Metal Coil Spring Couplings

BAUMANNFLEX

Max. nominal torque [N·m]	220
Pilot bore/added work ranges [mm]	ϕ3～35
Operating temperature [℃]	BAUMANN MINI FLEX: -40 to 120, BAUMANNFLEX: -30 to 100
Backlash	Insignificant
Driver	Induction motor
Application	Vacuum equipment, medical equipment, printing machinery

High flexibility · High torque · Stainless steel

Metal Coil Spring Couplings with Excellent Flexibility

These couplings connect hubs that mount on shafts to other hubs, separated by a metal coil spring. They achieve excellent flexibility, compact size, and high torque.

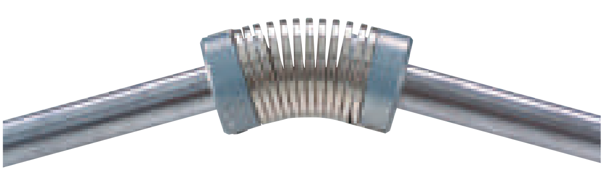
RoHS

Available Models

Series	Features	Spring Materials and Features		Lineup
BAUMANNFLEX	Small-capacity type	Spring steel		ZG
		Stainless steel	Standard	LM
			Ultra-flexible	LM-□-1
	Standard/Coupling type	Spring steel		MM-□K
		Stainless steel		MM-□K-S
	Standard/Single-flange Type	Spring steel		MF

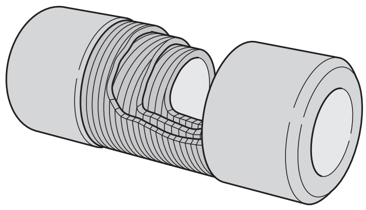
Main Features

Allows angular deflection up to 14°



ZG・LM

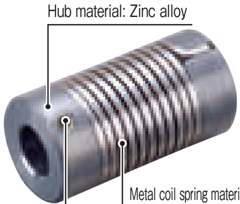
Three-layer coil makes it compact with high torque



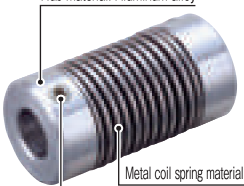
MM・MF

Structure and Materials

■ BAUMANN MINI FLEX ZG

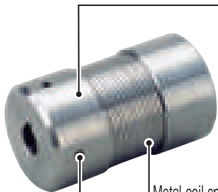


■ BAUMANN MINI FLEX LM

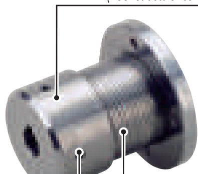


■ BAUMANNFLEX MM(K)

■ BAUMANNFLEX MM(K-S)



■ BAUMANNFLEX MF(K)



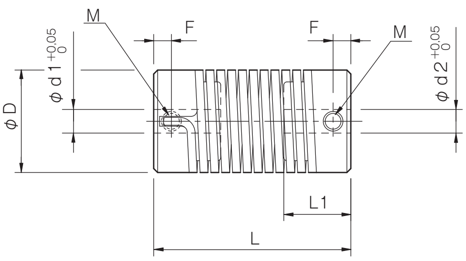
ZG Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
ZG-6	0.15	0.3	0.5	5	± 0.5	3000	0.17	1.95×10^{-7}	0.020
ZG-8	0.5	1.0	1.0	8	± 1.0	3000	0.48	1.02×10^{-6}	0.070
ZG-14	1.5	3.0	1.2	8	± 1.0	3000	1.70	1.15×10^{-5}	0.130

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Unit [mm]

Model	d1・d2			D	L	L1	F	M
	Pilot bore	Min.	Max.					
ZG-6	2	3	6	12	25	9	2.4	M3
ZG-8	3	4	8	16	35	12.5	3.5	M4
ZG-14	6	7	14	26	50	17	4.5	M5

* Pilot bores are to be drilled into the part.
* Left and right tap positions may be shifted slightly.

Standard Bore Diameter

Model	Standard bore diameter d1, d2												
	3	4	5	6	6.35	7	8	9	9.525	10	11	12	14
ZG-6	●	●	●	●									
ZG-8		●	●	●	●	●	●						
ZG-14						●	●	●	●	●	●	●	●

* Standard bore-drilled products do not have keyways. Keyways may be possible under some conditions. Contact Miki Pulley for details.

How to Place an Order

ZG-14 10-14

Size: ZG-14

Bore diameter: d1 (Small diameter) - d2 (Large diameter)
Blank: Pilot bore

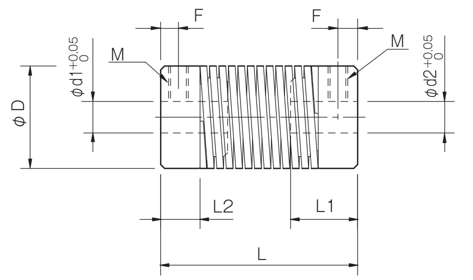
LM Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
LM-6	0.5	1.0	1.0	8	± 1.0	6000	0.77	5.10×10^{-7}	0.020
LM-6-1	0.5	1.0	3.0	14	± 1.5	6000	0.40	7.65×10^{-7}	0.030
LM-9	1.0	2.0	2.5	8	± 1.0	6000	1.55	2.55×10^{-6}	0.050
LM-9-1	1.0	2.0	4.0	14	± 1.5	6000	0.80	3.06×10^{-6}	0.060
LM-14	2.0	4.0	3.0	8	± 1.0	6000	3.10	7.65×10^{-6}	0.090
LM-14-1	2.0	4.0	4.5	14	± 1.5	6000	1.60	9.44×10^{-6}	0.110

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



CAD

Unit [mm]

Model	d1・d2			D	L	L1	L2	F	M
	Pilot bore	Min.	Max.						
LM-6	4	5	6	14	35	12	6.5	3.5	M4
LM-6-1	4	5	6	14	50	12	6.5	3.5	M4
LM-9	5	6	9	20	40	14	7.5	4	M4
LM-9-1	5	6	9	20	60	14	7.5	4	M4
LM-14	8	9	14	26	50	17	10	5	M5
LM-14-1	8	9	14	26	70	17	10	5	M5

* Pilot bores are to be drilled into the part.
* The left and right tap positions are not correlated as shown in the diagram.

Standard Bore Diameter

Model	Standard bore diameter d1, d2										
	5	6	6.35	7	8	9	9.525	10	11	12	14
LM-6 (-1)	●	●									
LM-9 (-1)		●	●	●	●	●					
LM-14 (-1)						●	●	●	●	●	●

* Standard bore-drilled products do not have keyways. Keyways may be possible under some conditions. Contact Miki Pulley for details.

How to Place an Order

LM-14-1 12-12

Size

Total length
Blank: Standard part
1: Long type

Bore diameter: d1 (Small diameter)
- d2 (Large diameter)
Blank: Pilot bore

MM Models

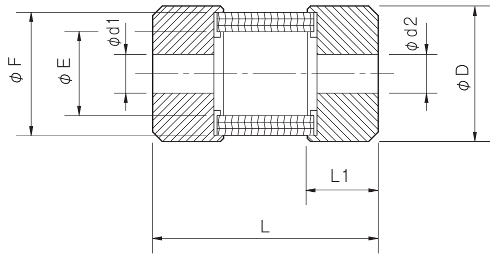
Specifications

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
MM-6K	2.5	5	0.3	3	＋0.6	20000	143	7.65×10^{-7}	0.03
MM-8K	5	10	0.3	3	＋0.8	15000	286.5	4.08×10^{-6}	0.07
MM-12K	10	20	0.4	3	＋1.0	12000	573	1.43×10^{-5}	0.14
MM-14K	10	20	0.5	3	＋1.0	10000	573	2.47×10^{-5}	0.15
MM-16K	20	40	0.6	3	＋1.2	9000	1146	6.12×10^{-5}	0.30
MM-19K	20	40	0.7	3	＋1.2	8000	1146	8.42×10^{-5}	0.32
MM-20K	40	80	0.7	3	＋1.6	7000	2292	1.99×10^{-4}	0.70
MM-24K	40	80	0.9	3	＋1.6	7000	2292	2.63×10^{-4}	0.75
MM-25K	90	180	0.9	3	＋2.0	6000	3438	5.66×10^{-4}	1.25
MM-28K	90	180	1.0	3	＋2.0	6000	2865	5.77×10^{-4}	1.35
MM-30K	150	300	1.1	3	＋2.5	5000	4297.5	1.39×10^{-3}	2.10
MM-35K	220	440	1.2	3	＋3.2	4500	6303	3.01×10^{-3}	3.50

Model	Torque		Misalignment			Max. rotation speed [min^{-1}]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m^2]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
MM-6K-S	2.5	5	0.3	3	＋0.6	20000	143	7.65×10^{-7}	0.03
MM-8K-S	5	10	0.3	3	＋0.8	15000	286.5	4.08×10^{-6}	0.07
MM-12K-S	10	20	0.4	3	＋1.0	12000	573	1.43×10^{-5}	0.14
MM-16K-S	20	40	0.6	3	＋1.2	9000	1146	6.12×10^{-5}	0.30
MM-20K-S	40	80	0.7	3	＋1.6	7000	2292	1.99×10^{-4}	0.70
MM-25K-S	90	180	0.9	3	＋2.0	6000	3438	5.66×10^{-4}	1.25

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



CAD

Unit [mm]

Model	d1・d2			D	L	L1	E	F
	Pilot bore	Min.	Max.					
MM-6K	2.5	3	8	16	20	6	11	15.5
MM-8K	3.5	4	8	21	35	11	13	19
MM-12K	5.5	6	12	26	50	16.5	16.5	24
MM-14K	5.5	7	14	30	50	16.5	20.5	28
MM-16K	5.5	10	16	35	65	22	22.4	32
MM-19K	5.5	10	19	38	65	22	26.4	36
MM-20K	5.5	10	20	45	80	27	28	40
MM-24K	5.5	14	24	48	80	27	33	45
MM-25K	5.5	14	25	55	100	33.5	35	50
MM-28K	5.5	14	28	55	100	33.5	37	52
MM-30K	5.5	16	30	65	125	40	40.8	60
MM-35K	5.5	20	35	75	150	48	46	70

Model	d1・d2			D	L	L1	E	F
	Pilot bore	Min.	Max.					
MM-6K-S	2.5	3	8	17	25	9	11	15.5
MM-8K-S	3.5	4	8	21	35	11	13	19
MM-12K-S	5.5	6	12	26	50	16.5	16.5	24
MM-16K-S	5.5	10	16	35	65	22	22.4	32
MM-20K-S	5.5	10	20	45	80	27	28	40
MM-25K-S	5.5	14	25	55	100	33.5	35	50

*Pilot bores are to be drilled into the part.

How to Place an Order

MM-16K-S 12H-14N

- Size: MM-16K
- Materials (-S)
  - Blank: Carbon steel and spring steel
  - -S : Stainless steel
- Bore diameter: d1 (Small diameter) - d2 (Large diameter)
  - Blank: Pilot bore
- Bore specifications (H / N)
  - Blank: Compliant with the old JIS standards (class 2)
  - H: Compliant with the new JIS standards
  - N: Compliant with the new motor standards

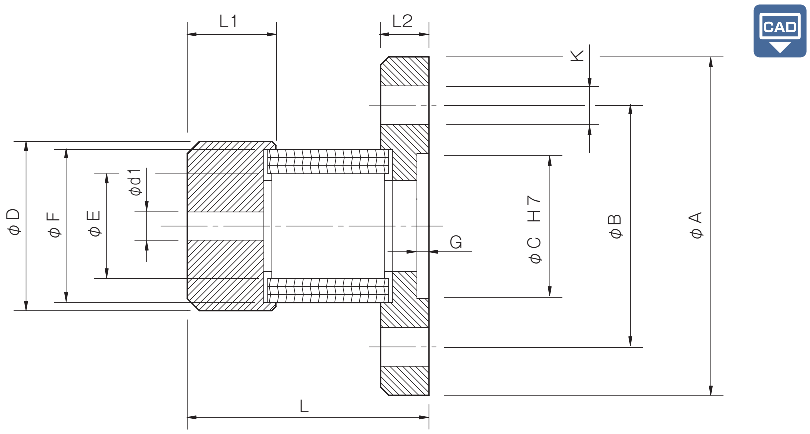
MF Models

Specifications

Model	Torque		Misalignment			Max. rotation speed [min⁻¹]	Torsional stiffness [N·m/rad]	Moment of inertia [kg·m²]	Mass [kg]
	Nominal [N·m]	Max. [N·m]	Parallel [mm]	Angular [°]	Axial [mm]				
MF-8K	5	10	0.3	3	＋0.8	15000	286.5	1.66×10^{-5}	0.1
MF-12K	10	20	0.4	3	＋1.0	12000	573	3.32×10^{-5}	0.16
MF-16K	20	40	0.6	3	＋1.2	9000	1146	9.18×10^{-5}	0.31
MF-20K	40	80	0.7	3	＋1.6	7000	2292	2.12×10^{-4}	0.5
MF-25K	90	180	0.9	3	＋2.0	6000	3438	5.33×10^{-4}	0.9
MF-30K	150	300	1.1	3	＋2.5	5000	4297.5	1.35×10^{-3}	1.7
MF-35K	220	440	1.2	3	＋3.2	4500	6303	2.86×10^{-3}	2.8

* Max. rotation speed does not take into account dynamic balance.
* The moment of inertia and mass are measured for the maximum bore diameter.

Dimensions



Unit [mm]

Model	d1			D	L	L1	L2	A	B	C	E	F	G	K
	Pilot bore	Min.	Max.											
MF-8K	3.5	4	8	21	30	11	6	42	30	18	13	19	1.5	3- ϕ 4.8
MF-12K	5.5	6	12	26	40	16.5	6	48	37	22	16.5	24	1.5	3- ϕ 4.8
MF-16K	5.5	10	16	35	50	22	6.5	58	47	30	22.4	32	1.5	4- ϕ 4.8
MF-20K	5.5	12	20	45	60	27	7	65	52	35	28	40	1.5	4- ϕ 4.8
MF-25K	5.5	14	25	55	75	33.5	8.5	75	62	42	35	50	1.5	6- ϕ 5.8
MF-30K	5.5	16	30	65	95	40	10	90	74.5	47	40.8	60	2.5	4- ϕ 7.0
MF-35K	5.5	20	35	75	115	48	13	100	84	57	46	70	2.5	6- ϕ 7.0

* Pilot bores are to be drilled into the part.

How to Place an Order

MF-16K 12H

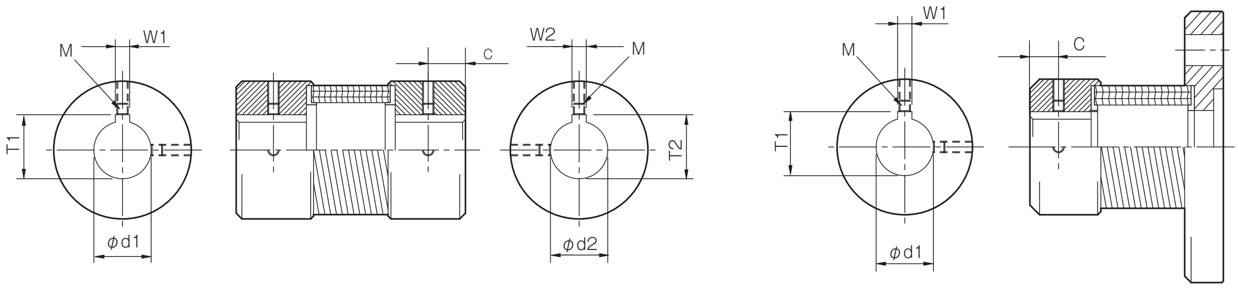
- 16K — Size
- 12H — Bore diameter: d1 / Blank: Pilot bore

Bore specifications
Blank: Compliant with the old JIS standards (class 2)
H: Compliant with the new JIS standards
N: Compliant with the new motor standards

MM/MF Models

Standard Hole-Drilling Standards

- These standard hole-drilling standards apply to the MM and MF models of the BAUMANNFLEX.
- Positioning precision for keyway milling is determined by sight, so contact Miki Pulley when the keyway requires a positioning precision for a particular hub.
- Set screw positions are not on the same plane.
- The set screws are included with the product.
- Refer to the technical documents at the end of this volume for standard dimensions for bore drilling other than those given here.



Unit [mm]

Models compliant with the old JIS standards (class 2)					Models compliant with the new JIS standards					Models compliant with the new motor standards				
Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]	Nominal bore diameter	Bore diameter [d1・d2]	Keyway width [W1・W2]	Keyway height [T1・T2]	Set screw hole [M]
Tolerance	H7,H8	E9	$^{+0.3}_{0}$	—	Tolerance	H7	H9	$^{+0.3}_{0}$	—	Tolerance	G7	H9	$^{+0.3}_{0}$	—
4	4 $^{+0.018}_{0}$	—	—	2-M3	—	—	—	—	—	—	—	—	—	—
5	5 $^{+0.018}_{0}$	—	—	2-M3	—	—	—	—	—	—	—	—	—	—
6	6 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
7	7 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
8	8 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
9	9 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
10	10 $^{+0.022}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
11	11 $^{+0.018}_{0}$	—	—	2-M4	—	—	—	—	—	—	—	—	—	—
12	12 $^{+0.018}_{0}$	4 $^{+0.050}_{+0.020}$	13.5	2-M4	12H	12 $^{+0.018}_{0}$	4 $^{+0.030}_{0}$	13.8	2-M4	—	—	—	—	—
14	14 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	16.0	2-M4	14H	14 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	16.3	2-M4	14N	14 $^{+0.024}_{+0.006}$	5 $^{+0.030}_{0}$	16.3	2-M4
15	15 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	17.0	2-M4	15H	15 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	17.3	2-M4	—	—	—	—	—
16	16 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	18.0	2-M4	16H	16 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	18.3	2-M4	—	—	—	—	—
17	17 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	19.0	2-M4	17H	17 $^{+0.018}_{0}$	5 $^{+0.030}_{0}$	19.3	2-M4	—	—	—	—	—
18	18 $^{+0.018}_{0}$	5 $^{+0.050}_{+0.020}$	20.0	2-M4	18H	18 $^{+0.018}_{0}$	6 $^{+0.030}_{0}$	20.8	2-M5	—	—	—	—	—
19	19 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	21.0	2-M4	19H	19 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	21.8	2-M5	19N	19 $^{+0.028}_{+0.007}$	6 $^{+0.030}_{0}$	21.8	2-M5
20	20 $^{+0.021}_{0}$	5 $^{+0.050}_{+0.020}$	22.0	2-M4	20H	20 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	22.8	2-M5	—	—	—	—	—
22	22 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	25.0	2-M6	22H	22 $^{+0.021}_{0}$	6 $^{+0.030}_{0}$	24.8	2-M5	—	—	—	—	—
24	24 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	27.0	2-M6	24H	24 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	27.3	2-M6	24N	24 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	27.3	2-M6
25	25 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	28.0	2-M6	25H	25 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	28.3	2-M6	—	—	—	—	—
28	28 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	31.0	2-M6	28H	28 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	31.3	2-M6	28N	28 $^{+0.028}_{+0.007}$	8 $^{+0.036}_{0}$	31.3	2-M6
30	30 $^{+0.021}_{0}$	7 $^{+0.061}_{+0.025}$	33.0	2-M6	30H	30 $^{+0.021}_{0}$	8 $^{+0.036}_{0}$	33.3	2-M6	—	—	—	—	—
32	32 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	35.5	2-M8	32H	32 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	35.3	2-M8	—	—	—	—	—
35	35 $^{+0.025}_{0}$	10 $^{+0.061}_{+0.025}$	38.5	2-M8	35H	35 $^{+0.025}_{0}$	10 $^{+0.036}_{0}$	38.3	2-M8	—	—	—	—	—

* The ø11 or below requirement under the new JIS standards and ø11 requirement for the new motor standards are the same as the old JIS standards (class 2)

Distance from Set Screw Edge

Coupling size	6	8	12	14	16	19	20	24	25	28	30	35
Distance from set screw edge C [mm]	3	5	7	7	10	10	10	10	15	15	15	15

ZG/LM/MM/MF Models

Items Checked for Design Purposes

Special Items to Take Note of

You should note the following to prevent any problems.

(1) Always be careful of parallel, angular, and axial misalignment.

(2) Always tighten bolts with the specified torque.

Precautions for Handling

(1) The operating temperature range is -40℃ to 120℃ for ZG and LM models and -30℃ to 100℃ for MM and MF models. Note that the MM(K) and MF(K) types are not waterproof and cannot be used outdoors.

(2) To prevent friction during operation, the MM and MF models are lightly lubricated with oil on their coil spring components. Do not clean them with degreasers.
Note that when processing the inner diameter of pilot-bore products, cutting oil (particularly if water soluble) should be kept away from the coil spring component.

(3) To get full coupling performance, mount couplings so that differences between coupling centers during operation are within the misalignment shown in the specifications table.
The coupling should be mounted, however, so that the difference between centers is 50% or less of that misalignment value if rotation speed exceeds 2000 min^{-1}.

(4) Remove any rust, dust, oil or the like from the inner diameter surfaces of the shaft and coupling.

(5) Be careful not to place more bending, tensile, or compressive load on the coupling than necessary when inserting a shaft into a coupling.

(6) Tighten set screws with hex socket heads to the tightening torques shown below using a calibrated torque screwdriver or torque wrench.

Size of hex-socket-head set screw	M3	M4	M5	M6	M8
Tightening torque [N·m]	0.7	1.7	3.6	6.0	14.2

Selection Procedures

(1) Find the torque, Ta, applied to the coupling using the output capacity, P, of the driver and the usage rotation speed, n.

$$Ta\,[N\cdot m] = 9550 \times \frac{P\,[kW]}{n[min^{-1}]}$$

(2) Determine the service factor K from the usage and operating conditions, and find the corrected torque, Td, applied to the coupling.

$$Td\,[N\cdot m] = Ta \times K1 \times K2 \times K3$$

■ Service factor based on load property: K1

	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
Load properties				
K1	1.0	1.25	1.75	2.25

■ Service factor based on operating time: K2

Hrs./day	~ 8	~ 16	~ 24
K2	1.0	1.12	1.25

■ Service factor based on starting/braking frequency: K3

Times/hr.	~ 10	~ 30	~ 60	~ 120	~ 240	Over 240
K3	1.0	1.1	1.3	1.5	2.0	*

* Items marked with asterisks require consultations.

(3) Set the size so that the nominal coupling torque Tn is at least equal to the corrected torque Td.

$$Tn \geqq Td$$

(4) Select a size that results in a maximum torque, Tm, for the coupling that is at least equal to the peak torque, Ts generated by the driver, follower or both. Maximum torque refers to the maximum amount of torque that can be applied for a set amount of time considering eight hours of operation per day and up to around ten instances.

$$Tm \geqq Ts$$

(5) When the required shaft diameter exceeds the maximum bore diameter of the selected size, select a suitable coupling.