Micron AquaTRUE™ AQT Series Planetary Gearheads B4

High Precision, Low Backlash, Compact-Sized Reduction for Servo Motors

NSF International Certified



Sizing and Selection

- Step 1: Select the required precision class and gearhead configuration (in-line or right angle).
- Step 2: Select the proper gearhead using exact or general method.

For continuous duty applications, please contact Applications Engineering.



General Method: Required Gearhead Torque(Tr,)

(1) $T_r = T_M * x i x e$ where: $T_{M^*} =$ continuous torque of motor i =Gearhead ratio

i = Gearhead ratio e = efficiency of Gearhead

* Since many motors are capable of exceeding their continuous torque rating for extended lengths of time, the value for T_M will only provide a starting point for Gearhead selection. Only use the general method if the continuous motor rating is not exceeded in the application.

Exact Method



 $t_n = time \text{ period } n$ $n_{nm} = mean \text{ speed during time period } t_n$

 $T_n = torque during time period t_n$

Mean input speed (n_m)

(2)
$$n_{\underline{m}} = n_{1\underline{m}}t_1 + n_{2\underline{m}}t_2 + n_{3\underline{m}}t_3 + \dots + n_{n\underline{m}}t_n$$

 t_t
where $t_t = t_1 + t_2 + t_3 + \dots + t_n$

Equivalent torque (T_{EQ})

3)
$$T_{EQ} = {}_{8,7} \sqrt{T_1^{8,7} \frac{n_1 m_1 t_1}{n_m t_1} + T_2^{8,7} \frac{n_{2m} t_2 + T_3^{8,7} n_{3m} t_3 + \dots + T_n^{8,7} \frac{n_{nm} t_n}{n_m t_1}}{n_m t_1}}$$

Modified equivalent torque (T_{EQm})

where Q is:

(4) $T_{EQm} = (T_{EQ})/Q$	

Q	# of cycles/hr
1,0	>0
0,9	>1000
0,7	>2500
0,5	>5000

For applications > 10,000 cycles/hour or for continuous duty operation, please contact application engineering.

Ordering Information



Modifications

Micron offers many different customization options to allow customers to meet the unique challenges of their applications.

Simple modifications that usually have little or no impact to price and lead time

- Output shaft modifications (shorter length or smaller diameter)
- Output shaft modifications (longer length or larger diameter would be product dependent)
- Custom output shaft designs (spline shafts, tapped holes)
- Higher precision options
- New ratio combinations (three stage designs, new ratios)
- Custom greases (food grade, low temperature, vacuum prep)
- Stainless steel, nickel plating or paint options

Other modifications that may require volume or longer lead time

- Envelope-size reductions (shorter length or width)
- Machined and mounted output gears
- Heavy shock and vibration requirements
- White paper, ground-up designs

Performance Specifications

			20,000 Hour Life					Torsional	
	Part Number	Ratio	Tr	Tr	Tr	Tr	T Peak	J	Stiffness
			(1000 rpm)	(2000 rpm)	(3000 rpm)	(4000 rpm)	NM [IN-ID]	kg-cm2	Nm/arc-min
	AOT060-003	3.1	16 [139]	13 [112]	12 [102]	11 [93]	55 [483]	0.572 [5.066]	1 /0 [13 17]
000	AQT000-004	4.1	20 [177]	17 [149]	15 [130]	14 [121]	46 [409]	0.457 [4.047]	1 47 [12 97]
Ĕ	AQT060-005	5.1	18 [158]	15 [130]	13 [112]	12 [102]	48 [427]	0.408 [3.615]	1 45 [12 79]
¥	AQT060-007	7:1	17 [149]	14 [121]	12 [102]	11 [93]	43 [381]	0.367 [3.245]	1.40 [12.41]
	AQT060-010	10:1	16 [139]	15 [130]	14 [121]	13 [112]	47 [418]	0.347 [3.068]	1.36 [12.07]
	AQT060-015	15:1	26 [232]	21 [186]	19 [167]	17 [149]	55 [483]	0.387 [3.424]	1.49 [13.14]
	AQT060-020	20:1	27 [242]	25 [223]	22 [195]	21 [186]	48 [427]	0.385 [3.408]	1.47 [13.00]
	AQT060-025	25:1	25 [223]	23 [204]	20 [177]	19 [167]	55 [483]	0.384 [3.400]	1.45 [12.85]
	AQT060-030	30:1	29 [260]	26 [232]	23 [204]	21 [186]	55 [483]	0.340 [3.006]	1.49 [13.18]
	AQT060-040	40:1	28 [251]	27 [242]	27 [242]	25 [223]	48 [427]	0.339 [3.002]	1.47 [13.04]
	AQT060-050	50:1	26 [232]	25 [223]	25 [223]	23 [204]	55 [483]	0.339 [3.001]	1.46 [12.88]
	AQT060-070	70:1	25 [223]	24 [214]	24 [214]	22 [195]	48 [427]	0.339 [2.999]	1.38 [12.23]
	AQT060-100	100:1	21 [186]	20 [177]	19 [167]	18 [158]	43 [381]	0.339 [2.998]	1.29 [11.41]
80	AQ1080-003	3:1	59 [520]	48 [427]	43 [381]	39 [344]	165 [1459]	2.433 [21.5]	6.21 [54.96]
Ê	AQ1080-004	4:1	70 [623]	58 [511]	53 [465]	48 [427]	165 [1459]	1.929 [17.1]	6.19 [54.81]
AG	AQ1080-005	5:1	65 [576]	53 [465]	47 [418]	43 [381]	165 [1459]	1.692 [15.0]	6.12 [54.18]
	AQ1080-007	0.1		0 [446]	45 [400]	40 [303]		1.472 [13.0]	5.70 [00.41]
	AQ1080-008	0.1	54 [474]	49 [434]	45 [396]	42 [372]	165 [1400]	1.420 [12.0]	5.83 [51.62]
	ΔΟΤ080-015	15.1		78 [688]	69 [613]	63 [558]	175 [1552]	1.605 [1/ 2]	6.18 [54.70]
	AQT080-020	20.1	92 [818]	88 [781]	81 [716]	75 [660]	175 [1552]	1.598 [14.1]	6 18 [54 67]
	AQT080-025	25:1	87 [771]	83 [734]	76 [669]	69 [613]	175 [1552]	1.594 [14.1]	6.11 [54.10]
	AQT080-030	30:1	100 [883]	90 [799]	85 [753]	78 [688]	175 [1552]	1.367 [12.1]	6.18 [54.68]
	AQT080-040	40:1	96 [846]	92 [818]	90 [799]	88 [781]	175 [1552]	1.365 [12.1]	6.18 [54.67]
	AQT080-050	50:1	90 [799]	87 [771]	85 [753]	83 [734]	175 [1552]	1.364 [12.1]	6.11 [54.10]
	AQT080-070	70:1	88 [781]	85 [753]	83 [734]	82 [725]	175 [1552]	1.363 [12.1]	5.37 [48.28]
	AQT080-080	80:1	84 [743]	80 [708]	78 [690]	74 [655]	175 [1549]	1.363 [12.1]	5.33 [47.21]
	AQT080-100	100:1	72 [641]	67 [595]	63 [558]	61 [539]	175 [1552]	1.363 [12.1]	5.58 [49.34]
20	AQT120-003	3:1	90 [799]	74 [650]	65 [576]	59 [520]	298 [2639]	9.014 [79.8]	13.58 [120.15]
Ë	AQT120-004	4:1	107 [948]	89 [790]	79 [697]	74 [650]	298 [2639]	7.286 [64.5]	13.49 [119.36]
AQ	AQT120-005	5:1	99 [873]	81 [716]	71 [632]	65 [576]	298 [2639]	6.484 [57.4]	13.37 [118.32]
	AQT120-007	/:1	97 [855]	79 [697]	68 [604]	63 [558]	298 [2639]	5.746 [50.9]	12.96 [114.65]
	AQT120-010	10:1	8/ [//]	110 [1050]	74 [650]	09 [013]	298 [2639]	5.376 [47.6]	12.12 [107.27]
	AQT120-015	20:1	140 [1292]				298 [2039]	6 127 [54.2]	12.22 [117.00]
	AQT120-020	20.1	161 [1/22]	130 [1227]	116 [1022]	106 [030]	298 [2639]	6 100 [5/ 0]	13.32 [117.90]
	AQT120-020	30.1	180 [1589]	146 [1292]	129 [1143]	119 [1050]	298 [2639]	5 298 [46 9]	13.39 [115.53]
	AQT120-040	40:1	187 [1654]	169 [1496]	150 [1329]	139 [1227]	298 [2639]	5.292 [46.8]	13.47 [119.22]
	AQT120-050	50:1	179 [1580]	161 [1422]	142 [1254]	130 [1152]	298 [2639]	5.289 [46.8]	13.40 [118.57]
	AQT120-070	70:1	176 [1561]	159 [1403]	140 [1236]	128 [1134]	298 [2639]	5.274 [46.7]	13.00 [115.05]
	AQT120-100	100:1	120 [1059]	109 [966]	104 [920]	100 [883]	298 [2639]	5.281 [46.7]	12.22 [108.18]
0	AQT160-003	3:1	317 [2806]	257 [2277]	228 [2016]	209 [1849]	876 [7750]	36.396 [322.13]	46.71 [413.39]
16	AQT160-004	4:1	371 [3280]	305 [2695]	272 [2407]	251 [2221]	876 [7750]	26.642 [235.80]	46.16 [408.73]
Ø	AQT160-005	5:1	350 [3094]	284 [2509]	251 [2221]	230 [2035]	876 [7750]	22.246 [196.89]	45.43 [402.08]
	AQT160-007	7:1	344 [3048]	278 [2463]	246 [2174]	225 [1989]	876 [7750]	18.551 [164.19]	43.44 [384.46]
	AQT160-010	10:1	222 [1961]	198 [1756]	185 [1635]	175 [1552]	876 [7750]	16.606 [146.97]	40.98 [362.68]
	AQ1160-015	15:1	508 [4498]	417 [3689]	370 [3271]	339 [3001]	876 [7750]	19.892 [176.06]	45.19 [399.89]
	AQ1160-020	20:1	513 [4544]	481 [4256]	428 [3791]	395 [3494]	876 [7750]	19.721 [174.55]	46.39 [410.38]
	AQT160-025	25:1	492 [4358]	460 [4070]	407 [3605]	374 [3308]	876 [7750]	19.632 [1/3.75]	45.62 [403.72]
	AQT160-030	30:1	536 [4971]	513 [4544]	400 [4024]	417 [3089]	876 [7750]	15.971 [141.36]	40.82 [413.83]
	AOT160-040	50.1	515 [4759]	492 [4344]	479 [4423]	460 [4230]	876 [7750]	15 971 [141.30]	45.60 [403.50]
	AQT160-070	70.1	509 [4507]	487 [4312]	474 [4191]	455 [4024]	876 [7750]	15.952 [141.18]	45.53 [385.27]
	AQT160-100	100:1	306 [2704]	279 [2472]	265 [2342]	254 [2249]	876 [7750]	15.941 [141.09]	40.95 [362.45]

 T_r = Rated output torque at rated speed for specific hours of life.

 T_{peak} = Allowable momentary peak torque for emergency stop or heavy shock loading. J = Mass moment of inertia reflected to the input shaft (including pinion assembly).

Specifications subject to change without notice.

Performance Specifications

Radial and Axial Load Ratings





Speed rpm	Axial Load, F _a N [lb _r]
50	2542 [571]
100	2017 [454]
250	1486 [334]
500	1180 [265]
1000	936 [211]





Speed rpm	Axial Load, F _a N [lb,]
50	3780 [850]
100	3000 [675]
250	2211 [497]
500	1755 [394]
1000	1393 [313]





Speed rpm	Axial Load, F _a N [lb _i]
50	6894 [1550]
100	5471 [1230]
250	4034 [907]
500	3203 [720]
1000	2540 [571]





Speed rpm	Axial Load, F _a N [lb,]
50	14,122 [3175]
100	11,209 [2520]
250	8260 [1857]
500	6556 [1474]
1000	5204 [1170]

These graphs display the allowable radial load at a given distance (X) from the mounting surface based on an L_{10} life of 20,000 hours for the mean output speed.

Dimensions



* 'L' Dimension will change depending on motor being used. Note: Mounting adapters available for both round and square motors.

Dimensions

Part Number	A Output Shaft Diameter mm [in.]	B Output Shaft Length mm [in.]	Y Shaft End Distance mm [in.]	V Keyway Length mm [in.]	R Keyway Height mm [in.]	l Key Width mm [in.]	H Pilot Diameter mm [in.]	J Body Diameter mm [in.]
AQT060	14 [0.55]	36.8 [1.45]	2.5 [0.10]	25 [0.98]	16 [0.63]	5 [0.20]	43 [1.69]	60 [2.36]
AQT080	20 [0.79]	43.2 [1.70]	4.0 [0.16]	28 [1.10]	22.5 [0.89]	6 [0.24]	60 [2.36]	80 [3.15]
AQT120	25 [0.98]	58.4 [2.30]	5 [0.20]	40 [1.57]	28 [1.10]	8 [0.31]	80 [3.15]	110.5 [4.36]
AQT160	40 [1.57]	90.3 [3.56]	8.0 [0.32]	65 [2.55]	43 [1.69]	12 [0.47]	105 [4.13]	140 [5.50]

Part Number	F Pilot Length mm [in]	D Output Housing Thread	E Thread Depth mm [in]	K Input Body Diameter	* L Standard Length mm [in]		C Bolt Circle mm [in]	P Output Body Length
				mm [in]	ratio 3:1 - 10:1	ratio 15:1 - 100:1		mm [in]
AQT060	2.5 [0.098]	M5x0.8-6H	8.1 [0.32]	92 [3.62]	91.7 [3.61]	109 [4.29]	52 [2.05]	38.5 [1.51]
AQT080	2.5 [0.098]	M6x1.0-6H	10.1 [0.40]	114.5 [4.51]	119.7 [4.71]	142.7 [5.62]	70 [2.76]	30.8 [1.21]
AQT120	4.0 [0.157]	M10x1.5-6H	16 [0.63]	150 [5.9]	148.2 [5.83]	179.3 [7.06]	95 [3.74]	56.1 [2.21]
AQT160	5.0 [0.197]	M12x1.75-6H	21.6 [0.85]	188.7[7.43]	195.8 [7.71]	243.8 [9.60]	124 [4.88]	76 [2.99]

Specifications

Part	Stagos	Backlash	Efficiency	Weight		Patio Availability
Number	Stages	(arc-min)	Eniciency	kg	[lbs.]	
AQT060	1	13	93%	2.4	[5.4]	3:1, 4:1, 5:1, 7:1; 10:1
	2	15	88%	3.3	[7.3]	15:1, 20:1, 25:1, 30:1, 40:1,50:1; 70:1; 100:1
AQT080	1	13	93%	5.7	[12.7]	3:1, 4:1, 5:1, 7:1; 8:1; 10:1
	2	15	88%	7.2	[15.9]	15:1, 20:1, 25:1, 30:1, 40:1, 50:1; 70:1; 80:1; 100:1
AQT120	1	13	93%	12.0	[26.5]	3:1, 4:1, 5:1, 7:1; 10:1
	2	15	88%	15.4	[33.9]	15:1, 20:1, 25:1, 30:1, 40:1, 50:1; 70:1; 100:1
AQT160	1	13	93%	24.8	[53.8]	3:1, 4:1, 5:1, 7:1; 10:1
	2	15	88%	31.2	[68.8]	15:1, 20:1, 25:1, 30:1, 40:1, 50:1; 70:1; 100:1

 T_r = Rated output torque at rated speed for specific hours of life.

 T_{peak} = Allowable momentary peak torque for emergency stop or heavy shock loading.

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Mounting Instructions

- 1. Slide the provided sleeve into the hub and align the slot in the bushing with the slot in the hub.
- 2. Set the motor on a work surface or hold fixture with the output shaft facing straight up. If there is a key on the motor, remove it and align the keyway with the slot in the hub. Slide the gearhead down onto the motor shaft.
- 3. Rotate the hub to align the input housing access holes with the hub clamping bolts.
- 4. Using a torque wrench, tighten the hub bolts to the pre-torque value indicated in the table.
- 5. Bolt the motor to the gearhead with the bolts provided.
- 6. Gradually tighten the hub bolts in three steps, increasing the torque each time until reaching the final tightening torque in the table.
- 7. Incorrectly mounted motor and gearbox void the warranty

Hub Bolt Tightening Torques

Gearhead	Gearhead	Pre-Tighter	ning Torque	Final Tightening Torque		
Model	Frame Size	inIb.	[Nm]	inIb.	[Nm]	
AquaTRUE™	060	2	0.2	39	4.4	
	080	4	0.4	76	8.5	
	120	16	1.8	316	36	
	160	32	3.6	636	72	

Gearhead must be mounted in vertical orientation.

Lubrication

All AQT Series Planetary Gearheads are supplied as Lubricated-for-Life for maximum efficiency, maintenance-free operation. The inherent design of planetary gearing is conducive to the use of grease as a lubricant, because the rotation of the sun and planet gears inside of the internal ring gear promotes even distribution of the lubricant and consistent recirculation. The lubricant we apply at the time of assembly is Lubriplate FGL-1 grease which has the characteristics shown below.

LUBRICANT	Туре	Operating Temperature Range	Certifications	Comments
Klubersynth FGL-1	Mineral-base, NLGI Grade 1	0 to 360*F	NSF International H-1 Registered	H1 Food-Grade

Notes: Temperature limit is dictated by multiplier components and not the lubricant.



Installation

B 4	Notes