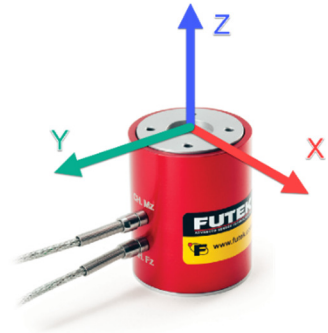


## Extraneous Load Factors

**Equation:**  $\sigma_{max} \geq AF_x + BF_y + CF_z + DM_x + EM_y + FM_z$



### Extraneous Load Coefficients:

#### Current Version:

Capacity [lb/in-lb]	Material	A	B	C	D	E	F
50/50	2024-T4	570	670	220	335	285	240
100/100	2024-T4	475	515	120	280	240	120
200/200	2024-T4	415	540	85	280	215	100
500/500	17-4 PH H900	205	740	80	395	120	90

#### Legacy Versions:

Capacity [lb/in-lb]	Material	A	B	C	D	E	F
50/50 SN: 861833 and prior	2024-T4	670	700	270	545	345	320
100/100 SN: 820424 and prior	2024-T4	490	700	150	570	250	155
200/200 SN: 871242 and prior	2024-T4	430	700	105	605	225	105

\*All Force and Moment to be calculated using lb and in-lb units

#### $\sigma_{max}$ Table:

Material	Static Load (=60% Y.S.)	Fatigue (Non-Reversing Loads)	Fatigue (Full Reversing Loads)
2024-T4	28,000	18,000	15,000
17-4 PH H900	100,000	78,000	62,000*

\*Value is 75% of Fatigue Strength based on 10-20 x 10<sup>6</sup> cycles and allow for factors that influence Fatigue such as surface finish, stress concentrations, corrosion, temperature and other variables during the production of the transducer, for runout life (100 x 10<sup>6</sup>) use 75% of values shown.

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## Deflection & Natural Frequency

### Current Version:

Capacity [lb/in-lb]	Z-Deflection [in]	Torsional Stiffness [in-lb/rad]	F <sub>z</sub> Natural Frequency [Hz]*	β
50/50	0.002	16,000	1800	0.11
100/100	0.002	22,000	2350	0.11
200/200	0.003	26,000	2700	0.11
500/500	0.002	160,000	2600	0.40

### Legacy Versions:

Capacity [lb/in-lb]	Z-Deflection [in]	Torsional Stiffness [in-lb/rad]	F <sub>z</sub> Natural Frequency [Hz]*	β
50/50 SN: 861833 and prior	0.002	15,000	1650	0.11
100/100 SN: 820424 and prior	0.002	20,000	2150	0.11
200/200 SN: 871242 and prior	0.003	23,000	2550	0.11

\*Natural frequencies results are based on FEA analysis. Analysis was performed assuming constrained fixed end.

### Natural Frequency & Frequency Response Equation's:

$$\text{Natural Frequency (FN)} = 3.13 \sqrt{\frac{1}{\frac{\beta}{\text{Capacity}} \cdot \text{Deflection}}} \text{ (Hz)}$$

$$\text{Frequency Response with load (FR)} = 3.13 \sqrt{\frac{1}{\frac{\beta + \text{AppliedLoad}}{\text{Capacity}} \cdot \text{Deflection}}} \text{ (Hz)}$$

\* β values are obtained by FUTEK Engineering

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