

EMF Reference Table

1. 規準熱起電力表

B熱電対 Type B Thermocouple

UNIT: μV

ITS-90

$^{\circ}\text{C}$	0	10	20	30	40	50	60	70	80	90	100
0	0	- 2	- 3	- 2	0	2	6	11	17	25	33
100	33	43	53	65	78	92	107	123	141	159	178
200	178	199	220	243	267	291	317	344	372	401	431
300	431	462	494	527	561	596	632	669	707	746	787
400	787	828	870	913	957	1 002	1 048	1 095	1 143	1 192	1 242
500	1 242	1 293	1 344	1 397	1 451	1 505	1 561	1 617	1 675	1 733	1 792
600	1 792	1 852	1 913	1 975	2 037	2 101	2 165	2 230	2 296	2 363	2 431
700	2 431	2 499	2 569	2 639	2 710	2 782	2 854	2 928	3 002	3 078	3 154
800	3 154	3 230	3 308	3 386	3 466	3 546	3 626	3 708	3 790	3 873	3 957
900	3 957	4 041	4 127	4 213	4 299	4 387	4 475	4 564	4 653	4 743	4 834
1000	4 834	4 926	5 018	5 111	5 205	5 299	5 394	5 489	5 585	5 682	5 780
1100	5 780	5 878	5 976	6 075	6 175	6 276	6 377	6 478	6 580	6 683	6 786
1200	6 786	6 890	6 995	7 100	7 205	7 311	7 417	7 524	7 632	7 740	7 848
1300	7 848	7 957	8 066	8 176	8 286	8 397	8 508	8 620	8 731	8 844	8 956
1400	8 956	9 069	9 182	9 296	9 410	9 524	9 639	9 753	9 868	9 984	10 099
1500	10 099	10 215	10 331	10 447	10 563	10 679	10 796	10 913	11 029	11 146	11 263
1600	11 263	11 380	11 497	11 614	11 731	11 848	11 965	12 082	12 199	12 316	12 433
1700	12 433	12 549	12 666	12 782	12 898	13 014	13 130	13 246	13 361	13 476	13 591
1800	13 591	13 706	13 820								

R熱電対 Type R Thermocouple

UNIT: μV

ITS-90

$^{\circ}\text{C}$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
0	0	- 51	- 100	- 145	- 188	- 226					
$^{\circ}\text{C}$	0	10	20	30	40	50	60	70	80	90	100
0	0	54	111	171	232	296	363	431	501	573	647
100	647	723	800	879	959	1 041	1 124	1 208	1 294	1 381	1 469
200	1 469	1 558	1 648	1 739	1 831	1 923	2 017	2 112	2 207	2 304	2 401
300	2 401	2 498	2 597	2 696	2 796	2 896	2 997	3 099	3 201	3 304	3 408
400	3 408	3 512	3 616	3 721	3 827	3 933	4 040	4 147	4 255	4 363	4 471
500	4 471	4 580	4 690	4 800	4 910	5 021	5 133	5 245	5 357	5 470	5 583
600	5 583	5 697	5 812	5 926	6 041	6 157	6 273	6 390	6 507	6 625	6 743
700	6 743	6 861	6 980	7 100	7 220	7 340	7 461	7 583	7 705	7 827	7 950
800	7 950	8 073	8 197	8 321	8 446	8 571	8 697	8 823	8 950	9 077	9 205
900	9 205	9 333	9 461	9 590	9 720	9 850	9 980	10 111	10 242	10 374	10 506
1000	10 506	10 638	10 771	10 905	11 039	11 173	11 307	11 442	11 578	11 714	11 850
1100	11 850	11 986	12 123	12 260	12 397	12 535	12 673	12 812	12 950	13 089	13 228
1200	13 228	13 367	13 507	13 646	13 786	13 926	14 066	14 207	14 347	14 488	14 629
1300	14 629	14 770	14 911	15 052	15 193	15 334	15 475	15 616	15 758	15 899	16 040
1400	16 040	16 181	16 323	16 464	16 605	16 746	16 887	17 028	17 169	17 310	17 451
1500	17 451	17 591	17 732	17 872	18 012	18 152	18 292	18 431	18 571	18 710	18 849
1600	18 849	18 988	19 126	19 264	19 402	19 540	19 677	19 814	19 951	20 087	20 222
1700	20 222	20 356	20 488	20 620	20 749	20 877	21 003				

S熱電対 Type S Thermocouple

UNIT: μV

ITS-90

$^{\circ}\text{C}$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
0	0	- 53	- 103	- 150	- 194	- 236					
$^{\circ}\text{C}$	0	10	20	30	40	50	60	70	80	90	100
0	0	55	113	173	235	299	365	433	502	573	646
100	646	720	795	872	950	1 029	1 110	1 191	1 273	1 357	1 441
200	1 441	1 526	1 612	1 698	1 786	1 874	1 962	2 052	2 141	2 232	2 323
300	2 323	2 415	2 507	2 599	2 692	2 786	2 880	2 974	3 069	3 164	3 259
400	3 259	3 355	3 451	3 548	3 645	3 742	3 840	3 938	4 036	4 134	4 233
500	4 233	4 332	4 432	4 532	4 632	4 732	4 833	4 934	5 035	5 137	5 239
600	5 239	5 341	5 443	5 546	5 649	5 753	5 857	5 961	6 065	6 170	6 275
700	6 275	6 381	6 486	6 593	6 699	6 806	6 913	7 020	7 128	7 236	7 345
800	7 345	7 454	7 563	7 673	7 783	7 893	8 003	8 114	8 226	8 337	8 449
900	8 449	8 562	8 674	8 787	8 900	9 014	9 128	9 242	9 357	9 472	9 587
1000	9 587	9 703	9 819	9 935	10 051	10 168	10 285	10 403	10 520	10 638	10 757
1100	10 757	10 875	10 994	11 113	11 232	11 351	11 471	11 590	11 710	11 830	11 951
1200	11 951	12 071	12 191	12 312	12 433	12 554	12 675	12 796	12 917	13 038	13 159
1300	13 159	13 280	13 402	13 523	13 644	13 766	13 887	14 009	14 130	14 251	14 373
1400	14 373	14 494	14 615	14 736	14 857	14 978	15 099	15 220	15 341	15 461	15 582
1500	15 582	15 702	15 822	15 942	16 062	16 182	16 301	16 420	16 539	16 658	16 777
1600	16 777	16 895	17 013	17 131	17 249	17 366	17 483	17 600	17 717	17 832	17 947
1700	17 947	18 061	18 174	18 285	18 395	18 503	18 609				

N 熱電対 Type N Thermocouple

UNIT: μV ITS-90

$^{\circ}\text{C}$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-3 990	-4 083	-4 162	-4 226	-4 277	-4 313	-4 336	-4 345			
-100	-2 407	-2 612	-2 808	-2 994	-3 171	-3 336	-3 491	-3 634	-3 766	-3 884	-3 990
0	0	-260	-518	-772	-1 023	-1 269	-1 509	-1 744	-1 972	-2 193	-2 407
$^{\circ}\text{C}$	0	10	20	30	40	50	60	70	80	90	100
0	0	261	525	793	1 065	1 340	1 619	1 902	2 189	2 480	2 774
100	2 774	3 072	3 374	3 680	3 989	4 302	4 618	4 937	5 259	5 585	5 913
200	5 913	6 245	6 579	6 916	7 255	7 597	7 941	8 288	8 637	8 988	9 341
300	9 341	9 696	10 054	10 413	10 774	11 136	11 501	11 867	12 234	12 603	12 974
400	12 974	13 346	13 719	14 094	14 469	14 846	15 225	15 604	15 984	16 366	16 748
500	16 748	17 131	17 515	17 900	18 286	18 672	19 059	19 447	19 835	20 224	20 613
600	20 613	21 003	21 393	21 784	22 175	22 566	22 958	23 350	23 742	24 134	24 527
700	24 527	24 919	25 312	25 705	26 098	26 491	26 883	27 276	27 669	28 062	28 455
800	28 455	28 847	29 239	29 632	30 024	30 416	30 807	31 199	31 590	31 981	32 371
900	32 371	32 761	33 151	33 541	33 930	34 319	34 707	35 095	35 482	35 869	36 256
1000	36 256	36 641	37 027	37 411	37 795	38 179	38 562	38 944	39 326	39 706	40 087
1100	40 087	40 466	40 845	41 223	41 600	41 976	42 352	42 727	43 101	43 474	43 846
1200	43 846	44 218	44 588	44 958	45 326	45 694	46 060	46 425	46 789	47 152	47 513
1300	47 513										

K 熱電対 Type K Thermocouple

UNIT: μV ITS-90

$^{\circ}\text{C}$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-5 891	-6 035	-6 158	-6 262	-6 344	-6 404	-6 441	-6 458			
-100	-3 554	-3 852	-4 138	-4 411	-4 669	-4 913	-5 141	-5 354	-5 550	-5 730	-5 891
0	0	-392	-778	-1 156	-1 527	-1 889	-2 243	-2 587	-2 920	-3 243	-3 554
$^{\circ}\text{C}$	0	10	20	30	40	50	60	70	80	90	100
0	0	397	798	1 203	1 612	2 023	2 436	2 851	3 267	3 682	4 096
100	4 096	4 509	4 920	5 328	5 735	6 138	6 540	6 941	7 340	7 739	8 138
200	8 138	8 539	8 940	9 343	9 747	10 153	10 561	10 971	11 382	11 795	12 209
300	12 209	12 624	13 040	13 457	13 874	14 293	14 713	15 133	15 554	15 975	16 397
400	16 397	16 820	17 243	17 667	18 091	18 516	18 941	19 366	19 792	20 218	20 644
500	20 644	21 071	21 497	21 924	22 350	22 776	23 203	23 629	24 055	24 480	24 905
600	24 905	25 330	25 755	26 179	26 602	27 025	27 447	27 869	28 289	28 710	29 129
700	29 129	29 548	29 965	30 382	30 798	31 213	31 628	32 041	32 453	32 865	33 275
800	33 275	33 685	34 093	34 501	34 908	35 313	35 718	36 121	36 524	36 925	37 326
900	37 326	37 725	38 124	38 522	38 918	39 314	39 708	40 101	40 494	40 885	41 276
1000	41 276	41 665	42 053	42 440	42 826	43 211	43 595	43 978	44 359	44 740	45 119
1100	45 119	45 497	45 873	46 249	46 623	46 995	47 367	47 737	48 105	48 473	48 838
1200	48 838	49 202	49 565	49 926	50 286	50 644	51 000	51 355	51 708	52 060	52 410
1300	52 410	52 759	53 106	53 451	53 795	54 138	54 479	54 819			

E 熱電対 Type E Thermocouple

UNIT: μV ITS-90

$^{\circ}\text{C}$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-8 825	-9 063	-9 274	-9 455	-9 604	-9 718	-9 797	-9 835			
-100	-5 237	-5 681	-6 107	-6 516	-6 907	-7 279	-7 632	-7 963	-8 273	-8 561	-8 825
0	0	-582	-1 152	-1 709	-2 255	-2 787	-3 306	-3 811	-4 302	-4 777	-5 237
$^{\circ}\text{C}$	0	10	20	30	40	50	60	70	80	90	100
0	0	591	1 192	1 801	2 420	3 048	3 685	4 330	4 985	5 648	6 319
100	6 319	6 998	7 685	8 379	9 081	9 789	10 503	11 224	11 951	12 684	13 421
200	13 421	14 164	14 912	15 664	16 420	17 181	17 945	18 713	19 484	20 259	21 036
300	21 036	21 817	22 600	23 386	24 174	24 964	25 757	26 552	27 348	28 146	28 946
400	28 946	29 747	30 550	31 354	32 159	32 965	33 772	34 579	35 387	36 196	37 005
500	37 005	37 815	38 624	39 434	40 243	41 053	41 862	42 671	43 479	44 286	45 093
600	45 093	45 900	46 705	47 509	48 313	49 116	49 917	50 718	51 517	52 315	53 112
700	53 112	53 908	54 703	55 497	56 289	57 080	57 870	58 659	59 446	60 232	61 017
800	61 017	61 801	62 583	63 364	64 144	64 922	65 698	66 473	67 246	68 017	68 787
900	68 787	69 554	70 319	71 082	71 844	72 603	73 360	74 115	74 869	75 621	76 373
1000	76 373										

J 熱電対 Type J Thermocouple										UNIT: μV	ITS-90
$^{\circ}C$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-7 890	-8 095									
-100	-4 633	-5 037	-5 426	-5 801	-6 159	-6 500	-6 821	-7 123	-7 403	-7 659	-7 890
0	0	- 501	- 995	-1 482	-1 961	-2 431	-2 893	-3 344	-3 786	-4 215	-4 633
$^{\circ}C$	0	10	20	30	40	50	60	70	80	90	100
0	0	507	1 019	1 537	2 059	2 585	3 116	3 650	4 187	4 726	5 269
100	5 269	5 814	6 360	6 909	7 459	8 010	8 562	9 115	9 669	10 224	10 779
200	10 779	11 334	11 889	12 445	13 000	13 555	14 110	14 665	15 219	15 773	16 327
300	16 327	16 881	17 434	17 986	18 538	19 090	19 642	20 194	20 745	21 297	21 848
400	21 848	22 400	22 952	23 504	24 057	24 610	25 164	25 720	26 276	26 834	27 393
500	27 393	27 953	28 516	29 080	29 647	30 216	30 788	31 362	31 939	32 519	33 102
600	33 102	33 689	34 279	34 873	35 470	36 071	36 675	37 284	37 896	38 512	39 132
700	39 132	39 755	40 382	41 012	41 645	42 281	42 919	43 559	44 203	44 848	45 494
800	45 494	46 141	46 786	47 431	48 074	48 715	49 353	49 989	50 622	51 251	51 877
900	51 877	52 500	53 119	53 735	54 347	54 956	55 561	56 164	56 763	57 360	57 953
1000	57 953	58 545	59 134	59 721	60 307	60 890	61 473	62 054	62 634	63 214	63 792
1100	63 792	64 370	64 948	65 525	66 102	66 679	67 255	67 831	68 406	68 980	69 553
1200	69 553										

T 熱電対 Type T Thermocouple										UNIT: μV	ITS-90
$^{\circ}C$	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	-5 603	-5 753	-5 888	-6 007	-6 105	-6 180	-6 232	-6 258			
-100	-3 379	-3 657	-3 923	-4 177	-4 419	-4 648	-4 865	-5 070	-5 261	-5 439	-5 603
0	0	- 383	- 757	-1 121	-1 475	-1 819	-2 153	-2 476	-2 788	-3 089	-3 379
$^{\circ}C$	0	10	20	30	40	50	60	70	80	90	100
0	0	391	790	1 196	1 612	2 036	2 468	2 909	3 358	3 814	4 279
100	4 279	4 750	5 228	5 714	6 206	6 704	7 209	7 720	8 237	8 759	9 288
200	9 288	9 822	10 362	10 907	11 458	12 013	12 574	13 139	13 709	14 283	14 862
300	14 862	15 445	16 032	16 624	17 219	17 819	18 422	19 030	19 641	20 255	20 872
400	20 872										

備考

- (1) 掲載した規準熱起電力表は以下に記載する3種類の規格と全く同一の特性である。

JIS C 1602-1995 (日本)

IEC 584-1-1995 (国際)

ASTM E 230-1996 (米国)

Note

- (1) EMF-Temperature reference tables shown are for the following 3 standards which are completely same characteristic.

JIS C 1602-1995 (Japan)

IEC 584-1-1995 (International)

ASTM E 230-1996 (USA)

Reference Resistance Value Table

2. 規準抵抗値表

Pt100(R100/R0=1.3851)

Platinum Resistance Thermometersensor IEC Pub.751(ITS-90)

白金測温抵抗体

JIS C1604-1997

(UNIT Ω)

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	18.52										
-100	60.26	56.19	52.11	48.00	43.88	39.72	35.54	31.34	27.10	22.83	18.52
0	100.00	96.09	92.16	88.22	84.27	80.31	76.33	72.33	68.33	64.30	60.26
	0	10	20	30	40	50	60	70	80	90	100
0	100.00	103.90	107.79	111.67	115.54	119.40	123.24	127.08	130.90	134.71	138.51
100	138.51	142.29	146.07	149.83	153.58	157.33	161.05	164.77	168.48	172.17	175.86
200	175.86	179.53	183.19	186.84	190.47	194.10	197.71	201.31	204.90	208.48	212.05
300	212.05	215.61	219.15	222.68	226.21	229.72	233.21	236.70	240.18	243.64	247.09
400	247.09	250.53	253.96	257.38	260.78	264.18	267.56	270.93	274.29	277.64	280.98
500	280.98	284.30	287.62	290.92	294.21	297.49	300.75	304.01	307.25	310.49	313.71
600	313.71	316.92	320.12	323.30	326.48	329.64	332.79	335.93	339.06	342.18	345.28
700	345.28	348.38	351.46	354.53	357.59	360.64	363.67	366.70	369.71	372.71	375.70
800	375.70	378.68	381.65	384.60	387.55	390.48					

規準抵抗値表は下式によって算出する。

-200°C～0°C : $R_t = R_0 [1 + At + Bt^2 + C(t-100)t^3]$

0～850°C : $R_t = R_0 (1 + At + Bt^2)$

$A = 3.9083 \times 10^{-3} \text{ } ^\circ\text{C}^{-1}$

$B = -5.775 \times 10^{-7} \text{ } ^\circ\text{C}^{-2}$

$C = -4.183 \times 10^{-12} \text{ } ^\circ\text{C}^{-4}$

JPt100(R100/R0=1.3916)

Platinum Resistance Thermometersensor JIS C1604-1989(Abolished)

白金測温抵抗体

(UNIT Ω)

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
-200	17.14										
-100	59.57	55.44	51.29	47.11	42.91	36.68	34.42	30.122	25.8	21.46	17.14
0	100.00	96.02	92.02	88.01	83.99	79.96	75.91	71.85	67.77	63.68	59.57
	0	10	20	30	40	50	60	70	80	90	100
0	100.00	103.97	107.93	111.88	115.81	119.73	123.64	127.54	131.42	135.30	139.16
100	139.16	143.01	146.85	150.67	154.49	158.29	162.08	165.86	169.63	173.38	177.13
200	177.13	180.86	184.58	188.29	191.99	195.67	199.35	203.01	206.66	210.30	213.93
300	213.93	217.54	221.15	224.74	228.32	231.89	235.45	238.99	242.53	246.05	249.56
400	249.56	253.06	256.55	260.02	263.49	266.94	270.38	273.80	277.22	280.63	284.02
500	284.02	287.40									

Temperature conversion table (°C→°F)

3. 温度換算表 (°C→°F)

$$\text{計算式： } ^\circ\text{F} = 9/5 \times ^\circ\text{C} + 32$$

°C→°F	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
-50	-58.0	-59.8	-61.6	-63.4	-65.2	-67.0	-68.8	-70.6	-72.4	-74.2	-76.0
-40	-40.0	-41.8	-43.6	-45.4	-47.2	-49.0	-50.8	-52.6	-54.4	-56.2	-58.0
-30	-22.0	-23.8	-25.6	-27.4	-29.2	-31.0	-32.8	-34.6	-36.4	-38.2	-40.0
-20	-4.0	-5.8	-7.6	-9.4	-11.2	-13.0	-14.8	-16.6	-18.4	-20.2	-22.0
-10	14.0	12.2	10.4	8.6	6.8	5.0	3.2	1.4	-0.4	-2.2	-4.0
0	32.0	30.2	28.4	26.6	24.8	23.0	21.2	19.4	17.6	15.8	14.0
°C→°F	0	1	2	3	4	5	6	7	8	9	10
0	32.0	33.8	35.6	37.4	39.2	41.0	42.8	44.6	46.4	48.2	50.0
10	50.0	51.8	53.6	55.4	57.2	59.0	60.8	62.6	64.4	66.2	68.0
20	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0
30	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2	104.0
40	104.0	105.8	107.6	109.4	111.2	113.0	114.8	116.6	118.4	120.2	122.0
50	122.0	123.8	125.6	127.4	129.2	131.0	132.8	134.6	136.4	138.2	140.0
60	140.0	141.8	143.6	145.4	147.2	149.0	150.8	152.6	154.4	156.2	158.0
70	158.0	159.8	161.6	163.4	165.2	167.0	168.8	170.6	172.4	174.2	176.0
80	176.0	177.8	179.6	181.4	183.2	185.0	186.8	188.6	190.4	192.2	194.0
90	194.0	195.8	197.6	199.4	201.2	203.0	204.8	206.6	208.4	210.2	212.0
100	212.0	213.8	215.6	217.4	219.2	221.0	222.8	224.6	226.4	228.2	230.0
110	230.0	231.8	233.6	235.4	237.2	239.0	240.8	242.6	244.4	246.2	248.0
120	248.0	249.8	251.6	253.4	255.2	257.0	258.8	260.6	262.4	264.2	266.0
130	266.0	267.8	269.6	271.4	273.2	275.0	276.8	278.6	280.4	282.2	284.0
140	284.0	285.8	287.6	289.4	291.2	293.0	294.8	296.6	298.4	300.2	302.0
150	302.0	303.8	305.6	307.4	309.2	311.0	312.8	314.6	316.4	318.2	320.0
160	320.0	321.8	323.6	325.4	327.2	329.0	330.8	332.6	334.4	336.2	338.0
170	338.0	339.8	341.6	343.4	345.2	347.0	348.8	350.6	352.4	354.2	356.0
180	356.0	357.8	359.6	361.4	363.2	365.0	366.8	368.6	370.4	372.2	374.0
190	374.0	375.8	377.6	379.4	381.2	383.0	384.8	386.6	388.4	390.2	392.0
200	392.0	393.8	395.6	397.4	399.2	401.0	402.8	404.6	406.4	408.2	410.0
210	410.0	411.8	413.6	415.4	417.2	419.0	420.8	422.6	424.4	426.2	428.0
220	428.0	429.8	431.6	433.4	435.2	437.0	438.8	440.6	442.4	444.2	446.0
230	446.0	447.8	449.6	451.4	453.2	455.0	456.8	458.6	460.4	462.2	464.0
240	464.0	465.8	467.6	469.4	471.2	473.0	474.8	476.6	478.4	480.2	482.0
250	482.0	483.8	485.6	487.4	489.2	491.0	492.8	494.6	496.4	498.2	500.0
260	500.0	501.8	503.6	505.4	507.2	509.0	510.8	512.6	514.4	516.2	518.0
270	518.0	519.8	521.6	523.4	525.2	527.0	528.8	530.6	532.4	534.2	536.0
280	536.0	537.8	539.6	541.4	543.2	545.0	546.8	548.6	550.4	552.2	554.0
290	554.0	555.8	557.6	559.4	561.2	563.0	564.8	566.6	568.4	570.2	572.0
°C→°F	0	10	20	30	40	50	60	70	80	90	100
300	572.0	590.0	608.0	626.0	644.0	662.0	680.0	698.0	716.0	734.0	752.0
400	752.0	770.0	788.0	806.0	824.0	842.0	860.0	878.0	896.0	914.0	932.0
500	932.0	950.0	968.0	986.0	1004.0	1022.0	1040.0	1058.0	1076.0	1094.0	1112.0
600	1112.0	1130.0	1148.0	1166.0	1184.0	1202.0	1220.0	1238.0	1256.0	1274.0	1292.0
700	1292.0	1310.0	1328.0	1346.0	1364.0	1382.0	1400.0	1418.0	1436.0	1454.0	1472.0
800	1472.0	1490.0	1508.0	1526.0	1544.0	1562.0	1580.0	1598.0	1616.0	1634.0	1652.0
900	1652.0	1670.0	1688.0	1706.0	1724.0	1742.0	1760.0	1778.0	1796.0	1814.0	1832.0
1000	1832.0	1850.0	1868.0	1886.0	1904.0	1922.0	1940.0	1958.0	1976.0	1994.0	2012.0

Temperature conversion table (°F->°C)
温度換算表 (°F→°C)

計算式：°C=5/9× (°F-32)

°F→°C	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
-50	-45.6	-46.1	-46.7	-47.2	-47.8	-48.3	-48.9	-49.4	-50.0	-50.6	-51.1
-40	-40.0	-40.6	-41.1	-41.7	-42.2	-42.8	-43.3	-43.9	-44.4	-45.0	-45.6
-30	-34.4	-35.0	-35.6	-36.1	-36.7	-37.2	-37.8	-38.3	-38.9	-39.4	-40.0
-20	-28.9	-29.4	-30.0	-30.6	-31.1	-31.7	-32.2	-32.8	-33.3	-33.9	-34.4
-10	-23.3	-23.9	-24.4	-25.0	-25.6	-26.1	-26.7	-27.2	-27.8	-28.3	-28.9
0	-17.8	-18.3	-18.9	-19.4	-20.0	-20.6	-21.1	-21.7	-22.2	-22.8	-23.3
°F→°C	0	1	2	3	4	5	6	7	8	9	10
0	-17.8	-17.2	-16.7	-16.1	-15.6	-15.0	-14.4	-13.9	-13.3	-12.8	-12.2
10	-12.2	-11.7	-11.1	-10.6	-10.0	-9.4	-8.9	-8.3	-7.8	-7.2	-6.7
20	-6.7	-6.1	-5.6	-5.0	-4.4	-3.9	-3.3	-2.8	-2.2	-1.7	-1.1
30	-1.1	-0.6	0.0	0.6	1.1	1.7	2.2	2.8	3.3	3.9	4.4
40	4.4	5.0	5.6	6.1	6.7	7.2	7.8	8.3	8.9	9.4	10.0
50	10.0	10.6	11.1	11.7	12.2	12.8	13.3	13.9	14.4	15.0	15.6
60	15.6	16.1	16.7	17.2	17.8	18.3	18.9	19.4	20.0	20.6	21.1
70	21.1	21.7	22.2	22.8	23.3	23.9	24.4	25.0	25.6	26.1	26.7
80	26.7	27.2	27.8	28.3	28.9	29.4	30.0	30.6	31.1	31.7	32.2
90	32.2	32.8	33.3	33.9	34.4	35.0	35.6	36.1	36.7	37.2	37.8
100	37.8	38.3	38.9	39.4	40.0	40.6	41.1	41.7	42.2	42.8	43.3
110	43.3	43.9	44.4	45.0	45.6	46.1	46.7	47.2	47.8	48.3	48.9
120	48.9	49.4	50.0	50.6	51.1	51.7	52.2	52.8	53.3	53.9	54.4
130	54.4	55.0	55.6	56.1	56.7	57.2	57.8	58.3	58.9	59.4	60.0
140	60.0	60.6	61.1	61.7	62.2	62.8	63.3	63.9	64.4	65.0	65.6
150	65.6	66.1	66.7	67.2	67.8	68.3	68.9	69.4	70.0	70.6	71.1
160	71.1	71.7	72.2	72.8	73.3	73.9	74.4	75.0	75.6	76.1	76.7
170	76.7	77.2	77.8	78.3	78.9	79.4	80.0	80.6	81.1	81.7	82.2
180	82.2	82.8	83.3	83.9	84.4	85.0	85.6	86.1	86.7	87.2	87.8
190	87.8	88.3	88.9	89.4	90.0	90.6	91.1	91.7	92.2	92.8	93.3
200	93.3	93.9	94.4	95.0	95.6	96.1	96.7	97.2	97.8	98.3	98.9
210	98.9	99.4	100.0	100.6	101.1	101.7	102.2	102.8	103.3	103.9	104.4
220	104.4	105.0	105.6	106.1	106.7	107.2	107.8	108.3	108.9	109.4	110.0
230	110.0	110.6	111.1	111.7	112.2	112.8	113.3	113.9	114.4	115.0	115.6
240	115.6	116.1	116.7	117.2	117.8	118.3	118.9	119.4	120.0	120.6	121.1
250	121.1	121.7	122.2	122.8	123.3	123.9	124.4	125.0	125.6	126.1	126.7
260	126.7	127.2	127.8	128.3	128.9	129.4	130.0	130.6	131.1	131.7	132.2
270	132.2	132.8	133.3	133.9	134.4	135.0	135.6	136.1	136.7	137.2	137.8
280	137.8	138.3	138.9	139.4	140.0	140.6	141.1	141.7	142.2	142.8	143.3
290	143.3	143.9	144.4	145.0	145.6	146.1	146.7	147.2	147.8	148.3	148.9
°F→°C	0	10	20	30	40	50	60	70	80	90	100
300	148.9	154.4	160.0	165.6	171.1	176.7	182.2	187.8	193.3	198.9	204.4
400	204.4	210.0	215.6	221.1	226.7	232.2	237.8	243.3	248.9	254.4	260.0
500	260.0	265.6	271.1	276.7	282.2	287.8	293.3	298.9	304.4	310.0	315.6
600	315.6	321.1	326.7	332.2	337.8	343.3	348.9	354.4	360.0	365.6	371.1
700	371.1	376.7	382.2	387.8	393.3	398.9	404.4	410.0	415.6	421.1	426.7
800	426.7	432.2	437.8	443.3	448.9	454.4	460.0	465.6	471.1	476.7	482.2
900	482.2	487.8	493.3	498.9	504.4	510.0	515.6	521.1	526.7	532.2	537.8
1000	537.8	543.3	548.9	554.4	560.0	565.6	571.1	576.7	582.2	587.8	593.3

Tolerance classes

for thermocouples (0°C cold junction) to EN 60584

Thermocouple	Class 1	
	Operating range	Tolerance ($\pm$) ¹
copper/constantan T	-40 to + 350°C	0.5°C or 0.004 x t l
iron/constantan J	-40 to + 750°C	1.5°C or 0.004 x t l
nickel-chrome/constantan E	-40 to + 800°C	0.5°C or 0.004 x t l
nickel-chrome/nickel K	-40 to +1000°C	1.5°C or 0.004 x t l
platinum-13% rhodium/platinum R	0 to +1600°C	1 °C or $[1+(t-1100) \times 0.003]$ °C
platinum-10% rhodium/platinum S	0 to +1600°C	1 °C or $[1+(t-1100) \times 0.003]$ °C
platinum-30% rhodium/platinum-6% rhodium B	-	-

Thermocouple	Class 2	
	Operating range	Tolerance ($\pm$) ¹
copper/constantan T	-40 to + 350°C	1 °C or 0.0075 x t l
iron/constantan J	-40 to + 750°C	2.5°C or 0.0075 x t l
nickel-chrome/constantan E	-40 to + 900°C	1 °C or 0.0075 x t l
nickel-chrome/nickel K	-40 to +1200°C	2.5°C or 0.0075 x t l
platinum-13% rhodium/platinum R	0 to +1600°C	1.5°C or 0.0025 x t
platinum-10% rhodium/platinum S	0 to +1600°C	1.5°C or 0.0025 x t
platinum-30% rhodium/platinum-6% rhodium B	+600 to +1700°C	1.5°C or 0.0025 x t

Thermocouple	Class 3 ²	
	Operating range	Tolerance ($\pm$) ¹
copper/constantan T	-200 to +40°C	1 °C or 0.015 x t l
iron/constantan J	-200 to +40°C	2.5°C or 0.015 x t l
nickel-chrome/constantan E	-200 to +40°C	1 °C or 0.015 x t l
nickel-chrome/nickel K	-200 to +40°C	2.5°C or 0.015 x t l
platinum-13% rhodium/platinum R	-	-
platinum-10% rhodium/platinum S	-	-
platinum-30% rhodium/platinum-6% rhodium B	+600 to +1700°C	4 °C or 0.005 x t

The standard tolerance for thermocouples corresponds to DIN 43 760 or EN 60 584, Class 2.

Restricted tolerance to Class 1 is possible on mineral-insulated thermocouples.

1. The tolerance is the specified value in °C or the percentage based on the actual temperature in °C, whichever is larger.
2. Thermocouples and thermocouple wires are usually supplied conforming to the tolerances according to the table above for the temperature range above -40°C.
At temperatures below -40°C, the deviations for thermocouples of the same material may exceed the tolerances for Class 3.
Where thermocouples according to tolerance classes 1, 2 and/or 3 are required, this has to be specified by the user; specially selected material is then used.

Material Selection Guide

This chart is a guide to selection of thermocouple sheath and thermowell materials according to process fluid. It includes factors such as catalytic reaction, contamination and electrolysis. However, there are many instances where factors other than these must be considered. It is recommended

SUBSTANCE	CONDITIONS	RECOMMENDED METAL	SUBSTANCE	CONDITIONS	RECOMMENDED METAL	SUBSTANCE	CONDITIONS	RECOMMENDED METAL
Acetate Solvents	Crude or Pure	Monel or Nickel	Ethyl Acetate		Monel	Picric Acid	70°F	304 Stainless Steel
Acetic Acid	10% - 70°F	304 Stainless Steel	Ethyl Chloride	70°F	304 Stainless Steel	Potassium Bromide	70°F	316 Stainless Steel
"	50% - 70°F	304 Stainless Steel	Ethylene Glycol		Steel (C1018)	Potassium Carbonate	1% - 70°F	304 Stainless Steel
"	50% - 212°F	316 Stainless Steel	Ethyl Sulphate	70°F	Monel	Potassium Chlorate	70°F	304 Stainless Steel
"	99% - 70°F	430 Stainless Steel	Ferric Chloride	1% - 70°F	316 Stainless Steel	Potassium Chloride	5% - 70°F	304 Stainless Steel
"	99% - 212°F	430 Stainless Steel	"	5% - 70°F	Tantalum	"	5% - 212°F	304 Stainless Steel
Acetic Anhydride		Monel	"	5% - Boiling	Tantalum	Potassium Hydroxide	5% - 70°F	304 Stainless Steel
Acetone	212°F	304 Stainless Steel	Ferric Sulphate	5% - 70°F	304 Stainless Steel	"	25% - 212°F	304 Stainless Steel
Acetylene		304, Monel, Nickel	Ferrous Sulphate	Dilute 70°F	304 Stainless Steel	"	50% - 212°F	316 Stainless Steel
Alcohol Ethyl	70°F	304 Stainless Steel	Formaldehyde		304 Stainless Steel	Potassium Nitrate	5% - 70°F	304 Stainless Steel
"	212°F	304 Stainless Steel	Freon		Steel (C1018)	"	5% - 212°F	304 Stainless Steel
Alcohol Methyl	70°F	304 Stainless Steel	Formic Acid	5% - 70°F	316 Stainless Steel	Potassium		
"	212°F	304 Stainless Steel	"	5% - 150°F	316 Stainless Steel	Permanganate	5% - 70°F	304 Stainless Steel
Aluminum	Molten	Cast iron	Gallic Acid	5% - 70°F	Monel	Potassium Sulphate	5% - 70°F	304 Stainless Steel
Aluminum Acetate	Saturated	304 Stainless Steel	"	5% - 150°F	Monel	"	5% - 212°F	304 Stainless Steel
Aluminum Sulphate	10% - 70°F	304 Stainless Steel	Gasoline	70°F	304 Stainless Steel	Potassium Sulphide	70°F	304 Stainless Steel
"	Saturated 70°F	304 Stainless Steel	Glucose	70°F	304 Stainless Steel	Propane		304 Stainless Steel
"	10% - 212°F	316 Stainless Steel	Glycerine	70°F	304 Stainless Steel	Pyrogalllic Acid		304 Stainless Steel
"	Saturated 212°F	316 Stainless Steel	Glycerol		304 Stainless Steel	Quinine Bisulphate	Dry	316 Stainless Steel
Ammonia	All concentrations 70°F	304 Stainless Steel	Heat Treating		446 Stainless Steel	Quinine Sulphate	Dry	304 Stainless Steel
Ammonium Chloride	All concentrations 212°F	316 Stainless Steel	Hydrobromic Acid	48% - 212°F	Hastelloy B	Resin		304 Stainless Steel
Ammonium Nitrate	All concentrations 70°F	304 Stainless Steel	Hydrochloric Acid	1% - 70°F	Hastelloy C	Rosin	Molten	304 Stainless Steel
"	All concentrations 212°F	304 Stainless Steel	"	1% - 212°F	Hastelloy B	Sea Water		Monel
Ammonium Sulphate	5% - 70°F	304 Stainless Steel	"	5% - 70°F	Hastelloy C	Salomoniac		Monel
"	10% - 212°F	316 Stainless Steel	"	5% - 212°F	Hastelloy B	Salicylic Acid		Nickel
"	Saturated 212°F	316 Stainless Steel	"	25% - 70°F	Hastelloy B	Shellac		304 Stainless Steel
Aniline	All concentrations 70°F	304 Stainless Steel	"	25% - 212°F	Hastelloy B	Soap	70°F	304 Stainless Steel
Amylacetate		Monel	Hydrocyanic Acid		316 Stainless Steel	Sodium Bicarbonate	All concentrations 70°F	304 Stainless Steel
Asphalt		Steel (C1018)	Hydrofluoric Acid		Hastelloy C	"	5% - 150°F	304 Stainless Steel
		Phosphor Bronze, Monel, Nickel	Hydrogen Peroxide	70°F	316 Stainless Steel	Sodium Bisulphate		Monel
			"	212°F	316 Stainless Steel	Sodium Carbonate	5% - 70°F	304 Stainless Steel
Barium Carbonate	70°F	304 Stainless Steel	Hydrogen Sulphide	Wet and dry	316 Stainless Steel	"	5% - 150°F	304 Stainless Steel
Barium Chloride	5% - 70°F	Monel	Iodine	70°F	Tantalum	Sodium Chloride	5% - 70°F	316 Stainless Steel
"	Saturated 70°F	Monel	Kerosene	70°F	304 Stainless Steel	"	5% - 150°F	316 Stainless Steel
"	Aqueous - Hot	316 Stainless Steel	Lactic Acid	5% - 70°F	304 Stainless Steel	"	Saturated - 70°F	316 Stainless Steel
Barium Hydroxide		Steel (C1018)	"	5% - 150°F	316 Stainless Steel	"	Saturated - 212°F	316 Stainless Steel
Barium Sulphite		Nichrome	"	10% - 212°F	Tantalum	Sodium Fluoride	5% - 70°F	Monel
Benzaldehyde		Steel (C1018)	Lacquer	70°F	316 Stainless Steel	Sodium Hydroxide		304 Stainless Steel
Benzene	70°F	304 Stainless Steel	Latex		Steel (C1018)	Sodium Hypochlorite	5% still	316 Stainless Steel
Benzine		Steel (C1018), Monel, Inconel	Lime Sulphur		Steel (C1018), 304, Monel	Sodium Nitrate	Fused	317 Stainless Steel
Benzol	Hot	304 Stainless Steel	Linseed Oil	70°F	304 Stainless Steel	Sodium Peroxide		304 Stainless Steel
Boracic Acid	5% Hot or Cold	304 Stainless Steel	Magnesium Chloride	5% - 70°F	Monel	Sodium Phosphate		Steel (C1018)
Bromine	70°F	Tantalum	"	5% - 212°F	Nickel	Sodium Silicate		Steel (C1018)
Butadiene		Brass, 304	Magnesium Sulphate	Cold and Hot	Monel	Sodium Sulphate	70°F	304 Stainless Steel
Butane	70°F	304 Stainless Steel	Malic Acid	Cold and Hot	316 Stainless Steel	Sodium Sulphide	70°F	316 Stainless Steel
Butylacetate		Monel	Mercury		Steel (C1018), 304, Monel	Sodium Sulphite	150°F	304 Stainless Steel
Butyl Alcohol		Copper	Methane	70°F	Steel (1020)	Steam		304 Stainless Steel
Butylenes		Steel (C1018), Phosphor Bronze	Milk		304, Nickel	Stearic Acid		304 Stainless Steel
Butyric Acid	5% - 70°F	304 Stainless Steel	Mixed Acids		Carpenter #20	Sulphur Dioxide	Moist Gas - 70°F	316 Stainless Steel
"	5% - 150°F	304 Stainless Steel	(Sulphuric and Nitric - all temp. and %)			"	Gas - 575°F	304 Stainless Steel
Calcium Bisulfite	70°F	316 Stainless Steel	Molasses		Steel (C1018), 304, Monel, Nickel	Sulphur	Dry - Molten	304 Stainless Steel
Calcium Chlorate	Dilute 70°F	304 Stainless Steel				"	Wet	316 Stainless Steel
"	Dilute 150°F	304 Stainless Steel	Muriatic Acid	70°F	Tantalum	Sulphuric Acid	5% - 70°F	Carp. 20, Hastelloy B
Calcium Hydroxide	10% - 212°F	304 Stainless Steel	Nap	70°F	304 Stainless Steel	"	5% - 212°F	Carp. 20, Hastelloy B
"	20% - 212°F	304 Stainless Steel	Natural Gas	70°F	304 Stainless Steel	"	10% - 70°F	Carp. 20, Hastelloy B
"	50% - 212°F	317 Stainless Steel	Neon	70°F	304 Stainless Steel	"	10% - 212°F	Carp. 20, Hastelloy B
Carbolic Acid	All 212°F	316 Stainless Steel	Nickel Chloride	70°F	304 Stainless Steel	"	50% - 70°F	Carp. 20, Hastelloy B
Carbon Dioxide	Dry	Steel (C1018), Monel	Nickel Sulphate	Hot and Cold	304 Stainless Steel	"	50% - 212°F	Carp. 20, Hastelloy B
"	Wet	Aluminum, Monel, Nickel	Nitric Acid	5% - 70°F	304 Stainless Steel	"	90% - 70°F	Carp. 20, Hastelloy B
Carbon Tetrachloride	10% - 70°F	Monel	"	20% - 70°F	304 Stainless Steel	"	90% - 212°F	Hastelloy D
Chlorex Caustic		316SS, 317SS	"	50% - 70°F	304 Stainless Steel	Tannic Acid	70°F	304 Stainless Steel
Chlorine Gas	Dry 70°F	317 Stainless Steel	"	50% - 212°F	304 Stainless Steel	Tar		Steel (C1018), 304, Monel, Nickel
"	Moist 70°F	Hastelloy C	"	65% - 212°F	316 Stainless Steel	Tartaric Acid	70°F	304 Stainless Steel
"	Moist 212°F	Hastelloy C	"	Concentrated - 70°F	304 Stainless Steel	"	150°F	316 Stainless Steel
Chromic Acid	5% - 70°F	304 Stainless Steel	"	Concentrated - 212°F	Tantalum	Tin	Molten	Cast Iron
"	10% - 212°F	316 Stainless Steel	Nitrobenzene	70°F	304 Stainless Steel	Tolvene		Aluminum, Phosphor Bronze, Monel
"	50% - 212°F	316 Stainless Steel	Nitrous Acid		304 Stainless Steel	Trichloroethylene		Steel (C1018)
Citric Acid	15% - 70°F	304 Stainless Steel	Oleic Acid	70°F	316 Stainless Steel	Turpentine		304 Stainless Steel
"	15% - 212°F	316 Stainless Steel	Oleum	70°F	316 Stainless Steel	Varnish		304 Stainless Steel
"	Concentrated 212°F	317 Stainless Steel	Oxalic Acid	5% - Hot and Cold	304 Stainless Steel	Vegetable Oils		Steel (C1018), 304, Monel
Coal Tar	Hot	304 Stainless Steel	"	10% - 212°F	Monel	Vinegar		304 Stainless Steel
Coke Oven Gas		Aluminum	Oxygen	70°F	Steel (C1018)	Water	Fresh	Copper, Steel (C1018), Monel
Copper Nitrate		304, 316	"	Liquid	304 Stainless Steel	"	Salt	Aluminum
Copper Sulphate		304, 316	Palmitic Acid		316 Stainless Steel	Whiskey, Wine		304, Nickel
Core Oils		316 Stainless Steel	Petroleum Ether		304 Stainless Steel	Xylene		Copper
Cottonseed Oil		Steel (C1018), Monel, Nickel	Phenol		304 Stainless Steel	Zinc	Molten	Cast Iron
Creosols		304 Stainless Steel	Pentane		304 Stainless Steel	Zinc Chloride		Monel
Creosote Crude		Steel (C1018), Monel, Nickel	Phosphoric Acid	1% - 70°F	304 Stainless Steel	"		304 Stainless Steel
			"	5% - 70°F	304 Stainless Steel	Zinc Sulphate	5% - 70°F	304 Stainless Steel
Cyanogen Gas		304 Stainless Steel	"	10% - 70°F	316 Stainless Steel	"	Saturated - 70°F	304 Stainless Steel
Dowtherm		Steel (C1018)	"	10% - 212°F	Hastelloy C	"	25% - 212°F	304 Stainless Steel
Epsom Salt	Hot and Cold	304 Stainless Steel	"	30% - 70°F	Hastelloy B			
Ether	70°F	304 Stainless Steel						