

[Technical Data] Selection of Transmission Timing Belts 2

Selection is easy with Timing Pulleys and Belts automatic calculation tool available at:
http://fawos.misumi.jp/FA_WEB/pulley_sea/

[Step 2-c] For 2GT/3GT Series

• Design Power (Pd) = Transmission Power (Pt) × Overload Coefficient (Ks)

• Calculate the Transmission Power (Pt) from the motor rated power (Originally, it is ideal to calculate from the actual load applied to the belt)
• Normal Motor Load Factor (Ks)=Ko+Ki+Kr+Kh

Ko : Load Correction Factor (Table 8)
Ki : Idler Correction Factor (Table 9)
Kr : Speed Increase Correction Factor (Table 10)
Kh : Operation Time Correction Factor (Table 11)

<For Servo Motor Applications>

In the process of designing, apply Ko=2.5 for the rated torque and Ko=0.5 for the max. torque.

* If the max. torque is generated each time the belt system is started up or stopped, choose an applicable load correction factor Ko from the Table 8., "Load Correction Factors based on Frequency of Start/Stop (Ko) operation," and apply it to the above expression.

<For Spindle Motor Applications>

In the process of designing, apply Ko=2.2 for the rated output and the basic rotation speed.

Table 8. Load Correction Factor (Ko)

Type of Motor		I	II	III	
Peak Output/Basic Output		150% or Less	Over 150%-200% or Less	Over 250%	
AC Motor	Single-Phase	—	—	All Types	
	Squirrel Cage Type	2 Phase	—	All Types	
		4 Phase	—	37Kw or More	30Kw or Less
		6 Phase · 8 Phase	—	—	All Types
	Wound Field Type	4 Phase	—	—	15Kw or Less
		6 Phase	—	—	11Kw or Less
		8 Phase	—	—	5.5Kw or Less
Synchronous Motor		—	Standard Torque Type	High Torque Type	
DC Motor		Shunt	Wound Field	Series	
Hydraulic Motor		—	—	All Types	
Office Machinery	Printer · Fax Machine · Copy Machine	—	1.2	1.4	
Home Appliance	Juicer	—	1.4	1.6	
	Vacuum Cleaner	1	1.2	1.4	
Finance Equipment	Money Exchanger · Ticket Machine · Ticket Gates · Bank Teller Machine	1.3	1.4	1.5	
Food · Medicine · Medical Equipment	Bakery Equipment	1.2	1.4	1.6	
	Mixer · Granulator	1.4	1.6	1.8	
	Centrifuge	1.5	1.7	1.9	
	Medical Machinery · Measurement Equipment	1	1.2	1.4	
Machine Tool	Drill Press · Lathe	1.2	1.4	1.6	
	Milling Machine	1.3	1.5	1.7	
	Wood Lather	1.2	1.4	1.6	
Printing Book Making	Printer · Book Making Machine · Cutter	1.2	1.4	1.6	
Textile Machine	Textile · Knitting Machinery	1.3	1.5	1.7	
Sawing Machine	Sawing Machine – Home Use	—	1.2	1.4	
	Sawing Machine – Industrial	—	1.6	1.8	
Belt Conveyor · Packaging Machine	Belt Conveyor – Light Objects	1.1	1.3	1.5	
	Packaging Machine	1.2	1.4	1.6	
Film · Wire Making Machine	Calender · Extruder	1.4	1.6	1.8	
	Wire Making Machinery	1.4	1.6	1.8	

Table 9. Idler Correction Factor (Ki)

Idler Position	Inside	Outside
Loose Side of the Belt	0	+0.1
Tense Side of the Belt	+0.1	+0.2

Table 11. Operation Time Correction Factor (Kh)

Operation Time	Correction Factor
Less than 10 hours (Everyday)	0
10~16 Hours Continuous (Everyday)	+0.2
16~24 Hours Continuous (Everyday)	+0.4
300 Hours/Year or Less (Seasonal operations etc.)	-0.2

Table 13. Load Correction Factor based on Frequency of Start/Stop (Ko) operation

When the frequency of Start/Stop is less than 100 times per day	Ko=1.5
When the frequency of Start/Stop is 100 times or more but less than 1,000 times per day	Ko=2.0
When the frequency of Start/Stop is more than 1,000 times per day	Ko=2.5

Table 10. Speed Multiplication Correction Factor (Kr)

Speed Increase Ratio	Correction Factor
1 or More Less than 1.25	0
1.25 or More Less than 1.75	+0.1
1.75 or More Less than 2.5	+0.2
2.5 or More Less than 3.5	+0.3
3.5 or More	+0.4

Table 12. Special Motor Correction Factor (Kp)

Motor Type	Load Correction Factor
Servo Motor	Design as Kp=2.5 for Rated Output, and Kp=0.5 for Peak Output (Rational speed as applied speed)
Spindle Motor	Design as Kp=2.2 for Rated Output and Base Rotational Speed

[Step 2-d] For EV5GT/EV8YU Series

• Design Power (Pd) = Transmission Power (Pt) × Overload Factor (Ks)

• Calculate Transmission Power at Motor Rated Power Output. (It is ideal to calculate from the actual load applied to the belt.)
• Overload Factor (Ks)=Ko+Ki+Kr+Kh+Km

Ko : Load Correction Factor (Table 14)
Ki : Idler Correction Factor (Table 15)
Kr : Speed Multiplication Correction Factor (Table 16)
Kh : Operation Time Correction Factor (Table 17)
Km : Start/Stop Correction Factor (Table 18)

• When converting the torque (Tq) into transmission power (Pd), calculate the applicable values by using the following expressions.

Tq : Design Torque (N·m)
tq : Transmission Torque
Ks : Overload Factor
Pd : Design Power (kW)
n : Speed (rpm)

Table 14. Load Correction Factor (Ko)

Prime Motor Type		Induction Motor	Spindle Motor	Servo Motor (Peak Output/Rated Output)		
				200% or Less	201~299%	300% or More
Robot	Scara Type	2.0	2.0	1.6	1.7	1.8
Injection Mold Machine	Mold Fastening · Ball Screw Drive	1.8	1.8	1.3	1.4	1.5
Machine Tool	Lathe · Drill Press	1.6	1.3	1.2	1.3	1.4
Machine Tool	Milling Machine	1.7	1.3	1.2	1.3	1.4
Conveyor		1.8	1.8	1.4	1.5	1.6
Medical Machinery · Measurement Equipment		1.5	1.5	1.1	0.1	0.2
Packaging Machine		1.6	1.5	1.1	0.1	0.2
Agitator · Mixer	Liquid	1.6	1.6	1.2	1.3	1.4
	Viscous Material	1.7	1.7	1.3	1.4	1.5
Drilling Machine · Granulator		1.8	1.8	1.4	1.5	1.6
Centrifuge		1.9	1.9	1.5	1.6	1.7
Mills	Ball · Rods	2.2	2.2	1.7	1.8	1.9
Printing Machine · Book Making Machine		2.0	2.0	1.6	1.7	1.8
Paper Making Machine	Calender · Dryer	2.0	2.0	1.6	1.7	1.8
Textile Machine		2.0	2.0	1.6	1.7	1.8
Wire Related	Wire Drawing & Twisting Machine	2.1	2.0	1.6	0.1	0.2
Woodworking Machine		1.7	1.7	1.2	1.3	1.4
Pump		2.0	2.0	1.6	1.7	1.8
Compressor	Reciprocating · Rotating	2.0	2.0	1.6	1.7	1.8
Fan · Blower	Axial Flow · Roots	2.0	1.8	1.3	1.4	1.5
Generator · Exciter		1.8	1.8	1.4	1.5	1.6
Rubber Industry Machinery · Lumber Mill Machinery		2.0	2.0	1.6	1.7	1.8

Table 15. Idler Correction Factor (Ki)

No Idler	0
Inside Idler	0.1×(Qty-1)
Outside Idler	0.1×(Qty-1)

Table 16. Speed Multiplication Correction Factor (Kr)

Operation Duration (Hours/Day)	Correction Factor
1 or More Less than 1.25	0
1.25 or More Less than 1.75	0.1
1.75 or More Less than 2.5	0.2
2.5 or More Less than 3.5	0.3
3.5 or More	0.4

Table 17. Operation Time Correction Factor (Kh)

Operation Duration (Hours/Day)	Correction Factor
≤8	0.1
8<16	0.2
16≤	0.3

Table 18. Start/Stop Correction Factor (Km)

Start/Stop Frequency (Times/Day)	Correction Factor
≤10	0.1
11<100	0.2
101<500	0.3
501<	0.4

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[Step 3] Temporarily Selecting the Type of Belt from Selection Guide Table

Table 19. Selection Guide Table 1 (MXL, XL, L, H, T5, T10)

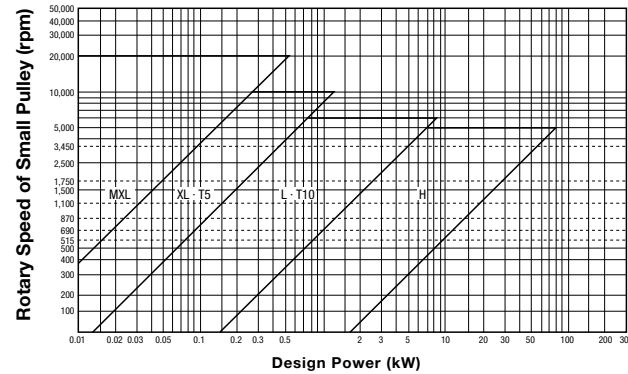


Table 20. Selection Guide Table 2 (S_M series)

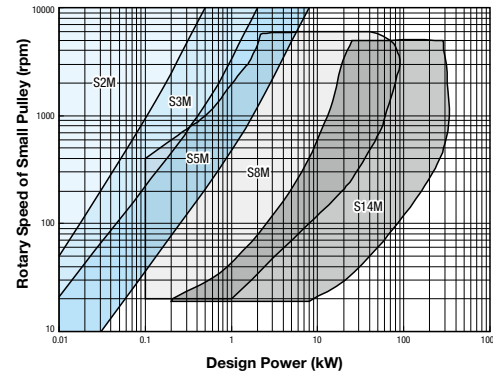


Table 21. Selection Guide Table 3 (P_M series)

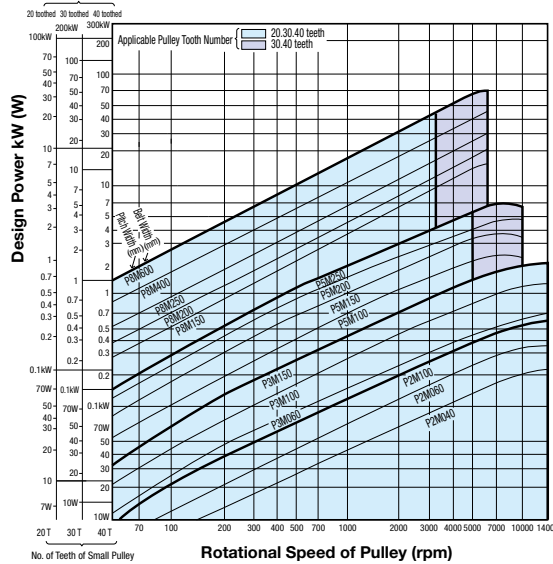


Table 22. Selection Guide Table 4 (MTS8M)

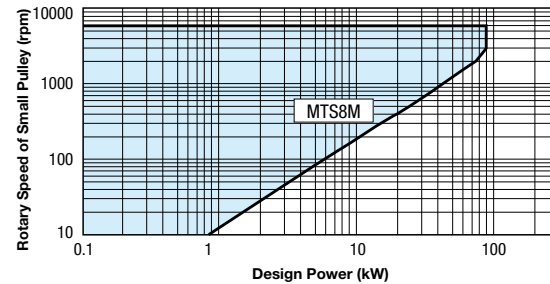


Table 23. Selection Guide Table 5 (UP_M series)

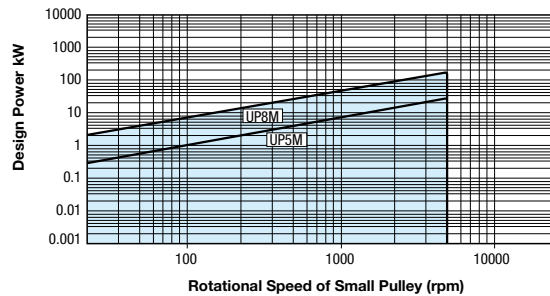


Table 24. Selection Guide Table (2GT-3GT series)

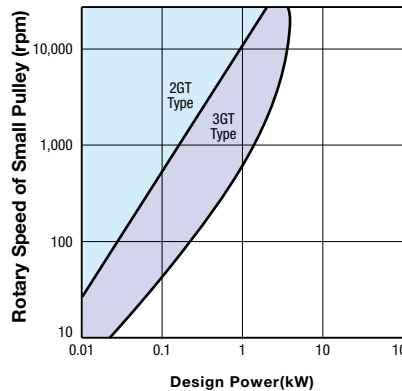
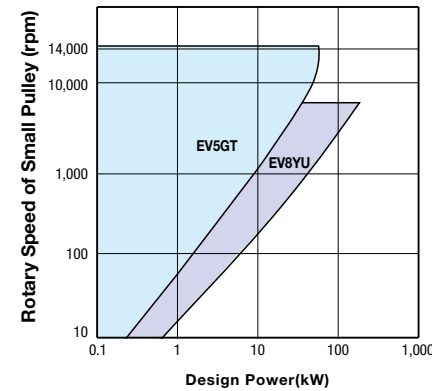


Table 25. Selection Guide Table (EV5GT-EV8YU series)



[Step 4] Determining Number of Teeth of Large and Small Pulley, Belt Length, Inter-Shaft Distance

- Select the number of teeth of large and small pulley from P.2261~2271, which can satisfy the predetermined speed ratio. (However, select the small pulley with number of teeth more than Min. Number of Teeth on Table 26.)

$$\text{Speed Ratio} = \frac{\text{Number of Teeth of Large Pulley}}{\text{Number of Teeth of Small Pulley}}$$

Table 26. Allowable min. number of teeth

Rotary Speed of Small Pulley (rpm)	Type of Belt, Minimum Number of Teeth																						
	MXL	XL	L	H	S2M	S3M	S5M	S8M	S14M	P2M	P3M	P5M	P8M	UP5M	UP8M	MTS8M	T5	T10	2GT	3GT	EV5GT	EV8YU	
900 or Less	12	11	14	16	16	16	16	24	-	14	14	18	22	18	22	24	12	16	12	14	18	26	26
Over 900 1200 or Less	15	11	14	18	16	16	20	25	40	14	14	20	24	20	24	24	14	18	14	14	20	28	28
Over 1200 1800 or Less	15	12	16	20	18	18	24	28	48	14	14	24	26	24	26	26	16	20	16	16	24	32	32
Over 1800 3600 or Less	16	16	19	24	20	20	24	30	-	16	18	28	28	28	28	28	18	22	18	20	28	36	36
Over 3600 4800 or Less	-	16	20	24	20	20	24	32	-	18	20	30	30	30	30	30	18	22	20	20	30	-	-
Over 4800 10000 or Less	-	-	-	-	20	20	26	-	-	20	28	40	-	40	-	-	-	-	-	-	-	-	-

- Determine approx. belt circum. length (Lp) in terms of temporary inter-shaft distance (C), diameter of large pulley (Dp) and diameter of small pulley (dp). (Calculate pulley diameter with P.D. dimensions.)

$$L_p = 2C + \frac{\pi(D_p + d_p)}{2} + \frac{(D_p - d_p)^2}{4C}$$

C : Temporary Inter-shaft Distance
Dp : Pitch Diameter of Large Pulley (mm)
dp : Pitch Diameter of Small Pulley (mm)
Lp : Approx. Belt Circum. Length (mm)

- Determine a belt circum. length (Lp) that is the nearest value to approx. belt circum. length referring to P.1459~1470, and then calculate the correct inter-shaft distance using the following formula.

$$C = \frac{b + \sqrt{b^2 - 8(D_p - d_p)^2}}{8}$$

$$b = 2L_p - \pi(D_p + d_p)$$

Dp : Pitch Diameter of Large Pulley (mm)
dp : Pitch Diameter of Small Pulley (mm)
Lp : Belt Circum. Length (mm)
C : Inter-shaft Distance

[Step 5] Determining Belt Width

- Calculate an approx. belt width using the following formula, and then select a belt width (Bw':mm) that is the nearest value to the approximated value.

$$Bw' = \frac{P_d}{P_s \cdot K_m} \times W_p$$

Pd : Design Power
Ps : Reference Transmission Capacity.....Use the Reference Transmission Capacity Table on P.2261~2271.
Km : Engagement Correction Coefficient (Table 27)
Wp : Reference Belt Width (Table 28)

Table 27. Engagement Correction Coefficient (Km)

No. of Teeth Engaged Zm	More than 6	5	4	3	2
Km	1.0	0.8	0.6	0.4	0.2
*Km	1.0	0.7	0.5	-	-

Table 28. Reference Belt Width (Wp)

Type of Belt	MXL	XL	L	H	S2M	S3M	S5M	S8M	S14M	MTS8M
Reference Belt Width	6.4	25.4	25.4	25.4	4	6	10	60	120	60

Type of Belt	P2M	P3M	P5M	P8M	T5	T10
Reference Belt Width	4	6	10	15	10	10

$$\text{No. of Teeth Engaged (Zm)} = \frac{Z_d \cdot \theta}{360^\circ}$$

$$\theta = 180^\circ - \frac{57.3(D_p - d_p)}{C}$$

Zd : No. of Teeth of Small Pulley
Dp : Pitch Diameter of Large Pulley (mm)
C : Inter-shaft Distance (mm)
θ : Contact Angle (°)
dp : Pitch Diameter of Small Pulley (mm)

- Check if Design Power (Pd) satisfies the following formula. (If not, select the belt width of one size larger again.)

For belt types P□M and UP□M, substitute *Km for meshing compensation factor

- Pd < Ps · Km · Kb
 - 2GT · 3GT · EV5GT · EV8YU
 - Pd < Ps · Km · Kb · KL
- Pd : Design Power
Ps : Reference Transmission Capacity
Km : Engagement Correction Coefficient
Kb : Width Correction Coefficient (Table 29)
KL : Length Correction Coefficient (Table 30)

Table 29. Width Correction Coefficient (Kb)

Type of Belt	Nominal mm	Width Correction Coefficient Kb	Type of Belt	Nominal mm	Width Correction Coefficient Kb	Type of Belt	Nominal mm	Width Correction Coefficient Kb	Type of Belt	Nominal mm	Width Correction Coefficient Kb		
MXL	019	4.8	S2M	040	4	P2M	40	4	2GT	4	4		
	025	6.4		060	6		60	6		6	6	6	
	037	9.5		100	10		100	10		10	9	9	
	050	12.7		150	15		150	15		150	15	150	15
	075	19.1		250	25		250	25		250	25	250	25
XL	025	6.4	S3M	100	10	P3M	100	10	3GT	6	6		
	031	7.9		150	15		150	15		150	15	150	15
	037	9.5		250	25		250	25		250	25	250	25
	050	12.7		400	40		400	40		400	40	400	40
	075	19.1		600	60		600	60		600	60	600	60
L	100	25.4	S5M	100	10	P5M	100	10	EV5GT	9	9		
	150	38.1		150	15		150	15		150	15	150	15
	200	50.8		250	25		250	25		250	25	250	25
	300	76.2		400	40		400	40		400	40	400	40
	400	101.6		600	60		600	60		600	60	600	60
H	075	19.1	S8M	150	15	P8M	150	15	EV8YU	15	15		
	100	25.4		250	25		250	25		250	25	250	25
	150	38.1		400	40		400	40		400	40	400	40
	200	50.8		600	60		600	60		600	60	600	60
	300	76.2		1000	100		1000	100		1000	100	1000	100

Table 30. Length Correction Coefficient (KL)

Length Correction Coefficient (KL)	0.80	0.90	1.00	1.10	1.20
2GT Belt Length (mm)	130 or less	131~182	183~280	281~419	420 or less
3GT Belt Length (mm)	190 or less	191~260	261~400	401~599	600 or less
EV5GT Belt Length (mm)	440 or less	441~550	551~800	801~1100	1101 or less
EV8YU Belt Length (mm)	600 or less	601~900	901~1250	1251~1799	1800 or less

[Technical Data]

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-Transmission Capacity Table-

Selection is easy with Timing Pulleys and Belts automatic calculation tool available at:
http://fawos.misumi.jp/FA_WEB/pulley/

Table 49. Reference Transmission Capacity of T5 Ps -Belt Width 10mm- (W)

Rotary Speed of Small Pulley (rpm)	No. of Teeth of Small Pulley		Diameter of the Pitch Circle (mm)		12		14		16		18		20		22		24		28		30		
	12	14	16	18	20	22	24	28	30	32	36	40	44	48	50	60	72	80	90	100	120	140	
1160	98.5	114.9	131.3	147.7	164.1	180.5	196.9	229.7	246.1	262.5	278.9	311.7	328.1	344.5	360.9	377.3	393.7	426.5	442.9	459.3	475.7	492.1	508.5
1750	134.3	156.7	179.1	201.5	223.9	246.3	268.7	301.5	317.9	334.3	350.7	383.5	399.9	416.3	432.7	449.1	465.5	498.3	514.7	531.1	547.5	563.9	580.3
3500	222.5	259.6	296.7	333.7	370.8	407.9	445.0	519.1	535.5	551.9	568.3	601.1	617.5	633.9	650.3	666.7	699.5	715.9	732.3	748.7	765.1	781.5	797.9
100	10.7	12.4	14.2	16.0	17.8	19.5	21.3	24.9	26.6	28.3	30.0	33.6	35.3	37.0	38.7	40.4	44.0	45.7	47.4	49.1	50.8	52.5	54.2
200	20.8	24.3	27.7	31.2	34.7	38.2	41.6	48.6	50.3	52.0	53.7	57.3	59.0	60.7	62.4	64.1	67.7	69.4	71.1	72.8	74.5	76.2	77.9
300	30.5	35.6	40.7	45.7	50.8	55.9	61.0	71.2	72.9	74.6	76.3	80.9	82.6	84.3	86.0	87.7	91.3	93.0	94.7	96.4	98.1	99.8	101.5
400	39.7	46.4	53.0	59.6	66.2	72.9	79.5	92.7	94.4	96.1	97.8	102.4	104.1	105.8	107.5	109.2	112.8	114.5	116.2	117.9	119.6	121.3	123.0
500	48.6	56.7	64.8	72.9	81.0	89.1	97.2	113.4	115.1	116.8	118.5	123.1	124.8	126.5	128.2	130.0	133.6	135.3	137.0	138.7	140.4	142.1	143.8
600	57.0	66.5	76.0	85.5	95.0	104.5	114.0	131.1	132.8	134.5	136.2	140.8	142.5	144.2	145.9	147.6	151.2	152.9	154.6	156.3	158.0	159.7	161.4
700	65.1	76.0	86.8	97.7	108.6	119.4	130.3	150.0	151.7	153.4	155.1	160.7	162.4	164.1	165.8	167.5	171.1	172.8	174.5	176.2	177.9	179.6	181.3
800	72.9	85.0	97.2	109.3	121.5	133.6	145.8	170.1	171.8	173.5	175.2	180.8	182.5	184.2	185.9	187.6	191.2	192.9	194.6	196.3	198.0	199.7	201.4
900	80.3	93.7	107.1	120.5	133.9	147.3	160.7	185.0	186.7	188.4	190.1	195.7	197.4	199.1	200.8	202.5	206.1	207.8	209.5	211.2	212.9	214.6	216.3
1000	87.5	102.1	116.7	130.1	143.5	156.9	170.3	204.6	206.3	208.0	210.0	215.6	217.3	219.0	220.7	222.4	226.0	227.7	229.4	231.1	232.8	234.5	236.2
1100	94.4	110.2	125.9	141.6	157.4	173.1	188.9	220.3	222.0	223.7	225.4	231.0	232.7	234.4	236.1	237.8	241.4	243.1	244.8	246.5	248.2	250.0	251.7
1200	101.1	117.9	134.8	151.6	168.5	185.3	202.2	235.9	237.6	239.3	241.0	246.6	248.3	250.0	251.7	253.4	257.0	258.7	260.4	262.1	263.8	265.5	267.2
1300	107.5	125.5	143.4	161.3	179.2	197.1	215.0	250.9	252.6	254.3	256.0	261.6	263.3	265.0	266.7	270.3	272.0	273.7	275.4	277.1	278.8	280.5	282.2
1400	113.8	132.8	151.7	170.7	189.7	208.6	227.6	265.5	267.2	268.9	270.6	276.2	277.9	279.6	281.3	283.0	286.6	288.3	290.0	291.7	293.4	295.1	296.8
1500	119.9	139.8	159.7	179.6	199.5	219.4	239.3	279.7	281.4	283.1	284.8	290.4	292.1	293.8	295.5	297.2	300.8	302.5	304.2	305.9	307.6	309.3	311.0
1600	125.8	146.7	167.6	188.5	209.4	230.3	251.2	293.6	295.3	297.0	302.6	304.3	306.0	307.7	309.4	311.1	314.7	316.4	318.1	319.8	321.5	323.2	324.9
1700	131.5	153.4	175.3	197.2	219.1	241.0	262.9	306.9	308.6	310.3	315.9	317.6	319.3	321.0	322.7	324.4	328.0	329.7	331.4	333.1	334.8	336.5	338.2
1800	137.1	160.0	181.9	203.8	225.7	247.6	269.5	315.5	317.2	318.9	324.5	326.2	327.9	329.6	331.3	332.9	336.5	338.2	339.9	341.6	343.3	345.0	346.7
1900	142.6	166.4	190.2	214.0	237.8	261.5	285.3	332.8	334.5	336.2	341.8	343.5	345.2	346.9	348.6	350.3	353.9	355.6	357.3	359.0	360.7	362.4	364.1
2000	148.0	172.7	197.4	222.1	246.7	271.4	296.1	345.4	347.1	348.8	354.4	356.1	357.8	359.5	361.2	362.9	366.5	368.2	369.9	371.6	373.3	375.0	376.7
2200	158.6	185.0	211.4	237.8	264.3	290.7	317.8	370.0	371.7	373.4	379.0	380.7	382.4	384.1	385.8	387.5	391.1	392.8	394.5	396.2	397.9	399.6	401.3
2400	168.8	196.9	225.1	253.2	281.4	309.5	337.6	393.9	395.6	397.3	402.9	404.6	406.3	408.0	409.7	411.4	415.0	416.7	418.4	420.1	421.8	423.5	425.2
2600	178.8	208.7	238.5	268.3	298.1	327.9	357.7	417.3	419.0	420.7	426.3	428.0	429.7	431.4	433.1	436.7	438.4	440.1	441.8	443.5	445.2	446.9	448.6
2800	188.7	220.2	251.6	283.1	314.5	346.0	377.4	440.4	442.1	443.8	449.4	451.1	452.8	454.5	456.2	459.8	461.5	463.2	464.9	466.6	468.3	470.0	471.7
3000	198.5	231.6	264.6	297.7	330.8	363.9	397.0	463.1	464.8	466.5	472.1	473.8	475.5	477.2	478.9	482.5	484.2	485.9	487.6	489.3	491.0	492.7	494.4
3200	208.2	242.8	277.5	312.2	346.9	381.6	416.3	485.7	487.4	489.1	494.7	496.4	498.1	499.8	501.5	505.1	506.8	508.5	510.2	511.9	513.6	515.3	517.0
3400	217.7	250.3	286.6	322.9	359.2	395.5	431.8	500.0	501.7	503.4	509.0	510.7	512.4	514.1	515.8	519.4	521.1	522.8	524.5	526.2	527.9	529.6	531.3
3600	227.2	261.1	300.0	340.8	381.6	422.4	463.2	531.4	533.1	534.8	540.4	542.1	543.8	545.5	547.2	550.8	552.5	554.2	555.9	557.6	559.3	561.0	562.7
3800	236.6	270.6	311.5	354.9	398.3	441.7	485.1	553.3	555.0	556.7	562.3	564.0	565.7	567.4	569.1	572.7	574.4	576.1	577.8	579.5	581.2	582.9	584.6
4000	245.8	280.8	322.7	368.7	409.7	450.7	491.6	573.6	575.3	577.0	582.6	584.3	586.0	587.7	589.4	593.0	594.7	596.4	598.1	599.8	601.5	603.2	604.9
4200	254.8	291.3	333.7	382.2	424.7	467.2	508.6	596.6	598.3	600.0	605.6	607.3	609.0	610.7	612.4	616.0	617.7	619.4	621.1	622.8	624.5	626.2	627.9
4400	263.5	301.4	345.4	395.3	439.2	483.1	527.0	619.0	620.7	622.4	628.0	629.7	631.4	633.1	634.8	638.4	640.1	641.8	643.5	645.2	646.9	648.6	650.3
4600	271.9	312.2	357.1	407.8	453.1	498.4	543.7	639.7	641.4	643.1	648.7	650.4	652.1	653.8	655.5	659.1	660.8	662.5	664.2	665.9	667.6	669.3	671.0
4800	279.7	320.4	366.0	416.6	462.9	509.2	554.5	650.6	652.3	654.0	659.6	661.3	663.0	664.7	666.4	670.0	671.7	673.4	675.1	676.8	678.5	680.2	681.9
5000	287.0	334.8	382.7	430.5	478.3	526.2	574.0	669.7	671.4	673.1	678.7	680.4	682.1	683.8	685.5	689.1	690.8	692.5	694.2	695.9	697.6	699.3	701.0
5500			402.2	452.4	502.7	553.0	603.2	703.8	705.5	707.2	712.8	714.5	716.2	717.9	719.6	723.2	724.9	726.6	728.3	730.0	731.7	733.4	735.1
6000			412.1	463.6	515.1	566.6	618.1	718.7	720.4	722.1	727.7	729.4	731.1	732.8	734.5	738.1	739.8	741.5	743.2	744.9	746.6	748.3	750.0
6500			408.2	459.7	511.2	562.7	614.2	714.8	716.5	718.2	723.8	725.5	727.2	728.9	730.6	734.2	735.9	737.6	739.3	741.0	742.7	744.4	746.1
7000			385.3	435.5	485.7	535.9	586.1	686.7	688.4	690.1	695.7	697.4	699.1	700.8	702.5	706.1	707.8	709.5	711.2	712.9	714.6	716.3	718.0
7500			337.7	379.9	422.1	464.3	506.5	591.0	592.7	594.4	599.9	601.6	603.3	605.0	606.7	610.3	612.0	613.7	615.4	617.1	618.8	620.5	622.2
8000				290.8	323.1	355.5	387.8	452.4	454.1	455.8	461.4	463.1	464.8	466.5	468.2	471.8	473.5	475.2	476.9	478.6	480.3	482.0	483.7
8500																							

[Technical Data]

Selection of Transmission Timing Belts 13

-Allowable Tension Table-

Selection is easy with Timing Pulleys and Belts automatic calculation tool available at:
http://fawos.misumi.jp/FA_WEB/pulley/

Table 61. 2GT Allowable Tension Table: Per 4.0mm of Belt Width (Unit: N)

Speed of Small Pulley (rpm)	Number of Small Pulley Teeth		Pitch Circle Dia. (mm)																																	
	12	14	16	18	20	22	24	26	28	30	32	36	40	44	48	50	60	72	12	14	16	18	20	22	24	26	28	30	32	36	40	44	48	50	60	72
20	56.09	57.27	58.45	59.63	60.80	61.98	63.16	64.33	65.51	66.69	67.86	70.22	72.57	74.92	77.28	78.45	84.34	84.34	56.09	57.27	58.45	59.63	60.80	61.98	63.16	64.33	65.51	66.69	67.86	70.22	72.57	74.92	77.28	78.45	84.34	84.34
40	50.60	51.78	52.96	54.13	55.31	56.49	57.66	58.84	60.02	61.20	62.37	64.73	67.08	69.43	71.79	72.96	78.85	78.85	50.60	51.78	52.96	54.13	55.31	56.49	57.66	58.84	60.02	61.20	62.37	64.73	67.08	69.43	71.79	72.96	78.85	78.85
60	47.39	48.57	49.75	50.92	52.10	53.28	54.45	55.63	56.81	57.98	59.16	61.51	63.87	66.22	68.57	69.75	75.64	75.64	47.39	48.57	49.75	50.92	52.10	53.28	54.45	55.63	56.81	57.98	59.16	61.51	63.87	66.22	68.57	69.75	75.64	75.64
100	43.35	44.52	45.70	46.88	48.05	49.23	50.41	51.58	52.76	53.94	55.11	57.47	59.82	62.17	64.53	65.70	71.59	71.59	43.35	44.52	45.70	46.88	48.05	49.23	50.41	51.58	52.76	53.94	55.11	57.47	59.82	62.17	64.53	65.70	71.59	71.59
200	37.85	39.03	40.21	41.38	42.56	43.74	44.92	46.09	47.27	48.45	49.62	51.98	54.33	56.68	59.04	60.21	66.10	66.10	37.85	39.03	40.21	41.38	42.56	43.74	44.92	46.09	47.27	48.45	49.62	51.98	54.33	56.68	59.04	60.21	66.10	66.10
300	34.64	35.82	37.00	38.17	39.35	40.53	41.70	42.88	44.06	45.23	46.41	48.76	51.12	53.47	55.82	57.00	62.89	62.89	34.64	35.82	37.00	38.17	39.35	40.53	41.70	42.88	44.06	45.23	46.41	48.76	51.12	53.47	55.82	57.00	62.89	62.89
400	32.36	33.54	34.72	35.89	37.07	38.25	39.42	40.60	41.78	42.95	44.13	46.48	48.84	51.19	53.55	54.72	60.61	60.61	32.36	33.54	34.72	35.89	37.07	38.25	39.42	40.60	41.78	42.95	44.13	46.48	48.84	51.19	53.55	54.72	60.61	60.61
500	30.60	31.77	32.95	34.13	35.30	36.48	37.66	38.83	40.01	41.19	42.36	44.72	47.07	49.42	51.78	52.96	58.84	58.84	30.60	31.77	32.95	34.13	35.30	36.48	37.66	38.83	40.01	41.19	42.36	44.72	47.07	49.42	51.78	52.96	58.84	58.84
600	29.15	30.33	31.51	32.68	33.86	35.04	36.21	37.39	38.57	39.74	40.92	43.27	45.63	47.98	50.33	51.51	57.39	57.39	29.15	30.33	31.51	32.68	33.86	35.04	36.21	37.39	38.57	39.74	40.92	43.27	45.63	47.98	50.33	51.51	57.39	57.39
700	27.93	29.11	30.28	31.46	32.64	33.81	34.99	36.17	37.34	38.52	39.70	42.05	44.41	46.76	49.11	50.29	56.17	56.17	27.93	29.11	30.28	31.46	32.64	33.81	34.99	36.17	37.34	38.52	39.70	42.05	44.41	46.76	49.11	50.29	56.17	56.17
800	26.87	28.05	29.23	30.40	31.58	32.76	33.93	35.11	36.29	37.46	38.64	40.99	43.35	45.70	48.06	49.23	55.12	55.12	26.87	28.05	29.23	30.40	31.58	32.76	33.93	35.11	36.29	37.46	38.64	40.99	43.35	45.70	48.06	49.23	55.12	55.12
870	26.21	27.39	28.56	29.74	30.92	32.09	33.27	34.45	35.62	36.80	37.98	40.33	42.68	45.04	47.39	48.57	54.45	54.45	26.21	27.39	28.56	29.74	30.92	32.09	33.27	34.45	35.62	36.80	37.98	40.33	42.68	45.04	47.39	48.57	54.45	54.45
900	25.94	27.12	28.29	29.47	30.65	31.82	33.00	34.18	35.35	36.53	37.71	40.06	42.41	44.77	47.12	48.30	54.18	54.18	25.94	27.12	28.29	29.47	30.65	31.82	33.00	34.18	35.35	36.53	37.71	40.06	42.41	44.77	47.12	48.30	54.18	54.18
1000	25.11	26.28	27.46	28.64	29.81	30.99	32.17	33.34	34.52	35.70	36.87	39.23	41.58	43.93	46.29	47.46	53.35	53.35	25.11	26.28	27.46	28.64	29.81	30.99	32.17	33.34	34.52	35.70	36.87	39.23	41.58	43.93	46.29	47.46	53.35	53.35
1160	23.93	25.11	26.28	27.46	28.64	29.81	30.99	32.17	33.34	34.52	35.70	38.05	40.40	42.76	45.11	46.29	52.17	52.17	23.93	25.11	26.28	27.46	28.64	29.81	30.99	32.17	33.34	34.52	35.70	38.05	40.40	42.76	45.11	46.29	52.17	52.17
1200	23.66	24.84	26.01	27.19	28.37	29.54	30.72	31.90	33.08	34.25	35.43	37.78	40.14	42.49	44.84	46.02	51.90	51.90	23.66	24.84	26.01	27.19	28.37	29.54	30.72	31.90	33.08	34.25	35.43	37.78	40.14	42.49	44.84	46.02	51.90	51.90
1400	22.44	23.62	24.79	25.97	27.15	28.32	29.50	30.68	31.85	33.03	34.21	36.56	38.91	41.27	43.62	44.80	50.68	50.68	22.44	23.62	24.79	25.97	27.15	28.32	29.50	30.68	31.85	33.03	34.21	36.56	38.91	41.27	43.62	44.80	50.68	50.68
1450	22.16	23.34	24.52	25.69	26.87	28.05	29.22	30.40	31.58	32.75	33.93	36.28	38.64	40.99	43.34	44.52	50.40	50.40	22.16	23.34	24.52	25.69	26.87	28.05	29.22	30.40	31.58	32.75	33.93	36.28	38.64	40.99	43.34	44.52	50.40	50.40
1600	21.38	22.56	23.74	24.91	26.09	27.27	28.44	29.62	30.80	31.97	33.15	35.50	37.86	40.21	42.56	43.74	49.62	49.62	21.38	22.56	23.74	24.91	26.09	27.27	28.44	29.62	30.80	31.97	33.15	35.50	37.86	40.21	42.56	43.74	49.62	49.62
1750	20.67	21.85	23.03	24.20	25.38	26.56	27.73	28.91	30.09	31.26	32.44	34.79	37.15	39.50	41.85	43.03	48.92	48.92	20.67	21.85	23.03	24.20	25.38	26.56	27.73	28.91	30.09	31.26	32.44	34.79	37.15	39.50	41.85	43.03	48.92	48.92
1800	20.45	21.63	22.80	23.98	25.16	26.33	27.51	28.69	29.86	31.04	32.22	34.57	36.92	39.28	41.63	42.81	48.69	48.69	20.45	21.63	22.80	23.98	25.16	26.33	27.51	28.69	29.86	31.04	32.22	34.57	36.92	39.28	41.63	42.81	48.69	48.69
2000	19.61	20.79	21.97	23.14	24.32	25.50	26.67	27.85	29.03	30.21	31.38	33.74	36.09	38.44	40.80	41.97	47.86	47.86	19.61	20.79	21.97	23.14	24.32	25.50	26.67	27.85	29.03	30.21	31.38	33.74	36.09	38.44	40.80	41.97	47.86	47.86
2400	18.17	19.35	20.52	21.70	22.88	24.05	25.23	26.41	27.58	28.76	29.94	32.29	34.65	37.00	39.35	40.53	46.41	46.41	18.17	19.35	20.52	21.70	22.88	24.05	25.23	26.41	27.58	28.76	29.94	32.29	34.65	37.00	39.35	40.53	46.41	46.41
2800	16.95	18.13	19.30	20.48	21.66	22.83	24.01	25.19	26.36	27.54	28.72	31.07	33.42	35.78	38.13	39.31	45.19	45.19	16.95	18.13	19.30	20.48	21.66	22.83	24.01	25.19	26.36	27.54	28.72	31.07	33.42	35.78	38.13	39.31	45.19	45.19
3200	15.89	17.07	18.24	19.42	20.60	21.77	22.95	24.13	25.31	26.48	27.66	30.01	32.37	34.72	37.07	38.25	44.13	44.13	15.89	17.07	18.24	19.42	20.60	21.77	22.95	24.13	25.31	26.48	27.66	30.01	32.37	34.72	37.07	38.25	44.13	44.13
3600	14.96	16.13	17.31	18.49	19.67	20.84	22.02	23.20	24.37	25.55	26.73	29.08	31.43	33.79	36.14	37.32	43.20	43.20	14.96	16.13	17.31	18.49	19.67	20.84	22.02	23.20	24.37	25.55	26.73	29.08	31.43	33.79	36.14	37.32	43.20	43.20
4000	14.12	15.30	16.48	17.65	18.83	20.01	21.18	22.36	23.54	24.71	25.89	28.24	30.60	32.95	35.31	36.48	42.37	42.37	14.12	15.30	16.48	17.65	18.83	20.01	21.18	22.36	23.54	24.71	25.89	28.24	30.60	32.95	35.31	36.48	42.37	42.37
5000	12.36	13.53	14.71	15.89	17.06	18.24	19.42	20.59	21.77	22.95	24.12	26.48	28.83	31.18	33.54	34.71	40.60	40.60	12.36	13.53	14.71	15.89	17.06	18.24	19.42	20.59	21.77	22.95	24.12	26.48	28.83	31.18	33.54	34.71	40.60	40.60
6000	10.91	12.09	13.26	14.44	15.62	16.80	17.97	19.15	20.33	21.50	22.68	25.03	27.39	29.74	32.09	33.27	39.15	39.15	10.91	12.09	13.26	14.44	15.62	16.80	17.97	19.15	20.33	21.50	22.68	25.03	27.39	29.74	32.09	33.27	39.15	39.15
7000	9.69	10.87	12.04	13.22	14.40	15.57	16.75	17.93	19.10	20.28	21.46	23.81	26.17	28.52	30.87	32.05	37.93	37.93	9.69	10.87	12.04	13.22	14.40	15.57	16.75	17.93	19.10	20.28	21.46	23.81	26.17	28.52	30.87	32.05	37.93	37.93
8000	8.63	9.81	10.99	12.16	13.34	14.52	15.69	16.87	18.05	19.22	20.40	22.75	25.11	27.46	29.81	30.99	36.88	36.88	8.63	9.81	10.99	12.16	13.34	14.52	15.69	16.87	18.05	19.22	20.40	22.75	25.11	27.46	29.81	30.99	36.88	36.88
10000																																				

Synchronous Belt Reference Information

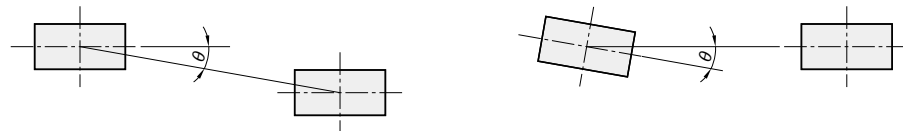
Synchronous Belt Replacement Signs

Early failures and countermeasures

Abnormal Phenomena	Cause	Measures
Abnormal Wear of Belt Side Faces	<ul style="list-style-type: none"> Pulley misalignment Pulley shafts misalignments Bent pulley flanges 	<ul style="list-style-type: none"> Realign Correct shaft misalignments Correct bent pulley flanges
Tooth Contact Pressure Surface Abnormal Wear	<ul style="list-style-type: none"> Overload Belt tension too high, too low 	<ul style="list-style-type: none"> Redesign with a wide belt or use larger belt pitch Adjust initial belt tension
Belt abnormal wear on pulley contacting area	<ul style="list-style-type: none"> Pulley tooth shape incorrect Belt tension too high 	<ul style="list-style-type: none"> Adjust initial belt tension Try to recreate belt systems by taking note of tooth tip radius
Broken/missing tooth	<ul style="list-style-type: none"> Pulley diameter too small Small pulley meshing 6 teeth or less Shock loading exists 	<ul style="list-style-type: none"> Redesign Increase small pulley tooth mesh or redesign Avoid shock loading on belt Increase belt width
Severed Core Wire	<ul style="list-style-type: none"> Overload Core wire decreased elasticity or corrosion Induction of foreign matter Excessive temperature 	<ul style="list-style-type: none"> Redesign Check belt storage and shipping history/condition Avoid shocks Provide a belt cover Lower environment temperature
Cracks on Backing Rubber	<ul style="list-style-type: none"> Usage in low temperature Pulley diameter too small 	<ul style="list-style-type: none"> Raise environment temp. Increase pulley diameter
Heat Degradation of Rubber	<ul style="list-style-type: none"> Rubber degradation due to high environment temperature 	<ul style="list-style-type: none"> Lower environment temperature
Rubber Swelling	<ul style="list-style-type: none"> Contact with oils Contact with water 	<ul style="list-style-type: none"> Avoid oil from contacting Avoid water from contacting
Abnormal Wear of Pulley Teeth	<ul style="list-style-type: none"> Overload Belt tension too high Pulley material too soft 	<ul style="list-style-type: none"> Redesign Adjust initial belt tension Apply surface hardening treatment on pulley or change pulley material
Pulley Circumference Wear	<ul style="list-style-type: none"> Pulley service life has been reached Belt tension too high (core wire visible on belt back side) 	<ul style="list-style-type: none"> Replace with a new pulley Replace with new pulley and belt, and use lower belt tension
Abnormal Sound	<ul style="list-style-type: none"> Belt tension too high Overload Pulley diameter too small Pulley tooth shape incorrect 	<ul style="list-style-type: none"> Realign Adjust initial belt tension Redesign Correct pulley tooth geometry
Apparent Belt Stretch	<ul style="list-style-type: none"> Shaft center distance too small Loose machine base 	<ul style="list-style-type: none"> Adjust to correct shaft distance Reinforce machine base

About Pulley Alignments

Misaligned pulleys may cause early belt failure and flange damages. Align as show below



•MXL/XL/L/H/S_M/MTS_M/T Series

Belt width (mm)	10	20	30≤
tanθ	5/1000	3/1000	2/1000

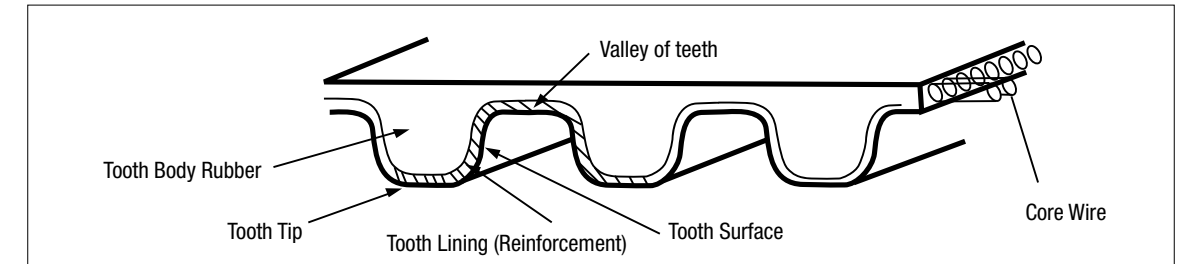
•P_M/UP_M

Belt width (mm)	≤30
tanθ	5/1000

•_GT/EV5GT/EV8YU

Belt width (mm)	≤20	20<40
tanθ	6/1000	3/1000

Names of Belt Components



Examples of Belt Replacement Signs

Examples	Condition
1. When belt tooth reinforcement fabric is worn and rubber/core wire are exposed When tooth surface/grooves are worn and rubber/core wire are exposed	
2. When the backing rubber shows cracks due to hardening	
3. When cracks reaching the rubber are seen at tooth base	
4. Belt side faces are damaged due to wear	
5. When missing tooth can be seen	
6. When excessive wear can be seen on belt back side	
7. When belt or core wire are broken	

These are belt replacement timing guides. Early or periodical replacements are recommended even the signs shown above are not yet visible.