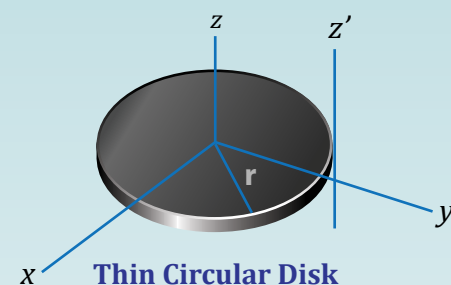


HOW TO PROPERLY SELECT A GEARBOX

WHEN IS A GEARBOX NEEDED?

- If your inertia load is much higher than the step motor's rotor inertia (deciding factor: inertial load) see sidebar for calculating load
- If you require very slow speeds (deciding factor: slower than 1 RPM)
- If you require high torque (deciding factor: more than Frame Size 34 motors)



$$I_{xx}=I_{yy}=\frac{1}{4} mr^2$$

$$I_{zz}=\frac{1}{2} mr^2$$

$$I_{z'z'}=\frac{3}{2} mr^2$$

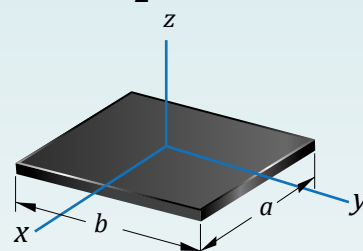
WHAT TYPE OF GEARBOX SHOULD BE USED?

OFFSET SPUR GEARBOXES:

- Low Cost but lower performance in both torque and accuracy

PLANETARY GEARBOXES:

- More expensive but provide plenty of torque
- Many choices of backlash for high accuracy



$$I_{xx}=\frac{1}{12} mb^2$$

$$I_{yy}=\frac{1}{12} mb^2$$

$$I_{zz}=\frac{1}{12} m(a^2+b^2)$$

WHAT SHOULD FIRST BE CONSIDERED?

HEAVY LOAD:

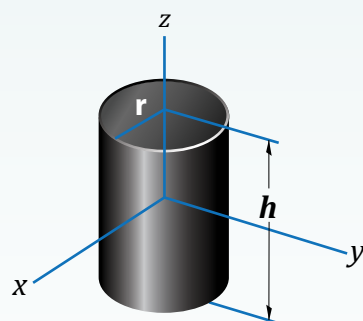
1. Calculate the inertial load
2. Determine approximately how fast you plan to accelerate the load
3. Select a suitable gearbox and motor

VERY SLOW SPEEDS

1. Determine how slow you need to move
2. Select a ratio that can allow the motor speed to be around 10 RPM or higher

HIGH TORQUE:

1. Determine the torque required for the application and choose a suitable gear ratio that requests for a reasonable amount of torque from the motor
2. Determine the desired speed of rotation
3. Select a motor that suits your needs



$$V=\pi r^2 h$$

$$I_{xx}=I_{yy}=\frac{1}{12} m(3r^2+h^2)$$

$$I_{zz}=mr^2$$



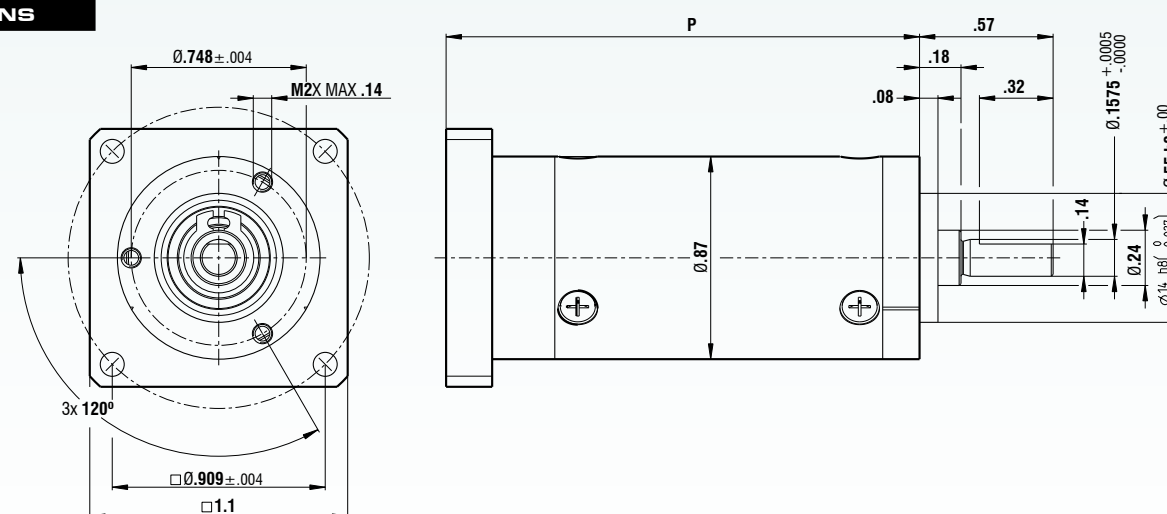
- High Efficiency
- Multiple ratios available
- Standard NEMA mountings
- Quick installation
- Cost Effective
- Low Noise Gearheads Available
- Can be used with model 208 motors (see page 43)

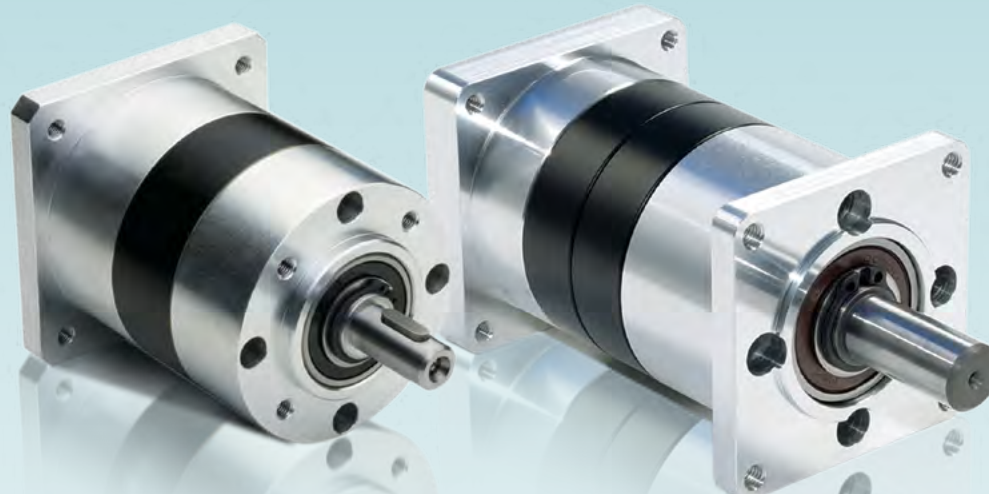
SPECIFICATIONS

PM11 (NEMA 11)

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl. factor $C_a = 1.0$)	84 oz-in	99 oz-in	113 oz-in	141 oz-in
Gearbox efficiency, approx.	90%	80%	70%	60%
Max. backlash in degree	1.5°	2.0°	2.5°	3.0°
Recommended initial speed	6,000 rpm	6,000 rpm	6,000 rpm	6,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	17.9 lbs.	17.9 lbs.	17.9 lbs.	17.9 lbs.
Max. load, axial	6.7 lbs.	6.7 lbs.	6.7 lbs.	6.7 lbs.
Max. perm. fitting pressure	33.7 lbs.	33.7 lbs.	33.7 lbs.	33.7 lbs.
Gearbox length p (in)	1.72 ± .02	2.10 ± 0.2	2.47 ± .02	2.85 ± 0.2
Weight (for gearbox length p)	.09 lbs.	.13 lbs.	.16 lbs.	.19 lbs.
Shaft OD (in)	.47	.47	.47	.47
Tolerance (in)	.00/-.0007	.00/-.0007	.00/-.0007	.00/-.0007
Available ratios * (* Additional ratios are available. Please contact Lin Engineering)	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
		35:1		

DIMENSIONS



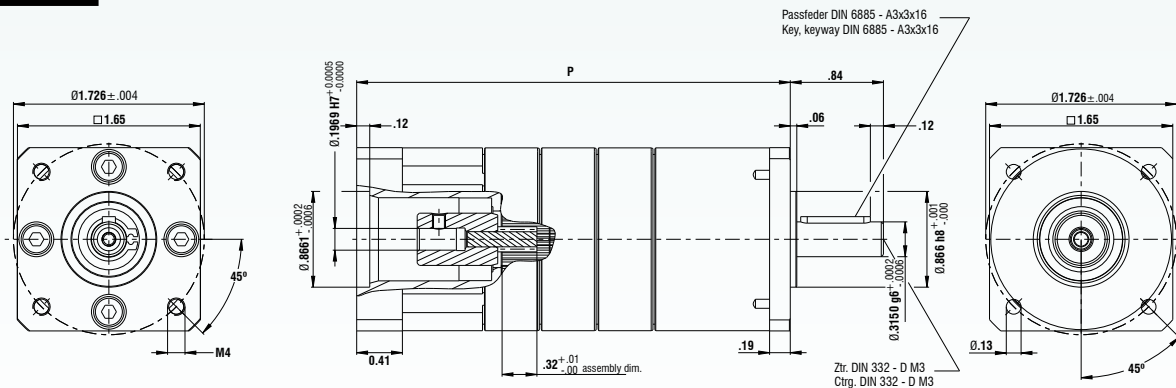


SPECIFICATIONS

PM17 (NEMA 17)

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl. factor $C_B = 1.0$)	424 oz-in	1062 oz-in	2124 oz-in	2124 oz-in
Gearbox efficiency, approx.	80%	0.75%	0.70%	0.65%
Max. backlash in degree	0.90°	0.95°	1.00°	1.05°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	35.97 lbs.	51.71 lbs.	67.44 lbs.	80.93 lbs.
Max. load, axial	11.24 lbs.	17.98 lbs.	24.73 lbs.	31.47 lbs.
Max. perm. fitting pressure	71.94 lbs.	71.94 lbs.	71.94 lbs.	71.94 lbs.
Gearbox length p (in)	2.89 ± .02	3.41 ± .02	3.93 ± .02	4.44 ± .02
Weight (for gearbox length p)	.88 lbs.	1.10 lbs.	1.32 lbs.	1.54 lbs.
Shaft OD (in)	.03	.03	.03	.03
Tolerance (in)	.0001/-.0006	.0001/-.0006	.0001/-.0006	.0001/-.0006
Tapped Hole Thread (Shaft center)	M3	M3	M3	M3
Available ratios *	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
	(* Additional ratios are available. Please contact Lin Engineering)			

DIMENSIONS

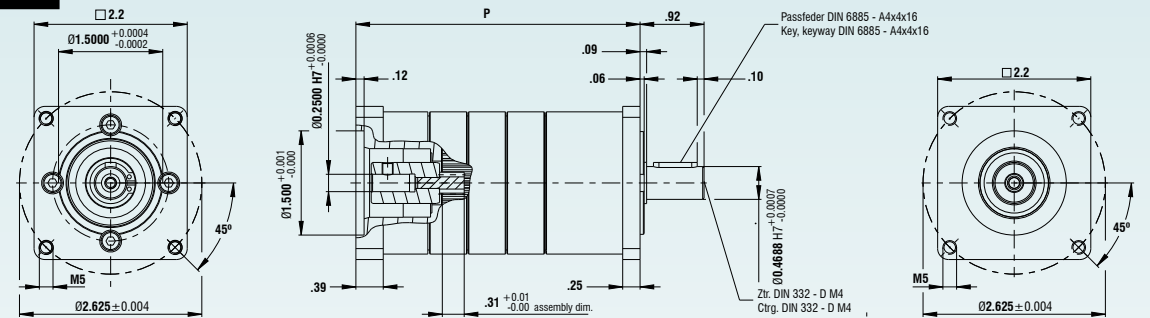


SPECIFICATIONS

PM23 (NEMA 23)

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl. factor $C_B = 1.0$)	566 oz-in	1699 oz-in	3540 oz-in	3540 oz-in
Gearbox efficiency, approx.	80%	75%	70%	65%
Max. backlash in degree	0.70°	0.75°	0.80°	0.85°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	44.96 lbs.	71.94 lbs.	101.16 lbs.	112.40 lbs.
Max. load, axial	13.49 lbs.	22.48 lbs.	33.72 lbs.	44.96 lbs.
Max. perm. fitting pressure	112.40 lbs.	112.40 lbs.	112.40 lbs.	112.40 lbs.
Gearbox length p (in)	2.98 ± .02	3.54 ± .02	4.09 ± .02	4.65 ± .02
Weight (for gearbox length p)	1.54 lbs.	1.98 lbs.	2.43 lbs.	2.87 lbs.
Shaft OD (in)	.47	.47	.47	.47
Tolerance (in)	.000/-.0007	.000/-.0007	.000/-.0007	.000/-.0007
Tapped Hole Thread (Shaft center)	M4	M4	M4	M4
Available ratios *	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
	(* Additional ratios are available. Please contact Lin Engineering)			

DIMENSIONS



SPECIFICATIONS

PM34 (NEMA 34)

PARAMETER	1-STAGE	2-STAGE	3-STAGE	4-STAGE
Perm. output torque (Appl. factor $C_B = 1.0$)	2832 oz-in	8496 oz-in	16993 oz-in	16993 oz-in
Gearbox efficiency, approx.	80%	0.75%	70%	65%
Max. backlash in degree	0.50°	0.55°	0.60°	0.65°
Recommended initial speed	3,000 rpm	3,000 rpm	3,000 rpm	3,000 rpm
Operating temperature	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C	-30°C to +140°C
OUTPUT SIDE WITH BALL BEARING (2RS)				
Max. load, radial	89.92 lbs.	134.89 lbs.	224.81 lbs.	292.25 lbs.
Max. load, axial	17.98 lbs.	26.98 lbs.	44.96 lbs.	62.95 lbs.
Max. perm. fitting pressure	337.21 lbs.	337.21 lbs.	337.21 lbs.	337.21 lbs.
Gearbox length p (in)	4.24 ± .02	5.09 ± .02	5.94 ± .02	6.79 ± .02
Weight (for gearbox length p)	3.97 lbs.	5.51 lbs.	7.05 lbs.	8.60 lbs.
Shaft OD (in)	.75	.75	.75	.75
Tolerance (in)	.000/-.0008	0.00/-.0021	0.00/-.0021	0.00/-.0021
Tapped Hole Thread (Shaft center)	M6	M6	M6	M6
Available ratios *	4:1	14:1	51:1	Contact Lin
	5:1	19:1	71:1	Contact Lin
	7:1	25:1	100:1	Contact Lin
	(* Additional ratios are available. Please contact Lin Engineering)			

DIMENSIONS

