

Balance Specification

Unbalance is measured in ounce-inches, gram-inches or gram-millimeters, all having a similar meaning, namely a mass multiplied by its distance from the shaft axis. An unbalance of 100 gram-inches, for example, indicates one side of the rotor has an excess mass equivalent to 100 grams at a 1 inch radius or 20 grams at a 5 inch radius. In each case, the mass multiplied by its distance from the shaft axis, amounts to the same unbalance value 100 gram-inches.

For our Lincoln polygon scanners, Cambridge Technology typically uses G0.4 gyro balance (ISO 1940 standard) tolerance for the allowable amount of residual unbalance. The tolerance G0.4 is equal to 0.4 kilograms at 1 millimeter, distance from the shaft axis, per 1 kilogram, of rotor weight, at 1 radian per second, angular velocity.

The G0.4 balance tolerance will produce a peak rotor displacement of 0.4 millimeters at the scanner design speed.

Example calculation:

Rotor Mass = 0.1 Kilograms

Speed = 20,000 RPM

2094 Rad Per Sec

Unbalance tolerance per unit weight for G0.4 ISO balance grade

0.4 kg @ 1 mm @ 1 rad per sec divided by 2094 rad per sec = 1.9×10^{-4} kg @ 1mm

Maximum unbalance mass for a rotor weight of .1 kg

1.9×10^{-4} kg @ 1mm multiplied by .1 kg = 1.9×10^{-5} kg @ 1mm or 0.019g-mm

Unit Conversions:

<u>Units</u>	<u>Multiply By</u>
oz-in to g-in	28.3495
oz-in to g-mm	720.0778
g-in to oz-in	0.035274
g-in to g-mm	25.400
g-mm to oz-in	0.001388
g-mm to g-in	0.03937