## HOW TO USE PT SERIES TENSION GAUGES

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# HOW TO MEASURE

Figure 1



Model	Cable size
Model PT-1	Cable size 3/32", 1/8", 5/32"
Model PT-1M	Cable size 2.5mm, 3mm, 4mm
Model PT-2	Cable size 3/16", 7/32", 1/4"
Model PT-2M	Cable size 5mm, 6mm, 7mm
Model PT-3	Cable size 1/4", 9/32", 5/16", 3/8"
Model PT-3M	Cable size 7mm, 8mm, 9mm, 10mm

Hold the gauge with the left hand and place the cable between the two nylon spools as shown in Figure 1.

With the right hand pull the lanyard and extend the spring until the hook on the nylon slider can be hooked on the cable as shown in Figure 2.

Figure 2



Release the lanyard. Read the needle position on the scale. Refer to the calibration table obtain correct tension in the cable. The gauge can be left on the wire for "hands free" adjusting of the cable.

To assure accurate readings make sure that the slider moves freely in the frame slot and does not bind. Also, lubricate the slider slot frequently with silicone lubricant.

**Note:** An extra 1/4" inch hole is provided in the frame of the instrument for an attachment of a short lanyard and snap hook (not furnished) for securing the gauge to the cable. This will prevent loss of the instrument if it becomes inadvertently detached.

# **HOW MUCH TENSION?**

Specific tension requirements for your application must be obtained from the boat, mast, or sail manufacturer or the manufacturer of the product on which the cable is used.

Table 1 recommends an initial tension setting, but there is no simple solution since the optimum rigging tension will be a function of the boat design, the rig (masthead or fractional, one or more spreaders, etc.), and even the cut of the sails. Many skippers use insufficient tension because of a fear of "breaking something." It should be noted that on America's Cup contenders, where electronic state of the art tension instrumentation is available, the standing rigging is set as tight as is structurally feasible.

	Table 1										
302/304 1x19 Stainless Steel Rigging Cable											
Diam., In.	Breaking Strength Pounds	Forestay* Pounds	Shrouds* Pounds								
3/32	1200	180	120								
1/8	2100	320	240								
5/32	3300	500	350								
3/16	4700	750	500								
7/32	6300	1000	700								
1/4	8200	1300	850								
9/32	10300	1600	1050								
5/16	12500	2000	1300								
3/8	17500	2750	1850								
*Suggested	initial settings.										

### ONE DESIGN CLASS RACING SAILBOATS

Most sail makers who produce sails for the one design classes provide each purchaser with specific set of readings on the Loos Model A or Model B tension gauges for use when setting up the standing rigging. This assures that the sails will have the correct shape when the rig is under load.

For the convenience of sailors who wish to upgrade from our Model A or B gauges to the professional model (PT-1, PT-2, or PT-3) gauges we include below a conversion chart so that the same recommended tension can be obtained with the PT-1, PT-2 or PT-3 gauges as with the Model A or B gauges.

MODEL A	MODEL PT-1			MODEL B	MODEL PT-2			MODEL PT-3
SCALE	3/32	1/8	5/32	SCALE	3/16	7/32	1/4	9/32
5	6			10	11			
	I			I	I	I		

10	9			15	13			
15	12	14		18	15			
20	16	16		20	16	18		
25	20	19		22	18	20		
28	23	21		24	19	22		
30		22		26	21	24		
35		27	25	28	23	25		
38		30	28	30	25	27	25	
40		33	30	32	27	29	27	
42			33	34	29	31	39	
44			36	36		33	31	
45			38	38		36	33	6
46			39	39		37	34	7
47			40	40			36	9
				41			37	10
				42			39	11
				43			40	12
				44				14
				45				16
				46				18
				47				20
				49				25

When no specific requirements are provided by the sail maker, the following general comments will provide a basis for a rational procedure for tuning the rig.

## **FORESTAY TENSION**

**Masthead Rig** On the masthead rig it's almost always advantageous to set the forestay tension as high as possible within the limits of structural strength. Generally, it's possible to use 15% of the breaking strength of the cable. Thus, a forestay tension of 1,000 lbs. is a reasonable place to start with a 7/32"diam., 302/304 1x19 stainless steel cable. Backstay tension would, of course, have to be adjusted to maintain a straight mast with the desired forestay tension. Since the backstay makes a greater angle to the mast, the backstay tension will be lower than the forestay tension.

#### NOTE! ROLLER FURLING CAN ONLY BE SET BY BACK STAY TENSION.

**Fractional Rig** In a fractional rig the forestay does not go all the way to the masthead and forestay tension cannot be directly balanced by tension in the backstay. Therefore, some mast bend is generally accepted and the mainsail is cut to fit the bend. A forestay tension of at least 15% of the cable strength is desirable. However, if this results in excessive mast bend it will be necessary to back off a bit. On some fractional rigs, diamond shrouds are used to reduce mast bend.

### **UPPER AND LOWER SHROUD TENSION**

**Masthead Rig** There is a simple criterion for shroud tension. The initial rigging tension should be high enough that the leeward shrouds do not go slack when sailing close-hauled in a reasonably brisk breeze. The proper value for your boat can be found by a few trial runs under sail. Once the correct tension is known, the gauge can be used to maintain the value.

For many boat designs a shroud tension of 10% to 12% of the breaking strength of the cable is adequate. Thus, for 7/32", 302/ 304 1x19 stainless steel cable, the upper and lower shrouds would be set to 600 to 700 lbs. tension. On some rigs it may be desirable to carry more tension in the uppers than in the lowers.

**Fractional Rig** For most fractional rigs the correct shroud tension is the same as that for a masthead rig, i. e., a tension setting that will keep the leeward shrouds from going slack. However there is one exception. On certain fractional rigs, the upper and lower shrouds lead to chain plates that are aft of the mast. The spreader is swept back. For such a rig most of the forestay tension is balanced by the upper shrouds. A shroud tension of approximately 20% of the cable strength may be required to achieve the desired forestay tension. Never exceed 25% of the cable breaking strength. (Refer to the breaking strength chart Table 1.)

NOTE! THE INTENDED USE OF THIS GAUGE IS TO BE USED ON 302 / 304 1x19 S.S. CABLE IN APPROPRIATE SIZES. IF USED ON OTHER CABLE TYPES, SIZES, AND CONSTRUCTION YOUR READINGS WOULD BE CONSISTENT (REPEATABLE) BUT POUND TENSION VALUES WOULD DIFFER FROM THOSE LISTED ON THE LABEL. GAUGE MAY NOT READ "O" WHEN AT REST, AS THEY ARE CALIBRATED AT MIDRANGE OF TENSION.

NOTE! IF FLAT SPOTS APPEAR ON NYLON SPOOLS AFTER EXTENDED USE, ROTATE NYLON SPOOLS 45°.

#### **ADDITIONAL SCALE READINGS**

#### **LBS. TENSION**

	CALIB	RATION	PLATE	CALIB	RATION	CALIBRATION PLATE				
	M	ODEL PI	Γ-1	M	ODEL PI	MODEL PT-3				
SCALE	3/32	1/8	5/32	3/16	7/32	1/4	1/4	9/32	5/16	3/8
5	70						550			
6	80						600			
7	90						700			
8	100						770	500		
9	110						830	550		
10	125			180			900	600	320	
11	135			240			1000	650	380	
12	150	100		270			1100	720	440	
13	160	110		300			1200	780	500	
14	170	125		330			1300	830	550	
15	185	135		370			1400	900	600	200
16	200	150		420			1500	1000	680	230
17	220	165		450			1650	1080	740	270
18	240	180		500			1800	1150	800	290

19	260	200		540			2000	1220	870	330
20	280	220	140	590	320			1300	950	360
21	300	240	155	640	360			1420	1050	380
22		260	170	700	410			1540	1130	420
23		280	185	770	450	300		1660	1210	480
24		300	200	840	500	350		1800	1300	530
25		320	220	920	560	400		1960	1400	570
26		345	245	1030	630	450		2130	1500	600
27		370	265	1110	680	500		2300	1600	650
28		390	300	1240	740	550		2500	1700	720
29		420	320		820	600			1850	800
30		450	335		890	660			2000	870
31		475	360		970	720			2200	930
32		500	390		1060	780			2400	1000
33			420		1180	840			2700	1100
34			450		1300	900			3000	1200
35			480		1480	1000				1300
36			520		1680	1100				1400
37			560			1200				1500
38			610			1300				1650
39			700			1600				1770
40			800			2000				1900
41										2100
42										2230
43										2400
44										2620
45										2850
46										3100
47										3400
48										3700
49										4100
50										4500

### **ADDITIONAL SCALE READINGS**

#### **KGS. TENSION**

	CALIBR MODEL	ATION P PT-1 ME		CALIB	CALIBRATION PLATE MODEL PT-3 METRIC					
	Kilograms				Kilograms					
SCALE	2.5mm	3mm	4mm	5mm	6mm	7mm	7mm	8mm	9mm	10mm
8	50									
9	54									
10	58						300			

11	62			95						
12	66			110			360	200		
13	70			120				220		
14	75			140				240		
15	82	70		150			480	270		
16	90	75		170				300		
17	100	82		180			550	330		
18	110	90		200				360		
19	120	100		220			630	400		
20	130	110		240				430		
21	140	120	70	260					460	
22		130	76	280	160		790	500		
23		140	83	310	180			540		
24		150	90	340	200		900	590		
25		160	100	370	210			630	370	
26		170	115	400	230		1100	680	410	
27		180	127	440	250			720	440	
28		190	140	490	270			770	480	
29		210	150	550	290			850	520	
30		220	160	620	320	220		920	560	
31		235	170		350	240		1000	590	
32		250	180		380	270		1100	630	
33			195		420	290		1240	700	
34			210		460	320		1400	750	400
35			225		510	350			810	430
36			240		570	370			870	460
37			260		640	400			940	500
38			280		730	440			1020	540
39			320			470			1100	590
40			360			510			1190	630
41			610			550			1300	680
42			700			620			1420	730
43			800						1600	790
44										870
45										940
46										1000
47										1090
48										1180
49										1270
50										1360
51										1500
52										1640
53										1800

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