Shock Guard TGM Series

Features

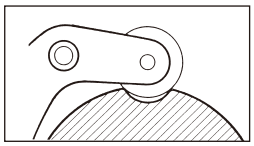
Sealed structure and superb accuracy.
Excels in wet, dusty, and oily applications.

Sealed structure

The TGM Series is covered with a special aluminum alloy casing and tightly sealed, so it is almost impossible for dust, oil, or water to penetrate, or for oil to leak out. Trip torque accuracy is not affected, making it an ideal overload protection device.

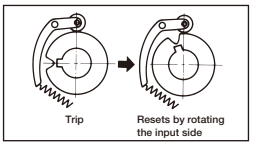
Backlash-free

There is no backlash because the engagement of the cam follower and pocket is a two-point contact.



Automatic reset

After removing the cause of the overload, rotating the input side slightly (at 50 r/min or less), or "jogging" the motor will automatically return the motor to its original phase.



LS detecting plate for overload detection

When the Shock Guard trips, the LS detecting plate slides axially, allowing for easy activation of limit switches to shut down power or sound warning alarms. This feature can be used on either the cam shaft side or the main body (case) side, depending on where it stops during the trip. The LS detecting plate is pre-installed on all TGM Series.

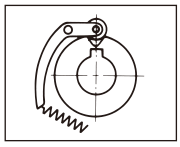
Long life

No need to lubricate

An optimal amount of high-quality grease is sealed in the TGM Series before shipment. The product can be used as is.

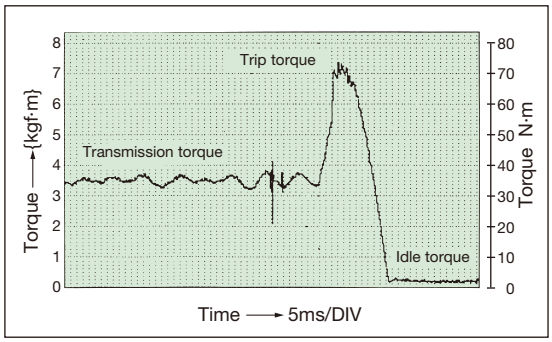
One-position design

Because the cam follower and pocket engage together, there is no phase misalignment between the drive side and the driven side.



High-precision trip torque

Repeated trip accuracy is within ±5%. A cam follower is pressed firmly against the precision-machined pocket from the radial direction. A highly rigid rectangular spring with a stable spring constant is used. Tripping is a rolling movement; therefore, even repeated trips produce almost no torque variation.



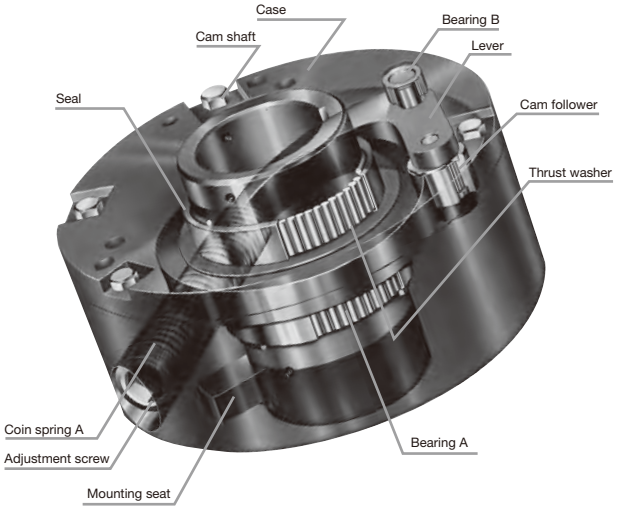
Easy to use

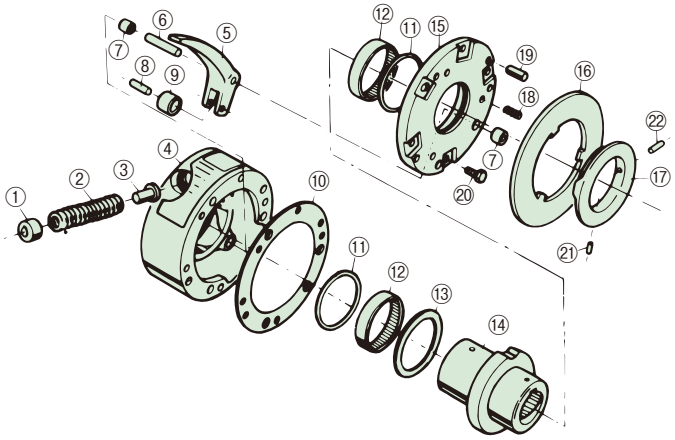
The cam shaft and case can be used as either the drive or passive side, and the direction of rotation is interchangeable. There is flexibility to choose from various drive members such as chains, pulleys, gears, and more. A coupling can also be used. Refer to page 64 for information on roller chain coupling types.

Torque setting is easy

The trip torque can be set accurately by simply turning the adjustment screw with a hexagon wrench. The adjustment screw is on the outer periphery of the Shock Guard, so torque setting is easy even when the device is mounted on a machine.

Structure and Operating Principles

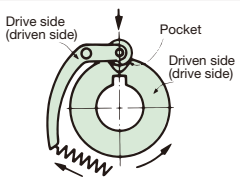
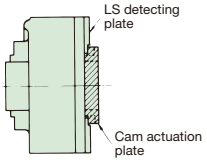
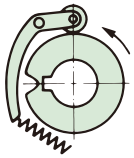
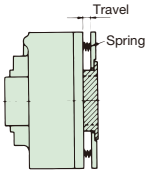




① Adjustment screw
② Coil spring A
③ Spring seat
④ Case
⑤ Lever
⑥ Fulcrum pin
⑦ Bearing B
⑧ Roller pin
⑨ Cam follower
⑩ Gasket
⑪ Seal
⑫ Bearing A
⑬ Thrust washer
⑭ Cam shaft
⑮ Cover
⑯ LS detecting plate
⑰ Cam actuation plate
⑱ Coil spring B
⑲ Spring pin
⑳ Hexagon bolt
㉑ Set screw
㉒ Set screw

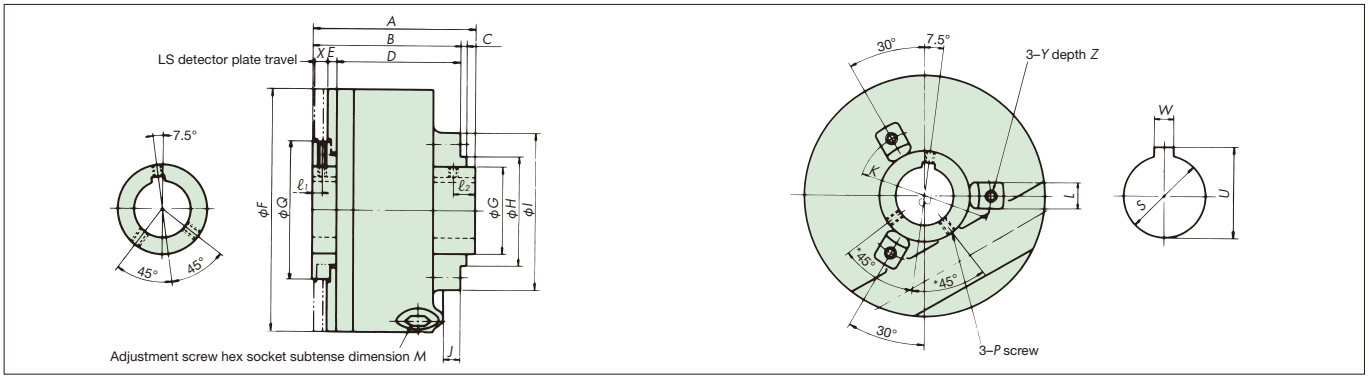
TGM60/200/400/800 with strong spring specifications and TGM400/800 with standard specifications employ two coil spring A components.

1. The cam follower transmits torque by engaging with the cam shaft pocket in a radial direction. In the event of an overload, the cam follower pops out of the pocket and completely separates from the overload.
2. The cam follower and pocket are precision machined and heat treated, so the Shock Guard is able to maintain high torque precision for extended periods of time.
3. The cam follower and pocket are a two-point contact system without backlash.
4. The cam follower is pressurized by a single rectangular coil spring that utilizes the lever action to provide precise, high-pressure application.
5. Torque level can be adjusted steplessly with the adjustment screw.
6. In the event of an overload, five needle bearings ensure that there is no slippage. This results in minimal frictional coasting torque.
7. The case and cover are made of special solution-treated aluminum, making them lightweight and strong.
8. Its sealed design provides a structure that resists dust, oil, and water ingress and minimizes the risk of oil leaking.
9. When the Shock Guard trips due to overload, the LS detecting plate slides axially to activate the limit switch for easy overload detection.

Cam and pocket correlation	LS detecting plate movement
During normal operation	
 Normal operation	 Before trip
During overload	
 Trip	 After trip

1. Torque is transmitted by the two-point-contact engagement of the cam follower and pocket.
   The cam follower is pressed firmly into the pocket from the radial direction by a rectangular spring. This eliminates backlash, allowing the Shock Guard to provide overload protection with high trip torque precision.
   Resetting is automatic. As operation resumes, the cam follower returns to its pocket. Two-point contact means there is no phase misalignment from the original position.
2. During overload, the cam follower pops out of its pocket and starts rolling. Since there is no sliding, the friction torque at idle is extremely small. This results in a highly durable mechanism. In addition, the simple structure and single-point engagement method do not affect the high tripping torque accuracy.
3. When the Shock Guard trips, the LS detecting plate slides axially, allowing for easy activation of limit switches to shut down power or sound warning alarms. The LS detecting plate slides three times per trip.

Dimensions



Note: For TGM20 and below models, the angle of 45° marked with an asterisk (*) is 60°. For TGM6 and below models, there are two P screws on the mounting seat side, one at the keyway portion and one to the left of it.

Transmission Capacity

Unit: mm

Model no.	Torque range N·m	Max. rpm	Bore range	Moment of inertia $\times 10^{-2}$kg·m^2	Mass kg
TGM3	1.5 to 3.7	600	10 to 14	0.0425	0.6
TGM6	2.5 to 6.4	600	10 to 14	0.0425	0.6
TGM20	6.4 to 20	500	14 to 20	0.168	1.1
TGM60	20 to 69	300	20 to 30	0.938	2.5
TGM200	68 to 225	200	28 to 50	4.03	5.4
TGM400	225 to 451	150	38 to 60	40.0	17.2
TGM800	451 to 902	150	38 to 60	40.0	17.2

Dimensions

Unit: mm

Model no.	A	B	C	D	E	F	G	H	I	J	K	L	M	P	Q	ℓ_1	ℓ_2	S_{H7}	U	W	X	Y	Z
TGM3	60	57	2	48	3	80	22	30 $^{0}_{-0.035}$	50	3	40	8	5	M4	40	4	6	14	16.3	5	4	M 4	8
TGM6	60	57	2	48	3	80	22	30 $^{0}_{-0.035}$	50	3	40	8	5	M4	40	4	6	14	16.3	5	4	M 4	8
TGM20	70	66	3	57	3	100	30	40 $^{0}_{-0.035}$	60	4	50	10	6	M4	50	4	7	20	22.8	6	4	M 5	10
TGM60	89	81	3	68	5	133	47.6	60 $^{0}_{-0.035}$	86	7	73	14	12	M5	76	6	12	30	33.3	8	6	M 6	13
TGM200	110	100	3	85	5	178	69.9	82 $^{0}_{-0.040}$	133	14	114	20	12	M6	105	7	14	50	53.8	14	6	M10	19
TGM400	157	147	9	131	5	273	88.9	114 $^{0}_{-0.050}$	190	17	165	28	17	M8	124	7	16	60	64.4	18	8	M12	28
TGM800	157	147	9	131	5	273	88.9	114 $^{0}_{-0.050}$	190	17	165	28	17	M8	124	7	16	60	64.4	18	8	M12	28

Note: 1. The keyway is finished to JIS 1301-1996 (new JIS standard) dimensions.
2. The torque is temporarily set to the minimum torque value at the time of shipment.

Semi Standard

1. Torque setting

Torque can be set at a Tsubaki factory before shipment if required. The accuracy of the torque setting is within ±5%. The set torque value is printed on the nameplate. The adjustment screw is coated with Loctite 243 or its equivalent to prevent loosening. When ordering, specify the torque value (N·m) after the bore diameter. (Refer to the table on the right.)

2. Weak or strong spring specifications

The weak or strong spring options are available for applications where the required trip torque falls outside the standard range.
(1) TGM6 and TGM800 do not have weak spring specifications.
(2) The standard torque range will be erased from the nameplate, and the weak (strong) spring torque range will be printed.
(3) The minimum and maximum torque values on the nameplate are the same for the weak or strong springs.
(4) Add “WS” for weak spring and “SS” for strong spring to the end of the model number.

Model no.	Weak spring torque range N·m	Strong spring torque range N·m
TGM3 (C)	*0.6 to 1.5	—
TGM6 (C)	—	6.0 to 12
TGM20 (C)	3.7 to 12	7.3 to 23
TGM60 (C)	7.6 to 26	44 to 105
TGM200 (C)	30 to 98	101 to 289
TGM400 (C)	118 to 235	—
TGM800 (C)	—	532 to 1060

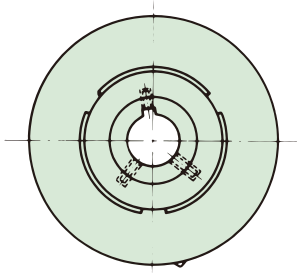
* The TGM3 weak spring specification has no O-ring, so it is not a sealed structure.

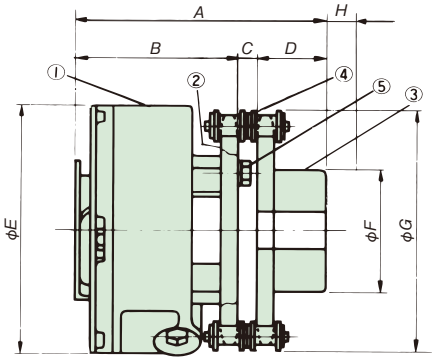
Coupling Type–Sprocket Combination

■ Coupling Type

These Shock Guard models incorporate a roller chain coupling to provide the high trip torque accuracy of a Shock Guard and the ease of use of a roller chain coupling. They are ideal for direct coupling between the drive and driven machines.
(Contact a Tsubaki representative if you want to directly connect with a backlash-free coupling.)

Transmission Capacity and Dimensions





① Shock Guard side
② TG sprocket
③ CP sprocket
④ Chain
⑤ Hexagon bolt

H: The space necessary for inserting the joint link

Unit: mm

Coupling type model no.	Torque range N·m	Max. rpm	Coupling bore dia.		*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	Sprocket	Mass kg	Moment of inertia $\times 10^{-2}$kg·m^2
			Pilot bore dia.	Max. bore dia.											
TGM3C	1.5 to 3.7	600	12.5	30	90	64.2	5.8	20	80	50	70	9	RS35-20	1.12	0.07
TGM6C	2.5 to 6.4														
TGM20C	6.4 to 20	500	12.5	32	100	72.2	5.8	22	100	53	82	7	RS35-24	1.78	0.218
TGM60C	20 to 69	300	12.5	42	120.6	88.2	7.4	25	133	63	117	17	RS40-26	4.15	1.21
TGM200C	68 to 225	200	18	55	163.3	111.7	11.6	40	178	83	188	26	RS60-28	11.8	6.80
TGM400C	225 to 451	150	28	75	221.9	161.6	15.3	45	273	107	251	38	RS80-28	31	50.8
TGM800C	451 to 902														

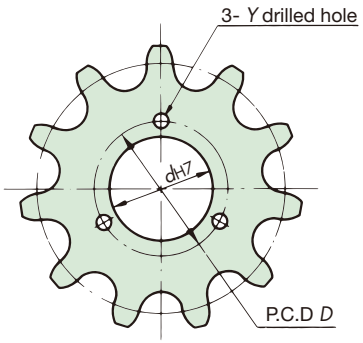
Note: 1. All products are MTO.
2. Apply lubricant such as molybdenum disulfide grease to the chain and sprocket teeth tip every 2,000 hours of use.

■ Sprocket Combinations

Shock Guards can be used as the driving or driven member. Refer to page 14 for sprocket availability.
The following table shows the machining dimensions of sprockets.

Unit: mm

Sprocket model no.	Finished sprocket dimensions		
	d_{H7}	*D*	*Y*
TGM3	30	40	4.5
TGM6	30	40	4.5
TGM20	40	50	5.5
TGM60	60	73	6.6
TGM200	82	114	11.0
TGM400	114	165	14.0
TGM800	114	165	14.0



Note: Confirm the chain transmission capacity when determining the number of sprocket teeth.
Insert the joint link from the outside of the sprocket.

Torque Setting

Precise torque can be set by simply turning the adjustment screw with a hexagon wrench.

1. The torque is temporarily set to the minimum torque value at the time of shipment. The front face of the adjustment screw is aligned with the “Min” torque (torque meter line 1) printed on the nameplate. This is the base point at which the adjustment screw is threaded.

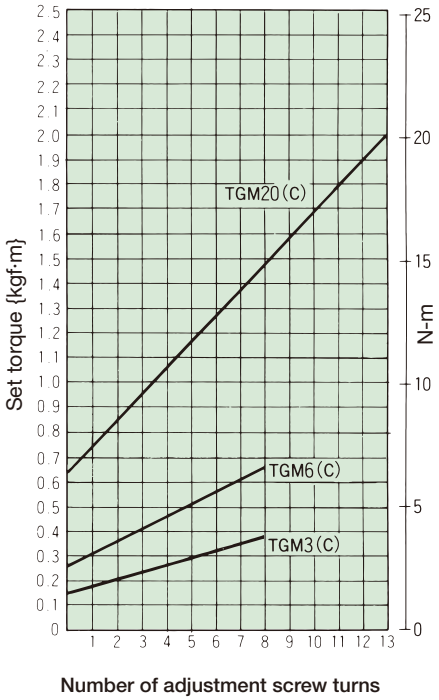
2. Before setting the torque, Loctite 243 or an equivalent adhesive should be applied to the exposed threads of the adjustment screw. This prevents loosening after setting the torque.
3. Refer to the Tightening Amount–Torque Correlation Charts below or the table to the right to determine the adjustment screw tightening angle equivalent to the trip torque. Set at 60° toward the determined tightening value, then install on the machine and perform a trip test. Gradually tighten and set at the optimum trip torque. Tightening Amount–Torque Correlation Charts should be used as a rough guide only, as the trip torque may not correspond with the chart values.
4. Do not set the torque lower than the “Min” torque on the nameplate (torque meter line 1). Use a weak spring when a trip torque below the minimum is required.
5. Do not turn the adjustment screw when the Shock Guard is disengaged.
6. Torque can be set at a Tsubaki factory before shipment if required. (Refer to page 63.)

Model no.	Approximate torque per turn N·m {kgf·m}	Max. turns
TGM3	0.28 {0.029}	8
TGM6	0.48 {0.049}	8
TGM20	1.02 {0.10 }	13
TGM60	4.90 {0.5 }	10
TGM200	9.80 {1.0 }	16
TGM400	20.6 {2.1 }	11
TGM800	41.2 {4.2 }	11

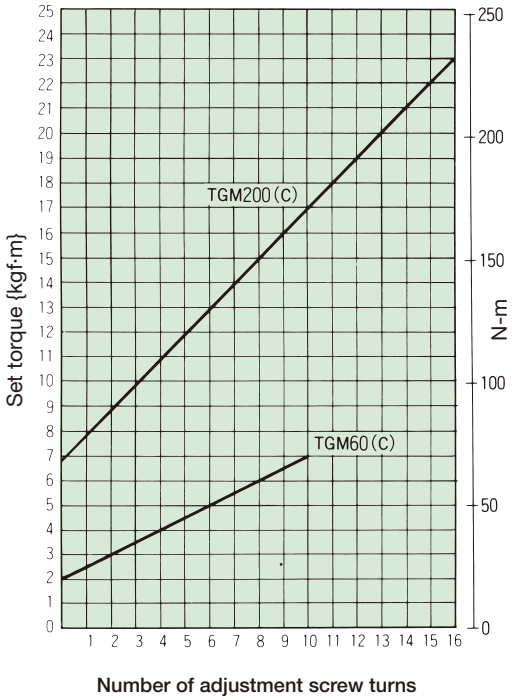
Set torque = Min. torque + (Approximate torque per turn × Number of adjustment screw turns)

Tightening Amount–Torque Correlation Charts

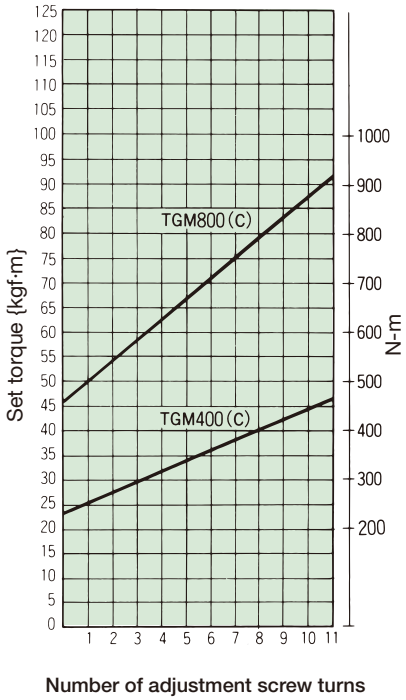
TGM3(C), TGM6(C), TGM20(C)



TGM60(C), TGM200(C)



TGM400(C), TGM800(C)



Overload Detection

Overload is easily detected by the limit switch. When the Shock Guard trips due to overload, the cam follower disengages from the pocket, and the cam shaft and main unit (case) will rotate freely. At the same time, the LS detecting plate moves in the axial direction. The limit switch detects this movement and shuts off the power or triggers the warning alarm. The overload can be detected whether the stop side is on the cam shaft side or the main unit (case) side. The LS detecting plate slides three times for each trip.

(1) Table 1 shows LS detecting plate travel and force during tripping. Select a limit switch that meets the PT (pre-travel) and OF (operating force) requirements.
(2) Figures 1 and 2 show limit switch installation examples.
(3) Connect the limit switch's "b" contact parallel to the start button's contact.
(4) Figure 3 shows an example of a typical circuit. Tsubaki recommends using a self-holding circuit.

Table 1

Model no.	Travel mm	Force during travel N {gf}
TGM3	4	3.9 {400}
TGM6	4	3.9 {400}
TGM20	4	3.9 {400}
TGM60	6	3.9 {400}
TGM200	6	5.4 {550}
TGM400	8	5.9 {600}
TGM800	8	5.9 {600}

■ Limit Switch Installation Example

Figure 1

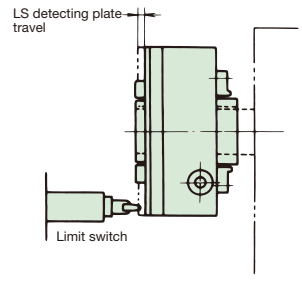
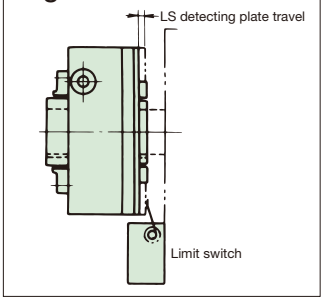
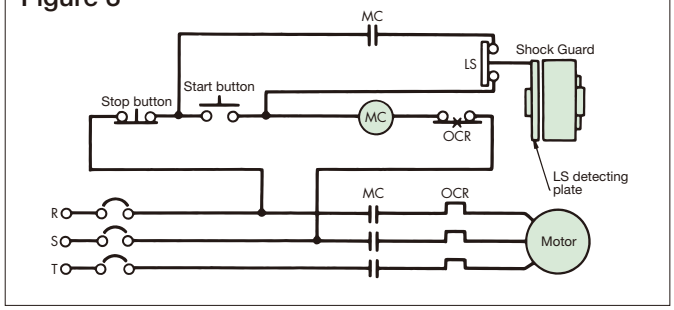


Figure 2



■ Circuit Example

Figure 3



Installation

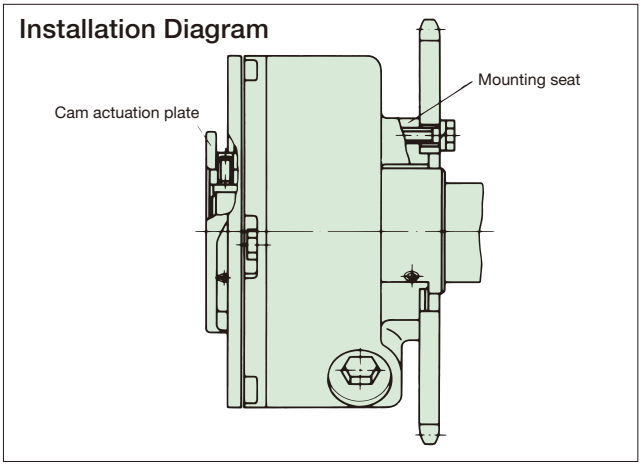
1. Installing to the shaft

- We recommend a shaft diameter tolerance of h7 for mounting the Shock Guard to the shaft.
  Use a JIS 1301-1996 (new JIS standard) parallel key. Allow some clearance between the top of the key and keyway.
- When fixing the Shock Guard to the shaft, tighten bolts in three places (one for the key, and two for the shaft) on the cam actuation plate.
- Depending on the installation method, such as mounting the Shock Guard to the end face of the shaft, the set bolts for the cam actuation plate may not be usable. In this case, use the tapped holes on the mounting seat side. Set bolts for these tapped holes are not supplied, so use bolts with a length that fits the bore diameter. Make sure that the head of the set bolts does not extend beyond the cam shaft end. If the head of the screws protrudes, they will interfere with the inner diameter and sides of the mounting seats when the Shock Guard trips.
- Loctite 243 or equivalent should be used to prevent loosening if there is a possibility that vibration during operation may cause the bolts to loosen.

2. Installing a drive member

- To install drive members like sprockets, pulleys, gears, and couplings, use the three mounting seats and tighten the bolts with the torque shown in Table 2 on page 67.
- Refer to page 64 for sprocket installation.
  If you need to use a Tsubaki Power-Lock (keyless locking device) or a backlash-free coupling, contact a Tsubaki representative.

Installation Diagram



3. Mounting bolts

Table 2 lists the recommended screw-in lengths and tightening torques for bolts attached to the case's mounting seat. The bolt pilot bores should have a JIS grade of B10012 or lower.

Table 2

Model no.	Bolt screw-in length (mm)	Bolt tightening torque N·m {kgf·m}	Pilot bore dia. for mounting bolt (mm)
TGM3	6 to 7	2.0 to 2.9 {0.2 to 0.3}	4.5
TGM6	6 to 7	2.0 to 2.9 {0.2 to 0.3}	4.5
TGM20	8 to 9	3.9 to 5.9 {0.4 to 0.6}	5.5
TGM60	9 to 11	6.9 to 11 {0.7 to 1.1}	6.6
TGM200	15 to 17	34 to 51 {3.5 to 5.2}	11.0
TGM400	18 to 25	59 to 89 {6.0 to 9.1}	14.0
TGM800	18 to 25	59 to 89 {6.0 to 9.1}	14.0

4. Connecting

The input/output connection is placed between the variator, reducer, or intermittent drive device and the machine/device. Figures 4, 5, and 6 show typical connecting examples.

Figure 4

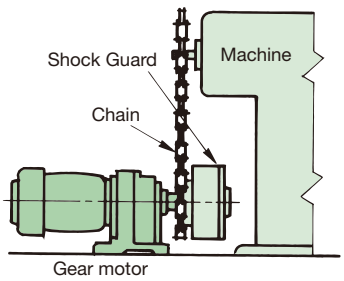


Figure 5

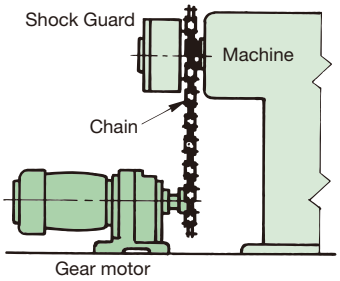
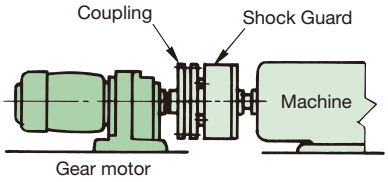


Figure 6



Resetting

Simply restarting the drive side (motor, etc.) automatically resets the device.

1. When the Shock Guard trips due to overload, stop the rotation and remove the cause of the overload.
2. Reset with an input rpm of 50 or less by "jogging" the motor. To avoid injury, do not reset the Shock Guard main unit or the shaft by hand.
3. A distinct clicking sound is made when the cam follower settles in its pocket.

Lubrication

The TGM Series is sealed with high-quality grease before shipment and does not require additional lubrication under normal operating conditions.

Grease used

EMG Lubricants	Mobilux EP-2

Note: The above product name is a trademark of EMG Lubricants LLC.

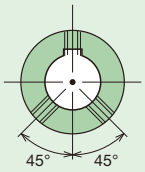
Shock Guard Finished Bore TGM and Coupling Type TGM-C

New model numbering As of April 2, 2018

Model Numbering Example

■ Single-unit type

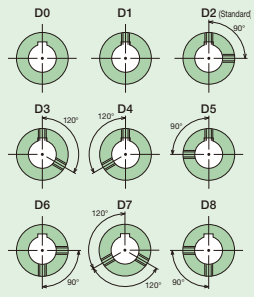
TGM60-TH30JDY-WS-N25

Series	Size	Shock Guard side	Bore tolerance	Bore dia. (1 mm increments)	Keyway tolerance	Set screw position (seen from LS detector plate side)	Spring specifications	Torque range
TGM	3 6 20 60 200 400 800	T	F : F7 G : G7 H : H7 J : JS7 P : P7 M : M7 N : N7 K : K7 R : R7	Size Min. to max 3 : 10 to 14 6 : 10 to 14 20 : 14 to 20 60 : 20 to 30 200 : 28 to 50 400 : 38 to 60 800 : 38 to 60	J: New JIS Js9 P: New JIS P9 F: Old JIS F7 E: Old JIS E9	DY  45° 45° • 60° for TGM20 and smaller.	Standard: Blank WS: Weak spring (except for TGM6 and TGM800) SS: Strong spring (except for TGM3 and TGM40)	Size N·m 3 : 0.6 to 3.7 6 : 2.5 to 12 20 : 3.7 to 23 60 : 7.6 to 105 200 : 30 to 289 400 : 118 to 451 800 : 451 to 7150 • Torque less than 10 N·m is shown to one decimal place. • Specify torque range only if required.

Note: TGM series is not sold with pilot bores.

■ Coupling type

TGM60C-TH20JDYXCH30ED2-WS-N98

Series Size	Coupling type	Shock Guard side, bore tolerance, bore dia., set screw position	Coupling side	Bore tolerance	Coupling side bore dia. (1 mm increments)	Keyway tolerance	Set screw position (seen from hub end)	Spring specifications	Torque range
Same as single-unit type	C	Same as single-unit type	C	F : F7 G : G7 H : H7 J : JS7 P : P7 M : M7 N : N7 K : K7 R : R7	Size Min. to max 3 : 14 to 30 6 : 14 to 30 20 : 14 to 32 60 : 14 to 42 200 : 20 to 55 400 : 30 to 75 800 : 30 to 75	J: New JIS Js9 P: New JIS P9 F: Old JIS F7 E: Old JIS E9	 	Standard: Blank WS: Weak spring (except for TGM6 and TGM800) SS: Strong spring (except for TGM3 and TGM40)	Size N·m 3 : 0.6 to 3.7 6 : 2.5 to 12 20 : 3.7 to 23 60 : 7.6 to 105 200 : 30 to 289 400 : 118 to 451 800 : 451 to 7150 • Torque less than 10 N·m is shown to one decimal place. • Specify torque range only if required.
				Pilot bore: R					

Shock Guard TGM		Shock Guard side			Coupling side (coupling type only)	
Shock Guard model no.		Set screw (other than keyway)	Set screw position		Set screw	Set screw position
Model no.	Bore dia. (mm)		*L1*	*L2*		
TGM3(-C) TGM6(-C)	10 to 12	M4× 8 (M4×10)	4	6	M4×4	7
	13 to 14	M4× 6 (M4× 8)				
TGM20(-C)	14 to 16	M4×10 (M4×12)	4	7	M4×4	7
	17 to 20	M4× 8 (M4×10)				
TGM60(-C)	20 to 22	M5×16 (M5×20)	6	12	M5×5	8
	23 to 28	M5×12 (M5×16)				
	29 to 30	M5×12 (M5×12)				
TGM200(-C)	28 to 30	M6×25 (M6×30)	7	14	M6×6	13
	31 to 40	M6×20 (M6×25)				
	41 to 50	M6×16 (M6×20)				
TGM400(-C) TGM800(-C)	38 to 45	M8×25 (M8×30)	7	16	M8×8	15
	46 to 55	M8×20 (M8×25)				
	56 to 60	M8×16 (M8×20)				

Innovation in Motion

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