TUF ONE
TURNING TO BECOME

PLANETARY REDUCER

ADVANCE SERIES

- TUB/TRB
- TUF/TRF
- TUD/TRD

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TURNING TO BECOME

TUF ONE is committed to create new value in Gear Reducer field; to optimized working conditions, and to provide new user experience. The precision planetary reducer introduced in phase one serves the application that required accurate positioning, such as processing machines, automation systems, etc.

With it's unique design and excellent manufacturing capability, TUF ONE is proudly presenting the planetary reducer, which is having ultra-low backlash to maximized smoothness in machnism and to generate high torque output and efficiency in rotary.

COMPANY PROFILE

Turvo International Co., Ltd. located in the industry clustering of the precision machinery industry of Taichung City. Expertised in metal machining parts development and production for decades. We built up the domain knowledge thru partnering with world famous enterprises, at the same time continuously improved in process and quality system.

In the next milestone, Turvo is introducing the new brand, TUF ONE to the world via precision planetary reducers and eager to prosue prosperous results in this field.
More information aboutTurvo, please refer to https://www.turvo.com.tw/

PRODUCT ADVANTAGES

DESIGN FROM ITALY

Co-work with Italian design house - MM design to give the planetary reducer a new face.

IDEA TO REAL

The innovation built up with professional analysis and calculation bringing the stunning design to the real world.

SPECTACULAR CRAFTSMANSHIP

Unique Plasma nitridation process optimized the strength and minimized damage to critical parts to give superb performance.

INSTALLER FRIENDLY

Utility model patent : Optimize installation procedure by giving an obstuction onto the input shaft to hold the clamping hub.

ENHANCE LUBRICATION

Invention patent : Put an oil groove onto the inner hole of gears to keep the needle roller bearing fully lubricated and keep smooth operating.

CONSIDERATED GRIP

Provides comfortable gripping feel for stable handling.

QUALITY GUARDIAN

Product guaranteed by tier 1 testing equipment before shipping to customer. Tracebility is available to track production history of every component used in the reducer.

ADVANCE SERIES

TUB / TRB

01. Characteristic

Outstanding Precision

High Efficiency

Heavy-duty output

Easy mounting

Quiet operation

- High precision and accurate positioning
- High efficiency, minimizing loss
- 200 times torque amplified
- Easy to install, no calibration required
- Low noise and smooth rotation

TUB / TRB								
	TUB042	TRB042	TUB060 TUB060A	TRB060 TRB060A	TUB090 TUB090A	TRB090 TRB090A	TUB115 TUB115A	TRB115 TRB115A
Flange size *(mm)*	42x42		60x60		90x90		115x115	
Motor output diameter *(mm)*	≤Ø11 / ≤Ø12		≤Ø14 / ≤Ø16		≤Ø19 / ≤Ø24		≤ Ø32	
Motor power *(W)*	50W~100W		100W~400W		400W~1.5kW		750W~1.5kW	
Stage & Ratio	1. stage: 3~10 2. stage: 12~100	1. stage: 3~10 2. stage: 12~100	1. stage: 3~10 2. stage: 12~100	1. stage: 3~20 2. stage: 25~200	1. stage: 3~10 2. stage: 12~100	1. stage: 3~20 2. stage: 25~200	1. stage: 3~10 2. stage: 12~100	1. stage: 3~20 2. stage: 25~200
Orientation of Input & Output	Coaxial	Vertical	Coaxial	Vertical	Coaxial	Vertical	Coaxial	Vertical
Output Shaft Option	Smooth shaft, Key shaft, DIN 5480 splined shaft							
Lifetime *(hours)*	20,000							
Ambient temp. *(°C)*	-10°C~90°C							
Protection class	IP65							
Lubrication	Synthetic grease							
Material	Stainless steel & Aluminum alloy							

ORDERING CODE										
TUB	042	A	-	005	-	S	-	P2	/	Motor
Type	Flange Size	2-stage Type		Ratio		Output Type		Backlash Grade		Manufacturer & Model Number
TUB TRB	042 060 090 115	A: When the dimensions of two gearboxes are identical.		003~200		S: Smooth shaft K: Key shaft G: DIN5480 splined shaft		P0 P1 P2		Mounted servo motor

01. Performance Index TUB

Performance Index TUB								
Properties	Ratio	TUB042	TUB060	TUB060A	TUB090	TUB090A	TUB115	TUB115A
Allowable Rated Torque (T_N) *Nm*	3	16	45		132		240	
	4	18	50		138		300	
	5	22	60		160		340	
	6	20	55		150		310	
	7	19	50		140		300	
	8	17	45		120		280	
	9	14	42		112		260	
	10	13	40		100		240	
	12	18	45	45	132	132	240	240
	15	19	45	45	132	132	240	240
	18	19	45	45	132	132	240	240
	20	20	50	50	138	138	300	300
	25	22	60	60	138	138	340	340
	28	19	50	50	138	138	340	340
	30	20	55	55	150	150	340	340
	35	19	50	50	140	140	340	340
	40	17	55	55	140	140	340	340
	45	14	55	55	112	112	260	260
	50	22	55	55	120	120	280	280
	60	19	55	55	130	130	300	300
	70	20	45	45	140	140w	260	260
	80	17	45	45	120	120	240	240
	90	14	40	40	100	100	240	240
	100	14	40	40	100	100	240	240
Emergency Stop Torque (T_S) *Nm*	3~100	3 times of Allowable Rated Torque						
Max. Acceleration Torque (T_A) *Nm*	3~100	60% of Emergency Stop Torque						
Allowable Rated Speed (n_{1N}) *rpm*	3~100	5,000	5,000	5,000	4,000	4,000	4,000	4,000
Max. Allowable Input Speed *rpm*	3~100	10,000	10,000	10,000	8,000	8,000	8,000	8,000
Torsional Stiffness *Nm/arcmin*	3~100	3	7	7	14	14	27	27
Allowable Radial Force (F_r)[1] *N*	3~100	780	1560	1560	3300	3300	6800	6800
Allowable Axial Force (F_a)[2] *N*	3~100	390	780	780	1650	1650	3400	3400
Max. Tilting Moment (M_{2K})[3] *Nm*	3~100	25	65	65	200	200	550	550
Backlash *arcmin* P0[4]	3~10	-	-	-	≤1	-	≤ 1	-
	12~100	-	-	-	-	-	≤ 3	≤ 3
Backlash *arcmin* P1[5]	3~10	≤ 3	≤ 3	-	≤ 3	-	≤ 3	-
	12~100	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
Backlash *arcmin* P2[6]	3~10	≤ 5	≤ 5	-	≤ 5	-	≤ 5	-
	12~100	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
Efficiency %	3~10	≥ 97						
	12~100	≥ 94						

Properties		Ratio	TUB042	TUB060	TUB060A	TUB090	TUB090A	TUB115	TUB115A
Operation Noise	*dB*	3~100	≤ 60					≤ 65	
Weight	*kg*	3~10	0.6	1.2		3.6		7.8	
		12~100	0.8	1.5	1.8	4	5.2	9	11.2
Mass Moment of Inertia *kgcm²*		3	0.03	0.16		0.66		3.3	
		4	0.03	0.14		0.53		2.8	
		5	0.03	0.13		0.48		2.75	
		6	0.03	0.13		0.45		2.72	
		7	0.03	0.13		0.45		2.68	
		8	0.03	0.13		0.44		2.65	
		9	0.03	0.13		0.44		2.62	
		10	0.03	0.13		0.44		2.62	
		12	0.03	0.03	0.16	0.16	0.61	0.61	3.25
		15	0.03	0.03	0.13	0.13	0.47	0.47	2.71
		18	0.03	0.03	0.14	0.13	0.47	0.47	2.74
		20	0.03	0.03	0.13	0.14	0.47	0.47	2.71
		25	0.03	0.03	0.13	0.13	0.48	0.48	2.71
		28	0.03	0.03	0.14	0.14	0.47	0.47	2.74
		30	0.03	0.03	0.13	0.13	0.48	0.48	2.71
		35	0.03	0.03	0.14	0.14	0.47	0.47	2.74
		40	0.03	0.03	0.13	0.13	0.47	0.47	2.71
		45	0.03	0.03	0.13	0.13	0.47	0.47	2.71
		50~100	0.03	0.03	0.13	0.13	0.44	0.44	2.57

1-stage reducer is listed on the yellow cell and 2-stage reducer is listed on the orange cell.

[1] The load at which the output bearing is at 100 rpm output speed (Axial load = 0 and radial load point is in the center of the output shaft)

[2] The load at which the output bearing is at 100 rpm output speed (Radial load = 0 and axial load point is in the center of the output shaft)

[3] Formula of Max. Tilting Moment is below.

[4] If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

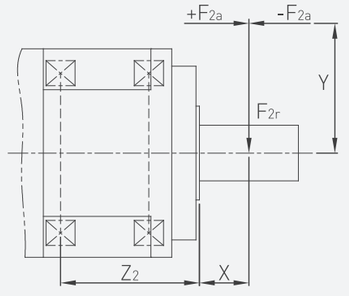
[5] If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

[6] If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

Max. Tilting Moment

$$M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z_2)}{1000}$$

F_{2a} *(Nm)* : Axial force acting on the shaft
F_{2r} *(Nm)* : Radial force acting on the shaft



Unit: mm

Type/Dimension	TUB042/TRB042	TUB060/TRB060	TUB090/TRB090	TUB115/TRB115
Z_2	32.5	44	57.5	66.5

01. Performance Index TRB

Performance Index TRB								
	Ratio	TRB042	TRB060	TRB060A	TRB090	TRB090A	TRB115	TRB115A
Allowable Rated Torque (T_N) *Nm*	3	16	45		132		240	240
	4	18	50		138		300	300
	5	22	60		160		340	340
	6	20	55		150		310	310
	7	19	50		140		300	300
	8	17	45		120		280	280
	9	14	42		112		260	260
	10	13	40		100		240	240
	12	18	55		150		310	310
	14	19	50		140		300	300
	16	19	45		120		280	280
	20	20	40		100		240	240
	25	22	60	60	160	160	340	340
	28	19	50	50	132	132	300	300
	30	20	55	55	150	150	310	310
	35	19	50	50	140	140	300	300
	40	17	50	50	120	120	280	280
	45	14	50	50	112	112	260	260
	50	22	50	50	150	150	340	340
	60	19	55	55	150	150	310	310
	70	20	50	50	140	140	300	300
	80	17	45	45	120	120	280	280
	90	14	40	40	100	100	240	240
	100	14	40	40	100	100	240	240
	120			55	140	140	300	300
	140			50	140	140	300	300
	160			45	120	120	260	260
	180			45	100	100	230	230
	200			45	100	100	230	230
Emergency Stop Torque (T_S) *Nm*	3~200	3 times of Allowable Rated Torque						
Max. Acceleration Torque (T_A) *Nm*	3~200	60% of Emergency Stop Torque						
Allowable Rated Speed (n_{1N}) *rpm*	3~200	3,000						
Max. Allowable Input Speed *rpm*	3~200	7,000						
Torsional Stiffness *Nm/arcmin*	3~200	3	7	7	14	14	27	27
Allowable Radial Force (F_r)[1] *N*	3~200	780	1560	1560	3300	3300	6800	6800
Allowable Axial Force (F_a)[2] *N*	3~200	390	780	780	1650	1650	3400	3400
Max. Tilting Moment (M_{2k})[3] *Nm*	3~200	25	65	65	200	200	550	550
Backlash P0[4]	3~20	-	-	-	≤ 2	-	≤ 2	-
	12~200	-	-	-	≤ 4	≤ 4	≤ 4	≤ 4
Backlash P1[5]	3~20	≤ 4	≤ 4	-	≤ 4	-	≤ 4	-
	12~200	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
Backlash P2[6]	3~20	≤ 6	≤ 6	-	≤ 6	-	≤ 6	-
	12~200	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9
Efficiency *%*	3~20	≥ 95						
	25~200	≥ 92						
Operation Noise *dB*	3~200	≤ 60			≤ 65		≤ 70	

		Ratio	TRB042	TRB060	TRB060A	TRB090	TRB090A	TRB115	TRB115A
Weight	*kg*	3~20	0.9	2.1		6.4		12.1	
		25~200	1.2	1.8	2.6	4.8	8	11.5	16
Mass moment of inertia	*kgcm²*	3~10	0.09	0.35		2.25		6.84	
		12~20	0.09	0.35		2.25		6.84	
		25~90	0.09	0.09	0.09	0.35	0.35	2.25	2.25
		100~200			0.35	0.35	1.88	1.88	6.25

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[2] The load at which the output bearing is at 100 rpm output speed (Radial load = 0 and axial load point is in the center of the output shaft)

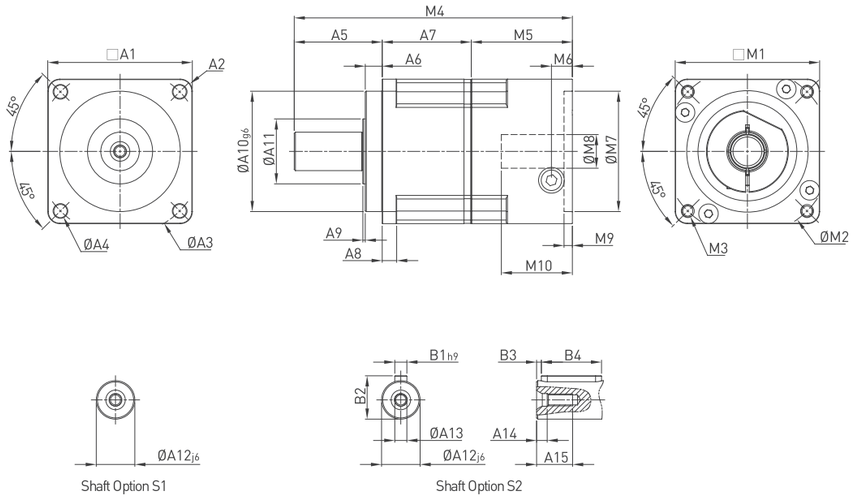
[3] Formula of Max. Tilting Moment refers to the page of TUB performance index.

[4] If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

[5] If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

[6] If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

TUB 1 - STAGE

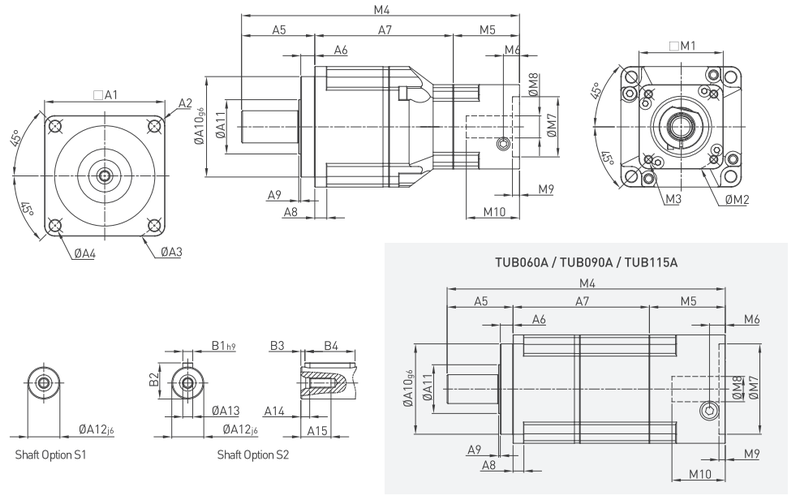


unit: mm

Dimension	TUB042	TUB060	TUB090	TUB115
A1	42	60	90	115
A2	R5	R5	R8	R8
A3	50	70	100	130
A4	3.4	5.5	6.6	9
A5	26	36.5	47	65
A6	5.5	7	10	12
A7	27.5	37	48	58
A8	4	6	8	10
A9	1	1.5	1.5	2
A10 $_{g6}$	35	50	80	110
A11	20	27	40	55
A12 $_{j6}$	13	16	22	32
A13	M4x0.7P	M5x0.8P	M8x1.25P	M12x1.75P
A14	4.5	4.4	7.2	10
A15	10	12.5	19	28
B1 $_{h9}$	5	5	6	10
B2	15	18	24.5	35
B3	2	2	3	5
B4	16	25	32	40
M1[1]	42	60	90	115
M2[1]	46	70	100	130
M3[1]	M4x0.7P	M5x0.8P	M6x1.0P	M8x1.25P
M4[1]	86.5	115.5	142.5	184
M5[1]	33	42	47.5	61
M6[1]	8	8.5	12.5	15.7
M7[1]	30	50	80	110
M8[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32
M9[1]	3.5	3.5	4	6
M10[1]	26.5	29.5	41	55.7

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TUB 2 - STAGE



unit: mm

Dimension	TUB042	TUB060	TUB060A	TUB090	TUB090A	TUB115	TUB115A
A1	42	60		90		115	
A2	R5	R5		R8		R8	
A3	50	70		100		130	
A4	3.4	5.5		6.6		9	
A5	26	36.5		47		65	
A6	5.5	7		10		12	
A7	55	69	75.5	88.5	96.5	108	118
A8	4	6		8		10	
A9	1	1.5		1.5		2	
A10 $_{g6}$	35	50		80		110	
A11	20	27		40		55	
A12 $_{j6}$	13	16		22		32	
A13	M4x0.7P	M5x0.8P		M8x1.25P		M12x1.75P	
A14	4.5	4.4		7.2		10	
A15	10	12.5		19		28	
B1 $_{h9}$	5	5		6		10	
B2	15	18		24.5		35	
B3	2	2		3		5	
B4	16	25		32		40	
M1[1]	42	42	60	60	90	90	115
M2[1]	46	46	70	70	100	100	130
M3[1]	M4x0.7P	M4x0.7P	M5x0.8P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P
M4[1]	114	138.5	154	177.5	191	220.5	244
M5[1]	33	33	42	42	47.5	47.5	61
M6[1]	8	8	8.7	8.7	12.5	12.5	15.7
M7[1]	30	30	50	50	80	80	110
M8[1]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32
M9[1]	3.5	3.5	3.5	3.5	4	4	6
M10[1]	25	26.5	29.5	29.5	41	41	55.7

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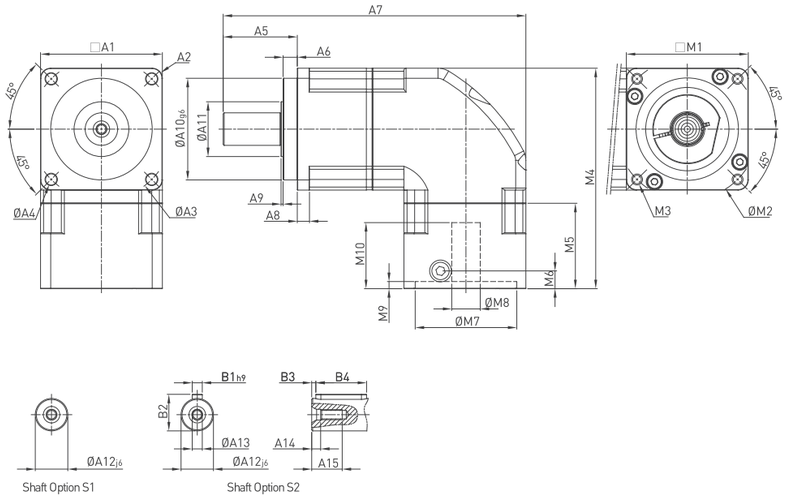
TRB 1 - STAGE

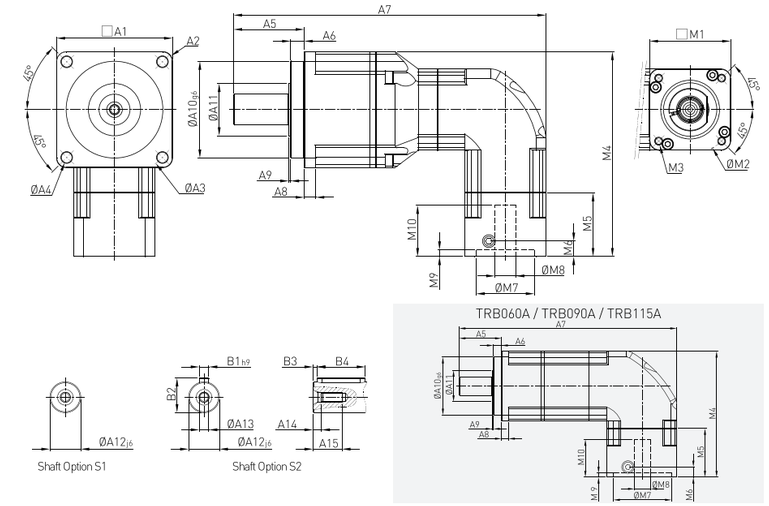


unit: mm

Dimension	TRB042	TRB060	TRB090	TRB115
A1	42	60	90	115
A2	R5	R5	R8	R8
A3	50	70	100	130
A4	3.4	5.5	6.6	9
A5	26	36.5	47	65
A6	5.5	7	10	12
A7	109.5	149	202	259
A8	4	6	8	10
A9	1	1.5	1.5	2
A10 g6	35	50	80	110
A11	20	27	40	55
A12 j6	13	16	22	32
A13	M4x0.7P	M5x0.8P	M8x1.25P	M12x1.75P
A14	4.5	4.4	7.2	10
A15	10	12.5	19	28
B1 h9	5	5	6	10
B2	15	18	24.5	35
B3	2	1.5	3	5
B4	16	25	32	40
M1[1]	42	60	90	115
M2[1]	46	70	100	130
M3[1]	M4x0.7P	M5x0.8P	M6x1.0P	M8x1.25P
M4[1]	97	108.5	152.7	190.5
M5[1]	33	42	47.5	61
M6[1]	8	8.7	12.5	15.7
M7[1]	30	50	80	110
M8[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32
M9[1]	3.5	3.5	4	6
M10[1]	26.6	32.4	41.2	43

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

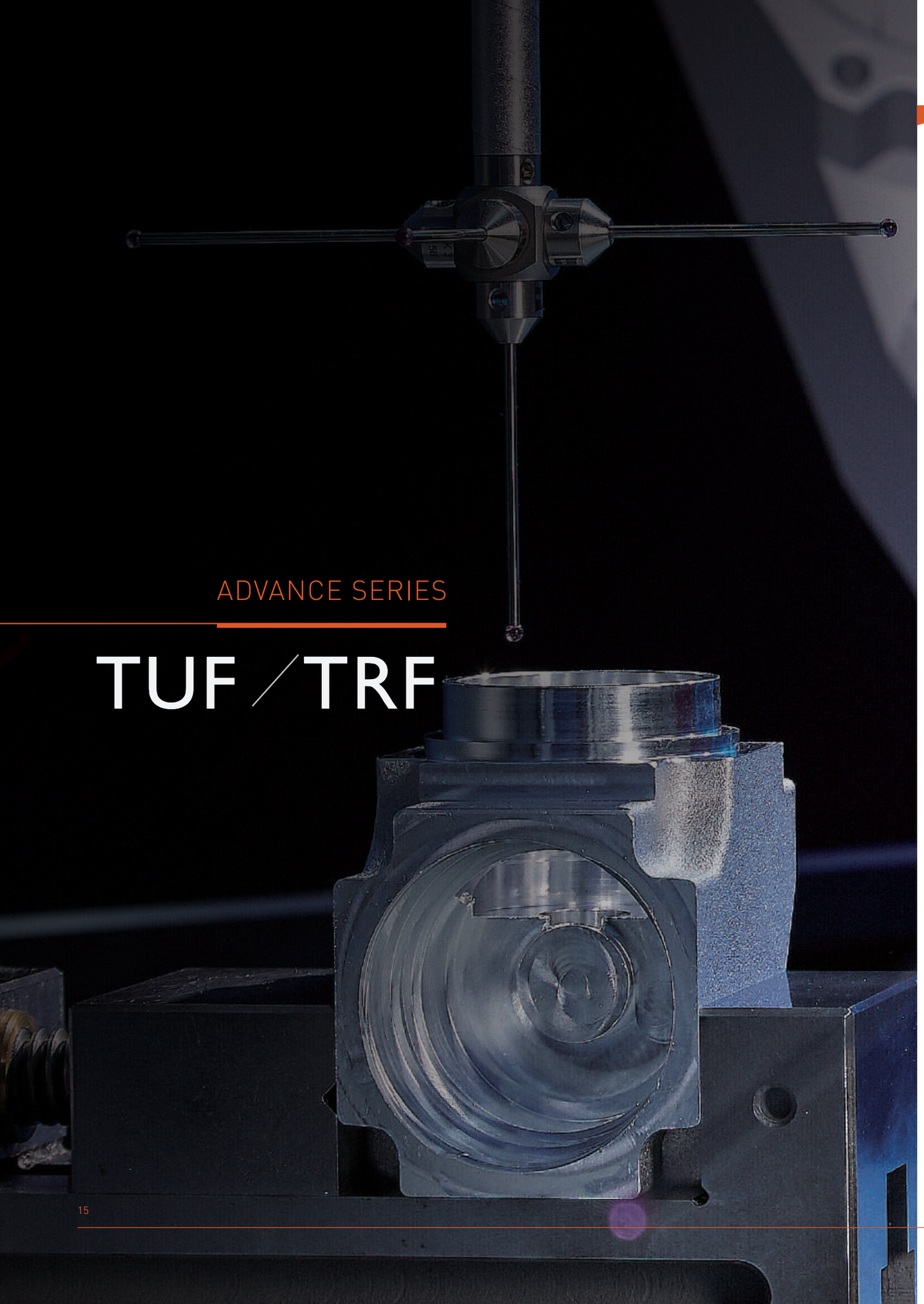
TRB 2 - STAGE



unit: mm

Dimension	TRB042	TRB060	TRB060A	TRB090	TRB090A	TRB115	TRB115A
A1	42	60		90		115	
A2	R5	R5		R8		R8	
A3	50	70		100		130	
A4	3.4	5.5		6.6		9	
A5	26	36.5		47		65	
A6	5.5	7		10		12	
A7	137	161.5	187.5	211	250.5	280	319
A8	4	6		8		10	
A9	1	1.5		1.5		2	
A10 g6	35	50		80		110	
A11	20	27		40		55	
A12 j6	13	16		22		32	
A13	M4x0.7P	M5x0.8P		M8x1.25P		M12x1.75P	
A14	4.5	4.4		7.2		10	
A15	10	12.5		19		28	
B1 h9	5	5		6		10	
B2	15	18		24.5		35	
B3	2	1.5		3		5	
B4	16	25		32		40	
M1[1]	42	42	60	60	90	90	115
M2[1]	46	46	70	70	100	100	130
M3[1]	M4x0.7P	M4x0.7P	M5x0.8P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P
M4[1]	97	106	108.5	123.5	152.7	165.2	190.5
M5[1]	33	33	42	42	47.5	47.5	61
M6[1]	8	8	8.7	8.7	12.5	12.5	15.7
M7[1]	30	30	50	50	80	80	110
M8[1]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32
M9[1]	3.5	3.5	3.5	3.5	4	4	6
M10[1]	26.6	26.5	32.4	32.4	41.2	41.2	43

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.



ADVANCE SERIES

TUF／TRF

01. Characteristic

Outstanding Precision | High Efficiency | Heavy-duty output | Easy mounting | High load | Quiet operation

- High precision and accurate positioning
- High efficiency, minimizing loss
- 200 times torque amplified
- Tapered roller bearing for absorting axial and radial forces
- Easy to install, no calibration required
- Low noise and smooth rotation

TUF / TRF								
	TUF042	TRF042	TUF060 TUF060A	TRF060 TRF060A	TUF075 TUF075A	TRF075 TRF075A	TUF100 TUF100A	TRF100 TRF100Av
Flange size *(mm)*	42x42		62x62		76x76		105x105	
Motor output diameter *(mm)*	≤Ø11 / ≤Ø12		≤Ø14 / ≤Ø16		≤Ø19 / ≤Ø24		≤ Ø32	
Motor power *(W)*	50W~100W		50W~400W		200W~750W		500W~1.5kW	
Stage & Ratio	1. stage: 3~10 2. stage: 12~100	1. stage: 3~10 2. stage: 12~100	1. stage: 3~10 2. stage: 12~100	1. stage: 3~20 2. stage: 25~200	1. stage: 3~10 2. stage: 12~100	1. stage: 3~20 2. stage: 25~200	1. stage: 3~10 2. stage: 12~100	1. stage: 3~20 2. stage: 25~200
Output Shaft Option	Smooth shaft, Key shaft, DIN 5480 splined shaft							
Orientation of Input & Output	Coaxial	Vertical	Coaxial	Vertical	Coaxial	Vertical	Coaxial	Vertical
Lifetime *(hours)*	20,000							
Ambient temp. *(°C)*	-10°C~90°C							
Protection class	IP65							
Lubrication	Synthetic grease							
Material	Stainless steel & Aluminum alloy							

ORDERING CODE										
TUF	042	A	-	005	-	S	-	P2	/	Motor
Type	Flange Size	2-stage Typev		Ratio		Output Type		Backlash Grade		Manufacturer & Model Number
TUF TRF	042 060 075 100	A: When the dimensions of two gearboxes are identical.		003~200		S：Smooth shaft K：Key shaft G：DIN5480 splined shaft		P0 P1 P2		Mounted servo motor

01. Performance Index TUF

Performance Index TUF								
Properties	Ratio	TUF042	TUF060	TUF060A	TUF075	TUF075A	TUF100	TUF100A
Allowable Rated Torque (T_N) *Nm*	3	16	45		132		240	
	4	18	50		138		300	
	5	22	60		160		340	
	6	20	55		150		310	
	7	19	50		140		300	
	8	17	45		120		280	
	9	14	42		112		260	
	10	13	40		100		240	
	12	18	45	45	132	132	240	240
	15	19	45	45	132	132	240	240
	18	19	45	45	132	132	240	240
	20	20	50	50	138	138	300	300
	25	22	60	60	138	138	340	340
	28	19	50	50	138	138	340	340
	30	20	55	55	150	150	340	340
	35	19	50	50	140	140	340	340
	40	17	55	55	140	140	340	340
	45	14	55	55	112	112	260	260
	50	22	55	55	120	120	280	280
	60	19	55	55	130	130	300	300
	70	20	45	45	140	140	260	260
	80	17	45	45	120	120	240	240
	90	14	40	40	100	100	240	240
	100	14	40	40	100	100	240	240
Emergency Stop Torque (T_S) *Nm*	3~100	3 times of Allowable Rated Torque						
Max. Acceleration Torque (T_A) *Nm*	3~100	60% of Emergency Stop Torque						
Allowable Rated Speed (n_{1N}) *rpm*	3~100	5,000	5,000	5,000	4,000	4,000	4,000	4,000
Max. Allowable Input Speed *rpm*	3~100	10,000	10,000	10,000	8,000	8,000	8,000	8,000
Torsional Stiffness *Nm/arcmin*	3~100	3	7	7	14	14	27	27
Allowable Radial Force (F_r)[1] *N*	3~100	780	1480	1480	4180	4180	9280	9280
Allowable Axial Force (F_a)[2] *N*	3~100	390	1150	1150	3750	3750	5860	5860
Max. Tilting Moment (M_{2k})[3] *Nm*	3~100	20	80	80	380	380	960	960
Backlash *arcmin* P0[4]	3~10	-	-	-	≤1	-	≤ 1	-
	12~100	-	-	-	-	-	≤ 3	-
P1[5]	3~10	≤ 3	≤ 3	-	≤ 3	-	≤ 3	-
	12~100	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5
P2[6]	3~10	≤ 5	≤ 5	-	≤ 5	-	≤ 5	-
	12~100	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
Efficiency %	3~10	≥ 97						
	12~100	≥ 94						

Properties		Ratio	TUF042	TUF060	TUF060A	TUF075	TUF075A	TUF100	TUF100A
Operation Noise	*dB*	3~100	≤ 60				≤ 65		
Weight	*kg*	3~10	0.6	1.2		3.6		6.5	
		12~100	0.8	1.5	1.8	4	5	7.8	9.5
Mass Moment of Inertia *kgcm²*		3	0.03	0.16	0.16	0.66	0.66	3.3	3.3
		4	0.03	0.14	0.14	0.53	0.53	2.8	2.8
		5	0.03	0.13	0.13	0.48	0.48	2.75	2.75
		6	0.03	0.13	0.13	0.45	0.45	2.72	2.72
		7	0.03	0.13	0.13	0.45	0.45	2.68	2.68
		8	0.03	0.13	0.13	0.44	0.44	2.65	2.65
		9	0.03	0.13	0.13	0.44	0.44	2.62	2.62
		10	0.03	0.13	0.13	0.44	0.44	2.62	2.62
		12	0.03	0.03	0.16	0.16	0.61	0.61	3.25
		15	0.03	0.03	0.13	0.13	0.47	0.47	2.71
		18	0.03	0.03	0.14	0.13	0.47	0.47	2.74
		20	0.03	0.03	0.13	0.14	0.47	0.47	2.71
		25	0.03	0.03	0.13	0.13	0.48	0.48	2.71
		28	0.03	0.03	0.14	0.14	0.47	0.47	2.74
		30	0.03	0.03	0.13	0.13	0.48	0.48	2.71
		35	0.03	0.03	0.14	0.14	0.47	0.47	2.74
		40	0.03	0.03	0.13	0.13	0.47	0.47	2.71
		45	0.03	0.03	0.13	0.13	0.47	0.47	2.71
		50~100	0.03	0.03	0.13	0.13	0.44	0.44	2.57

1-stage reducer is listed on the yellow cell and 2-stage reducer is listed on the orange cell.

(1) The load at which the output bearing is at 100 rpm output speed (Axial load = 0 and radial load point is in the center of the output shaft)

(2) The load at which the output bearing is at 100 rpm output speed (Radial load = 0 and axial load point is in the center of the output shaft)

(3) Formula of Max. Tilting Moment is below.

(4) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

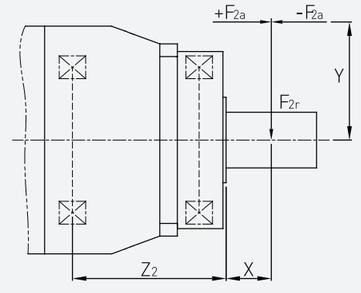
(5) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

(6) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

Max. Tilting Moment

$$M_{2K} = \frac{F_{2a} * Y + F_{2r} * (X+Z_2)}{1000}$$

F_{2a} *(Nm)* : Axial force acting on the shaft
F_{2r} *(Nm)* : Radial force acting on the shaft



Unit: mm

Type/Dimension	TUF042/TRF042	TUF075/TRF075	TUF100/TRF100
Z	32.5	70	73

01. Performance Index TRF

Performance Index TRF								
	Ratio	TRF042	TRF060	TRF060A	TRF075	TRF075A	TRF110	TRF110A
Allowable Rated Torque (T_N) *Nm*	3	16	45		132		240	
	4	18	50		138		300	
	5	22	60		160		340	
	6	20	55		150		310	
	7	19	50		140		300	
	8	17	45		120		280	
	9	14	42		112		260	
	10	13	40		100		240	
	12	18	55		150		310	
	14	19	50		140		300	
	16	19	45		120		280	
	20	20	40		100		240	
	25	22	60	60	160	160	340	340
	28	19	50	50	132	132	300	300
	30	20	55	55	150	150	310	310
	35	19	50	50	140	140	300	300
	40	17	50	50	120	120	280	280
	45	14	50	50	112	112	260	260
	50	22	50	50	150	150	340	340
	60	19	55	55	150	150	310	310
	70	20	50	50	140	140	300	300
	80	17	45	45	120	120	280	280
	90	14	40	40	100	100	240	240
	100	14	40	40	100	100	240	240
	120			50	140	140	300	300
	140			50	140	140	300	300
	160			45	120	120	260	260
	180			40	120	120	240	240
	200			40	100	100	240	240
Emergency Stop Torque (T_S) *Nm*	3~200	3 times of Allowable Rated Torque						
Max. Acceleration Torque (T_A) *Nm*		60% of Emergency Stop Torque						
Allowable Rated Speed (n_{1N}) *rpm*	3~200	5000	5000	5000	4000	4000	4000	4000
Max. Allowable Input Speed *rpm*	3~200	10000	10000	10000	8000	8000	8000	8000
Torsional Stiffness *Nm/arcmin*	3~200	3	7	7	14	14	27	27
Allowable Radial Force (F_r)[1] *N*	3~200	780	1480	1480	4180	4180	9280	9280
Allowable Axial Force (F_a)[2] *N*	3~200	390	1150	1150	3750	3750	5860	5860
Max. Tilting Moment (M_{2k})[3] *Nm*	3~200	20	80	80	380	380	960	960
Backlash *arcmin* P0[4]	3~20	-	-	-	≤ 2	-	≤ 2	-
	12~200	-	-	-	≤ 4	≤ 4	≤ 4	≤ 4
P1[5]	3~20	≤ 4	≤ 4	-	≤ 4	-	≤ 4	-
	12~200	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7	≤ 7
P2[6]	3~20	≤ 6	≤ 6	-	≤ 6	-	≤ 6	-
	12~200	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9	≤ 9
Efficiency *%*	3~20	≥ 95						
	12~200	≥ 92						
Operation Noise *dB*	3~200	≤ 65					≤ 70	

		Ratio	TRF042	TRF060	TRF060A	TRF075	TRF075A	TRF110	TRF110A
Weight	*kg*	3~20	0.9	2		6.4		11.2	
		12~200	1.2	1.8	2.8	4.8	8	10.5	15
Mass moment of inertia	*kgcm²*	3~10	0.09	0.35		2.25		6.84	
		12~20	0.09	0.07		1.87		6.25	
		25~90	0.09	0.09	0.35	0.35	2.25	2.25	6.84
		100~200			0.7	0.31	1.87	1.87	6.25

1-stage reducer is listed on the yellow cell and 2-stage reducer is listed on the orange cell.

(1) The load at which the output bearing is at 100 rpm output speed (Axial load = 0 and radial load point is in the center of the output shaft)

(2) The load at which the output bearing is at 100 rpm output speed (Radial load = 0 and axial load point is in the center of the output shaft)

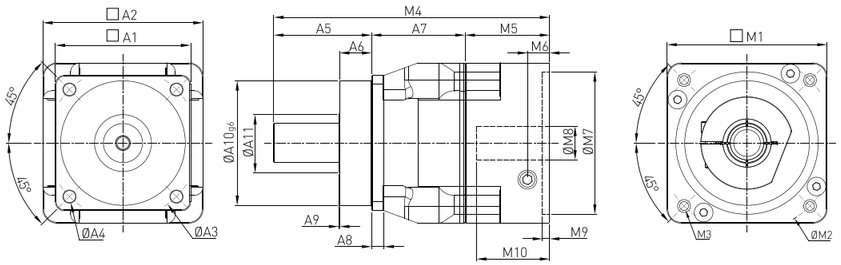
(3) Formula of Max. Tilting Moment refers to the page of TUF performance index.

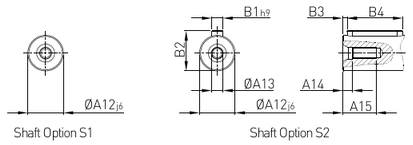
(4) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

(5) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

(6) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

TUF 1 - STAGE



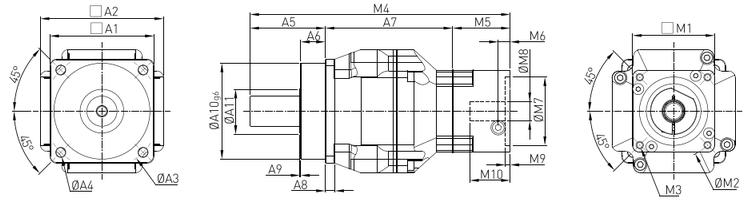


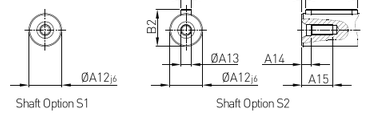
unit: mm

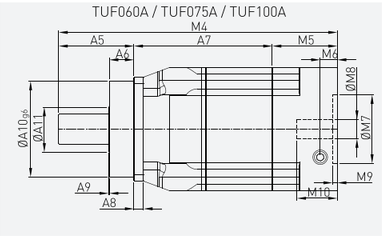
Dimension	TUF042	TUF060	TUF075	TUF100
A1	42	62	76	105
A2	42	60	90	115
A3	50	68	85	120
A4	3.4	5.5	6.8	9
A5	26	48.5	55	88
A6	5.5	18.5	18	28
A7	27.5	28.5	52.5	48.5
A8	4	6	7	10
A9	1	1.5	2	2
$A10_{g6}$	35	60	70	90
A11	20	27	40	55
$A12_{j6}$	13	16	22	32
A13	M4x0.7P	M5x0.8P	M8x1.25P	M12x1.75P
A14	4.5	4.4	7.2	10
A15	10	12.5	19	28
$B1_{h9}$	5	5	6	10
B2	15	18	24.5	35
B3	2	2	3	5
B4	16	25	32	40
M1[1]	42	60	90	115
M2[1]	46	70	100	130
M3[1]	M4x0.7P	M5x0.8P	M6x1.0P	M8x1.25P
M4[1]	86.5	119	155	197.5
M5[1]	33	42	47.5	61
M6[1]	8	8.5	12.5	15.7
M7[1]	30	50	80	110
M8[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32
M9[1]	3.5	3.5	4	6
M10[1]	26.5	29.5	41	55.7

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TUF 2 - STAGE





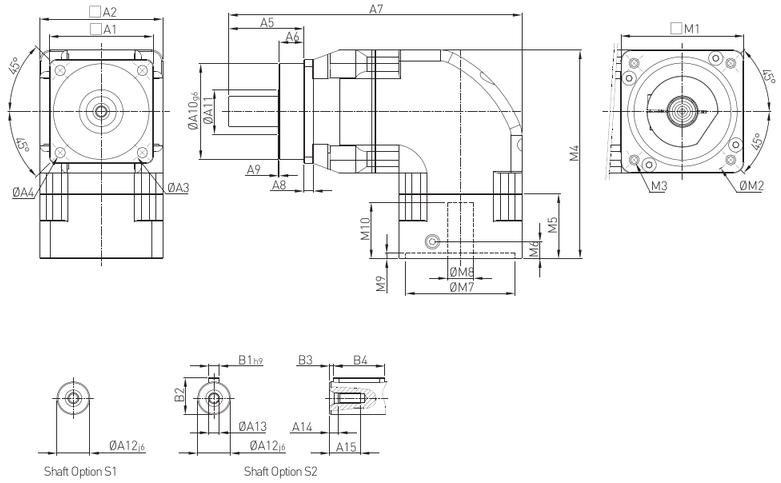


unit: mm

Dimension	TUF042	TUF060	TUF060A	TUF075	TUF075A	TUF100	TUF100A
A1	42	62		76		105	
A2	42	60		90		115	
A3	50	68		85		120	
A4	3.4	5.5		6.8		9	
A5	26	48.5		55		88	
A6	5.5	18.5		18		28	
A7	55	60.5	67	93	101	98.5	108.5
A8	4	6		7		10	
A9	1	1.5		2		2	
$A10_{g6}$	35	60		70		90v	
A11	20	27		40		55	
$A12_{j6}$	13	16		22		32	
A13	M4x0.7P	M5x0.8P		M8x1.25P		M12x1.75P	
A14	4.5	4.4		7.2		10	
A15	10	12.5		19		28	
$B1_{h9}$	5	5		6		10	
B2	15	18		24.5		35	
B3	2	2		3		5	
B4	16	25		32		40	
M1[1]	42	42	60	60	90	90	115
M2[1]	46	46	70	70	100	100	130
M3[1]	M4x0.7P	M4x0.7P	M5x0.8P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P
M4[1]	114	142	157.5	190	203.5	234	257.5
M5[1]	33	33	42	42	47.5	47.5	61
M6[1]	8	8	8.7	8.7	12.5	12.5	15.7
M7[1]	30	30	50	50	80	80	110
M8[1]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32
M9[1]	3.5	3.5	3.5	3.5	4	4	6
M10[1]	26.5	26.6	30	29.5	41	41	55.7

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TRF 1 - STAGE

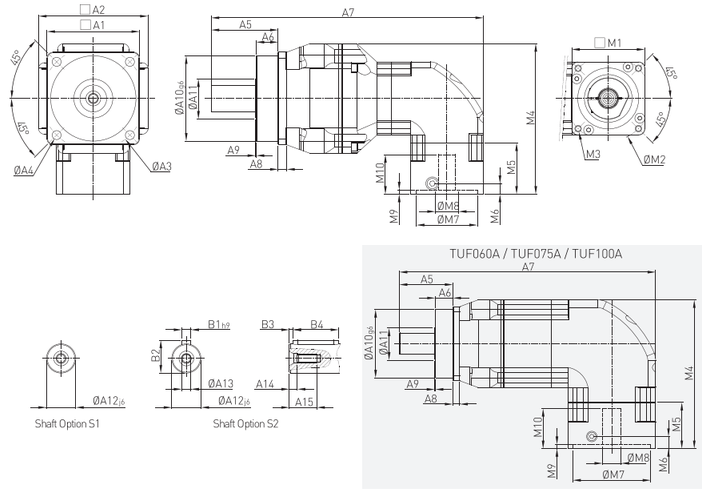


unit: mm

Dimension	TRF042	TRF060	TRF075	TRF100
A1	42	62	76	105
A2	42	60	90	115
A3	50	68	85	120
A4	3.4	5.5	6.8	9
A5	26	48.5	55	88
A6	5.5	18.5	18	28
A7	109.5	152.5	214.5	272.5
A8	4	6	7	10
A9	1	1.5	2	2
A10 g6	35	60	70	90
A11	20	27	40	55
A12 j6	13	16	22	32
A13	M4x0.7P	M5x0.8P	M8x1.25P	M12x1.75P
A14	4.5	4.8	7.2	10
A15	10	12.5	19	28
B1 h9	5	5	6	10
B2	15	18	24.5	35
B3	2	2	3	5
B4	16	25	32	40
M1[1]	42	60	90	115
M2[1]	46	70	100	130
M3[1]	M4x0.7P	M5x0.8P	M6x1.0P	M8x1.25P
M4[1]	97	109.5	152.7	190.5
M5[1]	33	42	47.5	61
M6[1]	8	8.7	12.5	15.7
M7[1]	30	50	80	110
M8[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32
M9[1]	3.5	3.5	4	6
M10[1]	31.5	32.4	41.2	43

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TRF 2 - STAGE



unit: mm

Dimension	TRF042	TRF060	TRF060A	TRF075	TRF075A	TRF100	TRF100A
A1	42	62		76		105	
A2	42n	60		90		115	
A3	50	68		85		120	
A4	3.4	5.5		6.8		9	
A5	26	48.5		55		88	
A6	5.5	18.5		18		28	
A7	137	165	191	223.5	263	293.5	332.5
A8	4	6		7		10	
A9	1	1.5		2		2	
A10 g6	35	60		70		90	
A11	20	27		40		55	
A12 j6	13	16		22		32	
A13	M4x0.7P	M5x0.8P		M8x1.25P		M12x1.75P	
A14	4.5	4.8		7.2		10	
A15	10	12.5		19		28	
B1 h9	5	5		6		10	
B2	15	18		24.5		35	
B3	2	2		3		5	
B4	16	25		32		40	
M1[1]	42	42	60	60	90	90	115
M2[1]	46	46	70	70	100	100	130
M3[1]	M4x0.7P	M4x0.7P	M5x0.8P	M5x0.8P	M6x1.0P	M6x1.0P	M8x1.25P
M4[1]	97	107	109.5	123.5	152.7	165.2	190.5
M5[1]	33	33	42	42	47.5	47.5	61
M6[1]	8	8	8.7	8.7	12.5	12.5	15.7
M7[1]	30	30	50	50	80	80	110
M8[1]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤14 / ≤16	≤19 / ≤24	≤19 / ≤24	≤32
M9[1]	3.5	3.5	3.5	3.5	4	4	6
M10[1]	26.6	26.6	32.4	32.4	41.2	41.2	43

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

ADVANCE SERIES

TUD / TRD

01. Characteristic

Outstanding Precision | High Efficiency | Heavy-duty output | Easy mounting | Quiet operation

- High precision and accurate positioning
- High efficiency, minimizing loss
- 200 times torque amplified
- Easy to install, no calibration required
- Low noise and smooth rotation

TUD / TRD								
	TUD047	TRD047	TUD064	TRD064	TUD090	TRD090	TUD110	TRD110
Flange size *(mm)*	47x47		64x64		90x90		110x110	
Motor output diameter *(mm)*	≤Ø11 / ≤Ø12		≤Ø14 / ≤Ø16		≤Ø19 / ≤Ø24		≤ Ø32	
Motor power *(W)*	50W~100W		50W~400W		200W~750W		500W~1.5kW	
Stage & Ratio	1. stage: 4~10 2. stage: 16~100	1. stage: 4~10 2. stage: 16~100	1. stage: 4~10 2. stage: 16~100	1. stage: 4~20 2. stage: 25~100	1. stage: 4~10 2. stage: 16~100	1. stage: 4~20 2. stage: 25~200	1. stage: 4~10 2. stage: 16~100	1. stage: 4~20 2. stage: 25~200
Orientation of Input & Output	Coaxial	Vertical	Coaxial	Vertical	Coaxial	Vertical	Coaxial	Vertical
Output Shaft Option	Smooth shaft, Key shaft, DIN 5480 splined shaft							
Lifetime *(hours)*	20,000							
Ambient temp. *(°C)*	-10°C~90°C							
Protection class	IP65							
Lubrication	Synthetic grease							
Material	Stainless steel & Aluminum alloy							

ORDERING CODE										
TUD	047	A	-	005	-	S	-	P2	/	Motor
Type	Flange Size	2-stage Type		Ratio		Output Type		Backlash Grade		Manufacturer & Model Number
TUD TRD	047 064 090 110	When the dimensions of two gearboxes are identical.		004~200		S: Smooth shaft K: Key shaft G: DIN5480 splined shaft		P0 P1 P2		Mounted servo motor

01. Performance Index TUD

Performance Index TUD						
Properties		Ratio	TUD047	TUD064	TUD090	TUD110
Allowable Rated Torque (T_N) *Nm*		4	18	50	138	300
		5	22	60	160	340
		7	19	50	140	300
		10	13	40	100	240
		16	19	45	130	260
		20	20	50	138	300
		25	22	60	138	340
		30	19	50	138	300
		35	19	50	140	340
		40	17	55	140	340
		50	22	55	120	280
		60	19	50	140	300
		70	20	45	140	260
		90	14	40	100	230
		100	14	40	100	240
Emergency Stop Torque (T_S) *Nm*		4~100	3 times of Allowable Rated Torque			
Max. Acceleration Torque (T_A) *Nm*		4~100	60% of Emergency Stop Torque			
Allowable Rated Speed (n_{1N}) *rpm*		4~100	3,000	3,000	3,000	3,000
Max. Allowable Input Speed *rpm*		4~100	7,000	7,000	7,000	7,000
Torsional Stiffness *Nm/arcmin*		4~100	3	7	14	27
Allowable Radial Force (F_r) *N*		4~100	780	1560	3300	6800
Allowable Axial Force (F_a) *N*		4~100	390	780	1650	3400
Max. Tilting Moment (M_{2k}) *Nm*		4~100	55	80	190	300
Backlash *arcmin*	P0[1]	4~10	-	-	≤1	≤ 1
		16~100	-	-	-	≤ 3
	P1	4~10	≤ 3	≤ 3	≤ 3	≤ 3
		16~100	≤ 5	≤ 5	≤ 5	≤ 5
	P2	4~10	≤ 5	≤ 5	≤ 5	≤ 5
		16~100	≤ 7	≤ 7	≤ 7	≤ 7
Efficiency %		4~10	≥ 97			
		20~100	≥ 94			
Operation Noise *dB*		4~100	≤ 60			≤ 65
Weight *kg*		4~10	0.7	1.2	3	5.6
		16~100	1	1.6	3.7	7.3
Mass Moment of Inertia *kgcm²*		4	0.03	0.14	0.53	2.85
		5	0.03	0.13	0.48	2.75
		7	0.03	0.13	0.45	2.68
		10	0.03	0.13	0.44	2.62
		20~35	0.03	0.03	0.14	0.45
		16~100	0.03	0.03	0.12	0.42

1-stage reducer is listed on the yellow cell and 2-stage reducer is listed on the orange cell.

(1) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

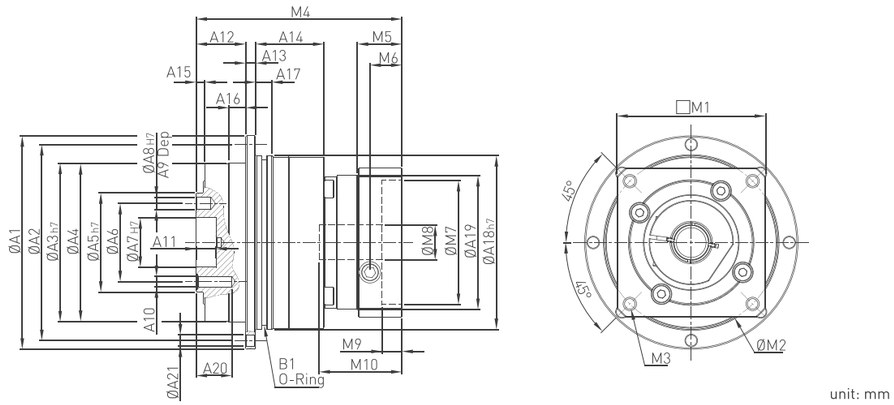
01. Performance Index TRD

Performance Index TRD						
Properties		Ratio	TUD047	TUD064	TUD090	TUD110
Allowable Rated Torque (T_N) *Nm*		4	18	50	138	300
		5	22	60	160	340
		7	19	50	140	300
		10	13	40	100	240
		16	19	50	140	300
		20	13	40	100	240
		25	22	60	160	340
		35	18	50	140	320
		40	19	50	130	280
		50	22	60	160	340
		70	19	50	140	300
		100	13	40	100	240
		140			140	280
		200			120	240
Emergency Stop Torque (T_S) *Nm*		4~200	3 times of Allowable Rated Torque			
Max. Acceleration Torque (T_A) *Nm*		4~200	60% of Emergency Stop Torque			
Allowable Rated Speed (n_{1N}) *rpm*		4~200	3,000	3,000	3,000	3,000
Max. Allowable Input Speed *rpm*		4~200	7,000	7,000	7,000	7,000
Torsional Stiffness *Nm/arcmin*		4~200	3	7	14	27
Allowable Radial Force (F_r) *N*		4~200	780	1560	3300	6800
Allowable Axial Force (F_a) *N*		4~200	390	780	1650	3400
Max. Tilting Moment (M_{2k}) *Nm*		4~2v 00	55	80	190	300
Backlash *arcmin*	P0[1]	4~20	-	-	≤2	≤ 2
		25~200	-	-	≤ 4	≤ 4
	P1	4~20	≤ 4	≤ 4	≤ 4	≤ 4
		25~200	≤ 7	≤ 7	≤ 7	≤ 7
	P2	4~20	≤ 6	≤ 6	≤ 6	≤ 6
		25~200	≤ 9	≤ 9	≤ 9	≤ 9
Efficiency %		4~10	≥ 95			
		20~100	≥ 92			
Operation Noise *dB*		4~200	≤ 61	≤ 63	≤ 65	≤ 68
Weight *kg*		4~20	1.1	2.1	5.9	10.5
		25~200	1.4	1.9	4.5	9.8
Mass Moment of Inertia *kgcm²*		4~10	0.09	0.35	2.25	6.84
		16~20	0.09	0.31	1.86	6.25
		25~100	0.09	0.09	0.35	2.25
		140~200			0.31	1.86

1-stage reducer is listed on the yellow cell and 2-stage reducer is listed on the orange cell.

(1) If your require backlash grade of reducer is not in above chart, please contact us for custom-made.

TUD 1 - STAGE

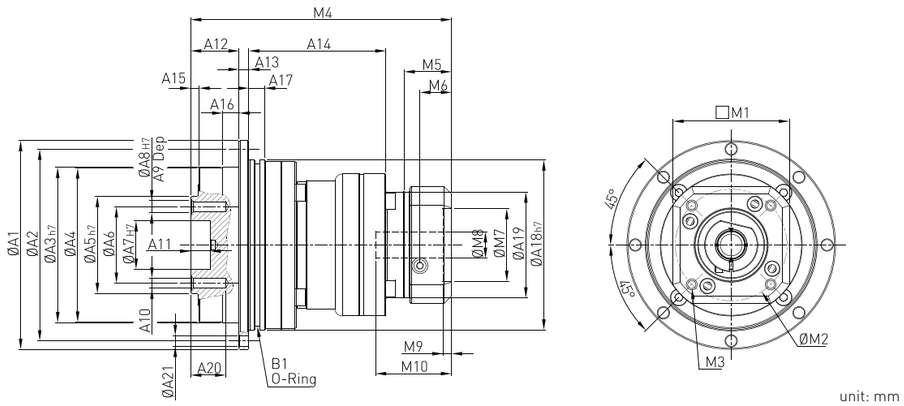


unit: mm

Dimension	TUD047	TUD064	TUD090	TUD110
A1	72	86	118	145
A2	67	79	109	135
A3 h7	47	64	90	110
A4	46.5	63.5	88	109.2
A5 h7	28	40	63	80
A6	20	31.5	50	63
A7 H7	12	20	31.5	40
A8 H7	3	5	5	6
A9	4	6	6	6
A10	4xM3x0.5P	7xM5x0.8P	7xM6x1.0P	11xM6x1.0P
A11	4	8	8	12
A12	19.5	20	30.5	29
A13	4	4	7	8
A14	18.5	27.5	27.5	31
A15	3	3.5	6.5	6
A16	7	7	10	10
A17	5	7	7.5	11
A18 h7	60	70	95	120
A19	43.6	54	75	90
A20	6.5	10	10	12
A21	8x3.4	8x4.5	8x5.5	8x5.5
B1	56x2	66x2	90x3	110x3
M1[1]	48	60	90	100
M2[1]	46	70	100	115
M3[1]	M4x0.7P	M5x0.8P	M6x1.0P	M8x1.25P
M4[1]	69	83	98.5	122.5
M5[1]	19.5	18	18	25.5
M6[1]	13	12.9	11.7	15.2
M7[1]	30	50	80	95
M8[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32
M9[1]	3.5	8	4	5
M10[1]	31.5	33.4	40	55.2

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TUD 2 - STAGE

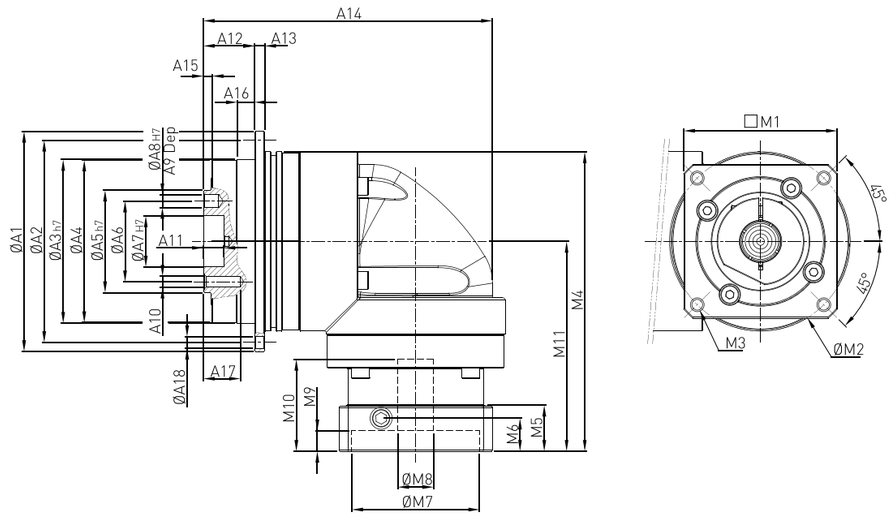


unit: mm

Dimension	TUD047	TUD064	TUD090	TUD110
A1	72	86	118	145
A2	67	79	109	135
A3 h7	47	64	90	110
A4	46.5	63.5	88	109.2
A5 h7	28	40	63	80
A6	20	31.5	50	63
A7 H7	12	20	31.5	40
A8 H7	3	5	5	6
A9	4	6	6	6
A10	4xM3x0.5P	7xM5x0.8P	7xM6x1.0P	11xM6x1.0P
A11	4	8	12	12
A12	19.5	20	30.5	29
A13	4	4	7	8
A14	46.5	56.5	70	86.5
A15	3	3.5	6.5	6
A16	7	7	10	10
A17	5	7	7.5	11
A18 h7	60	70	95	120
A19	43.6	43.6	54	75
A20	6.5	10	10	12
A21	8x3.4	8x4.5	8x5.5	8x5.5
B1	56x2	66x2	90x3	110x3
M1[1]	48	48	60	90
M2[1]	46	46	70	100
M3[1]	M4x0.7P	M4x0.7P	M5x0.8P	M6x1.0P
M4[1]	97	107.5	138	157
M5[1]	19.5	19.5	17	18
M6[1]	13	13	10.7	11.7
M7[1]	30	30	50	80
M8[1]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24
M9[1]	3.5	3.5	6	4
M10[1]	31.5	31.5	34	40.5

(1) M1~M10 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TRD 1 - STAGE

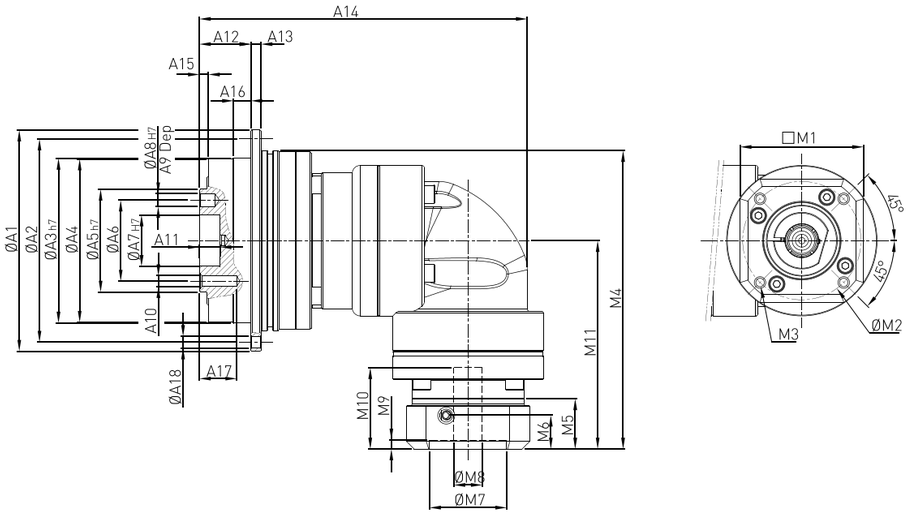


unit: mm

Dimension	TRD047	TRD064	TRD090	TRD110
A1	72	86	118	145
A2	67	79	109	135
A3 h7	47	64	90	110
A4	46.5	63.5	88	109.2
A5 h7	28	40	63	80
A6	20	31.5	50	63
A7 H7	12	20	31.5	40
A8 H7	3	5	5	6
A9	4	6	6	6
A10	4xM3x0.5P	7xM5x0.8P	7xM6x1.0P	11xM6x1.0P
A11	4	8	12	12
A12	19.5	20	30.5	29
A13	4	4	7	8
A14	95.25	118	162.25	201
A15	3	3.5	6.5	6
A16	7	7	10	10
A17	6.5	10	12	12
A18	8x3.4	8x4.5	8x5.5	8x5.5
M1[1]	48	60	90	100
M2[1]	46	70	100	90
M3[1]	M4x0.7P	M5x0.8P	M6x1.0P	M8x1.25P
M4[1]	111	117	155	192.2
M5[1]	19.5	18	18	25.5
M6[1]	13	12.9	11.7	15.2
M7[1]	30	50	80	70
M8[1]	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24	≤32
M9[1]	3.5	8	4	5
M10[1]	31.5	35.9	41	42.2
M11[1]	81	82	107.5	132.2

(1) M1~M11 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TRD 2 - STAGE



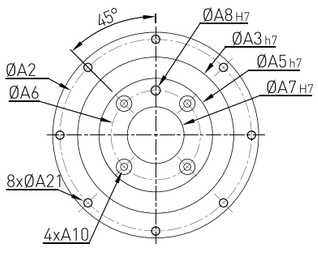
unit: mm

Dimension	TRD047	TRD064	TRD090	TRD110
A1	72	86	118	145
A2	67	79	109	135
A3 h7	47	64	90	110
A4	46.5	63.5	88	109.2
A5 h7	28	40	63	80
A6	20	31.5	50	63
A7 H7	12	20	31.5	40
A8 H7	3	5	5	6
A9	4	6	6	6
A10	4xM3x0.5P	7xM5x0.8P	7xM6x1.0P	11xM6x1.0P
A11	4	8	12	12
A12	19.5	20	30.5	29
A13	4	4	7	8
A14	123.25	133.75	174	220.75
A15	3	3.5	6.5	6
A16	7	7	10	10
A17	6.5	10	12	12
A18	8x3.4	8x4.5	8x5.5	8x5.5
M1[1]	48	48	60	90
M2[1]	46	46	70	100
M3[1]	M4x0.7P	M4x0.7P	M5x0.8P	M6x1.0P
M4[1]	111	116	128.5	168.5
M5[1]	19.5	19.5	17	19
M6[1]	13	13	11.1	12.7
M7[1]	30	30	50	80
M8[1]	≤11 / ≤12	≤11 / ≤12	≤14 / ≤16	≤19 / ≤24
M9[1]	3.5	3.5	6	4
M10[1]	31.5	31.5	34.9	42
M11[1]	81	81	81	108.5

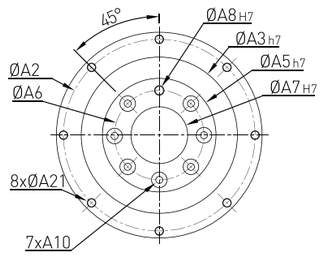
(1) M1~M11 are servo motor related specification. The table is TUF ONE standard specification. If the specification of your required servo motor is not in above chart, please contact us for custom-made.

TUD/TRD Output flange

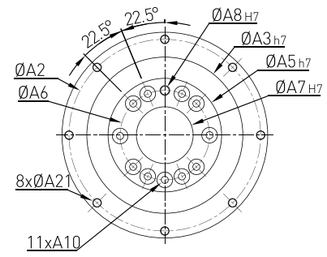
TUD047
TRD047



TUD064 / TUD090
TRD064 / TRD090



TUD110
TRD110



unit: mm

Dimension	TUD047 / TRD047	TUD064 / TRD064	TUD090 / TRD090	TUD110 / TRD110
A2	67	79	109	135
A3 h7	47	64	90	110
A5 h7	28	40	63	80
A6	20	31.5	50	63
A7 H7	12	20	31.5	40
A8 H7	3	5	5	6
A10	4xM3x0.5P	7xM5x0.8P	7xM6x1.0P	11xM6x1.0P
A21	8x3.4	8x4.5	8x5.5	8x5.5

Installation Guide

Step 1	Pick up the required model. Check the appearance of planetary reducer and rotate the input shaft slightly if the product is on shelf for 3 months or more. Please contact us if you have difficulty in installation or use.
Step 2	Pick up the required size and number of screws and bolts and the corresponding hexagonal wrench.
Step 3	Mount the planetary reducer to your device. Please check the orientation of your reducer if you install right-angle reducer (input and output are 90 degrees).
Step 4	Push the motor shaft into the input side of the reducer. Align a screw which locks the clamping hub with the hole on the motor connection plate of reducer and tighten the screw. Please refer to the table below for the torque value. You do not need to loosen the screw before operating because TUF ONE patent can avoid clamping hub fall off from the input shaft of reducer.
Step 5	Make sure your device, reducer and servo motor are completely secure to avoid looseness or shaking. Please refer to the table below for the recommended torque to tighten the screw, or you can find it on instruction in the packaging.
Step 6	The standard working environment of TUF ONE planetary reducer is -10°C~90°C; please contact us if the application requierd working in extreme temperature.
Step 7	For the warranty rights, do not disassemble TUF ONE reducer for repair or parts replacement.
Step 8	When starting the motor, please gradually increase the speed or load to avoid break down of the reducer caused by unacceptable torque or speed at the moment of starting.

Recommended tightening torque value for mounting bolt

Bolt size	Width across flats	Strength 8.8 tightening torque		Strength 10.9 tightening torque		Strength 12.9 tightening torque	
	mm	*Nm*	*In・lbs*	*Nm*	*In・lbs*	*Nm*	*In・lbs*
M3 x 0.5P	2.5	1.3	12	1.8	16	2.1	19
M4 x 0.7P	3	3	27	4.1	37	4.9	44
M5 x 0.8P	4	6.1	55	8.2	73	9.8	87
M6 x 1P	5	11	98	14	124	17	151
M8 x 1.25P	6	25	222	34	302	41	364
M10 x 1.5P	8	49	434	67	594	80	709
M12 x 1.75P	10	85	753	116	1028	139	1232
M14 x 2P	12	137	1214	186	1648	223	1976
M16 x 2P	14	210	1860	286	2534	343	3038

Recommended tightening torque value for bolt of clamping hub

Reducer Size		Motor shaft dia.	Bolt size	Width across flats	Tightening torque	
		mm	*mm*	*mm*	*Nm*	*In・lbs*
TUB/TRB042 TUF/TRF042 TUD/TRD047	1 stage	≤ 11 / ≤ 12	M3 x 0.5P x 8L	2.5	2.1	19
	2 stage	≤ 11 / ≤ 12	M3 x 0.5P x 8L	2.5	2.1	19
TUB/TRB060 TUF/TRF060 TUD/TRD064	1 stage	≤ 14 / ≤ 16	M4 x 0.7P x 12L	3	4.9	44
	2 stage	≤ 11 / ≤ 12	M3 x 0.5P x 8L	2.5	2.1	19
TUB/TRB090 TUF/TRF075 TUD/TRD090	1 stage	≤ 19 / ≤ 24	M5 x 0.8P x 14L	4	9.8	87
	2 stage	≤ 14 / ≤ 16	M4 x 0.7P x 12L	3	4.9	44
TUB/TRB115 TUF/TRF100 TUD/TRD110	1 stage	≤ 32	M6 x 1P x 16L	5	17	151
	2 stage	≤ 19 / ≤ 24	M5 x 0.8P x 14L	4	9.8	87
TUB/TRB060A TUF/TRF060A	1 stage	≤ 14 / ≤ 16	M4 x 0.7P x 12L	3	4.9	44
	2 stage					
TUB/TRB090A TUF/TRF075A	1 stage	≤ 19 / ≤ 24	M5 x 0.8P x 14L	4	9.8	87
	2 stage					
TUB/TRB115A TUF/TRF100A	1 stage	≤ 32	M6 x 1P x 16L	5	17	151
	2 stage					

Sizing Guide

Select your planetary reducer.

Decide a Duty Type **(Eqn.1)**

S5 Cycle Operation

Calculate the required Ratio I of reducer **(Eqn. 2)**

Calculate the Required Mean Output Torque T_{2m} **(Equ. 3)**

Refer to Allowable Rated Torque T_N of reducer and compare to T_{2m}

$T_{2m} < T_N$

Calculate max. Acceleration Output Torque T_{2A} **(Eqn. 4)**

Refer to Allowable Max. Acceleration Torque T_A of reducer and compare to T_{2A}.

$T_{2A} < T_A$

Calculate Mean Output Speed n_{2m} **(Eqn. 5)**

Calculate Allowable Output Speed n_{2N} of reducer **(Eqn. 6)** and compane to n_{2m}

$n_{2m} < n_{2N}$

S1 Continuous Operation

Calculate the required Ratio I of reducer **(Eqn. 2)**

Calculate the Required Mean Output Torque T_{2m} **(Equ. 3)**

Refer to Allowable Rated Torque T_N of reducer and compare to T_{2m}

$T_{2m} < T_N$

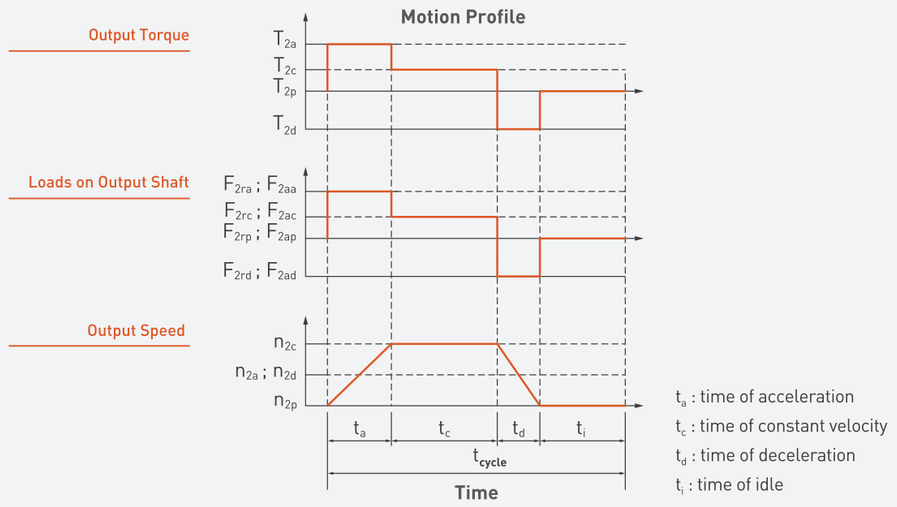
Calcalate Mean Radial Force F_{2rm} and Mean Axial Force F_{2am} worked on output shaft of reducer **(Eqn. 7)**

Refer to Allowable Radial Fr & Allowable Axial Force Fa of reducer and compre to F_{2rm} & F_{2am}

$F_{2rm} < F_r$; $F_{2am} < F_a$

Select the required backlash, shaft option and the diameter of hub diameter.

Complete the selection and contact our staff to order your TUF ONE reducer.



Eqn. 1

$ED = \frac{t_a+t_c+t_d}{t_{cycle}} \times 100\%$; $t_w = t_a + t_c + t_d$

S5: ED ≤ 60% and t_w ≤ 20 mins.

S1: ED > 60% or t_w > 20 mins.

Eqn. 2

$$i = \frac{n_1}{n_2}$$

n_1 : Output speed of mounted servo motor

n_2 : Working required speed.

Eqn. 3

$$T_{2m} = \sqrt[3]{\frac{n_{2a} \times t_a \times T_{2a}^{\ 3} + n_{2c} \times t_c \times T_{2c}^{\ 3} + n_{2d} \times t_d \times T_{2d}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

Eqn. 4

$T_{2A} = T_{1max} \times i \times k_s \times \eta$

K_s	Number of cycles/hr
1.0	0~1,000
1.1	1,000~1,500
1.3	1,500~2,000
1.6	2,000~3,000
1.8	3,000~5,000

T_{1max} : Max. output torque of mounted servo motor

η : Efficiency of reducer

Eqn. 5

$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d} \; ; \; n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$$

Eqn. 6

$$n_{2N} = \frac{n_{1N}}{i}$$; n_{1N} : Allowable Rated Speed of reducer

Eqn. 7

$$F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2ra}^{\ 3} + n_{2c} \times t_c \times F_{2rc}^{\ 3} + n_{2d} \times t_d \times F_{2rd}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

$$F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2aa}^{\ 3} + n_{2c} \times t_c \times F_{2ac}^{\ 3} + n_{2d} \times t_d \times F_{2ad}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

Memo

Material chosen
From the material physical properties to the adjustment of material physical properties to ensure that the design requirements.

High-precision machining technology
In order to meet the design requirements, we use high-precision processing equipment to meet the high-precision requirements.

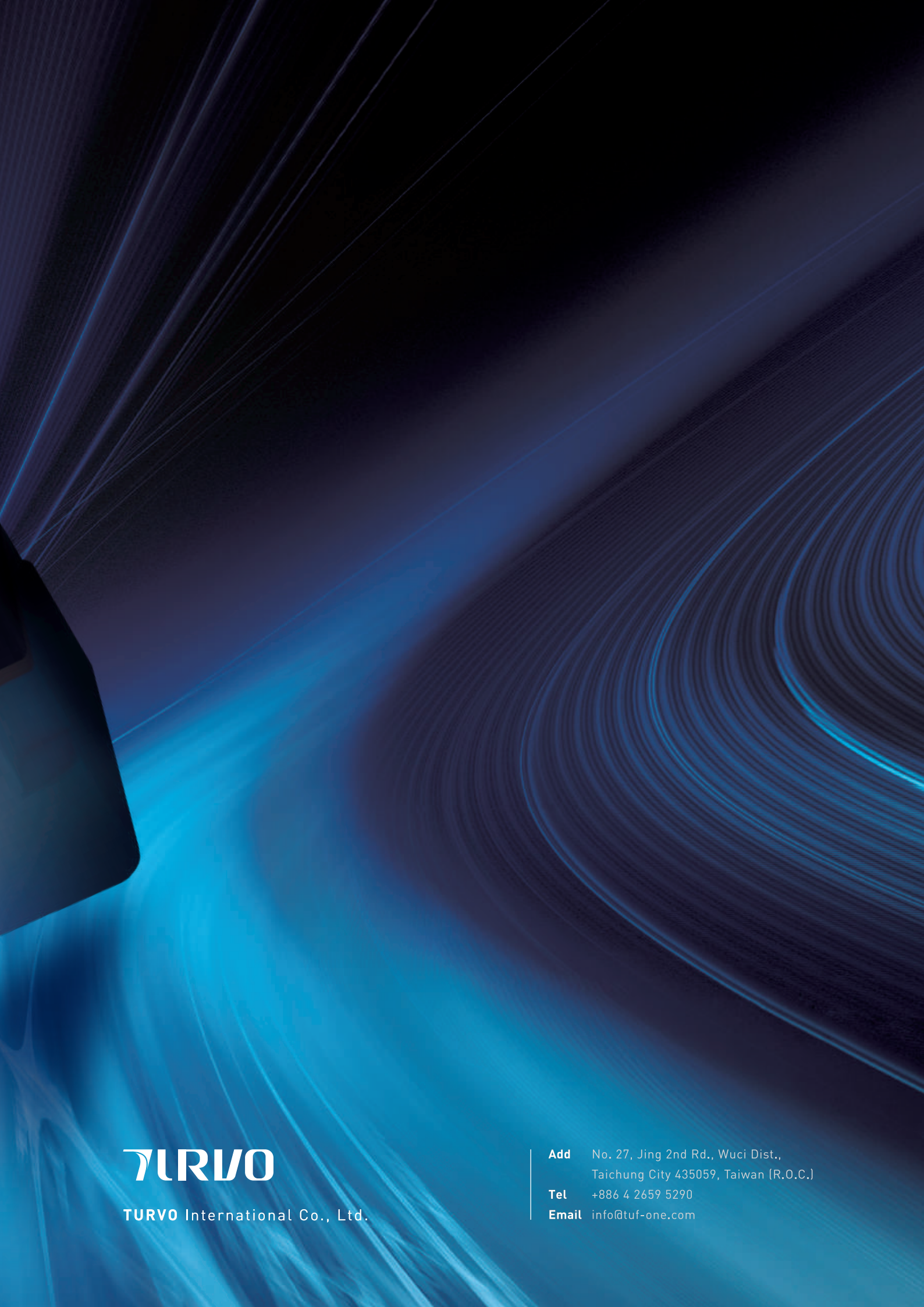
Dimension measurement
High-precision measuring machines are used to ensure machining tolerances, geometrical tolerances, gear accuracy and pitch.

Product assembly and testing
After a series of quality controls, they are assembled precisely, the finished product is running tested to ensure the best quality.

Dedicated test equipment
Special test equipment for backlash test, rigidity test, efficiency test, performance test, noise test, life test and so on.

Quality management
From R&D are managed and controlled with APQP, PFMEA, MSA, SPC & PPAP, the five core tools of IATF16949.

So, "TUF ONE" products are Reliability, Stability & Traceability!



TURVO

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