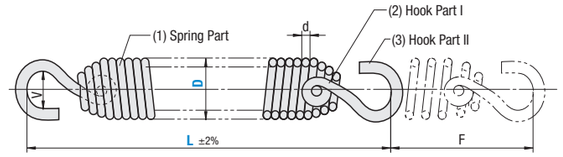
Tension Springs

Hook Free Movement

Tension Springs – Hook Free Movement

Type	Material	
	Main Body	Hook Part
AWFM	Spring Steel (ASTM A228)	304 Stainless Steel-WPB
AUFM	304 Stainless Steel-WPB	



Part Number Type	D - L	Wire Dia. dmm	Hooks Wire Dia. dmm	Hooks Inner Dia. V	Dynamic Load: Max. Deflection Fmax. mm	Dynamic Load: Max. Load N	(Initial Tension) N	(Springs Constant) N/mm
AWFM AUFM	7 - 25	1.0	1.2	4.6	8	39.2	7.84	3.92
	30				11.9			2.64
	35				16			1.96
	40				20			1.57
	8 - 30	1.2	1.4	5.2	9.6	66.25	9.81	5.88
	35				13.7			4.12
	40				18			3.13
	45				22.5			2.51
	50				25.15			2.24
	60				32.91			1.71
	70				40.68			1.39
	10 - 30	1.4	1.6	6.8	10.1	86.69	12.4	7.35
	35				13.8			5.39
	40				17.25			4.31
	45				23			3.23
	50				27.16			2.74
	60				36.72			2.02
	70				46.28			1.61
	80				55.85			1.33
	12 - 30	1.6	1.8	8.4	8.7	101.29	14.71	9.99
	35				13.6			6.37
	40				19.2			4.50
	45				26			3.33
	50				28.93			2.99
	60				34.78			2.49
	70				44.89			1.93
	80				54.99			1.57
	90				65.10			1.33
	100				75.21			1.15

Part Number Type	D - L	Wire Dia. dmm	Hooks Wire Dia. dmm	Hooks Inner Dia. V	Dynamic Load: Max. Deflection Fmax. mm	Dynamic Load: Max. Load N	(Initial Tension) N	(Springs Constant) N/mm
AWFM AUFM	14 - 50	1.8	2	10	18.20	107.87	22.56	4.69
	60				27.13			3.14
	70				36.05			2.37
	80				44.97			1.90
	90				53.90			1.58
	100				62.82			1.36
	125				85.13			1.00
	16 - 50	2	2.6	11.4	15.54	127	25.5	6.53
	60				25.01			4.06
	70				34.48			2.94
	80				43.96			2.31
	90				53.43			1.90
	100				62.90			1.61
	125				86.59			1.17
	18 - 80	2.3	2.9	12.9	39.58	180	36	3.64
	90				49.00			2.94
	100				58.43			2.46
	125				81.99			1.76
	150				105.55			1.36
	20 - 80	2.6	3.2	14.2	32.48	230	50.99	5.51
	90				41.12			4.35
	100				49.76			3.60
	125				71.36			2.51
	150				92.96			1.93

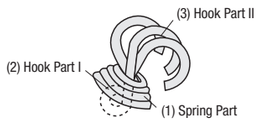
ⓘ Please note that Hook Wire Dia.for D16, 18, 20 are thicker. Inner diameter is the same as the previous type.

Part Number Example

Part Number
AWFM8-30

Features

Being separate from the spring body, the hook can move flexibly as desired. In addition, direct contact between the spring and the hook does not generate bending stress in the hook, which is not possible with conventional tension springs.

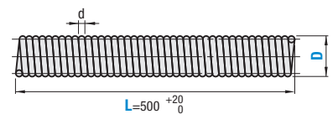


Tension Springs / Hooks

Long, Medium Load / Hook Insertion

Tension Springs – Long, Medium Load

Type	Material
LWS	Spring Steel (ASTM A228)
LUS	304 Stainless Steel



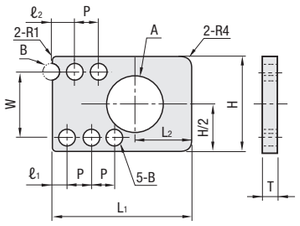
Part Number Type	D - L	Springs Constant N/mm	Wire Dia. dmm	Initial Tension N	Max. Deflection %	Applicable Hooks
LWS LUS	5 - 500	0.020	0.6	1.57	50	HBFK_5
	6 - 500	0.050	0.8	3.53		HBFK_6
	8 - 500	0.060	1.0	4.9		HBFK_8
	10 - 500	0.075	1.2	5.49		HBFK_10
	12 - 500	0.190	1.6	14.71		HBFK_12
LWS	14 - 500	0.210	1.8	16.67		HBFK_14
	16 - 500	0.230	2.0	19.61		HBFK_16
	18 - 500	0.340	2.3	27.46		HBFK_18

Load {kgf} = Load N x 0.101972

ⓘ LUS is not available for D14, D16, and D18.

Tension Springs – Hooks

Type	Material	Surface Treatment
HBFKN	Low Carbon Steel	Black Oxide
HBFKS	304 Stainless Steel	—



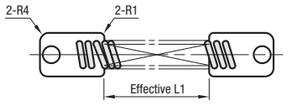
Part Number Type	No.	W	A	B	P	L_1	L_2	H	T	ℓ_1	ℓ_2
HBFKN HBFKS	5	4.1	5	1.0	2.0	24	6	10	1.0	1.0	2.0
	6	4.9									
	8	6.6	6	1.5	2.6	26	7	15		1.5	2.8
	10	8.4									
	12	9.9	7	2.2	3.2	30	7.5	18	2.0	2.0	3.6
	14	12.2			3.6			20		2.3	4.1
	16	14.0	9	2.5	4.0	34	8.5	22		2.5	4.5
	18	15.7		2.9	4.6			25		2.9	5.2

ⓘ Please choose the same number as D Dimension of LWS or LUS.

Part Number Example

Part Number
LWS10-500
HBFKN10

How to Use



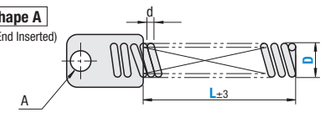
Springs can be cut to desired lengths. Use the hook HBFKN by inserting the springs in its five holes. Do not exceed 50% of the max. deflection for full length L_1 when cutting. Spring Constant should be L/L_1 times.

Tension Springs – Hook Insertion

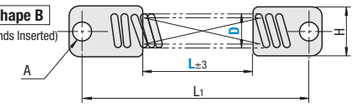
Type	Material: Springs	Material: Hooks	Surface Treatment: Hooks
LWSH	Spring Steel (ASTM A228)	Low Carbon Steel	Black Oxide
LUSH	304 Stainless Stee-WPB	304 Stainless Steel	—

– Spring Steel (ASTM A228) comes with the Low Carbon Steel hook, and 304 Stainless Steel-WPB comes with the 304 Stainless Steel hook.
– Load Formula
Load = Spring Constant x Deflection mm + Initial Tension
– The springs for LWSH and LUSH are different from that for LWS and LUS.

Shape A (One End Inserted)



Shape B (Both Ends Inserted)



Part Number Type	Shape	D	L 10 mm Increment	Wire Dia. dmm	A	H	Max. Deflection %	L_1	Initial Tension (N): LWSH	Initial Tension (N): LUSH	Standard Spring Constant (N/mm): LWSH	Standard Spring Constant (N/mm): LUSH
LWSH LUSH	A	5	50-500	0.6	5	10	70	L+36	1.01	1.32	0.045	0.040
		6		0.8					2.28	2.96	0.114	0.101
		8		1.0	6	15		L+38	3.04	4.26	0.145	0.128
		10		1.2					4.31	6.03	0.183	0.163
	B	12		1.6	7	18	60	L+45	8.72	12.21	0.470	0.415
		14		1.8		20			10.6	14.84	0.525	0.465
		16		2.0	9	22		L+51	12.6	17.64	0.593	0.525
		18		2.3		25			18.7	26.18	0.850	0.753

Part Number Example

Part Number	-	D	-	L
LWSHA	-	5	-	500

Standard Spring Constant

Standard spring constant is the value when the L Dimension is 200 on shape B. For other dimensions, use the formula below for calculation.

Spring Constant (N/mm) = 200 (Reference L Dimension)

Configurable L Dimension x Standard Spring Constant

Ex. LWSHB-8-400
0.0725 (N/mm) = 200

400 x 0.145
kgf=Nx0.101972