

COIL SPRINGS

COIL SPRINGS



Product name Catalog No.	SWY	SWU	COIL SPRINGS SWR	SWS	SWC
Page	967	968	969	971	973



SWF	SWL	COIL SPRINGS SWM	SWH	SWB
	975	977	979	981



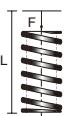
SWG	SWZ	COIL SPRINGS	SWV	SWX
	985	987	989	990



ROUND WIRE COIL SPRINGS WY-WR-WF-WL-WT-WM-WH-WB	ROUND WIRE COIL SPRINGS - INNER DIAMETER STANDARD TYPE - NWL-NWM-WP	WASHERS FOR COIL SPRINGS SSWA-SSWB-SSWC	SPRING GUIDE UNITS CUK
993~1000	1001	1002	1003



SPRING GUIDE PINS SGA	SPRING GUIDE RETAINERS SGC	SPRING UNIT FLANGES WUNT
1005	1006	1007

Load	Color	Catalogue No.	Page	Outer dia. (φ)		Free length (mm)		Allowable deflection (F/L)		
				min.	max.	min.	max.	Low deflection (1 million shots) 	Middle deflection (500,000 shots) 	High deflection (300,000 shots) 
Light	Pastel green 	SWY	P.967	11	42	20	300	65%	-	70%
	Light blue 	SWU	P.968	10.5	43	15	300	60%	-	65%
	Ivory 	SWR	P.969	10.5	50	15	400	50%	-	55%
	Orange 	SWS	P.971	10.5	52	20	300	40%	-	45%
	Purple 	SWC	P.973	6	30	15	200	50%	55%	60%
	Yellow 	SWF	P.975	6	70	15	500	40%	45%	50%
	Blue 	SWL	P.977	6	70	10	500	32%	36%	40%
	Red 	SWM	P.979	6	70	10	350	25.6%	28.8%	32%
	Green 	SWH	P.981	6	70	10	350	19.2%	21.6%	24%
	Brown 	SWB	P.983	6	70	10	350	16%	18%	20%
	Black 	SWG	P.985	10	50	15	200	16%	18%	20%
	Gold 	SWZ	P.987	10	50	25	200	10.5%	12%	13%
Heavy	Wine red 	SWV	P.989	10	50	30	200	10.5%	12%	13%
High speed type	—	SWX	P.990	20	40	25	100	10%		

● Operating temperatures

The load capacities and other data listed in the catalogue are those measured at normal temperatures (40°C or below). If the service environment temperature exceeds the normal temperature range, the load capacity and durability count may decrease, although this varies depending on a variety of conditions.

The maximum operating environment temperature is 80°C. Although the heat resistance temperature of the spring wire material is higher than the operating temperature (120°C for round wires, 200°C for shaped wires), a significant diminishment in function is expected if the spring is used at a temperature above the maximum service environment temperature.

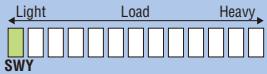
● Maximum allowable deflection

Do not use the springs at deflections exceeding the maximum allowable deflection. If used at higher deflections, the spring load capacity and durability will diminish, and in the worst case the spring may break.

② If a round wire coil spring is used even once at a stroke exceeding the maximum allowable deflection, the L dimension will be shortened.

COIL SPRINGS

—SWY—

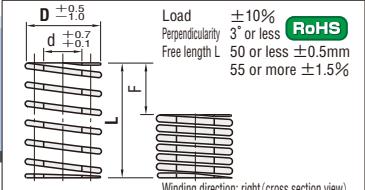
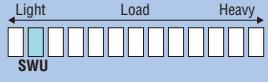


D	d	L	Spring constant N/mm (kgf/mm)	F=L×65%	Catalog No.	Base unit price	Type D-L	1~19 pieces
				Fmm N kgf				
11	7	20	2.26 {0.23}	13.0	SWY11-20			
		25	1.81 {0.18}	16.3	25			
		30	1.51 {0.15}	19.5	30			
		35	1.29 {0.13}	22.8	35			
		40	1.13 {0.12}	26.0	40			
		45	1.01 {0.10}	29.3	45			
		50	0.91 {0.092}	32.5	50			
		55	0.82 {0.084}	35.8	55			
		60	0.75 {0.077}	39.0	60			
		65	0.70 {0.071}	42.3	65			
		70	0.65 {0.066}	45.5	70			
		75	0.60 {0.061}	48.8	75			
		80	0.57 {0.058}	52.0	80			
		90	0.50 {0.051}	58.5	90			
		100	0.45 {0.046}	65.0	100			
12.5	8.5	20	3.09 {0.32}	13.0	SWY12.5-20			
		25	2.47 {0.25}	16.3	25			
		30	2.06 {0.21}	19.5	30			
		35	1.77 {0.18}	22.8	35			
		40	1.55 {0.16}	26.0	40			
		45	1.37 {0.14}	29.3	45			
		50	1.24 {0.13}	32.5	50			
		55	1.12 {0.11}	35.8	55			
		60	1.03 {0.11}	39.0	60			
		65	0.95 {0.10}	42.3	65			
		70	0.88 {0.090}	45.5	70			
		75	0.82 {0.084}	48.8	75			
		80	0.77 {0.079}	52.0	80			
		90	0.69 {0.070}	58.5	90			
		100	0.62 {0.063}	65.0	100			
		110	0.56 {0.057}	71.5	110			
		120	0.52 {0.053}	78.0	120			
		125	0.49 {0.050}	81.3	125			
16.5	10.5	20	7.02 {0.72}	13.0	SWY16.5-20			
		25	5.61 {0.57}	16.3	25			
		30	4.68 {0.48}	19.5	30			
		35	4.01 {0.41}	22.8	35			
		40	3.51 {0.36}	26.0	40			
		45	3.12 {0.32}	29.3	45			
		50	2.81 {0.29}	32.5	50			
		55	2.55 {0.26}	35.8	55			
		60	2.34 {0.24}	39.0	60			
		65	2.16 {0.22}	42.3	65			
		70	2.00 {0.20}	45.5	70			
		75	1.87 {0.19}	48.8	75			
		80	1.75 {0.18}	52.0	80			
		90	1.56 {0.16}	58.5	90			
		100	1.40 {0.14}	65.0	100			
		110	1.28 {0.13}	71.5	110			
		120	1.17 {0.12}	78.0	120			
		125	1.12 {0.11}	81.3	125			
		150	0.94 {0.10}	97.5	150			
20.5	13.5	30	5.58 {0.57}	19.5	SWY20.5-30			
		35	4.78 {0.49}	22.8	35			
		40	4.19 {0.43}	26.0	40			
		45	3.72 {0.38}	29.3	45			
		50	3.35 {0.34}	32.5	50			
		55	3.04 {0.31}	35.8	55			
		60	2.79 {0.28}	39.0	60			
		65	2.58 {0.26}	42.3	65			
		70	2.39 {0.24}	45.5	70			
		75	2.23 {0.23}	48.8	75			
		80	2.09 {0.21}	52.0	80			
		90	1.86 {0.19}	58.5	90			
		100	1.67 {0.17}	65.0	100			
		110	1.52 {0.16}	71.5	110			
		120	1.40 {0.14}	78.0	120			
20	13.5	130	11.32 {1.15}	26.0	SWY37-40			
		45	10.06 {1.03}	29.3	45			
		50	9.05 {0.92}	32.5	50			
		55	8.23 {0.84}	35.8	55			
		60	7.54 {0.77}	39.0	60			
		65	6.96 {0.71}	42.3	65			
		70	6.47 {0.66}	45.5	70			
		75	6.03 {0.62}	48.8	75			
		80	5.66 {0.58}	52.0	80			
		90	5.03 {0.51}	58.5	90			
		100	4.53 {0.46}	65.0	100			
		110	4.11 {0.42}	71.5	110			
		120	3.77 {0.38}	78.0	120			
		130	3.48 {0.36}	84.5	130			
		140	3.23 {0.33}	91.0	140			
24.5	16.5	130	11.32 {1.15}	26.0	SWY42-50			
		60	10.06 {1.03}	39.0	60			
		70	8.62 {0.88}	45.5	70			
		80	7.54 {0.77}	52.0	80			
		90	6.71 {0.68}	58.5	90			
		100	6.03 {0.62}	65.0	100			
		110	5.49 {0.56}	71.5	110			
		120	5.03 {0.51}	78.0	120			
		130	4.64 {0.47}	84.5	130			
		140	4.31 {0.44}	91.0	140			
		150	4.02 {0.41}	97.5	150			
		160	3.77 {0.38}	104.0	160			
		170	3.55 {0.36}	110.5	170			
		180	3.35 {0.34}	117.0	180			
		190	3.18 {0.32}	123.5	190			
30	21	130	8.79 {0.90}	22.8	SWY30-35			
		40	7.69 {0.78}	26.0	40			
		45	6.84 {0.70}	29.3	45			
		50	6.16 {0.63}	32.5	50			
		55	5.60 {0.57}	35.8	55			
		60	5.13 {0.52}	39.0	60			
		65	4.74 {0.48}	42.3	65			
		70	4.40 {0.45}	45.5	70			
		75	4.10 {0.42}	48.8	75			
		80	3.85 {0.39}	52.0	80			
		90	3.42 {0.35}	58.5	90			
		100	3.08 {0.31}	65.0	100			
		110	2.80 {0.29}	71.5	110			
		120	2.56 {0.26}	78.0	120			
		125	2.46 {0.25}	81.3	125			
		130	2.37 {0.24}	84.5	130			
		140	2.20 {0.22}	91.0	140			
		150	2.05 {0.21}	97.5	150			
		160	1.92 {0.20}	104.0	160			
		170	1.81 {0.18}	110.5	170			
		175	1.76 {0.18}	113.8	175			
		180	1.71 {0.17}	117.0	180			
		190	1.62 {0.17}	123.5	190			
		200	1.54 {0.16}	130.0	200			
		250	1.23 {0.13}	162.5	250			
		300	1.03 {0.10}	195.0	300			
Quotation Alterations Catalog No. NT — SWY 30-40								
Quotation Coating removal Alteration No coating								
Code NT Removal of the coil spring coating by shot peening.								
Spec. Price Springs with the coating removed are extremely susceptible to corrosion. Handle them with care. Corrosion of the spring will result in early breakage.								
Price Quotation There may be greater variation in the load capacity and other characteristics between lots than with ordinary coated products.								

● Load calculation method: Load = Spring constant × Deflection
(SI unit) $N=N/\text{mm} \times F\text{mm}$
 $\text{kgf}=\text{kgf}/\text{mm} \times F\text{mm}$
 $\text{kgf}=N \times 0.101972$

COIL SPRINGS

—SWU—



(② Clearance of D dim. and counterbore hole, and of d dim. and shaft **P.1008**

D	d	L	Spring constant N/mm (kgf/mm)	F=L×60% Fmm (N kgf)	Catalog No.	Base unit price Type D-L	1~19 pieces
10.5	6.0	15	7.63 {0.78}	9.0	SWU10.5-15	25 15.04 {1.53} 15.0	24.0
		20	5.72 {0.58}	12.0		30 12.53 {1.28} 18.0	
		25	4.58 {0.47}	15.0		35 10.74 {1.10} 21.0	
		30	3.81 {0.39}	18.0		40 9.40 {0.96} 24.0	
		35	3.27 {0.33}	21.0		45 8.35 {0.85} 27.0	
		40	2.86 {0.29}	24.0		50 7.52 {0.77} 30.0	
		45	2.54 {0.26}	27.0		55 6.83 {0.70} 33.0	
		50	2.29 {0.23}	30.0		60 6.27 {0.64} 36.0	
		55	2.08 {0.21}	33.0		65 5.78 {0.59} 39.0	
		60	1.91 {0.19}	36.0		70 5.37 {0.55} 42.0	
		65	1.76 {0.18}	39.0		75 5.01 {0.51} 45.0	
		70	1.63 {0.17}	42.0		80 4.70 {0.48} 48.0	
		75	1.53 {0.16}	45.0		90 4.18 {0.43} 54.0	
		80	1.43 {0.15}	48.0		100 3.76 {0.38} 60.0	
		15	8.72 {0.89}	9.0	SWU12.5-15	110 3.42 {0.35} 66.0	140 5.49 {0.56} 84.0
		20	6.54 {0.67}	12.0		120 3.13 {0.32} 72.0	
		25	5.23 {0.53}	15.0		125 3.01 {0.31} 75.0	
		30	4.36 {0.44}	18.0		130 2.89 {0.29} 78.0	
		35	3.74 {0.38}	21.0		140 2.69 {0.27} 84.0	
		40	3.27 {0.33}	24.0		150 2.51 {0.26} 90.0	
		45	2.91 {0.30}	27.0		175 2.15 {0.22} 105.0	
		50	2.62 {0.27}	30.0		200 1.88 {0.19} 120.0	
		55	2.38 {0.24}	33.0		30 16.34 {1.67} 18.0	
		60	2.18 {0.22}	36.0		35 14.01 {1.43} 21.0	
		65	2.01 {0.21}	39.0		40 12.26 {1.25} 24.0	
		70	1.87 {0.19}	42.0		45 10.90 {1.11} 27.0	
		75	1.74 {0.18}	45.0		50 9.81 {1.00} 30.0	
		80	1.63 {0.17}	48.0		55 8.92 {0.91} 33.0	
		90	1.45 {0.15}	54.0		60 8.17 {0.83} 36.0	
		100	1.31 {0.13}	60.0		65 7.54 {0.77} 39.0	
12.5	7.0	15	10.90 {1.11}	9.0	SWU14.5-15	70 7.00 {0.71} 42.0	100 9.81 {1.00} 60.0
		20	8.17 {0.83}	12.0		75 6.54 {0.67} 45.0	
		25	6.54 {0.67}	15.0		80 6.13 {0.63} 48.0	
		30	5.45 {0.56}	18.0		90 5.45 {0.56} 54.0	
		35	4.67 {0.48}	21.0		100 4.90 {0.50} 60.0	
		40	4.09 {0.42}	24.0		110 4.46 {0.45} 66.0	
		45	3.63 {0.37}	27.0		120 4.09 {0.42} 72.0	
		50	3.27 {0.33}	30.0		125 3.92 {0.40} 75.0	
		55	2.97 {0.30}	33.0		130 3.77 {0.38} 78.0	
		60	2.72 {0.28}	36.0		140 3.50 {0.36} 84.0	
		65	2.51 {0.26}	39.0		150 3.27 {0.33} 90.0	
		70	2.33 {0.24}	42.0		175 2.80 {0.29} 105.0	
		75	2.18 {0.22}	45.0		200 2.45 {0.25} 120.0	
		80	2.04 {0.21}	48.0		225 2.18 {0.22} 135.0	
		90	1.82 {0.19}	54.0		250 1.96 {0.20} 150.0	
		100	1.63 {0.17}	60.0		35 17.75 {1.81} 21.0	
		110	1.49 {0.15}	66.0		40 15.53 {1.58} 24.0	
		120	1.36 {0.14}	72.0		45 13.80 {1.41} 27.0	
		125	1.31 {0.13}	75.0		50 12.42 {1.27} 30.0	
		150	1.09 {0.11}	90.0		55 11.29 {1.15} 33.0	
14.5	8.5	20	12.26 {1.25}	12.0	SWU17-20	60 10.35 {1.06} 36.0	100 9.81 {1.00} 60.0
		25	9.81 {1.00}	15.0		65 9.56 {0.97} 39.0	
		30	8.17 {0.83}	18.0		70 8.87 {0.90} 42.0	
		35	7.00 {0.71}	21.0		75 8.28 {0.84} 45.0	
		40	6.13 {0.63}	24.0		80 7.76 {0.79} 48.0	
		45	5.45 {0.56}	27.0		90 6.90 {0.70} 54.0	
		50	4.90 {0.50}	30.0		100 6.21 {0.63} 60.0	
		55	4.46 {0.45}	33.0		110 5.65 {0.58} 66.0	
		60	4.09 {0.42}	36.0		120 5.18 {0.53} 72.0	
		65	3.77 {0.38}	39.0		125 4.97 {0.51} 75.0	
		70	3.50 {0.36}	42.0		130 4.78 {0.49} 78.0	
		75	3.27 {0.33}	45.0		140 4.44 {0.45} 84.0	
		80	3.06 {0.31}	48.0		150 4.14 {0.42} 90.0	
		90	2.72 {0.28}	54.0		160 3.88 {0.40} 96.0	
		100	2.45 {0.25}	60.0		170 3.65 {0.37} 102.0	
		110	2.23 {0.23}	66.0		175 3.55 {0.36} 105.0	
		120	2.04 {0.21}	72.0		180 3.45 {0.35} 108.0	
		125	1.96 {0.20}	75.0		190 3.27 {0.33} 114.0	
		150	1.63 {0.17}	90.0		200 3.11 {0.32} 120.0	
		175	1.40 {0.14}	105.0		250 2.48 {0.25} 150.0	
17	10.5	31	22.26 {1.25}	147.1	SWU31-35	300 2.07 {0.21} 180.0	300 3.27 {0.33} 180.0
		35	18.06 {1.18}	17.0		40 15.53 {1.58} 24.0	
		40	13.80 {1.41}	27.0		45 13.00 {1.30} 30.0	
		50	12.42 {1.27}	30.0		50 11.29 {1.15} 33.0	
		60	10.35 {1.06}	36.0		60 9.56 {0.97} 39.0	
		65	9.56 {0.97}	39.0		65 8.87 {0.90} 42.0	
		70	8.87 {0.90}	42.0		70 8.28 {0.84} 45.0	
		75	8.28 {0.84}	45.0		80 7.76 {0.79} 48.0	
		80	7.76 {0.79}	48.0		90 6.90 {0.70} 54.0	
		90	6.90 {0.70}	54.0		100 6.21 {0.63} 60.0	
		100	6.21 {0.63}	60.0		110 5.65 {0.58} 66.0	
		110	5.65 {0.58}	66.0		120 5.18 {0.53} 72.0	
		120	5.18 {0.53}	72.0		125 4.97 {0.51} 75.0	
		125	4.97 {0.51}	75.0		130 4.78 {0.49} 78.0	
		130	4.78 {0.49}	78.0		140 4.44 {0.45} 84.0	
		140	4.44 {0.45}	84.0		150 4.14 {0.42} 90.0	
		150	4.14 {0.42}	90.0		160 3.88 {0.40} 96.0	
		160	3.88 {0.40}	96.0		170 3.65 {0.37} 102.0	
		170	3.65 {0.37}	102.0		175 3.55 {0.36} 105.0	
		175	3.55 {0.36}	105.0		180 3.45 {0.35} 108.0	
		180	3.45 {0.35}	108.0		190 3.27 {0.33} 114.0	
		190	3.27 {0.33}	114.0		200 3.11 {0.32} 120.0	
		200	3.11 {0.32}	120.0		250 2.48 {0.25} 150.0	
		250	2.48 {0.25}	150.0		300 2.07 {0.21} 180.0	

D ± 9.5
d ± 0.7
Load Perpendicularity Free length L $\pm 10\%$
3° or less 50 or less $\pm 0.5\text{mm}$
55 or more $\pm 1.5\%$
RoHS

● Clearance of D dim. and counterbore hole, and of d dim. and shaft **P.1008**

● Load calculation method: Load = Spring constant × Deflection
(SI unit) N = N/mm × Fmm
kgf = kgf/mm × Fmm
(kgf = N × 0.101972)

● Operation count: 1 million (300,000 for L > 65%)

● Product guide **P.966** ● Load graph **P.992**

● Instructions and precautions for the use of coil springs **P.1008**

● Quotation

(NT) — Catalog No.
NT — SWU 31-50

Quotation

Coating removal

Alteration

No coating

Code

Removal of the coil spring coating by shot peening

● Springs with the coating removed are extremely susceptible to corrosion. Handle them with care.

Corrosion of the spring will result in early breakage.

● There may be greater variation in the load capacity and other characteristics between lots than with ordinary coated products.

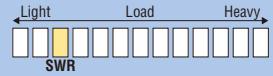
Price

Quotation

Quotation

COIL SPRINGS

—SWR—



D	d	L	Spring constant N/mm (kgf/mm)	F=L×50%	Catalog No.	Base unit price 1~19 pieces		
							Fmm	Load N [kgf]
10.5	6.0	78.5	15	10.46 [1.07]	7.5	SWR10.5-15	20	19.61 [2.00]
			20	7.85 [0.80]	10.0		25	15.69 [1.60]
			25	6.28 [0.64]	12.5		30	13.08 [1.33]
			30	5.23 [0.53]	15.0		35	11.21 [1.14]
			35	4.48 [0.46]	17.5		40	9.81 [1.00]
			40	3.92 [0.40]	20.0		45	8.72 [0.89]
			45	3.49 [0.36]	22.5		50	7.85 [0.80]
			50	3.14 [0.32]	25.0		55	7.13 [0.73]
			55	2.85 [0.29]	27.5		60	6.54 [0.67]
			60	2.62 [0.27]	30.0		65	6.03 [0.62]
			65	2.41 [0.25]	32.5		70	5.60 [0.57]
			70	2.24 [0.23]	35.0		75	5.23 [0.53]
			75	2.09 [0.21]	37.5		80	4.90 [0.50]
			80	1.96 [0.20]	40.0		90	4.36 [0.44]
12.5	7.0	88.3	15	11.77 [1.20]	7.5	SWR12.5-15	100	3.92 [0.40]
			20	8.83 [0.90]	10.0		125	3.14 [0.32]
			25	7.06 [0.72]	12.5		150	2.62 [0.27]
			30	5.88 [0.60]	15.0		175	2.24 [0.23]
			35	5.04 [0.51]	17.5		25	23.54 [2.40]
			40	4.41 [0.45]	20.0		30	19.61 [2.00]
			45	3.92 [0.40]	22.5		35	16.81 [1.71]
			50	3.53 [0.36]	25.0		40	14.71 [1.50]
			55	3.21 [0.33]	27.5		45	13.08 [1.33]
			60	2.94 [0.30]	30.0		50	11.77 [1.20]
			65	2.72 [0.28]	32.5		55	10.70 [1.09]
			70	2.52 [0.26]	35.0		60	9.81 [1.00]
			75	2.35 [0.24]	37.5		65	9.05 [0.92]
			80	2.21 [0.23]	40.0		70	8.41 [0.86]
14.5	8.5	127.5	90	1.96 [0.20]	45.0		75	7.85 [0.80]
			100	1.77 [0.18]	50.0		80	7.35 [0.75]
			15	17.00 [1.73]	7.5	SWR14.5-15	90	6.54 [0.67]
			20	12.75 [1.30]	10.0		100	5.88 [0.60]
			25	10.20 [1.04]	12.5		110	5.35 [0.55]
			30	8.50 [0.87]	15.0		120	4.90 [0.50]
			35	7.28 [0.74]	17.5		125	4.71 [0.48]
			40	6.37 [0.65]	20.0		130	4.53 [0.46]
			45	5.67 [0.58]	22.5		140	4.20 [0.43]
			50	5.10 [0.52]	25.0		150	3.92 [0.40]
			55	4.64 [0.47]	27.5		175	3.36 [0.34]
			60	4.25 [0.43]	30.0		200	2.94 [0.30]
			65	3.92 [0.40]	32.5		25	31.38 [3.20]
			70	3.64 [0.37]	35.0		30	26.15 [2.67]
			75	3.40 [0.35]	37.5		35	22.42 [2.29]
26	16.5	130.0	80	3.19 [0.33]	40.0		40	19.61 [2.00]
			90	2.83 [0.29]	45.0		45	17.43 [1.78]
			100	2.55 [0.26]	50.0		50	15.69 [1.60]
			125	2.04 [0.21]	62.5		55	14.26 [1.45]
			150	1.70 [0.17]	75.0		60	13.08 [1.33]
			150				65	12.07 [1.23]
							70	11.21 [1.14]
							75	10.46 [1.07]
							80	9.81 [1.00]
							90	8.72 [0.89]
							100	7.85 [0.80]
							110	7.13 [0.73]
							120	6.54 [0.67]
							125	6.28 [0.64]
							130	6.03 [0.62]
							140	5.60 [0.57]
							150	5.23 [0.53]
							175	4.48 [0.46]
							200	3.92 [0.40]
							225	3.49 [0.36]
							250	3.14 [0.32]

Quotation

● Load calculation method: Load=Spring constant×Deflection

(SI unit) N=N/mm×Fmm

kgf=kgf/mm×Fmm

(kgf=N×0.101972)

⌚ Operation count: 1 million (300,000 for L×55%)

🖨 Product guide P.966

⚠ Instructions and precautions for the use of coil springs P.1008

🕒 Load graph P.992



Catalog No.

SWR 37-40



Quotation

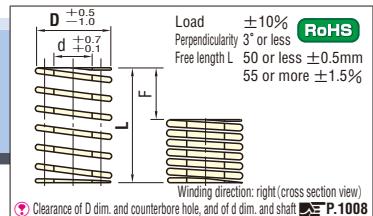


Quotation

Quotation

D	d	L	Spring constant N/mm (kgf/mm)	F=L×50%	Catalog No.	Base unit price 1~19 pieces		
							Fmm	Load N [kgf]
17	10.5	196.1 {20.0}	20	19.61 [2.00]	10.0	SWR17-20	25	
			25	15.69 [1.60]	12.5		30	
			30	13.08 [1.33]	15.0		35	
			35	11.21 [1.14]	17.5		40	
			40	9.81 [1.00]	20.0		45	
			45	8.72 [0.89]	22.5		50	
			50	7.85 [0.80]	25.0		55	
			55	7.13 [0.73]	27.5		60	
			60	6.54 [0.67]	30.0		65	
			65	6.03 [0.62]	32.5		70	
			70	5.60 [0.57]	35.0		75	
			75	5.23 [0.53]	37.5		80	
			80	4.90 [0.50]	40.0		90	
			90	4.36 [0.44]	45.0		100	
21	13.5	294.2	100	3.92 [0.40]	50.0	SWR21-25	125	
			125	3.14 [0.32]	62.5		150	
			150	2.62 [0.27]	75.0		175	
			175	2.24 [0.23]	87.5		200	
			25	23.54 [2.40]	12.5		30	
			30	19.61 [2.00]	15.0		35	
			35	16.81 [1.71]	17.5		40	
			40	14.71 [1.50]	20.0		45	
			45	13.08 [1.33]	22.5		50	
			50	11.77 [1.20]	25.0		55	
			55	10.70 [1.09]	27.5		60	
			60	9.81 [1.00]	30.0		65	
			65	9.05 [0.92]	32.5		70	
			70	8.41 [0.86]	35.0		75	
26	16.5	392.3 {40.0}	75	7.85 [0.80]	37.5	SWR26-25	90	
			80	9.81 [1.00]	40.0		100	
			90	8.72 [0.89]	45.0		110	
			100	7.85 [0.80]	50.0		120	
			110	7.13 [0.73]	55.0		125	
			120	6.54 [0.67]	60.0		130	
			125	6.28 [0.64]	62.5		140	
			130	6.03 [0.62]	65.0		150	
			140	5.60 [0.57]	70.0		175	
			150	5.23 [0.53]	75.0		200	
			175	4.48 [0.46]	87.5		225	
			200	3.92 [0.40]	100.0		250	
			225	3.49 [0.36]	112.5			
			250	3.14 [0.32]	125.0			

Quotation



D	d	L	Spring constant N/mm (kgf/mm)	F=L×50%	Catalog No.	Base unit price	
						Fmm	Load N [kgf]
31	21	35	28.02 [2.86]	17.5	SWR31-35		
		40	24.52 [2.50]	20.0		40	
		45	21.79 [2.22]	22.5		45	
		50	19.61 [2.00]	25.0		50	
		55	17.83 [1.82]	27.5		55	
		60	16.34 [1.67]	30.0		60	
		65	15.09 [1.54]	32.5		65	
		70	14.01 [1.43]	35.0		70	
		75	13.08 [1.33]	37.5		75	
		80	12.26 [1.25]	40.0		80	
		90	10.90 [1.11]	45.0		90	
		100	9.81 [1.00]	50.0		100	
		110	8.92 [0.91]	55.0	490.3	110	
		120	8.17 [0.83]	60.0		120	{50.0}
		125	7.85 [0.80]	62.5		125	
		130	7.54 [0.77]	65.0		130	
		140	7.00 [0.71]	70.0		140	
		150	6.54 [0.67]	75.0		150	
		160	6.13 [0.63]	80.0		160	
		170	5.77 [0.59]	85.0		170	
		175	5.60 [0.57]	87.5		175	
		180	5.45 [0.56]	90.0		180	
		190	5.16 [0.53]	95.0		190	
		200	4.90 [0.50]	100.0		200	
		250	3.92 [0.40]	125.0		250	
		300	3.27 [0.33]	150.0		300	
37	26	35	33.62 [3.43]	17.5	SWR37-35		
		40	29.42 [3.00]	20.0		40	
		45	26.15 [2.67]	22.5		45	
		50	23.54 [2.40]	25.0		50	
		55	21.40 [2.18]	27.5		55	
		60	19.61 [2.00]	30.0		60	
		65	18.10 [1.85]	32.5		65	
		70	16.81 [1.71]	35.0		70	
		75	15.69 [1.60]	37.5		75	
		80	14.71 [1.50]	40.0		80	
		90	13.08 [1.33]	45.0		90	
		100	11.77 [1.20]	50.0		100	
		110	10.70 [1.09]	55.0	588.4	110	
		120	9.81 [1.00]	60.0		120	{60.0}
		125	9.41 [0.96]	62.5		125	
		130	9.05 [0.92]	65.0		130	
		140	8.41 [0.86]	70.0		140	
		150	7.85 [0.80]	75.0		150	
		160	7.35 [0.75]	80.0		160	
		170	6.92 [0.71]	85.0		170	
		175	6.72 [0.69]	87.5		175	
		180	6.54 [0.67]	90.0		180	
		190	6.19 [0.63]	95.0		190	
		200	5.88 [0.60]	100.0		200	
		250	4.71 [0.48]	125.0		250	
		300	3.92 [0.40]	150.0		300	



Alterations



(NT) — Catalog No.
NT — SWR 31-60

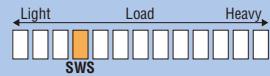
Quotation

Alteration	Code	Spec.	Price
No coating	NT	Coating removal Removal of the coil spring coating by shot peening (?) Springs with the coating removed are extremely susceptible to corrosion. Handle them with care. Corrosion of the spring will result in early breakage. (?) There may be greater variation in the load capacity and other characteristics between lots than with ordinary coated products.	Quotation

D	d	L	Spring constant N/mm (kgf/mm)	F=L×50%	Catalog No.	Base unit price	
				Fmm	Load N [kgf]	Type D—L	1~19 pieces
43	31	50	33.34 [3.40]	25.0	SWR43-50		
		60	27.79 [2.83]	30.0		60	
		70	23.82 [2.43]	35.0		70	
		80	20.84 [2.13]	40.0		80	
		90	18.52 [1.89]	45.0		90	
		100	16.67 [1.70]	50.0		100	
		110	15.16 [1.55]	55.0		110	
		120	13.89 [1.42]	60.0		120	
		130	12.82 [1.31]	65.0		130	
		140	11.91 [1.21]	70.0	833.6	140	
		150	11.11 [1.13]	75.0		150	
		160	10.42 [1.06]	80.0		160	
		170	9.81 [1.00]	85.0		170	
		180	9.26 [0.94]	90.0		180	
		190	8.77 [0.89]	95.0		190	
		200	8.34 [0.85]	100.0		200	
		225	7.41 [0.76]	112.5		225	
		250	6.67 [0.68]	125.0		250	
		275	6.06 [0.62]	137.5		275	
		300	5.56 [0.57]	150.0		300	
46	33	50	43.15 [4.40]	25.0	SWR46-50		
		60	35.98 [3.67]	30.0		60	
		70	30.82 [3.14]	35.0		70	
		80	26.97 [2.75]	40.0		80	
		90	23.97 [2.44]	45.0		90	
		100	21.57 [2.20]	50.0		100	
		110	19.61 [2.00]	55.0		110	
		120	17.98 [1.83]	60.0		120	
		125	17.26 [1.76]	62.5	1079	125	
		130	16.60 [1.69]	65.0		130	{110}
		140	15.41 [1.57]	70.0		140	
		150	14.38 [1.47]	75.0		150	
		175	12.33 [1.26]	87.5		175	
		200	10.79 [1.10]	100.0		200	
		225	9.59 [0.98]	112.5		225	
		250	8.63 [0.88]	125.0		250	
		275	7.85 [0.80]	137.5		275	
		300	7.19 [0.73]	150.0		300	
50	36	50	52.96 [5.40]	25.0	SWR50-50		
		60	44.13 [4.50]	30.0		60	
		70	37.83 [3.86]	35.0		70	
		80	33.10 [3.38]	40.0		80	
		90	29.42 [3.00]	45.0		90	
		100	26.48 [2.70]	50.0		100	
		110	24.07 [2.45]	55.0		110	
		120	22.06 [2.25]	60.0		120	
		130	20.37 [2.08]	65.0	1324	130	
		140	18.91 [1.93]	70.0		140	
		150	17.65 [1.80]	75.0		150	
		175	15.13 [1.54]	87.5		175	
		200	13.24 [1.35]	100.0		200	
		225	11.77 [1.20]	112.5		225	
		250	10.59 [1.08]	125.0		250	
		275	9.63 [0.98]	137.5		275	
		300	8.83 [0.90]	150.0		300	
		350	7.57 [0.77]	175.0		350	
		400	6.62 [0.68]	200.0		400	

COIL SPRINGS

—SWS—



D	d	L	Spring constant N/mm (kgf/mm)	F=L×40%	Catalog No.	Base unit price	Type D-L		1~19 pieces
							Fmm	N [kgf]	
10.5	5.5	20	10.90 [1.11]	8.0	SWS10.5-20		25		
		25	8.72 [0.89]	10.0			25		
		30	7.27 [0.74]	12.0			30		
		35	6.23 [0.64]	14.0			35		
		40	5.45 [0.56]	16.0			40		
		45	4.84 [0.49]	18.0			45		
		50	4.36 [0.44]	20.0	87.2 (8.9)		50		
		55	3.96 [0.40]	22.0			55		
		60	3.63 [0.37]	24.0			60		
		65	3.35 [0.34]	26.0			65		
		70	3.11 [0.32]	28.0			70		
		75	2.91 [0.30]	30.0			75		
		80	2.73 [0.28]	32.0			80		
12.5	6.5	20	15.25 [1.56]	8.0	SWS12.5-20		25		
		25	12.20 [1.24]	10.0			25		
		30	10.17 [1.04]	12.0			30		
		35	8.71 [0.89]	14.0			35		
		40	7.63 [0.78]	16.0			40		
		45	6.78 [0.69]	18.0			45		
		50	6.10 [0.62]	20.0	122.0 (12.4)		50		
		55	5.55 [0.57]	22.0			55		
		60	5.08 [0.52]	24.0			60		
		65	4.69 [0.48]	26.0			65		
		70	4.36 [0.44]	28.0			70		
		75	4.07 [0.41]	30.0			75		
		80	3.81 [0.39]	32.0			80		
14.5	8.5	20	24.50 [2.50]	8.0	SWS14.5-20		25		
		25	19.61 [2.00]	10.0			25		
		30	16.33 [1.67]	12.0			30		
		35	14.00 [1.43]	14.0			35		
		40	12.25 [1.25]	16.0			40		
		45	10.89 [1.11]	18.0			45		
		50	9.80 [1.00]	20.0	196.0 (20.0)		50		
		55	8.91 [0.91]	22.0			55		
		60	8.17 [0.83]	24.0			60		
		65	7.54 [0.77]	26.0			65		
		70	7.00 [0.71]	28.0			70		
		75	6.53 [0.67]	30.0			75		
		80	6.13 [0.62]	32.0			80		
		90	5.44 [0.56]	36.0			90		
17	10.5	100	4.90 [0.50]	40.0	SWS17-25 (30.0)		100		
		125	3.92 [0.40]	50.0			125		
		150	3.27 [0.33]	60.0			150		

● Load calculation method: Load=Spring constant×Deflection

(SI unit) N=N/mm×Fmm

kgf=kgf/mm×Fmm

(kgf=N×0.101972)

➊ Operation count: 1 million (300,000 for L×45%)

➋ Product guide P.966

➌ Instructions and precautions for the use of coil springs P.1008

➍ Load graph P.992



Order

Catalog No.

SWS 21-100



Days to Ship

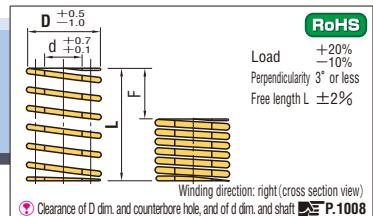
Quotation



Price

Quotation

D	d	L	Spring constant N/mm (kgf/mm)	F=L×40%	Catalog No.	Base unit price	Type D-L		1~19 pieces
							Fmm	N [kgf]	
21	13.5	25	29.42 [3.00]	10.0	SWS21-30 (43.0)		25		
		30	24.52 [2.50]	12.0			30		
		35	21.01 [2.14]	14.0			35		
		40	18.39 [1.88]	16.0			40		
		45	16.34 [1.67]	18.0			45		
		50	14.71 [1.50]	20.0			50		
		55	13.37 [1.36]	22.0			55		
		60	12.26 [1.25]	24.0	294.2 (30.0)		60		
		65	11.32 [1.15]	26.0			65		
		70	10.51 [1.07]	28.0			70		
		75	9.81 [1.00]	30.0			75		
		80	9.19 [0.94]	32.0			80		
		90	8.17 [0.83]	36.0			90		
		100	7.35 [0.75]	40.0			100		
		125	5.88 [0.60]	50.0			125		
26	16.5	150	4.90 [0.50]	60.0	SWS26-30 (58.0)		150		
		30	35.17 [3.59]	12.0			30		
		35	30.14 [3.07]	14.0			35		
		40	26.38 [2.69]	16.0			40		
		45	23.44 [2.39]	18.0			45		
		50	21.10 [2.15]	20.0			50		
		55	19.18 [1.96]	22.0			55		
		60	17.58 [1.79]	24.0			60		
		65	16.23 [1.66]	26.0			65		
		70	15.07 [1.54]	28.0			70		
		75	14.07 [1.43]	30.0			75		
		80	13.19 [1.34]	32.0			80		
		90	11.72 [1.20]	36.0			90		
26	16.5	100	10.55 [1.08]	40.0	SWS26-30 (58.0)		100		
		110	9.59 [0.98]	44.0			110		
		120	8.79 [0.90]	48.0			120		
		125	8.44 [0.86]	50.0			125		
		130	8.12 [0.83]	52.0			130		
		140	7.54 [0.77]	56.0			140		
		150	7.03 [0.72]	60.0			150		
		175	6.03 [0.61]	70.0			175		
		200	5.28 [0.54]	80.0			200		
		30	47.42 [4.84]	12.0			30		
		35	40.64 [4.14]	14.0			35		
		40	35.56 [3.63]	16.0			40		
		45	31.61 [3.22]	18.0			45		
26	16.5	50	28.45 [2.90]	20.0	569.0 (58.0)		50		
		55	25.86 [2.64]	22.0			55		
		60	23.71 [2.42]	24.0			60		
		65	21.88 [2.23]	26.0			65		
		70	20.32 [2.07]	28.0			70		
		75	18.97 [1.93]	30.0			75		
		80	17.78 [1.81]	32.0			80		
		90	15.81 [1.61]	36.0			90		
		100	14.23 [1.45]	40.0			100		
		110	12.93 [1.32]	44.0			110		
		120	11.85 [1.21]	48.0			120		
		125	11.38 [1.16]	50.0			125		
		130	10.94 [1.12]	52.0			130		
		140	10.16 [1.04]	56.0			140		
		150	9.48 [0.97]	60.0			150		
26	16.5	175	8.13 [0.83]	70.0	250 (58.0)		175		
		200	7.11 [0.73]	80.0			200		
		225	6.32 [0.64]	90.0			225		
		250	5.69 [0.58]	100.0			250		

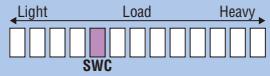


D	d	L	Spring constant N/mm (kgf/mm)	F=L×40%	Catalog No.	Base unit price			Catalog No.	Base unit price
							Fmm	N [kgf]	Type D-L	1~19 pieces
31	21	40	49.00 [5.00]	16.0	SWS31-40				50	50.15 [5.11] 20.0
		45	43.56 [4.44]	18.0					60	41.79 [4.26] 24.0
		50	39.20 [4.00]	20.0					70	35.82 [3.65] 28.0
		55	35.64 [3.63]	22.0					80	31.34 [3.20] 32.0
		60	32.67 [3.33]	24.0					90	27.86 [2.84] 36.0
		65	30.15 [3.07]	26.0					100	25.08 [2.56] 40.0
		70	28.00 [2.86]	28.0					110	22.80 [2.32] 44.0
		75	26.13 [2.66]	30.0					120	20.90 [2.13] 48.0
		80	24.50 [2.50]	32.0					130	19.29 [1.97] 52.0
		90	21.78 [2.22]	36.0					140	17.91 [1.83] 56.0
		100	19.60 [2.00]	40.0					150	16.72 [1.70] 60.0
		110	17.82 [1.82]	44.0					160	15.67 [1.60] 64.0
		120	16.33 [1.67]	48.0	784.0 [79.9]				170	14.75 [1.50] 68.0
		125	15.68 [1.60]	50.0					180	13.93 [1.42] 72.0
		130	15.08 [1.54]	52.0					190	13.20 [1.35] 76.0
		140	14.00 [1.43]	56.0					200	12.54 [1.28] 80.0
		150	13.07 [1.33]	60.0					225	11.14 [1.14] 90.0
		160	12.25 [1.25]	64.0					250	10.03 [1.02] 100.0
		170	11.53 [1.18]	68.0					275	9.12 [0.93] 110.0
		175	11.20 [1.14]	70.0					300	8.36 [0.85] 120.0
		180	10.89 [1.11]	72.0					50	63.74 [6.50] 20.0
		190	10.32 [1.05]	76.0					60	53.12 [5.42] 24.0
		200	9.80 [1.00]	80.0					70	45.53 [4.64] 28.0
		250	7.84 [0.80]	100.0					80	39.84 [4.06] 32.0
		300	6.53 [0.67]	120.0					90	35.41 [3.61] 36.0
44.5	31	40	52.13 [5.32]	16.0	SWS44.5-50				100	31.87 [3.25] 40.0
		45	46.33 [4.72]	18.0					110	28.97 [2.95] 44.0
		50	41.70 [4.25]	20.0					120	26.56 [2.71] 48.0
		55	37.91 [3.87]	22.0					125	25.50 [2.60] 50.0
		60	34.75 [3.54]	24.0					130	24.52 [2.50] 52.0
		65	32.08 [3.27]	26.0					140	22.77 [2.32] 56.0
		70	29.79 [3.04]	28.0					150	21.25 [2.17] 60.0
		75	27.80 [2.83]	30.0					175	18.21 [1.86] 70.0
		80	26.06 [2.66]	32.0					200	15.94 [1.63] 80.0
		90	23.17 [2.36]	36.0					225	14.17 [1.44] 90.0
		100	20.85 [2.13]	40.0					250	12.75 [1.30] 100.0
		110	18.95 [1.93]	44.0					275	11.59 [1.18] 110.0
		120	17.38 [1.77]	48.0					300	10.62 [1.08] 120.0
		125	16.68 [1.70]	50.0	834.0 [85.0]				50	65.42 [6.67] 24.0
		130	16.04 [1.64]	52.0					70	56.07 [5.72] 28.0
		140	14.89 [1.52]	56.0					80	49.06 [5.00] 32.0
		150	13.90 [1.42]	60.0					90	43.61 [4.45] 36.0
		160	13.03 [1.33]	64.0					100	39.25 [4.00] 40.0
		170	12.26 [1.25]	68.0					110	35.68 [3.64] 44.0
		175	11.91 [1.21]	70.0					120	32.71 [3.34] 48.0
		180	11.58 [1.18]	72.0					130	30.19 [3.08] 52.0
		190	10.97 [1.12]	76.0					140	28.04 [2.86] 56.0
		200	10.43 [1.06]	80.0					150	26.17 [2.67] 60.0
		250	8.34 [0.85]	100.0					175	22.43 [2.29] 70.0
		300	6.95 [0.71]	120.0					200	19.63 [2.00] 80.0
46	33	40	52.13 [5.32]	16.0	SWS46-50				225	17.44 [1.78] 90.0
		45	46.33 [4.72]	18.0					250	15.70 [1.60] 100.0
		50	41.70 [4.25]	20.0					275	14.27 [1.46] 110.0
		55	37.91 [3.87]	22.0					300	13.08 [1.33] 120.0
		60	34.75 [3.54]	24.0					50	65.42 [6.67] 24.0
		65	32.08 [3.27]	26.0					70	56.07 [5.72] 28.0
		70	29.79 [3.04]	28.0					80	49.06 [5.00] 32.0
		75	27.80 [2.83]	30.0					90	43.61 [4.45] 36.0
		80	26.06 [2.66]	32.0					100	39.25 [4.00] 40.0
		90	23.17 [2.36]	36.0					110	35.68 [3.64] 44.0
		100	20.85 [2.13]	40.0					120	32.71 [3.34] 48.0
		110	18.95 [1.93]	44.0					130	30.19 [3.08] 52.0
		120	17.38 [1.77]	48.0					140	28.04 [2.86] 56.0
		125	16.68 [1.70]	50.0	1275 [130]				150	26.17 [2.67] 60.0
		130	16.04 [1.64]	52.0					175	22.43 [2.29] 70.0
		140	14.89 [1.52]	56.0					200	19.63 [2.00] 80.0
		150	13.90 [1.42]	60.0					225	17.44 [1.78] 90.0
		160	13.03 [1.33]	64.0					250	15.70 [1.60] 100.0
		170	12.26 [1.25]	68.0					275	14.27 [1.46] 110.0
		175	11.91 [1.21]	70.0					300	13.08 [1.33] 120.0
52	37	40	52.13 [5.32]	16.0	SWS52-60				50	65.42 [6.67] 24.0
		45	46.33 [4.72]	18.0					70	56.07 [5.72] 28.0
		50	41.70 [4.25]	20.0					80	49.06 [5.00] 32.0
		55	37.91 [3.87]	22.0					90	43.61 [4.45] 36.0
		60	34.75 [3.54]	24.0					100	39.25 [4.00] 40.0
		65	32.08 [3.27]	26.0					110	35.68 [3.64] 44.0
		70	29.79 [3.04]	28.0					120	32.71 [3.34] 48.0
		75	27.80 [2.83]	30.0					130	30.19 [3.08] 52.0
		80	26.06 [2.66]	32.0					140	28.04 [2.86] 56.0
		90	23.17 [2.36]	36.0					150	26.17 [2.67] 60.0
		100	20.85 [2.13]	40.0					175	22.43 [2.29] 70.0
		110	18.95 [1.93]	44.0					200	19.63 [2.00] 80.0
		120	17.38 [1.77]	48.0					225	17.44 [1.78] 90.0
		125	16.68 [1.70]	50.0	1570 [160]				250	15.70 [1.60] 100.0
		130	16.04 [1.64]	52.0					275	14.27 [1.46] 110.0
		140	14.89 [1.52]	56.0					300	13.08 [1.33] 120.0

Alteration	Code	Spec.	Price
No coating	NT	Coating removal Removal of the coil spring coating by shot peening Springs with the coating removed are extremely susceptible to corrosion. Handle them with care. Corrosion of the spring will result in early breakage. There may be greater variation in the load capacity and other characteristics between lots than with ordinary coated products.	Quotation

COIL SPRINGS

—SWC—



D	d	L	Spring constant N/mm kgf/mm	F=L×50%			F=L×55%			F=L×60%			Catalog No.	Base unit price						
				Fmm N/kgf	N/kgf	Fmm N/kgf	N/kgf	Fmm N/kgf	N/kgf	Type D-L	1~19 pieces									
Operation count			1,000,000	500,000	300,000															
6	3	15.3.60 [0.37]	7.5	8.3		Out of range				SWC6-15	1~19 pieces									
			20.2.70 [0.28]	10.0	11.0															
			25.2.16 [0.22]	12.5	27	13.8		30	15.0											
			30.1.80 [0.18]	15.0	[2.8]	16.5		[3.0]	18.0	32										
			35.1.54 [0.16]	17.5		19.3			21.0	[3.3]										
			40.1.35 [0.14]	20.0		22.0			24.0											
8	4.6	15.3.81 [0.39]	7.5	8.3	Out of range		SWC8-15	1~19 pieces		SWC8-15	1~19 pieces									
			20.2.86 [0.29]	10.0																
			25.2.29 [0.23]	12.5	13.8															
			30.1.91 [0.19]	15.0		16.5			18.0											
			35.1.63 [0.17]	17.5		19.3			21.0											
			40.1.43 [0.15]	20.0		22.0			24.0											
			45.1.27 [0.13]	22.5	29	24.8		31	27.0	34										
			50.1.14 [0.12]	25.0	[2.9]	27.5		[3.2]	30.0	[3.5]										
			55.1.04 [0.11]	27.5		30.3			33.0											
			60.0.95 [0.10]	30.0		33.0			36.0											
10	5.8	15.6.10 [0.62]	7.5	8.3	Out of range		SWC10-15	1~19 pieces		SWC10-15	1~19 pieces									
			20.4.58 [0.47]	10.0																
			25.3.66 [0.37]	12.5	13.8															
			30.3.05 [0.31]	15.0		16.5			18.0											
			35.2.62 [0.27]	17.5		19.3			21.0											
			40.2.29 [0.23]	20.0		22.0			24.0											
			45.2.03 [0.21]	22.5	46	24.8		50	27.0											
			50.1.83 [0.19]	25.0	[4.7]	27.5		[5.1]	30.0	[5.6]										
			55.1.66 [0.17]	27.5		30.3			33.0											
			60.1.53 [0.16]	30.0		33.0			36.0											
12	7.4	15.6.14 [0.14]	32.5	35.8	Out of range		SWC12-20	1~19 pieces		SWC12-20	1~19 pieces									
			20.1.31 [0.13]	35.0		38.5			42.0											
			25.1.22 [0.12]	37.5		41.3			45.0											
			30.1.14 [0.12]	40.0		44.0			48.0											
			35.1.02 [0.10]	45.0		49.5			54.0											
			40.5.48 [0.56]	10.0		11.0			Out of range		SWC12-20	1~19 pieces								
			25.4.38 [0.45]	12.5		13.8														
			30.3.65 [0.37]	15.0		16.5														
			35.3.13 [0.32]	17.5		19.3														
			40.2.74 [0.28]	20.0		22.0														
14	8.5	15.6.18 [0.17]	32.5	35.8	Out of range		SWC14-25	1~19 pieces		SWC14-25	1~19 pieces									
			20.1.83 [0.19]	30.0		33.0														
			25.1.68 [0.17]	32.5		35.8														
			30.1.56 [0.16]	35.0		38.5														
			35.1.46 [0.15]	37.5		41.3														
			40.1.37 [0.14]	40.0		44.0														
			45.1.22 [0.12]	45.0		49.5														
			50.8.17 [0.83]	12.5		13.8														
			30.6.81 [0.69]	15.0		16.5														
			35.5.84 [0.60]	17.5		19.3														
22	13.5	15.6.22 [0.22]	22.5	24.8	Out of range		SWC22-25	1~19 pieces		SWC22-25	1~19 pieces									
			40.5.11 [0.52]	20.0		22.0														
			45.4.54 [0.46]	22.5		24.8														
			50.4.09 [0.42]	25.0		27.5														
			55.3.71 [0.38]	27.5	102	30.3		112	33.0	123										
			60.3.41 [0.35]	30.0	[10.4]	33.0		[11.4]	36.0	[12.5]										
			65.3.14 [0.32]	32.5		35.8			39.0											
			70.2.92 [0.30]	35.0		38.5			42.0											
			75.2.72 [0.28]	37.5		41.3			45.0											
			80.2.55 [0.26]	40.0		44.0			48.0											
12	7.4	15.6.27 [0.23]	45.5	49.5	Out of range		SWC12-25	1~19 pieces		SWC12-25	1~19 pieces									
			100.2.04 [0.21]	50.0		55.0			60.0											

● Load calculation method: Load=Spring constant×Deflection

(SI unit) $N = \text{N/mm} \times F_{\text{mm}}$

$\text{kgf} = \text{kgf/mm} \times F_{\text{mm}}$

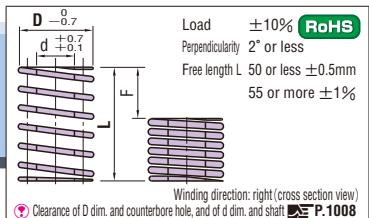
(kgf)=N×0.101972

● The maximum deflection for springs shown as "Out of range" is 55%.

Do not use such a spring at a deflection exceeding 55%.

Quotation

Quotation



D	d	L	Spring constant N/mm kgf/mm	F=L×50%			F=L×55%			F=L×60%			Catalog No.	Base unit price
				Fmm	N kgf	Fmm	N kgf	Fmm	N kgf	Type D-L	1~19 pieces			
			Operation count	1,000,000	500,000	300,000								
25	16	25	24.19 [2.47]	12.5	13.8		Out of range			SWC25-25				
		30	20.16 [2.06]	15.0	16.5		18.0			30				
		35	17.28 [1.76]	17.5	19.3		21.0			35				
		40	15.12 [1.54]	20.0	22.0		24.0			40				
		45	13.44 [1.37]	22.5	24.8		27.0			45				
		50	12.09 [1.23]	25.0	27.5		30.0			50				
		55	11.00 [1.12]	27.5	30.3		33.0			55				
		60	10.08 [1.03]	30.0	33.0		36.0			60				
		65	9.30 [0.95]	32.5	30.2	35.8	33.3	39.0	363	65				
		70	8.64 [0.88]	35.0	[30.8]	38.5	[33.9]	42.0	[37.0]	70				
		75	8.06 [0.82]	37.5	41.3		45.0			75				
		80	7.56 [0.77]	40.0	44.0		48.0			80				
		90	6.72 [0.69]	45.0	49.5		54.0			90				
		100	6.05 [0.62]	50.0	55.0		60.0			100				
		125	4.84 [0.49]	62.5	68.8		75.0			125				
		150	4.03 [0.41]	75.0	82.5		90.0			150				
		175	3.46 [0.35]	87.5	96.3		105.0			175				
		200	3.02 [0.31]	100.0	110.0		120.0			200				
27	17.5	25	28.11 [2.87]	12.5	13.8		Out of range			SWC27-25				
		30	23.43 [2.39]	15.0	16.5		18.0			30				
		35	20.08 [2.05]	17.5	19.3		21.0			35				
		40	17.57 [1.79]	20.0	22.0		24.0			40				
		45	15.62 [1.59]	22.5	24.8		27.0			45				
		50	14.06 [1.43]	25.0	27.5		30.0			50				
		55	12.78 [1.30]	27.5	30.3		33.0			55				
		60	11.71 [1.19]	30.0	33.0		36.0			60				
		65	10.81 [1.10]	32.5	35.1	35.8	38.7	39.0	422	65				
		70	10.04 [1.02]	35.0	[35.8]	38.5	[39.4]	42.0	[43.0]	70				
		75	9.37 [0.96]	37.5	41.3		45.0			75				
		80	8.79 [0.90]	40.0	44.0		48.0			80				
		90	7.81 [0.80]	45.0	49.5		54.0			90				
		100	7.03 [0.72]	50.0	55.0		60.0			100				
		125	5.62 [0.57]	62.5	68.8		75.0			125				
		150	4.69 [0.48]	75.0	82.5		90.0			150				
		175	4.02 [0.41]	87.5	96.3		105.0			175				
		200	3.51 [0.36]	100.0	110.0		120.0			200				
30	20	25	31.38 [3.20]	12.5	13.8		Out of range			SWC30-25				
		30	26.15 [2.67]	15.0	16.5		18.0			30				
		35	22.42 [2.29]	17.5	19.3		21.0			35				
		40	19.61 [2.00]	20.0	22.0		24.0			40				
		45	17.43 [1.78]	22.5	24.8		27.0			45				
		50	15.69 [1.60]	25.0	27.5		30.0			50				
		55	14.26 [1.45]	27.5	30.3		33.0			55				
		60	13.08 [1.33]	30.0	33.0		36.0			60				
		65	12.07 [1.23]	32.5	39.2	35.8	43.1	39.0	471	65				
		70	11.21 [1.14]	35.0	[40.0]	38.5	[44.0]	42.0	[48.0]	70				
		75	10.46 [1.07]	37.5	41.3		45.0			75				
		80	9.81 [1.00]	40.0	44.0		48.0			80				
		90	8.72 [0.89]	45.0	49.5		54.0			90				
		100	7.85 [0.80]	50.0	55.0		60.0			100				
		125	6.28 [0.64]	62.5	68.8		75.0			125				
		150	5.23 [0.53]	75.0	82.5		90.0			150				
		175	4.48 [0.46]	87.5	96.3		105.0			175				
		200	3.92 [0.40]	100.0	110.0		120.0			200				



Catalog No.

SWC 10-30



Days to Ship

Quotation



Price

Quotation



Alterations

(NT) — Catalog No.
NT — SWC 10-30

Quotation



Coating removal



No coating



NT

Removal of the coil spring coating by shot peening
 Springs with the coating removed are extremely susceptible to corrosion. Handle them with care.

Corrosion of the spring will result in early breakage.
 There may be greater variation in the load capacity and other characteristics between lots with ordinary coated products.



Spec.



Price

Quotation

COIL SPRINGS

—SWF—

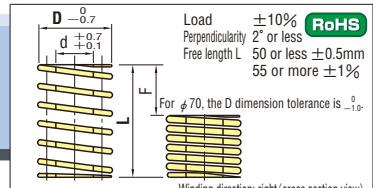


D	d	L	Spring constant N/mm kgf/mm	F=L×40% Fmm	F=L×45% N kgf	F=L×50% Fmm	N kgf	Catalog No.	Base unit price
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
6	3		15 7.8 [0.80]	6.0	6.8	7.5		SWF6-15	
			20 5.9 [0.60]	8.0	9.0	10.0		20	
			25 4.7 [0.48]	10.0	47 11.3 [53]	12.5 59		25	
			30 3.9 [0.40]	12.0	[4.8]	13.5 [5.4]	15.0 [6.0]	30	
			35 3.4 [0.34]	14.0		15.8	17.5	35	
			40 2.9 [0.30]	16.0		18.0	20.0	40	
8	4		10 15.7 [1.60]	4.0	4.5	5.0		SWF8-10	
			15 10.5 [1.07]	6.0	6.8	7.5		15	
			20 7.8 [0.80]	8.0	9.0	10.0		20	
			25 6.3 [0.64]	10.0	11.2	12.5		25	
			30 5.2 [0.53]	12.0	13.5	15.0		30	
			35 4.5 [0.46]	14.0	15.7	17.5		35	
			40 3.9 [0.40]	16.0	18.0	20.0		40	
			45 3.5 [0.36]	18.0	[6.4]	20.2 [7.2]	22.5 [8.0]	45	
			50 3.1 [0.32]	20.0		22.5	25.0	50	
			55 2.9 [0.29]	22.0		24.7	27.5	55	
			60 2.6 [0.27]	24.0		27.0	30.0	60	
			65 2.4 [0.25]	26.0		29.3	32.5	65	
			70 2.2 [0.23]	28.0		31.5	35.0	70	
			75 2.1 [0.21]	30.0		33.8	37.5	75	
10	5		80 2.0 [0.20]	32.0		36.0	40.0	80	
			10 19.6 [2.00]	4.0	4.5	5.0		SWF10-10	
			15 13.1 [1.33]	6.0	6.8	7.5		15	
			20 9.8 [1.00]	8.0	9.0	10.0		20	
			25 7.8 [0.80]	10.0	11.2	12.5		25	
			30 6.5 [0.67]	12.0	13.5	15.0		30	
			35 5.9 [0.57]	14.0	15.7	17.5		35	
			40 4.9 [0.50]	16.0	18.0	20.0		40	
			45 4.4 [0.44]	18.0	78	20.2 88	22.5 98	45	
			50 3.9 [0.40]	20.0	[8.0]	22.5 [9.0]	25.0 [10]	50	
			55 3.6 [0.36]	22.0		24.7	27.5	55	
			60 3.3 [0.33]	24.0		27.0	30.0	60	
			65 3.0 [0.31]	26.0		29.2	32.5	65	
			70 2.8 [0.29]	28.0		31.5	35.0	70	
			75 2.6 [0.27]	30.0		33.7	37.5	75	
			80 2.5 [0.25]	32.0		36.0	40.0	80	
			90 2.2 [0.22]	36.0		40.5	45.0	90	
12	6		15 18.3 [1.87]	6.0	6.8	7.5		SWF12-15	
			20 13.7 [1.40]	8.0	9.0	10.0		20	
			25 11.0 [1.12]	10.0	11.2	12.5		25	
			30 9.2 [0.93]	12.0	13.5	15.0		30	
			35 7.8 [0.80]	14.0	15.7	17.5		35	
			40 6.9 [0.70]	16.0	18.0	20.0		40	
			45 6.1 [0.62]	18.0	110	20.2 [124]	22.5 [137]	45	
			50 5.5 [0.56]	20.0	[11]	22.5 [13]	25.0 [14]	50	
			55 5.0 [0.51]	22.0		24.7	27.5	55	
			60 4.6 [0.47]	24.0		27.0	30.0	60	
			65 4.2 [0.43]	26.0		29.2	32.5	65	
			70 3.9 [0.40]	28.0		31.5	35.0	70	
14	7		75 3.7 [0.37]	30.0		33.7	37.5	75	
			80 3.4 [0.35]	32.0		36.0	40.0	80	
			90 3.1 [0.31]	36.0		40.5	45.0	90	
			20 17.7 [1.80]	8.0		9.0	10.0	SWF14-20	
			25 14.1 [1.44]	10.0		11.2	12.5	25	
			30 11.8 [1.20]	12.0		13.5	15.0	30	
			35 10.1 [1.03]	14.0		15.7	17.5	35	
			40 8.8 [0.90]	16.0		18.0	20.0	40	
			45 7.8 [0.80]	18.0		20.2	22.5	45	
			50 7.1 [0.72]	20.0	141	22.5 [159]	25.0 [177]	50	
22	11		55 6.4 [0.65]	22.0	[14]	24.7	27.5	55	
			60 5.9 [0.60]	24.0		27.0	30.0	60	
			65 5.4 [0.55]	26.0		29.2	32.5	65	
			70 5.0 [0.51]	28.0		31.5	35.0	70	
			75 4.7 [0.48]	30.0		33.7	37.5	75	
			80 4.4 [0.45]	32.0		36.0	40.0	80	
			90 3.9 [0.40]	36.0		40.5	45.0	90	
			100 3.5 [0.36]	40.0		45.0	50.0	100	

Quotation

Quotation

D	d	L	Spring constant N/mm kgf/mm	F=L×40% Fmm	F=L×45% N kgf	F=L×50% Fmm	N kgf	Catalog No.	Base unit price
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
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				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L				1~19 pieces	
				Type D-L					



D	d	L	Spring constant N/mm kgf/mm	F=L×40% F=L×45% F=L×50%	Catalog No.	Base unit price
			Type D-L	1~19 pieces		
Operation count			1,000,000	500,000	300,000	
25	13.5	25 39.2 [4.00] 10.0 11.2 12.5			SWF25-25	
		30 32.7 [3.33] 12.0 13.5 15.0			30	
		35 28.0 [2.86] 14.0 15.7 17.5			35	
		40 24.5 [2.50] 16.0 18.0 20.0			40	
		45 21.8 [2.22] 18.0 20.2 22.5			45	
		50 19.6 [2.00] 20.0 22.5 25.0			50	
		55 17.8 [1.82] 22.0 24.7 27.5			55	
		60 16.3 [1.67] 24.0 27.0 30.0			60	
		65 15.1 [1.54] 26.0 29.2 441 32.5 490			65	
		70 14.0 [1.43] 28.0 [45] 31.5 [45] 35.0 [50]			70	
		75 13.1 [1.33] 30.0 33.7 37.5			75	
		80 12.3 [1.25] 32.0 36.0 40.0			80	
		90 10.9 [1.11] 36.0 40.5 45.0			90	
		100 9.8 [1.00] 40.0 45.0 50.0			100	
		125 7.8 [0.80] 50.0 56.2 62.5			125	
		150 6.5 [0.67] 60.0 67.5 75.0			150	
		175 5.6 [0.57] 70.0 78.7 87.5			175	
		200 4.9 [0.50] 80.0 90.0 100.0			200	
27	13.5	25 47.1 [4.80] 10.0 11.2 12.5			SWF27-25	
		30 39.2 [4.00] 12.0 13.5 15.0			30	
		35 33.6 [3.43] 14.0 15.7 17.5			35	
		40 29.4 [3.00] 16.0 18.0 20.0			40	
		45 26.2 [2.67] 18.0 20.2 22.5			45	
		50 23.5 [2.40] 20.0 22.5 25.0			50	
		55 21.4 [2.18] 22.0 24.7 27.5			55	
		60 19.6 [2.00] 24.0 27.0 30.0			60	
		65 18.1 [1.85] 26.0 29.2 530 32.5 588			65	
		70 16.8 [1.71] 28.0 [48] 31.5 [54] 35.0 [60]			70	
		75 15.7 [1.60] 30.0 33.7 37.5			75	
		80 14.7 [1.50] 32.0 36.0 40.0			80	
		90 13.1 [1.33] 36.0 40.5 45.0			90	
		100 11.8 [1.20] 40.0 45.0 50.0			100	
		125 9.4 [0.96] 50.0 56.2 62.5			125	
		150 7.8 [0.80] 60.0 67.5 75.0			150	
		175 6.7 [0.69] 70.0 78.7 87.5			175	
		200 5.9 [0.60] 80.0 90.0 100.0			200	
30	16	25 56.5 [5.76] 10.0 11.2 12.5			SWF30-25	
		30 47.1 [4.80] 12.0 13.5 15.0			30	
		35 40.3 [4.11] 14.0 15.7 17.5			35	
		40 35.3 [3.60] 16.0 18.0 20.0			40	
		45 31.4 [3.20] 18.0 20.2 22.5			45	
		50 28.2 [2.88] 20.0 22.5 25.0			50	
		55 25.7 [2.62] 22.0 24.7 27.5			55	
		60 23.5 [2.40] 24.0 27.0 30.0			60	
		65 21.7 [2.22] 26.0 29.2 635 32.5 706			65	
		70 20.2 [2.06] 28.0 [58] 31.5 [65] 35.0 [72]			70	
		75 18.8 [1.92] 30.0 33.7 37.5			75	
		80 17.7 [1.80] 32.0 36.0 40.0			80	
		90 15.7 [1.60] 36.0 40.5 45.0			90	
		100 14.1 [1.44] 40.0 45.0 50.0			100	
		125 11.3 [1.15] 50.0 56.2 62.5			125	
		150 9.4 [0.96] 60.0 67.5 75.0			150	
		175 8.1 [0.82] 70.0 78.7 87.5			175	
		200 7.1 [0.72] 80.0 90.0 100.0			200	
35	19	40 48.0 [4.89] 16.0 18.0 20.0			SWF35-40	
		45 42.7 [4.35] 18.0 20.2 22.5			45	
		50 38.4 [3.92] 20.0 22.5 25.0			50	
		55 34.9 [3.56] 22.0 24.7 27.5			55	
		60 32.0 [3.26] 24.0 27.0 30.0			60	
		65 29.5 [3.01] 26.0 29.2 32.5			65	
		70 27.4 [2.80] 28.0 31.5 [78] 35.0 [88] 37.5 [98]			70	
		75 25.6 [2.61] 30.0 33.7 [864] 37.5 [960]			75	
		80 24.0 [2.45] 32.0 36.0 40.0			80	
		90 21.3 [2.18] 36.0 40.5 45.0			90	
		100 19.2 [1.96] 40.0 45.0 50.0			100	
		125 15.4 [1.57] 50.0 56.2 62.5			125	
		150 12.8 [1.31] 60.0 67.5 75.0			150	
		175 11.0 [1.12] 70.0 78.7 87.5			175	
		200 9.6 [0.98] 80.0 90.0 100.0			200	

Product guide P.966

Instructions and precautions for the use of coil springs P.1008

Load graph P.992

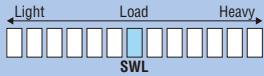
D	d	L	Spring constant N/mm kgf/mm	F=L×40% F=L×45% F=L×50%	Catalog No.	Base unit price
			Type D-L	1~19 pieces		
Operation count			1,000,000	500,000	300,000	
40	22	40 62.7 [6.39] 16.0 18.0 20.0			SWF40-40	
		45 55.7 [5.68] 18.0 20.3 22.5			45	
		50 50.2 [5.11] 20.0 22.5 25.0			50	
		55 45.6 [4.65] 22.0 24.8 27.5			55	
		60 41.8 [4.26] 24.0 27.0 30.0			60	
		65 38.6 [3.93] 26.0 29.3 32.5			65	
		70 35.8 [3.65] 28.0 31.5 35.0			70	
		75 33.4 [3.41] 30.0 33.8 37.5			75	
		80 31.4 [3.20] 32.0 36.0 [1003] 40.0			80	
		90 27.9 [2.84] 36.0 [102] 45.0 [115] 50.0 [128]			90	
		100 25.1 [2.56] 40.0 45.0 50.0			100	
		125 20.1 [2.05] 50.0 56.2 62.5			125	
		150 16.7 [1.70] 60.0 67.5 75.0			150	
		175 14.3 [1.46] 70.0 78.7 87.5			175	
		200 12.5 [1.28] 80.0 90.0 100.0			200	
		225 11.1 [1.14] 90.0 101.3 112.5			225	
		250 10.0 [1.02] 100.0 112.5 125.0			250	
		275 9.1 [0.93] 110.0 123.8 137.5			275	
		300 8.4 [0.85] 120.0 135.0 150.0			300	
Quotation						
50	27.5	50 78.4 [7.99] 20.0 22.5 25.0			SWF50-50	
		55 71.3 [7.27] 22.0 24.8 27.5			55	
		60 65.3 [6.66] 24.0 27.0 30.0			60	
		65 60.3 [6.15] 26.0 29.3 32.5			65	
		70 56.0 [5.71] 28.0 31.5 35.0			70	
		75 52.3 [5.33] 30.0 33.8 37.5			75	
		80 49.0 [5.00] 32.0 36.0 40.0			80	
		90 43.6 [4.44] 36.0 40.5 45.0			90	
		100 39.2 [4.00] 40.0 45.0 50.0			100	
		125 31.4 [3.20] 50.0 56.2 62.5			125	
		150 26.1 [2.66] 60.0 [160] 67.5 [180] 75.0 [200]			150	
		175 22.4 [2.28] 70.0 78.7 87.5			175	
		200 19.6 [2.00] 80.0 90.0 100.0			200	
		225 17.4 [1.78] 90.0 101.3 112.5			225	
		250 15.7 [1.60] 100.0 112.5 125.0			250	
		275 14.3 [1.45] 110.0 123.8 137.5			275	
		300 13.1 [1.33] 120.0 135.0 150.0			300	
		350 11.2 [1.14] 140.0 157.5 175.0			350	
		400 9.8 [1.00] 160.0 180.0 200.0			400	
		450 8.7 [0.89] 180.0 202.5 225.0			450	
		500 7.8 [0.80] 200.0 225.0 250.0			500	
Quotation						
60	33	60 94.0 [9.59] 24.0 27.0 30.0			SWF60-60	
		70 80.6 [8.22] 28.0 31.5 35.0			70	
		80 70.5 [7.19] 32.0 36.0 40.0			80	
		90 62.7 [6.39] 36.0 40.0 45.0			90	
		100 56.4 [5.75] 40.0 45.0 50.0			100	
		125 45.1 [4.60] 50.0 56.2 62.5			125	
		150 37.6 [3.83] 60.0 67.5 75.0			150	
		175 32.2 [3.29] 70.0 78.7 87.5			175	
		200 28.2 [2.88] 80.0 [2256] 90.0 [230] 100.0 [288] 125.0 [280]			200	
		225 25.1 [2.56] 90.0 [101.3] 112.5 [112.5] 125.0 [250]			225	
		250 22.6 [2.30] 100.0 112.5 125.0			250	
		275 20.5 [2.09] 110.0 123.8 137.5			275	
		300 18.8 [1.92] 120.0 135.0 150.0			300	
		350 16.1 [1.64] 140.0 157.5 175.0			350	
		400 14.1 [1.44] 160.0 180.0 200.0			400	
		450 12.5 [1.28] 180.0 202.5 225.0			450	
		500 11.3 [1.15] 200.0 225.0 250.0			500	
Quotation						
70	38.5	70 112 [11.4] 28.0 31.5 35.0			SWF70-70	
		80 98.0 [9.99] 32.0 36.0 40.0			80	
		90 87.1 [8.88] 36.0 40.5 45.0			90	
		100 78.4 [7.99] 40.0 45.0 50.0			100	
		125 62.7 [6.40] 50.0 [3136] 56.3 [3528] 62.5 [3920]			125	
		150 52.3 [5.33] 60.0 [320] 67.5 [360] 75.0 [400]			150	
		175 44.8 [4.57] 70.0 78.6 87.5			175	
		200 39.2 [4.00] 80.0 90.0 100.0			200	
		250 31.4 [3.20] 100.0 112.5 125.0			250	
		300 26.1 [2.66] 120.0 135.0 150.0			300	
		350 22.4 [2.28] 140.0 157.5 175.0			350	
Quotation						

Alteration	Code	Spec.	Price
	NT	Coating removal	Quotation

Removal of the coil spring coating by shot peening
Springs with the coating removed are extremely susceptible to corrosion. Handle them with care.
Corrosion of the spring will result in early breakage.
There may be greater variation in the load capacity and other characteristics between lots than with ordinary coated products.

COIL SPRINGS

—SWL—



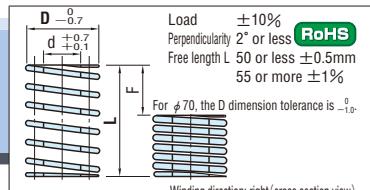
D	d	L	Spring constant N/mm (kg/mm)	F=L×32%		F=L×36%		F=L×40%		Catalog No.	Base unit price
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf		
Operation count				1,000,000	500,000	300,000	Type D—L		1 ~ 19 pieces		
6	3	15 13.1 [1.33]	4.8	5.4	6.0					SWL6—15	
		20 9.8 [1.00]	6.4	7.2	8.0					20	
		25 7.8 [0.80]	8.0	63	9.0	71	10.0	78		25	
		30 6.5 [0.67]	9.6	[6.4]	10.8	[7.2]	12.0	[8.0]		30	
		35 5.6 [0.57]	11.2		12.6		14.0			35	
		40 4.9 [0.50]	12.8		14.4		16.0			40	
		10 24.5 [2.50]	3.2		3.6		4.0			SWL8—10	
		15 16.3 [1.67]	4.8		5.4		6.0			15	
		20 12.3 [1.25]	6.4		7.2		8.0			20	
		25 9.8 [1.00]	8.0		9.0		10.0			25	
8	4	30 8.2 [0.83]	9.6		10.8		12.0			30	
		35 7.0 [0.71]	11.2		12.6		14.0			35	
		40 6.1 [0.63]	12.8	78	14.4	88	16.0	98		40	
		45 5.4 [0.56]	14.4	[8.0]	16.2	18.0		[10]		45	
		50 4.9 [0.50]	16.0		18.0		20.0			50	
		55 4.5 [0.45]	17.6		19.8		22.0			55	
		60 4.1 [0.42]	19.2		21.6		24.0			60	
		65 3.8 [0.38]	20.8		23.4		26.0			65	
		70 3.5 [0.36]	22.4		25.2		28.0			70	
		75 3.3 [0.33]	24.0		27.0		30.0			75	
10	5	80 3.1 [0.31]	25.6		28.8		32.0			80	
		10 34.3 [3.50]	3.2		3.6		4.0			SWL10—10	
		15 22.9 [2.33]	4.8		5.4		6.0			15	
		20 17.2 [1.75]	6.4		7.2		8.0			20	
		25 13.7 [1.40]	8.0		9.0		10.0			25	
		30 11.4 [1.17]	9.6		10.8		12.0			30	
		35 9.8 [1.00]	11.2		12.6		14.0			35	
		40 8.6 [0.88]	12.8		14.4		16.0			40	
		45 7.6 [0.78]	14.4	110	16.2	124	18.0	137		45	
		50 6.9 [0.70]	16.0	[11]	18.0	[13]	20.0	[14]		50	
12	6	55 6.2 [0.64]	17.6		19.8		22.0			55	
		60 5.7 [0.58]	19.2		21.6		24.0			60	
		65 5.3 [0.54]	20.8		23.4		26.0			65	
		70 4.9 [0.50]	22.4		25.2		28.0			70	
		75 4.6 [0.47]	24.0		27.0		30.0			75	
		80 4.3 [0.44]	25.6		28.8		32.0			80	
		90 3.8 [0.39]	28.8		32.4		36.0			90	
		15 34.3 [3.50]	4.8		5.4		6.0			SWL12—15	
		20 25.7 [2.63]	6.4		7.2		8.0			20	
		25 20.6 [2.10]	8.0		9.0		10.0			25	
12	6	30 17.2 [1.75]	9.6		10.8		12.0			30	
		35 14.7 [1.50]	11.2		12.6		14.0			35	
		40 12.9 [1.31]	12.8		14.4		16.0			40	
		45 11.4 [1.17]	14.4		16.2		18.0			45	
		50 10.3 [1.05]	16.0	165 [17]	18.0	185 [19]	20.0	206 [21]		50	
		55 9.4 [0.95]	17.6		19.8		22.0			55	
		60 8.6 [0.88]	19.2		21.6		24.0			60	
		65 7.9 [0.81]	20.8		23.4		26.0			65	
		70 7.4 [0.75]	22.4		25.2		28.0			70	
		75 6.9 [0.70]	24.0		27.0		30.0			75	
14	7	80 6.4 [0.66]	25.6		28.8		32.0			80	
		90 5.7 [0.58]	28.8		32.4		36.0			90	
		20 34.3 [3.50]	6.4		7.2		8.0			SWL14—20	
		25 27.5 [2.80]	8.0		9.0		10.0			25	
		30 22.9 [2.33]	9.6		10.8		12.0			30	
		35 19.6 [2.00]	11.2		12.6		14.0			35	
		40 17.2 [1.75]	12.8		14.4		16.0			40	
		45 15.3 [1.56]	14.4		16.2		18.0			45	
		50 13.7 [1.40]	16.0	220 [22]	18.0	247 [25]	20.0	275 [28]		50	
		55 12.5 [1.27]	17.6		19.8		22.0			55	
22	11	60 11.4 [1.17]	19.2		21.6		24.0			60	
		65 10.6 [1.08]	20.8		23.4		26.0			65	
		70 9.8 [1.00]	22.4		25.2		28.0			70	
		75 9.2 [0.93]	24.0		27.0		30.0			75	
		80 8.6 [0.88]	25.6		28.8		32.0			80	
		90 7.6 [0.78]	28.8		32.4		36.0			90	
		100 6.9 [0.70]	32.0		36.0		40.0			100	

Quotation

Quotation

●Load calculation method: Load=Spring constant×Deflection
(SI unit) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

D	d	L	Spring constant N/mm (kg/mm)	F=L×32%		F=L×36%		F=L×40%		Catalog No.	Base unit price
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf		
Operation count				1,000,000	500,000	300,000	Type D—L		1 ~ 19 pieces		
16	8	20 42.9 [4.38]	6.4			7.2		8.0		SWL16—20	
		25 34.3 [3.50]	8.0			9.0		10.0		25	
		30 28.6 [2.92]	9.6			10.8		12.0		30	
		35 24.5 [2.50]	11.2			12.6		14.0		35	
		40 21.5 [2.19]	12.8			14.4		16.0		40	
		45 19.1 [1.94]	14.4			16.2		18.0		45	
		50 17.2 [1.75]	16.0			18.0		20.0		50	
		55 15.6 [1.59]	17.6	275 [28]	19.8	309 [32]	22.0	343 [35]		55	
		60 14.3 [1.46]	19.2			21.6		24.0		60	
		65 13.2 [1.35]	20.8			23.4		26.0		65	
18	9	70 12.3 [1.25]	22.4			25.2		28.0		70	
		75 11.4 [1.17]	24.0			27.0		30.0		75	
		80 10.7 [1.09]	25.6			28.8		32.0		80	
		90 9.5 [0.97]	28.8			32.4		36.0		90	
		100 8.6 [0.88]	32.0			36.0		40.0		100	
		125 6.9 [0.70]	40.0			45.0		50.0		125	
		20 52.7 [5.38]	6.4			7.2		8.0		SWL18—20	
		25 42.2 [4.30]	8.0			9.0		10.0		25	
		30 35.1 [3.58]	9.6			10.8		12.0		30	
		35 30.1 [3.07]	11.2			12.6		14.0		35	
20	10	40 26.4 [2.69]	12.8			14.4		16.0		40	
		45 23.4 [2.39]	14.4			16.2		18.0		45	
		50 21.1 [2.15]	16.0			18.0		20.0		50	
		55 19.2 [1.95]	17.6	337 [43]	19.8	380 [43]	22.0	530 [54]		55	
		60 17.6 [1.79]	19.2			21.6		24.0		60	
		65 16.2 [1.65]	20.8			23.4		26.0		65	
		70 15.1 [1.54]	22.4			25.2		28.0		70	
		75 14.1 [1.43]	24.0			27.0		30.0		75	
		80 13.2 [1.34]	25.6			28.8		32.0		80	
		90 11.7 [1.19]	28.8			32.4		36.0		90	
22	11	100 13.2 [1.35]	32.0			36.0		40.0		100	
		125 10.6 [1.08]	40.0			45.0		50.0		125	
		150 8.8 [0.90]	48.0			54.0		60.0		150	
		25 65.7 [6.70]	8.0			9.0		10.0		25	
		30 54.8 [5.58]	9.6			10.8		12.0		30	
		35 46.9 [4.79]	11.2			12.6		14.0		35	
		40 41.1 [4.19]	12.8			14.4		16.0		40	
		45 36.5 [3.72]	14.4			16.2		18.0		45	
		50 32.9 [3.35]	16.0			18.0		20.0		50	
		55 29.9 [3.05]	17.6			19.8		22.0		55	
22	11	60 27.4 [2.79]	19.2	526 [54]	21.6	591 [60]	24.0	657 [67]		60	
		6									



D	d	L	Spring constant N/mm (kg/mm)	F=L×32%		F=L×36%		F=L×40%		Catalog No.	Base unit price
				Fmm	Load N/kgf	Fmm	Load N/kgf	Fmm	Load N/kgf		
Operation count 1,000,000 500,000 300,000											
25	12.5	25	82.4 [8.40]	8.0	9.0	10.0				SWL25-25	
		30	68.6 [7.00]	9.6	10.8	12.0				30	
		35	58.8 [6.00]	11.2	12.6	14.0				35	
		40	51.5 [5.25]	12.8	14.4	16.0				40	
		45	45.8 [4.67]	14.4	16.2	18.0				45	
		50	41.2 [4.20]	16.0	18.0	20.0				50	
		55	37.4 [3.82]	17.6	19.8	22.0				55	
		60	34.3 [3.50]	19.2	21.6	24.0				60	
		65	31.7 [3.23]	20.8	23.4	26.0	824			65	
		70	29.4 [3.00]	22.4	[67] 25.2 [76]	28.0	[84]			70	
		75	27.5 [2.80]	24.0	27.0	30.0				75	
		80	25.7 [2.63]	25.6	28.8	32.0				80	
		90	22.9 [2.33]	28.8	32.4	36.0				90	
		100	20.6 [2.10]	32.0	36.0	40.0				100	
		125	16.5 [1.68]	40.0	45.0	50.0				125	
		150	13.7 [1.40]	48.0	54.0	60.0				150	
		175	11.8 [1.20]	56.0	63.0	70.0				175	
		200	10.3 [1.05]	64.0	72.0	80.0				200	
27	13.5	25	98.1 [10.0]	8.0	9.0	10.0				SWL27-25	
		30	81.7 [8.33]	9.6	10.8	12.0				30	
		35	70.0 [7.14]	11.2	12.6	14.0				35	
		40	61.3 [6.25]	12.8	14.4	16.0				40	
		45	54.5 [5.56]	14.4	16.2	18.0				45	
		50	49.0 [5.00]	16.0	18.0	20.0				50	
		55	44.6 [4.55]	17.6	19.8	22.0				55	
		60	40.9 [4.17]	19.2	21.6	24.0				60	
		65	37.7 [3.85]	20.8	[785] 23.4 [883]	26.0	[981] [100]			65	
		70	35.0 [3.57]	22.4	[80] 25.2 [90]	28.0				70	
		75	32.7 [3.33]	24.0	27.0	30.0				75	
		80	30.6 [3.13]	25.6	28.8	32.0				80	
		90	27.2 [2.78]	28.8	32.4	36.0				90	
		100	24.5 [2.50]	32.0	36.0	40.0				100	
		125	19.6 [2.00]	40.0	45.0	50.0				125	
		150	16.3 [1.67]	48.0	54.0	60.0				150	
		175	14.0 [1.43]	56.0	63.0	70.0				175	
		200	12.3 [1.25]	64.0	72.0	80.0				200	
30	15	25	119 [12.1]	8.0	9.0	10.0				SWL30-25	
		30	98.8 [10.1]	9.6	10.8	12.0				30	
		35	84.7 [8.64]	11.2	12.6	14.0				35	
		40	74.1 [7.56]	12.8	14.4	16.0				40	
		45	65.9 [6.72]	14.4	16.2	18.0				45	
		50	59.3 [6.05]	16.0	18.0	20.0				50	
		55	53.9 [5.50]	17.6	19.8	22.0				55	
		60	49.4 [5.04]	19.2	21.6	24.0				60	
		65	45.6 [4.65]	20.8	[949] 23.4 [1067]	26.0	[1186]			65	
		70	42.4 [4.32]	22.4	[97] 25.2 [109]	28.0	[121]			70	
		75	39.5 [4.03]	24.0	27.0	30.0				75	
		80	37.1 [3.78]	25.6	28.8	32.0				80	
		90	32.9 [3.36]	28.8	32.4	36.0				90	
		100	29.7 [3.02]	32.0	36.0	40.0				100	
		125	23.7 [2.42]	40.0	45.0	50.0				125	
		150	19.8 [2.02]	48.0	54.0	60.0				150	
		175	16.9 [1.73]	56.0	63.0	70.0				175	
		200	14.8 [1.51]	64.0	72.0	80.0				200	
35	17.5	40	101 [10.3]	12.8	14.4	16.0				SWL35-40	
		45	89.8 [9.16]	14.4	16.2	18.0				45	
		50	80.9 [8.24]	16.0	18.0	20.0				50	
		55	73.5 [7.49]	17.6	19.8	22.0				55	
		60	67.4 [6.87]	19.2	21.6	24.0				60	
		65	62.2 [6.34]	20.8	23.4	26.0				65	
		70	57.8 [5.89]	22.4	[1294] 25.2 [1455]	28.0	[1617] [165]			70	
		75	53.9 [5.50]	24.0	[132] 27.0 [148]	30.0	[165]			75	
		80	50.5 [5.15]	25.6	28.8	32.0				80	
		90	44.9 [4.58]	28.8	32.4	36.0				90	
		100	40.4 [4.12]	32.0	36.0	40.0				100	
		125	32.3 [3.30]	40.0	45.0	50.0				125	
		150	27.0 [2.75]	48.0	54.0	60.0				150	
		175	23.1 [2.36]	56.0	63.0	70.0				175	
		200	20.2 [2.06]	64.0	72.0	80.0				200	

Quotation

D	d	L	Spring constant N/mm (kg/mm)	F=L×32%		F=L×36%		F=L×40%		Catalog No.	Base unit price
				Fmm	Load N/kgf	Fmm	Load N/kgf	Fmm	Load N/kgf		
40	20	40	132 [13.5]	8.0	10.0	12.0				SWL40-40	
		45	118 [12.0]	10.8	12.6	14.0				45	
		50	106 [10.8]	12.0	14.0	16.0				50	
		55	96.2 [9.81]	14.0	17.6	19.8				55	
		60	88.2 [8.99]	16.0	19.2	21.6				60	
		65	81.4 [8.30]	18.0	20.8	23.4				65	
		70	75.6 [7.71]	20.0	22.4	25.2				70	
		75	70.6 [7.20]	24.0	27.0	30.0				75	
		80	66.2 [6.75]	25.6	28.8	32.0	1905			80	
		90	58.8 [6.00]	28.8	32.4	36.0	[173]			90	
		100	52.9 [5.40]	32.0	36.0	40.0	[216]			100	
		125	42.3 [4.32]	40.0	45.0	50.0				125	
		150	35.3 [3.60]	48.0	54.0	60.0				150	
		175	30.2 [3.08]	56.0	63.0	70.0				175	
		200	26.5 [2.70]	64.0	72.0	80.0				200	
		225	23.5 [2.40]	72.0	81.0	90.0				225	
		250	21.2 [2.16]	80.0	90.0	100.0				250	
		275	19.2 [1.96]	88.0	99.0	110.0				275	
		300	17.6 [1.80]	96.0	108.0	120.0				300	

Quotation

Alteration	Code	Spec.	Price
No coating	NT	Coating removal Removal of the coil spring coating by shot peening Springs with the coating removed are extremely susceptible to corrosion. Handle them with care. Corrosion of the spring will result in early breakage. There may be greater variation in the load capacity and other characteristics between lots than with ordinary coated products.	Quotation

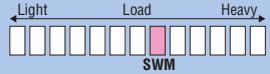
Product guide P.966

Instructions and precautions for the use of coil springs P.1008

Load graph P.992

COIL SPRINGS

—SWM—



D	d	L	Spring constant N/mm [kg/mm]	F=L×25.6%			F=L×28.8%			F=L×32%			Catalog No.	Base unit price		
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf			
Operation count												1,000,000	500,000	300,000	Type D—L	1 ~ 19 pieces
6	3	15	20.4 [2.08]	3.8	4.3	4.8									SWM6—15	
		20	18.3 [1.56]	5.1	5.8	6.4										20
		25	12.3 [1.25]	6.4	7.2	8.0										25
		30	10.2 [1.04]	7.7	8.6	9.6										30
		35	8.8 [0.89]	9.0	79	10.1	88	11.2	98							35
		40	7.7 [0.78]	10.2	(8.0)	11.5	(9.0)	12.8	(10)							40
		45	6.8 [0.69]	11.5		13.0		14.4								45
		50	6.1 [0.63]	12.8		14.4		16.0								50
		55	5.6 [0.57]	14.1		15.8		17.6								55
		60	5.1 [0.52]	15.4		17.3		19.2								60
8	4	10	42.9 [4.37]	2.6		2.9		3.2							SWM8—10	
		15	28.6 [2.91]	3.8		4.3		4.8								15
		20	21.5 [2.18]	5.1		5.8		6.4								20
		25	17.2 [1.75]	6.4		7.2		8.0								25
		30	14.3 [1.46]	7.7		8.6		9.6								30
		35	12.2 [1.25]	9.0		10.1		11.2								35
		40	10.7 [1.09]	10.2	11.5	12.3	13	14.4	137							40
		45	9.5 [0.97]	11.5	(11)	13.0	(13)	14.4	(14)							45
		50	8.6 [0.87]	12.8		14.4		16.0								50
		55	7.8 [0.79]	14.1		15.8		17.6								55
		60	7.1 [0.73]	15.4		17.3		19.2								60
		65	6.6 [0.67]	16.6		18.7		20.8								65
		70	6.1 [0.62]	17.9		20.2		22.4								70
		75	5.7 [0.58]	19.2		21.6		24.0								75
		80	5.4 [0.55]	20.5		23.0		25.6								80
10	5	10	61.3 [6.25]	2.6		2.9		3.2							SWM10—10	
		15	40.9 [4.17]	3.8		4.3		4.8								15
		20	30.6 [3.13]	5.1		5.8		6.4								20
		25	24.5 [2.50]	6.4		7.2		8.0								25
		30	20.4 [2.08]	7.7		8.6		9.6								30
		35	17.5 [1.79]	9.0		10.1		11.2								35
		40	15.3 [1.56]	10.2		11.5		12.8								40
		45	13.6 [1.39]	11.5	157	13.0	176	14.4	196							45
		50	12.3 [1.25]	12.8	(16)	14.4	(18)	16.0	(20)							50
		55	11.1 [1.14]	14.1		15.8		17.6								55
		60	10.2 [1.04]	15.4		17.3		19.2								60
		65	9.4 [0.96]	16.6		18.7		20.8								65
		70	8.8 [0.89]	17.9		20.2		22.4								70
		75	8.2 [0.83]	19.2		21.6		24.0								75
		80	7.7 [0.78]	20.5		23.0		25.6								80
		90	6.8 [0.69]	23.0		25.9		28.8								90
12	6	15	59.2 [6.04]	3.8		4.3		4.8							SWM12—15	
		20	44.4 [4.53]	5.1		5.8		6.4								20
		25	35.5 [3.63]	6.4		7.2		8.0								25
		30	29.6 [3.02]	7.7		8.6		9.6								30
		35	25.4 [2.59]	9.0		10.1		11.2								35
		40	22.2 [2.27]	10.2		11.5		12.8								40
		45	19.7 [2.01]	11.5	227	13.0	256	14.4	284							45
		50	17.8 [1.81]	12.8	(23)	14.4	(26)	16.0	(29)							50
		55	16.2 [1.65]	14.1		15.8		17.6								55
		60	14.8 [1.51]	15.4		17.3		19.2								60
14	7	65	13.7 [1.39]	16.6		18.7		20.8								65
		70	12.7 [1.29]	17.9		20.2		22.4								70
		75	11.8 [1.21]	19.2		21.6		24.0								75
		80	11.1 [1.13]	20.5		23.0		25.6								80
		90	9.9 [1.01]	23.0		25.9		28.8								90
		20	59.8 [6.09]	5.1		5.8		6.4								20
		25	47.9 [4.88]	6.4		7.2		8.0								25
		30	39.9 [4.08]	7.7		8.6		9.6								30
		35	34.2 [3.48]	9.0		10.1		11.2								35
		40	29.9 [3.05]	10.2		11.5		12.8								40
		45	26.6 [2.71]	11.5		13.0		14.4								45
		50	23.9 [2.44]	12.8	306	14.4	345	16.0	383							50
		55	21.8 [2.22]	14.1	(31)	15.8	(35)	17.6	(39)							55
		60	19.9 [2.03]	15.4		17.3		19.2								60
		65	18.4 [1.88]	16.6		18.7		20.8								65
		70	17.1 [1.74]	17.9		20.2		22.4								70
		75	16.0 [1.63]	19.2		21.6		24.0								75
		80	15.0 [1.52]	20.5		23.0		25.6								80
		90	13.3 [1.35]	23.0		25.9		28.8								90
		100	12.0 [1.22]	25.6		28.8		32.0								100



Catalog No.

SWM 20—80



Days to Ship

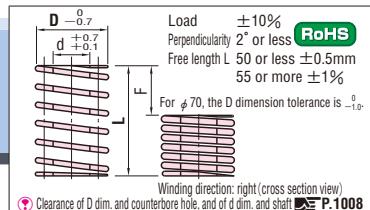
Quotation



Price

Quotation

Quotation



Clearance of D dim. and counterbore hole, and of d dim. and shaft **P.1008**

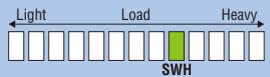
D	d	L	Spring constant N/mm (kgf/mm)	F=L×25.6%		F=L×28.8%		F=L×32%		Catalog No.	Base unit price
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf		
Operation count			1,000,000	500,000	300,000	Type D-L			1~19 pieces		
25	12.5	25	153 [15.6]	6.4	7.2	8.0				SWM25-25	
		30	128 [13.0]	7.7	8.6	9.6				30	
		35	109 [11.2]	9.0	10.1	11.2				35	
		40	95.7 [9.77]	10.2	11.5	12.8				40	
		45	85.1 [8.68]	11.5	13.0	14.4				45	
		50	76.6 [7.81]	12.8	14.4	16.0				50	
		55	69.6 [7.10]	14.1	15.8	17.6				55	
		60	63.8 [6.51]	15.4	17.3 [103]	19.2				60	
		65	58.9 [6.01]	16.6	18.7 [100]	20.8 [125]				65	
		70	54.7 [5.58]	17.9	22.4 [113]	24.4 [125]				70	
		75	51.0 [5.21]	19.2	21.6	24.0				75	
		80	47.9 [4.88]	20.5	23.0	25.6				80	
		90	42.5 [4.34]	23.0	25.9	28.8				90	
		100	38.3 [3.91]	25.6	28.8	32.0				100	
		125	30.6 [3.13]	32.0	36.0	40.0				125	
		150	25.5 [2.60]	38.4	43.2	48.0				150	
		175	21.9 [2.23]	44.8	50.4	56.0				175	
		25	179 [18.3]	6.4	7.2	8.0				SWM27-25	
		30	149 [15.2]	7.7	8.6	9.6				30	
		35	128 [13.0]	9.0	10.1	11.2				35	
		40	112 [11.4]	10.2	11.5	12.8				40	
		45	99.4 [10.1]	11.5	13.0	14.4				45	
		50	89.4 [9.13]	12.8	14.4	16.0				50	
		55	81.3 [8.30]	14.1	15.8	17.6				55	
		60	74.5 [7.60]	15.4	17.3 [1288]	19.2				60	
		65	68.8 [7.02]	16.6	18.7 [131]	20.8				65	
		70	63.9 [6.52]	17.9	20.2 [117]	22.4				70	
		75	59.6 [6.08]	19.2	21.6	24.0				75	
		80	55.9 [5.70]	20.5	23.0	25.6				80	
		90	49.7 [5.07]	23.0	25.9	28.8				90	
		100	44.7 [4.56]	25.6	28.8	32.0				100	
		125	35.8 [3.65]	32.0	36.0	40.0				125	
		150	29.8 [3.04]	38.4	43.2	48.0				150	
		175	25.6 [2.61]	44.8	50.4	56.0				175	
		25	221 [22.5]	6.4	7.2	8.0				SWM30-25	
		30	184 [18.8]	7.7	8.6	9.6				30	
		35	158 [16.1]	9.0	10.1	11.2				35	
		40	138 [14.1]	10.2	11.5	12.8				40	
		45	123 [12.5]	11.5	13.0	14.4				45	
		50	110 [11.3]	12.8	14.4	16.0				50	
		55	100 [10.2]	14.1	15.8	17.6				55	
		60	91.9 [9.38]	15.4	17.3	19.2				60	
		65	84.9 [8.65]	16.6	18.7 [1589]	20.8				65	
		70	78.8 [8.04]	17.9	20.2 [144]	22.4 [180]				70	
		75	73.5 [7.50]	19.2	21.6	24.0				75	
		80	69.0 [7.03]	20.5	23.0	25.6				80	
		90	61.3 [6.25]	23.0	25.9	28.8				90	
		100	55.2 [5.63]	25.6	28.8	32.0				100	
		125	44.1 [4.50]	32.0	36.0	40.0				125	
		150	36.8 [3.75]	38.4	43.2	48.0				150	
		175	31.5 [3.21]	44.8	50.4	56.0				175	
		200	27.6 [2.81]	51.2	57.6	64.0				200	
		40	188 [19.1]	10.2	11.5	12.8				SWM35-40	
		45	167 [17.0]	11.5	12.9	14.4				45	
		50	150 [15.3]	12.8	14.4	16.0				50	
		55	136 [13.9]	14.1	15.8	17.6				55	
		60	125 [12.8]	15.4	17.3	19.2				60	
		65	115 [11.8]	16.6	18.7	20.8				65	
		70	107 [10.9]	17.9	20.2 [1921]	22.4				70	
		75	100 [10.2]	19.2	21.6 [196]	24.0				75	
		80	93.8 [9.57]	20.5	23.0	25.6				80	
		90	83.4 [8.51]	23.0	25.9	28.8				90	
		100	75.0 [7.66]	25.6	28.8	32.0				100	
		125	60.0 [6.13]	32.0	36.0	40.0				125	
		150	50.0 [5.10]	38.4	43.2	48.0				150	
		175	42.9 [4.38]	44.8	50.4	56.0				175	
		200	37.5 [3.83]	51.2	57.6	64.0				200	

Quotation

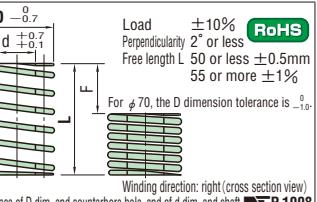
D	d	L	Spring constant N/mm (kgf/mm)	F=L×25.6%		F=L×28.8%		F=L×32%		Catalog No.	Base unit price
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf		
Operation count			1,000,000	500,000	300,000	Type D-L			1~19 pieces		
40	20	40	245 [25.0]	10.2	11.5	12.8				SWM40-40	
		45	218 [22.2]	11.5	13.0	14.4				45	
		50	196 [20.9]	12.8	14.4	16.0				50	
		55	178 [18.2]	14.1	15.8	17.6				55	
		60	163 [16.7]	15.4	17.3	19.2				60	
		65	151 [15.4]	16.6	18.7	20.8				65	
		70	140 [14.3]	17.9	20.2	22.4				70	
		75	131 [13.3]	19.2	21.6	24.0				75	
		80	123 [12.5]	20.5	23.0	25.6				80	
		90	109 [11.1]	23.0	25.9 [2510]	28.8 [3138]				90	
		100	98.1 [10.0]	25.6	28.8 [256]	32.0				100	
		125	78.5 [8.00]	32.0	36.0	40.0				125	
		150	65.4 [6.67]	38.4	43.2	48.0				150	
		175	56.0 [5.71]	44.8	50.4	56.0				175	
		200	49.0 [5.00]	51.2	57.6	64.0				200	
		225	43.6 [4.44]	57.6	64.8	72.0				225	
		250	39.2 [4.00]	64.0	72.0	80.0				250	
		275	35.7 [3.64]	70.4	79.2	88.0				275	
		300	32.7 [3.33]	76.8	86.4	96.0				300	
		50	306 [31.2]	12.8	14.4	16.0				SWM50-50	
		55	278 [28.4]	14.1	15.8	17.6				55	
		60	255 [26.0]	15.4	17.3	19.2				60	
		65	236 [24.0]	16.6	18.7	20.8				65	
		70	219 [22.3]	17.9	20.2	22.4				70	
		75	204 [20.8]	19.2	21.6	24.0				75	
		80	191 [19.5]	20.5	23.0	25.6				80	
		90	170 [17.3]	23.0	25.9	28.8				90	
		100	153 [15.5]	25.6	28.8 [5445]	32.0 [7056]				100	
		125	123 [12.5]	32.0 [400]	36.0 [648]	40.0 [500]				125	
		150	102 [10.4]	38.4	43.2	48.0				150	
		175	87.5 [8.92]	44.8	50.4	56.0				175	
		200	76.6 [7.81]	51.2	57.6	64.0				200	
		225	68.1 [6.94]	57.6	64.8	72.0				225	
		250	61.3 [6.25]	64.0	72.0	80.0				250	
		275	55.7 [5.68]	70.4	79.2	88.0				275	
		300	51.0 [5.20]	76.8	86.4	96.0				300	
		350	43.8 [4.46]	89.6	100.8	112.0				350	
		60	368 [37.5]	15.4	17.3	19.2				SWM60-60	
		70	315 [32.1]	17.9	20.2	22.4				70	
		80	276 [28.1]	20.5	23.0	25.6				80	
		90	245 [25.0]	23.0	25.9	28.8				90	
		100	221 [22.5]	25.6	28.8	32.0				100	
		125	176 [18.0]	32.0	36.0	40.0				125	
		150	147 [15.0]	38.4	43.2 [6664]	48.0 [7497]				150	

COIL SPRINGS

—SWH—



D	d	L	Spring constant N/mm (kg/mm)	F=L×19.2%		F=L×21.6%		F=L×24%		Catalog No.	Base unit price
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf		
Operation count			1,000,000	500,000		300,000		1 ~ 19 pieces			
6	3	15	38.1 3.9	2.9	3.2	3.6	4.0	4.3	4.8	SWH6-15	4.8
		20	28.5 2.9	3.8	4.3	4.8	5.2	5.7	6.2		
		25	22.8 2.3	4.8	5.4	6.0	6.6	7.2	7.8		
		30	19.0 1.9	5.8	6.5	7.2	7.9	8.6	9.2		
		35	16.3 1.7	6.7	7.6	8.4	9.1	9.8	10.5		
		40	14.3 1.5	7.7	[11]	8.6 [13]	9.6 [14]	10.3	11.0		
		45	12.7 1.3	8.6	9.7	10.8	11.5	12.2	12.9		
		50	11.4 1.2	9.6	10.8	12.0	12.8	13.5	14.3		
		55	10.4 1.1	10.6	11.9	13.2	14.0	14.8	15.6		
		60	9.5 1.0	11.5	13.0	14.4	15.2	16.0	16.8		
8	4	10	85.8 8.8	1.9	2.2	2.4	2.7	3.0	3.2	SWH8-10	4.8
		15	57.2 5.8	2.9	3.2	3.6	3.9	4.3	4.7		
		20	42.9 4.4	3.8	4.3	4.8	5.2	5.7	6.2		
		25	34.3 3.5	4.8	5.4	6.0	6.5	7.1	7.7		
		30	28.6 2.9	5.8	6.5	7.2	7.9	8.6	9.3		
		35	24.5 2.5	6.7	7.5	8.4	9.3	10.2	11.1		
		40	21.5 2.2	7.7	8.6	9.6	10.5	11.5	12.5		
		45	19.1 1.9	8.6	9.7	10.8	[19]	20.6	21.7		
		50	17.2 1.8	9.6	10.8	12.0	[21]	13.0	14.1		
		55	15.6 1.6	10.6	11.8	13.2					
		60	14.3 1.5	11.5	13.0	14.4					
		65	13.2 1.3	12.5	14.0	15.6					
		70	12.3 1.3	13.4	15.1	16.8					
		75	11.4 1.2	14.4	16.2	18.0					
		80	10.7 1.1	15.4	17.3	19.2					
10	5	10	123 12.5	1.9	2.2	2.4	2.7	3.0	3.2	SWH10-10	4.8
		15	81.7 8.3	2.9	3.2	3.6	3.9	4.3	4.7		
		20	61.3 6.3	3.8	4.3	4.8	5.2	5.7	6.2		
		25	49.0 5.0	4.8	5.4	6.0	6.5	7.1	7.7		
		30	40.8 4.2	5.8	6.5	7.2	7.9	8.6	9.3		
		35	35.0 3.6	6.7	7.5	8.4	9.3	10.2	11.1		
		40	30.6 3.1	7.7	8.6	9.6	10.5	11.5	12.5		
		45	27.2 2.8	8.6	9.7	10.8	12.6	14.0	15.4		
		50	24.5 2.5	9.6	[24]	10.8 [27]	12.0 [30]	13.4	14.8		
		55	22.3 2.3	10.6	11.8	13.2					
		60	20.4 2.1	11.5	13.0	14.4					
		65	18.8 1.9	12.5	14.0	15.6					
		70	17.5 1.8	13.4	15.1	16.8					
		75	16.3 1.7	14.4	16.2	18.0					
		80	15.3 1.6	15.4	17.3	19.2					
		90	13.6 1.4	17.3	19.4	21.6					
12	6	15	117 11.9	2.9	3.2	3.6	4.0	4.3	4.7	SWH12-15	4.8
		20	87.7 8.9	3.8	4.3	4.8	5.2	5.7	6.2		
		25	70.2 7.2	4.8	5.4	6.0	6.5	7.1	7.7		
		30	58.5 6.0	5.8	6.5	7.2	7.9	8.6	9.3		
		35	50.1 5.1	6.7	7.5	8.4	9.3	10.2	11.1		
		40	43.9 4.5	7.7	8.6	9.6	10.5	11.5	12.5		
		45	39.0 4.0	8.6	9.7	10.8	12.6	14.0	15.4		
		50	35.1 3.6	9.6	379	12.0 341	13.2 [38]	14.4	15.8		
		55	31.9 3.3	10.6	31.9	13.2	14.4	15.6	16.8		
		60	29.2 3.0	11.5	30.6	14.4	15.6	16.8	18.0		
		65	27.0 2.8	12.5	27.0	15.6	16.8	18.0	19.2		
		70	25.1 2.6	13.4	25.1	16.8	18.0	19.2	20.4		
		75	23.4 2.4	14.4	23.4	18.0	19.2	20.4	21.6		
		80	21.9 2.2	15.4	21.9	19.2	20.4	21.6	22.8		
		90	19.5 2.0	17.3	19.5	21.6	22.8	24.0	25.2		
14	7	20	120 12.3	3.8	4.3	4.8	5.2	5.7	6.2	SWH14-20	4.8
		25	96.3 9.8	4.8	5.4	6.0	6.5	7.1	7.7		
		30	80.3 8.2	5.8	6.5	7.2	7.9	8.6	9.3		
		35	68.8 7.0	6.7	7.5	8.4	9.3	10.2	11.1		
		40	60.2 6.1	7.7	8.6	9.6	10.5	11.5	12.5		
		45	53.5 5.5	8.6	9.7	10.8	11.7	12.8	13.8		
		50	48.2 4.9	9.6	10.8	12.0	13.2	14.4	15.6		
		55	43.8 4.5	10.6	11.8	13.2	14.4	15.6	16.8		
		60	40.1 4.1	11.5	13.0	14.4	15.8	17.2	18.4		
		65	37.1 3.8	12.5	14.0	15.6	17.2	18.8	20.0		
		70	34.4 3.5	13.4	15.1	16.8	18.5	20.2	21.9		
		75	32.1 3.3	14.4	16.2	18.0	19.8	21.6	23.4		
		80	30.1 3.1	15.4	17.3	19.2	21.0	22.8	24.6		
		90	26.8 2.7	17.3	19.4	21.6	23.4	25.2	27.0		
		100	24.1 2.5	19.2	21.6	24.0	25.8	27.6	29.4		
16	8	20	157 16.0	3.8	4.3	4.8	5.2	5.7	6.2	SWH16-20	4.8
		25	126 12.8	4.8	5.4	6.0	6.5	7.1	7.7		
		30	105 10.7	5.8	6.5	7.2	7.9	8.6	9.3		
		35	89.9 9.2	6.7	7.5	8.4	9.3	10.2	11.1		
		40	78.6 8.0	7.7	8.6	9.6	10.5	11.4	12.3		
		45	69.9 7.1	8.6	9.7	10.8	11.7	12.6	13.5		
		50	62.9 6.4	9.6	10.8	12.0	13.2	14.4	15.6		
		55	57.2 5.8	10.6	11.8	13.0	14.2	15.4	16.6		
		60	52.4 5.3	11.5	13.0	14.2	15.4	16.6	17.8		
		65	48.4 4.9	12.5	14.0	15.2	16.4	17.6	18.8		
		70	44.9 4.6	13.4	15.1	16.8	18.5	20.2	21.9		
		75	41.9 4.3	14.4	16.2	18.0	19.7	21.5	23.2		
		80	39.3 4.0	15.4	17.3	19.2	21.1	22.9	24.8		
		90	35.0 3.6	17.3	19.4	21.2	23.1	25.0	26.9		
		100	31.5 3.2	19.2	21.6	24.0	25.8	27.6	29.5		
18	9	20	188 20.2	3.8	4.3	4.8	5.2	5.7	6.2	SWH18-20	4.8
		25	159 16.2	4.8	5.4	6.0	6.5	7.2	7.8		
		30	132 13.5	5.8	6.5	7.2	7.9	8.6	9.3		
		35	113 11.5	6.7	7.5	8.4	9.3	10.2	11.1		
		40	99.1 10.1	7.7	8.6	9.6	10.5	11.4	12.3		
		45	88.1 9.0	8.6	9.7	10.8	11.7	12.6	13.5		
		50	79.3 8.1	9.6	10.8	11.7	12.6	13.5	14.4		
		55	72.0 7.3	10.6	11.8	12.7	13.6	14.5	15.4		
		60	66.0 6.7	11.5	13.0	14.2	15.1	16.0	17.0		
		65	61.0 6.2	12.5	14.0	15.2	16.1	17.0	18.0		
		70	56.6 5.8	13.4	15.1	16.8	18.5	20.2	21.9		
		75	52.8 5.4	14.4	16.2	18.0	19.7	21.5	23.2		
		80	49.5 5.1	15.4	17.3	19.2	21.1	22.9	24.8		
		90	44.0 4.5	17.3	19.4	21.2	23.1	25.0	26.9		
		100	39.6 4.0	19.2	21.6	23.4	25.2	27.0	28.9		
20	10	20	245 25.0	3.8	4.3	4.8	5.2	5.7	6.2		



Winding direction: right (cross section view)

For D > 70, the D dimension tolerance is ±0.5%.

For D ≤ 70, the D dimension tolerance is ±1.0%.

Load 50 or less ±0.5mm
Perpendicularity 50 or less ±1%

Free length L 55 or more ±1%

D	d	L	Spring constant N/mm (kgf/mm)	F=LX19.2% Fmm	F=LX21.6% Fmm	F=LX24% Fmm	Catalog No.	Base unit price
Operation count			1,000,000	500,000	300,000	Type D-L	1~19 pieces	

25	12.5	25	306 [31.2]	4.8	5.4	6.0	SWH25-25	
		30	255 [26.0]	5.8	6.5	7.2		
		35	218 [22.3]	6.7	7.6	8.4		
		40	191 [19.5]	7.7	8.6	9.6		
		45	170 [17.3]	8.6	9.7	10.8		
		50	153 [15.6]	9.6	10.8	12.0		
		55	139 [14.2]	10.6	11.9	13.2		
		60	127 [13.0]	11.5	13.0	14.4		
		65	118 [12.0]	12.5	14.0	15.6		
		70	109 [11.1]	13.4	[150] 15.1 [168]	[187] 16.8		
		75	102 [10.4]	14.4	16.2	18.0		
		80	95.5 [9.7]	15.4	17.3	19.2		
		90	84.9 [8.7]	17.3	19.4	21.6		
		100	76.4 [7.8]	19.2	21.6	24.0		
		125	61.1 [6.2]	24.0	27.0	30.0		
		150	50.9 [5.2]	28.8	32.4	36.0		
		175	43.6 [4.5]	33.6	37.8	42.0		

27	13.5	25	358 [36.5]	4.8	5.4	6.0	SWH27-25	
		30	298 [30.4]	5.8	6.5	7.2		
		35	255 [26.1]	6.7	7.6	8.4		
		40	224 [22.8]	7.7	8.6	9.6		
		45	199 [20.3]	8.6	9.7	10.8		
		50	179 [18.2]	9.6	10.8	12.0		
		55	163 [16.6]	10.6	11.9	13.2		
		60	149 [15.2]	11.5	13.0	14.4		
		65	138 [14.0]	12.5	14.0	15.6		
		70	128 [13.0]	13.4	[175] 15.1 [197]	[219] 16.8		
		75	119 [12.2]	14.4	16.2	18.0		
		80	112 [11.4]	15.4	17.3	19.2		
		90	99.4 [10.1]	17.3	19.4	21.6		
		100	89.4 [9.1]	19.2	21.6	24.0		
		125	71.5 [7.3]	24.0	27.0	30.0		
		150	59.6 [6.1]	28.8	32.4	36.0		
		175	51.1 [5.2]	33.6	37.8	42.0		

30	15	25	441 [45.0]	4.8	5.4	6.0	SWH30-25	
		30	368 [37.5]	5.8	6.5	7.2		
		35	315 [32.1]	6.7	7.6	8.4		
		40	276 [28.1]	7.7	8.6	9.6		
		45	245 [25.0]	8.6	9.7	10.8		
		50	221 [22.5]	9.6	10.8	12.0		
		55	200 [20.4]	10.6	11.9	13.2		
		60	184 [18.7]	11.5	13.0	14.4		
		65	170 [17.3]	12.5	2117 [2381]	15.6 [2646]		
		70	158 [16.1]	13.4	[216] 15.1 [243]	[270] 16.8 [270]		
		75	147 [15.0]	14.4	16.2	18.0		
		80	138 [14.1]	15.4	17.3	19.2		
		90	123 [12.5]	17.3	19.4	21.6		
		100	110 [11.2]	19.2	21.6	24.0		
		125	88.2 [9.0]	24.0	27.0	30.0		
		150	73.5 [7.5]	28.8	32.4	36.0		
		175	63.0 [6.4]	33.6	37.8	42.0		
		200	55.1 [5.6]	38.4	43.2	48.0		

35	17.5	40	375 [38.2]	7.7	8.6	9.6	SWH35-40	
		45	333 [34.0]	8.6	9.7	10.8		
		50	300 [30.6]	9.6	10.8	12.0		
		55	273 [27.8]	10.6	11.9	13.2		
		60	250 [25.5]	11.5	13.0	14.4		
		65	231 [23.5]	12.5	14.0	15.6		
		70	214 [21.8]	13.4	2878 [3237]	16.8 [3597]		
		75	200 [20.4]	14.4	[293] 18.2 [330]	18.0 [367]		
		80	187 [19.1]	15.4	17.3	19.2		
		90	167 [17.0]	17.3	19.4	21.6		
		100	150 [15.3]	19.2	21.6	24.0		
		125	120 [12.2]	24.0	27.0	30.0		
		150	99.9 [10.2]	28.8	32.4	36.0		
		175	85.6 [8.7]	33.6	37.8	42.0		
		200	74.9 [7.6]	38.4	43.2	48.0		

● Load calculation method: Load = Spring constant × Deflection
(SI unit) $N = N/\text{mm} \times F\text{mm}$
 $\text{kgf} = \text{kgf}/\text{mm} \times F\text{mm}$
 $(\text{kgf}) = N \times 0.101972$

● Product guide P.966 Load graph P.992
Instructions and precautions for the use of coil springs P.1008

D	d	L	Spring constant N/mm (kgf/mm)	F=LX19.2% Fmm	F=LX21.6% Fmm	F=LX24% Fmm	Catalog No.	Base unit price
Operation count			1,000,000	500,000	300,000	Type D-L	1~19 pieces	

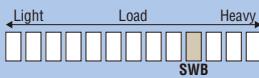
40	20	40	490 [50.0]	7.7	8.6	9.6	SWH40-40	
		45	436 [44.4]	8.6	9.7	10.8		
		50	392 [40.0]	9.6	10.8	12.0		
		55	356 [36.3]	10.6	11.9	13.2		
		60	327 [33.3]	11.5	13.0	14.4		
		65	302 [30.7]	12.5	14.0	15.6		
		70	280 [28.6]	13.4	15.1	16.8		
		75	261 [26.6]	14.4	16.2	18.0		
		80	245 [25.0]	15.4	17.3	19.2		
		90	218 [22.2]	17.3	19.4	21.6		
		100	196 [20.0]	19.2	[384] 21.6 [432]	[4704] 24.0 [480]		
		125	157 [16.0]	24.0	27.0	30.0		
		150	131 [13.3]	28.8	32.4	36.0		
		175	112 [11.4]	33.6	37.8	42.0		
		200	98.0 [10.0]	38.4	43.2	48.0		
		225	87.1 [8.9]	43.2	48.6	54.0		
		250	78.4 [8.0]	48.0	54.0	60.0		

50	25	50	613 [62.5]	9.6	10.8	12.0	SWH50-50	
		55	557 [56.8]	10.6	11.9	13.2		
		60	510 [52.0]	11.5	13.0	14.4		
		65	471 [48.0]	12.5	14.0	15.6		
		70	438 [44.6]	13.4	15.1	16.8		
		75	408 [41.6]	14.4	16.2	18.0		
		80	383 [39.0]	15.4	17.3	19.2		
		90	340 [34.7]	17.3	19.4	21.6		
		100	306 [31.2]	19.2	21.6 [24.0] (600)	24.0 [675]		
		125	245 [25.0]	24.0	27.0 [28.0] (600)	30.0 [750]		
		150	204 [20.8]	28.8	32.4	36.0		
		175	175 [17.8]	33.6	37.8	42.0		
		200	153 [15.6]	38.4	43.2	48.0		
		225	136 [13.9]	43.2	48.6	54.0		
		250	123 [12.5]	48.0	54.0	60.0		

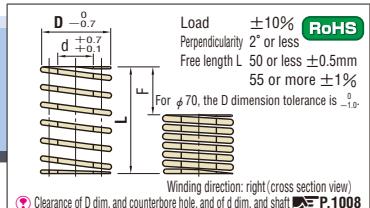
60	30	60	735 [74.9]	11.5	13.0	14.4	SWH60-60	
		70						

COIL SPRINGS

—SWB—



D	d	L	Spring constant N/mm (kg/mm)	F=L×16%			F=L×18%			F=L×20%			Catalog No.	Base unit price	
				Fmm	Load N/kgf	Fmm	Load N/kgf	Fmm	Load N/kgf	Fmm	Load N/kgf	Fmm	Load N/kgf		
Operation count				1,000,000			500,000			300,000					
6	3	15	59.0 6.0	2.4	2.7	3.0								SWB6—15	1~19 pieces
		20	44.3 4.5	3.2	3.6	4.0									
		25	35.4 3.6	4.0	4.5	5.0									
		30	29.5 3.0	4.8	5.4	6.0									
		35	25.3 2.6	5.6	142	6.3	159	7.0	177						
		40	22.1 2.3	6.4	[14]	7.2	[16]	8.0	[18]						
		45	19.7 2.0	7.2		8.1		9.0							
		50	17.7 1.8	8.0		9.0		10.0							
		55	16.1 1.6	8.8		9.9		11.0							
		60	14.8 1.5	9.6		10.8		12.0							
8	4	10	16.2 16.5	1.6		1.8		2.0						SWB8—10	1~19 pieces
		15	10.8 11.0	2.4		2.7		3.0							
		20	8.0 8.2	3.2		3.6		4.0							
		25	6.6 6.6	4.0		4.5		5.0							
		30	5.3 5.5	4.8		5.4		6.0							
		35	4.6 4.7	5.6		6.3		7.0							
		40	4.0 4.1	6.4	258	7.2	291	8.0	323						
		45	3.9 3.7	7.2	[26]	8.1	[30]	9.0	[33]						
		50	3.2 3.3	8.0		9.0		10.0							
		55	2.9 3.0	8.8		9.9		11.0							
10	5	60	2.6 2.7	9.6		10.8		12.0						SWB10—10	1~19 pieces
		65	2.4 2.5	10.4		11.7		13.0							
		70	2.3 2.4	11.2		12.6		14.0							
		75	2.1 2.2	12.0		13.5		15.0							
		80	2.0 2.1	12.8		14.4		16.0							
		10	2.2 2.5	1.6		1.8		2.0							
		15	1.7 15.0	2.4		2.7		3.0							
		20	1.1 11.2	3.2		3.6		4.0							
		25	8.8 9.0	4.0		4.5		5.0							
		30	7.3 7.5	4.8		5.4		6.0							
12	6	35	6.3 6.4	5.6		6.3		7.0						SWB12—15	1~19 pieces
		40	5.1 5.6	6.4		7.2		8.0							
		45	4.9 5.0	7.2	353	8.1	397	9.0	441						
		50	4.4 4.5	8.0	[36]	9.0	[41]	10.0	[45]						
		55	4.0 4.1	8.8		9.9		11.0							
		60	3.6 3.7	9.6		10.8		12.0							
		65	3.3 3.5	10.4		11.7		13.0							
		70	3.1 3.2	11.2		12.6		14.0							
		75	2.9 3.0	12.0		13.5		15.0							
		80	2.7 2.8	12.8		14.4		16.0							
14	7	90	2.4 2.5	14.4		16.2		18.0						SWB14—20	1~19 pieces
		15	1.9 19.3	2.4		2.7		3.0							
		20	1.4 14.5	3.2		3.6		4.0							
		25	1.1 11.6	4.0		4.5		5.0							
		30	0.9 9.7	4.8		5.4		6.0							
		35	0.8 8.3	5.6		6.3		7.0							
		40	0.7 7.3	6.4		7.2		8.0							
		45	0.6 6.4	7.2	455	8.1	512	9.0	569						
		50	0.6 5.8	8.0	[46]	9.0	[52]	10.0	[58]						
		55	0.5 5.3	8.8		9.9		10.8							
22	11	60	4.7 4.8	9.6		10.8		12.0						SWB12—15	1~19 pieces
		65	4.3 4.5	10.4		11.7		13.0							
		70	4.0 4.1	11.2		12.6		14.0							
		75	3.7 3.9	12.0		13.5		15.0							
		80	3.5 3.6	12.8		14.4		16.0							
		85	3.2 3.2	14.4		16.2		18.0							
		90	1.8 18.8	3.2		3.6		4.0							
		95	1.4 15.0	4.0		4.5		5.0							
		100	1.2 12.5	4.8		5.4		6.0							
		105	1.0 10.7	5.6		6.3		7.0							
16	8	110	0.9 9.4	6.4		7.2		8.0						SWB14—20	1~19 pieces
		115	0.8 8.1	7.2		8.1		9.0							
		120	0.7 7.8	7.2		8.1		9.0							
		125	0.6 7.6	8.0		8.1		9.0							
		130	0.5 7.4	8.8		9.0		10.0							
		135	0.4 7.3	9.6		9.9		11.0							
		140	0.3 7.2	10.4		10.8		12.0							
		145	0.2 7.1	11.2		11.7		13.0							
		150	0.1 7.0	12.0		12.6		14.0							
		155	0.0 6.9	12.8		14.4		16.0							
20	9	160	0.1 6.8	13.6	[60]	10.8	[68]	11.0	[75]					SWB12—15	1~19 pieces
		165	0.5 6.6	14.0		11.7		13.0							
		170	0.9 6.5	14.8		12.6		14.0							
		175	1.3 6.4	15.6		13.5		15.0							
		180	1.7 6.3	16.4		14.4		16.0							
		185	2.1 6.2	17.2		16.2		18.0							
		190	2.5 6.1	18.0		17.0		19.0							
		195	2.9 6.0	18.8		18.0		20.0							
		200	3.3 5.9	19.6		19.0		21.0							
		205	3.7 5.8	20.4		20.0		22.0							
22	11	210	4.1 5.7	21.2		21.0		23.0						SWB12—15	1~19 pieces
		215	4.5 5.6	22.0		21.7		23.7							
		220	4.9 5.5	22.8		22.5		24.5							
		225	5.3 5.4	23.6		23.3		25.3							
		230	5.7 5.3	24.4		24.1		26.1							
		235	6.1 5.2	25.2		24.9		26.6							
		240	6.5 5.1	26.0		25.7		27.3							
		245	6.9 5.0	26.8		26.5		28.2							
		250	7.3 4.9	27.6		27.3		29.2							
		255	7.7 4.8	28.4		28.1		30.1							
20	10	260	8.1 4.7	29.2		28.9		30.9						SWB12—15	1~19 pieces
		265	8.5 4.6	29.8		29.5		31.5							
		270	8.9 4.5	30.6		30.3		32.3							
		275	9.3 4.4	31.2		30.9		32.9							
		280	9.7 4.3	31.8		31.5		33.5							
		285	10.1 4.2	32.4		32.1		34.1							
		290	10.5 4.1	33.0		32.7	</td								



D	d	L	Spring constant N/mm (kgf/mm)	F=L×16%	F=L×18%	F=L×20%	Catalog No.	Base unit price
			Fmm Load N/kgf	Fmm Load N/kgf	Fmm Load N/kgf	Fmm Load N/kgf	Type D-L	1~19 pieces
			Operation count	1,000,000	500,000	300,000		
25	12.5	25	481 [49.0]	4.0	4.5	5.0	SWB25-25	
		30	400 [40.8]	4.8	5.4	6.0		
		35	343 [35.0]	5.6	6.3	7.0		
		40	300 [30.6]	6.4	7.2	8.0		
		45	267 [27.2]	7.2	8.1	9.0		
		50	240 [24.5]	8.0	9.0	10.0		
		55	218 [22.3]	8.8	9.9	11.0		
		60	200 [20.4]	9.6	10.8	12.0		
		65	185 [18.8]	10.4	11.7	13.0		
		70	172 [17.5]	11.2	12.6	14.0		
		75	160 [16.3]	12.0	13.5	15.0		
		80	150 [15.3]	12.8	14.4	16.0		
		90	133 [13.6]	14.4	16.2	18.0		
		100	120 [12.2]	16.0	18.0	20.0		
		125	96.1 [9.8]	20.0	22.5	25.0		
		150	80.1 [8.2]	24.0	27.0	30.0		
		175	68.6 [7.0]	28.0	31.5	35.0		
27	13.5	25	569 [58.0]	4.0	4.5	5.0	SWB27-25	
		30	474 [48.3]	4.8	5.4	6.0		
		35	406 [41.4]	5.6	6.3	7.0		
		40	355 [36.2]	6.4	7.2	8.0		
		45	316 [32.2]	7.2	8.1	9.0		
		50	284 [29.0]	8.0	9.0	10.0		
		55	259 [26.4]	8.8	9.9	11.0		
		60	237 [24.2]	9.6	10.8	12.0		
		65	219 [22.3]	10.4	11.7	13.0		
		70	203 [20.7]	11.2	12.6	14.0		
		75	190 [19.3]	12.0	13.5	15.0		
		80	178 [18.1]	12.8	14.4	16.0		
		90	158 [16.1]	14.4	16.2	18.0		
		100	142 [14.5]	16.0	18.0	20.0		
		125	114 [11.6]	20.0	22.5	25.0		
		150	94.8 [9.7]	24.0	27.0	30.0		
		175	81.3 [8.3]	28.0	31.5	35.0		
30	15	25	706 [72.0]	4.0	4.5	5.0	SWB30-25	
		30	588 [60.0]	4.8	5.4	6.0		
		35	504 [51.4]	5.6	6.3	7.0		
		40	441 [45.0]	6.4	7.2	8.0		
		45	392 [40.0]	7.2	8.1	9.0		
		50	353 [36.0]	8.0	9.0	10.0		
		55	321 [32.7]	8.8	9.9	11.0		
		60	294 [30.0]	9.6	10.8	12.0		
		65	272 [27.7]	10.4	11.7	13.0		
		70	252 [25.7]	11.2	12.6	14.0		
		75	235 [24.0]	12.0	13.5	15.0		
		80	221 [22.5]	12.8	14.4	16.0		
		90	196 [20.0]	14.4	16.2	18.0		
		100	177 [18.0]	16.0	18.0	20.0		
		125	141 [14.4]	20.0	22.5	25.0		
		150	118 [12.0]	24.0	27.0	30.0		
		175	101 [10.3]	28.0	31.5	35.0		
		200	88.3 [9.0]	32.0	36.0	40.0		
35	17.5	40	600 [61.2]	6.4	7.2	8.0	SWB35-40	
		45	534 [54.4]	7.2	8.1	9.0		
		50	480 [49.0]	8.0	9.0	10.0		
		55	437 [44.5]	8.8	9.9	11.0		
		60	400 [40.8]	9.6	10.8	12.0		
		65	369 [37.7]	10.4	11.7	13.0		
		70	343 [35.0]	11.2	12.6	14.0		
		75	320 [32.6]	12.0	13.5	15.0		
		80	300 [30.6]	12.8	14.4	16.0		
		90	267 [27.2]	14.4	16.2	18.0		
		100	240 [24.5]	16.0	18.0	20.0		
		125	192 [19.6]	20.0	22.5	25.0		
		150	160 [16.3]	24.0	27.0	30.0		
		175	137 [14.0]	28.0	31.5	35.0		
		200	120 [12.2]	32.0	36.0	40.0		

Quotation

Alteration	Code	Spec.	Price
	NT	Coating removal Removal of the coil spring coating by shot peening Springs with the coating removed are extremely susceptible to corrosion. Handle them with care. Corrosion of the spring will result in early breakage. There may be greater variation in the load capacity and other characteristics between lots than with ordinary coated products.	

● Load calculation method: Load=Spring constant×Deflection

(SI unit) $N=\text{N/mm} \times \text{Fmm}$

$\text{kgf}=\text{kgf/mm} \times \text{Fmm}$

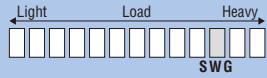
$(\text{kgf})=\text{N} \times 0.101972$

Product guide P.966 Load graph P.992

Instructions and precautions for the use of coil springs P.1008

COIL SPRINGS

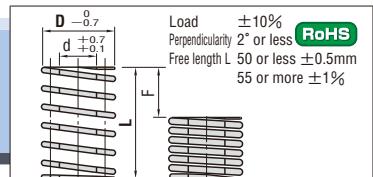
—SWG—



D	d	L	Spring constant N/mm (kg/mm)	F=L×16%		F=L×18%		F=L×20%		Catalog No.	Base unit price					
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf							
Operation count																
10	5	15	163 [16.7]	2.4	2.7	Out of range		Out of range		SWG10-15	1~19 pieces					
		20	123 [12.5]	3.2	3.6	Out of range		Out of range								
		25	98.1 [10.0]	4.0	4.5	Out of range		Out of range								
		30	81.7 [8.3]	4.8	5.4	Out of range		Out of range								
		35	70.0 [7.1]	5.6	6.3	Out of range		Out of range								
		40	61.3 [6.3]	6.4	7.2	Out of range		Out of range								
		45	54.5 [5.6]	7.2	8.1	Out of range		Out of range								
		50	49.0 [5.1]	8.0	9.0	441	10.0	490	Out of range							
		55	44.6 [4.5]	8.8	9.9	[45]	11.0	[50]	Out of range							
		60	40.9 [4.2]	9.6	10.8	Out of range		Out of range								
		65	37.7 [3.8]	10.4	11.7	Out of range		Out of range								
		70	35.0 [3.6]	11.2	12.6	Out of range		Out of range								
		75	32.7 [3.3]	12.0	13.5	Out of range		Out of range								
		80	30.6 [3.1]	12.8	14.4	Out of range		Out of range								
		90	27.2 [2.8]	14.4	16.2	Out of range		Out of range								
		100	24.5 [2.5]	16.0	18.0	Out of range		Out of range								
12	6	15	245 [25.0]	2.4	2.7	Out of range		Out of range		SWG12-15	1~19 pieces					
		20	184 [18.8]	3.2	3.6	Out of range		Out of range								
		25	147 [15.0]	4.0	4.5	Out of range		Out of range								
		30	123 [12.5]	4.8	5.4	Out of range		Out of range								
		35	105 [10.7]	5.6	6.3	Out of range		Out of range								
		40	91.9 [9.4]	6.4	7.2	Out of range		Out of range								
		45	81.7 [8.3]	7.2	8.1	Out of range		Out of range								
		50	73.5 [7.5]	8.0	9.0	662	10.0	735	Out of range							
		55	66.9 [6.8]	8.8	9.9	[68]	11.0	[75]	Out of range							
		60	61.3 [6.3]	9.6	10.8	Out of range		Out of range								
		65	56.6 [5.8]	10.4	11.7	Out of range		Out of range								
		70	52.5 [5.4]	11.2	12.6	Out of range		Out of range								
		75	49.0 [5.0]	12.0	13.5	Out of range		Out of range								
		80	46.0 [4.7]	12.8	14.4	Out of range		Out of range								
		90	40.9 [4.2]	14.4	16.2	Out of range		Out of range								
		100	36.8 [3.8]	16.0	18.0	Out of range		Out of range								
14	7	20	238 [24.3]	3.2	3.6	Out of range		Out of range		SWG14-20	1~19 pieces					
		25	190 [19.4]	4.0	4.5	Out of range		Out of range								
		30	159 [16.2]	4.8	5.4	Out of range		Out of range								
		35	136 [13.9]	5.6	6.3	Out of range		Out of range								
		40	119 [12.1]	6.4	7.2	Out of range		Out of range								
		45	106 [10.8]	7.2	8.1	Out of range		Out of range								
		50	95.1 [9.7]	8.0	9.0	856	10.0	951	Out of range							
		55	86.5 [8.8]	8.8	9.9	[78]	11.0	[97]	Out of range							
		60	79.3 [8.1]	9.6	10.8	[87]	12.0	[97]	Out of range							
		65	73.2 [7.5]	10.4	11.7	Out of range		Out of range								
		70	67.9 [6.9]	11.2	12.6	Out of range		Out of range								
		75	63.4 [6.5]	12.0	13.5	Out of range		Out of range								
		80	59.5 [6.1]	12.8	14.4	Out of range		Out of range								
		90	52.8 [5.4]	14.4	16.2	Out of range		Out of range								
		100	47.6 [4.9]	16.0	18.0	Out of range		Out of range								
16	8	20	319 [32.5]	3.2	3.6	Out of range		Out of range		SWG16-20	1~19 pieces					
		25	255 [26.0]	4.0	4.5	Out of range		Out of range								
		30	212 [21.7]	4.8	5.4	Out of range		Out of range								
		35	182 [18.6]	5.6	6.3	Out of range		Out of range								
		40	159 [16.3]	6.4	7.2	Out of range		Out of range								
		45	142 [14.4]	7.2	8.1	Out of range		Out of range								
		50	127 [13.0]	8.0	9.0	1147	10.0	1275	Out of range							
		55	116 [11.8]	8.8	9.9	[104]	11.0	[130]	Out of range							
		60	106 [10.8]	9.6	10.8	Out of range		Out of range								
		65	98.1 [10.0]	10.4	11.7	Out of range		Out of range								
		70	91.1 [9.3]	11.2	12.6	Out of range		Out of range								
		75	85.0 [8.7]	12.0	13.5	Out of range		Out of range								
		80	79.7 [8.1]	12.8	14.4	Out of range		Out of range								
		90	70.8 [7.2]	14.4	16.2	Out of range		Out of range								
		100	63.7 [6.5]	16.0	18.0	Out of range		Out of range								
25	12.5	20	760 [77.5]	3.2	3.6	Out of range		Out of range		SWG25-20	1~19 pieces					
		25	608 [62.0]	4.0	4.5	Out of range		Out of range								
		30	507 [51.7]	4.8	5.4	Out of range		Out of range								
		35	434 [44.3]	5.6	6.3	Out of range		Out of range								
		40	380 [38.8]	6.4	7.2	Out of range		Out of range								
		45	338 [34.4]	7.2	8.1	Out of range		Out of range								
		50	304 [31.0]	8.0	9.0	Out of range		Out of range								
		55	276 [28.2]	8.8	9.9	2432	10.0	2736	Out of range							
		60	253 [25.8]	9.6	10.8	[248]	[279]	[310]	Out of range							
		65	234 [23.8]	10.4	11.7	Out of range		Out of range								
		70	217 [22.1]	11.2	12.6	Out of range		Out of range								
		75	203 [20.7]	12.0	13.5	Out of range		Out of range								
		80	190 [19.4]	12.8	14.4	Out of range		Out of range								
		90	169 [17.2]	14.4	16.2	Out of range		Out of range								
		100	152 [15.5]	16.0	18.0	Out of range		Out of range								
		125	121.6 [12.4]	20.0	22.5	Out of range		Out of range								

Quotation

⚠ The maximum deflection for springs shown as "Out of range" is 18%.
Do not use such a spring at a deflection exceeding 18%.



Load $\pm 10\%$
Perpendicularity 2° or less
Free length L 50 or less $\pm 0.5\text{mm}$
55 or more $\pm 1\%$

(*) Clearance of D dim. and counterbore hole, and of d dim. and shaft. P.1008

D	d	L	Spring constant N/mm (kg/mm)	F=L×16%		F=L×18%		F=L×20%		Catalog No.	Base unit price
				Fmm	Load N/kgf	Fmm	Load N/kgf	Fmm	Load N/kgf		
			Operation count	1,000,000	500,000	300,000				Type D-L	1~19 pieces
27	13.5	20	907 [92.5]	3.2	3.6	Out of range				SWG27-20	
		25	726 [74.0]	4.0	4.5	5.0				25	
		30	605 [61.7]	4.8	5.4	6.0				30	
		35	518 [52.9]	5.6	6.3	7.0				35	
		40	454 [46.3]	6.4	7.2	8.0				40	
		45	403 [41.1]	7.2	8.1	9.0				45	
		50	363 [37.0]	8.0	9.0	10.0				50	
		55	330 [33.6]	8.8	9.9	11.0				55	
		60	302 [30.8]	9.6	10.8 [333]	12.0 [370]	3266	3628		60	
		65	279 [28.5]	10.4	11.7	13.0				65	
		70	259 [26.4]	11.2	12.6	14.0				70	
		75	242 [24.7]	12.0	13.5	15.0				75	
		80	227 [23.1]	12.8	14.4	16.0				80	
		90	202 [20.6]	14.4	16.2	18.0				90	
		100	181 [18.5]	16.0	18.0	20.0				100	
		125	145 [14.8]	20.0	22.5	25.0				125	
		150	121 [12.3]	24.0	27.0	30.0				150	
30	15	20	1177 [120.0]	3.2	3.6	Out of range				SWG30-20	
		25	941 [96.0]	4.0	4.5	5.0				25	
		30	785 [80.0]	4.8	5.4	6.0				30	
		35	672 [68.6]	5.6	6.3	7.0				35	
		40	588 [60.0]	6.4	7.2	8.0				40	
		45	523 [53.3]	7.2	8.1	9.0				45	
		50	471 [48.0]	8.0	9.0	10.0				50	
		55	428 [43.6]	8.8	9.9	11.0				55	
		60	392 [40.0]	9.6	10.8	12.0	3766	4236	4707	60	
		65	362 [36.9]	10.4	11.7 [384]	13.0 [432]				65	
		70	336 [34.3]	11.2	12.6	14.0				70	
		75	314 [32.0]	12.0	13.5	15.0				75	
		80	294 [30.0]	12.8	14.4	16.0				80	
		90	262 [26.7]	14.4	16.2	18.0				90	
		100	235 [24.0]	16.0	18.0	20.0				100	
		125	188 [19.2]	20.0	22.5	25.0				125	
		150	157 [16.0]	24.0	27.0	30.0				150	
		175	134 [13.7]	28.0	31.5	35.0				175	
		200	118 [12.0]	32.0	36.0	40.0				200	
35	17.5	30	1030 [105.0]	4.8	5.4	6.0				SWG35-30	
		35	883 [90.0]	5.6	6.3	7.0				35	
		40	772 [78.8]	6.4	7.2	8.0				40	
		45	686 [70.0]	7.2	8.1	9.0				45	
		50	618 [63.0]	8.0	9.0	10.0				50	
		55	562 [57.3]	8.8	9.9	11.0				55	
		60	515 [52.5]	9.6	10.8	12.0				60	
		65	475 [48.5]	10.4	11.7	13.0	4943	5560	6178	65	
		70	441 [45.0]	11.2	12.6 [504]	14.0 [567]				70	
		75	412 [42.0]	12.0	13.5	15.0				75	
		80	386 [39.4]	12.8	14.4	16.0				80	
		90	343 [35.0]	14.4	16.2	18.0				90	
		100	309 [31.5]	16.0	18.0	20.0				100	
		125	247 [25.2]	20.0	22.5	25.0				125	
		150	206 [21.0]	24.0	27.0	30.0				150	
		175	177 [18.0]	28.0	31.5	35.0				175	
		200	154 [15.8]	32.0	36.0	40.0				200	

Quotation

D	d	L	Spring constant N/mm (kg/mm)	F=L×16%		F=L×18%		F=L×20%		Catalog No.	Base unit price
				Fmm	Load N/kgf	Fmm	Load N/kgf	Fmm	Load N/kgf		
40	20	35	1149 [117.1]	5.6	6.3	7.0				SWG40-35	
		40	1005 [102.5]	6.4	7.2	8.0				40	
		45	893 [91.1]	7.2	8.1	9.0				45	
		50	804 [82.0]	8.0	9.0	10.0				50	
		55	731 [74.5]	8.8	9.9	11.0				55	
		60	670 [68.3]	9.6	10.8	12.0				60	
		65	619 [63.1]	10.4	11.7	13.0				65	
		70	574 [58.6]	11.2	12.6 [6433]	14.0 [7237]	8041			70	
		75	536 [54.7]	12.0	13.5 [656]	15.0 [738]	820			75	
		80	503 [51.3]	12.8	14.4	16.0				80	
		90	447 [45.6]	14.4	16.2	18.0				90	
		100	402 [41.0]	16.0	18.0	20.0				100	
		125	322 [32.8]	20.0	22.5	25.0				125	
		150	268 [27.3]	24.0	27.0	30.0				150	
		175	230 [23.4]	28.0	31.5	35.0				175	
		200	201 [20.5]	32.0	36.0	40.0				200	
50	25	50	1226 [125.0]	8.0	9.0	10.0				SWG50-50	
		55	1114 [113.6]	8.8	9.9	11.0				55	
		60	1022 [104.2]	9.6	10.8	12.0				60	
		65	943 [96.2]	10.4	11.7	13.0				65	
		70	876 [89.3]	11.2	12.6	14.0				70	
		75	817 [83.3]	12.0	13.5 [9807]	15.0 [11032]	12258			75	
		80	766 [78.1]	12.8	14.4 [1000]	16.0 [1125]	1250			80	
		90	681 [69.4]	14.4	16.2	18.0				90	
		100	613 [62.5]	16.0	18.0	20.0				100	
		125	490 [50.0]	20.0	22.5	25.0				125	
		150	409 [41.7]	24.0	27.0	30.0				150	
		175	350 [35.7]	28.0	31.5	35.0				175	
		200	306 [31.3]	32.0	36.0	40.0				200	

■ Features
 ● Load calculation method: Load = Spring constant × Deflection
 (SI unit) $N=N\text{mm} \times F\text{mm}$
 $k\text{gf}=k\text{gf/mm} \times F\text{mm}$
 $(\text{kgf})=N \times 0.101972$

● These springs have approximately 1.1 ~ 1.3 times the load capacity of SWB (P.983) at the same deflection. They can be used to make the die more compact and reduce the number of springs.

● Product guide P.966
 ● Instructions and precautions for the use of coil springs P.1008
 ● Load graph P.992
 ● SWB springs are electrocoated, for better corrosion resistance than springs with ordinary coatings. Electrocoatings also resist peeling better than ordinary coatings.



Catalog No.
SWG 20-80



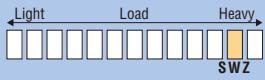
Quotation



Quotation

COIL SPRINGS

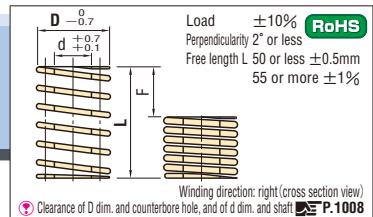
—SWZ—



D	d	L	Spring constant N/mm (kg/mm)	F=L×10.5%		F=L×12%		F=L×13%		Catalog No.	Base unit price
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf		
Operation count				1,000,000	500,000	300,000	Type D-L				1~19 pieces
10	5	25	158 {16}	2.6	3.0	3.3				SWZ10-25	
		30	132 {13}	3.2	3.6	3.9					30
		35	113 {12}	3.7	4.2	4.6					35
		40	99 {10}	4.2	4.8	475	5.2	515			40
		45	88 {9}	4.7	4.2	5.9	[48]	[53]			45
		50	79 {8}	5.3	6.0	6.5					50
		55	72 {7}	5.8	6.6	7.2					55
		60	66 {7}	6.3	7.2	7.8					60
12	6	25	215 {22}	2.6	3.0	3.3				SWZ12-25	
		30	179 {18}	3.2	3.6	3.9					30
		35	153 {16}	3.7	4.2	4.6					35
		40	134 {14}	4.2	564	4.8	645	5.2	698		40
		45	119 {12}	4.7	[57]	5.4	[66]	5.9	[71]		45
		50	107 {11}	5.3	6.0	6.5					50
		55	98 {10}	5.8	6.6	7.2					55
		60	89 {9}	6.3	7.2	7.8					60
14	7	30	305 {31}	3.2	3.6	3.9				SWZ14-30	
		35	262 {27}	3.7	4.2	4.6					35
		40	229 {23}	4.2	4.8	5.2					40
		45	204 {21}	4.7	962 [98]	5.4	1099 [112]	5.9	1191 [121]		45
		50	183 {19}	5.3	6.0	6.5					50
		55	167 {17}	5.8	6.6	7.2					55
		60	153 {16}	6.3	7.2	7.8					60
		30	440 {45}	3.2	3.6	3.9					30
16	8	35	377 {38}	3.7	4.2	4.6				SWZ16-30	
		40	330 {34}	4.2	4.8	5.2					35
		45	293 {30}	4.7	1385 [141]	5.4	1583 [161]	5.9	1715 [175]		40
		50	264 {27}	5.3	6.0	6.5					45
		55	240 {24}	5.8	6.6	7.2					50
		60	220 {22}	6.3	7.2	7.8					55
		30	553 {56}	3.2	3.6	3.9					60
		35	474 {48}	3.7	4.2	4.6					65
18	9	40	415 {42}	4.2	4.8	5.2				SWZ18-30	
		45	369 {38}	4.7	1742 [178]	5.4	1991 [203]	5.9	2157 [220]		40
		50	332 {34}	5.3	6.0	6.5					45
		55	302 {31}	5.8	6.6	7.2					50
		60	277 {28}	6.3	7.2	7.8					55
		30	660 {67}	3.2	3.6	3.9					60
		35	566 {58}	3.7	4.2	4.6					65
		40	495 {50}	4.2	4.8	5.2					70
20	10	45	440 {45}	4.7	5.4	5.9				SWZ20-30	
		50	396 {40}	5.3	6.0	6.5					35
		55	360 {37}	5.8	6.6	7.2					40
		60	330 {34}	6.3	7.2	7.8					45
		65	305 {31}	6.8	7.8	8.5					50
		70	283 {29}	7.4	8.4	9.1					55
		75	264 {27}	7.9	9.0	9.8					60
		80	248 {25}	8.4	9.6	10.4					65
		90	220 {22}	9.5	10.8	11.7					70
		100	198 {20}	10.5	12.0	13.0					75
		35	735 {75}	3.7	4.2	4.6					80
		40	643 {66}	4.2	4.8	5.2					85
22	11	45	572 {58}	4.7	5.4	5.9				SWZ22-35	
		50	514 {52}	5.3	6.0	6.5					35
		55	468 {48}	5.8	6.6	7.2					40
		60	429 {44}	6.3	7.2	8.0					45
		65	396 {40}	6.8	7.8	8.5					50
		70	367 {37}	7.4	8.4	9.1					55
		75	343 {35}	7.9	9.0	9.8					60
		80	322 {33}	8.4	9.6	10.4					65
		90	286 {29}	9.5	10.8	11.7					70
		100	257 {26}	10.5	12.0	13.0					75

Quotation

Quotation



D	d	L	Spring constant N/mm (kgf/mm)	F=L×10.5%			F=L×12%			F=L×13%			Catalog No.	Base unit price
				Fmm	Load N kgf	Fmm	Load N kgf	Fmm	Load N kgf	Type D—L				
Operation count			1,000,000	500,000			300,000							
40	20	45	1752 [179]	4.7		5.4		5.9		SWZ40—45				
		50	1577 [161]	5.3		6.0		6.5			50			
		55	1433 [146]	5.8		6.6		7.2			55			
		60	1314 [134]	6.3		7.2		7.8			60			
		65	1213 [124]	6.8		7.8		8.5			65			
		70	1126 [115]	7.4	8278	8.4	9460	9.1	10249		70			
		75	1051 [107]	7.9	[844]	9.0	[965]	9.8	[1045]		75			
		80	985 [100]	8.4		9.6		10.4			80			
		90	876 [89]	9.5		10.8		11.7			90			
		100	788 [80]	10.5		12.0		13.0			100			
		125	631 [64]	13.1		15.0		16.3			125			
		150	526 [54]	15.8		18.0		19.5			150			
		175	451 [46]	18.4		21.0		22.8			175			
50	25	55	2244 [229]	5.8		6.6		7.2		SWZ50—55				
		60	2057 [210]	6.3		7.2		7.8			60			
		65	1899 [194]	6.8		7.8		8.5			65			
		70	1763 [180]	7.4		8.4		9.1			70			
		75	1646 [168]	7.9		9.0		9.8			75			
		80	1543 [157]	8.4	12959	9.6	14810	10.4	16045		80			
		90	1371 [140]	9.5	[1321]	10.8	[1510]	11.7	[1636]		90			
		100	1234 [126]	10.5		12.0		13.0			100			
		125	987 [101]	13.1		15.0		16.3			125			
		150	823 [84]	15.8		18.0		19.5			150			
		175	705 [72]	18.4		21.0		22.8			175			
		200	617 [63]	21.0		24.0		26.0			200			

● Load calculation method: Load=Spring constant×Deflection

(SI units) $N=N/\text{mm} \times F_{\text{mm}}$
 $\text{kgf}=\text{kgf}/\text{mm} \times F_{\text{mm}}$
 $(\text{kgf}=N \times 0.101972)$

Product guide **P.966**

Instructions and precautions for the use of coil springs **P.1008**

Load graph **P.992**



Catalog No.

SWZ25—80



Days to Ship

Quotation



Price

Quotation

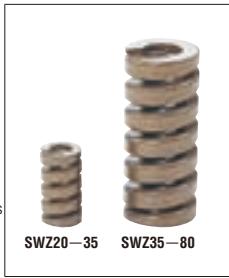
Features

● These springs have approximately 1.6 ~ 2 times the load capacity of SWB (P983) for the same size and operation count.

The spring constant is 2.5 times of that of SWB. They can be used to make the die more compact and reduce the number of springs.

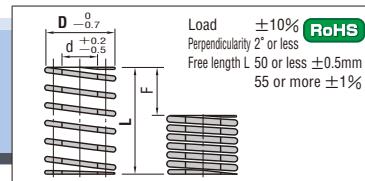
● SWZ springs are powder coated, making the coating highly resistant to peeling.

● The spring inner and outer diameters are the same as SWH, SWB, and other spring lineups, making these products effective when higher load capacities are required.



COIL SPRINGS

—SWX FOR HIGH-SPEED APPLICATIONS—



Winding direction: right (cross section view)
 Clearance of D dim. and counterbore hole, and of d dim. and shaft **P.1008**

D	d	L	Spring constant N/mm (kgf/mm)	$F=L \times 10\%$	Catalog No.	Base unit price 10,000,000	Operation count	
							Type D-L	1 ~ 19 pieces
20	9.5	25	510 { 52 }	2.5	SWX20-25	1274.9 { 130 }	25	
		30	425 { 43.3 }	3.0			30	
		35	363 { 37.1 }	3.5			35	
		40	319 { 32.5 }	4.0			40	
		45	283 { 28.9 }	4.5			45	
		50	255 { 26 }	5.0			50	
		55	231 { 23.6 }	5.5			55	
		60	213 { 21.7 }	6.0			60	
22	10.5	25	628 { 64 }	2.5	SWX22-25	1569.1 { 160 }	25	
		30	523 { 53.3 }	3.0			30	
		35	448 { 45.7 }	3.5			35	
		40	392 { 40 }	4.0			40	
		45	349 { 35.6 }	4.5			45	
		50	314 { 32 }	5.0			50	
		55	285 { 29.1 }	5.5			55	
		60	262 { 26.7 }	6.0			60	
25	12	25	785 { 80 }	2.5	SWX25-25	1961.3 { 200 }	25	
		30	654 { 66.7 }	3.0			30	
		35	560 { 57.1 }	3.5			35	
		40	490 { 50 }	4.0			40	
		45	435 { 44.4 }	4.5			45	
		50	392 { 40 }	5.0			50	
		55	357 { 36.4 }	5.5			55	
		60	327 { 33.3 }	6.0			60	
		70	280 { 28.6 }	7.0			70	
		80	245 { 25 }	8.0			80	
27	13	25	941 { 96 }	2.5	SWX27-25	2353.6 { 240 }	25	
		30	785 { 80 }	3.0			30	
		35	673 { 68.6 }	3.5			35	
		40	588 { 60 }	4.0			40	
		45	523 { 53.3 }	4.5			45	
		50	471 { 48 }	5.0			50	
		55	428 { 43.6 }	5.5			55	
		60	392 { 40 }	6.0			60	
		70	336 { 34.3 }	7.0			70	
		80	294 { 30 }	8.0			80	

Quotation

D	d	L	Spring constant N/mm (kgf/mm)	$F=L \times 10\%$	Catalog No.	Base unit price 10,000,000	Operation count	
							Type D-L	1 ~ 19 pieces
30	14.6	25	1432 { 146 }	2.5	SWX30-25	3579.4 { 365 }	25	
		30	1193 { 121.7 }	3.0			30	
		35	1023 { 104.3 }	3.5			35	
		40	895 { 91.3 }	4.0			40	
		45	795 { 81.1 }	4.5			45	
		50	716 { 73 }	5.0			50	
		55	651 { 66.4 }	5.5			55	
		60	596 { 60.8 }	6.0			60	
35	18	70	511 { 52.1 }	7.0			70	
		80	447 { 45.6 }	8.0			80	
		90	398 { 40.6 }	9.0			90	
		100	358 { 36.5 }	10.0			100	
		40	1030 { 105 }	4.0	SWX35-40	4119 { 420 }	40	
		45	915 { 93.3 }	4.5			45	
		50	824 { 84 }	5.0			50	
		55	749 { 76.4 }	5.5			55	
40	20.5	60	687 { 70 }	6.0	SWX40-40	5198 { 530 }	60	
		70	588 { 60 }	7.0			70	
		80	515 { 52.5 }	8.0			80	
		90	458 { 46.7 }	9.0			90	
		100	412 { 42 }	10.0			100	

Quotation

● Load calculation method: Load = Spring constant × Deflection
(SI units) $N=N\text{mm} \times F\text{mm}$

$\text{kgf}=kgf/mm \times F\text{mm}$
(kgf)=N×0.101972

● Product guide **P.966**

● Instructions and precautions for the use of coil springs **P.1008**



Catalog No.
SWX20-50



Price

Quotation

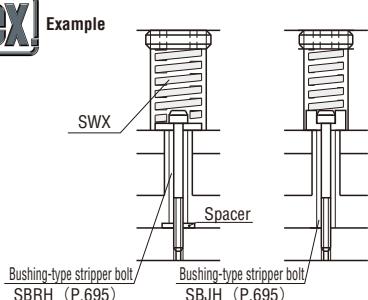


Days to Ship

Quotation



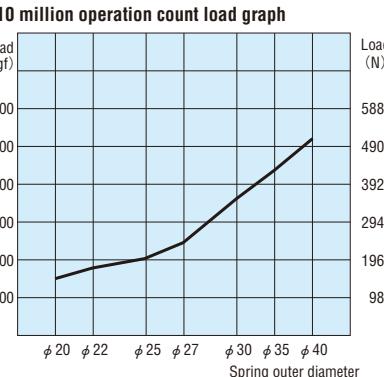
Example



Features

- SWX springs were developed for high-speed applications, with the focus on achieving a high operation count (high durability).
- Because this type is not coated, it can be used in a clean room.

■ 10 million operation count load graph



ALTERATION FOR COIL SPRING COATING REMOVAL

—GUIDE—

For the purposes of rust proofing and identification, all MISUMI coil springs are coated. However in order to meet the needs of users who are troubled by peeling of the coating during use, we have started offering an alteration for removal of the coil spring coating.



Ordinary coated product



Product with coating removed

Guide to alteration for coating removal

The alteration for removal of the coating involves shot peening the coated coil spring in order to remove the coating. After the coating is removed, oil is applied to prevent corrosion.

After the alteration is completed, the identifying coating is removed and the spring metal is exposed.

<Overview of the coating removal process>



Applicable coil springs (Alteration can be applied to the catalog Nos. listed below.)

SWY (P.967)	SWU (P.968)	SWR (P.969)	SWS (P.971)	SWC (P.973)
SWF (P.975)	SWL (P.977)	SWM (P.979)	SWH (P.981)	SWB (P.983)

☒ Cannot be used for coil springs SWG, SWZ, SWV, SWX.

Precautions

- Although oil is applied to the springs after the coating is removed, the silicon chrome steel oil-tempered wire (SWOSC-V) that is used in coil springs is extremely susceptible to corrosion. Be sure to handle the springs with sufficient care.
- Because corrosion of the springs will cause early breakage, it is recommended that when using a spring with the coating removed, the deflection be set lower than with a coated spring, and that the springs be replaced periodically as needed depending on the operating environment. These springs should be used soon after purchase.
- Be aware that there may be more variation in the load capacity and full length between lots than with ordinary coated products.
- Type identification for coil springs with the coating removed is difficult. Because identification based on wire thickness and the number of coils is difficult, these products must be managed adequately.



Order

When ordering the coating removal alteration, add "NT" prior to the catalog No.

N T — S W U 2 6 — 8 0

Coating removal Ordinary catalog No.



Price

The alteration charge per unit varies depending on the order volume as shown below.

Outer dia. D	1Code		
	1 ~ 10	11 ~ 19	20 or more
6·8			
10 ~ 35			
37 ~ 70			

Quotation

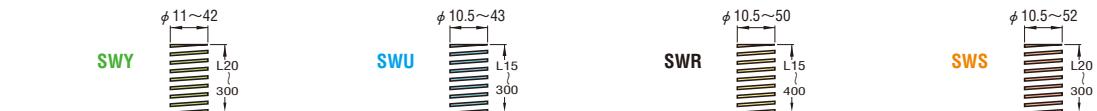


Days to Ship

Quotation

LOAD-DEFLECTION GRAPHS FOR COIL SPRINGS

■ High-deflection type



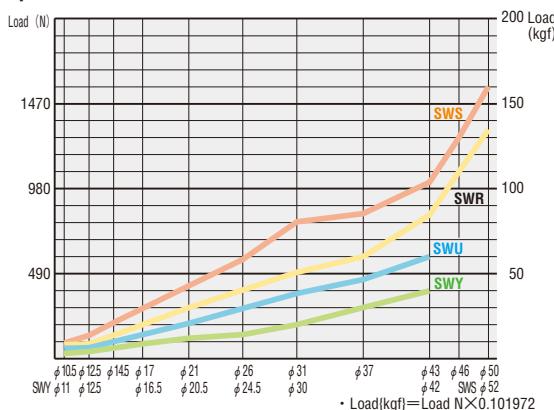
	Operation count	1,000,000	300,000
Deflection ratio	65%	70%	

	Operation count	1,000,000	300,000
Deflection ratio	60%	65%	

	Operation count	1,000,000	300,000
Deflection ratio	50%	55%	

	Operation count	1,000,000	300,000
Deflection ratio	40%	45%	

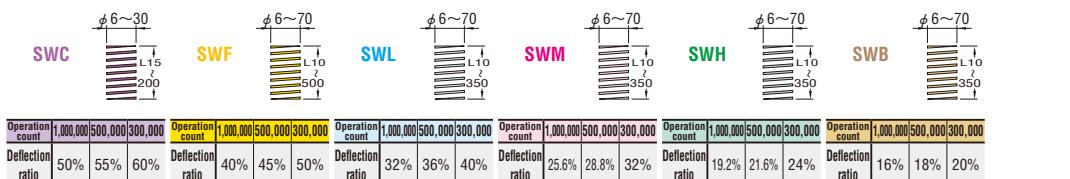
● Operation count: 1 million



● Operation count: 300,000



■ Heavy-load type



	Operation count	1,000,000	500,000	300,000
Deflection ratio	50%	55%	60%	

	Operation count	1,000,000	500,000	300,000
Deflection ratio	40%	45%	50%	

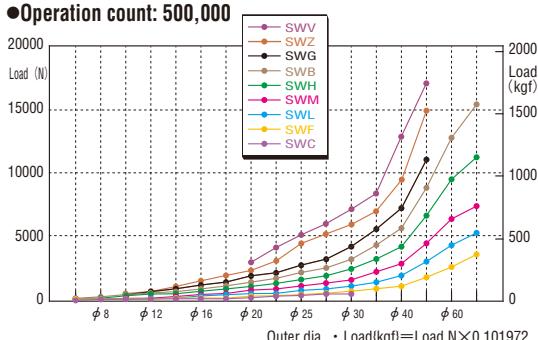
	Operation count	1,000,000	500,000	300,000
Deflection ratio	32%	36%	40%	

	Operation count	1,000,000	500,000	300,000
Deflection ratio	25.6%	28.8%	32%	

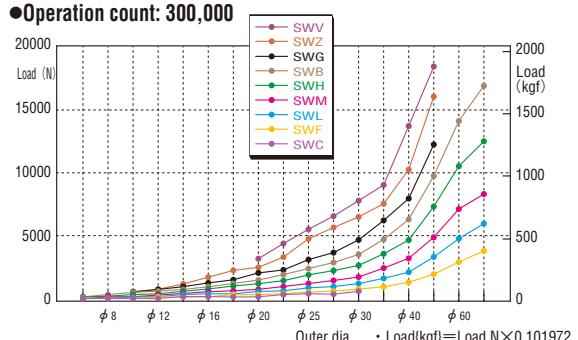
	Operation count	1,000,000	500,000	300,000
Deflection ratio	19.2%	21.6%	24%	

	Operation count	1,000,000	500,000	300,000
Deflection ratio	16%	18%	20%	

● Operation count: 500,000



● Operation count: 300,000



ROUND WIRE COIL SPRINGS

—WY (75% DEFLECTION) • WR (60% DEFLECTION) —



Order

Catalog No.
WY13-60



Days to Ship

Quotation



Price

Quotation

■ WY : Fmax. (Maximum allowable deflection) = L×75%

d	Solid height	F max.	Load N (kgf) max.	Catalog No.	Base unit price
	Type D-L				
0.16	1.0	3.75	0.38 {0.04}	WY3-5	
0.2	2.0	7.5	0.75 {0.08}	10	
0.23	3.6	11.2	1.12 {0.11}	15	
0.23	3.6	15	1.5 {0.15}	20	
0.25	5.5	18.7	1.87 {0.19}	25	
0.26	6.5	22.5	2.25 {0.23}	30	
0.2	1.1	3.75	0.38 {0.04}	WY4-5	
0.23	1.9	7.5	0.7 {0.08}	10	
0.23	1.9	11.2	1.1 {0.11}	15	
0.25	2.7	15	1.5 {0.15}	20	
0.29	5	18.7	1.8 {0.19}	25	
0.29	5	22.5	2.2 {0.23}	30	
0.32	7.7	26.2	2.6 {0.26}	35	
0.32	7.7	30	2.9 {0.3}	40	
0.25	1.7	7.5	0.7 {0.08}	WY5-10	
0.25	1.7	11.2	1.1 {0.11}	15	
0.3	3.2	15	1.5 {0.15}	20	
0.3	3.2	18.7	1.8 {0.19}	25	
0.35	6.3	22.5	2.2 {0.23}	30	
0.35	6.3	26.2	2.6 {0.26}	35	
0.38	9.2	30	2.9 {0.3}	40	
0.38	9.2	33.7	3.3 {0.34}	45	
0.38	9.2	37.5	3.7 {0.38}	50	
0.3	2.1	7.5	0.75 {0.08}	WY6-10	
0.32	2.8	11.2	1.1 {0.11}	15	
0.32	2.8	15	1.5 {0.15}	20	
0.35	4.1	18.7	1.8 {0.19}	25	
0.38	5.6	22.5	2.2 {0.23}	30	
0.38	5.6	26.2	2.6 {0.26}	35	
0.4	7.2	30	2.9 {0.3}	40	
0.4	7.2	33.7	3.3 {0.34}	45	
0.4	7.2	37.5	3.7 {0.38}	50	
0.45	12.2	41.2	4.0 {0.41}	55	
0.45	12.2	45	4.4 {0.45}	60	
0.45	12.2	48.7	4.8 {0.49}	65	
0.45	12.2	52.5	5.1 {0.53}	70	

d	Solid height	F max.	Load N (kgf) max.	Catalog No.	Base unit price
	Type D-L				
0.35	2.1	7.5	0.75 {0.08}	WY8-10	
0.38	3	11.2	1.1 {0.11}	15	
0.4	3.5	15	1.5 {0.15}	20	
0.4	3.5	18.7	1.8 {0.19}	25	
0.45	5.7	22.5	2.2 {0.23}	30	
0.45	5.7	26.2	2.6 {0.26}	35	
0.45	5.7	30	2.9 {0.3}	40	
0.45	5.7	33.7	3.3 {0.34}	45	
0.5	9	37.5	3.7 {0.38}	50	
0.5	9	41.2	4.0 {0.41}	55	
0.5	9	45	4.4 {0.45}	60	
0.5	9	48.7	4.8 {0.49}	65	
0.5	9	52.5	5.1 {0.53}	70	
0.5	3	11.2	2.26 {0.23}	WY10-15	
0.55	4.6	15	2.9 {0.3}	20	
0.55	4.6	18.7	3.7 {0.37}	25	
0.6	6.6	22.5	4.4 {0.45}	30	
0.6	6.6	26.2	5.1 {0.52}	35	
0.65	9.1	30	5.9 {0.6}	40	
0.65	9.1	33.7	6.6 {0.67}	45	
0.65	9.1	37.5	7.4 {0.75}	50	
0.7	12.6	41.2	8.1 {0.82}	55	
0.7	12.6	45	8.8 {0.9}	60	
0.7	12.6	48.7	9.6 {0.97}	65	
0.7	12.6	52.5	10.3 {1.05}	70	

d	Solid height	F max.	Load N (kgf) max.	Catalog No.	Base unit price
	Type D-L				
0.6	3.9	15	2.9 {0.3}	WY13-20	
0.65	5.1	18.7	3.7 {0.37}	25	
0.65	5.1	22.5	4.4 {0.45}	30	
0.7	6.7	26.2	5.1 {0.52}	35	
0.75	8.7	30	5.9 {0.6}	40	
0.75	8.7	33.7	6.6 {0.67}	45	
0.8	11.6	37.5	7.4 {0.75}	50	
0.8	11.6	41.2	8.1 {0.82}	55	
0.8	11.6	45	8.8 {0.9}	60	
0.85	15.3	48.7	9.6 {0.97}	65	
0.85	15.3	52.5	10.3 {1.05}	70	
0.65	3.6	15	2.9 {0.3}	WY16-20	
0.7	4.6	18.7	3.7 {0.37}	25	
0.75	5.7	22.5	4.4 {0.45}	30	
0.8	7	26.2	5.1 {0.52}	35	
0.85	9	30	5.9 {0.6}	40	
0.85	9	33.7	6.6 {0.67}	45	
0.9	11.3	37.5	7.4 {0.75}	50	
0.9	11.3	41.2	8.1 {0.82}	55	
0.9	11.3	45	8.8 {0.9}	60	
0.9	11.3	48.7	9.6 {0.97}	65	
0.9	11.3	52.5	10.3 {1.05}	70	

● Load calculation method: Load = Spring constant × Deflection
 (SI unit) N=N/mm × Fmm
 kgf=kgf/mm × Fmm
 (kgf=N×0.101972)

† Neither end is ground for all WY type springs.

† The solid height values are for reference only.
 There may be some variation between lots.

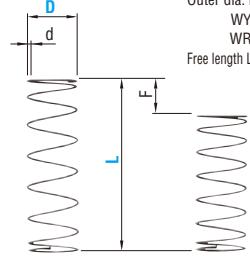
† Operation count: 1 million

† Instructions and precautions for the use of coil springs **P.1008**

Quotation

Quotation

Quotation

WY
WR

Spring constant $\pm 10\%$
 Outer dia. D $\phi 10$ or less 0.5mm
 WY: $\phi 13$ or more 0.8mm
 WR: $\phi 12$ or more 0.8mm
 Free length L 50 or less $\pm 1.5\text{mm}$
 55 or more $\pm 2.5\text{mm}$

RoHS

SWP-A

Spring constant

D	Type	WY	WR	WF	WL	WT	WM	WH	WB
2					0.5 [0.05]		1.5 [0.15]	2.0 [0.2]	
3		N/mm 0.1 [0.01]						2.9 [0.3]	3.9 [0.4]
4			N/mm 0.3 [0.03]						4.9 [0.5]
5				N/mm 0.5 [0.05]					N/mm 5.9 [0.6]
6					N/mm 1.0 [0.1]				N/mm 9.8 [1.0]
8						N/mm 2.0 [0.2]			
10		N/mm 0.2 [0.02]					N/mm 2.9 [0.3]		
12								N/mm 3.9 [0.4]	N/mm 10.9 [2.0]
13									29.4 [3.0]
14									
16									
18									
20									
22									
27									
Fmax.		F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

WR : Fmax. (maximum allowable deflection) = L×60%

d	Solid height	F max.	Load N (kgf) max.	Catalog No.	Base unit price
				Type D-L	
0.23	1.8	3	0.9 [0.09]	WR3-5	
0.25	2.3	6	1.8 [0.18]	10	
0.3	4.8	9	2.6 [0.27]	15	
0.3	4.8	12	3.5 [0.36]	20	
0.32	6.8	15	4.4 [0.45]	25	
0.32	6.8	18	5.3 [0.54]	30	
0.35	11.5	21	6.2 [0.63]	35	
0.35	11.5	24	7.1 [0.72]	40	
0.26	1.6	3	0.9 [0.09]	WR4-5	
0.29	2.2	6	1.8 [0.18]	10	
0.32	3.2	9	2.6 [0.27]	15	
0.38	6.5	12	3.5 [0.36]	20	
0.38	6.5	15	4.4 [0.45]	25	
0.4	8.4	18	5.3 [0.54]	30	
0.4	8.4	21	6.2 [0.63]	35	
0.45	15	24	7.1 [0.72]	40	
0.45	15	27	7.9 [0.81]	45	
0.45	15	30	8.8 [0.9]	50	
0.45	15	33	9.7 [0.99]	55	
0.5	23.5	36	10.6 [1.08]	60	
0.5	25	39	11.5 [1.17]	65	
0.5	25	42	12.4 [1.26]	70	
0.3	1.6	3	0.9 [0.09]	WR5-5	
0.35	1.6	6	1.8 [0.18]	10	
0.35	2.8	9	2.6 [0.27]	15	
0.4	4.8	12	3.5 [0.36]	20	
0.45	8	15	4.4 [0.45]	25	
0.45	8	18	5.3 [0.54]	30	
0.5	12.5	21	6.2 [0.63]	35	
0.5	12.5	24	7.1 [0.72]	40	
0.55	17.6	27	7.9 [0.81]	45	
0.55	18	30	8.8 [0.9]	50	
0.55	20	33	9.7 [0.99]	55	
0.55	20	36	10.6 [1.08]	60	
0.55	20.9	39	11.5 [1.2]	65	
0.55	20.9	42	12.4 [1.3]	70	
0.32	1.6	3	0.9 [0.09]	WR6-5	
0.4	3.2	6	1.8 [0.18]	10	
0.4	3.2	9	2.6 [0.27]	15	
0.5	7.5	12	3.5 [0.36]	20	
0.5	7.5	15	4.4 [0.45]	25	
0.5	7.5	18	5.3 [0.54]	30	
0.55	11.5	21	6.2 [0.63]	35	
0.55	11.5	24	7.1 [0.72]	40	
0.6	17.4	27	7.9 [0.81]	45	
0.6	17.4	30	8.8 [0.9]	50	
0.6	17.4	33	9.7 [0.99]	55	
0.6	17.4	36	10.6 [1.08]	60	
0.6	17.4	39	11.5 [1.17]	65	
0.6	17.4	42	12.4 [1.26]	70	
0.65	27.3	48	14.1 [1.4]	80	
0.45	2.7	6	1.8 [0.18]	WR8-10	
0.5	4	9	2.6 [0.27]	15	
0.5	4	12	3.5 [0.36]	20	
0.55	5.8	15	4.4 [0.45]	25	
0.6	8.4	18	5.3 [0.54]	30	
0.6	8.4	21	6.2 [0.63]	35	
0.6	8.4	24	7.1 [0.72]	40	
0.7	16	27	7.9 [0.81]	45	
0.7	16	30	8.8 [0.9]	50	
0.7	16	33	9.7 [0.99]	55	
0.7	16	36	10.6 [1.08]	60	
0.7	16	39	11.5 [1.17]	65	
0.7	16	42	12.4 [1.26]	70	
0.75	22.9	48	14.1 [1.4]	80	

Quotation

● Load calculation method: Load=Spring constant×Deflection
 (SI units) $N=N/\text{mm} \times F/\text{mm}$
 $\text{kgf}=kgf/\text{mm} \times F/\text{mm}$
 $(kgf)=N \times 0.101972$

Neither end is ground for all WR type springs.

The solid height values are for reference only. There may be some variation between lots.

Operation count: 1 million

Instructions and precautions for the use of coil springs P.1008

D12 and D14 are not available for WY type.

2	WY	WR	WF	WL	WT	WM	WH	WB
3				0.5 [0.05]	1.5 [0.15]	2.0 [0.2]	2.9 [0.3]	3.9 [0.4]
4	N/mm 0.1 [0.01]							4.9 [0.5]
5		N/mm 0.3 [0.03]						N/mm 5.9 [0.6]
6			N/mm 0.5 [0.05]					N/mm 9.8 [1.0]
8				N/mm 1.0 [0.1]				
10					N/mm 2.0 [0.2]			
12						N/mm 2.9 [0.3]		
13							N/mm 3.9 [0.4]	
14								N/mm 4.9 [1.5]
16								
18								
20								
22								
27								
Fmax.		F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%

ROUND WIRE COIL SPRINGS

—WF (45% DEFLECTION) • WL (40% DEFLECTION)—



Order

Catalog No.
WF13-60



Days to Ship

Quotation



Price

Quotation

■ WF : Fmax. (maximum allowable deflection) = L × 45%

d	Solid height	F max.	Load N (kgf) max.	Catalog No.	Base unit price
Type D-L					
0.26	2	2.25	1.1 [0.11]	WF3- 5*	
0.32	5	4.5	2.2 [0.22]	10*	
0.32	5	6.7	3.2 [0.33]	15*	
0.35	7	9	4.4 [0.45]	20*	
0.35	7	11.2	5.5 [0.56]	25*	
0.4	13.2	13.5	6.6 [0.67]	30	
0.4	13.2	15.7	7.6 [0.78]	35	
0.4	13.2	18	8.8 [0.9]	40	
0.32	2.3	2.25	1.1 [0.11]	WF4- 5*	
0.35	3.1	4.5	2.2 [0.22]	10*	
0.4	5.6	6.7	3.2 [0.33]	15*	
0.4	5.6	9	4.4 [0.45]	20*	
0.45	9.9	11.2	5.5 [0.56]	25*	
0.45	9.9	13.5	6.6 [0.67]	30*	
0.5	16.5	15.7	7.6 [0.78]	35	
0.5	16.5	18	8.8 [0.9]	40	
0.5	16.5	20	9.8 [1.0]	45	
0.5	16.5	22.5	10.8 [1.1]	50	
0.5	16.5	24.7	12.1 [1.23]	55	
0.5	16.5	27	12.7 [1.3]	60	
0.55	26.4	29.2	14.3 [1.46]	65*	
0.55	26.4	31.5	15.4 [1.58]	70*	
0.35	2	2.25	1.1 [0.11]	WF5- 5*	
0.38	2.8	4.5	2.2 [0.22]	10*	
0.4	3.4	6.7	3.2 [0.33]	15*	
0.45	5.4	9	4.4 [0.45]	20*	
0.5	8.5	11.2	5.5 [0.56]	25*	
0.55	13.2	13.5	6.6 [0.67]	30	
0.55	13.2	15.7	7.6 [0.78]	35	
0.55	20.4	18	8.8 [0.9]	40	
0.6	20.4	20	9.8 [1.0]	45	
0.6	20.4	22.5	10.8 [1.1]	50	
0.6	20.4	24.7	12.1 [1.23]	55	
0.6	20.4	27	12.7 [1.3]	60	
0.6	20.4	29.2	14.3 [1.5]	65	
0.6	20.4	31.5	15.4 [1.6]	70	
0.4	2.3	2.25	1.1 [0.11]	WF6- 5*	
0.5	5	4.5	2.2 [0.22]	10	
0.55	8	6.7	3.2 [0.33]	15	
0.55	8	9	4.4 [0.45]	20	
0.6	12	11.2	5.5 [0.56]	25	
0.65	16	13.5	6.6 [0.67]	30	
0.65	17	15.7	7.6 [0.78]	35	
0.65	17	18	8.8 [0.9]	40	
0.65	17	20	9.8 [1.0]	45	
0.7	25.2	22.5	10.8 [1.1]	50	
0.7	25.2	24.7	12.1 [1.23]	55	
0.7	25.2	27	12.7 [1.3]	60	
0.7	25.2	29.2	14.3 [1.46]	65	
0.7	25.2	31.5	14.7 [1.5]	70	
0.7	25.2	36	17.7 [1.8]	80	
0.6	5	4.5	2.2 [0.22]	WF8- 10	
0.65	7.5	6.7	3.2 [0.33]	15	
0.7	10.8	9	4.4 [0.45]	20	
0.7	10.8	11.2	5.5 [0.56]	25	
0.75	14.5	13.5	6.6 [0.67]	30	
0.75	14.5	15.7	7.6 [0.78]	35	
0.8	20	18	8.8 [0.9]	40	
0.8	20	20	9.8 [1.0]	45	
0.8	20	22.5	10.8 [1.1]	50	
0.8	20	24.7	12.1 [1.23]	55	
0.85	27.6	27	12.7 [1.3]	60	
0.85	27.6	29.2	14.3 [1.46]	65	
0.85	27.6	31.5	14.7 [1.5]	70	
0.85	28.1	36	17.7 [1.8]	80	

Quotation

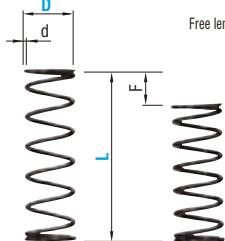
d	Solid height	F max.	Load N (kgf) max.	Catalog No.	Base unit price
Type D-L					
0.65	5	4.5	2.2 [0.22]	WF10- 10	
0.65	5	6.7	3.2 [0.33]	15	
0.8	10.4	9	4.4 [0.45]	20	
0.8	10.4	11.2	5.5 [0.56]	25	
0.85	14	13.5	6.6 [0.67]	30	
0.85	14	15.7	7.6 [0.78]	35	
0.9	17.5	18	8.8 [0.9]	40	
0.9	17.5	20	9.8 [1.0]	45	
0.9	17.5	22.5	10.8 [1.1]	50	
0.9	17.5	24.7	12.1 [1.23]	55	
1.0	31	27	12.7 [1.3]	60	
1.0	31	29.2	14.3 [1.46]	65	
1.0	31	31.5	14.7 [1.5]	70	
1.0	31	36	17.7 [1.8]	80	
0.7	4.6	4.5	2.3 [0.23]	WF12- 10	
0.7	4.6	6.7	3.2 [0.33]	15	
0.8	7.2	9	4.4 [0.45]	20	
0.8	7.2	11.2	5.5 [0.56]	25	
0.9	11.3	13.5	6.6 [0.67]	30	
0.9	11.3	15.7	7.6 [0.78]	35	
0.9	11.3	18	8.8 [0.9]	40	
0.9	11.3	20	9.8 [1.0]	45	
1.0	18	22.5	10.8 [1.1]	50	
1.0	18	24.7	12.1 [1.23]	55	
1.0	18	27	12.7 [1.3]	60	
1.0	18	29.2	14.3 [1.46]	65	
1.1	28.1	31.5	14.7 [1.5]	70	
1.1	27.5	36	17.7 [1.8]	80	
0.75	4.9	4.5	2.3 [0.23]	WF13- 10	
0.8	6	6.7	3.2 [0.33]	15	
0.8	6	9	4.4 [0.45]	20	
0.85	7.2	11.2	5.5 [0.56]	25	
1.0	15	13.5	6.6 [0.67]	30	
1.0	15	15.7	7.6 [0.78]	35	
1.0	15	18	8.8 [0.9]	40	
1.0	15	20	9.8 [1.0]	45	
1.0	15	22.5	10.8 [1.1]	50	
1.1	22	24.7	12.1 [1.23]	55	
1.1	22	27	12.7 [1.3]	60	
1.1	22	29.2	14.3 [1.46]	65	
1.1	22	31.5	14.7 [1.5]	70	
1.1	22	36	17.7 [1.8]	80	
1.2	33.6	40.5	19.9 [2.0]	90	
0.8	5.2	6.7	3.2 [0.33]	WF14- 15	
0.9	7.9	9	4.4 [0.45]	20	
0.9	7.9	11.2	5.5 [0.56]	25	
1.0	12	13.5	6.6 [0.67]	30	
1.0	12	15.7	7.6 [0.78]	35	
1.0	12	18	8.8 [0.9]	40	
1.0	12	20	9.8 [1.0]	45	
1.1	18.2	22.5	10.8 [1.1]	50	
1.1	18.2	24.7	12.1 [1.23]	55	
1.1	18.2	27	12.7 [1.3]	60	
1.2	27.6	29.2	14.3 [1.46]	65	
1.2	27.6	31.5	14.7 [1.5]	70	
1.2	27.6	36	17.7 [1.8]	80	
1.3	39.7	40.5	19.9 [2.0]	90	

Quotation

d	Solid height	F max.	Load N (kgf) max.	Catalog No.	Base unit price
Type D-L					
0.9	6.3	6.7	3.2 [0.33]	WF16- 15	
1.0	8.7	9	4.4 [0.45]	20	
1.0	8.7	11.2	5.5 [0.56]	25	
1.1	12.8	13.5	6.6 [0.67]	30	
1.1	12.8	15.7	7.6 [0.78]	35	
1.2	18.6	18	8.8 [0.9]	40	
1.2	18.6	20	9.8 [1.0]	45	
1.2	18.6	22.5	10.8 [1.1]	50	
1.2	18.6	24.7	12.1 [1.23]	55	
1.3	26.8	27	12.7 [1.3]	60	
1.3	26.8	29.2	14.3 [1.46]	65	
1.3	26.8	31.5	14.7 [1.5]	70	
1.4	36	36	17.7 [1.8]	80	
1.4	36.4	40.5	19.9 [2.0]	90	
1.2	9	9	8.8 [0.9]	WF18- 20	
1.3	12.4	11.2	10.8 [1.1]	25	
1.3	12.4	13.5	12.7 [1.3]	30	
1.4	16.1	15.7	14.7 [1.5]	35	
1.5	21	18	17.7 [1.8]	40	
1.5	21	20	19.9 [2.03]	45	
1.5	21	22.5	22.1 [2.25]	50	
1.6	28.8	24.7	24.3 [2.48]	55	
1.6	28.8	27	26.5 [2.7]	60	
1.6	28.8	29.2	28.7 [2.93]	65	
1.7	28.1	31.5	30.9 [3.15]	70	
1.7	28.1	36	35.3 [3.6]	80	
1.3	7.8	9	8.8 [0.9]	WF20- 20	
1.4	10.5	11.2	11.0 [1.12]	25	
1.4	10.5	13.5	13.2 [1.35]	30	
1.5	13.5	15.7	15.4 [1.57]	35	
1.5	13.5	18	17.7 [1.8]	40	
1.7	22.1	20.2	19.8 [2.02]	45	
1.7	22.1	22.5	22.1 [2.25]	50	
1.7	22.1	24.7	24.2 [2.47]	55	
1.8	28.8	27	26.5 [2.7]	60	
1.8	28.8	29.2	28.6 [2.92]	65	
1.8	28.8	31.5	30.9 [3.15]	70	
1.8	28.8	36	35.3 [3.6]	80	
1.7	14.1	13.5	13.2 [1.35]	WF27- 30	
1.7	14.1	15.7	15.4 [1.57]	35	
1.7	14.1	18	17.7 [1.8]	40	
1.9	21.4	20.2	19.8 [2.02]	45	
1.9	21.4	22.5	22.1 [2.25]	50	
2.0	26	24.7	24.2 [2.47]	55	
2.0	26	27	26.5 [2.7]	60	
2.0	26	29.2	28.6 [2.92]	65	
2.0	26	31.5	30.9 [3.15]	70	
2.0	26	36	35.3 [3.6]	80	

Quotation

- Load calculation method: Load = Spring constant × Deflection
(SI units) N = N/mm × Fmm
kgf = kgf/mm × Fmm
(kgf = N × 10.1972)
- No grinding on either end of WF types marked with *.
- The solid height values are for reference only.
There may be some variation between lots.
- Operation count: 1 million
- Instructions and precautions for the use of coil springs

WF
WL

Spring constant ±10%
Outer dia. D ϕ 10 or less 0.5 mm
 ϕ 12 or more 0.6 mm
Free length L 50 or less ±1.5 mm
55 or more ±2.5 mm
(WL : ±2mm)

RoHS

SWP-A

■ Spring constant

Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5 [0.05]		1.5 [0.15]	2.0 [0.2]	3.9 [0.4] 4.9 [0.5]
3	N/mm 0.1 (kgf/mm) [0.01]						N/mm 5.9 (kgf/mm) [0.6]	N/mm 9.8 (kgf/mm) [1.0]
4				N/mm 0.3 (kgf/mm) [0.03]	N/mm 0.5 (kgf/mm) [0.05]	N/mm 1.0 (kgf/mm) [0.1]	N/mm 2.0 (kgf/mm) [0.2]	N/mm 8.8 (kgf/mm) [1.0]
5							N/mm 2.9 (kgf/mm) [0.3]	N/mm 14.7 (kgf/mm) [1.5]
6								N/mm 19.6 (kgf/mm) [2.0]
8								N/mm 29.4 (kgf/mm) [2.0]
10								
12								
13								
14								
16								
18								
20								
22								
27								

Fmax. F=L×75% F=L×80% F=L×45% F=L×40% F=L×40% F=L×35% F=L×30% F=L×25%

■ WL : Fmax. (maximum allowable deflection) = L×40%

d	Solid height	F max.	Load N (kgf) max.	Catalog No. Type D-L	Base unit price
0.2	1.7	2	0.98 [0.1]	WL2-5*	
0.26	5.2	4	2.0 [0.2]	10*	
0.26	5.2	6	2.9 [0.3]	15*	
0.29	9	8	3.9 [0.4]	20*	
0.29	9	10	4.9 [0.5]	25*	
0.3	10.8	12	5.9 [0.6]	30*	
0.3	2.1	2	2.0 [0.2]	WL3-5*	
0.35	3.9	4	3.9 [0.4]	10*	
0.4	6.5	6	5.9 [0.6]	15*	
0.4	6.5	8	7.8 [0.8]	20*	
0.45	13	10	9.8 [1.0]	25*	
0.45	13	12	11.8 [1.2]	30*	
0.45	13	14	13.7 [1.4]	35*	
0.5	21	16	15.7 [1.6]	40*	
0.35	2.1	2	2.0 [0.2]	WL4-5*	
0.45	5	4	3.9 [0.4]	10*	
0.45	5	6	5.9 [0.6]	15*	
0.5	9	8	7.8 [0.8]	20*	
0.5	9	10	9.8 [1.0]	25*	
0.55	13.9	12	11.8 [1.2]	30*	
0.55	13.9	14	13.7 [1.4]	35*	
0.6	21.6	16	15.7 [1.6]	40*	
0.6	21.6	18	17.7 [1.8]	45*	
0.6	21.6	20	19.6 [2.0]	50*	
0.6	21.6	22	21.6 [2.2]	55*	
0.65	33	24	23.5 [2.4]	60*	
0.4	2.3	2	2.0 [0.2]	WL5-5*	
0.45	3.4	4	3.9 [0.4]	10*	
0.5	6	5.9 [0.6]	15*		
0.55	7.7	8	7.8 [0.8]	20*	
0.6	10.8	10	9.8 [1.0]	25*	
0.6	10.8	12	11.8 [1.2]	30*	
0.65	15.6	14	13.7 [1.4]	35*	
0.65	15.6	16	15.7 [1.6]	40*	
0.7	20	18	17.7 [1.8]	45*	
0.7	20	20	19.6 [2.0]	50*	
0.7	23.1	22	21.6 [2.2]	55*	
0.75	33	24	23.5 [2.4]	60*	
0.75	32.3	26	25.5 [2.6]	65*	
0.75	32.3	28	27.5 [2.8]	70*	
0.45	2.5	2	2.0 [0.2]	WL6-5*	
0.55	4.7	4	3.9 [0.4]	10	
0.55	4.7	6	5.9 [0.6]	15	
0.65	9	8	7.8 [0.8]	20	
0.65	9	10	9.8 [1.0]	25	
0.7	13.7	12	11.8 [1.2]	30	
0.7	13.7	14	13.7 [1.4]	35	
0.7	13.7	16	15.7 [1.6]	40	
0.75	18.9	18	17.7 [1.8]	45	
0.75	18.9	20	19.6 [2.0]	50	
0.75	18.9	22	21.6 [2.2]	55	
0.8	26.4	24	23.5 [2.4]	60	
0.8	26.4	26	25.5 [2.6]	65	
0.85	30.6	28	27.5 [2.8]	70	
0.85	34.9	32	31.4 [3.2]	80	

● Load calculation method: Load=Spring constant×Deflection

(SI units) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

? No grinding on either end of WL types marked with *.

? The solid height values are for reference only.

There may be some variation between lots.

? Operation count: 1 million

? Instructions and precautions for the use of coil springs P.1008

Quotation

Quotation

■ Spring constant

Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5 [0.05]		1.5 [0.15]	2.0 [0.2]	3.9 [0.4] 4.9 [0.5]
3	N/mm 0.1 (kgf/mm) [0.01]						N/mm 5.9 (kgf/mm) [0.6]	N/mm 9.8 (kgf/mm) [1.0]
4				N/mm 0.3 (kgf/mm) [0.03]	N/mm 0.5 (kgf/mm) [0.05]	N/mm 1.0 (kgf/mm) [0.1]	N/mm 2.0 (kgf/mm) [0.2]	N/mm 8.8 (kgf/mm) [1.0]
5							N/mm 2.9 (kgf/mm) [0.3]	N/mm 14.7 (kgf/mm) [1.5]
6								N/mm 19.6 (kgf/mm) [2.0]
8								N/mm 29.4 (kgf/mm) [2.0]
10								
12								
13								
14								
16								
18								
20								
22								
27								

WL10-10
WL12-10
WL13-10
WL14-15WL16-15
WL18-20
WL20-20
WL22-20
WL27-30

Quotation

ROUND WIRE COIL SPRINGS

—WT (40% DEFLECTION) • WM (35% DEFLECTION)—



Order

Catalog No.
WT13-60



Days to Ship

Quotation



Price

Quotation

WT : Fmax. (Maximum allowable deflection) = L×40% (L×35%)

d	Solid height	F max.	Load N [kgf] max.	Catalog No.	Base unit price	Type D-L
0.3	1.73	2	2.9 [0.3]	WT3-5*		
0.4	5	4	5.9 [0.6]	10*		
0.45	8.78	6	8.8 [0.9]	15*		
0.45	8.78	8	11.8 [1.2]	20*		
0.5	14.5	10	14.7 [1.5]	25*		
0.4	2.7	2	2.9 [0.3]	WT4-5*		
0.4	2.7	4	5.9 [0.6]	10*		
0.5	6.5	6	8.8 [0.9]	15*		
0.55	9.63	8	11.8 [1.2]	20		
0.55	9.63	10	14.7 [1.5]	25		
0.6	15	12	17.7 [1.8]	30		
0.6	15	14	20.6 [2.1]	35		
0.65	22.1	16	23.5 [2.4]	40		
0.45	2.36	2	3.9 [0.4]	WT5-5*		
0.5	3.25	4	7.8 [0.8]	10*		
0.6	6.3	6	11.8 [1.2]	15		
0.6	6.3	8	15.7 [1.6]	20		
0.7	12.6	10	19.6 [2.0]	25		
0.7	12.6	12	23.5 [2.4]	30		
0.75	17.3	14	27.5 [2.8]	35		
0.75	17.3	14	27.5 [2.8]	(40)		
0.8	24	15.8	30.9 [3.2]	(45)		
0.8	24	17.5	34.3 [3.5]	(50)		
0.85	32.3	19.3	37.8 [3.9]	(55)		
0.85	32.3	21	41.2 [4.2]	(60)		
0.85	34	22.7	44.5 [4.5]	(65)		
0.9	44.6	24.5	48.1 [4.9]	(70)		
0.5	2.38	2	3.9 [0.4]	WT6-5*		
0.6	4.35	4	7.8 [0.8]	10		
0.6	4.35	6	11.8 [1.2]	15		
0.7	7.7	8	15.7 [1.6]	20		
0.7	7.7	10	19.6 [2.0]	25		
0.8	14	12	23.5 [2.4]	30		
0.8	14	14	27.5 [2.8]	35		
0.85	18.7	16	31.4 [3.2]	40		
0.85	18.7	18	35.3 [3.6]	45		
0.9	24.8	20	39.2 [4.0]	50		
0.9	24.8	19	37.8 [3.9]	(55)		
0.9	24.8	21	41.2 [4.2]	(60)		
0.9	26.1	22.7	44.5 [4.5]	(65)		
1	43	24.5	48.1 [4.9]	(70)		
1	43	28	54.9 [5.6]	(80)		

● Load calculation method: Load=Spring constant×Deflection

(SI units) N=N/mm×Fmm
kgf=kgf/mm×Fmm
(kgf=N×0.101972)

① Maximum allowable deflection for size (L)

WT5-40 Fmax.=L×35%

WT5-45 Fmax.=L×35%

WT5-50 Fmax.=L×35%

WT5-55 Fmax.=L×35%

WT5-60 Fmax.=L×35%

WT5-65 Fmax.=L×35%

WT5-70 Fmax.=L×35%

WT6-55 Fmax.=L×35%

WT6-60 Fmax.=L×35%

WT6-65 Fmax.=L×35%

WT6-70 Fmax.=L×35%

WT6-80 Fmax.=L×35%

② No grinding on either end of WT types marked with *.

d	Solid height	F max.	Load N [kgf] max.	Catalog No.	Base unit price	Type D-L
0.7	4.38	4	7.8 [0.8]	WT8-10		
0.8	6.8	6	11.8 [1.2]	15		
0.8	6.8	8	15.7 [1.6]	20		
0.8	6.8	10	19.6 [2.0]	25		
0.9	10.8	12	23.5 [2.4]	30		
0.9	10.8	14	27.5 [2.8]	35		
1	17.5	16	31.4 [3.2]	40		
1	17.5	18	35.3 [3.6]	45		
1	17.5	20	39.2 [4.0]	50		
1.1	27.5	22	43.1 [4.4]	55		
1.1	27.5	24	47.1 [4.8]	60		
1.1	27.5	26	51.0 [5.2]	65		
1.1	27.5	28	54.9 [5.6]	70		
1.2	42	32	62.8 [6.4]	80		
0.85	5.53	4	7.8 [0.8]	WT10-10		
0.9	6.75	6	11.8 [1.2]	15		
0.9	6.75	8	15.7 [1.6]	20		
1	10	10	19.6 [2.0]	25		
1	10	12	23.5 [2.4]	30		
1	10	14	27.5 [2.8]	35		
1	10	16	31.4 [3.2]	40		
1.1	14.3	18	35.3 [3.6]	45		
1.1	14.3	20	39.2 [4.0]	50		
1.2	21.6	22	43.1 [4.4]	55		
1.2	21.6	24	47.1 [4.8]	60		
1.2	21.6	26	51.0 [5.2]	65		
1.3	32.5	28	54.9 [5.6]	70		
1.3	32.5	32	62.8 [6.4]	80		
1	6	6	11.8 [1.2]	WT13-15		
1.1	8.25	8	15.7 [1.6]	20		
1.1	8.25	10	19.6 [2.0]	25		
1.2	11.1	12	23.5 [2.4]	30		
1.2	11.1	14	27.5 [2.8]	35		
1.2	11.1	16	31.4 [3.2]	40		
1.2	11.1	18	35.3 [3.6]	45		
1.3	15.6	20	39.2 [4.0]	50		
1.3	15.6	22	43.1 [4.4]	55		
1.3	15.6	24	47.1 [4.8]	60		
1.4	21	26	51.0 [5.2]	65		
1.4	21	28	54.9 [5.6]	70		
1.4	21	32	62.8 [6.4]	80		
1.2	7.5	6	11.8 [1.2]	WT16-15		
1.3	9.43	8	15.7 [1.6]	20		
1.4	12.6	10	19.6 [2.0]	25		
1.4	12.6	12	23.5 [2.4]	30		
1.4	12.6	14	27.5 [2.8]	35		
1.4	12.6	16	31.4 [3.2]	40		
1.6	22.4	18	35.3 [3.6]	45		
1.6	22.4	20	39.2 [4.0]	50		
1.6	22.4	22	43.1 [4.4]	55		
1.7	28.9	24	47.1 [4.8]	60		
1.7	28.9	26	51.0 [5.2]	65		
1.7	28.9	28	54.9 [5.6]	70		
1.7	28.9	32	62.8 [6.4]	80		

d	Solid height	F max.	Load N [kgf] max.	Catalog No.	Base unit price	Type D-L
1.6	10.8	8	31.4 [3.2]	WT18-20		
1.7	13.6	10	39.2 [4.0]	25		
1.7	13.6	12	47.1 [4.8]	30		
1.7	13.6	14	54.9 [5.6]	35		
1.8	16.7	16	62.8 [6.4]	40		
1.9	20.5	18	70.6 [7.2]	45		
1.9	20.5	20	78.5 [8.0]	50		
2	26	22	86.3 [8.8]	55		
2	26	24	94.1 [9.6]	60		
2	26	26	102.0 [10.4]	65		
2	26	28	109.8 [11.2]	70		
2.1	31.5	32	125.5 [12.8]	80		
1.8	11.3	8	31.4 [3.2]	WT22-20		
1.8	11.3	10	39.2 [4.0]	25		
1.9	13.3	12	47.1 [4.8]	30		
1.9	13.3	14	54.9 [5.6]	35		
2	16	16	62.8 [6.4]	40		
2.1	19.5	18	70.6 [7.2]	45		
2.1	19.5	20	78.5 [8.0]	50		
2.3	28.2	22	86.3 [8.8]	55		
2.3	28.2	24	94.1 [9.6]	60		
2.3	28.2	26	102.0 [10.4]	65		
2.3	28.2	28	109.8 [11.2]	70		
2.4	33.6	32	125.5 [12.8]	80		
2.1	13.2	12	47.1 [4.8]	WT27-30		
2.3	17.9	14	54.9 [5.6]	35		
2.3	17.9	16	62.8 [6.4]	40		
2.4	20.4	18	70.6 [7.2]	45		
2.6	28.6	20	78.5 [8.0]	50		
2.6	28.6	22	86.3 [8.8]	55		
2.6	28.6	24	94.1 [9.6]	60		
2.6	28.6	26	102.0 [10.4]	65		
2.8	39.2	28	109.8 [11.2]	70		
2.8	39.2	32	125.5 [12.8]	80		

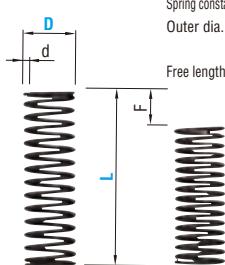
③ The solid height values are for reference only.

There may be some variation between lots.

④ Operation count: 1 million

⑤ Instructions and precautions for the use of coil springs P.1008

Quotation

WT
WM

Spring constant $\pm 10\%$
Outer dia. D $\phi 10$ or less...
 $\phi 12$ or more...
Free length L 50 or less $\pm 1.5\text{mm}$
55 or more $\pm 2\text{mm}$

RoHS

M SWP-A

■ Spring constant

Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5 [0.05]	1.5 [0.15]	2.0 [0.2]	2.9 [0.3]	3.9 [0.4] 4.9 [0.5]
3	N/mm 0.1 (kgf/mm) [0.01]						N/mm 5.9 (kgf/mm) [1.0]	N/mm 9.8 (kgf/mm) [1.0]
4				N/mm 0.3 (kgf/mm) [0.03]	N/mm 0.5 (kgf/mm) [0.05]	N/mm 1.0 (kgf/mm) [0.1]	N/mm 2.0 (kgf/mm) [0.2]	N/mm 5.6 (kgf/mm) [2.0]
5							N/mm 14.7 (kgf/mm) [1.5]	29.4 [3.0]
6								N/mm 22.4 (kgf/mm) [3.0]
8								
10	N/mm 0.2 (kgf/mm) [0.02]							
12								
13								
14								
16								
18								
20								
22								
27								
Fmax.	F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

■ WM : Fmax. (Maximum allowable deflection) = L×35%

d	Solid height	F max.	Load N (kgf) max.	Catalog No. Type D-L	Base unit price
0.35	2.5	1.8	3.4 [0.4]	WM3- 5*	
0.38	3.3	3.5	6.9 [0.7]	10*	
0.45	7	5.3	10.3 [1.1]	15*	
0.5	11.5	7	13.7 [1.4]	20*	
0.5	11.5	7.5	14.7 [1.5]	(25)	
0.55	20.4	9	17.7 [1.8]	(30)	
0.4	2.3	1.7	3.9 [0.4]	WM4- 5*	
0.45	3.4	3.5	6.9 [0.7]	10*	
0.5	5.1	5.2	10.8 [1.1]	15*	
0.55	7.7	7	13.7 [1.4]	20	
0.6	11.7	8.7	17.7 [1.8]	25	
0.6	11.7	10.5	20.6 [2.1]	30	
0.65	17.6	12.2	24.0 [2.5]	35	
0.65	17.6	12	23.5 [2.4]	(40)	
0.5	2.8	1.7	4.9 [0.5]	WM5- 5*	
0.6	4.2	3.5	9.8 [1.0]	10	
0.65	6.5	5.2	14.7 [1.5]	15	
0.65	6.5	7	20.6 [2.1]	20	
0.7	9.1	8.7	25.5 [2.6]	25	
0.75	12.7	10.5	30.4 [3.1]	30	
0.8	17.4	12.2	35.3 [3.6]	35	
0.85	23.8	14	41.2 [4.2]	40	
0.85	23.8	15.8	46.1 [4.7]	45	
0.9	23.8	15	43.5 [4.5]	(50)	
0.9	30	16.5	49.0 [5.0]	(55)	
0.9	30	18	53.0 [5.4]	(60)	
0.9	30	17.6	52.0 [5.3]	(65)	
0.9	30	19.6	58.8 [6.0]	(70)	
0.55	2.8	1.7	4.9 [0.5]	WM6- 5*	
0.65	4.7	3.5	9.8 [1.0]	10	
0.75	8	5.2	14.7 [1.5]	15	
0.75	8	7	20.6 [2.1]	20	
0.85	13.6	8.7	25.5 [2.6]	25	
0.85	13.6	10.5	30.4 [3.1]	30	
0.9	18	12.2	35.3 [3.6]	35	
0.9	18	14	41.2 [4.2]	40	
0.9	18	15.8	46.1 [4.7]	45	
0.85	18	17.5	51.0 [5.2]	50	
1.0	31	19.2	55.9 [5.7]	55	
1.0	31	18	53.0 [5.4]	(60)	
1.0	31	18.8	54.9 [5.6]	(65)	
1.1	47.3	20	58.8 [6.0]	(70)	
1.1	48.4	22.4	65.9 [6.7]	(80)	
0.75	4.2	3.5	9.8 [1.0]	WM8- 10	
0.9	8.5	5.2	14.7 [1.5]	15	
0.9	8.5	7	20.6 [2.1]	20	
0.9	8.5	8.7	25.5 [2.6]	25	
0.9	8.5	10.5	30.4 [3.1]	30	
1.0	13	12.2	35.3 [3.6]	35	
1.0	13	14	41.2 [4.2]	40	
1.1	19.8	15.8	46.1 [4.7]	45	
1.1	19.8	17.5	51.0 [5.2]	50	
1.2	31.2	19.2	55.9 [5.7]	55	
1.2	31.2	21	61.8 [6.3]	60	
1.2	31.2	22.7	64.7 [6.6]	65	
1.2	31.2	24.5	71.6 [7.3]	70	
1.3	44.2	28	82.4 [8.4]	80	

Quotation

● Load calculation method: Load=Spring constant×Deflection

(SI units) N=N/mm×Fmm

kgf=kgf/mm×Fmm

(kgf=N×0.101972)

○ The solid height values are for reference only.

There may be some variation between lots.

○ Operation count: 1 million

○ Instructions and precautions for the use of coil springs P.1008

○ Maximum allowable deflection for size (L)

Type	WY	WR	WF	WL	WT	WM	WH	WB
2				0.5 [0.05]	1.5 [0.15]	2.0 [0.2]	2.9 [0.3]	3.9 [0.4] 4.9 [0.5]
3	N/mm 0.1 (kgf/mm) [0.01]						N/mm 5.9 (kgf/mm) [1.0]	N/mm 9.8 (kgf/mm) [1.0]
4				N/mm 0.3 (kgf/mm) [0.03]	N/mm 0.5 (kgf/mm) [0.05]	N/mm 1.0 (kgf/mm) [0.1]	N/mm 2.0 (kgf/mm) [0.2]	N/mm 5.6 (kgf/mm) [2.0]
5							N/mm 14.7 (kgf/mm) [1.5]	29.4 [3.0]
6								
8								
10								
12								
13								
14								
16								
18								
20								
22								
27								
Fmax.	F=L×75%	F=L×60%	F=L×45%	F=L×40%	F=L×40%	F=L×35%	F=L×30%	F=L×25%

○ No grinding on either end of WM types marked with *

ROUND WIRE COIL SPRINGS

—WH(30% DEFLECTION) • WB(25% DEFLECTION)—



Order

Catalog No.
WH13-60



Days to Ship

Quotation



Price

Quotation

■ WH : Fmax. (Maximum allowable deflection) = L × 30%

d	Solid height max.	F max.	Load N (kgf) max.	Catalog No.	Base unit price
Type D-L					
0.45	2.7	1.5	4.9 [0.5]	WH4 - 5*	
0.45	2.7	3	8.8 [0.9]	10*	
0.55	5.8	4.5	13.7 [1.4]	15	
0.6	8.4	6	17.7 [1.8]	20	
0.65	12.4	7.5	22.6 [2.3]	25	
0.65	12.4	9	26.5 [2.7]	30	
0.6	3.3	1.5	8.8 [0.9]	WH5 - 5*	
0.7	5.5	3	17.7 [1.8]	10	
0.75	7.5	4.5	26.5 [2.7]	15	
0.75	7.5	6	35.3 [3.6]	20	
0.85	13.6	7.5	44.1 [4.5]	25	
0.85	13.6	7.5	44.3 [4.5]	(30)	
0.9	17.1	8.8	51.6 [5.3]	(35)	
0.9	17.1	8.8	51.9 [5.3]	(40)	
0.65	3.3	1.5	8.8 [0.9]	WH6 - 5*	
0.75	5.2	3	17.7 [1.8]	10	
0.8	6.4	4.5	26.5 [2.7]	15	
0.9	9.9	6	35.3 [3.6]	20	
0.9	9.9	7.5	44.1 [4.5]	25	
1.0	16	9	53.0 [5.4]	30	
1.0	16	10.5	61.8 [6.3]	35	
1.1	25	12	70.6 [7.2]	40	
1.1	25	13.3	66.7 [6.8]	(45)	
1.2	39.6	10	58.8 [6.0]	(50)	
1.2	39.6	14.5	85.3 [8.7]	(55)	
1.2	39.6	14	82.4 [8.4]	(60)	
1.2	39.6	14	82.4 [8.4]	(65)	
1.2	39.6	15	88.3 [9.0]	(70)	
0.9	5.4	3	17.7 [1.8]	WH8 - 10	
1.0	8	4.5	26.5 [2.7]	15	
1.1	11.5	6	35.3 [3.6]	20	
1.1	11.5	7.5	44.1 [4.5]	25	
1.2	16.8	9	53.0 [5.4]	30	
1.2	16.8	10.5	61.8 [6.3]	35	
1.2	16.8	12	70.6 [7.2]	40	
1.3	24.7	13.5	79.4 [8.1]	45	
1.3	24.7	15	88.3 [9.0]	50	
1.4	35	16.5	97.1 [9.9]	55	
1.4	35	18	105.9 [10.8]	60	
1.4	35	17	100.0 [10.2]	(65)	
1.4	35	19	111.8 [11.4]	(70)	
1.0	5.4	3	17.7 [1.8]	WH10 - 10	
1.1	7	4.5	26.5 [2.7]	15	
1.2	9.6	6	35.3 [3.6]	20	
1.2	9.6	7.5	44.1 [4.5]	25	
1.3	13.9	9	53.0 [5.4]	30	
1.4	18	10.5	61.8 [6.3]	35	
1.4	18	12	70.6 [7.2]	40	
1.5	25	13.5	79.4 [8.1]	45	
1.5	25	15	88.3 [9.0]	50	
1.5	25	16.5	97.1 [9.9]	55	
1.5	25	18	105.9 [10.8]	60	
1.6	35	19.5	114.7 [11.7]	65	
1.6	35	21	123.6 [12.6]	70	
1.7	45.9	24	141.0 [14.4]	80	

Quotation

d	Solid height max.	F max.	Load N (kgf) max.	Catalog No.	Base unit price
Type D-L					
1.2	6.9	3	17.7 [1.8]	WH12 - 10	
1.3	9.1	4.5	26.5 [2.7]	15	
1.3	9.1	6	35.3 [3.6]	20	
1.3	9.1	7.5	44.1 [4.5]	25	
1.4	11.9	9	53.0 [5.4]	30	
1.4	11.9	10.5	61.8 [6.3]	35	
1.5	15.4	12	70.6 [7.2]	40	
1.5	15.4	13.5	79.4 [8.1]	45	
1.6	20.4	15	88.3 [9.0]	50	
1.6	20.4	16.5	97.1 [9.9]	55	
1.7	26.8	18	105.9 [10.8]	60	
1.7	26.8	19.5	114.7 [11.7]	65	
1.8	35.1	21	123.6 [12.6]	70	
1.9	45.6	24	141.0 [14.4]	80	
1.3	6.2	3	29.4 [3.0]	WH13 - 10	
1.5	9.3	4.5	44.1 [4.5]	15	
1.6	12.3	6	58.8 [6.0]	20	
1.6	12.3	7.5	73.5 [7.5]	25	
1.7	15	9	88.3 [9.0]	30	
1.7	15	10.5	103.0 [10.5]	35	
1.8	19	12	117.7 [12.0]	40	
1.9	25	13.5	132.4 [13.5]	45	
1.9	25	15	147.1 [15.0]	50	
2.0	30	16.5	161.8 [16.5]	55	
2.0	30	18	176.5 [18.0]	60	
2.1	39	19.5	191.2 [19.5]	65	
2.1	39	21	205.9 [21.0]	70	
2.1	39	24	235.4 [24.0]	80	
1.6	10.4	4.5	44.1 [4.5]	WH14 - 15	
1.6	10.4	6	58.8 [6.0]	20	
1.6	10.4	7.5	73.5 [7.5]	25	
1.7	12.8	9	88.3 [9.0]	30	
1.7	12.8	10.5	103.0 [10.5]	35	
1.9	20	12	117.7 [12.0]	40	
1.9	20	13.5	132.4 [13.5]	45	
2.1	30.5	15	147.1 [15.0]	50	
2.1	30.5	16.5	161.8 [16.5]	55	
2.1	30.5	18	176.5 [18.0]	60	
2.2	37.4	19.5	191.2 [19.5]	65	
2.2	37.4	21	205.9 [21.0]	70	
2.3	47.2	24	235.4 [24.0]	80	
1.7	10.2	4.5	44.1 [4.5]	WH16 - 15	
1.8	12.6	6	58.8 [6.0]	20	
1.9	14.5	7.5	73.5 [7.5]	25	
1.9	14.5	9	88.3 [9.0]	30	
2.0	18	10.5	103.0 [10.5]	35	
2.1	21	12	117.7 [12.0]	40	
2.2	26	13.5	132.4 [13.5]	45	
2.2	26	15	147.1 [15.0]	50	
2.2	26	16.5	161.8 [16.5]	55	
2.3	32	18	176.5 [18.0]	60	
2.3	32	19.5	191.2 [19.5]	65	
2.4	38	21	205.9 [21.0]	70	
2.5	47.5	24	235.4 [24.0]	80	

Quotation

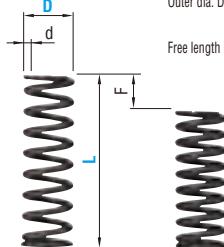
d	Solid height max.	F max.	Load N (kgf) max.	Catalog No.	Base unit price
Type D-L					
2.1	12.6	6	88.3 [9.0]	WH18 - 20	
2.2	15.4	7.5	109.8 [11.2]	25	
2.2	15.4	9	132.4 [13.5]	30	
2.3	18.4	10.5	154.0 [15.7]	35	
2.4	21.6	12	176.5 [18.0]	40	
2.5	25	13.5	199.1 [20.3]	45	
2.5	25	15	220.6 [22.5]	50	
2.6	30	16.5	242.2 [24.7]	55	
2.6	30	18	264.8 [27.0]	60	
2.8	42	19.5	286.4 [29.2]	65	
2.8	42	21	308.9 [31.5]	70	
2.9	49.3	24	353.0 [36.0]	80	
3.0	57	26.1	397.2 [40.5]	(90)	
3.0	57	24	441.3 [45.0]	(100)	
2.2	12.7	6	88.3 [9.0]	WH20 - 20	
2.3	15	7.5	109.8 [11.2]	25	
2.3	15	9	132.4 [13.5]	30	
2.5	20	10.5	154.0 [15.7]	35	
2.5	20	12	176.5 [18.0]	40	
2.5	20	13.5	199.1 [20.3]	45	
2.6	22.8	15	220.6 [22.5]	50	
2.6	22.8	16.5	242.2 [24.7]	55	
2.8	30.8	18	264.8 [27.0]	60	
2.8	30.8	19.5	286.4 [29.2]	65	
3.0	42	21	308.9 [31.5]	70	
3.0	42	24	353.0 [36.0]	80	
3.2	56.8	27	397.2 [40.5]	90	
3.2	56.8	30	441.3 [45.0]	100	
2.3	12.7	6	88.3 [9.0]	WH22 - 20	
2.5	16.7	7.5	109.8 [11.2]	25	
2.5	16.7	9	132.4 [13.5]	30	
2.6	18.2	10.5	154.0 [15.7]	35	
2.8	25	12	176.5 [18.0]	40	
2.8	25	13.5	199.1 [20.3]	45	
3.0	33	16.5	220.6 [22.5]	50	
3.0	33	18	242.2 [24.7]	55	
3.0	33	19.5	264.8 [27.0]	60	
3.0	33	21	286.4 [29.2]	65	
3.2	43	21	308.9 [31.5]	70	
3.2	43	24	353.0 [36.0]	80	
3.2	43	26.1	397.2 [40.5]	(90)	
3.5	64.4	26	441.3 [45.0]	(100)	
2.8	16.8	9	132.4 [13.5]	WH27 - 30	
2.8	16.8	10.5	154.0 [15.7]	35	
2.9	18.8	12	176.5 [18.0]	40	
2.9	19.4	13.5	199.1 [20.3]	45	
3.2	25.5	15	220.6 [22.5]	50	
3.2	25.5	16.5	242.2 [24.7]	55	
3.5	35.5	18	264.8 [27.0]	60	
3.5	35.5	19.5	286.4 [29.2]	65	
3.5	35.5	21	308.9 [31.5]	70	
3.5	35.5	24	353.0 [36.0]	80	
3.5	35.5	27	397.2 [40.5]	90	
4.0	68	30	441.3 [45.0]	100	

Quotation

- Load calculation method: Load = Spring constant × Deflection
- (SI units) $N = l/mm \times Fmm$
 $kgf = kgf/mm \times Fmm$
 $(kgf = N \times 0.101972)$
- The solid height values are for reference only.
 There may be some variation between lots.
- Operation count: 1 million
- Instructions and precautions for the use of coil springs P.1008

- Maximum allowable deflection for size (L)
- WH5-30 Fmax. = L × 25%
- WH5-35 Fmax. = L × 25%
- WH5-40 Fmax. = L × 22%
- WH6-45 Fmax. = L × 25%
- WH6-50 Fmax. = L × 20%
- WH8-55 Fmax. = L × 25%
- WH8-60 Fmax. = L × 23%
- WH8-65 Fmax. = L × 21%
- WH8-70 Fmax. = L × 21%
- WH8-65 Fmax. = L × 26%
- WH8-60 Fmax. = L × 27%
- WH8-55 Fmax. = L × 29%
- WH8-50 Fmax. = L × 24%
- WH8-45 Fmax. = L × 29%
- WH8-40 Fmax. = L × 29%
- WH8-35 Fmax. = L × 26%
- WH8-30 Fmax. = L × 26%

○ No grinding on either end of WH types marked with *.

WH
WB

Spring constant: $\pm 10\%$
Outer dia. D $\phi 10$ or less 0.5mm
 $\phi 12$ or more 0.8mm
Free length L 50 or less WH: $\pm 1.5\text{mm}$
WB: $\pm 1\text{mm}$
55 or more WH: $\pm 2\text{mm}$
WB: $\pm 1.5\text{mm}$

RoHS

M SWP-A

■ Spring constant

D	Type	WY	WR	WF	WL	WT	WM	WH	WB
2					0.5 [0.05]				
3						1.5 [0.15]			
4							2.0 [0.2]		
5	N/mm 0.1 (kgf/mm) [0.01]							2.9 [0.3]	3.9 [0.4]
6								N/mm 5.9 (kgf/mm) [0.6]	4.9 [0.5]
8								N/mm 9.8 (kgf/mm) [1.0]	
10	N/mm 0.2 (kgf/mm) [0.02]							N/mm 19.6 (kgf/mm) [2.0]	
12									29.4 [3.0]
13									
14									
16									
18									
20									
22									
27									
Fmax.	$F=L \times 75\%$	$F=L \times 60\%$	$F=L \times 45\%$	$F=L \times 40\%$	$F=L \times 40\%$	$F=L \times 35\%$	$F=L \times 30\%$	$F=L \times 25\%$	

■ WB : Fmax. (maximum allowable deflection) = $L \times 25\%$

d	Solid height max.	F N [kgf] max.	Catalog No.	Base unit price
Type D-L				
0.4	3.2	1.3 4.9 [0.5]	WB3 - 5*	
0.5	6.5	2.5 9.8 [1.0]	10*	
0.55	10.5	3.8 14.7 [1.5]	15*	
0.55	12.7	5 19.6 [2.0]	20*	
0.6	17.4	6.3 24.5 [2.5]	25*	
0.6	21.0	7.5 29.4 [3.0]	30*	
0.65	24.0	8.8 34.3 [3.5]	35*	
0.65	27.0	10.0 39.2 [4.0]	40*	
0.5	3	1.3 5.9 [0.6]	WB4 - 5*	
0.6	6	2.5 12.3 [1.3]	10	
0.65	9.8	3.8 18.1 [1.9]	15	
0.7	12.6	5 24.5 [2.5]	20	
0.75	16.5	6.3 30.4 [3.1]	25	
0.75	20.3	7.5 36.8 [3.8]	30	
0.8	24	8.8 43.1 [4.4]	35	
0.8	28	10 49.0 [5.0]	40	
0.8	29	11.3 55.4 [5.7]	45	
0.85	34	12.5 61.3 [6.3]	50	
0.65	3.3	1.3 12.7 [1.3]	WB5 - 5	
0.8	7	2.5 24.5 [2.5]	10	
0.8	7	3.8 37.3 [3.8]	15	
0.9	13	5 49.0 [5.0]	20	
0.9	13	6.3 61.8 [6.3]	25	
1.0	21	7.5 73.5 [7.5]	30	
1.0	25	8.8 86.3 [8.8]	35	
1.0	25	10 98.1 [10.0]	40	
1.1	31	11.3 110.8 [11.3]	45	
1.1	34	12.5 122.6 [12.5]	50	
1.1	39	13.8 135.3 [13.8]	55	
1.1	43	15 147.1 [15.0]	60	
1.1	46	16.3 159.8 [16.3]	65	
1.2	50	17.5 171.6 [17.5]	70	
0.7	3.5	1.3 12.7 [1.3]	WB6 - 5	
0.9	7	2.5 24.5 [2.5]	10	
0.9	7.5	3.8 37.3 [3.8]	15	
1.0	11.5	5 49.0 [5.0]	20	
1.1	17.5	6.3 61.8 [6.3]	25	
1.1	19.5	7.5 73.5 [7.5]	30	
1.1	20	8.8 86.3 [8.8]	35	
1.2	28	10 98.1 [10.0]	40	
1.2	30	11.3 110.8 [11.3]	45	
1.2	32	12.5 122.6 [12.5]	50	
1.2	32	13.8 135.3 [13.8]	55	
1.3	43	15 147.1 [15.0]	60	
1.3	46	16.3 159.8 [16.3]	65	
1.3	50	17.5 171.6 [17.5]	70	
1.4	57	20 196.1 [20.0]	80	
1.0	6	2.5 24.5 [2.5]	WB8 - 10	
1.2	10.8	3.8 37.3 [3.8]	15	
1.2	11.5	5 49.0 [5.0]	20	
1.3	17	6.3 61.8 [6.3]	25	
1.3	17	7.5 73.5 [7.5]	30	
1.4	24.5	8.8 86.3 [8.8]	35	
1.4	25.2	10 98.1 [10.0]	40	
1.5	32	11.3 110.8 [11.3]	45	
1.5	33	12.5 122.6 [12.5]	50	
1.5	36.5	13.8 135.3 [13.8]	55	
1.5	36.5	15 147.1 [15.0]	60	
1.6	48	16.3 159.8 [16.3]	65	
1.6	48	17.5 171.6 [17.5]	70	
1.6	55	20 196.1 [20.0]	80	

Quotation

● Load calculation method: Load = Spring constant \times Deflection(SI units) $N=N/\text{mm} \times F/\text{mm}$
 $\text{kgf}=kgf/\text{mm} \times F/\text{mm}$
 $(kgf=F \times 0.101972)$

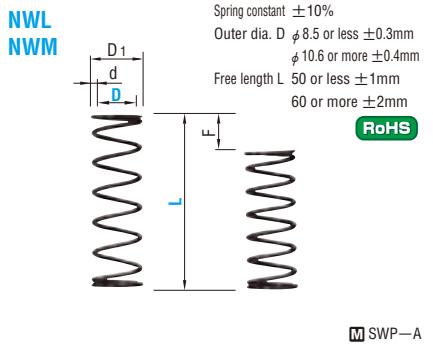
- No grinding on either end of WB types marked with *.
- The solid height values are for reference only.
- There may be some variation between lots.
- Operation count: 1 million
- Instructions and precautions for the use of coil springs P.1008

Quotation

d	Solid height max.	F N [kgf] max.	Catalog No.	Base unit price
Type D-L				
2.0	10	3.8 74.5 [7.6]	WB16 - 15	
2.1	12.5	5 98.1 [10.0]	20	
2.3	17	6.3 123.6 [12.6]	25	
2.3	18.5	7.5 147.1 [15.0]	30	
2.4	21.5	8.8 172.6 [17.6]	35	
2.4	21.5	10 196.1 [20.0]	40	
2.5	27.5	11.3 221.6 [22.6]	45	
2.5	27.5	12.5 245.2 [25.0]	50	
2.6	32	13.8 270.7 [27.6]	55	
2.6	32	15 294.2 [30.0]	60	
2.8	46	16.3 319.7 [32.6]	65	
2.8	46	17.5 343.2 [35.0]	70	
2.9	55	20 392.3 [40.0]	80	
2.5	13.5	5 147.1 [15.0]	WB18 - 20	
2.6	17	6.3 185.3 [18.9]	25	
2.6	17	7.5 220.6 [22.5]	30	
2.8	23.5	8.8 258.9 [26.4]	35	
2.9	27.5	10 294.2 [30.0]	40	
2.9	27.5	11.3 332.4 [33.9]	45	
3.0	33	12.5 367.7 [37.5]	50	
3.0	33	13.8 406.0 [41.4]	55	
3.2	43	15 441.3 [45.0]	60	
3.2	44.5	16.3 479.5 [48.9]	65	
3.2	44.5	17.5 514.8 [52.5]	70	
3.4	58	20 588.4 [60.0]	80	
3.4	61	22.5 661.9 [67.5]	90	
3.5	71	25 735.5 [75.0]	100	
2.8	13.5	5 147.1 [15.0]	WB22 - 20	
2.9	16	6.3 185.3 [18.9]	25	
3.0	18	7.5 220.6 [22.5]	30	
3.0	18	8.8 258.9 [26.4]	35	
3.2	24	10 294.2 [30.0]	40	
3.2	24	11.3 332.4 [33.9]	45	
3.5	36	12.5 367.7 [37.5]	50	
3.5	36	13.8 406.0 [41.4]	55	
3.5	36	15 441.3 [45.0]	60	
3.6	45	16.3 479.5 [48.9]	65	
3.6	45	17.5 514.8 [52.5]	70	
3.8	57	20 588.4 [60.0]	80	
3.8	57	22.5 661.9 [67.5]	90	
4.0	72	25 735.5 [75.0]	100	
3.5	19	7.5 220.6 [22.5]	WB27 - 30	
3.6	21	8.8 258.9 [26.4]	35	
3.6	21	10 294.2 [30.0]	40	
3.8	30	11.3 332.4 [33.9]	45	
3.8	30	12.5 367.7 [37.5]	50	
4.0	38	13.8 406.0 [41.4]	55	
4.0	38	15 441.3 [45.0]	60	
4.0	38	16.3 479.5 [48.9]	65	
4.0	38	17.5 514.8 [52.5]	70	
4.3	57	20 588.4 [60.0]	80	
4.5	63	22.5 661.9 [67.5]	90	
4.5	67	25 735.5 [75.0]	100	

ROUND WIRE COIL SPRINGS

—NWL・NWM (INNER DIAMETER STANDARD TYPE) / WP (70% DEFLECTION, LONG TYPE)—



Order

Catalog No.
NWL6.5-50



Days to Ship

Quotation



Price

Quotation

■Features

These products are round wire coil springs that are based on the inner diameter value as reference and have a fixed load capacity for each inner diameter.

● Load calculation method: Load=Spring constant×Deflection

(SI units) N=N/mm×Fmm

kgf=kgf/mm×Fmm

(kgf=N×0.101972)

● The solid height values are for reference only. There may be some variation between lots.

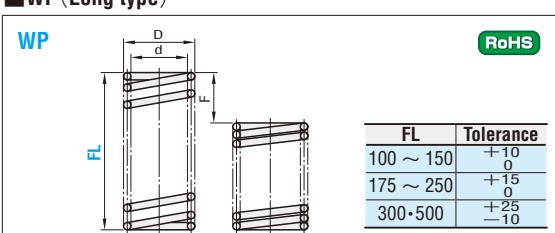
● Instructions and precautions for the use of coil springs [P.1008](#)

■NWL : Fmax. (Maximum allowable deflection) =L×40%

Pin dia.	D	D1	d	F max.	Solid height	Load N (kgf) max.	Spring constant [kgf/mm]	Catalog No. Type D-L	Base unit price
5	5.5	7	0.75	12	10.9	13.7 [1.4]	1.1 [0.12]	NWL5.5-30	
				14	12		1.0 [0.10]	35	
				16	13.5		0.9 [0.09]	40	
				18	15		0.8 [0.08]	45	
6	6.5	8.1	0.8	20	16.5		0.7 [0.07]	50	
				12	9.6	13.7 [1.4]	1.1 [0.12]	NWL6.5-30	
				14	10.8		1.0 [0.10]	35	
				16	12		0.9 [0.09]	40	
				18	13.2		0.8 [0.08]	45	
8	8.5	10.5	1.0	20	14.4		0.7 [0.07]	50	
				12	9.8	20.6 [2.1]	1.7 [0.18]	NWL8.5-30	
				14	10.8		1.5 [0.15]	35	
				16	12		1.3 [0.13]	40	
				18	13		1.1 [0.12]	45	
				20	14		1.0 [0.11]	50	
				24	16.5		0.9 [0.09]	60	
10	10.6	12.8	1.1	12	9.1	20.6 [2.1]	1.7 [0.18]	NWL10.6-30	
				14	9.9		1.5 [0.15]	35	
				16	11		1.3 [0.13]	40	
				18	12.1		1.1 [0.12]	45	
				20	12.7		1.0 [0.11]	50	
				24	14.9		0.9 [0.09]	60	
13	13.6	16.4	1.4	14	12.3	27.5 [2.8]	2.0 [0.20]	NWL13.6-35	
				16	13.3		1.7 [0.18]	40	
				18	14.7		1.5 [0.16]	45	
				20	15.8		1.4 [0.14]	50	
				24	18.2		1.1 [0.12]	60	
				14	13.6		2.0 [0.20]	NWL16.6-35	
16	16.6	19.8	1.6	16	14.8	27.5 [2.8]	1.7 [0.18]	40	
				18	16		1.5 [0.16]	45	
				20	17.2		1.4 [0.14]	50	
				24	20		1.1 [0.12]	60	

Quotation

■WP (Long type)



Catalog No.

WP 13-100



Quotation



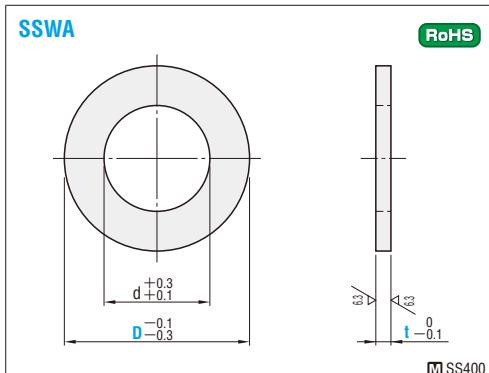
Quotation

d	D	Wire diameter	Solid height	Spring constant N/mm [kgf/mm]	F=L×70% Fmm	Load N (kgf)	Catalog No. Type No. — FL	Base unit price 1 ~ 9 pieces
8.5 or more	11.5 or less	0.9	23	0.30 [0.031]	70	21.3 [2.2]	WP8-100	
			28	0.27 [0.028]	87.5	24.0 [2.5]		125
			33	0.23 [0.023]	105	23.7 [2.4]		150
			40	0.18 [0.018]	122.5	21.6 [2.2]		175
			46	0.16 [0.016]	140	22.0 [2.2]		200
			55	0.12 [0.012]	175	20.6 [2.1]		250
			71	0.10 [0.010]	210	20.6 [2.1]		300
			118	0.06 [0.006]	350	20.6 [2.1]		500
10.5 or more	13.5 or less	1.0	23	0.37 [0.038]	70	26.1 [2.7]	WP10-100	
			30	0.27 [0.028]	87.5	24.0 [2.5]		125
			35	0.24 [0.024]	105	24.7 [2.5]		150
			40	0.20 [0.020]	122.5	24.0 [2.5]		175
			45	0.18 [0.018]	140	24.7 [2.5]		200
			56	0.15 [0.015]	175	25.7 [2.6]		250
			64	0.12 [0.012]	210	24.7 [2.5]		300
			106	0.08 [0.008]	350	27.5 [2.8]		500
13.5 or less	17 or less	1.2	17	0.59 [0.060]	70	41.2 [4.2]	WP13-100	
			22	0.42 [0.043]	87.5	36.9 [3.8]		125
			26	0.31 [0.032]	105	33.0 [3.4]		150
			34	0.25 [0.025]	122.5	30.0 [3.1]		175
			37	0.23 [0.023]	140	31.6 [3.2]		200
			42	0.19 [0.019]	175	32.6 [3.3]		250
			53	0.15 [0.015]	210	30.9 [3.2]		300
			80	0.10 [0.010]	350	34.3 [3.5]		500

● Load (kgf) = Load (N) × 0.101972

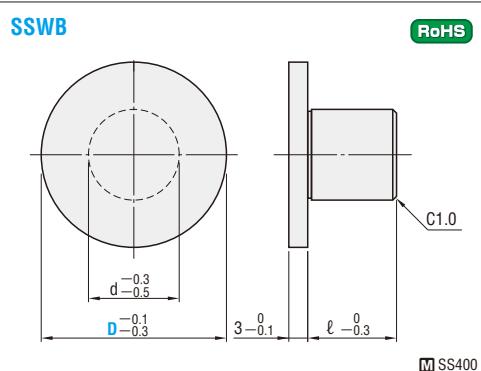
Quotation

WASHERS FOR COIL SPRINGS



d	Spring diameter	Catalog No.		t	Base unit price 1~19 pieces t=1.0 t=2.0 t=3.0 t=4.0 t=5.0
		Type	D		
3.0	6		5		
5.0	8		7		
6.0	10		9		
7.0	12		11.5	1.0	
8.0	14		13		
9.0	16		15		
10.0	18		17	2.0	
12.0	20		19		
12.0	22		21	3.0	
14.5	25		24		
15.0	27		26	4.0	
17.0	30		29		
20.0	35		34	5.0	
23.0	40		39		

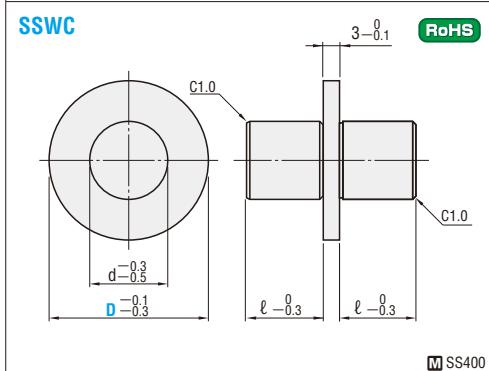
Quotation



d	ℓ	Spring diameter	Catalog No.		Base unit price 1~19 pieces
			Type	D	
3.5	4.0	8		7	
4.5	5.0	10		9	
5.5	6.0	12		11	
6.5	7.0	14		13	
7.5	8.0	16		15	
8.5	9.0	18		17	
9.5	10.0	20		19	
10.5	11.0	22		21	
12.0	12.0	25		24	
13.0	13.0	27		26	
14.5	15.0	30		29	
17.0	17.0	35		34	
19.5	20.0	40		39	

Quotation

⊗ Cannot be used for SWC and SWX types.



d	ℓ	Spring diameter	Catalog No.		Base unit price 1~19 pieces
			Type	D	
3.5	4.0	8		7	
4.5	5.0	10		9	
5.5	6.0	12		11	
6.5	7.0	14		13	
7.5	8.0	16		15	
8.5	9.0	18		17	
9.5	10.0	20		19	
10.5	11.0	22		21	
12.0	12.0	25		24	
13.0	13.0	27		26	
14.5	15.0	30		29	
17.0	17.0	35		34	
19.5	20.0	40		39	

Quotation

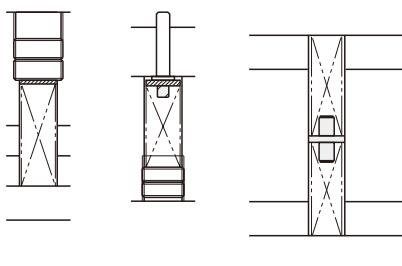
⊗ Cannot be used for SWC and SWX types.

Order Catalog No. — t
SSWA 15 — 2.0
SSWC 9

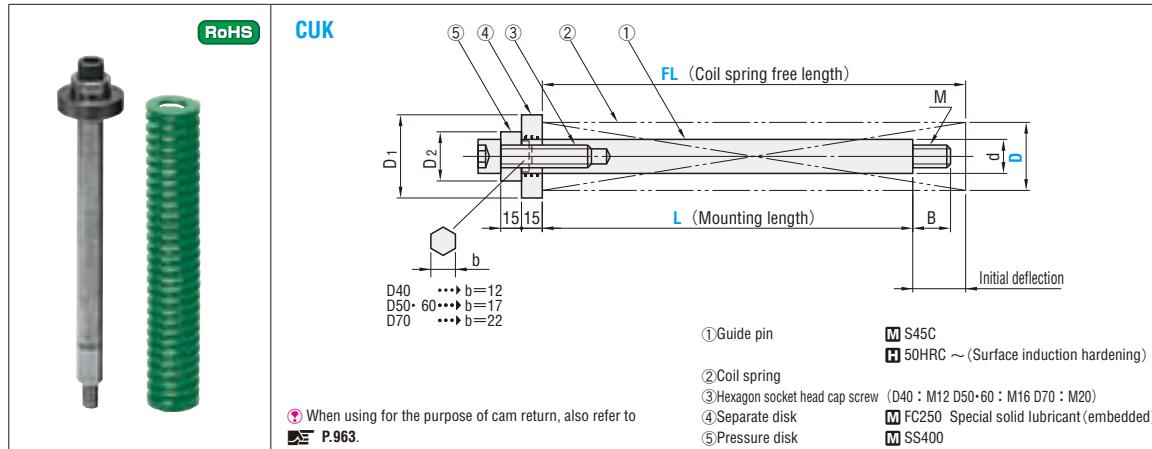
Days to Ship **Quotation**

P Price **Quotation**

ex Example



SPRING GUIDE UNITS



d	D ₁	D ₂	M×P	B	Catalog No.	① Type	② D	L: 1mm increments												
								90	100	125	150	175	200	250	300	350	* 400	* 450	* 500	
19	50	28	12×1.75	24	CUK	SWF SWL SWM SWH	40	68 ~90	80 ~100	90 ~125	105 ~150	130 ~175	145 ~200	195 ~250	240 ~300	—	—	—		
24	60	36	16×2.0	28			50									325 ~400	375 ~450	425 ~500		
29	70	43	16×2.0				60	68 ~90	80 ~100	95 ~125	110 ~150	120 ~175	135 ~200	185 ~250	225 ~300	275 ~350	—	—	—	
35	80	48	20×2.5	33			(70)									—	—	—		

① D=(70) is a specification available for SWF and SWL only. ② * FL 400 and larger are available for SWF only.



Catalog No. — Spring type — D — FL — L
 CUK — SWM — 60 — 250 — 200



Days to Ship Quotation



Quotation

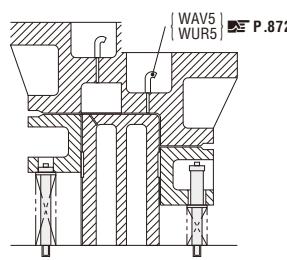
③ Coil spring specifications

SWF P.975
SWL P.977

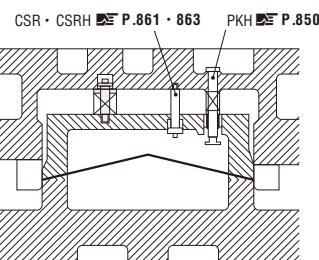
SWM P.979
SWH P.981



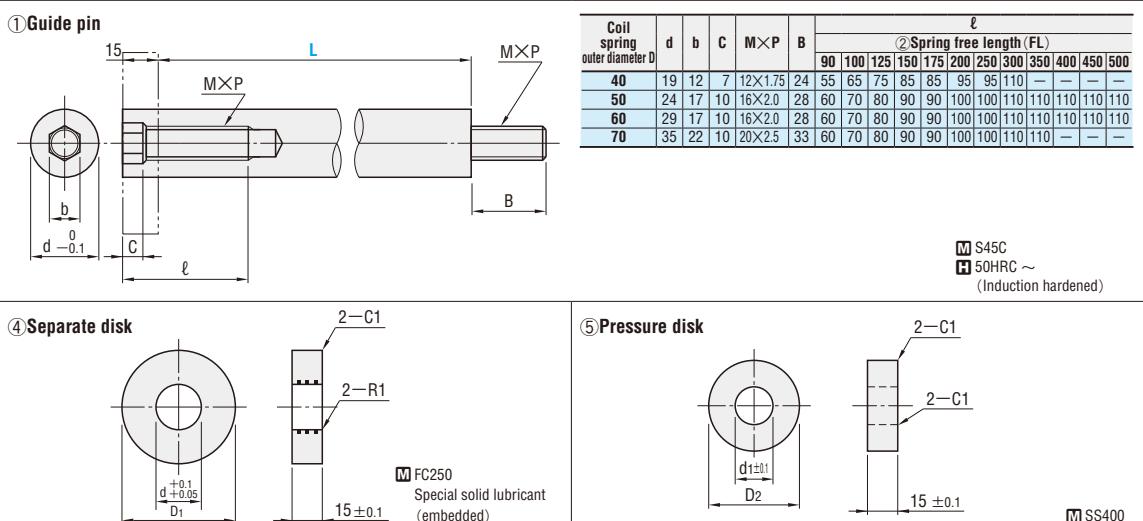
Example



(When using as a cushion for drawing)



(When using as a pressure source for pad)



Components for spring guide units

Coil spring outer diameter D	Catalog No.		L: 1mm increments												Base unit price 1~9 pieces											
	Type	No.	FL												FL											
			90	100	125	150	175	200	250	300	350	400	450	500	90	100	125	150	175	200	250	300	350	400	450	500
① Guide pin CUKGP	40	40	68	80	90	105	130	145	195	240	—	—	—	—	Quotation	Quotation	Quotation	Quotation	Quotation	Quotation	Quotation	Quotation	Quotation	Quotation	Quotation	Quotation
		50	90	100	125	150	175	200	250	300	—	—	—	—												
		60	68	80	95	110	120	135	185	225	275	325	375	425												
		70	90	100	125	150	175	200	250	300	350	400	450	500												

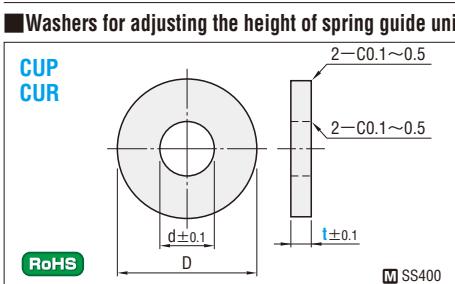
Coil spring outer diameter D	D1	d	Catalog No.		Base unit price	
			Type	No.	1~9 pieces	1~9 pieces
40	50	19	④ Separate disk CUKSD	40	Quotation	Quotation
50	60	24		50		
60	70	29		60		
70	80	35		70		

Spring outer dia. D	D2	d1	Catalog No.		Base unit price	
			Type	No.	1~9 pieces	1~9 pieces
⑤ Pressure disk CUKPD	40	28	40	Quotation	Quotation	Quotation
	50	36	50	Quotation		
	60	43	60	Quotation		
	70	48	70	Quotation		

Order Catalog No. — Spring FL — L
CUKGP 60 — 250 — 200

Days to Ship Quotation

Price Quotation



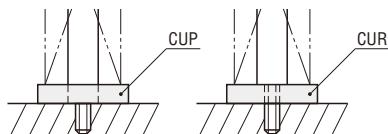
D	d	Catalog No.		t	Base unit price 1~9 pieces
		Type	No.		
CUP	40	40	1	Quotation	Quotation
	50	50	2		
	60	60	5		
	70	70	Quotation		

D	d	Catalog No.		t	Base unit price 1~9 pieces
		Type	No.		
CUR	40	40	5	Quotation	Quotation
	50	50	Quotation		
	60	60	Quotation		
	70	70	Quotation		

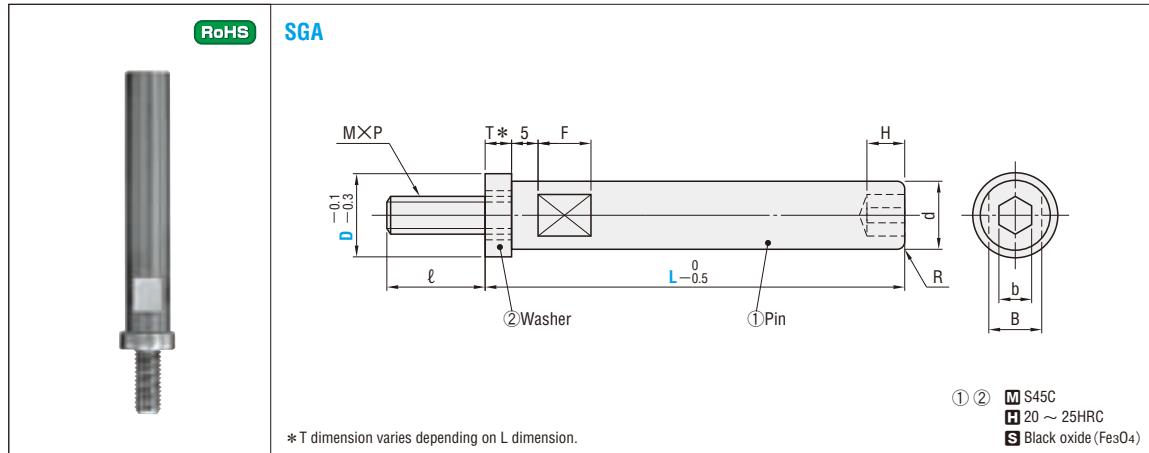
Order Catalog No. — t
CUR 40 — 5

Days to Ship Quotation

Price Quotation



SPRING GUIDE PINS



M×P	l	b	H	B	F	R	T	d	Coil spring SW				Catalog No.	Type	D	L 5mm increments
									C	F	L-M-H B-G-Z-V	X				
4×0.7	7	3	3	4	8	1	3	6	φ14	φ14	φ14	—	7	20~ 50	7	20~ 50
									φ16	φ16	φ16	—				
5×0.8	8	4	3	6	8	1.5	4	8	—	φ18	φ18	φ20	9	20~ 75	9	20~ 75
									φ18	—	φ20	φ22				
6×1.0	10	5	4	8	8	2	5	10	—	φ20·22	φ22	φ25	10	20~ 85	10	20~ 85
									φ20	—	φ25	φ27				
8×1.25	17 (12)	6	4	11	10	2.5	5 (10)	13	φ22	φ25·27	φ27	φ30	11	20~ 125	11	20~ 125
									φ25	—	φ30	—				
10×1.5	20 (15)	8	5	14	12	3	5 (10)	16	—	φ35	φ35	φ35	12.5	30~ 185	12.5	30~ 185
									φ35	—	φ40	φ40				
12×1.75	23 (18)	10	6	17	14	3	5 (10)	20	—	φ40	—	—	13.5	30~ 215	13.5	30~ 215
									—	φ50	—	—				
16×2.0	27 (22)	14	8	22	16	3	5 (10)	25	—	φ60	—	—	15	50~ 215	15	50~ 215
									—	φ60	—	—				

⚠ No spanner groove is machined when L dimension is 20 for SGA7 ~ 12.5, when L dimension is 20 ~ 25 for SGA13.5 ~ 16, and when L dimension is 30 ~ 35 for SGA17.5 ~ 27.5.

⚠ For SGA13.5 ~ 33, when the L dimension is a 5 mm size (L=25, 35, 45···), then the T and l dimensions are those shown in ().

⚠ "Coil spring" indicates the outer diameter dimension of the spring.



Catalog No. — L
SGA 20 — 125



Price

Quotation



Days to Ship

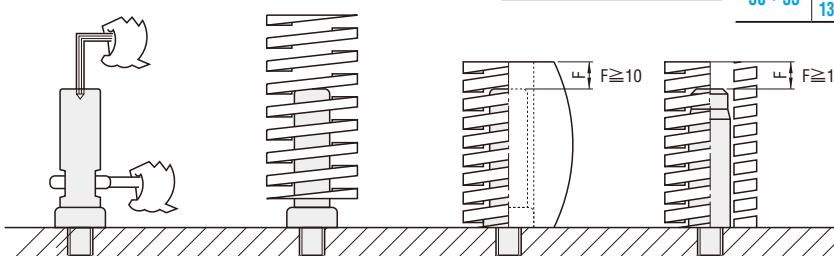
Quotation



Example

D	L	Base unit price 1~19 pieces
7·8	20~ 50	Quotation
9·10	20~ 75	Quotation
11·12·12.5	20~ 85	Quotation
13.5·16	20~ 85 90~ 125	Quotation

D	L	Base unit price 1~19 pieces
17.5~20	30~105 110~185	Quotation
22~27.5	30~125 130~215	Quotation
30·33	50~125 130~215	Quotation

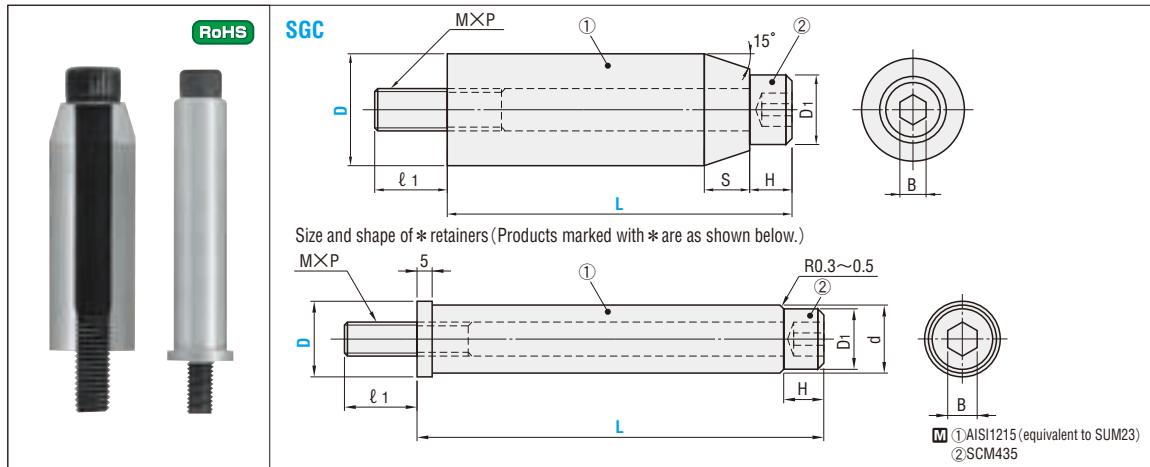


Tighten using the hexagon hole in the head or the groove on the sides created for using a spanner.

Position the spring correctly by installing it over the bushing.

When selecting L, assume a safety allowance of at least 10mm for the top of the spring guide at bottom dead center.

SPRING GUIDE RETAINERS



D	d	D1	B	Coil spring SW□					Catalog No.	Base unit price	Type D-L	Coil spring SW□					Catalog No.	Base unit price						
				M × P	H	S	ℓ ₁	C				C	F	L·H· B·G· Z·V	X	1~19 pieces								
6	—	4.5	2	M2.5 × P0.45	2.5	2	9.5	φ12	φ14	φ14	—	SGC6-18	23	—	—	SGC19-28	40							
				M3 × P0.5	3	3	8	φ14	φ16	φ18	SGC8-20													
								φ16	φ20	φ22														
8	—	5.5	2.5	M3 × P0.5	3	3	8	φ14	φ18	φ20	SGC10-20	30	—	—	SGC20-23	40								
10	—	7	3	M4 × P0.7	4	4	9	φ18	φ20	φ22	SGC12-20	30	—	—	SGC23-30	40								
12	—	8.5	4	M5 × P0.8	5	4	10	φ20	φ25	φ27	SGC14-12	30	—	—	SGC26-28	60								
14	—	10	5	M6 × P1.0	4	4	12	φ25	φ30	φ30	SGC16-18	30	—	—	SGC28-30	40								
16	—	13	6	M8 × P1.25	8	5	15	φ27	φ35	φ35	SGC16-18	30	—	—	SGC31-28	40								



Catalog No.
SGC 20-23



Quotation



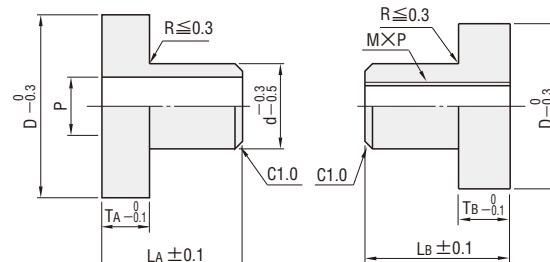
Quotation

④ "Coil spring" indicates the outer diameter dimension of the spring.

SPRING UNIT FLANGES

RoHS

WUNT



●Stripper bolt(MSB)  P. 691
 ●Coil springs  P. 965

M S45C
S Black oxide (Fe₃O₄)

Spring dia. D	Bolt	P	M×P	T_A+T_B	L_A	L_B	D	d	Catalog No.		Base unit price 1~9 pieces	
									Type	No.		
25	MSB8	8	6×1.0		10	10	26	11.5	WUNT	25		
27					11	11	28	12.5		27		
30	MSB10	10	8×1.25	5	11	11	31	14		30		
					13	13				31		
35					13	13	36	16.5		35		
40	MSB12	12			13	13	41	19		40		

Quotation

⚠ The catalog Nos. were changed (for selection of the spring diameter and LB length) due to the addition of WUNT30-13.

⚠ Cannot be used for SWC. (Not suitable for the spring inner diameter.)

 Order Catalog No. **WUNT 25**

 Days to Ship Quotation

 Price Quotation

 Alterations Catalog No. — (LAC·LBC·TAC·TBC)
WUNT 35 — LAC7

Alteration	Code	Spec.	1Code
	LAC	L _A dimension change 0.1mm increments $1.5 + T_A \leq LAC < L_A$ When combined with TAC: $1.5 + TAC \leq LAC < L_A - TAC$	
	LBC	L _B dimension change 0.1mm increments $1.5 + T_B \leq LBC < L_B$ When combined with TBC: $1.5 + TBC \leq LBC < L_B - TBC$	
	TAC	Head thickness change 0.1mm increments $3 \leq TAC < T_A$ L _A dimension is shortened by ($T_A - TAC$). When combined with LAC, LAC dimension remains as specified.	
	TBC	Head thickness change 0.1mm increments $3 \leq TBC < T_B$ L _B dimension is shortened by ($T_B - TBC$). When combined with LBC, LBC dimension remains as specified.	

⚠ Some alterations may result in the removal of the surface treatment at the alteration location.

■Features

- ① An initial load can be applied to the spring.
- ② The spring can be deflected beforehand, reducing the trouble involved in die assembly and adjustment.

■Notes for use

- Unit example

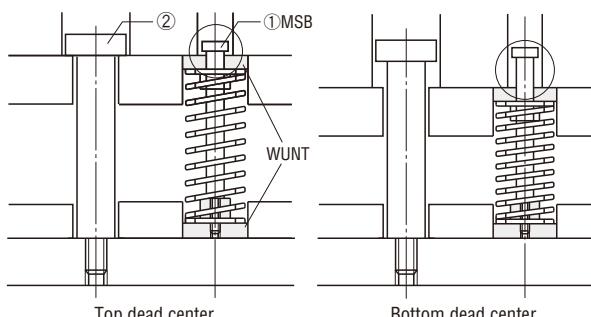


⚠ The coil spring and stripper bolt are sold separately.

- Adjust the height of stripper bolt ② so that the head of stripper bolt ① does not contact the flange when mounted in the die. (Refer to the figure below.)
- Create a bolt relief hole as shown in the figure below.



Example



[TECHNICAL DATA] INSTRUCTIONS AND PRECAUTIONS FOR THE USE OF COIL SPRINGS

■ Instructions and precautions for the use of coil springs

① Always use a spring guide.

If used without a spring guide, problems such as buckling or bending of the spring body may occur, resulting in concentrated high stress on the inside of the bend and leading to breakage. Be sure to use a spring guide, such as a shaft or outer diameter guide. *In general the best results are obtained by inserting a shaft all the way through the coil spring from top to bottom to serve as an inner diameter guide.

② Clearance between spring inner diameter and shaft

The shaft diameter should be set approximately 1.0mm smaller than the inner diameter of the coil spring. If the clearance with the shaft is too small, the spring inner diameter will become worn by the shaft, leading to breakage occurring at the worn points. If the clearance is too large, buckling or other problems may occur. If the spring has a long free length (Free length ÷ Outer dia.=4 or more), add a step to the shaft as shown on the left side of Figure 1 in order to prevent inner diameter contact when the spring body is bent.

③ Clearance between spring outer diameter and counterbore hole

The counterbore hole diameter should be set approximately 1.5 mm larger than the coil spring outer diameter. If the clearance with the counterbore hole is too small, the outer diameter becomes restrained by expansion on the outer diameter side when the spring is flexed. The resulting concentration of stress may cause the spring to break. For a spring with a long free length, a counterbore hole shape such as that shown on the right side of Figure 1 is ideal.

④ Avoid short guide lengths and shallow counterbore hole depths.

If the guide is too short, the spring may contact the end of the guide when the spring buckles, and the resulting friction may cause the spring to break. The guide length should be to a minimum of 150% of the initial set height. Also be sure to chamfer the shaft to approximately C3.

⑤ Do not use in excess of the maximum allowable deflection (the maximum allowable deflection). (Do not use close to the solid height.)

If the spring is used beyond the maximum allowable deflection, high stress in excess of the calculated value occurs in the cross section. This can cause the spring to break.

In addition, if the coil spring is used close to its solid height, the active coils will gradually adhere to each other, increasing the spring constant value and causing the load curve to rise as shown in Fig.2. The resulting high stress may cause the spring to break. This also is a cause of strain. Do not use the coil spring in excess of the maximum allowable deflection.

⑥ Set an initial deflection.

If there is a gap, the spring will move vertically, resulting in an impact force and causing bending of the body or buckling. Setting an initial deflection stabilizes the top and bottom ends of the spring.

⑦ Do not use when scrap or other foreign substances are caught in the spring.

Foreign substances which get caught between the coils prevent that part of the coil spring from functioning as an active coil, forcing the other coils to deflect as shown in Fig.3. This effectively reduces the number of active coils, increasing the stress on the spring, and eventually causing it to break. Be careful to prevent scrap or other foreign substances from entering the coils.

⑧ Do not use in locations where the mounting surfaces are not sufficiently parallel.

If the mounting surfaces are insufficiently parallel, bending of the spring body occurs, resulting in concentrated high stress on the inside of the bend that may cause the spring to break. In addition, if the die is not sufficiently parallel, as shown in Figure 4, the spring may break due to bending or to exceeding the maximum allowable deflection. Ensure that the coil spring's mounting surfaces are as close to perfectly parallel as possible in order to prevent the maximum allowable deflection from being exceeded.

⑨ Do not use coil springs in series.

If two coil springs are used in series, the springs will bend as shown in Figure 5. In some cases, the spring will ride up on the shaft or counterbore hole, causing breakage by the same mechanism described in ①. Variation in the spring load capacities will also result in the weaker spring being overcome by the stronger spring (Figure 6). This increases the deflection of the weaker spring, resulting in a difference in durability between the springs or else in breakage. In addition, when two springs are used in series, the spring constant of each is reduced by 1/2.

⑩ Do not use two coil springs in a double-spring arrangement.

The use of two coil springs in a double-spring arrangement, as shown in Figure 7, may result in the inner coils being sandwiched between the outer coils (or vice versa) when the springs buckle. This can cause the coil springs to break for the same reason described in ④.

⑪ Do not use the coil spring horizontally.

If the spring is used horizontally, the shaft will cause wear of the spring inner diameter, resulting in breakage at the points of wear.

MISUMI endurance test conditions

① Spring guide type

Inside shaft
Shaft diameter: d=1.0 mm

② Initial deflection

1.0mm

③ Amplitude

Amount of deflection at the maximum allowable deflection

④ Speed

180spm

*Durability count may vary depending on the conditions of use.

Fig. 1

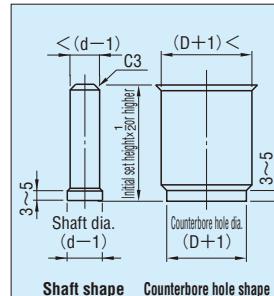


Fig. 4

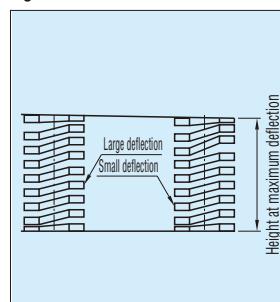


Fig. 2

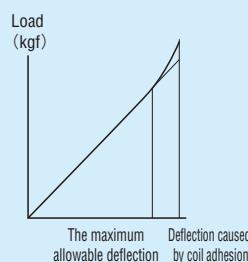


Fig. 3

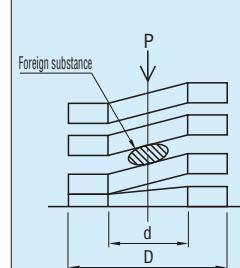


Fig. 5

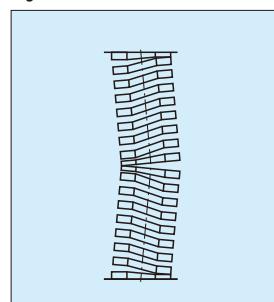


Fig. 6

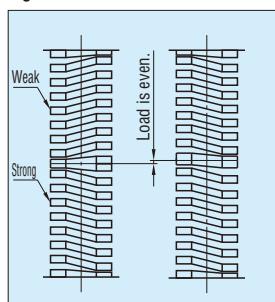
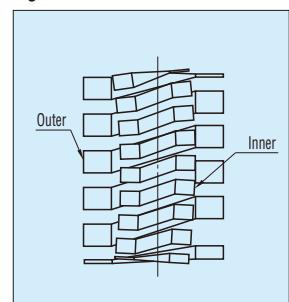


Fig. 7



GAS SPRINGS

GAS SPRINGS



Product name
Catalog No.

—HIGH ALLOWABLE ECCENTRICITY AND HIGH SPEED TYPE—
GSZ

—PLATES FOR GSZ—
HM FM

—STANDARD TYPE—
GSX

Page

1013

1014

1015



—PLATES FOR GSX—
AM

—SHORT TYPE—
GSC

—PLATES FOR GSC—
BM

—HEAVY LOAD MINI TYPE—
MGSC

—MINI TYPE—
MGSA H F

1016

1017

1017

1018

1019



—THREADED TYPE—
MGSB

—ISO/CNOMO STANDARD TYPE—
GSK

—PLATES FOR GSE—
FFC FC

—SLOW RETURN TYPE—
GSSR

1020

1021

1022

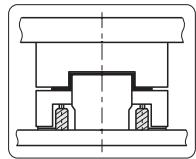
1023

These gas springs require little space and generate heavy loads.

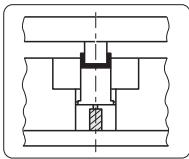
■Features of gas springs

1. Space saving Although these gas springs generate heavy loads and have long strokes, they are very compact. It is possible to generate a heavy load in a very small space.
2. High initial load An initial maximum load of 73,900N (approx. 7.5t) can be obtained beginning from the first stroke. This is ideal for machining of high tensile steel sheet and thick plates.
3. A wide range of strokes Because the maximum stroke length is 200mm, these springs are suitable for difficult machining such as deep drawing.
4. Flat load characteristic Because the difference between the initial load and the maximum load is small, these springs are useful for machining of thin materials and for maintaining the balance of the upper and lower dies.
5. No need for initial deflection These gas springs can be fastened in place with bolts, so there is no need to install them with an initial deflection. This simplifies the assembly process.

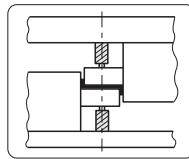
■Examples of gas spring applications



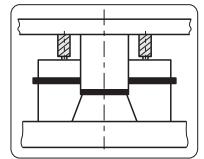
Used as blank holder cushion.



Used as a source of padding force in a bending die.



Used for double-action bending.



Used as a source of stripping force in a punching die.

⚠ Be sure to use guide pins, bushings and heel guides in order to avoid eccentric loads.