398	1299	2370	4298	1577	2870	5198
749	1380	2516	1027	1880	3416	1304	2380	4316	1582	2880	5216
754	1390	2534	1032	1890	3434	1310	2390	4334	1588	2890	5234
760	1400	2552	1038	1900	3452	1316	2400	4352	1593	2900	5252
766	1410	2570	1043	1910	3470	1321	2410	4370	1599	2910	5270
771	1420	2588	1049	1920	3488	1327	2420	4388	1604	2920	5288
777	1430	2606	1054	1930	3506	1332	2430	4406	1610	2930	5306
782	1440	2624	1060	1940	3524	1338	2440	4424	1616	2940	5324
788	1450	2642	1066	1950	3542	1343	2450	4442	1621	2950	5342
793	1460	2660	1071	1960	3560	1349	2460	4460	1627	2960	5360
799	1470	2678	1077	1970	3578	1354	2470	4478	1632	2970	5378
804	1480	2696	1082	1980	3596	1360	2480	4496	1638	2980	5396
810	1490	2714	1088	1990	3614	1366	2490	4514	1643	2990	5414
816	1500	2732	1093	2000	3632	1371	2500	4532	1649	3000	5432

ÇEVRİM FAKTÖRLERİ

BU TABLOYU NASIL KULLANABİLİRSİNİZ

Sol kenarda büyük harflerle listelenmiş birimlerden çevirmek istediğiniz birimi bulunuz. Sağ tarafta listelenmiş olan birimlerden hangisine çevirmek istiyorsanız, o birime geliniz. Çevirmek istediğiniz birimin miktarı ile sol sütundaki çarpanı çarparak arzu ettiğiniz birim cinsinden değeri bulmuş olursunuz.

ÖRNEK

METRE - m (uzunluk)

x 10^{6}	= Mm
x 10^{3}	= mm
x 10^{2}	= cm
x 10^{-3}	= Km
x 39. 370	= in
x 3. 2808	= ft.
x 1. 0936	= yd.
x 6. 2137 x 10^{-4}	= mi, statute
x 5. 3996 x 10^{-4}	= mi, nautical

3 metrenin ne kadar cm. olduğunu ve ne kadar inch yaptığını bulalım.

3 x 10^{2}	= 300 cm.
3 x 39. 370	= 118. 11 inch

TÜRETİLEN BİRİMLER =Pekçok birim, ana birimin 10' un kuvvetleri (örnek = Pa ve kPa) veya 60' ın faktörleri (örnek = ft / s, ft / min, ft / h) ile çarpılmış şeklidir. Genelde çevrim faktörleri sadece SI birimi veya kullanımı en kolay birim için yapılır.
Listede yer almamış birimleri türetmek için kestirme yöntemler vardır.

NOT = Yoğunluk söz konusu olduğu zaman, aşağıdaki sayılar baz alınır.

60 ^{o} F'da su yoğunluğu	= 62. 3707 lb / ft^{3}
0 ^{o} C' de civa yoğunluğu	= 13.5955 g / cm^{3}

ÖNEMLİ: AŞAGIDAKİ TABLO İNGİLİZCE VERİLMEKTEDİR. TEKNİK LİSANDA BİRÇOK BİRİM İNGİLİZCE ORJİNAL KELİMELERİ İLE KULLANILDIĞI İÇİN TEKNİK ARKADAŞLARA KOLAYLIK OLACAĞI DÜŞÜNÜLMÜŞTÜR. BU NEDENLE TÜRKÇEYE ÇEVRİLMEMİŞTİR. ARADIĞINIZ BİRİMİ ALFABETİK SIRADA BULABİLİRSİNİZ.

ACRES, U.S. Survey (area)

×	4.0469 × 10^{3}	=	m^{2}*
×	4.3560 × 10^{4}	=	ft^{2}
×	1.5625 × 10^{-3}	=	mi^{2}
×	0.4047	=	ha

ATMOSPHERES, Standard at Sea Level Pressure — atm (pressure)

×	1.0132 × 10^{5}	=	Pa*
×	14.696	=	psia
×	7.60 × 10^{2}	=	mmHg at 0°C
×	29.921	=	inHg at 0°C
×	4.0716 × 10^{2}	=	inH_2O at 60°F
×	33.930	=	ftH_2O at 60°F
×	1.0132	=	bars absolute
×	1.0332	=	kgf/cm^{2} absolute

NOTE: Where a qualifying temperature s noted, the values for this unit vary with temperature.

BARRELS, Petroleum — bbl (volume)

×	0.1590	=	m^{3}*
×	9.702 × 10^{3}	=	in^{3}
×	5.6146	=	ft^{3}
×	42	=	gal, U.S.
×	34.972	=	gal, Imp.
×	1.5898 × 10^{2}	=	L

BARS (pressure)

×	10^{5}	=	Pa*
×	14.504	=	psi
×	7.5006 × 10^{2}	=	mmHg at 0°C
×	29.530	=	inHg at 0°C
×	4.0184 × 10^{2}	=	inH_2O at 60°F
×	33.486	=	ftH_2O at 60°F
×	0.9869	=	atm
×	10^{3}	=	mbar
×	1.0197	=	kgf/cm^{2}

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

BRITISH THERMAL UNITS, International Table — Btu (energy)

×	1.054 × 10^{3}	=	J*
×	2.929 × 10^{-4}	=	kW-h
×	3.928 × 10^{-4}	=	hp-h
×	0.252	=	kcal
×	7.780 × 10^{2}	=	ft-lbf

NOTE: There are definitions of Btu other than the International Table, but th differ only past the third decimal place. If four or more decimal places a needed, refer to the appropriate handbook.

BTU PER HOUR, International Table — Btu/h (power)

×	0.293	=	W*
×	1.667 × 10^{-2}	=	Btu/min
×	3.93 × 10^{-4}	=	hp
×	4.20 × 10^{-3}	=	kcal/min
×	12.961	=	ft-lbf/min

NOTE: See note under Btu.

BTU PER MINUTE, International Table — Btu/min (power)
NOTE: Multiply by 60 and refer to Btu Per Hour.

CALORIES, International Table — cal (energy)
NOTE: Divide by 1000 and refer to Kilocalories.

CENTARES — ca (area)
NOTE: Refer to Square Metres*

CENTIMETRES — cm (length)
NOTE: Divide by 100 and refer to Metres.*

CENTIMETRES OF MERCURY, at 0°C — cmHg (pressure)
NOTE: Multiply by 10 and refer to Millimetres of Mercury.

CENTIMETRES PER SECOND — cm/s (velocity)
NOTE: Divide by 100 and refer to Metres Per Second.*

*Indicates proper SI unit

CENTIPOISES — cP (absolute viscosity)
NOTE: Divide by 100 and refer to Poises.

CENTISTOKES — cSt (kinematic viscosity)
NOTE: Divide by 100 and refer to Stokes.

CUBIC CENTIMETRES — cm^3 (volume)

× 10^{-6}	=	m^{3*}
× 6.1024 × 10^{-2}	=	in^3
× 3.5315 × 10^{-5}	=	ft^3
× 3.3814 × 10^{-2}	=	oz, U. S. fluid
× 3.5195 × 10^{-2}	=	oz, Imp. fluid
× 2.6417 × 10^{-4}	=	gal, U. S.
× 2.1997 × 10^{-4}	=	gal, Imp.
× 10^{-3}	=	L
× 2.1134 × 10^{-3}	=	pt
× 1.0567 × 10^{-3}	=	qt

CUBIC CENTIMETRES PER SECOND — cm^3/s (volume per unit time)

× 10^{-6}	=	m^3/s^*
× 3.6614	=	in^3/min
× 2.1189 × 10^{-3}	=	cfm
× 10^{-3}	=	L/s
× 1.5850 × 10^{-2}	=	U. S. gpm
× 2.2824 × 10^{-5}	=	million U. S. gpd

CUBIC FEET — ft^3 (volume)

× 2.832 × 10^{-2}	=	m^{3*}
× 1.728 × 10^{3}	=	in^3
× 9.5751 × 10^{2}	=	oz, U. S. fluid
× 9.9661 × 10^{2}	=	oz, Imp. fluid
× 7.4805	=	gal, U. S.
× 6.229	=	gal, Imp.
× 28.317	=	L
× 0.1781	=	bbl

CUBIC FEET PER HOUR — cfh (volume per unit time)
NOTE: Divide by 60 and refer to Cubic Feet Per Minute.

CUBIC FEET PER MINUTE — cfm (volume per unit time)

× 4.7195 × 10^{-4}	=	m^3/s^*
× 1.6990	=	m^3/h
× 1.728 × 10^{3}	=	in^3/min
× 1.667 × 10^{-2}	=	cfs
× 60	=	cfh
× 0.4719	=	L/s
× 7.4805	=	U. S. gpm
× 1.0772 × 10^{-2}	=	million U. S. gpd

CUBIC FEET PER SECOND — cfs (volume per unit time)
NOTE: Multiply by 60 and refer to Cubic Feet Per Minute.

CUBIC INCHES — in^3 (volume)

× 1.6387 × 10^{-5}	=	m^{3*}
× 5.787 × 10^{-4}	=	ft^3
× 0.5541	=	oz, U. S. fluid
× 0.5767	=	oz, Imp. fluid
× 4.329 × 10^{-3}	=	gal, U. S.
× 3.605 × 10^{-3}	=	gal, Imp.
× 1.639 × 10^{-2}	=	L

CUBIC INCHES PER MINUTE — in^3/min (volume per unit time)

× 2.7312 × 10^{-7}	=	m^3/s^*
× 5.787 × 10^{-4}	=	cfm
× 2.7312 × 10^{-4}	=	L/s
× 4.3290 × 10^{-3}	=	U. S. gpm

* CUBIC METRES — m^3 (volume)

× 6.1024 × 10^{4}	=	in^3
× 35.315	=	ft^3
× 3.3814 × 10^{4}	=	oz, U. S. fluid
× 3.5195 × 10^{4}	=	oz, Imp. fluid
× 2.6417 × 10^{2}	=	gal, U. S.
× 2.1997 × 10^{2}	=	gal, Imp.
× 10^{3}	=	L
× 6.2898	=	bbl

CUBIC METRES PER HOUR — m^3/h (volume per unit time)
NOTE: Divide by 3600 and refer to Cubic Metres Per Second.*

CUBIC METRES PER MINUTE — m^3/min (volume per unit time)
NOTE: Divide by 60 and refer to Cubic Metres Per Second.*

* CUBIC METRES PER SECOND — m^3/s (volume per unit time)

× 60	=	m^3/min
× 3.600 × 10^{3}	=	m^3/h
× 10^{6}	=	cm^3/s
× 2.1189 × 10^{3}	=	cfm
× 10^{3}	=	L/s
× 15.850 × 10^{3}	=	U. S. gpm
× 22.824	=	million U. S. gpd

DEGREES, Angular — ° (plane angles)

× 1.745 × 10^{-2}	=	rad*
× 60	=	', angular
× 3.600 × 10^{3}	=	'', angular

* DEGREES CELSIUS — °C (temperature)

(C × 9/5) + 32	=	°F
C + 273.15	=	K
(C × 9/5) + 491.67	=	°R

NOTE: See also the Temperature Conversion Tables.

DEGREES CENTIGRADE — see Degrees Celsius (temperature)

DEGREES FAHRENHEIT — °F (temperature)

(F − 32)/1.8	=	°C*
(F + 459.67)/1.8	=	K
F + 459.67	=	°R

NOTE: See also the Temperature Conversion Tables.

DEGREES KELVIN — see Kelvin (temperature)

DEGREES RANKINE — °R (temperature)

(R/1.8) − 273.15	=	°C*
R − 459.69	=	°F
R/1.8	=	K

DEGREES PER SECOND, Angular — °/s (angular velocity)

× 1.7453 × 10^{-2}	=	rad/s*
× 0.1667	=	r/min (rpm)

DYNES (force)

× 10^{-5}	=	N*
× 1.0197 × 10^{-6}	=	kgf
× 2.2481 × 10^{-6}	=	lbf

FEET — ft (length)

× 0.3048	=	m*
× 12	=	in
× 0.3333	=	yd
× 1.894 × 10^{-4}	=	mi, statute
× 1.6458 × 10^{-4}	=	mi, nautical

FEET OF WATER, at 60°F — ftH_2O (pressure)

× 2.9863 × 10^{3}	=	Pa*
× 0.4331	=	psi
× 22.399	=	mmHg at 0°C
× 0.8818	=	inHg at 0°C
× 12	=	inH_2O at 60°F
× 2.9473 × 10^{-2}	=	atm
× 2.9863 × 10^{-2}	=	bar
× 3.0452 × 10^{-2}	=	kgf/cm^2

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

FEET PER MINUTE — ft/min (velocity)

× 5.0800 × 10^{-3}	=	m/s*
× 1.8288 × 10^{-2}	=	km/h
× 1.1364 × 10^{-2}	=	mph
× 1.6667 × 10^{-2}	=	ft/s
× 9.8750 × 10^{-3}	=	kn

FEET PER SECOND — ft/s (velocity)
NOTE: Multiply by 60 and refer to Feet Per Minute.

FEET PER SECOND SQUARED — ft/s^2 (acceleration)

× 0.3048	=	m/s^{2*}

FOOT-POUNDS-FORCE — ft-lbf (energy)

× 1.3558	=	J*
× 3.7662 × 10^{-7}	=	MW-h
× 1.285 × 10^{-3}	=	Btu
× 5.0505 × 10^{-7}	=	hp-h
× 3.238 × 10^{-4}	=	kcal

FOOT-POUNDS-FORCE PER HOUR — ft-lbf/h (power)
NOTE: Divide by 60 and refer to Foot-Pounds-Force Per Minute.

FOOT-POUNDS-FORCE PER MINUTE — ft-lbf/min (power)

× 2.2597 × 10^{-2}	=	W*
× 7.716 × 10^{-2}	=	Btu/h
× 3.030 × 10^{-5}	=	hp
× 3.2405 × 10^{-4}	=	kcal/min
× 60	=	ft-lbf/h
× 1.667 × 10^{-2}	=	ft-lbf/s

*Indicates proper SI unit

FOOT-POUNDS-FORCE PER SECOND — ft-lbf/s (power)
NOTE: Multiply by 60 and refer to Foot-Pounds-Force Per Minute.

GALLONS, Imperial — gal (volume)

×	4.546 × 10^{-3}	=	m^3*
×	2.774 × 10^{2}	=	in^3
×	0.1605	=	ft^3
×	1.537 × 10^{2}	=	oz, U. S. fluid
×	160	=	oz, Imp. fluid
×	1.2009	=	gal, U. S.
×	4.546	=	L
×	2.859 × 10^{-2}	=	bbl

GALLONS, U. S. — gal (volume)

×	3.7854 × 10^{-3}	=	m^3*
×	2.31 × 10^{2}	=	in^3
×	0.1337	=	ft^3
×	128	=	oz, U. S. fluid
×	1.3323 × 10^{2}	=	oz, Imp. fluid
×	0.8327	=	gal, Imp.
×	3.7854	=	L
×	8	=	pt
×	4	=	qt
×	2.3810 × 10^{-2}	=	bbl

GALLONS PER HOUR, U. S. — U. S. gph (volume per unit time)
NOTE: Divide by 60 and refer to Gallons Per Minute, U. S.

GALLONS PER MINUTE, U. S. — U. S. gpm (volume per unit time)

×	6.3090 × 10^{-5}	=	m^3/s*
×	2.31 × 10^{2}	=	in^3/min
×	0.1337	=	cfm
×	60	=	U. S. gph
×	1.667 × 10^{-2}	=	U. S. gps
×	6.309 × 10^{-2}	=	L/s
×	1.4400 × 10^{-3}	=	million U. S. gpd

GALLONS PER SECOND, U. S. — U. S. gps (volume per unit time)
NOTE: Multiply by 60 and refer to Gallons Per Minute, U.S.

GRAINS, Avoirdupois or Troy — gr (mass)

×	6.480 × 10^{-5}	=	kg*
×	6.480 × 10^{-2}	=	g
×	2.2857 × 10^{-3}	=	oz, av.
×	2.0833 × 10^{-3}	=	oz, troy
×	1.4286 × 10^{-4}	=	lb, av.
×	1.7361 × 10^{-4}	=	lb, troy
×	4.1667 × 10^{-2}	=	dwt

GRAMS — g (mass)

×	10^{-3}	=	kg*
×	3.5274 × 10^{-2}	=	oz, av.
×	3.2151 × 10^{-2}	=	oz, troy
×	2.2046 × 10^{-3}	=	lb, av.
×	2.6792 × 10^{-3}	=	lb, troy
×	15.432	=	gr
×	0.6430	=	dwt

GRAMS PER CUBIC CENTIMETRE — g/cm^3 (mass per unit volume)
NOTE: Divide by 1000 and refer to Kilograms Per Cubic Metre.*

GRAMS PER CUBIC METRE — g/m^3 (mass per unit volume)
NOTE: Divide by 1000 and refer to Kilograms Per Cubic Metre.*

GRAMS PER LITRE (g/L) — see Kilograms Per Cubic Metre*(mass per unit volume)

HECTARES — ha (area)

×	10^{4}	=	m^2*
×	3.861 × 10^{-3}	=	mi^2
×	2.4711	=	acre

HORSEPOWER, Boiler — boiler hp (power)

×	9.8095 × 10^{3}	=	W*
×	3.3446 × 10^{4}	=	Btu/h
×	13.1548	=	hp (mechanical)
×	1.407 × 10^{2}	=	kcal/min
×	4.3411 × 10^{5}	=	ft-lbf/min

HORSEPOWER, Mechanical — hp (power)

×	7.457 × 10^{2}	=	W*
×	2.543 × 10^{3}	=	Btu/h
×	10.694	=	kcal/min
×	3.30 × 10^{4}	=	ft-lbf/min
×	1.0139	=	metric hp
×	7.6018 × 10^{-2}	=	boiler hp

NOTE: In most conversions, this is the type of horsepower assumed unless otherwise stated.

HORSEPOWER, Metric — metric hp (power)

×	7.3550 × 10^{2}	=	W*
×	2.51 × 10^{3}	=	Btu/h
×	0.9863	=	hp (mechanical)
×	10.55	=	kcal/min

HORSEPOWER-HOURS — hp-h (energy)

×	2.6845 × 10^{6}	=	J*
×	0.7457	=	kW-h
×	2.546 × 10^{3}	=	Btu
×	6.416 × 10^{2}	=	kcal
×	1.98 × 10^{6}	=	ft-lbf

INCHES — in (length)

×	2.54 × 10^{-2}	=	m*
×	8.3333 × 10^{-2}	=	ft
×	2.7778 × 10^{-2}	=	yd
×	1.5783 × 10^{-5}	=	mi, statute

INCHES OF MERCURY, at 0°C — inHg (pressure)

×	3.3864 × 10^{3}	=	Pa*
×	0.4912	=	psi
×	25.4	=	mmHg at 0°C
×	13.608	=	inH_2O at 60°F
×	1.1340	=	ftH_2O at 60°F
×	3.3421 × 10^{-2}	=	atm
×	3.3864 × 10^{-2}	=	bar
×	3.4532 × 10^{-2}	=	kgf/cm^2

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

INCHES OF WATER, at 60°F — inH_2O (pressure)

×	2.4886 × 10^{2}	=	Pa*
×	3.6094 × 10^{-2}	=	psi
×	1.8666	=	mmHg at 0°C
×	7.3486 × 10^{-2}	=	inHg at 0°C
×	8.333 × 10^{-2}	=	ftH_2O at 60°F
×	2.4560 × 10^{-3}	=	atm
×	2.4886 × 10^{-3}	=	bar
×	2.5377 × 10^{-3}	=	kgf/cm^2

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

*JOULES — J (energy)

×	2.778 × 10^{-7}	=	kW-h
×	9.485 × 10^{-4}	=	Btu
×	3.725 × 10^{-7}	=	hp-h
×	2.390 × 10^{-4}	=	kcal
×	0.7376	=	ft-lbf

KELVIN — K (temperature)

K	− 273.15	=	°C*
1.8K	− 459.67	=	°F
1.8K		=	°R

KILOCALORIES, International Table — kcal (energy)

×	4.184 × 10^{3}	=	J*
×	1.1622 × 10^{-3}	=	kW-h
×	3.9683	=	Btu
×	1.5586 × 10^{-3}	=	hp-h
×	3.0860 × 10^{3}	=	ft-lbf
×	10^{3}	=	cal

KILOCALORIES PER MINUTE, International Table — kcal/min (power)

×	69.733	=	W*
×	2.3810 × 10^{2}	=	Btu/h
×	9.3514 × 10^{-2}	=	hp
×	3.0860 × 10^{3}	=	ft-lbf/min

*KILOGRAMS — kg (mass)

×	10^{3}	=	g
×	35.274	=	oz, av.
×	32.151	=	oz, troy
×	2.2046	=	lb, av.
×	2.6792	=	lb, troy
×	1.5432 × 10^{4}	=	gr
×	6.4301 × 10^{2}	=	dwt
×	9.8420 × 10^{-4}	=	long ton
×	1.1023 × 10^{-3}	=	short ton
×	10^{-3}	=	t

*KILOGRAMS PER CUBIC METRE — kg/m^3 (mass per unit volume)

×	10^{3}	=	g/m^3
×	10^{-3}	=	g/cm^3
×	3.6127 × 10^{-5}	=	lb/in^3
×	8.3454 × 10^{-3}	=	lb/U. S. gal
×	1.0022 × 10^{-2}	=	lb/Imp. gal
×	9.9908 × 10^{3}	=	ppm inH_2O at 60°F

*Indicates proper SI unit

KILOGRAMS PER HOUR — kg/h (mass per unit time)
NOTE: Divide by 3600 and refer to Kilograms Per Second.*

KILOGRAMS PER MINUTE — kg/min (mass per unit time)
NOTE: Divide by 60 and refer to Kilograms Per Second.*

* KILOGRAMS PER SECOND — kg/s (mass per unit time)

×	1.3228×10^2	= lb/min
×	60	= kg/min
×	3.600×10^3	= kg/h

KILOGRAMS-FORCE — kgf (force)

×	9.8067	= N*
×	2.2046	= lbf
×	9.8067×10^5	= dynes

KILOGRAMS-FORCE PER SQUARE CENTIMETRE — kgf/cm² (pressure)

×	9.8067×10^4	= Pa*
×	14.223	= psi
×	7.3556×10^2	= mmHg at 0°C
×	28.959	= inHg at 0°C
×	3.9406×10^2	= inH_2O at 60°F
×	32.838	= ftH_2O at 60°F
×	0.9678	= atm
×	0.9807	= bar

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

KILOGRAMS-FORCE TIMES METRES — kgf × m (torque)

×	9.8067	= N-m*
×	7.2330	= lbf × ft

KILOMETRES — km (length)
NOTE: Multiply by 1000 and refer to Metres.*

KILOMETRES PER HOUR — km/h (velocity)

×	0.2778	= m/s*
×	0.6214	= mph
×	54.681	= ft/min
×	0.5400	= kn

KILOPASCALS — kPa (pressure)
NOTE: Multiply by 1000 and refer to Pascals.*

KILOPONDS — see Kilograms-force (force)

KILOWATTS — kW (power)
NOTE: Multiply by 1000 and refer to Watts.*

KILOWATT-HOURS — kW-h (energy)

×	3.600×10^6	= J*
×	10^3	= W-h
×	3.4095×10^3	= Btu
×	1.3410	= hp-h
×	8.5918×10^2	= kcal
×	2.6552×10^6	= ft-lbf

KNOTS, International — kn (velocity)

×	0.5144	= m/s*
×	1.852	= km/h
×	1.1508	= mph
×	1.0127×10^2	= ft/min

LITRES — L (volume)

×	10^{-3}	= m^3*
×	61.024	= in^3
×	3.5315×10^{-2}	= ft^3
×	33.814	= oz, U. S. fluid
×	35.195	= oz, Imp. fluid
×	0.2642	= gal, U. S.
×	0.2200	= gal, Imp.
×	6.2898×10^{-3}	= bbl

LITRES PER SECOND — L/s (volume per unit time)

×	10^{-3}	= m^3/s*
×	3.6614×10^3	= in^3/min
×	2.1189	= cfm
×	15.850	= U. S. gpm
×	2.2824×10^{-2}	= million U. S. gpd

MEGAPASCALS — MPa (pressure)
NOTE: Multiply by 1 000 000 and refer to Pascals.*

MEGAWATTS — MW (power)
NOTE: Multiply by 1 000 000 and refer to Watts.*

* METRES — m (length)

×	10^6	= µm
×	10^3	= mm
×	10^2	= cm
×	10^{-3}	= km
×	39.370	= in
×	3.2808	= ft
×	1.0936	= yd
×	6.2137×10^{-4}	= mi, statute
×	5.3996×10^{-4}	= mi, nautical

METRES PER MINUTE — m/min (velocity)
NOTE: Divide by 60 and refer to Metres Per Second.*

* METRES PER SECOND — m/s (velocity)

×	60	= m/min
×	10^2	= cm/s
×	3.6	= km/h
×	2.2369	= mph
×	1.9685×10^2	= ft/min
×	1.9438	= kn

* METRES PER SECOND SQUARED — m/s^2 (acceleration)

×	3.281	= ft/s^2

METRIC TONS — see Tonnes (mass)

MICROMETRES — µm (length)

×	1.000×10^{-6}	= m*

MICRONS — see Micrometres (length)

MILES, Statute — mi (length)

×	1.6093×10^3	= m*
×	6.3360×10^4	= in
×	5.280×10^3	= ft
×	1.760×10^3	= yd
×	0.8690	= mi, nautical

MILES, International Nautical — mi (length)

×	1.852×10^3	= m*
×	7.2913×10^4	= in
×	6.0761×10^3	= ft
×	2.0254×10^3	= yd
×	1.1508	= mi, statute

MILES PER HOUR, Statute — mph (velocity)

×	0.4470	= m/s*
×	1.6093	= km/h
×	88	= ft/min
×	0.8690	= kn

MILLIBARS — mbar (pressure)

×	10^{-3}	= bars

MILLILITRES — see Cubic Centimetres (volume)

MILLIMETRES — mm (length)
NOTE: Divide by 1000 and refer to Metres.*

MILLIMETRES OF MERCURY, at 0°C — mmHg (pressure)

×	1.3332×10^2	= Pa*
×	1.9337×10^{-2}	= psi
×	0.10	= cmHg at 0°C
×	3.9370×10^{-2}	= inHg at 0°C
×	0.5357	= inH_2O at 60°F
×	4.4644×10^{-2}	= ftH_2O at 60°F
×	1.3158×10^{-3}	= atm
×	1.3332×10^{-3}	= bar
×	1.3595×10^{-3}	= kgf/cm^2

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

MILLION GALLONS PER DAY, U. S. — million U. S. gpd (volume per unit time)

×	4.3813×10^{-2}	= m^3/s*
×	1.6042×10^5	= in^3/min
×	92.834	= cfm
×	43.813	= L/s
×	6.9444×10^2	= U. S. gpm

MINUTES, Angular — ' (plane angles)

×	2.9089×10^{-4}	= rad*
×	1.667×10^{-2}	= °, angular
×	60	= '', angular

* NEWTONS — N (force)

×	0.1020	= kgf
×	0.2248	= lbf
×	10^5	= dynes

*Indicates proper SI unit

* NEWTON-METRES — N-m (torque)

× 0.1020	=	kgf × m
× 0.7376	=	lbf × ft

OUNCES, Avoirdupois — av. oz (mass)

× 2.8350×10^{-2}	=	kg*
× 28.350	=	g
× 0.9115	=	oz, troy
× 0.0625	=	lb, av.
× 7.595×10^{-2}	=	lb, troy
× 4.375×10^{2}	=	gr
× 18.229	=	dwt

OUNCES, Fluid, Imperial — oz (volume)

× 2.8412×10^{-5}	=	m^{3}*
× 1.7339	=	in^3
× 1.0034×10^{-3}	=	ft^3
× 0.9608	=	oz, U. S. fluid
× 7.5060×10^{-3}	=	gal, U. S.
× 6.25×10^{-3}	=	gal, Imp.
× 2.8412×10^{-2}	=	L

OUNCES, Fluid, U. S. — oz (volume)

× 2.9574×10^{-5}	=	m^{3}*
× 1.8047	=	in^3
× 1.0444×10^{-3}	=	ft^3
× 1.0408	=	oz, Imp. fluid
× 7.8125×10^{-3}	=	gal, U. S.
× 6.5053×10^{-3}	=	gal, Imp.
× 2.9573×10^{-2}	=	L

OUNCES, Troy — troy oz (mass)

× 3.1103×10^{-2}	=	kg*
× 31.103	=	g
× 1.0971	=	oz, av.
× 8.3333×10^{-2}	=	lb, troy
× 6.857×10^{-2}	=	lb, av.
× 4.80×10^{2}	=	gr
× 20	=	dwt

PARTS PER MILLION, by weight (mass) in water at 60°F — ppm or ppm in H_2O at 60°F (mass per unit volume)

× 9.9908×10^{-4}	=	kg/m^{3}*
× 3.6094×10^{-8}	=	lb/in^3
× 8.3377×10^{-6}	=	lb/U. S. gal
× 1.0013×10^{-5}	=	lb/Imp. gal

* PASCALS — Pa (pressure)

× 10^{-3}	=	kPa
× 10^{-6}	=	MPa
× 1.4504×10^{-4}	=	psi
× 7.5006×10^{-3}	=	mmHg at 0°C
× 2.9530×10^{-4}	=	inHg at 0°C
× 4.0186×10^{-3}	=	inH_2O at 60°F
× 3.3488×10^{-4}	=	ftH_2O at 60°F
× 9.8692×10^{-6}	=	atm
× 10^{-5}	=	bar
× 1.0197×10^{-5}	=	kgf/cm^2
× 10	=	$dynes/cm^2$

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

PENNYWEIGHTS — dwt (mass)

× 1.5552×10^{-3}	=	kg*
× 1.5552	=	g
× 5.4857×10^{-2}	=	oz, av.
× 5.00×10^{-2}	=	oz, troy
× 3.4286×10^{-3}	=	lb, av.
× 4.167×10^{-3}	=	lb, troy
× 24	=	gr

PINTS, Fluid — pt (volume)

× 4.7316×10^{-4}	=	m^{3}*
× 28.875	=	in^3
× 1.671×10^{-2}	=	ft^3
× 16	=	oz, U. S. fluid
× 16.653	=	oz, Imp. fluid
× 0.125	=	gal, U. S.
× 0.1041	=	gal, Imp.
× 0.4732	=	L
× 0.5	=	qt

POISES — P (absolute viscosity)

× 0.1000	=	Pa-s*
× 100	=	cP
× 2.0885×10^{-3}	=	$lbf\text{-}s/ft^2$
× 0.0672	=	lb/ft-s

POUNDS, Avoirdupois — lb (mass)

× 0.4536	=	kg*
× 4.5359×10^{2}	=	g
× 16	=	oz, av.
× 14.583	=	oz, troy
× 1.2153	=	lb, troy
× 7.00×10^{3}	=	gr
× 2.9167×10^{2}	=	dwt
× 5.00×10^{-4}	=	short ton
× 4.464×10^{-4}	=	long ton
× 4.536×10^{-4}	=	t

POUNDS, Troy — lb (mass)

× 0.3732	=	kg*
× 3.732×10^{2}	=	g
× 12	=	oz, troy
× 13.166	=	oz, av.
× 0.8229	=	lb, av.
× 5.760×10^{3}	=	gr
× 2.40×10^{2}	=	dwt
× 4.1143×10^{-4}	=	short ton
× 3.6735×10^{-4}	=	long ton
× 3.7324×10^{-4}	=	t

POUNDS PER CUBIC FOOT — lb/ft^3 (mass per unit volume)

× 16.018	=	kg/m^{3}*
× 5.787×10^{-4}	=	lb/in^3
× 0.1337	=	lb/U. S. gal
× 0.1605	=	lb/Imp. gal
× 1.6033×10^{4}	=	ppm in H_2O at 60°F

POUNDS PER CUBIC INCH — lb/in^3 (mass per unit volume)

× 2.7680×10^{4}	=	kg/m^{3}*
× 1.728×10^{3}	=	lb/ft^3
× 2.31×10^{2}	=	lb/U. S. gal
× 2.774×10^{2}	=	lb/Imp. gal
× 2.7705×10^{7}	=	ppm in H_2O at 60°F

POUNDS PER HOUR — lb/h (mass per unit time)
NOTE: Divide by 60 and refer to Pounds Per Minute.

POUNDS PER IMPERIAL GALLON — lb/gal (mass per unit volume)

× 99.776	=	kg/m^{3}*
× 3.6047×10^{-3}	=	lb/in^3
× 0.8327	=	lb/U. S. gal
× 9.9868×10^{4}	=	ppm in H_2O at 60°F

POUNDS PER MINUTE — lb/min (mass per unit time)

× 7.5599×10^{-3}	=	kg/s*
× 1.667×10^{-2}	=	lb/s
× 60	=	lb/h

POUNDS PER SECOND — lb/s (mass per unit time)
NOTE: Multiply by 60 and refer to Pounds Per Minute.

POUNDS PER U. S. GALLON — lb/gal (mass per unit volume)

× 1.1983×10^{2}	=	kg/m^{3}*
× 4.3290×10^{-3}	=	lb/in^3
× 1.2010	=	lb/Imp. gal
× 1.1994×10^{5}	=	ppm in H_2O at 60°F

POUNDS-FORCE — lbf (force)

× 4.4482	=	N*
× 0.4536	=	kgf
× 4.4482×10^{5}	=	dynes

POUNDS-FORCE TIMES FEET — lbf × ft (torque)

× 1.3558	=	N-m*
× 0.1383	=	kgf × m

POUNDS-FORCE PER SQUARE INCH — psi (pressure)

× 6.895×10^{3}	=	Pa*
× 51.715	=	mmHg at 0°C
× 2.036	=	inHg at 0°C
× 27.705	=	inH_2O at 60°F
× 2.3088	=	ftH_2O at 60°F
× 6.8046×10^{-2}	=	atm
× 6.895×10^{-2}	=	bar
× 7.031×10^{-2}	=	kgf/cm^2

NOTE: Where a qualifying temperature is noted, the values for this unit vary with temperature.

*Indicates proper SI unit

QUARTS, Fluid — qt (volume)

× 9.4635 × 10^{-4}	=	m^3*
× 57.75	=	in^3
× 3.342 × 10^{-2}	=	ft^3
× 32	=	oz, U. S. fluid
× 33.31	=	oz, Imp. fluid
× 0.25	=	gal, U. S.
× 0.2082	=	gal, Imp.
× 0.9464	=	L

* RADIANS — rad (plane angles)

× 57.296	=	°, angular
× 3.4377 × 10^3	=	', angular
× 2.0626 × 10^5	=	'', angular

* RADIANS PER SECOND — rad/s (angular velocity)

× 57.296	=	°/s
× 9.5493	=	r/min (rpm)

REVOLUTIONS PER MINUTE — r/min (angular velocity)

× 0.1047	=	rad/s*
× 6	=	°/s
× 1.667 × 10^{-2}	=	r/s

NOTE: A common variation of the short form of this category is rpm.

REVOLUTIONS PER SECOND — r/s (angular velocity)
NOTE: Multiply by 60 and refer to Revolutions Per Minute.

SECONDS, Angular — '' (plane angles)

× 4.8481 × 10^{-6}	=	rad*
× 2.778 × 10^{-4}	=	°, angular
× 1.667 × 10^{-2}	=	', angular

SQUARE CENTIMETRES — cm^2 (area)
NOTE: Divide by 10 000 and refer to Square Metres.*

SQUARE FEET — ft^2 (area)

× 9.2903 × 10^{-2}	=	m^2*
× 1.44 × 10^2	=	in^2
× 3.5870 × 10^{-8}	=	mi^2
× 2.2957 × 10^{-5}	=	acre
× 9.29 × 10^{-6}	=	ha

SQUARE INCHES — in^2 (area)

× 6.4516 × 10^{-4}	=	m^2*
× 6.944 × 10^{-3}	=	ft^2

* SQUARE METRES — m^2 (area)

× 10^4	=	cm^2
× 1.550 × 10^3	=	in^2
× 10.764	=	ft^2
× 2.4711 × 10^{-4}	=	acre
× 10^{-4}	=	ha
× 1	=	ca

SQUARE MILES — mi^2 (area)

× 2.5900 × 10^6	=	m^2*
× 6.40 × 10^2	=	acre
× 2.5900 × 10^2	=	ha

STOKES — St (kinematic viscosity)

× 10^{-4}	=	m^2/s*
× 1.076 × 10^{-3}	=	ft^2/s
× 10^2	=	cSt

TONNES — t (mass)

× 10^3	=	kg*
× 2.2046 × 10^3	=	lb, av.
× 2.679 × 10^3	=	lb, troy
× 0.9842	=	long ton
× 1.1023	=	short ton

TONS — long ton (mass)

× 1.016 × 10^3	=	kg*
× 2.240 × 10^3	=	lb, av.
× 2.722 × 10^3	=	lb, troy
× 1.120	=	short ton
× 1.016	=	t

TONS — ton or short ton (mass)

× 9.072 × 10^2	=	kg*
× 2 × 10^3	=	lb, av.
× 2.4306 × 10^3	=	lb, troy
× 0.8929	=	long ton
× 0.9072	=	t

TORR — see Millimetres of Mercury (pressure)

* WATTS — W (power)

× 10^{-3}	=	kW
× 10^{-6}	=	MW
× 3.414	=	Btu/h
× 1.3410 × 10^{-3}	=	hp
× 1.432 × 10^{-2}	=	kcal/min
× 44.2357	=	ft-lbf/min

WATT-HOURS — W-h (energy)
NOTE: Divide by 1000 and refer to Kilowatt-hours.

YARDS — yd (length)

× 0.9144	=	m*
× 36	=	in
× 3	=	ft
× 5.682 × 10^{-4}	=	mi, statute
× 4.937 × 10^{-4}	=	mi, nautical

*Indicates proper SI unit