

MISCELLANEOUS TABLES

Miscellaneous Tables M33

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● Conversion Table of Units

Comparison table between SI units (system of international units), CGS units and gravitational system of units

Item System of units	Length	Mass	Time	Acceleration	Force	Stress	Pressure
SI units	m	kg	s	m/s ²	N	Pa	Pa
CGS units	cm	g	s	Gal	dyn	dyn/cm ²	dyn/cm ²
Grav. units	m	kgf·s ² /m	s	m/s ²	kgf	kgf/m ²	kgf/m ²

Conversion rates into SI units

Item	Unit name	Symbol	Conversion rate into SI	SI unit name	Symbol
Angle	Degree	°	$\pi / 180$	Radian	rad
	Minute	'	$\pi / 10\ 800$		
	Second	"	$\pi / 648\ 000$		
Length	Meter	m	1	Meter	m
	Micrometer	μ	10 ⁻⁶		
	Angstrom	Å	10 ⁻¹⁰		
	X-ray unit		$\approx 1.002\ 08 \times 10^{-13}$		
	Nautical mile	n mile	1852		
Area	Square meter	m ²	1	Square meter	m ²
	Are	a	10 ²		
	Hectare	ha	10 ⁴		
Volume	Cubic meter	m ³	1	Cubic meter	m ³
	Liter	l, L	10 ⁻³		
Mass	Kilogram	kg	1	Kilogram	kg
	Ton	t	10 ³		
	Atomic mass unit	u	$\approx 1.660\ 57 \times 10^{-27}$		
Time	Second	s	1	Second	s
	Minute	min	60		
	Hour	h	3 600		
	Day	d	86 400		
Velocity	Meter per second	m/s	1	Meter per second	m/s
	Knot	kn	1 852/3 600		
Frequency and number of oscillations per time	Cycle	s ⁻¹	1	Hertz	Hz
Rotational speed	Rotation per minute	min ⁻¹	1/60	Per second	s ⁻¹
Angular velocity	Radian per second	rad/s	1	Radian per second	rad/s
Acceleration	Meter per square second	m/s ²	1	Meter per square second	m/s ²
	G	G	9.806 65		
Force	Kilogram force	kgf	9.806 65	Newton	N
	Ton force	tf	9 806.65		
	Dyne	dyn	10 ⁻⁵		
Moment of force	Kilogram force-meter	kgf·m	9.806 65	Newton-meter	N·m
Stress and pressure	Kilogram force per square meter	kgf/m ²	9.806 65	Pascal	Pa
	Kilogram force per square centimeter	kgf/cm ²	$9.806\ 65 \times 10^4$		
	Kilogram force per square millimeter	kgf/mm ²	$9.806\ 65 \times 10^6$		

Energy	Power	Temperature	Viscosity	Kinematic viscosity	Magnetic flux	Magnetic flux density	Magnetic field intensity
J	W	K	Pa·s	m ² /s	Wb	T	A/m
erg	erg/s	°C	P	St	Mx	Gs	Oe
kgf·m	kgf·m/s	°C	kgf·s/m ²	m ² /s	—	—	—

Item	Unit name	Symbol	Conversion rate into SI	SI unit name	Symbol
Pressure	Hydro-column meter	mH ₂ O	9 806.65	Pascal	Pa
	Mercurial column millimeter	mmHg	101 325/760		
	Torr	Torr	101 325/760		
	Atmosphere	atm	101 325		
	Bar	bar	10 ⁵		
Energy	Erg	erg	10 ⁻⁷	Joule	J
	IT calorie	cal _{IT}	4.186 8		
	Kilogram force - meter	kgf·m	9.806 65		
	Kilowatt hour	kW·h	3.600×10^6		
	Horse power hour (French)	PS·h	$\approx 2.647\ 79 \times 10^6$		
	Electron volt	eV	$\approx 1.602\ 19 \times 10^{-19}$		
Power	Watt	W	1	Watt	W
	Horse power (French)	PS	≈ 735.5		
	Kilogram force -meter per second	kgf·m/s	9.806 65		
Viscosity	Poise	P	10 ⁻¹	Pascal-second	Pa·s
	Centipoise	cP	10 ⁻³		
	Kilogram force-second per square meter	kgf·s/m ²	9.806 65		
Kinematic viscosity	Stokes	St	10 ⁻⁴	Square meter per second	m ² /s
	Centistokes	cSt	10 ⁻⁶		
Temperature	Degree	°C	+273.15	Kelvin	K
Radioactivity	Curie	Ci	3.7×10^{10}	Becquerel	Bq
	Exposure dose	R	2.58×10^{-4}		
	Absorbed dose	rad	10 ⁻²		
	Dose equivalent	rem	10 ⁻²		
Magnetic flux	Maxwell	Mx	10 ⁻⁸	Weber	Wb
Magnetic flux density	Gamma	γ	10 ⁻⁹	Tesla	T
	Gauss	Gs	10 ⁻⁴		
Magnetic field intensity	Oersted	Oe	$10^{3/4} \pi$	Ampere per meter	A/m
Quantity of electricity	Coulomb	C	1	Coulomb	C
Electric potential difference	Volt	V	1	Volt	V
Electrostatic capacity	Farad	F	1	Farad	F
(Electric) resistance	Ohm	Ω	1	Ohm	Ω
(Electric) conductance	Siemens	S	1	Siemens	S
Inductance	Henry	H	1	Henry	H
Current	Ampere	A	1	Ampere	A



1 inch = 25.4 mm

inch		0"	1"	2"	3"	4"	5"	6"	7"	8"
Fraction	Decimal									
	0		25.400	50.800	76.200	101.600	127.000	152.400	177.800	203.200
1 / 64"	0.015625	0.397	25.797	51.197	76.597	101.997	127.397	152.797	178.197	203.597
1 / 32"	0.031250	0.794	26.194	51.594	76.994	102.394	127.794	153.194	178.594	203.994
3 / 64"	0.046875	1.191	26.591	51.991	77.391	102.791	128.191	153.591	178.991	204.391
1 / 16"	0.062500	1.588	26.988	52.388	77.788	103.188	128.588	153.988	179.388	204.788
5 / 64"	0.078125	1.984	27.384	52.784	78.184	103.584	128.984	154.384	179.784	205.184
3 / 32"	0.093750	2.381	27.781	53.181	78.581	103.981	129.381	154.781	180.181	205.581
7 / 64"	0.109375	2.778	28.178	53.578	78.978	104.378	129.778	155.178	180.578	205.978
1 / 8"	0.125000	3.175	28.575	53.975	79.375	104.775	130.175	155.575	180.975	206.375
9 / 64"	0.140625	3.572	28.972	54.372	79.772	105.172	130.572	155.972	181.372	206.772
5 / 32"	0.156250	3.969	29.369	54.769	80.169	105.569	130.969	156.369	181.769	207.169
11 / 64"	0.171875	4.366	29.766	55.166	80.566	105.966	131.366	156.766	182.166	207.566
3 / 16"	0.187500	4.762	30.162	55.562	80.962	106.362	131.762	157.162	182.562	207.962
13 / 64"	0.203125	5.159	30.559	55.959	81.359	106.759	132.159	157.559	182.959	208.359
7 / 32"	0.218750	5.556	30.956	56.356	81.756	107.156	132.556	157.956	183.356	208.756
15 / 64"	0.234375	5.953	31.353	56.753	82.153	107.553	132.953	158.353	183.753	209.153
1 / 4"	0.250000	6.350	31.750	57.150	82.550	107.950	133.350	158.750	184.150	209.550
17 / 64"	0.265625	6.747	32.147	57.547	82.947	108.347	133.747	159.147	184.547	209.947
9 / 32"	0.281250	7.144	32.544	57.944	83.344	108.744	134.144	159.544	184.944	210.344
19 / 64"	0.296875	7.541	32.941	58.341	83.741	109.141	134.541	159.941	185.341	210.741
5 / 16"	0.312500	7.938	33.338	58.738	84.138	109.538	134.938	160.338	185.738	211.138
21 / 64"	0.328125	8.334	33.734	59.134	84.534	109.934	135.334	160.734	186.134	211.534
11 / 32"	0.343750	8.731	34.131	59.531	84.931	110.331	135.731	161.131	186.531	211.931
23 / 64"	0.359375	9.128	34.528	59.928	85.328	110.728	136.128	161.528	186.928	212.328
3 / 8"	0.375000	9.525	34.925	60.325	85.725	111.125	136.525	161.925	187.325	212.725
25 / 64"	0.390625	9.922	35.322	60.722	86.122	111.522	136.922	162.322	187.722	213.122
13 / 32"	0.406250	10.319	35.719	61.119	86.519	111.919	137.319	162.719	188.119	213.519
27 / 64"	0.421875	10.716	36.116	61.516	86.916	112.316	137.716	163.116	188.516	213.916
7 / 16"	0.437500	11.112	36.512	61.912	87.312	112.712	138.112	163.512	188.912	214.312
29 / 64"	0.453125	11.509	36.909	62.309	87.709	113.109	138.509	163.909	189.309	214.709
15 / 32"	0.468750	11.906	37.306	62.706	88.106	113.506	138.906	164.306	189.706	215.106
31 / 64"	0.484375	12.303	37.703	63.103	88.503	113.903	139.303	164.703	190.103	215.503
1 / 2"	0.500000	12.700	38.100	63.500	88.900	114.300	139.700	165.100	190.500	215.900

1 inch = 25.4 mm

inch		0"	1"	2"	3"	4"	5"	6"	7"	8"
Fraction	Decimal									
33 / 64"	0.515625	13.097	38.497	63.897	89.297	114.697	140.097	165.497	190.897	216.297
17 / 32"	0.531250	13.494	38.894	64.294	89.694	115.094	140.494	165.894	191.294	216.694
35 / 64"	0.546875	13.891	39.291	64.691	90.091	115.491	140.891	166.291	191.691	217.091
9 / 16"	0.562500	14.288	39.688	65.088	90.488	115.888	141.288	166.688	192.088	217.488
37 / 64"	0.578125	14.684	40.084	65.484	90.884	116.284	141.684	167.084	192.484	217.884
19 / 32"	0.593750	15.081	40.481	65.881	91.281	116.681	142.081	167.481	192.881	218.281
39 / 64"	0.609375	15.478	40.878	66.278	91.678	117.078	142.478	167.878	193.278	218.678
5 / 8"	0.625000	15.875	41.275	66.675	92.075	117.475	142.875	168.275	193.675	219.075
41 / 64"	0.640625	16.272	41.672	67.072	92.472	117.872	143.272	168.672	194.072	219.472
21 / 32"	0.656250	16.669	42.069	67.469	92.869	118.269	143.669	169.069	194.469	219.869
43 / 64"	0.671875	17.066	42.466	67.866	93.266	118.666	144.066	169.466	194.866	220.266
11 / 16"	0.687500	17.462	42.862	68.262	93.662	119.062	144.462	169.862	195.262	220.662
45 / 64"	0.703125	17.859	43.259	68.659	94.059	119.459	144.859	170.259	195.659	221.059
23 / 32"	0.718750	18.256	43.656	69.056	94.456	119.856	145.256	170.656	196.056	221.456
47 / 64"	0.734375	18.653	44.053	69.453	94.853	120.253	145.653	171.053	196.453	221.853
3 / 4"	0.750000	19.050	44.450	69.850	95.250	120.650	146.050	171.450	196.850	222.250
49 / 64"	0.765625	19.447	44.847	70.247	95.647	121.047	146.447	171.847	197.247	222.647
25 / 32"	0.781250	19.844	45.244	70.644	96.044	121.444	146.844	172.244	197.644	223.044
51 / 64"	0.796875	20.241	45.641	71.041	96.441	121.841	147.241	172.641	198.041	223.441
13 / 16"	0.812500	20.638	46.038	71.438	96.838	122.238	147.638	173.038	198.438	223.838
53 / 64"	0.828125	21.034	46.434	71.834	97.234	122.634	148.034	173.434	198.834	224.234
27 / 32"	0.843750	21.431	46.831	72.231	97.631	123.031	148.431	173.831	199.231	224.631
55 / 64"	0.859375	21.828	47.228	72.628	98.028	123.428	148.828	174.228	199.628	225.028
7 / 8"	0.875000	22.225	47.625	73.025	98.425	123.825	149.225	174.625	200.025	225.425
57 / 64"	0.890625	22.622	48.022	73.422	98.822	124.222	149.622	175.022	200.422	225.822
29 / 32"	0.906250	23.019	48.419	73.819	99.219	124.619	150.019	175.419	200.819	226.219
59 / 64"	0.921875	23.416	48.816	74.216	99.616	125.016	150.416	175.816	201.216	226.616
15 / 16"	0.937500	23.812	49.212	74.612	100.012	125.412	150.812	176.212	201.612	227.012
61 / 64"	0.953125	24.209	49.609	75.009	100.409	125.809	151.209	176.609	202.009	227.409
31 / 32"	0.968750	24.606	50.006	75.406	100.806	126.206	151.606	177.006	202.406	227.806
63 / 64"	0.984375	25.003	50.403	75.803	101.203	126.603	152.003	177.403	202.803	228.203



● Hardness Conversion Table (Reference)

Rockwell C scale hardness Load 1471N	Vickers' hardness	Brinell hardness		Rockwell hardness		Shore hardness
		Standard ball	Tungsten carbide ball	A scale Load 588.4N Diamond circular cone	B scale Load 980.7N 1/16" ball	
HRC	HV					HS
68	940	—	—	85.6	—	97
67	900	—	—	85.0	—	95
66	865	—	—	84.5	—	92
65	832	—	(739)	83.9	—	91
64	800	—	(722)	83.4	—	88
63	772	—	(705)	82.8	—	87
62	746	—	(688)	82.3	—	85
61	720	—	(670)	81.8	—	83
60	697	—	(654)	81.2	—	81
59	674	—	(634)	80.7	—	80
58	653	—	615	80.1	—	78
57	633	—	595	79.6	—	76
56	613	—	577	79.0	—	75
55	595	—	560	78.5	—	74
54	577	—	543	78.0	—	72
53	560	—	525	77.4	—	71
52	544	(500)	512	76.8	—	69
51	528	(487)	496	76.3	—	68
50	513	(475)	481	75.9	—	67
49	498	(464)	469	75.2	—	66
48	484	451	455	74.7	—	64
47	471	442	443	74.1	—	63
46	458	432	432	73.6	—	62
45	446	421	421	73.1	—	60
44	434	409	409	72.5	—	58
43	423	400	400	72.0	—	57
42	412	390	390	71.5	—	56
41	402	381	381	70.9	—	55
40	392	371	371	70.4	—	54
39	382	362	362	69.9	—	52

Rockwell C scale hardness Load 1471N	Vickers' hardness	Brinell hardness		Rockwell hardness		Shore hardness
		Standard ball	Tungsten carbide ball	A scale Load 588.4N Diamond circular cone	B scale Load 980.7N 1/16" ball	
HRC	HV					HS
38	372	353	353	69.4	—	51
37	363	344	344	68.9	—	50
36	354	336	336	68.4	(109.0)	49
35	345	327	327	67.9	(108.5)	48
34	336	319	319	67.4	(108.0)	47
33	327	311	311	66.8	(107.5)	46
32	318	301	301	66.3	(107.0)	44
31	310	294	294	65.8	(106.0)	43
30	302	286	286	65.3	(105.5)	42
29	294	279	279	64.7	(104.5)	41
28	286	271	271	64.3	(104.0)	41
27	279	264	264	63.8	(103.0)	40
26	272	258	258	63.3	(102.5)	38
25	266	253	253	62.8	(101.5)	38
24	260	247	247	62.4	(101.0)	37
23	254	243	243	62.0	100.0	36
22	248	237	237	61.5	99.0	35
21	243	231	231	61.0	98.5	35
20	238	226	226	60.5	97.8	34
(18)	230	219	219	—	96.7	33
(16)	222	212	212	—	95.5	32
(14)	213	203	203	—	93.9	31
(12)	204	194	194	—	92.3	29
(10)	196	187	187	—	90.7	28
(8)	188	179	179	—	89.5	27
(6)	180	171	171	—	87.1	26
(4)	173	165	165	—	85.5	25
(2)	166	158	158	—	83.5	24
(0)	160	152	152	—	81.7	24



Tolerance of Shaft Diameter

Nominal Diameter mm		b12		c12		d6		e6		e12		f5		f6		g5	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
—	3	−140	− 240	− 60	− 160	− 20	− 26	− 14	− 20	− 14	−114	− 6	−10	− 6	− 12	− 2	− 6
3	6	−140	− 260	− 70	− 190	− 30	− 38	− 20	− 28	− 20	−140	−10	−15	−10	− 18	− 4	− 9
6	10	−150	− 300	− 80	− 230	− 40	− 49	− 25	− 34	− 25	−175	−13	−19	−13	− 22	− 5	−11
10	18	−150	− 330	− 95	− 275	− 50	− 61	− 32	− 43	− 32	−212	−16	−24	−16	− 27	− 6	−14
18	30	−160	− 370	−110	− 320	− 65	− 78	− 40	− 53	− 40	−250	−20	−29	−20	− 33	− 7	−16
30	40	−170	− 420	−120	− 370	− 80	− 96	− 50	− 66	− 50	−300	−25	−36	−25	− 41	− 9	−20
40	50	−180	− 430	−130	− 380												
50	65	−190	− 490	−140	− 440	−100	−119	− 60	− 79	− 60	−360	−30	−43	−30	− 49	−10	−23
65	80	−200	− 500	−150	− 450												
80	100	−220	− 570	−170	− 520	−120	−142	− 72	− 94	− 72	−422	−36	−51	−36	− 58	−12	−27
100	120	−240	− 590	−180	− 530												
120	140	−260	− 660	−200	− 600												
140	160	−280	− 680	−210	− 610	−145	−170	− 85	−110	− 85	−485	−43	−61	−43	− 68	−14	−32
160	180	−310	− 710	−230	− 630												
180	200	−340	− 800	−240	− 700												
200	225	−380	− 840	−260	− 720	−170	−199	−100	−129	−100	−560	−50	−70	−50	− 79	−15	−35
225	250	−420	− 880	−280	− 740												
250	280	−480	−1000	−300	− 820	−190	−222	−110	−142	−110	−630	−56	−79	−56	− 88	−17	−40
280	315	−540	−1060	−330	− 850												
315	355	−600	−1170	−360	− 930	−210	−246	−125	−161	−125	−695	−62	−87	−62	− 98	−18	−43
355	400	−680	−1250	−400	− 970												
400	450	−760	−1390	−440	−1070	−230	−270	−135	−175	−135	−765	−68	−95	−68	−108	−20	−47
450	500	−840	−1470	−480	−1110												

Nominal Diameter mm		h12		h13		js5		j5		js6		j6		j7		k5	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
—	3	0	−100	0	−140	+ 2	− 2	+2	− 2	+ 3	− 3	+ 4	− 2	+ 6	− 4	+ 4	0
3	6	0	−120	0	−180	+ 2.5	− 2.5	+3	− 2	+ 4	− 4	+ 6	− 2	+ 8	− 4	+ 6	+1
6	10	0	−150	0	−220	+ 3	− 3	+4	− 2	+ 4.5	− 4.5	+ 7	− 2	+10	− 5	+ 7	+1
10	18	0	−180	0	−270	+ 4	− 4	+5	− 3	+ 5.5	− 5.5	+ 8	− 3	+12	− 6	+ 9	+1
18	30	0	−210	0	−330	+ 4.5	− 4.5	+5	− 4	+ 6.5	− 6.5	+ 9	− 4	+13	− 8	+11	+2
30	40	0	−250	0	−390	+ 5.5	− 5.5	+6	− 5	+ 8	− 8	+11	− 5	+15	−10	+13	+2
40	50																
50	65	0	−300	0	−460	+ 6.5	− 6.5	+6	− 7	+ 9.5	− 9.5	+12	− 7	+18	−12	+15	+2
65	80																
80	100	0	−350	0	−540	+ 7.5	− 7.5	+6	− 9	+11	−11	+13	− 9	+20	−15	+18	+3
100	120																
120	140	0	−400	0	−630	+ 9	− 9	+7	−11	+12.5	−12.5	+14	−11	+22	−18	+21	+3
140	160																
160	180																
180	200																
200	225	0	−460	0	−720	+10	−10	+7	−13	+14.5	−14.5	+16	−13	+25	−21	+24	+4
225	250																
250	280	0	−520	0	−810	+11.5	−11.5	+7	−16	+16	−16	+16	−16	+26	−26	+27	+4
280	315																
315	355	0	−570	0	−890	+12.5	−12.5	+7	−18	+18	−18	+18	−18	+29	−28	+29	+4
355	400																
400	450	0	−630	0	−970	+13.5	−13.5	+7	−20	+20	−20	+20	−20	+31	−32	+32	+5
450	500																

unit : μm

g6		h5		h6		h7		h8		h9		h10		h11		Nominal Diameter mm	
High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
− 2	− 8	0	− 4	0	− 6	0	−10	0	−14	0	− 25	0	− 40	0	− 60	—	3
− 4	−12	0	− 5	0	− 8	0	−12	0	−18	0	− 30	0	− 48	0	− 75	3	6
− 5	−14	0	− 6	0	− 9	0	−15	0	−22	0	− 36	0	− 58	0	− 90	6	10
− 6	−17	0	− 8	0	−11	0	−18	0	−27	0	− 43	0	− 70	0	−110	10	18
− 7	−20	0	− 9	0	−13	0	−21	0	−33	0	− 52	0	− 84	0	−130	18	30
− 9	−25	0	−11	0	−16	0	−25	0	−39	0	− 62	0	−100	0	−160	30	40
																40	50
−10	−29	0	−13	0	−19	0	−30	0	−46	0	− 74	0	−120	0	−190	50	65
																65	80
−12	−34	0	−15	0	−22	0	−35	0	−54	0	− 87	0	−140	0	−220	80	100
																100	120
−14	−39	0	−18	0	−25	0	−40	0	−63	0	−100	0	−160	0	−250	120	140
																140	160
																160	180
−15	−44	0	−20	0	−29	0	−46	0	−72	0	−115	0	−185	0	−290	180	200
																200	225
																225	250
−17	−49	0	−23	0	−32	0	−52	0	−81	0	−130	0	−210	0	−320	250	280
																280	315
−18	−54	0	−25	0	−36	0	−57	0	−89	0	−140	0	−230	0	−360	315	355
																355	400
−20	−60	0	−27	0	−40	0	−63	0	−97	0	−155	0	−250	0	−400	400	450
																450	500

unit : μm

k6		m5		m6		n5		n6		p6		Nominal Diameter mm	
High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
+ 6	0	+ 6	+ 2	+ 8	+ 2	+ 8	+ 4	+10	+ 4	+12	+ 6	—	3
+ 9	+1	+ 9	+ 4	+12	+ 4	+13	+ 8	+16	+ 8	+ 20	+12	3	6
+10	+1	+12	+ 6	+15	+ 6	+16	+10	+19	+10	+ 24	+15	6	10
+12	+1	+15	+ 7	+18	+ 7	+20	+12	+23	+12	+ 29	+18	10	18
+15	+2	+17	+ 8	+21	+ 8	+24	+15	+28	+15	+ 35	+22	18	30
+18	+2	+20	+ 9	+25	+ 9	+28	+17	+33	+17	+ 42	+26	30	40
												40	50
+21	+2	+24	+11	+30	+11	+33	+20	+39	+20	+ 51	+32	50	65
												65	80
+25	+3	+28	+13	+35	+13	+38	+23	+45	+23	+ 59	+37	80	100
												100	120
+28	+3	+33	+15	+40	+15	+45	+27	+52	+27	+ 68	+43	120	140
												140	160
												160	180
+33	+4	+37	+17	+46	+17	+51	+31	+60	+31	+ 79	+50	180	200
												200	225
												225	250
+36	+4	+43	+20	+52	+20	+57	+34	+66	+34	+ 88	+56	250	280
												280	315
+40	+4	+46	+21	+57	+21	+62	+37	+73	+37	+ 98	+62	315	355
												355	400
+45	+5	+50	+23	+63	+23	+67	+40	+80	+40	+108	+68	400	450
												450	500

● Tolerance of Housing Bore Diameter

Nominal Diameter mm		B12		E7		E11		E12		F6		F7		G6		G7	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
—	3	+ 240	+140	+ 24	+ 14	+ 74	+ 14	+114	+ 14	+ 12	+ 6	+ 16	+ 6	+ 8	+ 2	+12	+ 2
3	6	+ 260	+140	+ 32	+ 20	+ 95	+ 20	+140	+ 20	+ 18	+10	+ 22	+10	+12	+ 4	+16	+ 4
6	10	+ 300	+150	+ 40	+ 25	+115	+ 25	+175	+ 25	+ 22	+13	+ 28	+13	+14	+ 5	+20	+ 5
10	18	+ 330	+150	+ 50	+ 32	+142	+ 32	+212	+ 32	+ 27	+16	+ 34	+16	+17	+ 6	+24	+ 6
18	30	+ 370	+160	+ 61	+ 40	+170	+ 40	+250	+ 40	+ 33	+20	+ 41	+20	+20	+ 7	+28	+ 7
30	40	+ 420	+170	+ 75	+ 50	+210	+ 50	+300	+ 50	+ 41	+25	+ 50	+25	+25	+ 9	+34	+ 9
40	50	+ 430	+180														
50	65	+ 490	+190	+ 90	+ 60	+250	+ 60	+360	+ 60	+ 49	+30	+ 60	+30	+29	+10	+40	+10
65	80	+ 500	+200														
80	100	+ 570	+220	+107	+ 72	+292	+ 72	+422	+ 72	+ 58	+36	+ 71	+36	+34	+12	+47	+12
100	120	+ 590	+240														
120	140	+ 660	+260														
140	160	+ 680	+280	+125	+ 85	+335	+ 85	+485	+ 85	+ 68	+43	+ 83	+43	+39	+14	+54	+14
160	180	+ 710	+310														
180	200	+ 800	+340														
200	225	+ 840	+380	+146	+100	+390	+100	+560	+100	+ 79	+50	+ 96	+50	+44	+15	+61	+15
225	250	+ 880	+420														
250	280	+1000	+480	+162	+110	+430	+110	+630	+110	+ 88	+56	+108	+56	+49	+17	+69	+17
280	315	+1060	+540														
315	355	+1170	+600	+182	+125	+485	+125	+695	+125	+ 98	+62	+119	+62	+54	+18	+75	+18
355	400	+1250	+680														
400	450	+1390	+760	+198	+135	+535	+135	+765	+135	+108	+68	+131	+68	+60	+20	+83	+20
450	500	+1470	+840														

Nominal Diameter mm		JS7		J7		K5		K6		K7		M6		M7		N6	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
—	3	+ 5	− 5	+ 4	− 6	0	− 4	0	− 6	0	−10	− 2	− 8	−2	−12	− 4	−10
3	6	+ 6	− 6	+ 6	− 6	0	− 5	+2	− 6	+ 3	− 9	− 1	− 9	0	−12	− 5	−13
6	10	+ 7	− 7	+ 8	− 7	+1	− 5	+2	− 7	+ 5	−10	− 3	−12	0	−15	− 7	−16
10	18	+ 9	− 9	+10	− 8	+2	− 6	+2	− 9	+ 6	−12	− 4	−15	0	−18	− 9	−20
18	30	+10	−10	+12	− 9	+1	− 8	+2	−11	+ 6	−15	− 4	−17	0	−21	−11	−24
30	40	+12	−12	+14	−11	+2	− 9	+3	−13	+ 7	−18	− 4	−20	0	−25	−12	−28
40	50																
50	65	+15	−15	+18	−12	+3	−10	+4	−15	+ 9	−21	− 5	−24	0	−30	−14	−33
65	80																
80	100	+17	−17	+22	−13	+2	−13	+4	−18	+10	−25	− 6	−28	0	−35	−16	−38
100	120																
120	140	+20	−20	+26	−14	+3	−15	+4	−21	+12	−28	− 8	−33	0	−40	−20	−45
140	160																
160	180																
180	200																
200	225	+23	−23	+30	−16	+2	−18	+5	−24	+13	−33	− 8	−37	0	−46	−22	−51
225	250																
250	280	+26	−26	+36	−16	+3	−20	+5	−27	+16	−36	− 9	−41	0	−52	−25	−57
280	315																
315	355	+28	−28	+39	−18	+3	−22	+7	−29	+17	−40	−10	−46	0	−57	−26	−62
355	400																
400	450	+31	−31	+43	−20	+2	−25	+8	−32	+18	−45	−10	−50	0	−63	−27	−67
450	500																

unit : μm

H6		H7		H8		H9		H10		H11		JS6		J6		Nominal Diameter mm	
High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
+ 6	0	+10	0	+14	0	+ 25	0	+ 40	0	+ 60	0	+ 3	− 3	+ 2	−4	—	3
+ 8	0	+12	0	+18	0	+ 30	0	+ 48	0	+ 75	0	+ 4	− 4	+ 5	−3	3	6
+ 9	0	+15	0	+22	0	+ 36	0	+ 58	0	+ 90	0	+ 4.5	− 4.5	+ 5	−4	6	10
+11	0	+18	0	+27	0	+ 43	0	+ 70	0	+110	0	+ 5.5	− 5.5	+ 6	−5	10	18
+13	0	+21	0	+33	0	+ 52	0	+ 84	0	+130	0	+ 6.5	− 6.5	+ 8	−5	18	30
+16	0	+25	0	+39	0	+ 62	0	+100	0	+160	0	+ 8	− 8	+10	−6	30	40
																40	50
+19	0	+30	0	+46	0	+ 74	0	+120	0	+190	0	+ 9.5	− 9.5	+13	−6	50	65
																65	80
+22	0	+35	0	+54	0	+ 87	0	+140	0	+220	0	+11	−11	+16	−6	80	100
																100	120
+25	0	+40	0	+63	0	+100	0	+160	0	+250	0	+12.5	−12.5	+18	−7	120	140
																140	160
																160	180
+29	0	+46	0	+72	0	+115	0	+185	0	+290	0	+14.5	−14.5	+22	−7	180	200
																200	225
																225	250
+32	0	+52	0	+81	0	+130	0	+210	0	+320	0	+16	−16	+25	−7	250	280
																280	315
+36	0	+57	0	+89	0	+140	0	+230	0	+360	0	+18	−18	+29	−7	315	355
																355	400
+40	0	+63	0	+97	0	+155	0	+250	0	+400	0	+20	−20	+33	−7	400	450
																450	500

unit : μm

N7		P6		P7		R7		S7		Nominal Diameter mm	
High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
− 4	−14	− 6	−12	− 6	− 16	−10	− 20	− 14	− 24	—	3
− 4	−16	− 9	−17	− 8	− 20	−11	− 23	− 15	− 27	3	6
− 4	−19	−12	−21	− 9	− 24	−13	− 28	− 17	− 32	6	10
− 5	−23	−15	−26	−11	− 29	−16	− 34	− 21	− 39	10	18
− 7	−28	−18	−31	−14	− 35	− 20	− 41	− 27	− 48	18	30
− 8	−33	−21	−37	−17	− 42	− 25	− 50	− 34	− 59	30	40
										40	50
− 9	−39	−26	−45	−21	− 51	− 30	− 60	− 42	− 72	50	65
						− 32	− 62	− 48	− 78	65	80
−10	−45	−30	−52	−24	− 59	− 38	− 73	− 58	− 93	80	100
						− 41	− 76	− 66	−101	100	120
−12	−52	−36	−61	−28	− 68	− 48	− 88	− 77	−117	120	140
						− 50	− 90	− 85	−125	140	160
						− 53	− 93	− 93	−133	160	180
−14	−60	−41	−70	−33	− 79	− 60	−106	−105	−151	180	200
						− 63	−109	−113	−159	200	225
						− 67	−113	−123	−169	225	250
−14	−66	−47	−79	−36	− 88	− 74	−126	−138	−190	250	280
						− 78	−130	−150	−202	280	315
−16	−73	−51	−87	−41	− 98	− 87	−144	−169	−226	315	355
						− 93	−150	−187	−244	355	400
−17	−80	−55	−95	−45	−108	−103	−166	−209	−272	400	450
						−109	−172	−229	−292	450	500



● N-lbf Conversion Table

1N = 0.224809 lbf 1lbf = 4.44822 N								
N		lbf	N		lbf	N		lbf
4.448	1	0.225	151.24	34	7.643	298.03	67	15.062
8.896	2	0.450	155.69	35	7.868	302.48	68	15.287
13.345	3	0.674	160.14	36	8.093	306.93	69	15.512
17.793	4	0.899	164.58	37	8.318	311.38	70	15.737
22.241	5	1.124	169.03	38	8.543	315.82	71	15.961
26.689	6	1.349	173.48	39	8.768	320.27	72	16.186
31.138	7	1.574	177.93	40	8.992	324.72	73	16.411
35.586	8	1.798	182.38	41	9.217	329.17	74	16.636
40.034	9	2.023	186.83	42	9.442	333.62	75	16.861
44.482	10	2.248	191.27	43	9.667	338.06	76	17.085
48.930	11	2.473	195.72	44	9.892	342.51	77	17.310
53.379	12	2.698	200.17	45	10.116	346.96	78	17.535
57.827	13	2.923	204.62	46	10.341	351.41	79	17.760
62.275	14	3.147	209.07	47	10.566	355.86	80	17.985
66.723	15	3.372	213.51	48	10.791	360.31	81	18.210
71.171	16	3.597	217.96	49	11.016	364.75	82	18.434
75.620	17	3.822	222.41	50	11.240	369.20	83	18.659
80.068	18	4.047	226.86	51	11.465	373.65	84	18.884
84.516	19	4.271	231.31	52	11.690	378.10	85	19.109
88.964	20	4.496	235.76	53	11.915	382.55	86	19.334
93.413	21	4.721	240.20	54	12.140	386.99	87	19.558
97.861	22	4.946	244.65	55	12.364	391.44	88	19.783
102.31	23	5.171	249.10	56	12.589	395.89	89	20.008
106.76	24	5.395	253.55	57	12.814	400.34	90	20.233
111.21	25	5.620	258.00	58	13.039	404.79	91	20.458
115.65	26	5.845	262.44	59	13.264	409.24	92	20.682
120.10	27	6.070	266.89	60	13.489	413.68	93	20.907
124.55	28	6.295	271.34	61	13.713	418.13	94	21.132
129.00	29	6.519	275.79	62	13.938	422.58	95	21.357
133.45	30	6.744	280.24	63	14.163	427.03	96	21.582
137.89	31	6.969	284.69	64	14.388	431.48	97	21.806
142.34	32	7.194	289.13	65	14.613	435.93	98	22.031
146.79	33	7.419	293.58	66	14.837	440.37	99	22.256

How to use : For example, to convert 20 N into lbf, find the number 20 in the center of the first column. By referring to the lbf column on the right, it will be found that 20 N equals 4.496 lbf.
To convert 20 lbf into N, refer to the N column on the left and it will be found that 20 lbf equals 88.964 N.

● N-kgf Conversion Table

1N = 0.1019716 kgf 1kgf = 9.80665 N								
N		kgf	N		kgf	N		kgf
9.8066	1	0.1020	333.43	34	3.4670	657.05	67	6.8321
19.613	2	0.2039	343.23	35	3.5690	666.85	68	6.9341
29.420	3	0.3059	353.04	36	3.6710	676.66	69	7.0360
39.227	4	0.4079	362.85	37	3.7729	686.47	70	7.1380
49.033	5	0.5099	372.65	38	3.8749	696.27	71	7.2400
58.840	6	0.6118	382.46	39	3.9769	706.08	72	7.3420
68.647	7	0.7138	392.27	40	4.0789	715.89	73	7.4439
78.453	8	0.8158	402.07	41	4.1808	725.69	74	7.5459
88.260	9	0.9177	411.88	42	4.2828	735.50	75	7.6479
98.066	10	1.0197	421.69	43	4.3848	745.31	76	7.7498
107.87	11	1.1217	431.49	44	4.4868	755.11	77	7.8518
117.68	12	1.2237	441.30	45	4.5887	764.92	78	7.9538
127.49	13	1.3256	451.11	46	4.6907	774.73	79	8.0558
137.29	14	1.4276	460.91	47	4.7927	784.53	80	8.1577
147.10	15	1.5296	470.72	48	4.8946	794.34	81	8.2597
156.91	16	1.6315	480.53	49	4.9966	804.15	82	8.3617
166.71	17	1.7335	490.33	50	5.0986	813.95	83	8.4636
176.52	18	1.8355	500.14	51	5.2006	823.76	84	8.5656
186.33	19	1.9375	509.95	52	5.3025	833.57	85	8.6676
196.13	20	2.0394	519.75	53	5.4045	843.37	86	8.7696
205.94	21	2.1414	529.56	54	5.5065	853.18	87	8.8715
215.75	22	2.2434	539.37	55	5.6084	862.99	88	8.9735
225.55	23	2.3453	549.17	56	5.7104	872.79	89	9.0755
235.36	24	2.4473	558.98	57	5.8124	882.60	90	9.1774
245.17	25	2.5493	568.79	58	5.9144	892.41	91	9.2794
254.97	26	2.6513	578.59	59	6.0163	902.21	92	9.3814
264.78	27	2.7532	588.40	60	6.1183	912.02	93	9.4834
274.59	28	2.8552	598.21	61	6.2203	921.83	94	9.5853
284.39	29	2.9572	608.01	62	6.3222	931.63	95	9.6873
294.20	30	3.0591	617.82	63	6.4242	941.44	96	9.7893
304.01	31	3.1611	627.63	64	6.5262	951.25	97	9.8912
313.81	32	3.2631	637.43	65	6.6282	961.05	98	9.9932
323.62	33	3.3651	647.24	66	6.7301	970.86	99	10.0952

How to use : For example, to convert 20 N into kgf, find the number 20 in the center of the first column. By referring to the kgf column on the right, it will be found that 20 N equals 2.0394 kgf.
To convert 20 kgf into N, refer to the N column on the left and it will be found that 20 kgf equals 196.13 N.

● Temperature Conversion Table

°C

°F

-73.3

-100

-148.0

-62.2

- 80

-112.0

-51.1

- 60

- 76.0

-40.0

- 40

- 40.0

-28.9

- 20

- 4.0

-17.8

0

32.0

-17.2

1

33.8

-16.7

2

35.6

-16.1

3

37.4

-15.6

4

39.2

-15.0

5

41.0

-14.4

6

42.8

-13.9

7

44.6

-13.3

8

46.4

-12.8

9

48.2

-12.2

10

50.0

-11.7

11

51.8

-11.1

12

53.6

-10.6

13

55.4

-10.0

14

57.2

- 9.4

15

59.0

- 8.9

16

60.8

- 8.3

17

62.6

- 7.8

18

64.4

- 7.2

19

66.2

- 6.7

20

68.0

- 6.1

21

69.8

- 5.6

22

71.6

- 5.0

23

73.4

- 4.4

24

75.2

- 3.9

25

77.0

- 3.3

26

78.8

- 2.8

27

80.6

°C

°F

-2.2

28

82.4

-1.7

29

84.2

-1.1

30

86.0

-0.6

31

87.8

0

32

89.6

0.6

33

91.4

1.1

34

93.2

1.7

35

95.0

2.2

36

96.8

2.8

37

98.6

3.3

38

100.4

3.9

39

102.2

4.4

40

104.0

5.0

41

105.8

5.6

42

107.6

6.1

43

109.4

6.7

44

111.2

7.2

45

113.0

7.8

46

114.8

8.3

47

116.6

8.9

48

118.4

9.4

49

120.2

10.0

50

122.0

10.6

51

123.8

11.1

52

125.6

11.7

53

127.4

12.2

54

129.2

12.8

55

131.0

13.3

56

132.8

13.9

57

134.6

14.4

58

136.4

15.0

59

138.2

15.6

60

140.0

°C

°F

16.1

61

141.8

16.7

62

143.6

17.2

63

145.4

17.8

64

147.2

18.3

65

149.0

18.9

66

150.8

19.4

67

152.6

20.0

68

154.4

20.6

69

156.2

21.1

70

158.0

21.7

71

159.8

22.2

72

161.6

22.8

73

163.4

23.3

74

165.2

23.9

75

167.0

24.4

76

168.8

25.0

77

170.6

25.6

78

172.4

26.1

79

174.2

26.7

80

176.0

27.2

81

177.8

27.8

82

179.6

28.3

83

181.4

28.9

84

183.2

29.4

85

185.0

30.0

86

186.8

30.6

87

188.6

31.1

88

190.4

31.7

89

192.2

32.2

90

194.0

32.8

91

195.8

33.3

92

197.6

33.9

93

199.4

°C

°F

34.4

94

201.2

35.0

95

203.0

35.6

96

204.8

36.1

97

206.6

36.7

98

208.4

37.2

99

210.2

37.8

100

212

43.3

110

230

48.9

120

248

54.4

130

266

60.0

140

284

65.6

150

302

71.1

160

320

76.7

170

338

82.2

180

356

87.8

190

374

93.3

200

392

121.1

250

482

149

300

572

177

350

662

204

400

752

232

450

842

260

500

932

288

550

1022

316

600

1112

343

650

1202

371

700

1292

399

750

1382

427

800

1472

454

850

1562

482

900

1652

510

950

1742

538

1000

1832

$C = \frac{5}{9}(F-32)$

$F = 32 + \frac{9}{5}C$

How to use : For example, to convert 20°C into °F, find the number 20 in the center of the first column. By referring the °F column on the right, it will be found that 20°C equals 68.0°F.
To convert 20°F into °C, refer to the °C column on the left and it will be found that 20°F equals -6.7°C.

● Grease names and the characteristics (Reference)

Sort	Name	Supplier	Thickener of metallic soap	Con-sistency	Dropping point (°C)	Service range(1) (°C)	Remarks
General purpose	ALVANIA GREASE S1	SHELL LUBRICANTS JAPAN	Li	323	182	−35~+120	General, Centralized greasing
	ALVANIA GREASE S2	SHELL LUBRICANTS JAPAN	Li	283	185	−25~+120	General, Centralized greasing
	ALVANIA GREASE S3	SHELL LUBRICANTS JAPAN	Li	242	185	−20~+135	General
	DAPHNE GREASE MP NO.2	IDEMITSU	Li	276	195	−20~+120	General
	COSMO GREASE DYNAMAX No.2	COSMO	Li	280	188	−20~+120	General
Low temperature	MULTINOC GREASE 2	JXTG NIPPON OIL & ENERGY	Li	278	212	−30~+125	General
	ALVANIA GREASE RA-J	SHELL LUBRICANTS JAPAN	Li	252	183	−40~+130	Low temperature
	BEACON 325	EMG LUBRICANTS	Li	280	193	−60~ ⁽⁺¹⁶⁰⁾ +120	Low temperature, Low torque
	ISOFLEX LDS 18 SPECIAL A	KLÜBER	Li	280	≥185	−60~+130	Low temperature, High speed,Extreme pressure
	ISOFLEX SUPER LDS 18	KLÜBER	Li	280	≥185	−60~+130	Low temperature, High speed,Low noise
Wide temperature range	LT GREASE No.2	JXTG NIPPON OIL & ENERGY	Li	275	181	−50~+150	Low temperature
	TEMPREX N3	EMG LUBRICANTS	Li Complex	235	≥300	−20~ ⁽⁺²⁰⁰⁾ +160	Wide temperature range, High temperature
	AEROSHELL GREASE 7	SHELL LUBRICANTS JAPAN	Microgel	288	≥260	−73~+149	Wide temperature range, Low temperature
	MULTEMP PS No.2	KYODO YUSHI	Li	275	190	−50~+130	Wide temperature range, For low temperature & low noise
	MULTEMP SRL	KYODO YUSHI	Li	242	192	−50~+150	Wide temperature range, For low temperature & low noise
Extreme pressure	MULTINOC WIDE No.2	JXTG NIPPON OIL & ENERGY	Li+special Na	247	203	−40~+135	Wide temperature range
	ALVANIA EP GREASE 2	SHELL LUBRICANTS JAPAN	Li	276	187	−20~+110	Extreme pressure, Centralized greasing
	MOLYKOTE BR2-PLUS	TORAY/DOW CORNING	Li	265	185	−30~+150	With MoS2, Extreme pressure
	MOLUB-ALLOY #777-2	CASTROL	Li	280	182	0~+135	With MoS2, Extreme pressure
	G 40M	SHIN-ETSU	Li	260	≥200	−30~+200	Wide temperatur range, Superior at high temperature with stable anti-oxidation and water proof, Chemically inert
Others	G 40H	SHIN-ETSU	Li	220	≥200	−30~+200	Wide temperatur range, Superior at high temperature with stable anti-oxidation and water proof, Chemically inert
	KRYTOX 240AD	CHEMOURS	Fluorinated	275	None	−30~+288	Stabl at high temperature, Chemically inert, Anti-solvent
	BARRIERTA L55/2	KLÜBER	Fluorinated	No.2	None	−35~ ⁽⁺²⁵⁰⁾ +220	General, Low evaporation at high temperature, Chemically inert
	BARRIERTA IMI/V	KLÜBER	Fluorinated	No.2	None	−50~+220	For high vacuum
	DOLIUM GREASE R	SHELL LUBRICANTS JAPAN	Polyurea	281	249	−30~+150	Heat resistant, Superior at high temperature with stable anti-oxidation
	STAMINA GREASE RL2	SHELL LUBRICANTS JAPAN	Polyurea	268	271	−20~+180	Heat resistant, Superior at high temperature with stable anti-oxidation

Note(1) : Figures in parentheses show the maximum allowable temperature in very short time operation, and they are not applicable for continuous operation.
Remark When using these products, see individual manufacturer's catalogs.

IKO Linear Motion Rolling Guide Series,

Configuration of General Catalog

IKO Linear Motion Rolling Guide Series General Catalog Consists of **BLUE** and (CAT-1587E)

RED , the two volumes. (CAT-1588E)



CAT-1587E

【Models】

- Rail Guide Type
Endless Linear Motion Type



CAT-1588E

【Models】

- Rail Guide Type
Limited Linear Motion Type
- Shaft Guide Type
Endless Linear Motion Type
Limited Linear Motion Type + Rolling Motion Type
- Flat Guide Type
Endless Linear Motion Type
Limited Linear Motion Type

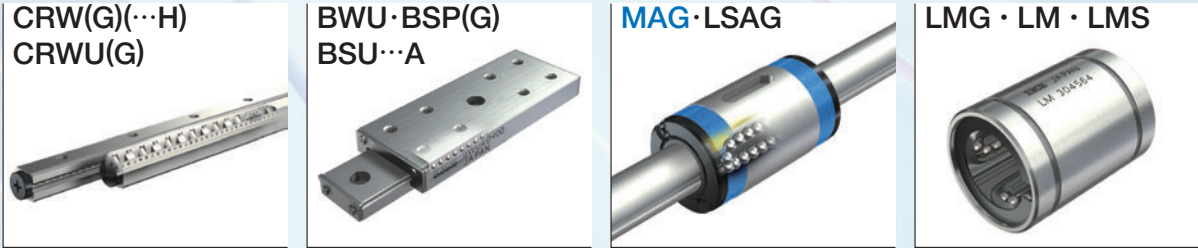
C-Lube Linear Way ML C-Lube Linear Way MLV C-Lube Linear Way MV C-Lube Linear Way ME C-Lube Linear Way MH
Linear Way L Linear Way E Linear Way H



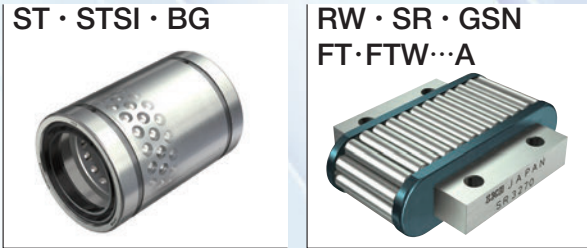
Linear Way F C-Lube Linear Way MUL C-Lube Linear Roller Way Super MX
Linear Way U Linear Roller Way Super X Linear Roller Way X Linear Way Module



Rail Guide Type Crossed Roller Way Rail Guide Type Linear Slide Unit Shaft Guide Type Linear Ball Spline Shaft Guide Type Linear Bushing



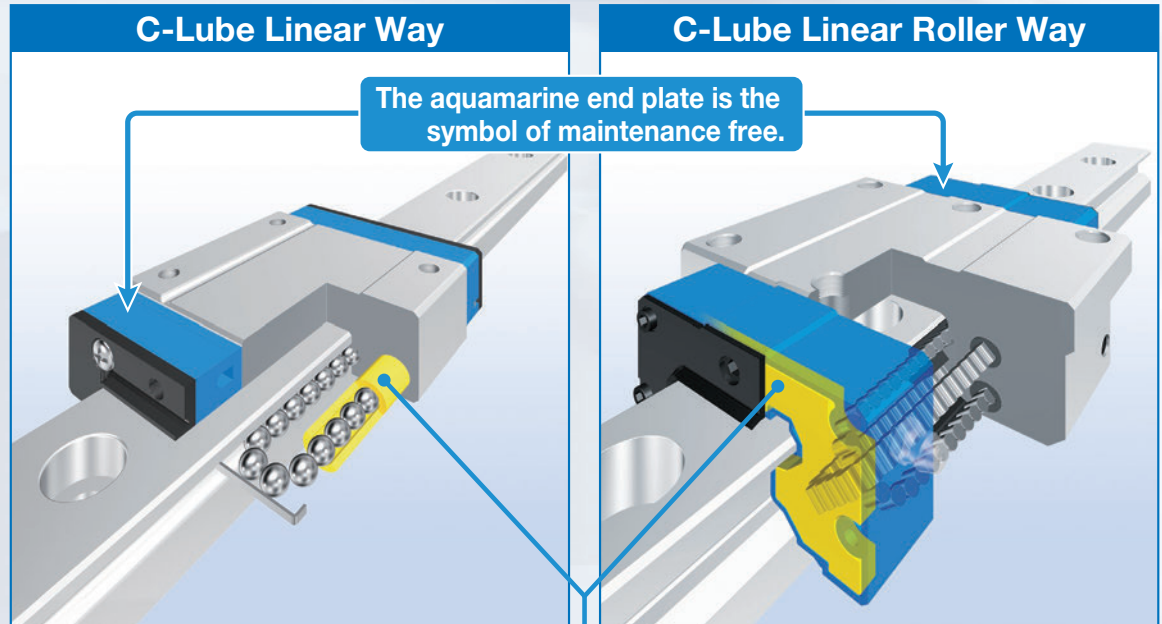
Shaft Guide Type Stroke Rotary Bushing Flat Guide Type Roller Way & Flat Roller Cage



Oil Minimum
IKO Gentle to The Earth

Features of C-Lube Linear Way and C-Lube Linear Roller Way

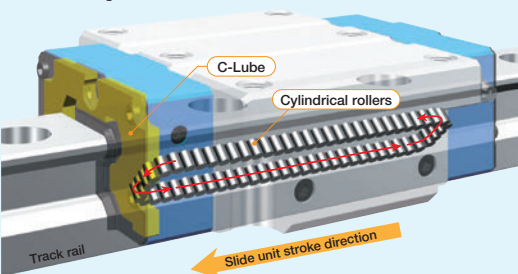
Original and world's first structure with [C-Lube]



C-Lube integrated

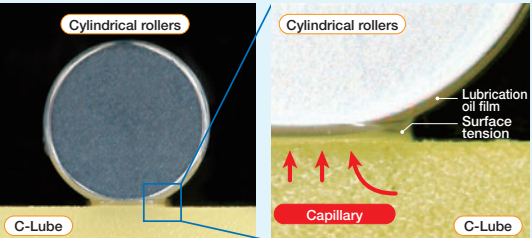
Lubrication oil is carried through circulation of rolling elements

The lubrication oil is supplied directly to the rolling elements, not to the track rail.
When rolling elements make contact with the capillary lubricating element integrated with the circulation path of slide unit rolling elements, the lubrication oil is supplied to surfaces of rolling elements and carried to the loading area through circulation of rolling elements.
This results in adequate lubrication oil being properly maintained in the loading area and lubrication performance will last for a long time.



Lubrication oil is directly supplied to surfaces of the rolling elements

The surface of capillary lubricating element is always covered with the lubrication oil.
Lubrication oil is continuously supplied to the surface of rolling elements by surface tension in the contact of capillary lubricating element surface and rolling elements.
On the surface of capillary lubricating element with which the rolling elements make contact, new lubrication oil is always supplied from the other sections.



Long term maintenance free is realized with oil impregnated with C-Lube only !!



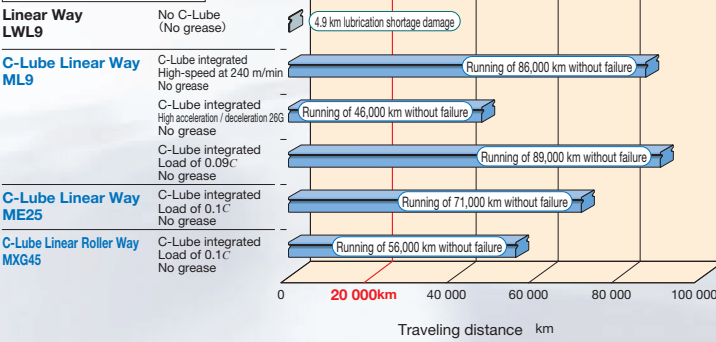
Maintenance free

This endures running over 20,000 km without oil feeding with lubrication oil in the C-Lube only.
Furthermore, grease is pre-packed in the slide unit so long term maintenance free can be realized.

Maintenance free is achieved until the end of device life!

*1. Typical device life is assumed. Re-greasing may be necessary depending on use conditions.

Durability test result

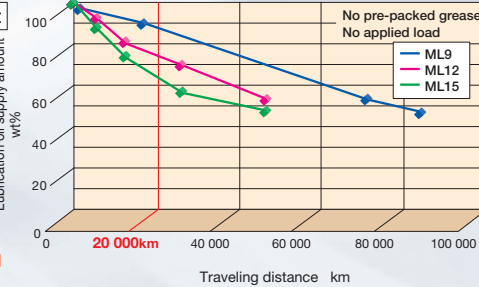


Eco-friendly

As lubrication oil in C-Lube is supplied by the amount necessary to maintain lubrication performance of the rolling guide, the consumption of lubrication oil is reduced and lubrication performance is maintained even when it run for a long period.

Eco-friendly specification reducing usage of lubrication oil!

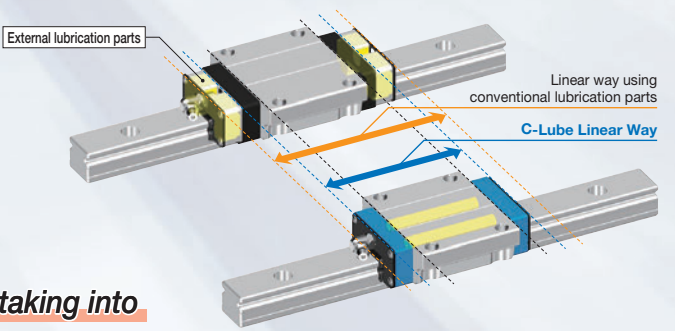
Oil supply test result



Compact

As C-Lube Linear Way and C-Lube Linear Roller Way are integrated with lubrication part C-Lube, their slide units are not long unlike types with external lubrication parts.
Replacement of conventional parts is easy free from constraints of mounting space and stroke length.

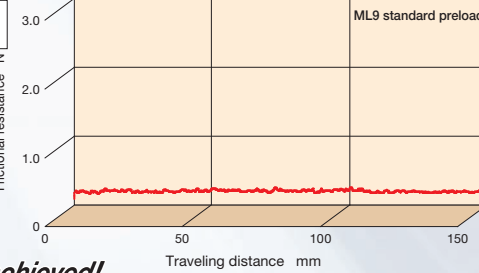
Compact design taking into account compactness!



Smooth

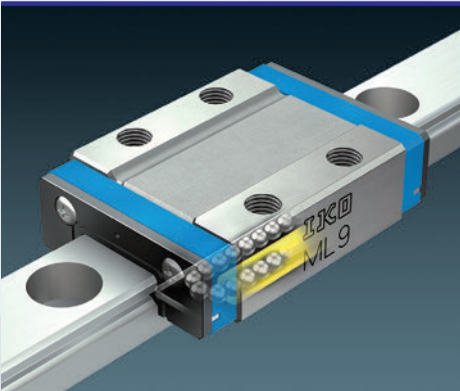
C-Lube Linear Way and C-Lube Linear Roller Way do not generate slide resistance unlike lubrication parts external to the slide unit that make contact with the track rail.
Driving force follow-up property is superior and energy is saved by improvement of accuracy and reduction of friction loss.

Frictional resistance test result



Light and smooth motion is achieved!

A variety of models and size variations



Ball Type Miniature Series

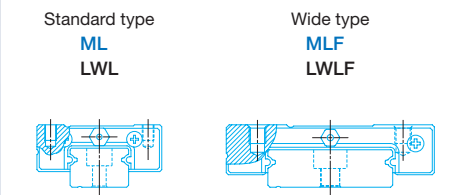
C-Lube Linear Way ML C-Lube Linear Way MLV Linear Way L

Thanks to the structure with two rows of balls to contact with the way at four points, stable accuracy and rigidity can be achieved even in applications where load has variable direction and size or complex load is applied, despite its very small body.

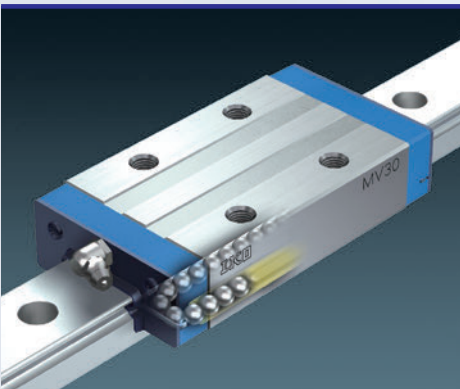


Micro Linear Way L

As the lineup of track rail width from 1 mm to 6 mm is available, you can select an optimal product for the specifications of your machine and device. For LWL1, world's smallest size is realized: track rail width of 1 mm, slide unit width of 4 mm and assembly height of 2.5 mm.



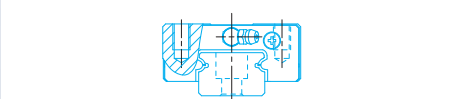
Length of slide unit		Size	
C	Short	Standard type	1, 2, 3, 5, 7, 9, 12, 15, 20, 25
	Standard		
	Long		
	Extra long		
No symbol		Wide type	4, 6, 10, 14, 18, 24, 30, 42
G			
L			



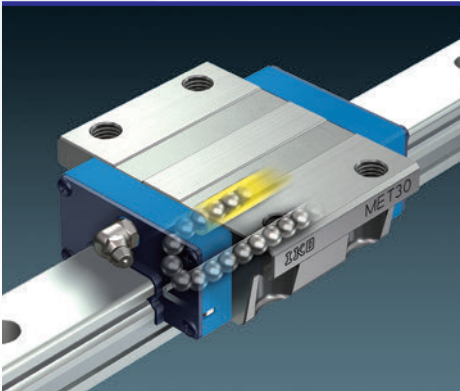
Ball Type Low Profile/Light Weight Series

C-Lube Linear Way MV

Despite its extra low profile and extra light weight, this linear motion rolling guide has the maximum load rating among the ball types while achieving high load capacity.



Length of slide unit	Size
Standard	20, 25, 30



Ball Type Compact Series

C-Lube Linear Way ME Linear Way E Low Decibel Linear Way E

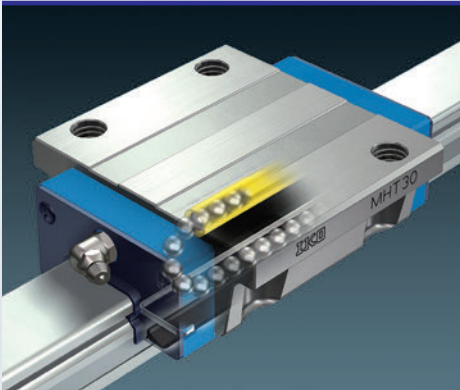
Versatile linear motion rolling guide that has achieved utility pursuing compactness in every aspect. Low decibel types with resin separator to prevent direct contact between balls are also available.

Flange type mounting from bottom
ME
LWE

Flange type mounting from top
MET
LWET

Block type mounting from top
MES
LWES

Length of slide unit		Size
C	Short	15, 20, 25, 30, 35, 45
No symbol	Standard	
G	Long	



Ball Type High Rigidity Series

C-Lube Linear Way MH Linear Way H

High rigidity linear motion rolling guides designed to evenly support high load capacity by incorporating large-diameter balls. Stable accuracy and rigidity can be achieved even in applications where load with variable direction and size and complex load are applied.

Flange type mounting from bottom
MH
LWH

Flange type mounting from top⁽¹⁾
MHT
LWHT

Block type mounting from top
MHD
LWHD

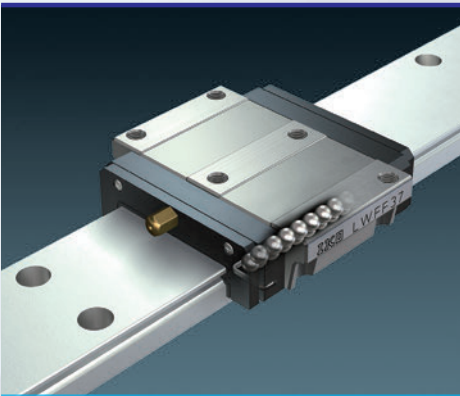
Compact block type mounting from top
MHS
LWHS

Length of slide unit		Size
C	Short	
No symbol	Standard	
G	Long	
L	Extra long	
Size		8, 10, 12, 15, 20, 25, 30, 35, 45, 55, 65

Note ⁽¹⁾ Some models may be mounted from bottom.



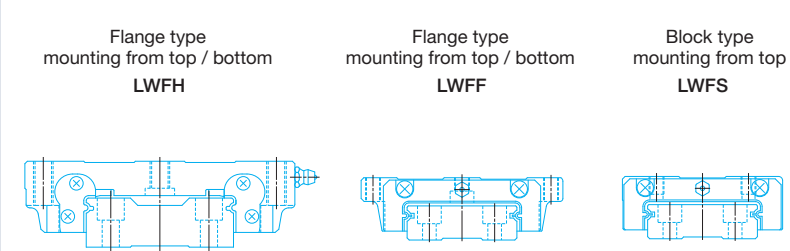
A variety of models and size variations



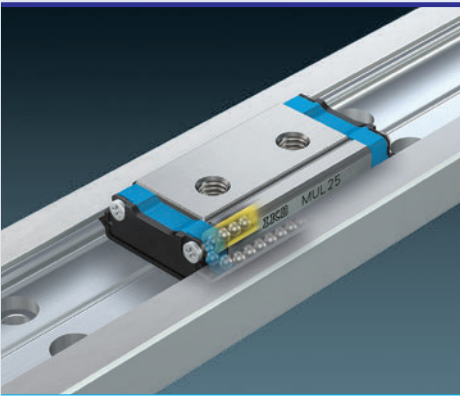
Ball Type Wide Type Series

Linear Way F

As wide track rail is used and the distance between the load points is long, this is a linear motion rolling guide suitable to single-row use due to the structure resistant to across-the-width moment load. It is also resistant to complex load.



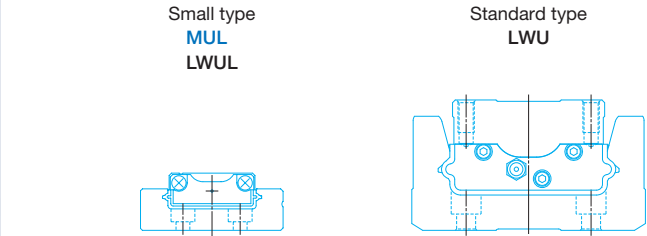
Length of slide unit	
No symbol	Standard
Size	
LWFH	40,60,90
LWFF	33,37,42,69
LWFS	33,37,42



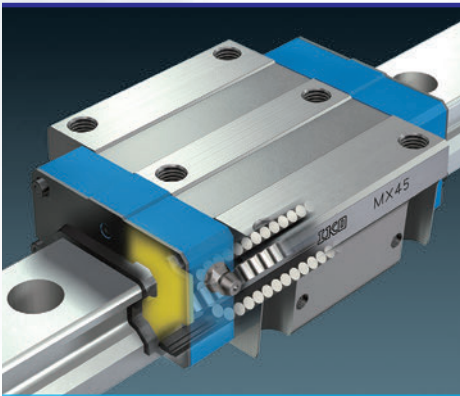
Ball Type U-Shaped Track Rail Series

C-Lube Linear Way MUL
Linear Way U

Linear motion rolling guide of the structure with way inside the track rail of U-shaped section and slide unit therein. With the U-shaped track rail, rigidity against the track rail moment load and torsion is significantly improved.



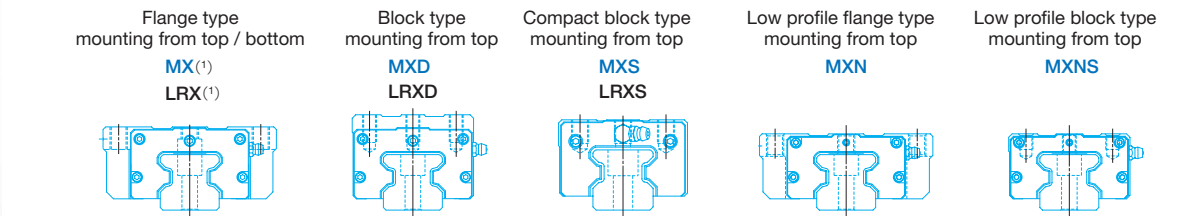
Length of slide unit	
No symbol	Standard
Size	
MUL	25, 30
LWUL	25, 30
LWU	40, 50, 60, 86, 100, 130



Roller Type

C-Lube Linear Roller Way Super MX
Linear Roller Way Super X

Linear motion rolling guide that has achieved the highest level of performance in all characteristics utilizing the roller's superior characteristic, such as rigidity, load capacity, running accuracy and vibration damping property. With extra long unit with the maximum slide unit length, load capacity and rigidity are improved and running performance with super high accuracy is realized.



Note (*) Size 20 series allows only for mounting from top and model mounting from bottom is MXH and LRXH.

Length of slide unit			
C	No symbol	G	L
Short	Standard	Long	Extra long

Size
10, 12, 15, 20, 25, 30, 35, 45, 55, 65, 85, 100

Four-row roller guide of world's smallest size
Track rail width of 10 mm

Super high rigidity
Super high load capacity
High running performance
Excellent frictional characteristics

Stainless steel made
LRXD10...SL



Mechatronics Series

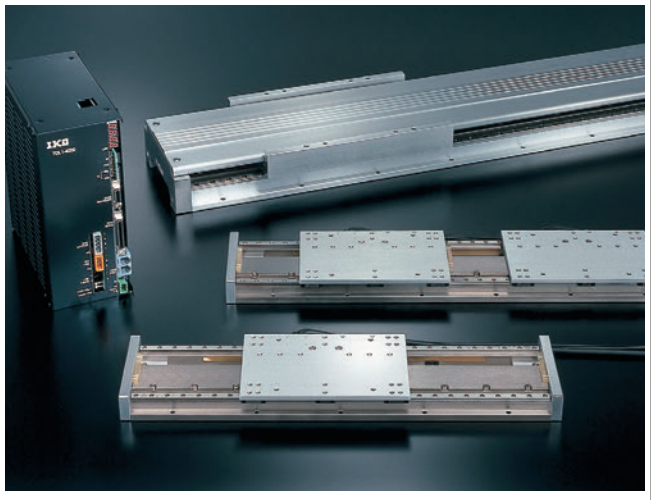
TU Series

IKO Precision Positioning Table TU is a compact and slim positioning table with good load balance and high resistance to complex loads, in which the side table is arranged inside the U-shape track rail. Six types with a track rail width of 25 ~ 130mm are available. Each slide table length can be selected as required. Different table specifications including ball screw, motor, sensor, etc. can be selected. This allows each user to configure the most suitable positioning table for each application. Abundant options meet diversified market needs such as a motor loopback specification, table with bellows, table with bridge cover, and table finished by black chrome surface treatment.



Linear Motor Table LT

The IKO Linear Motor Table LT is a compact and lightweight direct-drive positioning table with a very small sectional height in which an AC servo-motor and an optional linear scale are integrated in a moving table and a bed made of aluminum alloy. The IKO Linear Motor Table LT employs a C-shaped magnet yoke, and a coil board is sandwiched between two stator magnets. It provides a high thrust of 450N though its height is only 40 mm. The moving table is as light as 1.5 kg but provides high thrust. It permits high acceleration and deceleration exceeding 10 G. (In the case of LT150 CG.) Also, High Thrust Series LT...H outputs 900N thrust. Using advanced servo technology, this product achieves high static stability and high-speed stability.



Long-stroke Series

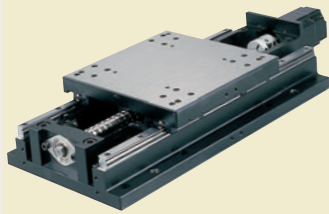
- Standard type which has been practically used in many fields.
- Stable characteristics in parallel use together with Linear Way



TSL...M

High-rigidity Series

- High reliability and high accuracy with component parts strictly selected
- High rigidity and large mounting weight



TSLH...M · CTLH...M

Super Precision Series

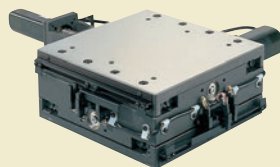
- XY configuration available for advanced inspection stage
- High positioning accuracy realized with IKO Roller technology and full closed loop controlling



TX...M CTX...M

Compact Series

- Compact structure with a small sectional height
- High reliability and high accuracy achieved by using Crossed Roller Way



TS · CT

High-speed Long Stroke Series

- High-speed type using a timing belt drive
- Stable and high traveling performance in parallel use together with Linear Way



TSLB

Precision Positioning Table

- Light weight precision positioning table made of high-strength aluminum alloy.
- Built-in C-Lube for long-term maintenance-free service.



TE...B

Micro Precision Positioning Table

- Very compact positioning table that is 20mm high(sectional) and 17mm wide driven by a ground ball screw.
- +/-0.5micron repeatability is achieved with 60 mm stroke length.



TM

Nano Linear

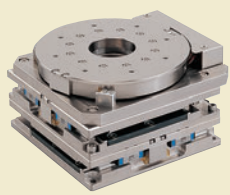
- Direct drive type with high speed and high response
- Maximum thrust of 25 N achieved with a sectional height of 14 mm



NT...V

Alignment Stage Direct Drive

- Ultra compact XY θ stage contributing to space saving
- High resolution and response realized with optical scale

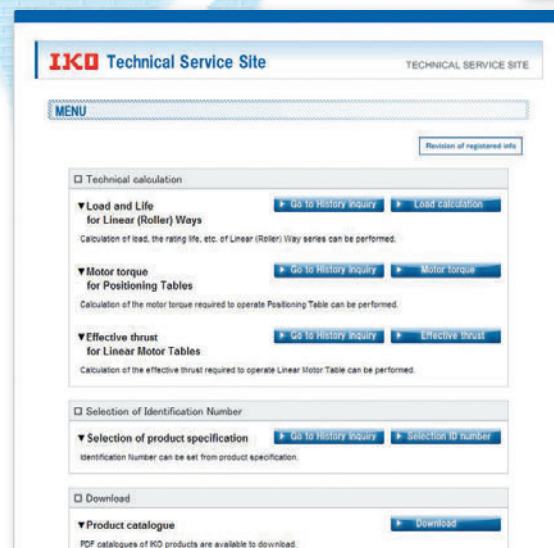
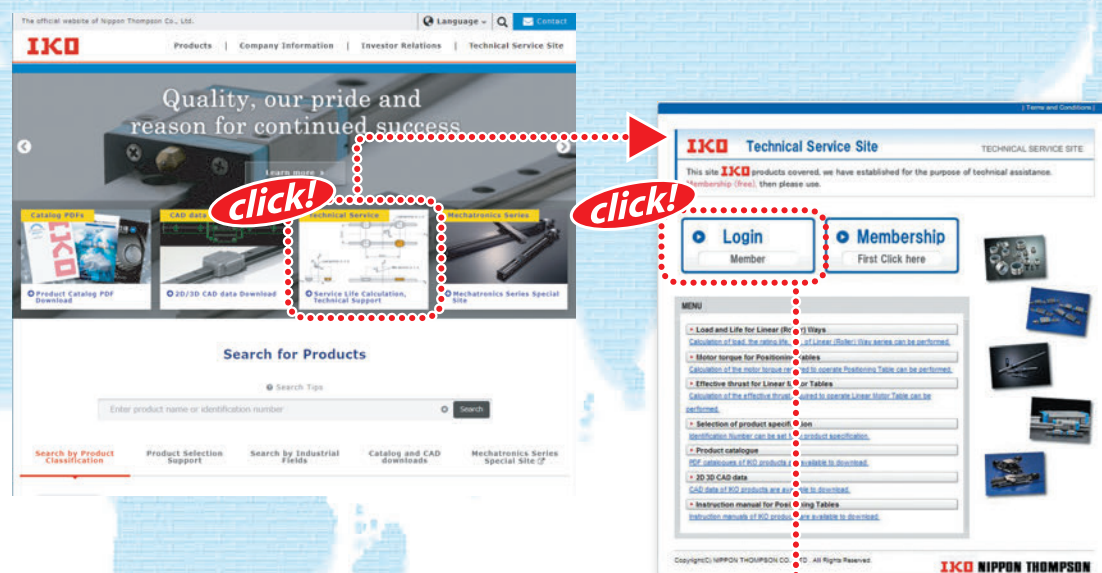


SA...DE

IKO Introduction of Technical Service Site

"IKO Technical Service Site" can be accessed from our home page. The site provides various tools for selecting Linear Ways and Linear Roller Ways. Please utilize these tools for assistance when selecting products. Additionally the site also provides CAD data and product catalogs for the Needle Series, Linear Motion Rolling Guide Series, and Mechatronics Series for download. Please utilize them to improve your design efficiency.

<https://www.ikont.co.jp/eg/>



1. Technical calculations

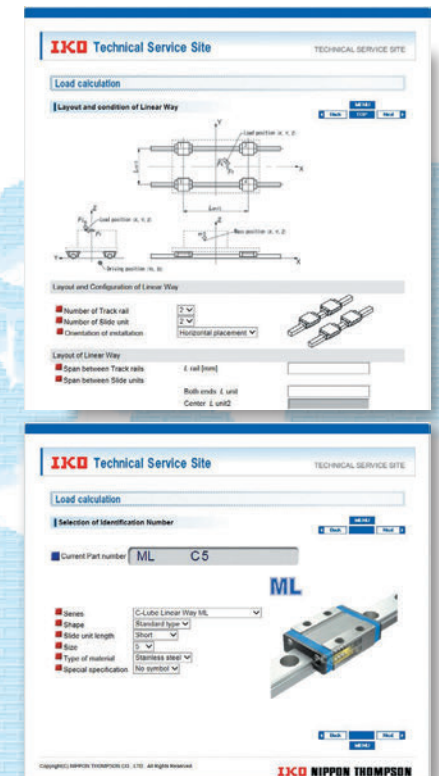
For Linear Way/Linear Roller Way load and life calculation, you can obtain the calculated load and the rating life by entering the operating conditions.

Also you can derive the motor torque required for operation and the effective thrust force during operation in the sections of motor torque calculation and calculation of effective thrust force of linear motor tables respectively, and output the calculation results in PDF format, as well as save the histories.

2. Selection of Identification Number

By selecting such specification as model code, dimensions, part code, material code, preload symbol, classification symbol, interchangeable code and supplemental code of Linear ways/Linear roller ways, you can easily specify the identification number used for ordering.

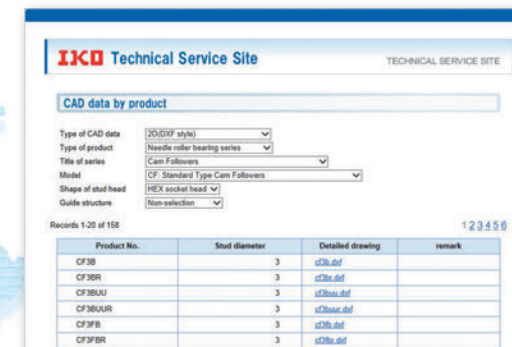
Also you can browse the CAD data of the selected products, calculate the load, and output the selection results in PDF format, as well as save the histories.



3. Downloading CAD data

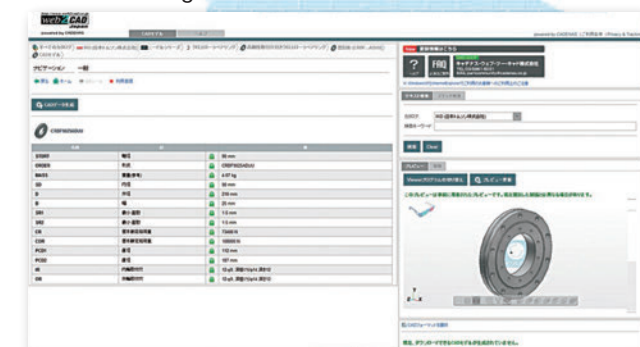
2-dimensional CAD data (DXF file)

There are two types of figures, brief figure and detailed figure. The brief figure shows only the external view lines, and the detailed figure shows the detailed lines. The drawing consists of three drawings: front view, side view and plain view. The scale shows only the original size (1:1), and it does not show dimension lines.



3-dimensional CAD data

It is linked to the mechanical parts CAD library "PART community". Entering the rail dimension and option contents to the detail, you can view the 2D/3D CAD data suitable for the specification for free of charge.



4. Downloading Catalog and Operation Manual

You can download product catalogs of needle series, linear motion rolling guide series and mechatronics series, operation manuals of precision positioning tables and various electrical components in PDF format, as well as support software for precision positioning tables. If you would like a copy of our catalog, please visit the IKO official website and apply for the catalog, or contact our regional office or sales office nearby.

Index of Model Codes

A		
AR	L21	Cir-clips for Needle Roller Bearings
AS	F7	Thrust Bearings
AZ	F11	Thrust Bearings
AZK	F11	Thrust Bearings
B		
BA...Z	B27	Shell Type Needle Roller Bearings
BAM	B27	Shell Type Needle Roller Bearings
BAMW	B45	Shell Type Needle Roller Bearings
BAW...Z	B45	Shell Type Needle Roller Bearings
BHA...Z	B27	Shell Type Needle Roller Bearings
BHAM	B27	Shell Type Needle Roller Bearings
BR	D47	Machined Type Needle Roller Bearings
BR...UU	D67	Machined Type Needle Roller Bearings
BRI	D51	Machined Type Needle Roller Bearings
BRI...UU	D71	Machined Type Needle Roller Bearings
C		
CF...B	I25	Cam Followers
CF...BM	I25	Cam Followers
CF...BR	I25	Cam Followers
CF...BRM	I25	Cam Followers
CF...BUU	I25	Cam Followers
CF...BUUM	I25	Cam Followers
CF...BUUR	I25	Cam Followers
CF...BUURM	I25	Cam Followers
CF...FB	I29	Cam Followers
CF...FBR	I29	Cam Followers
CF...FBUU	I29	Cam Followers
CF...FBUUR	I29	Cam Followers
CF...FWBR	I47	Cam Followers

CF...FWBUUR	I47	Cam Followers
CF...G	I53	Cam Followers
CF...VB	I27	Cam Followers
CF...VBM	I27	Cam Followers
CF...VBR	I27	Cam Followers
CF...VBRM	I27	Cam Followers
CF...VBUU	I27	Cam Followers
CF...VBUUM	I27	Cam Followers
CF...VBUUR	I27	Cam Followers
CF...VBUURM	I27	Cam Followers
CF...WBR	I45	Cam Followers
CF...WBUUR	I45	Cam Followers
CF...WBUUR/SG	I55	C-Lube Cam Followers
CF-FU1	I49	Cam Followers
CF-RU1	I49	Cam Followers
CF-SFU...B	I51	Cam Followers
CFE...B	I35	Cam Followers
CFE...BR	I35	Cam Followers
CFE...BUU	I35	Cam Followers
CFE...BUUR	I35	Cam Followers
CFE...VB	I37	Cam Followers
CFE...VBR	I37	Cam Followers
CFE...VBUU	I37	Cam Followers
CFE...VBUUR	I37	Cam Followers
CFES...B	I43	Cam Followers
CFES...BR	I43	Cam Followers
CFES...BUU	I43	Cam Followers
CFES...BUUR	I43	Cam Followers
CFKR	I31	Cam Followers
CFKR...R	I31	Cam Followers
CFKR...V	I33	Cam Followers
CFKR...VR	I33	Cam Followers
CFKR...VUU	I33	Cam Followers
CFKR...VUUR	I33	Cam Followers

Index of Model Codes

CFKR...UU	I31	Cam Followers
CFKR...UUR	I31	Cam Followers
CFKRE	I39	Cam Followers
CFKRE...R	I39	Cam Followers
CFKRE...V	I41	Cam Followers
CFKRE...VR	I41	Cam Followers
CFKRE...VUU	I41	Cam Followers
CFKRE...VUUR	I41	Cam Followers
CFKRE...UU	I39	Cam Followers
CFKRE...UUR	I39	Cam Followers
CFS	I57	Miniature Type Cam Followers
CFS...F	I59	Miniature Type Cam Followers
CFS...FW	I63	Miniature Type Cam Followers
CFS...FV	I59	Miniature Type Cam Followers
CFS...V	I57	Miniature Type Cam Followers
CFS...W	I61	Miniature Type Cam Followers
CFS...WV	I61	Miniature Type Cam Followers
CL	I22	C-Lube Unit for Cam Followers
CR	I69	Cam Followers
CR...B	I67	Cam Followers
CR...BR	I67	Cam Followers
CR...BUU	I67	Cam Followers
CR...BUUR	I67	Cam Followers
CR...R	I69	Cam Followers
CR...UU	I69	Cam Followers
CR...UUR	I69	Cam Followers
CR...V	I75	Cam Followers
CR...VB	I71	Cam Followers
CR...VBS	I73	Cam Followers
CR...VBSR	I73	Cam Followers
CR...VBR	I71	Cam Followers
CR...VBUU	I71	Cam Followers
CR...VBUUR	I71	Cam Followers
CR...VR	I75	Cam Followers

CR...VUU	I75	Cam Followers
CR...VUUR	I75	Cam Followers
CRB	J19	Crossed Roller Bearings
CRB...UU	J19	Crossed Roller Bearings
CRBC	J19	Crossed Roller Bearings
CRBC...UU	J19	Crossed Roller Bearings
CRBFV	J17	Crossed Roller Bearings
CRBHV...A	J15	Crossed Roller Bearings
CRBHV...AUU	J15	Crossed Roller Bearings
CRBS	J27	Crossed Roller Bearings
CRBS...AUU	J27	Crossed Roller Bearings
CRBS...V	J27	Crossed Roller Bearings
CRBS...VUU	J27	Crossed Roller Bearings
CRBT...A	J23	Crossed Roller Bearings
CRBTF...A	J25	Crossed Roller Bearings
CRH...VB	I79	Cam Followers
CRH...VBR	I77	Cam Followers
CRH...VBUU	I79	Cam Followers
CRH...VBUUR	I77	Cam Followers
CRY...V	I105	Roller Followers
CRY...VR	I103	Roller Followers
CRY...VUU	I105	Roller Followers
CRY...VUUR	I103	Roller Followers

D		
DS	L4	Seals for Needle Roller Bearings
G		
GE...E	K15	Spherical Bushings
GE...EC	K27	Spherical Bushings
GE...EC-2RS	K27	Spherical Bushings
GE...ES	K15	Spherical Bushings
GE...ES-2RS	K15	Spherical Bushings
GE...G	K19	Spherical Bushings



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GE···GS	K19	Spherical Bushings
GE···GS-2RS	K19	Spherical Bushings
GS	F7	Thrust Bearings
GTR	D9	Machined Type Needle Roller Bearings
GTRI	D31	Machined Type Needle Roller Bearings
I		
IRB	H10	Inner Rings
IRT	H5	Inner Rings
K		
KT	C5	Needle Roller Cages for General Usage
KT···EG	C21	Needle Roller Cages for Engine Connecting Rods
KTV···EG	C22	Needle Roller Cages for Engine Connecting Rods
KTW	C9	Needle Roller Cages for General Usage
L		
LHS	K51	L-Balls
LHSA	K49	L-Balls
LRB	H25	Inner Rings
LRBZ	H25	Inner Rings
LRBZ···B	H25	Inner Rings
LRT	H13	Inner Rings
LRTZ	H13	Inner Rings
N		
NA 48	D41	Machined Type Needle Roller Bearings
NA 49	D29	Machined Type Needle Roller Bearings
NA 49···UU	D61	Machined Type Needle Roller Bearings
NA 69	D29	Machined Type Needle Roller Bearings
NA 69···UU	D61	Machined Type Needle Roller Bearings
NAF	D89	Needle Roller Bearings with Separable Cage

NAFW	D89	Needle Roller Bearings with Separable Cage
NAG 49	E7	Roller Bearings
NAG 49···UU	E13	Roller Bearings
NART···FR	I97	Roller Followers
NART···FUUR	I97	Roller Followers
NART···R	I93	Roller Followers
NART···UUR	I93	Roller Followers
NART···UUR/SG	I99	C-Lube Roller Followers
NART···VR	I93	Roller Followers
NART···VUUR	I93	Roller Followers
NAS 50···UUNR	E19	Roller Bearings
NAS 50···ZZNR	E19	Roller Bearings
NAST	I90	Roller Followers
NAST···R	I90	Roller Followers
NAST···ZZ	I91	Roller Followers
NAST···ZZR	I91	Roller Followers
NAST···ZZUU	I91	Roller Followers
NAST···ZZUUR	I91	Roller Followers
NATA 59	G9	Combined Type Needle Roller Bearings
NATB 59	G9	Combined Type Needle Roller Bearings
NAU 49	E7	Roller Bearings
NAU 49···UU	E13	Roller Bearings
NAX	G5	Combined Type Needle Roller Bearings
NAX···Z	G5	Combined Type Needle Roller Bearings
NAXI	G7	Combined Type Needle Roller Bearings
NAXI···Z	G7	Combined Type Needle Roller Bearings
NBX	G5	Combined Type Needle Roller Bearings
NBX···Z	G5	Combined Type Needle Roller Bearings
NBXI	G7	Combined Type Needle Roller Bearings
NBXI···Z	G7	Combined Type Needle Roller Bearings
NTB	F7	Thrust Needle bearings
NUCF···BR	I65	Cam Followers
NURT	I101	Roller Followers
NURT···R	I101	Roller Followers

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O		
OS	L3	Seals for Needle Roller Bearings
P		
PB	K37	PILLOBALLs
PHS	K38	PILLOBALLs
PHS···EC	K43	PILLOBALLs
PHSA	K42	PILLOBALLs
PHSB	K40	PILLOBALLs
POS	K39	PILLOBALLs
POSB	K41	PILLOBALLs
POS···EC	K44	PILLOBALLs
PRC	K53	PILLOBALLs
R		
RNA 48	D23	Machined Type Needle Roller Bearings
RNA 49	D7	Machined Type Needle Roller Bearings
RNA 49···UU	D55	Machined Type Needle Roller Bearings
RNA 69	D9	Machined Type Needle Roller Bearings
RNA 69···UU	D55	Machined Type Needle Roller Bearings
RNAF	D83	Needle Roller Bearings with Separable Cage
RNAFW	D83	Needle Roller Bearings with Separable Cage
RNAST	I89	Roller Followers
RNAST···R	I89	Roller Followers
S		
SB	K11	Spherical Bushings
SB···A	K11	Spherical Bushings
SBB	K23	Spherical Bushings
SBB···-2RS	K23	Spherical Bushings
SNA	K58	Super Flexible Nozzle

SNM	K59	Super Flexible Nozzle
SNPT	K59	Super Flexible Nozzle
T		
TA···Z	B7	Shell Type Needle Roller Bearings
TAF	D7	Machined Type Needle Roller Bearings
TAF···/SG	D77	C-Lube Machined Type Needle Roller Bearings
TAFI	D29	Machined Type Needle Roller Bearings
TAM	B7	Shell Type Needle Roller Bearings
TAMW	B21	Shell Type Needle Roller Bearings
TAW···Z	B21	Shell Type Needle Roller Bearings
TLA···UU	B49	Shell Type Needle Roller Bearings
TLA···Z	B7	Shell Type Needle Roller Bearings
TLAM	B7	Shell Type Needle Roller Bearings
TLAMW	B17	Shell Type Needle Roller Bearings
TLAW···Z	B17	Shell Type Needle Roller Bearings
TR	D9	Machined Type Needle Roller Bearings
TRI	D31	Machined Type Needle Roller Bearings
TRU	E7	Roller Bearings
TRU···UU	E13	Roller Bearings
W		
WR	L19	Cir-clips for Needle Roller Bearings
WS	F7	Thrust Bearings
Y		
YB	B27	Shell Type Needle Roller Bearings
YBH	B29	Shell Type Needle Roller Bearings
YT	B7	Shell Type Needle Roller Bearings
YTL	B7	Shell Type Needle Roller Bearings