Advanced Technology of "Miniature"

Master Catalogue of KSS Products

Ball Screws & Actuators

Vol.13.3

Master Catalogue of KSS Products

KSS CO.,LTD.

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Introduction

Thank you for your interest in KSS products.
With the recent rapid development of mechatronics products, there is an ever-increasing demand for greater precision and reduced size for a wide range of mechanisms.
Since its founding in 1960, KSS has widened its manufacturing scope from a base of manufacturing technology in the ultra-precision field. Beginning with thread gauges, our product line has grown to include Precision Lead Screws, Precision Miniature Ball Screws, as well as Standard Miniature Ball Screws, that have anticipated later demand.
We are confident that such developments have resulted from our diligence in the field of ultra precision technology, which has fulfilled the needs of society.

With the release of this new Catalogue, both standardized & customized new models have been added.
In addition, Lead Screws, Resin Lead Screws have been combined as well as Unit-products such as Ball screw Support Unit, Linear Actuators, Z-θ Actuators and so on.
There are many choices of KSS products for customer satisfaction to use.

We trust that you will be able to find all of the products you require among the comprehensive range of KSS products in this catalogue, and we are sure that these products will play a vital role in meeting today's needs in precision positioning, further miniaturization in drive technology, cost reductions, and assisting in the design and development of a wide variety of products.

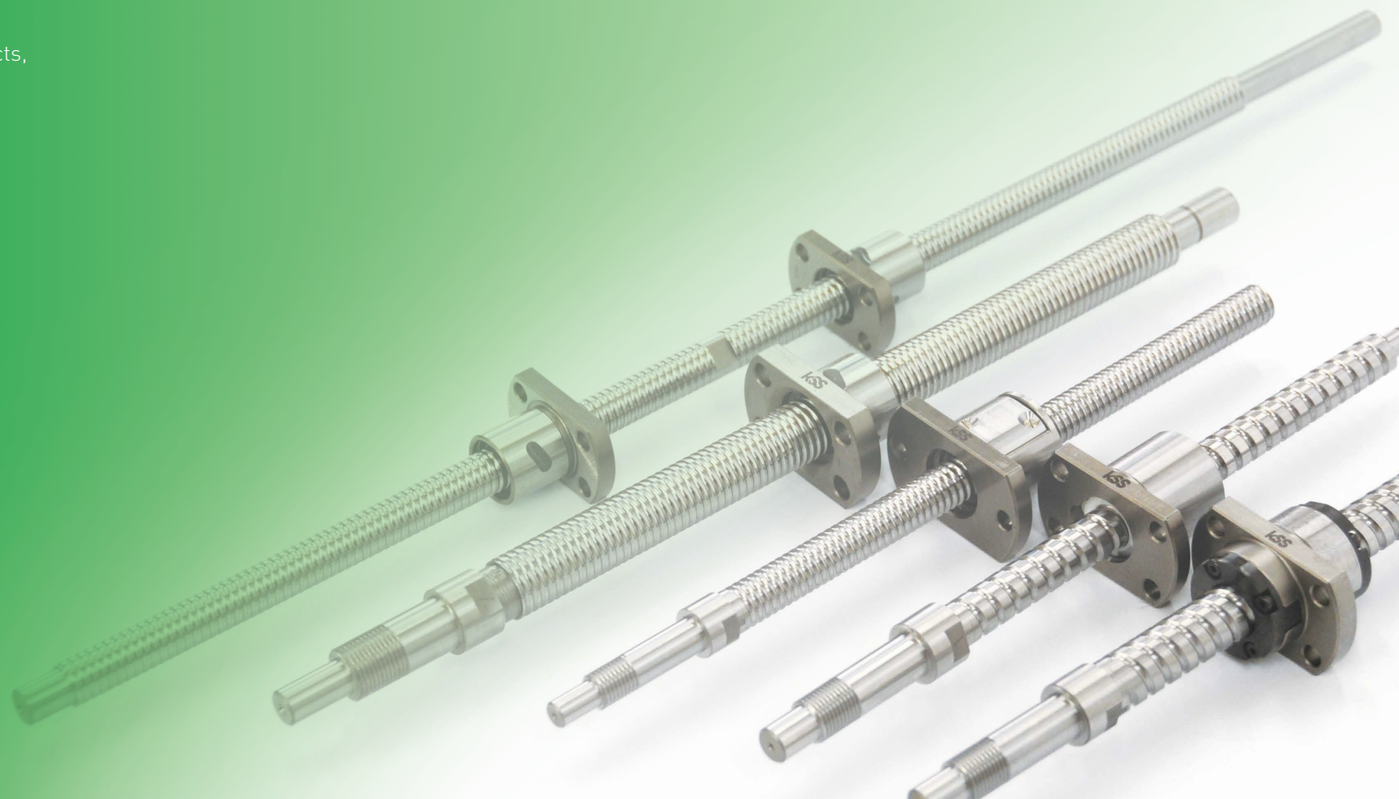
We will continue to apply our expertise and technology to the development of new technology and new products, as we work to satisfy our customers' most advanced needs.
We hope you find our new catalogue, featuring the latest products from KSS, be helpful.

What dose the KSS logo signify?

Manufacturing Division:
Know-How
Superior Quality
Safety Motion

Sales Division:
Kindness
Speed
Service

The letters KSS extend out from the triangular logo,
symbolizing our constant technological breakthroughs.
The **green** corporate color signifies a business that is youthful, bright, and active.



Outline of KSS Products

■ Ball Screws

Standard products
Precision Ball Screws / Rolled Ball Screws (A101～)

These series are KSS standard Ball Screws, Precision & Rolled type. These types of products can be delivered shortly with end-journal machining.
End-journal profile is also standardized.

Customized products
Precision Ball Screws / Rolled Ball Screws (A501～)

In order to meet the needs of customer's requested design, we offer customized products.
To reduce design process at customer, each Nut type is standardized.

■ Grease

Original Grease for Miniature Ball Screws (B101～)

This grease has high lubrication performance without deteriorating Ball Screw function.
The original Grease for Clean room usage is also available.

■Precision Lead Screws

Precision Lead Screws (C101～)

Ultra Fine Pitch is available, which only Lead Screws achieve. With precise grinding technology on flank surface, fine surface roughness and low wobble become reality. This is the triangular Screw with low torque and less wear.

■Lead Screws with Plastic Nuts

Resin Lead Screws(D101～)

This series have good corrosion resistance by a combination of Stainless Shaft and Plastic Nut. It is reasonable price and suitable for transport with light Load.

■Ball Screw with Ball Spline

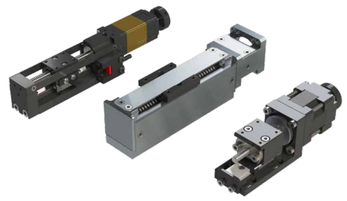
Miniature Ball Screw with Ball Spline(F101～)

This is a combined product which is possible for linear and rotary motion as well as suction at the same time with one unit.
Achieved developing very compact product as "Overlap type" using Miniature Ball Screws and Miniature Ball Splines .

■Actuator

Ball Screw Linear Actuators(P101～)

This is a Ball Screw type compact electric Linear Actuator which combined with Stepping Motor.
3 types of Linear Actuators, External, Captive and Non-Captive type are available for customer usage.



Single axis Actuators(Q101～)

Single axis Actuator is the stage-type compact Actuator which is made of small sized Ball Screw and Linear Guide.

Variety of options are available such as External photo-sensor or Brake unit.

V-Z-θ Actuators(R101～)

This is our state of the art product which applied the KSS miniature Ball Screw with Ball Spline(BSSP), and realized three functions, linear (Z), rotary (θ) and vacuum (V) with one product.
KSS provides 3-types of multi-functional VZθ Actuator, which are Direct Drive type, Hybrid Drive type and Belt Drive type.

■Attachements related KSS products

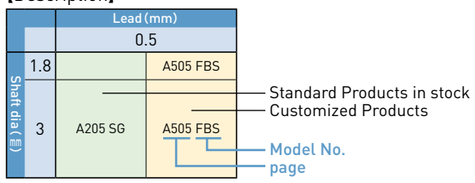
Ball Screw Support Units (E101～)

KSS Support Units are suitable for Miniature Ball Screw end journal.
Several types of Support Units are available with Ball Screws.

Contents

Table of Shaft dia. and Lead combination

【Description】



Nut style list for Precision Ball Screws & Rolled Ball Screws.

Nut style	Precision Ball Screws		Precision Rolled Ball Screws	Rolled Ball Screws	
	Standard Products	Customized Products	Standard Products	Standard Products	Customized Products
Single Nut with Flange	SG	FKB FBS FDB FEB	PSR PSRT	SR SSR SRT SSRT	MRB
Sleeve type Single Nut	—	BS		—	BSR
Single Nut with M-thread	—	MS		—	MSR
Square type Single Nut	—	KS		—	—
Bi-directional Nut with Flange	SD	FBS* FKB*		—	—

※Please refer to page A201 regarding the detail of Standard Products Note)* means Bi-directional Nut with Flange.

Table of Shaft dia. and Lead combination (Model distinction)

Shaft dia. (ϕ)	Lead (mm) 0.5	1	1.5	2	2.5	3	4	5	6	8	10	12	15	20	30
1.8	A505 FBS														
3	A207 SG A505 FBS	A208 SG A505 FBS A529 BS													
4	A505 FBS	A209 SG A239 SD A247 SR A248 SR(K) A289 SRT A290 SRT(K) A323 PSR A324 PSRT A325 PSR(K) A326 PSRT(K) A505 FKB A505 FBS A529 BS A539 MS A545 FKB* A551 MRB A551 MRB(K) A559 BSR A563 MSR		A210 SG A249 SR A291 SRT A505 FBS A529 BS A551 MRB A559 BSR			A505 FEB			A505 FEB					
5	A507 FBS	A507 FKB A507 FBS A529 BS A545 FKB*					A211 SG A250 SR A292 SRT A507 FBS A529 BS A551 MRB A559 BSR								
6	A509 FBS	A212 SG A240 SD A251 SR A252 SR(K) A281 SSR A293 SRT A294 SRT(K) A315 SSRT A327 PSR A328 PSRT A329 PSR(K) A330 PSRT(K) A509 FKB A509 FBS A529 BS A543 KS A545 FKB* A551 MRB A551 MRB(K) A559 BSR	A509 FBS A529 BS	A213 SG A253 SR A295 SRT A509 FBS A529 BS A539 MS A543 KS A551 MRB A559 BSR	A214 SG A509 FBS A529 BS				A215 SG A254 SR A296 SRT A509 FEB A551 MRB		A216 SG A255 SR A297 SRT A509 FEB A551 MRB	A509 FEB			
8	A511 FBS	A217 SG A241 SD A256 SR A257 SR(K) A282 SSR A298 SRT A299 SRT(K) A316 SSRT A331 PSR A332 PSRT A333 PSR(K) A334 PSRT(K) A511 FKB A511 FBS A531 BS A543 KS A545 FKB* A553 MRB A553 MRB(K) A559 BSR	A511 FKB A511 FBS A531 BS A539 MS A545 FKB*	A218 SG A242 SD A258 SR A259 SR(K) A283 SSR A300 SRT A301 SRT(K) A317 SSRT A335 PSR A336 PSRT A337 PSR(K) A338 PSRT(K) A511 FKB A511 FBS A531 BS A539 MS A545 FKB* A553 MRB A553 MRB(K) A559 BSR A563 MSR	A219 SG A260 SR A302 SRT A513 FDB A513 FBS A531 BS A539 MS A553 MRB A559 BSR A563 MSR	A513 FBS A531 BS A539 MS	A220 SG	A513 FBS A531 BS A539 MS	A221 SG A261 SR A303 SRT	A513 FBS A531 BS A539 MS A553 MRB A559 BSR A563 MSR		A222 SG A262 SR A304 SRT	A513 FEB A553 MRB	A263 SR	A513 FEB A553 MRB	A223 SG A264 SR A305 SRT A339 PSR A340 PSRT	A513 FEB A553 MRB			
10		A224 SG	A515 FKB A515 FBS A533 BS A543 KS A545 FKB*	A515 FKB A515 FBS A533 BS A545 FKB*	A225 SG A243 SD A265 SR A266 SR(K) A284 SSR A306 SRT A307 SR(K) A318 SSRT A341 PSR(K) A342 PSRT(K) A515 FKB A515 FBS A533 BS A541 MS A543 KS A545 FKB* A555 MRB A555 MRB(K) A561 BSR A563 MSR		A515 FKB A515 FBS A533 BS A545 FKB*	A517 FBS A533 BS A545 FBS* A555 MRB A561 BSR A563 MSR	A226 SG A267 SR	A517 FBS A533 BS A545 FBS* A555 MRB A561 BSR	A227 SG A268 SR A308 SRT	A517 FDB A517 FBS A533 BS A545 FBS* A555 MRB A561 BSR		A555 MRB A561 BSR		A228 SG A269 SR A309 SRT	A517 FEB A555 MRB		A555 MRB	A229 SG A270 SR A310 SRT	A517 FEB A555 MRB	A271 SR A311 SRT	A517 FEB A555 MRB	A517 FEB
12			A519 FKB A519 FBS A535 BS A547 FKB*		A230 SG A244 SD A272 SR A273 SR(K) A312 SRT A313 SRT(K) A343 PSR(K) A344 PSRT(K) A519 FKB A519 FBS A535 BS A541 MS A547 FKB* A555 MRB A555 MRB(K) A561 BSR A563 MSR		A519 FKB A519 FBS A535 BS A547 FKB*	A519 FKB A519 FBS A535 BS A547 FKB*		A519 FBS A535 BS A541 MS A547 FBS*		A519 FBS A535 BS			A231 SG A274 SR A314 SRT	A521 FEB A521 FBS A555 MRB						
13														A521 FEB A557 MRB		A521 FEB A557 MRB		A521 FEB A557 MRB	
14				A232 SG A275 SR	A523 FKB A523 FBS A535 BS A541 MS A547 FKB* A557 MRB A561 BSR A563 MSR		A233 SG A276 SR	A523 FKB A523 FBS A535 BS A541 MS A547 FKB* A547 MRB A561 BSR A563 MSR		A523 FBS A535 BS A547 FBS*						
15					A525 FBS			A234 SG A277 SR	A525 FEB A525 FBS A557 MRB			A235 SG A278 SR	A525 FEB A525 FBS A557 MRB		A236 SG A279 SR	A525 FEB A525 FBS A557 MRB	A525 FEB
16			A527 FBS A537 BS A549 FBS*		A527 FKB A527 FBS A537 BS A549 FKB*		A527 FKB A527 FBS A537 BS A549 FKB*	A527 FKB A527 FBS A537 BS A549 FKB*		A527 FBS A537 BS A549 FBS*						

Ball Screws

Outline

Since KSS started production and sales of Ball Screw in 1978, we have been working on product development as a pioneer of Miniature Ball Screws. In addition, we developed Unit Products related Ball Screw. At this time, we have combined developed products until now into one catalogue for more usability.

●Classification of KSS Ball Screws

For better understanding of KSS Ball Screws, kinds and classification of KSS Ball Screws are as follows.

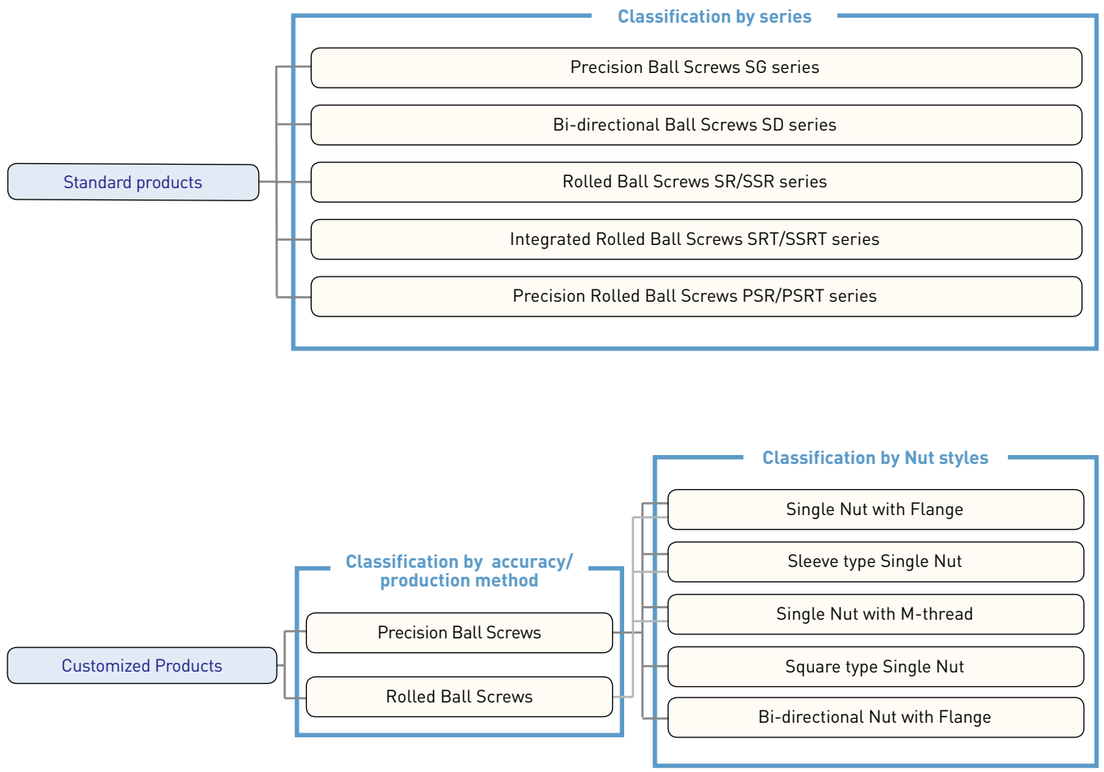


Fig. A-11 : Classification of KSS Ball Screws

●Standard Products

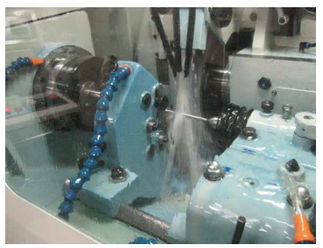
To meet customer's request of quick delivery , KSS has specified model type in stock.
The end-journal configuration is standardized and it is possible to reduce numbers of design process by customer. Moreover, since we have end machining knowhow, high accurate end machining is possible.
Standard products can be chosen from many kinds of Precision Ball Screws and Rolled Ball Screws shown in Fig. A-11.

●Customized products

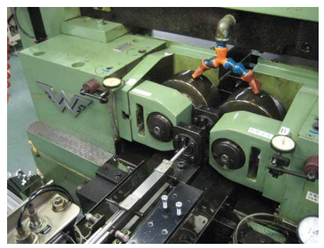
Products other than standardized model are customized products. To reduce numbers of design process by customer, dimensions of each model are standardized as Nut type shown in Fig. A-11
Please consult KSS if you need products which are not standardized model, configuration, dimension are requested.
Please also inquire KSS when stainless steel products, special material, surface treatment are needed.

●Precision Ball Screws and Rolled Ball Screws

Production procedures vary by accuracy requested from customers. Precision Ball Screws with high accuracy by Grinding process and Rolled Ball Screws with formed groove by Rolling dies(Tooling for Rolling process) can be classified.
Generally, C5 or higher grade is manufactured by Grinding process and accuracy of C7, C10 are manufactured by Rolling process. It is also possible to produce C7, C10 by Grinding when Rolling dies do not exist.



High accurate shaft groove process by Grinding machine



Rolling process by Rolling dies

●Approach of quality and environment

JQA-QM4131
Ojiya Plant

KSS Ball Screws including design, production are qualified by ISO-9001. Since quality management system such as shipping inspection, traceability is organized, KSS products can be used with safety.

JQA-EM4583
Ojiya Plant

For environmental side, KSS is qualified by ISO-14001. We make an effort to reduce CO_2 and take care of environmentally friendly design by using parts, which conform to RoHs regulation.

●Export administration

Our policy is to comply with Foreign Exchange, Foreign Trade Act, and other related lows when KSS products and technologies are exported. Therefore if the purpose of using our products is military use(weapon of mass destruction, things related with arms), we decline to export our products except specific country. Please refer to KSS homepage regarding list regulation by Export administration.
http://www.kssballscrew.com

Standard Products

KSS has several varieties of standard products as follows. It is possible to make quick delivery to customers by using standard products.

●Precision Ball Screws

SG series (Precision Ball Screws)

- Configuration of fixed side end-journal is standardized, supported side end-journal is free type and standard travel is set up.
- Since supported side end-journal is unfinished, it is possible to do additional end machining with your requested thread length.
- There are C3 (Axial play 0), C5 (Axial play 5µm or less) available.

SD series (Bi-directional Ball Screws)

- These are economical Ball Screws because a shaft has bi-directional thread.
- Since fixed and supported side end-journal are unfinished, design flexibility is enlarged.
- There are C3 (Axial play 0), C5 (Axial play 5µm or less) available.

●Rolled Ball Screws

SR series (Rolled Ball Screws)/SSR series (Stainless Rolled Ball Screws)

- Standard and reasonable price products by Rolling formed process.
- Since fixed and supported side end-journal are unfinished, design flexibility is enlarged.
- There are Ct7 (Axial play 20µm or less), Ct10 (Axial play 50µm or less) available.
- There are also Rolled Ball Screws made of stainless steel (SSR series) in stock.

SRT

SRT series (Rolled Ball Screws with integrated end-journal)
SSRT series (Stainless Rolled Ball Screws with integrated end-journal)

- Fixed side end-journal is set up bigger than Shaft nominal diameter and unfinished.
- More design flexibility compared to current Rolled Ball Screws.
- It is possible to design end-journal configuration compatible with SG series.
- There are also Integrated end-journal Rolled Ball Screws made of stainless steel (SSRT series) in stock.

SSRT

●Precision Rolled Ball Screws

PSR series (Precision Rolled Ball Screws)
PSRT series (Precision Rolled Ball Screws with integrated end-journal)

- KSS newly developed the high grade accuracy (JIS C5) Rolled Ball Screws, which surpasses the conventional type of Ct7 or Ct10 grade.
- PSR series with unfinished end-journal and PSRT series with integrated end-journal are in stock, so wide variety of design choices are available.
- The axial play is set at 5um or less, but zero backlash is possible by your request.
- For integrated type, fixed side end-journal is standardized and finished, KSS Compact Support Unit can be installed.

●Additional end-journal machining

Technology of KSS end-journal machining enables to keep high accuracy of Ball Screws after re-works. Please ask for end-journal machining to us. Precautions of end-journal machining are as follows.

1) We recommend additional end-journal machining is done by KSS. We do not guarantee accuracy after re-works done by other than KSS.

2) When additional end-journal machining other than standard configuration in catalogue is requested, please send us drawing with end-journal profile on it.

3) Additional machining is not applied to the Nut. Please design flange configuration according to our dimension table.

4) Lubrication
In Ball Screws use, lubricant should be applied on them.
KSS Ball Screws are in vacuum wrapping with anti-rust oil due to purpose for long term stock.
If you need specified lubricant, we will supply Ball Screws with lubricant you requested when requesting additional end-journal machining.
Since anti-rust oil is not lubricant, anti-rust oil should be washed off from the Ball Screw with clean Kerosene and apply lubricant (Grease or lubricating oil).
Please check the lubricant condition every 2 or 3months. If grease is contaminated, remove old grease, and replace with the new one.

5) Ball Nut falling by weight
If Ball Screw is not preloaded, Ball Nut will fall down due to its own weight. Care must be taken.

6) Additional end-journal machining by customer
Additional end-journal machining done by customer is out of our guarantee, but in case of unavoidably conducting, please take caution regarding above precautions as well as following points.

- Invasion of dust inside Nut
Care must be taken regarding invasion of dust inside Nut when additional end-journal machining.
If additional end-journal machining is being done to the Shaft with Ball Nut, wrap the Nut with vinyl, sealing up both ends and surely protect it from dust.

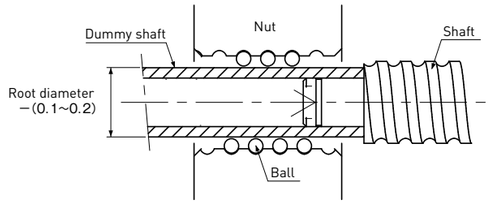
- Nut removal
In case of Nut removal, please use dummy shaft shown in Fig. A-21. We can supply dummy shaft with products if you request.
Make sure Balls and Screw Shaft groove are meshing correctly and remove the Nut slowly as well as re-assembling.

- Cleaning after additional end-journal machining
After additional end-journal machining, Ball Screws should be washed dust off with clean Kerosene.

- Applying lubrication
After additional end-journal machining, apply lubricant before using Ball Screw.

- Storage
After additional end-journal machining, surely conduct anti-rust treatment when Ball Screws are in long term stock.

Fig. A-21 : Dummy shaft and Nut removal



SG series　Standardized Precision Ball Screws

Precision Ball Screws which are accuracy C3, C5 and have machined shaft end at fixed side in advance are available. Short delivery is available by machining supported end in accordance with customer's request.

●Combination of Shaft nominal dia. & Lead

Unit：mm

Shaft dia. \ Lead	0.5	1	2	2.5	4	5	6	8	10	12	15	20
3	A207	A208										
4		A209	A210									
5					A211							
6		A212	A213	A214			A215		A216			
8		A217	A218	A219	A220	A221		A222		A223		
10		A224	A225		A226	A227			A228		A229	
12			A230						A231			
14			A232		A233							
15						A234			A235			A236

Note 1)　The number in a table：showing a page in this catalogue.

●Accuracy Grade & Axial play

Accuracy grade of SG series (Standardized Precision Ball Screws) are based on C3 and C5(JIS B 1192-3).
According to accuracy grade, Axial play 0(Preload：C3) and 0.005mm or less (C5) are in stock.

●Material & Surface hardness

SG series (Standardized Precision Ball Screws) consists of Shaft and Nut materials SCM415 (Carburizing and quenching) and Surface hardness is HRC58～62.

●Lubrication

SG series (Standardized Precision Ball Screws) without end-journal machining will be applied with anti-rust oil for rust prevention.
Anti-rust oil does not have lubricating function so that please apply Grease or lubrication oil when using the Ball Screws.
If there is no specific instruction, KSS would recommend our original Grease (MSG No.2) as standard lubricant.
Please feel free to contact us.

●Customized products

It will be a customized product other than the above. Please ask KSS.

●Model number notation

Please use model number below when additional end-journal machining is requested.

SG　04　01　－　046　R　085　C3　B　1　X
①　②　③　④　⑤　⑥　⑦　⑧　⑨　⑩

①Ball Screws Series No.
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Screw thread length(mm)
(Specify in 1mm unit after end-journal machining)
⑤Thread direction(R=Right-hand)
⑥Screw Shaft total length(mm)
(Specify in 1mm unit)
⑦Accuracy grade(C3 or C5)
⑧Shaft supported end profile
Refer to Fig. A-22 below：A-type,B-type,C-type,
D-type(other)
⑨Anti-rust oil or Lubricant
0：KSS grease (MSG No.2)
1：Anti-rust oil(Non Ruster PZ2)
2：Multemp PS2 grease
3：Other
⑩Nut Flange direction (Refer to Fig. A-23 below)

Fig. A-22：Shaft supported end profile

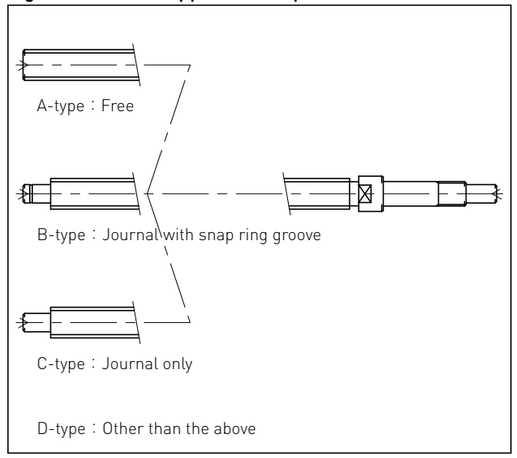
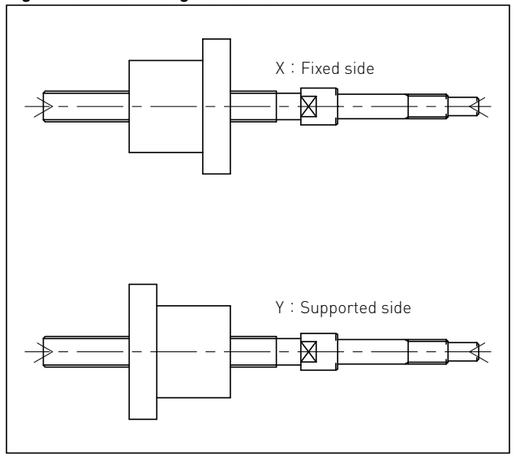


Fig. A-23：Nut Flange direction

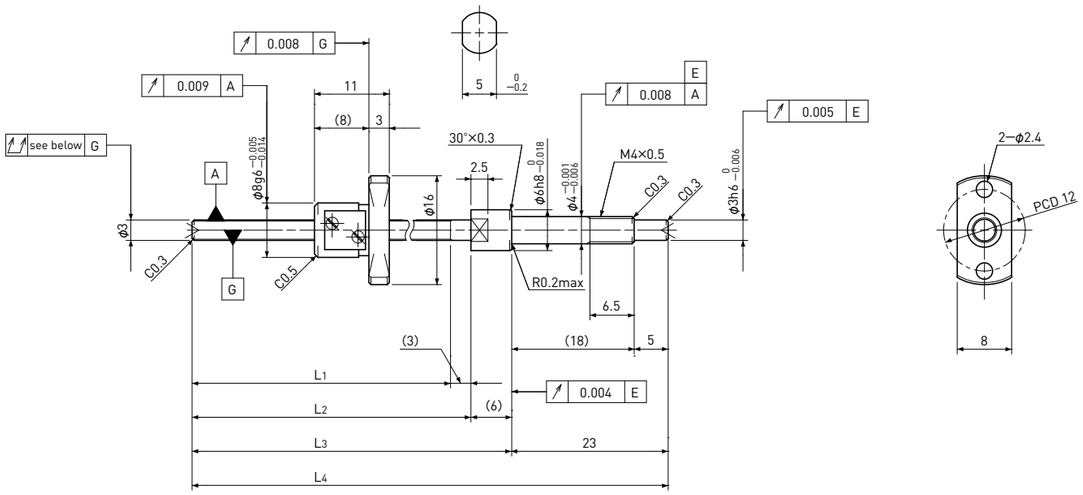


●Note

1)The detail of end-journal dimension for each size is shown from next page.
2)KSS does not make additional Nut machining.
3)The specification is subject to change without notice.
4)If the other configuration except (A,B,C)is requested, please contact KSS.

Standard products in stock SG series

SG0300.5 | Shaft dia. φ3 Lead 0.5mm | C3

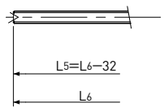


Unit : mm

Ball Screw Specifications	
Ball size	φ0.4
Number of thread	1
Thread direction	Right
Shaft root dia.	φ2.6
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile

A-type



L5 : Thread length after end-journal machining.
L6 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	—
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

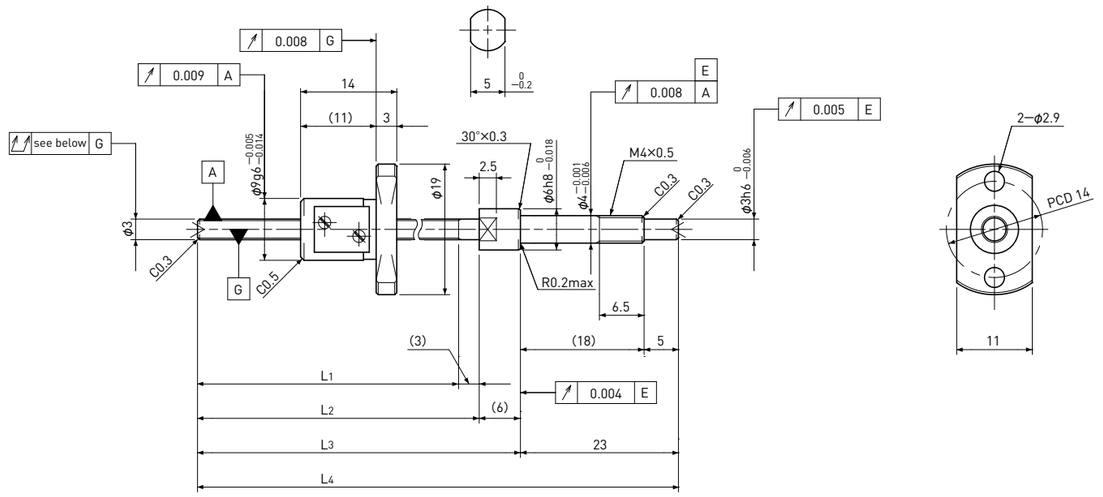
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0300.5-038R070C3	25	C3	38	41	47	70	±0.008	0.008	0.025	～0.005	—	150	220

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

SG0301 | Shaft dia. φ3 Lead 1mm | C3

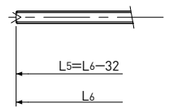


Unit : mm

Ball Screw Specifications	
Ball size	φ0.6
Number of thread	1
Thread direction	Right
Shaft root dia.	φ2.4
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile

A-type



L5 : Thread length after end-journal machining.
L6 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	—
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

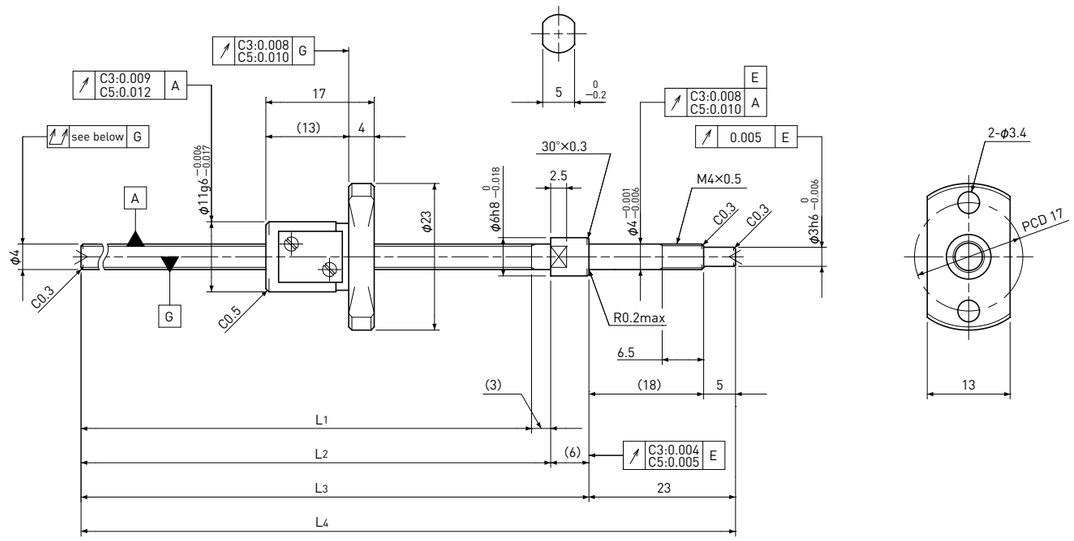
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0301-038R070C3	20	C3	38	41	47	70	±0.008	0.008	0.025	～0.005	—	330	440

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

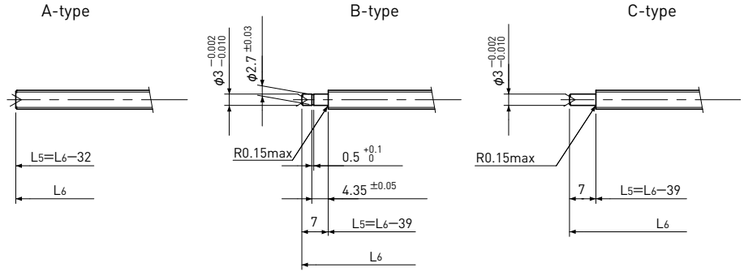
SG0401 | Shaft dia. ϕ4 Lead 1mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ3.3
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

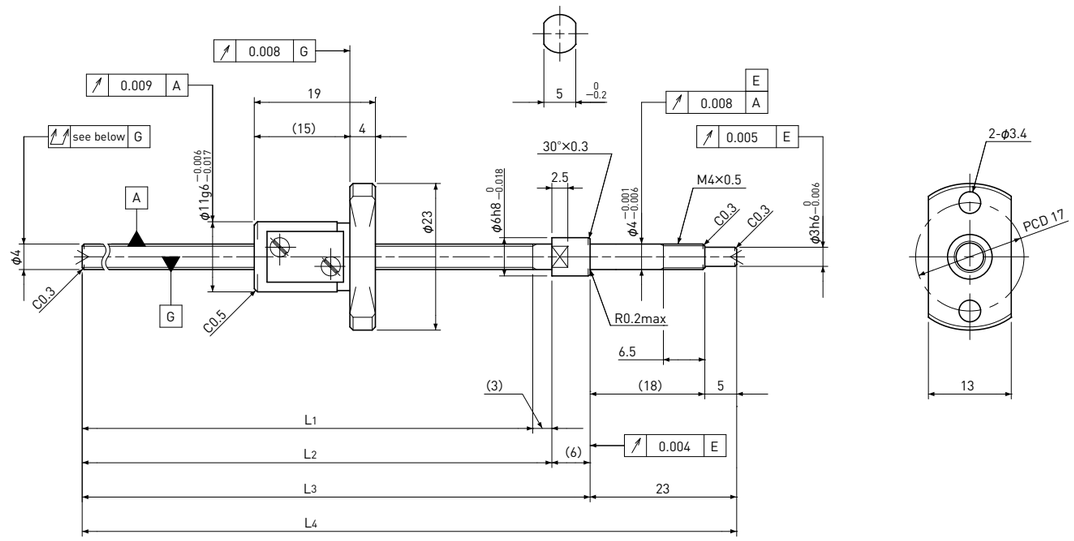
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0401-063R095C3	45	C3	63	66	72	95	±0.008	0.008	0.025	0 Spacer Ball (1:1)	～0.004	350	400
SG0401-083R115C3	65	C3	83	86	92	115	±0.008	0.008	0.025				
SG0401-103R135C3	85	C3	103	106	112	135	±0.010	0.008	0.035				
SG0401-063R095C5	45	C5	63	66	72	95	±0.018	0.018	0.035	～0.005	—	560	790
SG0401-083R115C5	65	C5	83	86	92	115	±0.018	0.018	0.035				
SG0401-103R135C5	85	C5	103	106	112	135	±0.020	0.018	0.050				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

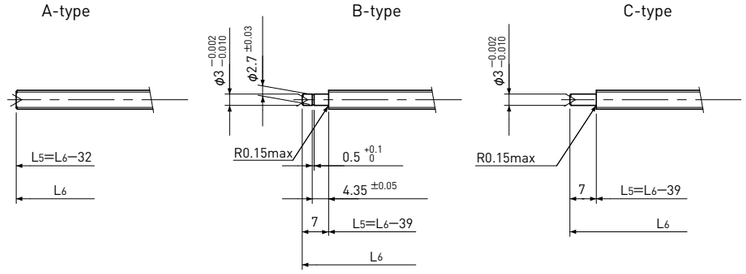
SG0402 | Shaft dia. ϕ4 Lead 2mm | C3



Unit:mm

Ball Screw Specifications	
Ball size	ϕ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ3.3
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

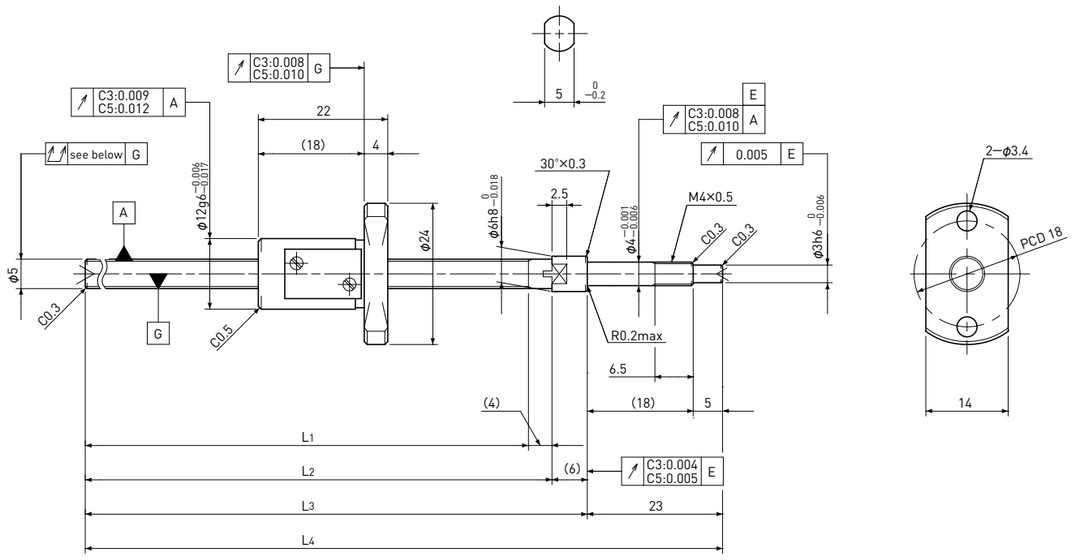
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0402-103R135C3	80	C3	103	106	112	135	±0.010	0.008	0.035	～0.005	—	420	570

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

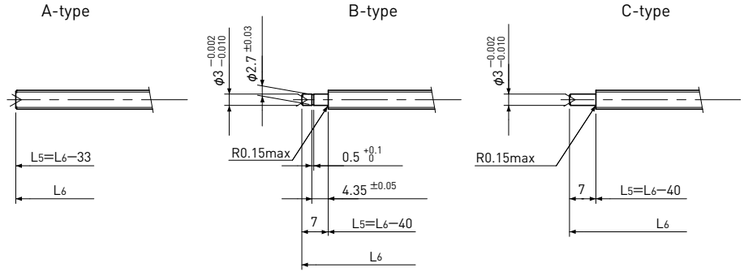
SG0504 | Shaft dia. ϕ5 Lead 4mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ4.3
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

Unit:mm

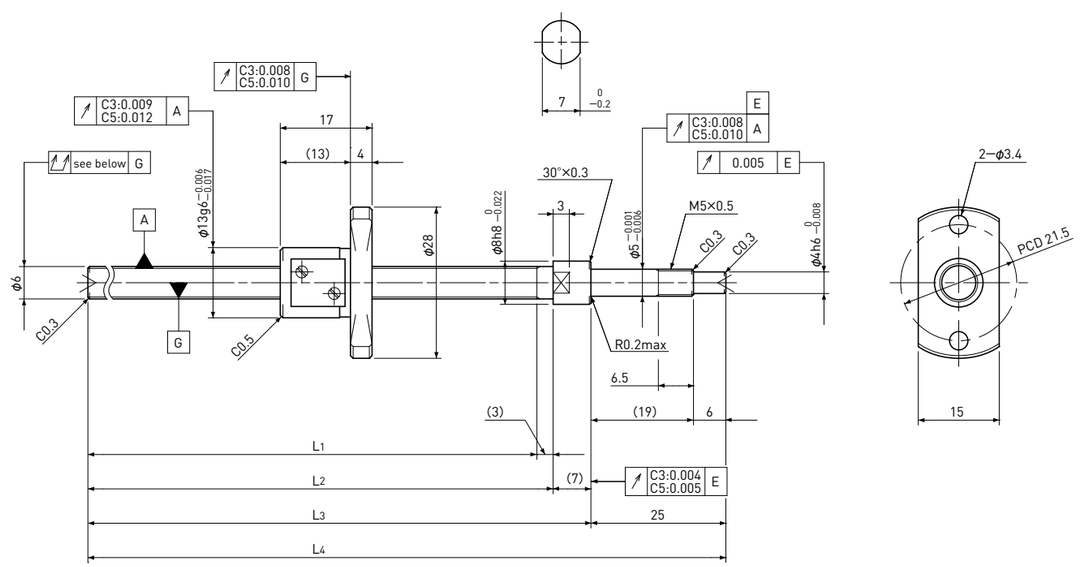
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0504-062R095C3	40	C3	62	66	72	95	±0.008	0.008	0.025	0 Spacer Ball (1:1)	～0.005	300	360
SG0504-112R145C3	90	C3	112	116	122	145	±0.010	0.008	0.035				
SG0504-062R095C5	40	C5	62	66	72	95	±0.018	0.018	0.035	～0.005	—	470	720
SG0504-112R145C5	90	C5	112	116	122	145	±0.020	0.018	0.050				

Note) Please refer to page A206 for order code of end-journal machining.

Ball Screw
Standard products in stock SG series

Standard products in stock SG series

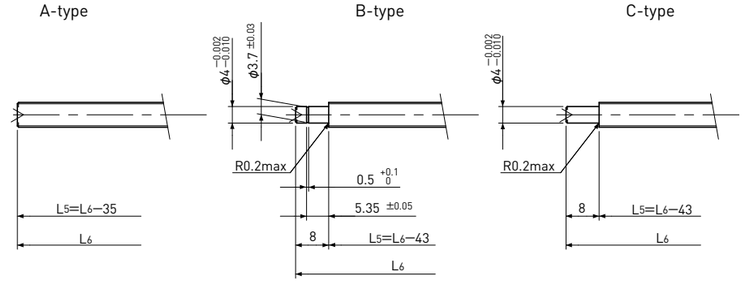
SG0601 | Shaft dia. ϕ6 Lead 1mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ5.3
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

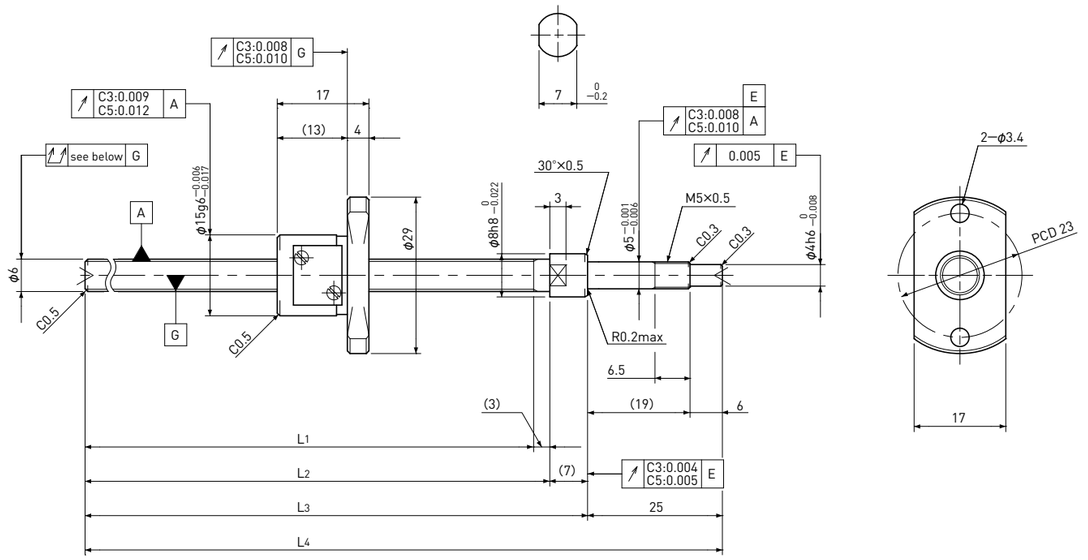
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0601-085R120C3	65	C3	85	88	95	120	±0.008	0.008	0.025	0 Spacer Ball (1:1)	～0.006	430	610
SG0601-110R145C3	90	C3	110	113	120	145	±0.010	0.008	0.035				
SG0601-135R170C3	115	C3	135	138	145	170	±0.010	0.008	0.035				
SG0601-085R120C5	65	C5	85	88	95	120	±0.018	0.018	0.035	～0.005	—	680	1200
SG0601-110R145C5	90	C5	110	113	120	145	±0.020	0.018	0.050				
SG0601-135R170C5	115	C5	135	138	145	170	±0.020	0.018	0.050				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

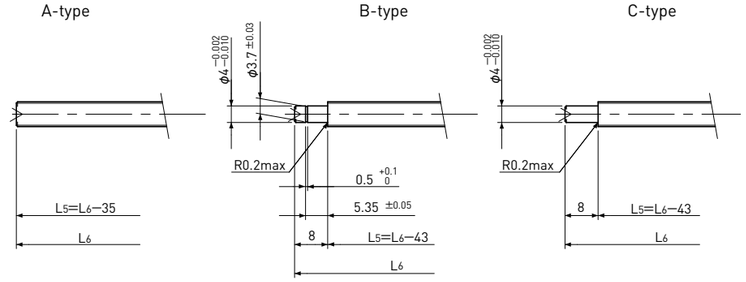
SG0602 | Shaft dia. ϕ6 Lead 2mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ1.0
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ5.1
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

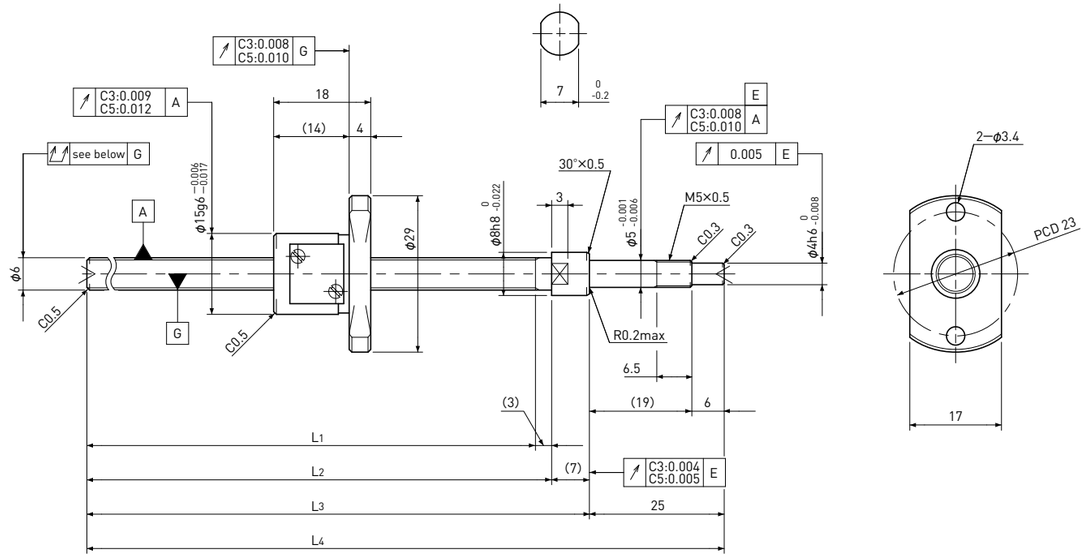
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length				Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	L_3	L_4	Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SG0602-085R120C3	65	C3	85	88	95	120	±0.008	0.008	0.025	0 Spacer Ball (1:1)	0.003～0.007	470	590
SG0602-135R170C3	115	C3	135	138	145	170	±0.010	0.008	0.035				
SG0602-085R120C5	65	C5	85	88	95	120	±0.018	0.018	0.035	～0.005	—	750	1200
SG0602-135R170C5	115	C5	135	138	145	170	±0.020	0.018	0.050				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

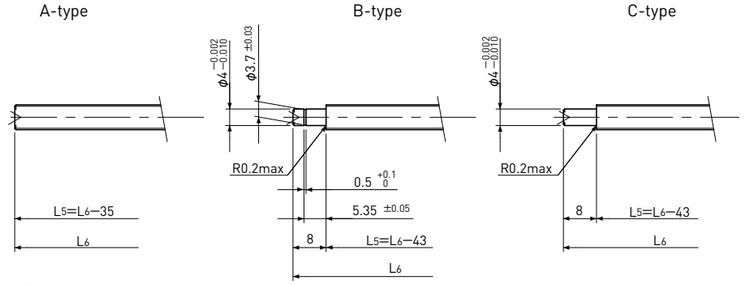
SG0602.5 | Shaft dia. ϕ6 Lead 2.5mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ1.0
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ5.1
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

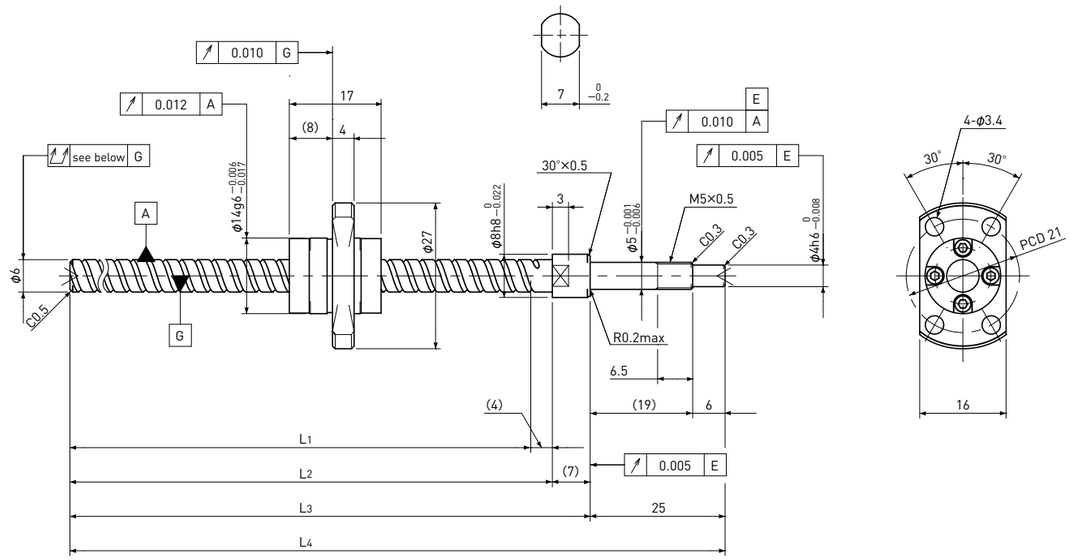
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length				Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	L_3	L_4	Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SG0602.5-085R120C3	65	C3	85	88	95	120	±0.008	0.008	0.025	0 Spacer Ball (1:1)	0.003～0.007	470	590
SG0602.5-135R170C3	115	C3	135	138	145	170	±0.010	0.008	0.035				
SG0602.5-085R120C5	65	C5	85	88	95	120	±0.018	0.018	0.035	～0.005	—	750	1200
SG0602.5-135R170C5	115	C5	135	138	145	170	±0.020	0.018	0.050				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

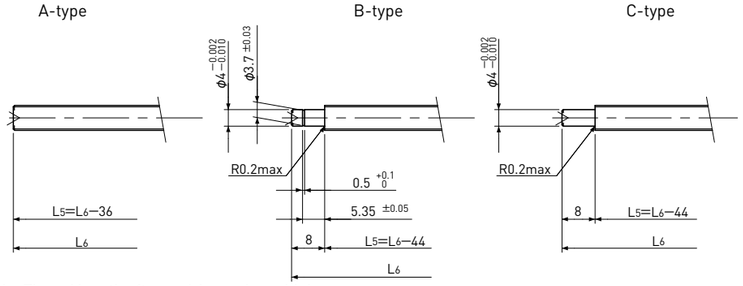
SG0606 | Shaft dia. ϕ6 Lead 6mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ1.0
Number of thread	2
Thread direction	Right
Shaft root dia.	ϕ5.2
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side :	MSU-5CS/5GS
	Fixed-side :	MSU-5C/5G

D-type : Other than the above.

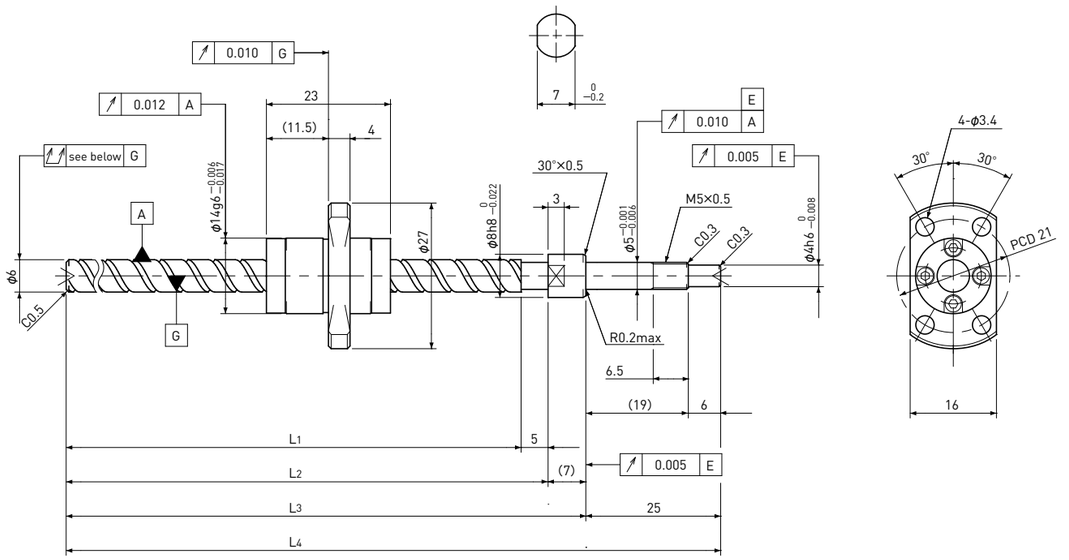
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0606-084R120C5	65	C5	84	88	95	120	±0.018	0.018	0.035	～0.005	—	870	1450
SG0606-134R170C5	115	C5	134	138	145	170	±0.020	0.018	0.050				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

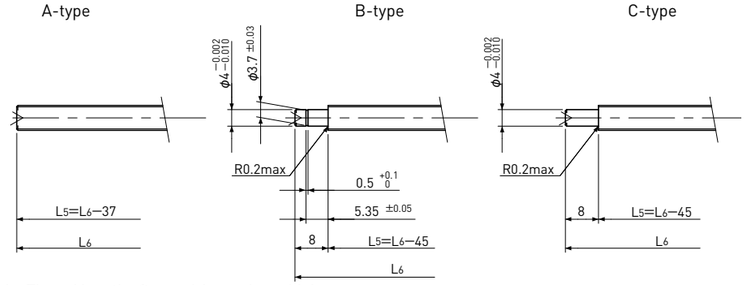
SG0610 | Shaft dia. ϕ6 Lead 10mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ1.2
Number of thread	2
Thread direction	Right
Shaft root dia.	ϕ5.0
Number of circuit	1.2×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side :	MSU-5CS/5GS
	Fixed-side :	MSU-5C/5G

D-type : Other than the above.

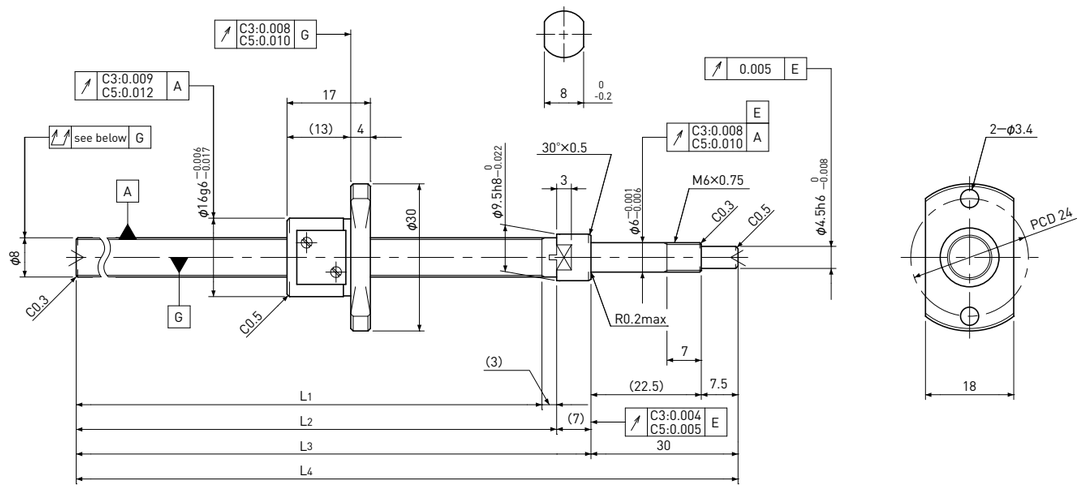
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0610-133R170C5	110	C5	133	138	145	170	±0.020	0.018	0.050	～0.005	—	950	1600

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

SG0801 | Shaft dia. ϕ8 Lead 1mm | C3&C5

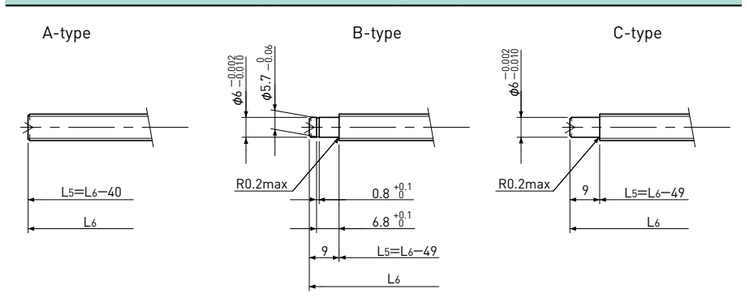


Unit:mm

Ball Screw Specifications

Ball size	ϕ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ7.3
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

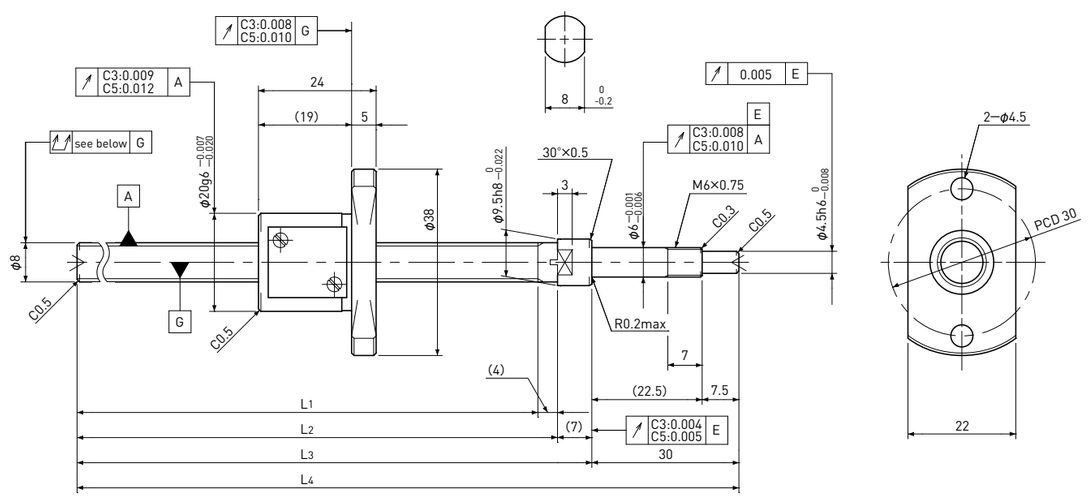
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0801-100R140C3	80	C3	100	103	110	140	±0.008	0.008	0.035	0 Spacer Ball (1:1)	0.002～0.008	490	820
SG0801-130R170C3	110	C3	130	133	140	170	±0.010	0.008	0.035				
SG0801-160R200C3	140	C3	160	163	170	200	±0.010	0.008	0.035				
SG0801-210R250C3	190	C3	210	213	220	250	±0.012	0.008	0.050				
SG0801-100R140C5	80	C5	100	103	110	140	±0.018	0.018	0.050	～0.005	—	780	1650
SG0801-130R170C5	110	C5	130	133	140	170	±0.020	0.018	0.050				
SG0801-160R200C5	140	C5	160	163	170	200	±0.020	0.018	0.050				
SG0801-210R250C5	190	C5	210	213	220	250	±0.023	0.018	0.065				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

SG0802 | Shaft dia. ϕ8 Lead 2mm | C3&C5

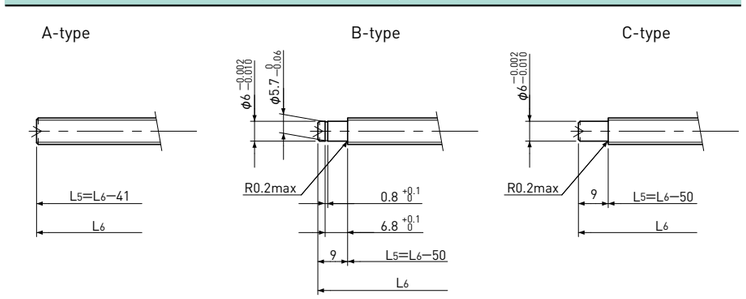


Unit:mm

Ball Screw Specifications

Ball size	ϕ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ6.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

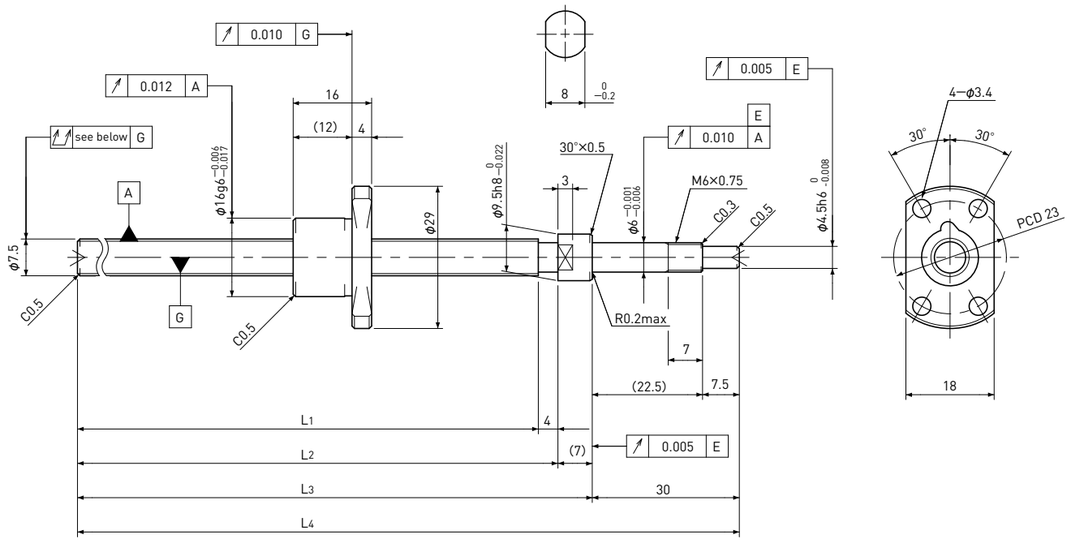
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0802-099R140C3	75	C3	99	103	110	140	±0.008	0.008	0.035	0 Spacer Ball (1:1)	0.004～0.020	1550	2100
SG0802-129R170C3	105	C3	129	133	140	170	±0.010	0.008	0.035				
SG0802-159R200C3	135	C3	159	163	170	200	±0.010	0.008	0.035				
SG0802-209R250C3	185	C3	209	213	220	250	±0.012	0.008	0.050				
SG0802-099R140C5	75	C5	99	103	110	140	±0.018	0.018	0.050	～0.005	—	2400	4100
SG0802-129R170C5	105	C5	129	133	140	170	±0.020	0.018	0.050				
SG0802-159R200C5	135	C5	159	163	170	200	±0.020	0.018	0.050				
SG0802-209R250C5	185	C5	209	213	220	250	±0.023	0.018	0.065				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

SG0802.5 | Shaft dia. φ8 Lead 2.5mm | C5

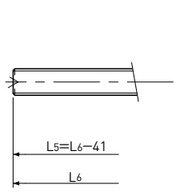


Unit:mm

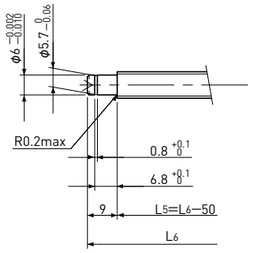
Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ6.3
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile

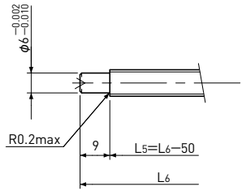
A-type



B-type



C-type



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

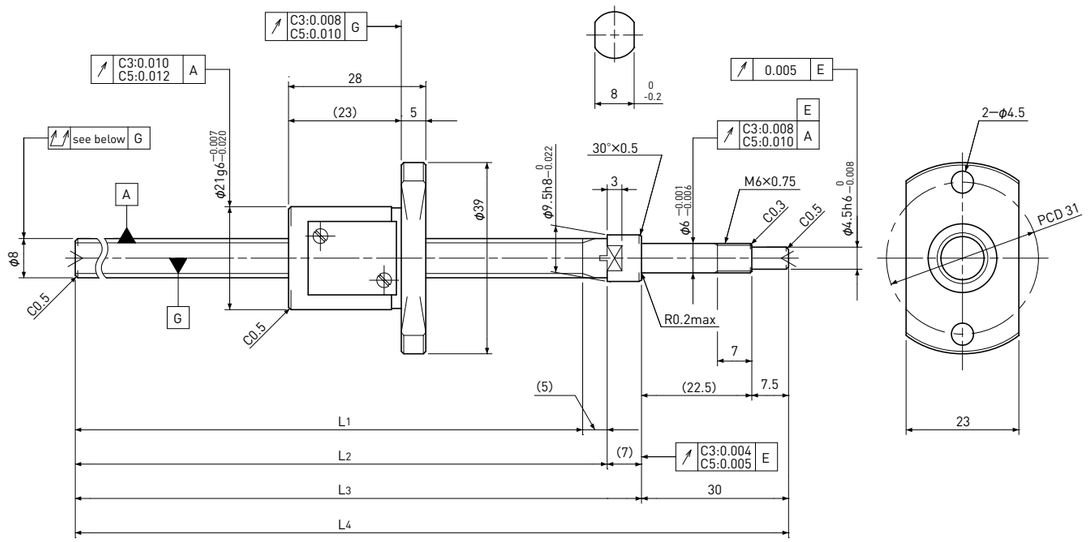
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0802.5-129R170C5	110	C5	129	133	140	170	±0.020	0.018	0.050	～0.005	—	1850	3000
SG0802.5-209R250C5	190	C5	209	213	220	250	±0.023	0.018	0.065				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

SG0804 | Shaft dia. φ8 Lead 4mm | C3&C5

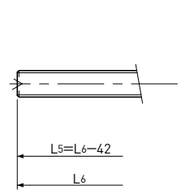


Unit:mm

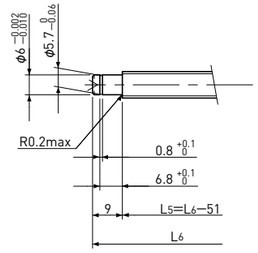
Ball Screw Specifications	
Ball size	φ2.0
Number of thread	1
Thread direction	Right
Shaft root dia.	φ6.2
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile

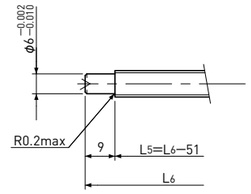
A-type



B-type



C-type



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

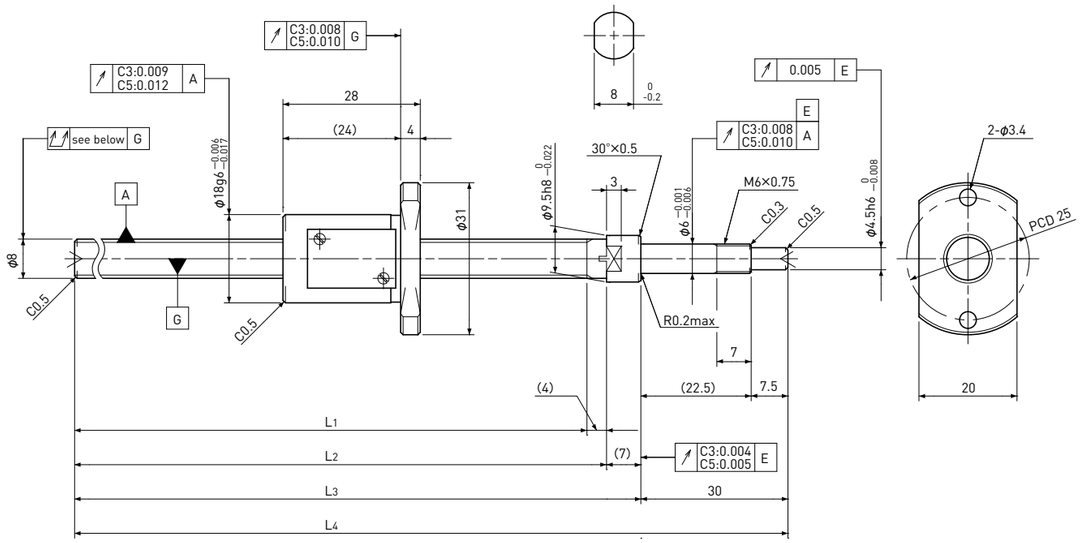
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0804-098R140C3	70	C3	98	103	110	140	±0.008	0.008	0.035	0 Spacer Ball (1:1)	～0.015	1650	2100
SG0804-208R250C3	180	C3	208	213	220	250	±0.012	0.008	0.050				
SG0804-098R140C5	70	C5	98	103	110	140	±0.018	0.018	0.050	～0.005	—	2600	4200
SG0804-208R250C5	180	C5	208	213	220	250	±0.023	0.018	0.065				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

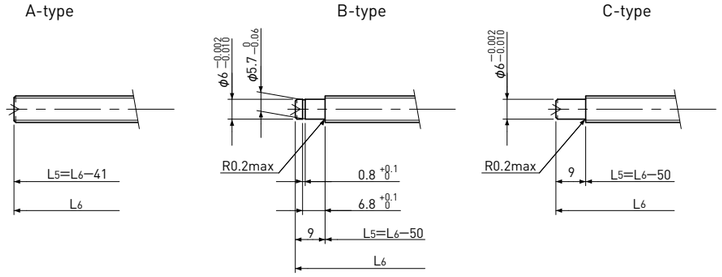
SG0805 | Shaft dia. φ8 Lead 5mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ6.6
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side :	MSU-6CS/6GS
	Fixed-side :	MSU-6C/6G

D-type : Other than the above.

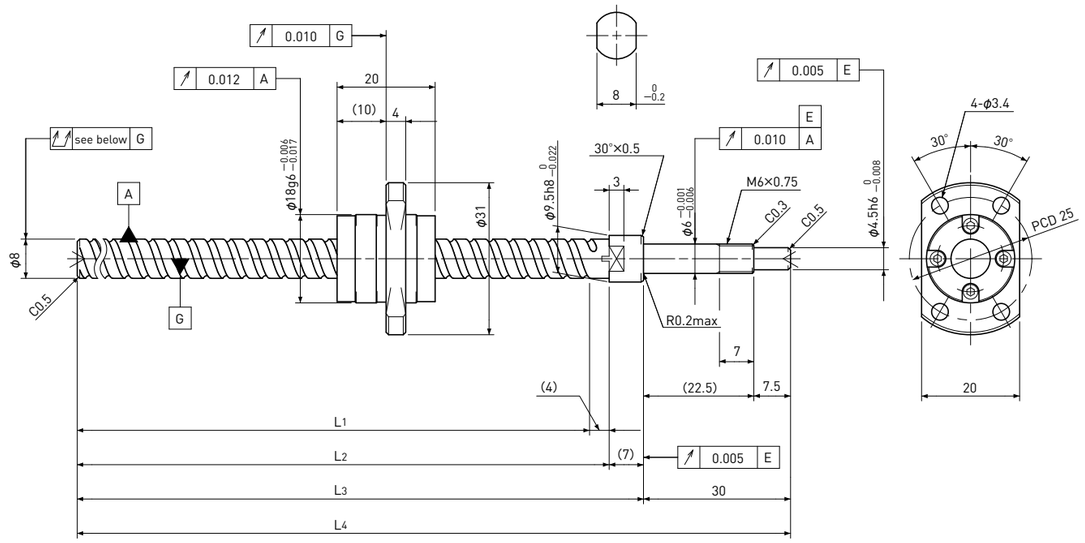
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0805-099R140C3	70	C3	99	103	110	140	±0.008	0.008	0.035	0 Spacer Ball (1:1)	～0.015	1150	1500
SG0805-209R250C3	180	C3	209	213	220	250	±0.012	0.008	0.050				
SG0805-099R140C5	70	C5	99	103	110	140	±0.018	0.018	0.050	～0.005	—	1850	3000
SG0805-209R250C5	180	C5	209	213	220	250	±0.023	0.018	0.065				

Note)Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

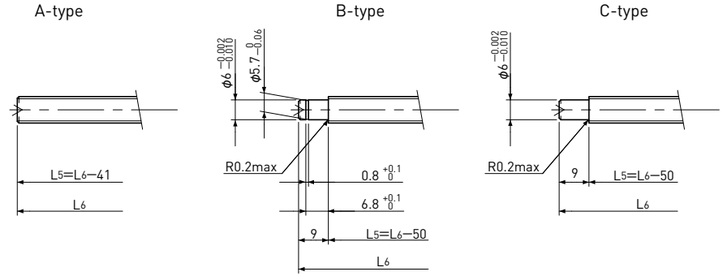
SG0808 | Shaft dia. φ8 Lead 8mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	2
Thread direction	Right
Shaft root dia.	φ6.7
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side :	MSU-6CS/6GS
	Fixed-side :	MSU-6C/6G

D-type : Other than the above.

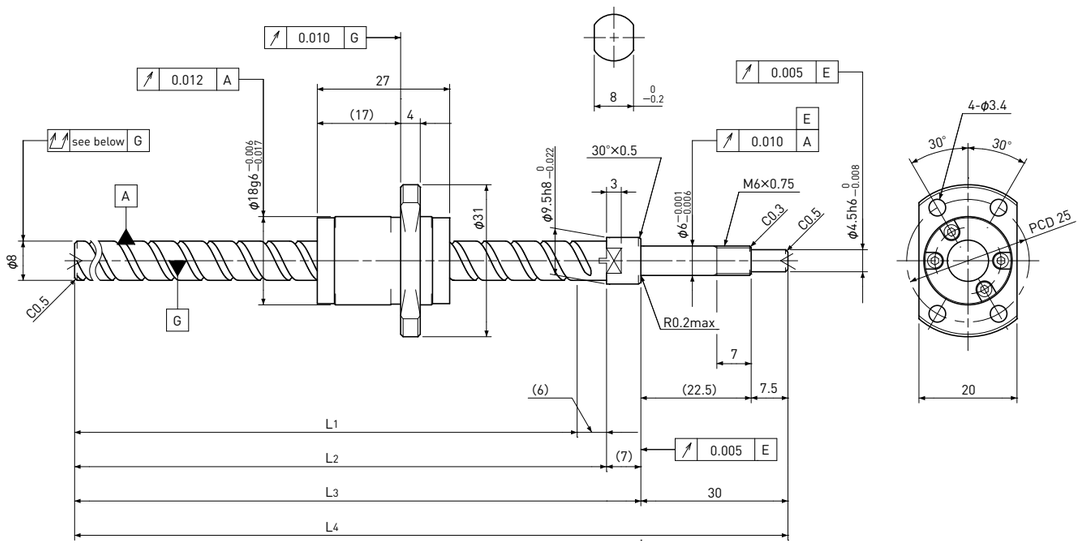
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG0808-099R140C5	75	C5	99	103	110	140	±0.018	0.018	0.050	～0.005	—	2200	3800
SG0808-209R250C5	185	C5	209	213	220	250	±0.023	0.018	0.065				

Note)Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

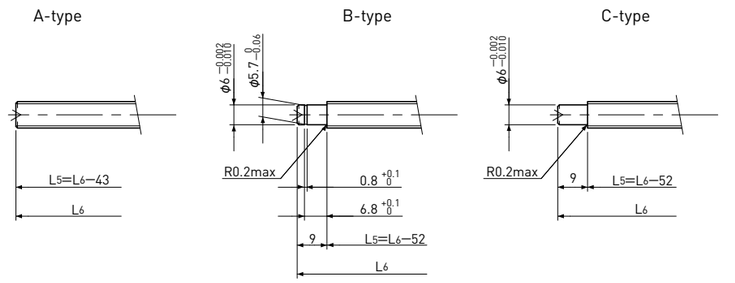
SG0812 | Shaft dia. φ8 Lead 12mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	2
Thread direction	Right
Shaft root dia.	φ6.7
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

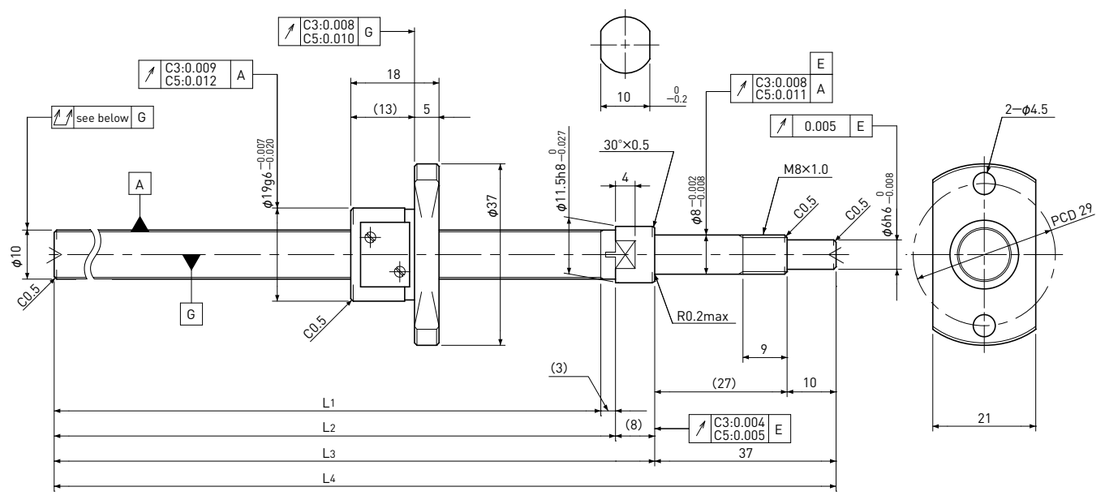
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length				Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L1	L2	L3	L4	Travel deviation ep	Variation Vu				Dynamic Ca	Static Coa
SG0812-097R140C5	70	C5	97	103	110	140	±0.018	0.018	0.050	～0.005	—	2200	4000
SG0812-207R250C5	180	C5	207	213	220	250	±0.023	0.018	0.065				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

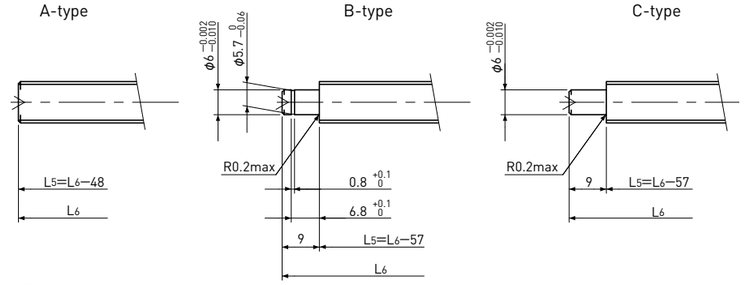
SG1001 | Shaft dia. φ10 Lead 1mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	φ9.3
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

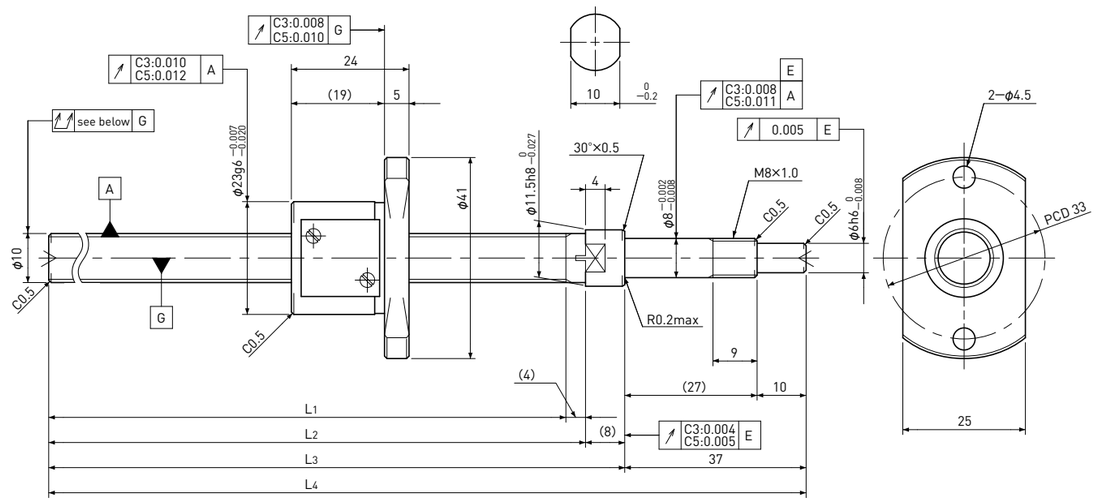
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length				Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L1	L2	L3	L4	Travel deviation ep	Variation Vu				Dynamic Ca	Static Coa
SG1001-112R160C3	90	C3	112	115	123	160	±0.010	0.008	0.035	0 Spacer Ball (1:1)	～0.020	530	1000
SG1001-162R210C3	140	C3	162	165	173	210	±0.010	0.008	0.040				
SG1001-212R260C3	190	C3	212	215	223	260	±0.012	0.008	0.040				
SG1001-262R310C3	240	C3	262	265	273	310	±0.012	0.008	0.040				
SG1001-112R160C5	90	C5	112	115	123	160	±0.020	0.018	0.040	～0.005	—	840	2000
SG1001-162R210C5	140	C5	162	165	173	210	±0.020	0.018	0.055				
SG1001-212R260C5	190	C5	212	215	223	260	±0.023	0.018	0.055				
SG1001-262R310C5	240	C5	262	265	273	310	±0.023	0.018	0.055				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

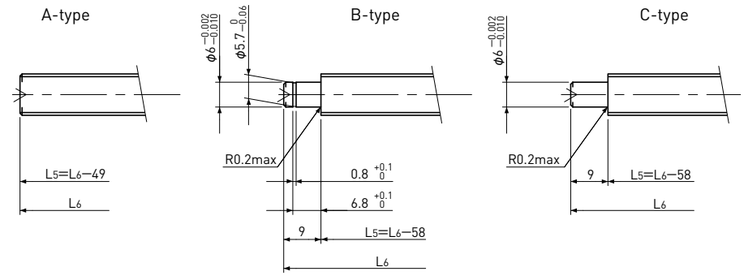
SG1002 | Shaft dia. φ10 Lead 2mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ8.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

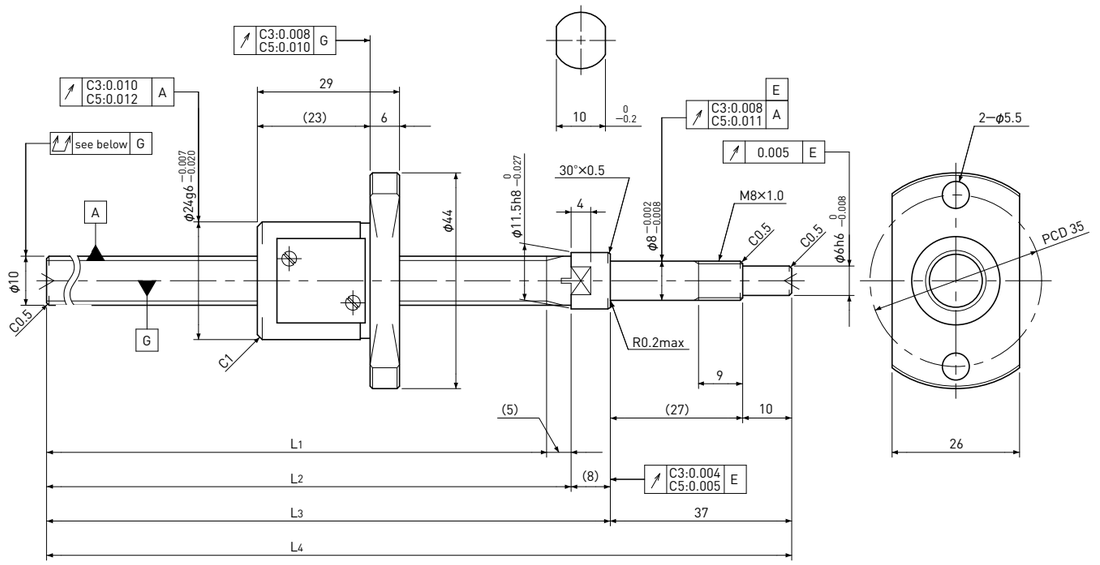
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1002-111R160C3	85	C3	111	115	123	160	±0.010	0.008	0.035	0 Spacer Ball (1:1)	0.006～0.030	1750	2700
SG1002-161R210C3	135	C3	161	165	173	210	±0.010	0.008	0.040				
SG1002-211R260C3	185	C3	211	215	223	260	±0.012	0.008	0.040				
SG1002-261R310C3	235	C3	261	265	273	310	±0.012	0.008	0.040				
SG1002-111R160C5	85	C5	111	115	123	160	±0.020	0.018	0.040	～0.005	—	2700	5300
SG1002-161R210C5	135	C5	161	165	173	210	±0.020	0.018	0.055				
SG1002-211R260C5	185	C5	211	215	223	260	±0.023	0.018	0.055				
SG1002-261R310C5	235	C5	261	265	273	310	±0.023	0.018	0.055				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

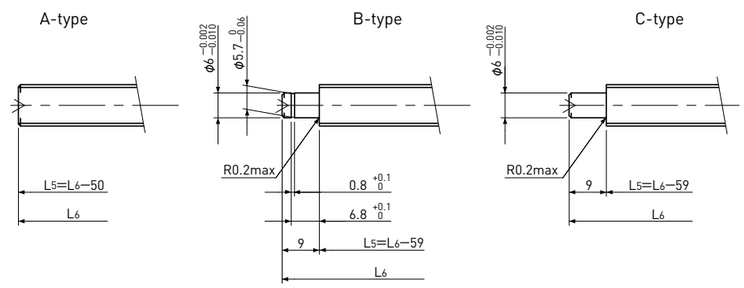
SG1004 | Shaft dia. φ10 Lead 4mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ2.0
Number of thread	1
Thread direction	Right
Shaft root dia.	φ8.2
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

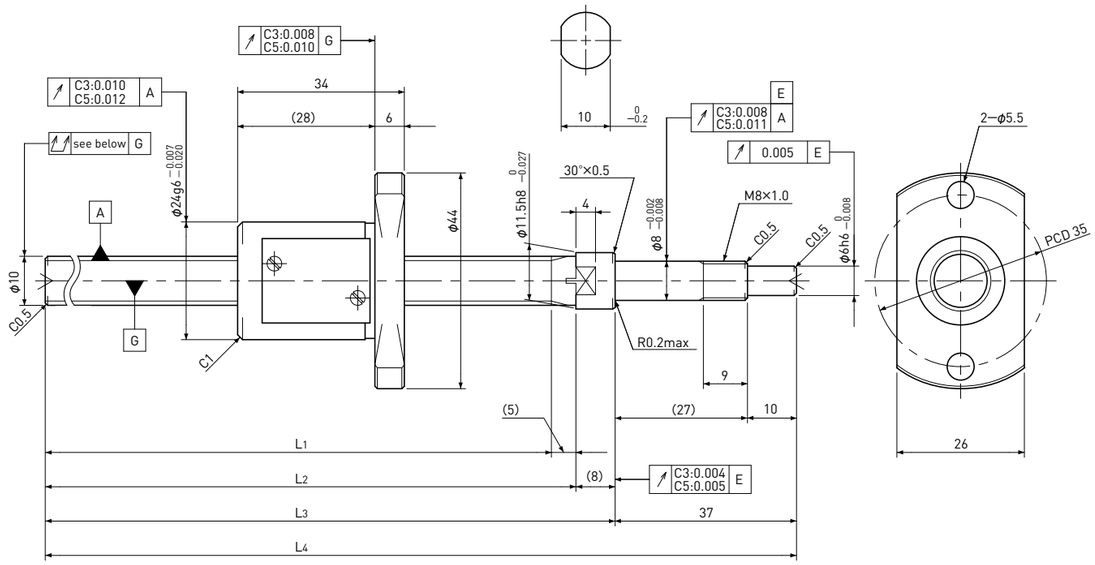
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1004-110R160C3	80	C3	110	115	123	160	±0.010	0.008	0.035	0 Spacer Ball (1:1)	0.005～0.040	1800	2600
SG1004-260R310C3	230	C3	260	265	273	310	±0.012	0.008	0.040				
SG1004-110R160C5	80	C5	110	115	123	160	±0.020	0.018	0.040	～0.005	—	3000	5200
SG1004-260R310C5	230	C5	260	265	273	310	±0.023	0.018	0.055				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

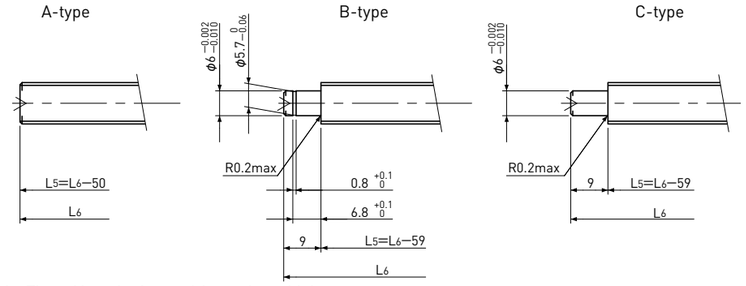
SG1005 | Shaft dia. ϕ10 Lead 5mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ2.0
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ8.2
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

Unit:mm

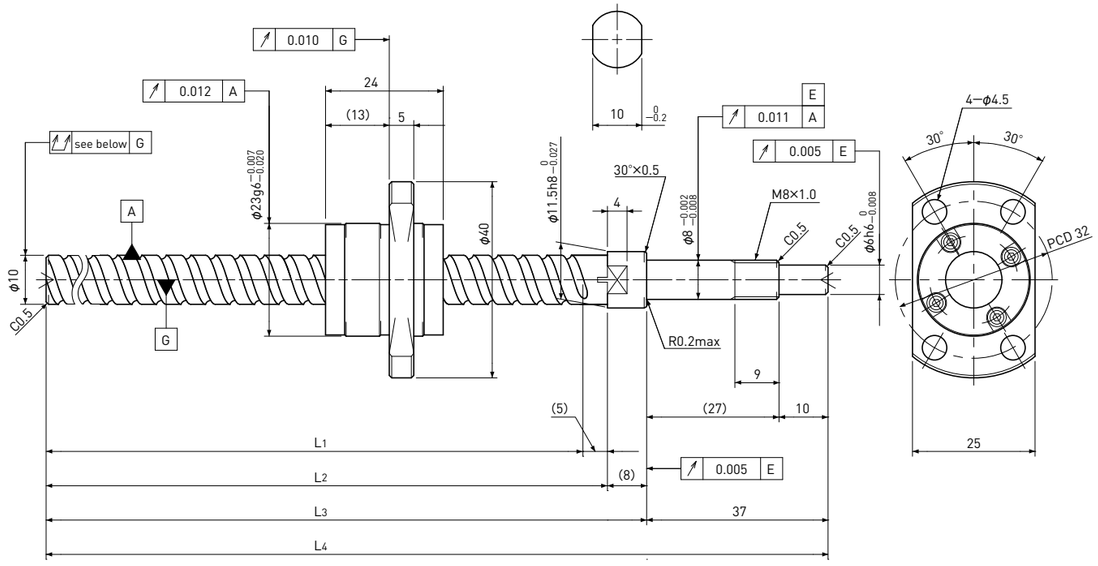
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1005-110R160C3	75	C3	110	115	123	160	±0.010	0.008	0.035	0 Spacer Ball (1:1)	0.005～0.040	1800	2600
SG1005-260R310C3	225	C3	260	265	273	310	±0.012	0.008	0.040				
SG1005-110R160C5	75	C5	110	115	123	160	±0.020	0.018	0.040	～0.005	—	3000	5200
SG1005-260R310C5	225	C5	260	265	273	310	±0.023	0.018	0.055				

Note)Please refer to page A206 for order code of end-journal machining.

Ball Screw
Standard products in stock SG series

Standard products in stock SG series

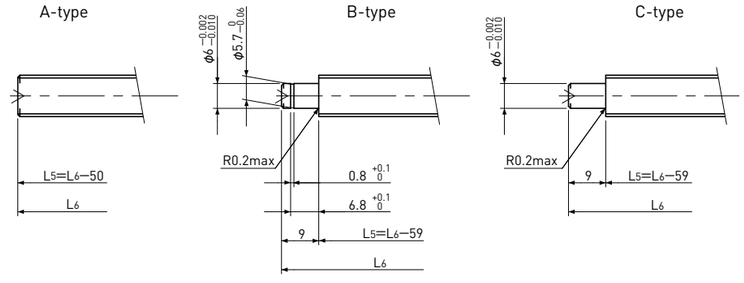
SG1010 | Shaft dia. ϕ10 Lead 10mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ2.0
Number of thread	2
Thread direction	Right
Shaft root dia.	ϕ8.4
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

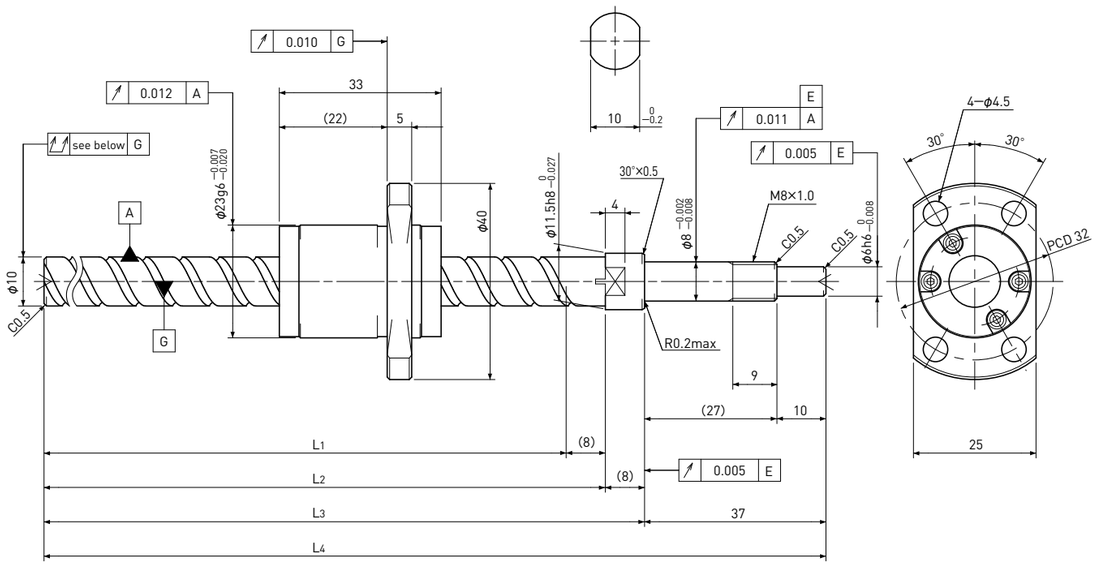
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1010-110R160C5	85	C5	110	115	123	160	±0.020	0.018	0.040	～0.005	—	3300	5900
SG1010-260R310C5	235	C5	260	265	273	310	±0.023	0.018	0.055				

Note)Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

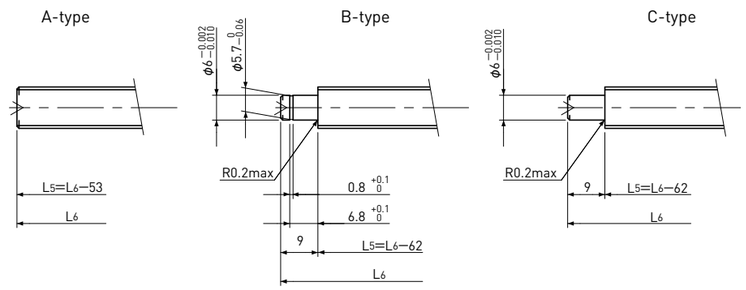
SG1015 | Shaft dia. ϕ10 Lead 15mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ2.0
Number of thread	2
Thread direction	Right
Shaft root dia.	ϕ8.4
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

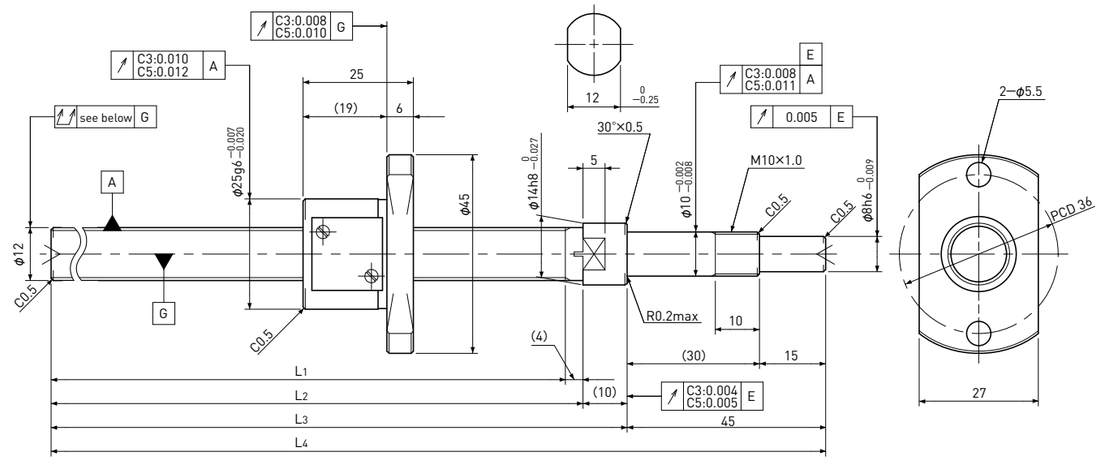
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length				Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L1	L2	L3	L4	Travel deviation ep	Variation Vu				Dynamic Ca	Static Coa
SG1015-107R160C5	70	C5	107	115	123	160	±0.020	0.018	0.040	～0.005	—	3300	6400
SG1015-257R310C5	220	C5	257	265	273	310	±0.023	0.018	0.055				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

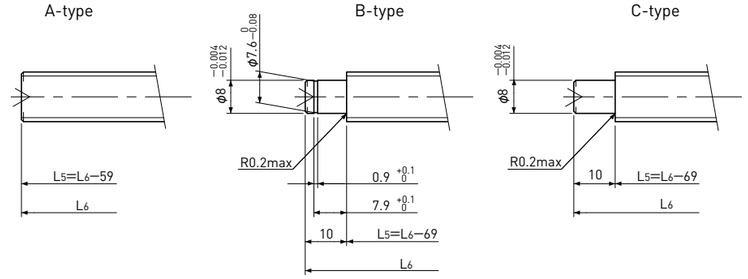
SG1202 | Shaft dia. ϕ12 Lead 2mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ10.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	—
	Fixed-side	:	—

D-type : Other than the above.

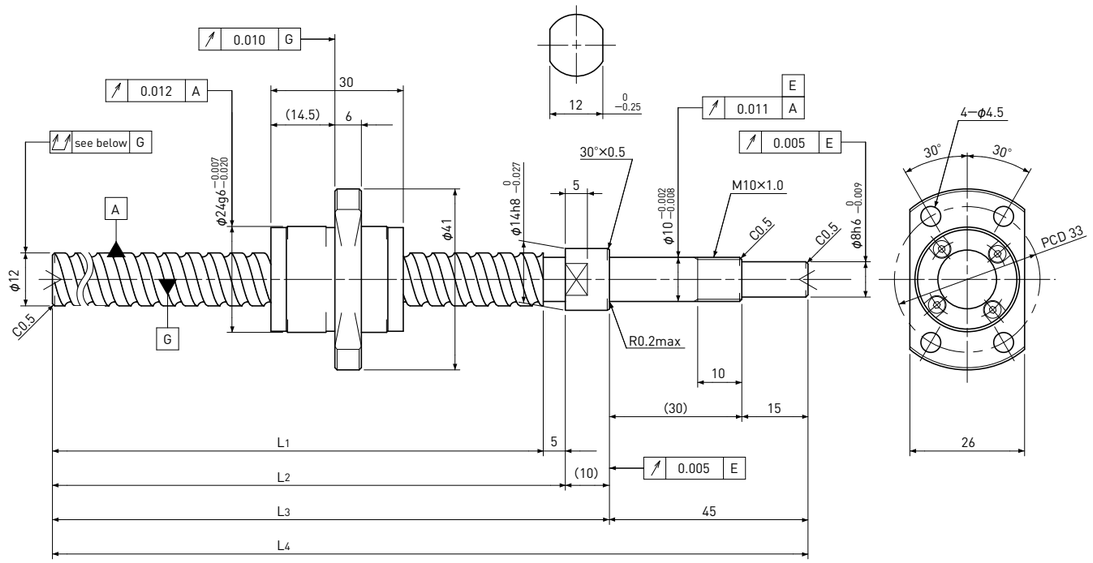
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length				Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L1	L2	L3	L4	Travel deviation ep	Variation Vu				Dynamic Ca	Static Coa
SG1202-141R200C3	115	C3	141	145	155	200	±0.010	0.008	0.035	0 Spacer Ball (1:1)	0.008～0.040	1900	3200
SG1202-191R250C3	165	C3	191	195	205	250	±0.010	0.008	0.040				
SG1202-241R300C3	215	C3	241	245	255	300	±0.012	0.008	0.040				
SG1202-291R350C3	265	C3	291	295	305	350	±0.012	0.008	0.050				
SG1202-341R400C3	315	C3	341	345	355	400	±0.013	0.010	0.050				
SG1202-141R200C5	115	C5	141	145	155	200	±0.020	0.018	0.040	～0.005	—	3000	6400
SG1202-191R250C5	165	C5	191	195	205	250	±0.020	0.018	0.055				
SG1202-241R300C5	215	C5	241	245	255	300	±0.023	0.018	0.055				
SG1202-291R350C5	265	C5	291	295	305	350	±0.023	0.018	0.065				
SG1202-341R400C5	315	C5	341	345	355	400	±0.025	0.020	0.065				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

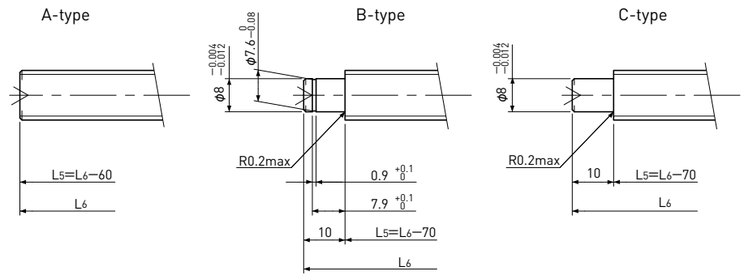
SG1210 | Shaft dia. ϕ12 Lead 10mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ2.381
Number of thread	2
Thread direction	Right
Shaft root dia.	ϕ10.2
Number of circuit	1.7×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	—
	Fixed-side	:	—

D-type : Other than the above.

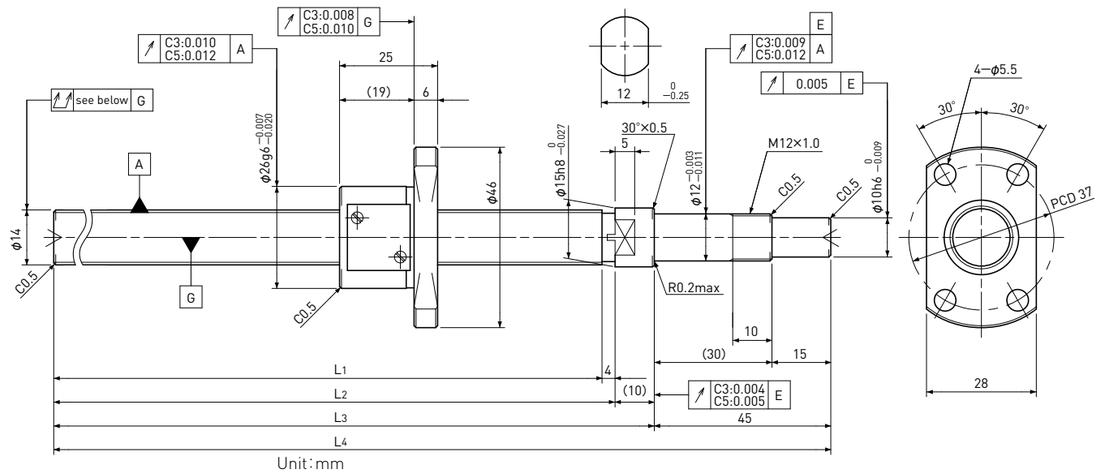
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1210-240R300C5	210	C5	240	245	255	300	±0.023	0.018	0.055	～0.005	—	5100	9800
SG1210-340R400C5	310	C5	340	345	355	400	±0.025	0.020	0.065				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

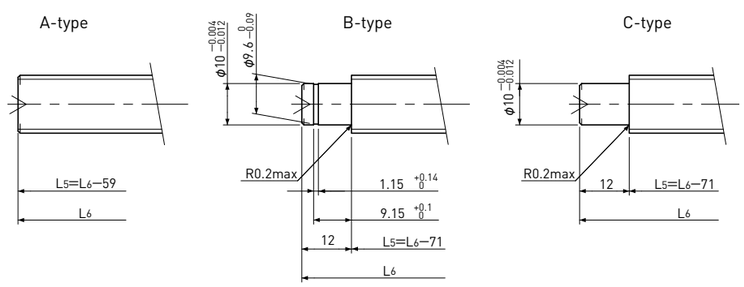
SG1402 | Shaft dia. ϕ14 Lead 2mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	ϕ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ12.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	—
	Fixed-side	:	—

D-type : Other than the above.

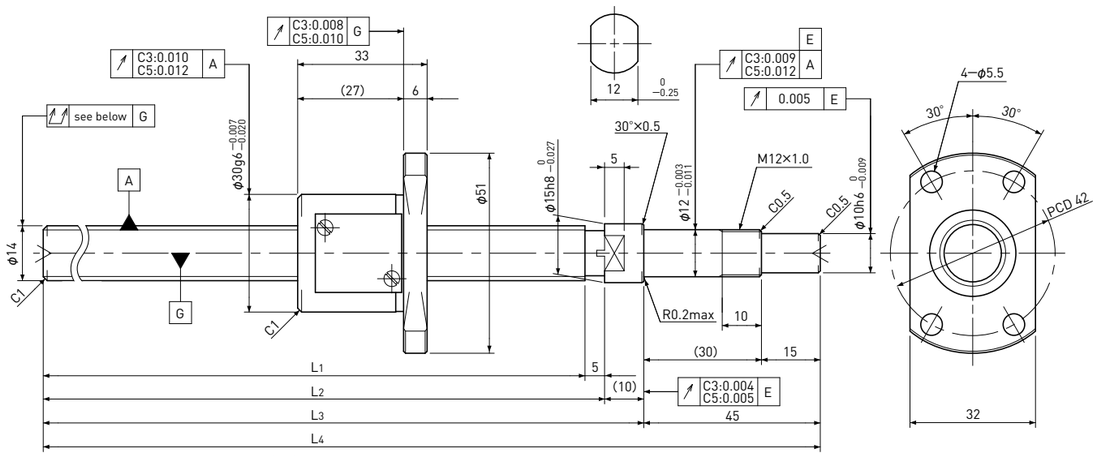
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1402-141R200C3	115	C3	141	145	155	200	±0.010	0.008	0.025	0 Spacer Ball (1:1)	0.010～0.050	2000	3800
SG1402-191R250C3	165	C3	191	195	205	250	±0.010	0.008	0.030				
SG1402-241R300C3	215	C3	241	245	255	300	±0.012	0.008	0.030				
SG1402-291R350C3	265	C3	291	295	305	350	±0.012	0.008	0.040				
SG1402-391R450C3	365	C3	391	395	405	450	±0.013	0.010	0.050				
SG1402-141R200C5	115	C5	141	145	155	200	±0.020	0.018	0.040	～0.005	—	3200	7500
SG1402-191R250C5	165	C5	191	195	205	250	±0.020	0.018	0.045				
SG1402-241R300C5	215	C5	241	245	255	300	±0.023	0.018	0.045				
SG1402-291R350C5	265	C5	291	295	305	350	±0.023	0.018	0.055				
SG1402-391R450C5	365	C5	391	395	405	450	±0.025	0.020	0.060				

Note) Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

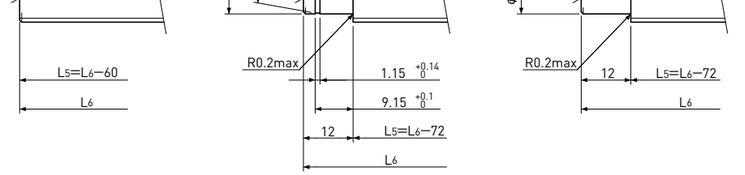
SG1404 | Shaft dia. φ14 Lead 4mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ2.381
Number of thread	1
Thread direction	Right
Shaft root dia.	φ11.8
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side	: —
	Fixed-side	: —

D-type : Other than the above.

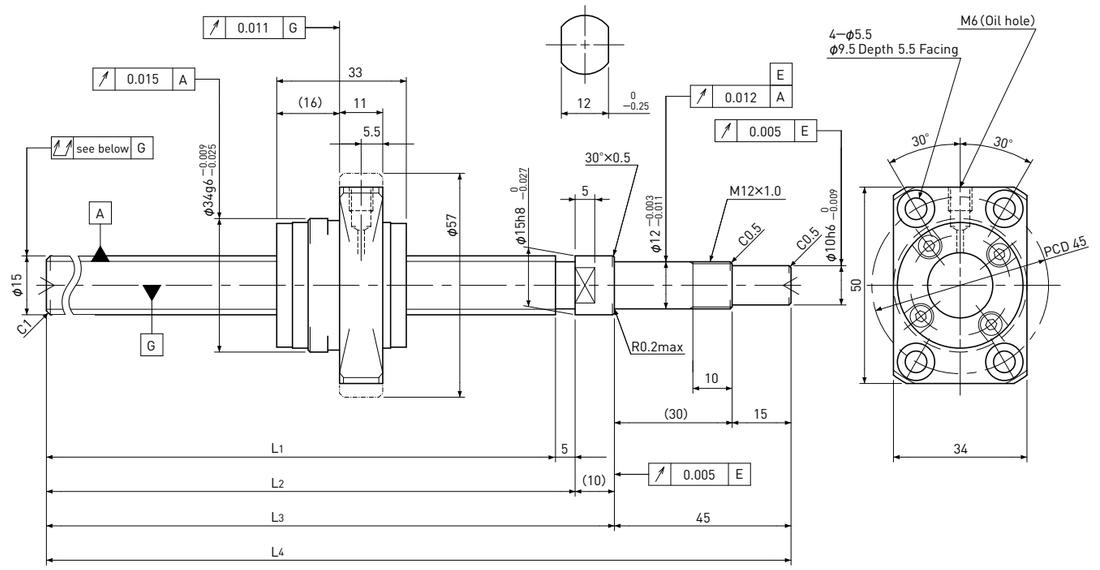
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1404-190R250C3	155	C3	190	195	205	250	±0.010	0.008	0.030	0 Spacer Ball (1:1)	0.020～0.070	3600	5800
SG1404-240R300C3	205	C3	240	245	255	300	±0.012	0.008	0.030				
SG1404-290R350C3	255	C3	290	295	305	350	±0.012	0.008	0.040				
SG1404-390R450C3	355	C3	390	395	405	450	±0.013	0.010	0.050				
SG1404-490R550C3	455	C3	490	495	505	550	±0.015	0.010	0.055				
SG1404-190R250C5	155	C5	190	195	205	250	±0.020	0.018	0.045	～0.005	—	5700	11600
SG1404-240R300C5	205	C5	240	245	255	300	±0.023	0.018	0.045				
SG1404-290R350C5	255	C5	290	295	305	350	±0.023	0.018	0.055				
SG1404-390R450C5	355	C5	390	395	405	450	±0.025	0.020	0.060				
SG1404-490R550C5	455	C5	490	495	505	550	±0.027	0.020	0.075				

Note)Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

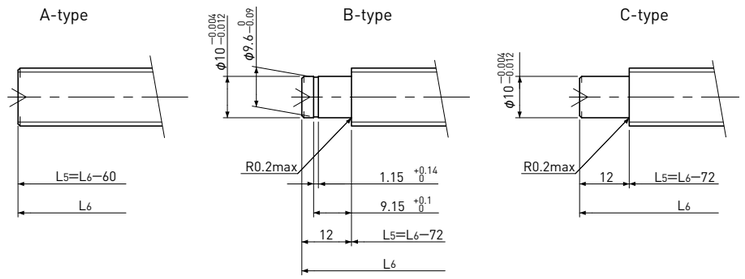
SG1505 | Shaft dia. φ15 Lead 5mm | C5



Unit:mm

Ball Screw Specifications	
Ball size	φ3.175
Number of thread	1
Thread direction	Right
Shaft root dia.	φ12.2
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side	: —
	Fixed-side	: —

D-type : Other than the above.

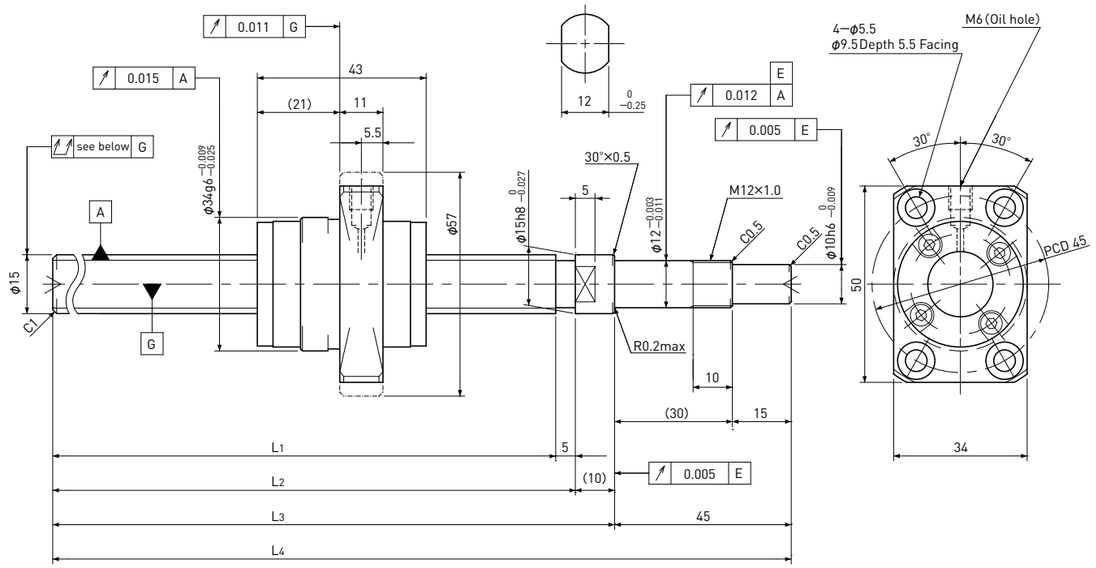
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1505-340R400C5	305	C5	340	345	355	400	±0.025	0.020	0.055	～0.005	—	8900	17000
SG1505-540R600C5	505	C5	540	545	555	600	±0.030	0.023	0.075				

Note)Please refer to page A206 for order code of end-journal machining.

Standard products in stock SG series

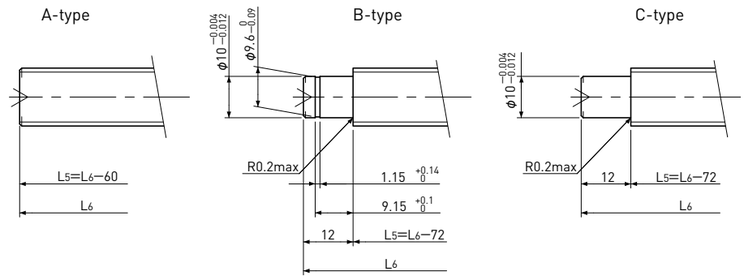
SG1510 | Shaft dia. φ15 Lead 10mm | C5



Unit : mm

Ball Screw Specifications	
Ball size	φ3.175
Number of thread	2
Thread direction	Right
Shaft root dia.	φ12.2
Number of circuit	2.7×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5 : Thread length after end-journal machining.
L6 : Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side	: —
	Fixed-side	: —

D-type : Other than the above.

Unit : mm

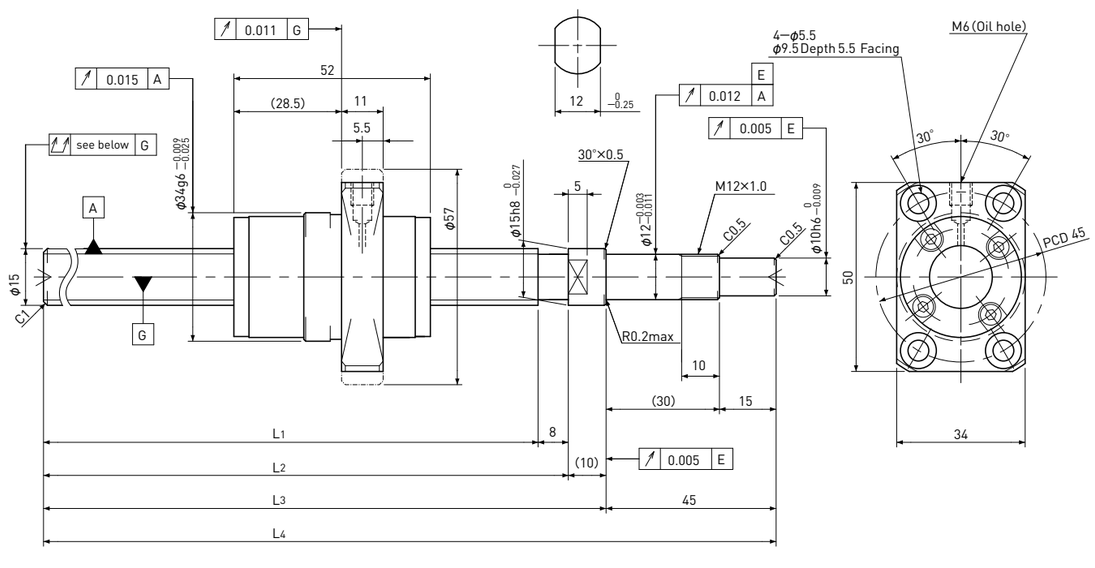
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1510-340R400C5	295	C5	340	345	355	400	±0.025	0.020	0.055	～0.005	—	12000	25000
SG1510-540R600C5	495	C5	540	545	555	600	±0.030	0.023	0.075				

Note) Please refer to page A206 for order code of end-journal machining.

Ball Screw
Standard products in stock SG series

Standard products in stock SG series

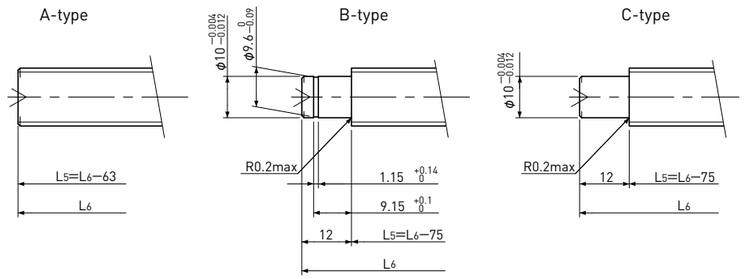
SG1520 | Shaft dia. φ15 Lead 20mm | C5



Unit : mm

Ball Screw Specifications	
Ball size	φ3.175
Number of thread	2
Thread direction	Right
Shaft root dia.	φ12.4
Number of circuit	1.7×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Supported-side end-journal profile



L5 : Thread length after end-journal machining.
L6 : Total length after end-journal machining.

Support-unit Recommendation		
	Supported-side	: —
	Fixed-side	: —

D-type : Other than the above.

Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	L4	Lead accuracy Travel deviation ep	Variation Vu	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SG1520-337R400C5	285	C5	337	345	355	400	±0.025	0.020	0.055	～0.005	—	8000	16000
SG1520-537R600C5	485	C5	537	545	555	600	±0.030	0.023	0.075				

Note) Please refer to page A206 for order code of end-journal machining.

SD series　Standardized Bi-directional Ball Screws

SD series are economical Ball Screws which moves bi-directionally with a shaft, and perform centering, precise positioning. There are Precision Ball Screws C3, C5 grade.

●Combination of Shaft nominal dia. & Lead

Unit：mm

Shaft dia. \ Lead	1	2
4	A239	
6	A240	
8	A241	A242
10		A243
12		A244

Note 1)The number in a table：showing a page in this catalogue.

●Accuracy Grade & Axial play

Accuracy grades of SD series (Standardized Bi-directional Precision Ball Screws) are 2 kinds, C3 and C5(JIS B 1192-3). Axial play are 0(Preload：C3)and 0.005mm or less(C5) corresponding to accuracy grades in stock.

●Material & Surface hardness

Shafts and Nuts of SD series(Standardized Bi-directional Precision Ball Screws) adopts SCM415(carburizing and quenching), surface hardness of Ball Screw part is HRC58-62.

●Lubrication

SD series(Standardized Bi-directional Precision Ball Screws) are applied with anti-rust oil for rust prevention when unfinished end journal. Since anti-rust oil is not lubricant, apply Grease or lubrication oil before using Ball Screws.
If there is no specific instruction, KSS would recommend our original Grease (MSG No.2) as standard lubricant. Please feel free to contact us.

●End-journal profile

End-journal configuration of SD series (Standardized Bi-directional Precision Ball Screws) is not standardized. Please ask for KSS regarding additional machining with a drawing which shows end-journal profile.

●Model number notation

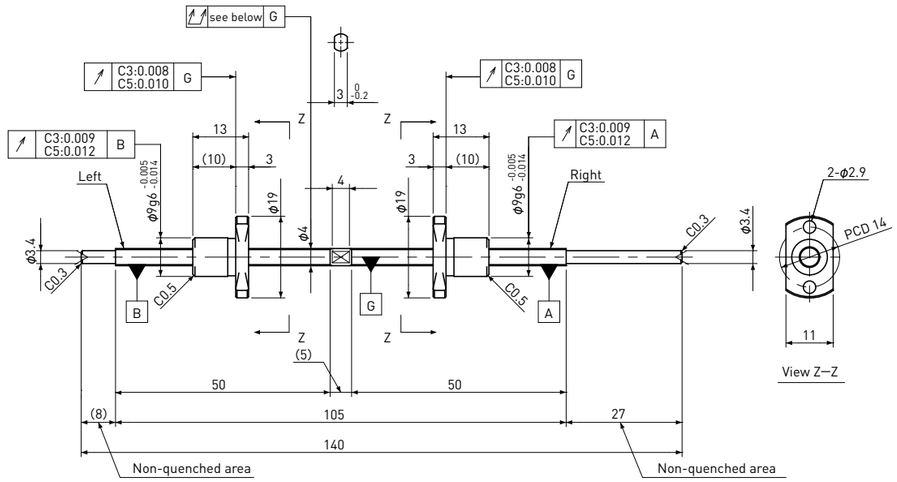
Model number notation of SD series(Standardized Bi-directional Precision Ball Screws) is as follows.

SD	08	01	–	120	L	120	R	300	C5
①	②	③		④	⑤	⑥	⑦	⑧	⑨

①Bi-directional Ball Screws series No.
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Left-side thread length(mm)
⑤Left-hand
⑥Right-side thread length(mm)
⑦Right-hand
⑧Screw Shaft total length(mm)
⑨Accuracy grade(C3 or C5)

Standard products in stock SD series

SD0401 | Shaft dia.ϕ4 Lead 1mm | C3&C5



Unit:mm

Ball Screw Specifications

Ball size	ϕ0.6
Number of thread	1
Thread direction	Left&Right
Shaft root dia.	ϕ3.4
Number of circuit	1×3
Shaft,Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

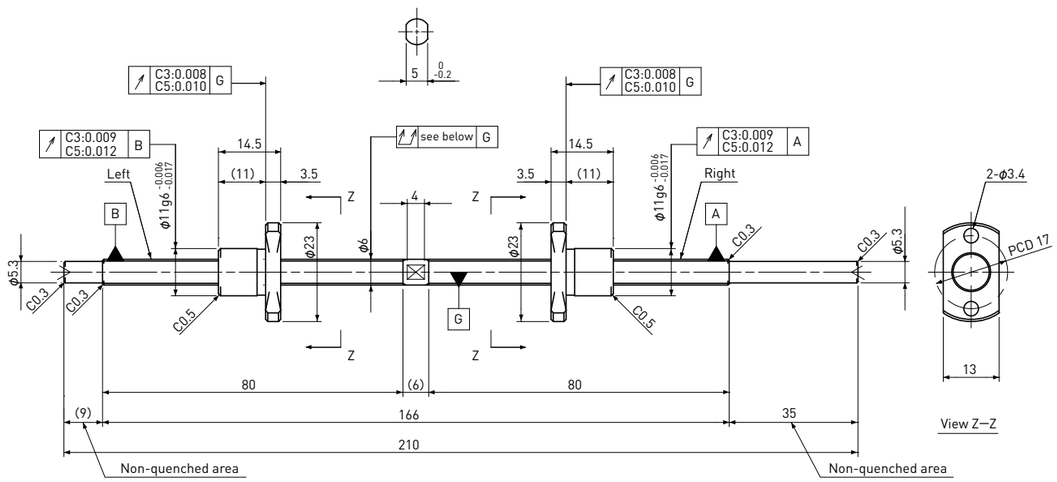
Unit:mm

Ball Screw Model	Travel	Grade	Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SD0401-50L50R140C3	35	C3	±0.008	0.008	0.035	0	～0.010	300	430
SD0401-50L50R140C5	35	C5	±0.018	0.018	0.050	～0.005	—		

Note 1) Please designate end-journal profile with your sketch.
Note 2) Absolute position of both Nuts related to the Screw Shaft is not under the control.

Standard products in stock SD series

SD0601 | Shaft dia.ϕ6 Lead 1mm | C3&C5



Unit:mm

Ball Screw Specifications

Ball size	ϕ0.8
Number of thread	1
Thread direction	Left&Right
Shaft root dia.	ϕ5.3
Number of circuit	1×3
Shaft,Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

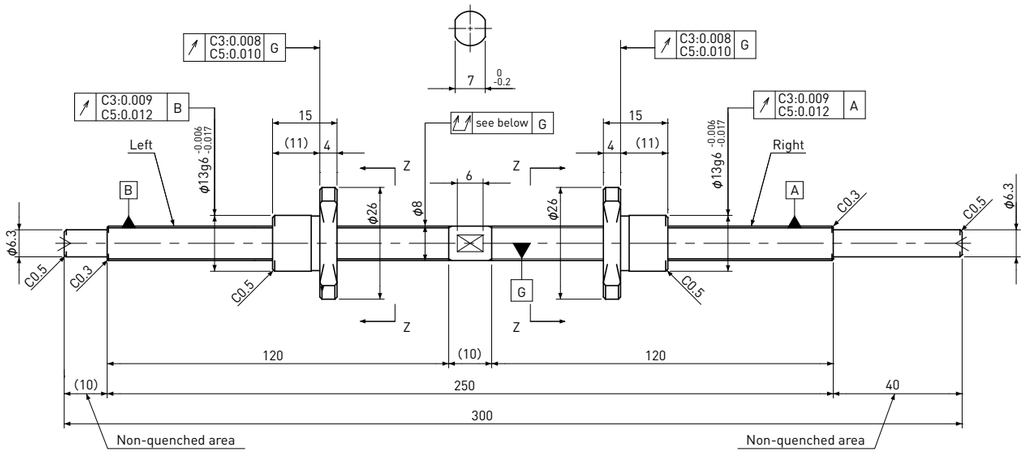
Unit:mm

Ball Screw Model	Travel	Grade	Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SD0601-80L80R210C3	65	C3	±0.008	0.008	0.050	0	～0.013	550	1000
SD0601-80L80R210C5	65	C5	±0.018	0.018	0.065	～0.005	—		

Note 1) Please designate end-journal profile with your sketch.
Note 2) Absolute position of both Nuts related to the Screw Shaft is not under the control.

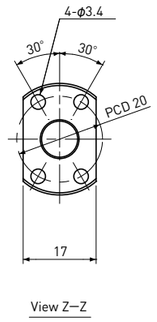
Standard products in stock SD series

SD0801 | Shaft dia.φ8 Lead 1mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ0.8
Number of thread	1
Thread direction	Left&Right
Shaft root dia.	φ7.3
Number of circuit	1×3
Shaft,Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil



View Z–Z

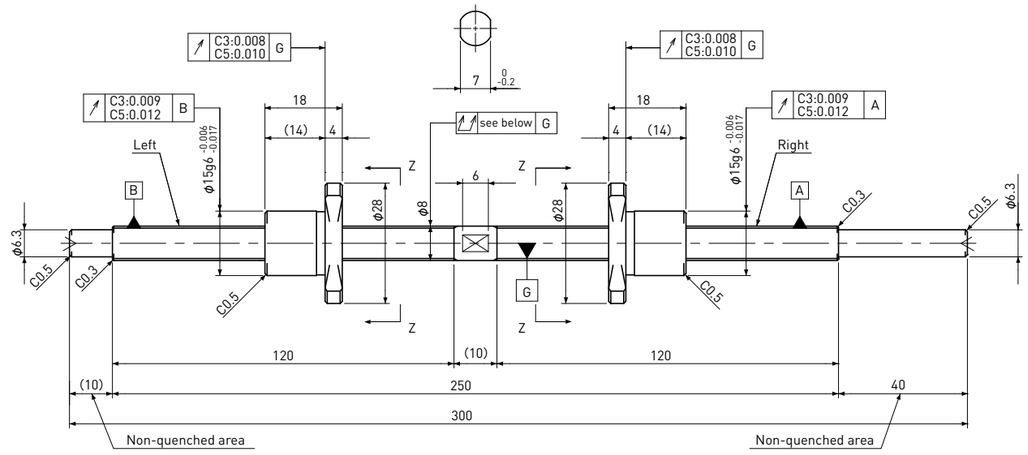
Unit:mm

Ball Screw Model	Travel	Grade	Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SD0801-120L120R300C3	105	C3	±0.010	0.008	0.050	0	～0.018	650	1300
SD0801-120L120R300C5	105	C5	±0.020	0.018	0.065	～0.005	—		

Note 1) Please designate end-journal profile with your sketch.
Note 2) Absolute position of both Nuts related to the Screw Shaft is not under the control.

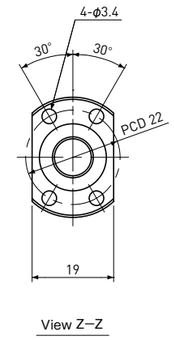
Standard products in stock SD series

SD0802 | Shaft dia.φ8 Lead 2mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ1.2
Number of thread	1
Thread direction	Left&Right
Shaft root dia.	φ7.0
Number of circuit	1×3
Shaft,Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil



View Z–Z

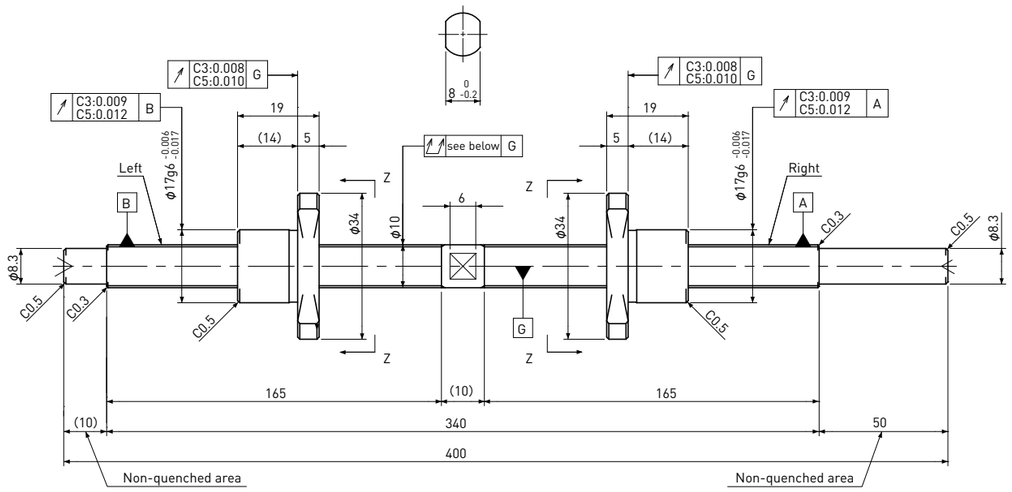
Unit:mm

Ball Screw Model	Travel	Grade	Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SD0802-120L120R300C3	100	C3	±0.010	0.008	0.050	0	～0.020	1300	2300
SD0802-120L120R300C5	100	C5	±0.020	0.018	0.065	～0.005	—		

Note 1) Please designate end-journal profile with your sketch.
Note 2) Absolute position of both Nuts related to the Screw Shaft is not under the control.

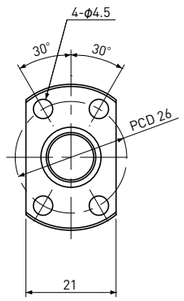
Standard products in stock SD series

SD1002 | Shaft dia.φ10 Lead 2mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ1.2
Number of thread	1
Thread direction	Left&Right
Shaft root dia.	φ9.0
Number of circuit	1×3
Shaft,Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil



View Z—Z

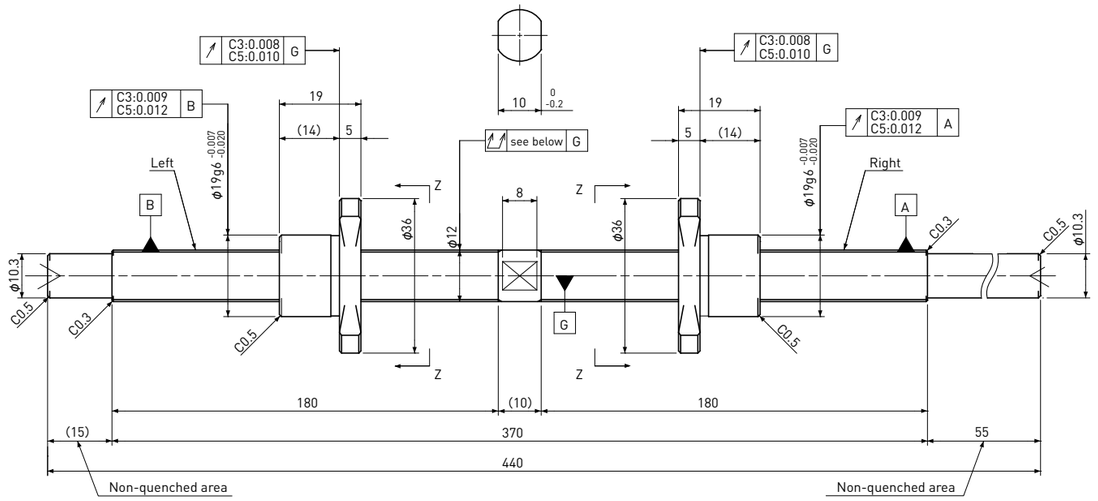
Unit:mm

Ball Screw Model	Travel	Grade	Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SD1002-165L165R400C3	145	C3	±0.010	0.008	0.050	0	～0.025	1450	3000
SD1002-165L165R400C5	145	C5	±0.020	0.018	0.065	～0.005	—		

Note 1) Please designate end-journal profile with your sketch.
Note 2) Absolute position of both Nuts related to the Screw Shaft is not under the control.

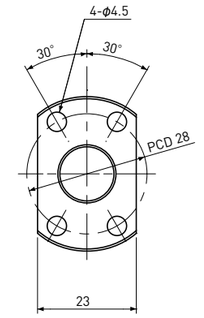
Standard products in stock SD series

SD1202 | Shaft dia.φ12 Lead 2mm | C3&C5



Unit:mm

Ball Screw Specifications	
Ball size	φ1.2
Number of thread	1
Thread direction	Left&Right
Shaft root dia.	φ11.0
Number of circuit	1×3
Shaft,Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil



View Z—Z
矢視 Z—Z

Unit:mm

Ball Screw Model	Travel	Grade	Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			Travel deviation e_p	Variation V_u				Dynamic Ca	Static Coa
SD1202-180L180R440C3	160	C3	±0.010	0.008	0.065	0	～0.035	1600	3700
SD1202-180L180R440C5	160	C5	±0.020	0.018	0.080	～0.005	—		

Note 1) Please designate end-journal profile with your sketch.
Note 2) Absolute position of both Nuts related to the Screw Shaft is not under the control.

SR/SSR series Standardized Rolled Ball Screws

Rolled Ball Screws with accuracy Ct7 and Ct10 are available in stock. It is suitable for low cost design.
Rolled Ball Screws with end-journal machining are available for short delivery.
Stainless Rolled Ball Screws are also available.

●Combination of Shaft nominal dia. & Lead

Unit : mm

Shaft dia. \ Lead	1	2	2.5	4	5	6	8	10	12	15	20
4	A247 A248	A249									
5				A250							
6	A251 A252 A281	A253				A254		A255			
8	A256 A257 A282	A258 A259 A283	A260		A261		A262	A263	A264		
10		A265 A266 A284		A267	A268			A269		A270	A271
12		A272 A273						A274			
14		A275		A276							
15					A277			A278			A279

Note 1) The models marked red are available for Stainless Rolled Ball Screws.
Note 2) The numbers in a table : showing a page in this catalogue.

●Model number notation

SR 06 01 K – 200 R 200 C7
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Rolled Ball Screws Series No.
SR : Rolled Ball Screws
SSR : Stainless Rolled Ball Screws
②Screw Shaft nominal diameter (mm)
③Lead (mm)
④Ball Nut type
None : Standard
K : Compact type
⑤Screw thread length (mm)
⑥Thread direction (R=Right-hand)
⑦Screw Shaft total length (mm)
⑧Accuracy grade (C7 or C10)

●Accuracy Grade & Axial play

Accuracy grade of SR series (Standardized Rolled Ball Screws) and SSR series (Standardized Stainless Rolled Ball Screws) are based on Ct7 and Ct10 (JIS B 1192-3). According to accuracy grade, Axial play 0.020mm or less (Ct7) and 0.050mm or less (Ct10) are in stock.

●Material & Surface hardness

Materials and Surface hardness of SR series (Standardized Rolled Ball Screws) and SSR series (Standardized Stainless Rolled Ball Screws) are as follows.

Products	Material	Heat treatment	Surface hardness
Rolled Ball Screws (SR series)	Shaft : SCM415 S55C SUJ2	Carburizing Induction Hardening Quench & Temper	HRC58 or more
	Nut : SCM415	Carburizing and Quenching	
Stainless Rolled Ball Screws (SSR series)	Shaft : SUS440C	Induction hardening	HRC55 or more
	Nut : SUS440C	Vacuum hardening	

●Lubrication

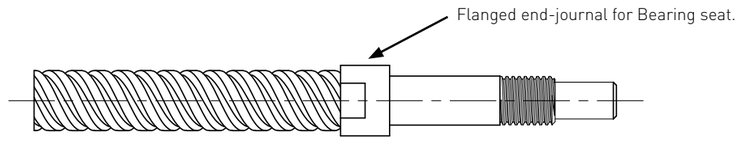
SR series (Standardized Rolled Ball Screws) and SSR series (Standardized Stainless Rolled Ball Screws) without end-journal machining are applied with anti-rust oil for rust prevention.
Anti-rust oil does not have lubricating function so that please apply the Grease or lubrication oil when using the Ball Screws.
If there is no specific instruction, KSS would recommend our original Grease (MSG No.2) as standard lubricant.
Please feel free to contact us.

●Precision Rolled Ball Screws

High accuracy (JIS C5) can be produced by Rolled process, what we call Precision Rolled Ball Screws (PSR/PSRT series). Please see page A319.

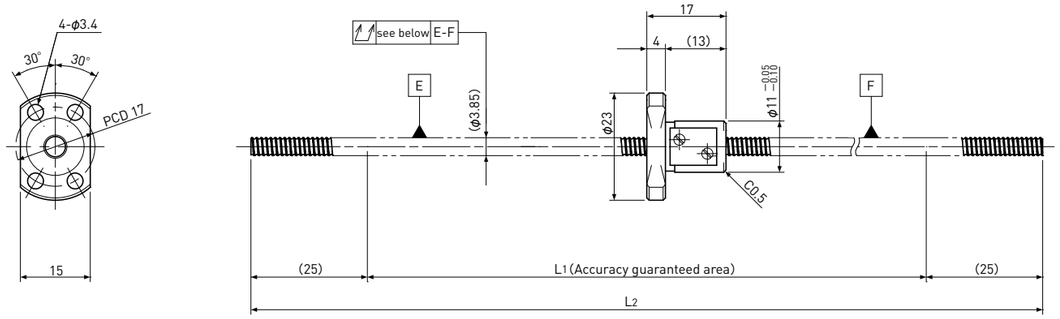
●Others

End-journal configuration of SR series (Standardized Rolled Ball Screws) and SSR series (Standardized stainless Rolled Ball Screws) are not standardized. When you request additional machining, please send us a drawing with end-journal profile.
Rolled Ball Screws with Integrated end-journal, which is bigger Bearing face than supported seat, are available (SRT/SSRT series) as shown below.
Please refer to page A285 or ask KSS.



Standard products in stock SR series

SR0401 | Shaft dia.ϕ4 Lead 1mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	ϕ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	ϕ3.3
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

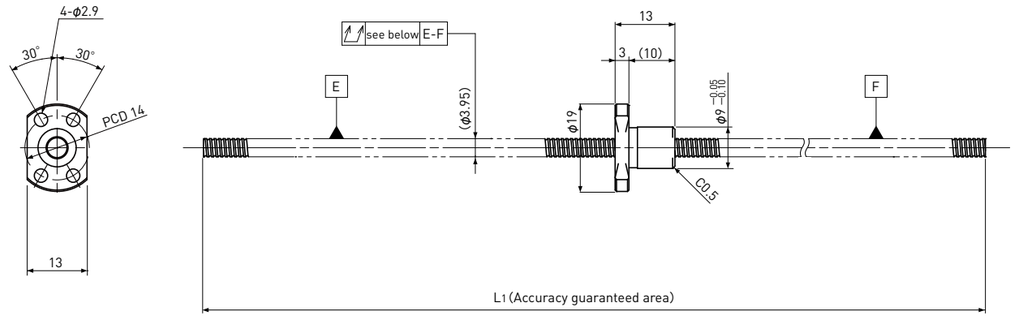
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0401-250R250C7	180	Ct7	200	250	±0.03	—	0.200	～0.020	—	560	790
SR0401-250R250C10	180	Ct10	200	250	±0.14	—	0.400	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0401K | Compact Nut Shaft dia.ϕ4 Lead 1mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications		
Ball size		ϕ0.6
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.4
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

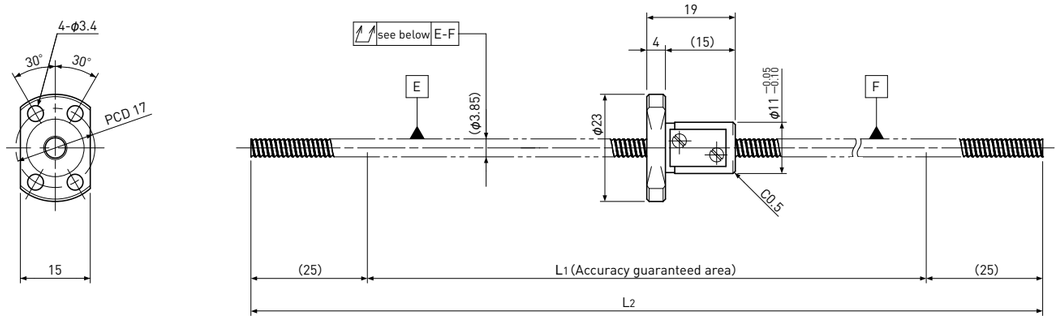
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0401K-100R100C7	80	Ct7	100	—	±0.02	—	0.080	～0.020	—	300	430
SR0401K-100R100C10	80	Ct10	100	—	±0.07	—	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0402 | Shaft dia.φ4 Lead 2mm | Ct7&Ct10



Unit:mm

Ball Screw Specifications	
Ball size	φ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	φ3.3
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit:mm

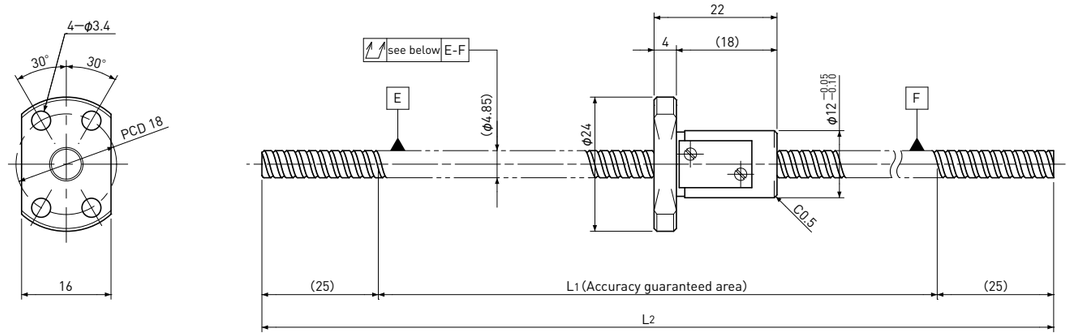
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0402-250R250C7	180	Ct7	200	250	±0.03	—	0.200	～0.020	—	420	570
SR0402-250R250C10	180	Ct10	200	250	±0.14	—	0.400	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR0504 | Shaft dia.φ5 Lead 4mm | Ct7&Ct10



Unit:mm

Ball Screw Specifications	
Ball size	φ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	φ4.3
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit:mm

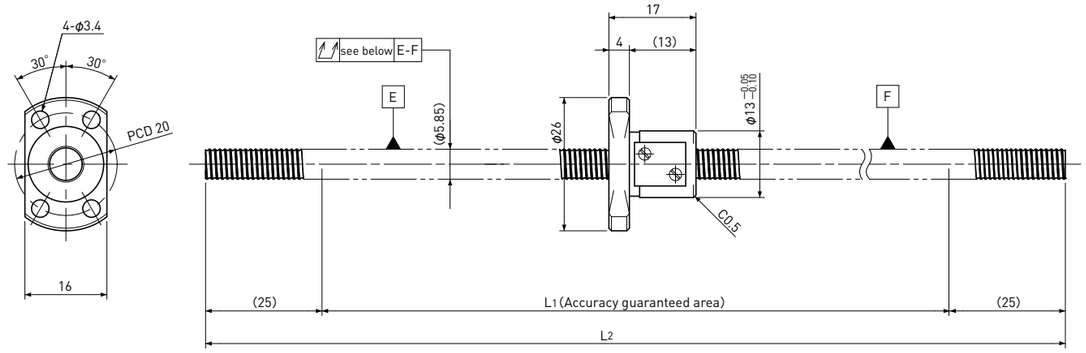
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0504-250R250C7	175	Ct7	200	250	±0.03	—	0.120	～0.020	—	470	720
SR0504-250R250C10	175	Ct10	200	250	±0.14	—	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0601 | Shaft dia.φ6 Lead 1mm | Ct7&Ct10

＊Please refer to page A281 for stainless steel type.



Unit：mm

Ball Screw Specifications	
Ball size	φ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	φ5.3
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

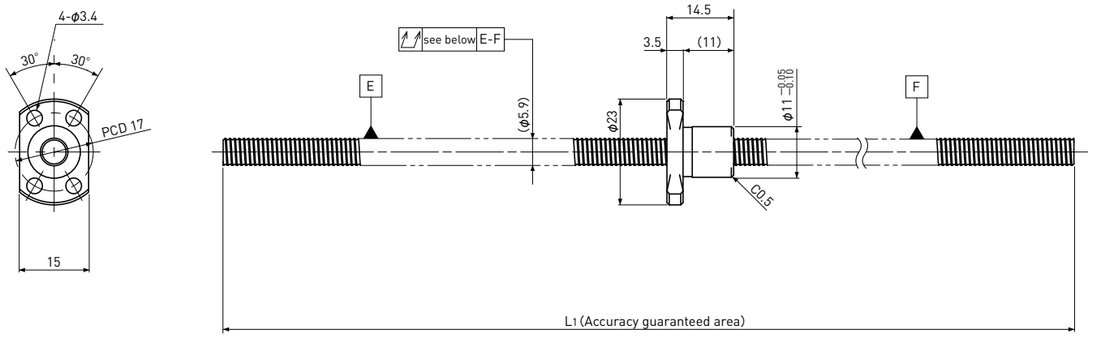
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0601-300R300C7	230	Ct7	250	300	±0.04	—	0.120	～0.020	—	680	1200
SR0601-300R300C10	230	Ct10	250	300	±0.17	—	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0601K | Compact Nut | Shaft dia.φ6 Lead 1mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ5.3
Number of circuit		1×3
material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

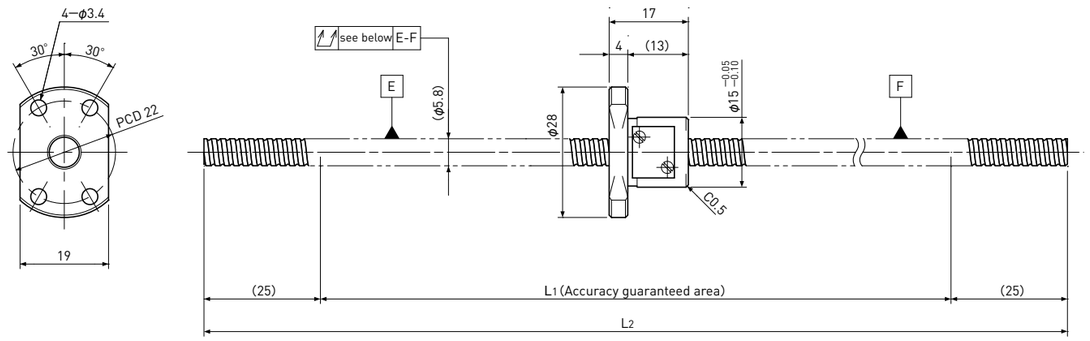
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0601K-200R200C7	175	Ct7	200	—	±0.03	—	0.080	～0.020	—	560	950
SR0601K-200R200C10	175	Ct10	200	—	±0.14	—	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0602 | Shaft dia.φ6 Lead 2mm | Ct7&Ct10



Unit:mm

Ball Screw Specifications	
Ball size	φ1.0
Number of thread	1
Thread direction	Right
Shaft root dia.	φ5.1
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit:mm

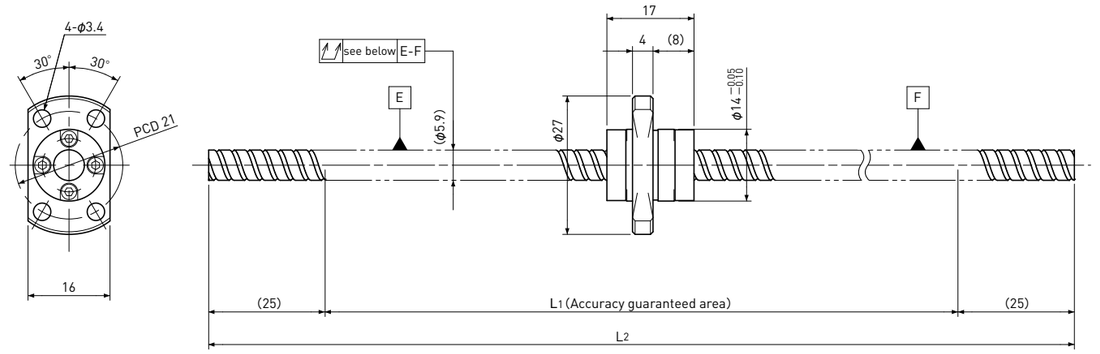
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0602-300R300C7	230	Ct7	250	300	±0.04	—	0.120	～0.020	—	750	1200
SR0602-300R300C10	230	Ct10	250	300	±0.17	—	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Ball Screw
Standard products in stock SR series

Standard products in stock SR series

SR0606 | Shaft dia.φ6 Lead 6mm | Ct7&Ct10



Unit:mm

Ball Screw Specifications	
Ball size	φ1.0
Number of thread	2
Thread direction	Right
Shaft root dia.	φ5.2
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

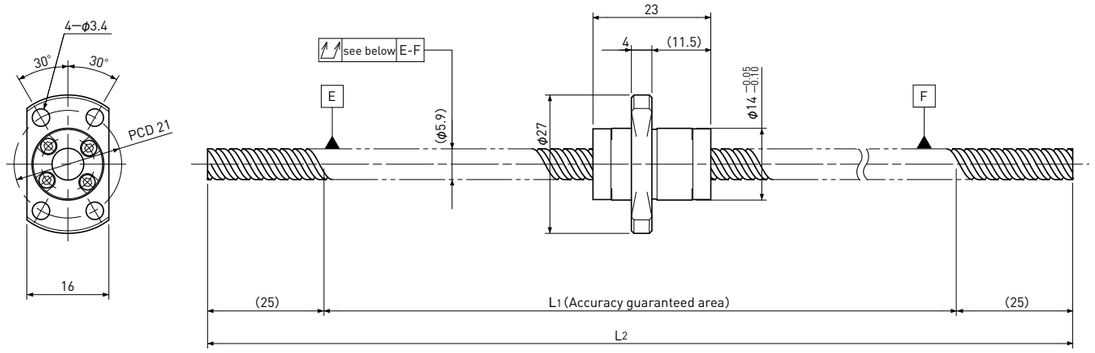
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0606-300R300C7	230	Ct7	250	300	±0.04	—	0.120	～0.020	—	870	1450
SR0606-300R300C10	230	Ct10	250	300	±0.17	—	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0610 | Shaft dia.φ6 Lead 10mm | Ct7&Ct10



Unit:mm

Ball Screw Specifications	
Ball size	φ1.2
Number of thread	2
Thread direction	Right
Shaft root dia.	φ5.0
Number of circuit	1.2×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit:mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0610-300R300C7	225	Ct7	250	300	±0.04	—	0.120	～0.020	—	950	1600
SR0610-300R300C10	225	Ct10	250	300	±0.17	—	0.240	～0.050			

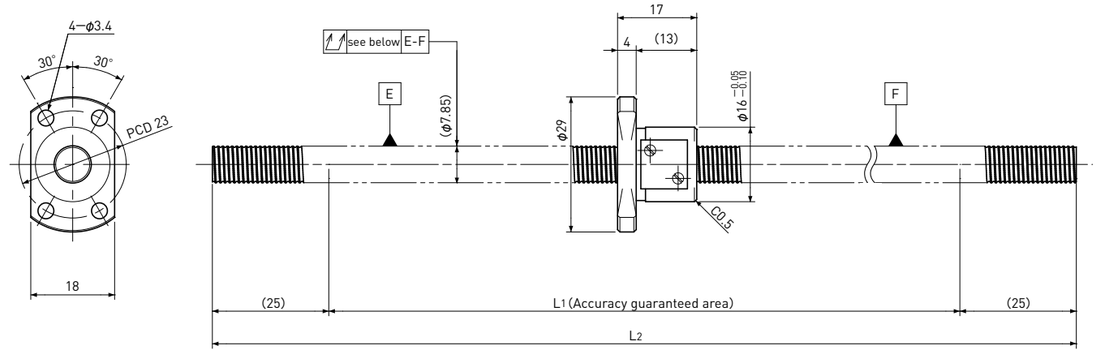
Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR0801 | Shaft dia.φ8 Lead 1mm | Ct7&Ct10

＊Please refer to page A282 for stainless steel type.



Unit:mm

Ball Screw Specifications	
Ball size	φ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	φ7.3
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit:mm

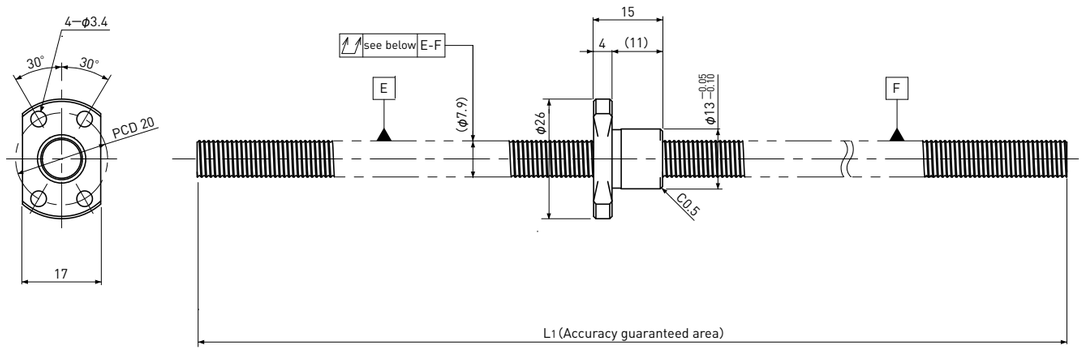
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0801-400R400C7	330	Ct7	350	400	±0.06	0.05	0.120	～0.020	—	780	1650
SR0801-400R400C10	330	Ct10	350	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0801K | Compact Nut | Ct7&Ct10

Shaft dia.φ8 Lead 1mm



Unit:mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.3
Number of circuit		1×3
material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

Unit:mm

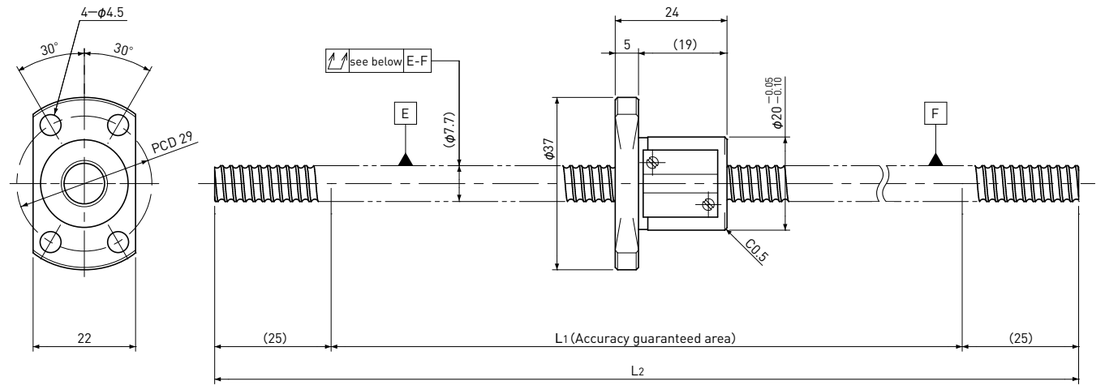
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0801K-230R230C7	200	Ct7	230	—	±0.03	—	0.080	～0.020	—	650	1300
SR0801K-230R230C10	200	Ct10	230	—	±0.16	—	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0802 | Shaft dia.φ8 Lead 2mm | Ct7&Ct10

＊Please refer to page A283 for stainless steel type.



Unit:mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ6.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit:mm

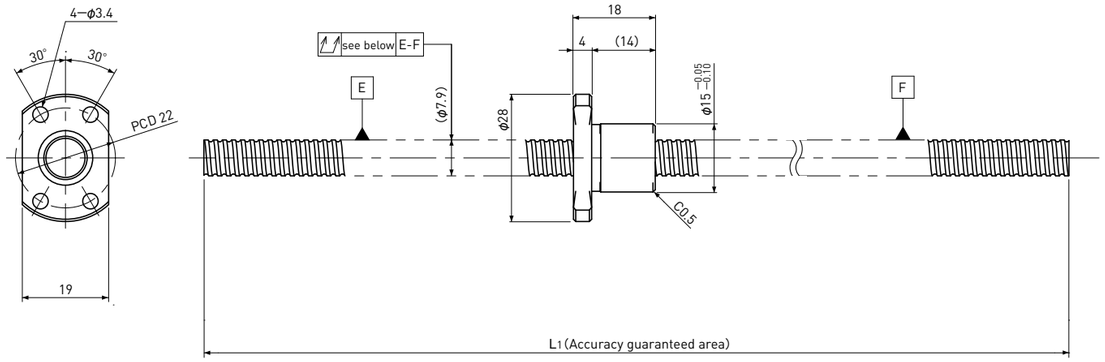
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0802-400R400C7	325	Ct7	350	400	±0.06	0.05	0.120	～0.020	—	2400	4100
SR0802-400R400C10	325	Ct10	350	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0802K | Compact Nut | Ct7&Ct10

Shaft dia.φ8 Lead 2mm



Unit：mm

Ball Screw Specifications	
Ball size	φ1.2
Number of thread	1
Thread direction	Right
Shaft root dia.	φ7.0
Number of circuit	1×3
Material — Shaft	S55C
Material — Nut	SCM415H
Surface hardness	HRC58～ (Thread area)
Anti-rust treatment	Anti-rust oil

Unit：mm

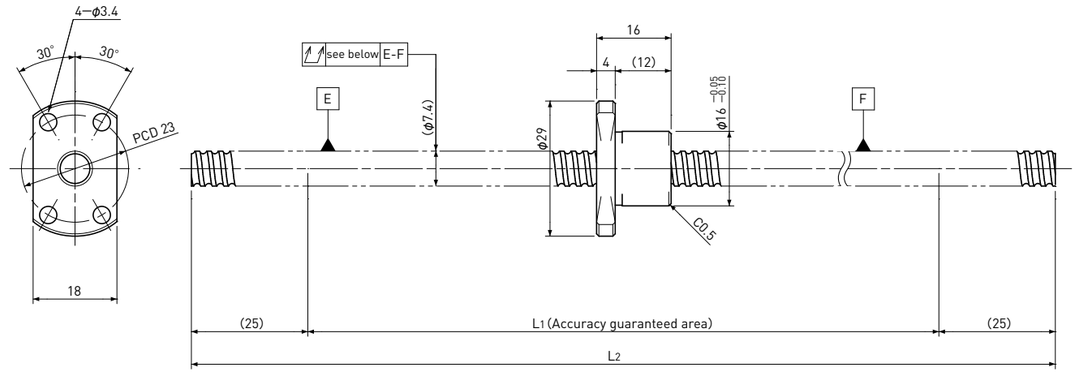
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0802K-230R230C7	200	Ct7	230	—	±0.03	—	0.080	～0.020	—	1300	2300
SR0802K-230R230C10	200	Ct10	230	—	±0.16	—	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Ball Screw
Standard products in stock SR/SS series

Standard products in stock SR series

SR0802.5 | Shaft dia.φ8 Lead 2.5mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ6.3
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

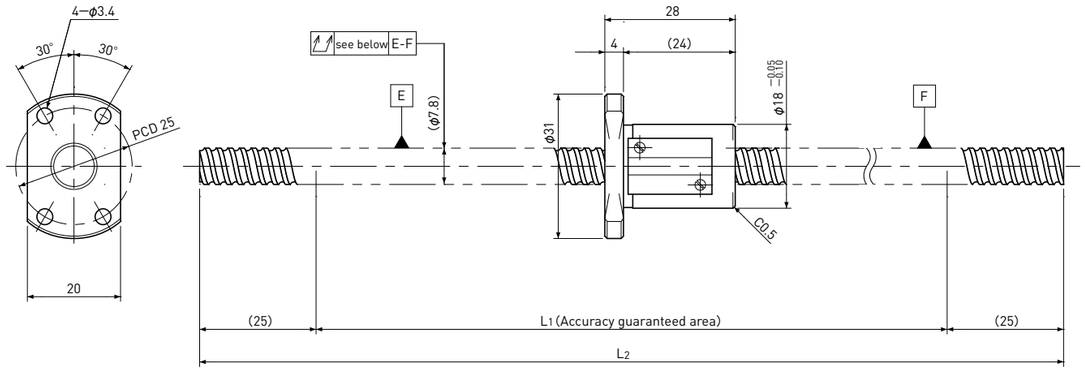
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0802.5-400R400C7	330	Ct7	350	400	±0.06	0.05	0.120	～0.020	—	1850	3000
SR0802.5-400R400C10	330	Ct10	350	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0805 | Shaft dia.φ8 Lead 5mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ6.6
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit : mm

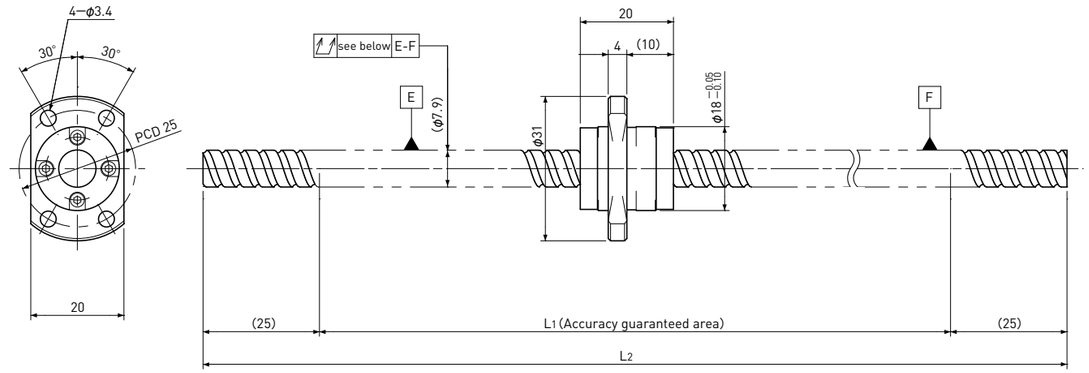
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0805-400R400C7	320	Ct7	350	400	±0.06	0.05	0.120	～0.020	—	1850	3000
SR0805-400R400C10	320	Ct10	350	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR0808 | Shaft dia.φ8 Lead 8mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	2
Thread direction	Right
Shaft root dia.	φ6.7
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

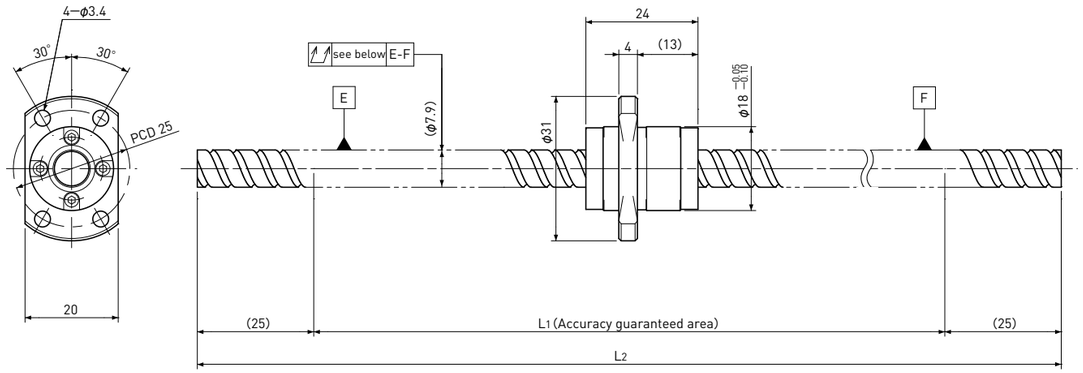
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0808-400R400C7	330	Ct7	350	400	±0.06	0.05	0.120	～0.020	—	2200	3800
SR0808-400R400C10	330	Ct10	350	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0810 | Shaft dia.φ8 Lead 10mm | Ct7&Ct10



Unit:mm

Ball Screw Specifications

Ball size	φ1.5875
Number of thread	2
Thread direction	Right
Shaft root dia.	φ6.7
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

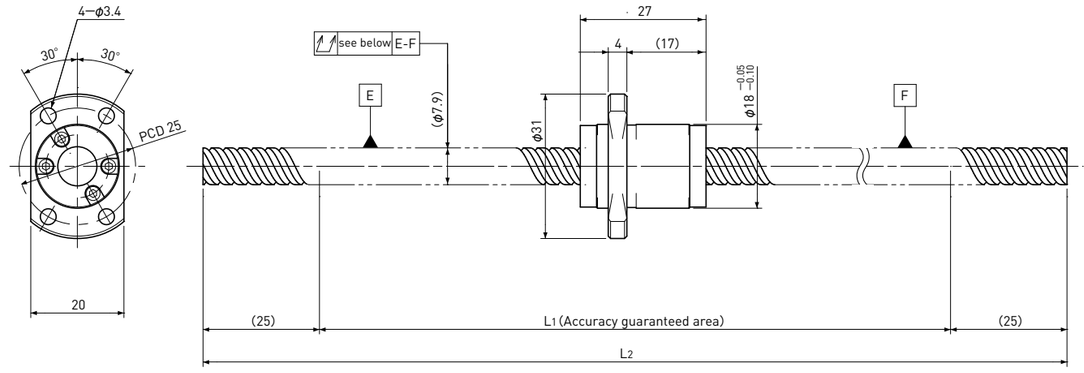
Unit:mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0810-400R400C7	325	Ct7	350	400	±0.06	0.05	0.120	～0.020	—	2200	3800
SR0810-400R400C10	325	Ct10	350	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR0812 | Shaft dia.φ8 Lead 12mm | Ct7&Ct10



Unit:mm

Ball Screw Specifications

Ball size	φ1.5875
Number of thread	2
Thread direction	Right
Shaft root dia.	φ6.7
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit:mm

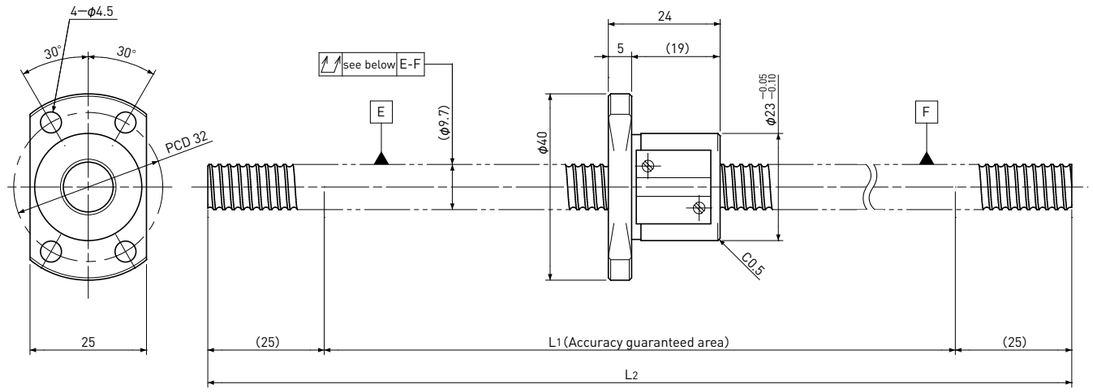
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR0812-400R400C7	320	Ct7	350	400	±0.06	0.05	0.120	～0.020	—	2200	4000
SR0812-400R400C10	320	Ct10	350	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1002 | Shaft dia.φ10 Lead 2mm | Ct7&Ct10

＊Please refer to page A284 for stainless steel type.



Unit：mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ8.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

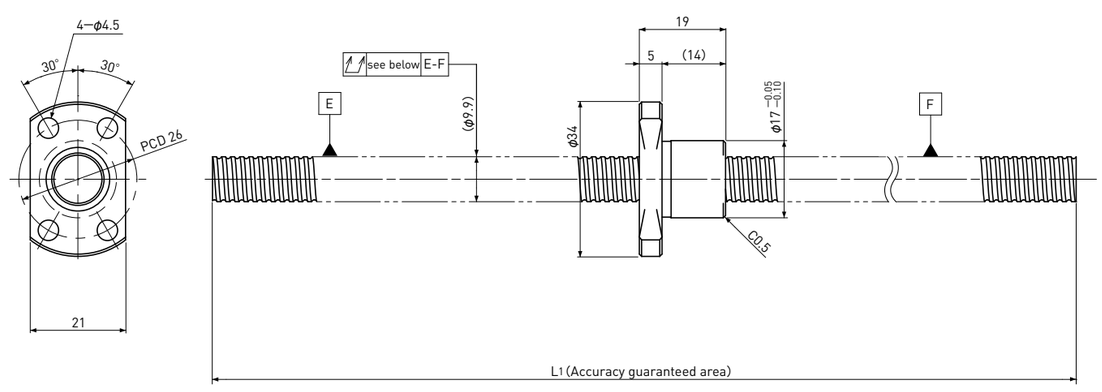
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1002-400R400C7	325	Ct7	350	400	±0.05	0.05	0.080	～0.020	—	2700	5300
SR1002-400R400C10	325	Ct10	350	400	±0.24	0.21	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1002K | Compact Nut | Shaft dia.φ10 Lead 2mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ9.0
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

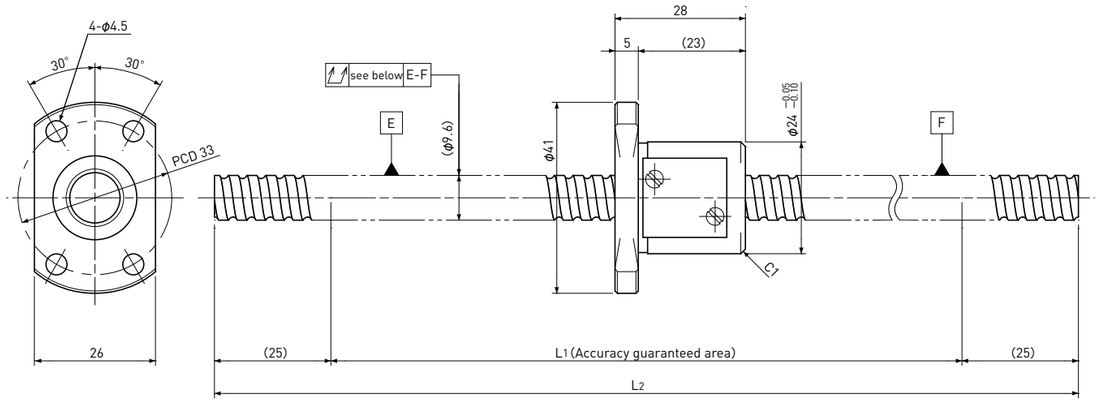
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1002K-230R230C7	200	Ct7	230	—	±0.03	—	0.080	～0.020	—	1450	3000
SR1002K-230R230C10	200	Ct10	230	—	±0.16	—	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1004 | Shaft dia.φ10 Lead 4mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ2.0
Number of thread	1
Thread direction	Right
Shaft root dia.	φ8.2
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit : mm

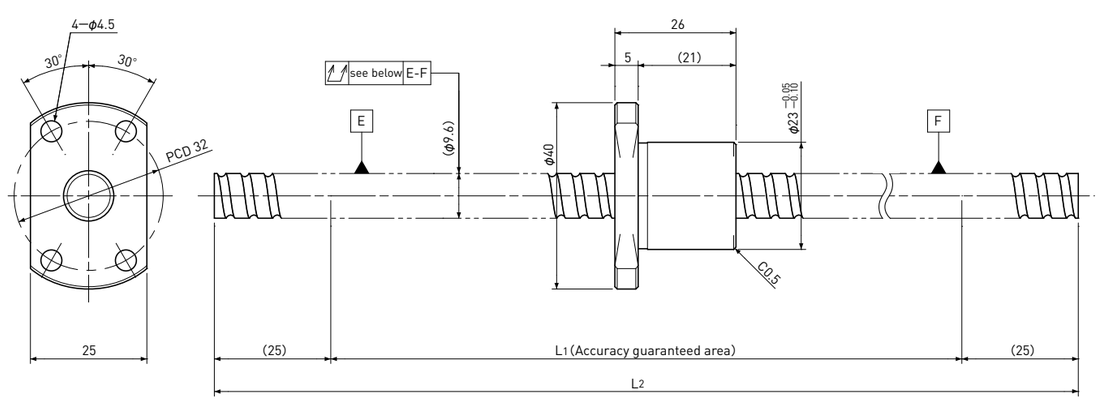
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1004-450R450C7	370	Ct7	400	450	±0.06	0.05	0.120	～0.020	—	3000	5200
SR1004-450R450C10	370	Ct10	400	450	±0.28	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR1005 | Shaft dia.φ10 Lead 5mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ2.0
Number of thread	1
Thread direction	Right
Shaft root dia.	φ8.2
Number of circuit	2.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

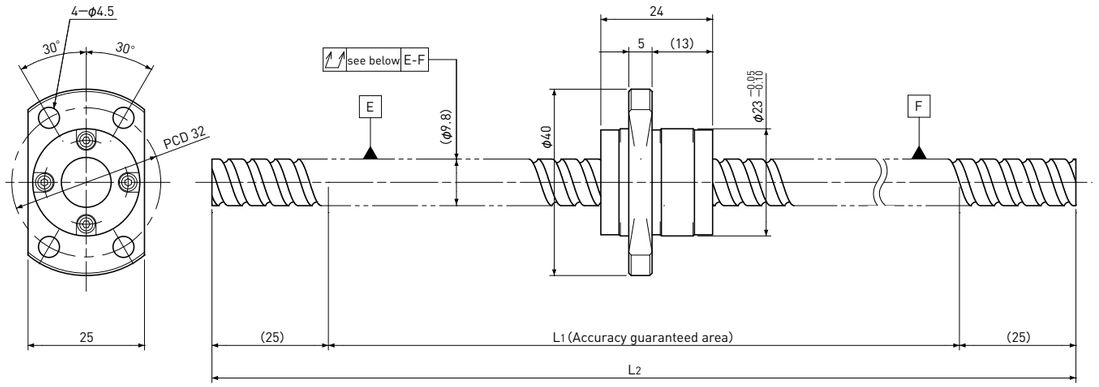
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1005-450R450C7	370	Ct7	400	450	±0.06	0.05	0.120	～0.020	—	3000	5200
SR1005-450R450C10	370	Ct10	400	450	±0.28	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1010 | Shaft dia.φ10 Lead 10mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ2.0
Number of thread	2
Thread direction	Right
Shaft root dia.	φ8.4
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

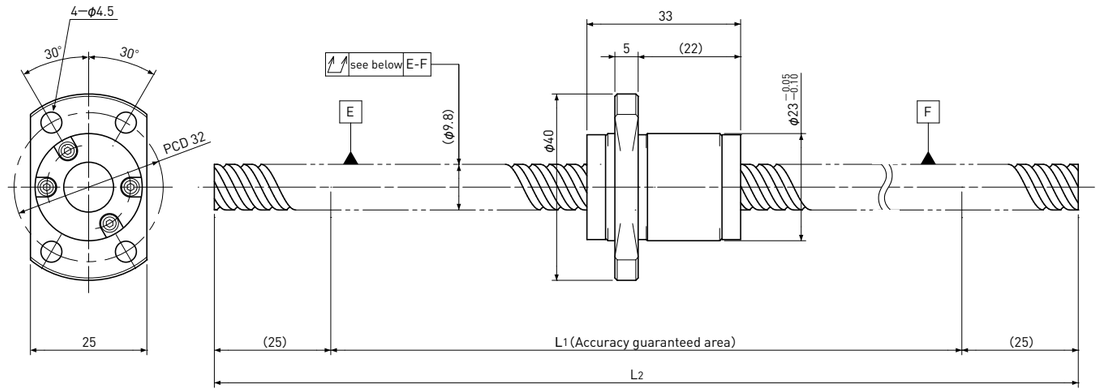
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1010-450R450C7	375	Ct7	400	450	±0.06	0.05	0.120	～0.020	—	3300	5900
SR1010-450R450C10	375	Ct10	400	450	±0.28	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1015 | Shaft dia.φ10 Lead 15mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ2.0
Number of thread	2
Thread direction	Right
Shaft root dia.	φ8.4
Number of circuit	1.6×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

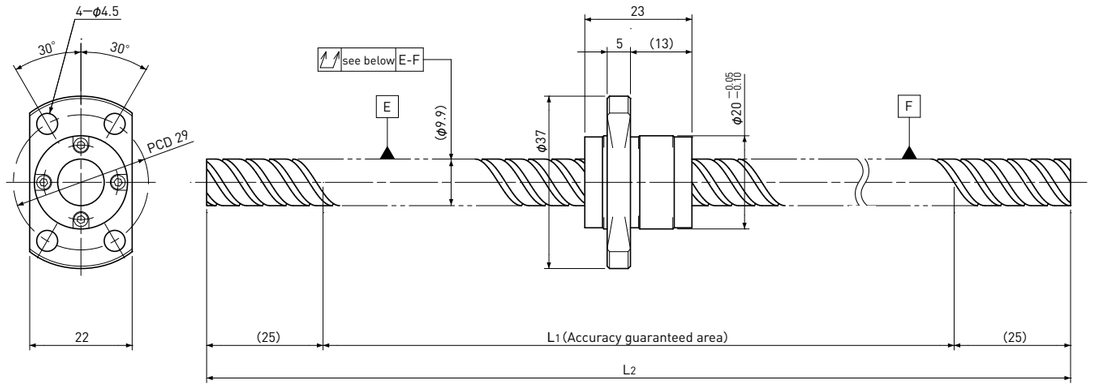
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1015-450R450C7	365	Ct7	400	450	±0.06	0.05	0.120	～0.020	—	3300	6400
SR1015-450R450C10	365	Ct10	400	450	±0.28	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1020 | Shaft dia.φ10 Lead 20mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications

Ball size	φ1.5875
Number of thread	4
Thread direction	Right
Shaft root dia.	φ8.7
Number of circuit	0.7×4
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit：mm

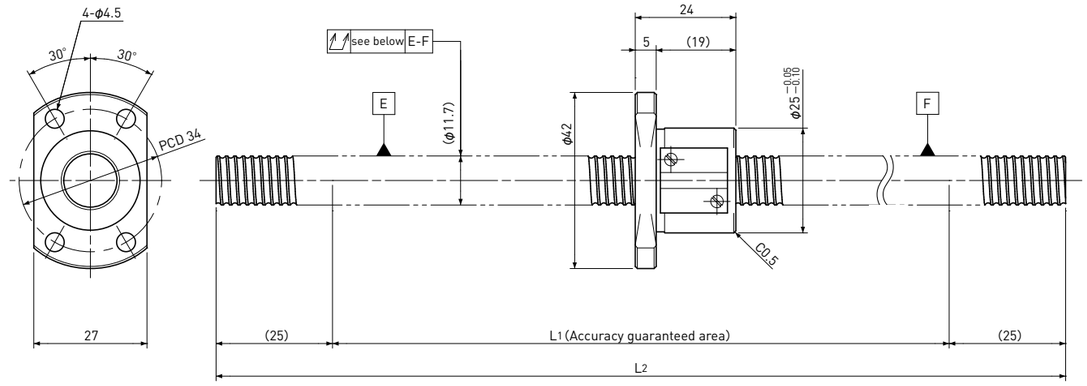
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1020-450R450C7	375	Ct7	400	450	±0.06	0.05	0.120	～0.020	—	2100	4000
SR1020-450R450C10	375	Ct10	400	450	±0.28	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR1202 | Shaft dia.φ12 Lead 2mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications

Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ10.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

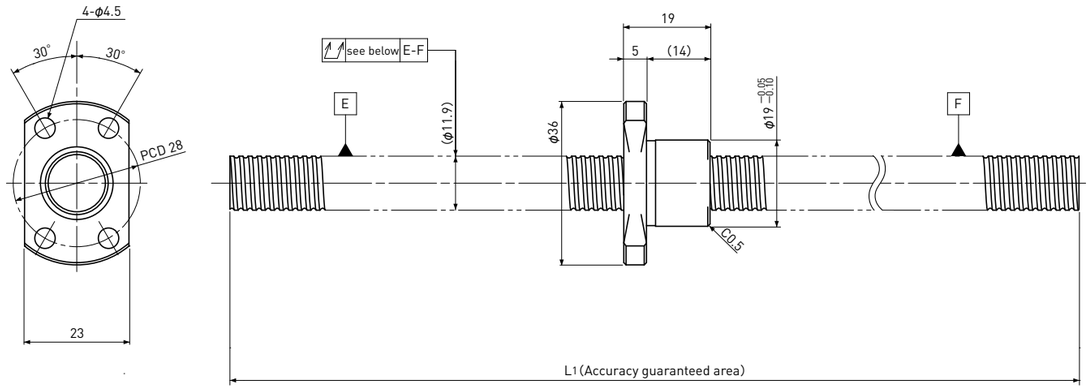
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1202-450R450C7	375	Ct7	400	450	±0.06	0.05	0.080	～0.020	—	3000	6400
SR1202-450R450C10	375	Ct10	400	450	±0.28	0.21	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1202K | Compact Nut | Shaft dia.φ12 Lead 2mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications

Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ11.0
Number of circuit		1×3
material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

Unit : mm

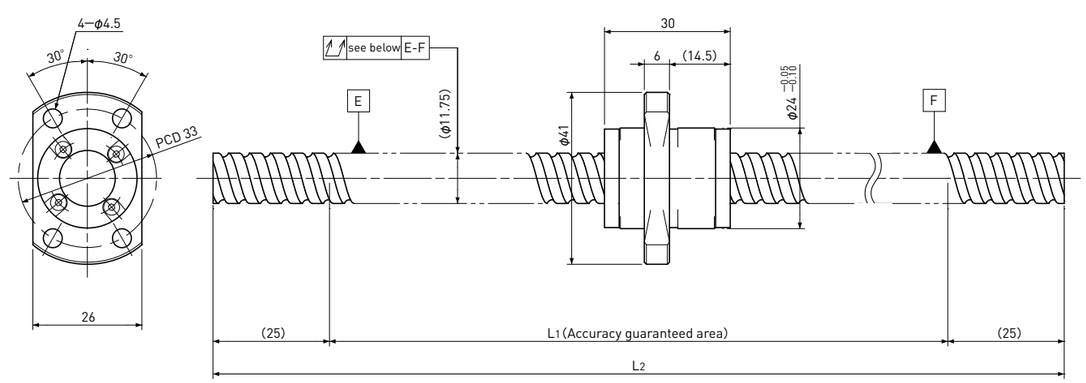
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1202K-280R280C7	250	Ct7	280	—	±0.04	—	0.080	～0.020	—	1600	3700
SR1202K-280R280C10	250	Ct10	280	—	±0.19	—	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR1210 | Shaft dia.φ12 Lead 10mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications

Ball size	φ2.381
Number of thread	2
Thread direction	Right
Shaft root dia.	φ10.2
Number of circuit	1.7×2
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

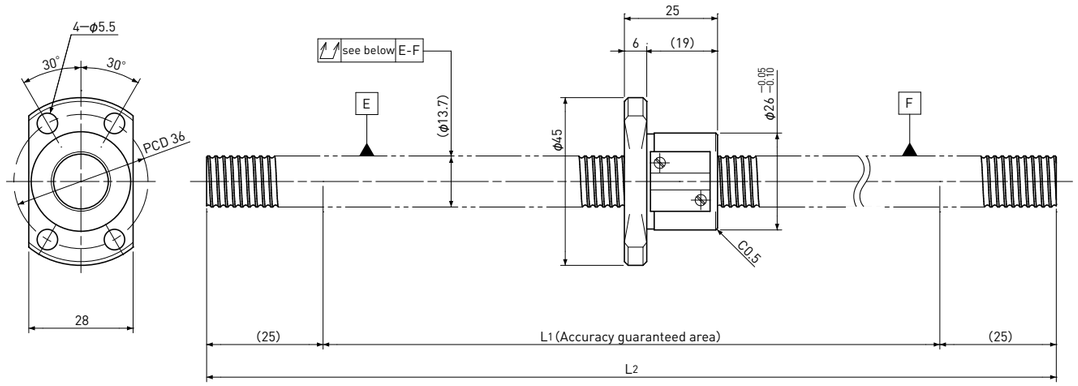
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1210-450R450C7	370	Ct7	400	450	±0.06	0.05	0.080	～0.020	—	5100	9800
SR1210-450R450C10	370	Ct10	400	450	±0.28	0.21	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1402 | Shaft dia.φ14 Lead 2mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ12.6
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

Unit : mm

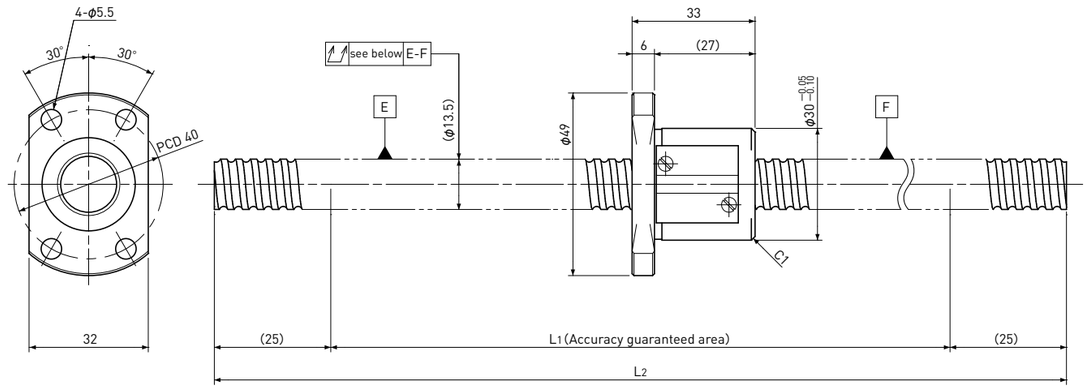
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1402-500R500C7	425	Ct7	450	500	±0.07	0.05	0.080	～0.020	—	3200	7500
SR1402-500R500C10	425	Ct10	450	500	±0.31	0.21	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR1404 | Shaft dia.φ14 Lead 4mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications	
Ball size	φ2.381
Number of thread	1
Thread direction	Right
Shaft root dia.	φ11.8
Number of circuit	3.7×1
Shaft, Nut material	SCM415H
Surface hardness	HRC58～62 (Thread area)
Anti-rust treatment	Anti-rust oil

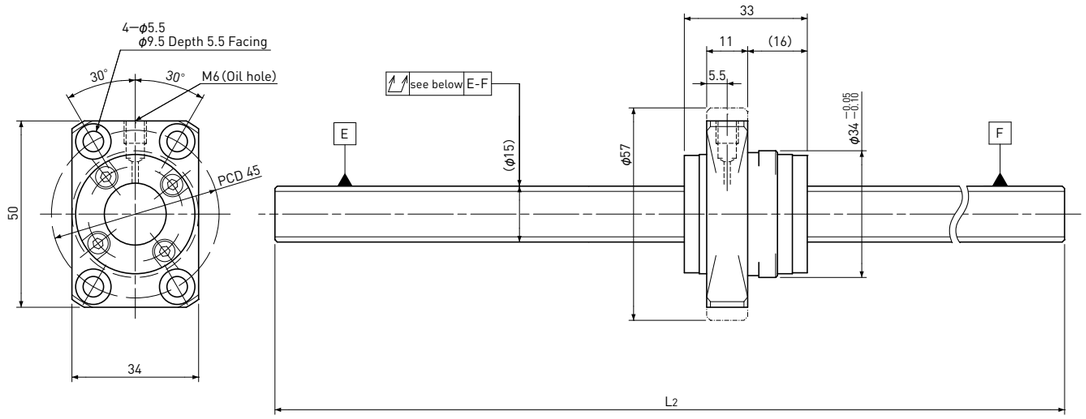
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1404-500R500C7	415	Ct7	450	500	±0.07	0.05	0.080	～0.020	—	5700	11600
SR1404-500R500C10	415	Ct10	450	500	±0.31	0.21	0.160	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1505 | Shaft dia.φ15 Lead 5mm | Ct10



Unit : mm

Ball Screw Specifications		
Ball size		φ3.175
Number of thread		1
Thread direction		Right
Shaft root dia.		φ12.2
Number of circuit		3.7×1
Material	Shaft	SUJ2
	Nut	SCM415
Surface hardness		HRC58～62 (Thread area)
Anti-rust treatment		Anti-rust oil

Unit : mm

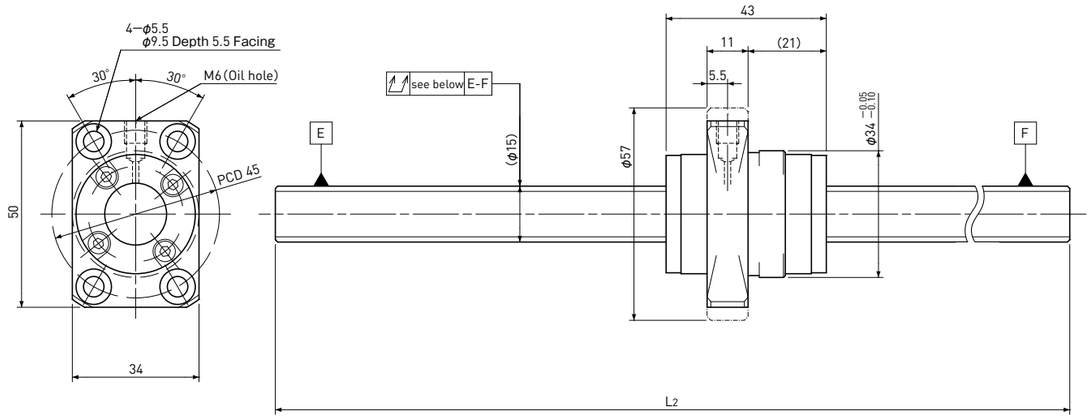
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1505-1000R1000C10	965	Ct10	—	1000	±0.7	0.21	0.400	～0.050	—	8900	17000

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

Standard products in stock SR series

SR1510 | Shaft dia.φ15 Lead 10mm | Ct10



Unit : mm

Ball Screw Specifications		
Ball size		φ3.175
Number of thread		2
Thread direction		Right
Shaft root dia.		φ12.2
Number of circuit		2.7×2
Material	Shaft	SUJ2
	Nut	SCM415
Surface hardness		HRC58～62 (Thread area)
Anti-rust treatment		Anti-rust oil

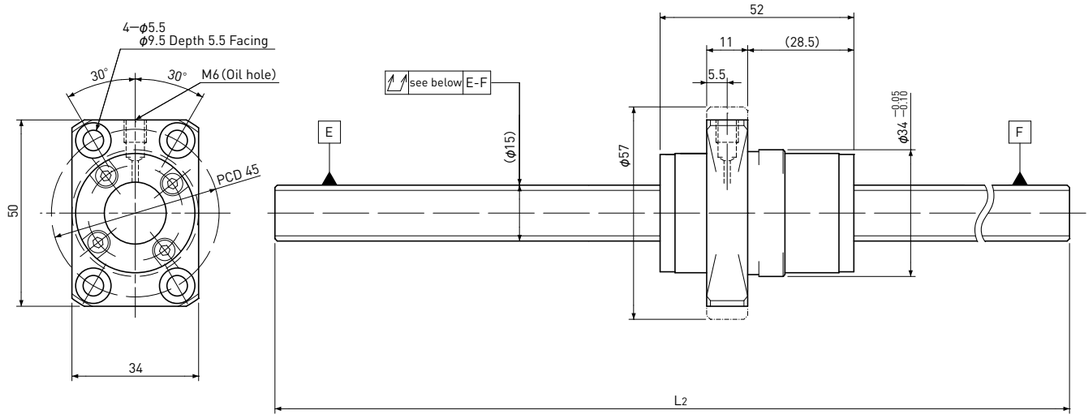
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SR1510-1000R1000C10	955	Ct10	—	1000	±0.7	0.21	0.400	～0.050	—	12000	25000

Note) Please designate end-journal profile with your sketch.

Standard products in stock SR series

SR1520 | Shaft dia.φ15 Lead 20mm | Ct10



Unit : mm

Ball Screw Specifications		
Ball size		φ3.175
Number of thread		2
Thread direction		Right
Shaft root dia.		φ12.7
Number of circuit		1.7×2
Material	Shaft	SUJ2
	Nut	SCM415
Surface hardness		HRC58～62 (Thread area)
Anti-rust treatment		Anti-rust oil

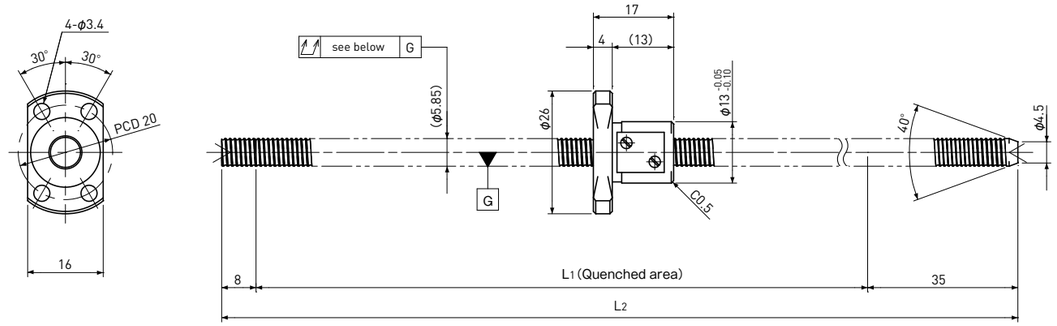
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_p	Variation V_{300}				Dynamic Ca	Static Coa
SR1520-1000R1000C10	945	Ct10	—	1000	±0.7	0.21	0.400	～0.050	—	8000	16000

Note) Please designate end-journal profile with your sketch.

Standard products in stock SSR series

SSR0601 | Stainless Shaft dia.φ6 Lead 1mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications

Ball size	φ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	φ5.3
Number of circuit	3.7×1
Shaft,Nut material	SUS440C
Surface hardness	HRC55～ (Thread area)
Anti-rust treatment	Anti-rust oil

Unit：mm

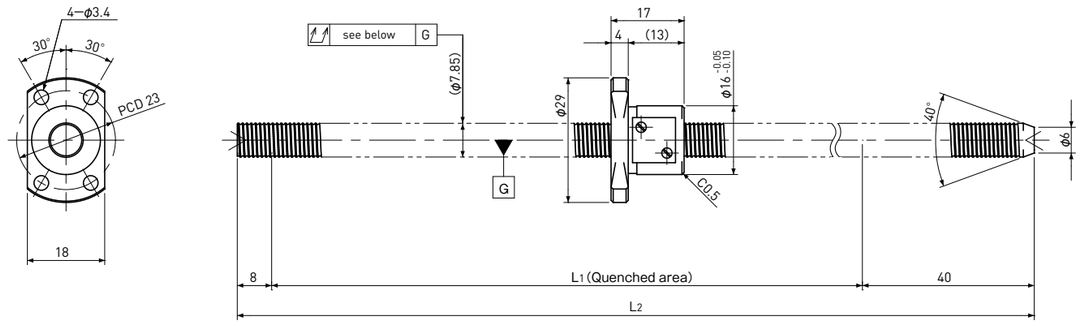
Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SSR0601-300C7	240	Ct7	257	300	±0.04	—	0.120	～0.020	—	560	900
SSR0601-300C10	240	Ct10	257	300	±0.17	—	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Ball Screw
Standard products in stock SR/SS series

Standard products in stock SSR series

SSR0801 | Stainless Shaft dia.φ8 Lead 1mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications

Ball size	φ0.8
Number of thread	1
Thread direction	Right
Shaft root dia.	φ7.3
Number of circuit	3.7×1
Shaft,Nut material	SUS440C
Surface hardness	HRC55～ (Thread area)
Anti-rust treatment	Anti-rust oil

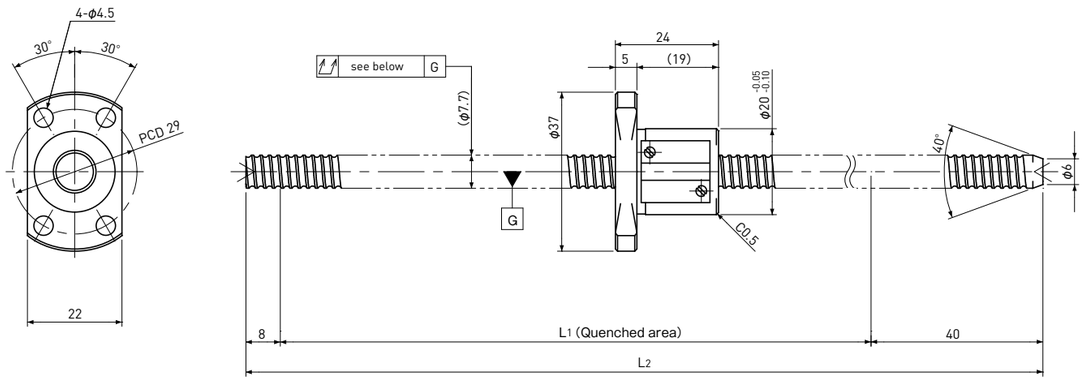
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SSR0801-400C7	335	Ct7	352	400	±0.06	0.05	0.120	～0.020	—	630	1250
SSR0801-400C10	335	Ct10	352	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SSR series

SSR0802 | Stainless Shaft dia.φ8 Lead 2mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications

Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ6.6
Number of circuit	3.7×1
Shaft,Nut material	SUS440C
Surface hardness	HRC55～ (Thread area)
Anti-rust treatment	Anti-rust oil

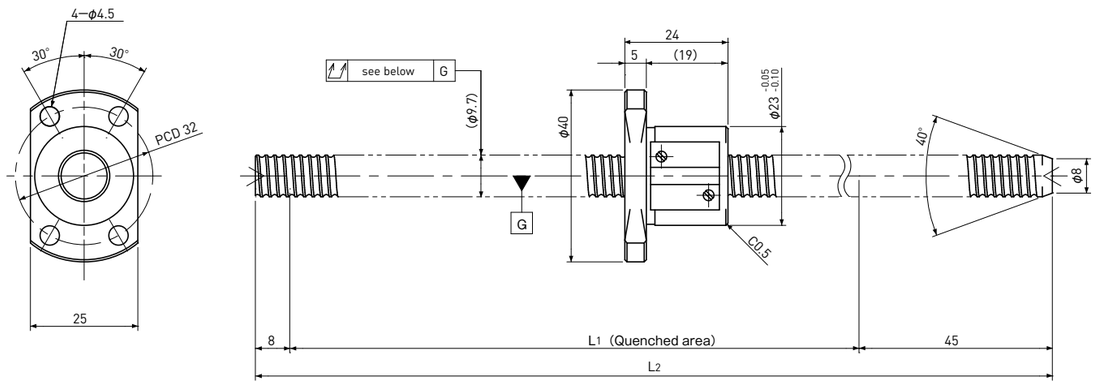
Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SSR0802-400C7	325	Ct7	352	400	±0.06	0.05	0.120	～0.020	—	1950	3100
SSR0802-400C10	325	Ct10	352	400	±0.24	0.21	0.240	～0.050			

Note) Please designate end-journal profile with your sketch.

Standard products in stock SSR series

SSR1002 | Stainless Shaft dia.φ10 Lead 2mm | Ct7&Ct10



Unit：mm

Ball Screw Specifications

Ball size	φ1.5875
Number of thread	1
Thread direction	Right
Shaft root dia.	φ8.6
Number of circuit	3.7×1
Shaft,Nut material	SUS440C
Surface hardness	HRC55～ (Thread area)
Anti-rust treatment	Anti-rust oil

Unit：mm

Ball Screw Model	Travel	Grade	Shaft length		Lead accuracy		Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N	
			L_1	L_2	Travel deviation e_P	Variation V_{300}				Dynamic Ca	Static Coa
SSR1002-400C7	320	Ct7	347	400	±0.06	0.05	0.080	～0.020	—	2200	4000
SSR1002-400C10	320	Ct10	347	400	±0.24	0.21	0.160	～0.050			

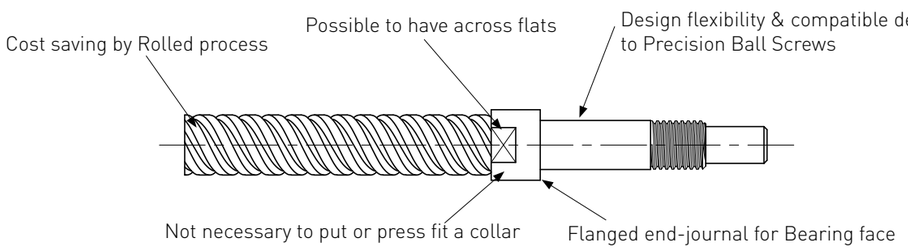
Note) Please designate end-journal profile with your sketch.

SRT/SSRT series
Standardized Rolled Ball Screws with Integrated end-journal

For production reason, Rolled Ball Screws are normally necessary to have smaller end-journal, but as KSS has adopted special technology, it enables fixed end-journal bigger than Shaft diameter alike Ground Ball Screws. This technology enables stable and more flexible on end-journal design.

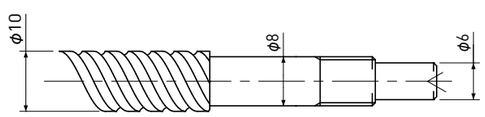
●Features

- Design flexibility and wide use of Bearings on end-journal.
- Compatible end-journal to Precision Ball Screws.
- No need to insert or press fit collar as Bearing shoulder.
- Quick delivery due to unfinished end-journal stock.
- Stainless Rolled Ball Screws are also available.

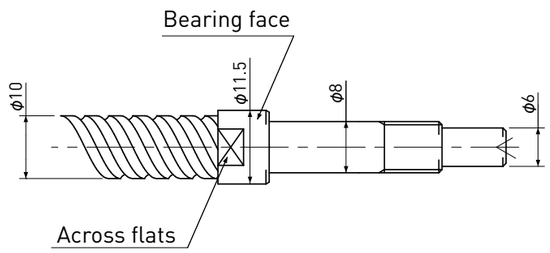


●Comparison with current model

***Shaft nominal diameter : ϕ10mm



Current model design



New model design

●Combination of Shaft nominal dia. & Lead

Unit : mm

Shaft dia. \ Lead	1	2	2.5	4	5	6	8	10	12	15	20
4	A289 A290	A291									
5				A292							
6	A293 A294 A315	A295				A296		A297			
8	A298 A299 A316	A300 A301 A317	A302		A303		A304		A305		
10		A306 A307 A318			A308			A309		A310	A311
12		A312 A313						A314			

Note 1) Yellow cells are available for Stainless Shaft and Nut.
Note 2) The numbers in a table : showing a page in this catalogue

●Accuracy Grade & Axial play

The grade of SRT/SSRT series (Standardized Rolled & Stainless Rolled Ball Screws with Integrated end-journal) are Ct7 and Ct10(JIS B 1192-3).
According to accuracy grade, Axial play 0.020mm or less (Ct7) and 0.050mm or less(Ct10) are in stock.

●Material & Surface hardness

The material and hardness of SRT/SSRT series (Standardized Rolled & Stainless Rolled Ball Screws with Integrated end-journal) are as follows.

Products	Material of thread area	Heat treatment	Surface hardness
Rolled Ball Screws (SRT series)	Shaft : SCM415 S55C	Carburizing and Quenching Induction hardening	HRC58 or more
	Nut : SCM415		
Stainless Rolled Ball Screws (SSRT series)	Shaft : SUS440C	Induction hardening	HRC55 or more
	Nut : SUS440C	Vacuum hardening	

●Lubrication

SRT/SSRT series (Standardized Rolled & Stainless Rolled Ball Screws with Integrated end-journal) will be supplied with anti-rust oil.
This oil is not lubricant, when Ball Screw operates, lubricant should be applied.
If there is no specific instruction, KSS would recommend our original Grease (MSG No.2) as standard lubricant. Please feel free to contact us.

●Precision Rolled Ball Screws

High accuracy(JIS C5) can be produced by Rolled process, what we call Precision Rolled Ball Screws(PSR/PSRT series).Please see page A319.

●Model number notation

SRT 04 01 K – 086 R 126 C7 B 1 X
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

①Rolled Ball Screws Series No.
SRT ：Rolled Ball Screws with Integrated end-journal
SSRT ：Stainless Rolled Ball Screws with Integrated end-journal
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Ball Nut type
None：Standard
K：Compact type
⑤Screw thread length(mm)
(Specify in 1mm unit after end-journal machining)
⑥Thread direction(R=Right-hand)
⑦Screw Shaft total length(mm)
(Specify in 1mm units)
⑧Accuracy grade(C7 or C10)
⑨Shaft end-journal profile
Refer to Fig. A-24 below：A-type,B-type,C-type,
D-type(other)
⑩Anti-rust oil or Lubricant
0：KSS grease(MSG No.2)
1：Anti-rust oil(Non Ruster PZ2)
2：Multemp PS2 grease
3：Other
⑪Nut Flange direction(Refer to Fig. A-25 below)

Fig. A-24：Shaft end-journal profile

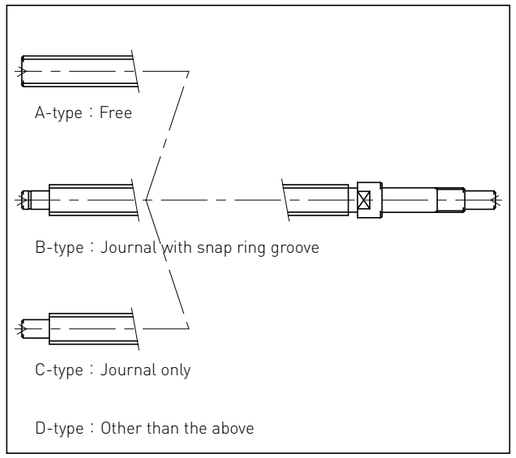
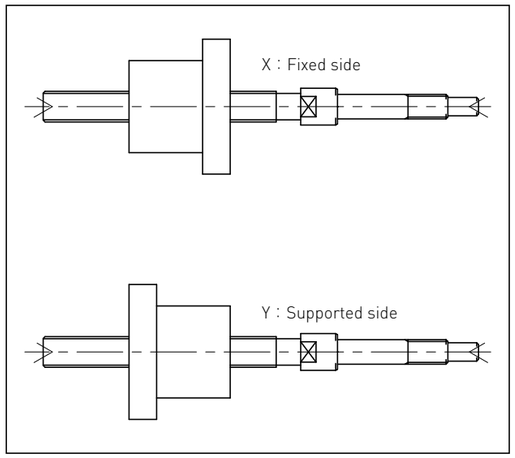


Fig. A-25：Nut Flange direction

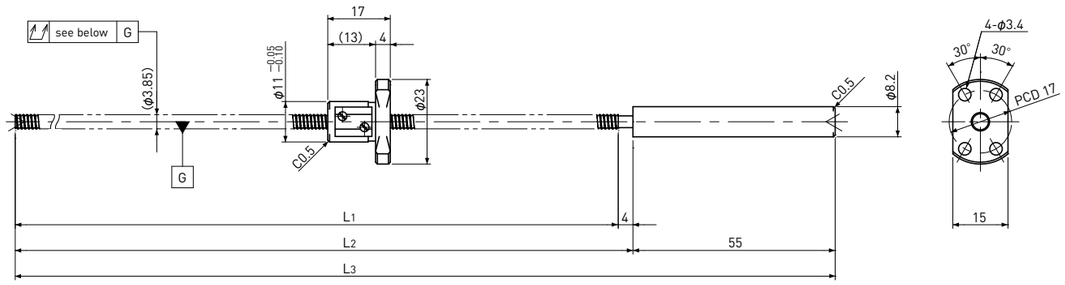


●Note

1)The detail of end-journal dimension for each size is shown from next page.
2)KSS does not make additional Nut machining.
3)The specification is subject to change without notice.
4)If the other configuration except (A,B,C)is requested, please contact KSS.

Standard products in stock SRT series

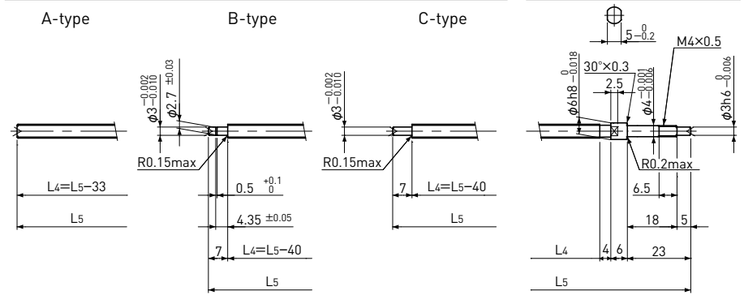
SRT0401 | Shaft dia. ϕ4 Lead 1mm | Ct7&Ct10



Unit :mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.3
Number of circuit		3.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side / Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4G
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

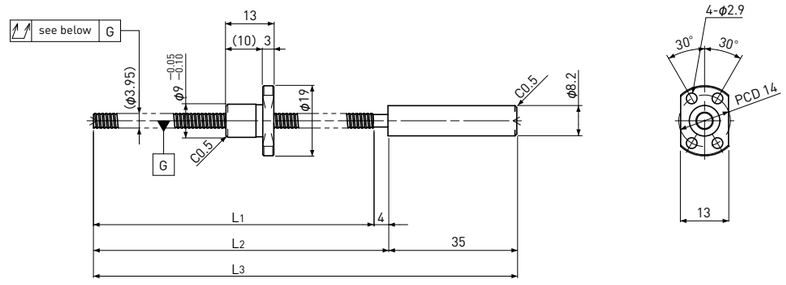
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0401-96R155C7	75	Ct7	96	100	155	±0.02	—	0.080	～0.020	—	560	790
SRT0401-216R275C7	195	Ct7	216	220	275	±0.03	—	0.120				
SRT0401-96R155C10	75	Ct10	96	100	155	±0.06	—	0.160	～0.050			
SRT0401-216R275C10	195	Ct10	216	220	275	±0.15	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

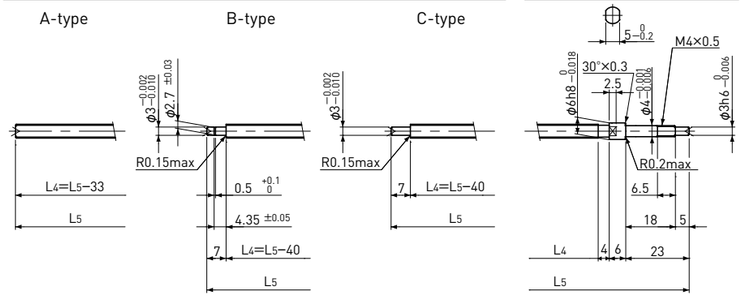
SRT0401K | Compact Nut Shaft dia. ϕ4 Lead 1mm | Ct7&Ct10



Unit :mm

Ball Screw Specifications		
Ball size		ϕ0.6
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.4
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side / Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

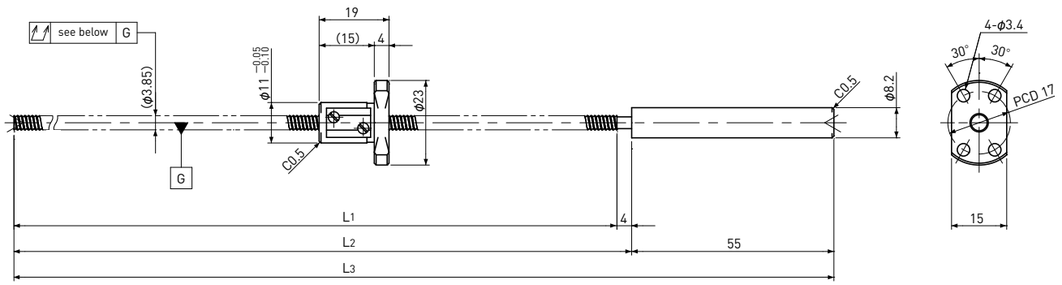
D-type : Other than the above.

Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0401K-76R115C7	60	Ct7	76	80	115	±0.02	—	0.080	～0.020	—	300	430
SRT0401K-76R115C10	60	Ct10	76	80	115	±0.05	—	0.160	～0.050			

Note)Please refer to page A287 for order code of end-journal machining.

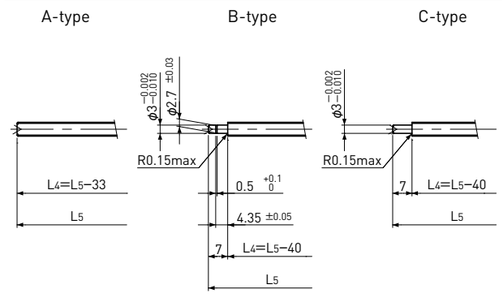
SRT0402 | Shaft dia. ϕ4 Lead 2mm | Ct7&Ct10



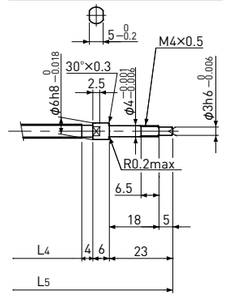
Unit : mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.3
Number of circuit		2.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

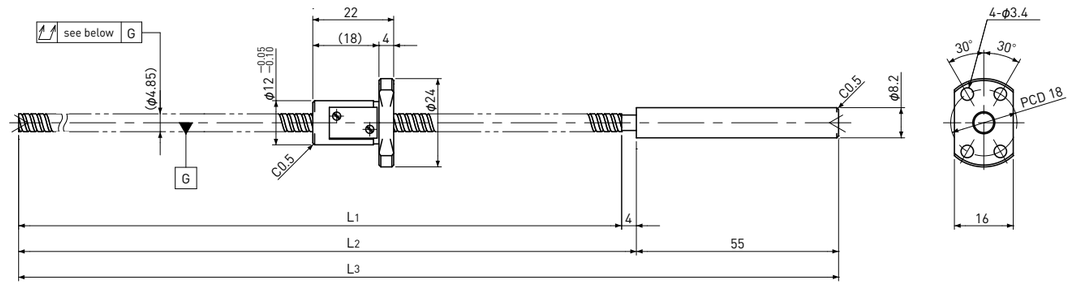
D-type : Other than the above.

Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	Shaft length L2	Shaft length L3	Lead accuracy: Travel deviation e_p	Lead accuracy: Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N: Dynamic Ca	Basic Load Rating N: Static Coa
SRT0402-96R155C7	75	Ct7	96	100	155	±0.02	—	0.080	～0.020	—	420	570
SRT0402-216R275C7	195	Ct7	216	220	275	±0.03	—	0.120				
SRT0402-96R155C10	75	Ct10	96	100	155	±0.06	—	0.160	～0.050			
SRT0402-216R275C10	195	Ct10	216	220	275	±0.15	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

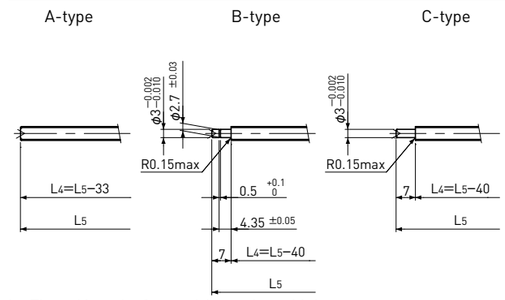
SRT0504 | Shaft dia. ϕ5 Lead 4mm | Ct7&Ct10



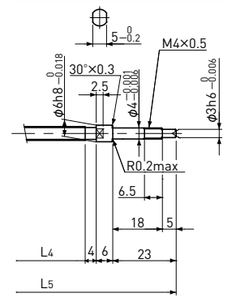
Unit : mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ4.3
Number of circuit		2.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

Unit : mm

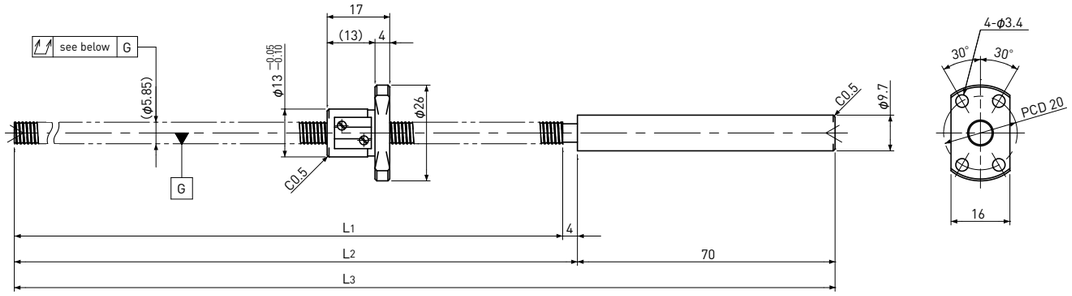
Ball Screw Model	Travel	Grade	Shaft length L1	Shaft length L2	Shaft length L3	Lead accuracy: Travel deviation e_p	Lead accuracy: Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N: Dynamic Ca	Basic Load Rating N: Static Coa
SRT0504-96R155C7	70	Ct7	96	100	155	±0.02	—	0.080	～0.020	—	470	720
SRT0504-216R275C7	190	Ct7	216	220	275	±0.03	—	0.120				
SRT0504-96R155C10	70	Ct10	96	100	155	±0.06	—	0.160	～0.050			
SRT0504-216R275C10	190	Ct10	216	220	275	±0.15	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

SRT0601 | Shaft dia. ϕ6 Lead 1mm | Ct7&Ct10

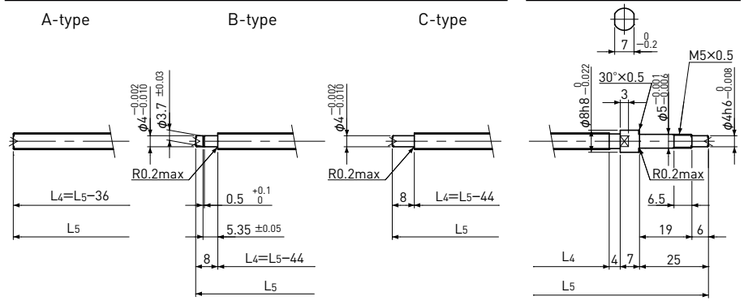
＊Please refer to page A315 for stainless steel type.



Unit :mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ5.3
Number of circuit		3.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Fixed-side

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

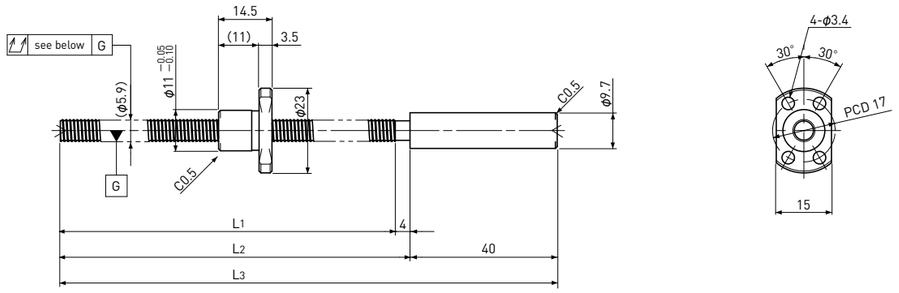
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	Shaft length L2	Shaft length L3	Lead accuracy Travel deviation ep	Lead accuracy Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
SRT0601-146R220C7	125	Ct7	146	150	220	±0.02	—	0.080	～0.020	—	680	1200
SRT0601-261R335C7	240	Ct7	261	265	335	±0.04	—	0.120				
SRT0601-146R220C10	125	Ct10	146	150	220	±0.10	—	0.160	～0.050			
SRT0601-261R335C10	240	Ct10	261	265	335	±0.18	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

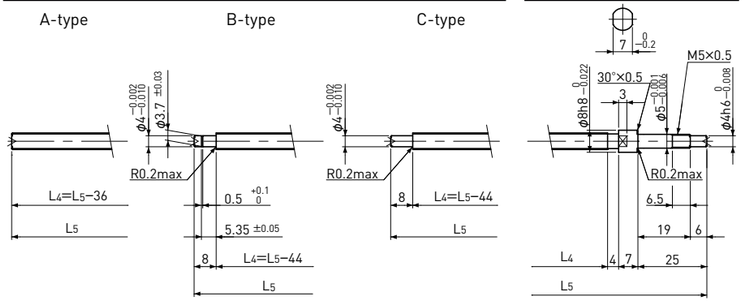
SRT0601K | Compact Nut | Shaft dia. ϕ6 Lead 1mm | Ct7&Ct10



Unit :mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ5.3
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Fixed-side

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

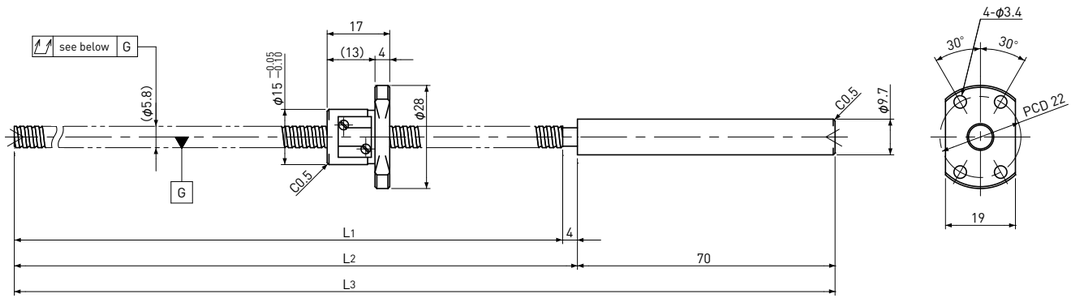
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	Shaft length L2	Shaft length L3	Lead accuracy Travel deviation ep	Lead accuracy Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
SRT0601K-91R135C7	70	Ct7	91	95	135	±0.02	—	0.080	～0.020	—	560	950
SRT0601K-91R135C10	70	Ct10	91	95	135	±0.06	—	0.160	～0.050			

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

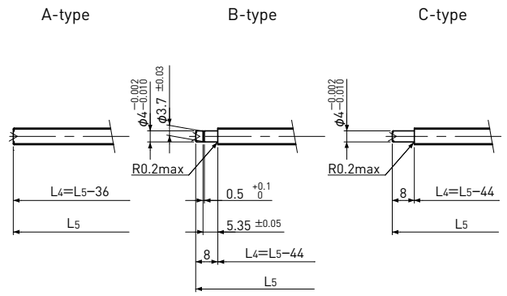
SRT0602 | Shaft dia. ϕ6 Lead 2mm | Ct7&Ct10



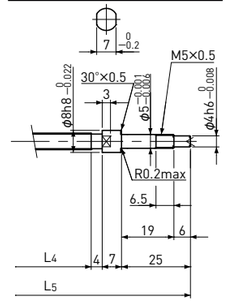
Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.0
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ5.1
Number of circuit		2.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

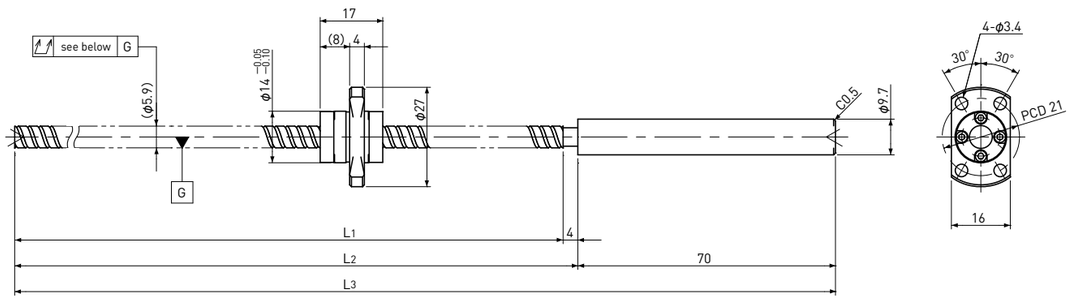
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0602-146R220C7	125	Ct7	146	150	220	±0.02	—	0.080	～0.020	—	750	1200
SRT0602-261R335C7	240	Ct7	261	265	335	±0.04	—	0.120				
SRT0602-146R220C10	125	Ct10	146	150	220	±0.10	—	0.160	～0.050			
SRT0602-261R335C10	240	Ct10	261	265	335	±0.18	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

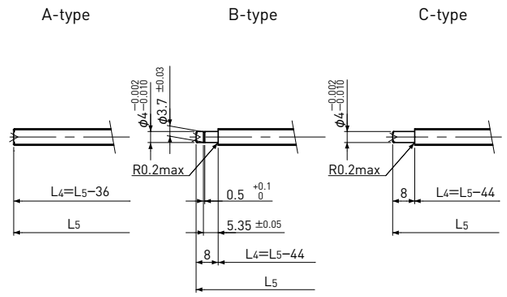
SRT0606 | Shaft dia. ϕ6 Lead 6mm | Ct7&Ct10



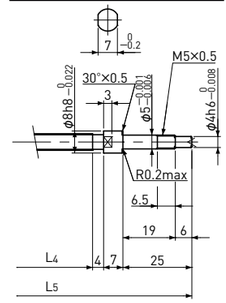
Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.0
Number of thread		2
Thread direction		Right
Shaft root dia.		ϕ5.2
Number of circuit		1.6×2
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

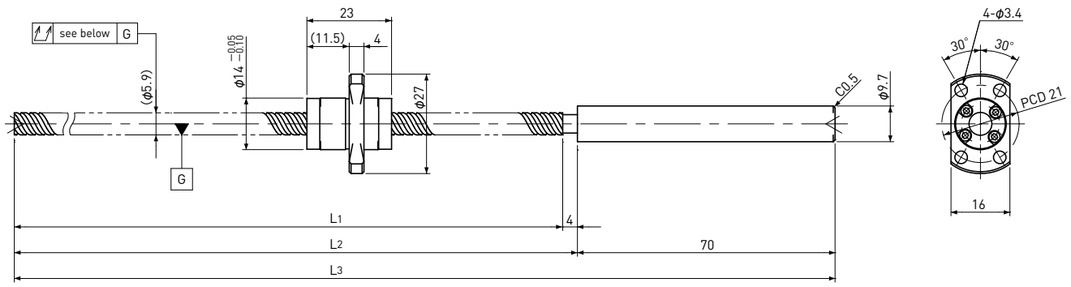
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0606-146R220C7	125	Ct7	146	150	220	±0.02	—	0.080	～0.020	—	870	1450
SRT0606-261R335C7	240	Ct7	261	265	335	±0.04	—	0.120				
SRT0606-146R220C10	125	Ct10	146	150	220	±0.10	—	0.160	～0.050			
SRT0606-261R335C10	240	Ct10	261	265	335	±0.18	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

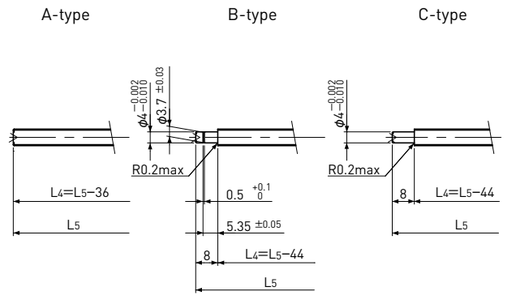
SRT0610 | Shaft dia. φ6 Lead 10mm | Ct7&Ct10



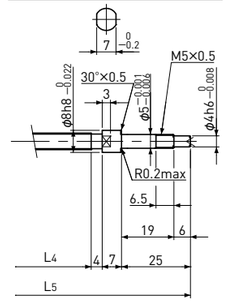
Unit : mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		2
Thread direction		Right
Shaft root dia.		φ5.0
Number of circuit		1.2×2
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

Unit : mm

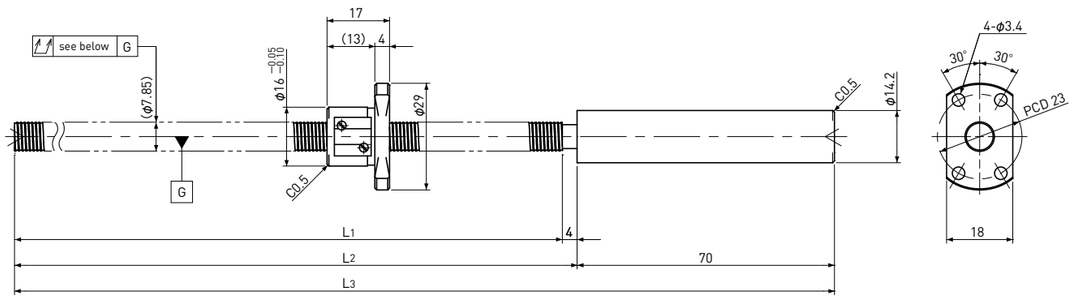
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0610-146R220C7	120	Ct7	146	150	220	±0.02	—	0.080	～0.020	—	950	1600
SRT0610-261R335C7	235	Ct7	261	265	335	±0.04	—	0.120				
SRT0610-146R220C10	120	Ct10	146	150	220	±0.10	—	0.160	～0.050			
SRT0610-261R335C10	235	Ct10	261	265	335	±0.18	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

SRT0801 | Shaft dia. φ8 Lead 1mm | Ct7&Ct10

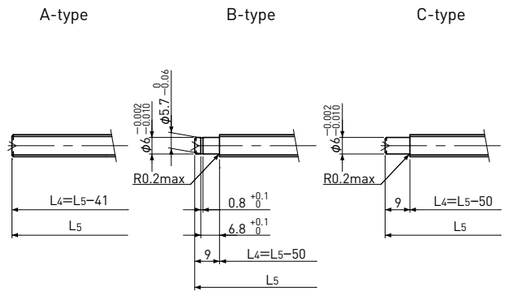
＊Please refer to page A316 for stainless steel type.



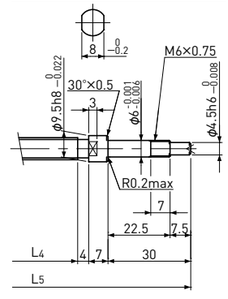
Unit : mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.3
Number of circuit		3.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0801-196R270C7	175	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	780	1650
SRT0801-356R430C7	335	Ct7	356	360	430	±0.06	0.05	0.120				
SRT0801-196R270C10	175	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT0801-356R430C10	335	Ct10	356	360	430	±0.24	0.21	0.240				

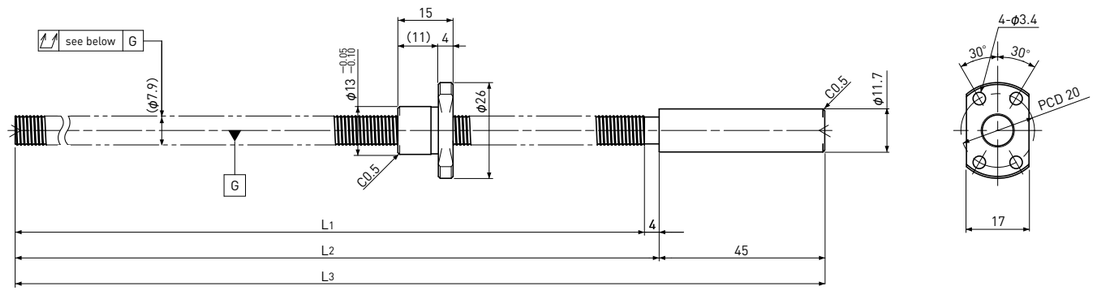
Note)Please refer to page A287 for order code of end-journal machining.

Ball Screw
Standard products in stock SRT/SSRT series

Standard products in stock SRT series

SRT0801K | Compact Nut | Ct7&Ct10

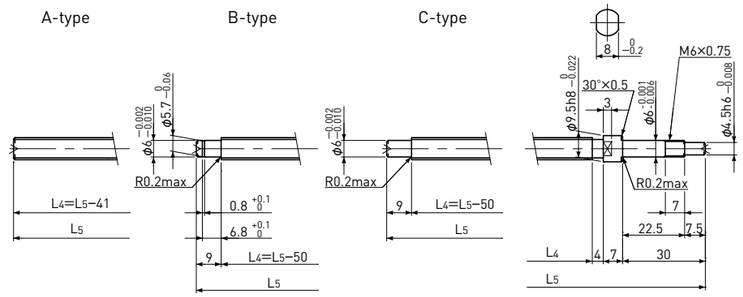
Shaft dia. φ8 Lead 1mm



Unit :mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.3
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side

L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

Unit :mm

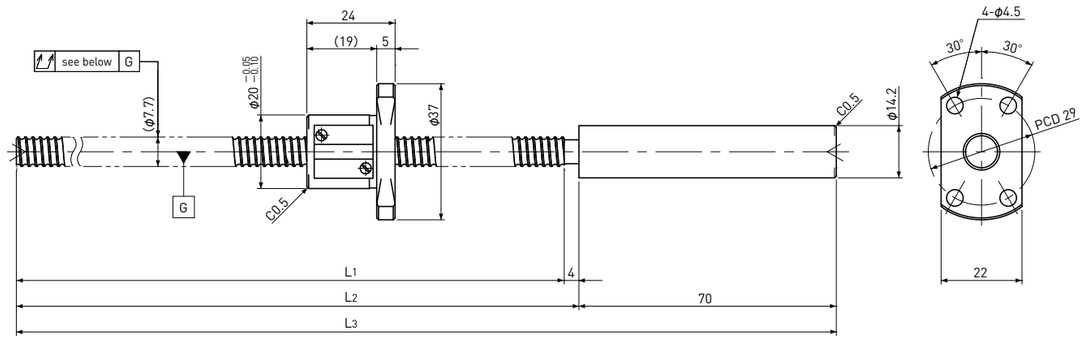
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0801K-171R220C7	150	Ct7	171	175	220	±0.03	—	0.080	～0.020	—	650	1300
SRT0801K-171R220C10	150	Ct10	171	175	220	±0.11	—	0.160	～0.050			

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

SRT0802 | Shaft dia. φ8 Lead 2mm | Ct7&Ct10

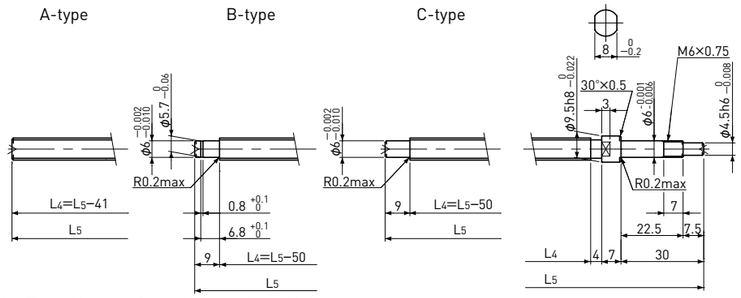
＊Please refer to page A317 for stainless steel type.



Unit :mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia.		φ6.6
Number of circuit		3.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side

L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

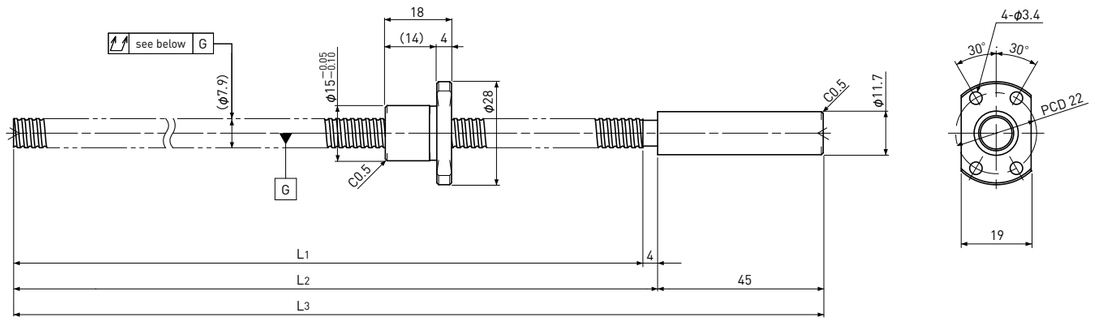
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0802-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	2400	4100
SRT0802-356R430C7	330	Ct7	356	360	430	±0.06	0.05	0.120				
SRT0802-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT0802-356R430C10	330	Ct10	356	360	430	±0.24	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

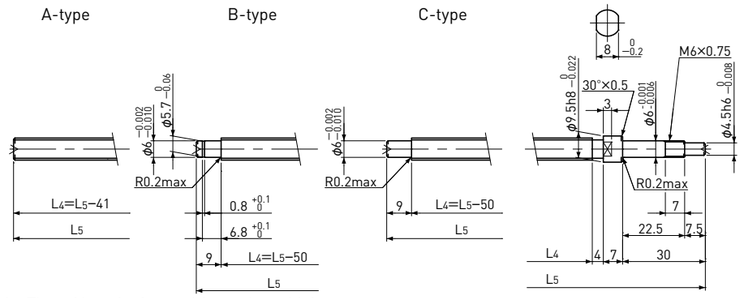
SRT0802K | Compact Nut | Shaft dia. φ8 Lead 2mm | Ct7&Ct10



Unit :mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.0
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Fixed-side

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

Unit :mm

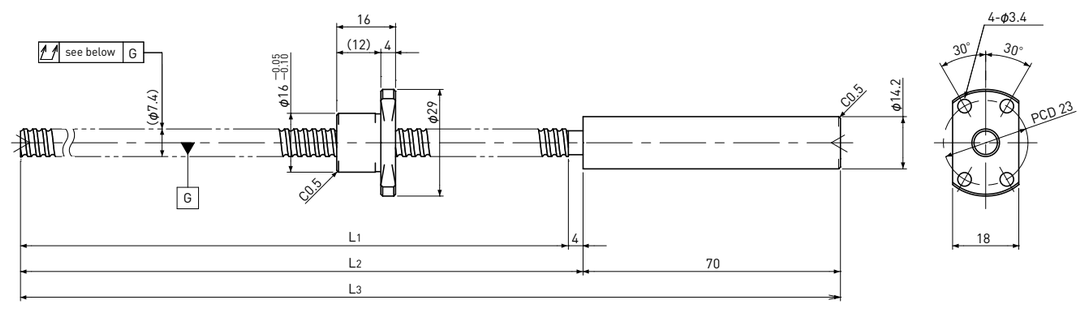
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0802K-171R220C7	145	Ct7	171	175	220	±0.03	—	0.080	～0.020	—	1300	2300
SRT0802K-171R220C10	145	Ct10	171	175	220	±0.11	—	0.160	～0.050			

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

Standard products in stock SRT series

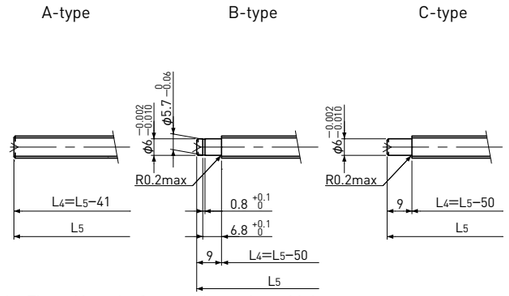
SRT0802.5 | Shaft dia. φ8 Lead 2.5mm | Ct7&Ct10



Unit :mm

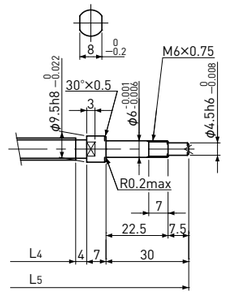
Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia.		φ6.3
Number of circuit		2.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Fixed-side



Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

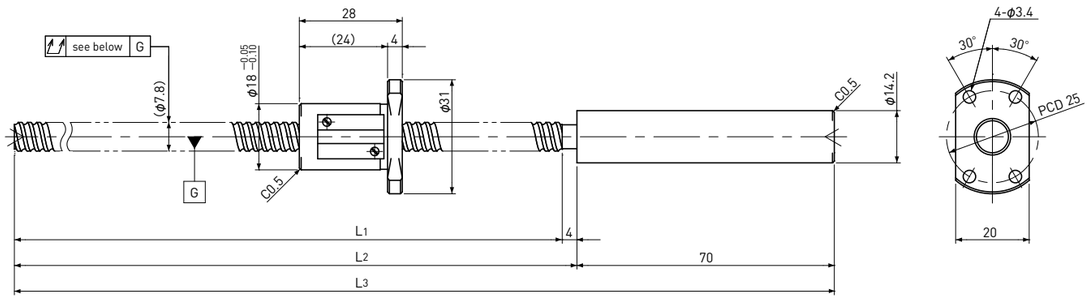
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0802.5-196R270C7	180	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	1850	3000
SRT0802.5-356R430C7	340	Ct7	356	360	430	±0.06	0.05	0.120				
SRT0802.5-196R270C10	180	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT0802.5-356R430C10	340	Ct10	356	360	430	±0.24	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

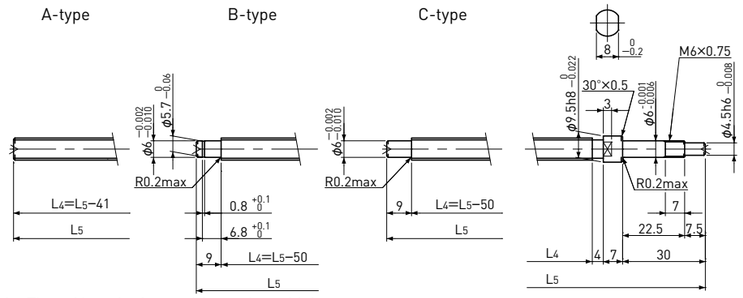
SRT0805 | Shaft dia. ϕ8 Lead 5mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ6.6
Number of circuit		2.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Fixed-side

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

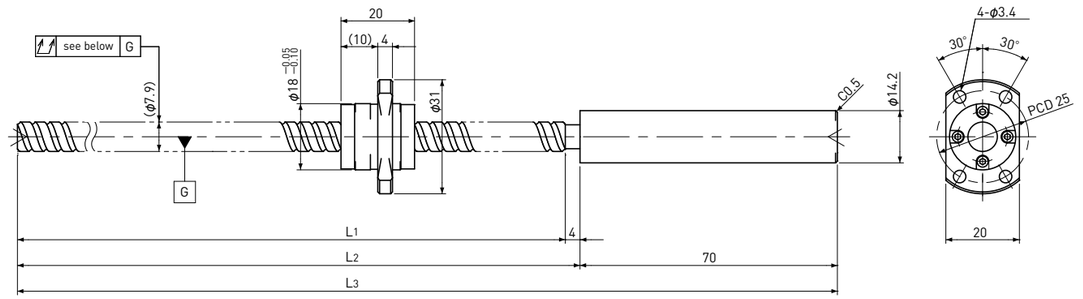
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0805-196R270C7	165	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	1850	3000
SRT0805-356R430C7	325	Ct7	356	360	430	±0.06	0.05	0.120				
SRT0805-196R270C10	165	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT0805-356R430C10	325	Ct10	356	360	430	±0.24	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

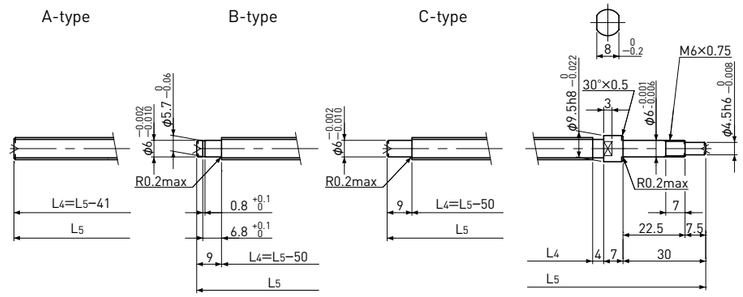
SRT0808 | Shaft dia. ϕ8 Lead 8mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.5875
Number of thread		2
Thread direction		Right
Shaft root dia.		ϕ6.7
Number of circuit		1.6×2
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Fixed-side

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

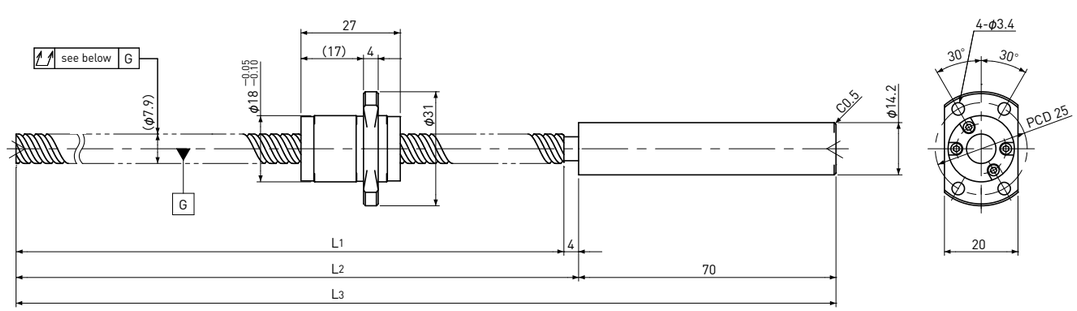
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0808-196R270C7	175	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	2200	3800
SRT0808-356R430C7	335	Ct7	356	360	430	±0.06	0.05	0.120				
SRT0808-196R270C10	175	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT0808-356R430C10	335	Ct10	356	360	430	±0.24	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

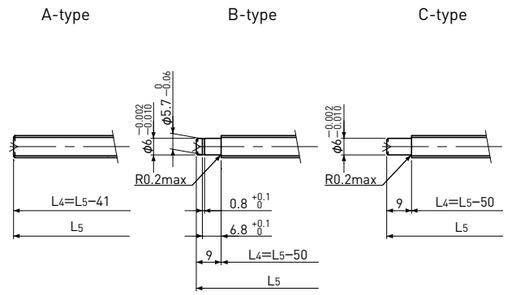
SRT0812 | Shaft dia. φ8 Lead 12mm | Ct7&Ct10



Unit : mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		2
Thread direction		Right
Shaft root dia.		φ6.7
Number of circuit		1.6×2
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side

L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

Unit : mm

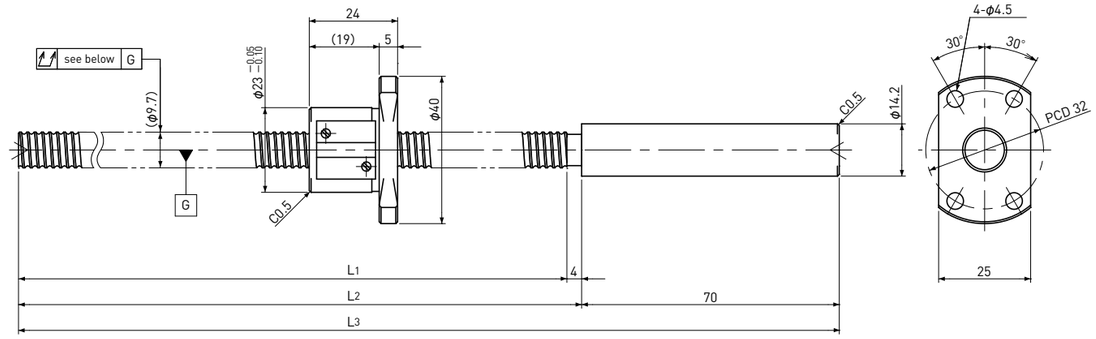
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT0812-196R270C7	165	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	2200	4000
SRT0812-356R430C7	325	Ct7	356	360	430	±0.06	0.05	0.120				
SRT0812-196R270C10	165	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT0812-356R430C10	325	Ct10	356	360	430	±0.24	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

SRT1002 | Shaft dia. φ10 Lead 2mm | Ct7&Ct10

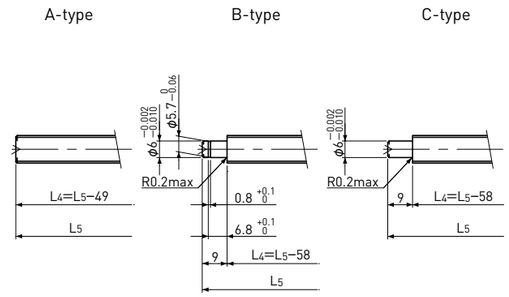
＊Please refer to page A318 for stainless steel type.



Unit : mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia.		φ8.6
Number of circuit		3.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side

L4 : Thread length after end-journal machining.
L5 : Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

Unit : mm

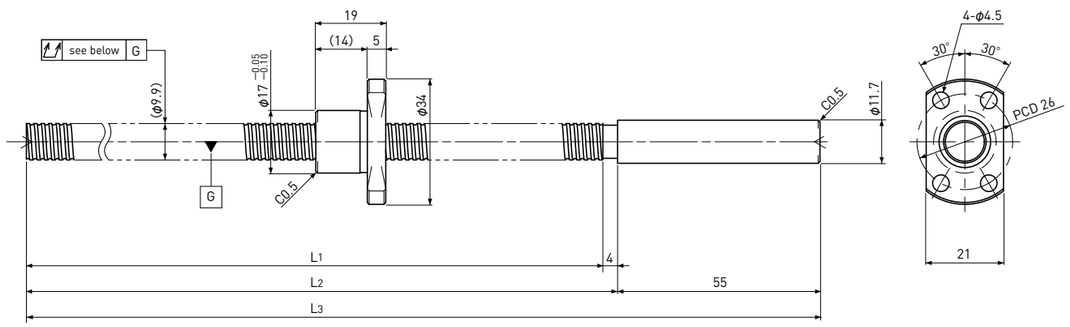
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT1002-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	2700	5300
SRT1002-396R470C7	370	Ct7	396	400	470	±0.06	0.05	0.120				
SRT1002-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT1002-396R470C10	370	Ct10	396	400	470	±0.27	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

SRT1002K | Compact Nut | Ct7&Ct10

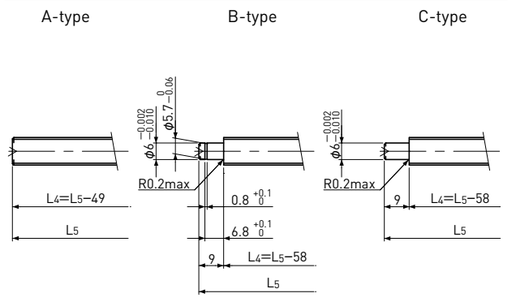
Shaft dia. ϕ10 Lead 2mm



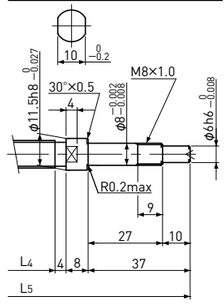
Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ9.0
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

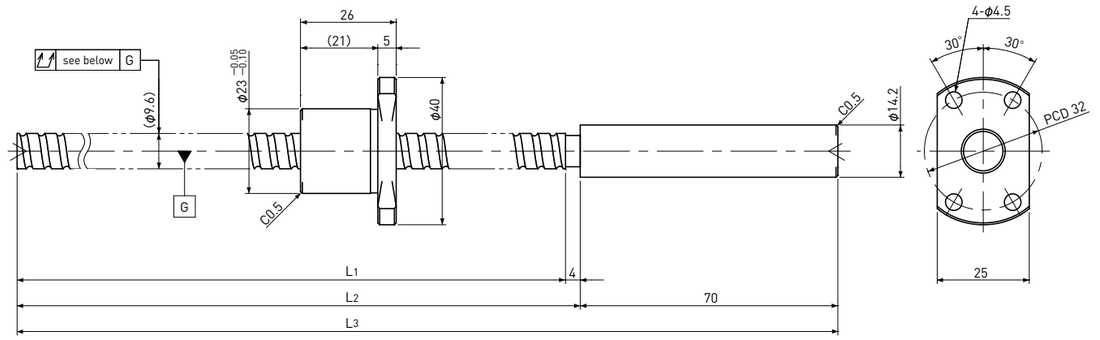
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	Shaft length L2	Shaft length L3	Lead accuracy Travel deviation e_p	Lead accuracy Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
SRT1002K-201R260C7	175	Ct7	201	205	260	±0.03	—	0.080	～0.020	—	1450	3000
SRT1002K-201R260C10	175	Ct10	201	205	260	±0.14	—	0.160	～0.050			

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

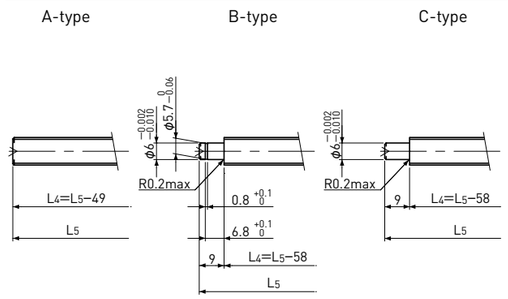
SRT1005 | Shaft dia. ϕ10 Lead 5mm | Ct7&Ct10



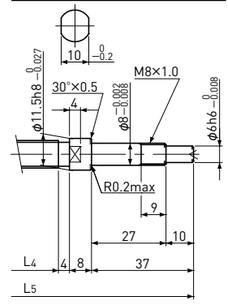
Unit : mm

Ball Screw Specifications		
Ball size		ϕ2.0
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ8.2
Number of circuit		2.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

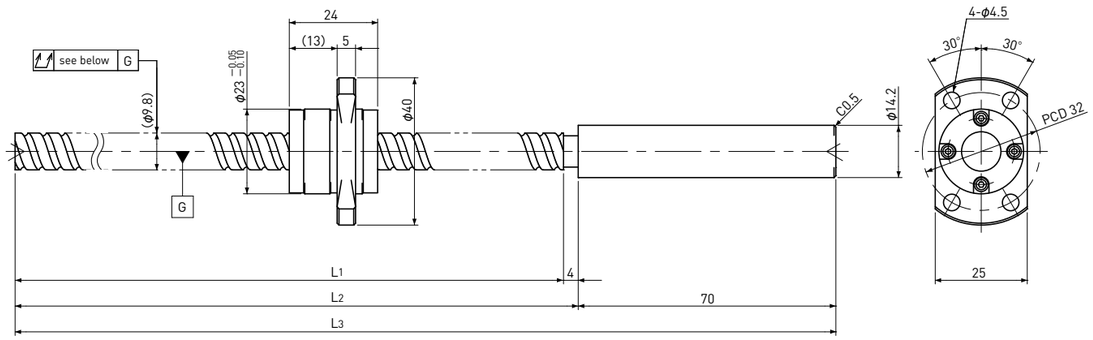
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	Shaft length L2	Shaft length L3	Lead accuracy Travel deviation e_p	Lead accuracy Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
SRT1005-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	3000	5200
SRT1005-396R470C7	370	Ct7	396	400	470	±0.06	0.05	0.120				
SRT1005-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT1005-396R470C10	370	Ct10	396	400	470	±0.27	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

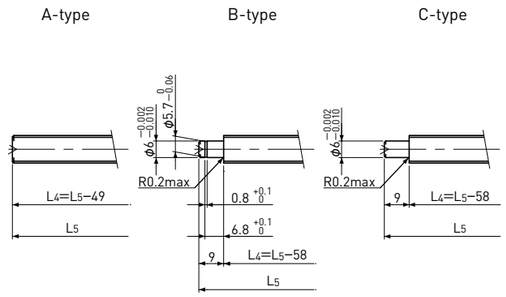
SRT1010 | Shaft dia. ϕ10 Lead 10mm | Ct7&Ct10



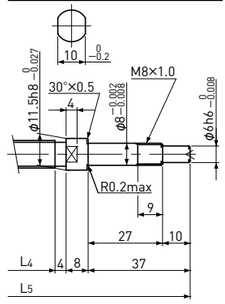
Unit :mm

Ball Screw Specifications		
Ball size		ϕ2.0
Number of thread		2
Thread direction		Right
Shaft root dia.		ϕ8.4
Number of circuit		1.6×2
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

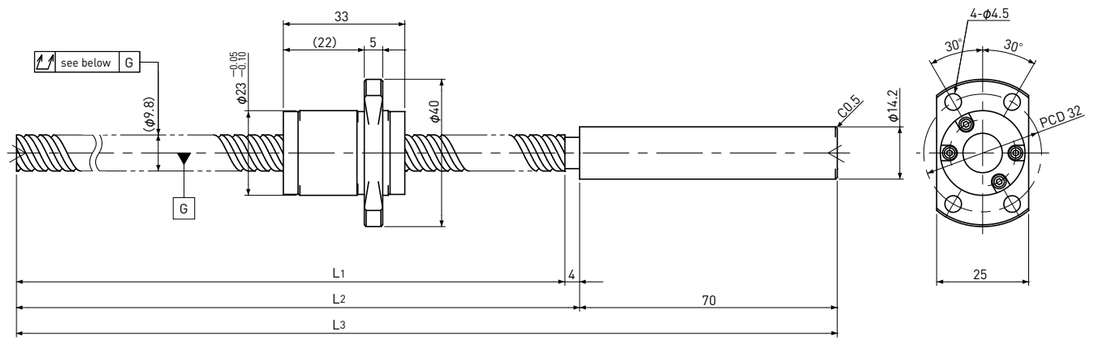
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT1010-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	3300	5900
SRT1010-396R470C7	370	Ct7	396	400	470	±0.06	0.05	0.120				
SRT1010-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT1010-396R470C10	370	Ct10	396	400	470	±0.27	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

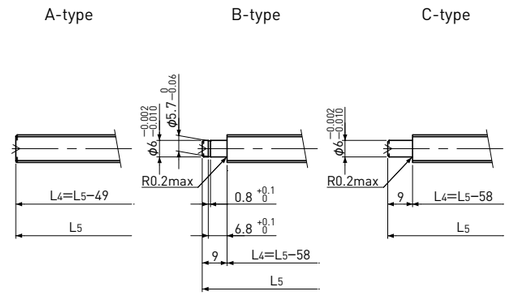
SRT1015 | Shaft dia. ϕ10 Lead 15mm | Ct7&Ct10



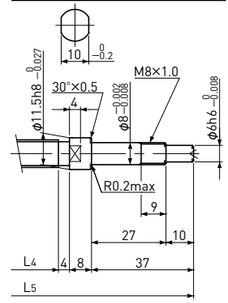
Unit :mm

Ball Screw Specifications		
Ball size		ϕ2.0
Number of thread		2
Thread direction		Right
Shaft root dia.		ϕ8.4
Number of circuit		1.6×2
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

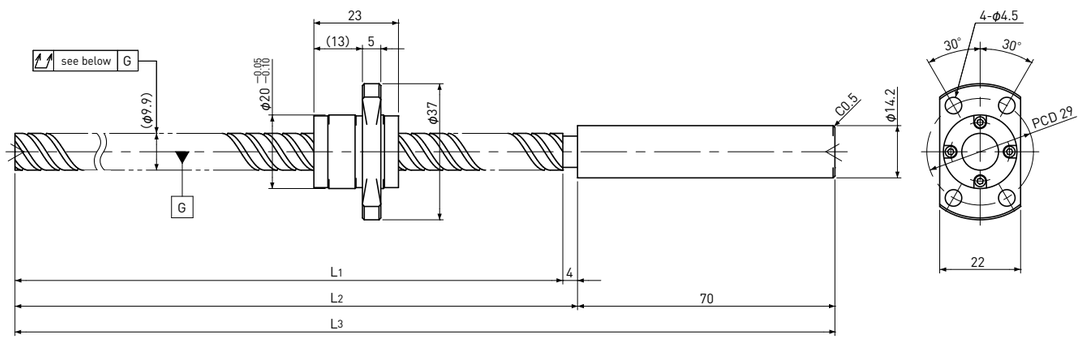
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT1015-196R270C7	160	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	3300	6400
SRT1015-396R470C7	360	Ct7	396	400	470	±0.06	0.05	0.120				
SRT1015-196R270C10	160	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT1015-396R470C10	360	Ct10	396	400	470	±0.27	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

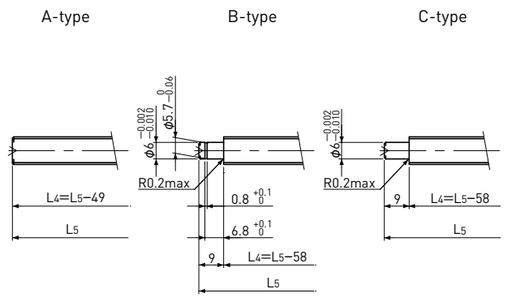
SRT1020 | Shaft dia. ϕ10 Lead 20mm | Ct7&Ct10



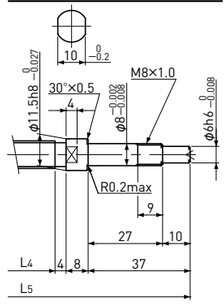
Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.5875
Number of thread		4
Thread direction		Right
Shaft root dia.		ϕ8.7
Number of circuit		0.7×4
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

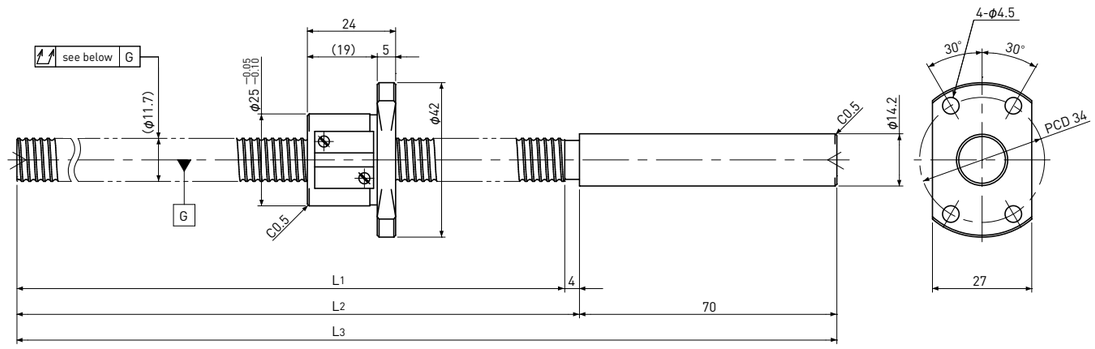
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT1020-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	2100	4000
SRT1020-396R470C7	370	Ct7	396	400	470	±0.06	0.05	0.120				
SRT1020-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT1020-396R470C10	370	Ct10	396	400	470	±0.27	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

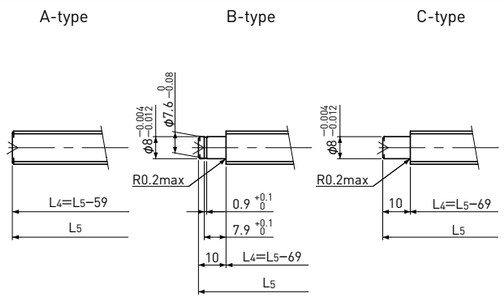
SRT1202 | Shaft dia. ϕ12 Lead 2mm | Ct7&Ct10



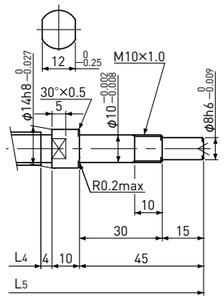
Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ10.6
Number of circuit		3.7×1
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	—
	Fixed-side	:	—

D-type : Other than the above.

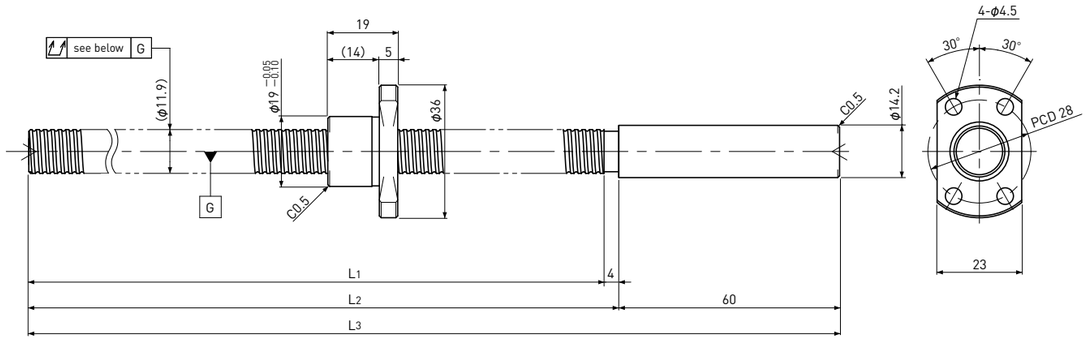
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT1202-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	3000	6400
SRT1202-396R470C7	370	Ct7	396	400	470	±0.06	0.05	0.080				
SRT1202-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT1202-396R470C10	370	Ct10	396	400	470	±0.27	0.21	0.160				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

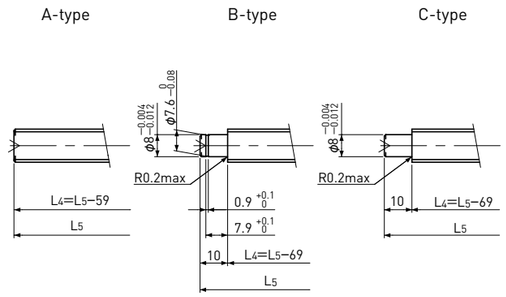
SRT1202K | Compact Nut Shaft dia. ϕ12 Lead 2mm | Ct7&Ct10



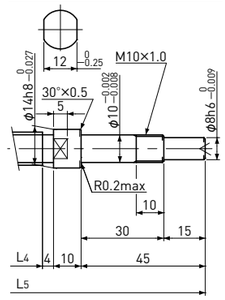
Unit : mm

Ball Screw Specifications		
Ball size		ϕ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ11.0
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation	Supported-side : —
	Fixed-side : —

D-type : Other than the above.

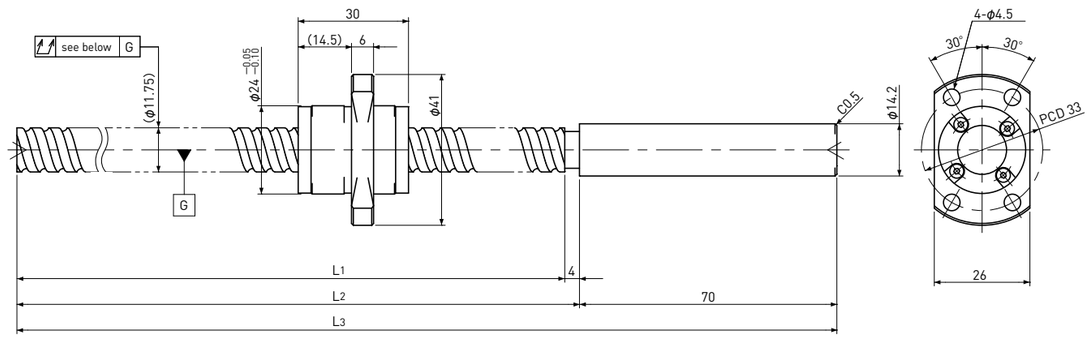
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT1202K-271R335C7	245	Ct7	271	275	335	±0.04	—	0.080	～0.020	—	1600	3700
SRT1202K-271R335C10	245	Ct10	271	275	335	±0.19	—	0.160	～0.050			

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SRT series

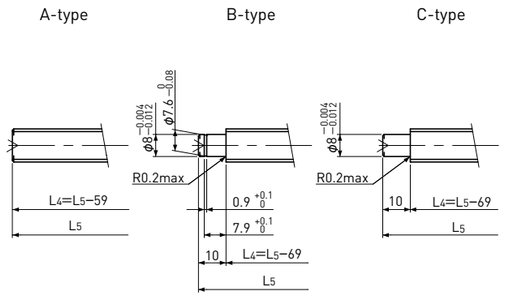
SRT1210 | Shaft dia. ϕ12 Lead 10mm | Ct7&Ct10



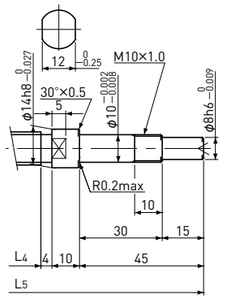
Unit : mm

Ball Screw Specifications		
Ball size		ϕ2.381
Number of thread		2
Thread direction		Right
Shaft root dia.		ϕ10.2
Number of circuit		1.7×2
Material	Shaft	SCM415H+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation	Supported-side : —
	Fixed-side : —

D-type : Other than the above.

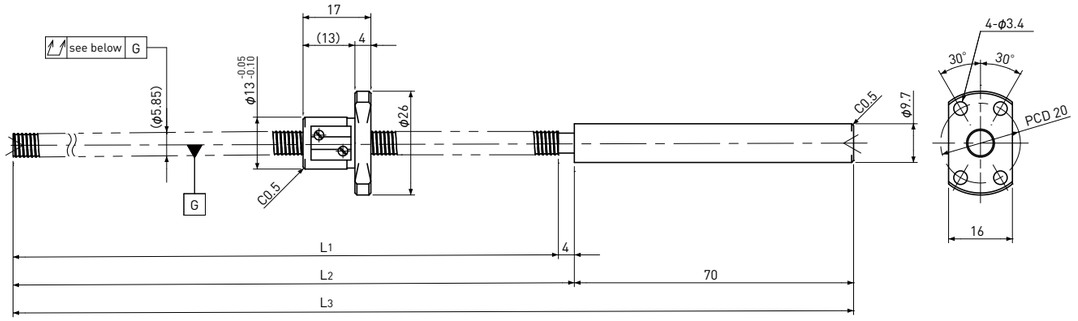
Unit : mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation e_p	Variation V_{300}	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SRT1210-196R270C7	165	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	5100	9800
SRT1210-396R470C7	365	Ct7	396	400	470	±0.06	0.05	0.080				
SRT1210-196R270C10	165	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SRT1210-396R470C10	365	Ct10	396	400	470	±0.27	0.21	0.160				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SSRT series

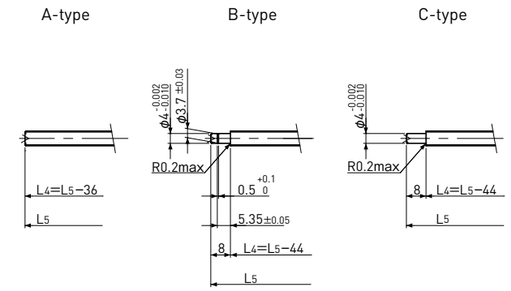
SSRT0601 | Stainless Shaft dia.φ6 Lead 1mm | Ct7&Ct10



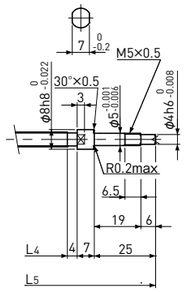
Unit :mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia		φ5.3
Number of circuit		3.7×1
Material	Shaft	SUS440C+SUS303
	Nut	SUS440C
Surface hardness		HRC55～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

Unit :mm

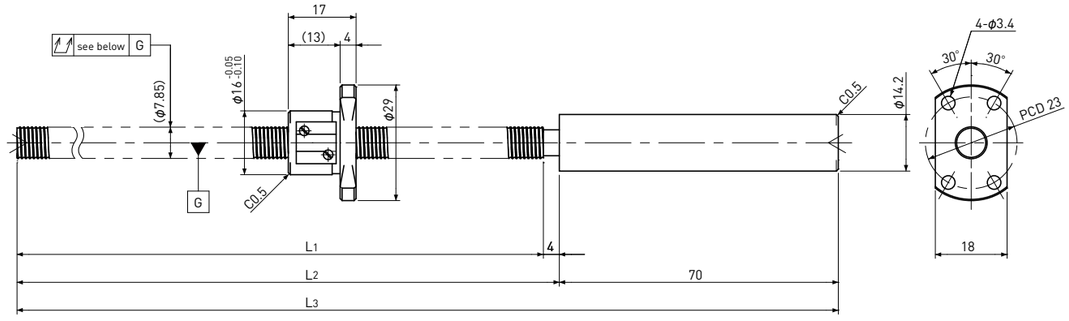
Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SSRT0601-146R220C7	125	Ct7	146	150	220	±0.02	—	0.080	～0.020	—	560	900
SSRT0601-261R335C7	240	Ct7	261	265	335	±0.04	—	0.120				
SSRT0601-146R220C10	125	Ct10	146	150	220	±0.10	—	0.160	～0.050			
SSRT0601-261R335C10	240	Ct10	261	265	335	±0.18	—	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Ball Screw
Standard products in stock SRT/SSRT series

Standard products in stock SSRT series

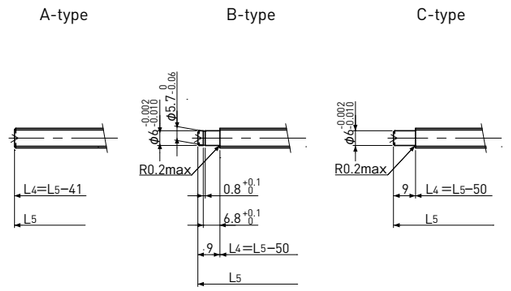
SSRT0801 | Stainless Shaft dia.φ8 Lead 1mm | Ct7&Ct10



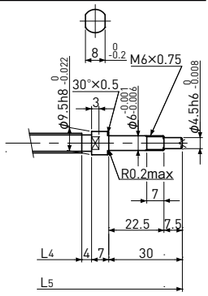
Unit :mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia		φ7.3
Number of circuit		3.7×1
Material	Shaft	SUS440C+SUS303
	Nut	SUS440C
Surface hardness		HRC55～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

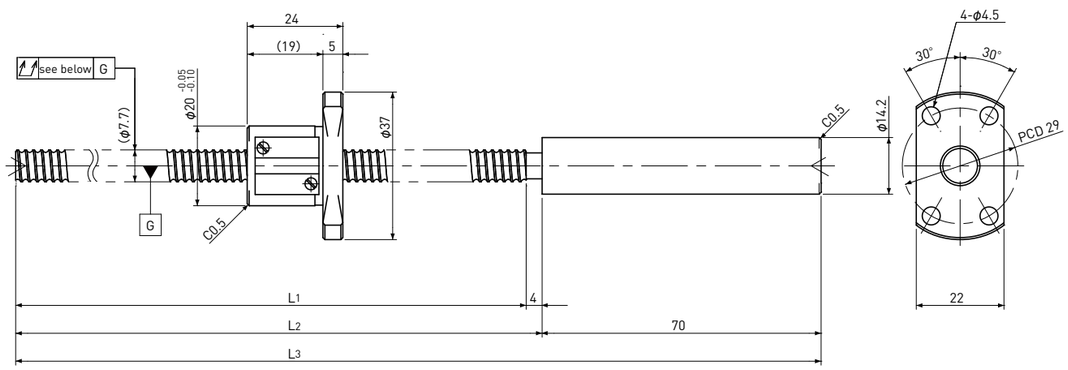
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SSRT0801-196R270C7	175	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	630	1250
SSRT0801-356R430C7	335	Ct7	356	360	430	±0.06	0.05	0.120				
SSRT0801-196R270C10	175	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SSRT0801-356R430C10	335	Ct10	356	360	430	±0.24	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SSRT series

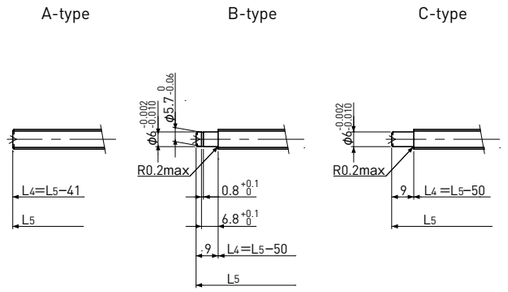
SSRT0802 | Stainless Shaft dia.φ8 Lead 2mm | Ct7&Ct10



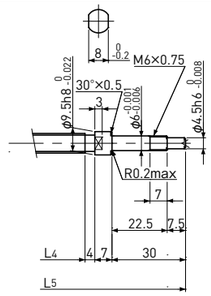
Unit :mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia		φ6.6
Number of circuit		3.7×1
Material	Shaft	SUS440C+SUS303
	Nut	SUS440C
Surface hardness		HRC55～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

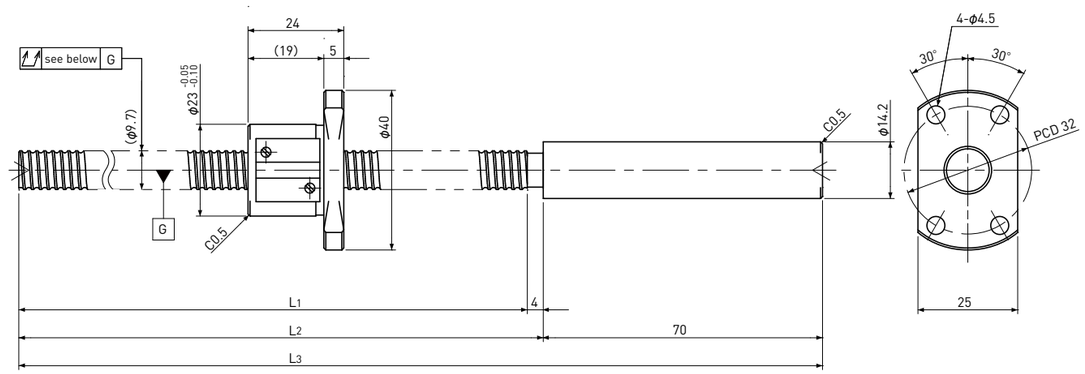
Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SSRT0802-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	1950	3100
SSRT0802-356R430C7	330	Ct7	356	360	430	±0.06	0.05	0.120				
SSRT0802-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SSRT0802-356R430C10	330	Ct10	356	360	430	±0.24	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

Standard products in stock SSRT series

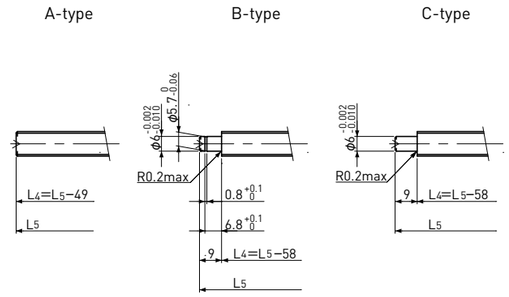
SSRT1002 | Stainless Shaft dia.φ10 Lead 2mm | Ct7&Ct10



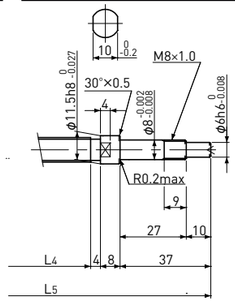
Unit :mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia		φ8.6
Number of circuit		3.7×1
Material	Shaft	SUS440C+SUS303
	Nut	SUS440C
Surface hardness		HRC55～ (Thread area)
Anti-rust treatment		Anti-rust oil

End-journal profile Supported-side



Fixed-side



L4:Thread length after end-journal machining.
L5:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

Unit :mm

Ball Screw Model	Travel	Grade	Shaft length L1	L2	L3	Lead accuracy Travel deviation eP	Variation V300	Total Run-out	Axial play	Preload Torque Nm	Basic Load Rating N Dynamic Ca	Static Coa
SSRT1002-196R270C7	170	Ct7	196	200	270	±0.03	—	0.080	～0.020	—	2200	4000
SSRT1002-396R470C7	370	Ct7	396	400	470	±0.06	0.05	0.120				
SSRT1002-196R270C10	170	Ct10	196	200	270	±0.13	—	0.160	～0.050			
SSRT1002-396R470C10	370	Ct10	396	400	470	±0.27	0.21	0.240				

Note)Please refer to page A287 for order code of end-journal machining.

PSR/PSRT series　Precision Rolled Ball Screws

High accuracy(JIS C5) has been achieved by Rolled Ball Screw. We provide Rolled Ball Screws with high precision & better cost performance, which can be replaced with conventional Ground Ball Screw with C5 grade.

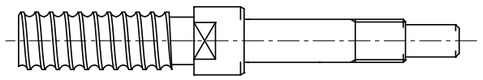
●Features

- The conventional type of Rolled Ball Screws can reach the Accuracy grade of Ct10 or Ct7. KSS newly developed the high grade accuracy of Rolled Ball Screw, which can achieve JIS C5 grade.
- We have 2 types of Precision Rolled Ball Screws, which are Integrated type with larger journal and whole threaded type. So it provides wide variety of design choices.
- For Integrated end-journal type, Fixed side end-journal can be set larger than nominal diameter of Screw Shaft, so there is no need to use Collar by press fit.
- Fixed side End-journal profile and dimension are standardized, so KSS Compact Support-Unit can be installed.
- Since supported-side end-journal is unfinished, it is possible to do additional end machining with your requested thread length.
- Special end-journal profile can be available as customized order.
- Whole threaded type is a high cost performance type and end-journal machining is available in accordance with your request.
- The Axial play is set at 5um or less, but Zero backlash is possible based on your request.

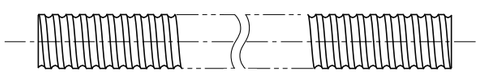
●Variation

We have 2 types of Precision Rolled Ball Screws, which are Integrated type with larger journal(PSRT) and whole threaded length type(PSR).

[Integrated journal type]



[whole threaded type]



●Combination of Shaft nominal dia. & Lead

Unit：mm

Shaft dia. \ Lead	1	2	12
4	A323　A325 A324　A326		
6	A327　A329 A328　A330		
8	A331　A333 A332　A334	A335　A337 A336　A338	A339 A340
10		A341 A342	
12		A343 A344	

Note 1)The numbers in a table ：showing a page in this catalogue

●Accuracy Grade & Axial play

The grade of PSR/PSRT series(Standardized Precision Rolled Ball Screws) is C5(JIS B 1192-3).
Axial play of this series is 0.005mm or less, but zero backlash(pre-load) type is available by your request.

●Material & Surface hardness

The material and hardness of PSR/PSRT series
(Standardized Precision Rolled Ball Screws) are as follows.

Products	Material of thread area	Heat treatment	Surface hardness
Precision Rolled Ball Screws (PSR series)	Shaft：S55C	Induction hardening	HRC58 or more
	Nut：SCM415	Carburizing and Quenching	
Precision Rolled Ball Screws with Integrated end-journal (PSRT series)	Shaft：S55C	Induction hardening	HRC58 or more
	Nut：SCM415	Carburizing and Quenching	

●Lubrication

Standardized Precision Rolled Ball Screws whole threaded length type(PSR Series) will be supplied with anti-rust oil.This oil is not lubricant, when Ball Screw operates, lubricant should be applied.
If there is no specific instruction, KSS would recommend our original grease(MSG No.2) as standard lubricant.
Please feel free to contact us.

●Others

PSR/PSRT series(Standardized Precision Rolled Ball Screws) provide 3 types of Ball Nut profile.
Return-plate style and End-cap style are our standard. In addition Internal-Deflector style as Compact Ball Nut is also in stock. So you can pick one of them based on your design.

●Model number notation

【Integrated journal type】

In case of PSRT type(Integrated journal type), please designate length, end-journal profile, lubricant and Nut direction according to the Model number notation below.

PSRT 08 01 K – 155 R 204 C5 B 0 X
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

①Precision Rolled Ball Screws Series No.
PSRT : Integrated journal type
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Ball Nut type
None : Standard
K : Compact type
⑤Screw thread length(mm)
(Specify in 1mm unit after end-journal machining)
⑥Thread direction(R=Right-hand)
⑦Screw Shaft total length(mm)
(Specify in 1mm unit)
⑧Accuracy grade(JIS C5)
⑨Shaft end-journal profile
Refer to Fig. A-26 below : A-type,B-type,C-type, D-type(Othes)
⑩Anti-rust oil or Lubricant
0 : KSS grease(MSG No.2)
1 : Anti-rust oil(Non Ruster PZ2)
2 : Multemp PS2 grease
3 : Other
⑪Nut Flange direction(Refer to Fig. A-27 below)

Fig. A-26 : Shaft end-journal profile

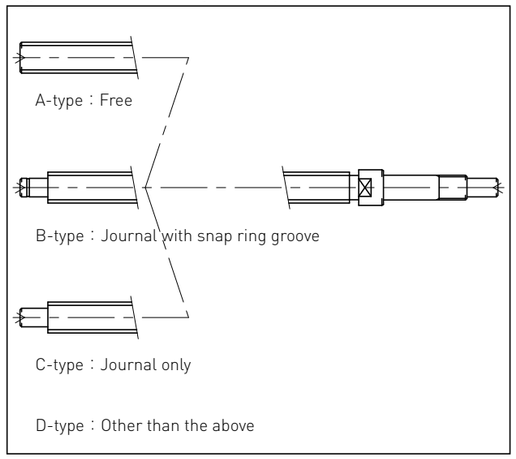
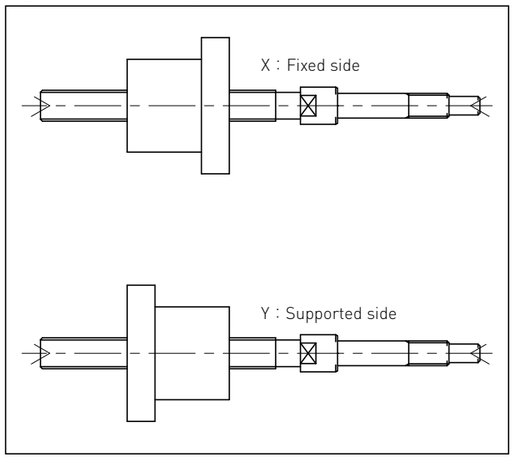


Fig. A-27 : Nut Flange direction



●Note

1)The detail of end-journal dimension for each size is shown from next page.
2)KSS does not make additional Nut machining.
3)The specification is subject to change without notice.
4)If the other configuration except (A,B,C)is requested, please contact KSS.
5)KSS will not be responsible for quality, in case re-work is done by other than KSS.

【Whole threaded type】

Model number notation of PSR type(whole threaded type) is as follows. Please designate end-journal profile with your simple sketch.

PSR 08 01 K – 230 R 230 C5
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Precision Rolled Ball Screws Series No.
PSR : Whole threaded type
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Ball Nut type
None : Standard
K : Compact type
⑤Screw thread length(mm)
(Specify in 1mm unit after end-journal machining)
⑥Thread direction(R=Right-hand)
⑦Screw Shaft total length(mm)
(Specify in 1mm unit)
⑧Accuracy grade(Class JIS C5)

●Customized Design

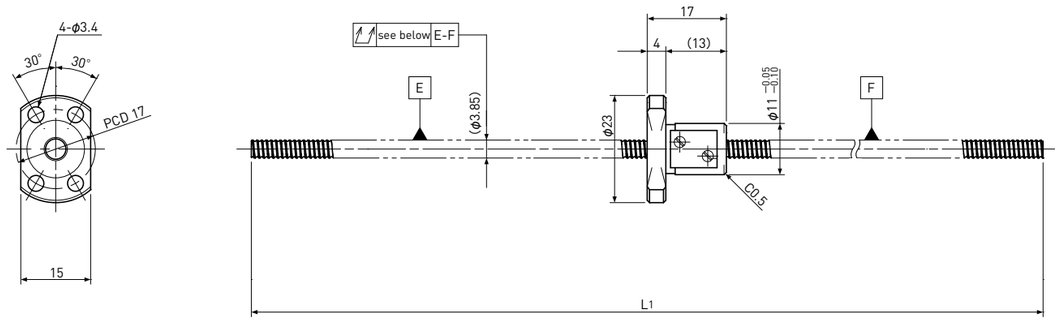
It will be the customized if you need special specifications like below, please ask KSS representative.
1) Non-standard profile or dimension on Shaft end-journal.
2) Non-standard profile or dimension on Ball Nut or Flange.
3) Zero backlash (Pre-loaded) type Ball Screw.
4) Longer length of Ball Screw Shaft than standard product.

●Note

1)Zero backlash is possible by your request, please ask KSS representative.
2)We recommend additional end-journal machining is done by KSS. We do not guarantee accuracy after re-works done by other than KSS.
3)Please send us drawing with end-journal profile when you request end-journal maching.
4)Additional machining is not applied to the Nut.
Please design flange configuration according to our standard dimension.
5)In Ball Screws use, lubricant should be applied on them. Please note that anti-rust oil is not lubricant.

Standard products in stock PSR series

PSR0401 | Shaft dia.ϕ4 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.3
Number of circuit		3.7×1
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

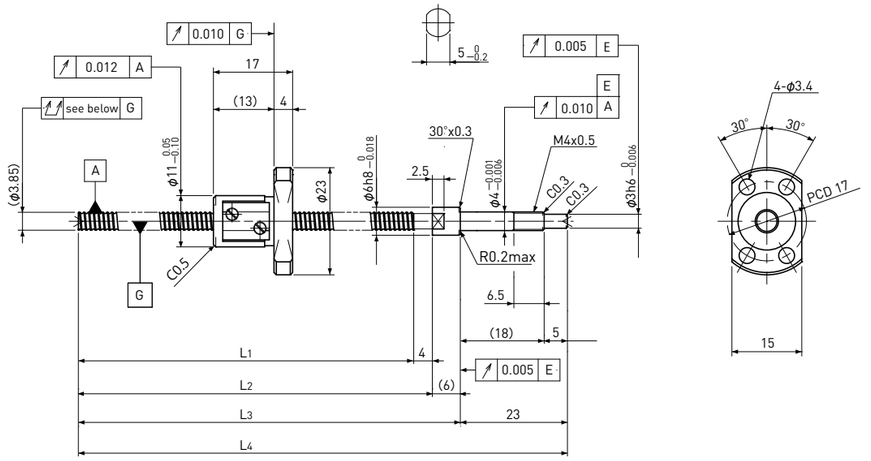
Unit:mm

Ball Screw Model	Travel	Shaft length L_1	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSR0401-100R100C5	75	100	±0.018	0.035	～0.005	560	790

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

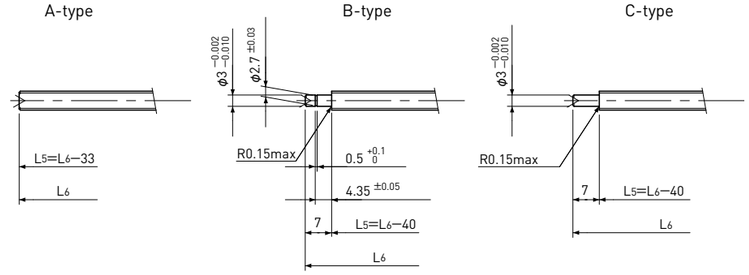
PSRT0401 | Shaft dia.ϕ4 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.3
Number of circuit		3.7×1
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

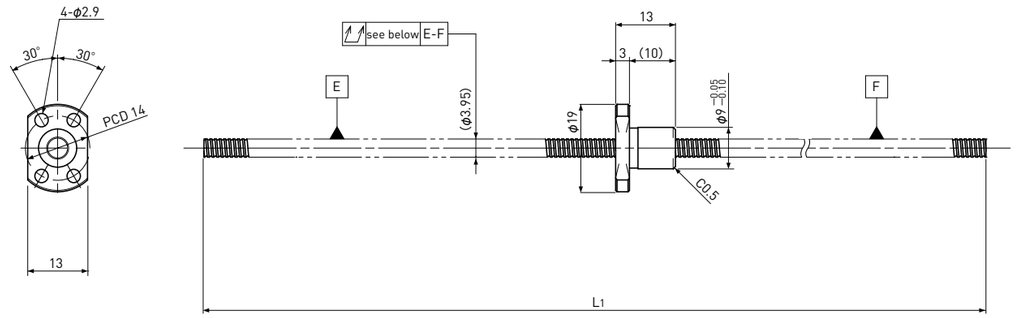
Unit:mm

Ball Screw Model	Travel	Shaft length L_1	L_2	L_3	L_4	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSRT0401-72R105C5	50	72	76	82	105	±0.018	0.035	～0.005	560	790

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0401K | Compact Nut | Shaft dia.ϕ4 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		ϕ0.6
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.4
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

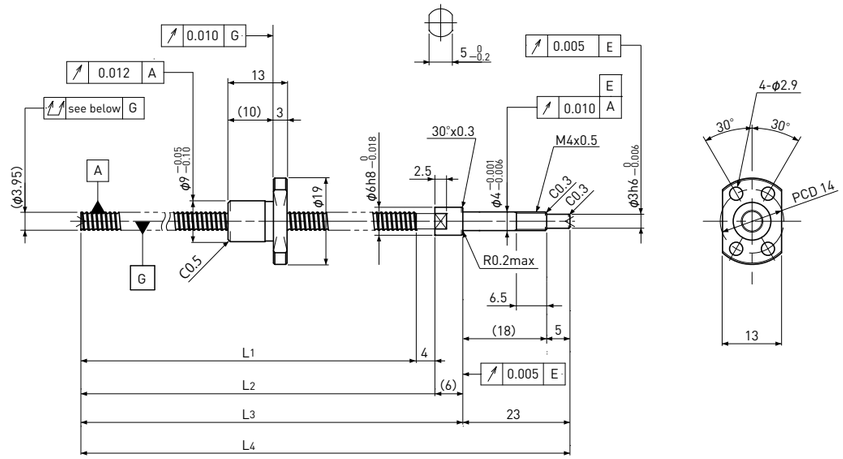
Unit:mm

Ball Screw Model	Travel	Shaft length L_1	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSR0401K-100R100C5	80	100	±0.018	0.035	～0.005	300	430

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

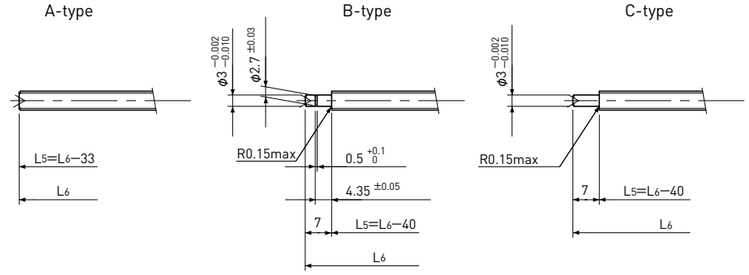
PSRT0401K | Compact Nut | Shaft dia.ϕ4 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		ϕ0.6
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ3.4
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-4CS/4GS
	Fixed-side	:	MSU-4C/4G

D-type : Other than the above.

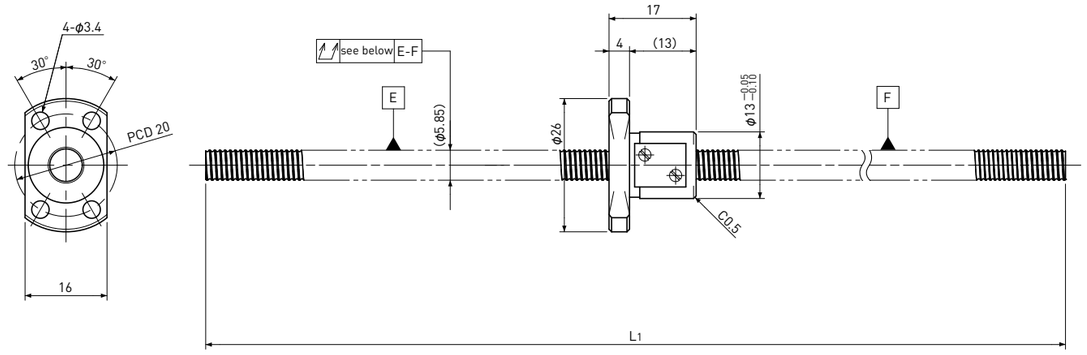
Unit:mm

Ball Screw Model	Travel	Shaft length L_1	L_2	L_3	L_4	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSRT0401K-72R105C5	50	72	76	82	105	±0.018	0.035	～0.005	300	430

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0601 | Shaft dia. ϕ6 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ5.3
Number of circuit		3.7×1
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

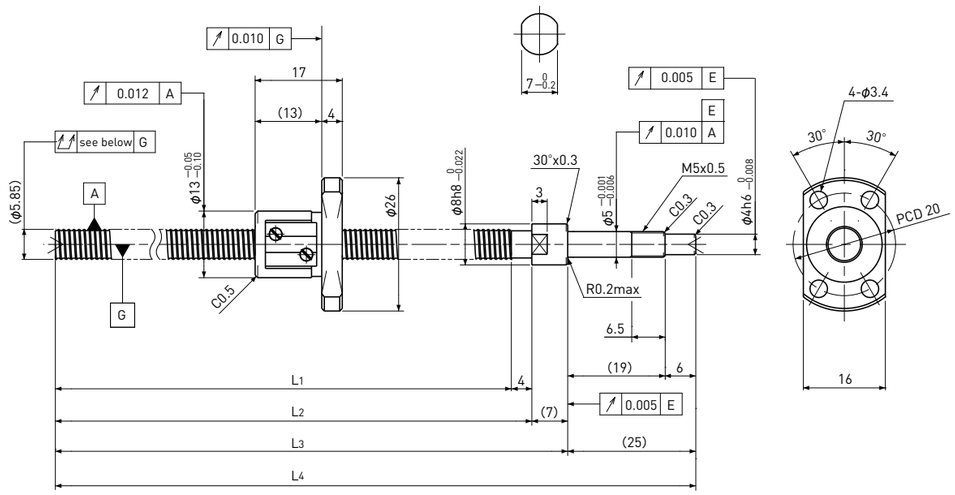
Unit:mm

Ball Screw Model	Travel	Shaft length	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1				Dynamic Ca	Static Coa
PSR0601-200R200C5	175	200	±0.020	0.050	～0.005	680	1200

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

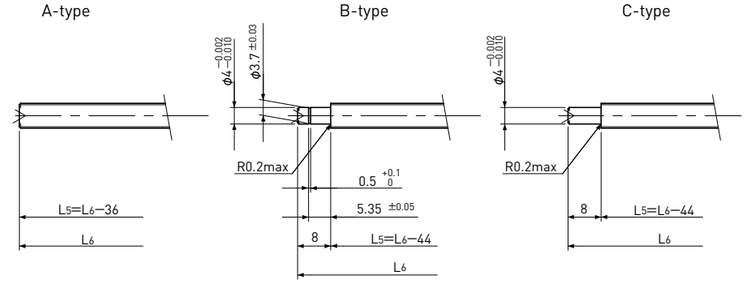
PSRT0601 | Shaft dia. ϕ6 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		ϕ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		ϕ5.3
Number of circuit		3.7×1
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

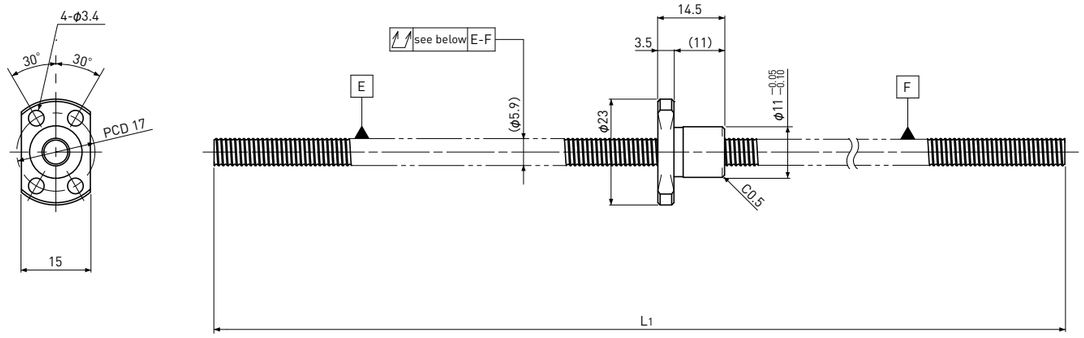
Unit:mm

Ball Screw Model	Travel	Shaft length				Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1	L_2	L_3	L_4				Dynamic Ca	Static Coa
PSRT0601-89R125C5	65	89	93	100	125	±0.018	0.035	～0.005	680	1200

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0601K | Compact Nut | Shaft dia.φ6 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ5.3
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

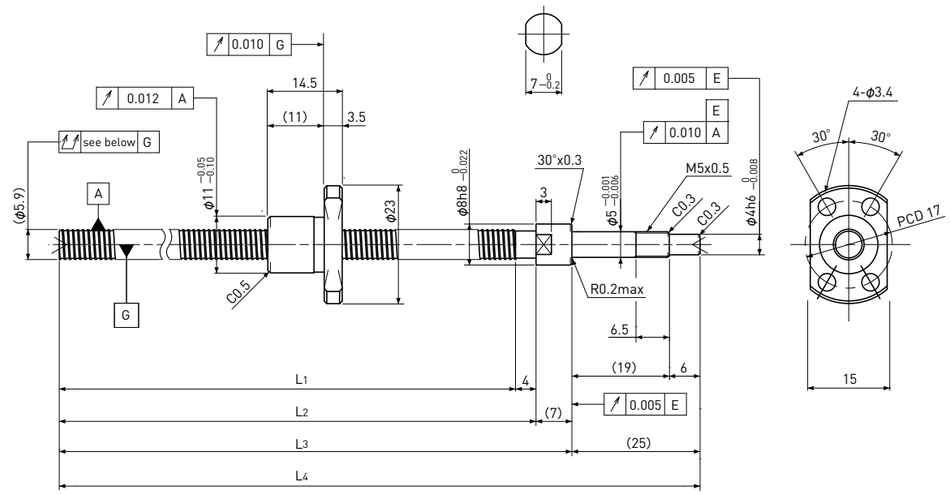
Unit:mm

Ball Screw Model	Travel	Shaft length L1	Travel deviation ep	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSR0601K-200R2000C5	180	200	±0.020	0.050	～0.005	560	950

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

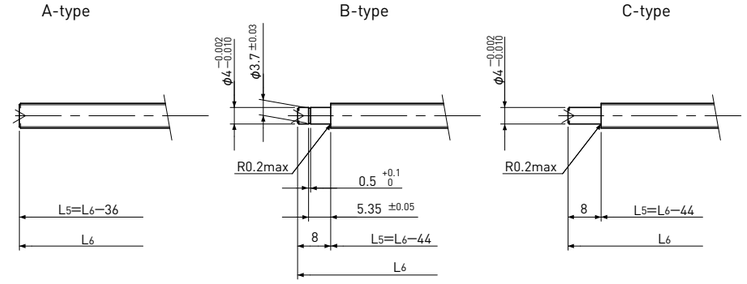
PSRT0601K | Compact Nut | Shaft dia.φ6 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ5.3
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-5CS/5GS
	Fixed-side	:	MSU-5C/5G

D-type : Other than the above.

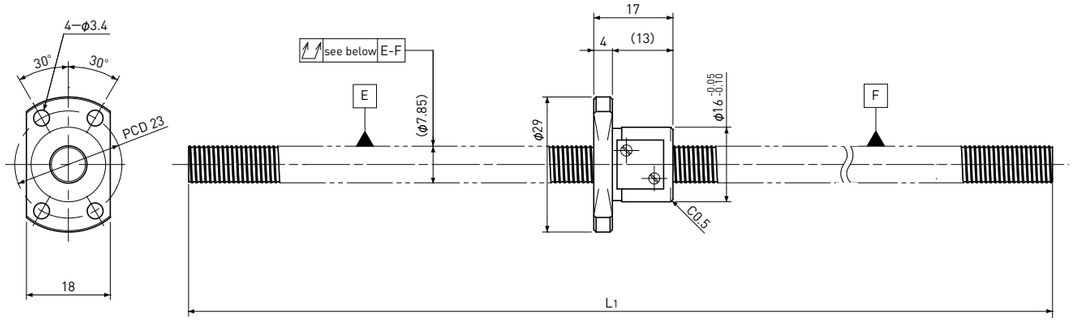
Unit:mm

Ball Screw Model	Travel	Shaft length L1	L2	L3	L4	Travel deviation ep	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSRT0601K-89R125C5	65	89	93	100	125	±0.018	0.035	～0.005	560	950

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0801 | Shaft dia.φ8 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.3
Number of circuit		3.7×1
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

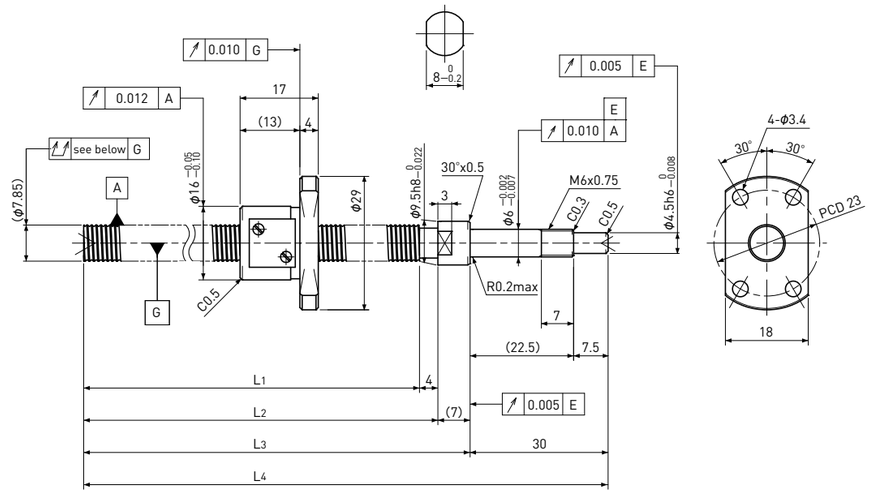
Unit:mm

Ball Screw Model	Travel	Shaft length	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1				Dynamic Ca	Static Coa
PSR0801-230R230C5	205	230	±0.023	0.065	～0.005	780	1650

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

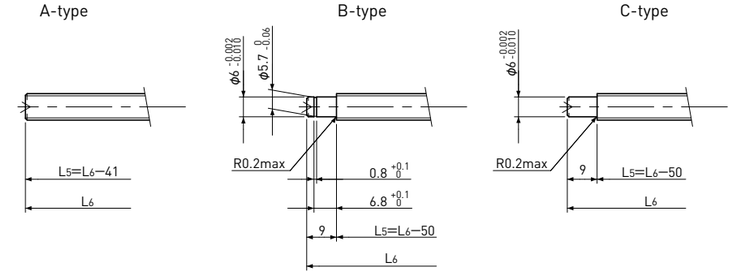
PSRT0801 | Shaft dia.φ8 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.3
Number of circuit		3.7×1
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above

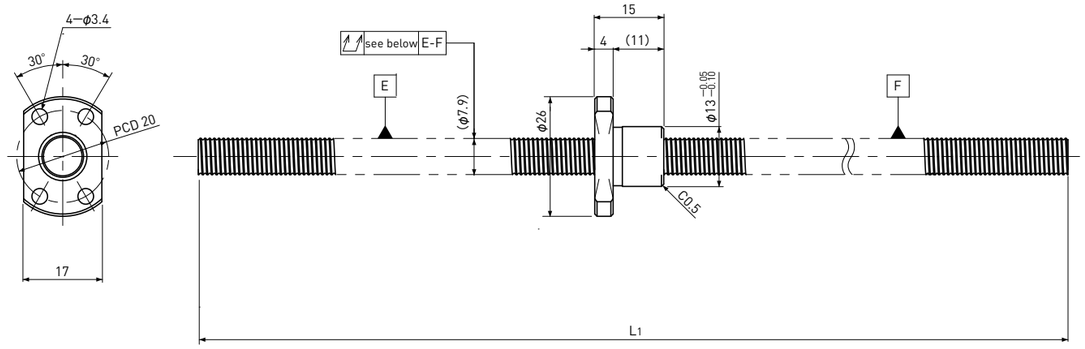
Unit:mm

Ball Screw Model	Travel	Shaft length				Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1	L_2	L_3	L_4				Dynamic Ca	Static Coa
PSRT0801-169R210C5	145	169	173	180	210	±0.020	0.065	～0.005	780	1650

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0801K | Compact Nut | Shaft dia.φ8 Lead 1mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.3
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58∼ (Thread area)
Anti-rust treatment		Anti-rust oil

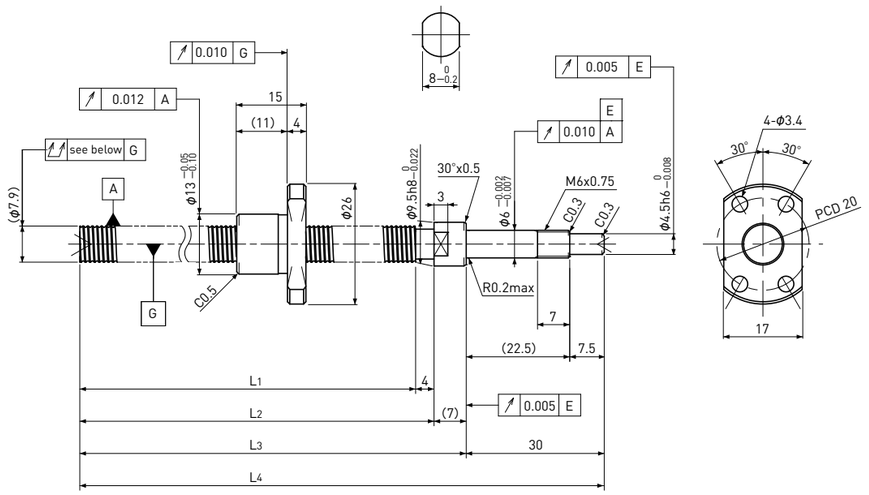
Unit:mm

Ball Screw Model	Travel	Shaft length	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1				Dynamic Ca	Static Coa
PSR0801K-230R230C5	210	230	±0.023	0.065	∼0.005	650	1300

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

PSRT0801K | Compact Nut | Shaft dia.φ8 Lead 1mm | C5

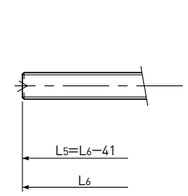


Unit:mm

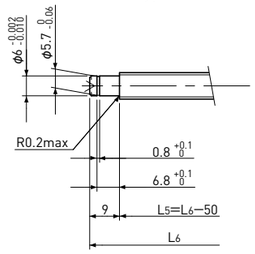
Ball Screw Specifications		
Ball size		φ0.8
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.3
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58∼ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile

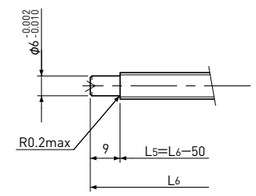
A-type



B-type



C-type



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above

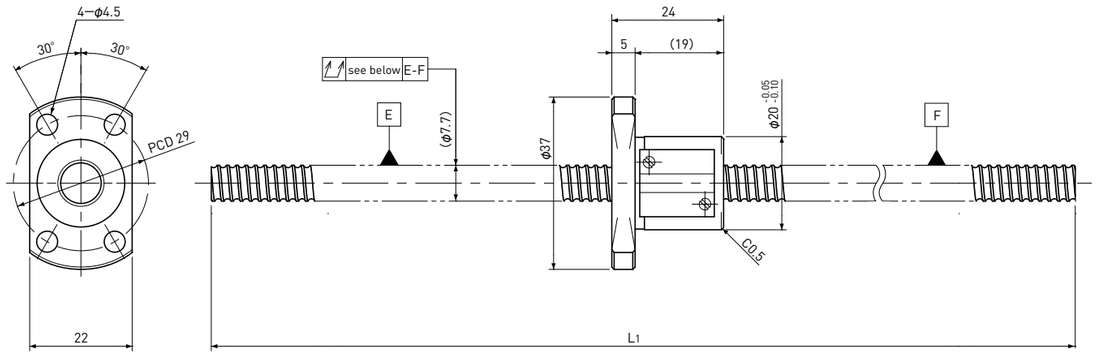
Unit:mm

Ball Screw Model	Travel	Shaft length				Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1	L_2	L_3	L_4				Dynamic Ca	Static Coa
PSRT0801K-169R210C5	145	169	173	180	210	±0.020	0.065	∼0.005	650	1300

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0802 | Shaft dia.φ8 Lead 2mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia.		φ6.6
Number of circuit		3.7×1
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

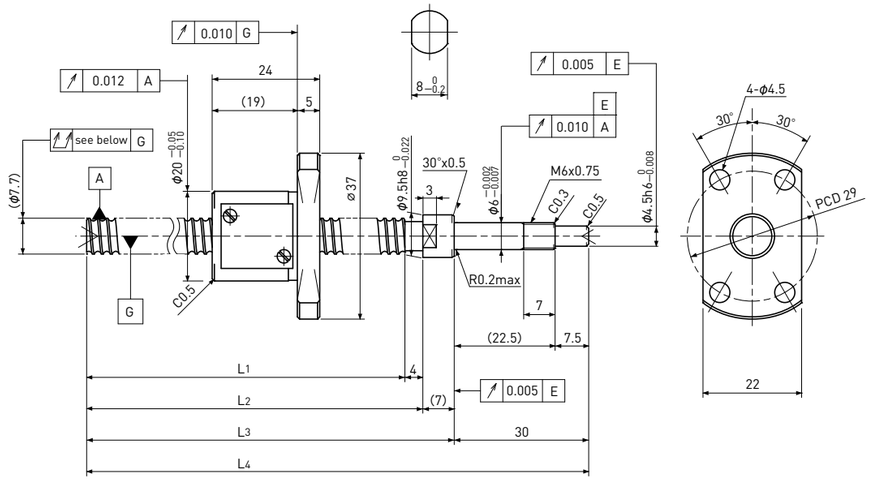
Unit:mm

Ball Screw Model	Travel	Shaft length	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1				Dynamic Ca	Static Coa
PSR0802-230R230C5	200	230	±0.023	0.065	～0.005	2400	4100

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

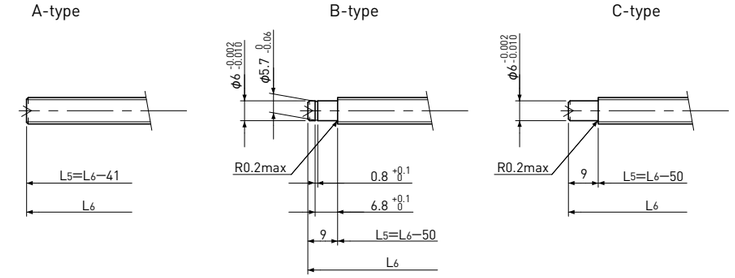
PSRT0802 | Shaft dia.φ8 Lead 2mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		1
Thread direction		Right
Shaft root dia.		φ6.6
Number of circuit		3.7×1
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above

Unit:mm

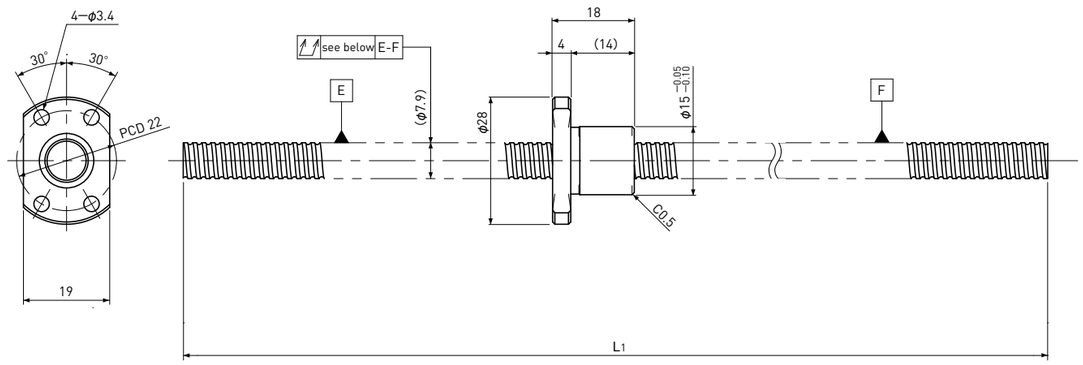
Ball Screw Model	Travel	Shaft length				Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1	L_2	L_3	L_4				Dynamic Ca	Static Coa
PSRT0802-169R210C5	140	169	173	180	210	±0.020	0.065	～0.005	2400	4100

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0802K | Compact Nut | C5

Shaft dia.φ8 Lead 2mm



Unit:mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.0
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

Unit:mm

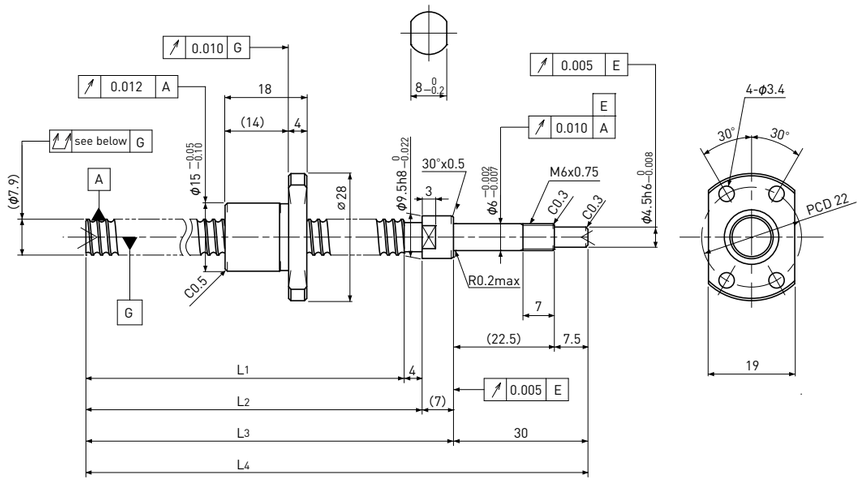
Ball Screw Model	Travel	Shaft length	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1				Dynamic Ca	Static Coa
PSR0802K-230R230C5	205	230	±0.023	0.065	～0.005	1300	2300

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

PSRT0802K | Compact Nut | C5

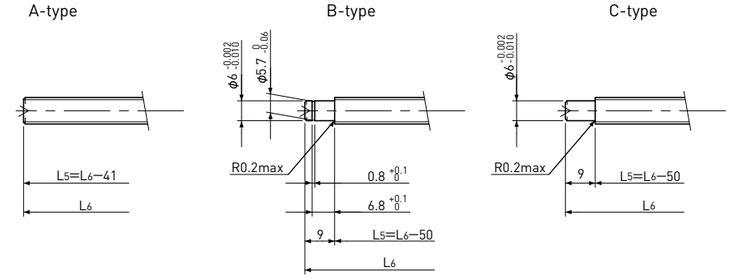
Shaft dia.φ8 Lead 2mm



Unit:mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ7.0
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above

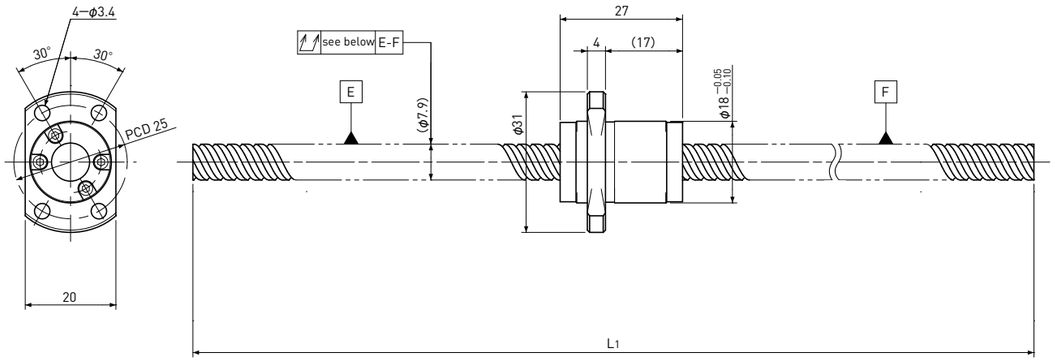
Unit:mm

Ball Screw Model	Travel	Shaft length				Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1	L_2	L_3	L_4				Dynamic Ca	Static Coa
PSRT0802K-169R210C5	145	169	173	180	210	±0.020	0.065	～0.005	1300	2300

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR0812 | Shaft dia.φ8 Lead 12mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		2
Thread direction		Right
Shaft root dia.		φ6.7
Number of circuit		1.6×2
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

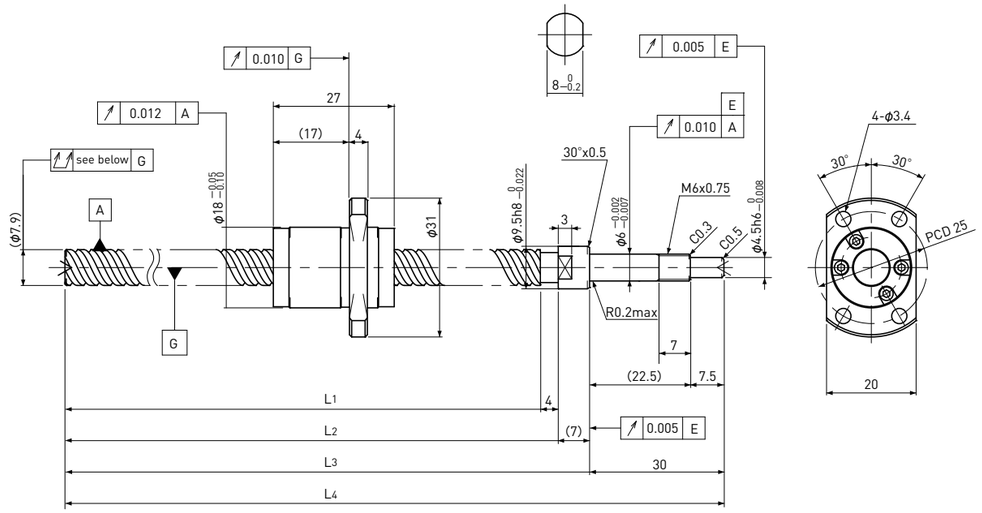
Unit:mm

Ball Screw Model	Travel	Shaft length	Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1				Dynamic Ca	Static Coa
PSR0812-230R230C5	195	230	±0.023	0.065	～0.005	2200	4000

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

PSRT0812 | Shaft dia.φ8 Lead 12mm | C5

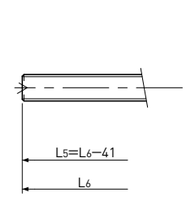


Unit:mm

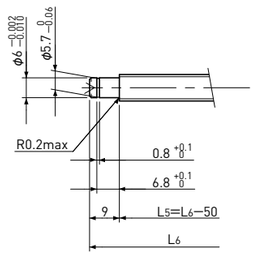
Ball Screw Specifications		
Ball size		φ1.5875
Number of thread		2
Thread direction		Right
Shaft root dia.		φ6.7
Number of circuit		1.6×2
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile

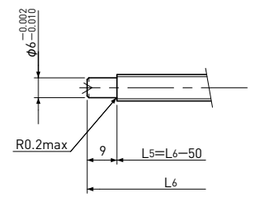
A-type



B-type



C-type



L_5:Thread length after end-journal machining.
L_6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-6CS/6GS
	Fixed-side	:	MSU-6C/6G

D-type : Other than the above.

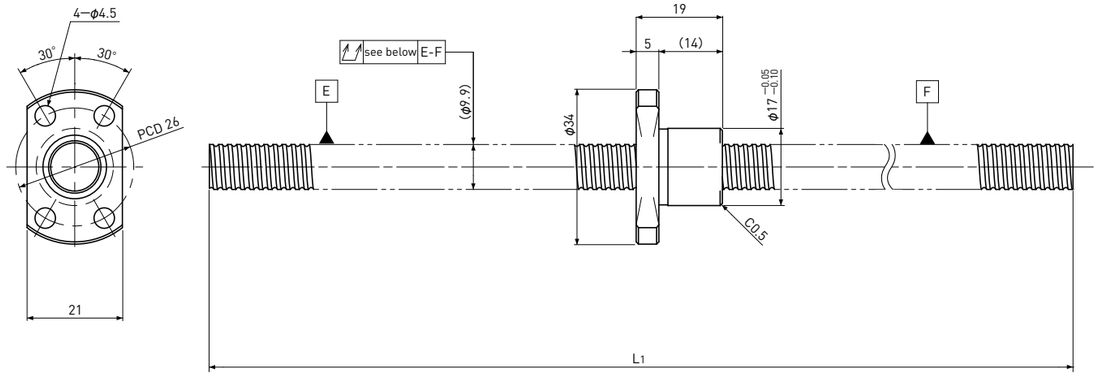
Unit:mm

Ball Screw Model	Travel	Shaft length				Travel deviation e_p	Total Run-out	Axial play	Basic Load Rating N	
		L_1	L_2	L_3	L_4				Dynamic Ca	Static Coa
PSRT0812-169R210C5	135	169	173	180	210	±0.020	0.065	～0.005	2200	4000

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR1002K | Compact Nut | Shaft dia.φ10 Lead 2mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ9.0
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

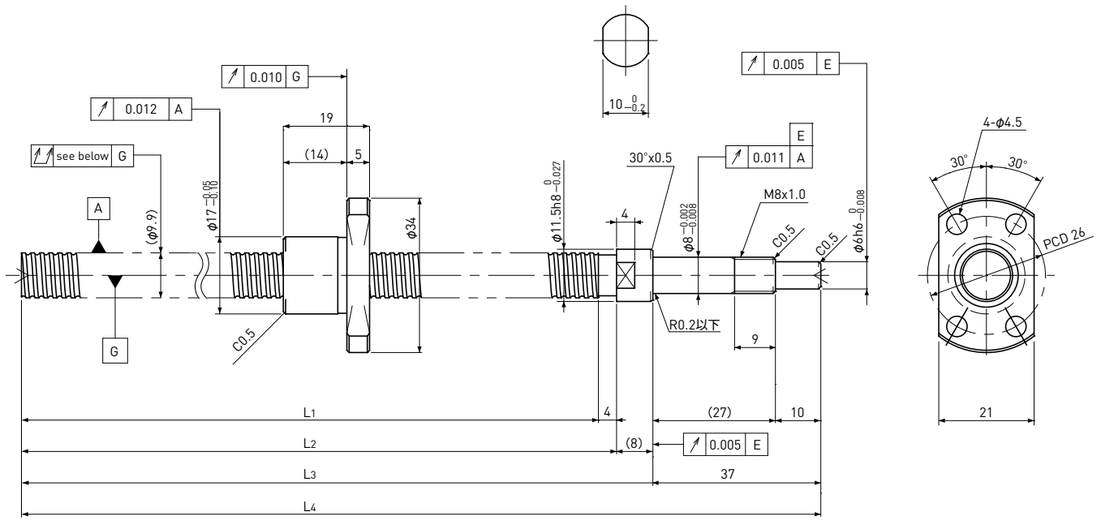
Unit:mm

Ball Screw Model	Travel	Shaft length L1	Travel deviation ep	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSR1002K-230R230C5	205	230	±0.023	0.055	～0.005	1450	3000

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

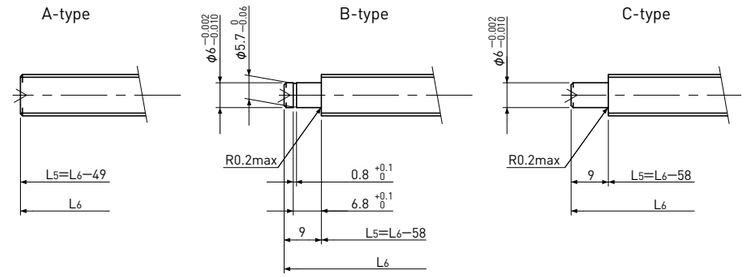
PSRT1002K | Compact Nut | Shaft dia.φ10 Lead 2mm | C5



Unit:mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ9.0
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



L5:Thread length after end-journal machining.
L6:Total length after end-journal machining.

Support-unit Recommendation			
	Supported-side	:	MSU-8CS/8GS
	Fixed-side	:	MSU-8C/8G

D-type : Other than the above.

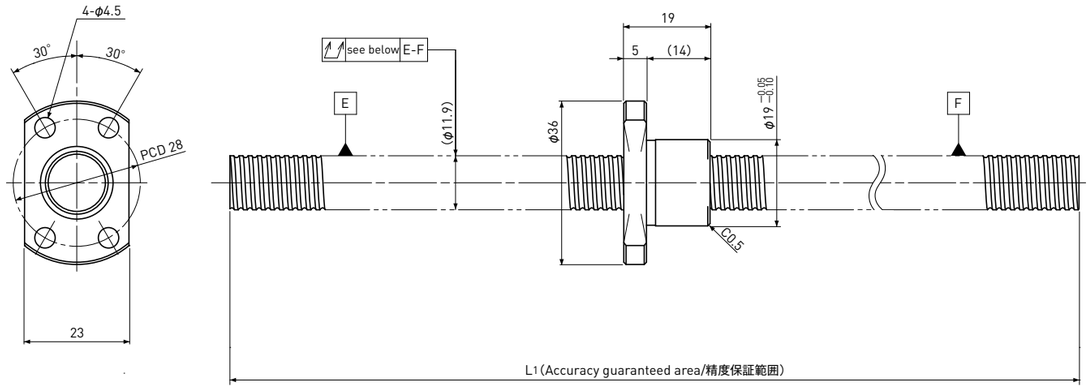
Unit:mm

Ball Screw Model	Travel	Shaft length L1	L2	L3	L4	Travel deviation ep	Total Run-out	Axial play	Basic Load Rating N Dynamic Ca	Basic Load Rating N Static Coa
PSRT1002K-201R250C5	175	201	205	213	250	±0.023	0.055	～0.005	1450	3000

Note) Please refer to page A321 for order code of end-journal machining.

Standard products in stock PSR series

PSR1202K | Compact Nut Shaft dia.φ12 Lead 2mm | C5



Unit : mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ11.0
Number of circuit		1×3
Material	Shaft	S55C
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Anti-rust treatment		Anti-rust oil

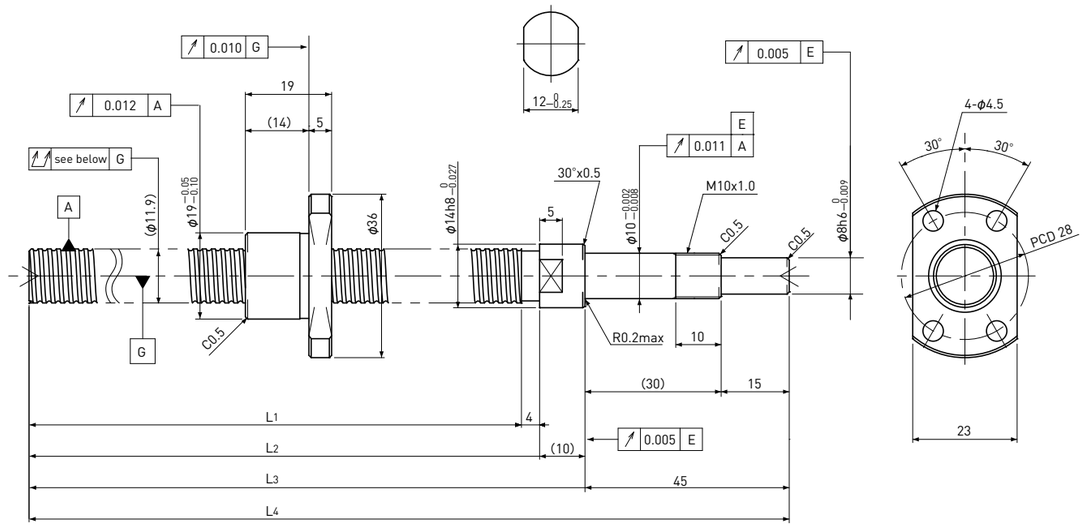
Unit : mm

Ball Screw Model	Travel	Shaft length	Travel deviation	Total Run-out	Axial play	Basic Load Rating N	
		L_1	e_p			Dynamic Ca	Static Coa
PSR1202K-280R280C5	255	280	±0.023	0.055	～0.005	1600	3700

Note) Please dsignate end-journal profile with your sketch.

Standard products in stock PSRT series

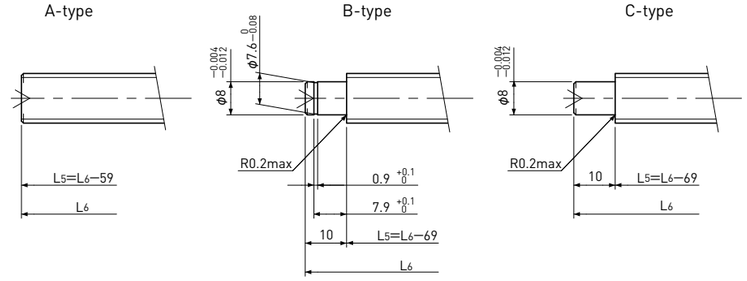
PSRT1202K | Compact Nut Shaft dia.φ12 Lead 2mm | C5



Unit : mm

Ball Screw Specifications		
Ball size		φ1.2
Number of thread		1
Thread direction		Right
Shaft root dia.		φ11.0
Number of circuit		1×3
Material	Shaft	S55C+SUS303
	Nut	SCM415H
Surface hardness		HRC58～ (Thread area)
Lubrication		KSS Original Grease MSG No.2

Supported-side end-journal profile



Support-unit Recommendation			
	Supported-side	:	—
	Fixed-side	:	—

D-type : Other than the above.

Unit : mm

Ball Screw Model	Travel	Shaft length				Travel deviation	Total Run-out	Axial play	Basic Load Rating N	
		L_1	L_2	L_3	L_4	e_p			Dynamic Ca	Static Coa
PSRT1202K-271R330C5	245	271	275	285	330	±0.023	0.065	～0.005	1600	3700

Note) Please refer to page A321 for order code of end-journal machining.

Customized products

In order to meet the needs of customer's requested design, we offer customized products.
To reduce design process at customer, each Nut type is standardized.

●Variety of Customized products

Customized Precision Ball Screws and Rolled Ball Screws are both standardized in Ball Nut dimension only.
Please refer to following description about Standardized Ball Nut type. If you need special Ball Nut other than below, feel free to ask KSS.
KSS will provide with required Ball Nut as a special order.

●Single Nut with Flange

Precision & Rolled Ball Screws

It is the most simple Single Nut type. Normally Ball Screws are used with small Axial play, but using oversized Balls allows the application of light preloading and eliminates backlash(only Precision grade). Nut should be mounted using bolt holes in Flange. FBS, MRB(Return-plate), FKB(Internal-deflector), FDB(End-deflector), FEB (End-cap) circulation system can be distinguished. Please refer to dimension table.

●Sleeve type Single Nut

Precision & Rolled Ball Screws

It is Cylindrical Single Nut which is compact. Alike Single Nut with Flange, Axial play can be eliminated(only Precision grade). The Nut should be mounted by clamping on the key way on the Nut outer and Nut end surface.

●Single Nut with M-thread

Precision & Rolled Ball Screws

The Cylindrical type with M-thread at the Nut end. The Nut should be mounted using M-thread. It is suitable for mounting with cylinder.

●Square type Single Nut

Precision Ball Screws only

The Square Nut is finished with a large mounting face parallel to the Nut center.
Nut itself has Housing function. This allows more compact design compared to Flange type.

●Bi-directional Nut with Flange

Precision Ball Screws only

Since there are both Right-handed thread and Left-handed thread on a Shaft, it has Bi-directional function.
Single Nut with Flange type is standardized, but it is also possible to manufacture Sleeve type Nut. In addtion, absolute positon control for both Nut is available.

●Others

Double Nut with Flange

KSS can provide Double Nut style as one of choices for pre-loaded Ball Screws as special customized products.
Please ask KSS representative if necessary.

Sleeve type Double Nut

●Model number notation

FBS 04 01 B – 100 R 120 C3 – 05
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①Ball Nut type No.
FBS : Precision Ball Screws Single Nut with Flange
BS : Precision Ball Screws Sleeve type Single Nut
MS : Precision Ball Screws Single Nut with M-thread
KS : Precision Ball Screws Square type Single Nut

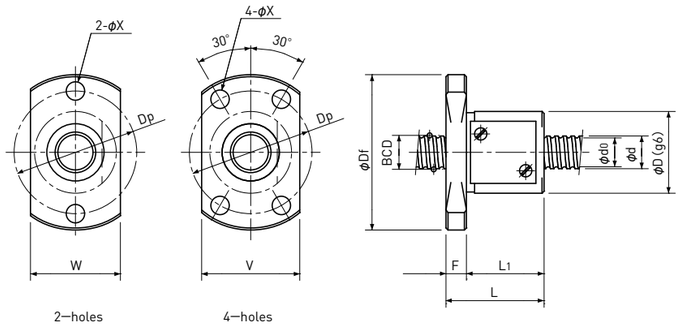
MRB : Rolled Ball Screws Single Nut with Flange
BSR : Rolled Ball Screws Sleeve type Single Nut
MSR : Rolled Ball Screws Single Nut with M-thread
②Screw Shaft nominal diameter(mm)
③Lead(mm)
④Re-circulation number(In detail refer to dimension table)
⑤Screw thread length(mm)
⑥Thread direction(R=Right-hand, L=Left-hand)
⑦Screw shaft total length(mm)
⑧Accuracy grade(C0,C1,C3,C5,C7,C10)
⑨Axial play(μm)

●Precaution

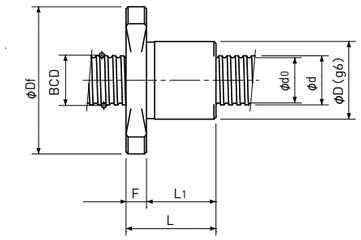
- Please refer to dimension table of each model regarding dimension, Load Rating, Rigidity.
- Please refer to Technical Description in page A801 regarding Accuracy, Axial play, Material, production range and so on.
- Shaft configuration, Shaft dimension of Customized products are not standardized.
  KSS will create a Drawing based on customer's specifications.
- When designing Shaft configuration, fixed end or supported end (in case of Bi-directional Ball Screws and Rolled Ball Screw, both ends) should be smaller than Shaft Root diameter due to Nut assemble.
- Please refer to「Precaution of storage, handling, and operating」in page A901 in detail other than the above.

Single Nut with Flange

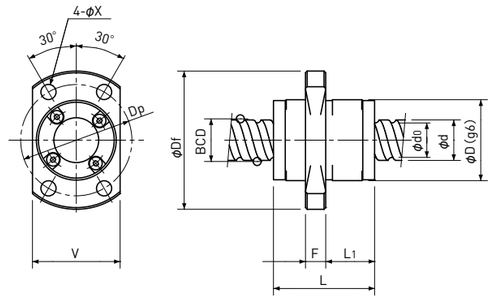
Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or
End-deflector type



Type-3:End-cap type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X		
FBS 01800.5 A	1.8	0.5	0.4	1.95	4°40′	1.5	2.7×1	110 / —	130 / —	19 / —		1	6	14	8.5	7	1.5	8	—	10	2.4		FBS 01800.5 A
FBS 0300.5 A	3	0.5	0.4	3.10	2°56′	2.6	2.7×1	150 / —	220 / —	29 / —		1	8	16	11	8	3	8	—	12	2.4		FBS 0300.5 A
FBS 0301 B	3	1	0.6	3.18	5°43′	2.4	3.7×1	330 / —	440 / —	42 / —		1	9	19	14	11	3	11	—	14	2.9		FBS 0301 B
FBS 0400.5 A	4	0.5	0.4	4.10	2°13′	3.6	2.7×1	160 / —	290 / —	36 / —		1	10	20	13	10	3	12	—	15	2.9		FBS 0400.5 A
FKB 0401 A	4	1	0.6	4.15	4°23′	3.4	1×3	300 / 300	430 / 430	38 / 59		2	9	19	13	10	3	11	13	14	2.9		FKB 0401 A
FBS 0401 A	4	1	0.8	4.15	4°23′	3.3	2.7×1	420 / 270	570 / 290	40 / 34		1	10	20	12	9	3	12	14	15	2.9		FBS 0401 A
FBS 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7×1	560 / 350	790 / 400	54 / 45		1	11	23	17	13	4	13	15	17	3.4		FBS 0401 B
FBS 0402 A	4	2	0.8	4.15	8°43′	3.3	2.7×1	420 / 260	570 / 290	39 / 33		1	11	23	19	15	4	13	15	17	3.4		FBS 0402 A
FEB 0404 A	4	4	0.8	4.2	16°51′	3.3	2.6×2	750 / —	1150 / —	73 / —		3	11	23	17.5	11	3	—	15	17	3.4		FEB 0404 A
FEB 0408 A	4	8	0.6	4.15	31°32′	3.4	1.7×4	590 / —	1110 / —	78 / —		3	11	23	20	12	3	—	15	17	3.4		FEB 0408 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

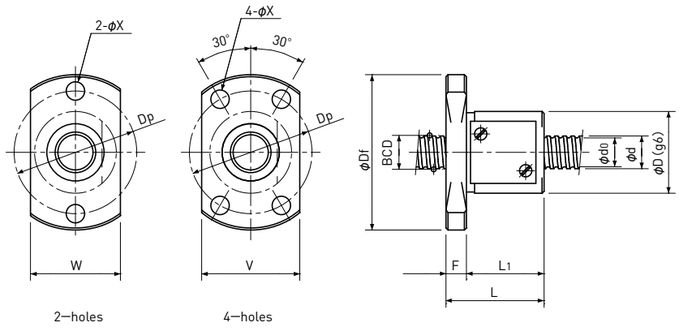
Preload type

Backlash type

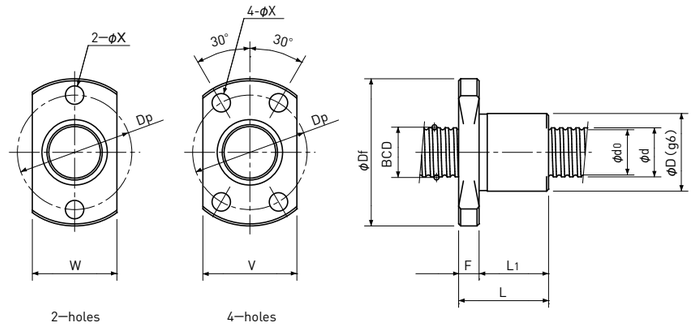
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS. Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions. Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca. Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca. For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X		
FBS 0500.5 A	5	0.5	0.4	5.10	1°47′	4.6	2.7×1	180 / —	370 / —	44 / —		1	11	23	13	10	3	13	—	17	3.4		FBS 0500.5 A
FKB 0501 A	5	1	0.6	5.15	3°32′	4.4	1×3	330 / 330	560 / 560	45 / 70		2	10	20	13	10	3	12	14	15	2.9		FKB 0501 A
FBS 0501 B	5	1	0.8	5.15	3°32′	4.3	3.7×1	630 / 400	1000 / 500	65 / 55		1	12	24	17	13	4	14	15	18	3.4		FBS 0501 B
FBS 0504 A	5	4	0.8	5.15	13°53′	4.3	2.7×1	470 / 300	720 / 360	47 / 39		1	12	24	22	18	4	14	15	18	3.4		FBS 0504 A

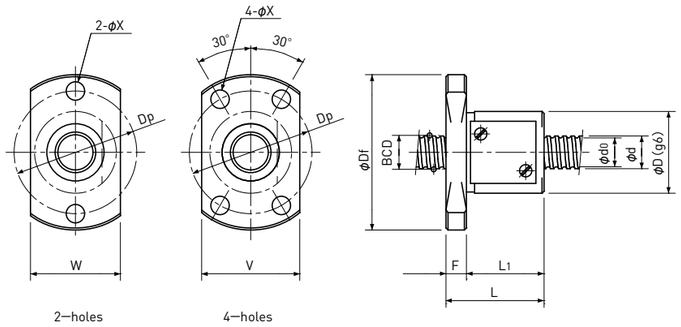
Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type
Backlash type

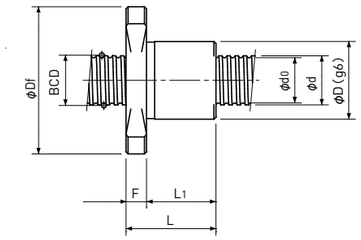
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

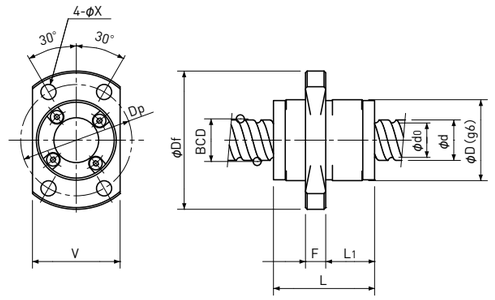
Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or
End-deflector type



Type-3:End-cap type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X		
FBS 0600.5 A	6	0.5	0.4	6.10	1°30′	5.6	2.7×1	190 / —	440 / —	50 / —		1	12	25	13	10	3	14	—	19	3.4		FBS 0600.5 A
FKB 0601 A	6	1	0.8	6.20	2°56′	5.3	1×3	560 / 560	950 / 950	55 / 86		2	11	23	14.5	11	3.5	13	15	17	3.4		FKB 0601 A
FBS 0601 B	6	1	0.8	6.15	2°58′	5.3	3.7×1	680 / 430	1200 / 610	75 / 63		1	13	28	17	13	4	15	17	21.5	3.4		FBS 0601 B
FBS 0601.5 B	6	1.5	1.0	6.20	4°24′	5.1	3.7×1	980 / 620	1600 / 800	79 / 67		1	14	28	19	15	4	16	17	22	3.4		FBS 0601.5 B
FBS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750 / 470	1200 / 590	58 / 49		1	15	29	17	13	4	17	18	23	3.4		FBS 0602 A
FBS 0602.5 A	6	2.5	1.0	6.20	7°19′	5.1	2.7×1	750 / 470	1200 / 590	59 / 49		1	15	29	18	14	4	17	18	23	3.4		FBS 0602.5 A
FEB 0606 A	6	6	1.0	6.30	16°52′	5.2	1.6×2	870 / —	1450 / —	67 / —		3	14	27	17	8	4	—	16	21	3.4		FEB 0606 A
FEB 0610 A	6	10	1.2	6.30	26°48′	5.0	1.2×2	950 / —	1600 / —	50 / —		3	14	27	23	11.5	4	—	16	21	3.4		FEB 0610 A
FEB 0612 A	6	12	1.2	6.30	31°13′	5.0	0.7×2	600 / —	950 / —	29 / —		3	14	27	16	8.3	4	—	16	21	3.4		FEB 0612 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type

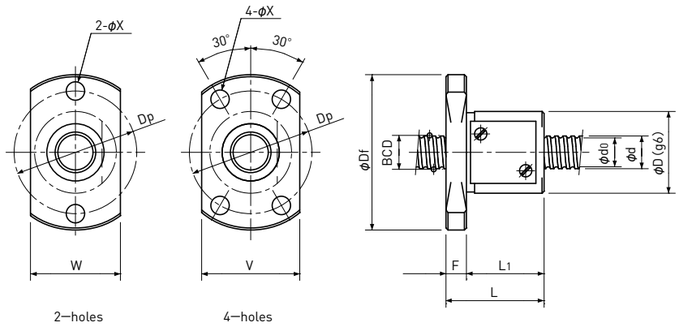
Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

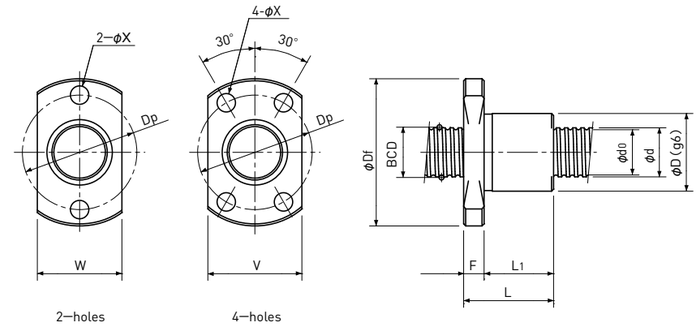
Precision Ball Screws

Single Nut with Flange

Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X		
FBS 0800.5 A	8	0.5	0.4	8.10	1°08′	7.6	2.7×1	220 / —	590 / —	64 / —		1	14	27	13	10	3	16	—	21	3.4		FBS 0800.5 A
FKB 0801 A	8	1	0.8	8.20	2°13′	7.3	1×3	650 / 650	1300 / 1300	70 / 109		2	13	26	15	11	4	15	17	20	3.4		FKB 0801 A
FBS 0801 B	8	1	0.8	8.15	2°15′	7.3	3.7×1	780 / 490	1650 / 820	95 / 80		1	16	30	17	13	4	18	18	24	3.4		FBS 0801 B
FKB 0801.5 A	8	1.5	1.0	8.30	3°18′	7.2	1×3	890 / 890	1650 / 1650	73 / 113		2	15	28	20	16	4	17	19	22	3.4		FKB 0801.5 A
FBS 0801.5 B	8	1.5	1.0	8.20	3°20′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		1	16	30	19	15	4	18	18	24	3.4		FBS 0801.5 B
FKB 0802 A	8	2	1.2	8.30	4°23′	7.0	1×3	1300 / 1300	2300 / 2300	77 / 121		2	15	28	18	14	4	17	19	22	3.4		FKB 0802 A
FBS 0802 B(1)	8	2	1.0	8.20	4°26′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		1	16	30	21	17	4	18	18	24	3.4		FBS 0802 B(1)
FBS 0802 B(2)	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 94		1	20	38	24	19	5	22	23	30	4.5		FBS 0802 B(2)

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

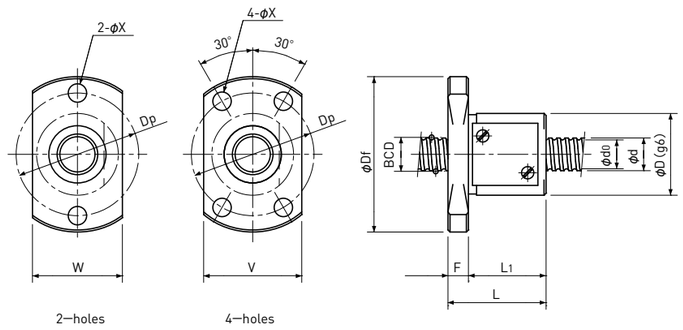
Preload type

Backlash type

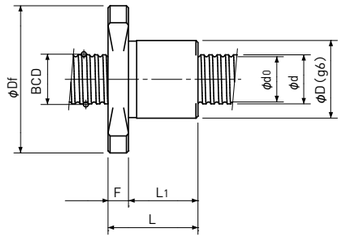
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS. Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions. Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca. Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca. For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

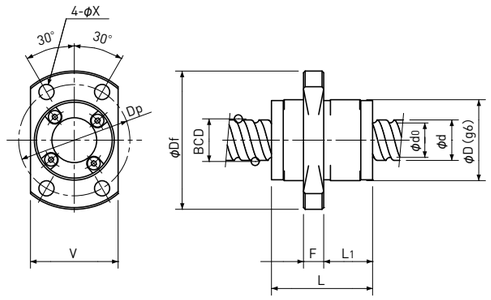
Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or
End-deflector type



Type-3:End-cap type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
FDB 0802.5 A	8	2.5	1.5875	8.00	5°41′	6.3	2.7×1	1850 / —	3000 / —	80 / —		2	16	29	16	12	4	—	18	23	3.4	FDB 0802.5 A
FBS 0802.5 B	8	2.5	1.5875	8.30	5°29′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 93		1	20	38	26	21	5	22	23	30	4.5	FBS 0802.5 B
FBS 0803 A	8	3	2.0	8.30	6°34′	6.2	2.7×1	2600 / 1650	4200 / 2100	85 / 70		1	20	38	25	20	5	22	23	30	4.5	FBS 0803 A
FBS 0804 A	8	4	2.0	8.30	8°43′	6.2	2.7×1	2600 / 1650	4200 / 2100	84 / 70		1	21	39	28	23	5	23	23	31	4.5	FBS 0804 A
FBS 0805 A	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850 / 1150	3000 / 1500	82 / 67		1	18	31	28	24	4	20	20	25	3.4	FBS 0805 A
FEB 0808 A	8	8	1.5875	8.40	16°52′	6.7	1.6×2	2200 / —	3800 / —	95 / —		3	18	31	20	10	4	—	20	25	3.4	FEB 0808 A
FEB 0810 A	8	10	1.5875	8.40	20°45′	6.7	1.6×2	2200 / —	3900 / —	92 / —		3	18	31	24	13	4	—	20	25	3.4	FEB 0810 A
FEB 0812 A	8	12	1.5875	8.40	24°27′	6.7	1.6×2	2200 / —	4000 / —	90 / —		3	18	31	27	17	4	—	20	25	3.4	FEB 0812 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

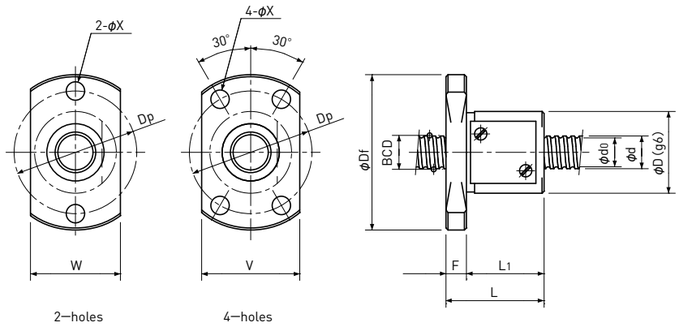
Preload type

Backlash type

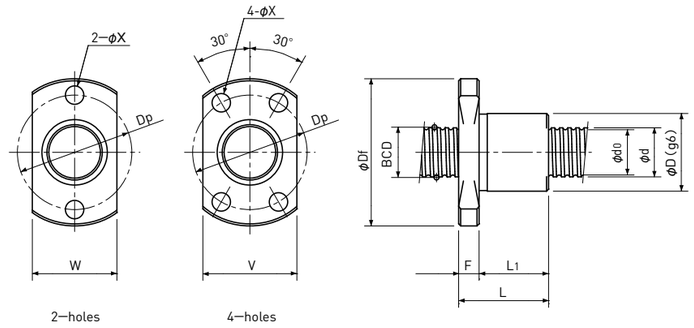
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X		
FKB 1001 A	10	1	0.8	10.20	1°47′	9.3	1×3	720 / 720	1650 / 1650	84 / 131		2	15	28	15	11	4	17	19	22	3.4		FKB 1001 A
FBS 1001 B	10	1	0.8	10.15	1°48′	9.3	3.7×1	840 / 530	2000 / 1000	113 / 95		1	19	37	18	13	5	21	22	29	4.5		FBS 1001 B
FKB 1001.5 A	10	1.5	1.0	10.30	2°39′	9.2	1×3	990 / 990	2100 / 2100	87 / 136		2	17	34	21	16	5	19	21	26	4.5		FKB 1001.5 A
FBS 1001.5 B	10	1.5	1.0	10.20	2°41′	9.1	3.7×1	1250 / 790	2800 / 1400	120 / 101		1	19	37	20	15	5	21	22	29	4.5		FBS 1001.5 B
FKB 1002 A	10	2	1.2	10.30	3°32′	9.0	1×3	1450 / 1450	3000 / 3000	93 / 144		2	17	34	19	14	5	19	21	26	4.5		FKB 1002 A
FBS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700 / 1750	5300 / 2700	134 / 112		1	23	41	24	19	5	25	25	33	4.5		FBS 1002 B
FKB 1002.5 A	10	2.5	1.5875	10.40	4°23′	8.7	1×3	2100 / 2100	3800 / 3800	96 / 150		2	18	35	21	16	5	20	22	27	4.5		FKB 1002.5 A
FBS 1002.5 B	10	2.5	1.5875	10.30	4°25′	8.6	3.7×1	2700 / 1750	5300 / 2700	133 / 112		1	24	44	27	21	6	26	27	35	5.5		FBS 1002.5 B

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

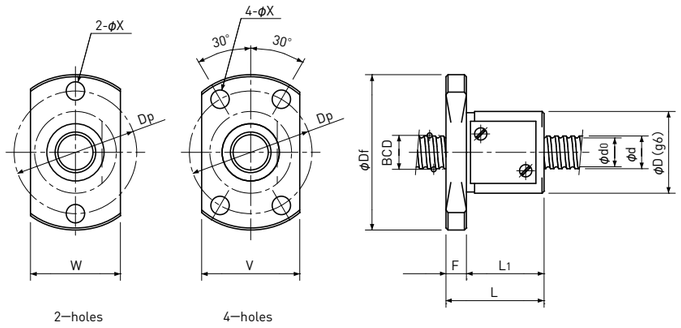
Preload type

Backlash type

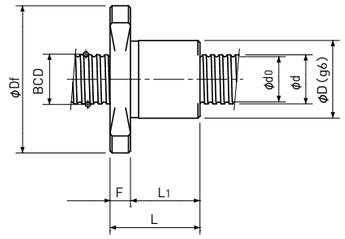
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS. Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions. Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca. Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca. For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

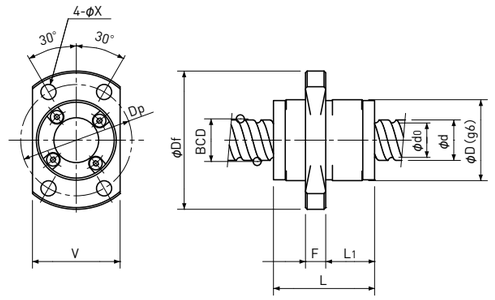
Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or
End-deflector type



Type-3:End-cap type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
FBS 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900 / 2500	7200 / 3600	140 / 118		1	24	44	30	24	6	26	27	35	5.5	FBS 1003 B
FBS 1004 A	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000 / 1800	5200 / 2600	104 / 86		1	24	44	29	23	6	26	27	35	5.5	FBS 1004 A
FDB 1005 A	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / —	5200 / —	103 / —		2	23	40	26	21	5	—	25	32	4.5	FDB 1005 A
FBS 1005 A	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / 1800	5200 / 2600	103 / 85		1	24	44	34	28	6	26	27	35	5.5	FBS 1005 A
FEB 1010 A	10	10	2.0	10.50	16°52′	8.4	1.6×2	3300 / —	5900 / —	117 / —		3	23	40	24	13	5	—	25	32	4.5	FEB 1010 A
FEB 1015 A	10	15	2.0	10.50	24°27′	8.4	1.6×2	3300 / —	6400 / —	110 / —		3	23	40	33	22	5	—	25	32	4.5	FEB 1015 A
FEB 1020 A	10	20	1.5875	10.40	31°28′	8.7	0.7×4	2100 / —	4000 / —	88 / —		3	20	37	23	13	5	—	22	29	4.5	FEB 1020 A
FEB 1030 A	10	30	1.5875	10.40	42°33′	8.7	0.7×4	2100 / —	4000 / —	76 / —		3	20	37	31.5	21.7	5	—	22	29	4.5	FEB 1030 A

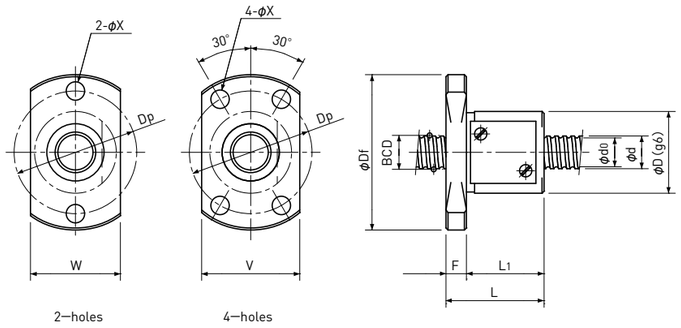
Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type
Backlash type

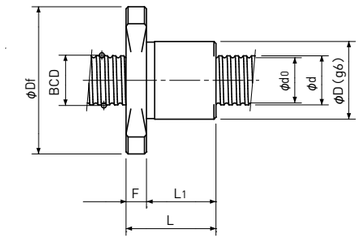
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

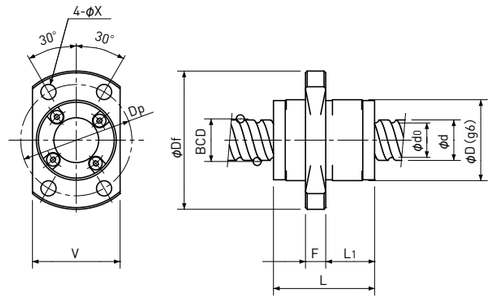
Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or
End-deflector type



Type-3:End-cap type or End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
FKB 1201 A	12	1	0.8	12.20	1°30′	11.3	1×3	780 / 780	2000 / 2000	97 / 152		2	17	34	16	11	5	19	21	26	4.5	FKB 1201 A
FBS 1201 B	12	1	0.8	12.15	1°30′	11.3	3.7×1	910 / 570	2400 / 1200	131 / 110		1	22	40	18	13	5	24	24	32	4.5	FBS 1201 B
FKB 1202 A	12	2	1.2	12.30	2°58′	11.0	1×3	1600 / 1600	3700 / 3700	109 / 169		2	19	36	19	14	5	21	23	28	4.5	FKB 1202 A
FBS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000 / 1900	6400 / 3200	156 / 132		1	25	45	25	19	6	27	27	36	5.5	FBS 1202 B
FKB 1202.5 A	12	2.5	1.5875	12.40	3°41′	10.7	1×3	2300 / 2300	4700 / 4700	112 / 174		2	20	37	21	16	5	22	24	29	4.5	FKB 1202.5 A
FBS 1202.5 B	12	2.5	1.5875	12.30	3°42′	10.6	3.7×1	3000 / 1850	6400 / 3200	156 / 130		1	26	46	27	21	6	28	28	37	5.5	FBS 1202.5 B
FKB 1203 A	12	3	2.0	12.50	4°22′	10.4	1×3	3100 / 3100	5700 / 5700	115 / 179		2	22	41	32	26	6	24	26	32	5.5	FKB 1203 A
FBS 1203 B	12	3	2.0	12.30	4°26′	10.2	3.7×1	4300 / 2800	8700 / 4300	162 / 137		1	28	48	30	24	6	30	30	39	5.5	FBS 1203 B
FBS 1204 B	12	4	2.381	12.30	5°55′	9.8	3.7×1	5400 / 3400	10200 / 5100	165 / 139		1	28	48	33	27	6	30	30	39	5.5	FBS 1204 B
FBS 1205 A	12	5	2.381	12.30	7°22′	9.8	2.7×1	4100 / 2500	7400 / 3700	122 / 101		1	28	48	33	27	6	30	30	39	5.5	FBS 1205 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

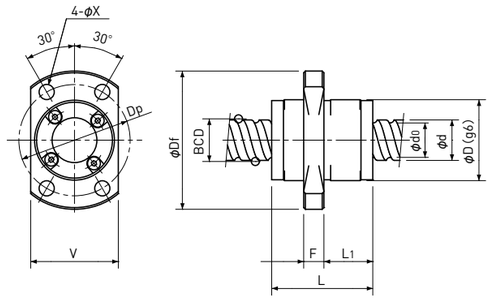
Preload type

Backlash type

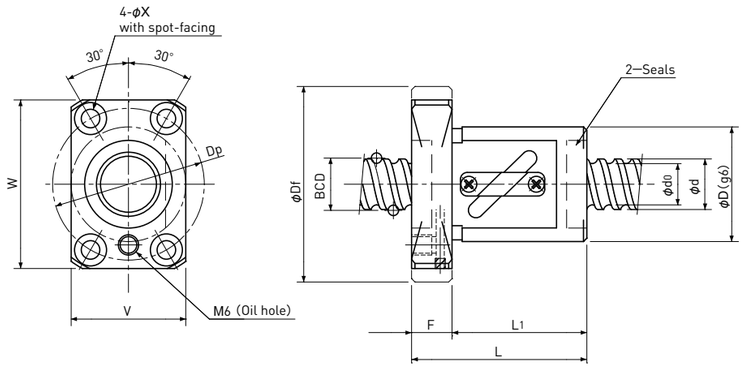
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS. Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions. Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca. Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca. For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

Backlash type/Preload type



Type-3:End-cap type or End-deflector type



Type-4:Return-tube type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
FEB 1210 A	12	10	2.381	12.65	14°07′	10.2	1.7×2	5100 / —	9800 / —	152 / —		3	24	41	30	14.5	6	—	26	33	4.5	FEB 1210 A
FBS 1210 T	12	10	2.381	12.65	14°07′	10.2	2.5×1	3800 / 2350	7100 / 3350	113 / 93		4	30	50	50	40	10	45	32	40	4.5	FBS 1210 T
FEB 1312 A	13	12	2.381	13.50	15°48′	11.0	1.6×2	5000 / —	9900 / —	151 / —		3	28	45	30	17	5	—	30	37	4.5	FEB 1312 A
FEB 1315 A	13	15	2.381	13.50	19°29′	11.0	1.6×2	5000 / —	10300 / —	147 / —		3	28	45	35	22	5	—	30	37	4.5	FEB 1315 A
FEB 1320 A	13	20	2.381	13.50	25°15′	11.0	1.6×2	5000 / —	10700 / —	142 / —		3	28	45	43	29	5	—	30	37	4.5	FEB 1320 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

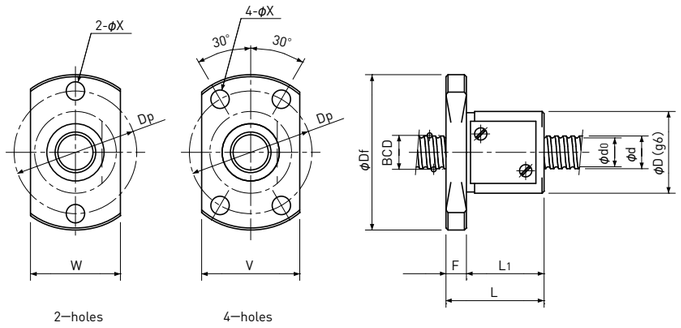
Preload type

Backlash type

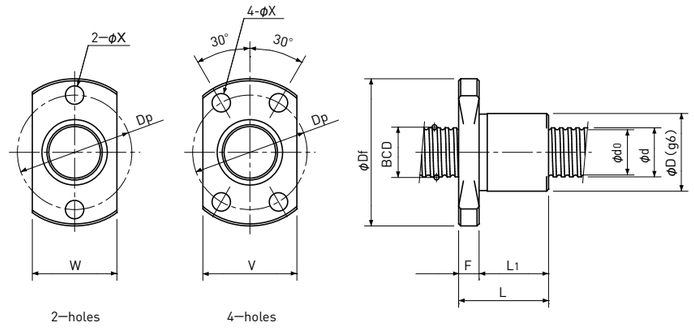
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

Backlash type/Preload type



Type-1:Return-plate type



Type-2:Internal-deflector type or End-deflector type

Unit :mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
FBS 1401 B	14	1	0.8	14.15	1°17′	13.3	3.7×1	960 / 610	2900 / 1450	148 / 124		1	26	46	21	15	6	28	28	37	5.5		FBS 1401 B
FKB 1402 A	14	2	1.2	14.30	2°33′	13.0	1×3	1700 / 1700	4300 / 4300	122 / 190		2	21	40	20	14	6	23	26	31	5.5		FKB 1402 A
FBS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200 / 2000	7500 / 3800	176 / 148		1	26	46	25	19	6	28	28	37	5.5		FBS 1402 B
FKB 1402.5 A	14	2.5	1.5875	14.40	3°10′	12.7	1×3	2500 / 2500	5600 / 5600	127 / 197		2	22	41	22	16	6	24	26	32	5.5		FKB 1402.5 A
FBS 1402.5 B	14	2.5	1.5875	14.30	3°11′	12.6	3.7×1	3200 / 2000	7500 / 3700	176 / 148		1	28	48	27	21	6	30	30	39	5.5		FBS 1402.5 B
FKB 1403 A	14	3	2.0	14.50	3°46′	12.4	1×3	3400 / 3400	6800 / 6800	131 / 204		2	24	43	32	26	6	26	27	34	5.5		FKB 1403 A
FBS 1403 B	14	3	2.0	14.30	3°49′	12.2	3.7×1	4600 / 2900	10100 / 5000	184 / 154		1	30	51	30	24	6	32	32	42	5.5		FBS 1403 B
FKB 1404 A	14	4	2.381	14.65	4°58′	12.2	1×3	4500 / 4500	8600 / 8600	136 / 212		2	26	45	29	23	6	28	28	36	5.5		FKB 1404 A
FBS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700 / 3600	11600 / 5800	187 / 157		1	30	51	33	27	6	32	32	42	5.5		FBS 1404 B
FBS 1405 B	14	5	2.381	14.30	6°21′	11.8	3.7×1	5700 / 3600	11600 / 5800	186 / 157		1	30	51	39	33	6	32	32	42	5.5		FBS 1405 B

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

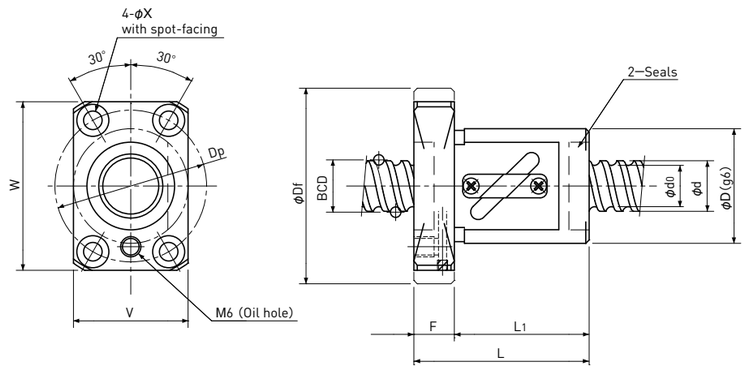
Preload type

Backlash type

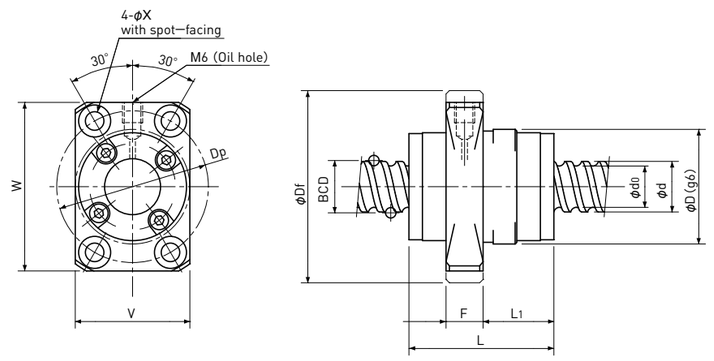
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS. Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions. Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca. Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca. For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

Backlash type/Preload type



Type-4:Return-tube type



Type-5:End-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
FBS 1504 T	15	4	2.381	15.50	4°42′	13.0	2.5×1	4100 / 2580	8550 / 4300	136 / 112		4	32	56	41	31	10	48	32	43	5.5	FBS 1504 T
FEB 1505 A	15	5	3.175	15.50	5°41′	12.2	3.7×1	8900 / —	17000 / —	208 / —		5	34	57	33	16	11	50	34	45	5.5	FEB 1505 A
FBS 1505 T	15	5	3.175	15.80	5°45′	12.4	2.5×1	6900 / 4350	12500 / 6250	148 / 122		4	34	58	44	34	10	50	34	45	5.5	FBS 1505 T
FEB 1510 A	15	10	3.175	15.50	11°36′	12.2	2.7×2	12000 / —	25000 / —	289 / —		5	34	57	43	21	11	50	34	45	5.5	FEB 1510 A
FBS 1510 T	15	10	3.175	15.80	11°23′	12.4	1.5×1	4400 / 2540	7900 / 3450	87 / 69		4	34	58	52	40	12	50	34	45	6.0	FBS 1510 T
FEB 1520 A	15	20	3.175	15.75	22°01′	12.4	1.7×2	8000 / —	16000 / —	178 / —		5	34	57	52	28.5	11	50	34	45	5.5	FEB 1520 A
FBS 1520 T	15	20	3.175	15.80	21°56′	12.4	1.5×1	4400 / 2540	7900 / 3450	84 / 67		4	34	58	62	50	12	50	34	45	6.0	FBS 1520 T
FEB 1530 A	15	30	3.175	15.75	31°14′	12.4	1.7×2	8000 / —	16000 / —	163 / —		5	34	57	71	45.5	11	50	34	45	5.5	FEB 1530 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

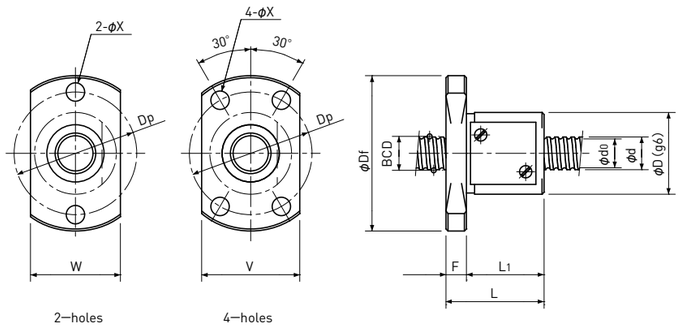
Preload type

Backlash type

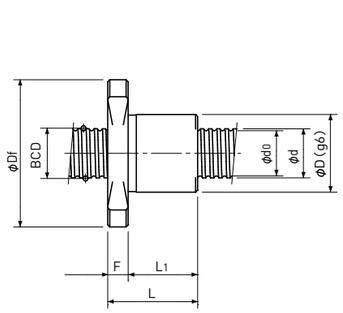
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with Flange

Backlash type/Preload type



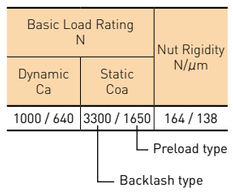
Type-1:Return-plate type



Type-2:Internal-deflector type or
End-deflector type

Unit : mm

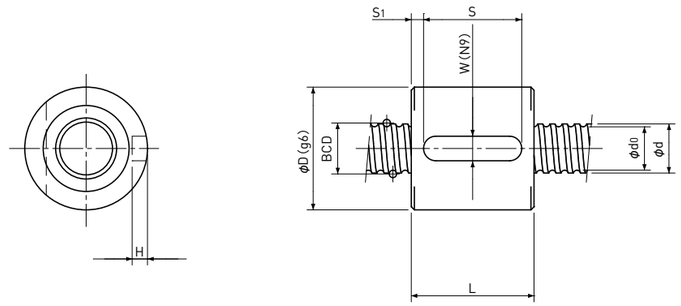
Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X		
FBS 1601 B	16	1	0.8	16.15	1°08′	15.3	3.7×1	1000 / 640	3300 / 1650	164 / 138		1	28	48	21	15	6	30	30	39	5.5		FBS 1601 B
FKB 1602 A	16	2	1.2	16.30	2°14′	15.0	1×3	1850 / 1850	5000 / 5000	137 / 213		2	24	43	20	14	6	26	27	34	5.5		FKB 1602 A
FBS 1602 B	16	2	1.5875	16.30	2°14′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		1	28	48	25	19	6	30	30	39	5.5		FBS 1602 B
FKB 1603 A	16	3	2.0	16.50	3°19′	14.4	1×3	3600 / 3600	8000 / 8000	146 / 227		2	26	45	32	26	6	28	28	36	5.5		FKB 1603 A
FBS 1603 B	16	3	2.0	16.30	3°21′	14.2	3.7×1	4900 / 3100	11600 / 5800	205 / 172		1	32	53	30	24	6	34	34	44	5.5		FBS 1603 B
FKB 1604 A	16	4	2.381	16.65	4°22′	13.9	1×3	4800 / 4800	10000 / 10000	152 / 237		2	28	47	29	23	6	30	30	38	5.5		FKB 1604 A
FBS 1604 B	16	4	2.381	16.30	4°28′	13.8	3.7×1	6200 / 3900	13600 / 6800	209 / 174		1	34	54	34	28	6	36	36	45	5.5		FBS 1604 B
FBS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100 / 5700	18200 / 9100	217 / 182		1	38	57	42	36	6	40	40	48	5.5		FBS 1605 B



Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut

Backlash type/Preload type



Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension						Ball Nut Model number
								Dynamic Ca	Static Coa			D	L	W	H	S	S_1	
BS 0301 B	3	1	0.6	3.18	5°43′	2.4	3.7×1	330 / —	440 / —	42 / —		9	12	2	1.2	8	2	BS 0301 B
BS 0401 A	4	1	0.8	4.15	4°23′	3.3	2.7×1	420 / 270	570 / 290	40 / 34		10	12	2	1.2	8	2	BS 0401 A
BS 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7×1	560 / 350	790 / 400	54 / 45		11	14	3	1.8	8	3	BS 0401 B
BS 0402 A	4	2	0.8	4.15	8°43′	3.3	2.7×1	420 / 260	570 / 290	39 / 33		11	16	3	1.8	8	4	BS 0402 A
BS 0501 B	5	1	0.8	5.15	3°32′	4.3	3.7×1	630 / 400	1000 / 500	65 / 55		12	14	3	1.8	8	3	BS 0501 B
BS 0504 A	5	4	0.8	5.15	13°53′	4.3	2.7×1	470 / 300	720 / 360	47 / 39		12	22	3	1.8	12	5	BS 0504 A
BS 0601 B	6	1	0.8	6.15	2°58′	5.3	3.7×1	680 / 430	1200 / 610	75 / 63		13	14	3	1.8	10	2	BS 0601 B
BS 0601.5 B	6	1.5	1.0	6.20	4°24′	5.1	3.7×1	980 / 620	1600 / 800	79 / 67		14	16	3	1.8	10	3	BS 0601.5 B
BS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750 / 470	1200 / 590	58 / 49		15	15	3	1.8	10	2.5	BS 0602 A
BS 0602.5 A	6	2.5	1.0	6.20	7°19′	5.1	2.7×1	750 / 470	1200 / 590	59 / 49		15	16	3	1.8	10	3	BS 0602.5 A

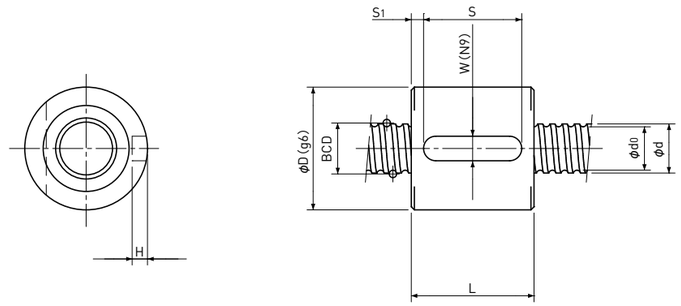
Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type
Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above,
see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut

Backlash type/Preload type



Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension						Ball Nut Model number
								Dynamic Ca	Static Coa			D	L	W	H	S	S_1	
BS 0801 B	8	1	0.8	8.15	2°15′	7.3	3.7×1	780 / 490	1650 / 820	95 / 80		16	14	3	1.8	10	2	BS 0801 B
BS 0801.5 B	8	1.5	1.0	8.20	3°20′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		16	16	3	1.8	10	3	BS 0801.5 B
BS 0802 B(1)	8	2	1.0	8.20	4°26′	7.1	3.7×1	1100 / 700	2200 / 1100	99 / 83		16	18	3	1.8	12	3	BS 0802 B(1)
BS 0802 B(2)	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 94		20	20	4	2.5	16	2	BS 0802 B(2)
BS 0802.5 A	8	2.5	1.5875	8.00	5°41′	6.3	2.7×1	1850 / —	3000 / —	80 / —		16	16	3	1.8	8	4	BS 0802.5 A
BS 0802.5 B	8	2.5	1.5875	8.30	5°29′	6.6	3.7×1	2400 / 1550	4100 / 2100	111 / 93		20	22	4	2.5	16	3	BS 0802.5 B
BS 0803 A	8	3	2.0	8.30	6°34′	6.2	2.7×1	2600 / 1650	4200 / 2100	85 / 70		20	22	4	2.5	16	3	BS 0803 A
BS 0804 A	8	4	2.0	8.30	8°43′	6.2	2.7×1	2600 / 1650	4200 / 2100	84 / 70		21	26	4	2.5	20	3	BS 0804 A
BS 0805 A	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850 / 1150	3000 / 1500	82 / 67		18	28	4	2.5	20	4	BS 0805 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type

Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
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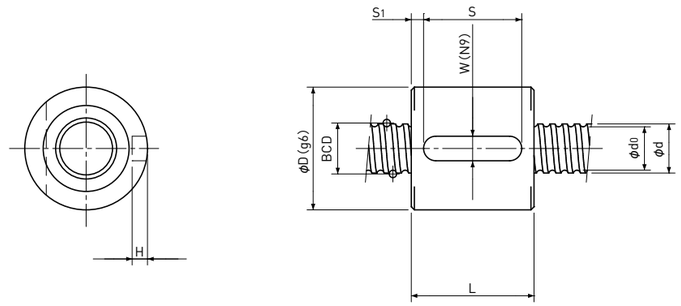
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above,
see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut

Backlash type/Preload type



Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension						Ball Nut Model number
								Dynamic Ca	Static Coa			D	L	W	H	S	S_1	
BS 1001 B	10	1	0.8	10.15	1°48′	9.3	3.7×1	840 / 530	2000 / 1000	113 / 95		19	14	3	1.8	10	2	BS 1001 B
BS 1001.5 B	10	1.5	1.0	10.20	2°41′	9.1	3.7×1	1250 / 790	2800 / 1400	120 / 101		19	16	3	1.8	10	3	BS 1001.5 B
BS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700 / 1750	5300 / 2700	134 / 112		23	20	5	3	16	2	BS 1002 B
BS 1002.5 B	10	2.5	1.5875	10.30	4°25′	8.6	3.7×1	2700 / 1750	5300 / 2700	133 / 112		24	22	5	3	16	3	BS 1002.5 B
BS 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900 / 2500	7200 / 3600	140 / 118		24	26	5	3	20	3	BS 1003 B
BS 1004 A	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000 / 1800	5200 / 2600	104 / 86		24	26	5	3	20	3	BS 1004 A
BS 1005 A(1)	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / —	5200 / —	103 / —		23	26	5	3	16	5	BS 1005 A(1)
BS 1005 A(2)	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / 1800	5200 / 2600	103 / 85		24	34	5	3	28	3	BS 1005 A(2)

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type

Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
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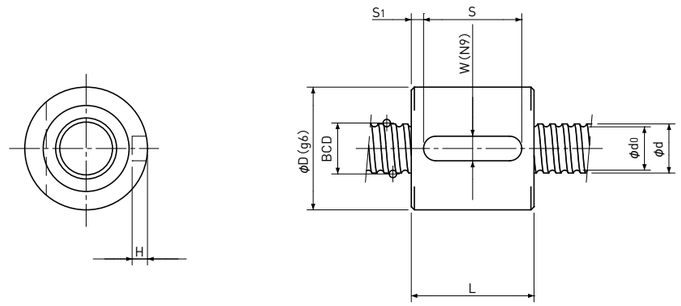
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above,
see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Ball Screw
Customized products Precision Ball Screws

Sleeve type Single Nut

Backlash type/Preload type



Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension						Ball Nut Model number
								Dynamic Ca	Static Coa			D	L	W	H	S	S_1	
BS 1201 B	12	1	0.8	12.15	1°30′	11.3	3.7×1	910 / 570	2400 / 1200	131 / 110		22	14	4	2.5	10	2	BS 1201 B
BS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000 / 1900	6400 / 3200	156 / 132		25	20	5	3	16	2	BS 1202 B
BS 1202.5 B	12	2.5	1.5875	12.30	3°42′	10.6	3.7×1	3000 / 1850	6400 / 3200	156 / 130		26	22	5	3	16	3	BS 1202.5 B
BS 1203 B	12	3	2.0	12.30	4°26′	10.2	3.7×1	4300 / 2800	8700 / 4300	162 / 137		28	26	5	3	20	3	BS 1203 B
BS 1204 B	12	4	2.381	12.30	5°55′	9.8	3.7×1	5400 / 3400	10200 / 5100	165 / 139		28	31	5	3	25	3	BS 1204 B
BS 1205 A	12	5	2.381	12.30	7°22′	9.8	2.7×1	4100 / 2500	7400 / 3700	122 / 101		28	31	5	3	25	3	BS 1205 A
BS 1401 B	14	1	0.8	14.15	1°17′	13.3	3.7×1	960 / 610	2900 / 1450	148 / 124		26	16	5	3	10	3	BS 1401 B
BS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200 / 2000	7500 / 3800	176 / 148		26	20	5	3	16	2	BS 1402 B
BS 1402.5 B	14	2.5	1.5875	14.30	3°11′	12.6	3.7×1	3200 / 2000	7500 / 3700	176 / 148		28	22	5	3	16	3	BS 1402.5 B
BS 1403 B	14	3	2.0	14.30	3°49′	12.2	3.7×1	4600 / 2900	10100 / 5000	184 / 154		30	26	5	3	20	3	BS 1403 B
BS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700 / 3600	11600 / 5800	187 / 157		30	31	5	3	25	3	BS 1404 B
BS 1405 B	14	5	2.381	14.30	6°21′	11.8	3.7×1	5700 / 3600	11600 / 5800	186 / 157		30	38	5	3	28	5	BS 1405 B

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

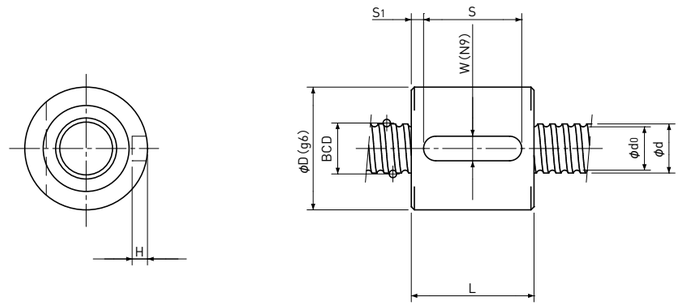
Preload type

Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above,
see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Sleeve type Single Nut

Backlash type/Preload type



Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension						Ball Nut Model number
								Dynamic Ca	Static Coa			D	L	W	H	S	S_1	
BS 1601 B	16	1	0.8	16.15	1°08′	15.3	3.7×1	1000 / 640	3300 / 1650	164 / 138		28	16	5	3	10	3	BS 1601 B
BS 1602 B	16	2	1.5875	16.30	2°14′	14.6	3.7×1	3400 / 2100	8600 / 4300	197 / 163		28	20	5	3	16	2	BS 1602 B
BS 1603 B	16	3	2.0	16.30	3°21′	14.2	3.7×1	4900 / 3100	11600 / 5800	205 / 172		32	26	5	3	20	3	BS 1603 B
BS 1604 B	16	4	2.381	16.30	4°28′	13.8	3.7×1	6200 / 3900	13600 / 6800	209 / 174		34	32	5	3	25	3.5	BS 1604 B
BS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100 / 5700	18200 / 9100	217 / 182		38	38	5	3	28	5	BS 1605 B

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

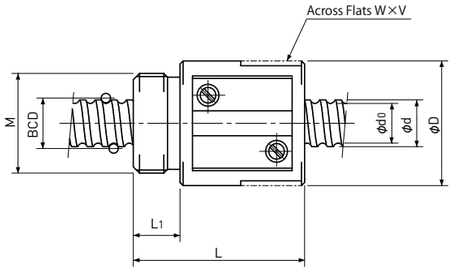
Preload type
Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above,
see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

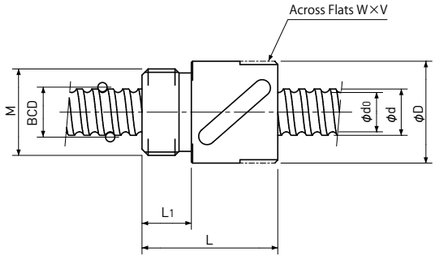
Ball Screw
Customized products Precision Ball Screws

Single Nut with M-thread

Backlash type/Preload type



Type-1:Return-plate type



Type-2:Return-tube type

Unit:mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension							Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	L	L_1	Across Flats width W	Across Flats length V	M	
MS 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7x1	560 / 350	790 / 400	54 / 45		1	11	17	4	10	6	M9x0.75	MS 0401 B
MS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7x1	750 / 470	1200 / 590	58 / 49		1	16.5	22	8	14	4	M14x1.0	MS 0602 A
MS 0801.5 B	8	1.5	1.0	8.20	3°20′	7.1	3.7x1	1100 / 700	2200 / 1100	99 / 83		1	16.5	24	8	14	5	M14x1.0	MS 0801.5 B
MS 0802 B	8	2	1.5875	8.30	4°23′	6.6	3.7x1	2400 / 1550	4100 / 2100	111 / 94		1	20	27.5	7.5	18	5	M16x1.0	MS 0802 B
MS 0802.5 T(1)	8	2.5	1.5875	8.00	5°41′	6.3	3.5x1	2300 / —	3900 / —	102 / —		2	16.5	22	8	14	4	M14x1.0	MS 0802.5 T(1)
MS 0802.5 T(2)	8	2.5	1.5875	8.00	5°41′	6.3	3.5x1	2300 /—	3900 / —	102 / —		2	17.5	25.5	7.5	15	4	M15x1.0	MS 0802.5 T(2)
MS 0803 A	8	3	2.0	8.30	6°34′	6.2	2.7x1	2600 / 1650	4200 / 2100	85 / 70		1	20	28.5	7.5	18	5	M16x1.0	MS 0803 A
MS 0804 T	8	4	1.5875	8.00	9°03′	5.9	2.5x1	1750 / —	2800 / —	75 / —		2	16.5	24	8	14	4	M14x1.0	MS 0804 T
MS 0805 A	8	5	1.5875	8.30	10°51′	6.6	2.7x1	1850 / 1150	3000 / 1500	82 / 67		1	18	32.5	7.5	16	5	M15x1.0	MS 0805 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

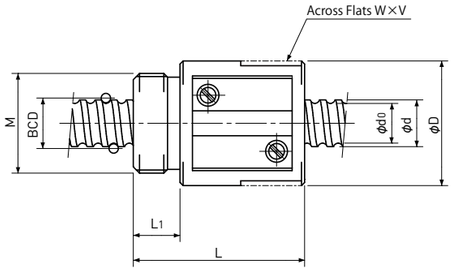
Preload type

Backlash type

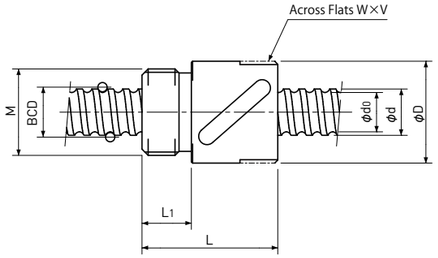
Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Across Flats or drill hole is available on the Ball Nut for the convenience of assembly. Please ask KSS representative.
Note 6) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Single Nut with M-thread

Backlash type/Preload type



Type-1:Return-plate type



Type-2:Return-tube type

Unit:mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension							Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	L	L_1	Across Flats width W	Across Flats length V	M	
MS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7x1	2700 / 1750	5300 / 2700	134 / 112		1	23	27.5	7.5	21	5	M17x1.0	MS 1002 B
MS 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7x1	3000 / 1900	6400 / 3200	156 / 132		1	25	30	10	23	5	M20x1.0	MS 1202 B
MS 1204 T	12	4	2.381	12.30	5°55′	9.8	2.5x1	3900 / —	7000 / —	113 / —		2	25.5	34	10	23	5	M20x1.0	MS 1204 T
MS 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7x1	3200 / 2000	7500 / 3800	176 / 148		1	26	30	10	23	5	M22x1.5	MS 1402 B
MS 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7x1	5700 / 3600	11600 / 5800	187 / 157		1	30	38	10	27	8	M25x1.0	MS 1404 B

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type

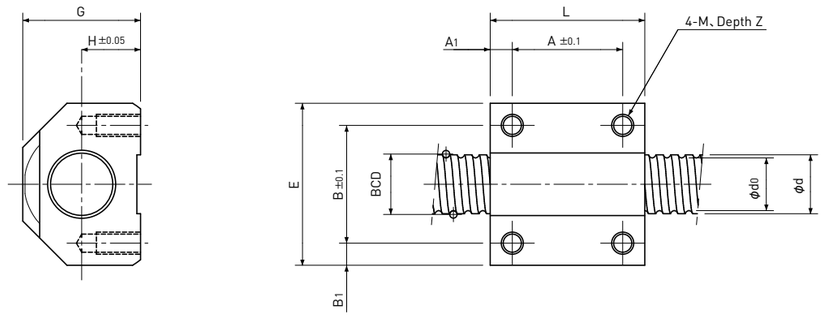
Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above,
see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Across Flats or drill hole is available on the Ball Nut for the convenience of assembly. Please ask KSS representative.
Note 6) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

Ball Screw
Customized products Precision Ball Screws

Square type Single Nut

Backlash type/Preload type



Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			L	E	G	H	A	A_1	B	B_1	M	Z	
KS 0601 B	6	1	0.8	6.15	2°58′	5.3	3.7×1	680 / 430	1200 / 610	75 / 63		20	20	14	7	14	3	14	3	M3	6	KS 0601 B
KS 0602 A	6	2	1.0	6.20	5°52′	5.1	2.7×1	750 / 470	1200 / 590	58 / 49		20	20	14	7	14	3	14	3	M3	6	KS 0602 A
KS 0801 B	8	1	0.8	8.15	2°15′	7.3	3.7×1	780 / 490	1650 / 820	95 / 80		21	22	16	8	15	3	16	3	M3	6	KS 0801 B
KS 0802 A	8	2	1.0	8.20	4°26′	7.1	2.7×1	850 / 540	1600 / 800	74 / 61		21	22	16	8	15	3	16	3	M3	6	KS 0802 A
KS 1001 B	10	1	0.8	10.15	1°48′	9.3	3.7×1	840 / 530	2000 / 1000	113 / 95		26	28	22	12	18	4	20	4	M4	7	KS 1001 B
KS 1002 B	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700 / 1750	5300 / 2700	134 / 112		26	28	23.5	12	18	4	20	4	M4	7	KS 1002 B

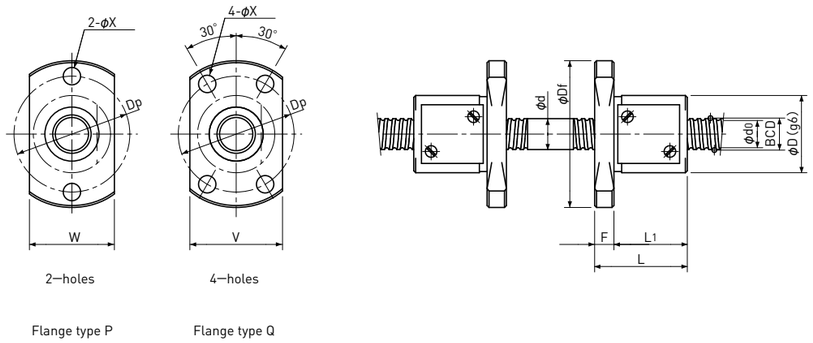
Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type
Backlash type

Note 1) The diameter of one of the Screw Shaft ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) All models are Right-hand Screw. If Left-hand Screw is required, please ask KSS representative.
Note 5) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

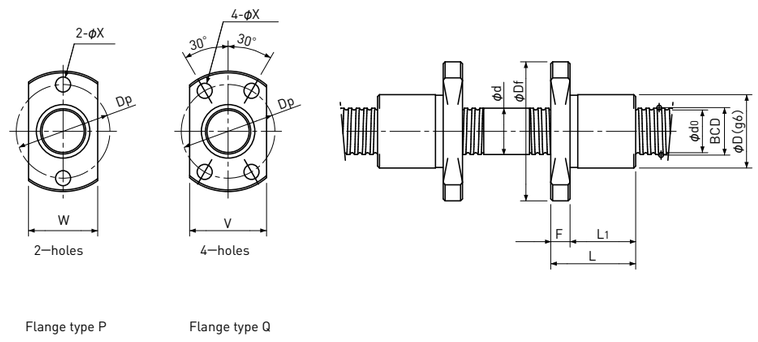
Bi-directional Nut with Flange

Backlash type/Preload type



Flange type P　　Flange type Q

Type-1:Return-plate type



Flange type P　　Flange type Q

Type-2:Internal-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension												Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	Flange Type	
FKB 0401 A	4	1	0.6	4.15	4°23′	3.4	1×3	300 / 300	430 / 430	38 / 59		2	9	19	13	10	3	11	13	14	2.9	P,Q	FKB 0401 A
FKB 0501 A	5	1	0.6	5.15	3°32′	4.4	1×3	330 / 330	560 / 560	45 / 70		2	10	20	13	10	3	12	14	15	2.9	P,Q	FKB 0501 A
FKB 0601 A	6	1	0.8	6.20	2°56′	5.3	1×3	560 / 560	950 / 950	55 / 86		2	11	23	14.5	11	3.5	13	15	17	3.4	P,Q	FKB 0601 A
FKB 0801 A	8	1	0.8	8.20	2°13′	7.3	1×3	650 / 650	1300 / 1300	70 / 109		2	13	26	15	11	4	15	17	20	3.4	P,Q	FKB 0801 A
FKB 0801.5 A	8	1.5	1.0	8.30	3°18′	7.2	1×3	890 / 890	1650 / 1650	73 / 113		2	15	28	20	16	4	17	19	22	3.4	P,Q	FKB 0801.5 A
FKB 0802 A	8	2	1.2	8.30	4°23′	7.0	1×3	1300 / 1300	2300 / 2300	77 / 121		2	15	28	18	14	4	17	19	22	3.4	P,Q	FKB 0802 A
FKB 1001 A	10	1	0.8	10.20	1°47′	9.3	1×3	720 / 720	1650 / 1650	84 / 131		2	15	28	15	11	4	17	19	22	3.4	P,Q	FKB 1001 A
FKB 1001.5 A	10	1.5	1.0	10.30	2°39′	9.2	1×3	990 / 990	2100 / 2100	87 / 136		2	17	34	21	16	5	19	21	26	4.5	P,Q	FKB 1001.5 A
FKB 1002 A	10	2	1.2	10.30	3°32′	9.0	1×3	1450 / 1450	3000 / 3000	93 / 144		2	17	34	19	14	5	19	21	26	4.5	P,Q	FKB 1002 A
FKB 1002.5 A	10	2.5	1.5875	10.40	4°23′	8.7	1×3	2100 / 2100	3800 / 3800	96 / 150		2	18	35	21	16	5	20	22	27	4.5	P,Q	FKB 1002.5 A
FBS 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900 / 2500	7200 / 3600	140 / 118		1	24	44	30	24	6	26	27	35	5.5	P,Q	FBS 1003 B
FBS 1004 A	10	4	2.0	10.30	7°03′	8.2	2.7×1	3000 / 1800	5200 / 2600	104 / 86		1	24	44	29	23	6	26	27	35	5.5	P,Q	FBS 1004 A
FBS 1005 A	10	5	2.0	10.30	8°47′	8.2	2.7×1	3000 / 1800	5200 / 2600	103 / 85		1	24	44	34	28	6	26	27	35	5.5	P,Q	FBS 1005 A

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

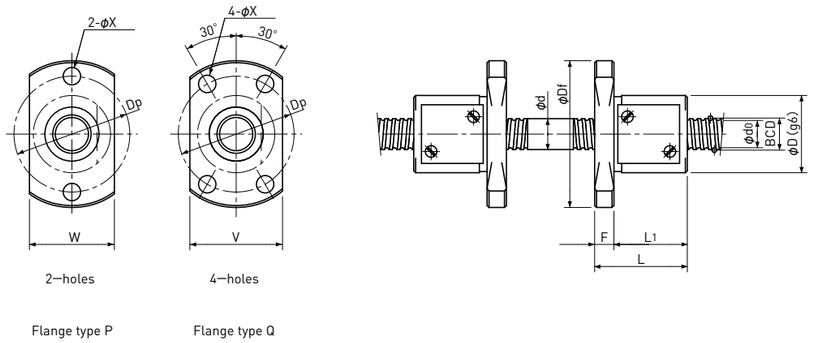
Preload type

Backlash type

Note 1) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

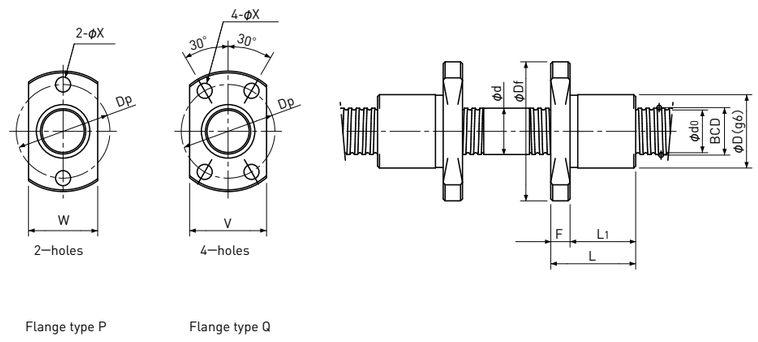
Bi-directional Nut with Flange

Backlash type/Preload type



Flange type P　Flange type Q

Type-1:Return-plate type



Flange type P　Flange type Q

Type-2:Internal-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension											Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	Flange Type	
FKB 1201 A	12	1	0.8	12.20	1°30′	11.3	1×3	780 / 780	2000 / 2000	97 / 152		2	17	34	16	11	5	19	21	26	4.5	P,Q	FKB 1201 A
FKB 1202 A	12	2	1.2	12.30	2°58′	11.0	1×3	1600 / 1600	3700 / 3700	109 / 169		2	19	36	19	14	5	21	23	28	4.5	P,Q	FKB 1202 A
FKB 1202.5 A	12	2.5	1.5875	12.40	3°41′	10.7	1×3	2300 / 2300	4700 / 4700	112 / 174		2	20	37	21	16	5	22	24	29	4.5	P,Q	FKB 1202.5 A
FKB 1203 A	12	3	2.0	12.50	4°22′	10.4	1×3	3100 / 3100	5700 / 5700	115 / 179		2	22	41	32	26	6	24	26	32	5.5	P,Q	FKB 1203 A
FBS 1204 B	12	4	2.381	12.30	5°55′	9.8	3.7×1	5400 / 3400	10200 / 5100	165 / 139		1	28	48	33	27	6	30	30	39	5.5	P,Q	FBS 1204 B
FBS 1401 B	14	1	0.8	14.15	1°17′	13.3	3.7×1	960 / 610	2900 / 1450	148 / 124		1	26	46	21	15	6	28	28	37	5.5	P,Q	FBS 1401 B
FKB 1402 A	14	2	1.2	14.30	2°33′	13.0	1×3	1700 / 1700	4300 / 4300	122 / 190		2	21	40	20	14	6	23	26	31	5.5	P,Q	FKB 1402 A
FKB 1402.5 A	14	2.5	1.5875	14.40	3°10′	12.7	1×3	2500 / 2500	5600 / 5600	127 / 197		2	22	41	22	16	6	24	26	32	5.5	P,Q	FKB 1402.5 A
FKB 1403 A	14	3	2.0	14.50	3°46′	12.4	1×3	3400 / 3400	6800 / 6800	131 / 204		2	24	43	32	26	6	26	27	34	5.5	P,Q	FKB 1403 A
FKB 1404 A	14	4	2.381	14.65	4°58′	11.9	1×3	4500 / 4500	8600 / 8600	136 / 212		2	26	45	29	23	6	28	28	36	5.5	P,Q	FKB 1404 A
FBS 1405 B	14	5	2.381	14.30	6°21′	11.8	3.7×1	5700 / 3600	11600 / 5800	186 / 157		1	30	51	39	33	6	32	32	42	5.5	P,Q	FBS 1405 B

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

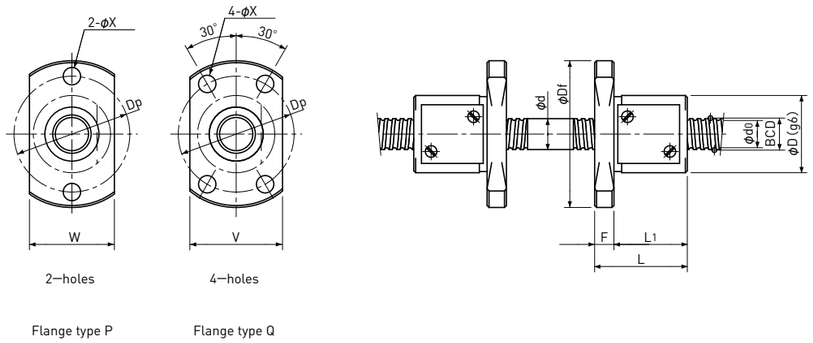
Preload type

Backlash type

Note 1) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

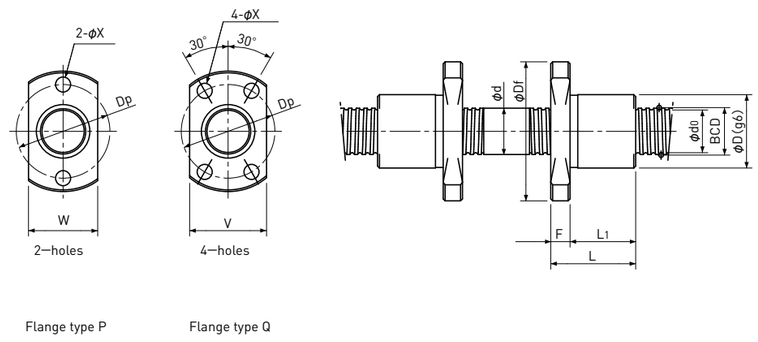
Bi-directional Nut with Flange

Backlash type/Preload type



Flange type P　Flange type Q

Type-1:Return-plate type



Flange type P　Flange type Q

Type-2:Internal-deflector type

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension												Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	Flange Type	
FBS 1601 B	16	1	0.8	16.15	1°08′	15.3	3.7×1	1000 / 640	3300 / 1650	164 / 138		1	28	48	21	15	6	30	30	39	5.5	P,Q	FBS 1601 B
FKB 1602 A	16	2	1.2	16.30	2°15′	15.0	1×3	1850 / 1850	5000 / 5000	137 / 213		2	24	43	20	14	6	26	27	34	5.5	P,Q	FKB 1602 A
FKB 1603 A	16	3	2.0	16.50	3°19′	14.4	1×3	3600 / 3600	8000 / 8000	146 / 227		2	26	45	32	26	6	28	28	36	5.5	P,Q	FKB 1603 A
FKB 1604 A	16	4	2.381	16.65	4°22′	13.9	1×3	4800 / 4800	10000 / 10000	152 / 237		2	28	47	29	23	6	30	30	38	5.5	P,Q	FKB 1604 A
FBS 1605 B	16	5	3.175	16.50	5°31′	13.2	3.7×1	9100 / 5700	18200 / 9100	217 / 182		1	38	57	42	36	6	40	40	48	5.5	P,Q	FBS 1605 B

Basic Load Rating N		Nut Rigidity N/μm
Dynamic Ca	Static Coa	
1000 / 640	3300 / 1650	164 / 138

Preload type

Backlash type

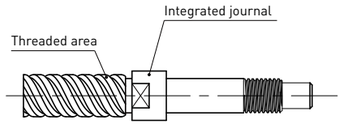
Note 1) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, otherwise Ball Nut cannot be installed.
Note 2) Ball Nut dimension is without seal at the both ends.
If the seals are required, Ball Nut dimension should be changed, in that case, please ask KSS.
Some type of Ball Nuts cannot equip with seals, please ask KSS representative.
Note 3) The Rigidity values shown in the table are theoretical values of Ball Nut Rigidity calculated from the amount of Elastic Displacement under the following conditions.
Backlash type ; Apply the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
Preload type ; Apply the Preload equivalent to 5% of the Basic Dynamic Load Rating Ca.
For Axial load or Preload condition other than the above, see the formula in page A823 or page A824, you can calculate Rigidity using this formula.
Note 4) Basic Load Rating and Rigidity for Backlash type and Preload type are described in the same cell.

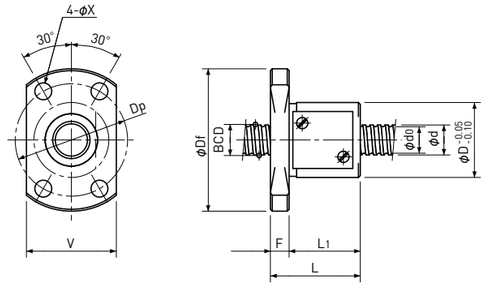
Rolled Ball Screws

Single Nut with Flange

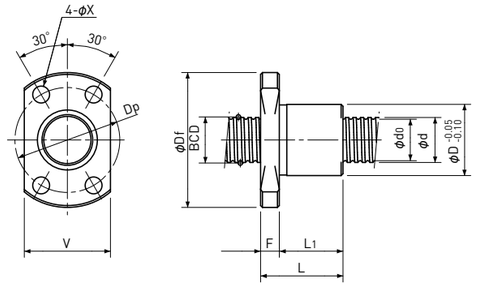
Backlash type

■ Rolled Ball Screws with integrated journal are available(ϕ12 or less only), which have larger diameter than threaded area shown below.

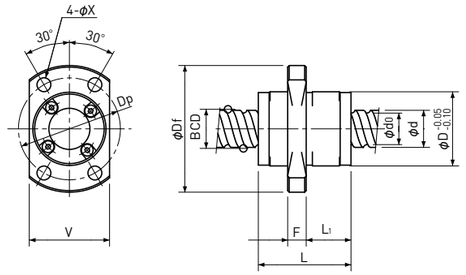




Type-1:Return-plate type



Type-2:Internal-deflector type or End-deflector type



Type-3:End-cap type or End-deflector type

Unit :mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
MRB 0401	4	1	0.8	4.15	4°23′	3.3	3.7×1	560	790	54		1	11	23	17	13	4	—	15	17	3.4	MRB 0401
MRB 0401K	4	1	0.6	4.15	4°23′	3.4	1×3	300	430	38		2	9	19	13	10	3	—	13	14	2.9	MRB 0401K
MRB 0402	4	2	0.8	4.15	8°43′	3.3	2.7×1	420	570	39		1	11	23	19	15	4	—	15	17	3.4	MRB 0402
MRB 0504	5	4	0.8	5.15	13°53′	4.3	2.7×1	470	720	47		1	12	24	22	18	4	—	16	18	3.4	MRB 0504
MRB 0601 **	6	1	0.8	6.15	2°58′	5.3	3.7×1	680	1200	75		1	13	26	17	13	4	—	16	20	3.4	MRB 0601 **
MRB 0601K	6	1	0.8	6.20	2°56′	5.3	1×3	560	950	55		2	11	23	14.5	11	3.5	—	15	17	3.4	MRB 0601K
MRB 0602	6	2	1.0	6.20	5°52′	5.1	2.7×1	750	1200	58		1	15	28	17	13	4	—	19	22	3.4	MRB 0602
MRB 0606	6	6	1.0	6.30	16°52′	5.2	1.6×2	870	1450	67		3	14	27	17	8	4	—	16	21	3.4	MRB 0606
MRB 0610	6	10	1.2	6.30	26°48′	5.0	1.2×2	950	1600	50		3	14	27	23	11.5	4	—	16	21	3.4	MRB 0610

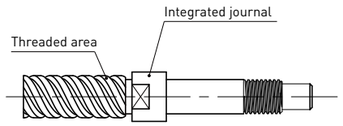
Note 1) All models are Right-hand screw.
Note 2) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, because of productlon and Nut assembly reason.
Note 3) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4) Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in page A823, you can calculate Rigidity using this formula.
Note 5) Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

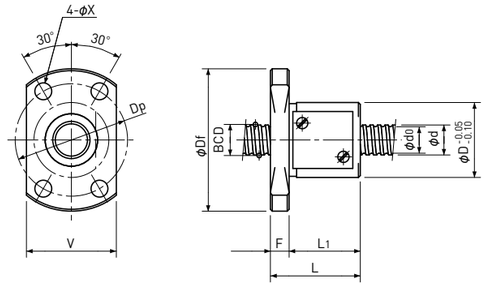
Rolled Ball Screws

Single Nut with Flange

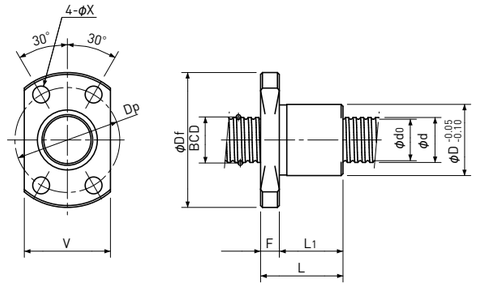
Backlash type

■ Rolled Ball Screws with integrated journal are available(ϕ12 or less only), which have larger diameter than threaded area shown below.

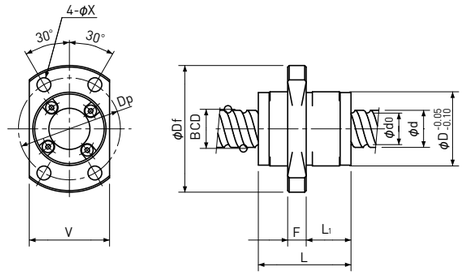




Type-1:Return-plate type



Type-2:Internal-deflector type or End-deflector type



Type-3:End-cap type or End-deflector type

Unit :mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
MRB 0801 **	8	1	0.8	8.15	2°15′	7.3	3.7×1	780	1650	95		1	16	29	17	13	4	—	18	23	3.4	MRB 0801 **
MRB 0801K	8	1	0.8	8.20	2°13′	7.3	1×3	650	1300	70		2	13	26	15	11	4	—	17	20	3.4	MRB 0801K
MRB 0802 **	8	2	1.5875	8.30	4°23′	6.6	3.7×1	2400	4100	111		1	20	37	24	19	5	—	22	29	4.5	MRB 0802 **
MRB 0802K	8	2	1.2	8.30	4°23′	7.0	1×3	1300	2300	77		2	15	28	18	14	4	—	19	22	3.4	MRB 0802K
MRB 0802.5	8	2.5	1.5875	8.00	5°41′	6.3	2.7×1	1850	3000	80		2	16	29	16	12	4	—	18	23	3.4	MRB 0802.5
MRB 0805	8	5	1.5875	8.30	10°51′	6.6	2.7×1	1850	3000	82		1	18	31	28	24	4	—	20	25	3.4	MRB 0805
MRB 0808	8	8	1.5875	8.40	16°52′	6.7	1.6×2	2200	3800	95		3	18	31	20	10	4	—	20	25	3.4	MRB 0808
MRB 0810	8	10	1.5875	8.40	20°45′	6.7	1.6×2	2200	3800	92		3	18	31	24	13	4	—	20	25	3.4	MRB 0810
MRB 0812	8	12	1.5875	8.40	24°27′	6.7	1.6×2	2200	4000	90		3	18	31	27	17	4	—	20	25	3.4	MRB 0812

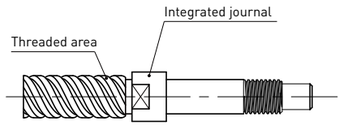
Note 1) All models are Right-hand screw.
Note 2) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, because of productlon and Nut assembly reason.
Note 3) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4) Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in page A823, you can calculate Rigidity using this formula.
Note 5) Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

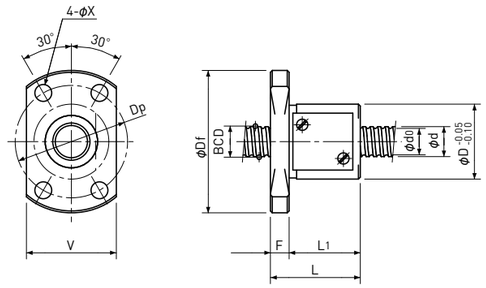
Rolled Ball Screws

Single Nut with Flange

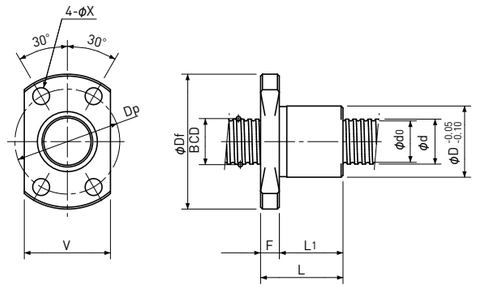
Backlash type

■ Rolled Ball Screws with integrated journal are available(φ12 or less only), which have larger diameter than threaded area shown below.

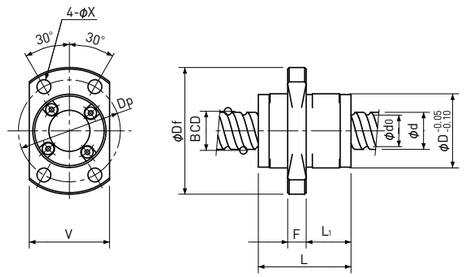




Type-1:Return-plate type



Type-2:Internal-deflector type or End-deflector type



Type-3:End-cap type or End-deflector type

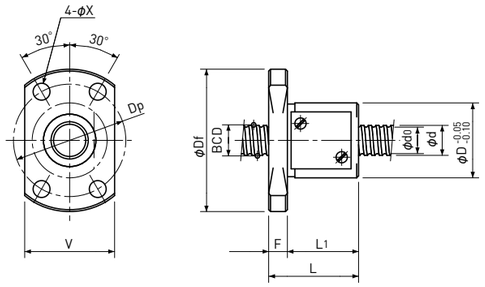
Unit :mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
MRB 1002 **	10	2	1.5875	10.30	3°32′	8.6	3.7×1	2700	5300	134		1	23	40	24	19	5	—	25	32	4.5	MRB 1002 **
MRB 1002K	10	2	1.2	10.30	3°32′	9.0	1×3	1450	3000	93		2	17	34	19	14	5	—	21	26	4.5	MRB 1002K
MRB 1003	10	3	2.0	10.30	5°18′	8.2	3.7×1	3900	7200	140		1	24	41	29	24	5	—	26	33	4.5	MRB 1003
MRB 1004	10	4	2.0	10.30	7°03′	8.2	2.7 ×1	3000	5200	104		1	24	41	28	23	5	—	26	33	4.5	MRB 1004
MRB 1005	10	5	2.0	10.30	8°47′	8.2	2.7 ×1	3000	5200	103		2	23	40	26	21	5	—	25	32	4.5	MRB 1005
MRB 1006	10	6	2.0	10.30	10°30′	8.2	2.7 ×1	3000	5000	102		1	26	42	33	28	5	—	28	34	4.5	MRB 1006
MRB 1010	10	10	2.0	10.50	16°52′	8.4	1.6×2	3300	5900	117		3	23	40	24	13	5	—	25	32	4.5	MRB 1010
MRB 1012	10	12	2.0	10.50	19°59′	8.4	1.6×2	3300	6200	115		3	23	40	28	17	5	—	25	32	4.5	MRB 1012
MRB 1015	10	15	2.0	10.50	24°27′	8.4	1.6×2	3300	6400	110		3	23	40	33	22	5	—	25	32	4.5	MRB 1015
MRB 1020	10	20	1.5875	10.40	31°28′	8.7	0.7×4	2100	4000	88		3	20	37	23	13	5	—	22	29	4.5	MRB 1020
MRB 1202	12	2	1.5875	12.30	2°58′	10.6	3.7×1	3000	6400	156		1	25	42	24	19	5	—	27	34	4.5	MRB 1202
MRB 1202K	12	2	1.2	12.30	2°58′	11.0	1×3	1600	3700	109		2	19	36	19	14	5	—	23	28	4.5	MRB 1202K
MRB 1210	12	10	2.381	12.65	14°07′	10.2	1.7×2	5100	9800	152		3	24	41	30	14.5	6	—	26	33	4.5	MRB 1210

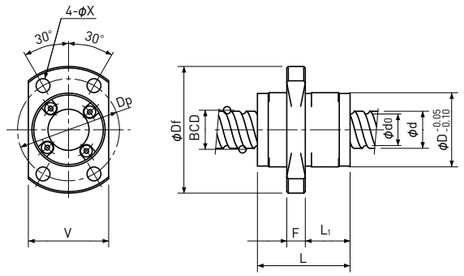
Note 1) All models are Right-hand screw.
Note 2) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, because of productlon and Nut assembly reason.
Note 3) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4) Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in page A823, you can calculate Rigidity using this formula.
Note 5) Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

Single Nut with Flange

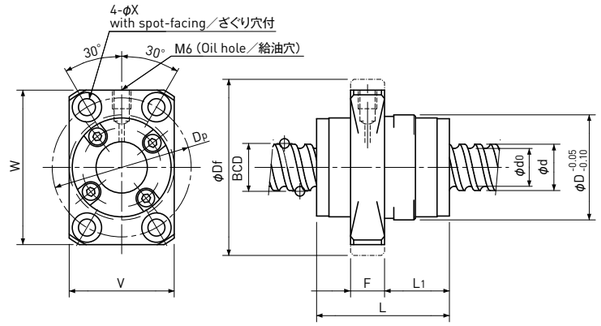
Backlash type



Type-1:Return-plate type



Type-3:End-cap type or End-deflector type



Type-4:End-deflector type

Unit :mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension										Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	Df	L	L_1	F	W	V	Dp	Bolt Hole X	
MRB 1312	13	12	2.381	13.50	15°48′	11.0	1.6×2	5000	9900	151		3	28	45	30	17	5	—	30	37	4.5	MRB 1312
MRB 1315	13	15	2.381	13.50	19°29′	11.0	1.6×2	5000	10300	147		3	28	45	35	22	5	—	30	37	4.5	MRB 1315
MRB 1320	13	20	2.381	13.50	25°15′	11.0	1.6×2	5000	10700	142		3	28	45	43	29	5	—	30	37	4.5	MRB 1320
MRB 1402	14	2	1.5875	14.30	2°33′	12.6	3.7×1	3200	7500	176		1	26	45	25	19	6	—	28	36	5.5	MRB 1402
MRB 1404	14	4	2.381	14.30	5°05′	11.8	3.7×1	5700	11600	187		1	30	49	33	27	6	—	32	40	5.5	MRB 1404
MRB 1505	15	5	3.175	15.50	5°41′	12.2	3.7×1	8900	17000	208		4	34	57	33	16	11	50	34	45	5.5	MRB 1505
MRB 1510	15	10	3.175	15.50	11°36′	12.2	2.7×2	12000	25000	289		4	34	57	43	21	11	50	34	45	5.5	MRB 1510
MRB 1520	15	20	3.175	15.75	22°01′	12.7	1.7×2	8000	16000	178		4	34	57	52	28.5	11	50	34	45	5.5	MRB 1520

Note 1) All models are Right-hand screw.
Note 2) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, because of productlon and Nut assembly reason.
Note 3) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4) Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in page A823, you can calculate Rigidity using this formula.
Note 5) Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

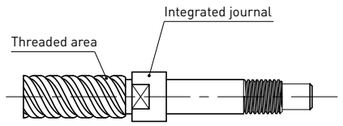
Ball Screw
Customized products Rolled Ball Screws

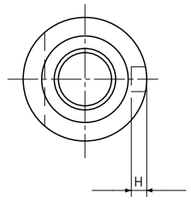
Rolled Ball Screws

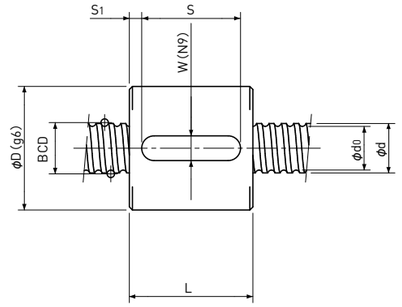
Sleeve type Single Nut

Backlash type

■ Rolled Ball Screws with integrated journal are available (ϕ 12 or less only), which have larger diameter than threaded area shown below.







Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension						Ball Nut Model number
								Dynamic Ca	Static Coa			D	L	W	H	S	S_1	
BSR 0401	4	1	0.8	4.15	4°23′	3.3	3.7x1	560	790	54		11	14	3	1.8	8	3	BSR 0401
BSR 0402	4	2	0.8	4.15	8°43′	3.3	2.7x1	420	570	39		11	16	3	1.8	8	4	BSR 0402
BSR 0504	5	4	0.8	5.15	13°53′	4.3	2.7x1	470	720	47		12	22	3	1.8	12	5	BSR 0504
BSR 0601 **	6	1	0.8	6.15	2°58′	5.3	3.7x1	680	1200	75		13	14	3	1.8	10	2	BSR 0601 **
BSR 0602	6	2	1.0	6.20	5°52′	5.1	2.7x1	750	1200	58		15	15	3	1.8	10	2.5	BSR 0602
BSR 0801 **	8	1	0.8	8.15	2°15′	7.3	3.7x1	780	1650	95		16	14	3	1.8	10	2	BSR 0801 **
BSR 0802 **	8	2	1.5875	8.30	4°23′	6.6	3.7x1	2400	4100	111		20	20	4	2.5	16	2	BSR 0802 **
BSR 0802.5	8	2.5	1.5875	8.00	5°41′	6.3	2.7x1	1850	3000	80		16	16	3	1.8	8	4	BSR 0802.5
BSR 0805	8	5	1.5875	8.30	10°51′	6.6	2.7x1	1850	3000	82		18	28	4	2.5	20	4	BSR 0805

Note 1) All models are Right-hand screw.
Note 2) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, because of productlon and Nut assembly reason.
Note 3) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4) Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in page A823, you can calculate Rigidity using this formula.
Note 5) Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

Ball Screw

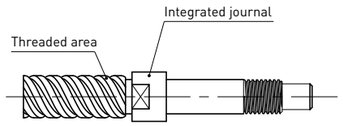
Customized products Rolled Ball Screws

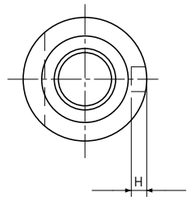
Rolled Ball Screws

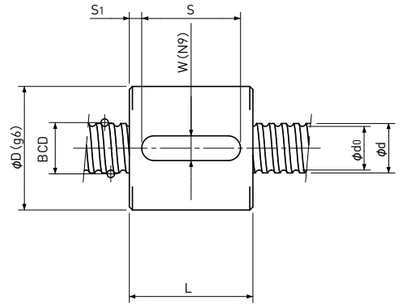
Sleeve type Single Nut

Backlash type

■ Rolled Ball Screws with integrated journal are available (ϕ 12 or less only), which have larger diameter than threaded area shown below.







Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension						Ball Nut Model number
								Dynamic Ca	Static Coa			D	L	W	H	S	S_1	
BSR 1002 **	10	2	1.5875	10.30	3°32′	8.6	3.7x1	2700	5300	134		23	20	5	3	16	2.0	BSR 1002 **
BSR 1003	10	3	2.0	10.30	5°18′	8.2	3.7x1	3900	7200	140		24	26	5	3	20	3	BSR 1003
BSR 1004	10	4	2.0	10.30	7°03′	8.2	2.7x1	3000	5200	104		24	26	5	3	20	3	BSR 1004
BSR 1005	10	5	2.0	10.30	8°47′	8.2	2.7x1	3000	5200	103		23	26	5	3	16	5	BSR 1005
BSR 1006	10	6	2.0	10.30	10°30′	8.2	2.7x1	3000	5000	102		26	31	5	3	20	5.5	BSR 1006
BSR 1202	12	2	1.5875	12.30	2°58′	10.6	3.7x1	3000	6400	156		25	20	5	3	16	2	BSR1202
BSR 1402	14	2	1.5875	14.30	2°33′	12.6	3.7x1	3200	7500	176		26	20	5	3	16	2	BSR 1402
BSR 1404	14	4	2.381	14.30	5°05′	11.8	3.7x1	5700	11600	187		30	31	5	3	25	3	BSR 1404

Note 1) All models are Right-hand screw.
Note 2) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, because of productlon and Nut assembly reason.
Note 3) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4) Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in page A823, you can calculate Rigidity using this formula.
Note 5) Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

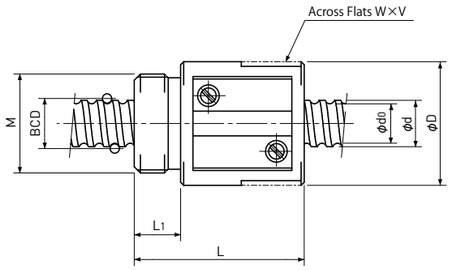
Ball Screw

Customized products Rolled Ball Screws

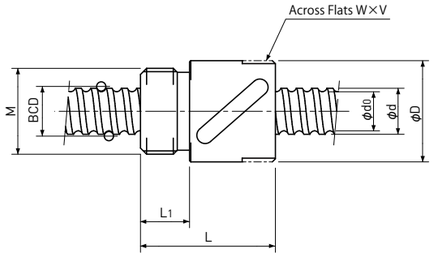
Rolled Ball Screws

Single Nut with M-thread

Backlash type

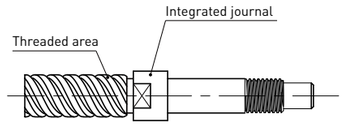


Type-1:Return-plate type



Type-2:Return-tube type

■ Rolled Ball Screws with integrated journal are available(ϕ12 or less only), which have larger diameter than threaded area shown below.



Unit:mm

Ball Nut Model number	Shaft nominal dia. d	Lead	Ball size	BCD	Lead angle	Root dia. d_0	Number of Circuit	Basic Load Rating N		Nut Rigidity N/μm		Nut dimension							Ball Nut Model number
								Dynamic Ca	Static Coa			Nut type	D	L	L_1	Across Flats width W	Across Flats length V	M	
MSR 0401 B	4	1	0.8	4.15	4°23′	3.3	3.7x1	560	790	54		1	11	17	4	10	6	M9x0.75	MSR 0401 B
MSR 0802 B **	8	2	1.5875	8.30	4°23′	6.6	3.7x1	2400	4100	111		1	20	27.5	7.5	18	5	M16x1.0	MSR 0802 B **
MSR 0802.5 T(1)	8	2.5	1.5875	8.00	5°41′	6.3	3.5x1	2300	3900	102		2	16.5	22	8	14	4	M14x1.0	MSR 0802.5 T(1)
MSR 0802.5 T(2)	8	2.5	1.5875	8.00	5°41′	6.3	3.5x1	2300	3900	102		2	17.5	25.5	7.5	15	4	M15x1.0	MSR 0802.5 T(2)
MSR 0805 A	8	5	1.5875	8.30	10°51′	6.6	2.7x1	1850	3000	82		1	18	32.5	7.5	16	5	M15x1.0	MSR 0805 A
MSR 1002 B **	10	2	1.5875	10.30	3°32′	8.6	3.7x1	2700	5300	134		1	23	27.5	7.5	21	5	M17x1.0	MSR 1002 B **
MSR 1003 B	10	3	2.0	10.30	5°18′	8.2	3.7x1	3900	7200	140		1	24	32	8	22	5	M18x1.0	MSR 1003 B
MSR 1202 B	12	2	1.5875	12.30	2°58′	10.6	3.7x1	3000	6400	156		1	25	30	10	23	5	M20x1.0	MSR 1202 B
MSR 1402 B	14	2	1.5875	14.30	2°33′	12.6	3.7x1	3200	7500	176		1	26	30	10	23	5	M22x1.5	MSR 1402 B
MSR 1404 B	14	4	2.381	14.30	5°05′	11.8	3.7x1	5700	11600	187		1	30	38	10	27	8	M25x1.0	MSR 1404 B

Note 1) All models are Right-hand screw.
Note 2) The diameter of the Screw Shaft both ends must be less than the Screw Shaft Root diameter, because of productlon and Nut assembly reason.
Note 3) Ball Nut dimension is without seal at the both ends. All type of Ball Nuts cannot equip with seals.
Note 4) Rigidity
The Rigidity values shown in the table are theoretical values calculated from the amount of Elastic Displacement under the Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca.
For Axial load condition other than the above, see the formula in page A823, you can calculate Rigidity using this formula.
Note 5) Stainless Rolled Ball Screw
Stainless Rolled Ball Screw is available for Ball Nut Model Number marked **.

Ball Screw Technical Description

Feature of Ball Screws

●High mechanical efficiency

KSS Ball Screws are fitted with steel Balls, providing rolling contact between the Nut and Screw Shaft, allowing for mechanical efficiency of about 90% and reducing the required Torque to less than one-third that of conventional Lead Screws. The design of the KSS Ball Screws also allows linear motion to be converted into rotary motion easily (Fig. A-81).

●Axial play

With conventional Triangular and Trapezoidal Screw threads, reducing the Axial play increases the rotational Torque due to the sliding friction.
KSS Ball Screws, on the other hand, are very easily rotated, even with no Axial play. The use of Double Nuts also provides increased Rigidity.

●High precision

KSS Ball Screws are machined, assembled, and inspected using the technology of ultra-precision Lead Screw and Screw Gauge machining, under the temperature controlled room. High precision and accurate positioning ensure high reliability in use.

●Long service life

The Ball Screw movement results in virtually no wear, as the rolling-contact design, combined with the use of carefully selected heat-treated materials, results in an extremely low friction. This is the reason that high precision can be kept over long period.

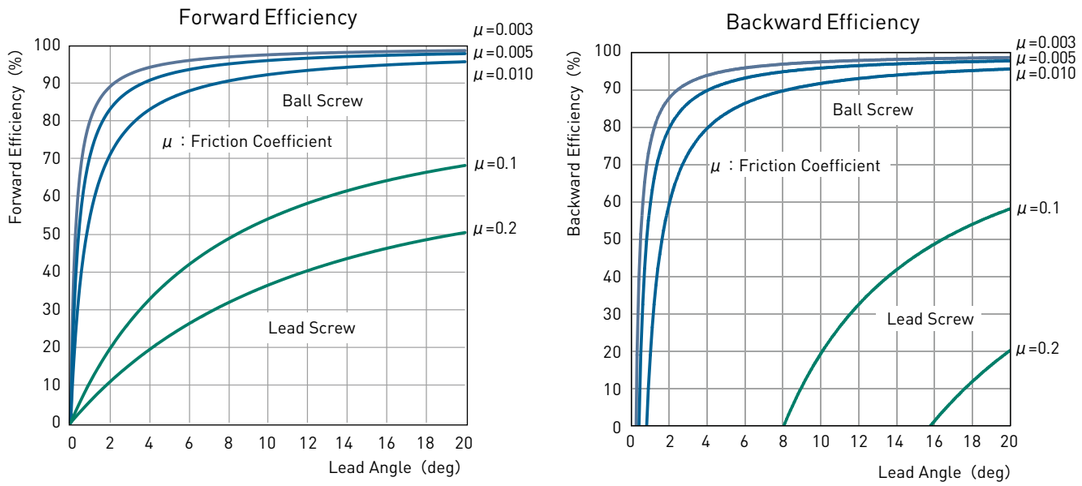
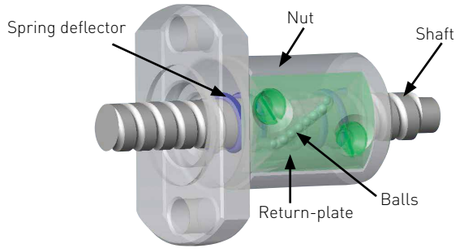


Fig. A-81 : Mechanical Efficiency

Construction of Ball Screws

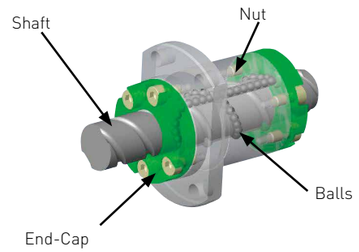
●Return-plate system

The Return-plate system uses coil-type deflectors incorporated inside the Nut to pick up the steel Balls and circulate them via the Return-plate channel. This system has the advantage of allowing the use of a Nut that is smaller in diameter than those employed in Return-tube systems. In addition, the upward-angle installation of the Return-plate ensures even smoother rotation.



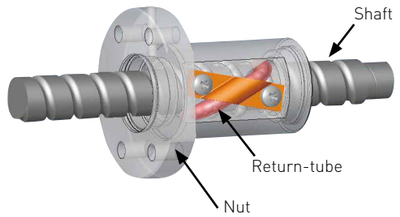
●End-cap system

The End-cap system is a recirculating system in which the Balls advance by rolling through the screw groove between the Nut and the Screw Shaft. The Balls are then returned via the holes in the Nut and the channels in the recirculating sections of the End-caps on either end of the Nut.



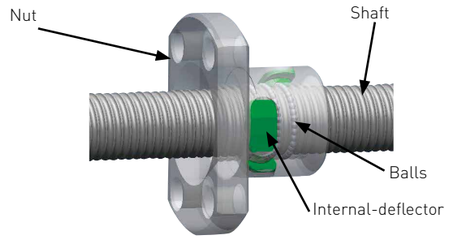
●Return-tube system

In the Return-tube system, Balls rolling between the Nut and the Shaft are picked up from the screw groove by the end of the Return-tube built into the Nut. Then, they flow back through the Return-tube to the screw groove.



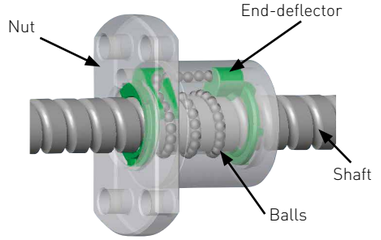
●Internal-deflector system

The Internal-deflector system employs a lightweight Miniature Ball Screw, which enables the Nut diameter and length to be reduced to the smallest possible size. The Balls bear the load while rolling along the screw groove between the Shaft and the Nut. The Balls are continuously circulated, transferred to the adjacent groove in the screw via the Internal-deflector channel and then back to the loaded groove area.



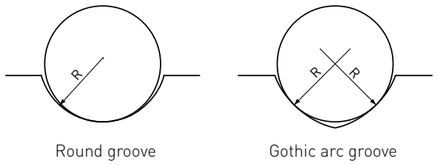
●End-deflector system

The Balls are circulated from End-deflector incorporated inside the Nut or outside the Nut through the hole in the Nut and the channels in the recirculating sections. Ball Nut diameter can be smaller than Return-plate system. This is suitable for the middle lead Ball Screws.



●Thread Groove profile

Ball screws may have either a circular arc profile, formed of a single arc, or a gothic arc profile, formed from two arcs.
KSS Ball Screws feature a gothic arc profile.



The range of manufacturing for Ball Screws

The range of manufacturing for KSS Ball Screws is from ϕ1.8 to ϕ16mm as Shaft nominal diameter. Maximum limit of overall lengths are shown below. Maximum limit of overall lengths will vary depending on the Shaft end configuration, materials and KSS series. Please inquire KSS for details.

●Maximum limit of overall lengths for Precision Ball Screws

Unit : mm

Shaft nominal diameter \ Accuracy grade	C0	C1	C3	C5
4	90	120	160	170
6	140	180	240	250
8	200	250	330	350
10	260	320	420	450
12	320	390	510	550
14	380	460	600	660
16	450	540	700	770

Note 1) If required length exceeds the number in table above, please ask KSS representative.

●Maximum limit of overall lengths for Rolled Ball Screws (Ct7 & Ct10)

Unit : mm

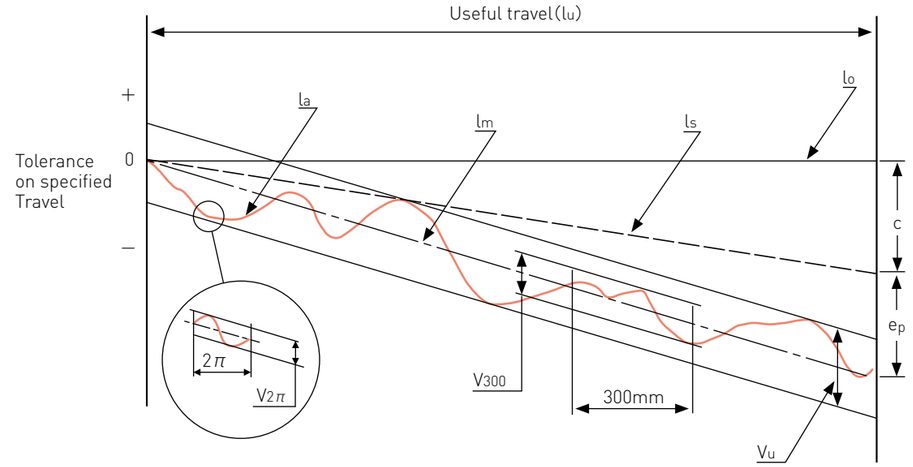
Shaft nominal diameter	Maximum length
4	240
5	300
6	350
8	450
10	650
12	700
13	700
14	700
15	1000

Note 1) If required length exceeds the number in table above, please ask KSS representative.
Note 2) Maximum limit of overall length for Rolled Ball Screws includes 25mm of incomplete thread area at both end.

Lead accuracy of Ball Screws

Ball Screw lead accuracy conforming to JIS B 1192-3 is specified by the tolerance on specified travel over the Nut effective travel amount, or Screw Shaft useful travel, travel variation and travel variation within arbitrary 300mm, and 1 revolution (2π rad) over the Screw Shaft useful travel.
Tolerance of each accuracy grades are shown in the Table A-83, 84, 85.

Fig. A-82 : Travel deviation diagram



Nominal travel (l_0) : Travel in axial direction when rotated arbitrary number of revolution according to the Nominal lead

Specified Lead (Phs) : Lead given some amount of correction to the Nominal lead in order to compensate the deformation generated due to the temperature rise or the load.

Travel compensation (c) : Difference between the Specified travel and the Nominal travel within the valid travel.

Specified travel (l_s) : Travel in axial direction when rotated arbitrary number of revolution according to the Specified lead.

Actual travel (l_a) : Actual travel of Ball Nut in axial direction in respect to an arbitrary angle of rotation of Ball Screw Shaft.

Actual mean travel (l_m) : Straight line which represents the tendency of Actual travel. It is obtained by the least square method or a simple and appropriate approximation method from the curve indicating the Valid travel of Ball Nut.

Tolerance on specified travel (e_p) : Difference between the Actual mean travel and the Specified travel corresponding to the Valid travel of Ball Nut or the Useful travel of Ball Screw Shaft.

Travel variation (V_u) : Maximum width of the Actual travel curve between the two straight lines put in parallel to the Actual mean travel line, that corresponding to Valid travel of Ball Nut or Useful travel of Ball Screw Shaft.

Travel variation (V_{300}) : Maximum width of the Actual travel curve between the two straight lines put in parallel to the Actual mean travel line, that corresponding to arbitrary 300mm taken within Useful travel of Ball Screw Shaft.

Travel variation ($V_{2\pi}$) : Maximum width of the Actual travel curve between the two straight lines put in parallel to the Actual mean travel line, that corresponding to arbitrary one revolution (2π rad) within Useful travel of Ball Screw Shaft.

Table A-83 : Tolerance on specified travel ($\pm e_p$) and permissible travel variation (Vu) of precision Ball Screws (for positioning : C series)

Unit : μm

Accuracy Grade			C0		C1		C3		C5	
Useful travel (mm)	Over	Up to	$\pm e_p$	Vu	$\pm e_p$	Vu	$\pm e_p$	Vu	$\pm e_p$	Vu
	—	100	3	3	3.5	5	8	8	18	18
	100	200	3.5	3	4.5	5	10	8	20	18
	200	315	4	3.5	6	5	12	8	23	18
	315	400	5	3.5	7	5	13	10	25	20
	400	500	6	4	8	5	15	10	27	20
	500	630	6	4	9	6	16	12	30	23
	630	800	7	5	10	7	18	13	35	25
	800	1000	8	6	11	8	21	15	40	27

Table A-84 : Permissible travel variation V_{300}, $V_{2\pi}$ (for positioning : C series)

Unit : μm

Accuracy grade	C0		C1		C3		C5	
Item	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$	V_{300}	$V_{2\pi}$
Permissible value	3.5	3	5	4	8	6	18	8

Table A-85 : Permissible travel variation V_{300} for Ct series (7,10 grade)

Unit : μm

Accuracy grade	Ct7	Ct10
V_{300}	52	210

Tolerance on specified travel (e_p) for Ct series is calculated as follows.

$$e_p = \pm \frac{lu}{300} \times V_{300}$$

lu : Useful travel (mm)

Japan Industrial Standard of Ball Screw (JIS B1192) was revised in 1997, 2013 and 2018 in order to correspond to ISO.
Regarding accuracy grade, C series (current JIS C0, 1, 3, 5) and Cp, Ct series (standard corresponding to ISO) are established. KSS conforms to JIS B 1192-3 (2018) and adopts C series for 0,1,3,5 grade, Cp, Ct series for 7,10 grade.

Ball Screw Run-out and location tolerances

Japan Industrial Standard of Ball Screw (JIS B1192) was revised in 1997, 2013 and 2018 in order to correspond to ISO. Regarding accuracy grade, C series (current JIS C0, 1, 3, 5) and Cp, Ct series (standard corresponding to ISO) are established. There are some differences between C series and Cp, Ct series in notation and tolerances for accuracy of Ball Screw mounting section. KSS uses notation in Fig. A-86 below and standard tolerance value, which conforms to C series standard, and KSS refers to Cp, Ct series standard in case of 7 and 10 grade.
Moreover, in the revision of 2018, the notation of perpendicularity changed to "run-out of the mounting surface or end face", and geometric tolerance symbols changed from ⊥ to ↗.

Fig. A-86 : Description of Run-out and location tolerances for Ball Screws

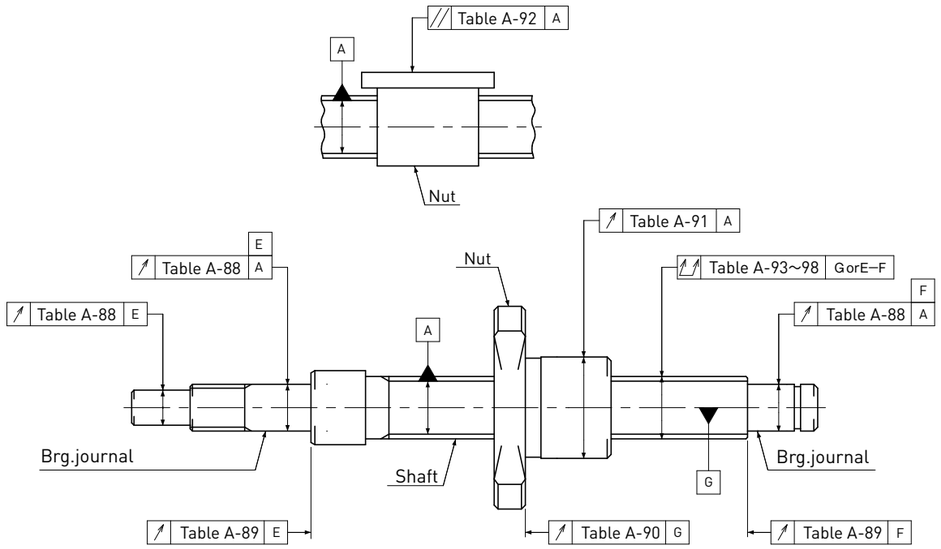


Table A-88 : Radial Run-out of Bearing seat related to the centerline of screw groove and Radial Run-out of journal diameter related to the Bearing seat

Unit : μm

Shaft nominal diameter (mm)		Permissible deviation of Radial Run-out					
Over	Up to	C0	C1	C3	C5	C7	C10
—	8	3	5	8	10	14	40
8	12	4	5	8	11	14	40
12	20	4	6	9	12	14	40

This measurement item is affected by Total Run-out of the Screw Shaft, and so it must be corrected as follows. Find the corrected value from the Total Run-out tolerances given in Tables A-93～98 on page A809～A811 using the ratio of the total Shaft length to the distance between the supporting point and the measuring point(L_1,L_2) (see Fig. A-87), and add the values obtained to the tolerance given in Table A-88.

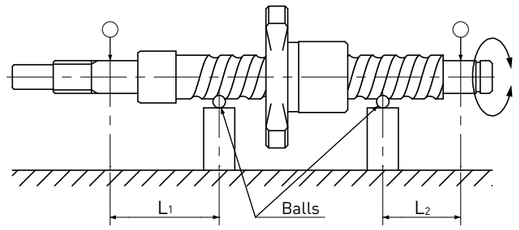


Fig. A-87 : Compensation of Radial Run-out

$$\text{Compensation Value of Run-out} = \frac{\text{Tolerance of total Run-out (Table A-93～98)}}{\text{Total shaft length}} \times (L_1 \text{ or } L_2)$$

L_1 ,L_2 : Distance btw supporting pt & measuring pt(mm)

Table A-89 : Axial Run-out (Perpendicularity) of Shaft(Bearing) face related to the centerline of the Bearing seat

Unit : μm

Shaft nominal diameter (mm)		Permissible deviations of Axial Run-out (Perpendicularity)					
Over	Up to	C0	C1	C3	C5	C7	C10
—	8	2	3	4	5	7	10
8	12	2	3	4	5	7	10
12	20	2	3	4	5	7	10

Table A-90 : Axial Run-out (Perpendicularity) of Ball Nut location face related to the centerline of Screw Shaft

Unit : μm

Nut outside diameter (mm)		Permissible deviations of Axial Run-out (Perpendicularity)					
Over	Up to	C0	C1	C3	C5	C7	C10
—	20	5	6	8	10	14	20
20	32	5	6	8	10	14	20
32	50	6	7	8	11	18	30

Table A-91 : Radial Run-out of Ball Nut location diameter related to the centerline of Screw Shaft

Unit : μm

Nut outside diameter (mm)		Permissible deviations of Radial Run-out					
Over	Up to	C0	C1	C3	C5	C7	C10
—	20	5	6	9	12	20	40
20	32	6	7	10	12	20	40
32	50	7	8	12	15	30	60

Table A-92 : Parallelism of rectangular Ball Nut related to the centerline of Screw Shaft

Unit : μm

Mounting length (mm)		Permissible deviations of Parallelism					
Over	Up to	C0	C1	C3	C5	C7	C10
—	50	5	6	8	10	17	30
50	100	7	8	10	13	17	30

Ball Screw

Technical description

Table A-93 : Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft (C0)

Unit : mm

Shaft total length		Shaft nominal diameter		
	Over	—	8	12
	Up to	8	12	20
Over	Up to	Permissible deviations of total Run-out in radial direction		
—	125	0.015	0.015	0.015
125	200	0.025	0.020	0.020
200	315	0.035	0.025	0.020
315	400	—	0.035	0.025
400	500	—	0.045	0.035
500	630	—	0.050	0.040
630	800	—	—	0.050
800	1000	—	—	0.065

Table A-94 : Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft (C1)

Unit : mm

Shaft total length		Shaft nominal diameter		
	Over	—	8	12
	Up to	8	12	20
Over	Up to	Permissible deviations of total Run-out in radial direction		
—	125	0.020	0.020	0.015
125	200	0.030	0.025	0.020
200	315	0.040	0.030	0.025
315	400	0.045	0.040	0.030
400	500	—	0.050	0.040
500	630	—	0.060	0.045
630	800	—	—	0.060
800	1000	—	—	0.075

Table A-95 : Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft (C3)

Unit : mm

Shaft total length		Shaft nominal diameter		
	Over	—	8	12
	Up to	8	12	20
Over	Up to	Permissible deviations of total Run-out in radial direction		
—	125	0.025	0.025	0.020
125	200	0.035	0.035	0.025
200	315	0.050	0.040	0.030
315	400	0.060	0.050	0.040
400	500	—	0.065	0.050
500	630	—	0.070	0.055
630	800	—	—	0.070
800	1000	—	—	0.095

Table A-96 : Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft (C5)

Unit : mm

Shaft total length		Shaft nominal diameter		
	Over	—	8	12
	Up to	8	12	20
Over	Up to	Permissible deviations of total Run-out in radial direction		
—	125	0.035	0.035	0.035
125	200	0.050	0.040	0.040
200	315	0.065	0.055	0.045
315	400	0.075	0.065	0.055
400	500	—	0.080	0.060
500	630	—	0.090	0.075
630	800	—	—	0.090
800	1000	—	—	0.120

Table A-97 : Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft (C7)

Unit : mm

Shaft total length		Shaft nominal diameter		
	Over	—	8	12
	Up to	8	12	20
Over	Up to	Permissible deviations of total Run-out in radial direction		
—	125	0.060	0.055	0.055
125	200	0.075	0.065	0.060
200	315	0.100	0.080	0.070
315	400	—	0.100	0.080
400	500	—	0.120	0.095
500	630	—	0.150	0.110
630	800	—	—	0.140
800	1000	—	—	0.170

Table A-98 : Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft (C10)

Unit : mm

Shaft total length		Shaft nominal diameter		
	Over	—	8	12
	Up to	8	12	20
Over	Up to	Permissible deviations of total Run-out in radial direction		
—	125	0.100	0.095	0.090
125	200	0.140	0.120	0.110
200	315	0.210	0.160	0.130
315	400	—	0.210	0.160
400	500	—	0.270	0.200
500	630	—	0.350	0.250
630	800	—	0.460	0.320
800	1000	—	—	0.420

Note) In case of Ct7, Ct10 grade, KSS may use the standard of Total Run-out based on slenderness ratio, which conforms to JIS B1192-2013.

Slenderness ratio		Total Run-out	
Over	Up to	Ct7	Ct10
—	40	0.080	0.160
40	60	0.120	0.240
60	80	0.200	0.400
80	100	0.320	0.640

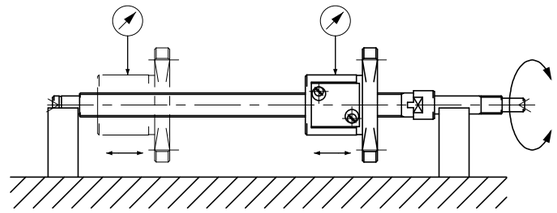
Slenderness ratio= lu/do

lu: Useful travel (mm)
do: Nominal diametor of Ball Screw (mm)

Measuring method of Ball Screw Run-out and location tolerances

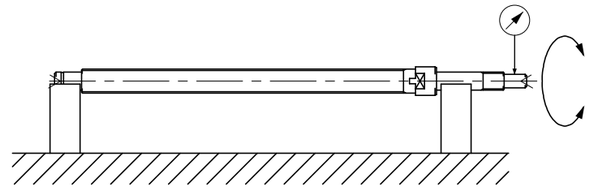
●Radial Run-out of Bearing seat related to the centerline of screw groove (Table A-88)

Place the Ball Screw in identical V-blocks at both Bearing seat. Place the dial gauge perpendicular to the Nut cylindrical surface. Rotate Screw Shaft slowly and record the dial gauge readings. Measurement should be done at near both ends of threaded part. Some cases, this measurement will be done by both centerhole support, and directly measured on Bearing seat.



●Radial Run-out of journal diameter related to the Bearing seat (Table A-88)

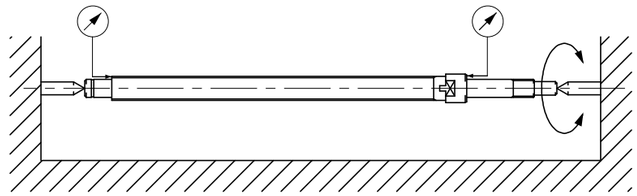
Place the Ball Screw in identical V-blocks at both Bearing seats. Place the dial gauge perpendicular to the journal cylindrical surface. Rotate the Screw Shaft slowly and record the dial gauge readings.



●Axial Run-out (Perpendicularity) of shaft (Bearing) face related to the centerline of the Bearing seat (Table A-89)

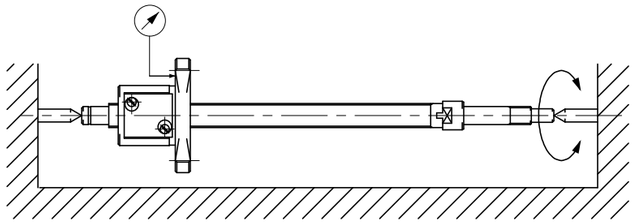
Support a Screw Shaft at both centers. Place the dial gauge perpendicular to the end face of the journal. Rotate the Screw Shaft slowly and record the dial gauge readings.

**This method is equivalent to the one, which is supported at both Bearing seats, because Bearing seats are ground related to both centers.



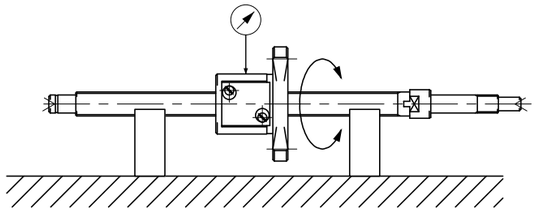
●Axial Run-out (Perpendicularity) of Ball Nut location face related to the centerline of Screw Shaft (Table A-90)

Support the Ball Screw at both centers. Place the dial gauge perpendicular to the flange face. Rotate the Screw Shaft with Ball Nut slowly and record the dial gauge readings. Secure the Ball Nut against rotation on the Screw Shaft.



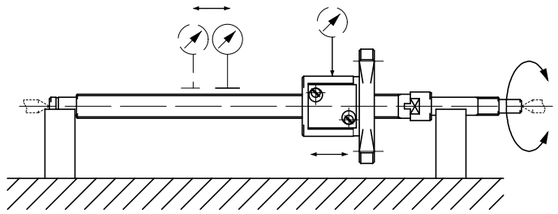
●Radial Run-out of Ball Nut location diameter related to the centerline of Screw Shaft (Table A-91)

Place the Ball Screw on V-blocks at adjacent sides of the Ball Nut. Place the dial gauge perpendicular to the cylindrical surface of Ball Nut. Secure the Screw Shaft against rotation of Ball Nut. Rotate Ball Nut slowly and record the dial gauge readings.



●Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft (Table A-93~98)

Place the Ball Screw in identical V-blocks at both Bearing seats, or support the Ball Screw at both centers. Place the dial gauge with measuring shoe at the several points over the full thread length.Rotate the Screw Shaft slowly and record the dial gauge readings. Maximum value of measurement should be the Total Run-out.



Material and Heat treatment, Surface hardness

Standard material of KSS Ball Screws, Heat treatment and Surface hardness are shown in table A-99, 100. However, they vary depending on series or model number. Please refer to KSS drawings.

Table A-99 : Material, Heat treatment & Surface hardness for regular items

	Material	Heat treatment	Surface hardness
Screw Shaft	SCM415 (JIS G 4105)	Carburizing and quenching	HRC 58-62
	S55C (JIS G 4051)	Induction hardening	HRC min.58
Nut	SCM415 (JIS G 4105)	Carburizing and quenching	HRC 58-62

Note 1) Hardness on table shows surface hardness of thread part.
Note 2) S55C is applicable for Precision Rolled Ball Screws.

Table A-100 : Material, Heat treatment & Surface hardness for stainless steel items

	Material	Heat treatment	Surface hardness
Screw Shaft	SUS440C (JIS G 4303)	Quenching and tempering	HRC min.55
Nut	SUS440C (JIS G 4303)	Quenching and tempering	HRC min.55

Note) Hardness on table shows surface hardness of thread part.

Permissible Axial load

It is recommended that Ball Screw Shafts be used almost exclusively under tension load conditions. However, in some applications, compression loads may exist, and under such conditions it must be checked that Shaft buckling will not occur.
Also, when the mounting span distance is short, there is a restriction on the permissible tension or compression load and the Basic Static Load Rating Coa unrelated to mounting.
Buckling load, permissible tension and permissible compression load can be calculated below.

●Permissible compression load calculation for buckling

$$P = \alpha \times \frac{n\pi^2 E \cdot I}{L^2} \quad N \qquad \text{Formula for Oiler}$$

α : Safety Factor 0.5
E : Young's modulus 2.08×10^5 N/mm^2(MPa)
I : Screw Shaft minimum moment of inertia of area

$$I = \frac{\pi}{64} d^4 \quad mm^4$$

d : Screw Shaft Root diameter mm
L : Mounting span distance mm
n : Factor for Ball Screw mounting method

Supported—Supported	n = 1
Fixed—Supported	n = 2
Fixed—Fixed	n = 4
Fixed—Free	n = 1/4

●Permissible tension, compression load calculation for Screw Shaft yield stress

$$P = \sigma \times A \qquad N$$

σ : Permissible stress 98N/mm^2 (MPa)
A : Screw Shaft minimum section area

$$A = \frac{\pi}{4} d^2 \quad mm^2$$

d : Screw Shaft Root diameter mm

Permissible speed

For Screw Shaft rotation, the mounting method determines the established rotation limits. When this value is approached, resonance phenomenon will occur, and operation becomes impossible. There is also rotation limit which causes damages to recirculating parts. This limit is unrelated to mounting methods.

●Permissible speed calculation for critical speed

$$N = \beta \times \frac{60 \cdot \lambda^2}{2\pi} \times \sqrt{\frac{E \cdot I \cdot g}{\gamma \cdot A \cdot L^4}} \quad min^{-1}$$

β : Safety Factor 0.8
E : Young's modulus 2.08×10^5 N/mm^2 (MPa)
I : Screw Shaft minimum moment of inertia of area

$$I = \frac{\pi}{64} d^4 \quad mm^4$$

d : Screw Shaft Root diameter mm
g : Gravity acceleration 9.8×10^3 mm/sec^2
γ : Material specific gravity 7,850kg/m^3 (7.7×10^{-5} N/mm^3)
L : Mounting span distance mm
A : Screw Shaft minimum section area

$$A = \frac{\pi}{4} d^2 \quad mm^2$$

λ : Factor for Ball Screw mounting method

Supported—Supported	$\lambda = \pi$
Fixed—Supported	$\lambda = 3.927$
Fixed—Fixed	$\lambda = 4.730$
Fixed—Free	$\lambda = 1.875$

●Rotational speed limit for damage on recirculating parts

Generally, regarding critical speed for damage on recirculating parts, limitation is established by dn value, which is multiplied Shaft nominal diameter of revolution, but dn value cannot be applied to Miniature Ball Screws. For KSS Ball Screws, please consider rotational speed limit by damage on recirculating parts as 3,500 to 4,000min^{-1}. This value varies depending on operating conditions and environment. Please inquire KSS for details.
Moreover, possibilities of breakage of recirculating parts will be increased when using in high acceleration / deceleration.
Estimate criterion of the breakage in the recirculating section is depending on the internal specification of the Ball Screw, please ask KSS for more detail.

Ball Screw
Technical description

Ball Screw mounting methods

Typical Ball Screw's mounting methods are shown in Fig. A-101. Mounting configuration affects permissible Axial load in relation to buckling, as well as permissible speed in relation to critical speed. Please refer to below when studying strength and speed.

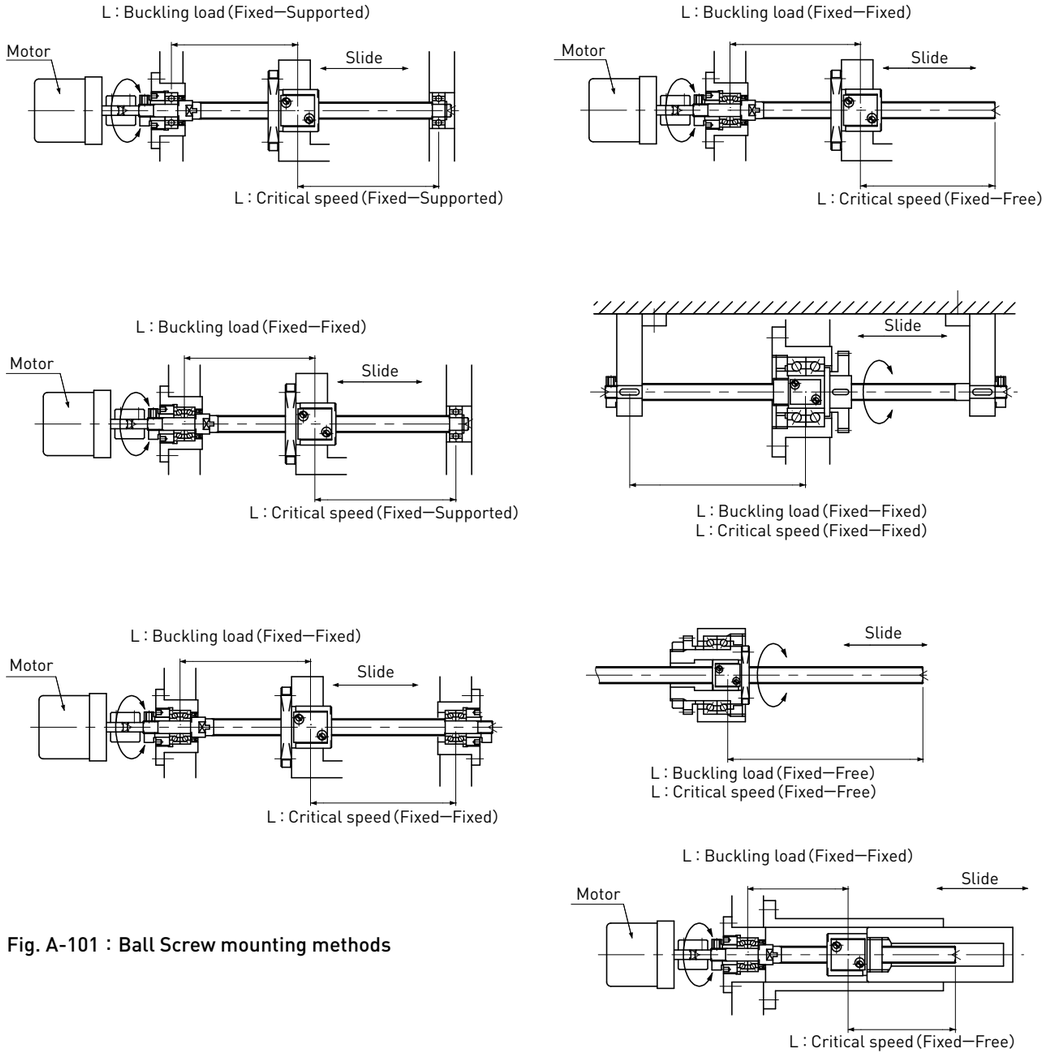


Fig. A-101 : Ball Screw mounting methods

Axial play and Preload

For standard Single Nut Ball Screws under normal conditions, a slight Axial play exists between the Screw Shaft and Nut. Consequently, when Axial loads act on Single Nut Ball Screws, total amount of Axial play and Elastic displacement due to Axial load becomes backlash. In order to prevent this backlash in Ball Screws, the Axial play can be reduced to a negative value. That is what we call "Preload", which is the method of causing Elastic deformation to the Balls between the Screw Shaft and Nut in advance.

●Axial play

Symbol and permissible value for Axial play are shown in Table A-102.
Combination of accuracy grade and symbol are shown in Table A-103.

Table A-102 : Symbol and permissible value for Axial play

Unit : mm

Symbol	0	02	05	20	50
Axial play	0 (Preloading)	0.002 max.	0.005 max.	0.02 max.	0.05 max.

Table A-103 : Combination of accuracy grade and Axial play

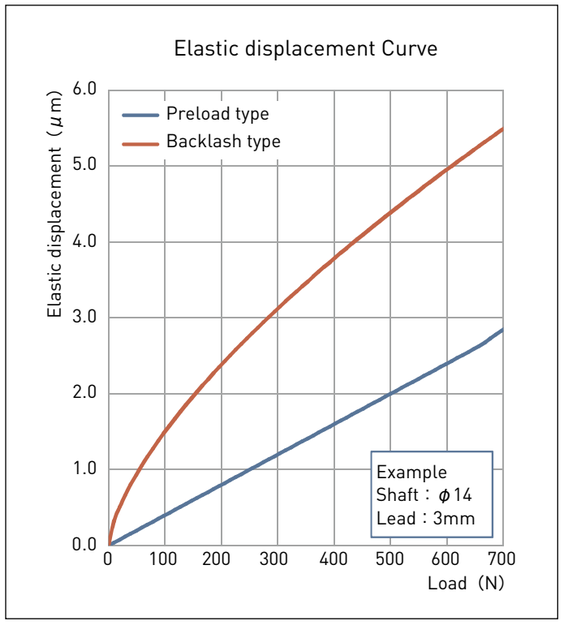
Symbol / Accuracy grade	0	02	05	20	50
C0	C0-0	—	—	—	—
C1	C1-0	C1-02	—	—	—
C3	C3-0	C3-02	C3-05	C3-20	C3-50
C5	—	—	C5-05	C5-20	C5-50
C7	—	—	—	C7-20	C7-50
C10	—	—	—	C10-20	C10-50

Note) When combinations other than the above are requested, please inquire KSS.

●Preload effect

Preload is not only used for removing Axial play, it also has the effect of reducing the amount of Axial displacement due to Axial load, and improving the Rigidity in Ball Screws. Fig. A-104 shows the difference of the amount of Elastic displacement (theoretical value) regarding Ball Screw with Axial play and Ball Screw with Preload under the Axial load.

Fig. A-104：Elastic displacement curve comparison between Backlash type and Preload type



●Proper amount of Preload

Although the amount of Preload should be determined by the required Rigidity and the permissible amount of backlash, when setting Preload, there are some concerning issues as follows.

1) Increased Dynamic Drag Torque
2) Heat generation, lowering of positioning accuracy due to the temperature rise.
3) Shortened life

Therefore, it is advisable to establish the amount of Preload at the lowest possible limits.

●Preload methods

Generally, a method of Double Nut Preload by inserting a spacer between two Nuts is adopted. KSS Ball Screw adopts「Oversized Ball Preload」by inserting Balls slightly bigger than space between Screw Shaft and Nut. As a result, it can eliminate Axial play even with a Single Nut and it is possible to maintain compact. Moreover, operating performance will never be deteriorated by using spacer Balls (Balls with slightly smaller diameter than those of the oversize Balls) alternatively with oversize Balls.

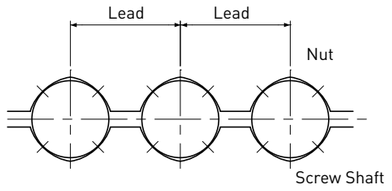


Fig. A-105：Preload by oversized Balls

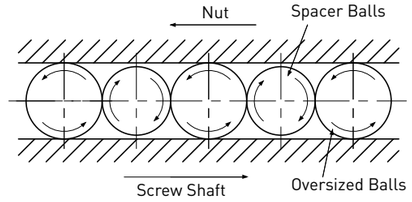
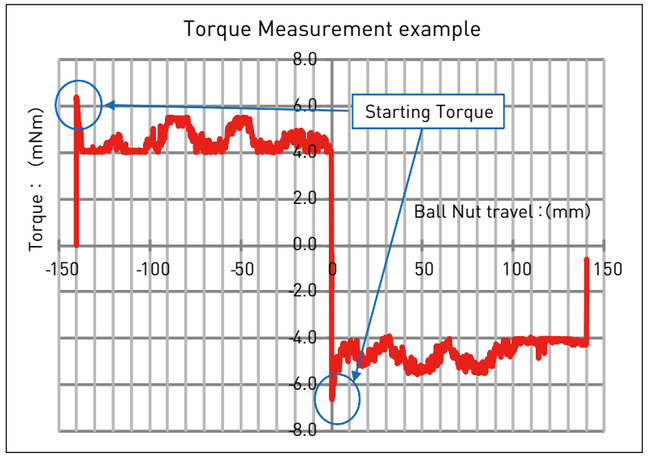


Fig. A-106：Spacer Balls

●Preload control

It is difficult to control Preload amount by measuring. Therefore, Preload of Ball Screw is controlled by measuring Preload Dynamic Drag Torque, which is converted from Preload amount. Amount of Preload Dynamic Drag Torque is decided with customers by specification drawing. Preload Dynamic Drag Torque is measured under specific condition to verify the amount of Axial play is 0. Dynamic Drag Torque installed actual machine will vary depending on lubricating condition, load condition and so on. Starting torque (Torque for starting Ball Screw) is slightly bigger than Dynamic Drag Torque.



*Torque wave in this diagram is exaggerated for explanation.

Fig. A-107：Dynamic Drag Torpue measurement

Rigidity in Linear Motion system

In precision machinery, to improve positioning accuracy of the drive screws or to increase Rigidity for load, the Rigidity of the entire Linear Motion system must be examined. Rigidity of entire Linear Motion system is as follows.

$$\frac{1}{K} = \frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} + \frac{1}{K_4} \quad \mu m/N$$

K	: Total Rigidity of Linear Motion system	N/μm
K_1	: Screw Shaft Rigidity	N/μm
K_2	: Nut Rigidity	N/μm
K_3	: Support Bearing Rigidity	N/μm
K_4	: Nut, Bearing fitting part Rigidity	N/μm

●Total Rigidity of Linear Motion system K

$$K = \frac{Fa}{\delta} \quad N/\mu m$$

Fa	: Axial load applied to Linear Motion system	N
δ	: Elastic displacement of Linear Motion system	μm

●Screw Shaft Rigidity K_1

(1) In case of general mounting (Fixed-Free in axial direction) (Fig. A-108)

$$K_1 = \frac{A \cdot E}{\ell} \times 10^{-3} \quad N/\mu m$$

(2) In case of Fixed-Fixed mounting in axial direction (Fig. A-109)

$$K_1 = \frac{A \cdot E \cdot L}{\ell\ (L-\ell\ )} \times 10^{-3} \quad N/\mu m$$

The max. axial displacement occurs when $\ell = L/2$. The formula is as follows.

$$K_1 = \frac{4 \cdot A \cdot E}{L} \times 10^{-3} \quad N/\mu m$$

A : Screw Shaft minimum section area

$$A = \frac{\pi}{4} d^2 \quad mm^2$$

d	: Screw Shaft Root diameter	mm
E	: Young's modulus	2.08×10^5 N/mm² (MPa)
ℓ	: Axial distance between fixed point & Nut center	mm
L	: Mounting span distance	mm

Accordingly, the amount of Screw Shaft Elastic displacement δ due to Axial load Fa is as follows.

$$\delta = \frac{Fa}{K_1} \quad \mu m$$

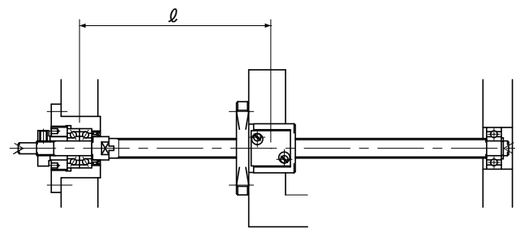


Fig. A-108 : Fixed-Free in axial direction

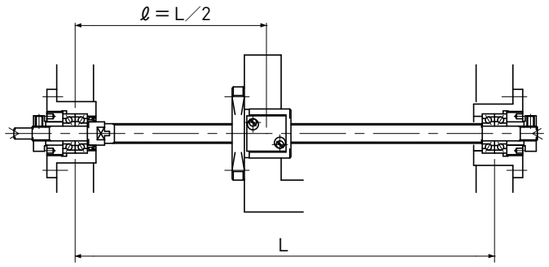


Fig. A-109 : Fixed-Fixed in axial direction

●Nut Rigidity K_2

Calculation formula of static Rigidity is defined by JIS B1192-4 established in 2018. KSS will use the formula which is defined by JIS to identify the static Rigidity.

(1) Rigidity of Single Nut with backlash

Theoretical static Rigidity(K_2) of the Single Nut with backlash is calculated by the formula as follows.

$$K_2 = f_{ar} \times (3/2) \times Fa/\delta \quad (N/\mu m)$$

K_2	: Theoretical Nut Rigidity	N/μm
Fa	: Axial Load	N
δ	: Amount of Elastic displacement at Axial Load Fa	μm
f_{ar}	: Correction factor = 0.67	

$$\delta = k \times Fa^{2/3} \quad (\mu m)$$

$$k = \frac{C}{Z^{2/3} \times Dw^{1/3} \times (\sin\alpha \times \cos\beta)^{5/3}}$$

k	: Rigidity characterization factor	
Z	: Quantity of loaded Ball)	個(qty.)
Dw	: Diameter of Ball	mm
α	: Contact angle to the thread groove	度(deg.)
β	: Lead angle	度(deg.)
C	: Coefficient depending on the material, shape and dimension	0.52～0.58

The theoretical static Rigidity K_2 of the Nut under an Axial load equivalent to 30% of the Basic Dynamic Load Rating Ca is described in dimension table. For Axial loads which are not 30% of the Basic Dynamic Load Rating Ca, it can be easily calculated by following formula.

$$K'_2 = K_2 \times \left(\frac{Fa}{0.3Ca}\right)^{1/3} \quad N/\mu m$$

K_2	: Nut Rigidity in dimension table	N/μm
Fa	: Axial load	N
Ca	: Basic Dynamic Load Rating	N

(2) Rigidity of preloaded Ball Nut

Theoretical static Rigidity(K_2) of the preloaded single Ball Nut will become a fixed value if axial load (Fa) is less than $2\sqrt{2}$ times of the preload amount(F_{pr}) regardless of the value of the axial load(Fa), and this will be calculated as follows.

$$K_2 = 2^{3/2} \times \frac{1}{k} \times F_{Pr}^{1/3} \quad N/\mu m$$

k	: Rigidity Characterization factor See formula stated above	
F_{pr}	: Preload amount	N

In case of Preload type Ball Screws, Rigidity varies depending on the dispersion of Preload Dynamic Drag Torque. Therefore, please inquire KSS for details.
If the axial load(Fa) will be more than $2\sqrt{2}$ times of the preload amount(F_{pr}), the calculation formula will be the same as the formula for single Nut Theoretical static Rigidity.

The theoretical static Rigidity K_2 under a Preload equivalent to 5% of the Basic Dynamic Load Rating Ca is described in dimension table. For Preload amounts other than the above, it can be easily calculated by following formula.

$$K'_2 = K_2 \times \left(\frac{F_{pr}}{0.05Ca}\right)^{1/3} \quad N/\mu m$$

K_2	: Nut Rigidity in dimension table	N/μm
F_{pr}	: Preload amount	N
Ca	: Basic Dynamic Load Rating	N

●Support Bearing Rigidity K_3

Support Bearing Rigidity varies depending on the type of Bearing and amount of Preload. Please inquire Bearing manufacturers.

●Nut, Bearing fitting part Rigidity K_4

Rigidity of Nut mounting part and Bearing mounting part vary depending on machine structure and design. KSS cannot mention the details but a design of high Rigidity must be considered.

●Screw Shaft torsion Rigidity

For positioning error due to torsion, this error is a relatively small compared to axial displacement. However, if investigation is required, the following formula may be used for calculation.

$$\theta = \frac{32TL}{\pi Gd^4} \times \frac{180}{\pi} \times 10 \quad deg$$

θ	: Torsion angle due to torsion moment	deg
T	: Torsion moment	N·cm
L	: Distance between Nut & Shaft end support	mm
G	: Modulus of Rigidity	8.3×10^4 N/mm² (MPa)
d	: Screw Shaft Root diameter	mm

Amount of axial displacement δa due to torsion angle is as follows.

$$\delta a = \ell \times \frac{\theta}{360} \times 10^3 \quad \mu m$$

ℓ : Lead mm

Ball Screw

Technical description

Basic Load Rating and Basic Rating Life

●Basic Dynamic Load Rating Ca and Basic Rating Life

The Basic Rating Life of Ball Screws means the total number of revolutions which 90% of the Ball Screws can endure. Failure is indicated by flaking caused by rolling fatigue on the surface of grooves or Balls. These figures are valid when a group of the same type Ball Screws are operated individually under the same conditions. The Basic Dynamic Load Rating Ca is the Axial load for which the Basic Rating Life is 1,000,000 revolutions. These values are listed under Ca in the dimension tables. Ball Screw's Basic Rating Life L_{10} can be estimated using Basic Dynamic Load Rating Ca in the following basic formula.

$$L_{10} = \left(\frac{Ca}{f \cdot Fa}\right)^3 \times 10^6 \quad \text{rev.}$$

Also, in place of the total number of revolutions, the Basic Rating Life can be expressed in hours: L_{10h} or traveled distance: L_{10d}, and these can be calculated through the following formulas.

$$L_{10h} = \left(\frac{1}{60 \cdot N}\right) \times L_{10} \quad \text{hours}$$

$$L_{10d} = \left(\frac{\ell}{10^6}\right) \times L_{10} \quad \text{km}$$

Ca : Basic Dynamic Load Rating N
Fa : Axial load N
N : Revolution min^{-1}
ℓ : Lead mm
f : Load factor
f=1.0～1.2 for almost no vibration, no impact load
f=1.2～1.5 for slight vibration, impact load
f=1.5～3.0 for severe vibration, impact load

Generally, Axial load on the most machine is not constant and it can be divided into several operating pattern. In this case, Basic Rating Life can be calculated to figure up equivalent Axial load Fam, equivalent Revolution N_m in the following formula.

Axial load N	Revolution min^{-1}	Frequency of use %
Fa_1	N_1	t_1
Fa_2	N_2	t_2
Fa_3	N_3	t_3

$$Fam = \left(\frac{Fa_1^3 \cdot N_1 \cdot t_1 + Fa_2^3 \cdot N_2 \cdot t_2 + Fa_3^3 \cdot N_3 \cdot t_3}{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3}\right)^{1/3} \quad N$$

$$N_m = \frac{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3}{t_1 + t_2 + t_3} \quad min^{-1}$$

Also, for Axial loads which vary linearly, the average Axial load Fam can be calculated approximately using the following formula.

$$Fam = \frac{Fa\,min + 2 \cdot Fa\,max}{3} \quad N$$

Fa min : Minimum Axial load N
Fa max : Maximum Axial load N

Note) As the Basic Rating Life varies due to lubricating conditions, and contaminations, Moment load or Radial load, etc., this should be considered a rough estimate only.

Load direction and Preload will be taken into consideration when calculate the Basic Rating Life by JIS B1192-5, which was established in 2018. Therefore, KSS uses a calculation formula of Basic Rating Life for Miniature Ball Screws that is conformed to JIS B1192-5.

●Life calculation considered the Load direction

Contact point of the Steel Balls changes based on Load direction (see Fig. A-110), therefore it is considered the lifetime when flaking occurred at any contact points, with calculating the Rating Life at each contact point of the Steel Balls.
The calculating formula is as follows.

$$L'_{10} = \left(L_{10(A)}^{-10/9} + L_{10(B)}^{-10/9}\right)^{-9/10} \quad \text{rev.}$$

L'_{10} : Merged Basic Rating Life of contact point A and B
$L_{10(A)}$: Basic Rating Life on contact point A
$L_{10(B)}$: Basic Rating Life on contact point B

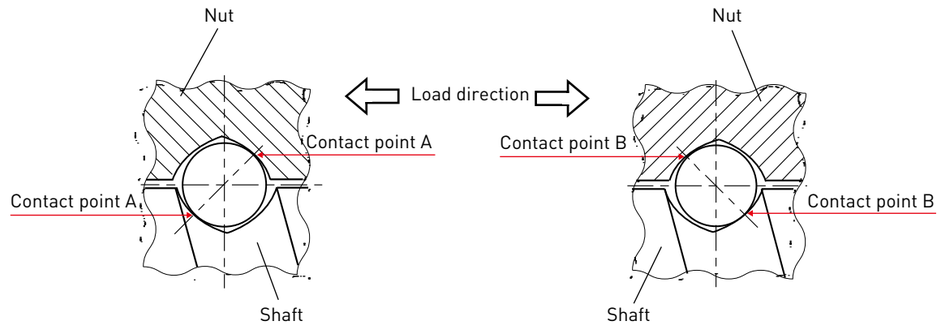


Fig. A-110 : Ball contact condition by load direction

Ball Screw
Technical description

●Life calculation considered the Preload

Preloaded Ball Screw is filled with oversized Balls, therefore each Steel Ball is contacted at four (4) points between Screw Shaft and Ball Nut. It is considered the lifetime when flaking occurred at any contact points, with calculating the Rating Life at each contact point.

The contact point of the Steel Balls is described in Fig. A-111, when Preload is effective by oversized Balls. The amount of Elastic displacement is described schematically by oval (contact ellipse).
Both contact point A and B are evenly contacted under no load from outside.

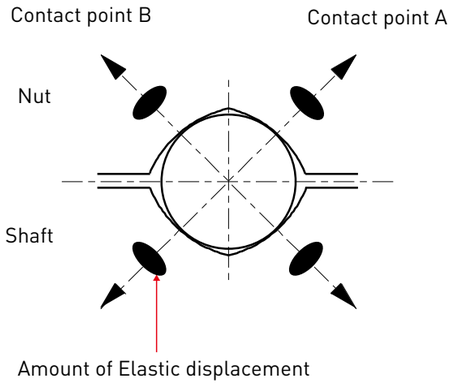


Fig. A-111 : Ball Contact condition under Preload

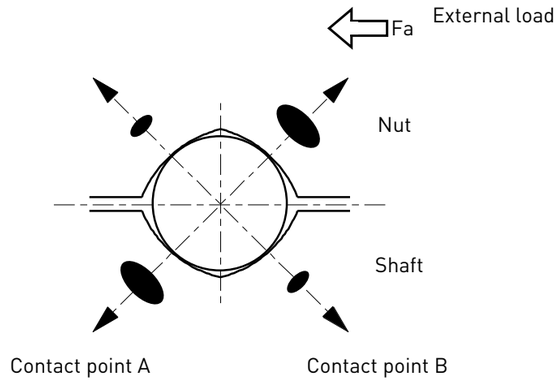


Fig. A-112 : Ball contact condition under preload & external load

When external load (Fa) is applied, Elastic displacement increases at contact point A, and decreases at contact point B(see Fig. A-112).
In this case, the load at contact point A and B can be calculated as below based on the Hertz theory of Elastic displacement.
By substituted each values into the formula of Basic Rating Life, Rating Life of each contact point can be calculated.

In case of $Fa \leqq 2\sqrt{2}\ F_{pr}$

$$Fa_{(A)} = F_{pr} \times \left(1 + \frac{Fa}{2^{3/2} \times F_{pr}}\right)^{3/2} \qquad Fa_{(B)} = Fa_{(A)} - Fa$$

Fa	: Amount of external load	N
$Fa_{(A)}$	: Axial load applying on contact point A	N
$Fa_{(B)}$	: Axial load applying on contact point B	N
F_{pr}	: Preload	N

In case of $Fa > 2\sqrt{2}\ F_{pr}$

$$Fa_{(A)} = Fa \qquad Fa_{(B)} = 0$$

Note) Load direction of A and B is opposite.

Using the value calculated by the above formula, calculate the Rating Life at each contact point A and B ($L_{10(A)}$, $L_{10(B)}$), then merge both value to calculate the merged Basic Rating Life.

$$L_{10(A)} = \left(\frac{Ca}{f \cdot Fa_{(A)}}\right)^3 \times 10^6 \quad \text{rev.}$$

$$L_{10(B)} = \left(\frac{Ca}{f \cdot Fa_{(B)}}\right)^3 \times 10^6 \quad \text{rev.}$$

$$L'_{10} = \left(L_{10(A)}^{-10/9} + L_{10(B)}^{-10/9}\right)^{-9/10} \quad \text{rev.}$$

Note) As a rough estimation of Basic Rating Life,
we consider the Axis load as external load added by preload amount F_{pr} for some cases.

●Basic Static Load Rating Coa

The Basic Static Load Rating Coa is the Axial Static load at which the amount of permanent deformation (Ball + Raceway) occurring at the maximum stress contact point between the Ball and Raceway surfaces is 1/10,000 times the Ball diameter. These values are listed under Coa in the dimension tables. The Basic Static Load Rating Coa values apply to investigation of stationary state or extremely low Revolution load conditions (less than 10 min^{-1}). However, in most cases the amount of permanent deformation causes absolutely no problems under the general conditions. The maximum permissible load Fa max for the screw groove can be found by using the following formula.

$$Fa\ max = \frac{Coa}{fs} \quad N$$

fs : Static safety factor
fs=1～2 for normal operation
fs=2～3 for vibration, impact

●Hardness coefficient

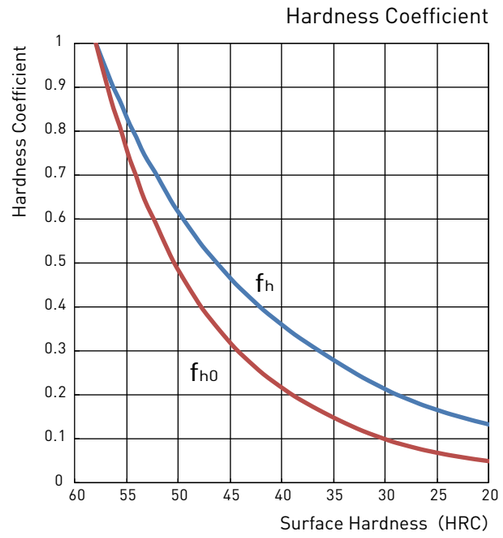
For Surface hardness of less than HRC58(654 Hv10), the Basic Dynamic Load Rating Ca and the Basic Static Load Rating Coa must be adjusted. Adjustment is made by the following formula.

$$Ca' = f_h \cdot Ca \quad (N)$$
$$Coa' = f_{h0} \cdot Coa \quad (N)$$

$$f_h = \left(\frac{H_a}{654}\right)^2 \leqq 1$$
$$f_{h0} = \left(\frac{H_a}{654}\right)^3 \leqq 1$$

f_h, f_{h0} : Hardness coefficient
(See formula above and graph right)

H_a : Vickers hardness Hv10



Driving Torque

Driving Torque in Linear Motion System T is expressed according to the following formula.

$$T = T_1+T_2+T_3+T_4 \quad N\cdot m$$

T_1	: Acceleration Torque	N·m
T_2	: Load Torque	N·m
T_3	: Preload Dynamic Drag Torque	N·m
T_4	: Additional Torque	N·m

When Motor selection, Driving Torque in Linear Motion System is needed.
$T_1 \sim T_3$ can be calculated by the following formula

●Acceleration Torque T_1

$$T_1 = \alpha \cdot I \quad N\cdot m$$

$$\alpha = \frac{2\pi N}{60 \cdot t} \quad rad/sec^2$$

$$I = Iw\cdot A^2 + Is\cdot A^2 + I_A\cdot A^2 + I_B \quad kg\cdot m^2$$

$$Iw = m_W \times \left(\frac{\ell}{2\pi}\right)^2 \quad kg\cdot m^2$$

$$Is = m_S \times \left(\frac{d^2}{8}\right) \quad kg\cdot m^2$$

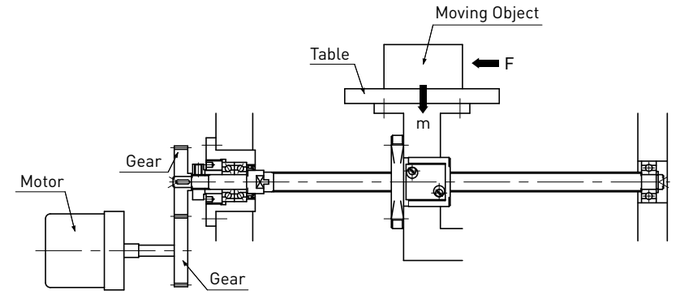
$$m_S = \pi \left(\frac{d}{2}\right)^2 \times L \times \gamma \quad kg$$

α	: Angular acceleration	rad/sec²
I	: Inertia moment	kg·m²
Iw	: Inertia moment of moving object by Motor axial conversion	kg·m²
Is	: Inertia moment of Screw Shaft	kg·m²
I_A	: Inertia moment of gears on screw side	kg·m²
I_B	: Inertia moment of gears on motor side	kg·m²
m_W	: Mass of moving object	kg
m_S	: Mass of Screw Shaft	kg
ℓ	: Lead	m
d	: Screw Shaft diameter	m
L	: Ball Screw length	m
γ	: Specific gravity	7,850 kg/m³
A	: Reduction ratio	
N	: Motor speed	min⁻¹
t	: Acceleration time	sec

●Load Torque T_2

$$T_2 = \frac{P\cdot\ell\cdot A}{2\pi\eta}\times 10^{-3} = \frac{(F+\mu mg)}{2\pi\eta}\cdot\ell\cdot A\times 10^{-3} \quad N\cdot m$$

P	: Axial load	N
F	: Load	N
m	: Mass of moving object	kg
g	: Gravity acceleraration=9.8×10³ mm/sec²	
ℓ	: Lead	mm
μ	: Sliding surface friction coefficient	
η	: Efficiency=0.9	
A	: Reduction ratio	



●Preload Dynamic Drag Torque T_3

$$T_3 = 0.05 \times (\tan\beta)^{-0.5} \times \frac{F_{pr}\cdot\ell}{2\pi}\times 10^{-3} \quad N\cdot m$$

β	: Lead angle	deg
F_{pr}	: Preload	N
ℓ	: Lead	mm

●Additional Torque T_4

Described as Torque which occurs in addition to those listed above. For example, support Bearing friction Torque, oil seal resistance Torque, etc.

Rust prevention and Lubrication

●Rust prevention

KSS Ball Screws are applied anti-rust oil when shipping in case of no specific instruction. This oil should be removed before use. Wash Ball Screws with cleaned Kerosine and apply lubricant(Grease or Oil) on Ball Screws. As customer's request, specified Grease or Oil can be applied, but it should be noted that they are not suitable for long term storage purpose and rust might occur.

Note)Anti-rust oil is focused on anti-rust performance and it does not have lubricating function. Therefore, when using Ball Screws with anti-rust oil coating, the problems such as shortened Life, increase of Torque and abnormal heat generation occurs.

●Lubrication

In Ball Screw use, lubricant should be required. If lubricant is not applied with, the problem such as increase of Torque and shortened Life occurs. Applying lubricant can minimize temperature increases, decline of mechanical efficiency due to friction, and deterioration of accuracy caused by wear.
Ball Screw lubrication is divided into Greasing and Oiling. A regular lithium-soap-based Grease and ISO VG32-68 Oil (turbine Oil #1 to #3) are recommended. It is highly important to choose lubricant depending on customer's usage. Especially in case of Miniature Ball Screws, malfunction such as increase of Torque are caused by the stir resistance. KSS original Greases which maintains Ball Screw's smooth movement and have high lubricating performance are prepared. MSG No.1 is appropriate for high smooth requirement and high positioning usage(consistency 1). MSG No.2 is suitable for high speed and general usage(consistency 2).
Please refer to page B101「Original Grease for Miniature Ball Screws」.

Recommended lubricants for normal operating conditions

Lubricant	Type	Product name
Grease	Lithium-based Grease	KSS original Grease MSG No.2
Lubricating Oil	Sliding surface Oil or turbine Oil	Super Multi 68

●Inspection and replenishment

Grease inspection should be performed once every two to three months, and Oil inspection should be performed approximately weekly. Check the Oil or Grease amount and contamination at each inspection and replenish if needed.
When re-greasing, the old or discolored one should be wiped off as much as you can.

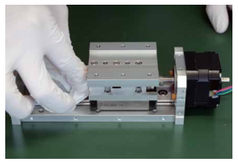
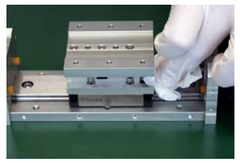
Inspection and replenishment Interval of lubricant

Lubrication	Inspection frequency	Inspection Items	Replenishment and replacement frequency
Automatic intermittent lubrication	Weekly	Oil level, contamination	Replenish at each inspection, depending on tank capacity
Grease	Every 2 to 3 months initially	Contamination, swarf contamination	Replenish annually or as necessary, depending on Inspection results The old or discolored grease should be wiped off before re-greasing.
Oil bath	Daily before operation	Oil suface check	Set a rule for replenishment as necessary, depending on amount of wear.

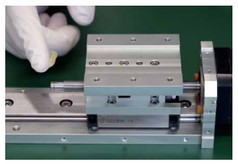
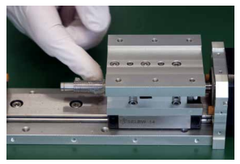
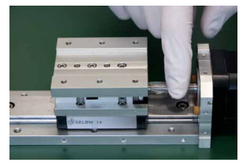
●Grease-up Procedure(Example)

1)It is desirable to wear rubber gloves, not to handle Ball Screw by bear hand.

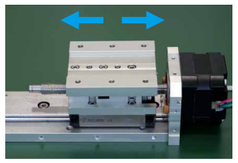
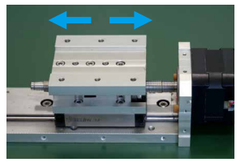
2)Wipe off discolored Grease on the Screw Shaft by using cloth or paper exclusive for wiping Grease or oil (e.g.: Kim Wipes by Kimberly-Clark Corp.).
Move the Ball Nut to wipe off remaining Grease inside the Ball Nut as much as possible.

3)There is no oil hole on the flange for KSS Ball Screws as standard design, apply Grease entirely throughout the Screw Shaft.
Please use the brush exclusive for applying Grease, or apply directly to the Screw Shaft by hand with wearing rubber gloves.If the Ball Nut has an oil hole, utilize it to fill in the new Grease.

4)In order to apply Grease entirely on the Screw Shaft, move the Ball Nut over full travel manually, or install in the device and do running-in.
Remove any remaining Grease on either end of the Screw Shaft.

Please consult KSS for details.

Dust prevention

In Ball Screws, if dust or other contaminations intrude into the Ball Nut, wear is accelerated, the screw groove will be damaged, circulation will be obstructed due to Ball fracture, damage of recirculation parts and so on. Eventually, the Ball Screws will cease to function. Where the possibility of dust or other contaminant exists, the screw thread section cannot be left exposed, and dust prevention measure such as a bellows or Telescopic pipe must be taken.

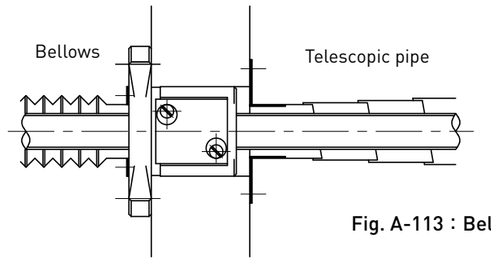


Fig. A-113 : Bellows & Telescopic pipe

KSS Ball Screws are concentrated on compact design for a feature of Miniature Ball Screw. Therefore, all models in the catalogue are the dimension without seals. Please inquire KSS if seals are required. Please note that Nut dimension may change due to seal installation. Some models cannot install the seals.

Surface treatment

Surface treatment can be possible for the purpose of rust prevention. Very Low temp. Black Chrome treatment (BCr) is KSS standard surface treatment for the purpose of rust prevention. Please inquire KSS if other surface treatments are needed.

●Feature of KSS Ball Screws with Very Low temp. Black Chrome(BCr) coating

- Due to thin film thickness, mating part can be applicable with BCr.
- Due to strict production management, film thickness can be treated equally and smoothness is kept.
- High anti-rust ability is possible.
- To improve sliding characteristics, BCr+fluorine resin coating is also available.

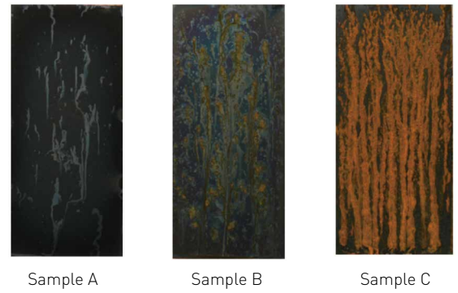
Photo A-114 : Very Low temp. Black Chrome coating

●Examination data of anti-rust ability

Based on the salt spray corrosion test(JIS Z2371), anti-rust ability has been evaluated, as follows.

- Standard test piece : 70mm×150mm×1mm(material= SPCC)
- Data : Evaluated by appearance and rating number method
  after 24 hours of salt spray corrosion test.(The less number, the more corrosion)

	Rating number(Average)
Sample A(BCr coating)	9.3
Sample B(R coating)	9~8
Sample C(M coating)	3~4



Sample A　Sample B　Sample C

●About RoHS compliance

The amount of hexavalent Chromium in KSS Very Low temp. Black Chrome(BCr) coating is less value than the based on RoHS regulation.

Traceability

KSS Ball Screws are manufactured from rigidly selected materials in our temperature controlled factory. They are manufactured using the latest production equipment, with consistent quality control supervision ranging from the production process to inspection and shipping.
Certificate of inspection, Photo A-115, or Inspection report, Photo A-116 can be provided as your request.
The Ball Screws produced by KSS have a serial number which is marked on the Nut (refer to the Photo A-117).
Record of inspection and production trail which is in correspondence to a production number, are stored in KSS and inspection data can be retrieved by inquiry of a serial number.

However,some products may not be applicable for serial number, please ask KSS for more detail.


CERTIFICATE OF INSPECTION

This is to Certify that this product has passed the inspection of KSS STANDARD.

KSS CO., LTD.

Head Office: 1-22-14 Yaguchi, Otaku, Tokyo 146-0093
TEL 03(3756)3921
Ojiya Plant: TEL 0258(82)5577

Photo A-115：Certificate of Inspection

Photo A-116：Inspection report

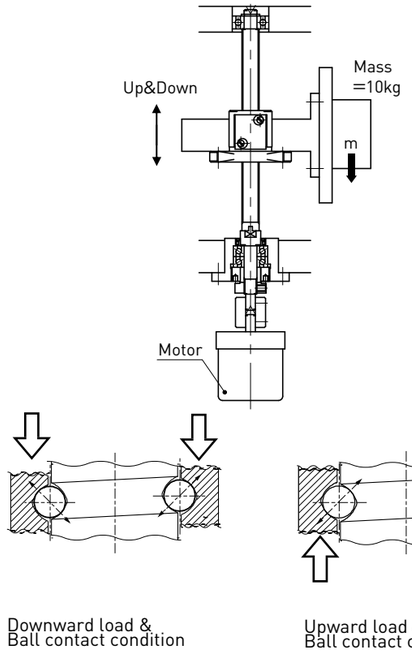
Photo A-117：Serial Number

Calculation example of characteristic for Ball Screws.

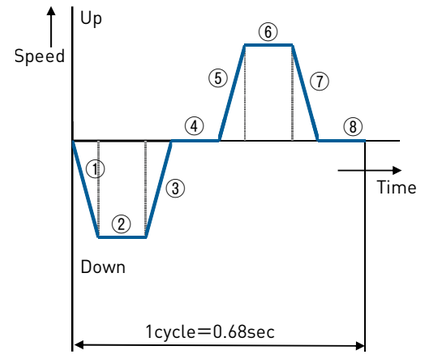
Load direction and Preload will be taking into consideration when calculate the Basic Rating Life by JIS B1192-5, which was established in 2018.
Therefore, KSS uses a calculation formula of Basic Rating Life for Miniature Ball Screws that is conformed to JIS B 1192-5.

Example 1：Vertical Pick&Place

Ball Screw model and operating condition



Operating pattern



Load direction (Ball contact point) should be considered in calculation of lifetime for Vertical axis application. Load direction is defined as plus for downward, and as minus for upward. The status of Ball contact point is indicated in Fig. A-118.

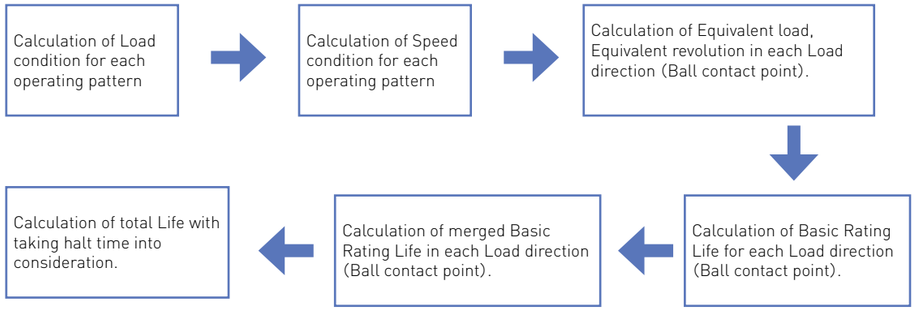
Fig. A-118：Load direction and Ball Contact condition

Ball Screw spec.
- Shaft dia. = ϕ10mm
- Lead = 10mm
- Dynamic Capacity Ca = 3,300N
- Total length = 180mm
- Axial play = 20μm or less

Operating Pattern
- Max Speed = 0.4m/sec
  ** 2,400 min^{-1} because of Lead 10mm
- Acceleration & Deceleration time = 0.02 sec
  **①③⑤⑦ in diagram above
- Constant speed time = 0.2 sec
  **②⑥ in diagram above
- Halt time = 0.1 sec
  **④⑧ in diagram above
- Cycle time = 0.68sec

Calculation of Basic Rating Life

Basic Rating Life is calculated in the following procedure.



1) Calculation of Load condition from Operating pattern

Load condition of each operating pattern which is numbered is as follows.

①Down & Acceleration

$Fa_1 = mg - m\alpha = 10 \times 9.807 - 10 \times 20 = -101.9$(N)

②Down & Constant speed area

$Fa_2 = mg = 10 \times 9.807 = 98.1$(N)

③Down & Deceleration

$Fa_3 = mg + m\alpha = 10 \times 9.807 + 10 \times 20 = 298.1$(N)

④Halt

$Fa_4 = 0$

⑤Up & Acceleration

$Fa_5 = mg + m\alpha = 10 \times 9.807 + 10 \times 20 = 298.1$(N)

⑥Up & Constant speed area

$Fa_6 = mg = 10 \times 9.807 = 98.1$(N)

⑦Up & Deceleration

$Fa_7 = mg - m\alpha = 10 \times 9.807 - 10 \times 20 = -101.9$(N)

⑧Halt

$Fa_8 = 0$

Here,

m : Mass = 10 kg

g : Gravity Acceleration = 9.807 m/sec^2

α : Acceleration

Acceleration up to 0.4m/sec

α = 0.4/0.02=20 m/sec^2

2) Calculation of Speed condition from Operating pattern

Speed condition (Revolution condition) of each operating pattern which is numbered is as follows.

Constant speed area(②、⑥) ;

0.4m/sec = 400 × 60 mm/min = 24,000mm/min = 2,400 min^{-1}(Lead 10mm)

Acceleration and deceleration area(①、③、⑤、⑦) ;

as an average revolution above, 2,400/2 = 1,200 min^{-1}

Calculation result of the load condition and speed condition (revolution) for each operating patterns are as below.

Condition	Axial load Fai(N)	Revolution Ni(min^{-1})	Frequency of use ti(sec)
①Down & Acceleration	−101.9	1,200	0.02
②Down & Constant speed	98.1	2,400	0.2
③Down & Deceleration	298.1	1,200	0.02
④Halt	0	0	0.1
⑤Up & Acceleration	298.1	1,200	0.02
⑥Up & Constant speed	98.1	2,400	0.2
⑦Up & Deceleration	−101.9	1,200	0.02
⑧Halt	0	0	0.1

plus(+) indicates downward load and minus(−) indicates upward load.

3) Calculation of Equivalent load, Equivalent revolution for in each Load direction (Ball contact point)

As we could calculate the applying load and direction in each operating pattern, now we calculate the Equivalent load and Equivalent revolution for each Load direction.

Calculation formula shown in page A825 will be used for calculating Equivalent load and Equivalent revolution.

$$Fam = \left(\frac{Fa_1^3 \cdot N_1 \cdot t_1 + Fa_2^3 \cdot N_2 \cdot t_2 + Fa_3^3 \cdot N_3 \cdot t_3 + \cdots\cdots + Fa_i^3 \cdot N_i \cdot t_i}{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3 + \cdots\cdots + N_i \cdot t_i}\right)^{1/3} \quad N$$

$$N_m = \frac{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3 + \cdots\cdots + N_i \cdot t_i}{t_1 + t_2 + t_3 + \cdots\cdots + t_i} \quad min^{-1}$$

Now calculation table should be re-arranged as below by load direction, and Equivalent load and Equivalent revolution in each load direction are as follows.

Condition	Downward load		Upward load		Frequency of use ti(sec)
	Axial load Fai(N)	Revolution Ni(min^{-1})	Axial load Fai(N)	Revolution Ni(min^{-1})	
①Down & Acceleration	—	—	101.9	1,200	0.02
②Down & Constant speed	98.1	2,400	—	—	0.2
③Down & Deceleration	298.1	1,200	—	—	0.02
④Halt	—	—	—	—	0.1
⑤Up & Acceleration	298.1	1,200	—	—	0.02
⑥Up & Constant speed	98.1	2,400	—	—	0.2
⑦Up & Deceleration	—	—	101.9	1,200	0.02
⑧Halt	—	—	—	—	0.1
Equivalence	Fam(d) =129.3	Nm(d) =2,290.9	Fam(u) =101.9	Nm(u) =1,200	Working duration : 0.48 sec Halt time : 0.2 sec 1 cycle : 0.68 sec

4) Calculation of Basic Rating Life for each Load direction (Ball contact point)

Then calculate the Basic Rating Life for downward load, upward load by using the value of Equivalent load, Equivalent revolution in each load direction (Ball contact point).

【Downward load】

Substitute the Equivalment Load Fam(d) and Revolution Nm(d) in the following formula in page A825.

$$L_{10h(d)} = \left(\frac{Ca}{f \cdot Fam(d)}\right)^3 \times \left(\frac{10^6}{60 \cdot Nm(d)}\right) = 69{,}991 \text{ hours}$$

Here, Basic Dynamic Load Rating Ca = 3,300N, Load factor f = 1.2.

【Upward load】

Calculate the upward load as same method as above.

$$L_{10h(u)} = \left(\frac{Ca}{f \cdot Fam(u)}\right)^3 \times \left(\frac{10^6}{60 \cdot Nm(u)}\right) = 272{,}988 \text{ hours}$$

5) Calculation of merged Basic Rating Life in each Load direction (Ball contact point)

Calculate the merged Basic Rating Life by combining the Basic Rating Life of each Load direction ($L_{10h(d)}$, $L_{10h(u)}$), with the calculation formula of page A826.

$$L'_{10h} = \left(L_{10h(d)}^{-10/9} + L_{10h(u)}^{-10/9}\right)^{-9/10} = 58{,}504 \text{ hours}$$

5) Calculation of total Life with taking halt time into consideration

Above calculation is only for the working duration, therefore calculate the total Life with taking halt time in each cycle into consideration.

$$L''_{10h} = L'_{10h} \times (\text{cycle time}) / (\text{working duration}) = 58{,}504 \times (0.68 / 0.48)$$

$$= 82{,}881 \text{ hours}$$

Calculation of Driving Torque for Linear Motion system

Calculate Driving Torque for Linear Motion system according to page A829. It is important for motor selection. In the above case, due to backlash type Ball Screw, Preload Dynamic Drag Torque does not occur. Therefore, calculate acceleration Torque T_1 and Load Torque T_2.

$$T = T_1 + T_2 + T_3 + T_4 \quad N \cdot m$$

T_1 : Acceleration Torque N·m
T_2 : Load Torque N·m
T_3 : Preload Dynamic Drag Torque N·m
T_4 : Additional Torque N·m

1) Calculation of acceleration Torque T_1

$$T_1 = \alpha \cdot I = \alpha\,(Iw + Is) \quad N \cdot m$$

α : Angular acceleration rad/sec²
I : Inertia moment kg·m²
Iw : Inertia moment of moving object by motor axis conversion kg·m²
Is : Inertia moment of Screw Shaft kg·m²

$$Iw = m_W \times (\ell/2\pi)^2 = 2.53 \times 10^{-5} \quad kg \cdot m^2$$

m_W : Mass of moving object = 10 kg
ℓ : Ball Screw Lead = 0.01 m

$$Is = m_S \times (d^2/8) = (d/2)^2 \pi \gamma \times L \times (d^2/8) = 0.139 \times 10^{-5} \quad kg \cdot m^2$$

m_S : Mass of Screw Shaft kg
γ : Specific gravity of Screw Shaft = 7,850 kg/m³
d : Shaft dia. = 0.01 m
L : Shaft length = 0.18 m

$$\alpha = (2\pi N)/60t = 12{,}566.4 \text{ rad/sec}^2$$

N : Max speed = 2,400 min⁻¹
t : Acceleration time = 0.02 sec

$$T_1 = 12{,}566.4 \times (2.53 + 0.139) \times 10^{-5} = 0.335 \text{ N} \cdot \text{m}$$

2) Calculation of Load Torque T_2

$$T_2 = mg\ell/(2\pi\eta) = 0.173 \text{ N} \cdot \text{m}$$

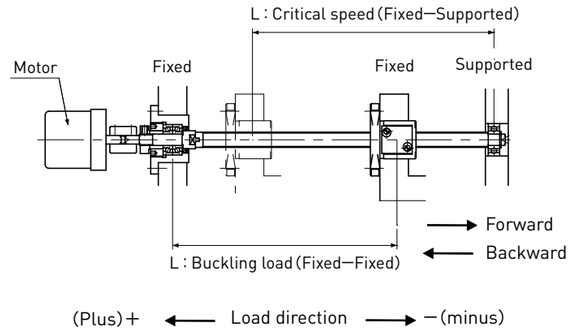
m : Mass of moving object = 10 kg
g : Gravity acceleration = 9.807 m/sec²
ℓ : Ball Screw Lead = 0.01 m
η : Ball Screw efficiency = 0.9

3) Calculation of Driving Torque T for Linear Motion system

In case without consideration of Torque by support Bearings, Driving Torque of Ball Screw is as follows.

$$T = T_1 + T_2 = 0.335 \text{ N} \cdot \text{m} + 0.173 \text{ N} \cdot \text{m} = 0.508 \text{ N} \cdot \text{m}$$

Example 2 : Horizontal desk top small lathe
Ball Screw model and operating condition



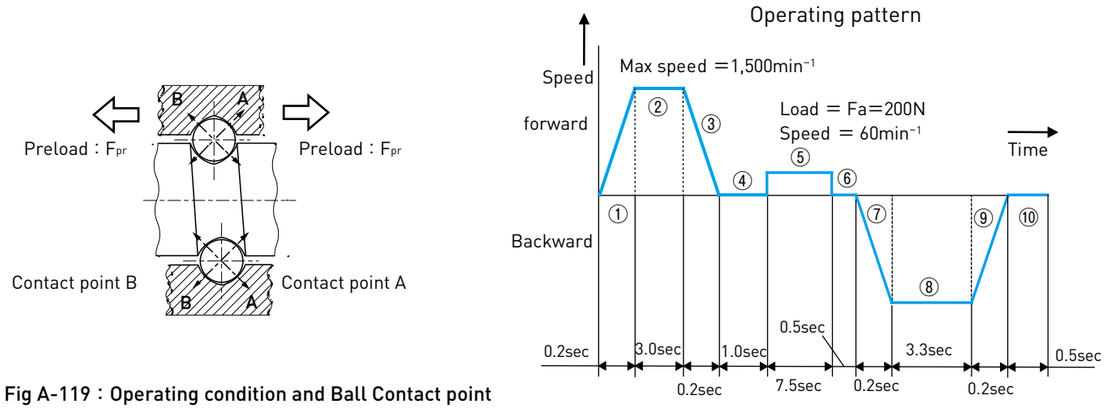


Fig A-119 : Operating condition and Ball Contact point

Ball Screw spec.
- Shaft dia. = ϕ12mm
- Lead = 2mm
- Shaft Root dia. d = ϕ10.6mm
- Dynamic Capacity Ca =1,900N
- Mounting span L = 400mm
- Axial play = 0μm or less
- Mass of moving object m = 10kg
- Sliding surface friction coefficient μ = 0.05
- Preload F_{pr} = 95N(Ca×5%)

Operating Pattern
- Max Speed = 50mm/sec
  ** 1,500 min^{-1} because of Lead 2mm
- Operating pattern : see diagram above
  - ①⑦Acceleration = 0.2sec
  - ②Constant speed(forward) = 3.0sec
  - ③⑨Deceleration = 0.2sec
  - ④⑥⑩halt = 2.0sec(total)
  - ⑤Turning time = 7.5sec
  - ⑧Constant speed(backward) = 3.3sec
- Load Fa = 200N
- Cutting speed = 2mm/sec
- **60min^{-1} due to 2 mm lead

Calculation of permissible Axial load

1) Study of Buckling load

Calculate Buckling load according to the following formula in page A815.

$$P = \alpha \times \frac{n\pi^2 E \cdot I}{L^2} \quad N \qquad I = \frac{\pi}{64} d^4 \quad mm^4$$

Substitute safety factor α = 0.5, Young's modulus E = 2.08 × 10^5 N/mm^2(MPa), Root diameter d = 10.6mm, Fixed — Fixed mounting factor n = 4, mounting span L = 400mm in formula above.

P = 15,900N

It is more than maximum Load so that there is no problem.

2) Study of permissible Load for yield stress

Calculate permissible Load for yield stress based on the formula in page A815.

$$P = \sigma \times A \quad N \qquad A = \frac{\pi}{4} d^2 \quad mm^2$$

Substitute permissible stress σ=98N/mm^2(MPa), Root diameter d=10.6mm in the formula above.

P = 8,650 N

It is more than maximum Load and there is no problem.

Calculation of permissible Revolution

Calculate permissible Revolution based on the formula in page A816

$$N = \beta \times \frac{60 \cdot \lambda^2}{2\pi} \times \sqrt{\frac{E \cdot I \cdot g}{\gamma \cdot A \cdot L^4}} \quad min^{-1}$$

$$I = \frac{\pi}{64} d^4 \quad mm^4 \qquad A = \frac{\pi}{4} d^2 \quad mm^2$$

Substitute safety factor β=0.8, Young's modulus E = 2.08×10^5 N/mm^2(MPa), gravity acceleration g = 9.8×10^3 mm/sec^2, material specific gravity γ = 7.7×10^{-5} N/mm^3, Root diameter d = 10.6mm, Fixed — Support mounting factor λ = 3.927, mounting span L = 400mm in formula above.

N = 10,000 min^{-1}

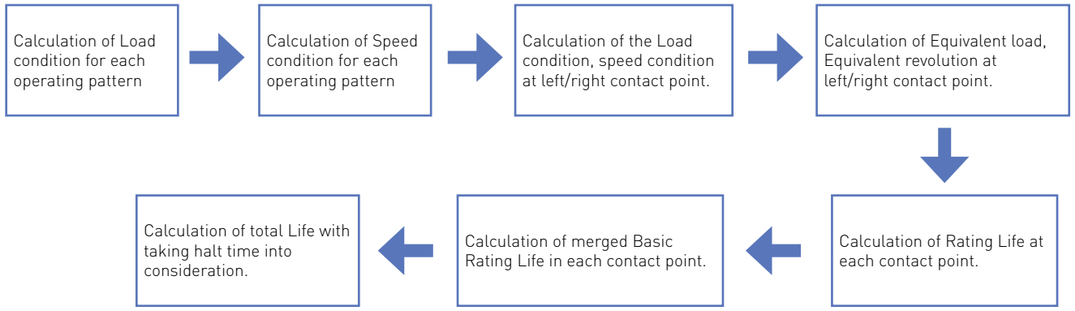
Therefore, it is more than maximum Revolution and there is no problem.

Technical description

Calculation of Basic Rating Life

Load direction and Preload will be taken into consideration when calculate the Basic Rating Life by JIS B1192-5, which was established in 2018. Therefore, KSS uses a calculation formula of Basic Rating Life for Miniature Ball Screws that is conformed to JIS B 1192-5.

In case when preload is effective by oversized Ball, the contact condition of the Ball is 4 points as per Fig. A-111. As explained in page A827, total Life can be calculated after calculation of Rating Life at contact point A and B due to the change of initial contact condition under the preload casused by external load.



1) Calculation of Load condition from Operating pattern

Load condition of each operating pattern which is numbered is as follows.

①Forward Acceleration
$Fa_1 = \mu mg + m\alpha = 0.05 \times 10 \times 9.807 + 10 \times 0.25 = 7.4(N)$
②Forward at constant speed area
$Fa_2 = \mu mg = 0.05 \times 10 \times 9.807 = 4.9(N)$
③Forward Deceleration
$Fa_3 = \mu mg - m\alpha = 0.05 \times 10 \times 9.807 - 10 \times 0.25 = 2.4(N)$
④Halt
$Fa_4 = 0$
⑤at Turning
$Fa_5 = \mu mg + Fa = 0.05 \times 10 \times 9.807 + 200 = 204.9(N)$
⑥Halt
$Fa_6 = 0$
⑦Backward Acceleration
$Fa_7 = -(\mu mg + m\alpha) = -(0.05 \times 10 \times 9.807 + 10 \times 0.25) = -7.4(N)$
⑧Backward at constant speed area
$Fa_8 = -\mu mg = -0.05 \times 10 \times 9.807 = -4.9(N)$
⑨Backward Deceleration
$Fa_9 = -\mu mg + m\alpha = -0.05 \times 10 \times 9.807 + 10 \times 0.25 = -2.4(N)$
⑩Halt
$Fa_{10} = 0$

Here,
m ; Mass = 10 kg
g ; Gravity Acceleration = 9.807 m/sec^2
α ; Acceleration
Acceleration which reaches up to 50mm/sec
$\alpha = 0.05 / 0.2 = 0.25$ m/sec^2

2) Calculation of Speed condition from Operating pattern

Speed condition (Revolution condition) of each operating pattern which is numbered as follows.

Constant speed area(②、⑧) ;
50mm/sec=50×60 mm/min = 3,000mm/min = 1,500 min^{-1}(Lead 2mm)

Acceleration and deceleration area(①、③、⑦、⑨) ;
As above average revolution, 1,500/2= 750 min^{-1}

Calculation result of the load condition and speed condition (revolution) for each operating patterns are as below.

Condition	Axial load Fai(N)	Revolution Ni(min^{-1})	Frequency of use ti(sec)
①Forward Acceleration	7.4	750	0.2
②Forward at Constant speed	4.9	1,500	3.0
③Forward Deceleration	2.4	750	0.2
④Halt	0	0	1.0
⑤Turning	204.9	60	7.5
⑥Halt	0	0	0.5
⑦Backward Acceleration	−7.4	750	0.2
⑧Backward at constant speed	−4.9	1,500	3.3
⑨Backward Deceleration	−2.4	750	0.2
⑩Halt	0	0	0.5

3) Calculation of the Load condition at left/right contact point

Ball contact condition in 4 point between Balls and thread grooves by preload may changes by external load as shown in page 827(Fig. A-112). Based on the changed Elastic displacement, load applying on the contact point A and B will be calculated by formula below.

【If the direction of the external load is plus(+)】

$$Fai_{(A)} = F_{pr} \times \left(1 + \frac{Fai}{2^{3/2} \times F_{pr}}\right)^{3/2} \qquad Fai_{(B)} = Fai_{(A)} - Fai$$

【If the direction of the external load is minus(−)】

$$Fai_{(B)} = F_{pr} \times \left(1 + \frac{|Fai|}{2^{3/2} \times F_{pr}}\right)^{3/2} \qquad Fai_{(A)} = Fai_{(B)} - |Fai|$$

Here,
F_{pr} : Preloaded load = 95 N
Fai : Axial load in each condition(N)
(A),(B) : This means contact point

The calculation result of each load condition and revolution condition as per contact point A and B is shown in table A-120.

4) Calculation of Equivalent load, Equivalent revolution at left and right contact point

Load applying on contact point A and B is calculated under each operating condition, then Equivalent load and Equivalent revolution at each contact point will be calculated. However, the speed and frequency of use stay the same, only the load condition will be different.
Calculation formula shown in page A825 will be used for calculating Equivalent load and Equivalent revolution.

$$Fam = \left(\frac{Fa_1^3 \cdot N_1 \cdot t_1 + Fa_2^3 \cdot N_2 \cdot t_2 + Fa_3^3 \cdot N_3 \cdot t_3 + \cdots\cdots + Fa_i^3 \cdot N_i \cdot t_i}{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3 + \cdots\cdots + N_i \cdot t_i} \right)^{1/3} \quad N$$

$$N_m = \frac{N_1 \cdot t_1 + N_2 \cdot t_2 + N_3 \cdot t_3 + \cdots\cdots + N_i \cdot t_i}{t_1 + t_2 + t_3 + \cdots\cdots + t_i} \quad min^{-1}$$

The axial load applying on contact point A and B for each condition, Equivalent load and Equivalent revolution are as follows.

Table A-120 : Load & Revolution condition at each contact point

Condition	Axial load Fai(N)	Axial load at contact pt. A $Fai_{(A)}$ (N)	Axial load at contact pt. B $Fai_{(B)}$ (N)	Revolution Ni(min^{-1})	Frequency of use ti(sec)
① Forward Acceleration	7.4	99.0	91.6	750	0.2
② Forward at Constant speed	4.9	97.6	92.7	1,500	3.0
③ Forward Deceleration	2.4	96.3	93.9	750	0.2
④ Halt	0	—	—	0	1.0
⑤ Turning	204.9	222.3	17.4	60	7.5
⑥ Halt	0	—	—	0	0.5
⑦ Backward Acceleration	−7.4	91.6	99.0	750	0.2
⑧ Backward at constant speed	−4.9	92.7	97.6	1,500	3.3
⑨ Backward Deceleration	−2.4	93.9	96.3	750	0.2
⑩ Halt	0	—	—	0	0.5
Equivalence		$Fam_{(A)}$=109.0	$Fam_{(B)}$=94.0	Nm=719.2	Working duration : 14.6 sec Halt time : 2.0 sec 1 cycle : 16.6 sec

Note) Results of applying load at contact point A and B are all absolute number.

5) Calculation of Rating Life at each contact point

Calculate the Basic Rating Life at contact point A and B by using the value of Equivalent load, Equivalent revolution in each contact point A, B.

【Contact point A】

Substitute the Equivalent load $Fam_{(A)}$ and Equivalent revolution N_m in the following formula as shown in page A825.

$$L_{10h(A)} = \left(\frac{Ca}{f \cdot Fam_{(A)}} \right)^3 \times \left(\frac{10^6}{60 \cdot N_m} \right) = 71{,}029 \text{ hours}$$

【Contact point B】

Substitute the Equivalent load $Fam_{(B)}$ and Equivalent revolution N_m in the following formula as shown in page A825.

$$L_{10h(B)} = \left(\frac{Ca}{f \cdot Fam_{(B)}} \right)^3 \times \left(\frac{10^6}{60 \cdot N_m} \right) = 110{,}747 \text{ hours}$$

Here, Basic Dynamic Load Rating Ca = 1,900N, Load factor f = 1.2.

6) Calculation of merged Basic Rating Life in each contact point

Calculate merged Basic Rating Life of contact point A, B ($L_{10h(A)}$, $L_{10h(B)}$) by using formula in page A 826.

$$L'_{10h} = \left(L_{10h(A)}^{-10/9} + L_{10h(B)}^{-10/9} \right)^{-9/10} = 46{,}257 \text{ hours}$$

7) Calculation of total Life with taking halt time into consideration

Above calculation is only for the working duration, therefore calculate the total Life with taking halt time into consideration.

$$L''_{10h} = L'_{10h} \times (\text{cycle time}) / (\text{working duration}) = 46{,}257 \times (16.6 / 14.6)$$
$$= 52{,}594 \text{ hours}$$

Ball Screw
Technical description

Precaution of storage, handling and operating

●Handling precaution for Ball Screws

Ball screws are precision components, and must be handled carefully in accordance with the instruction below.

Storage

Ball Screws should be stored unopened in their original KSS packaging. Avoid opening the package or breaking the inner package unnecessarily. This may result in contamination or rusting, and may degrade operating performance.

Handling

1. Never disassemble Ball Screws. This will cause contamination, reduce accuracy, and lead to accidents.
2. Customers should not attempt to reassemble Ball Screws by themselves. Incorrect reassembly can easily result in malfunction. Ball Screws should be returned to KSS, where they will be repaired and reassembled for a fee.
3. Take care to avoid injuries due to falling Ball Screw Shafts or Nuts. If dropped, performance may be adversely affected by damage to the recirculating component. Ball Screws must therefore be inspected by KSS for a fee. Please make sure you return dropped Shafts or Nuts.
4. Dropping Ball Screws may cause scratching or impact damage to recirculating components, Shaft outside diameters, Balls, or screw grooves, which may cause malfunction, such as incorrect rotation.

●Precaution of Ball Screw for operating

Dust proof

Ball Screws must be used in a clean environment. They should be used with a dustproof cover to prevent contamination from dust or swarf. Dust or swarf contamination due to insufficient dust protection may reduce the Ball Screw performance, cause damage to recirculating components, which lead to locking.

Lubrication

Check lubrication before use. Insufficient lubrication will rapidly deteriorate the operating performance of the Ball Screw. Since anti-rust oil is not lubricant(Grease/ Oil), Ball Screws should be washed off anti-rust oil with clean Kerosene and apply lubricant before using Ball Screws. Please check the lubricant condition every 2 to 3months. If Grease is contaminated, remove old Grease, and replace with new Grease.

Critical speed and Axial load

Ball Screws have the maximum limit of speed and Axial load depending on its size, material, mounting method etc. when design Ball Screws, KSS would recommend that you consult with KSS engineering about the operating condition and model selection. To release your operating condition, please use Technical Data Sheet at the end of this catalogue.

Over-run

Allowing Ball Screw Nuts to overrun may result in malfunctioning due to Balls escaping, damage to recirculation components, and indentation of the Ball grooves. Continued use in this state will lead to rapid wear and damage to recirculation components. Ball Screw Nuts must therefore never be allowed to overrun. If overrunning occurs, contact KSS for an inspection for a fee.
Some products may fit the O-ring on the end of the shaft for the purpose of preventing fall off or overrunning the Ball Nut.
Please detach O-ring in such case in prior to use.

Temperature

Ball Screws are designed to be used at operating temperatures up to 80℃. Avoid use at higher temperatures. This may result in the following problems .

- Reduced performance of Ball recirculation, and smooth movement.
- Damage to recirculation components.
- Reduced hardness of heat treated components.

If it is necessary to work beyond the recommended temperatures, please consult with KSS first as we may be able to provide a solution.

Moment load or Radial load

Ball Screws primarily generate thrusts in the axial direction, and are not designed to withstand Radial loads and Moment loads. Care must be taken not to apply Radial loads and Moment loads to the Nut. If there loads act on the Ball Screws, Ball load uniformity is lost, and the life of Ball Screws is drastically reduced. When installing Ball Screws, misalignment between Ball Screw and Support Bearings or Nut Bracket causes the unbalanced load on Ball Screw, care must be taken.

Oscillation

Under the oscillation (short stroke + back & forth operation) of Ball Screws, Drag Torque tends to increase gradually due to the stuck of Balls inside Ball Nut. Dummy stroke (preferably full length stroke) would be effective to release this phenomenon.

Ball Screw
Handling instruction

Original Grease for Miniature Ball Screws

In general, it is known that the operation characteristic of the Ball Screws is influenced by properties of Grease. Especially, the stir resistance of Grease influences Ball Screw torque after applying Grease. Selection of Grease is extremely important in the Miniature Ball Screws. KSS has developed Ball Screw excellent Grease, which has high lubrication performance without deteriorating Ball Screw operation.
KSS has also developed its exclusive Grease, which keeps smooth feeling and less contamination under clean room environment.
We think the best special Grease is prepared respectively according to customer's usage.

●Features

It is the best Grease for the Miniature Ball Screws, which has low coefficient of friction, good adhesion characteristic, excellent lubricity.

●Application

General use
MSG No.1 : High positioning usage
appropriate for high smoothness requirement.
MSG No.2 : General usage
appropriate for high speed.

Clean room use
MCG No.1 : High positioning usage in clean room focused on less contamination, high smoothness.

●Specifications

	MSG No.1	MSG No.2	MCG No.1
Application	General use	General use	Clean room use
Thickener	Lithium	Lithium	Lithium
Base-oil	Synthetic oil	Synthetic oil	Synthetic oil
Appearance	Light brown	Light brown	Beige
Consistency	310～340	265～295	310～340
Temp.range	−60～120℃	−60～120℃	−30～120℃
Type & Contents	MSG-1-380:380g(400cc) MSG-1-45:45g(50cc)	MSG-2-380:380g(400cc) MSG-2-45:45g(50cc)	MCG-1-45:40g(45cc)

Note 1)In case of the usage of this grease under other than room temperature,please consult KSS.

●Grease Friction Test(MSG No.1、MSG No.2)

1)Testing device

- Pin-on Disk test machine (Photo B-11)
- Pin：3/16 inch Steel Ball (SUJ2　HRC60～62)
- Load：50N ⇒ 250N or 350N(Step up each 10N)
- Disk material：SCM415(surface roughness=0.8s)Case hardening (HRC58～62)

2)Comparison data to other Grease

See Fig. B-12, B-13
Sample A,B,D：Lithium based Grease,
Sample C：Urea based Grease

Photo B-11：Pin-on Disk test machine

MSG No.1 hardly increase coefficient of friction.
It has an advantage for smooth operation.

Disk rev.=100min⁻¹

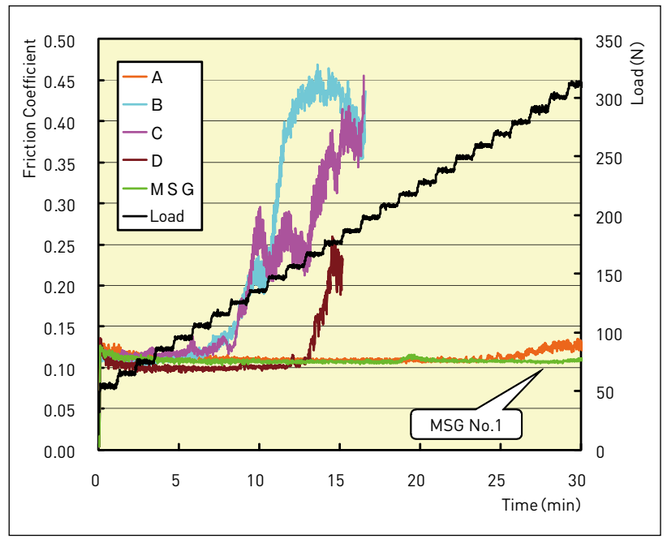


Fig. B-12 : Comparison btw MSG No.1 & others

MSG No.2 does not increase coefficient of friction under the relatively high speed.

Disk rev.=500min⁻¹

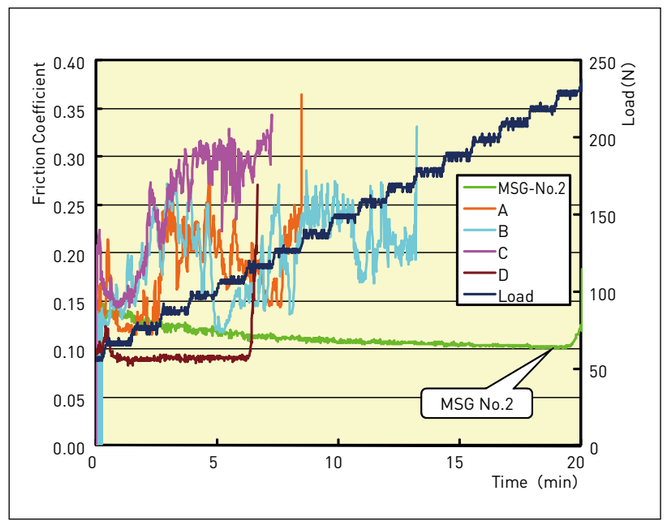


Fig. B-13 : Comparison btw MSG No.2 & others

●Grease Load Test (MSG No.1、MSG No.2)

1) Testing device and method

- Testing device and method : SOTA-4-Ball test machine (Photo B-14)
- Testing method : 750 min^{-1} Step load method (3/4 inch Ball)***

***Note) Step load method

Pressure is added by each 0.5kgf/cm^2 (0.049MPa) from the first 0.5kgf/cm^2 in every one minutes. Durable load are defined when discoloration occur.

2) Test results

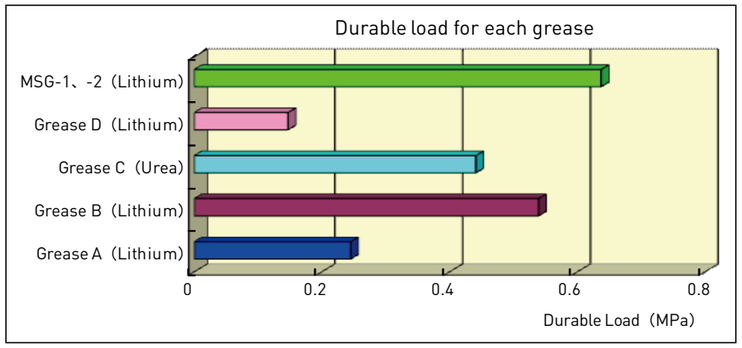


Photo B-14 : SOTA-4-Ball wear test machine

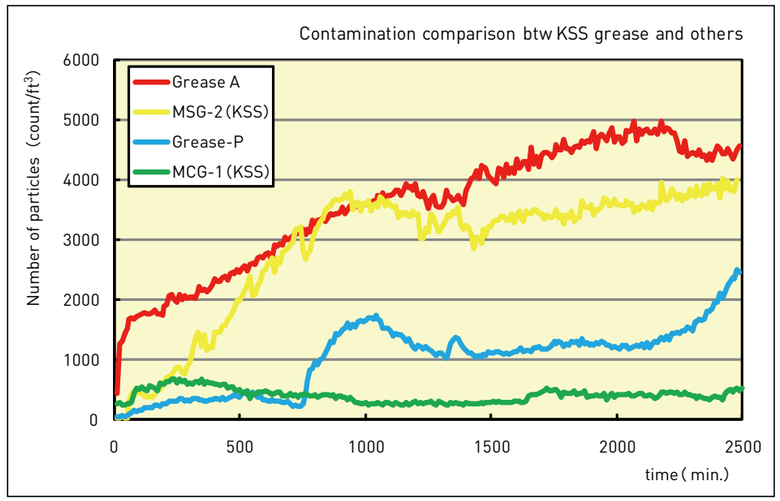
●Grease Contamination Test (MCG No.1)

1) Testing device and method

- Measurement device : see Photo B-15
- Ball Screw size : ϕ10mm / Lead 15mm
- Revolution : 500min^{-1}

KSS clean room Grease (MCG No.1) has less contamination compared to other Grease such as KSS general use Grease (MSG No.2) and other competitor's (Grease-A,-P) as the time passed.

2) Test result (0.5μm particle)



①Suction
②Servo Motor
③Particle Counter
④Sample

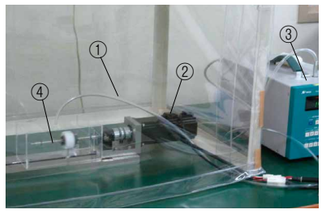


Photo B-15 : Clean bench

●Difference of Torque characteristics by Grease

Driving torque of Miniature Ball Screw is relatively small, therefore torque characteristics of Miniature Ball Screw is influenced by the Grease consistency.
If high consistency Grease applied, driving torque of the Ball Screw tends to become larger.
By using KSS original Grease for Miniature Ball Screw, influence of the Grease consistency is relatively smaller, and able to prevent the increase in the driving torque. See graph blow(Fig.B-16).

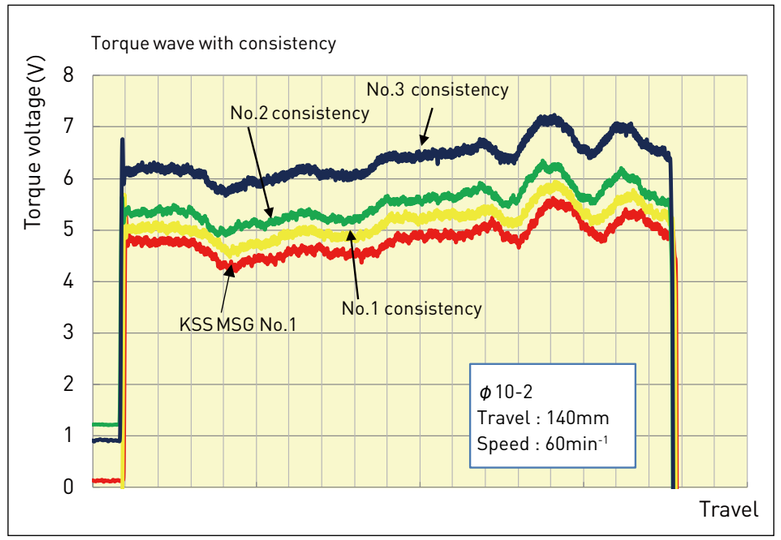


Fig. B-16: Torque wave by Grease consistency

Handling instruction

Handling Precaution

- It might be inflammatory when entering eyes.
  Wear glasses when you handle it.
- When it touches the skin, it might be inflammatory.
  Wear globes when you handle it.
- Do not eat or drink it.
  It is likely to have loose bowels, and to vomit when drinking.
- Put the Grease on the place where child's hand does not reach.

First aid

- Wash for 15 minutes by clean water, and receive the doctor's diagnosis when it enters eyes.
- Wash enough with water and soap when it touches your skin.
- Receive the doctor's diagnosis without forcibly vomiting when drinking.

Disposal

- Dispose properly according to the law.
- Consult manufacturer about an uncertain point.

Storage

- Seal up to avoid mixing garbage and moisture.
- Avoid direct sunlight, and keep it in darkness.

Precision Lead Screws

Customized products MG series

KSS manufactures not only Ball Screws but also Precision Lead Screws. It can be used as fine Pitch which Ball Screws do not have, and it can be achievable when less precise products are needed.

●Features

Possible to select fine Pitch
It is possible to select fine Pitch which Ball Screws do not have.

Wide variety of size
Metric Fine Thread and Metric Coarse Thread based on JIS (Japanese Industrial Standard) are standardized but we also manufacture Trapezoidal Thread, Unified Screw Thread, ACME Screw Thread, special Pitch, and multiple start Thread.

Low torque
With knowhow of screw gauge, we make use of grinding technique, and lapping technique, so fine surface roughness and low wobble become reality, which lead low torque and less wear.

Flexibility of Nut configuration
Nut configuration is not restricted and it is possible to manufacture in accordance with customer's design.

●Model number notation

MG ① 6 ② P=0.5 ③ (2N) ④ — 120 ⑤ R ⑥ 150 ⑦

①Lead Screws series No.
MG：Precision Lead Screws
M：General Lead Screws
**Sign differs other than M-thread Screw.
②Screw Shaft outside diameter(mm)
③Pitch(mm)
④Number of Thread
2N=double-start thread、No identified for single-start thread
⑤Screw thread length(mm)
⑥Thread direction R=Right-hand, L=Left-hand
⑦Screw Shaft total length(mm)

Note 1)Model number is mentioned in specification document that we hand in.
Note 2)Accuracy, Axial play are not mentioned in Model number notation.

●Material & Surface hardness

Components	Material	Surface hardness
Shaft	SKS-31、SCM415、SUS440C	HRC50 or more
	SUS303	N/A
Nut	C5191B、CAC902C(AQ10)	N/A

●Combination of Shaft dia. & Pitch

Unit：mm

Shaft dia. \ Pitch	0.25	0.35	0.4	0.45	0.5	0.7	0.75	0.8	1.0	1.25	1.5	2.0
2	◎		○									
2.5		◎		○								
3		◎			○							
4					◎	○						
5					◎			○				
6					◎		◎		○			
7					◎		◎		○			
8					◎		◎		◎	○	□	
9					◎		◎		◎		○	□
10					◎		◎		◎		○	□

◎ Recommended model including Metric Fine Pitch Thread.
○ Metric Coarse Pitch Thread.
□ Metric Trapezoidal Thread.
***Blank：Can be manufactured, but please inquire KSS.

●Ultra Fine Pitch (0.1mm) Lead Screws

0.1mm Pitch is not shown on the table above, but with our machining technique, we have experiences to manufacture 0.1mm Ultra Fine Pitch Lead Screws. If 0.1mm pitch is needed, please inquire KSS.

Precision Lead Screws

●Recommended Axial play

Unit : mm

Axial play	max. 0.005	0.005~0.010	0.010~0.020	0.015~0.030	0.020~0.050

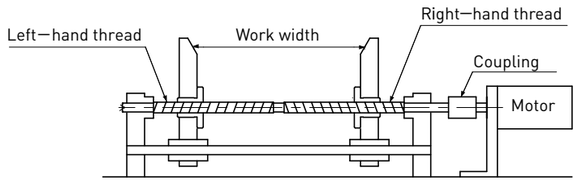
●Maximum Length

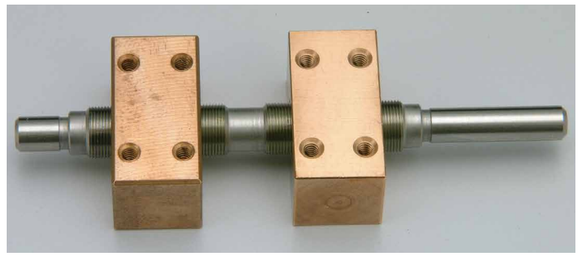
Unit : mm

Grade \ Shaft dia.	2	2.5	3	4	5	6	7	8	9	10
Precision type	25	30	80	120	160	200	250	300	350	400
Normal type	25	40	90	140	180	250	300	350	400	450

●Bi-directional Lead Screws

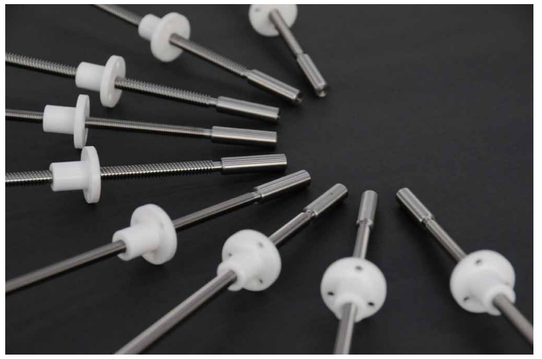
Bi-directional Lead Screws which are machined Left handed and Right handed thread on a Shaft, and Nuts are mounted on each thread. Both Right and Left Nuts move symmetrically, precise positioning, and width adjustment by single motor.
Nut configuration is designed freely to suit customer's requirements





●Special Lead Screws

KSS Lead Screws are defined as precision Lead Screws due to making use of grinding technique. According to customer's request, we manufacture Lead Screws which are done only machining process as a low price version. Moreover, when mass-production, it is possible to manufacture Screw Shaft by Rolling process.
The Lead Screws which have plastic Nuts are also available as special Lead Screws. In mass-production case, plastic Nuts are produced by injection mold.



●Precaution for design and use of Lead Screws

1) We recommend Shaft and Nut are made from different materials.
2) Make sure not to raise surface pressure and relative velocity on thread surface.
3) Lubricating is highly important for Lead Screws due to sliding contact by Flank surface.
Make sure not to be lack of lubricant.

Lead Screws with Plastic Nuts

Resin Lead Screws

●Features

- The Shaft is manufactured from SUS304(or SUS303), which gives excellent corrosion resistance.
- Wide range of combination of Shaft dia. and Lead are available.
- MRH incorporates a lubricating agent so it can be used without oiling. It is possible to obtain smooth movement with lubricant.
- Uses the same gothic arc grooves as Ball Screws, ensuring smooth transmission.
- MRH is standard in stock, but Nut material can be changed to order, based on the environmental condition.
- Selecting backlash free type, Axial play can be 0.

●Type

Customized products

MRH-A,B series : KSS products

A Polyamide type Resin with good sliding properties is employed in the standard MRH Nut material. And because a lubricating agent is incorporated in the material, it can be used without oiling. Additionally, other Nut materials are available as options.

Customized products

MRH-BP2 series : KSS products

A Polyamide type Resin with good sliding properties is employed.
Backlash free construction made possible with Double Nuts and a Spring in between.

Customized products

R-MSS(Y) series :
NTN Corp. products

Corresponding to a wide range of environment and having corrosion resistance, heat resistance. High lead types(3 times as dia.) are available.

●Combination of Shaft nominal dia. & Lead

Unit:mm

Shaft dia. \ Lead	1	2	5	6	8	9	10	12	15	18	20	24	30	36
4	D109	D109												
6	D109	D105 D106 D109		D105 D106		D105 D106 D109				D109				
8	D109	D105 D106 D109	D105 D106		D105 D106			D105 D106 D109				D109		
10		D105 D106 D109		D105 D106			D105 D106		D105 D106 D109		D105 D106		D109	
12		D105 D106 D109		D105 D106			D105 D106			D109	D105 D106		D105 D106	D109

Note1)The numbers in each cell show pages in the catalogue. D105 and D109 are for back lash type, D106 is for backlash free type.

●Specifications

Accuracy grade and Axial play

Accuracy grade of KSS Resin Lead Screws is based on JIS Ct10. Tolerance on specified travel is calculated by following formula.
Axial play is 0.05 to 0.10mm(except Backlash free type).

Tolerance on specified travel ep: $ep = \pm \frac{\ell u}{300} \times 0.21$ (mm)

ℓu : Useful travel(mm)

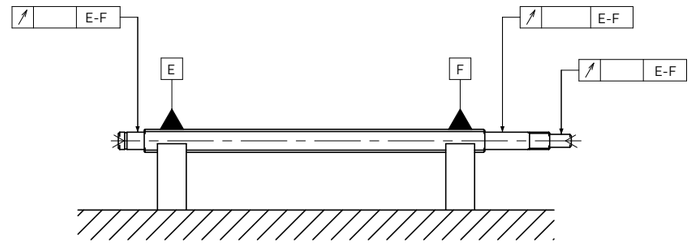
Material

Parts	Material
Shaft	SUS304 or SUS303
Nut	MC nylon (MC703HL) Mitsubishi Chemical Advanced Materials

Note 1) Please refer to page D104 for Nut material suitable for special environment.
Note 2) If material other than the table is requested, please inquire KSS

Description of Run-out and location tolerance

Description of Run-out and location tolerance for KSS Resin Lead Screws is as follows.
Each part of Run-out tolerance is based on JIS Ct10 of Ball Screws.



●Technical Data

Thread groove profile

The thread grooves are of a gothic arc design. This is basically the same as those used in our Ball Screws.

Mechanical efficiency

Mechanical efficiency of KSS Resin Lead Screws η (%) can be calculated by the following formula.
The expected "Mechanical efficiency" calculated from measurements is 20%-50%.
Generally, as the Lead increases, "Mechanical efficiency" tends to be high. Please use this number as a reference.

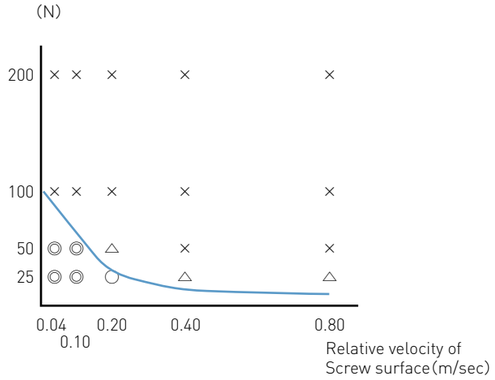
$$\eta = \frac{Fa \times \ell}{T \times 2\pi} \times 100 \quad (\%)$$

Fa : Axial load(N)
ℓ : Screw Lead(m)
T : Rotational torque(Nm)

FV value limits on use and endurance data

- FV value limits on use
  For KSS Resin Lead Screws, the product of Axial Load and relative velocity of Screw surface is defined as FV, and this definition is reference to check if it is usable or not. Fig. D-11 is maximum FV which can be operated without lubricants in case of using Nut material MRH(Material : MC703HL).
  Please use it as one of the reference. It is expected to improve operational condition by applying lubricants.

Fig. D-11 : FV value limits

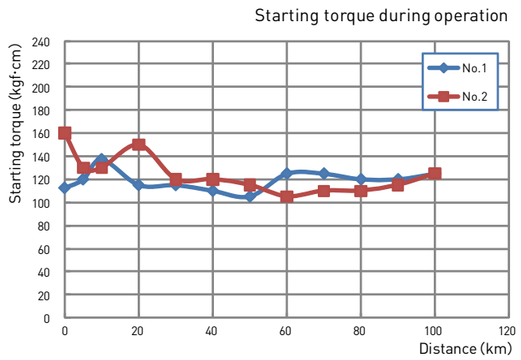


Model : MRH0805 / Lubricant : None
Evaluation :
◎Stable operational conditions were maintained for the long term.
○Operation were good, but some wears were seen on the Nuts.
△Operations became difficult in a relatively short time.
×Operations became difficult in the short time.

In case of FV<5(N·m/s), stable operations were maintained.
Operations under FV>10 (N·m/s), maintaining stability was difficult.
Axial Load should be treated more carefully as to upper limits rather than relative speed.

- Endurance test data of Preloaded products(BP2 type)

Model : ϕ10mm、Lead = 6mm
Load : None
Speed : 1000rpm
Travel : 400mm(2-way)
Lubricant : None
Result : After running 100km, operation were good
Starting Torque monitor : see Diagram right



●Special products

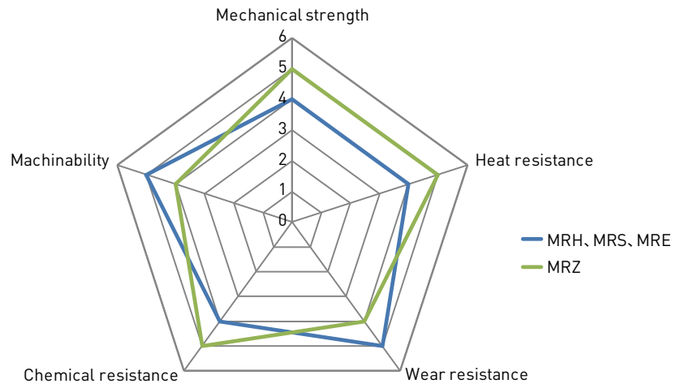
Regarding KSS Resin Lead Screws, the standard material of Nut is MC nylon(MC703HL), but we also provide with the following Nut materials.
Please inquire KSS if Trapezoidal thread and ACME thread are needed.
In case of bulk order, it is possible to save the price to select material which is manufactured by injection molding.

Table D-12 : Product performance comparison

Product	MRH	MRS	MRE	MRZ
Classification	Standard	Customized		
Operating environment	Standard environment			Special environment
Nut appearnce				
Material	Polyamide type			Polyether ether ketone type
Features	Balanced performance			Flame resistance, heat/water resistance
Other	Good sliding properties	—	Good electrical conductivity	Food hygiene, chemical resistance
Mechanical strength	○	○	○	◎
Heat resistance	○	○	○	◎
Wear resistance	◎	◎	◎	○
Chemical resistance	○	○	○	◎
Machinability	◎	◎	◎	○

◎ superior
○ usable
△ relatively inferior
▲ nferior

Fig. D-13 : Evaluation each material



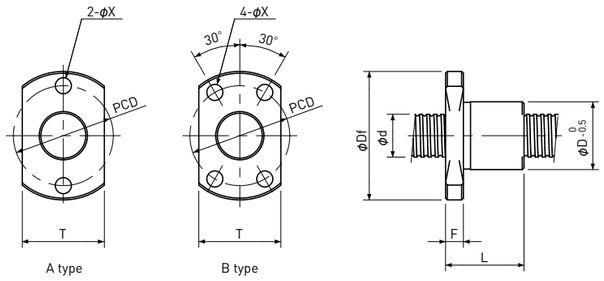
MRH-A,B series (Customized Products)

●Dimension table

Model number notation

MRH 06 02 A – 300 R 300 N2

①Nut model
②Screw Shaft nominal diameter (mm)
③Lead (mm)
④Flange configuration
A : 2 holes ····· Only products with φ6mm
B : 4 holes
⑤Screw thread length (mm)
⑥Thread direction (Right-hand only)
⑦Screw Shaft total length (mm)
⑧Number of Nut
(Example : N2 means 2 Nuts on a Shaft. There is no notation when 1 Nut.)



Unit : mm

Model	Screw Shaft				Nut								Standard Shaft length
	Dia. d	Lead	Root dia.	No. of threads	D	L	Df	F	P.C.D	X	Nut type	T	
MRH0602A	6	2	5.1	1	10	14	20	3	15	3.1	A	10	300
MRH0606A		6	5.2	2									
MRH0609A		9	5.3	4									
MRH0802B	8	2	6.6	1	13	16	26	4	20	3.6	B	17	400
MRH0805B		5	6.6	2									
MRH0808B		8	6.7	2									
MRH0812B		12	6.7	4									
MRH1002B	10	2	8.6	1	15	20	28		22			19	500
MRH1006B		6	8.4	2									
MRH1010B		10	8.4	2									
MRH1015B		15	8.4	4									
MRH1020B		20	8.7	4									
MRH1202B	12	2	10.6	1	18	24	31		25			20	600
MRH1206B		6	10.4	2									
MRH1210B		10	10.4	2									
MRH1220B		20	10.4	6									
MRH1230B		30	10.4	8									

Note 1) Additional machining of Screw Shafts should be performed by KSS. Note that accuracy cannot be guaranteed if additional machining is performed by someone other than KSS.
Note 2) When additional end-journal machining is performed by someone other than KSS, always remove the Nut from the Screw Shaft. After machining, wash away any debris on the Screw Shaft with clean refined kerosene or similar material.
Note 3) The Shaft end diameter should be smaller than the Screw Shaft Root diameter, and the Screw thread length should be specified in 1mm unit.
Note 4) Only Right-hand thread is available.
Note 5) Screw Shafts and Nuts are not sold separately.

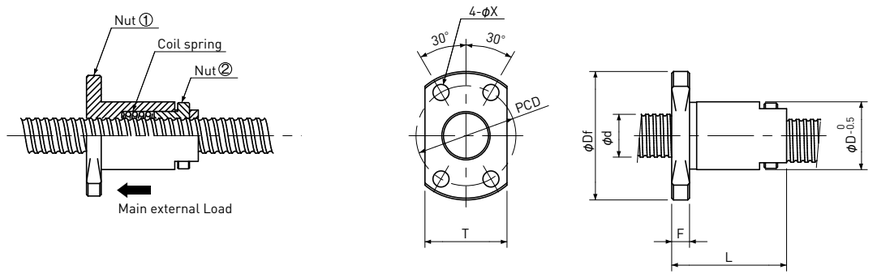
MRH-BP2 series (Customized Products)

●Dimension table

Model number notation

MRH 06 02 B P2 – 300 R 300

①Nut model
②Screw Shaft nominal diameter (mm)
③Lead (mm)
④Flange configuration
B : 2 flat faces (4 holes)
⑤Backlash free mark
P2 : Standard Preload
⑥Screw thread length (mm)
⑦Thread direction (Right-hand only)
⑧Screw Shaft total length (mm)



Unit : mm

Model	Screw Shaft				Nut							Standard Shaft length
	Dia. d	Lead	Root dia.	No. of threads	D	L	Df	F	P.C.D	X	T	
MRH0602BP2	6	2	5.1	1	13	20	26	4	20	3.6	17	300
MRH0606BP2		6	5.2	2								
MRH0609BP2		9	5.3	4								
MRH0802BP2	8	2	6.6	1	15	23	28		22		19	400
MRH0805BP2		5	6.6	2								
MRH0808BP2		8	6.7	2								
MRH0812BP2		12	6.7	4								
MRH1002BP2	10	2	8.6	1	18	30	31		25		20	500
MRH1006BP2		6	8.4	2								
MRH1010BP2		10	8.4	2								
MRH1015BP2		15	8.4	4								
MRH1020BP2		20	8.7	4								
MRH1202BP2	12	2	10.6	1	23	38	41	5	33	4.8	25	600
MRH1206BP2		6	10.4	2								
MRH1210BP2		10	10.4	2								
MRH1220BP2		20	10.4	6								
MRH1230BP2		30	10.4	8								

Note 1) Additional machining of Screw Shafts should be performed by KSS. Note that accuracy cannot be guaranteed if additional machining is performed by someone other than KSS.
Note 2) The Shaft end diameter should be smaller than the Screw Shaft Root diameter, and the Screw thread length should be specified in 1mm unit.
Note 3) Only Right-hand thread is available.
Note 4) Screw Shafts and Nuts are not sold separately.
Note 5) Please inquire regarding spring tension (lower or higher than standard is available).
Note 6) It is recommended that the main external load is in the direction as indicated by the arrow in the Figure above.

●Caution

1) Lubrication
- MC Nylon which is standard Nut material of MRH series includes oil, but depending on operating condition, abnormal noise or wearing at early stage might occur. In that case, surface treatment on shaft or grease applying are recommended.

2) Additional end-journal machining
- Additional machining of Screw Shaft should be performed by KSS. Note that accuracy cannot be guaranteed if additional end-journal machining is performed by someone other than KSS.
- Remove the Nut from the Screw Shaft for additional machining.
  After machining, wash away any debris on the Screw Shaft with clean refined kerosene or similar material.
  For Backlash free type, it is difficult to reproduce Preload if Nut is removed. We will do additional machining when needed.

3) Handling and use precaution.
- Do not subject to sudden impact, as this is a precision part.
- Do not disassemble Backlash free type Nut.
- When storing the products, please store in the original wrapping. Do not open the wrapping or tear the inner wrapping until ready to use. Dust may get inside the wrapper and may cause a decline in functionality.
- If the products falls, loss of functionality due to damage to component parts may result. Please send products back to KSS so that we can check the products. There will be a charge for this service.
- This product has been designed for normal use in temperatures under 80℃. In case of exceeding 80℃, please ask KSS.
- Resin Lead Screws are mechanical components that generates thrust toward the axis. It is not constructed to accept Radial Load (Radial direction). This may result in wear and damage at an early stage.
  Therefore, there should be no Radial Load on the Resin Nut parts, take care to set up with other linear equipment for Radial Load.
- Coarse mounting accuracy such as misalignment of Nut bracket and Support Bearing, perpendicularity of Nut mounting face, will affect Resin Lead Screws performance, so be careful with the mounting accuracy.

R-MSS (Y) Series

●BEAREE product is NTN registered trademark.

●Features

BEAREE AS5000 (PPS Resign: Poly Phenylene Sulfide) Nuts and Stainless (SUS304) Shafts are employed. This Lead Screw with low operating noise is able to be used as wide use.

- Wide use: Because Screw surfaces are smooth and its lead is high, the back drive operation can be easy.
- Low operation noise compared with Ball Screws.
- Due to the Nuts with low friction, the Screw efficiency is high.

●Specifications

Type	Single Nut with Flange
Nut material	BEAREE AS5000
Shaft material	JIS : SUS304
Axial play	50μm or less (lead 1mm, 2mm) 100μm or less (more than lead 2mm)
Accuracy grade	Ct10 (JISB1192-3)
Cumulative lead error	±0.21/300mm

●Material characteristics

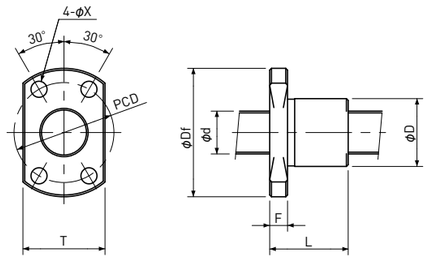
	AS5000
Specific gravity	1.53
Hardness	80 Durometer
Tensile strength	51Mpa
Elongation	3%
Bending strength	61Mpa
Water absorption rate	0.05%
Linear Expansion coefficient	8.1 x 10^{-5} / ℃
Maximum temperature	230℃

●Dimension table

Model number notation

R — MSS 04 01 Y — 200 R 200

①NTN products
②Miniature Plastic Lead Screws
③Shaft nominal diameter(mm)
④Lead(mm)
⑤Nut symbol：BEAREE AS5000
⑥Screw thread length(mm)
⑦Thread direction(Right-hand only)
⑧Screw total length(mm)



Unit：mm

Model	Shaft			Nut							Shaft length
	Dia. d	Lead	Number of thread	D	L	Df	F	P.C.D	X	T	
R-MSS0401Y	4	1	1	10	11.5	23	3.5	15	2.9	15	200
R-MSS0402Y		2	2								
R-MSS0601Y	6	1	1	12	14.5	26		18	3.4	17	300
R-MSS0602Y		2									
R-MSS0609Y		9	4								
R-MSS0618Y		18									
R-MSS0801Y	8	1	1	14	18	29	4	21		18	300
R-MSS0802Y		2									
R-MSS0812Y		12	4								400
R-MSS0824Y		24	6								
R-MSS1002Y	10	2	1	16	22	33	5	24	4.5	21	300
R-MSS1015Y		15	4								450
R-MSS1030Y		30	6								
R-MSS1202Y	12	2	1	18	25	35		26		22	300
R-MSS1218Y		18	6								500
R-MSS1236Y		36									

Note 1) End-journal is not machined. Please inquire, if end-journal machining is required.

●Technical data

Model	Shaft		② Permissible Axial Load N	② Permissible Revolution rpm	③ Tightening Torque(max) N·mm	① Efficiency %
	Dia. mm	Lead mm				
R-MSS0401Y	4	1	50	2000	180	45
R-MSS0402Y		2	60			70
R-MSS0601Y	6	1	120	2000	400	40
R-MSS0602Y		2	60			55
R-MSS0609Y		9	90			85
R-MSS0618Y		18	110			85
R-MSS0801Y	8	1	200	2000		30
R-MSS0802Y		2	290			45
R-MSS0812Y		12	210			80
R-MSS0824Y		24	210			85
R-MSS1002Y	10	2	460	1500	500	40
R-MSS1015Y		15	410			80
R-MSS1030Y		30	440			85
R-MSS1202Y	12	2	660	1000		35
R-MSS1218Y		18	750			75
R-MSS1236Y		36	540			80

Criteria：MSS0824Y, verification of no remarkable wear after 200km running test under 100N of Axial Load and 2,000rpm of Speed. Other than that are obtained by calculation.

① Efficiency η is calculated by following formula based on measurement results of rotational torque(M) under the Axial Load (Q).

$$\eta = \frac{R \cdot Q \cdot \tan\beta}{M} \times 100 \ (\%) \quad \tan\beta = \frac{Lead}{2\pi R}$$

η : Efficiency
R : Pitch circle radius
Q : Axial Load
β : Lead angle
M : Rotational torque

② Permissible Axial Load and Permissible Revolution are based on the test results under the following condition.
1) Test machine：NTN Lead Screw Durability test machine
2) Condition：Room temperature, no lubricant, 100mm travel (200mm/ cycle) or 200mm travel (400mm/cycle)
3) Criteria：No remarkable damage or wear on Screw surface after running test of 10^3 or 6×10^3 cycles under the Permissible Load and Revolution in the table above.

③ This number means when Plastic Nut is fixed onto the Bracket.

Resin Lead Screws

Ball Screw Support Units

Outline

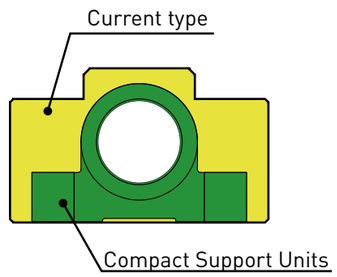
MSU Series

KSS provides the customer with suitable Support Units for end journal of Miniature Ball Screws.
MSU series have features of light weight & compact compared to existing series.
Our Support Units fit the standard end journal profile of KSS Ball Screws.
Please try and use them as well as Ball Screws.

Compact Support Units

Light weight (more than 50% down)

Comparison to our current model



This type of Support Unit has features of light-weight & compact profile compared to our conventional Support Units. KSS believes this type is suitable for Miniature Ball Screws.

●Features

- By eliminating extra shape of Housing, and minimizing pitch of mounting holes, light-weight & compact design Support Units became reality.
- Pre-load controlled Angular Contact Bearings are installed, so Rigidity can be kept high.
- Reasonable price has been achieved with reducing number of components, because oil seals have been eliminated by using shielded type Angular Contact Bearings.
- Angular Contact Bearings are made from stainless steel and low contamination Grease is applied, so Support Units can be used in clean-environment.
- Ultra-compact size (ϕ3) is standardized, it would be suitable for Ultra Miniature Ball Screws.
- Pillow & Flange type are standardized for both fixed & supported side, so wide variety of choices are available.

●Variation

Compact Support Units(MSU series) provide 2 choices of Housing type, which are Pillow type and Flange type. Fixed side and supported side Units are standardized for each type. In case of Pillow type, it became light-weight & more compact compared to our conventional type.

Pillow type

Flange type

●Specifications

Angular Contact Bearings built in Compact Support Units(MSU series) are made from stainless steel and low contamination Grease is applied. Other components of Support Units are also made form stainless steel or are coated by black finishing. These series can be used in clean-environment.

[Ball Bearings for MSU Sries]

Angular Contact Ball Bearings

This series is the Angular Contact Ball Bearings built in fixed side of Compact Support Units(MSU series).
This can be provided as a set of DF or DB configuration only.
(Refer to dimension table in page E115-E116)

Deep Groove Bearings

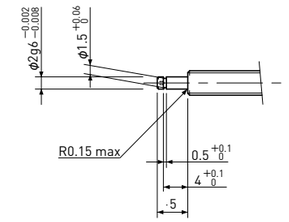
This series is the Deep Groove Ball Bearings built in supported side of Compact Support Units(MSU series).
This type can be provided as a Bearing itself.
(Refer to dimension table in page E117-E118)

Support Unit

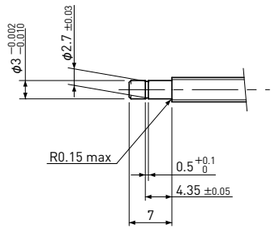
●Standardized end-journal profile

KSS Support Units are designed to fit standard end-journal profile of KSS Miniature Ball Screws. Table below shows KSS Support Units list corresponding to standard end-journal profile.

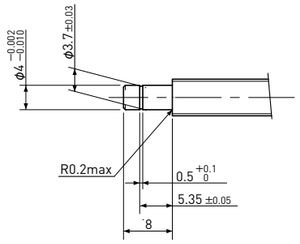
【Supported side】



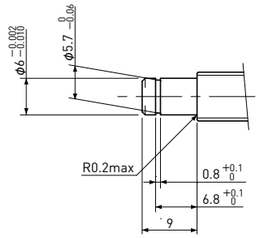
Brg. Inner dia.	Support Unit model
ϕ2	MSU-3CS / MSU-3GS



Brg. Inner dia.	Support Unit model
ϕ3	MSU-4CS / MSU-4GS



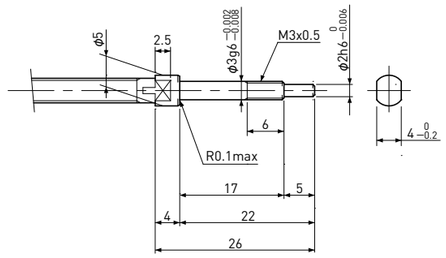
Brg. Inner dia.	Support Unit model
ϕ4	MSU-5CS / MSU-5GS



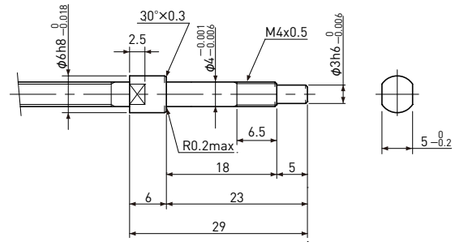
Brg. Inner dia.	Support Unit model
ϕ6	MSU-6CS / MSU-6GS MSU-8CS / MSU-8GS

Note) Request for Supported side Support Units with ϕ8 and ϕ10 as well as standard design, please ask KSS representative.

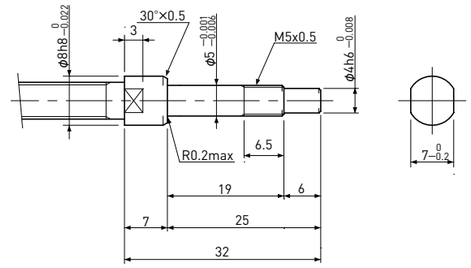
【Fixed side】



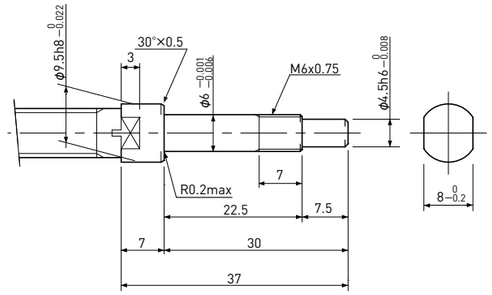
Brg. Inner dia.	Support Unit model
ϕ3	MSU-3C / MSU-3G



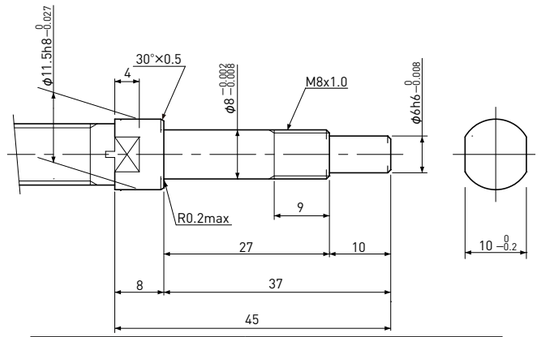
Brg. Inner dia.	Support Unit model
ϕ4	MSU-4C / MSU-4G



Brg. Inner dia.	Support Unit model
ϕ5	MSU-5C / MSU-5G



Brg. Inner dia.	Support Unit model
ϕ6	MSU-6C / MSU-6G



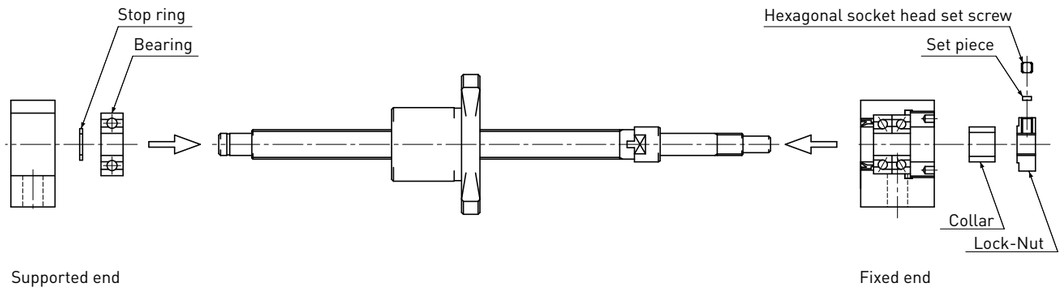
Brg. Inner dia.	Support Unit model
ϕ8	MSU-8C / MSU-8G

Note) Request for fixed side Support Units with ϕ10 and ϕ12 as well as standard design, please ask KSS representative.

●Mounting procedure

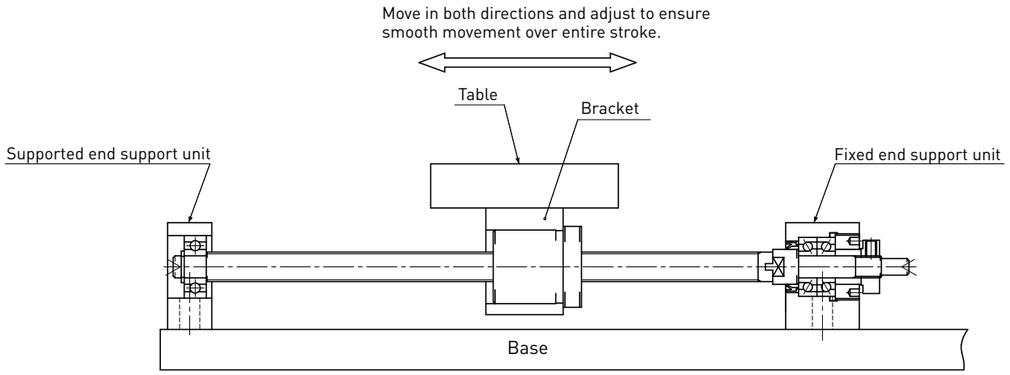
1.Assembling Support Unit

1) Mount the fixed end Support Unit onto the Ball Screw.
   Note 1) Do not disassemble the Support Unit.
2) Tighten the Lock-Nut after inserting into the fixed end Support Unit, and secure using the set piece and hexagonal socket head set screw.
   Note 1) Make sure that the set piece is not allowed to curl.
3) Mount the supported end Bearing, secure with the stop ring, and fit into the Housing.



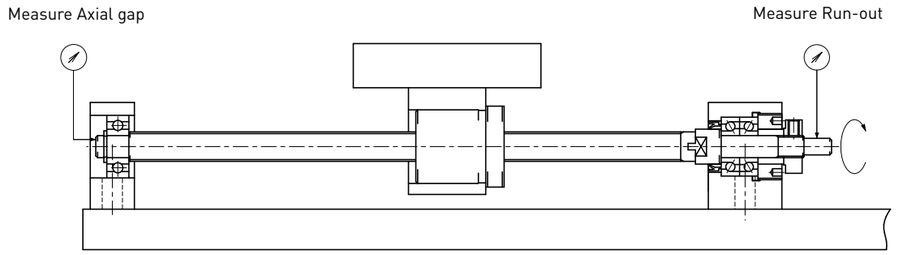
2.Mounting the table on the Ball Screw Nut and mounting the Support Unit on the base

1) Insert the Ball Screw Nut into the table or Bracket, which is attached to the table, and loosely tighten.
2) Loosely tighten the fixed end Support Unit to the base.
   Note 1) Move the table toward the Support Unit and center it. Adjust to ensure that the table moves smoothly.



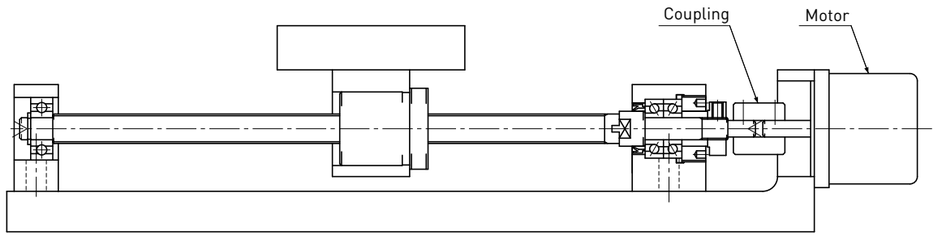
3.Mounting the supported end Housing on the base and checking accuracy

1) Move the table toward the supported end Housing and center it. Move the table in both directions and adjust to ensure smooth movement over entire length. Secure loosely to the base.
2) Check the Run-out and Axial gap at the Ball Screw Shaft end using a dial gauge, and fully tighten the Nut, fixed end Support Unit and supported end Housing.



4.Connecting to the Motor

1) Secure the Motor to the main Unit.
2) Connect the Motor to the Ball Screw using the coupling.
3) Run in thoroughly.

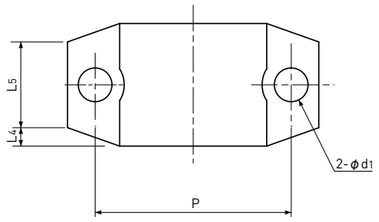


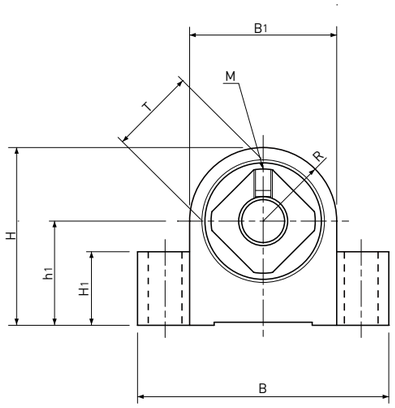
Note) Instruction above is for Pillow type and Block type Support Units, In case of Flange type Support Units, the same procedure can be applicable.

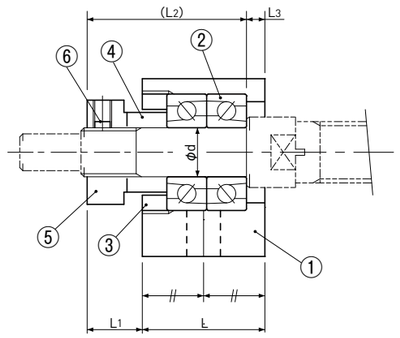
Support Unit

MSU Series

Pillow type (Fixed side)







●Model number notation

MSU - 5 C S

① ② ③ ④

①Series No.
MSU : KSS Compact Support Unit Series
②Nominal number
③Housing type
C : Pillow type
G : Flange type
④End-journal type
None : fixed side
S : supported side

Note) In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List

Part No.	Part name	Qty
1	Housing (Black Chrome coating)	1
2	Bearings (with Shields)	1 set
3	Pressure Nut	1
4	Colla	1
5	Lock Nut	1
6	Hexagonal socket head set screw (with set piece)	1 set

Unit : mm

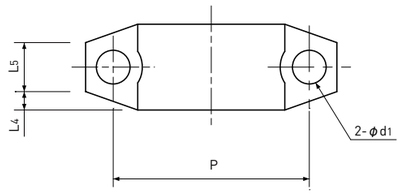
Type	Brg. Inner dia. d 0 −0.005	L	L1	L2	L3	L4	L5	B	H	h1 0 −0.03	B1	H1		R	P	d1	M	T	Lock Nut	Tightening torque of Lock Nut N·cm	Bearing	Mass g	Type
MSU-3C	3	12.5	5.5	16.5	1.5	2	8.5	24	14.5	9	11	5		5.5	18	3.5	M3	8	M3×0.5	80	MTA03-08HP5DF	16.5	MSU-3C
MSU-4C	4	14	5.5	17.5	2	2.5	9	27	17	10	14	6		7	21	3.5	M3	10	M4×0.5	100	MTA04-11HP5DF	27	MSU-4C
MSU-5C	5	15	5.5	18.5	2	2	11	30.5	19.5	11	17	6		8.5	23	4.5	M3	11	M5×0.5	140	MTA05-13HP5DF	35	MSU-5C
MSU-6C	6	17	7.5	22	2.5	2.5	12	35	22.5	13	19	8		9.5	26	5.5	M3	12	M6×0.75	190	MTA06-15HP5DF	50	MSU-6C
MSU-8C	8	20	9	26	3	3	14	41	29	17	24	12		12	32	5.5	M3	14	M8×1.0	200	MTA08-19HP5DF	96	MSU-8C

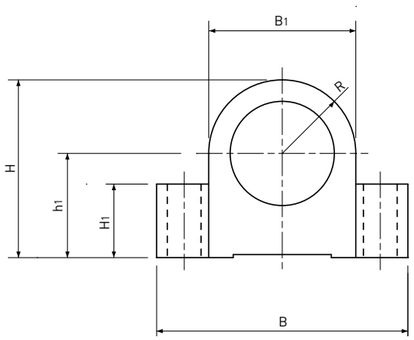
Note 1) Angular Contact Ball Bearings (manufactured by ISC) are designed for clean room use, they are made of Stainless steel with low contamination grease (NSK LG2) packed.
Note 2) Pressure Nut, Collar and Lock Nut are coated with Black finishing.
Note 3) Do not disassemble Support Unit, as they are pre-loaded and pre-adjusted.

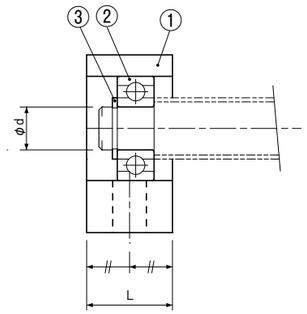
Support Unit

MSU Series

Pillow type (Supported side)







●Model number notation

MSU - 5 C S

①Series No.
MSU : KSS Compact Support Unit Series
②Nominal number
③Housing type
C : Pillow type
G : Flange type
④End-journal type
None : fixed side
S : supported side

Note) In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List

Part No.	Part name	Qty
1	Housing (Black Chrome coating)	1
2	Bearing (with Shields)	1
3	Stop ring	1

Unit : mm

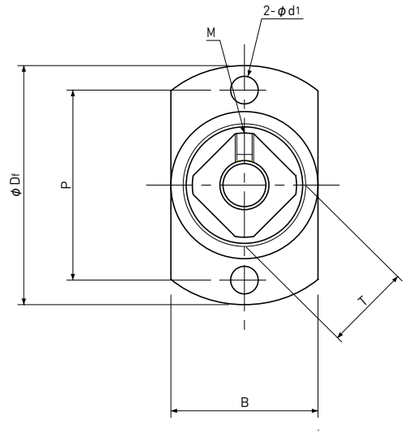
Type	Brg. Inner dia. d 0 −0.005	L	L4	L5	B	H	h1 0 −0.03	B1		H1	R	P	d1	Bearing	Stop ring	Mass g	Type
MSU-3CS	2	8	2	4	24	14.5	9	11		5	5.5	18	3.5	602HZZ	ETW-1.5(OCHIAI)	8.5	MSU-3CS
MSU-4CS	3	10	2.5	5	27	17	10	14		6	7	21	3.5	623HZZ	G-3(IWATA)	16	MSU-4CS
MSU-5CS	4	10	2	6	30.5	19.5	11	17		6	8.5	23	4.5	624HZZ	G-4(IWATA)	21	MSU-5CS
MSU-6CS	6	12	2.5	7	35	22.5	13	19		8	9.5	26	5.5	B6-113HZZ1	STW-6(OCHIAI)	32	MSU-6CS
MSU-8CS	6	14	3	8	41	29	17	24		12	12	32	5.5	606HZZ1	STW-6(OCHIAI)	60	MSU-8CS

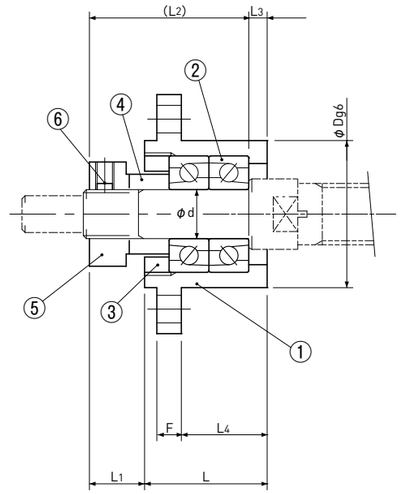
Note 1) Deep Groove Ball Bearing (manufactured by ISC) is designed for clean room use, it is made of Stainless steel with low contamination grease (NSK LG2) packed.
Note 2) Stop ring may be the equivalent one described in the table above.

Support Unit

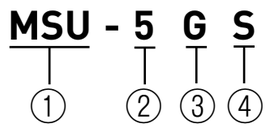
MSU Series

Flange type (Fixed side)





●Model number notation



①Series No.
MSU : KSS Compact Support Unit Series
②Nominal number
③Housing type
C : Pillow type
G : Flange type
④End-journal type
None : fixed side
S : supported side

Note) In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List

Part No.	Part name	Qty
1	Housing (Black Chrome coating)	1
2	Bearings (with Shields)	1 set
3	Pressure Nut	1
4	Collar	1
5	Lock Nut	1
6	Hexagonal socket head set screw (with set piece)	1 set

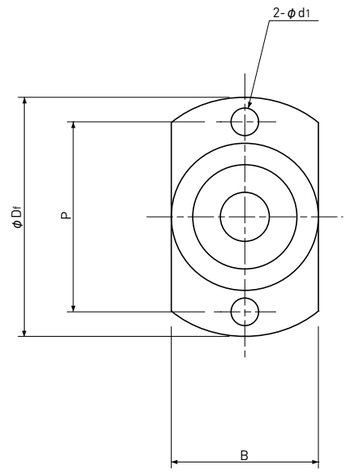
Unit : mm

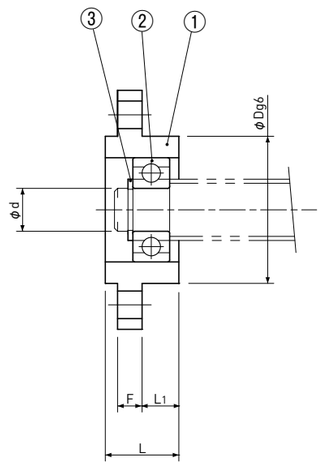
Type	Brg. Inner dia. d 0 −0.005	L	L_1	L_2	L_3	F	L_4	B	Df	D		P	d_1	M	T	Lock Nut	Tightening torque of Lock Nut N·cm	Bearing	Mass g	Type
MSU-3G	3	12.5	5.5	16.5	1.5	3	7.5	11	23	11		17	3.5	M3	8	M3×0.5	80	MTA03-08HP5DF	12.5	MSU-3G
MSU-4G	4	13.5	5.5	17.5	1.5	3	8.5	14	26	14		20	3.5	M3	10	M4×0.5	100	MTA04-11HP5DF	20	MSU-4G
MSU-5G	5	15	5.5	18.5	2	3	10	17	29	17		23	3.5	M3	11	M5×0.5	140	MTA05-13HP5DF	30	MSU-5G
MSU-6G	6	17	7.5	22	2.5	4	12	19	34	19		26	4.5	M3	12	M6×0.75	190	MTA06-15HP5DF	42	MSU-6G
MSU-8G	8	20	9	26	3	4	16	24	39	24		31	4.5	M3	14	M8×1.0	200	MTA08-19HP5DF	70	MSU-8G

Note 1) Angular Contact Ball Bearings (manufactured by ISC) are designed for clean room use, they are made of Stainless steel with low contamination grease (NSK LG2) packed.
Note 2) Pressure Nut, Collar and Lock Nut are coated with Black finishing.
Note 3) Do not disassemble Support Unit, as they are pre-loaded and pre-adjusted.

MSU Series

Flange type (Supported side)





●Model number notation

MSU - 5 G S

① ② ③ ④

①Series No.
MSU : KSS Compact Support Unit Series
②Nominal number
③Housing type
C : Pillow type
G : Flange type
④End-journal type
None : fixed side
S : supported side

Note) In some cases, nominal number is not the same as Bearing Inner diameter.

Parts List

Part No.	Part name	Qty
1	Housing (Black Chrome coating)	1
2	Bearing (with Shields)	1
3	Stop ring	1

Unit : mm

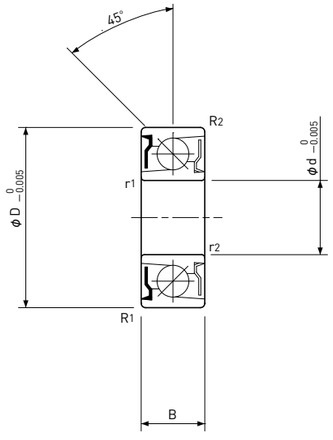
Type	Brg. Inner dia. d 0 −0.005	L	F	L1	B	Df		D	P	d1	Bearing	Stop ring	Mass g	Type
MSU-3GS	2	8	3	3	11	23		11	17	3.5	602HZZ	ETW-1.5(OCHIAI)	7.5	MSU-3GS
MSU-4GS	3	10	3	5	14	26		14	20	3.5	623HZZ	G-3(IWATA)	12	MSU-4GS
MSU-5GS	4	10	3	5	17	29		17	23	3.5	624HZZ	G-4(IWATA)	16	MSU-5GS
MSU-6GS	6	10	4	5	19	34		19	26	4.5	B6-113HZZ1	STW-6(OCHIAI)	24	MSU-6GS
MSU-8GS	6	10	4	6	24	39		24	31	4.5	606HZZ1	STW-6(OCHIAI)	40	MSU-8GS

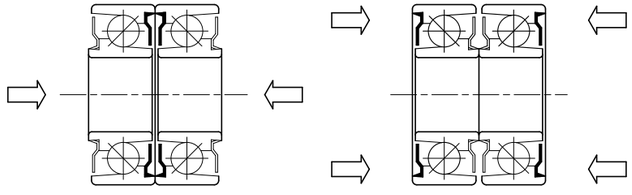
Note 1) Deep Groove Ball Bearing (manufactured by ISC) is designed for clean room use, it is made of Stainless steel with low contamination grease (NSK LG2) packed.
Note 2) Stop ring may be the equivalent one described in the table above.

Fixed side Ball Bearings for MSU series

Angular Contact Ball Bearings (Stainless type)

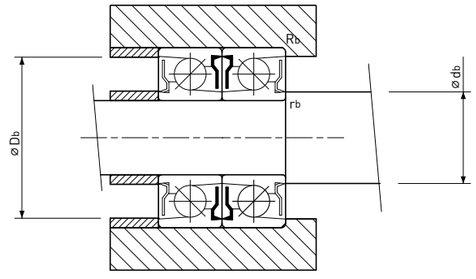
Contact Angle



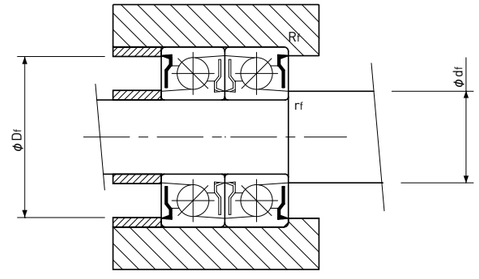


DB type
(Inner ring pre-load type)
**Silver colored shields are outside

DF type
(Outer ring pre-load type)
**Bronze colored shields are outside



DB Configuration



DF Configuration

●Model number notation

MTA 08 −19 H P5 DF
① ② ③ ④ ⑤ ⑥

①Series No.
②Inner diameter of Bearing (mm)
③Outer diameter of Bearing (mm)
④Material
H : Stainless Steel
T : Bearing Steel
⑤Accuracy grade
Equivalent to P5
⑥Duplex type
DF : Face to Face duplex
DB : Back to Back duplex

Recommended tightening torque

Unit : N·cm (kgf ·cm)

Type	DF type	DB type
MTA02-06HP5DF/DB	19.6(2.0)	9.8(1.0)
MTA03-08HP5DF/DB	19.6(2.0)	14.7(1.5)
MTA04-11HP5DF/DB	49(5.0)	19.6(2.0)
MTA05-13HP5DF/DB	49(5.0)	24.5(2.5)
MTA06-15HP5DF/DB	78.4(8.0)	29.4(3.0)
MTA08-19HP5DF/DB	78.4(8.0)	39.2(4.0)

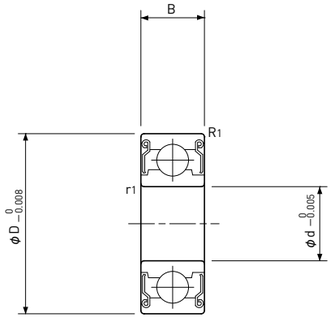
Unit : mm

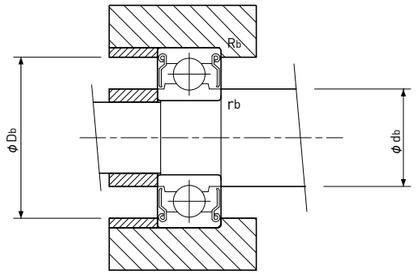
Type	Dimension							Basic Load Rating		Limit Speed		Abutment & Fillet								Mass	Type
				Chamfer (min.)								DF type				DB type					
	I.D. φd	O.D. φD	Width B	r1	r2	R1	R2	Ca (N)	Coa (N)	min⁻¹		Df max.	df min.	Rf max.	rf max.	Db max.	db min.	Rb max.	rb max.		
MTA02-06HP5DF/DB	2	6	3	0.10	0.10	0.10	0.04	470	360	26,000		5.0	2.8	0.10	0.10	5.3	3.0	0.04	0.10	0.8	MTA02-06HP5DF/DB
MTA03-08HP5DF/DB	3	8	4	0.10	0.10	0.15	0.03	820	670	22,000		6.7	3.9	0.15	0.10	7.2	4.4	0.03	0.10	1.8	MTA03-08HP5DF/DB
MTA04-11HP5DF/DB	4	11	4.5	0.20	0.20	0.20	0.10	1250	1130	17,000		8.9	5.1	0.20	0.20	9.5	6.2	0.10	0.20	3.8	MTA04-11HP5DF/DB
MTA05-13HP5DF/DB	5	13	5	0.20	0.20	0.20	0.10	1780	1740	16,000		10.8	6.1	0.20	0.20	11.3	7.2	0.10	0.20	5.6	MTA05-13HP5DF/DB
MTA06-15HP5DF/DB	6	15	5.5	0.20	0.20	0.20	0.20	2350	2360	14,000		12.5	7.2	0.20	0.20	13.2	8.6	0.20	0.20	7.8	MTA06-15HP5DF/DB
MTA08-19HP5DF/DB	8	19	6.5	0.20	0.20	0.30	0.30	3400	3480	13,000		15.8	9.4	0.30	0.20	16.8	11.4	0.30	0.20	14.5	MTA08-19HP5DF/DB

Note 1) Angular Contact Ball Bearings (manufactured by ISC) are designed for clean room use,
they are made of Stainless steel with low contamination grease (NSK LG2) packed.
If necessary, Bearing steel type Angular Contact Ball Bearings with anti-fretting grease can be also provided.
Note 2) Bearing duplex can be distinguished by the color of shield plate for each duplex, please refer to figure above.
Note 3) Please designate duplex number (DF or DB), when you place order.
Note 4) This series can be provided as sets of DF or DB configuration only.

Supported side Ball Bearings for MSU series

Deep Groove Bearings (Stainless type)





Unit : mm

Type	Dimension					Basic Load Rating			Limit Speed	Abutment & Fillet				Mass	Type
	I.D. φd	O.D. φD	Width B	Chamfer (min.) r1	Chamfer (min.) R1	Cr (N)	Cor (N)		min⁻¹	Db max.	db min.	Rb max.	rb max.	(g)	
602HZZ	2	7	3.5	0.15	0.15	320	102		63,000	6.25	3.85	0.15	0.15	0.6	602HZZ
623HZZ	3	10	4	0.15	0.15	535	175		50,000	7.98	4.35	0.15	0.15	1.7	623HZZ
624HZZ	4	13	5	0.20	0.20	1110	390		40,000	11.35	6.0	0.20	0.20	3.1	624HZZ
B6-113HZZ1	6	15	6	0.20	0.20	1470	535		40,000	13.3	7.9	0.20	0.20	4.3	B6-113HZZ1
606HZZ1	6	17	6	0.30	0.30	1920	670		38,000	14.8	8.2	0.30	0.30	6.1	606HZZ1

Note 1) Deep Groove Ball Bearings (manufactured by ISC) are designed for clean room use, they are made of Stainless steel with low contamination grease (NSK LG2) packed.

Ball Screw with Ball Spline

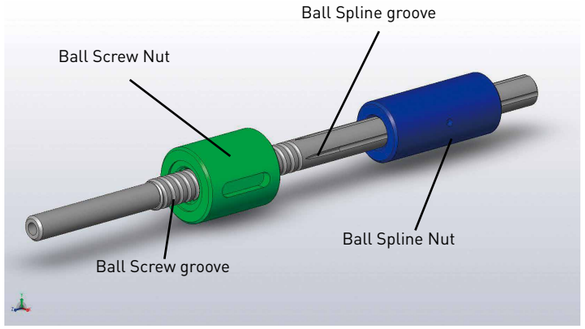
Miniature Ball Screw with Ball Spline

Ball Screw manufacturing company (KSS) and Ball Spline manufacturing company (HEPHAIST) collaborated for developing new product which is focused on Hybrid, Compact and lightweight.

●Features

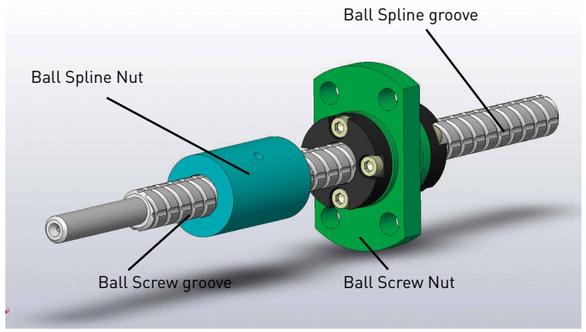
- This is a combined product which is possible for linear and rotational movement as well as suction at the same time with one unit.
- Achieved developing very compact product as "Overlap type" using Miniature Ball Screws and Miniature Ball Splines .

BSSP Separated type



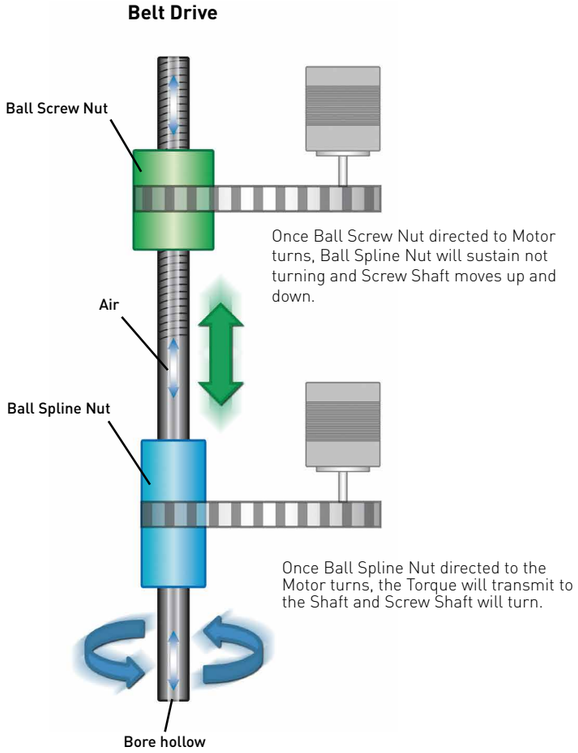
It's a combined products, which has Ball Screw and Ball Spline processed on the same Shaft.

BSSP Overlap type

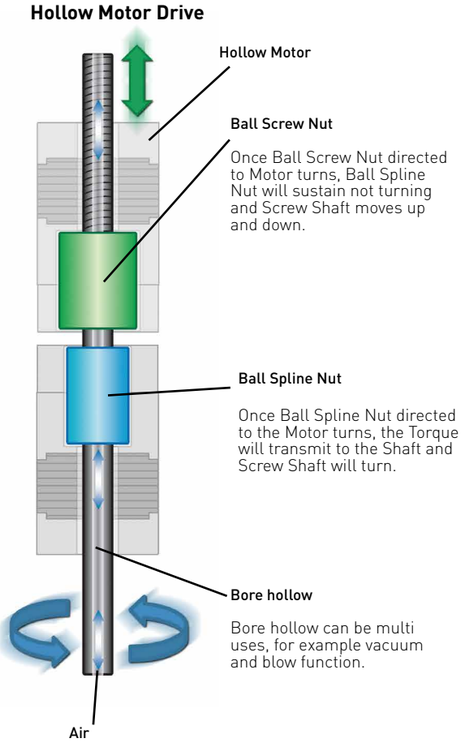


By processing Ball Screw and Ball Spline on the same place makes product have longer travel and compact.

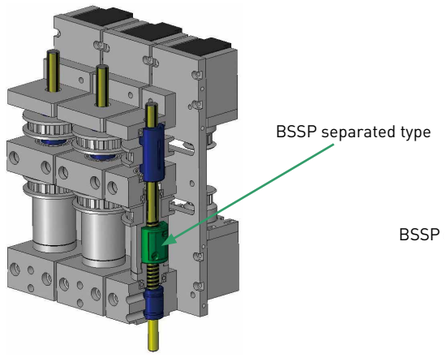
●Usage example



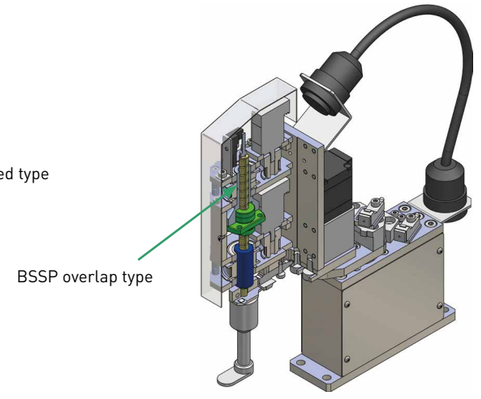
Bore hollow can be multi uses. For example vacuum and blow function.



●Application Example



Using "Separated type" of Ball Screw Spline is suitable for downsizing devices and equipment. Suitable for Chip-Mounter application etc.



Using "Overlap type" can save Shaft length and makes devise as minimized as possible. For example, suitable for Miniature SCARA Robot, especially for the head part.

Ball Screw with Ball Spline

●Specifications

1) Accuracy Grade & Axial/Radial play

Accuracy grade and Axial/Radial play for BSSP are shown in Table below.

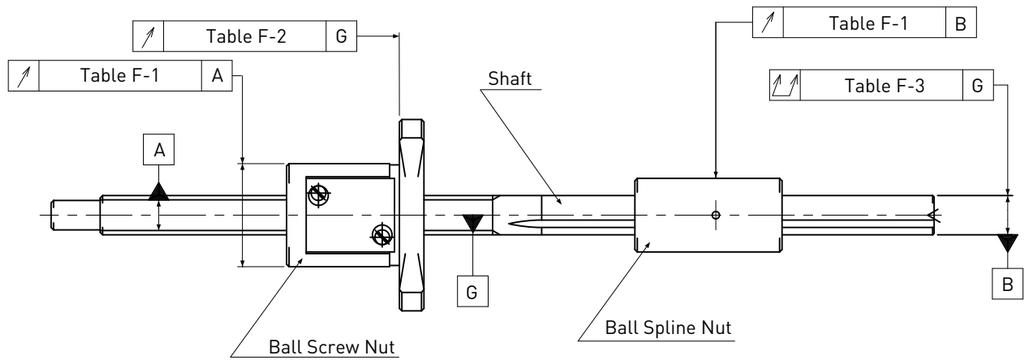
Unit : mm

Type	Part	C3 (Maximum)	C5 (Maximum)
Separated type	Ball Screw Axial play	0 or 0.005	0.005
	Ball Spline Radial play	0	
Overlap type	Ball Screw Axial play	0.005	
	Ball Spline Radial play	0.002	

2) Run-out and location tolerances for BSSP

Run-out and location tolerances for BSSP are based on JIS B1192-3(Ball Screw), JIS B1193(Ball Spline) .
Tolerance for each part and description are as follows.

【Separated type】



【Overlap type】

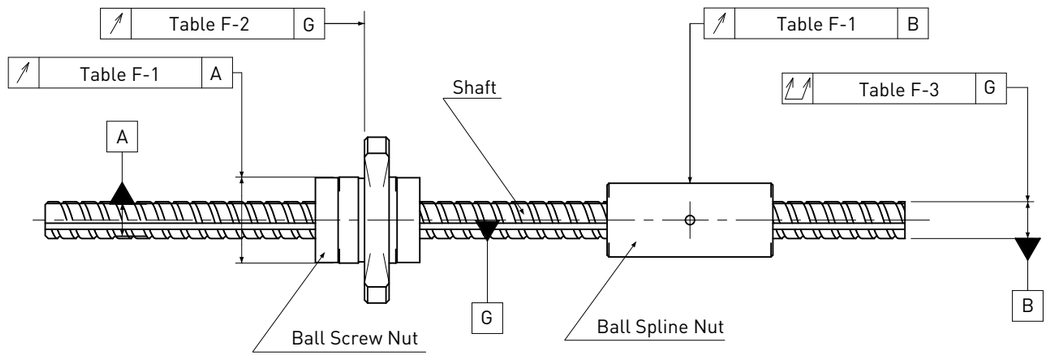


Table F-1 : Radial Run-out of Ball Nut location diameter related to the centerline of Screw Shaft

Unit : μm

Nut outside diameter (mm)		Permissible deviation of Radial Run-out		
Over	Up to	Ball Screw Nut		Ball Spline Nut
		C3	C5	
—	20	9	12	11
20	32	10	12	—

Table F-2 : Axial Run-out (Perpendicularity) of Ball Nut location face related to the centerline of Screw Shaft

Unit : μm

Nut outside diameter (mm)		Permissible deviations of Axial Run-out(Perpendicularity)	
Over	Up to	Ball Screw Nut	
		C3	C5
—	20	8	10
20	32	8	10

Table F-3 : Total Run-out in radial direction of Screw Shaft related to the centerline of Screw Shaft

Unit : μm

Shaft total length (mm)		Permissible deviations of total Run-out in radial direction	
Over	Up to	C3	C5
—	125	25	35
125	200	35	50
200	315	50	65

3) Lead accuracy of Ball Screws

Ball Screw lead accuracy is specified by the tolerance of actual mean travel error ($\pm e_p$) and travel variation (V_u) over the Screw Shaft effective length.
Tolerance of each accuracy grades are shown in the Table F-4.

Table F-4 : Tolerance on Specified travel ($\pm e_p$) and permissible travel variation of Ball Screws.

Unit : μm

Accuracy Grade			C3		C5	
Effective screw length (mm)	Over	Up to	$\pm e_p$	V_u	$\pm e_p$	V_u
	—	100	8	8	18	18
	100	200	10	8	20	18
	200	315	12	8	23	18

4) Material & Heat treatment, Surface hardness

Standard material of BSSP, Heat treatment and Surface hardness are shown in Table F-5.
However, they vary depending on profile of Shaft or Nut. Please refer to KSS drawings.

Table F-5 : Material, Heat treatment & Surface hardness

		Material	Heat treatment	Surface hardness
Screw Shaft	Solid Shaft	SCM415	Carburizing and quenching	HRC 58-62
	Hollow Shaft	SUJ2	Induction hardening	
Nut		SCM415	Carburizing and quenching	HRC 58-62

5) Lubrication

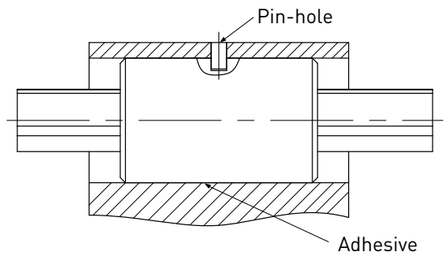
In Ball Screw with Ball Spline(BSSP) use, lubricant should be required. If lubricant is not applied with, the problem such as increase of Torque and shortened Life occurs. Applying lubricant can minimize temperature increases, decline of mechanical efficiency due to friction, and deterioration of accuracy caused by wear.
For lubrication of BSSP, regular lithium-soap-based Grease and ISO VG32-68 Oil (turbine Oil #1 to #3) are recommended.
BSSP are applied with anti-rust oil for rust prevention, if there is no designation when shipping. Since anti-rust oil is not lubricant, apply Grease or Lubrication oil before using BSSP.
If there is no specific request, KSS would recommend our original grease (MSG No.2) as standard lubricant.
We can apply designated Grease before shipping, please ask KSS representative.

Table F-6 : Recommended lubricants for normal operating conditions

Lubricant	Type	Product name
Grease	Lithium-based Grease	KSS original Grease MSG No.2
Lubricating Oil	Sliding surface Oil or turbine Oil	Super Multi 68

6) Mounting of Ball Spline Nut

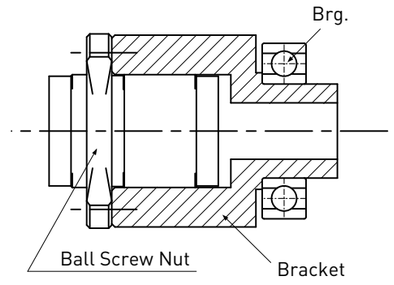
Ball Spline Nut should be mounted using pin-hole located on Nut outer, and adhesive.
Please make sure that no load would be applied on pin when using pin-hole.



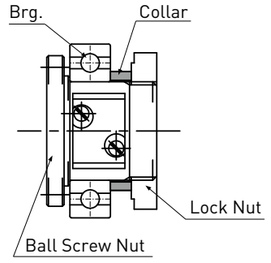
7) Mounting of Ball Screw Nut

There would be a couple of ways to install Bearings onto Ball Screw Nut, such as using Bracket as Bearing shaft, direct mounting on Ball Screw Nut.
KSS designs special profile of Ball Screw Nut in accordance with customer's mounting request. Please ask KSS representative for further information.

Brg. install with Bracket



Direct install of Brg. onto Nut outer



●Model number notation

【Separated type】

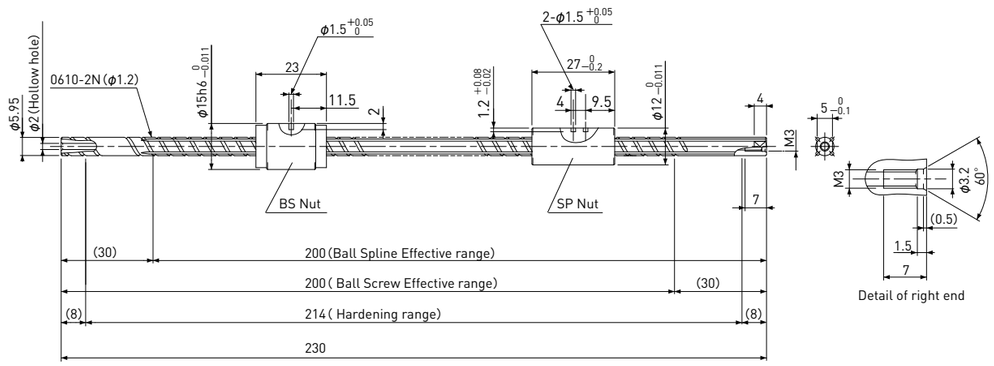
BSSP 06 10 / 06 - 080 R 070 S 200 C5 T
① ② ③ ④ ⑤ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

【Overlap type】

BSSP 06 10 - 150 R 180 C5 T
① ② ③ ⑥ ⑦ ⑩ ⑪ ⑫

① Ball Screw with Ball Spline series No.
BSSP : Ball Screw with Ball Spline
② Screw Shaft nominal diameter (mm)
③ Lead (mm)
④ Ball Spline Shaft nominal diameter (mm)
⑤ Screw thread length (mm)
⑥ Screw thread & Spline length (mm)
⑦ Thread direction (R=Right-hand, L=Left-hand)
⑧ Spline length (mm)
⑨ S means Ball Spline part
⑩ Total length (mm)
⑪ Accuracy grade
⑫ Shaft option : No indication=solid shaft, T=Hollow shaft

BSSP0610 | Shaft dia. ϕ6 Lead 10mm | C5



Ball Screw Specifications	
Accuracy Grade	JIS C5
Ball size	ϕ1.2mm
Number of thread	2
Thread direction	Right
Pitch circle dia.	6.30mm
Number of circuit	1.2×2
Basic Load Rating Dynamic : Ca	(650N)
Basic Load Rating Static : Coa	(900N)
Axial Play	Max 0.005 mm

Ball Spline Specifications	
Accuracy Grade	JIS C5
Basic Load Rating Dynamic : Cr	(750N)
Basic Load Rating Static : Cor	(1200N)
Basic Torque Rating Dynamic : Ct	(1.9 Nm)
Basic Torque Rating Static : Cot	(1.3 Nm)
Radial Play	Max 0.002 mm

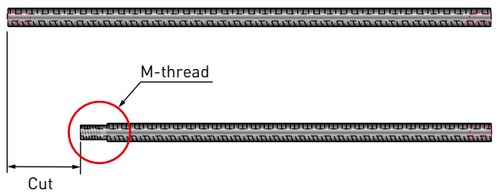
Common Specifications		
Material	Shaft	SUJ2
	Nut	SCM415
Anti-rust treatment		Anti-rust Oil

Note 1) The detail will be provided by drawing.
Note 2) Female thread on left end journal is not available.

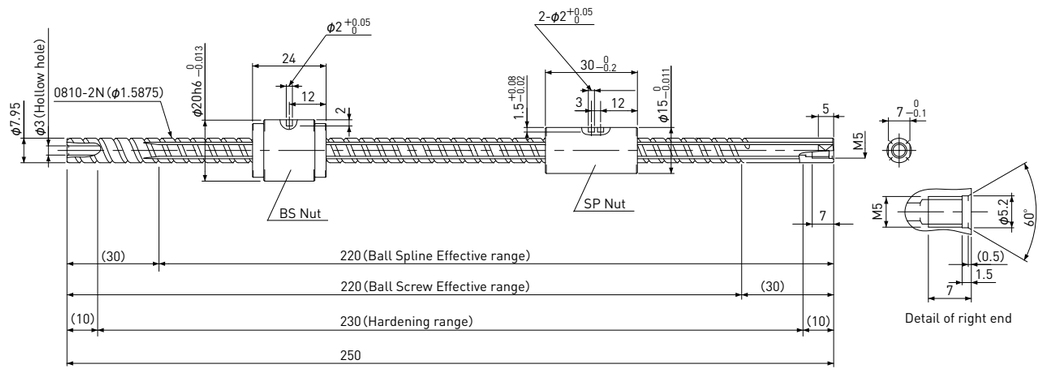
【Re-works on Shaft-end】

Other parts can be attached by re-working the end journal, such as turning down, or male thread.

Re-works Example



BSSP0810 | Shaft dia. ϕ8 Lead 10mm | C5



Ball Screw Specifications	
Accuracy Grade	JIS C5
Ball size	ϕ1.5875mm
Number of thread	2
Thread direction	Right 右
Pitch circle dia.	8.40mm
Number of circuit	1.65×2
Basic Load Rating Dynamic : Ca	(1400N)
Basic Load Rating Static : Coa	(2000N)
Axial Play	Max 0.005 mm

Ball Spline Specifications	
Accuracy Grade	JIS C5
Basic Load Rating Dynamic : Cr	(1000N)
Basic Load Rating Static : Cor	(1450N)
Basic Torque Rating Dynamic : Ct	(3.4Nm)
Basic Torque Rating Static : Cot	(2.4Nm)
Radial Play	Max 0.002 mm

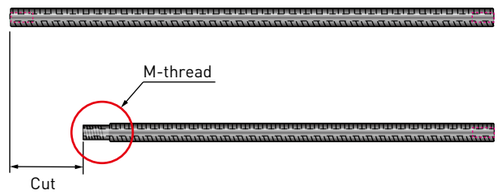
Common Specifications		
Material	Shaft	SUJ2
	Nut	SCM415
Anti-rust treatment		Anti-rust Oil

Note 1) The detail will be provided by drawing.
Note 2) Female thread on left end journal is not available.。

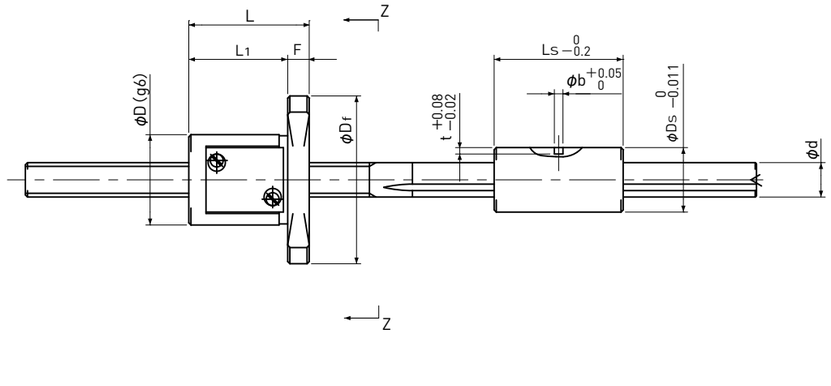
【Re-works on Shaft-end】

Other parts can be attached by re-working the end journal, such as turning down, or male thread.

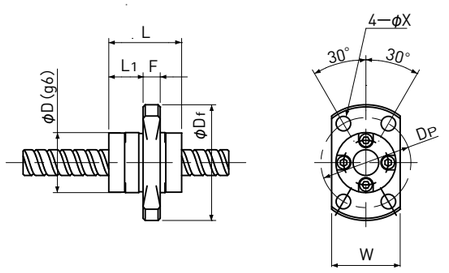
Re-works Example



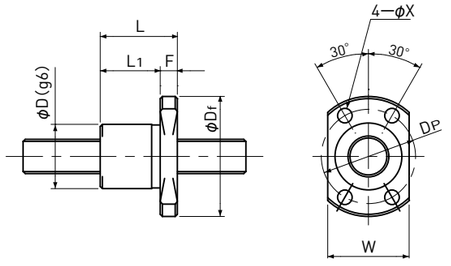
Separated type



Type-1 : Return-plate type (Ball Screw Nut)



Type-2 : End-cap type (Ball Screw Nut)



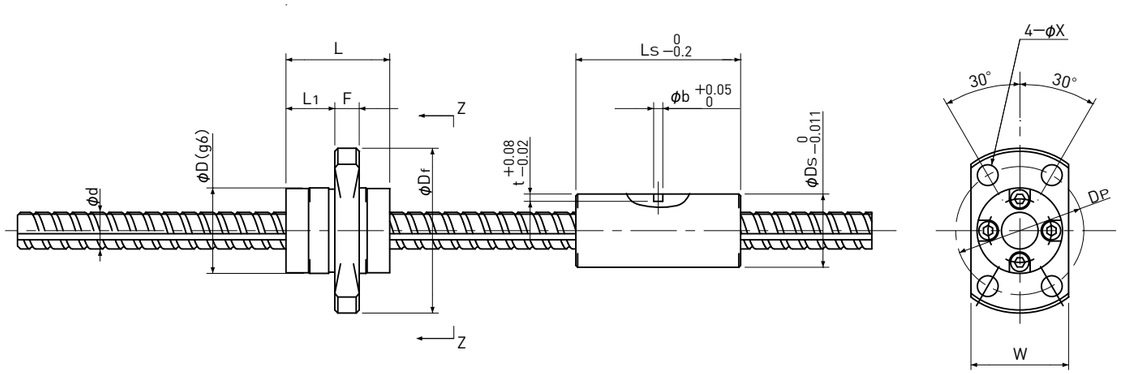
Type-3 : Internal-deflector type (Ball Screw Nut)

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Ball Screw part: Lead	Basic Load Rating (Reference) Ca N	Coa N	Nut dimension: Nut type	Nut mass g	D	Df	L	L1	F	W	Dp	Bolt Hole X	Ball Spline part: Basic Load Rating (Reference) Cr N	Cor N	Basic Torque Rating (Reference) Ct Nm	Cot Nm	Permissble Moment (Ref.) Mo Nm	Nut dimension: Nut mass g	OD. Ds	Length Ls	Pin hole b	Pin hole t	Bore hollow	Shaft Inertia Kgm²/mm	Ball Nut Model number
BSSP 0602/06	6	2	(750)	(1200)	1	25	15	29	17	13	4	17	23	3.4	(860)	(1400)	(2.2)	(1.6)	(3.0)	14	12	27	1.5	1.2	2	9.99×10^{-10}	BSSP 0602/06
BSSP 0606/06		6	(870)	(1450)	2	20	14	27	17	8	4	16	21	3.4													BSSP 0606/06
BSSP 0610/06		10	(950)	(1600)	2	20	14	27	23	11.5	4	16	21	3.4													BSSP 0610/06
BSSP 0802/08(1)	8	2	(850)	(1600)	1	25	16	30	17	13	4	18	24	3.4	(1200)	(1900)	(4.1)	(3.1)	(4.1)	22	15	30	2.0	1.5	3	31.6×10^{-10}	BSSP 0802/08(1)
BSSP 0802/08(2)		2	(2400)	(4000)	1	60	20	38	24	19	5	22	30	4.5													BSSP 0802/08(2)
BSSP 0802/08(3)		2	(1300)	(2300)	3	25	15	28	18	14	4	17	22	3.4													BSSP 0802/08(3)
BSSP 0804/08		4	(2600)	(4200)	1	75	21	39	28	23	5	23	31	4.5													BSSP 0804/08
BSSP 0812/08		12	(2200)	(4000)	2	40	18	31	27	17	4	20	25	3.4													BSSP 0812/08

Note 1) Please note that Bore hollow is an option, not a standard.
In some cases Bore hollow is not available due to Shaft length.
Note 2) If special profile of Ball Screw Nut / Ball Spline Nut, please ask KSS representative.
Note 3) Basic Load Rating, Basic Torque Rating and Permissible Moment are theoretical number based on effective number of Balls. They may vary drastically depending on operating condition. Please consider them just reference.
Note 4) It is difficult to estimate theoretical life, because of combined products with Ball Spline which withstands Radial Load and Ball Screw for Axial Load. We would recommend that final decision should be based on your evaluation on actual machine or our experimental data.
Note 5) Maximum limit of Shaft length is 150mm(for φ6), 200mm(for φ8).
Please ask KSS in case of exceeding limit length.

Overlap type



ViewZ-Z

Type-2 : End-cap type（Ball Screw Nut）

Unit : mm

Ball Nut Model number	Shaft nominal dia. d	Ball Screw part														Ball Spline part										Bore hollow	Shaft Inertia	Ball Nut Model number
		Lead	Basic Load Rating (Reference)		Nut dimension											Basic Load Rating (Reference)		Basic Torque Rating (Reference)		Permissble Moment (Ref.) Mo	Nut dimension							
			Ca	Coa	Nut type	Nut mass	D	Df	L	L1	F	W	Dp	Bolt Hole X		Cr	Cor	Ct	Cot		Nut mass	OD. Ds	Length Ls	Pin hole b	Pin hole t			
			N	N												N	N	Nm	Nm	Nm	g						Kgm²/mm	
BSSP 0606	6	6	(600)	(900)	2	20	14	27	17	8	4	16	21	3.4		(650)	(1000)	(1.7)	(1.2)	(2.2)	14	12	27	1.5	1.2	2	9.99×10^{-10}	BSSP 0606
BSSP 0610		10	(650)	(900)	2	20	14	27	23	11.5	4	16	21	3.4		(750)	(1200)	(1.9)	(1.3)	(2.4)								BSSP 0610
BSSP 0812	8	12	(1400)	(2000)	2	40	18	31	27	17	4	20	25	3.4		(1100)	(1700)	(3.8)	(2.8)	(2.7)	22	15	30	2.0	1.5	3	31.6×10^{-10}	BSSP 0812

Note 1) Please note that Bore hollow is an option, not a standard.
In some cases Bore hollow is not available due to Shaft length.
Note 2) If special profile of Ball Screw Nut / Ball Spline Nut, please ask KSS representative.
Note 3) Basic Load Rating, Basic Torque Rating and Permissible Moment are theoretical number based on effective number of Balls. They may vary drastically depending on operating condition. Please consider them just reference.
Note 4) It is difficult to estimate theoretical life, because of combined products with Ball Spline which withstands Radial Load and Ball Screw for Axial Load. We would recommend that final decision should be based on your evaluation on actual machine or our experimental data.
Note 5) Maximum Load Capacity should be considered 10N.
Note 6) Maximum limit of Shaft length is 150mm(for φ6), 200mm(for φ8).
Please ask KSS in case of exceeding limit length.

●Precaution of storage, handling and operating

• Precaution for handling

BSSP is precision components, and must be handled carefully in accordance with the instruction below.

Storage

BSSP should be stored unopened in their original KSS packaging. Avoid opening the package or breaking the inner package unnecessarily. This may result in contamination or rusting, and may degrade operating performance.
Please store BSSP under −20℃ ~80 ℃, less than 80%RH humidity without any dew condensation.

Handling

1. Never disassemble BSSP. This will cause contamination, reduce accuracy, and lead to accidents.
2. Customers should not attempt to reassemble BSSP. Incorrect reassembly can easily result in malfunction. BSSP should be returned to KSS, where it will be repaired and reassembled with charge.
3. Take care to avoid injuries due to falling BSSP Shaft or Nut.
4. Dropping BSSP may cause scratching or impact damage to recirculating components, Shaft outside diameters, Balls, or Screw & Spline grooves, which may cause malfunction, such as incorrect rotation. If dropped, BSSP must be inspected by KSS with charge. Please make sure you return dropped Shaft or Nut.

• Precaution for operating

Dust proof

Ball Screws must be used in a clean environment. They should be used with a dustproof cover to prevent contamination from dust or swarf. Dust or swarf contamination due to insufficient dust protection may reduce the BSSP performance, cause damage to recirculating components, which lead to locking.

Lubrication

Check lubrication before use. Insufficient lubrication will rapidly deteriorate the operating performance of BSSP.
Since anti-rust oil is not lubricant（Grease / Oil）, Anti-rust oil on BSSP should be washed off with clean Kerosene and apply lubricant before using BSSP.
Please check the lubricant condition every 2 to 3months. If Grease is contaminated, remove old Grease, and replace with new Grease.

Critical speed and Permissible Axial load

BSSP has the maximum limit of speed and Axial load depending on its size, material, mounting method etc. When design BSSP, KSS would recommend that you consult with KSS engineering about the operating condition and model selection.

Over-run

Allowing Nuts to overrun may result in malfunctioning due to Balls escaping, damage to recirculation components, and indentation of the Ball grooves. Continued use in this state will lead to rapid wear and damage to recirculation components. Ball Screw Nut and Ball Spline Nut must therefore never be allowed to overrun. If overrunning occurs, contact KSS for an inspection with charge.

Temperature

BSSP should be used under the temperature of −20℃ ~80 ℃ , and humidity of less than 80%RH.
Avoid use BSSP under lower / higher temperatures and higher humidity.
This may result in the following problems.
・Reduced performance of Ball recirculation, and smooth movement.
・Damage to recirculation components.
・Reduced hardness of heat treated components.
・Rust on BSSP components.
If it is necessary to work beyond the recommended temperatures, please consult with KSS first as we may be able to provide a solution.

Moment load or Radial load

Ball Screw Nut primarily generate thrusts in the axial direction, and are not designed to withstand Radial loads and Moment loads. Care must be taken not to apply Radial loads and Moment loads to the Ball Screw Nut. If these kinds of loads act on the Ball Screws, Ball load uniformity is lost, and the life of Ball Screws is drastically reduced.

Actuator

Outline

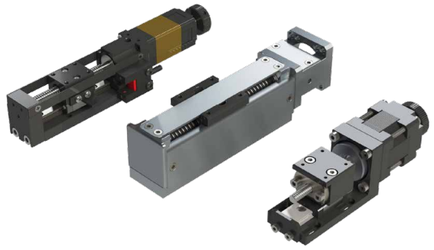
KSS as specialize in the Miniature Ball Screw, is pursuing the light-weight and compactness for our Actuator products. Adopting the know-how of Miniature Ball Screw, we have selections of Actuator products which enables ultimate compactness where no other company can follow.

●Classification of KSS Actuator

【Ball Screw Linear Actuator】

Features
- This is a Ball Screw type compact electric Linear Actuator which combined with Stepping Motor.
- 3 types of Linear Actuators, External, Captive and Non-Captive type are available for customer usage.

【Single axis Actuator】



Features
- Single axis Actuator is the stage-type compact Actuator which is made of small sized Ball Screw and Linear Guide.
- Variety of options are available such as External photo-sensor or Brake unit.

【V-Z-θ Actuator】

Features
- This is our state of the art product which applied the KSS miniature Ball Screw with Ball Spline(BSSP), and realized three functions, linear (Z), rotary (θ) and vacuum (V) with one product.
- KSS provides 3-types of multi-functional VZ θ Actuator, which are Direct Drive type, Hybrid Drive type and Belt Drive type.

Ball Screw Linear Actuators

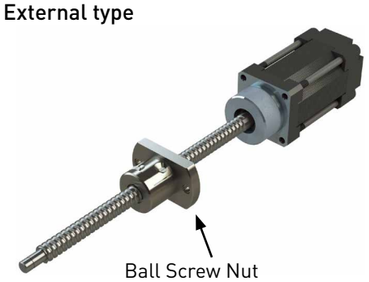
- This is a Ball Screw type Compact Electric Linear Actuators with Stepping Motor.
- 3 types of Linear Actuators, Captive, Non-captive, & External, are provided for customer's usage.
- KSS is only one manufacturer who has all 3-types of Linear Actuators.
- Wide variety of selection of Motor & Ball Screw are available.

●Features

- High accuracy & compactness are achieved due to direct drive structure.
- Compact design, to reduce the number of components, to save the labor cost are possible.
- High efficiency, long life & high accuracy can be achieved compared to lead screw type.
- Pick one models that fits your application or specifications among variety of combination, Motor size, Ball screw type & screw lead.

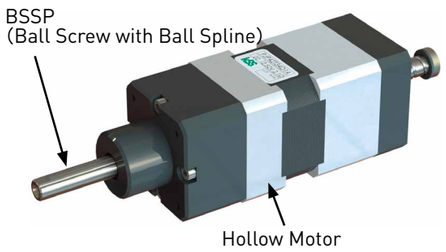
●Variation and Structure

External type



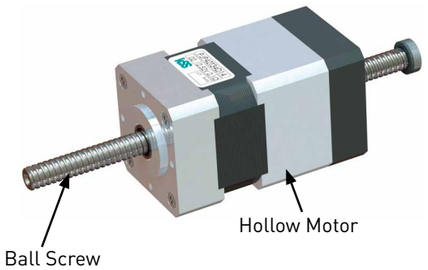
Stepping Motor is directly mounted onto Ball Screw shaft, so that Coupling is not required in this type of Actuator.

Captive type



Ball Screw with Ball Spline(BSSP) is built in the Hollow Motor.
Ball Spline Nut plays a role of anti-rotating device and slide guide.
No need to set up anti-rotating design outside the Actuators.

Non-Captive type



This is the simple design Linear Actuator with Ball Screw built in Hollow Motor.
Anti-rotating device should be set up outside Actuators when usage.

Linear Actuator External type

It's a Compact Linear Actuator series, what we call MoBo.
The MoBo is the combined product that Stepping Motor Shaft is directly mounted onto Ball Screw Shaft, and eliminated Coupling accordingly.

In KSS, we always pursue the downsizing of our products that is the mission of the Miniature Ball Screw manufacturer. Linear Actuator External type is one of our representative product, which combines a Motor Shaft and a Ball Screw.
External type can achieve shortening the longitudinal dimension by eliminating the Coupling.
Since KSS launched the first version of External type in 2001, we continued to add various type of External type on our line-up and provides the variety of choices to our customer.

Linear Actuator (External type) can offer variety of choices, based on its combination of Stepping Motor type (2-phase or 5-phase) and Ball Screw type (refer to TableP-1, TableP-2).
In addition, we can provide Resin (plastic Nut) Lead Screw type as customized product, please ask KSS representative if necessary.

Table P-1 : Combination of Ball Screw and Stepping Motor

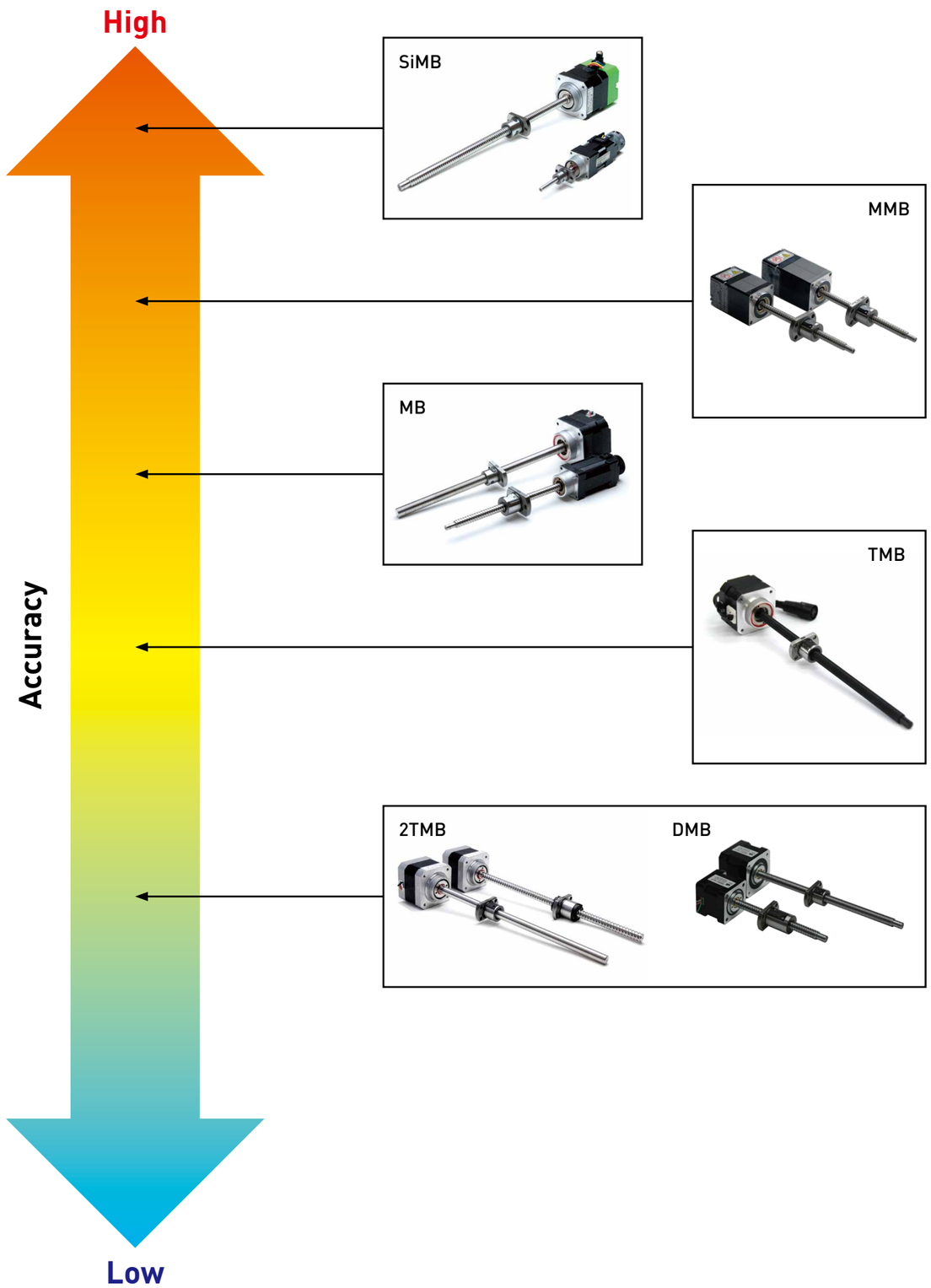
Type	Ball Screw type		Stepping Motor		Additional Function
	Precision type	Rolled type	2-phase	5-phase	
DMB		○ JIS Ct7 equivalent	○		
2TMB		○ JIS Ct7 equivalent	○		
TMB		○ JIS Ct7		○	
MB	○ JIS C3			○	
MMB		○ JIS Ct7 equivalent	○		Encoder / Driver / Controller
SiMB	○ JIS C3		○		Encoder / Memory chip

Table P-2 : Combination of Ball Screw and Stepping Motor

Unit:mm

Shaft Nominal dia. \ Lead	0.5	1	2	4	5	6	10	12
4	MB	DMB TMB MB SiMB	DMB					
5					DMB TMB			
6		DMB TMB MB	DMB TMB MB MMB			TMB	DMB	
8		DMB TMB 2TMB MB SiMB	DMB TMB 2TMB MB SiMB		DMB TMB 2TMB SiMB		DMB	TMB 2TMB

Linear Actuator (External type) provides various types of combination for Ball Screw and Motor ranging from high precision to multi-purpose type depending on the customer requirement.



【DMB Series】

Ct7 class Rolled Ball Screw is installed into 2-phase Stepping Motor for multi-purpose use.
Variety of Motor size and Ball Screw lead are available.

【2TMB Series】

Ct7 class Rolled Ball Screw is installed into 2-phase Stepping Motor for multi-purpose use.
Variety of Ball Screw lead are available.

【TMB Series】

This series is all-round performance drive unit with Rolled Ball Screw and 5-Phase Stepping Motor.
Ct7 class Rolled Ball Screw is built in this series.

【MB Series】

This series is high performance, high accurate positioning drive unit with Precision Ball Screw and 5-Phase Stepping Motor. C3 class Precision Ball Screws are adopted for this series.

【MMB Series】

Rolled Ball Screw with All-in-One Motor (Encoder, Servo driver and Controller) is to realize high performance and significant saving in wiring. Providing smooth drive and closed loop operation.

【SiMB Series】

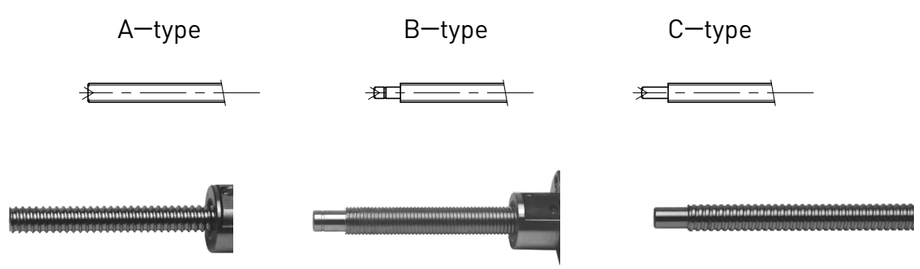
This series have high accurate positioning, ultra smooth drive, torque control drive and closed loop operation by using Precision Ball Screw with C3 accuracy and Si-Servo Motor.

DMB Series
Rolled Ball Screw + 2 Phase Stepping Motor

●Features

- Wide variety in Motor size, which are NEMA08(□20), NEMA11(□28), NEMA14(□35) and NEMA17(□42).
- 2-phase Stepping Motor is mounted directly onto the Shaft end of the Ball Screw, which is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving the total length can be achieved.
- High cost performance item is provided by combining Rolled Ball Screw and 2-phase Stepping Motor.
- End journal profiles and travel length can be customized(see photo below).

[End journal variation]



Cut only　　Journal with snap-ring groove　　Journal only

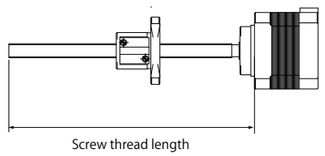
●Model number notation

Model number notation for customized DMBR series is as follows.
In case of standard style, model number is described in catalogue from pageP111 to pageP115.

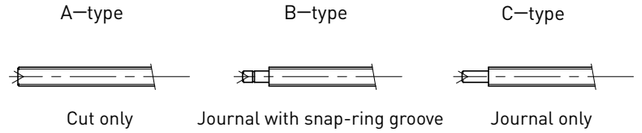
DMB R 06 01 - 80 A - 11E2110 - XXX
①　②　③　④　⑤　⑥　⑦　⑧

①Series No.
DMB : Linear Actuator Ball Screw External type (2-phase Stepping Motor)
②Ball Screw type
R : Rolled Ball Screw
③Screw Shaft nominal diameter(mm)
06 means 6mm
④Lead(mm)
01 means 1mm
⑤Screw thread length(mm)
Screw length which is exposed from Motor(see below)
⑥End journal profile
A : Cut only
B : Journal with snap ring groove(standard)
C : Journal only
⑦Motor Model
Refer to table below
⑧Extra notation

【⑤Screw thread length】



【⑥End journal profile】



Motor Model	Motor size (mm)	Motor length (mm)	Rated current (A/phase)	Holding Torque (Nm)	Applicable Shaft dia. (mm)	Lead (mm)
08E2004	NEMA08(□20)	(22)	0.4	0.003	φ4	1,2
08E2105	NEMA08(□20)	(29)	0.5	0.0035	φ4	1,2
11E2110	NEMA11(□28)	(35)	1.0	0.036	φ5,φ6	1,2,4,10
11E2216	NEMA11(□28)	(47)	1.6	0.052	φ5,φ6	1,2,4,10
14E2110	NEMA14(□35)	(36)	1.0	0.060	φ8	1,2,5,10
14E2215	NEMA14(□35)	(48)	1.5	0.10	φ8	1,2,5,10
17E2115	NEMA17(□42)	(36)	1.5	0.18	φ8	1,2,5,10

●Specifications

Motor Size	Model No.	Motor length (mm)	Screw Shaft nominal dia. (mm)	Lead (mm)	Travel (mm)	Travel per pulse (μm)	Mass (g)
NEMA 08 (□20)	DMBR0401-08E2004	(22)	4	1	23	5	52
	DMBR0402-08E2004	(22)	4	2	21	10	52
	DMBR0401-08E2105	(29)	4	1	23	5	62
	DMBR0402-08E2105	(29)	4	2	21	10	62
NEMA 11 (□28)	DMBR0504-11E2110	(35)	5	4	39	20	140
	DMBR0504-11E2216	(47)	5	4	39	20	194
	DMBR0601-11E2110	(35)	6	1	43	5	140
	DMBR0602-11E2110	(35)	6	2	43	10	148
	DMBR0610-11E2110	(35)	6	10	40	50	146
	DMBR0601-11E2216	(47)	6	1	43	5	194
	DMBR0602-11E2216	(47)	6	2	43	10	202
	DMBR0610-11E2216	(47)	6	10	40	50	198
NEMA 14 (□35)	DMBR0801-14E2110	(36)	8	1	58	5	212
	DMBR0802-14E2110	(36)	8	2	50	10	240
	DMBR0805-14E2110	(36)	8	5	47	25	234
	DMBR0810-14E2110	(36)	8	10	54	50	226
	DMBR0801-14E2215	(48)	8	1	58	5	292
	DMBR0802-14E2215	(48)	8	2	50	10	320
	DMBR0805-14E2215	(48)	8	5	47	25	314
	DMBR0810-14E2215	(48)	8	10	54	50	304
NEMA 17 (□42)	DMBR0801-17E2115	(36)	8	1	118	5	298
	DMBR0802-17E2115	(36)	8	2	110	10	322
	DMBR0805-17E2115	(36)	8	5	107	25	318
	DMBR0810-17E2115	(36)	8	10	114	50	308

Repeatability (reference)	max.±0.01mm (NEMA08/□20:max.±0.02mm)
Lost Motion (reference)	max.0.01mm (NEMA08/□20:max.0.02mm)

※The reference value about Repeatability and Lost Motion represents when the DMB built into KSS original Stage. Please make a contact to KSS for actual value.

Note1) Detail specifications & dimensions are shown in diagram from page P111.
Note2) Travel per pulse represents the value for full step.
Note3) Acceleration & Deceleration Rate should be 50ms/kHz or more.
Note4) For reference thrust, please refer to Force-speed diagram in page109 and page110.

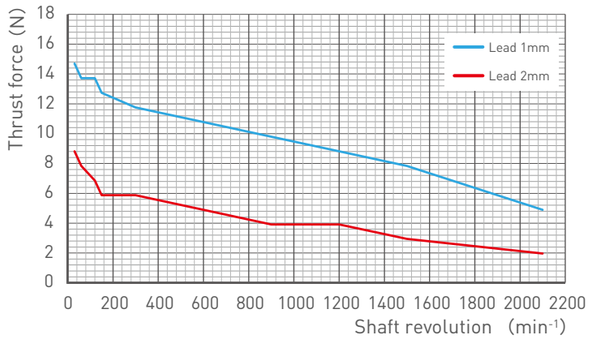
●Motor Specification

Motor size	Motor model	Rated Voltage (V)	Rated current (A/phase)	Winding resistance (Ω)	Holding Torque (Nm)	Rotor Inertia (g・cm²)	Motor length (mm)	Load limit in Vertical Position (N)
NEMA 08 (□20)	08E2004	DC3.5	0.4	8.8	0.003	2.4	(22)	43
	08E2105	DC2.6	0.5	5.1	0.0035	2.6	(29)	43
NEMA 11 (□28)	11E2110	DC2.1	1.0	2.1	0.036	φ5mm : 6.7 φ6mm : 7.2	(35)	150
	11E2216	DC2.4	1.6	1.5	0.052	φ5mm : 11.5 φ6mm : 12.0	(47)	150
NEMA 14 (□35)	14E2110	DC3.5	1.0	3.5	0.060	21	(36)	230
	14E2215	DC4.0	1.5	2.7	0.10	32	(48)	230
NEMA 17 (□42)	17E2115	DC2.8	1.5	1.85	0.18	36	(36)	230

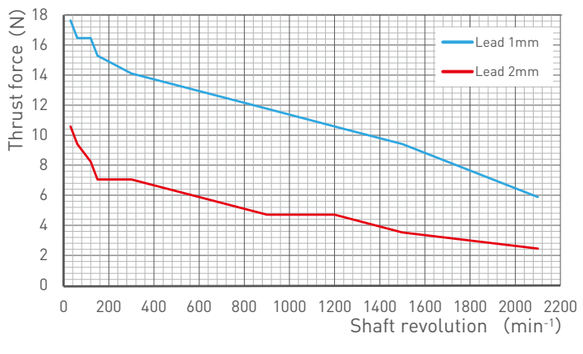
Note) Driving Method is 2-phase Bi-polar, Basic step angle is 1.8 degree.

●Force-speed diagram

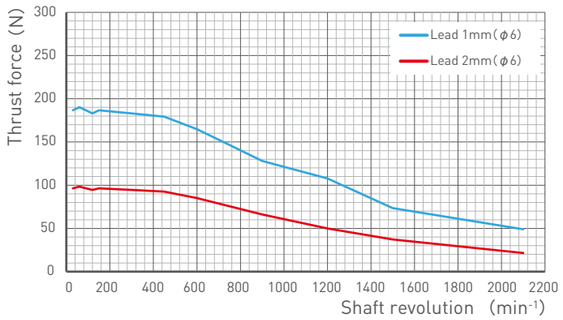
Motor model : 08E2004 (□20)
Applicable Actuator : DMBR0401, DMBR0402

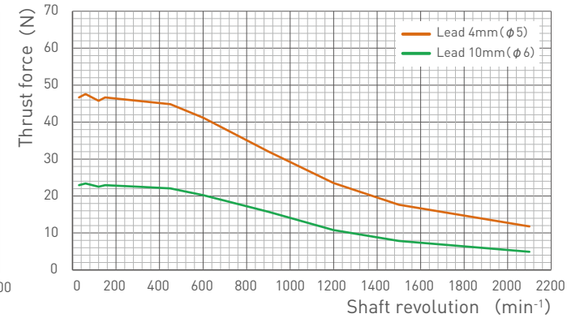


Motor model : 08E2105 (□20)
Applicable Actuator : DMBR0401, DMBR0402

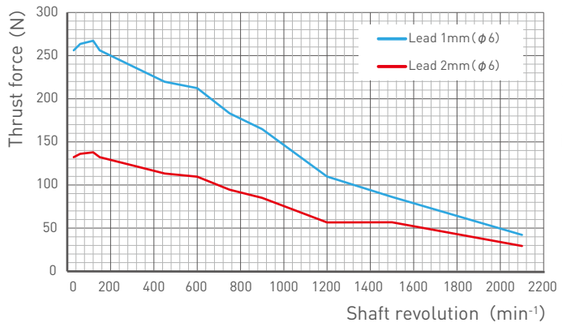


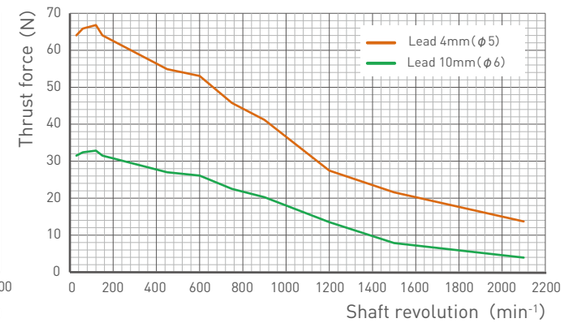
Motor model : 11E2110 (□28)
Applicable Actuator : DMBR0504, DMBR0601, DMBR0602, DMBR0610



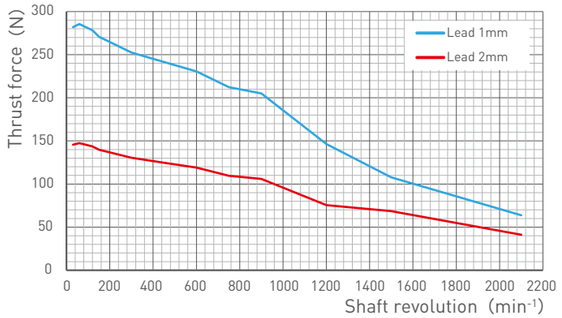


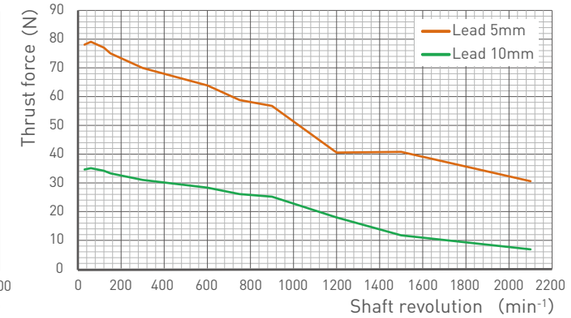
Motor model : 11E2216 (□28)
Applicable Actuator : DMBR0504, DMBR0601, DMBR0602, DMBR0610



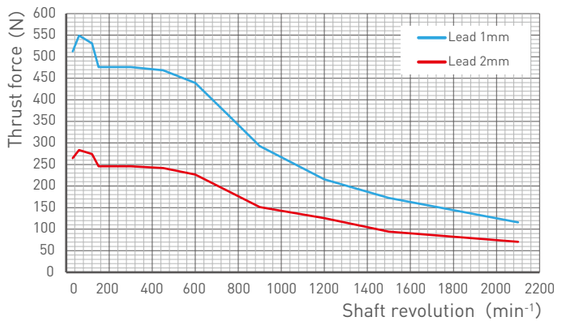


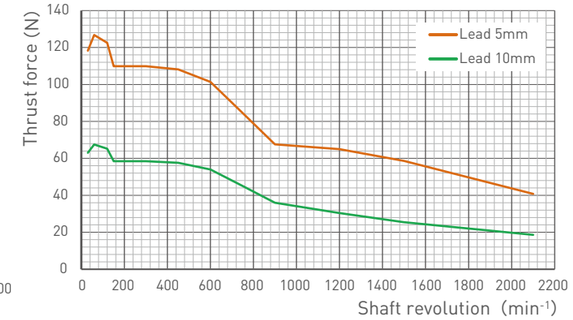
Motor model : 14E2110 (□35)
Applicable Actuator : DMBR0801, DMBR0802, DMBR0805, DMBR0810



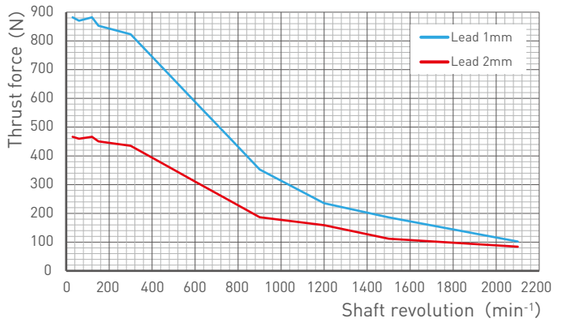


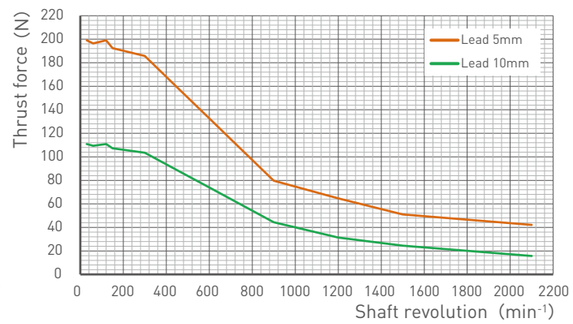
Motor model : 14E2215 (□35)
Applicable Actuator : DMBR0801, DMBR0802, DMBR0805, DMBR0810





Motor model : 17E2115 (□42)
Applicable Actuator : DMBR0801, DMBR0802, DMBR0805, DMBR0810



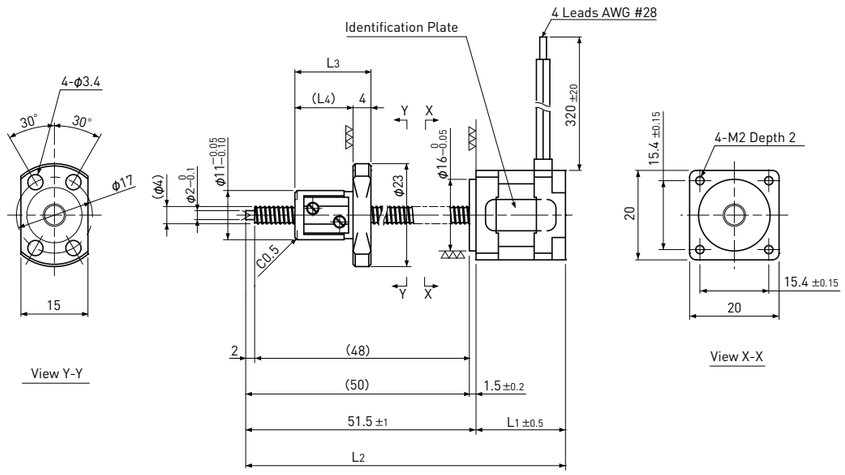


Note) Force-speed diagrams above are measurement data of samples.
It may vary depending on each motor's characteristic.
Please consider these diagrams as reference data.

Rolled Ball Screw + 2-phase Stepping Motor

DMBR □20 / NEMA 08

Shaft dia.ϕ4



Unit:mm

Model	Lead	Travel	L_1	L_2	L_3	L_4	Mass (g)
DMBR0401-08E2004	1	23	20	71.5	17	13	52
DMBR0402-08E2004	2	21	20	71.5	19	15	52
DMBR0401-08E2105	1	23	27.2	78.7	17	13	62
DMBR0402-08E2105	2	21	27.2	78.7	19	15	62

Motor Wire	
A	Red
$\bar{A}$	Red/White
B	Green
$\bar{B}$	Green/White

Recommended Drivers	SD4015B3

Note) Refer to page P161 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

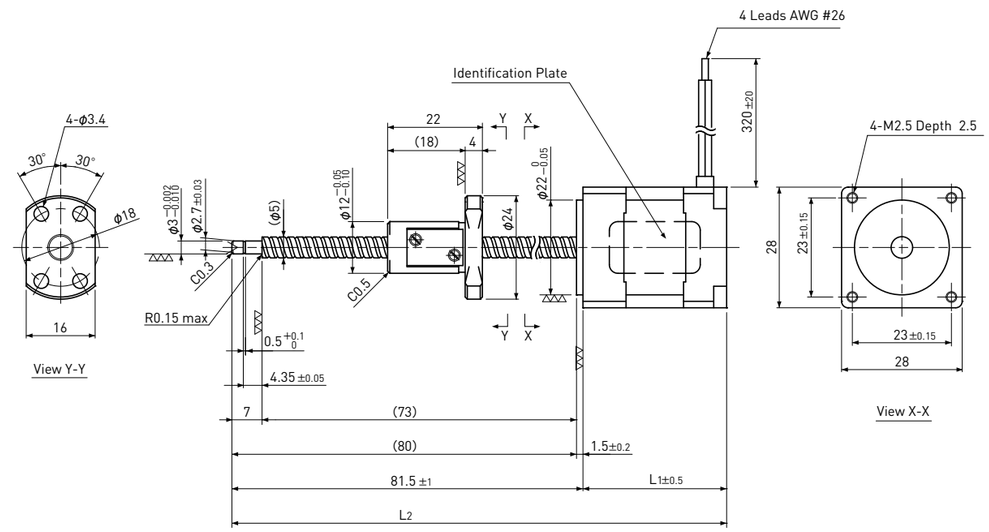
Note) Please contact KSS if different journal profile or length from the above is required.

Motor Specifications		
Motor Model	08E2004	08E2105
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 3.5 V	DC 2.6 V
Rated current	DC 0.4A/phase	DC 0.5A/phase
Winding resistance	8.8Ω	5.1Ω
Holding Torque	0.003Nm	0.0035Nm
Rotor inertia	2.4g·cm²	2.6g·cm²
Operating temperature	−10℃~50℃	

Rolled Ball Screw + 2-phase Stepping Motor

DMBR □28 / NEMA 11

Shaft dia.ϕ5



Unit:mm

Model	Lead	Travel	L_1	L_2	Mass (g)
DMBR0504-11E2110	4	39	33.35	114.85	140
DMBR0504-11E2216	4	39	45	126.5	194

Motor Wire	
A	Red
$\bar{A}$	Red/White
B	Green
$\bar{B}$	Green/White

Recommended Drivers	SD4030B3

Note) Refer to page P161 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Note) Please contact KSS if different journal profile or length from the above is required.

Motor Specifications		
Motor Model	11E2110	11E2216
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 2.1 V	DC 2.4 V
Rated current	DC 1.0A/phase	DC 1.6A/phase
Winding resistance	2.1Ω	1.5Ω
Holding Torque	0.036Nm	0.052Nm
Rotor inertia	6.7g·cm²	11.5g·cm²
Operating temperature	−10℃~50℃	

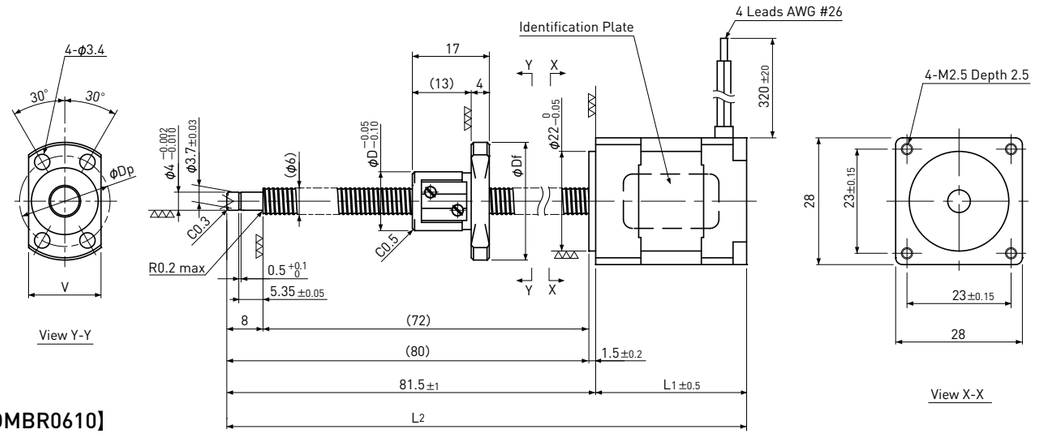
Standard style of DMB series — Dimensions & Specifications

Rolled Ball Screw + 2-phase Stepping Motor

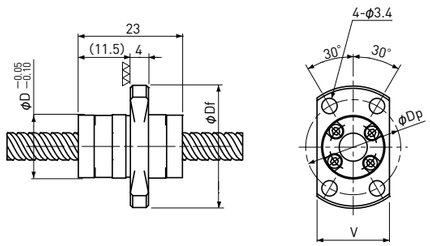
DMBR □28 / NEMA 11

Shaft dia. ϕ6

【DMBR0601 / DMBR0602】



【DMBR0610】



Unit:mm

Model	Lead	Travel	L_1	L_2	D	Df	V	Dp	Mass (g)
DMBR0601-11E2110	1	43	33.35	114.85	13	26	16	20	140
DMBR0602-11E2110	2	43	33.35	114.85	15	28	19	22	148
DMBR0610-11E2110	10	40	33.35	114.85	14	27	16	21	146
DMBR0601-11E2216	1	43	45	126.5	13	26	16	20	194
DMBR0602-11E2216	2	43	45	126.5	15	28	19	22	202
DMBR0610-11E2216	10	40	45	126.5	14	27	16	21	198

Motor Wire	
A	Red
$\overline{A}$	Red/White
B	Green
$\overline{B}$	Green/White

Recommended Drivers	SD4030B3

Note) Refer to page P161 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Note) Please contact KSS if different journal profile or length from the above is required.

Motor Specifications		
Motor Model	11E2110	11E2216
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 2.1 V	DC 2.4 V
Rated current	DC 1.0A/phase	DC 1.6A/phase
Winding resistance	2.1Ω	1.5Ω
Holding Torque	0.036Nm	0.052Nm
Rotor inertia	7.2g·cm²	12.0g·cm²
Operating temperature	−10℃~50℃	

Actuator
Linear Actuator External type

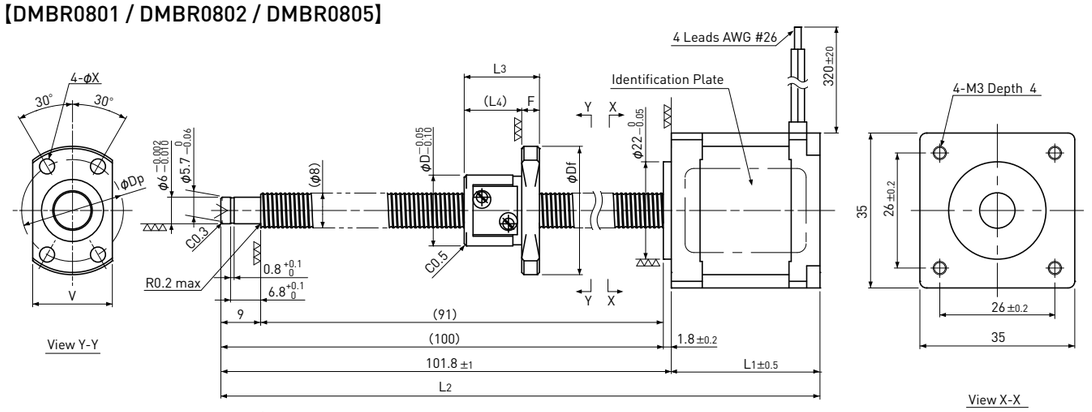
Standard style of DMB series — Dimensions & Specifications

Rolled Ball Screw + 2-phase Stepping Motor

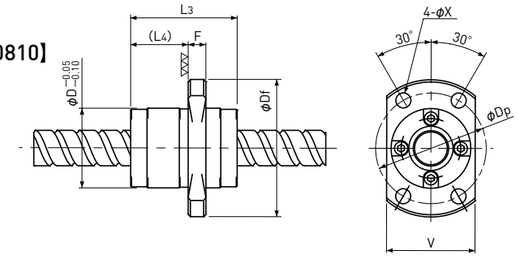
DMBR □35 / NEMA 14

Shaft dia. ϕ8

【DMBR0801 / DMBR0802 / DMBR0805】



【DMBR0810】



Motor Wire	
A	Red
$\overline{A}$	Red/White
B	Green
$\overline{B}$	Green/White

Unit:mm

Model	Lead	Travel	L_1	L_2	L_3	L_4	D	Df	F	V	Dp	X	Mass (g)
DMBR0801-14E2110	1	58	33.6	135.4	17	13	16	29	4	18	23	3.4	212
DMBR0802-14E2110	2	50	33.6	135.4	24	19	20	37	5	22	29	4.5	240
DMBR0805-14E2110	5	47	33.6	135.4	28	24	18	31	4	20	25	3.4	234
DMBR0810-14E2110	10	54	33.6	135.4	24	13	18	31	4	20	25	3.4	226
DMBR0801-14E2215	1	58	45.6	147.4	17	13	16	29	4	18	23	3.4	292
DMBR0802-14E2215	2	50	45.6	147.4	24	19	20	37	5	22	29	4.5	320
DMBR0805-14E2215	5	47	45.6	147.4	28	24	18	31	4	20	25	3.4	314
DMBR0810-14E2215	10	54	45.6	147.4	24	13	18	31	4	20	25	3.4	304

Recommended Drivers	SD4030B3

Note) Refer to page P161 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Note) Please contact KSS if different journal profile or length from the above is required.

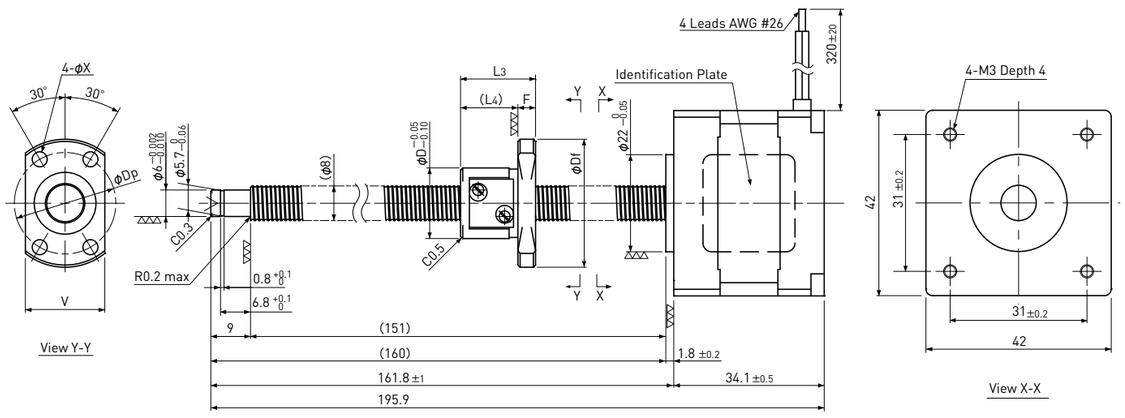
Motor Specifications		
Motor Model	14E2110	14E2215
Basic step angle	1.8°	
Driving method	2-phase Bi-polar	
Rated Voltage	DC 3.5 V	DC 4.0 V
Rated current	DC 1.0A/phase	DC 1.5A/phase
Winding resistance	3.5Ω	2.7Ω
Holding Torque	0.060Nm	0.10Nm
Rotor inertia	21.0g·cm²	32.0g·cm²
Operating temperature	−10℃~50℃	

Rolled Ball Screw + 2-phase Stepping Motor

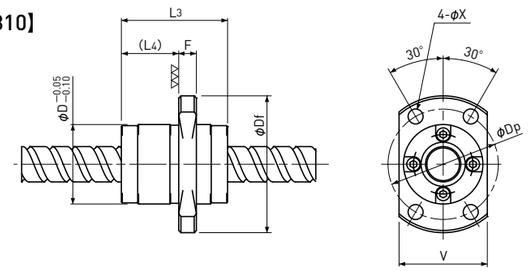
DMBR □42 / NEMA 17

Shaft dia.ϕ8

【DMBR0801 / DMBR0802 / DMBR0805】



【DMBR0810】



Unit:mm

Model	Lead	Travel	L_3	L_4	D	Df	F	V	Dp	X	Mass (g)
DMBR0801-17E2115	1	118	17	13	16	29	4	18	23	3.4	298
DMBR0802-17E2115	2	110	24	19	20	37	5	22	29	4.5	322
DMBR0805-17E2115	5	107	28	24	18	31	4	20	25	3.4	318
DMBR0810-17E2115	10	114	24	13	18	31	4	20	25	3.4	308

Motor Wire	
A	Red
$\overline{A}$	Red/White
B	Green
$\overline{B}$	Green/White

Recommended Drivers	SD4030B3

Note) Refer to page P161 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58
Lubricant	KSS original grease MSG No.2

Note) Please contact KSS if different journal profile or length from the above is required.

Motor Specifications	
Motor Model	17E2115
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.8 V
Rated current	DC 1.5A/phase
Winding resistance	1.85Ω
Holding Torque	0.18Nm
Rotor inertia	36.0g·cm²
Operating temperature	−10℃~50℃

2TMB Series
Rolled Ball Screw + 2 Phase Stepping Motor

●Features

- A 2-phase Stepping Motor is mounted directly onto the shaft end of a Ct7 grade Rolled Ball Screw, which means compact and multipurpose type product.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, and reducing labor cost can be achieved.
- Recommended Driver for 2-phase Stepping Motor is available.
- Flexible length can be provided by the end journal turning.
- Stable mounting is secured by the exclusive Support Unit.

●Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pulse (μm)	Reference Thrust (N)	Mass (g)
2TMB0801	φ8	1	150	5	75	350
2TMB0802	φ8	2	150	10	100	400
2TMB0805	φ8	5	150	25	50	400
2TMB0812	φ8	12	150	60	25	400

Repeatability(reference)	max. ±0.01mm
Lost Motion(reference)	max. 0.01mm

※The reference value about Repeatability and Lost Motion represents when the 2TMB built into KSS original Stage. Please make a contact to KSS for actual value.

Note1) Detail specifications & dimensions are shown in drawings from page P120.
Note2) Travel per pulse represents the value for full step.
Note3) Acceleration & Deceleration Rate should be 50ms/kHz or more.
Note4) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

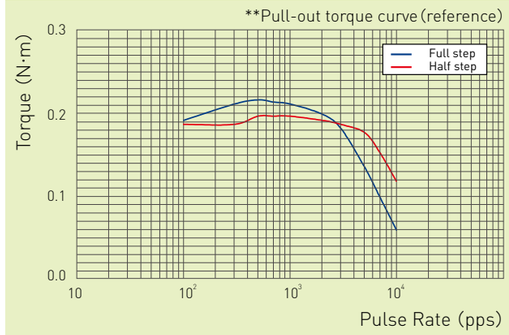
●Motor Specifications

Model	Motor size	Rated voltage (V)	Rated current (A/phase)	Winding resistance (Ω)	Holding torque (Nm)	Rotor Inertia ($g \cdot cm^2$)	Load limit in Vertical Position (N)
2TMB0801	NEMA 17 (□42)	DC 2.2	2.0	1.1	0.24	42	300
2TMB0802	NEMA 17 (□42)	DC 2.2	2.0	1.1	0.24	42	300
2TMB0805	NEMA 17 (□42)	DC 2.2	2.0	1.1	0.24	42	300
2TMB0812	NEMA 17 (□42)	DC 2.2	2.0	1.1	0.24	42	300

Driving method	2-phase Bi-polar
Basic step angle	1.8°

Note) Rotor Inertia includes Ball Screw Shaft.

●Motor Characteristic

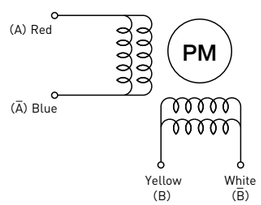


■Test condition

Driver : Maker Standard
Input Voltage : DC24V
Phase Currnt : 2.0A

Note) Motor characteristic will vary depending on Driver type, opearting conditions.

●結線図 / Schematic



Swiching sequence for CW rotation viewed from shaft end.

STEP	Red (A)	Yellow (B)	Blue (Ā)	White (B̄)
0	+	+	−	−
1	−	+	+	−
2	−	−	+	+
3	+	−	−	+
0	+	+	−	−

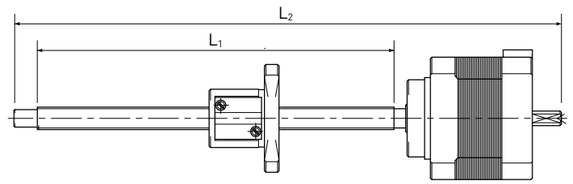
●Model number notation

Model number notation for customized 2TMB series is as follows.
In case of standard style, model number is described in catalogue in page P120.

2TMB 08 01 - 30 R 80 C7 - 30
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

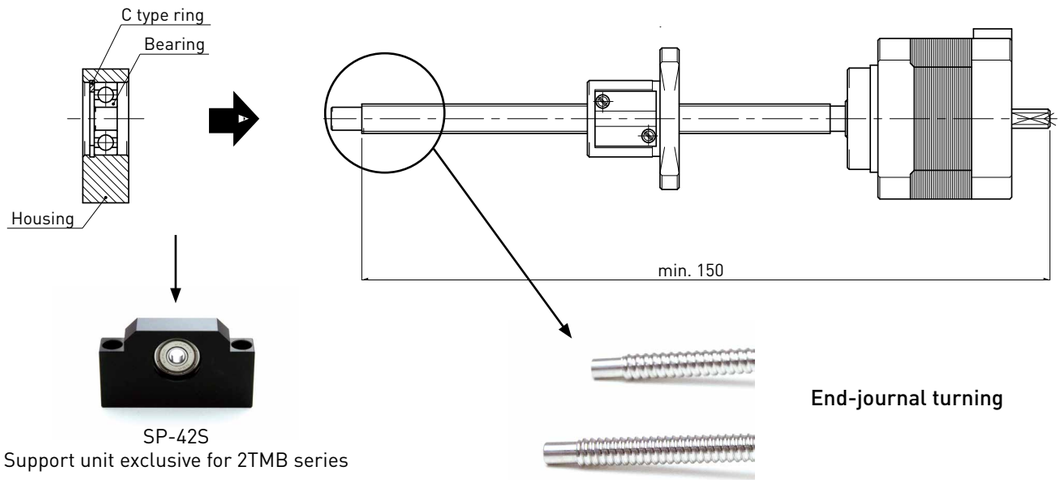
①Series No.
2TMB : Rolled Ball Screw+2-phase Stepping Motor
②Screw Shaft nominal diameter(mm)
③Lead(mm)
01 means 1mm
④Screw thread length(mm)
L_1 : See below
⑤Thread direction (R=Right-hand)
⑥Screw Shaft total length(mm)
L_2 : See below
⑦Accuracy grade
⑧Axial play(μm)

【④⑥Definition of Screw length】



●End-journal turning & Exclusive Support Unit

All of 2TMB series are in stock. In order to meet the request of flexible length, Shaft end journal turning is available. Please note that re-work is only for cutting and turning down(see photo below).
KSS does not process Ring groove machining on the end of Shaft. Exclusive Support Unit with Brg. & Retaining ring for hole is provided by KSS.



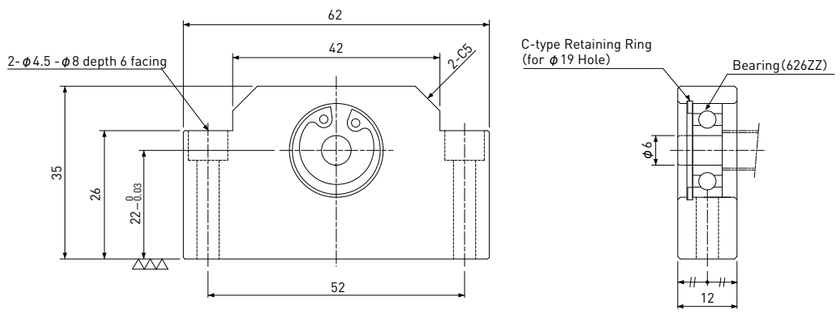
SP-42S
Support unit exclusive for 2TMB series

End-journal turning

Please note that minimum re-work length is 150mm (except re-work portion) as shown in figure above.
Total length shorter than 150mm (except re-work portion) should be used as cantilever.
If supported journal with ring groove or total length of less than 150mm is required, it will be available as a customized order.

Regarding the profile and dimension of KSS Exclusive Support Unit (SP-42S) for 2TMB series, please see below.
Special profile of Support Unit is required, please ask KSS representative.

【SP-42S】



Standard products in stock 2TMB series

Dimensions & Specifications

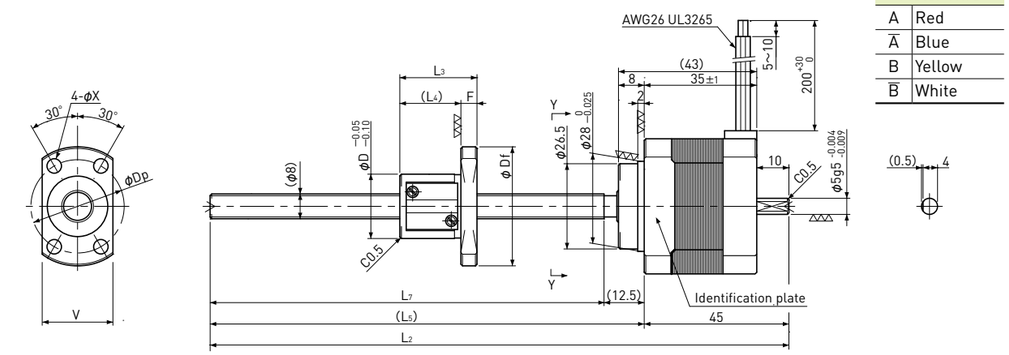
Rolled Ball Screw + 2-Phase Stepping Motor

2TMB □42 / NEMA 17

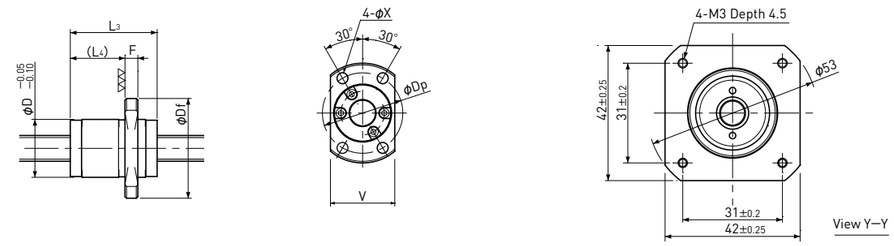
Shaft dia.φ8

【2TMB0801 / 2TMB0802 / 2TMB0805】

Motor Wire	
A	Red
Ā	Blue
B	Yellow
B̄	White



【2TMB0812】



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L2	L5	L7	D	Df	F	L3	L4	V	Dp	X	Mass (g)
2TMB0801	1	150	75	240	195	182.5	16	29	4	17	13	18	23	3.4	350
2TMB0802	2	150	100	250	205	192.5	20	37	5	24	19	22	29	4.5	400
2TMB0805	5	150	50	250	205	192.5	18	31	4	28	24	20	25	3.4	400
2TMB0812	12	150	25	250	205	192.5	18	31	4	27	17	20	25	3.4	400

Recommended Drivers	SD4030B3

Note) Refer to page P162 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	Equivalent to JIS Ct7
Thread direction	Right
Axial play	0.03mm or less
Shaft material	Stainless steel
Nut material	Chrome - molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.2

Note) Please refer to page P119 for about end-journal turning.

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.2 V
Rated current	DC 2.0 A/phase
Winding resistance	1.1 Ω
Holding Torque	0.24 Nm
Rotor inertia	42 g·cm²
Operating temperature	−20℃~50℃

TMB Series
Rolled Ball Screw + 5 Phase Stepping Motor

Features

- A 5-phase Stepping Motor is mounted directly onto the shaft end of a Ct7 grade Rolled Ball Screw, which is all-round performance drive unit.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, and reducing labor cost can be achieved.
- Recommended Driver for 5-phase Stepping Motor is available.

Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pules (μm)	Reference Thrust (N)	Mass (g)
TMB0401	ϕ4	1	30	2	50	100
TMB0504	ϕ5	4	75	8	25	180
TMB0601	ϕ6	1	75	2	100	180
TMB0602	ϕ6	2	75	4	50	180
TMB0606	ϕ6	6	75	12	15	180
TMB0801	ϕ8	1	150	2	300	320
TMB0802	ϕ8	2	150	4	150	320
TMB0805	ϕ8	5	150	10	120	450
TMB0812	ϕ8	12	150	24	50	450

Repeatability(reference)	max. ±0.01mm
Lost Motion(reference)	max. 0.01mm

※The reference value about Repeatability and Lost Motion represents when the TMB built into KSS original Stage. Please make a contact to KSS for actual value.

Note 1) Detail specifications & dimensions are shown in drawings from page P124.
Note 2) Travel per pulse represents the value for full step.
Note 3) Acceleration & Deceleration Rate should be 20ms/kHz or more.
Note 4) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

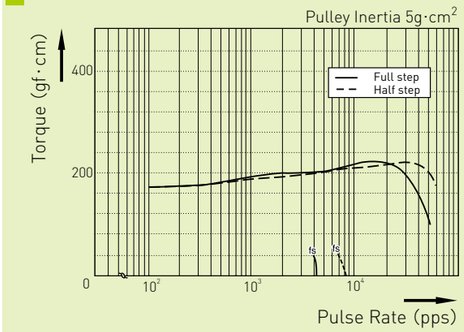
Motor Specifications

Model	Motor size (mm)	Rated voltage (V)	Rated current (A/phase)	Winding resistance (Ω)	Holding torque (Nm)	Rotor Inertia (g·cm²)	Load limit in Vertical Position (N)
TMB0401	NEMA 10 (□24)	DC 0.83	0.75	1.1	0.018	4.2	230
TMB0504	NEMA 10 (□24)	DC 1.28	0.75	1.7	0.028	8.3	230
TMB0601	NEMA 10 (□24)	DC 1.28	0.75	1.7	0.028	8.8	230
TMB0602	NEMA 10 (□24)	DC 1.28	0.75	1.7	0.028	8.7	230
TMB0606	NEMA 10 (□24)	DC 1.28	0.75	1.7	0.028	8.8	230
TMB0801	NEMA 17 (□42)	DC 1.28	0.75	1.7	0.128	40	300
TMB0802	NEMA 17 (□42)	DC 1.28	0.75	1.7	0.128	40	300
TMB0805	NEMA 17 (□42)	DC 1.65	0.75	2.2	0.236	74	300
TMB0812	NEMA 17 (□42)	DC 1.65	0.75	2.2	0.236	74	300

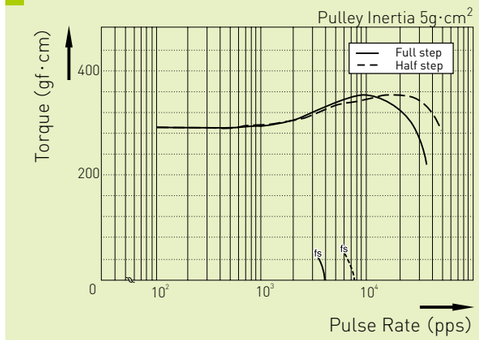
Note 1) Basic step angle is 0.72°
Note 2) Rotor Inertia includes Ball Screw Shaft.

Motor Characteristic

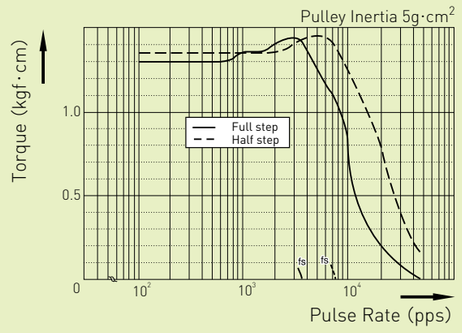
TMB0401



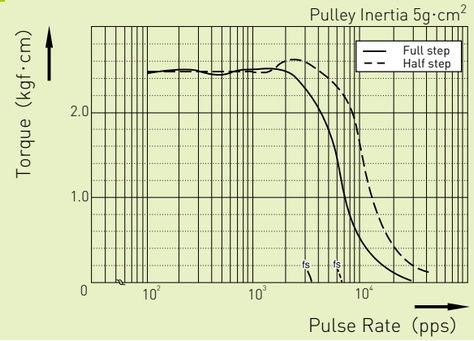
TMB0504 / TMB0601 / TMB0602 / TMB0606



TMB0801 / TMB0802



TMB0805 / TMB0812



Test condition

Driver: Maker Standard
Input Voltage : DC24V
Phase Currnt : 0.75A

Note) Motor characteristic will vary depending on Driver type, opearting conditions.

Actuator
Linear Actuator External type

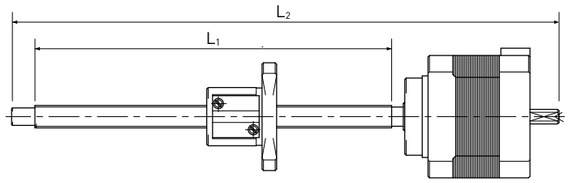
●Model number notation

Model number notation for customized TMB series is as follows.
In case of standard style, model number is described in catalogue from page P124 to page P128.

TMB	04	01	-	30	R	80	C7	-	20
①	②	③		④	⑤	⑥	⑦		⑧

①Series No.
TMB：Rolled Ball Screw+5-phase Stepping Motor
②Screw Shaft nominal diameter(mm)
③Lead(mm)
01 means 1mm
④Screw thread length(mm)
L_1：See below
⑤Thread direction（R=Right-hand)
⑥Screw Shaft total length(mm)
L_2：See below
⑦Accuracy grade
⑧Axial play(μm)

【④⑥Definition of Screw length】



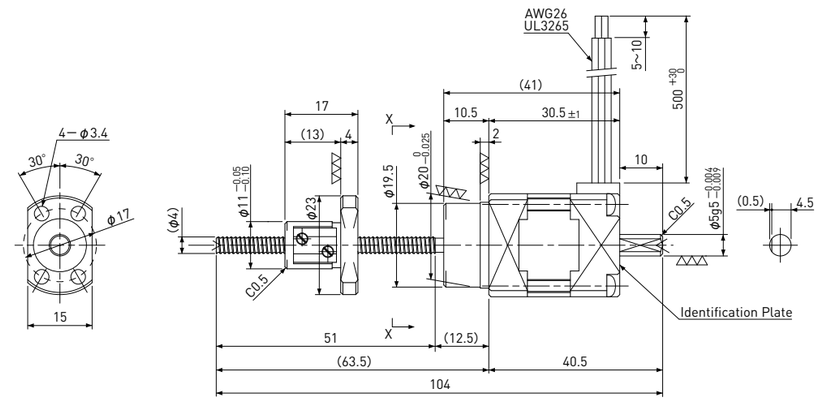
Standard products in stock TMB series

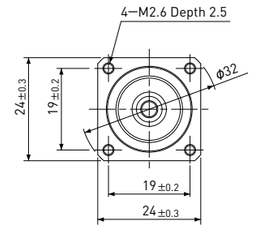
Dimensions & Specifications

Rolled Ball Screw + 5-Phase Stepping Motor

TMB □24 / NEMA 10

Shaft dia.φ4





View X—X

Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
TMB0401	1	30	50	100

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100～220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58～62 (Thread area)
Lubricant	KSS original grease MSG No.1

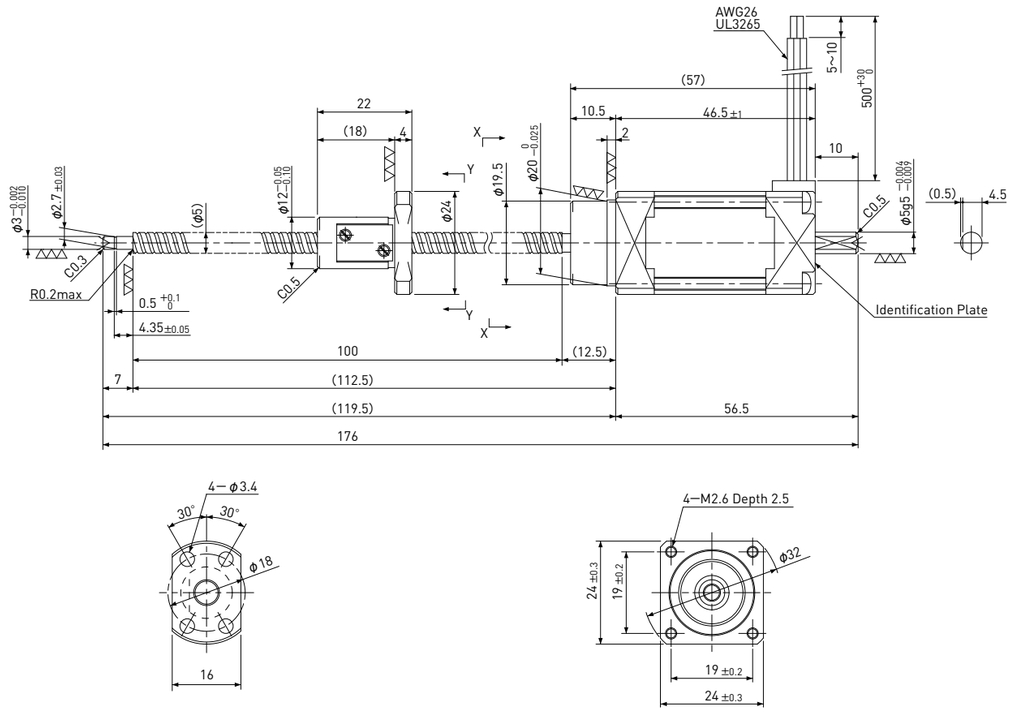
Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 0.83 V
Rated current	DC 0.75 A/phase
Winding resistance	1.1Ω
Holding Torque	0.018Nm
Rotor inertia	4.2g·cm²
Operating temperature	−20℃～50℃

Note) Only shaft end cutting is available.
Other than that, it would be customized order.

Rolled Ball Screw + 5-Phase Stepping Motor

TMB □24 / NEMA 10

Shaft dia.φ5



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
TMB0504	4	75	25	180

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58～62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.028Nm
Rotor inertia	8.3g·cm²
Operating temperature	−20℃～50℃

Note) Only shaft end cutting is available.
Other than that, it would be customized order.

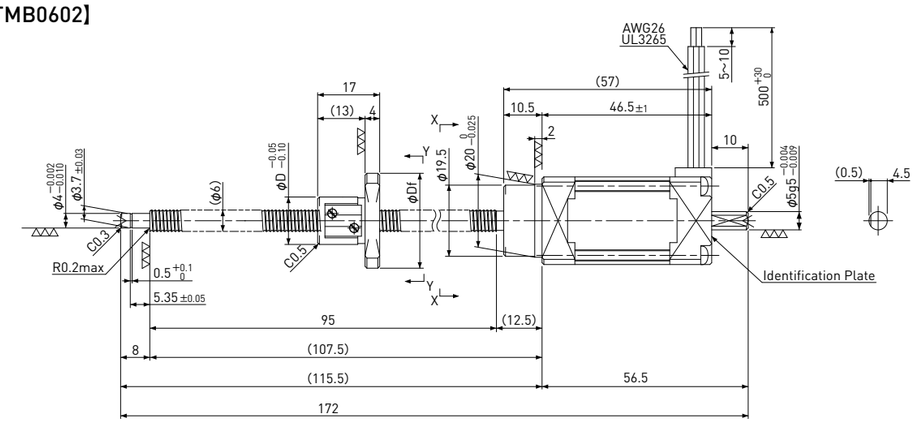
Standard products in stock TMB series Dimensions & Specifications

Rolled Ball Screw + 5-Phase Stepping Motor

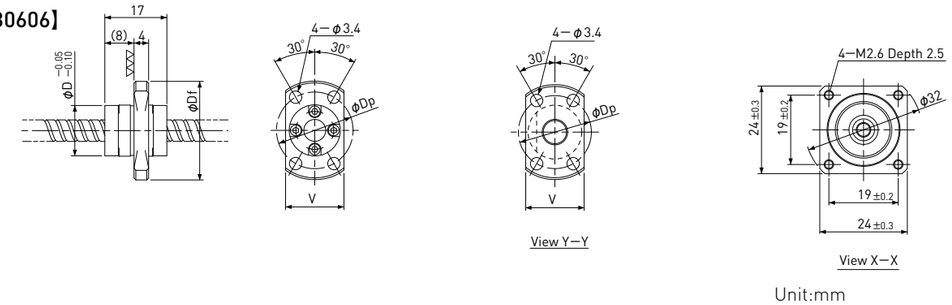
TMB □24 / NEMA 10

Shaft dia.φ6

【TMB0601 / TMB0602】



【TMB0606】



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	V	Dp	Mass (g)
TMB0601	1	75	100	13	26	16	20	180
TMB0602	2	75	50	15	28	19	22	180
TMB0606	6	75	15	14	27	16	21	180

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100～220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58～62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.028Nm
Rotor inertia	TMB0601、TMB0606：8.8g·cm² TMB0602：8.7g·cm²
Operating temperature	−20℃～50℃

Note) Only shaft end cutting is available.
Other than that, it would be customized order.

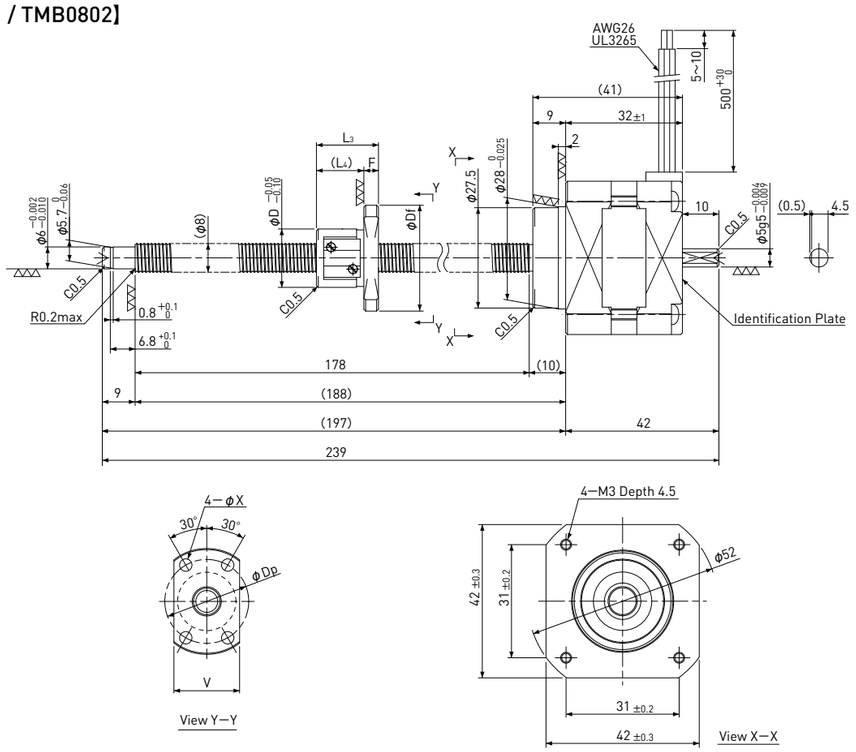
Actuator
Linear Actuator External type

Rolled Ball Screw + 5-Phase Stepping Motor

TMB □42 / NEMA 17

Shaft dia.ϕ8

【TMB0801 / TMB0802】



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	F	L_3	L_4	V	Dp	X	Mass (g)
TMB0801	1	150	300	16	29	4	17	13	18	23	3.4	320
TMB0802	2	150	150	20	37	5	24	19	22	29	4.5	320

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58~62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.128Nm
Rotor inertia	40g·cm²
Operating temperature	−20℃~50℃

Note) Only shaft end cutting is available.
Other than that, it would be customized order.

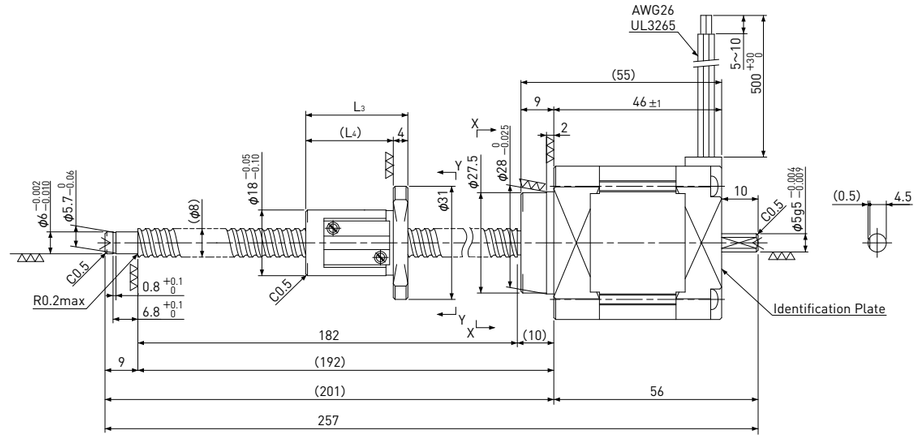
Standard products in stock TMB series
Dimensions & Specifications

Rolled Ball Screw + 5-Phase Stepping Motor

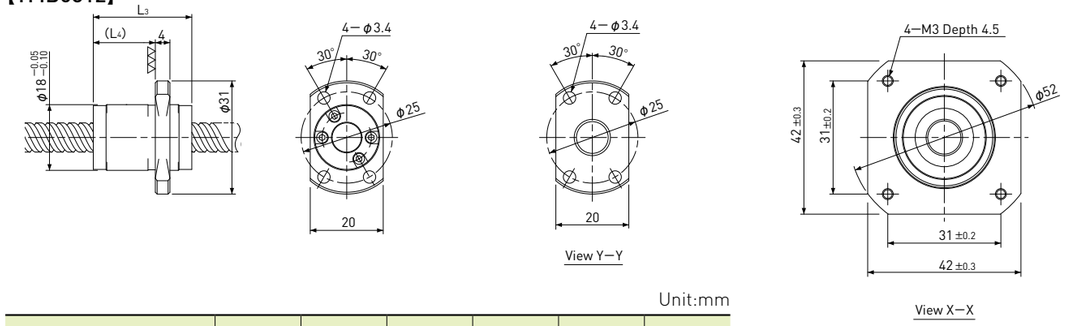
TMB □42 / NEMA 17

Shaft dia.ϕ8

【TMB0805】



【TMB0812】



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L_3	L_4	Mass (g)
TMB0805	5	150	120	28	24	450
TMB0812	12	150	50	27	17	450

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	0.020mm or less
Shaft & Nut material	Chrome-molybdenum steel
Surface Coating	Black Chrome coating on Shaft
Surface hardness	HRC58~62 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.65 V
Rated current	DC 0.75 A/phase
Winding resistance	2.0Ω
Holding Torque	0.236Nm
Rotor inertia	74g·cm²
Operating temperature	−20℃~50℃

Note) Only shaft end cutting is available.
Other than that, it would be customized order.

MB Series
Precision Ball Screw + 5 Phase Stepping Motor

MoBo

Features

- A 5-pahse Stepping Motor is mounted directly onto the shaft end of a C3 grade precision Ball Screw, which is suitable for high accurate positioning system.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, low lost-motion can be achieved.
- Recommended Driver for 5-phase Stepping Motor is available.

Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pules (μm)	Reference Thrust (N)	Mass (g)
MB04005A	φ4	0.5	20	1	10	84
MB0401A	φ4	1	30	2	20	84
MB0401	φ4	1	30	2	50	100
MB0601	φ6	1	75	2	100	170
MB0602	φ6	2	75	4	50	180
MB0801	φ8	1	150	2	300	310
MB0802	φ8	2	150	4	150	320

Repeatability(reference)	max. ±0.005mm
Lost Motion(reference)	max. 0.005mm

※The reference value about Repeatability and Lost Motion represents when the MB built into KSS original Stage. Please make a contact to KSS for actual value.

Note 1) Detail specifications & dimensions are shown in drawings from page P132.
Note 2) Travel per pulse represents the value for full step.
Note 3) Acceleration & Deceleration Rate should be 20ms/kHz or more.
Note 4) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

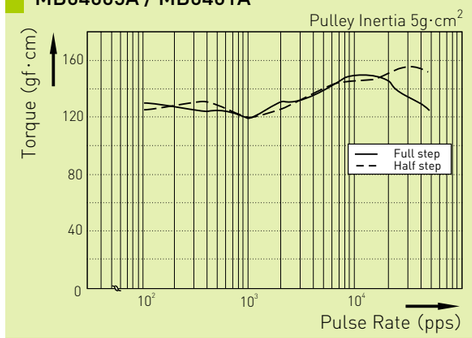
Motor Specifications

Model	Motor size	Rated voltage (V)	Rated current (A/phase)	Winding resistance (Ω)	Holding torque (Nm)	Rotor Inertia ($g \cdot cm^2$)	Load limit in Vertical Position (N)
MB04005A	NEMA 08 (□20)	DC 1.05	0.75	1.4	0.010	3.9	230
MB0401A	NEMA 08 (□20)	DC 1.05	0.75	1.4	0.010	3.9	230
MB0401	NEMA 10 (□24)	DC 0.83	0.75	1.1	0.018	4.2	230
MB0601	NEMA 10 (□24)	DC 1.28	0.75	1.7	0.028	8.9	230
MB0602	NEMA 10 (□24)	DC 1.28	0.75	1.7	0.028	8.9	230
MB0801	NEMA 17 (□42)	DC 1.28	0.75	1.7	0.128	41	300
MB0802	NEMA 17 (□42)	DC 1.28	0.75	1.7	0.128	41	300

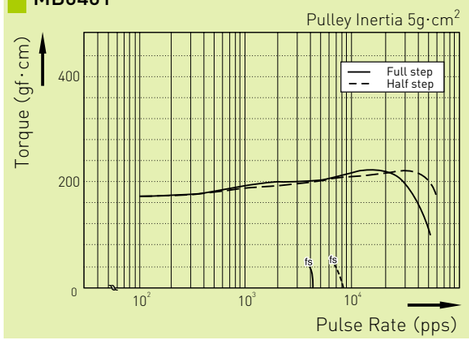
Note 1) Basic step angle is 0.72°
Note 2) Rotor Inertia includes Ball Screw Shaft.

Motor Characteristic

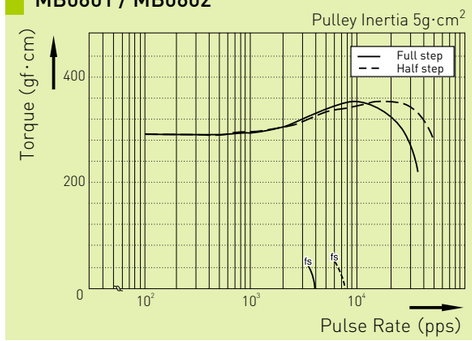
MB04005A / MB0401A



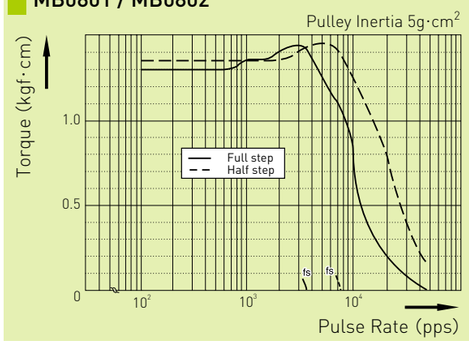
MB0401



MB0601 / MB0602



MB0801 / MB0802



Test Condition

Driver : Maker Standard
Input Voltage : DC24V
Phase Current : 0.75A

Note) Motor characteristic will vary depending on Driver type, opearting conditions.

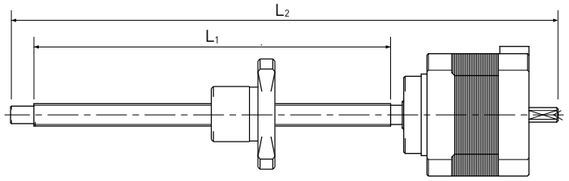
●Model number notation

Model number notation for customized MB series is as follows.
In case of standard style, model number is described in catalogue from page P132 to page P135.

MB 04 01 - 30 R 80 C3 - 0
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Series No.
MB：Precision Ball Screw+5-phase Stepping Motor
②Screw Shaft nominal diameter(mm)
③Lead(mm)
01 means 1mm
④Screw thread length(mm)
L_1：See below
⑤Thread direction（R=Right-hand）
⑥Screw Shaft total length(mm)
L_2：See below
⑦Accuracy grade
⑧Axial play(μm)

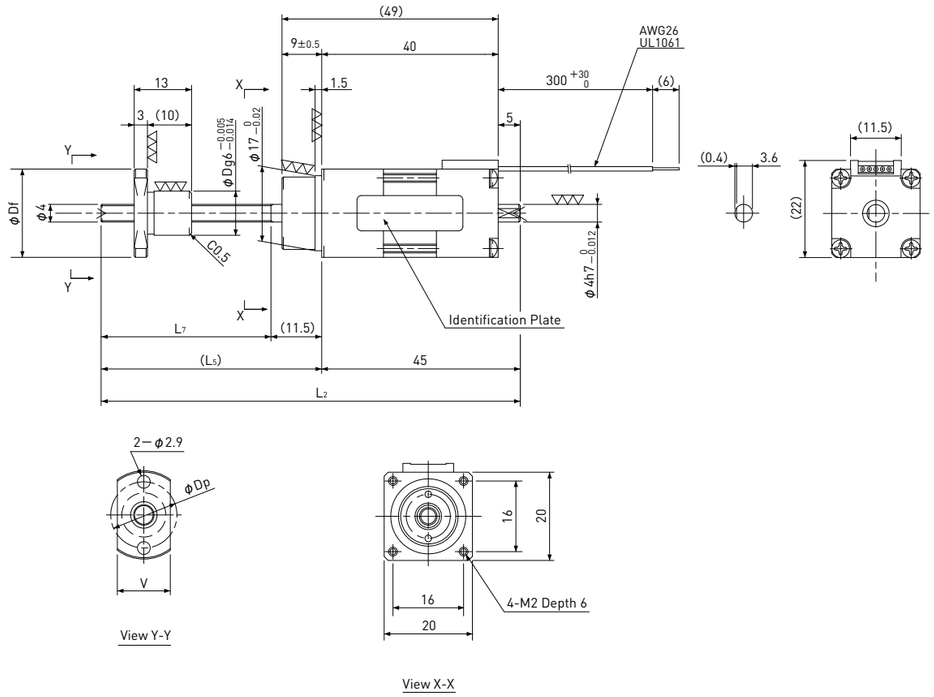
【④⑥Definition of Screw length】



Precision Ball Screw + 5-Phase Stepping Motor

MB □20 / NEMA 08

Shaft dia.φ4



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L_2	L_5	L_7	D	Df	V	Dp	Mass (g)
MB04005A	0.5	20	10	95	50	38.5	10	20	12	15	84
MB0401A	1	30	20	105	60	48.5	9	19	11	14	84

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	MB04005A:0.005mm or less MB0401A:0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

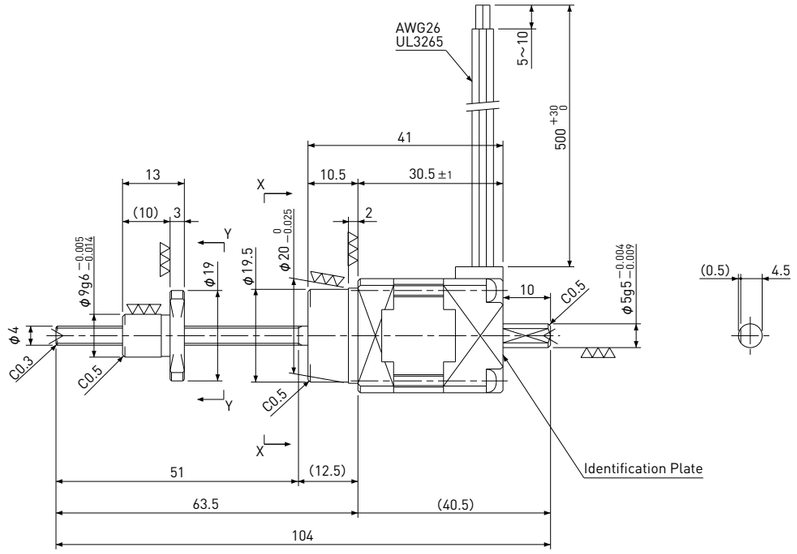
Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.05 V
Rated current	DC 0.75 A/phase
Winding resistance	1.4Ω
Holding Torque	0.010Nm
Rotor inertia	3.9g·cm²
Operating temperature	−20℃~50℃

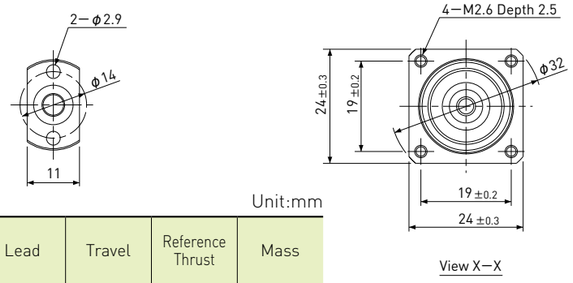
Note) Only shaft end cutting is available.
Other than that, it would be customized order.

Precision Ball Screw + 5-Phase Stepping Motor

MB □24 / NEMA 10

Shaft dia.ϕ4





Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
MB0401	1	30	50	100

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

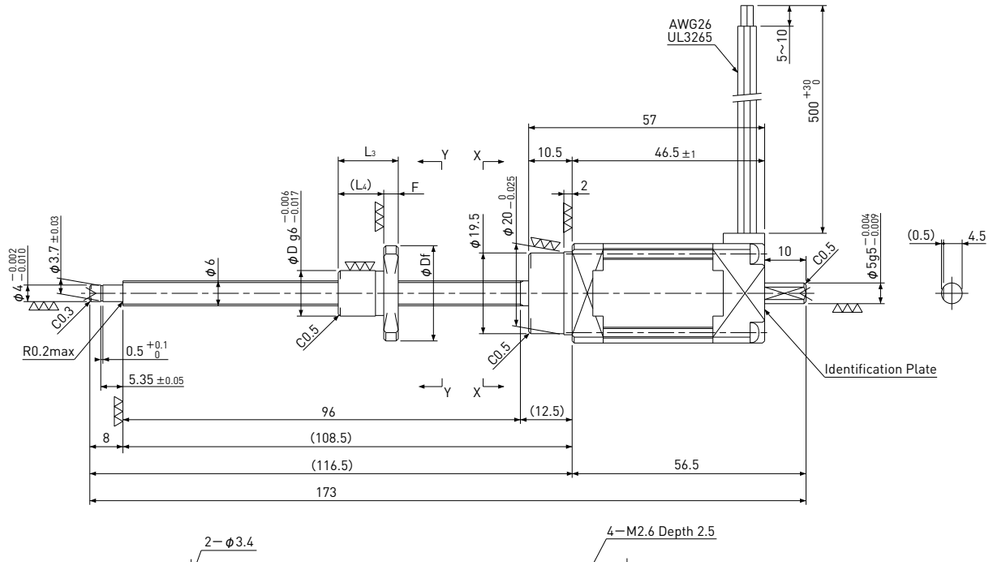
Motor Specifications	
Basic step angl	0.72°
Rated Voltage	DC 0.83 V
Rated current	DC 0.75 A/phase
Winding resistance	1.1Ω
Holding Torque	0.018Nm
Rotor inertia	4.2g·cm²
Operating temperature	−20℃~50℃

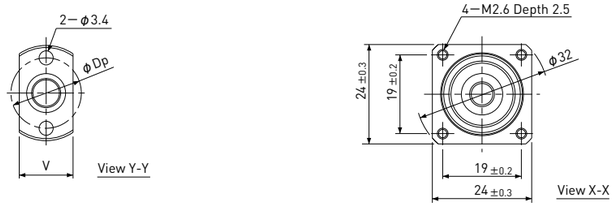
Note) Only shaft end cutting is available.
Other than that, it would be customized order.

Precision Ball Screw + 5-Phase Stepping Motor

MB □24 / NEMA 10

Shaft dia.ϕ6





Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	F	L_3	L_4	V	Dp	Mass (g)
MB0601	1	75	100	11	23	3.5	14.5	11	13	17	170
MB0602	2	75	50	15	28	4	17	13	17	22	180

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

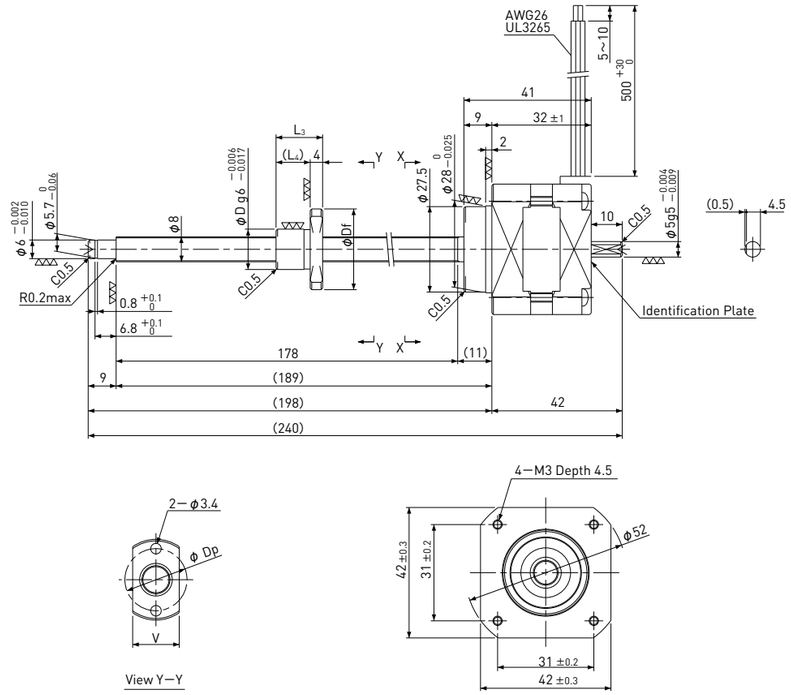
Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.028Nm
Rotor inertia	8.9g·cm²
Operating temperature	−20℃~50℃

Note) Only shaft end cutting is available.
Other than that, it would be customized order.

Precision Ball Screw + 5-Phase Stepping Motor

MB □42 / NEMA 17

Shaft dia.ϕ8



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	D	Df	L_3	L_4	V	Dp	Mass (g)
MB0801	1	150	300	13	26	15	11	15	20	310
MB0802	2	150	150	15	28	18	14	17	22	320

Recommended Drivers	KR-A5CC KR-A55MC(Micro step) KR-A535M(Micro step / AC-100~220V)

Note) Refer to page P162 or P163 for connection diagram of recommended Drivers.

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0mm
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

Motor Specifications	
Basic step angle	0.72°
Rated Voltage	DC 1.28 V
Rated current	DC 0.75 A/phase
Winding resistance	1.7Ω
Holding Torque	0.128Nm
Rotor inertia	41g·cm²
Operating temperature	−20℃~50℃

Note) Only shaft end cutting is available.
Other than that, it would be customized order.

MMB Series
Rolled Ball Screw + All in One Stepping Servo Motor

●Features

- Stepping Servo Motor is mounted directly onto the shaft end of a Ct7 grade Rolled Ball Screw, which is the best for space saving & high-speed, non-step-out operation.
- Enables to bind Rotary Encoder, Servo Driver and Controller within the Actuator body by simplified circuits due to high-speed operation processing of Servo and Controller using Digital Signal Processor(DSP).
- Enables to set parameters, servo control or control program through PC(RS-422/485 communication) by using exclusive software.
- The wiring is completed inside the Actuator, enabling significant saving in wiring.

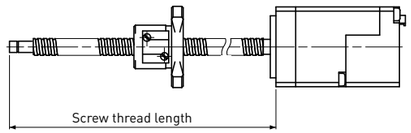
●Model number notation

Model number notation for customized MMB series is as follows.
In case of standard style, model number is described in catalogue in page P138.

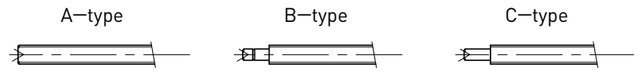
MMB R 06 02 - 94 B 1 - XXX
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Series No.
MMB : Moons type Linear Actuator
②Ball Screw type
R : Rolled Ball Screw
③Screw Shaft nominal diameter (mm)
06 means 6mm
④Lead (mm)
02 means 2mm
⑤Screw Shaft length (mm)
Screw length which is exposed from Motor (see below)
⑥End journal profile (see below)
A : Cut only
B : Journal with snap ring groove (standard)
C : Journal only
⑦Motor length symbol
1 : Short type
2 : Long type
⑧Extra notation

【⑤Screw thread length】



【⑥End journal profile】



●Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pulse (μm)	Reference Thrust (N)	Mass (g)
MMBR0602-94B1	φ6	2	62	0.1	65	162
MMBR0602-94B2	φ6	2	62	0.1	104	205

Repeatability(reference)	max. ±0.01mm
Lost Motion(reference)	max. 0.01mm

※The reference value about Repeatability and Lost Motion represents when the actuator built into KSS original Stage. Please make a contact to KSS for actual value.

Note1) Detail specifications & dimensions are shown in drawing from page P138.
Note2) Travel per pulse represents the value of default setting.
Note3) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

●Motor Specifications

Model	Motor size	Rated voltage (V)	Rated current (A/phase)	Winding resistance (Ω)	Holding torque (Nm)	Rotor Inertia ($g \cdot cm^2$)	Load limit in Vertical Position (N)
MMBR0602-94B1	NEMA 11 (□28)	DC2.6	1.0	2.6	0.05	9	150
MMBR0602-94B2	NEMA 11 (□28)	DC1.7	1.0	1.7	0.08	12	150

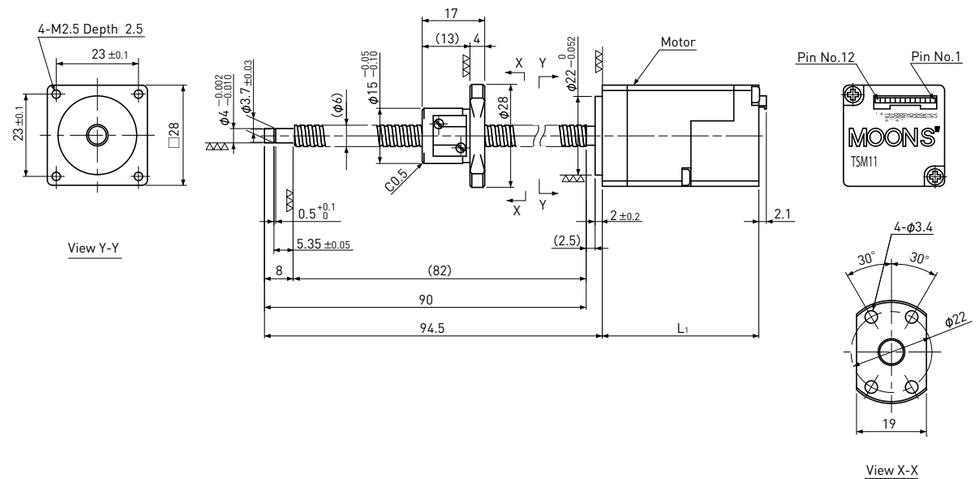
Standard style of MMB series

Dimensions & Specifications

Rolled Ball Screw + Stepping Servo Motor

MMB □28 / NEMA 11

Shaft dia.φ6



Note1) Please contact KSS if different journal profile or length from the above is required.
Note2) Recommended journal profile is type B(journal with snap ring groove). Please use Bearing to support the shaft end.

Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L1	Mass (g)
MMBR0602-94B1 (Short type)	2	62	65	44	162
MMBR0602-94B2 (Long type)	2	62	104	53	205

Ball Screw Specifications	
Accuracy grade	JIS Ct7
Thread direction	Right
Axial play	Max 0.03mm
Ball Screw material	Chrome-molybdenum steel
Surface hardness	Min. HRC58 (Thread area)
Lubricant	KSS original grease MSG No.2

Motor Specifications		
	Short type	Long type
Basic step angle	1.8°	1.8°
Driving method	2-phase Bi-polar	
Rated Voltage	DC 2.6 V	DC 1.7 V
Rated current	DC 1.0 A/phase	
Winding resistance	2.6Ω	1.7Ω
Holding Torque	0.05Nm	0.08Nm
Rotor inertia	9g·cm²	12g·cm²
Operating temperature	0℃～40℃	

Connector Pin Diagram

Pin No.	Name	Description
1	Y2	Open drain outputs with freewheeling diode (30VDC 100 mA in max.)
2	Y1	
3	X4	Digital inputs (input high voltage 5~24VDC, input low voltage below 1VDC, signal frequency 1MHz in max.)
4	X3	
5	X2	Digital inputs (input high voltage 5~24 VDC, input low voltage below 2VDC, signal frequency 1MHz in max.)
6	X1	
7	RX-	RS-422 / 488 interface differential signals
8	RX+	
9	TX-	
10	TX+	
11	+	V+ Power supply (typ. 24 VDC)
12	-	V- Power ground (GND)

Driver Specification

Power Amplifier	
Amplifier Type	Dual H-Bridge, 4 Quadrant
Current Control	4 state PMW at 20 KHz
Power Supply	External 24VDC power supply required, Current capacity 6.5A
Input Voltage Range	15-30 VDC min/max (nominal 24VDC)
Protection	Over-voltage, under-voltage, over-temperature, internal motor shorts (phase-to-phase, phase-to-ground)
Ambient Temperature	0℃~40℃(32~104℉) when mounted to a suitable heatsink
Humidity	90% non-condensing

Controller Specification

Controller	
Current Control	Advanced digital current control provides excellent high speed torque
Microstep Resolution	Software selectable from 200 to 51200 steps/rev. in increments of 2 steps/rev.
Speed Range	Max.60rps
Distance Range	Over 10,000,000 revolutions (at 200 step/rev.)
Noise Filtering	Programmable hardware digital noise filter. Software noise filter
Serial Commanding	Support Serial Command Language (SCL)
Encorder Feedback	4096 counts/rev. encorder feedback
Non-Volatile Storage	Configurations are saved in FLASH memory on-board the DSP
X1/Step	Input:5~24 vdc, single-ended signals, max. pulse frequency 1MHz Functions:Step, CW Step, A Quadrature, CW Limit, CW Jog, Run/Stop, general purpose input. ＊Adjustable bandwidth digital noise rejection filter ＊Connect with NPN type output ONLY
X2/Direction	Input:5~24 VDC, signal-ended signals, max. pulse frequency 1MHz Functions:Dir, CCW Step, B Quadrature, CCW Limit, CCW Jog, general purpose input. ＊Adjustable bandwidth digital noise rejection filter ＊Connect with NPN type output ONLY
X3/Enable	Inputs:5~24 VDC, single-ended signals, max. pulse frequency 1MHz Functions:Enable, general purpose input. ＊Connect with NPN type output ONLY
X4/Alarm Reset	Inputs:5~24 VDC, single-ended signals, max. pulse frequency 1MHz Functions:Alarm reset, Change speed, general purpose input. ＊Connect with NPN type output ONLY
Y1/FAULT	Open drain output:maximum current 100mA with maximum voltage of 30 VDC Functions: Fault detection, general purpose
Y2/BRAKE	Open drain output:maximum current 100mA with maximum voltage of 30 VDC Functions: Brake, In Position, Tach Output, general purpose
Communication Interface	RS - 422/485 Modbus/RTU available to use for TSM 11Q

SiMB Series
Precision Ball Screw + Stepping Servo Motor

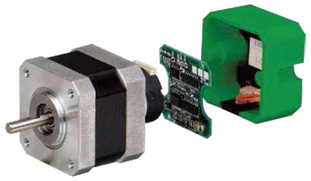
MoBo

Features

- A Stepping Servo Motor, what we call Si-servo Motor, is mounted directly onto the Shaft end of a Precision Ball Screw, which is high resolution and precise positioning unit.
- An Encoder and a Memory chip are installed at the end of Motor, high accurate positioning, ultra smooth drive, torque control drive, and closed loop function have been achieved.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, and reducing labor cost can be achieved.
- Exclusive Driver, and Cable are provided for Si-servo Motor.

Database compensation control

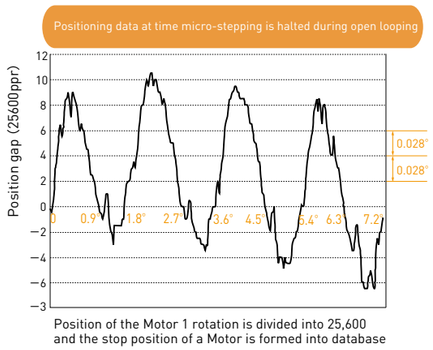
Control mechanism of the Si servo is not simply the micro-step control. Both an Encoder and a Memory chip are installed, and the Encoder position for 400pulse resolution per revolution as well as electrical current feedback are standard. Furthermore, data inherent to the Motor is recorded in the Memory at time of shipping from the factory so that high speed and high precision positioning to designated positions can be realized using a precise database revision control method of compensation and control when the Motor starts.



Sampling motor characteristics

Cogging Torque and Torque ripples originate from Motor processing and assembly precision, big factors that can hinder a low vibration, high accuracy positioning. The Si servo, by accurately measuring and storing individual Motor characteristics data inherit to the Motor, we can create a database of the optimal electrical current wave forms for the highest possible rotary precision.

Sampling of Motor's Positioning Characteristic



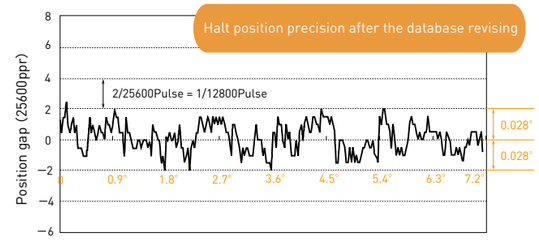
Position of the Motor 1 rotation is divided into 25,600 and the stop position of a Motor is formed into database

Storing data in memory

The data gained from sampling is stored in Memory within the Motor, which can be transferred to a Driver by using an Encoder cable at the time power is supplied. This makes it possible for the Driver and the Motor to work as an optimal combination.

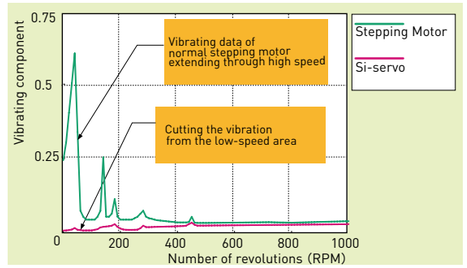
High precision positioning

This is not just a simple command analysis as with Micro-step controls. It raises the actual precision of halting to a proper 10000 pulse encoder.
Furthermore uniform pitch positioning to the pulse, which can not be achieved by Micro-step, has been realized.
(*As one condition, the output Torque of the Motor needs to sufficiently exceed load resistance.)



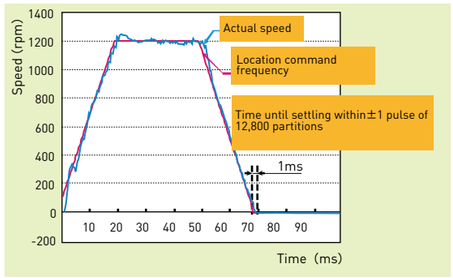
Low vibrations

Vibrating elements in the Motor have been largely removed thanks to the optimal high-speed revision current commands while the Motor is in operation. Also unlike a standard Servo Motor, there is no searching between Encoder counts when the Motor stops.



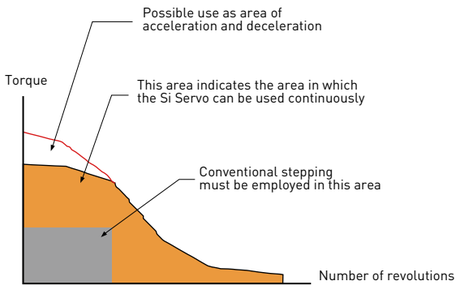
Settling time

The Si Servo makes the most of the stepping motor's advantsges including its ability to closely follow the command pulse train
The amount of time until setting within ±1 pulse of 12,800 partitions is only 1ms. Providing superior performance in high response systems.



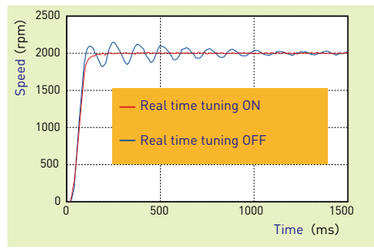
Surplus Torque

Because the Si Servo is never step out, it is possible to operate continuously at 100% capacity. There is no need to consider the Torque margin as with the Stepping Motor.

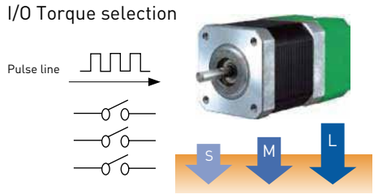


Real-time auto-tuning

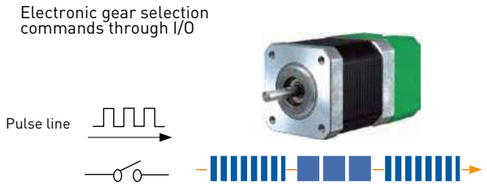
Even machinery that could not operate smoothly with conventional tuning methods will automatically imitate Inertia and Rigidity, always able to realize the optimal responsive and stable tuning.



Torque controls through stepping
Five steps of Torque control are performed during position control. Optional Torque value settings are possible during the point table operations. A high degree of freedom in control is possible thanks to being able to switch back and forth between position control and torque control. Even during Torque control, differential controls are still being performed internally, so positions will not deviate.



External electronic gear transfer
Using external I/O signals and/or communication commands, switching the electronicgear setting in two steps possible. Even controller that cannot output except on command pulses with low frequencies can be highly functional in a wide range from low speed to high speed operations.
*Switching can be performed while the motor is halted.



⚠ Depends on the condition, this product will not be suitable for your specifications.
Please always consult with KSS regarding your requirement.

●Specifications

Model	Shaft Nominal Dia. (mm)	Lead (mm)	Travel (mm)	Travel per pules (μm)	Reference Thrust (N)	Mass (g)
SiMB0401	φ4	1	30	1/25,600	30	114
SiMB0801	φ8	1	100	1/25,600	300	130
SiMB0802	φ8	2	160	2/25,600	150	165
SiMB0805	φ8	5	150	5/25,600	80	200

Repeatability(reference)	max. ±0.001mm
Lost Motion(reference)	max. 0.001mm

※The reference value about Repeatability and Lost Motion represents when the MoBo built into KSS original Stage. Please make a contact to KSS for actual value.

Note1) Detail specifications & dimensions are shown in drawings from page P149.
Note2) Acceleration & Deceleration Rate should be recommended by 0.5ms/kHz or more(Abiliby as a Motor itself) .
Note3) Reference Thrust may vary depending on the operating condition, please ask KSS for more detail.

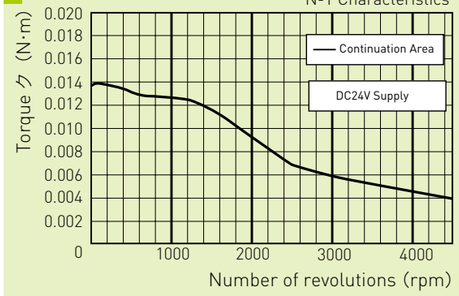
●Motor Specifications

Model		TS3692N61S02(SiMB0401)	TS3617N370S04 (SiMB08xx)
Maximum output torque	N・m	0.017	0.24
Maximum rotating speed	rpm	4500	4500
Rated current	A0-p	0.35	2.0
Rated voltage	V	3.0	2.2
Coil resistance	Ω	8.5±15%	1.1±15%
Rotor inductance	mH	3.4±20%	1.4±20%
Rotor inertia	10^{-7}kg・m^2	1.9	35
Shaft run out	mm T.I.R	0.05	0.05
Load limit in Vertical Position	N	230	300
Thrust play	mm max.	0.01	0.01
Coil Method	—	2-phase hybird stepping motor Bipolar coil	
Insulation class	—	CLASS B	
Insulation resistance	MΩ min.	100 (at DC500V)	
Dielectric strength	V	500 (at AC 1MIN)	
Operating temperature range	℃	−20～+50	
Operating humidity range	%RH	5～95	
Storage temperature range	℃	−40～+70	

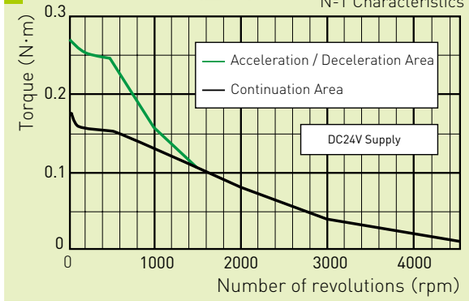
Note) Rotor Inertia includes Ball Screw Shaft.

●Torque Characteristics

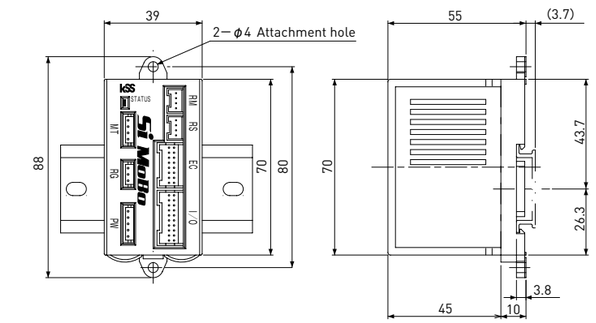
TS3692N61S02(□20) N-T Characteristics



TS3617N370S04(□42) N-T Characteristics



●Driver Outer Dimensions



●ドライバ仕様 / Driver Specifications

Model			Si-02LDE(SiMB0401)	Si-02DE(SiMB08xx)
Applicable Motor Model			TS3692N61S02	TS3617N370S04
Rated Output Current(A0-p)			0.35	2.0
Maximum Output Current(A0-p)			1.0	4.5
Controlling Method			Transistor PWM（Sine Wave Drive）	
Feedback			Incremental Encoder 200 ppr	Increnebtal Encoder 400ppr
Power supply	Voltage (V)	Power supply	DC24V±10% or DC36V±10%	
		Control power supply	DC24V±10%	
	Power Supply Current(A)		2	
Position Command Method			Communication and Control Input through 3 Mode Pules Lines and RS485	
Conditions for Use	Temperature for Use		0～+50℃	
	Storage Temperature		−20～+85℃	
	Humidity for Use or Storage		Under 90%RH(no condensation)	
	Resistance Vibrations		0.5G	
	Impact Resistance		2G	
Standard Functions	Dynamic Braking		None	
	Regenerative Function		Able to connect to external regeneration processing circuit	
	Over Travle Prevention		Hard OT, Soft OT(Select ON or OFF parameters)	
	Internal Speed Setting		Point Table Transfer Speed, Jog Speed, Reset Speed	
	Display		1- LED(Alarm Display, Servo ON Conditions)	
Input / Output	Input	Control Input	5 points(Select function parameters)	
		Command Pulse Input	CW / CCW、PULSE / SIGN、A / B Phase Input(Select parameters) Maximum response waves : 750kpps	
	Output	Control output	3 points(Select parameters), Brake Release Signal	
Protection Functions			EEPROM abnormalities, Encoder abnormalities, System abnormalities, Over Currents, Driver overheating, Excessive location deviation, Motor current abnormalities, Control Current abnormalities	
Zero Return Mode			Zero LS Signal input or using mechanical stopper(Set parameters of 7 methods)	
Multi-axis			Multi-drops of up to 15 axis with RS485	
Settigs			Parameters are set through use of a computer(RS485 converter required)	
Standard, Environmental, and Protection Grades			UL conformance / CE(self-declaration) / Corresponds to RoHS / IP40	

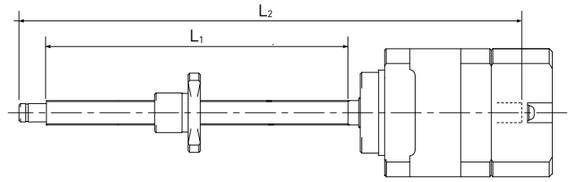
●Model number notation

Model number notation for customized SiMB series is as follows.
In case of standard style, model number is described in catalogue from page P149 to page P150.

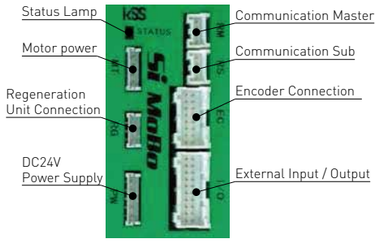
SiMB 08 01 - 50 R 100 C3 - 0
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

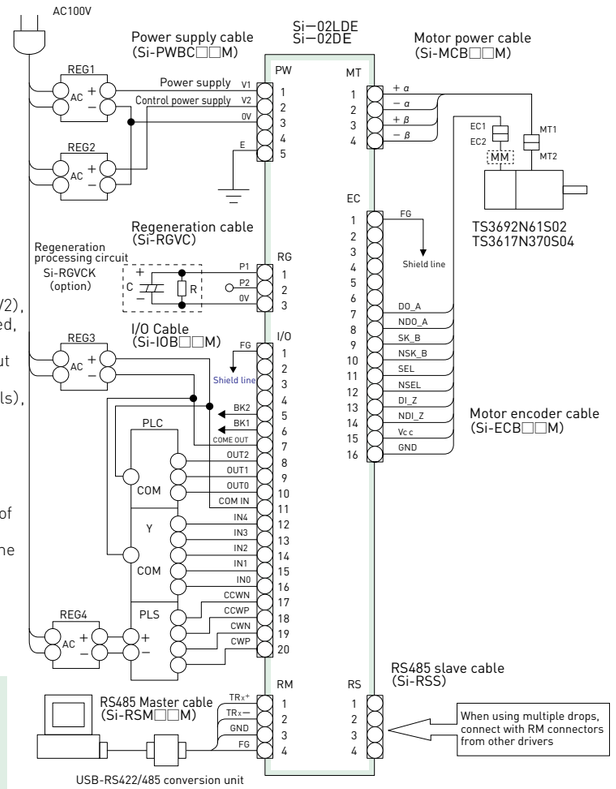
①Series No.
SiMB：Precision Ball Screw+Stepping Servo Motor
②Screw Shaft nominal diameter(mm)
③Lead(mm)
01 means 1mm
④Screw thread length(mm)
L_1：See below
⑤Thread direction（R=Right-hand)
⑥Screw Shaft total length(mm)
L_2：See below
⑦Accuracy grade
⑧Axial play(μm)

【④⑥Definition of Screw length】



●Connections





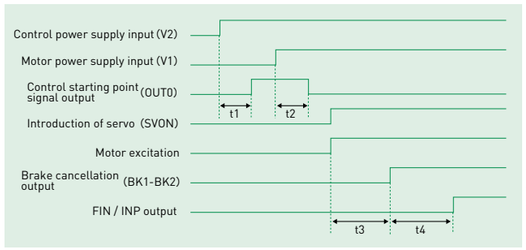
*REG1 uses either DC24V or DC36V for stabilizing power supply to the main circuit power supply. When DC24V is used, REG2 may be shared.
*REG2 uses DC24V for stabilizing power supply to the control circuit.
*REG3 uses DC24V for stabilizing power supply to I/O.
*REG4 uses DC5V(or higher) for stabilizing power supply when the command pulse line outputs an open collector.
*BK1 and 2 have no voltage relay connector output.
*MM refers to motor memory unit, and is packaged only in cables TS3692N61S02 and TS3617N370S04.

■Timing the introduction of activation power supply

If using separate power supplies from activation(V1) and control (V2), introduce the control power supply first. When the control is supplied, the OUT0 signal is turned on as a signal that control has begun. Introduce the activation power supply only after confiming the output from this signal. If using the same power supply for activation and control (connecting the power supply to parallel V1 and V2 terminals), you can introduce them at the same time.

■Initialization action when introducing power supply

Give the command to turn on the servo timed with the introduction of the activation power supply and the OUT0 signal.*3 When the positioning of the motor excitation starting point (every 7.2° from the machine angle) is complate, the FIN/INP signal will be output and initialization actions are complete.*2All pulse line and other commands input before these initialization actions will be ignored. Furthermore, be sure to use non-voltage relay connection output BK1-BK2 on this device, where the brake cancellation signal measures timing with the motor excitation activation.



■Power Supply Introduction Timing

(These value do not take into consideration times for starting control and activation power supplies)

Symbol	Meaning	Time	Unit
t1	Introduce control power supply, after t1 OUT0 signal is output.	1000	ms
t2	Introduce control power supply, after t2 conditions are set for motor excitation*3	50	
t3	After the command to turn on servo, motor excitation begins and positioning of the motor excitation starting point(every 7.2° from the machine angle) is perfomed.*1 The brake cancellation signal is output at the same time.	500	
t4	After the brake cancellation signal is output and t4, the FIN/INP signal is output and initialization actions are complete *2	Value of Parameter 53	

*1) If the motor rotor cannot accurately position the excitation starting point when the FIN/INP signal is output because it is on the edge of the machine or because the machine has a strong resistance to friction, this is a possibillity that vibrations may occur or that the prescribed torque cannot be output. In this case, either set parameter 53, "Time to Hold Excitation at start Time," to an appropriately large value, or set parameter 56, "Machine Edge Detection Sequence," to "1".
*2) If parameter 58, "Machine Edge Detection Sequence", is set to "1", after t4 is completed, machine edge detection activities will begin and the FIN/INP signal will be output upon completion.
*3) If the automatic servo on function is in effect, motor excitation will begin at the same time the control start signal(OUT0)output goes off.

Control Input Selection Table

Selection Function	Code	Contents	Selection Function	Code	Contents
SVON	01	Servo ON	SBK	18	Single block
PJOG	02	CW JOG	EXIN	1C	Input branching
NJOG	03	CCW JOG	EMCE	20	Emergency stop (control movement)
ARST	04	Reset alarm	EMCF	21	Emergen stop (servo-free)
STR	05	Start	EXIN2	23	Input branching 2
ZSTR	06	Zero start	EXIN3	24	Input branching 3
DEC	07	Deceleration	STRP	25	Start (One-shot Input)
HOLD	08	Hold	ZSTRP	26	Zero start (one-shot Input)
P0_IN	09	Point number input	ERST	27	Clear deviation
P1_IN	0A		MFIN	28	M Completion
P2_IN	0B		SENS	29	Sensor positioning
P3_IN	30		STP	2A	Stop
P4_IN	31		RSEL	38	Select resolution function
P5_IN	32		TSEL0	39	Torque selection input
P6_IN	33		TSEL1	3A	
P7_IN	34		TSEL2	3B	
TDIN	0C	Teaching	TSEL3	3C	
POT	12	CW OT	TSEL4	3D	
NOT	13	CCW OT	VDIR	2E	Input selection for revolution direction

Parameters 60 and 61 refer to the above codes.

Parameter 60	IN3	IN2	IN1	IN0
Parameter 61				IN4

Control Output Selection Table

Selection Function	Code	Contents	Selection Function	Code	Contents
RDY	01	Servo ready	P0_OUT	04	Current point output
INP	02	In position	P1_OUT	05	
ALM	03	Alarm	P2_OUT	06	
PRG	11	Program in operation	P3_OUT	20	
FIN	12	Completed	P4_OUT	21	
VCMP	1A	Velocity agreement	P5_OUT	22	
VZR	1B	Zero velocity	P6_OUT	23	
TFIN	1C	Torque completed	P7_OUT	24	
FIN+TFIN	1D	Completed and torque completed	P0_FIN	14	Point completion output
M0	30	M output	P1_FIN	15	
M1	31		P2_FIN	16	
M2	32		P3_FIN	28	
TLMT	38	Torque limit	P4_FIN	29	
SLMT	39	Speed limit	P5_FIN	2A	
POTOUT	3A	Positive drive prohibited	P6_FIN	2B	
NOTOUT	3B	Negative drive prohibited	P7_FIN	2C	
ZFIN	3C	Zero complete	ZPLS	3E	Z phase signal output
ZERO	3D	Zero position output	—	—	—

Parameters 63 refer to the above codes.

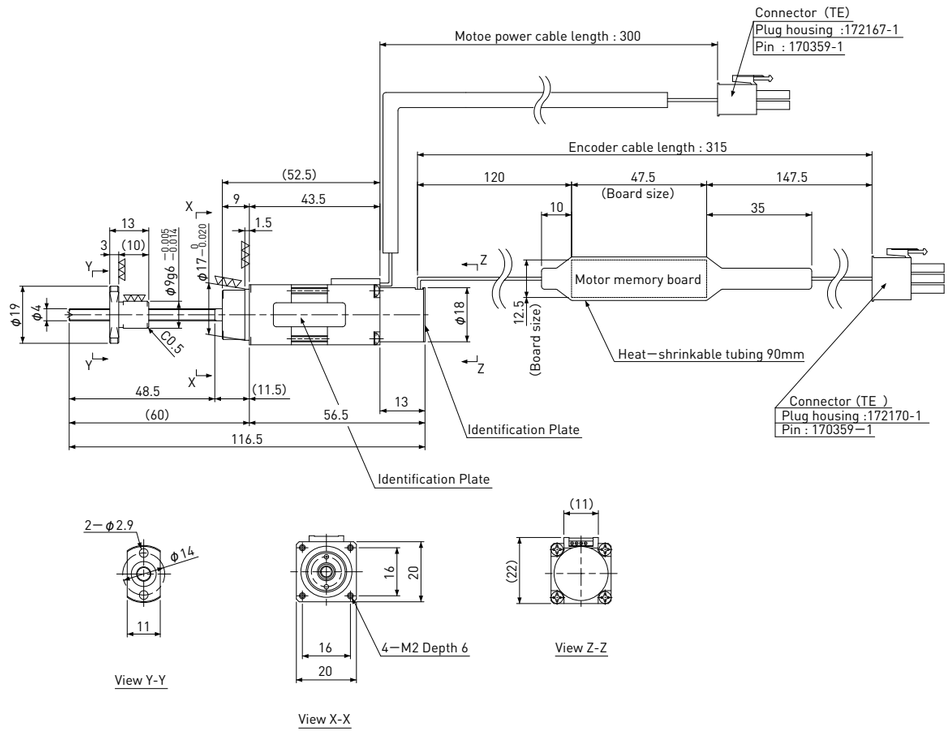
Parameter 63		OUT2	OUT1	OUT0

*Parameter number 60, 61, and 63 are 32-bit hexadecimal data, and are divided into 8 bits each, set through the input and output functions. When functions are set, the corresponding terminals are assigned to the set functions.
*When multiple input terminals are assigned to the same function,the one with input perfoms that function.
*When multiple output terminals are assigned to the same function,the output from that function will be perfomed at all assigend terminals.

Precision Ball Screw + Stepping Servo Motor

SiMB □20 / NEMA 08

Shaft dia.ϕ4



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	Mass (g)
SiMB0401	1	30	30	114

Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	KSS original grease MSG No.1

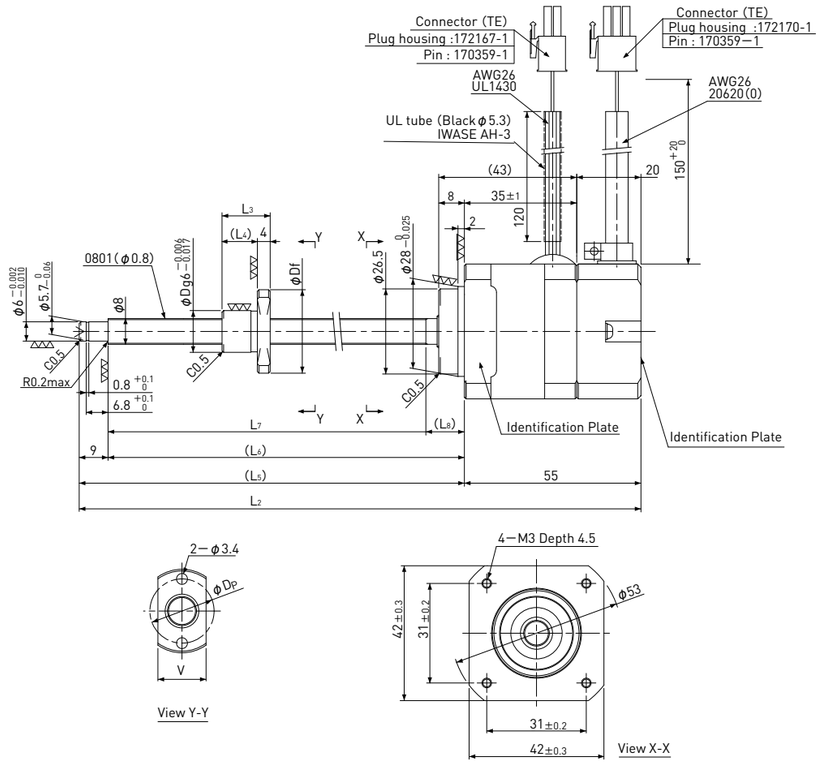
Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 3.0 V
Rated current	DC 0.35 A/phase
Winding resistance	8.5Ω
Holding Torque	0.017Nm
Rotor inertia	1.9g·cm²
Operating temperature	−20℃～50℃
Encoder	Incremental 200ppr

Note1) Exclusive Driver(Si-02LDE)is required this type.
Note2) Only shaft end cutting is available. Other than that, it would be customized order.

Precision Ball Screw + Stepping Servo Motor

SiMB □42 / NEMA 17

Shaft dia.ϕ8



Unit:mm

Model	Lead	Travel	Reference Thrust (N)	L_2	L_5	L_6	L_7	L_8	D	Df	L_3	L_4	V	Dp	Mass (g)
SiMB0801	1	100	300	215	160	151	139	12	13	26	15	11	15	20	130
SiMB0802	2	160	150	265	210	201	189	12	15	28	18	14	17	22	165
SiMB0805	5	150	80	265	210	201	188	13	18	31	28	24	20	25	200

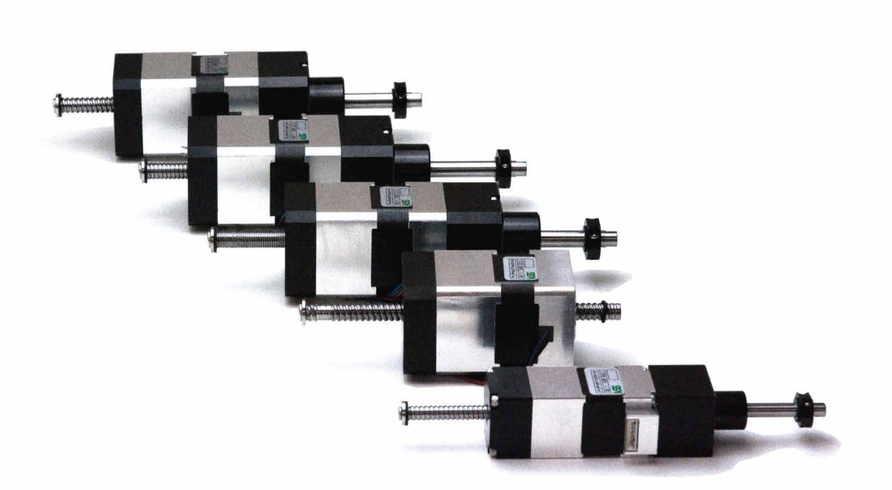
Ball Screw Specifications	
Accuracy grade	JIS C3
Thread direction	Right
Axial play	0
Shaft material	Stainless steel
Nut material	Chrome-molybdenum steel
Surface hardness	Min. HRC55 (Thread area)
Lubricant	Multemp PS-2

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.2 V
Rated current	DC 2.0 A/phase
Winding resistance	1.1Ω
Holding Torque	0.24Nm
Rotor inertia	35g·cm²
Operating temperature	−20℃～50℃
Encoder	Incremental 400ppr

Note1) Exclusive Driver(Si-02DE)is required this type.
Note2) Only shaft end cutting is available. Other than that, it would be customized order.

Linear Actuator Captive, Non-Captive Type

Compact type Electric Cylinder with 2-phase Hollow Stepping Motor integrated with Ball Screw or Ball Screw with Ball Spline（BSSP）.



●Features

- The new Cylinder type Actuator comes with 2 Motor sizes, NEMA 11 & NEMA 17. Captive type with anti-rotating device or Non-Captive type without anti-rotating device can be selected in each Motor size as standard.
- Variety of Drive Screw, Shaft diameter & Lead combination allows wider selection of Accuracy and Thrust Force.

●Types

Captive Type

KSS miniature Ball Screw with Ball Spline(BSSP) is used for an anti-rotating device.

Non-Captive Type

Simple combination of the Hollow Motor and the Ball Screw contributes to lightweight and compact body.

●Variation

Unit : mm

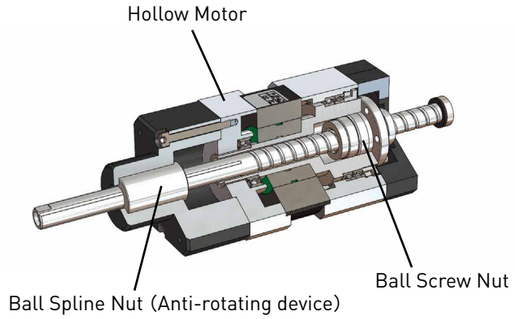
	Drive Screw	Notation	NEMA 11 (□28)		NEMA 17 (□42)	
			Lead	Travel	Lead	Travel
Captive type	Precision Ball Screw	G	1,2	40	2,5	50
Non-Captive type	Precision Ball Screw	G	1,2	40,80	2,5	50,100
	Rolled Ball Screw	R	1,2	40,80	2,5	50,100

Note) If the Lead other than the above is required, please ask KSS representative.

Utility model resisterd

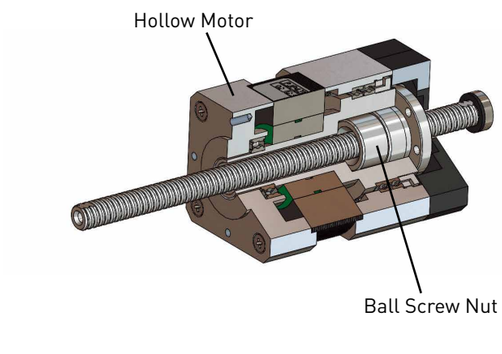
●Internal Structure

Captive type



Ball Spline Nut in BSSP plays a role of anti-rotating device. No need to set up anti-rotating design outside the Actuator.
Our unique BSSP enable a compact and slim body by using Ball Spline Nut as an anti-rotating device.

Non-Captive type



Simple design of Screw Shaft in Hollow Motor.
External anti-rotating device should be set up when usage.

●Model number notation

DDA AR 42 - G 05 050 N XXX

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Series No.
DDA : Direct Drive Actuator Series
②Clynder type
AR : Captive type
CL : Non-Captive type
③Motor size
42 : NEMA 17 Stepping Motor
28 : NEMA 11 Stepping Motor
④Lead Screw / Ball Screw type
G : Precision Ball Screw
R : Rolled Ball Screw
⑤Lead / Pitch（mm）: 05 means 5mm
⑥Travel（mm）: 050 means 50mm
⑦Connector type
N : No connector（Bare）
E : EI connector（TE Connectivity）
⑧Extra notation

Actuator
Linear Actuator Captive, Non-Captive type

●Specifications

【Captive type】

Model	DDAAR28-G01 040	DDAAR28-G02 040	DDAAR42-G02 050	DDAAR42-G05 050
Motor size	NEMA 11 □28		NEMA 17 □42	
Travel	40mm		50mm	
Drive Screw	Precision Ball Screw with Ball Spline			
Screw lead	1mm	2mm	2mm	5mm
Resolution	0.005mm	0.01mm	0.01mm	0.025mm
Repeatability	±0.005mm			
Lost motion	0.010mm			
Thrust force	50N	25N	80N	30N
Permissible speed	20mm/sec	40mm/sec	40mm/sec	100mm/sec
Acceleration & Deceleration time	Min. 0.2 sec			
Operating Temperature	0~40℃ (No Condensation)			
Lubrication	KSS original Grease MSG No.2			
Mass	270g		660g	

【Non-Captive type】

Model	DDACL28-G01 040 / 080	DDACL28-G02 040 / 080	DDACL28-R01 040 / 080	DDACL28-R02 040 / 080	DDACL42-G02 050 / 100	DDACL42-G05 050 / 100	DDACL42-R02 050 / 100	DDACL42-R05 050 / 100
Motor size	NEMA 11 □28				NEMA 17 □42			
Travel	40mm / 80mm				50mm / 100mm			
Drive Screw	Precision Ball Screw		Rolled Ball Screw		Precision Ball Screw		Rolled Ball Screw	
Screw lead	1mm	2mm	1mm	2mm	2mm	5mm	2mm	5mm
Resolution	0.005mm	0.010mm	0.005mm	0.010mm	0.010mm	0.025mm	0.010mm	0.025mm
Repeatability	±0.005mm		±0.010mm		±0.005mm		±0.010mm	
Lost motion	0.010mm		0.020mm		0.010mm		0.020mm	
Thrust force	50N	25N	50N	25N	80N	30N	80N	30N
Permissible speed	20mm/sec	40mm/sec	20mm/sec	40mm/sec	40mm/sec	100mm/sec	40mm/sec	100mm/sec
Acceleration & Deceleration time	Min. 0.2 sec							
Operating Temperature	0~40℃ (No Condensation)							
Lubrication	KSS original Grease MSG No.2							
Mass	St 40:230g St 80:240g	St 40:230g St 80:240g	St 40:230g St 80:240g	St 40:230g St 80:240g	St 50:530g St 100:550g	St 50:530g St 100:550g	St 50:530g St 100:550g	St 50:530g St 100:550g

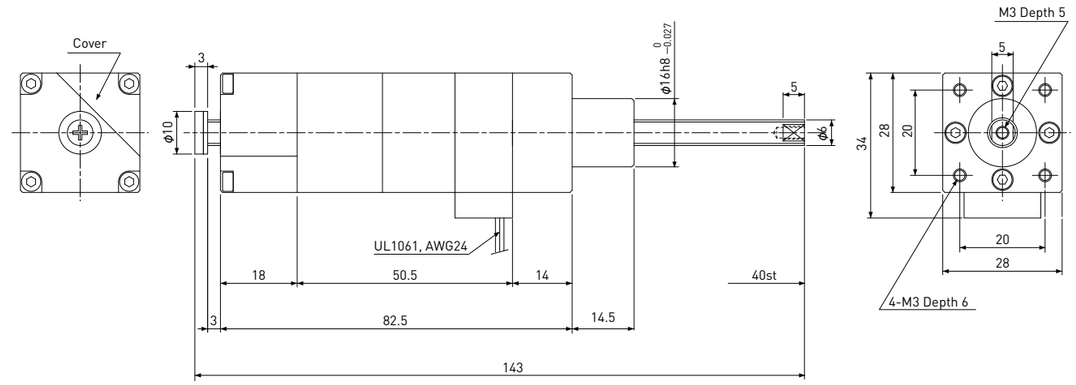
Standard style of Captive type

Dimensions & Specifications

Anti-rotating device built-in model

DDAAR □28 / NEMA 11

Shaft dia. ϕ6



Motor lead wire	
A	Black
$\overline{A}$	Green
B	Red
$\overline{B}$	Blue

UL1061, AWG24(310mm)

Recommended Drivers	SD4030B3

Note) Refer to page P164 for connection diagram of recommended Drivers.

Specifications		
	DDAAR28-G01 040	DDAAR28-G02 040
Drive Screw type	Precision Ball Screw	
Screw lead	1mm	2mm
Travel	40mm	
Repeatability	±0.005mm	
Lost Motion	0.010mm	
Permissible Speed	20mm/sec	40mm/sec
Acceleration & deceleration time	Min. 0.2sec	
Thrust Force	50N	25N
Mass	270g	

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 3.8 V
Rated current	0.67 A/phase
Winding resistance	5.6Ω
Winding inductance	5.3mH
Insulation Class	Class B (130℃)
Operating Temperature	0~40℃ (No Condensation)

Precautions

- Radial load can not be applied on Captive type. For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

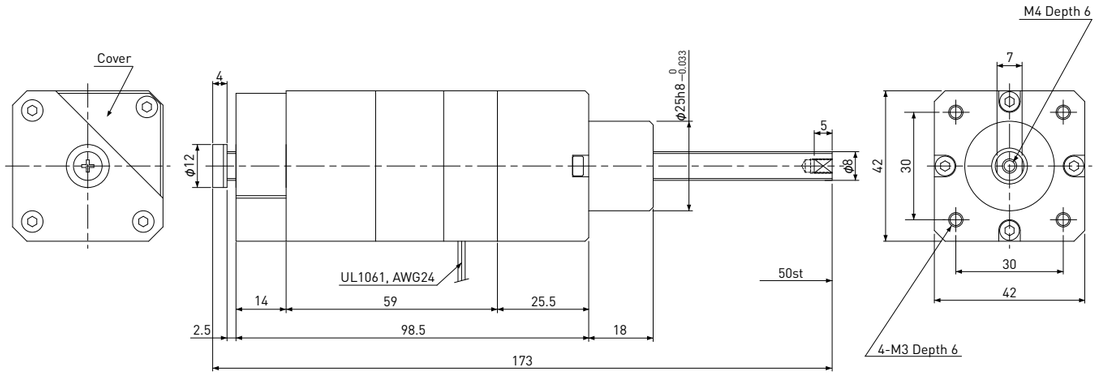
Standard style of Captive type

Dimensions & Specifications

Anti-rotating device built-in model

DDAAR □42 / NEMA 17

Shaft dia. ϕ8



Motor lead wire	
A	Black
$\overline{A}$	Green
B	Red
$\overline{B}$	Blue

UL1061, AWG24(310mm)

Recommended Drivers	SD4030B3

Note) Refer to page P164 for connection diagram of recommended Drivers.

Specifications		
	DDAAR42-G02 050	DDAAR42-G05 050
Drive Screw type	Precision Ball Screw	
Screw lead	2mm	5mm
Travel	50mm	
Repeatability	±0.005mm	
Lost Motion	0.010mm	
Permissible Speed	40mm/sec	100mm/sec
Acceleration & deceleration time	Min. 0.2sec	
Thrust Force	80N	30N
Mass	660g	

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.5 V
Rated current	1.2 A/phase
Winding resistance	2.1Ω
Winding inductance	4.0mH
Insulation Class	Class B (130℃)
Operating Temperature	0~40℃ (No Condensation)

Precautions

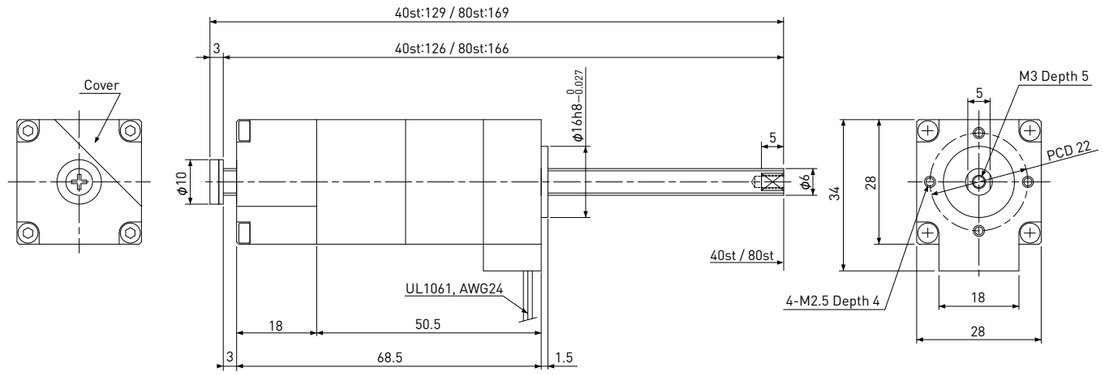
- Radial load can not be applied on Captive type.
  For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

Standard style of Non-Captive type

Dimensions & Specifications

DDACL □28 / NEMA 11

Shaft dia. ϕ6



Motor lead wire	
A	Black
$\overline{A}$	Green
B	Red
$\overline{B}$	Blue

UL1061, AWG24(310mm)

Recommended Drivers	SD4030B3

Note) Refer to page P164 for connection diagram of recommended Drivers.

Specifications				
	DDACL28-G01 040/080	DDACL28-G02 040/080	DDACL28-R01 040/080	DDACL28-R02 040/080
Drive Screw type	Precision Ball Screw		Rolled Ball Screw	
Screw lead	1mm	2mm	1mm	2mm
Travel	40mm / 80mm		40mm / 80mm	
Repeatability	±0.005mm		±0.010mm	
Lost Motion	0.010mm		0.020mm	
Permissible Speed	20mm/sec	40mm/sec	20mm/sec	40mm/sec
Acceleration & deceleration time	Min. 0.2sec		Min. 0.2sec	
Thrust Force	50N	25N	50N	25N
Mass	Travel 40mm:230g Travel 80mm:240g		Travel 40mm:230g Travel 80mm:240g	

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 3.8 V
Rated current	0.67 A/phase
Winding resistance	5.6Ω
Winding inductance	5.3mH
Insulation Class	Class B (130℃)
Operating Temp.	0~40℃ (No Condensation)

Precautions

- Non-Captive type does not have an anti-rotating device.
  External anti-rotating devices should be set up when usage.
  Radial load can not be applied on Captive type.
  For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

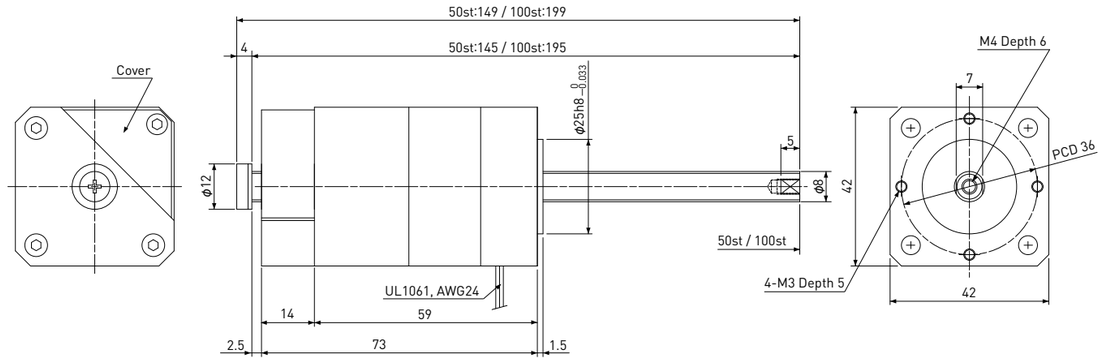
Actuator
Linear Actuator Captive, Non-Captive type

Standard style of Non-Captive type

Dimensions & Specifications

DDACL □42 / NEMA 17

Shaft dia.ϕ8



Motor lead wire	
A	Black
$\overline{A}$	Green
B	Red
$\overline{B}$	Blue

UL1061, AWG24(310mm)

Recommended Drivers	SD4030B3

Note) Refer to page P164 for connection diagram of recommended Drivers.

Specifications				
	DDACL42-G02 050/100	DDACL42-G05 050/100	DDACL42-R02 050/100	DDACL42-R05 050/100
Drive Screw type	Precision Ball Screw		Rolled Ball Screw	
Screw lead	2mm	5mm	2mm	5mm
Travel	50mm / 100mm		50mm / 100mm	
Repeatability	±0.005mm		±0.010mm	
Lost Motion	0.010mm		0.020mm	
Permissible Speed	40mm/sec	100mm/sec	40mm/sec	100mm/sec
Acceleration & deceleration time	Min. 0.2sec		Min. 0.2sec	
Thrust Force	80N	30N	80N	30N
Mass	Travel 50mm :530g Travel 100mm :550g		Travel 50mm :530g Travel 100mm :550g	

Motor Specifications	
Basic step angle	1.8°
Driving method	2-phase Bi-polar
Rated Voltage	DC 2.5 V
Rated current	1.2 A/phase
Winding resistance	2.1Ω
Winding inductance	4.0mH
Insulation Class	Class B (130℃)
Operating Temp.	0~40℃ (No Condensation)

Precautions

- Non-Captive type does not have an anti-rotating device.
  External anti-rotating devices should be set up when usage.
  Radial load can not be applied on Captive type.
  For more detail, please see page S105.
- Specifications above are reference value measured in vertical position at virgin condition.
- Sensor is not built in this standard design. Please ask KSS if necessary

●Recommended Driver

KSS provides recommended Stepping Motor Driver as an option for Linear Actuator in order to make it easy to use.

KR-A5CC

This Driver is for 5-phase Stepping Motor operated by DC24V power supply. It has automatic current reduction circuits. You can choose full-step or half step function.

KR-A55MC

Micro-Step Driver for 5-phase Stepping Motor with DC24V power supply. 16 step angle types can be set up to 250 divisions.

KR-A535M

Micro-Step Driver for 5-phase Stepping Motor, which can be used with AC100~220V power supply. 16 step angle types can be set up to 250 divisions.

SD4015B3

This is recommended for Motor model 08E2004 of DMB series. It has automatic current down function and Micro-step function with 8-step angle.

SD4030B3

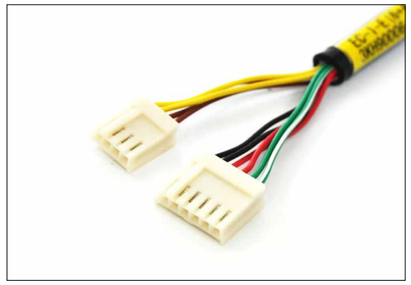
This is recommended for 2 phase stepping Motor Linear Actuator.
(Motor model:Other than 08E2004)
It has automatic current down function and Micro-step function with 8-step angle.

●Extension Cable

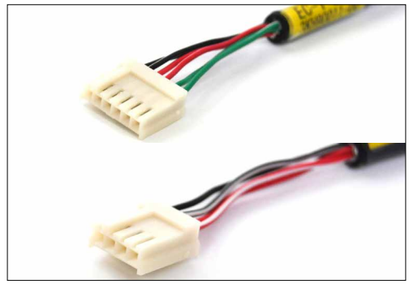
Extension Cable between Linear Actuator Captive type or Non-Captive type, and KSS recommended Stepping Motor Driver.
Please designate Cable length and Connector type in accordance with the example below.
Please note that one side of Extension Cable is cut end only (no connector).

EC R — 2 — E(6)
① ② ③ ④

①Extension Cable
②Cable type
R :Robot cable type
③Cable length (m)
④Connector type at both end
N : No connector (Cut only)
E(6) : EI connector 6-pins
E(4) : EI connector 4-pins
E(6+4) : EI connector 6+4-pins



E(6+4) : EI connector 6+4-pins
(TE Connectivity)



E(6) : EI connector 6-pins
E(4) : EI connector 4-pins
(TE Connectivity)

●Linear Actuator Connection diagram

Describe the connection diagram between the KSS Linear Actuator and the recommended driver.
Please check the combination of the Linear Actuator and the driver, then wire according to diagrams as shown below.

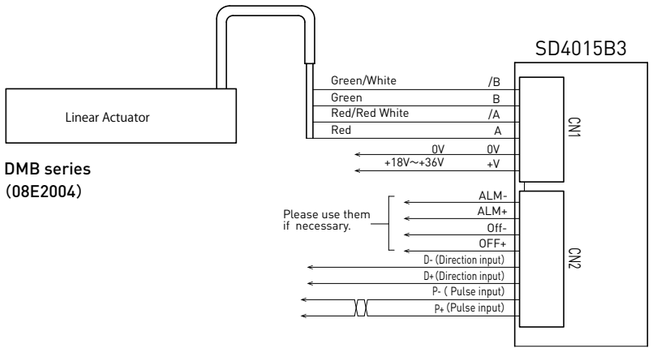
Type	Series	Recommended Driver	Output current	Connection diagram
External	DMB (Motor Model：08E2004)	SD4015B3	0.25 ～ 1.5A/phase	Fig. P-3
	DMB (Motor Model：Other than 08E2004)	SD4030B3	0.5 ～ 3A/phase	Fig. P-4
	2TMB	SD4030B3	0.5 ～ 3A/phase	Fig.P-5
	MB ／ TMB	KR-A5CC	0.1 ～ 0.9A/phase	Fig. P-6
		KR-A55MC	0.4 ～ 1.4A/phase	Fig. P-7
		KR-A535M	0.4 ～ 1.4A/phase	Fig. P-8
Captive Non-Captive	DDAAR ／ DDACL	SD4030B3	0.5 ～ 3A/phase	Fig. P-9

External type

■Applicable Product series
DMB series (Motor model : 08E2004)

■Recommended Driver
SD4015B3 : 2-phase Microstep Driver
**Output current : 0.25～1.5A/Phase

※Caution
- The factory setting of SD4015B3 is 1A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.

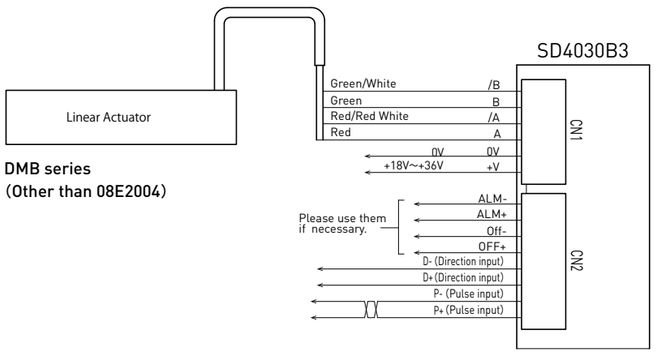


【Fig.P-3】

■Applicable Product series
DMB series (Motor model : Other than 08E2004)

■Recommended Driver
SD4030B3 : 2-phase Microstep Driver
**Output current : 0.5～3A/Phase

※Caution
- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.

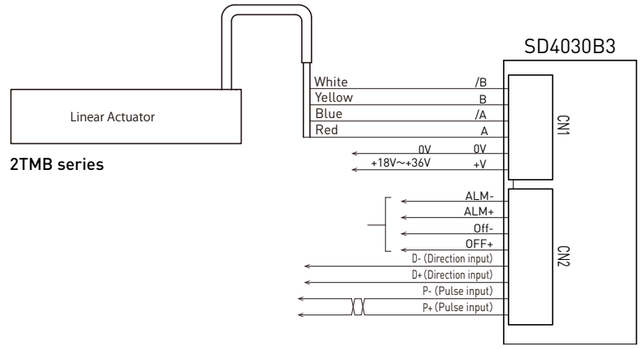


【Fig.P-4】

■Applicable Product series
2TMB series

■Recommended Driver
SD4030B3 : 2-phase Microstep Driver
**Output current : 0.5～3A/Phase

※Caution
- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.

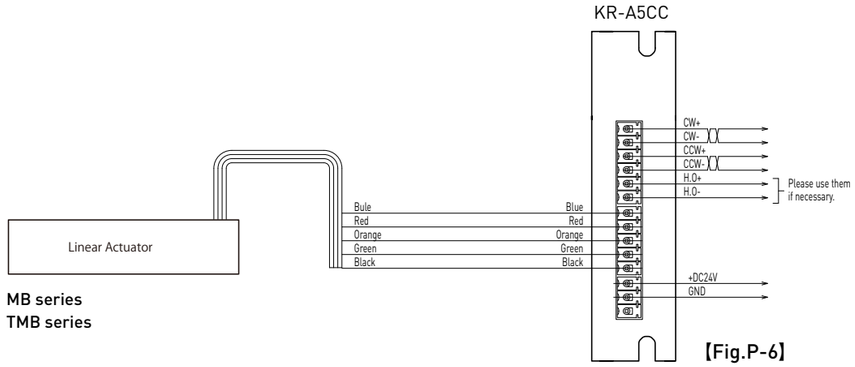


【Fig.P-5】

■Applicable Product series
MB series
TMB series

■Recommended Driver
KR-A5CC : 5-phase Stepping Motor Driver
**Output current : 0.1～0.9A/Phase

※Caution
- The factory setting of KR-A5CC is 0.35A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.

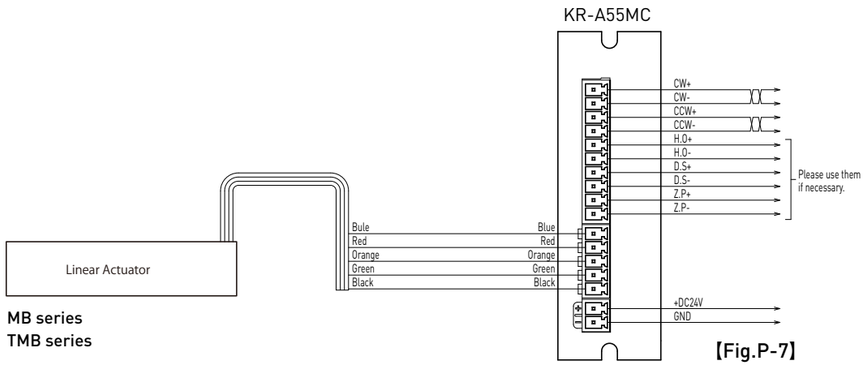


【Fig.P-6】

■Applicable Product series
MB series
TMB series

■Recommended Driver
KR-A55MC : 5-phase Microstep Driver
**Output current : 0.4~1.4A/Phase

※Caution
- The factory setting of KR-A55MC is 0.75A
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



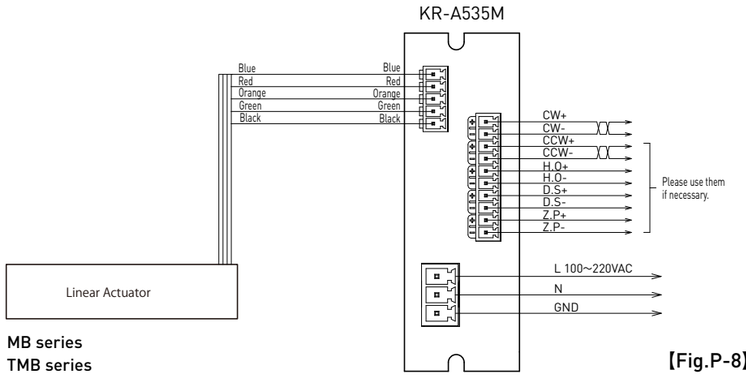
MB series
TMB series

【Fig.P-7】

■Applicable Product series
MB series
TMB series

■Recommended Driver
KR-A535M : 5-phase Microstep Driver
**Output current : 0.4~1.4A/Phase

※Caution
- The factory setting of KR-A535M is 0.75A
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.



MB series
TMB series

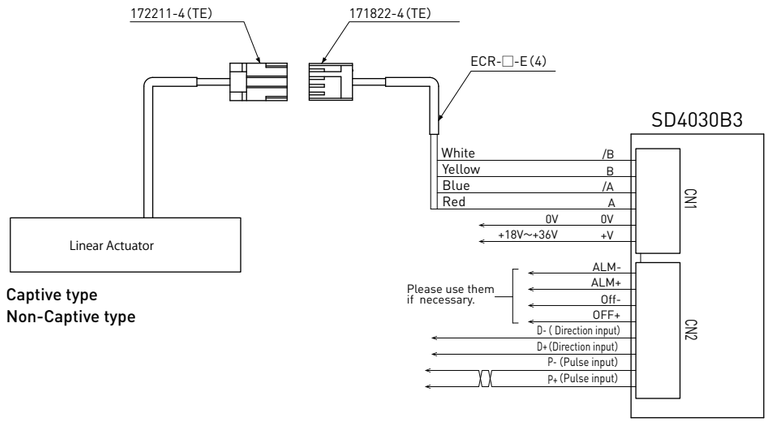
【Fig.P-8】

Captive, Non-Captive type

■Applicable Product series
Captive type, Non-Captive type

■Recommended Driver
SD4030B3 : 2-phase Microstep Driver
**Output current : 0.5~3A/Phase

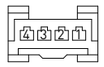
※Caution
- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current set up of Driver based on Motor Rated current before use.
- For the details about current setup, please download the manual from KSS web site.



Captive type
Non-Captive type

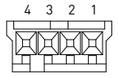
【Fig.P-9】

Motor cable 172211-4 (male)



1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable 171822-4 (female)

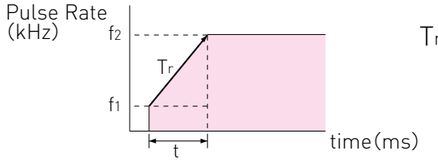


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

●Precaution of handling and operating

★Precaution for operating

1. Before use, please read instruction manuals and follow the precautions below.
   The instruction manuals are availabe on KSS web site.
2. Do not hit or drop the Shaft, do not apply Axial load exceeding specifications or Radial load,
   it may cause malfunction.
3. Before use, please check that the product has no defect, and product is the same as your order.
4. Do not disassemble each component, dust may get inside the product. It may deteriorate accuracy.
5. Please prevent contamination from dust or swarf. Dust or swarf may cause damage to Ball Screw,
   which lead to deteriorating the function.
6. Motor is not designed to resist water oil. Item cannot be used in direct exposure of water or oil,
   or environment such as oil bath.
7. Lubrication is required under the Ball Screw operation. Lubricant condition should be checked
   every 2 to 3 months. If Grease is contaminated, remove old Grease and replace with new one.
8. Do not use the Actuator exceeding our specifications in Load or Speed.
9. Care must be taken not to apply Radial load or Moment load directly on Ball Screw.
   This will lead to shorten the Ball Screw life remarkably. In addition, misalignment between Ball Screw
   and other components will lead to deterioration of function, such as accuracy, life and so on.
10. Allowing Ball Screw Nut to over-run may result in malfunctioning due to Balls escaping,
    damage to recirculation parts, and indentation on the raceways. Continued use in this state will lead to rapid
    wear and damage to recirculation parts.Therefore Ball Screw Nut must never be allowed to over-run.
    If over-running occurs, contact KSS for an inspection with charge.
11. Acceleration & Deceleration rate should be followed by recommended number described in each series.Do
    not use Linear Actuator under our recommended Acceleration & Deceleration Rate.



$$Tr = \frac{t}{f_2 - f_1}$$

Tr : Acceleration & Deceleration Rate (ms/kHz)
t : Acceleration & Deceleration time (ms)
f1,f2 : Pulse Rate (kHz)

12. Do not hold the Motor lead wire. Motor lead wire is for fixation, do not use the Motor lead wire as movabilities.
13. Keep away from Magnetic memory device.
14. The Motor torque and speed characteristics may vary from the specifications,
    depending on the load conditions or Driver used.
15. The Motor has a resonant point within the specifications. Please avoid the resonant point when in use.

★Precaution for safety

1. If abnormal odor, noise, smoke, overheating, or vibration occurs, stop operation immediately
   and turn the power off.
2. Do not use the Actuator exceeding rated current.
3. Check and confirm the polarity of the power supply in prior to activate the Motor.
4. The Motor may overheat depending on the load condition or Driver used.
   Make sure that the Motor surface temperature does not exceed 80℃ when in use.
5. Check the wire connection type, Drive system, and phase sequence.
   Inappropriate connection leads to malfunction.
6. A ground connection must be used.
7. Do not bend, pull or pinch the Motor lead wire.
8. Do not touch moving parts during operation.
9. Disconnect from the Controller before performing dielectric withstanding voltage test of the Motor or
   megger test.
10. Please switch off the Driver, when inspection or maintenance.

★Operating environment

1. Operating environment should be 0~40℃ in temperature and 20~80%RH in humidity.
   Do not use the Actuator under dew condensation, corrosive gas or inflammable gas environment.
2. Do not use the Actuator under strong electric field, strong magnetic field.
3. Please prevent from swarf, oil mist, cutting fluid, water/moisture, salt spray,
   organic solvent and other contamination.
4. The Actuator cannot be used under the vibration, impact, vacuum, and other special environment.

★Precaution for External type

※Since External type is the product which integrated the Motor Shaft and the Screw Shaft,
repair is not possible, if either Motor or Ball Screw is damaged.

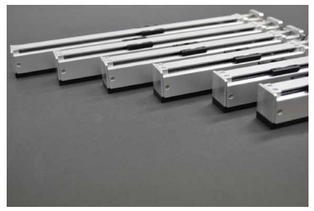
Single axis Actuator

Flex Actuator Series

Many variation of KSS Flex Actuator became reality. Various choices among accuracy(Drive Screw type), speed(Screw Lead), Travel length and power(Motor type) are available.

●Features

- We make full use of features of Miniature Ball Screw manufacturer and super compact design Actuator can be achieved.
- Depending on kinds of Drive Screws, wide range of choices related to positioning accuracy are available.
- Several variations of Screw Lead & Travel for each Screw type are standardized. So wide variety of choice for speed is available.
- Motor-less type is our standard, but a couple of Motors are in stock as an option. Suitable Motor and Actuator would be assembled in accordance with your specifications.
- Recommended Motor Drivers for each Motors are also in stock.
- Accessories can be provided as special design, such as outside photo-sensor, Brake unit and so on.



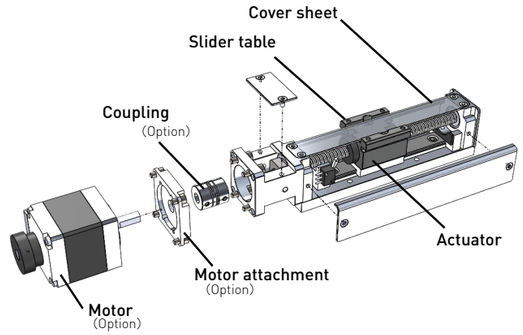
Wide range of choices

Motor-less is standard

Wide variety of Drive Screw type

●Structure

KSS Flex Actuator is the slider type Actuator, which is built in small size Drive Screw and Slide Guide in it. KSS Flex Actuator series are standardized without Motor. It is designed to set the appropriate Motor easily based on the required specifications.



●Variation & Features

There are several kinds of KSS Flex Actuators shown below. Each Actuator has a different kinds of Drive Screw inside. Please choose appropriate type Drive Screw depending on your required accuracy. For further information, please refer to Table Q-3 in page Q106.

1) Rolled Ball Screw type
   Reasonable price and accuracy have been achieved by using Rolled Ball Screw.
2) Precision Ball Screw type
   High accuracy in both Repeatability and Lost motion by using Precision Ball Screw.
3) Resin Lead Screw type is available for less-expensive application based on your request. Please ask KSS representative.

Table Q-1 : Positioning accuracy for each Drive Screw

Drive Screw type	Repeatability (mm)	Lost motion (mm)
Rolled Ball Screw	±0.01 max.	0.01 max.
Precision Ball Screw	±0.005 max.	0.005 max.

Note) These numbers are obtained with standard Motor.

There are several choices of Motor as option shown below. Specifications for each combination of Actuator and Motor are shown in page Q106.

Motor type	Manufacturer	Model number	Rated Current
2-phase □25	Minebea Motor	10PM-K202B Single shaft	0.7A / Phase
5-phase □28	Oriental Motor	PK523HPB Double shaft	0.75A / Phase

●Model number notation

FA S — G 020 — 080 M N R SBU
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①Series No.
FA : KSS Flex Actuator Series
②Actuator type
S : Slider type
③Drive Screw type
R : Rolled Ball Screw
G : Precision Ball Screw
④Lead / Pitch (mm) : 020 means 2mm
⑤Travel (mm) : 080 means 80mm
⑥Motor type
None : No Motor (Standard)
M : Minebea Motor 2-phase Stepping Motor (□25&0.7A / phase)
E : Oriental Motor 5-phase Stepping Motor (□28&0.75A / phase)
S : Other
⑦Connector type
N : No connector (Bare)
H : HIROSE RP17
E : EI connector (TE Connectivity)
⑧Direction of Motor leads
R : Right (from Shaft end side)
L : Left
⑨Option
None : no optional design
S : Photo micro Sensor outside
B : Solenoid Brake Unit
U : Side Motor mounting kit

●Combination & Specifications

KSS Flex Actuator has a lot of combinations with Drive Screws (positioning accuracy), Screw Lead, and travel length. Motor-less type is our standard, but 2 types of Motor can be provided as an optional order. Standard combination and Motor choices make design flexibility enlarge widely based on your specifications.
Combination of Drive Screw and Motor are shown in Table Q-2.
The detail specifications and dimensions are described in each dimension table.
If other combination in Table Q-2 is required, please ask KSS representative.

Standard Combination

Choice of Drive Screw
×
Choice of Travel
×
Choice of Screw Lead

Positioning accuracy will vary depending on the kind of Drive Screw. Lead and travel length are standardized for each Drive Screw.

Refer to Table Q-3

×

Motor Option

Option Motor ①
2-phase Stepping Motor (□25&0.7A / phase)

Option Motor ②
5-phase Stepping Motor (□28&0.75A / phase)

Permissible speed and Load Capacity are determined by Motor choice.

The detail specifications for each combination are shown in dimension Table. Page index is shown in Table below.

Table Q-2 : Page index for each combination

Motor			Rolled Ball Screw	Precision Ball Screw
Standard		Motor : None	See page Q107～Q108	See page Q109～Q110
Option	M	Minebea Motor 2-phase Stepping Motor (□25&0.7A / phase) Bi-polar type	See page Q111～Q112	See page Q113～Q114
	E	Oriental Motor 5-phase Stepping Motor (□28&0.75A / phase)	See page Q115～Q116	See page Q117～Q118

●Selection guide

KSS Flex Actuator has a lot of combinations with Drive screws, Screw Lead, Travel length and Motor as an option.
Therefore, when you try to select the suitable combination, its procedure may be complicated.
KSS shows the selection guide below from the various approach of choices.

Drive Screw selection guide	Positioning related accuracy	Price
Rolled Ball Screws	Middle	Reasonable
Precision Ball Screws	High	Costly

Screw Lead selection guide	Speed	Resolution	Load Capacity
1mm	Slow	High	High
2mm			
6mm			
10mm	Fast	Low	Low

Motor selection guide	Fine step	Acceleration	Rotational speed	Price
2-phase □25	Middle	Middle	Middle	Less expensive
5-phase □28	Fine	High	Low & high speed	Costly

The table above shows the functional comments when the Motor is built in KSS Flex Actuators.
Please note that the table above is not the function of Motor itself. For more detail, please see the table of specifications in next page.

Table Q-3 : Specifications for each combination

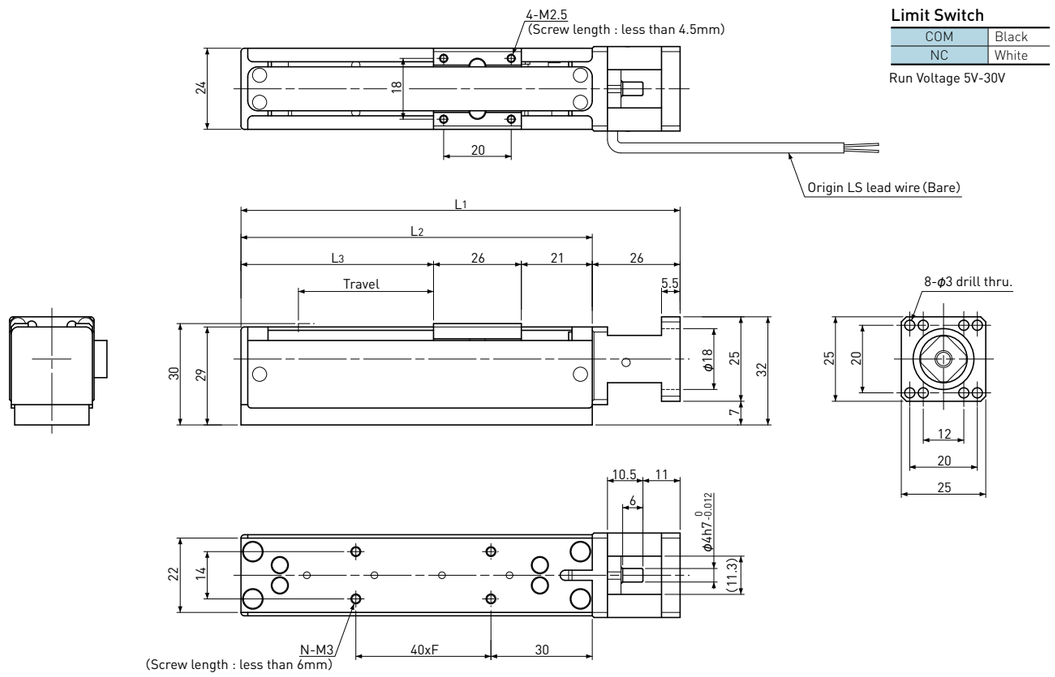
Drive Screw type	Rolled Ball Screw	Precision Ball Screw
Repeatability(mm)	±0.01 max.	±0.005 max.
Lost motion(mm)	0.01 max.	0.005 max.
Permissible Moment(Nm) Mp(Pitching)	0.10 ** In case of no load in My & Mr direction	
Permissible Moment(Nm) My(Yawing)	0.09 ** In case of no load in Mp & Mr direction	
Permissible Moment(Nm) Mr(Rolling)	0.23 ** In case of no load in Mp & My direction	

Spec. for each Motor			Rolled Ball Screw				Precision Ball Screw			
Motor	Lead(mm) H:Horizontal V:Vertical		1	2	6	10	1	2	6	10
Standard Motor-less	Max. Load Capacity(N)	H	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	19.6	19.6	9.8	4.9	19.6	19.6	9.8	4.9
	Permissible speed(mm / sec)		0~25	0~50	0~150	0~250	0~25	0~50	0~150	0~250
Motor : M 2-phase / 2相 □25 0.7A / phase	Max. Load Capacity(N)	H	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	19.6	19.6	2.94	2.94	19.6	19.6	2.94	2.94
	Permissible speed(mm / sec)		3~20	6~40	18~120	30~200	3~20	6~40	18~120	30~200
Motor : E 5-phase □28 0.75A / phase	Max. Load Capacity(N)	H	29.4	29.4	19.6	19.6	29.4	29.4	19.6	19.6
		V	19.6	19.6	4.9	4.9	19.6	19.6	4.9	4.9
	Permissible speed(mm / sec)		0~25	0~50	0~150	0~250	0~25	0~50	0~150	0~250
**Motor mounting is option	Travel(mm)	20	○				○			
		40	○	○	○	○	○	○	○	○
		80	○	○	○	○	○	○	○	○
		120			○	○			○	○
		160			○	○			○	○
		200			○	○			○	○

Note 1) In case of Standard (Motor-less), Repeatability & Lost motion are reference value, Permissible speed & Load Capacity are recommended value.
Note 2) For more detail, please refer to dimension table.

Flex Actuator

Motor-less type (Standard)
Rolled Ball Screw type Actuator



Limit Switch

COM	Black
NC	White

Run Voltage 5V-30V

Note

1) There should be no condensation when using.
2) Permissible Moment is the number when no load in other direction.
3) Please consider Torque as reference number.
4) In case of Motor-less type, Repeatability & Lost motion are reference number.
5) In case of Motor-less type, Permissible speed & Load Capacity are recommended number.
6) Required Torque is under maximum vertical Load Capacity.
7) Recommended Coupling
   - SAKAI SEISAKUSYO : LAS-12C-4× (3 or 4 or 5)
   - NBK : MWS-12C-4× (4 or 5)
   - NBK : MOS-12C-4× (3 or 4 or 5)
   - MISUMI : CPSCN12-4 × (4 or 5)

Model Number	Travel (mm)	Screw Lead (mm)	Motor Required Torque (Nm)	Length (mm) L1	L2	L3	F	N		Max. Load Capacity (N) Hor.	Vert.	Permissible speed (mm / sec)	Mass (g)
FAS-R010-020	20	1	0.009	110	84	37	1	4		29.4	19.6	0 ~ 25	160
FAS-R010-040	40	1	0.009	130	104	57	1	4		29.4	19.6	0 ~ 25	180
FAS-R020-040		2	0.011							29.4	19.6	0 ~ 50	
FAS-R060-040		6	0.017							19.6	9.8	0 ~ 150	
FAS-R100-040		10	0.015							19.6	4.9	0 ~ 250	
FAS-R010-080	80	1	0.009	170	144	97	2	6		29.4	19.6	0 ~ 25	225
FAS-R020-080		2	0.011							29.4	19.6	0 ~ 50	
FAS-R060-080		6	0.017							19.6	9.8	0 ~ 150	
FAS-R100-080		10	0.015							19.6	4.9	0 ~ 250	
FAS-R060-120	120	6	0.017	210	184	137	3	8		19.6	9.8	0 ~ 150	265
FAS-R100-120		10	0.015							19.6	4.9	0 ~ 250	
FAS-R060-160	160	6	0.017	250	224	177	4	10		19.6	9.8	0 ~ 150	310
FAS-R100-160		10	0.015							19.6	4.9	0 ~ 250	
FAS-R060-200	200	6	0.017	290	264	217	5	12		19.6	9.8	0 ~ 150	350
FAS-R100-200		10	0.015							19.6	4.9	0 ~ 250	

Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

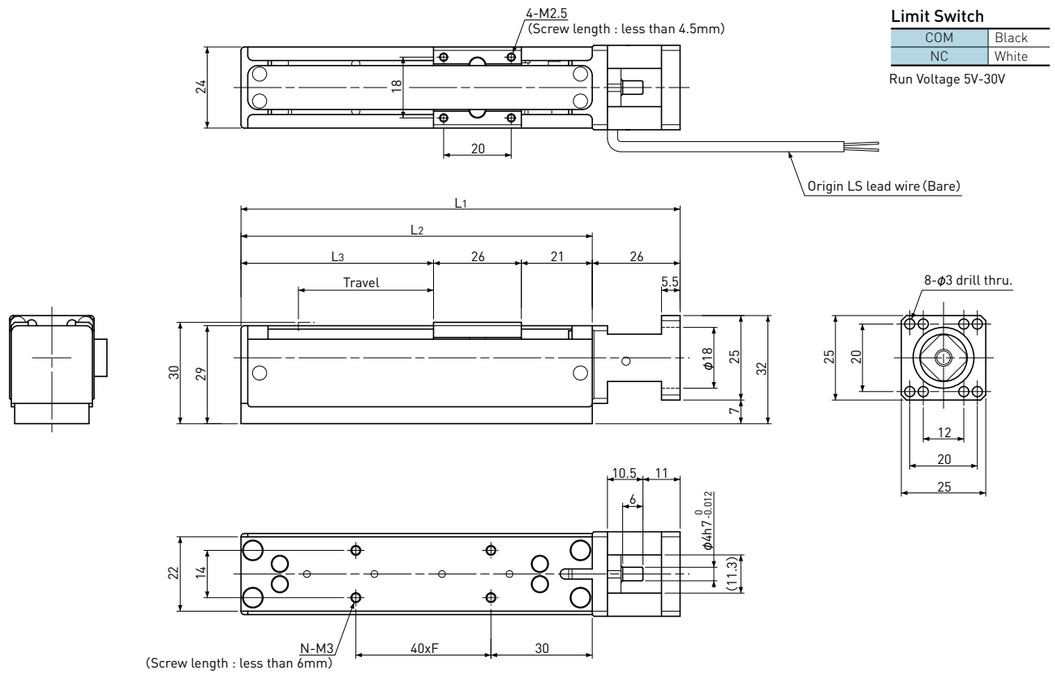
Common Specifications	
Repeatability	Max. ±0.01mm
Lost Motion	Max. 0.01mm
Body Material	Aluminum
Sliding guide	Slide Guide rail
Sensor	Limit switch
Accuracy of Zero pt. return	Max. ±0.01mm

Permissible Moment	
Pitching Mp	0.10Nm
Yawing My	0.09Nm
Rolling Mr	0.23Nm

Lubrication	Grease MSG No.2 (KSS)
Operating Temp.	0 ~ 40℃

Flex Actuator

Motor-less type (Standard)
Precision Ball Screw type Actuator



Limit Switch

COM	Black
NC	White

Run Voltage 5V-30V

Note

1) There should be no condensation when using.
2) Permissible Moment is the number when no load in other direction.
3) Please consider Torque as reference number.
4) In case of Motor-less type, Repeatability & Lost motion are reference number.
5) In case of Motor-less type, Permissible speed & Load Capacity are recommended number.
6) Required Torque is under maximum vertical Load Capacity.
7) Recommended Coupling
   - SAKAI SEISAKUSYO : LAS-12C-4× (3 or 4 or 5)
   - NBK : MWS-12C-4× (4 or 5)
   - NBK : MOS-12C-4× (3 or 4 or 5)
   - MISUMI : CPSCN12-4 × (4 or 5)

Model Number	Travel (mm)	Screw Lead (mm)	Motor Required Torque (Nm)	Length (mm) L1	L2	L3	F	N		Max. Load Capacity (N) Hor.	Vert.	Permissible speed (mm / sec)	Mass (g)
FAS-G010-020	20	1	0.009	110	84	37	1	4		29.4	19.6	0 ~ 25	160
FAS-G010-040	40	1	0.009	130	104	57	1	4		29.4	19.6	0 ~ 25	180
FAS-G020-040		2	0.011							29.4	19.6	0 ~ 50	
FAS-G060-040		6	0.017							19.6	9.8	0 ~ 150	
FAS-G100-040		10	0.015							19.6	4.9	0 ~ 250	
FAS-G010-080	80	1	0.009	170	144	97	2	6		29.4	19.6	0 ~ 25	225
FAS-G020-080		2	0.011							29.4	19.6	0 ~ 50	
FAS-G060-080		6	0.017							19.6	9.8	0 ~ 150	
FAS-G100-080		10	0.015							19.6	4.9	0 ~ 250	
FAS-G060-120	120	6	0.017	210	184	137	3	8		19.6	9.8	0 ~ 150	265
FAS-G100-120		10	0.015							19.6	4.9	0 ~ 250	
FAS-G060-160	160	6	0.017	250	224	177	4	10		19.6	9.8	0 ~ 150	310
FAS-G100-160		10	0.015							19.6	4.9	0 ~ 250	
FAS-G060-200	200	6	0.017	290	264	217	5	12		19.6	9.8	0 ~ 150	350
FAS-G100-200		10	0.015							19.6	4.9	0 ~ 250	

Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

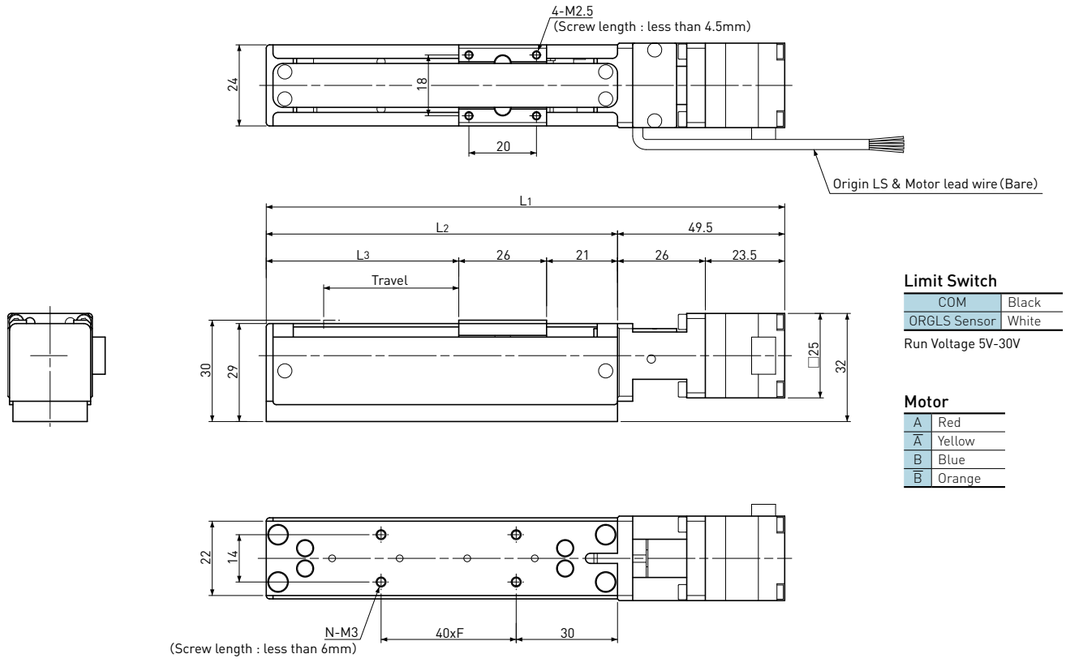
Common Specifications	
Repeatability	Max. ±0.005mm
Lost Motion	Max. 0.005mm
Body Material	Aluminum
Sliding guide	Slide Guide rail
Sensor	Limit switch
Accuracy of Zero pt. return	Max. ±0.01mm

Permissible Moment	
Pitching Mp	0.10Nm
Yawing My	0.09Nm
Rolling Mr	0.23Nm

Lubrication	Grease MSG No.2(KSS)
Operating Temp.	0 ~ 40℃

Flex Actuator

2-phase Stepping Motor (Bi-polar 0.7A / phase & □25) with Rolled Ball Screw type Actuator



Limit Switch

COM	Black
ORGLS Sensor	White

Run Voltage 5V-30V

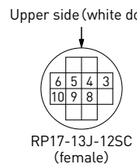
Motor

A	Red
$\overline{A}$	Yellow
B	Blue
$\overline{B}$	Orange

Motor Model : 10PM-K202B (Single shaft)
Minebea Motor
Driver recommendation : SD4030B3

Connector choice

Please designate connector type below.
No connector if there is no designation.
1) None (Bare)
2) RP17-13J-12SC (HIROSE)
3) EI-Connector (TE connectivity)
172211-6 pins for Motor +172211-4 pins for Sensor



RP17-13J-12SC
(female)

HIROSE RP17 Connector

1	None
2	None
3	Stepping Motor A (Red)
4	Stepping Motor $\overline{A}$ (Yellow)
5	Stepping Motor B (Blue)
6	Stepping Motor $\overline{B}$ (Orange)
7	None
8	COM (Black)
9	Short circuit with No.8
10	ORGLS Sensor NC (White)
11	None
12	None

172211-6 (male)

172211-4 (male)

EI Connector

1	None
2	None
3	Stepping Motor A (Red)
4	Stepping Motor $\overline{A}$ (Yellow)
5	Stepping Motor B (Blue)
6	Stepping Motor $\overline{B}$ (Orange)

1	None
2	COM (Black)
3	Short circuit with No.2
4	ORGLS Sensor NC (White)

Model Number	Travel (mm)	Screw Lead (mm)	Resolution (μm)	Length (mm) L1	L2	L3	F	N	Max. Load Capacity (N) Hor.	Vert.		Permissible speed (mm / sec)	Max. Acceleration (m / sec²)	Mass (g)
FAS-R010-020MNR	20	1	5	133.5	84	37	1	4	29.4	19.6		3 ~ 20	0.1	210
FAS-R010-040MNR	40	1	5	153.5	104	57	1	4	29.4	19.6		3 ~ 20	0.1	230
FAS-R020-040MNR		2	10						29.4	19.6		6 ~ 40	0.2	
FAS-R060-040MNR		6	30						19.6	2.94		18 ~ 120	0.6	
FAS-R100-040MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-R010-080MNR	80	1	5	193.5	144	97	2	6	29.4	19.6		3 ~ 20	0.1	275
FAS-R020-080MNR		2	10						29.4	19.6		6 ~ 40	0.2	
FAS-R060-080MNR		6	30						19.6	2.94		18 ~ 120	0.6	
FAS-R100-080MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-R060-120MNR	120	6	30	233.5	184	137	3	8	19.6	2.94		18 ~ 120	0.6	315
FAS-R100-120MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-R060-160MNR	160	6	30	273.5	224	177	4	10	19.6	2.94		18 ~ 120	0.6	360
FAS-R100-160MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-R060-200MNR	200	6	30	313.5	264	217	5	12	19.6	2.94		18 ~ 120	0.6	400
FAS-R100-200MNR		10	50						19.6	2.94		30 ~ 200	1.0	

Note) Refer to page Q129 for connection diagram of recommended Driver (SD4030B3).
Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Note

1) There should be no condensation when using.
2) Permissible Moment is the number when no load in other direction.
3) Resolution represents the values for full step.
4) Model number is for no-connector and lead wire is set on right side on Motor.
5) Vibration may increase at low speed or zero return.

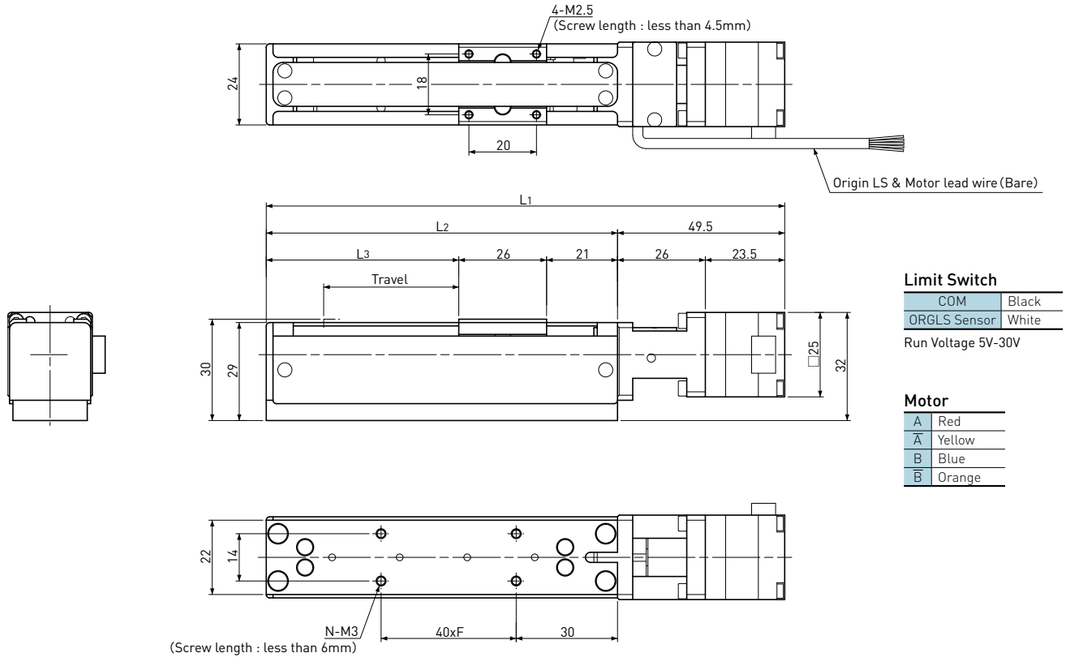
Common Specifications	
Repeatability	Max. ±0.01mm
Lost Motion	Max. 0.01mm
Body Material	Aluminum
Sliding guide	Slide Guide rail
Sensor	Limit switch
Accuracy of Zero pt. return	Max. ±0.01mm

Permissible Moment	
Pitching Mp	0.10Nm
Yawing My	0.09Nm
Rolling Mr	0.23Nm

Lubrication	Grease MSG No.2 (KSS)
Operating Temp.	0 ~ 40℃

Flex Actuator

2-phase Stepping Motor (Bi-polar 0.7A / phase & □25) with Precision Ball Screw type Actuator



Limit Switch

COM	Black
ORGLS Sensor	White

Run Voltage 5V-30V

Motor

A	Red
$\overline{A}$	Yellow
B	Blue
$\overline{B}$	Orange

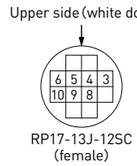
Model Number	Travel (mm)	Screw Lead (mm)	Resolution (μm)	Length (mm) L1	L2	L3	F	N	Max. Load Capacity (N) Hor.	Vert.		Permissible speed (mm / sec)	Max. Acceleration (m / sec²)	Mass (g)
FAS-G010-020MNR	20	1	5	133.5	84	37	1	4	29.4	19.6		3 ~ 20	0.1	210
FAS-G010-040MNR	40	1	5	153.5	104	57	1	4	29.4	19.6		3 ~ 20	0.1	230
FAS-G020-040MNR		2	10						29.4	19.6		6 ~ 40	0.2	
FAS-G060-040MNR		6	30						19.6	2.94		18 ~ 120	0.6	
FAS-G100-040MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-G010-080MNR	80	1	5	193.5	144	97	2	6	29.4	19.6		3 ~ 20	0.1	275
FAS-G020-080MNR		2	10						29.4	19.6		6 ~ 40	0.2	
FAS-G060-080MNR		6	30						19.6	2.94		18 ~ 120	0.6	
FAS-G100-080MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-G060-120MNR	120	6	30	233.5	184	137	3	8	19.6	2.94		18 ~ 120	0.6	315
FAS-G100-120MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-G060-160MNR	160	6	30	273.5	224	177	4	10	19.6	2.94		18 ~ 120	0.6	360
FAS-G100-160MNR		10	50						19.6	2.94		30 ~ 200	1.0	
FAS-G060-200MNR	200	6	30	313.5	264	217	5	12	19.6	2.94		18 ~ 120	0.6	400
FAS-G100-200MNR		10	50						19.6	2.94		30 ~ 200	1.0	

Note) Refer to page Q129 for connection diagram of recommended Driver (SD4030B3).
Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Motor Model : 10PM-K202B (Single shaft)
Minebea Motor
Driver recommendation : SD4030B3

Connector choice

Please designate connector type below.
No connector if there is no designation.
1) None (Bare)
2) RP17-13J-12SC (HIROSE)
3) EI-Connector (TE connectivity)
172211-6 pins for Motor +172211-4 pins for Sensor



RP17-13J-12SC
(female)

HIROSE RP17 Connector

1	None
2	None
3	Stepping Motor A (Red)
4	Stepping Motor $\overline{A}$ (Yellow)
5	Stepping Motor B (Blue)
6	Stepping Motor $\overline{B}$ (Orange)
7	None
8	COM (Black)
9	Short circuit with No.8
10	ORGLS Sensor NC (White)
11	None
12	None

172211-6 (male)

172211-4 (male)

EI Connector

1	None
2	None
3	Stepping Motor A (Red)
4	Stepping Motor $\overline{A}$ (Yellow)
5	Stepping Motor B (Blue)
6	Stepping Motor $\overline{B}$ (Orange)

1	None
2	COM (Black)
3	Short circuit with No.2
4	ORGLS Sensor NC (White)

Note

1) There should be no condensation when using.
2) Permissible Moment is the number when no load in other direction.
3) Resolution represents the values for full step.
4) Model number is for no-connector and lead wire is set on right side on Motor.
5) Vibration may increase at low speed or zero return.

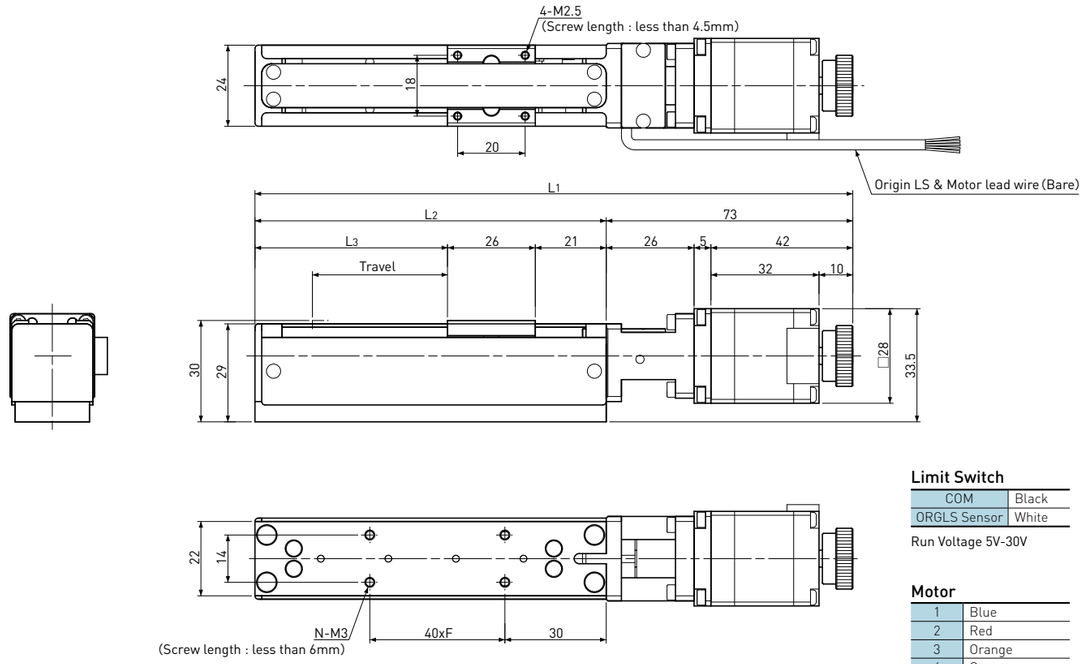
Common Specifications	
Repeatability	Max. ±0.005mm
Lost Motion	Max. 0.005 mm
Body Material	Aluminum
Sliding guide	Slide Guide rail
Sensor	Limit switch
Accuracy of Zero pt. return	Max. ±0.01mm

Permissible Moment	
Pitching Mp	0.10Nm
Yawing My	0.09Nm
Rolling Mr	0.23Nm

Lubrication	Grease MSG No.2 (KSS)
Operating Temp.	0 ~ 40℃

Flex Actuator

5-phase Stepping Motor (0.75A / phase & □28) with Rolled Ball Screw type Actuator



Limit Switch

COM	Black
ORGLS Sensor	White

Run Voltage 5V-30V

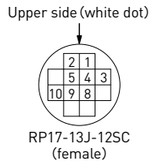
Motor

1	Blue
2	Red
3	Orange
4	Green
5	Black

Motor Model : PK523HPB (Double shaft)
Oriental Motor
Driver recommendation : KR-A5CC KR-A55MC

Connector choice

Please designate connector type below.
No connector if there is no designation.
1) None (Bare)
2) RP17-13J-12SC (HIROSE)
3) EI-Connector (TE connectivity)
172211-6 pins for Motor +172211-4 pins for Sensor



RP17-13J-12SC
(female)

HIROSE RP17 Connector

1	Stepping Motor (Blue)
2	Stepping Motor (Red)
3	Stepping Motor (Orange)
4	Stepping Motor (Green)
5	Stepping Motor (Black)
6	None
7	None
8	COM (Black)
9	Short circuit with No.8
10	ORGLS Sensor NC (White)
11	None
12	None

172211-6 (male)

172211-4 (male)

EI Connector

1	Stepping Motor (Blue)
2	Stepping Motor (Red)
3	Stepping Motor (Orange)
4	Stepping Motor (Green)
5	Stepping Motor (Black)
6	None

1	None
2	COM (Black)
3	Short circuit with No.2
4	ORGLS Sensor NC (White)

Model Number	Travel (mm)	Screw Lead (mm)	Resolution (μm)	Length (mm) L1	L2	L3	F	N	Max. Load Capacity (N) Hor.	Vert.		Permissible speed (mm / sec)	Max. Acceleration (m / sec²)	Mass (g)
FAS-R010-020ENR	20	1	2	157	84	37	1	4	29.4	19.6		0 ~ 25	0.125	265
FAS-R010-040ENR	40	1	2	177	104	57	1	4	29.4	19.6		0 ~ 25	0.125	285
FAS-R020-040ENR		2	4						29.4	19.6		0 ~ 50	0.25	
FAS-R060-040ENR		6	12						19.6	4.9		0 ~ 150	0.75	
FAS-R100-040ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-R010-080ENR	80	1	2	217	144	97	2	6	29.4	19.6		0 ~ 25	0.125	330
FAS-R020-080ENR		2	4						29.4	19.6		0 ~ 50	0.25	
FAS-R060-080ENR		6	12						19.6	4.9		0 ~ 150	0.75	
FAS-R100-080ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-R060-120ENR	120	6	12	257	184	137	3	8	19.6	4.9		0 ~ 150	0.75	370
FAS-R100-120ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-R060-160ENR	160	6	12	297	224	177	4	10	19.6	4.9		0 ~ 150	0.75	415
FAS-R100-160ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-R060-200ENR	200	6	12	337	264	217	5	12	19.6	4.9		0 ~ 150	0.75	455
FAS-R100-200ENR		10	20						19.6	4.9		0 ~ 250	1.25	

Note) Refer to page Q129 or Q130 for connection diagrams of recommended Driver (KR-A5CC, KR-A55MC).
Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Note

1) There should be no condensation when using.
2) Permissible Moment is the number when no load in other direction.
3) Resolution represents the values for full step.
4) Model number is for no-connector and lead wire is set on right side on Motor

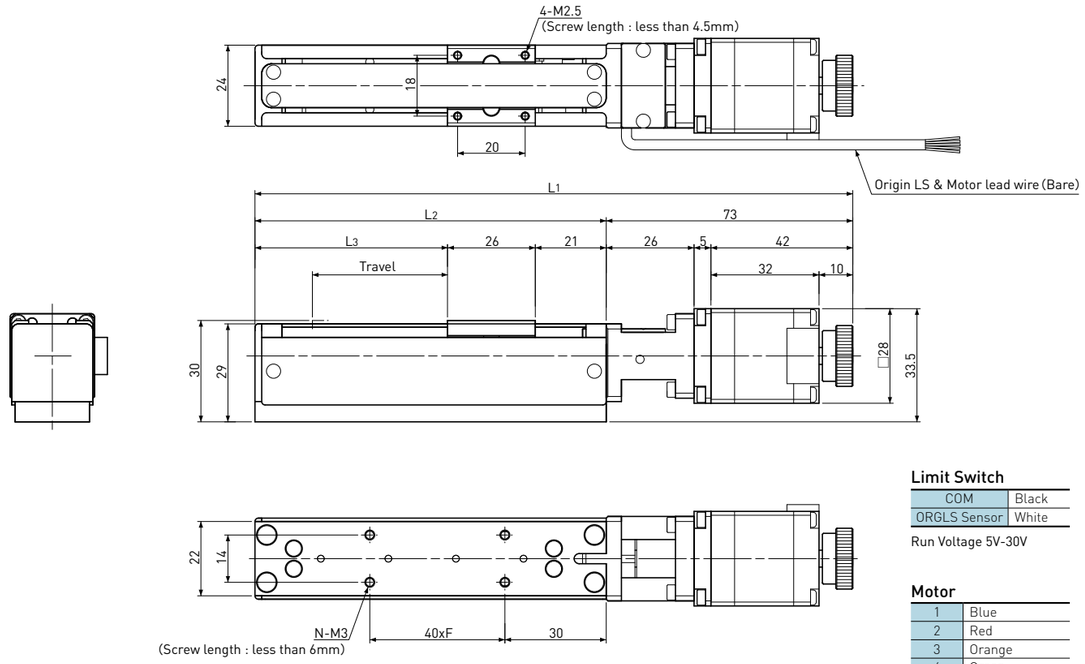
Common Specifications	
Repeatability	Max. ±0.01mm
Lost Motion	Max. 0.01mm
Body Material	Aluminum
Sliding guide	Slide Guide rail
Sensor	Limit switch
Accuracy of Zero pt. return	Max. ±0.01mm

Permissible Moment	
Pitching Mp	0.10Nm
Yawing My	0.09Nm
Rolling Mr	0.23Nm

Lubrication	Grease MSG No.2 (KSS)
Operating Temp.	0 ~ 40℃

Flex Actuator

5-phase Stepping Motor (0.75A / phase & □28) with Precision Ball Screw type Actuator



Limit Switch

COM	Black
ORGLS Sensor	White

Run Voltage 5V-30V

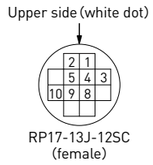
Motor

1	Blue
2	Red
3	Orange
4	Green
5	Black

Motor Model : PK523HPB (Double shaft)
Oriental Motor
Driver recommendation : KR-A5CC KR-A55MC

Connector choice

Please designate connector type below.
No connector if there is no designation.
1) None (Bare)
2) RP17-13J-12SC (HIROSE)
3) EI-Connector (TE connectivity)
172211-6 pins for Motor +172211-4 pins for Sensor



RP17-13J-12SC
(female)

HIROSE RP17 Connector

1	Stepping Motor (Blue)
2	Stepping Motor (Red)
3	Stepping Motor (Orange)
4	Stepping Motor (Green)
5	Stepping Motor (Black)
6	None
7	None
8	COM (Black)
9	Short circuit with No.8
10	ORGLS Sensor NC (White)
11	None
12	None

172211-6 (male)

172211-4 (male)

EI Connector

1	Stepping Motor (Blue)
2	Stepping Motor (Red)
3	Stepping Motor (Orange)
4	Stepping Motor (Green)
5	Stepping Motor (Black)
6	None

1	None
2	COM (Black)
3	Short circuit with No.2
4	ORGLS Sensor NC (White)

Model Number	Travel (mm)	Screw Lead (mm)	Resolution (μm)	Length (mm) L1	Length (mm) L2	Length (mm) L3	F	N	Max. Load Capacity (N) Hor.	Max. Load Capacity (N) Vert.		Permissible speed (mm / sec)	Max. Acceleration (m / sec²)	Mass (g)
FAS-G010-020ENR	20	1	2	157	84	37	1	4	29.4	19.6		0 ~ 25	0.125	265
FAS-G010-040ENR	40	1	2	177	104	57	1	4	29.4	19.6		0 ~ 25	0.125	285
FAS-G020-040ENR		2	4						29.4	19.6		0 ~ 50	0.25	
FAS-G060-040ENR		6	12						19.6	4.9		0 ~ 150	0.75	
FAS-G100-040ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-G010-080ENR	80	1	2	217	144	97	2	6	29.4	19.6		0 ~ 25	0.125	330
FAS-G020-080ENR		2	4						29.4	19.6		0 ~ 50	0.25	
FAS-G060-080ENR		6	12						19.6	4.9		0 ~ 150	0.75	
FAS-G100-080ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-G060-120ENR	120	6	12	257	184	137	3	8	19.6	4.9		0 ~ 150	0.75	370
FAS-G100-120ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-G060-160ENR	160	6	12	297	224	177	4	10	19.6	4.9		0 ~ 150	0.75	415
FAS-G100-160ENR		10	20						19.6	4.9		0 ~ 250	1.25	
FAS-G060-200ENR	200	6	12	337	264	217	5	12	19.6	4.9		0 ~ 150	0.75	455
FAS-G100-200ENR		10	20						19.6	4.9		0 ~ 250	1.25	

Note) Refer to page Q129 or Q130 for connection diagrams of recommended Driver (KR-A5CC, KR-A55MC).
Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Note

1) There should be no condensation when using.
2) Permissible Moment is the number when no load in other direction.
3) Resolution represents the values for full step.
4) Model number is for no-connector and lead wire is set on right side on Motor

Common Specifications	
Repeatability	Max. ±0.005mm
Lost Motion	Max. 0.005mm
Body Material	Aluminum
Sliding guide	Slide Guide rail
Sensor	Limit switch
Accuracy of Zero pt. return	Max. ±0.01mm

Permissible Moment	
Pitching Mp	0.10Nm
Yawing My	0.09Nm
Rolling Mr	0.23Nm

Lubrication	Grease MSG No.2 (KSS)
Operating Temp.	0 ~ 40℃

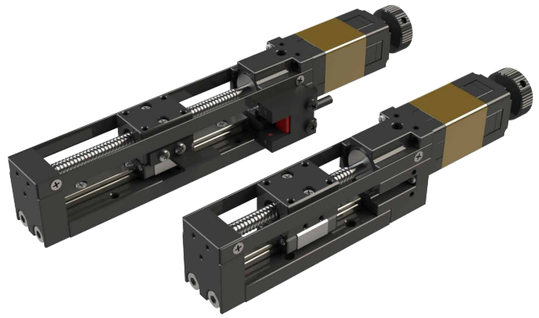
Compact Actuator NEMA 6 size

CAS Series

The most compact single axis Actuator in KSS with NEMA 6 size of 2 phase stepping Motor.

●Features

Realized compactness not only the body width, but total length of the Actuator by combining NEMA 6 Stepping Motor using our unique coupling - less connection.



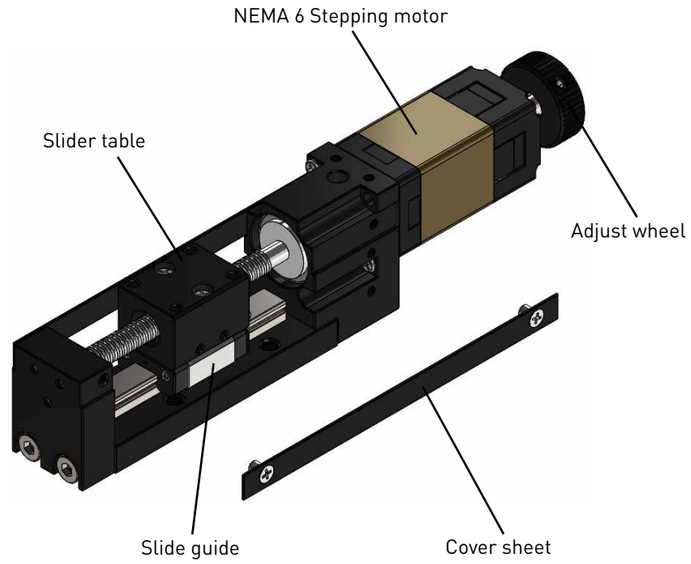
●Specifications

	Lead 1mm	Lead 2mm
Travel (mm)	20、40	
Drive Screw	Rolled Ball Screw	
Resolution (mm)	0.005	0.01
Repeatability (mm)	Max. ±0.010	
Lost motion (mm)	Max. 0.010	
Horizontal Load Capacity (N)	Max. 10	Max. 5
Vertical Load Capacity (N)	Max. 5	Max. 3
Permissible speed (mm/sec)	Max. 20	Max. 40
Maximum acceleration (m/sec^2)	0.1	0.2
Permissible Moment Mp (Nm) (Pitching)	0.14	
Permissible Moment My (Nm) (Yawing)	0.12	
Permissible Moment Mr (Nm) (Rolling)	0.22	

Recommended Drivers	SD4015B3

Note) Refer to page Q130 for connection diagram of recommended Drivers.

●Structure



●Model number notation

CAS 14 - R 010 - 020 H R S

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

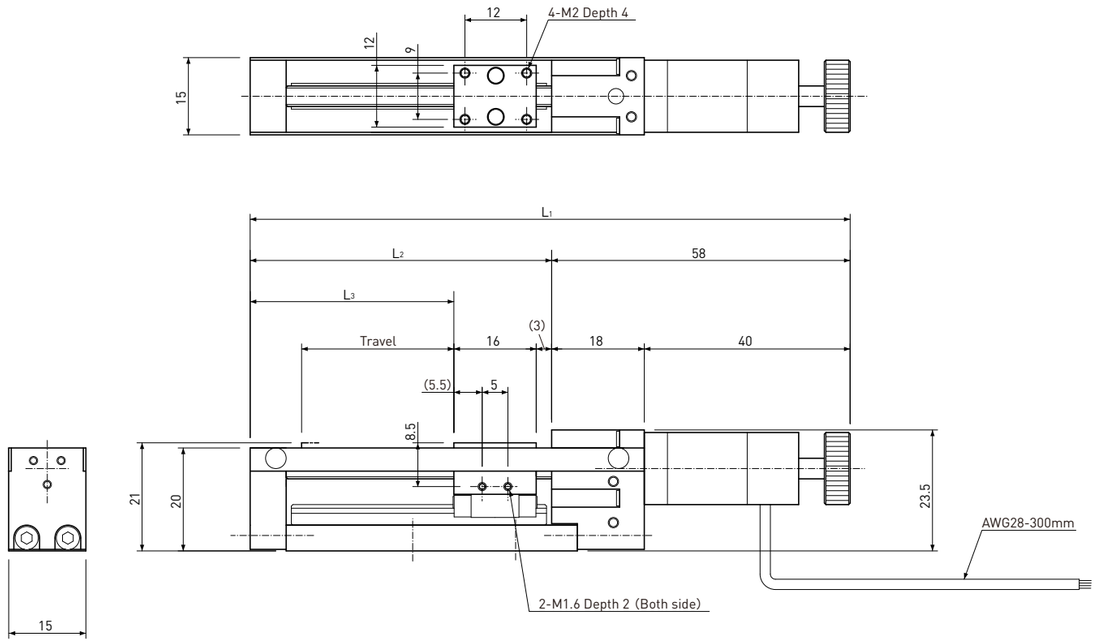
①Series No.
CA : KSS Compact Actuator Series
②Motor Frame Size
14 : NEMA 6
③Drive Screw type
R : Rolled Ball Screw
④Lead / Pitch (mm) : 010 means 1mm
⑤Travel (mm) 020 means 20mm
⑥Connector type
N : No connector (Bare)
H : HIROSE RP17
E : EI connector (TE Connectivity)
S : Others
⑦Direction of Motor leads
R : Right (from shaft end side)
L : Left
T : Top
B : Bottom
⑧Option
S : Sensor outside

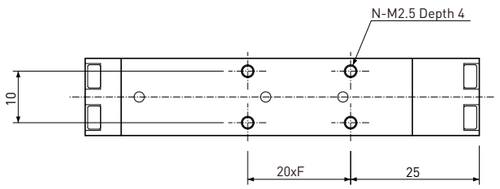
Standard style of CAS series

Rolled Ball Screw + 2-phase Stepping Motor

CAS□14 / CAS NEMA 6

Shaft dia.ϕ4





Motor

A	Orange
$\overline{A}$	Blue
B	Red
$\overline{B}$	Yellow

Model Number	Travel (mm)	Screw Lead (mm)	Resolution (μm)	Length (mm) L_1	L_2	L_3	F	N		Max. Load Capacity (N) Hor.	Vert.	Permissible speed (mm / sec)	Mass (g)
CAS14 - R010 - 020	20	1	0.005	107	49	30	1	4		10	5	20	88
CAS14 - R010 - 040	40	1	0.005	127	69	50	2	6		10	5	20	96
CAS14 - R020 - 020	20	2	0.01	107	49	30	1	4		5	3	40	88
CAS14 - R020 - 040	40	2	0.01	127	69	50	2	6		5	3	40	96

Permissible Moment	
Pitching Mp	0.14Nm
Yawing My	0.12Nm
Rolling Mr	0.22Nm

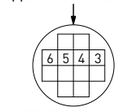
Lubrication	Grease MSG No.2 (KSS)
Operating Temp.	0~40℃

Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

Motor Model：SH2141-5511(Double Shaft)
Sanyo Denki
Driver recommendation：SD4015B3

Connector choice
Please designate connector type below.
No connector if there is no designation.
1) None(Bare)
2) RP17-13J-12SC(HIROSE)
3) EI-Connector(TE connectivity)
172211-6 pins for Motor +172211-4 pins for Sensor

Upper side(white dot)

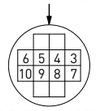


RP17-13J-12SC (female)

HIROSE RP17 Connector

1	None
2	None
3	Stepping Motor A(Orange)
4	Stepping Motor $\overline{A}$(Blue)
5	Stepping Motor B(Red)
6	Stepping Motor $\overline{B}$(Yellow)
7	None
8	None
9	None
10	None
11	None
12	None

Upper side(white dot)



RP17-13J-12SC (female)

When Sensor option is selected

1	None
2	None
3	Stepping Motor A(Orange)
4	Stepping Motor $\overline{A}$(Blue)
5	Stepping Motor B(Red)
6	Stepping Motor $\overline{B}$(Yellow)
7	+5~24V(Blown)
8	COM(Blue)
9	Short circuit with No.8
10	ORGLS Sensor NC(Black)
11	None
12	None

172211-6(male)

EI Connector

1	None
2	None
3	Stepping Motor A(Orange)
4	Stepping Motor $\overline{A}$(Blue)
5	Stepping Motor B(Red)
6	Stepping Motor $\overline{B}$(Yellow)

172211-4(male)

When Sensor option is selected

1	+5~24V(Blown)
2	COM(Blue)
3	Short circuit with No.2
4	ORGLS Sensor NC(Black)

Note
1) There should be no condensation when using.
2) Permissible Moment is the number when no load in other direction.
3) Resolution represents the values for full step.
4) Model number is for no-connector and lead wire is set on right side on Motor.
5) Vibration may increase at low speed or zero return.

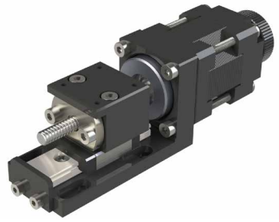
Common Specifications	
Repeatability	Max. ±0.01mm
Lost Motion	Max. 0.01mm
Body Material	Aluminum
Sliding guide	Slide Guide rail

Motor Specifications	
Driving method	2-phase Bi-polar
Rated Voltage	6.3V(DC)
Rated current	0.3A/phase(※)
Winding resistance	21Ω
Insulation Class	Class B(130℃)

※SD4015B3 (Vanguard Systems Co., Ltd.) is recommended for driver.
Please use Run current 0.4A setting.

MoBo Actuator (MA Series)

External Ball Screw type(MoBo) is built in this series, what we call MoBo Actuators.
All of MoBo Actuators are produced as customized products, in accordance with customer's order.



●Features

More compact design of Unit products in longitudinal dimension became reality by using Direct Motor Drive Ball Screws / Resin Lead Screws.

●Variation

There are several kinds of MoBo Actuator shown below. Each Actuator has a different kinds of Ball Screw / Lead Screw inside.

1) Precision Ball Screw type
   High accuracy in both Repeatability and Lost motion by using Precision Ball Screw.

2) Rolled Ball Screw type
   Reasonable price and accuracy have been achieved by using Rolled Ball Screw.

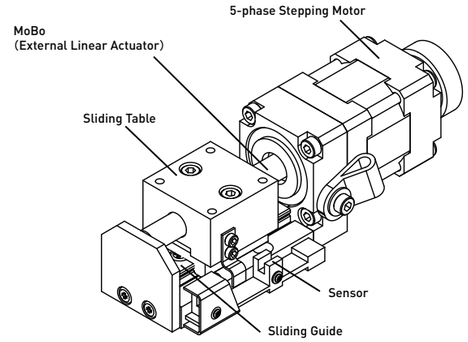
3) Resin Lead Screw type
   It can be used without oiling in normal environment, because lubricating agent is incorporated in Resin Nut.

●Model number notation

MA S – G 020 – 015 N R
① ② ③ ④ ⑤ ⑥ ⑦

①Series No.
MA : MoBo Actuator Series
②Actuator type
S : Slider type
③Lead Screw / Ball Screw
G : Precision Ball Screw
R : Rolled Ball Screw
Re : Resin Lead Screw
④Lead/Pitch (mm) : 020 means 2mm
⑤Travel (mm) : 015 means 15mm
⑥Connector type
N : No connector (Bare)
H : HIROSE RP17
E : EI connector (TE Connectivity)
⑦Direction of Motor leads
R : Right (from Shaft end side)
L : Left

●Structure



●Specifications

Overall specifications for MoBo Actuators are shown in Table below.
For further information, please see dimension Table.

Model	MAS-G010-015	MAS-G010-030	MAS-R010-015	MAS-R010-030	MAS-Re020-015	MAS-Re020-030
Travel	15mm	30mm	15mm	30mm	15mm	30mm
Drive Screw	Precision Ball Screw Lead = 1mm		Rolled Ball Screw Lead = 1mm		Resin Lead Screw Lead = 2mm	
Sliding Guide	Slide Guide rail					
Body Material	Aluminum					
Mass	200g	210g	200g	210g	200g	210g
Resolution	0.002mm		0.002mm		0.004mm	
Repeatability	Max. ±0.005mm		Max. ±0.01mm		Max. ±0.05mm	
Lost motion	Max. 0.005mm		Max. 0.01mm		Max. 0.05mm	
Horizontal Load Capacity	Max. 29.4N		Max. 29.4N		Max. 9.8N	
Vertical Load Capacity	Max. 19.6N		Max. 19.6N		Max. 4.9N	
Permissible speed	0.4~20mm/sec		0.4~20mm/sec		0.8~15mm/sec	
Maximum acceleration	0.1m/sec^2					
Permissble Moment Mp (Pitching)	0.16Nm ** In case of no load in My & Mr direction					
Permissible Moment My (Yawing)	0.10Nm ** In case of no load in Mp & Mr direction					
Permissible Moment Mr (Rolling)	0.20Nm ** In case of no load in Mp & My direction					
Operating Temp.	0~40℃ (without any due condensation)					
Lubrication	Ball Screw : KSS MSG No.2 Sliding Guide : KSS MSG No.2				Lead Screw: Sumitec Liquid H20 Sliding Guide: KSS MSG No.2	

•Motor : 5-phase Stepping Motor □24(NEMA 10) , 0.75A/phase
•Photo Micro sensor : EE-SX1103(Omron) , DC5V 50mA (Motor side and Travel end)

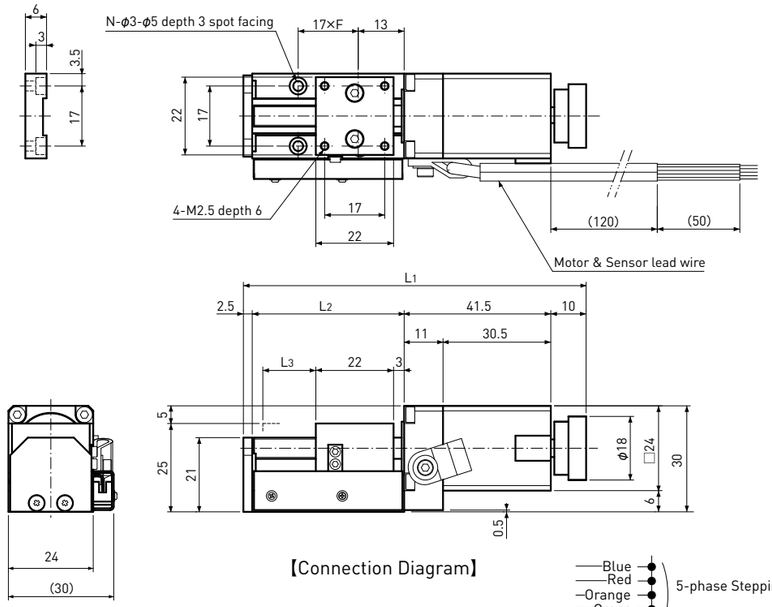
Actuator
Single axis Actuator

Standard style of MAS series

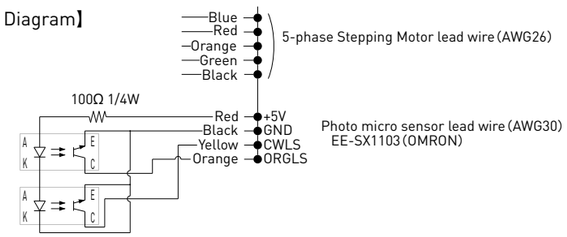
Drive Ball Screw + 5-phase Stepping Motor

MAS□24 / MAS NEMA 11

Shaft dia. ϕ6



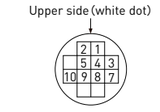
【Connection Diagram】



【Connector choice】。
Please designate connector type below.
No connector if there is no designation.

1) None (Bare)
2) RP17-13J-12SC (HIROSE)
3) EI-Connector (TE connectivity :
172211-6 pins for Motor + 172211-4 pins for Sensor)

【HIROSE RP-Connector】



RP17-13J-12SC (female)

1	Stepping Motor (Blue)
2	Stepping Motor (Red)
3	Stepping Motor (Orange)
4	Stepping Motor (Green)
5	Stepping Motor (Black)
6	None
7	5V (Red)
8	GND (Black)
9	CWLS Sensor (Yellow)
10	ORGLS Sensor (orange)
11	None
12	None

【EI-Connector】

172211-6 (male)

1	Stepping Motor (Bule)
2	Stepping Motor (Red)
3	Stepping Motor (Orange)
4	Stepping Motor (Green)
5	Stepping Motor (Black)
6	None

172211-4 (male)

1	5V (Red)
2	GND (Black)
3	CWLS Sensor (Yellow)
4	ORGLS Sensor (Orange)

Common Specifications	
Motor	5-phase Stepping Motor □24, 0.75A / phase
Body Material	Aluminum
Sliding guide	Slide Guide rail (Single)
Photo Sensor (Motor side & travel end)	Omron : EE-SX1103 ※Light-on
Permissible Moment	
Pitching Mp	0.16Nm
Yawing My	0.10Nm
Rolling Mr	0.20Nm
Lubrication	
MSG No.2 (KSS original Grease) **Sumitec Liquid H20 for Resin Lead Screw	
Operating Temp.	
0～40℃ **No due condensation	

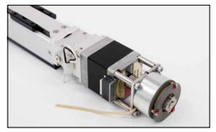
Model Number	Drive Screw type	Travel (mm)	Screw Lead (mm)	Resolution (mm)	Length (mm) L1	L2	L3	F	N		Repeatability max. (mm)	Lost Motion max. (mm)	Load Capacity max. (N/kgf) Hor.	Vert.	Maximum Acceleration (m/sec²)	Permissible speed (mm/sec)	Mass (g)	Model Number
MAS-G010-015NR	Precision Ball Screw	15	1	0.002	97	43	15	1	4		±0.005	0.005	29.4/3.0	19.6/2.0	0.1	0.4～20	200	MAS-G010-015NR
MAS-R010-015NR	Rolled Ball Screw		1	0.002	97	43	15	1	4		±0.01	0.01	29.4/3.0	19.6/2.0	0.1	0.4～20	200	MAS-R010-015NR
MAS-Re020-015NR	Resin Lead Screw		2	0.004	97	43	15	1	4		±0.05	0.05	9.8/1.0	4.9/0.5	0.1	0.8～15	200	MAS-Re020-015NR
MAS-G010-030NR	Precision Ball Screw	30	1	0.002	112	58	30	2	6		±0.005	0.005	29.4/3.0	19.6/2.0	0.1	0.4～20	210	MAS-G010-030NR
MAS-R010-030NR	Rolled Ball Screw		1	0.002	112	58	30	2	6		±0.01	0.01	29.4/3.0	19.6/2.0	0.1	0.4～20	210	MAS-R010-030NR
MAS-Re020-030NR	Resin Lead Screw		2	0.004	112	58	30	2	6		±0.05	0.05	9.8/1.0	4.9/0.5	0.1	0.8～15	210	MAS-Re020-030NR

Note 1) Model Number above is for no-connector and lead wire is set on right side on Motor.
Note 2) Permissible moment is based on no load in other direction.
Note 3) Dimension above is our model case, if you need special specifications, please ask KSS representative.
Note 4) Refer to page Q131 for connection diagrams of recommended Driver (KR-A5CC, KR-A55MC).
Note 5) Please refer to Technical Description page S106 for the Datum clamp face of the Actuator.

●Options for Single axis Actuator

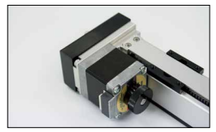
【 Solenoid Brake Unit】(Only for Flex series)

If Flex Actuators are operated in vertical position, Ball Screw / Lead Screw may fall down when its power is off. Solenoid Brake Unit is effective to maintain intermediate position.



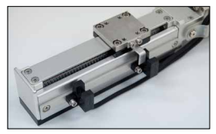
【Motor side mounting kit】(Only for Flex series)

This kit can shorten the Actuator length with side mounting Motor shown in Photo right. Motor mount, timing pulley, timing belt and set screws are included in this kit. KSS can assemble in accordance with your request.



【Photo-micro sensor】(Only for Flex series)

Sensor accessories for the purpose of putting sensor outside Actuator. Sensor dog, sensor rail, photo sensor, sensor plate and set screws are included in this kit.
KSS can assemble in accordance with your reguest.



【Grease】

KSS original Grease (MSG No.2) is used for KSS Flex Actuator series, except Lead Screw type. This Grease has high lubrication performance without deteriorating Ball Screw smooth movement. It would be useful for Grease maintenance to keep long term operation.

●Recommended Driver

KSS provides Standard Stepping Motor Driver and Extension Cable as an option for Single axis Actuators in order to make it easy to use.

【Stepping Motor Driver】

KR-A5CC

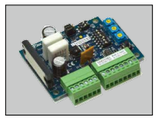
This Driver is for 5-phase Stepping Motor operated by DC24V power supply. It has automatic current reduction circuits. You can choose full-step or half step function(page V102).

KR-A55MC

Micro-Step Driver for 5-phase Stepping Motor with DC24V power supply. 16 step angle types can be set with up to 250 divisions(page V103～V104).

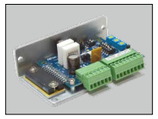
SD4015B3

This is recommended 2-phase stepping Motor Driver for 0.25～1.5 A. It has Micro-Step function with 8-step angle(page V107).



SD4030B3

This is recommended 2-phase stepping Motor Driver for 0.5～3.0A. It has Micro-Step function with 8-step angle(page V108).



●Extension Cable

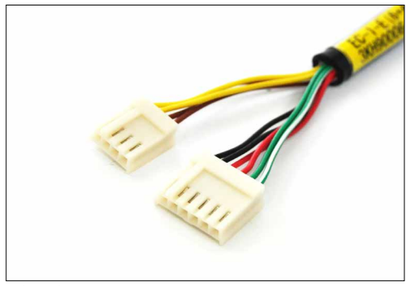
Extension Cable between KSS Single axis Actuators and KSS recommended Stepping Motor Driver.
Please designate Cable type, Cable length and Connector type in accordance with the example below.
Please note that one side of Extension Cable is cut endge only (no connector).

EC R — 2 — E(6)
① ② ③ ④

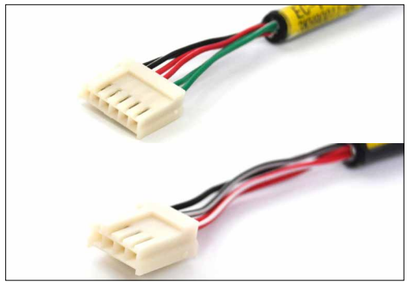
①Extension Cable
②Cable type
R:Robot cable type
③Cable length (m)
④Connector type at both end

N	: No connector (Bare)
H	: HIROSE RP17
E(6)	: EI connector 6-pins (for Motor only)
E(4)	: EI connector 4-pins (for Sensor only)
E(6+4)	: EI connector 6+4-pins (for Motor & Sensor)

H : HIROSE RP17



E(6+4) : EI connector 6+4-pins
(TE Connectivity)



E(6) : EI connector 6-pins
E(4) : EI connector 4-pins
(TE Connectivity)

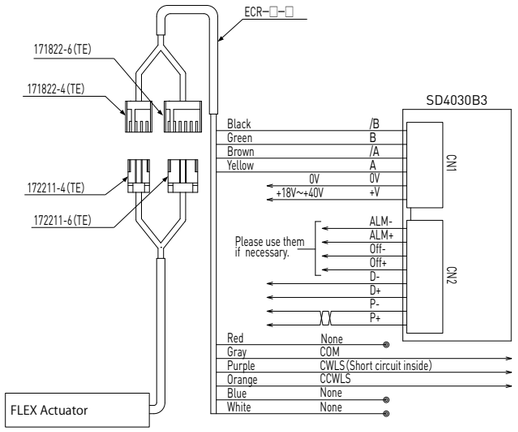
Connection diagrams

For Flex series

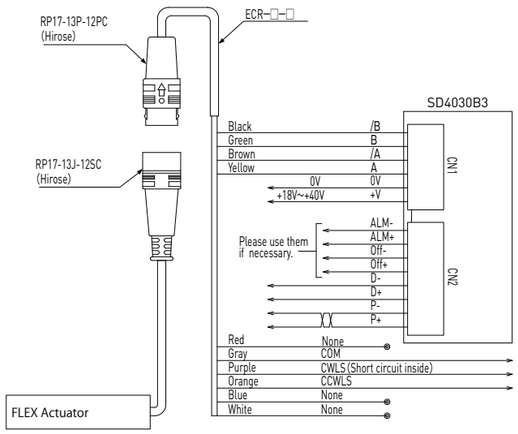
【SD4030B3 Connection diagrams】

Applicable Motor
Minebea Motor　10PM-K202B

【EI connector】



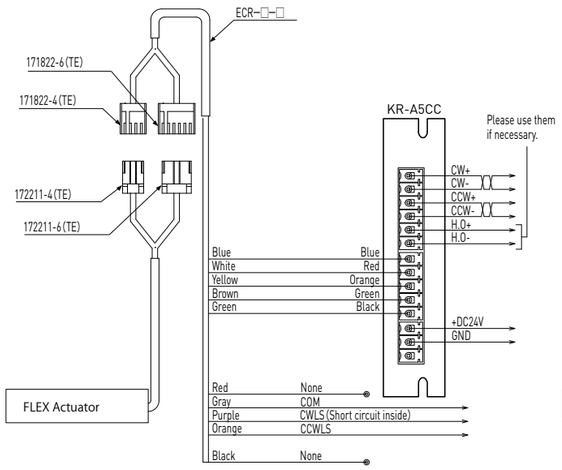
【HIROSE connector】



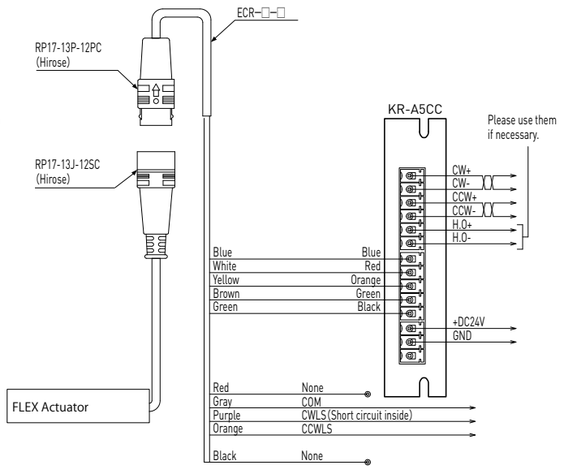
【KR-A5CC Connection diagrams】

Applicable Motor
Oriental Moter　PK523HPB

【EI connector】



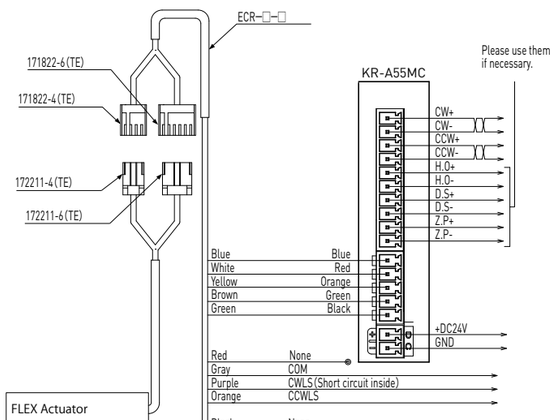
【HIROSE connector】



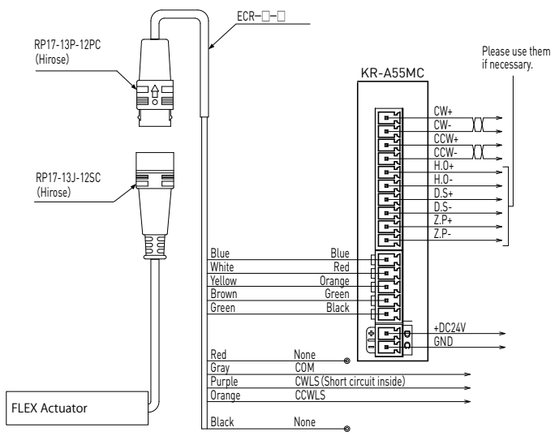
【KR-A55MC Connection diagrams】

Applicable Motor
Oriental Moter　PK523HPB

【EI connector】



【HIROSE connector】

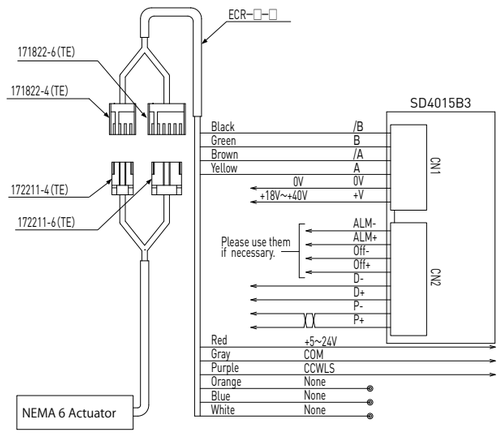


For CAS series

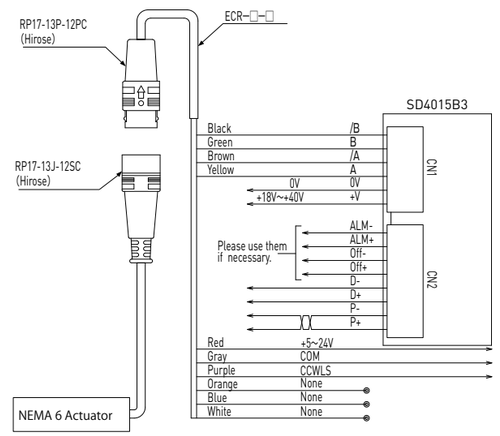
【SD4015B3 Connection diagrams】

Applicable Motor
Sanyo　SH2141-551

【EI connector】



【HIROSE connector】

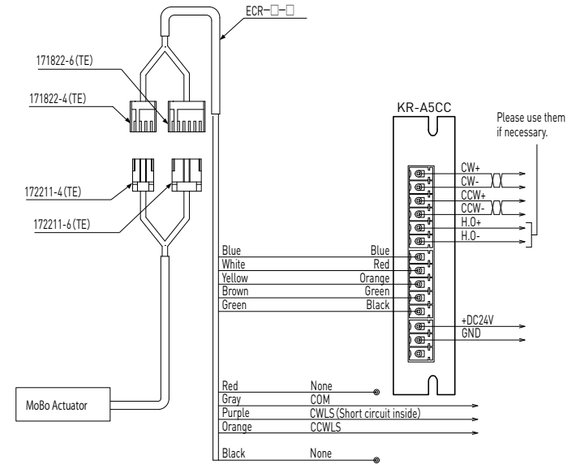


●For MA series

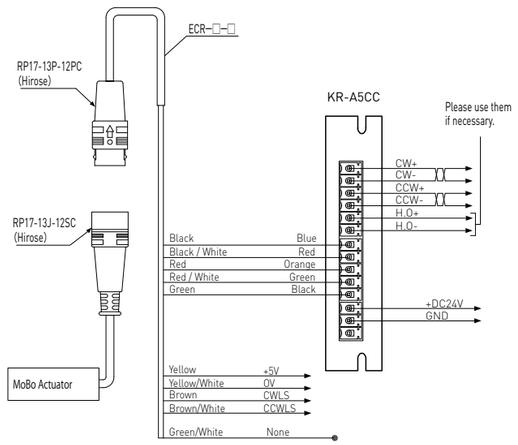
【KR-A5CC Connection diagrams】

Applicable Motor
TAMAGAWA SEIKI　Dedicated Motor for Linear Actuator

【EI connector】



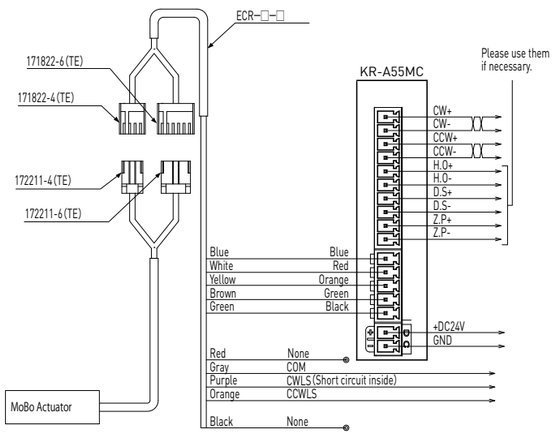
【HIROSE connector】



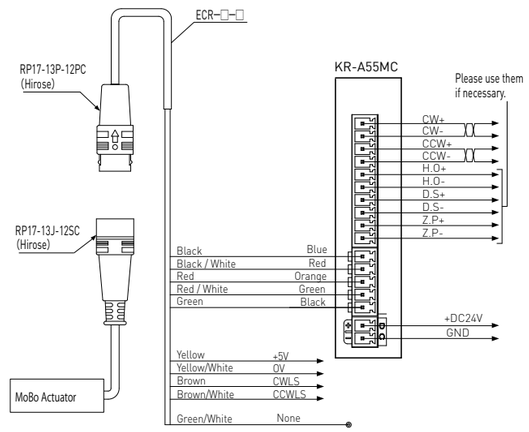
【KR-A55MC Connection diagrams】

Applicable Motor
TAMAGAWA SEIKI　Dedicated Motor for Linear Actuator

【EI connector】



【HIROSE connector】



●Precaution of handling and operating

【Precaution for safety】

1) Before using these products, please read instruction manuals and follow the precautions below.
2) Do not hit or drop the Shaft, do not apply Axial or Radial load exceeding specifications, it may cause malfunction.
3) Before using, please check that the product has no defect, and product is the same as your order.
4) Do not disassemble each component, dust may get inside the product. It may deteriorate accuracy.
5) Please prevent contamination from dust or swarf. Dust or swarf may cause damage to Ball Screw/Lead Screw, which lead to deteriorating the function.
6) Single axis Actuator should be checked the lubricant condition every 2 to 3 months. If Grease is contaminated, remove old Grease and replace with new one. Grease should be the same as the original Grease, which is described in dimension table.
7) Do not use Single axis Actuator exceeding our specifications in Load or Speed.
8) Do not use Single axis Actuator beyond the Maximum Acceleration.
9) Do not hold the Motor leads and Sensor leads, this may result in damage to the device or injury. The Motor lead wire should be fixed securely.
10) Keep away from Magnetic memory device.

【Precaution for safety】

1) If abnormal odor, noise, smoke overheating, or vibration occurs, stop operation immediately and turn the power off.
2) Do not use exceeding rated current.
3) The Motor may overheat depending on the load conditions or driver used. Make sure that the Motor surface temperature does not exceed 80℃ when in use.
4) Do not bend, pull or pinch the Motor lead wire.
5) Do not touch moving parts during operation.
6) Please switch off the Driver, when inspection or maintenance.

【Operating environment】

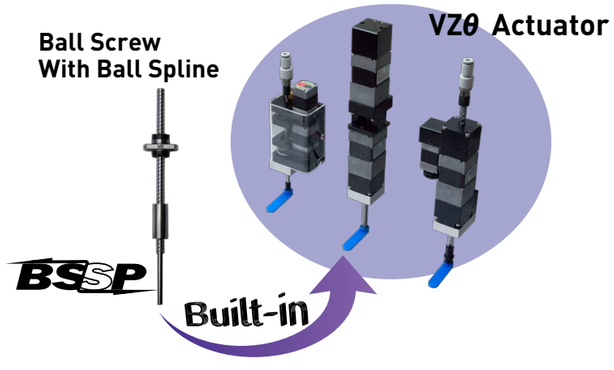
1) Operating environment should be 0～40℃ in temperature and 20～80%RH in humidity. Do not use these products under dew condensation, corrosive gas or inflammable gas environment.
2) Do not use these products under strong electric field, strong magnetic field.
3) Please prevent from swarf, oil mist, cutting fluid, Water/moisture, salt spray, organic solvent and other contamination.
4) Single axis Actuator cannot be used under the vibration, impact, vacuum, and other special environment.

VZθ Actuator

VZθ Series

The brand new products which applied the KSS miniature Ball Screw with Ball Spline (BSSP), and realized three functions, linear motion(Z), rotary motion(θ), and vacuum(V), with one product.

Ball Screw with Ball Spline (BSSP)



●Types and Features

KSS provides 3-types of VZθ Actuator, which are Direct Drive type, Hybrid Drive type, and Belt-Drive type including high speed type. It is possible to select one of them according to your specifications or application.

Direct Drive type

Hybrid Drive type

Belt Drive type

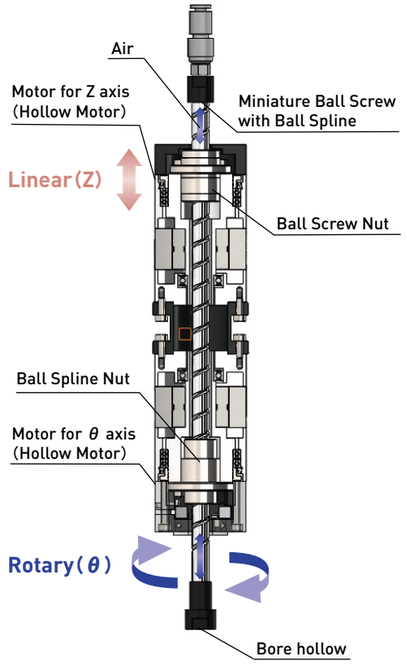
●Specifications

Model	Shaft dia. (mm)	Lead (mm)	Travel (mm)	Max. Speed(Z) (mm/sec)	Max. speed(θ) (rev/sec)	Thrust Force (N)	Max. Permissible Moment ($kg \cdot m^2$)
Direct Drive type	φ6	10	50	120	3	5	0.15×10^{-4}
	φ8	10	50	200	3	25	0.15×10^{-3}
Hybrid Drive type	φ6	10	60	200	3	5	0.15×10^{-4}
Belt-Drive type	φ4	4	60	80	3	5	0.8×10^{-5}
	φ6	10	60,120	200	3	10	0.4×10^{-4}
	φ8	10	120	200	3	15	0.1×10^{-3}
Belt-Drive High speed type	φ6	10	80	500	25	3	0.15×10^{-4}

●Structures

【Direct Drive type】

Slim form is realized by driving a Ball Screw and a Ball Spline Nut directly bult in a Hollow Motor.



-Principle of operation-

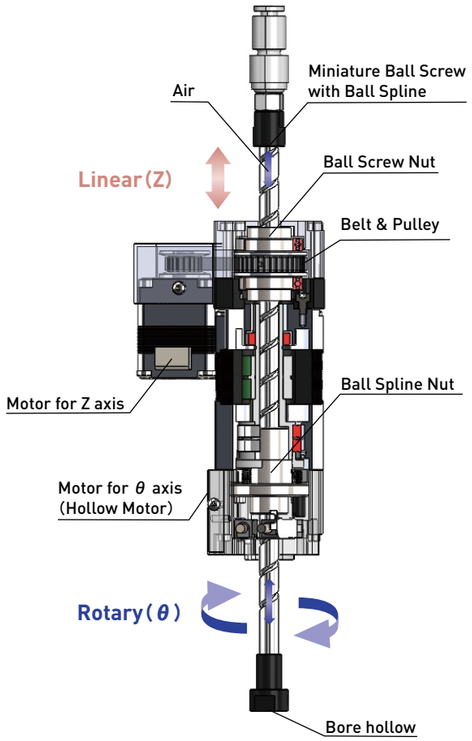
Linear motion (Z)
Linear motion by driving a Z-axis Motor and rotating the Ball Screw Nut. At this time, the Ball Spline Nut plays a role of anti-rotating device and slide guide of a Screw Shaft.

Rotary Motion (θ)
Turn the Ball Screw Nut and Ball Spline Nut at the same time, same speed and direction, the Shaft rotates without moving up & down.

Vacuum (V)
Bore Hollow can be multi uses.
For example vacuum and blow function.

【Hybrid Drive type】

Combination of the Hollow Motor and Normal Motor gives dramatically short length of Actuator Body.



-Principle of operation-

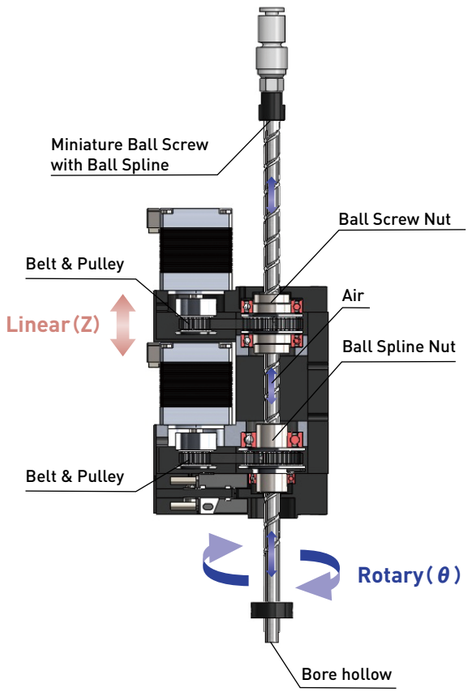
Linear motion (Z)
For linear motion, drive the Ball Screw Nut by Z-axis Motor through the Belt & Pulley. In this case, Ball Spline Nut plays a role of slide guide & anti-rotating device.

Rotary Motion (θ)
Turn the Ball Screw Nut and Ball Spline Nut at the same time, same speed and direction, the Shaft rotates without moving up & down.

Vacuum (V)
Bore Hollow can be multi uses.
For example vacuum and blow function.

【Belt Drive type】

Wide variety of Motor can be set on this Actuator.
This means various options are available based on Motor Specifications.



-Principle of operation-

Linear motion (Z)
For linear motion, drive the Ball Screw Nut by Z-axis Motor through the Belt & Pulley. In this case, Ball Spline Nut plays a role of slide guide & anti-rotating device.

Rotary Motion (θ)
Turn the Ball Screw Nut and Ball Spline Nut at the same time, same speed and direction, the Shaft rotates without moving up & down.

Vacuum (V)
Bore Hollow can be multi uses.
For example vacuum and blow function.

●Model number notation
【Direct Type / Hybird Drive type】

DD VZ 42 - G 05 - 050 N XXX
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①Series No.
DD : Direct Drive type
HD : Hybrid Drive type
②Actuator type
VZ : VZθ (VZ-theta) Actuator
③Motor size
42 : NEMA 17 Stepping Motor
28 : NEMA 11 Stepping Motor
④Lead Screw / Ball Screw type
G : Precision Ball Screw+Ball Spline
⑤Lead / Pitch (mm) : 05 means 5mm
⑥Travel(mm) : 050 means 50mm
⑦Connector type
N : No connector(Bare)
E : EI connector(TE Connectivity)
⑧Extra notation

【Belt Drive type】

BD VZ 06 - G 10 - 050 N 01 XXX
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①Series No.
BD : Belt Drive Actuator Series
②Actuator type
VZ : VZθ (VZ-theta) Actuator
③Shaft Nominal diameter : 06 means 6mm
④Lead Screw / Ball Screw type
G : Precision Ball Screw+Ball Spline
⑤Lead / Pitch (mm) : 10 means 10mm
⑥Travel (mm) : 050 means 50mm
⑦Connector type
N : No connector (Bare)
E : EI connector (TE Connectivity)
⑧Motor type
01 : NEMA 10 Stepping Motor
02 : NEMA 11 Stepping Motor
03 : NEMA 14 Stepping Motor
⑨Extra notation

【High Speed Belt Drive type】

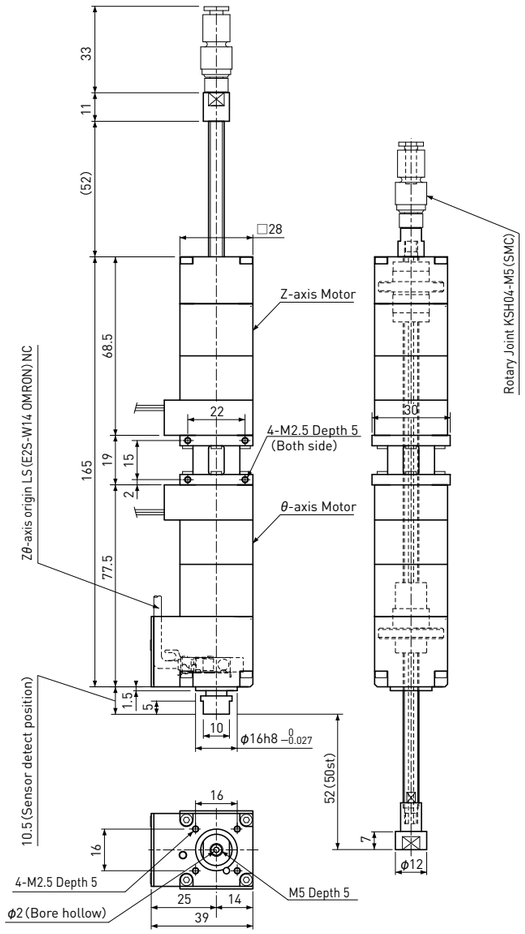
The model number nomination is as follows for High Speed Belt Drive type or custom design products which specifications and dimension significantly change from Catalogue.

DD 28 - G 100 100 N2 K 2 E - B
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

①Actuator type
DD : Direct Drive Actuator Series
HD : Hybrid Drive Actuator Series
BD : Belt Drive Actuator Series
②Motor Frame size
25 : NEMA 10 28 : NEMA 11
35 : NEMA 14 42 : NEMA 17
③Lead Screw / Ball Screw type
G : Precision Ball Screw
④Lead / Pitch (mm) : 100 means 10mm
⑤Travel (mm) : 100 means 100mm
⑥Motor type
N2 : 2-phase stepping motor
N5 : 5-phase stepping motor
NE : Stepping motor with Encoder
NS : Servo motor
⑦Sensor type
F : Photo-Micro L : Limit Switch
K : Proximity Z : Magnetic
⑧Number of Sensor
1 : 1 sensor 2 : 2 sensors
⑨Connector type
H : HIROSE
E : EI (TE Connectivity)
N : No connector (Bare)
⑩Option
B : Electro Magnetic Brake
C : for Clean room V : Vacuum
( ) : Motor position represented by degree

DDVZ28 - G10 - 050 N

□28 / NEMA 11 2-phase Stepping Motor
Lead 10mm Travel 50mm



Parts List	
Motor	NEMA 11 Hollow Stepping Motor 0.67A/phase
Drive Screw	Ball Screw φ6 (Lead 10mm)
Sliding Guide	Ball Spline φ6mm
Sensor (Linear,Rotary)	Proximity Sensor E2S-W14-1M(OMRON)

Motor (Z, θ -axis)

A	Black
Ā	Green
B	Red
B̄	Blue

UL1061,AWG24 (300mm)

Sensor (Z, θ -axis)

+12~24V	Brown
LS	Black
GND	Blue

1000mm

●Specifications

※The numbers in table below are reference. Detail dimmensions will be provided by drawing

Items	Z Axis	θ Axis
Movable Range	50mm	± 360°
Repeatability	±0.010mm	±0.03°
Resolution	50μm (Full Step)	1.8° (Full Step)
Maximum Speed	120mm / sec	3 rev / sec
Maximum acceleration	0.6 m/sec²	150π rad/sec²
Reference Thrust Force	5N	—
Maximun Permissible Moment	—	0.15×10⁻⁴kg·m² (※1)
Mass	540g	
Operating Temperature	0~40℃ (No Condensation)	

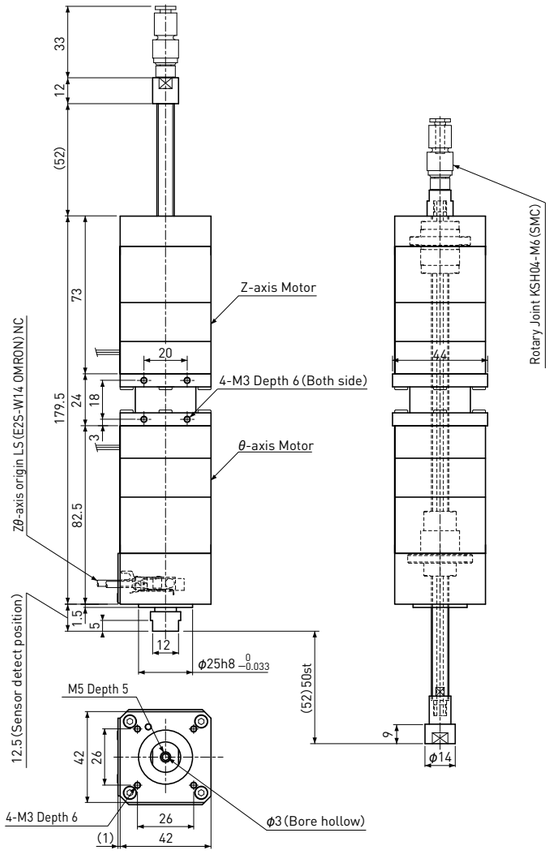
Reference of Moment of Inertia		
Dia.	Height	
	Aluminum	Steel
φ20mm	340mm (300g)	120mm (300g)
φ30mm	65mm (130g)	25mm (130g)
φ40mm	20mm (75g)	7.5mm (75g)

Precautions
1) The Z-axis does not have brake device. Please be careful when the power supply is switched off in case Z-axis may free-fall.
2) Reference of Moment of Inertia table shows the theoretical values. KSS recommends that you should apply actual moment to the machine and confirm the safety operation before use.

※1 For the Maximum Permissible Moment, see "Reference of Moment of Inertia" table above.
※2 For the technical information, see " Actuator Technical Description".

DDVZ42 - G10 - 050 N

□42 / NEMA 17 2-phase Stepping Motor
Lead 10mm Travel 50mm



Parts List	
Motor	NEMA 17 Hollow Stepping Motor 1.2A/phase
Drive Screw	Ball Screw φ8 (Lead 10mm)
Sliding Guide	Ball Spline φ8mm
Sensor (Linear, Rotary)	Proximity Sensor E2S-W14-1M(OMRON)

Motor (Z, θ -axis)

A	Black
Ā	Green
B	Red
B̄	Blue

UL1061,AWG24 (300mm)

Sensor (Z, θ -axis)

+12~24V	Brown
LS	Black
GND	Blue

1000mm

●Specifications

※The numbers in table below are reference. Detail dimmensions will be provided by drawing.

Items	Z Axis	θ Axis
Movable Range	50mm	± 360°
Repeatability	±0.010mm	±0.03°
Resolution	50μm (Full Step)	1.8° (Full Step)
Maximum Speed	200mm / sec	3 rev / sec
Maximum acceleration	1 m/sec²	150π rad/sec²
Reference Thrust Force	25N	—
Maximun Permissible Moment	—	0.15×10⁻³kg·m² (※1)
Mass	1150g	
Operating Temperature	0~40℃ (No Condensation)	

Reference of Moment of Inertia		
Dia.	Height	
	Aluminum	Steel
φ30mm	670mm (1300g)	240mm (1300g)
φ50mm	85mm (460g)	30mm (460g)
φ100mm	5mm (110g)	1.5mm (90g)

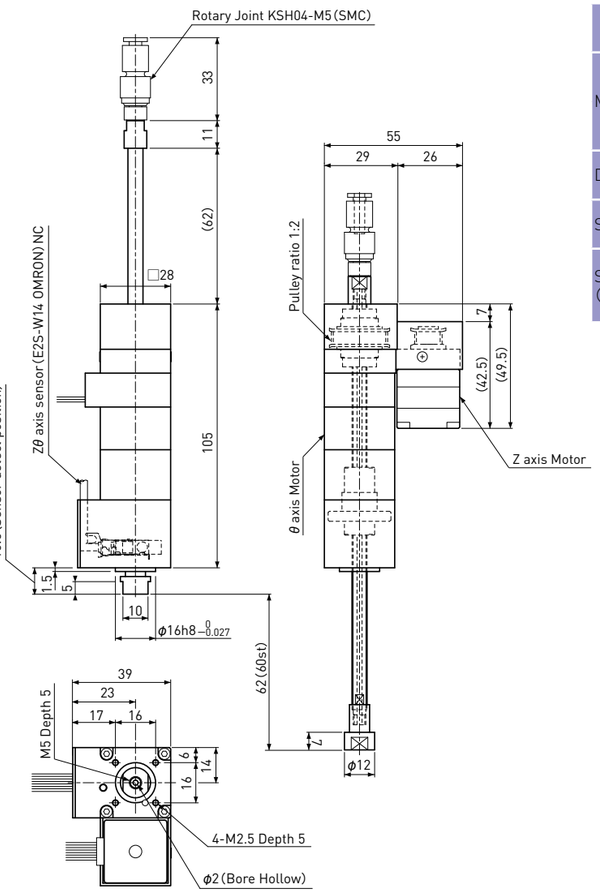
Precautions
1) The Z-axis does not have brake device. Please be careful when the power supply is switched off in case Z-axis may free-fall.
2) Reference of Moment of Inertia table shows the theoretical values. KSS recommends that you should apply actual moment to the machine and confirm the safety operation before use.

※1 For the Maximum Permissible Moment, see "Reference of Moment of Inertia" table above.
※2 For the technical information, see " Actuator Technical Description".

Standard style of VZθ HD series — Hybrid type

HDVZ28 - G10 - 060 N

□25/28 (NEMA10/11) 2-phase Stepping Motor
Lead 10mm Travel 60mm



Parts List		
Motor	Z	NEMA 10 Stepping Motor 0.7A/phase
	θ	NEMA 11 Hollow Stepping Motor 0.67A/phase
Drive Screw	Ball Screw φ6 (Lead 10mm)	
Sliding Guide	Ball Spline φ6mm	
Sensor (Linear, Rotary)	Proximity Sensor E2S-W14-1M (OMRON)	

Z-axis Motor

A	Red
Ā	Yellow
B	Blue
B̄	Orange

UL1061,AWG26 (300mm)

θ -axis Motor

A	Black
Ā	Green
B	Red
B̄	Blue

UL1061,AWG24 (300mm)

Sensor (Z, θ -axis)

+12~24V	Brown
LS	Black
GND	Blue

1000mm

●Specifications

※The numbers in table below are reference. Detail dimmensions will be provided by drawing.

Items	Z Axis	θ Axis
Movable Range	60mm	± 360°
Repeatability	±0.020mm	±0.03°
Resolution	25μm (Full Step)	1.8° (Full Step)
Maximum Speed	200mm / sec	3 rev / sec
Maximum acceleration	1 m/sec²	150π rad/sec²
Reference Thrust Force	5N	—
Maximun Permissible Moment	—	0.15×10⁻⁴kg·m² (※1)
Reduction ratio	1/2	—
Mass	440g	
Operating Temperature	0~40℃ (No Condensation)	

Reference of Moment of Inertia		
Dia.	Height	
	Aluminum	Steel
φ20mm	340mm (300g)	120mm (300g)
φ30mm	65mm (130g)	25mm (130g)
φ40mm	20mm (75g)	7.5mm (75g)

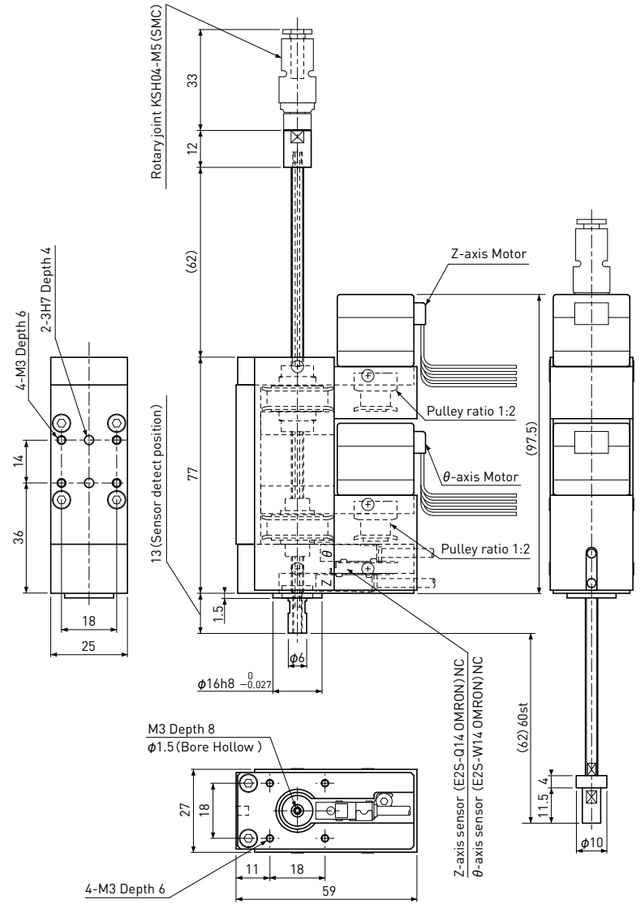
Precautions
1) The Z-axis does not have brake device. Please be careful when the power supply is switched off in case of Z-axis may free-fall.
2) Reference of Moment of Inertia table shows the theoretical values. KSS recommends that you should apply actual moment to the machine and confirm the safety operation before use.

※1 For the Maximum Permissible Moment, see "Reference of Moment of Inertia" table above.
※2 For the technical information, see " Actuator Technical Description".

Standard style of VZθ BD series — Belt Drive type

BDVZ04 - G04 - 060 N 01

□25/NEMA 10 2-phase Stepping Motor
Lead 4mm Travel 60mm



Parts List	
Motor	NEMA 10 Stepping Motor 0.7A/phase
Drive Screw	Ball Screw φ4 (Lead 4mm)
Sliding Guide	Ball Spline φ4mm
Sensor	Z axis : Proximity Sensor E2S-Q14-1M (OMRON) NC θ axis : Proximity Sensor E2S-W14-1M (OMRON) NC

Motor (Z, θ -axis)

A	Red
Ā	Yellow
B	Blue
B̄	Orange

UL1061,AWG26 (300mm)

Sensor (Z, θ -axis)

+12~24V	Brown
LS	Black
GND	Blue

1000mm

●Specifications

※The numbers in table below are reference. Detail dimmensions will be provided by drawing.

Items	Z Axis	θ Axis
Movable Range	60mm	± 360°
Repeatability	±0.020mm	±0.03°
Resolution	10μm (Full Step)	0.9° (Full Step)
Maximum Speed	80mm / sec	3 rev / sec
Maximum acceleration	0.4 m/sec²	150π rad/sec²
Reference Thrust Force	5N	—
Maximun Permissible Moment	—	0.8×10⁻⁵kg·m² (※1)
Reduction ratio	1/2	1/2
Mass	370g	
Operating Temperature	0~40℃ (No Condensation)	

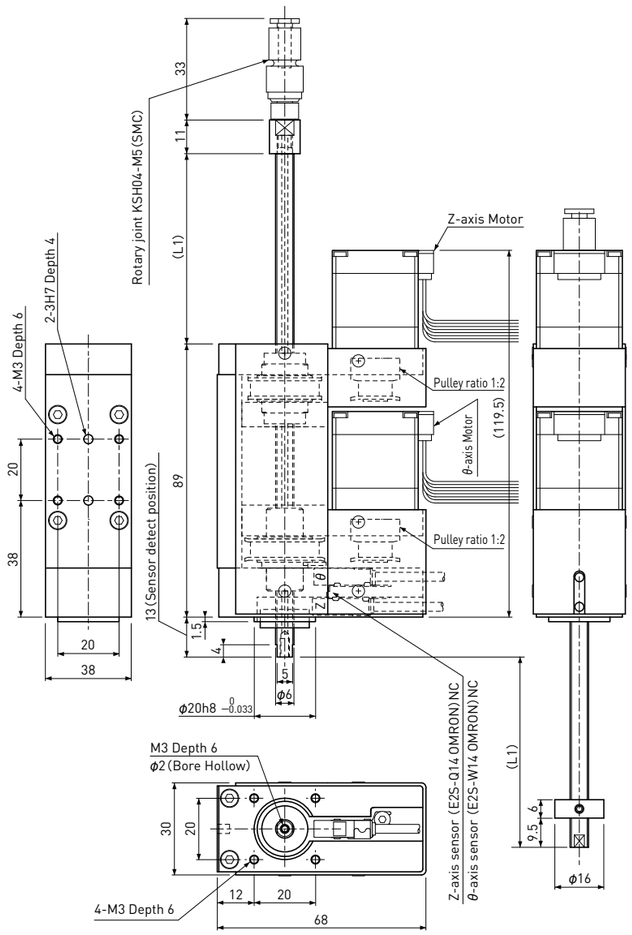
Reference of Moment of Inertia		
Dia.	Height	
	Aluminum	Steel
φ20mm	180mm (160g)	64mm (160g)
φ30mm	36mm (70g)	12.5mm (70g)
φ40mm	11mm (40g)	4mm (40g)

Precautions
1) The Z-axis does not have brake device. Please be careful when the power supply is switched off in case of Z-axis may free-fall.
2) Reference of Moment of Inertia table shows the theoretical values. KSS recommends that you should apply actual moment to the machine and confirm the safety operation before use.

※1 For the Maximum Permissible Moment, see "Reference of Moment of Inertia" table above.
※2 For the technical information, see " Actuator Technical Description".

BDVZ06 - G10 - 060/120 N 02

□28/NEMA 11 2-phase Stepping Motor
Lead 10mm Travel 60/120mm



Parts List	
Motor	NEMA 11 Stepping Motor 1.5A/phase
Drive Screw	Ball Screw φ6 (Lead 10mm)
Sliding Guide	Ball Spline φ6mm
Sensor	Z axis : Proximity Sensor E2S-Q14-1M (OMRON) NC θ axis : Proximity Sensor E2S-W14-1M (OMRON) NC

Motor (Z, θ -axis)

A	Black
Ā	Green
B	Red
B̄	Blue

UL3265,AWG24 (600mm)

Sensor (Z, θ -axis)

+12~24V	Brown
LS	Black
GND	Blue

1000mm

	L1
Travel 60mm	62
Travel 120mm	122

Specifications

※The numbers in table below are reference. Detail dimmensions will be provided by drawing.

Items	Z Axis	θ Axis
Movable Range	60mm / 120mm	± 360°
Repeatability	±0.020mm	±0.03°
Resolution	25μm (Full Step)	0.9° (Full Step)
Maximum Speed	200mm / sec	3 rev / sec
Maximum acceleration	1 m/sec²	150π rad/sec²
Reference Thrust Force	10N	—
Maximun Permissible Moment	—	0.4×10⁻⁴kg·m² (※1)
Reduction ratio	1/2	1/2
Mass	590g (60 travel) , 600g (120 travel)	
Operating Temperature	0~40℃ (No Condensation)	

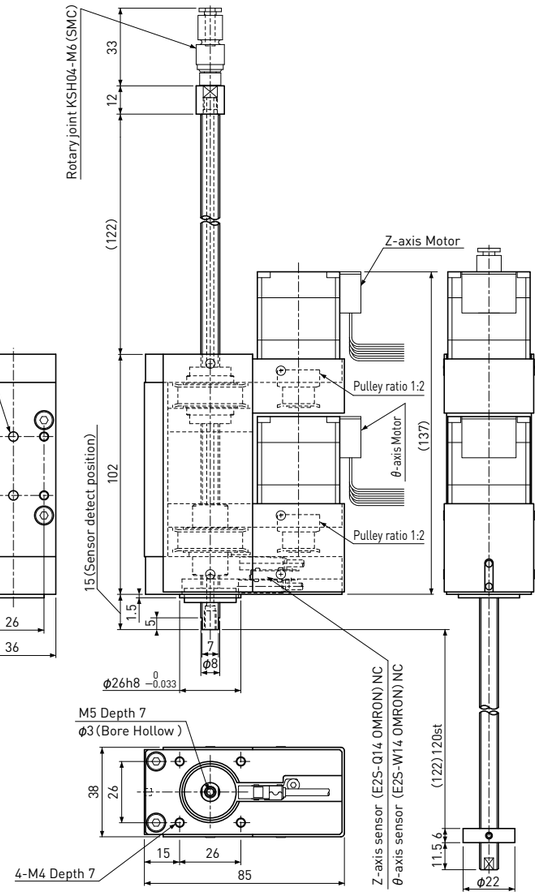
※1 For the Maximum Permissible Moment, see "Reference of Moment of Inertia" table above.
※2 For the technical information, see " Actuator Technical Description".

Reference of Moment of Inertia		
Dia.	Height	
	Aluminum	Steel
φ30mm	180mm (360g)	65mm (360g)
φ40mm	57mm (200g)	20mm (200g)
φ50mm	23mm (130g)	8.5mm (130g)

Precautions
1) The Z-axis does not have brake device. Please be careful when the power supply is switched off in case of Z-axis may free-fall.
2) Reference of Moment of Inertia table shows the theoretical values. KSS recommends that you should apply actual moment to the machine and confirm the safety operation before use.

BDVZ08 - G10 - 120 N 03

□35 / NEMA 14 2-phase Stepping Motor
Lead 10mm Travel 120mm



Parts List	
Motor	NEMA 14 Stepping Motor 1.5A/phase
Drive Screw	Ball Screw φ8 (Lead 10mm)
Sliding Guide	Ball Spline φ8mm
Sensor	Z axis : Proximity Sensor E2S-Q14-1M (OMRON) NC θ axis : Proximity Sensor E2S-W14-1M (OMRON) NC

Motor (Z, θ -axis)

A	Black
Ā	Green
B	Red
B̄	Blue

UL3265,AWG24 (600mm)

Sensor (Z, θ -axis)

+12~24V	Brown
LS	Black
GND	Blue

1000mm

Specifications

※The numbers in table below are reference. Detail dimmensions will be provided by drawing.

Items	Z Axis	θ Axis
Movable Range	120mm	± 360°
Repeatability	±0.020mm	±0.03°
Resolution	25μm (Full Step)	0.9° (Full Step)
Maximum Speed	200mm / sec	3 rev / sec
Maximum acceleration	1 m/sec²	150π rad/sec²
Reference Thrust Force	15N	—
Maximun Permissible Moment	—	0.1×10⁻³kg·m² (※1)
Reduction ratio	1/2	1/2
Mass	1000g	
Operating Temperature	0~40℃ (No Condensation)	

※1 For the Maximum Permissible Moment, see "Reference of Moment of Inertia" table above.
※2 For the technical information, see " Actuator Technical Description".

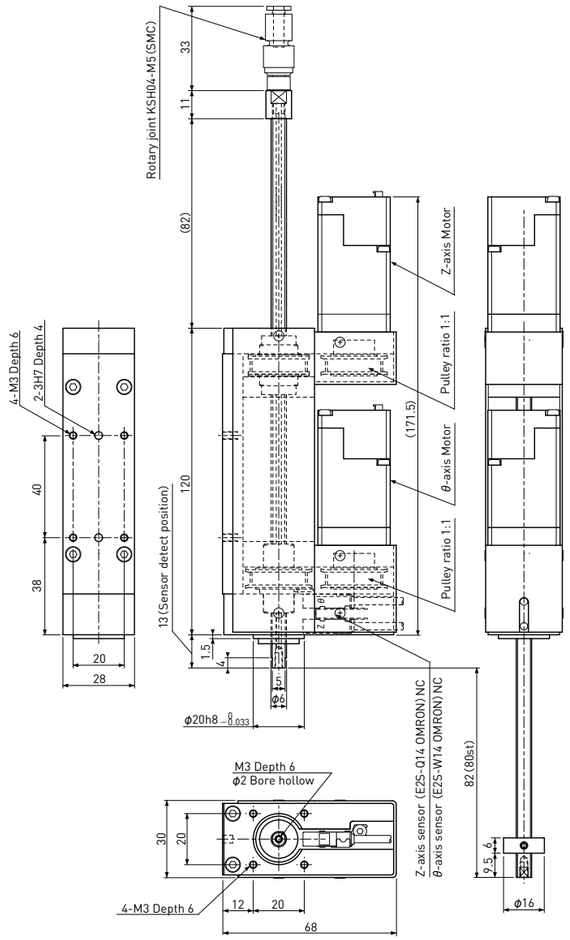
Reference of Moment of Inertia		
Dia.	Height	
	Aluminum	Steel
φ40mm	142mm (500g)	50mm (500g)
φ50mm	58mm (320g)	20.5mm (320g)
φ60mm	28mm (220g)	10mm (220g)

Precautions
1) The Z-axis does not have brake device. Please be careful when the power supply is switched off in case of Z-axis may free-fall.
2) Reference of Moment of Inertia table shows the theoretical values. KSS recommends that you should apply actual moment to the machine and confirm the safety operation before use.

Standard style of VZθ BD series — Belt Drive High Speed type

BD28-G100 080 NEK2N-V

□28 / NEMA 11 2-phase Stepping-Servo Motor type
Lead 10mm Travel 80mm



Parts List	
Motor	NEMA 11 Stepping-Servo Motor TSM11Q-2RM
Drive Screw	Ball Screw φ6 (Lead 10mm)
Sliding Guide	Ball Spline φ6mm
Sensor	Z axis : Proximity Sensor E2S-Q14-1M (OMRON) NC θ axis : Proximity Sensor E2S-W14-1M (OMRON) NC

Sensor(Z, θ-axis)

+12~24V	Brown
LS	Black
GND	Blue

1000mm

●Specifications

※The numbers in table below are reference. Detail dimmensions will be provided by drawing.

Items	Z Axis	θ Axis
Movable Range	80mm (※1)	± 360°
Repeatability	±0.020mm	±0.03°
Resolution	0.5μm (※2)	0.018° (※2)
Maximum Speed	500mm / sec	25 rev/sec
Maximum acceleration	10 m/sec²	1000π rad/sec²
Reference Thrust Force	3N	—
Maximun Permissible Moment	—	0.15×10⁻⁴kg·m² (※3)
Reduction ratio	1/1	
Mass	740g	
Operating Temperature	0~40℃(No Condensation)	

※1) Travel length(Movable Range) can be changed according to your request.
※2) Default setting : 20,000 steps / rev
※3) For the Maximum Permissible Moment, see "Reference of Moment of Inertia" table above.
※4) For the technical information, see " Actuator Technical Description".

Reference of Moment of Inertia		
Dia.	Height	
	Aluminum	Steel
φ30mm	65mm(128g)	23mm(128g)
φ40mm	21mm(74g)	7.5mm(74g)
φ50mm	8.5mm(46g)	3mm(46g)

Precautions
1) The Z-axis does not have brake device. Please be careful when the power supply is switched off in case Z-axis may free-fall.
2) Reference of Moment of Inertia table shows the theoretical values. KSS recommends that you should apply actual moment to the machine and confirm the safety operation before use.

●Connector Pin diagram

Pin No.	Name	Color	Description
1	Y2	Purple	Open drain outputs with freewheeling diode (30 VDC, 100 mA in max.)
2	Y1	Orange	
3	X4	White	Digital inputs (input high voltage 5~24 VDC, input low voltage below 1 VDC, signal frequency 1 MHz in max.)
4	X3	Brown	
5	X2	Yellow	Digital inputs (input high voltage 5~24 VDC, input low voltage below 2 VDC, signal frequency 1 MHz in max.)
6	X1	Gray	
7	RX-	Green and White	RS-422/485 interface differential signals
8	RX+	Green	
9	TX-	Blue and White	
10	TX+	Blue	
11	+	Red	V+ power supply(typ. 24 VDC)
12	—	Black	V- power ground(GND)

Note 1) All digital inputs & outputs are referenced to the power ground-(V-).
Note 2) Please use Mating Cable.

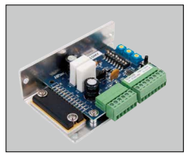
●Attachment

KSS provides Standard Stepping Motor Driver and Extension Cable as an option for VZθ Actuators in order to make it easy to use.

【Stepping Motor Driver】

SD4030B3

This is recommended Driver for 2-phase stepping Motor.
It has Micro-Step function with 8-step angle.(page V108)



※Caution

- The factory setting of SD4030B3 is 2A.
- Please be sure to perform a current setup of Driver based on Motor Rated current before use.
- Please confirm the operation manual attached to a Driver about current setup.

【Extension Cable】

Extension Cable between VZθ Actuators and KSS recommended Stepping Motor Driver.
Please designate Cable length and Connector type in accordance with the example below.
Please note that one side of Extension Cable is cut endge only (Bare).

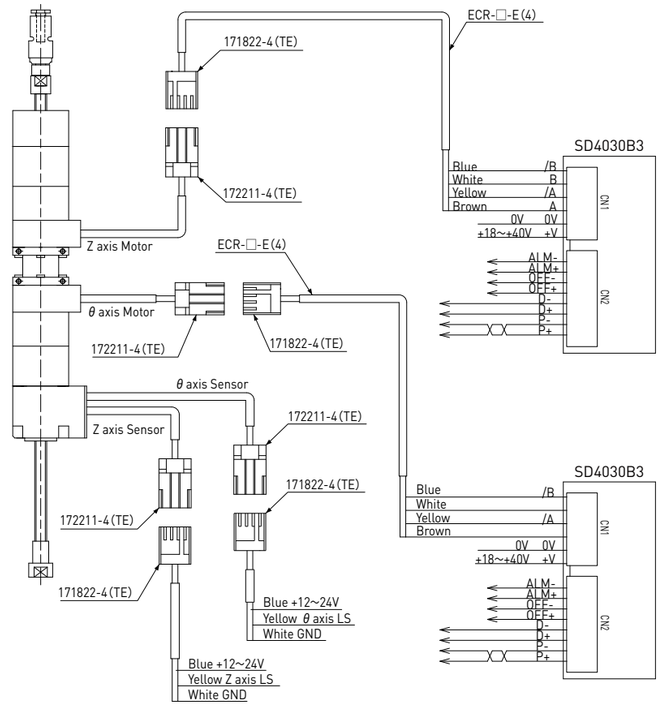
EC ① R ② — 2 ③ — E(4) ④

①Extension Cable
②Cable type
R : Robot Cable
③Cable length (m)
④Connector type
N : No commector (Bare)
E(4) : EI connector 4-pins (TE Connectivity)

Actuator
VZ θ Actuator

●Connection Diagram

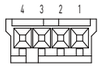
【□28 / NEMA11 Direct Drive type】



Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable171822-4 (female)

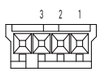


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

Sensor cable 172211-4 (male)

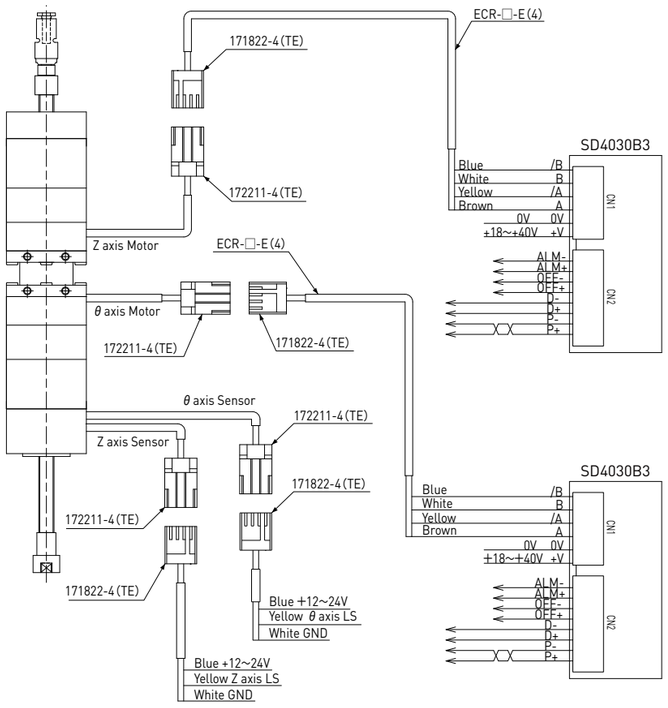
1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable171822-4 (female)



1	+12V~24 (Blue)
2	GND (White)
3	LS (Yellow)
4	None

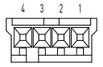
【□42 / NEMA17 Direct Drive type】



Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

Motor Extension cable171822-4 (female)

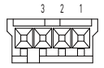


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

Sensor cable 172211-4 (male)

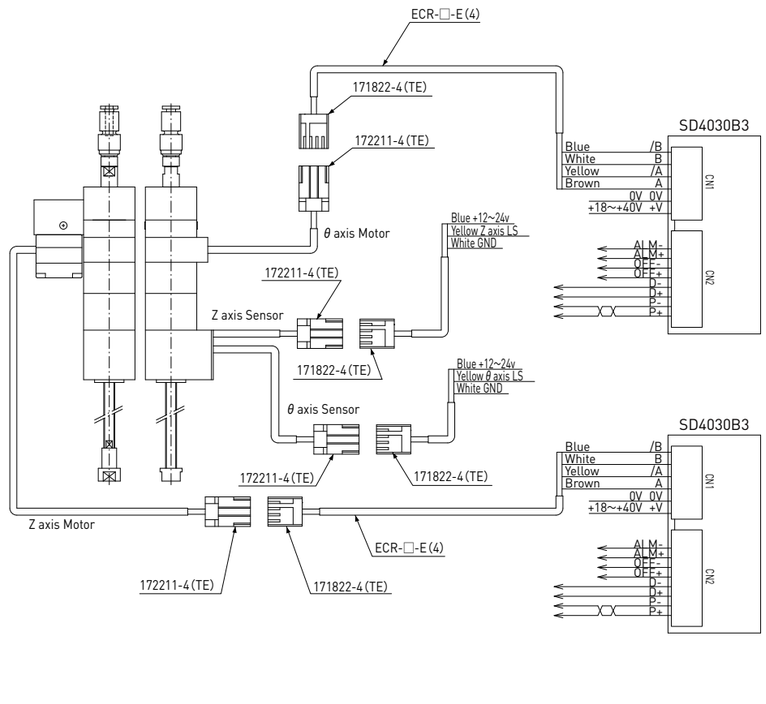
1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable171822-4 (female)



1	+12V~24 (Blue)
2	GND (White)
3	LS (Yellow)
4	None

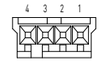
【Hybrid Drive type】



Z axis Motor cable 172211-4 (male)

1	Stepping Motor /B (Orange)
2	Stepping Motor B (Blue)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Red)

Z axis Motor Extension cable171822-4 (female)

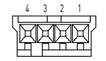


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

θ axis Motor cable 172211-4 (male)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (Red)
3	Stepping Motor /A (Green)
4	Stepping Motor A (Black)

θ axis Motor Extension cable 171822-4 (female)

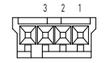


1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

Sensor cable 172211-4 (male)

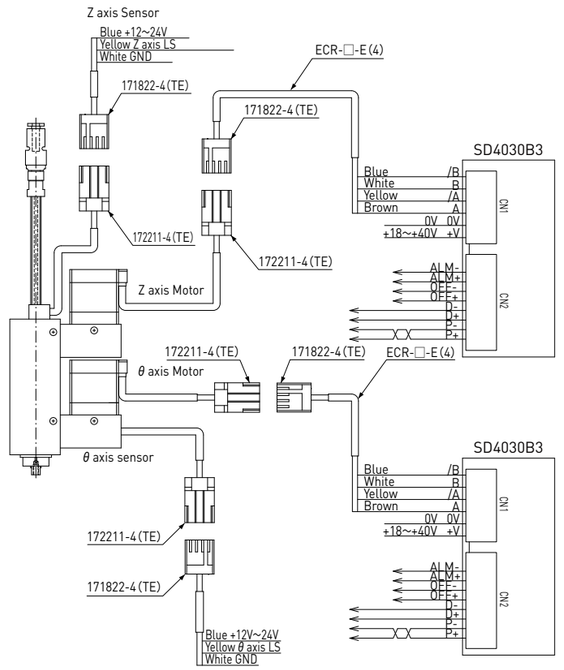
1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable 171822-4 (female)



1	+12V~24 (Blue)
2	GND (White)
3	LS (Yellow)
4	None

【Belt Drive type】



Motor cable 172211-4 (male)

		BDVZ04	BDVZ06/BDVZ08
1	Stepping Motor /B	Orange	Blue
2	Stepping Motor B	Blue	Red
3	Stepping Motor /A	Yellow	Green
4	Stepping Motor A	Red	Black

Motor Extension cable171822-4 (female)

1	Stepping Motor /B (Blue)
2	Stepping Motor B (White)
3	Stepping Motor /A (Yellow)
4	Stepping Motor A (Brown)

Sensor cable 172211-4 (male)

1	+12V~24 (Brown)
2	GND (Blue)
3	LS (Black)
4	None

Sensor Extension cable 171822-4 (female)

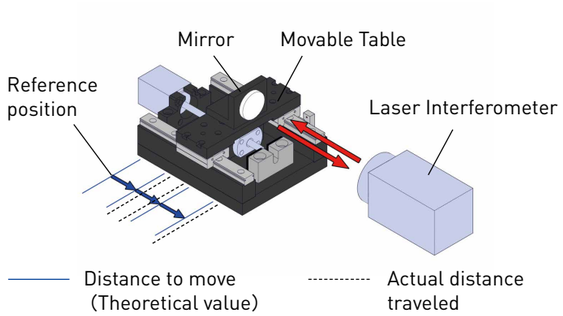
1	+12V~24 (Blue)
2	GND (White)
3	LS (Yellow)
4	None

Technical Description of the Actuator products

Accuracy of the Actuator and Measurement method

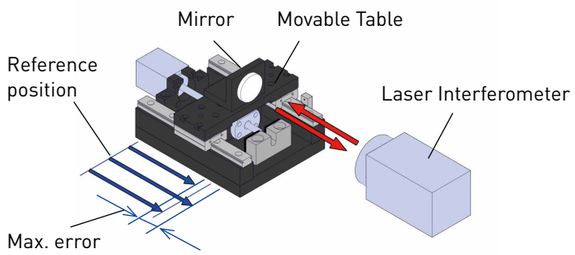
We introduce the method to inspect the positioning related accuracy, and optional inspection (on demand) as below.

【Absolute Positioning Accuracy】



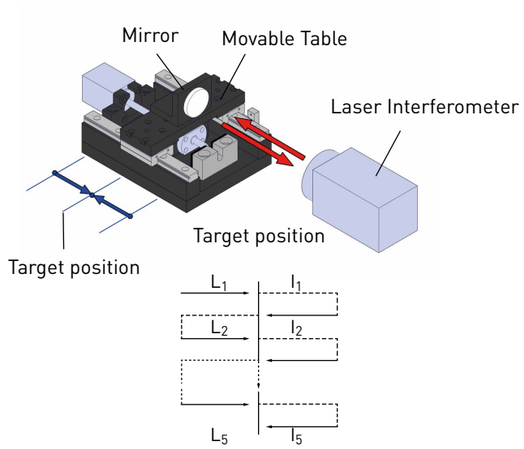
Absolute positioning accuracy is the difference between actual and ideal position in one direction. Measurement is done at several arbitrary points within effective travel range, it should be repeated 5 times under the same points. Maximum difference for each measurement is defined as Absolute Positioning Accuracy.

【Repeatability】



Repeatability is the difference between actual and ideal position at the arbitrary one point from the same direction. 5 times measurements should be conducted at the same point from the same direction. Half of maximum gap of measurement with ± should be defined as Repeatability.

【Lost Motion】

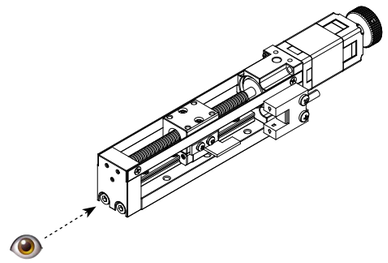


Lost motion is frankly the back and forth positioning error at the arbitrary one point from the different direction. Averaged number of the difference between forward and backward should be obtained for 5 times measurements at the center and both end points. Maximum number from the measurement above is defined as Lost Motion.

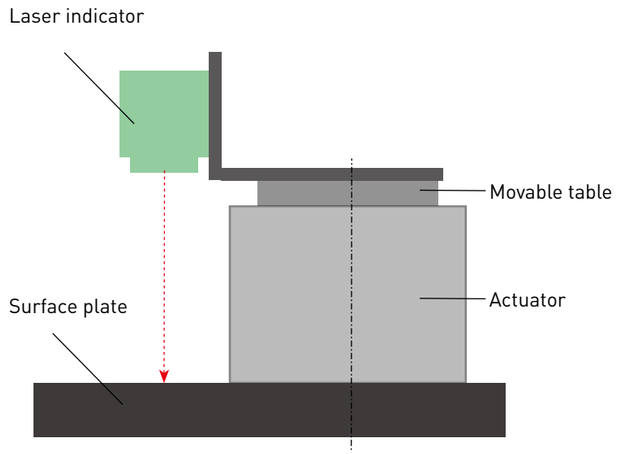
【Parallelism】

Applicable for Slider type Actuator

Set the Laser indicator on top of the table of the Actuator which is secured on the surface plate, measure the displacement when moving entire travel range and take the maximum value as Parallelism.



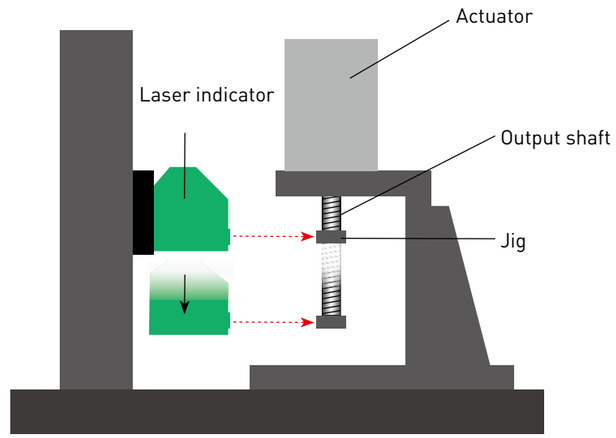
※Illustration is seen from the supporting side of the Actuator.



【Straightness】

Applicable for Cylinder type Actuator, Z-θ Actuator

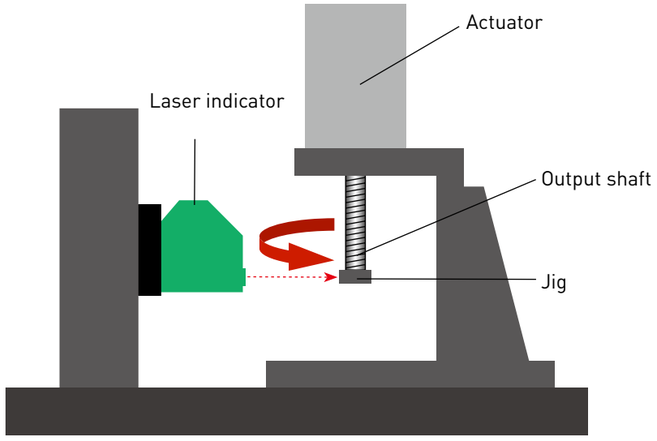
By using the Laser indicator which synchronized with output shaft, reciprocate the shaft from home position one time and inspect the maximum value of difference. Do the same inspection by setting the Actuator at 90 degrees of phase, take the maximum value for both measurement as Straightness.



【Runout of shaft travel end】

Applicable for Z-θ Actuator

Rotate the Shaft at the position which the shaft moved entirely toward the end of travel, the amount of deflection measured by Laser indicator is defined as Runout of shaft travel end. Measurement is done for 360 degrees.



【About optional inspection items with charge】

Parallelism, Straightness, and Runout of Shaft travel end are inspection items that will be charged.
Inspection data is packing together in the product with the actual measurement value on the inspection certificate.

【About shipping inspection】

Positioning-related accuracy is executed as shipping inspection, and the Certificate of Inspection shown below is issued for the product that meets the inspection standard. The Certificate of Inspection is shipped with the product.
If you require the actual measured value, we will issue the Inspection Report with charge.


CERTIFICATE OF INSPECTION

This is to Certify that this product has passed the inspection of KSS STANDARD.

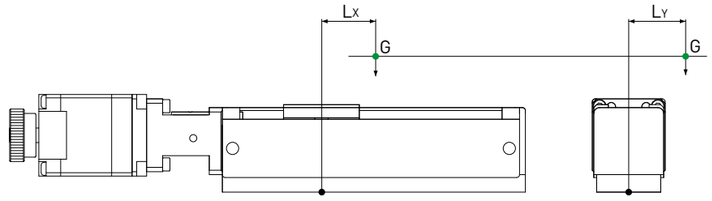
KSS CO., LTD.

Head Office: 1-22-14 Yaguchi, Otaku, Tokyo 146-0093
TEL 03(3756)3921
Ojiya Plant: TEL 0258(82)5577

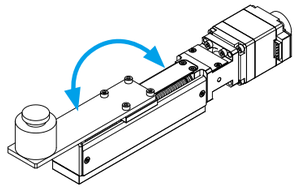
Permissible Moment for the Actuator

【Permissible Moment of Slider type Actuator】

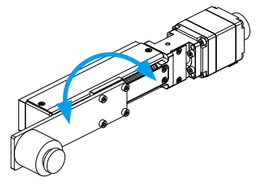
Momentum Load which is applicable for Slider type Actuator is defined in three (3) directions; Mp (pitching) My(yawing) and Mr (Rolling). KSS is setting the Permissible Moment for each series of the Slider type Actuator.
Please apply calculation formula below to calculate the value of Moment of Load under operating condition, make sure not to exceed the value of Permissible Moment shown in the table below. Please note that using the Actuator by exceeding the maximum value in each limit may cause the risk of malfunction or breakage of the product.



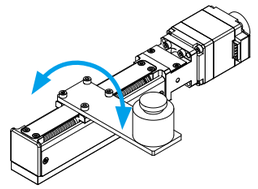
m:Work mass (kg)
g:Gravity acceleration 9.807(m/sec²)
L_X:Amount of overhang in X-axis direction(m)
L_Y:Amount of overhang in Y-axis direction(m)
G:Work center of gravity position



Formula for Mp(Pitchng)
$Mp=m \cdot g \cdot L_X$



Formula for My (Yawing)
$My=m \cdot g \cdot L_X$



Formula for Mr(Rolling)
$Mr=m \cdot g \cdot L_Y$

Table S-1 : Permissible Moment for Slider type Actuator

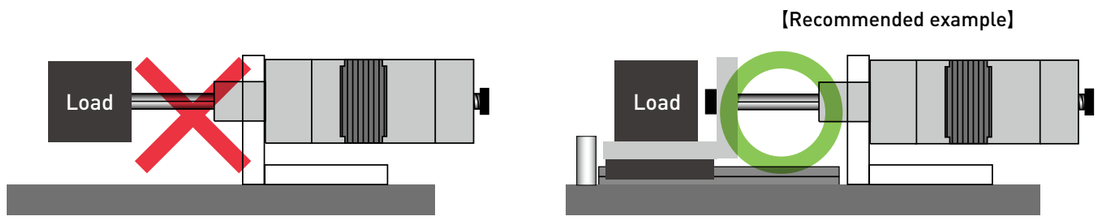
Unit:Nm

Actuator series	Pitchng (M_P)	Yawing (My)	Rolling (Mr)
Flex Actuator	0.10	0.09	0.23
Compact Actuator NEMA 6 size	0.14	0.12	0.22
MoBo Actuator	0.16	0.10	0.20

Moment Load to the Ball Screw with Ball Spline (BSSP)

Please be careful that Radial or Momentum Load cannot be applied to those products such as BSSP, Z- θ Actuator or Linear Actuator.
Radial or Momentum Load may affect to Ball Screw's function due to its structure as BSSP, which is Ball Screw and Ball Spline lying on the same axial line. It may cause earlier damage or breakage of the recirculation parts.

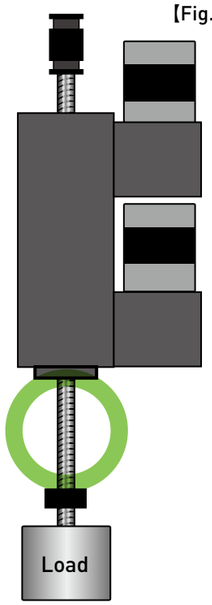
Captive type Load applying example



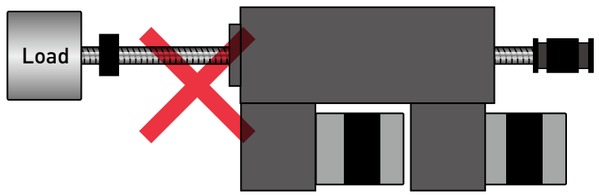
・Do not apply load as illustration shown above left.
・In horizontal position, configure as illustration shown above right as recommended example to apply radial load by Guide rail.

Z- θ Actuator Load applying example

【Fig.S-2】



【Fig.S-3】



※Illustration above is used Belt-Drive type as example. Please refer to the example and use the same posture for Direct-Drive type and Hybrid-Drive type.

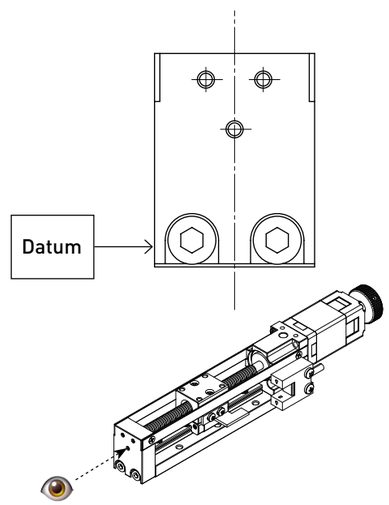
・Radial load cannot be applied on Z- θ Actuator. Please use it in vertical position, as illustrated in Fig.S-2 .
・Do not apply load as Fig.S-3. Radial load will directly apply to Ball Screw and may damage recirculation part of Ball Screw.

Assembling method and precautions for the Actuator

【Datum clamp face of Slider type Actuator】

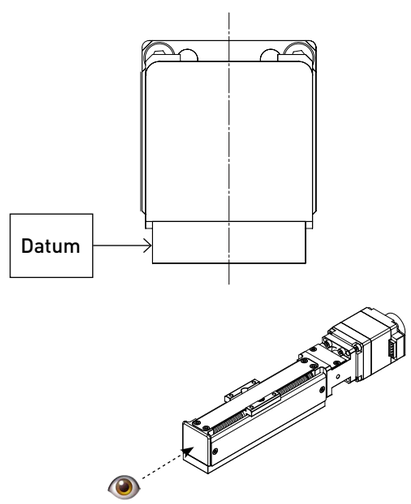
Use the Datum clamp face when assembling the Slider type Actuator to the device.
Note that Datum clamp face does not guarantee parallelism with the movable table.

・Compact Actuator (CAS)



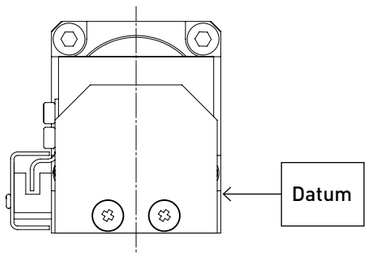
※Illustration is seen from the supporting side of the Actuator.

・Flex Actuator (FAS)

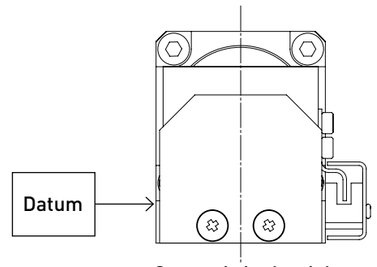


※Illustration is seen from the supporting side of the Actuator.

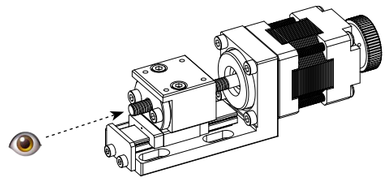
・MoBo Actuator (MAS)



Sensor is in the left position.



Sensor is in the right position.

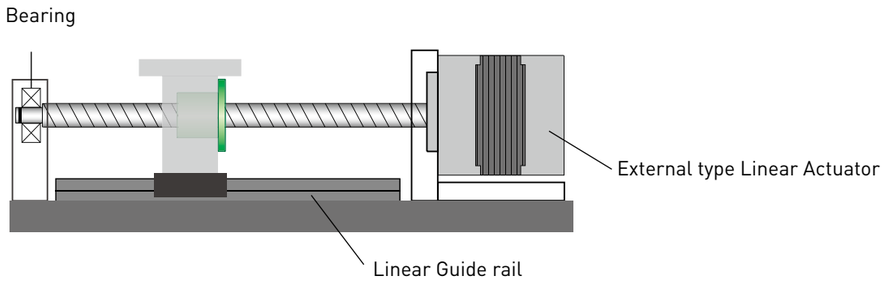


※Illustration is seen from the shaft end of the Actuator.

【Linear Actuator】

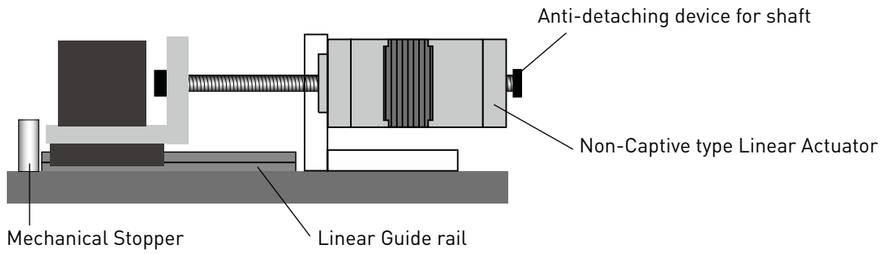
Customer should be careful with assembling and using KSS Actuator due to its compactness and light-weighted design. There are differences of assembling method and precautions depending on each type of Actuator, so please refer to instruction below to assemble and use them properly.

External type Assembling example



・External type does not have anti-rotating device. External anti-rotating device, such as Linear Guide rail, should be set up when usage.
・Please support journal end by Bearing.

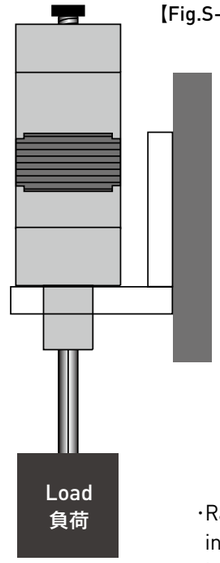
Non-Captive type Assembling example



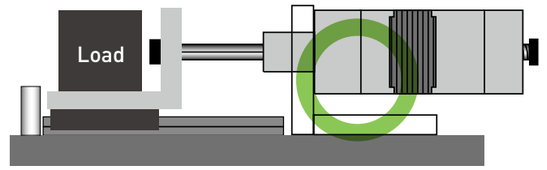
・Non-Captive type does not have anti-rotating device. External anti-rotating device, such as Linear Guide rail should be set up when usage. In addition, Radial load should be applied on External anti-rotating device.
・Do not use anti-detaching device for shaft as mechanical stopper for linear movement. It may damage the Actuator by excessive force input. Anti-detaching device is for the shaft not to slip out from the Motor. Please set up mechanical stopper outside body like shown in figure above.

Captive type Assembling example

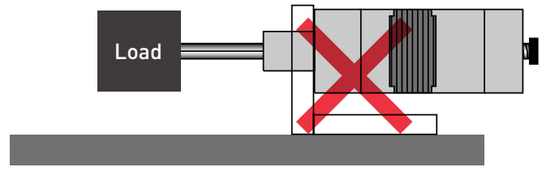
【Fig.S-4】



【Fig.S-5】



【Fig.S-6】

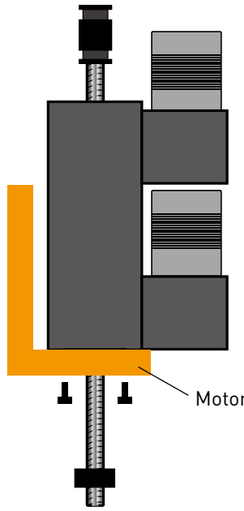


・Radial load cannot be applied on Captive type Linear Actuator. Please use Captive type Actuator in vertical position, as illustrated in Fig.S-4 above.
・In horizontal position, configure as Fig.S-5 as to apply radial load by Guide rail.
・Do not apply load as Fig.S-6. Radial load will directly apply to Ball Screw and may damage recirculation part of Ball Screw.

【 Precautions for assembling Z-θ Actuator 】

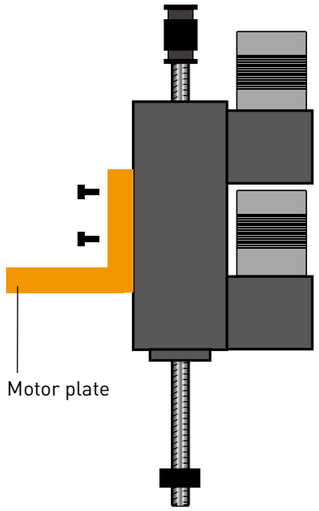
When using Z-θ Actuator, movable range may vary depending on the area to be assembled on your unit. Please refer to instruction below to select the best mounting method.

Z-θ Actuator Assembling example



【Bottom mount】

Please be aware of losing travel length due to the thickness of the Motor mounting plate.



【Side mount】

Side mounting is recommended if you do not want to sacrifice the effective travel.

Load limit in Vertical Position for Linear Actuator

【Load limit in Vertical Position for External type】

External type Actuator does not require Bearing at fixed side support, therefore the Axial Load will be applied to the inside the Motor directly. So permissible Axial Load is not the same as its Basic Dynamic Load Rating (Ca) of the Ball Screw. It relys on the Motor specifications and may vary depending on each series of Linear Actuator selection. Please use the list below to support your choice for appropriate External Linear Actuator. If you are looking for any Actuators exceeding permissible Axial Load, please contact KSS.

Table S-7 : Load limit in Vertical Position for the External type

Actuator series	Motor size	Load limit in Vertical Position (N)
DMBR	□20 / NEMA08	43
	□28 / NEMA11	150
	□35 / NEMA14	230
	□42 / NEMA17	
2TMB	□42 / NEMA17	300
TMB	□24 / NEMA10	230
	□42 / NEMA17	300
MB	□20 / NEMA08	230
	□24 / NEMA10	
	□42 / NEMA17	300
MMBR	□28 / NEMA11	150
SiMB	□20 / NEMA08	230
	□42 / NEMA17	300

Motor-Attatchment

【Flex Actuator】

In order to assemble a Motor other than KSS specified in the Flex Actuator series, it is necessary to have an attachment that matches the mounting dimensions and output shaft length of each Motor manufacturer. The drawings of the Motor attachment which matches each Motor manufacturer are shown below.

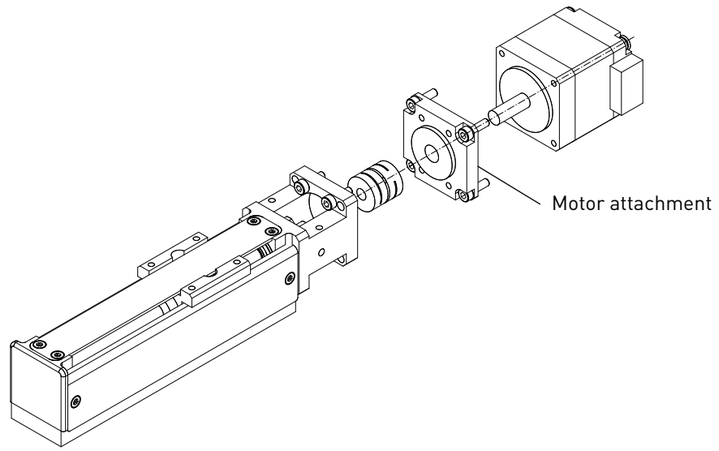
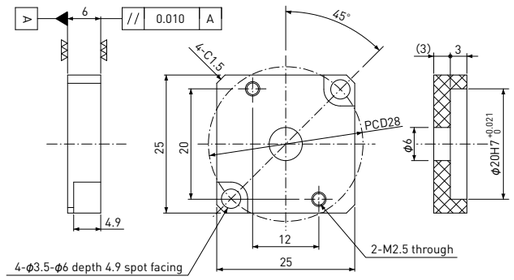


Table S-8 : Motor-Attachment list

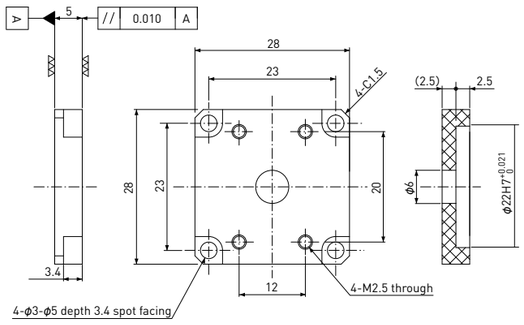
Motor manufacturer	Motor Type	Motor Size	Acceptable Motor
Mitsubishi	AC Servo Motor	NEMA 10 □25	HG-AK0＊＊＊
Yasukawa		NEMA 10 □25	SGMMV-A＊＊
Oriental Motor	2 Phase Stepping Motor	NEMA 11 □28	PKP2＊＊
	5 Phase Stepping Motor	NEMA 11 □28	PKP5＊＊
	α Step Motor	NEMA 11 □28	ARM2＊＊ AZM2＊＊
Tamagawa	2 Phase Stepping Motor	NEMA 11 □28	TS3641N1＊E2
	5 Phase Stepping Motor	NEMA 10 □24	TS3664N1＊E2
Sanmei	Stepping Servo Motor	NEMA 11 □28	TS3641N61S02
Moons		NEMA 11 □28	TSM11＊＊

Mitsubishi HG-AK0＊＊
Yasukawa SGMMV-A＊＊

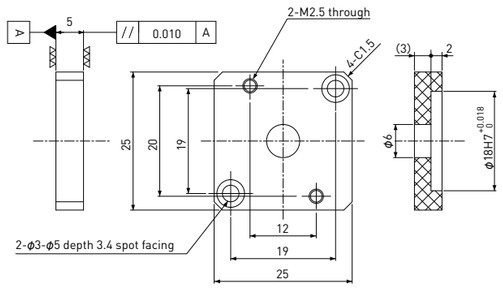


Moons TSM11＊＊

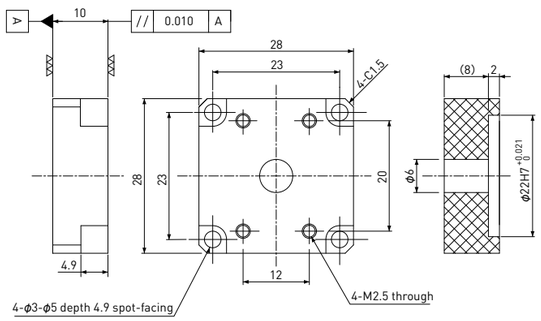
Oriental Motor
PKP2＊＊、PKP5＊＊、ARM2＊＊、AZM2＊＊



Tamagawa TS3664N1＊E2



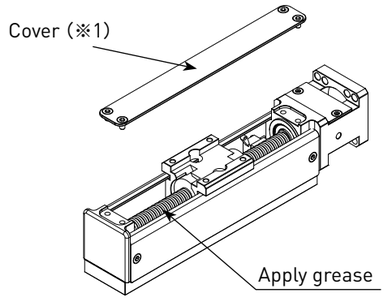
Tamagawa TS3641N＊E2, Sanmei TS3641N61S02



Lubricant and Greasing method

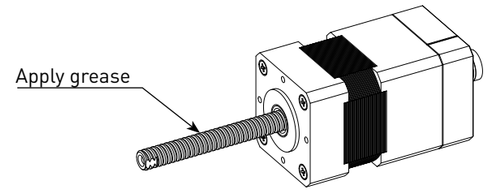
Greasing is required for any KSS Actuators. Maintenance cycle will be depending on your usage and working condition, however in general we recommend that you check the Grease condition in every 3 months, and if required please apply re-Greasing. Please refer to diagram below for how to re-Grease for each Actuator type.

●Slider type（FAS, CAS, MAS）



※1) For only FAS
Remove the cover first and expose the shaft before applying the Grease.

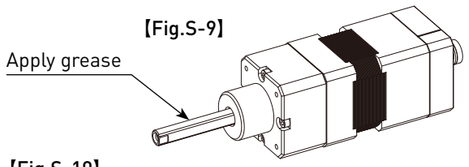
●Non-Captive type



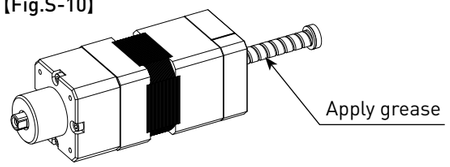
The Ball Nut is located on the output-shaft side. Move the shaft in the direction shown by the illustration and then apply the Grease.

●Captive type

【Fig.S-9】



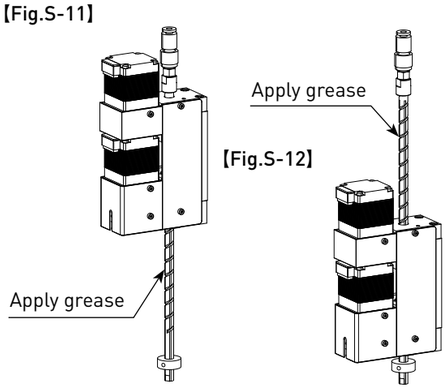
【Fig.S-10】



Please follow the procedure below to lubricate both the Ball Spline and the Ball Screw.
・Move the Shaft in the direction shown by the illustration and then apply the Grease (Fig.S-9).

・Applying the Grease for Ball Screw
Move the Shaft in the direction shown by the illustration and then apply the Grease (Fig.S-10).

●Z-θ Actuator
【Fig.S-11】



Please follow the procedure below to lubricate both the Ball Spline and the Ball Screw.
・Move the Shaft in the direction shown by the illustration and then apply the Grease (Fig.S-11).

・Applying the Grease for Ball Screw
Move the Shaft in the direction shown by the illustration and then apply the Grease (Fig.S-12).

【Precautions for Grease maintenance】

● Grease maintenance.
If any discoloration (black, brown) are identified in the Grease remaining in the Screw Shaft, please consider that is the appropriate timing for re-Greasing.

● How to wipe off old Grease.
Wipe off old Grease by wiping sheet which is specially designed for wiping oil or Grease.
Note) Do not use the waste clothes which may attract fiber or clothes remaining onto the surface of the Shaft.
Note) Wipe off any debris or foreign particles carefully, they may be attached on the surface of the Shaft.
Move the Ball Nut and wipe off all the remaining Grease as much as possible. Wipe the remaining Grease attached on close to the both edge of the Ball Nut.

● How to apply new Grease.
Apply Grease entirely throughout the Shaft.
Note) Use designated brush, or apply new Grease directly onto the Shaft surface with rubber gloves.
Note) Move the Ball Nut and apply Grease to make sure that the Grease is applied entirely throughout the surface.
Move the Ball Nut throughout the Shaft to apply Grease entirely on the Shaft.
Run the Ball Nut back and forth several times and perform running-in operation.

● Periodic Inspection.
Re-Grease is recommended once every 2~3 months.
If severe discoloration of Grease identified, it is recommended to re-Greasing in a shorter period.

● Precautions.
Please wear rubber gloves when handling the Ball Screw to avoid getting rust.
Please be careful of handling the Ball Screw not to make dents or scars when applying Grease.
Avoid collecting foreign particles onto the Ball Screw.
Do not apply different grease from the time of shipping.

Other technical information

【Free fall】

Z-θ Actuator does not equip with anti-free fall device.
If free falling is not allowed when use, external anti-free fall device should be set up.
Or choose the Belt Drive type and customize the Motor equipped with Magnetic brake, the Actuator can hold the Shaft even when it powers off.

※**Please note;**
The Motor equipped with Magnetic brake can only be chosen for Belt Drive type Actuator.
It is not available with either Direct-Drive type or Hybrid Drive type Actuator.

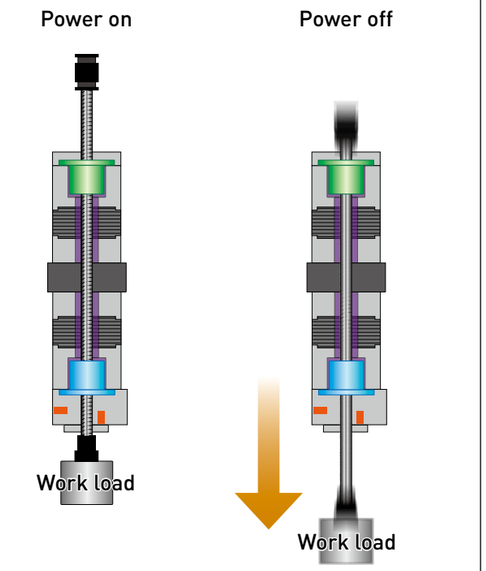
For your reference, below table shows the free fall weight for each type of the Actuator.

Table S-13 : Free-fall load of Z-θ Actuator

Model	Motor Frame size	Lead	Free-falling load
Direct-Drive type	NEMA11 (□28)	10mm	2N
	NEMA17 (□42)	10mm	5N
Hybrid-Drive type	NEMA10/11 (□25/28)	10mm	3N
Belt-Drive type	NEMA10 (□25)	4mm	18N
	NEMA11 (□28)	10mm	17N
	NEMA14 (□35)	10mm	16N

※Caution
Values are not guaranteed number.
Please take them as reference value.

【Example of free falling】



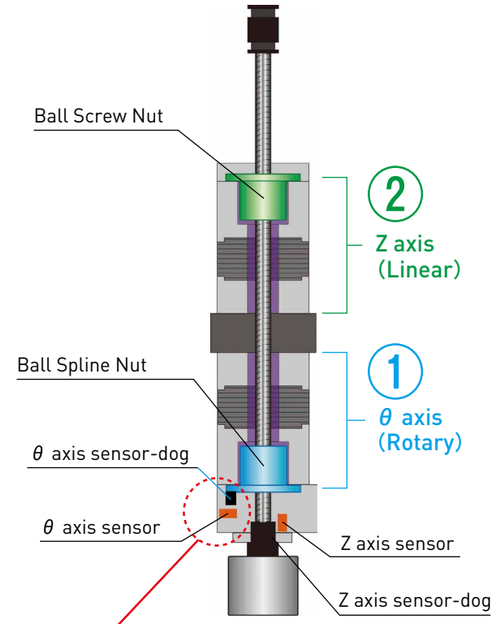
The Shaft can be held by its retention force of the Motor.

The Shaft will free fall once the Actuator turned off, by the loss of retention force from the Motor.

【Home positioning】

In order to apply home positioning, we recommend that θ-axis should be the first, then followed by Z axis. If Z-axis home positioning is first, then zero position may move after θ-axis home positioning.
The reason is shown below diagram.

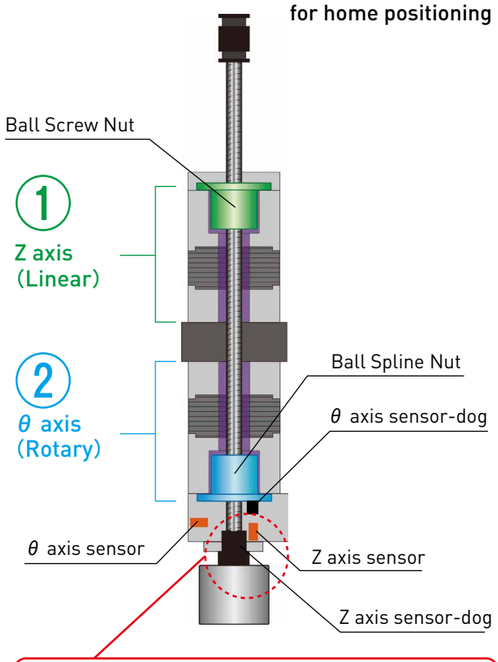
Recommended procedure of home positioning



θ-axis home positioning has been done in zero position. In this situation, Z-axis home positioning should be applied. θ-axis will never move because Ball Spline Nut only plays a role of guide for linear motion.

In case of home positioning for Z axis → θ axis

＊Not recommended way for home positioning



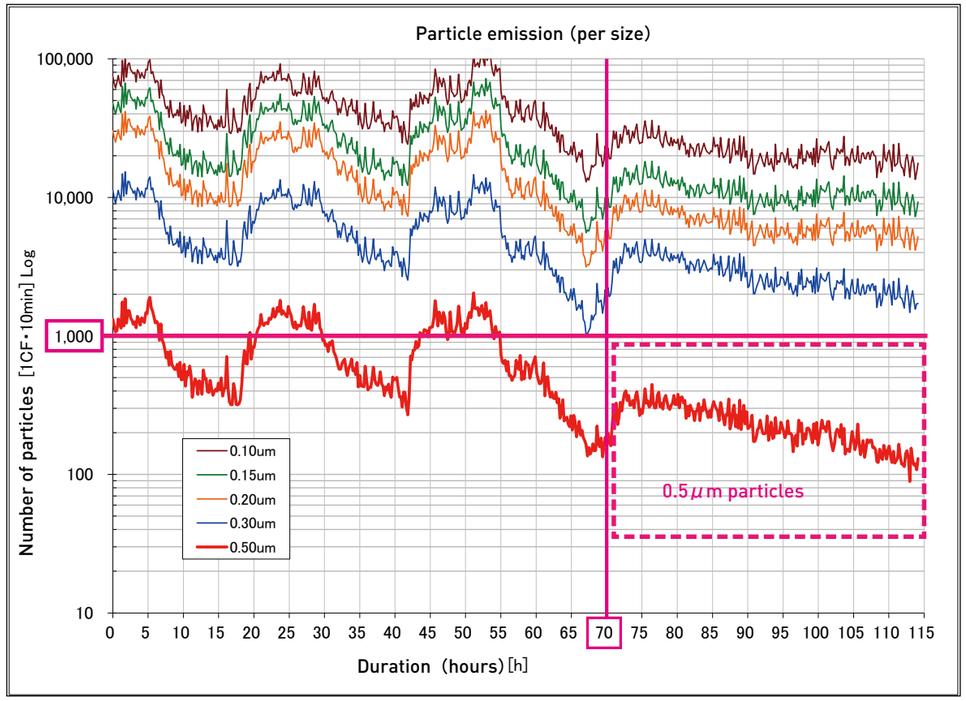
Z-axis home positioning has been done in zero position. In this situation, if θ-axis home positioning is applied. BPPS shaft (Ball Screw with Ball Spline) will move up or down with rotary movement at the same time of CW/CCW home positioning.

【Particle emission of Belt-Drive Actuator】

Z-θ Actuator is not designed for using in clean room facility or environment.
Below graph shows the measurement result of dust particle of Belt-Drive Actuator for your example.
Please refer to the result below when using our Z-θ Actuator in such facility.

Measurement Condition

- Sample : BDVZ06-G10050N02 (Belt-Drive type)
- Running period : 115 hours
- Speed : Z axis 200mm/sec (Highest spec in Catalogue)
  θ axis 1080°/sec (Highest spec in Catalogue)
- Operating pattern : Spiral moving (Z & θ)
- Load : No loading



※Measurement Method : Followed with FED209D Standard.
※Above values are not guaranteed values.
Please take them as one of the reference data.

【Warranty of Actuator products】

Product warranty is 1 year from the date of shipment. If any defects or malfunctions originated by KSS responsibility, product will be replaced or repaired without any charge.
Any defects or malfunctions occurred after warranty period, we will required support with charge.

Stepping Motor Driver

Stepping Motor Driver recommendation

KSS provides recommended Stepping Motor Driver as an option in order to make it easy to use.

●Precaution of Driver usage

Please adjust the run current according to the rated current of the Motor before use.
The adjustment method of the Run current is different for each driver. To adjust the Run current, it is available to down load each instruction manuals from KSS website and follow the steps to make the correct adjustment.

●Standard Stepping Motor Driver

KR-A5CC

This Driver is for 5-phase Stepping Motor operated by DC24V power supply. It has automatic current reduction circuits. You can choose full-step or half step function.

KR-A55MC

Micro-Step Driver for 5-phase Stepping Motor with DC24V power supply. 16 step angle types can be set with up to 250 divisions.

KR-A535M

Micro-Step Driver for 5-phase Stepping Motor, which can be used with AC100~220V power supply. 16 step angle types can be set with up to 250 divisions.

SD4015B3

This is recommended Bipolar 2-phase stepping Motor Driver for rated current 0.25A/phase~1.5A/phase. It has Micro-Step function with 8-step angle.

SD4030B3

This is recommended Bipolar 2-phase stepping Motor Driver for rated current 0.5A/phase~3.0A/phase. It has Micro-Step function with 8-step angle.

Outer dimensions and specifications of KSS recommended Driver are shown from next page.

KR-A5CC

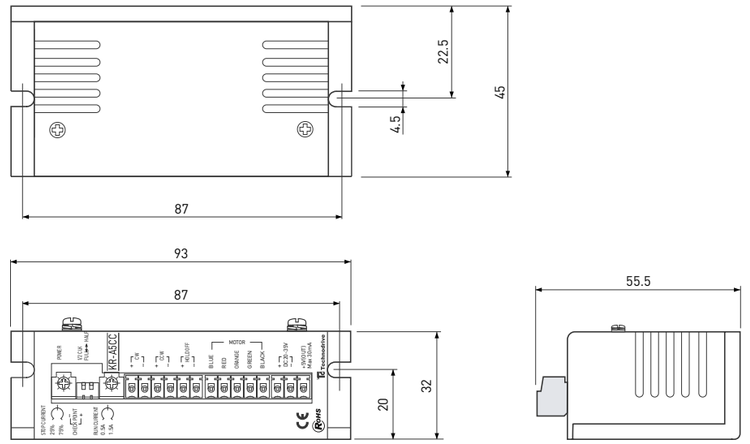
DC24V Input 5-phase Stepping Motor Driver

DC24V | 0.1~0.9A / phase | Full / Half-Step | Case type

■Specifications

Items		Specification	
Power supply		DC20-35V(-10%,+20%) max.3A	
Output current (0.35A/phase at shipping)		Rated current : 0.1~0.9A/phase	
Driving Type		Bipolar pentagon constant current drive	
Input signal circuit	Signal name	Functional description	Input resistance
	CW+	Pulse signal input for 1 clock mode CW rotation input for 2 clock mode	390Ω
	CW-		
	CCW+	Rotational direction input for 1 clock CCW rotation input for 2 clock	390Ω
	CCW-		
	H.O.+	Motor exciting OFF control signal "H" for motor exciting OFF	390Ω
	H.O.-		
		Pulse width : 0.5μs min., Rising-up time : 10μs max. Pulse interval : 0.5μs min., Pulse frequency : 50kpps max. Pulse voltage : "H" for 4~8V & "L" for 0~0.5V Triggerd at the edge of OFF (Logic"L") to ON (Logic"H") of photo-coupler current CCW rotation with CCW input of "L" in 1-clock system	
Setting of driving current		To change the RUN current, connect the CP+ to the (+) terminal of the voltmeter and the CP- to the (-) terminal of the voltmeter then adjust RUN CURRENT volume. Setting current (A) = CP voltage (V) / 4 Setting example) When drive current is set to 0.35A/phase, the CP voltage is adjusted to 1.4V. Note) Run current should be changed during the operating of motor.	
Setting of Stop current		In order to reduce the heat adjusting the current, change it using STOP CURRENT volume. The setting value of STOP CURRENT volume is a percentage of the setting volume of RUN CURRENT. Ex) After setting 1.4A for Run current then put STOP CURRENT volume at 50%, the stop current will be 0.7A.	
Setting of Dip-switches (All off at shipping)	No. / Symbol / Function / ON / OFF		
	1 / 1/2 CLK / Switching of clock / 1 clock mode / 2 clock mode		
	2 / Full / Half / Setting of Interpolation / Full-step (0.72°) / Half-step (0.36°)		
Operating temperature & humidity		0~40℃ 85%RH max. without any dew condensation.	
Storage temperature & humidity		-10~70℃ 85%RH max. without any dew condensation.	
Mass		Approximately 130g	

●Driver Outer Dimensions



KR-A55MC

DC24V Input Microstep Driver

DC24V | 0.4～1.4A / phase | Micro-step | Case type

■Specifications

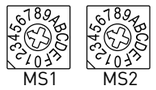
Items		Specification	
Power supply		DC20-35V (-10%,+20%) max.3A	
Output current (0.75A/phase at shipping)		Rated current : 0.4～1.4A/phase Capable of setting the current to 0.4～1.4A/phase by the digital switch "RUN"	
Driving Type		Bipolar pentagon constant current drive	
Input signal circuit	Signal name	Functional description	Input resistance
	CW+	Pulse signal input for 1 clock mode CW rotation input for 2 clock mode	270Ω
	CW-		
	CCW+	Rotational direction input for 1 clock CCW rotation input for 2 clock	270Ω
	CCW-		
	H.O.+	Motor excitation OFF control signal "H" for motor exciting OFF	390Ω
	H.O.-		
	D.S.+	Micro-step interpolation selection "L" for MS1 & "H" for MS2	390Ω
	D.S.-		
		Pulse width : 0.25μs min., Rising-up time : 10μs max. Pulse interval : 0.25μs min., Pulse frequency : 500kpps max. Pulse voltage : "H" for 4～8V & "L" for 0～0.5V Triggerd at the edge of OFF (Logic"L") to ON (Logic"H") of photo-coupler current CCW rotation with CCW input of "L" in 1-clock system	
Output signal Circuit	Signal name	Functional description	Output capacity
	Z.P.+	Origin exciting output signal Switched ON while origin is being excited	DC30V max. 50mA max.
	Z.P.-		
		This signal is ON at the exciting sequence of [0] and is transmitted at each 7.2 degrees for the Step Motor with 0.72°steps. When micro-step angle is changed after the power supply is turned on, it may not be transmitted.	

Setting of micro-step Interpolation (MS1 : 5, MS2 : 0 at shipping)

For micro-step driving of one type only, set the number interpolution using the digital SW MS1.
For micro-step driving of two types. (i.e. when changing speed for going and returning in reciprocating motion) set respective numbers of interpolation using the digital SW MS1 and MS2.

Set No.	0	1	2	3	4	5	6	7	8	9
Interpolation	1	2	4	5	8	10	16	20	25	40
	A	B	C	D	E	F				
	50	80	100	125	200	250				

Note 1)



When the setting of micro-step interpolating No. is "0.1", 1/4-interpolate low-frequency driving takes place inside.

Setting of driving current (Setting "5" at shipping)

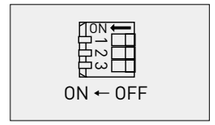
The output current to the motor in rotation is set by the digital switch "RUN" to select from the table below.

Set No.	0	1	2	3	4	5	6	7	8	9
Current (A)	0.4	0.5	0.57	0.63	0.71	0.77	0.84	0.9	0.96	1.02
	A	B	C	D	E	F				
	1.09	1.15	1.22	1.27	1.33	1.4				

Automatic current-down (Setting "5" at shipping)

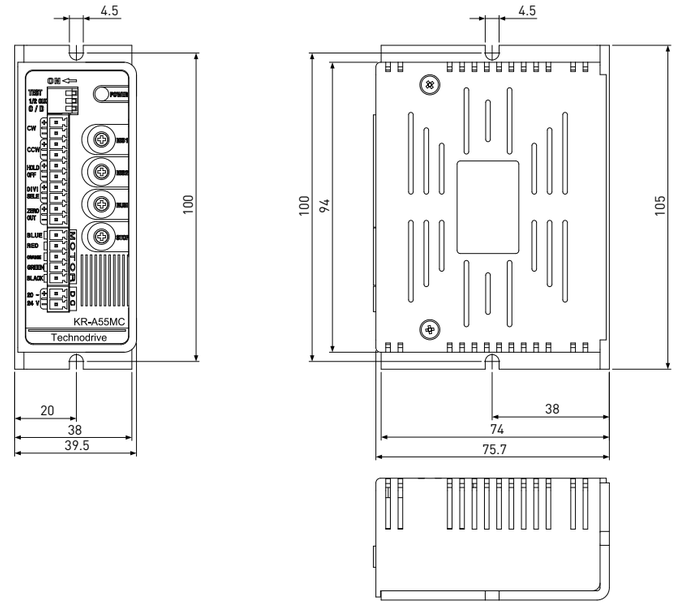
The output current to the motor at stationary is set by the digital switch "STOP" to select from the table below.
The value is set by the percent to "RUN" current. The current decreases at approx. 500ms after the last pulse.

設定番号　Set No.	0	1	2	3	4	5	6	7	8	9
(%)	27	31	36	40	45	50	54	58	62	66
	A	B	C	D	E	F				
	70	74	78	82	86	90				

Items	Specification					
Setting of dip-switches (All off at shipping)	No.	symbol	Function	ON	OFF	
	1	TEST	Self test function	Rotating at 250pps	Normal operation	
	2	1 / 2 CLK	Switching of clock	1 clock mode	2 clock mode	
	3	C / D	Automatic current-down	Invaild	Vaild	
						Note2
Operating temperature & humidity	0 ～ 40℃　85%RH Max. without any condensation.					
Storage temperature & humidity	-10 ～ 70℃　85%RH Max. without any dew condensation.					
Mass	Approximately 220g					

Note 1) Micro-step angle for 1 pulse=Basic step angle / Number of interpolation
Note 2) Approx. 250pps is generated inside, regardless of splits setting ; CCW rotation when the dip switch NO.2 is ON, and CW rotation when the dip switch NO.2 is OFF.

●Driver Outer Dimensions



Stepping Motor Driver

KR-A535M

AC100-220V Input Microstep Driver

AC100-220V | 0.4~1.4A / phase | Micro-step | Full connector

■Specifications

Items		Specification	
Power supply		AC100-220V (±10%) max.3A 50/60Hz	
Output current (0.75A/phase at shipping)		Rated current : 0.4~1.4A/phase Capable of setting the current to 0.4~1.4A/phase by the digital switch "RUN"	
Driving Type		Bipolar pentagon constant current drive	
Input signal circuit	Signal name	Functional description	Input resistance
	CW+	Pulse signal input for 1 clock mode CW rotation input for 2 clock mode	270Ω
	CW-		
	CCW+	Rotational direction input for 1 clock CCW rotation input for 2 clock	270Ω
	CCW-		
	H.O.+	Motor exciting OFF control signal "H" for motor exciting OFF	390Ω
	H.O.-		
	D.S.+	Micro-step interpolation selection "L" for MS1 & "H" for MS2	390Ω
	D.S.-		
		Pulse width : 0.25μs min., Rising-up time : 10μs max. Pulse interval : 0.25μs min., Pulse frequency : 500kpps max. Pulse voltage : "H" for 4~8V & "L" for 0~0.5V Triggerd at the edge of OFF (Logic"L") to ON (Logic"H") of photo-coupler current CCW rotation with CCW input of "L" in 1-clock system	
Output signal Circuit	Signal name	Functional description	Output capacity
	Z.P.+	Origin exciting output signal Switched ON while origin is being excited	DC30V max. 50mA max.
	Z.P.-		
		This signal is ON at the exciting sequence of [0] and is transmitted at each 7.2 degrees for the Step Motor with 0.72°steps. When micro-step angle is changed after the power supply is turned on,it may not be transmitted.	

Setting of micro-step interpolation (MS1 : 5, MS2 : 0 at shipping)

For micro-step driving of one type only, set the number interpolution using the digital SW MS1.
For micro-step driving of two types. (i.e. when changing speed for going and returning in reciprocating motion) set respective numbers of interpolation using the digital SW MS1 and MS2.

Set No.	0	1	2	3	4	5	6	7	8	9
Interpolation	1	2	4	5	8	10	16	20	25	40
	A	B	C	D	E	F				
	50	80	100	125	200	250				

Note) When the setting of micro-step interpolating No. is "0.1", 1/4-interpolate low-frequency driving takes place inside.

Setting of driving current (Setting "5" at shipping)

The output current to the motor in rotation is set by the digital switch "RUN" to select from the table below.

Set No.	0	1	2	3	4	5	6	7	8	9
Current (A)	0.4	0.5	0.57	0.63	0.71	0.77	0.84	0.9	0.96	1.02
	A	B	C	D	E	F				
	1.09	1.15	1.22	1.27	1.33	1.4				

Automatic current-down (Setting "5" at shipping)

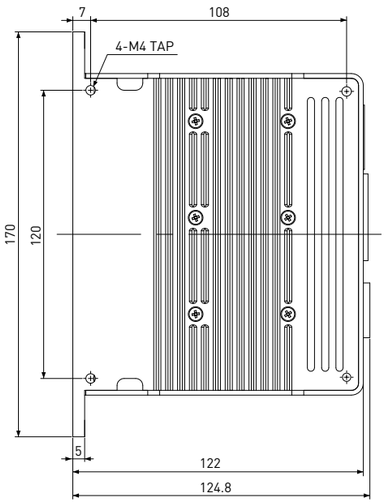
The output current to the motor at stationary is set by the digital switch "STOP" to select from the table below.
The value is set by the percent to "RUN" current. The current decreases at approx. 500ms after the last pulse.

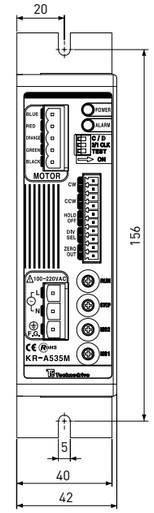
Set No.	0	1	2	3	4	5	6	7	8	9
(%)	27	31	36	40	45	50	54	58	62	66
	A	B	C	D	E	F				
	70	74	78	82	86	90				

Items	Specification					
Setting of dip-switches (All off at shipping)	No.	symbol	Function	ON	OFF	 OFF → ON Note2
	1	TEST	Self test function	Rotating at 250pps	Normal operation	
	2	1 / 2 CLK	Switching of clock	1 clock mode	2 clock mode	
	3	C / D	Automatic current-down	Invaild	Vaild	
Operating temperature & humidity	0 ~ 40℃ 85%RH Max. without any condensation.					
Storage temperature & humidity	-10 ~ 70℃ 85%RH Max. without any dew condensation.					
Mass	Approximately 660g					

Note 1) Micro-step angle for 1 pulse=Basic step angle / Number of interpolation
Note 2) Approx. 250pps is generated inside, regardless of splits setting ; CCW rotation when the dip switch NO.2 is ON, and CW rotation when the dip switch NO.2 is OFF.

●Driver Outer Dimensions

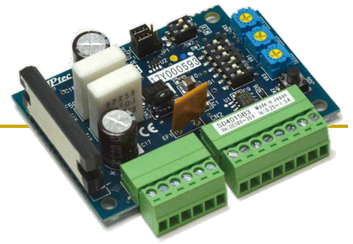




Stepping Motor Driver

SD4015B3

DC24V Input 2-phase Stepping Motor Driver

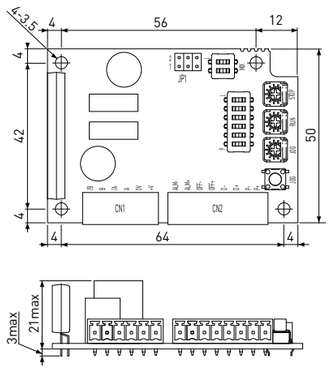


DC24V | 0.25～1.5A / phase | Full / half step | Board type

■Specifications

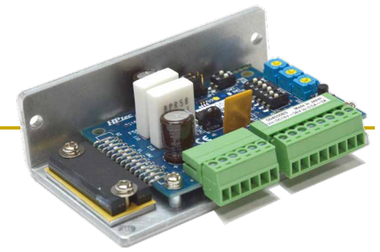
Items		Description	Note
Input voltagee		DC+18V～36V	
Output current		0.25～1.5A peak(±5%)/phase	Being lower rated output current beyond Power Supply 24V
Drive method		Chopper mode by Bipolar constant current	It can be used for uni-polar type.
Current down function		Auto Current down Adjusting to set lower current of CND volume about 0.25 ～ 1 second after pulse stop	Selectable by switch.
Maximum input pulse cycle		200Kpps	
Adjusting	RUN	For excitation current(0.25～1.5A)	The default factory setting is 1A.
	STOP	For current down value on current down mode.	Selectable between 10% to 60% of RUN current.
	MIX	Mixed Decay ratio(0%、20%、40%、80%)	The default factory setting is 80%
	JOG	For JOG speed setting.	300pps～14Kpps
Select function	SW-1,2,3	Select of Resolutions	1/2, 1/8, 1/10, 1/16, 1/20, 1/32, 1/40, 1/64
	SW-4	ON/OFF for function of auto current down mode.	Switch ON is active and OFF is no active. The default factory setting is ON.
	SW-5,6	Select of JOG function	SW-5 ON is active for JOG, SW6 ON is CW, OFF is CCW
	SW-3	Select of Mix-Decay ratio	
	JP1	Select of 1-pulse, 2-pulse	
Input signals	P+,P-	Pulse Command	Selection of 1 pulse an 2 pulse for pulse command. Isolated by photo coupler
	D+,D-	Direction Command	
	OFF+,OFF-	No excitation	
Output signals	ALM+,ALM-	Alarm (Prospecting of over-heat for Power device) Output at over 170℃(Typ.) of power device	Photo Isolation, ON is active, OFF is no active(ALARM).
Dimension		W72×D50×H21	
Operating Temperature and Humidity		0～40℃、35～80% RH	No condensation
Storage Temperature and Humidity		-20～+85℃、35～80% RH	No condensation
Mass		Approximately 40g	

●Driver Outer Dimensions



SD4030B3

DC24V Input 2-phase Microstep Driver

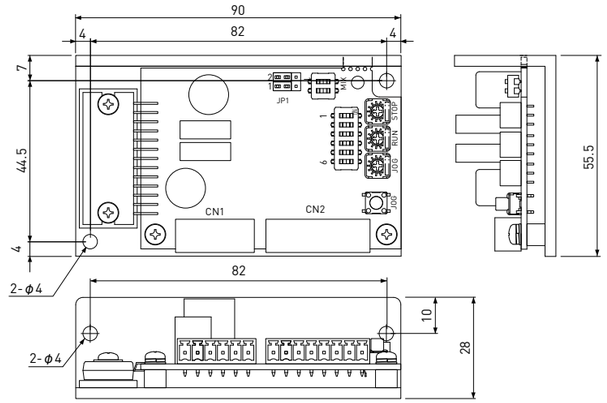


DC24V | 0.5～3A / phase | Micro-step | Board type

■Specifications

Items		Description	Note
Input voltagee		DC+18V～36V	
Output current		0.5～3A peak(±5%)/phase	Being lower rated output current beyond Power Supply 24V
Drive method		Chopper mode by Bipolar constant current	It can be used for uni-polar type.
Current down function		Auto Current down Adjusting to set lower current of CND volume about 0.7 second after pulse stop	Selectable by switch.
Maximum input pulse cycle		200Kpps	
Adjusting	RUN	For excitation current(0.5～3A)	The default factory setting is 2A.
	STOP	For current down value on current down mode.	Selectable between 10% to 60% of RUN current.
	MIX	Mixed Decay ratio(0%、20%、40%、80%)	The default factory setting is 80%
	JOG	For JOG speed setting.	300pps～14Kpps
Select function	SW-1,2,3	Select of Resolutions	1/2, 1/8, 1/10, 1/16, 1/20, 1/32, 1/40, 1/64
	SW-4	ON/OFF for function of auto current down mode.	Switch ON is active and OFF is no active. The default factory setting is ON.
	SW-5,6	Select of JOG function	SW-5 ON is active for JOG, SW6 ON is CW, OFF is CCW
	SW-3	Select of Mix-Decay ratio	
	JP1	Select of 1-pulse, 2-pulse	
Input signals	P+,P-	Pulse Command	Selection of 1 pulse an 2 pulse for pulse command. Isolated by photo coupler
	D+,D-	Direction Command	
	OFF+,OFF-	No excitation	
Output signals	ALM+,ALM-	Alarm (Prospecting of over-heat for Power device) Output at over 170℃(Typ.) of power device	Photo Isolation, ON is active, OFF is no active(ALARM).
Dimension		W90×D55.5×H28	
Operating Temperature and Humidity		0～40℃、35～80% RH	No condensation
Storage Temperature and Humidity		-20～+85℃、35～80% RH	No condensation
Mass		Approximately 112g	

●Driver Outer Dimensions



SI unit conversion table

●SI-Prefixes

	SI-Prefixes			SI-Prefixes			SI-Prefixes	
	Prefix	Symbol		Prefix	Symbol		Prefix	Symbol
10^{18}	exa	E	10^{2}	hecto	h	10^{-9}	nano	n
10^{15}	peta	P	10^{1}	deca	da	10^{-12}	pico	p
10^{12}	tera	T	10^{-1}	deci	d	10^{-15}	femto	f
10^{9}	giga	G	10^{-2}	centi	c	10^{-18}	atto	a
10^{6}	mega	M	10^{-3}	milli	m			
10^{3}	kilo	k	10^{-6}	micro	μ			

●Force, Weight

N $kg \cdot m/s^2$	dyn $g \cdot cm/s^2$	kgf	lbf
1	10^{5}	0.101972	0.224809
10^{-5}	1	1.01972×10^{-6}	0.224809×10^{-6}
9.80665	9.80665×10^{5}	1	2.20462
4.44822	4.44822×10^{5}	0.453592	1

Note) Highlighted cells show SI unit.

●mass

kg	g	lb	t	oz
1	10^{3}	2.20462	10^{-3}	35.274
10^{-3}	1	2.20462×10^{-3}	10^{-6}	0.035274
0.453592	453.592	1	0.453592×10^{-3}	16
1000	10^{6}	2204.62	1	3.5274×10^{4}
0.0283495	28.3495	0.06250	2.83495×10^{-5}	1

Note) Highlighted cells show SI unit.

●Stress

Pa N/m^2	MPa N/mm^2	kgf/mm^2	kgf/cm^2
1	1×10^{-6}	1.01972×10^{-7}	1.01972×10^{-5}
1×10^{6}	1	1.01972×10^{-1}	1.01972×10
9.80665×10^{6}	9.80665	1	1×10^{2}
9.80665×10^{4}	9.80665×10^{-2}	1×10^{-2}	1

Note) Highlighted cells show SI unit.

●Pressure

Pa N/m^2	MPa N/mm^2	bar	kgf/cm^2	atm	mmH_2O	mmHg Torr
1	1×10^{-6}	1×10^{-5}	1.01972×10^{-5}	9.86923×10^{-6}	1.01972×10^{-1}	7.50062×10^{-3}
1×10^{3}	1×10^{-3}	1×10^{-2}	1.01972×10^{-2}	9.86923×10^{-3}	1.01972×10^{2}	7.50062
1×10^{6}	1	1×10	1.01972×10	9.86923	1.01972×10^{5}	7.50062×10^{3}
1×10^{5}	1×10^{-1}	1	1.01972	9.86923×10^{-1}	1.01972×10^{4}	7.50062×10^{2}
9.80665×10^{4}	9.80665×10^{-2}	9.80665×10^{-1}	1	9.67841×10^{-1}	1×10^{4}	7.35559×10^{2}
1.01325×10^{5}	1.01325×10^{-1}	1.01325	1.03323	1	1.03323×10^{4}	7.60000×10^{2}
9.80665	9.80665×10^{-6}	9.80665×10^{-5}	1×10^{-4}	9.67841×10^{-5}	1	7.35559×10^{-2}
1.33322×10^{2}	1.33322×10^{-4}	1.33322×10^{-3}	1.35951×10^{-3}	1.31579×10^{-3}	1.35951×10	1

Note) Highlighted cells show SI unit.

●Kinematic Viscosity

m^2/s	cSt mm^2/s	St cm^2/s
1	1×10^{6}	1×10^{4}
1×10^{-6}	1	1×10^{-2}
1×10^{-4}	1×10^{2}	1

Note) Highlighted cells show SI unit.

●Velocity

m/s	m/min	km/h	ft/s	ft/min	mile/h
1	60	3.6	3.28084	196.850	2.23693
0.0166667	1	0.06	0.0546807	3.2808	0.0372823
0.277778	16.667	1	0.911344	54.6807	0.621371
0.30480	18.288	1.09728	1	60	0.681818
5.0800×10^{-3}	0.30480	0.018288	0.0166667	1	0.0113636
0.447041	26.8224	1.60934	1.46667	88	1

●Length

m	cm	mm	μm	nm	Å	in	ft
1	100	1000	10^{6}	10^{9}	10^{10}	39.3701	3.28084
0.01	1	10	10^{4}	10^{7}	10^{8}	0.393701	0.0328084
0.001	0.1	1	10^{3}	10^{6}	10^{7}	0.0393701	3.28084×10^{-3}
10^{-6}	10^{-4}	10^{-3}	1	10^{3}	10^{4}	39.3701×10^{-6}	3.28084×10^{-6}
10^{-9}	10^{-7}	10^{-6}	10^{-3}	1	10	39.3701×10^{-9}	3.28084×10^{-9}
10^{-10}	10^{-8}	10^{-7}	10^{-4}	0.1	1	39.3701×10^{-10}	3.28084×10^{-10}
0.0254	2.54	25.4	25.4×10^{3}	25.4×10^{6}	25.4×10^{7}	1	0.0833333
0.3048	30.48	304.8	304.8×10^{3}	304.8×10^{6}	304.8×10^{7}	12	1

Conversion Table for Hardness

Rockwell hardness C-scale	Vickers hardness	Brinell hardness		Rockwell hardness		Shore hardness
		Standard Ball	Tungsten Carbide Ball	A-Scale Load;600N barle Pressure Piece	B-Scale Load;1000N 1/16-in dia.Ball	
HRC	Hv	HB	HB	HRA	HRB	Hs
68	940	—	—	85.6	—	97
67	900	—	—	85.0	—	95
66	865	—	—	84.5	—	92
65	832	—	739	83.9	—	91
64	800	—	722	83.4	—	88
63	772	—	705	82.8	—	87
62	746	—	688	82.3	—	85
61	720	—	670	81.8	—	83
60	697	—	654	81.2	—	81
59	674	—	634	80.7	—	80
58	653	—	615	80.1	—	78
57	633	—	595	79.6	—	76
56	613	—	577	79.0	—	75
55	595	—	560	78.5	—	74
54	577	—	543	78.0	—	72
53	560	—	525	77.4	—	71
52	544	500	512	76.8	—	69
51	528	487	496	76.3	—	68
50	513	475	481	75.9	—	67
49	498	464	469	75.2	—	66
48	484	451	455	74.7	—	64
47	471	442	443	74.1	—	63
46	458	432	432	73.6	—	62
45	446	421	421	73.1	—	60
44	434	409	409	72.5	—	58
43	423	400	400	72.0	—	57
42	412	390	390	71.5	—	56
41	402	381	381	70.9	—	55
40	392	371	371	70.4	—	54
39	382	362	362	69.9	—	52
38	372	353	353	69.4	—	51
37	363	344	344	68.9	—	50
36	354	336	336	68.4	(109.0)	49
35	345	327	327	67.9	(108.5)	48
34	336	319	319	67.4	(108.0)	47
33	327	311	311	66.8	(107.5)	46
32	318	301	301	66.3	(107.0)	44
31	310	294	294	65.8	(106.0)	43
30	302	286	286	65.3	(105.5)	42
29	294	279	279	64.7	(104.5)	41
28	286	271	271	64.3	(104.0)	41
27	279	264	264	63.8	(103.0)	40
26	272	258	258	63.3	(102.5)	38
25	266	253	253	62.8	(101.5)	38
24	260	247	247	62.4	(101.0)	37
23	254	243	243	62.0	100.0	36
22	248	237	237	61.5	99.0	35
21	243	231	231	61.0	98.5	35
20	238	226	226	60.5	97.8	34
(18)	230	219	219	—	96.7	33
(16)	222	212	212	—	95.5	32
(14)	213	203	203	—	93.9	31
(12)	204	194	194	—	92.3	29
(10)	196	187	187	—	90.7	28
(8)	188	179	179	—	89.5	27
(6)	180	171	171	—	87.1	26
(4)	173	165	165	—	85.5	25
(2)	166	158	158	—	83.5	24
(0)	160	152	152	—	81.7	24

Material Chemical Composition

Category	Std. No.	Designation	Chemical Composition %									
			C	Si	Mn	P	S	Ni	Cr	Mo	Al	others
Carbon Steels for machine structural use	JIS G 4051	S40C	0.37~0.43	0.15~0.35	0.60~0.90	≦0.030	≦0.035	≦0.20	≦0.20			Cu≦0.30 Ni+Cr≦0.35
		S45C	0.42~0.48	0.15~0.35	0.60~0.90	≦0.030	≦0.035	≦0.20	≦0.20			Cu≦0.30 Ni+Cr≦0.35
		S50C	0.47~0.53	0.15~0.35	0.60~0.90	≦0.030	≦0.035	≦0.20	≦0.20			Cu≦0.30 Ni+Cr≦0.35
		S53C	0.50~0.56	0.15~0.35	0.60~0.90	≦0.030	≦0.035	≦0.20	≦0.20			Cu≦0.30 Ni+Cr≦0.35
		S55C	0.52~0.58	0.15~0.35	0.60~0.90	≦0.030	≦0.035	≦0.20	≦0.20			Cu≦0.30 Ni+Cr≦0.35
Structural Steels with specified hardenability bands	JIS G 4052	SCM415H	0.12~0.18	0.15~0.35	0.55~0.95	≦0.030	≦0.030	≦0.25	0.85~1.25	0.15~0.30		
		SCM420H	0.17~0.23	0.15~0.35	0.55~0.95	≦0.030	≦0.030	≦0.25	0.85~1.25	0.15~0.30		
		SCM435H	0.32~0.39	0.15~0.35	0.55~0.95	≦0.030	≦0.030	≦0.25	0.85~1.25	0.15~0.35		
		SCM440H	0.37~0.44	0.15~0.35	0.55~0.95	≦0.030	≦0.030	≦0.25	0.85~1.25	0.15~0.35		
		SCM445H	0.42~0.49	0.15~0.35	0.55~0.95	≦0.030	≦0.030	≦0.25	0.85~1.25	0.15~0.35		
Chrome - molybdenum Steel	JIS G 4105	SCM415	0.13~0.18	0.15~0.35	0.60~0.85	≦0.030	≦0.030	≦0.25	0.90~1.20	0.15~0.30		Cu≦0.30
		SCM418	0.16~0.21	0.15~0.35	0.60~0.85	≦0.030	≦0.030	≦0.25	0.90~1.20	0.15~0.30		Cu≦0.30
		SCM420	0.18~0.23	0.15~0.35	0.60~0.85	≦0.030	≦0.030	≦0.25	0.90~1.20	0.15~0.30		Cu≦0.30
		SCM430	0.28~0.33	0.15~0.35	0.60~0.85	≦0.030	≦0.030	≦0.25	0.90~1.20	0.15~0.30		Cu≦0.30
		SCM435	0.35~0.38	0.15~0.35	0.60~0.85	≦0.030	≦0.030	≦0.25	0.90~1.20	0.15~0.30		Cu≦0.30
		SCM440	0.38~0.43	0.15~0.35	0.60~0.85	≦0.030	≦0.030	≦0.25	0.90~1.20	0.15~0.30		Cu≦0.30
		SCM445	0.43~0.48	0.15~0.35	0.60~0.85	≦0.030	≦0.030	≦0.25	0.90~1.20	0.15~0.30		Cu≦0.30

Category	Std. No.	Designation	Chemical Composition %								
			C	Si	Mn	P	S	Ni	Cr	Mo	others
Stainless Steels	JIS G 4303	SUS303	≦0.15	≦1.00	≦2.00	≦0.20	≧0.15	8.00~10.00	17.00~19.00	≦0.60	
		SUS304	≦0.08	≦1.00	≦2.00	≦0.045	≦0.030	8.00~10.50	18.00~20.00		
		SUS316	≦0.08	≦1.00	≦2.00	≦0.045	≦0.030	10.00~14.00	16.00~18.00	2.00~3.00	
		SUS317	≦0.08	≦1.00	≦2.00	≦0.045	≦0.030	11.00~15.00	18.00~20.00	3.00~4.00	
		SUS440A	0.60~0.75	≦1.00	≦1.00	≦0.040	≦0.040		16.00~18.00	≦0.75	
		SUS440B	0.75~0.95	≦1.00	≦1.00	≦0.040	≦0.030		16.00~18.00	≦0.75	
		SUS440C	0.95~1.20	≦1.00	≦1.00	≦0.040	≦0.030		16.00~18.00	≦0.75	
		SUS630	≦0.07	≦1.00	≦1.00	≦0.040	≦0.030	3.00~5.00	15.50~17.50		
		SUS631	≦0.09	≦1.00	≦1.00	≦0.040	≦0.030	6.5~7.75	16.00~18.00		

Category	Std. No.	Designation	Chemical Composition %									
			C	Si	Mn	P	S	Pb	Cr	Mo	W	others
Alloy Tool Steels	JIS G 4404	SKS 2	1.00~1.10	≦0.35	≦0.80	≦0.030	≦0.030		0.50~1.00		1.00~1.50	
		SKS 3	0.90~1.00	≦0.35	0.90~1.20	≦0.030	≦0.030		0.50~1.00		0.50~1.00	
		SKS 4	0.45~0.55	≦0.35	≦0.50	≦0.030	≦0.030		0.50~1.00		0.50~1.00	
High Carbon Chromium Bearing Steels	JIS G 4805	SUJ 1	0.95~1.10	0.15~0.35	≦0.50	≦0.025	≦0.025		0.90~1.20	≦0.08		
		SUJ 2	0.95~1.10	0.15~0.35	≦0.50	≦0.025	≦0.025		1.30~1.60	≦0.08		
		SUJ 3	0.95~1.10	0.40~0.70	0.90~1.15	≦0.025	≦0.025		0.90~1.20	≦0.08		
		SUJ 4	0.95~1.10	0.15~0.35	≦0.50	≦0.025	≦0.025		1.30~1.60	0.10~0.25		

Category	Std. No.	Designation	Chemical Composition %							
			Cu	Pb	Fe	Sn	Zn	Mn	Ni	others
Copper alloy	JIS H 3270	C5191B				5.5~7.0				P;0.03~0.35 Cu+Sn+P≧99.5
	JIS H 3260	C3604W	57.0~61.0	1.8~3.7	≦0.50		Remains			Fe+Sn≦1.2

Category	Std. No.	Designation	Chemical Composition %									
			Cu	Zn	Al	Mn	Ni	Pb	Sn	Fe	Si	others
Copper alloy	JIS H 5111	BC6	82.0 ~87.0	4.0~6.0	≦0.01		≦1.0	4.0~6.0	4.0~6.0	≦0.3	≦0.01	

Comparison with other country's standard for material

Japan Industrial Standard;JIS			ISO	USA	UK	Germany	France
Category	Std. No.	Designation					
Carbon Steels for Machine structural use	JIS G 4051	S40C	C40/C40E4/C40M2	AISI 1040	EN-C40,C40E,C40R		
		S45C	C45/C45E4/C45M2	AISI 1045	EN-C45,C45E,C45R		
		S50C	C50/C50E4/C50M2	AISI 1049	EN-C50,C50E,C50R		
		S53C	—	AISI 1053	—	—	—
		S55C	C55/C55E4/C55M2	AISI 1055	EN-C55,C55E,C55R		
Structural Steels with specified hardenability bands	JIS G 4052	SCM415H	—	—	—	—	—
		SCM420H	—	—	708H20	—	—
		SCM435H	34CrMo4/34CrMoS4	AISI 4137H	—	—	—
		SCM440H	42CrMo4/42CrMoS4	AISI 4140H	EN-42CrMo4/42CrMoS4		
		SCM445H	—	AISI 4147H	—	—	—
Chrome - molybdenum Steel	JIS G 4105	SCM415	—	—	—	—	—
		SCM418	18CrMo4/18CrMoS4	—	—	—	—
		SCM420	—	—	708M20	—	—
		SCM430	—	AISI 4130	—	—	—
		SCM435	34CrMo4/34CrMoS4	AISI 4137	—	—	—
		SCM440	42CrMo4/42CrMoS4	AISI 4140	EN-42CrMo4/42CrMoS4		
		SCM445	—	AISI 4147	—	—	—

Japan Industrial Standard;JIS			ISO	USA	UK	Germany	France
Category	Std. No.	Designation					
Stainless Steels	JIS G 4303	SUS303	TR15510(1997)-13	ASTM-S 30300	303 S 31	X10CrNiS 189	Z8 CNF 18.09
		SUS304	TR15510(1997)-6	ASTM-S 30400	304 S 31	X5CrNi 1810	Z7CN 18.09
		SUS316	TR15510(1997)-26	ASTM-S 31600	316 S 31	X5CrNiMo17122	Z7CND 17.11-02
		SUS317	—	ASTM-S 31700	317 S 16	—	—
		SUS440A	—	ASTM-S 44002	EN-1.4109		
		SUS440B	—	ASTM-S 44003	—	—	—
		SUS440C	—	ASTM-S 44004	EN-1.4125		Z100CD17
		SUS630	TR15510(1997)-58	ASTM-S 17400	—	—	Z7CNU 17.04
		SUS631	TR15510(1997)-59	ASTM-S 17700	—	X7CrNiAl 177	Z9CNA 17.07
Alloy Tool Steels	JIS G 4404	SKS 2	105WCr1	—	—	105WCr6	105WCr5
		SKS 3	—	—	—	—	—
		SKS 4	—	—	—	—	—
High Carbon Chromium Bearing Steels	JIS G 4805	SUJ 1	—	ASTM 51100	—	—	—
		SUJ 2	100Cr6	ASTM 52100	—	100Cr6	100Cr6
		SUJ 3	100CrMnSi4-4	ASTM A 485 Grade1	—	—	—
Copper alloy	JIS H 3270	C5191B	CuSn6	—	PB103	CuSn6	—
	JIS H 3260	C3604W	CuZn 39 PB 3	—	—	CuZn 39 PB 3	—
	JIS H 5111	BC6	—	ASTM-C 83600	LG2	CuSn 5 ZnPb	—

Fits tolerances for frequent use　JIS B 0401

●Fit tolerances of normal holes

Unit: μm

Dimensional division		Fit tolerance grade for holes															
over	up to	D8	D9	D10	E7	E8	E9	F6	F7	F8	G6	G7	H6	H7	H8	H9	H10
—	3	+34 +20	+45 +20	+60 +20	+24 +14	+28 +14	+39 +14	+12 +6	+16 +6	+20 +6	+8 +2	+12 +2	+6 0	+10 0	+14 0	+25 0	+40 0
3	6	+48 +30	+60 +30	+78 +30	+32 +20	+38 +20	+50 +20	+18 +10	+22 +10	+28 +10	+12 +4	+16 +4	+8 0	+12 0	+18 0	+30 0	+48 0
6	10	+62 +40	+76 +40	+98 +40	+40 +25	+47 +25	+61 +25	+22 +13	+28 +13	+35 +13	+14 +5	+20 +5	+9 0	+15 0	+22 0	+36 0	+58 0
10	14	+77 +50	+93 +50	+120 +50	+50 +32	+59 +32	+75 +32	+27 +16	+34 +16	+43 +16	+17 +6	+24 +6	+11 0	+18 0	+27 0	+43 0	+70 0
14	18																
18	24	+98 +65	+117 +65	+149 +65	+61 +40	+73 +40	+92 +40	+33 +20	+41 +20	+53 +20	+20 +7	+28 +7	+13 0	+21 0	+33 0	+52 0	+84 0
24	30																
30	40	+119 +80	+142 +80	+180 +80	+75 +50	+89 +50	+112 +50	+41 +25	+50 +25	+64 +25	+25 +9	+34 +9	+16 0	+25 0	+39 0	+62 0	+100 0
40	50																
50	65	+146 +100	+174 +100	+220 +100	+90 +60	+106 +60	+134 +60	+49 +30	+60 +30	+76 +30	+29 +10	+40 +10	+19 0	+30 0	+46 0	+74 0	+120 0
65	80																
80	100	+174 +120	+207 +120	+260 +120	+107 +72	+126 +72	+159 +72	+58 +36	+71 +36	+90 +36	+34 +12	+47 +12	+22 0	+35 0	+54 0	+87 0	+140 0
100	120																

●Fit tolerances of normal shafts

Unit: μm

Dimensional division		Fit tolerance grade for shafts															
over	up to	d8	d9	e7	e8	e9	f6	f7	f8	g5	g6	g7	h5	h6	h7	h8	h9
—	3	-20 -34	-20 -45	-14 -24	-14 -28	-14 -39	-6 -12	-6 -16	-6 -20	-2 -6	-2 -8	-2 -12	0 -4	0 -6	0 -10	0 -14	0 -25
3	6	-30 -48	-30 -60	-20 -32	-20 -38	-20 -50	-10 -18	-10 -22	-10 -28	-4 -9	-4 -12	-4 -16	0 -5	0 -8	0 -12	0 -18	0 -30
6	10	-40 -62	-40 -76	-25 -40	-25 -47	-25 -61	-13 -22	-13 -28	-13 -35	-5 -11	-5 -14	-5 -20	0 -6	0 -9	0 -15	0 -22	0 -36
10	14	-50 -77	-50 -93	-32 -50	-32 -59	-32 -75	-16 -27	-16 -34	-16 -43	-6 -14	-6 -17	-6 -24	0 -8	0 -11	0 -18	0 -27	0 -43
14	18																
18	24	-65 -98	-65 -117	-40 -61	-40 -73	-40 -92	-20 -33	-20 -41	-20 -53	-7 -16	-7 -20	-7 -28	0 -9	0 -13	0 -21	0 -33	0 -52
24	30																
30	40	-80 -119	-80 -142	-50 -75	-50 -89	-50 -112	-25 -41	-25 -50	-25 -64	-9 -20	-9 -25	-9 -34	0 -11	0 -16	0 -25	0 -39	0 -62
40	50																
50	65	-100 -146	-100 -174	-60 -90	-60 -106	-60 -134	-30 -49	-30 -60	-30 -76	-10 -23	-10 -29	-10 -40	0 -13	0 -19	0 -30	0 -46	0 -74
65	80																
80	100	-120 -174	-120 -207	-72 -107	-72 -126	-72 -159	-36 -58	-36 -71	-36 -90	-12 -27	-12 -34	-12 -47	0 -15	0 -22	0 -35	0 -54	0 -87
100	120																

Unit: μm

Dimensional division		Fit tolerance grade for holes															
over	up to	JS6	JS7	K6	K7	M6	M7	N6	N7	N8	N9	P6	P7	P8	P9	R7	S7
—	3	±3	±5	0 -6	0 -10	-2 -8	-2 -12	-4 -10	-4 -14	-4 -18	-4 -29	-6 -12	-6 -16	-6 -20	-6 -31	-10 -20	-14 -24
3	6	±4	±6	+2 -6	+3 -9	-1 -9	0 -12	-5 -13	-4 -16	-2 -20	0 -30	-9 -17	-8 -20	-12 -30	-12 -42	-11 -23	-15 -27
6	10	±4.5	±7.5	+2 -7	+5 -10	-3 -12	0 -15	-7 -16	-4 -19	-3 -25	0 -36	-12 -21	-9 -24	-15 -37	-15 -51	-13 -28	-17 -32
10	14	±5.5	±9	+2 -9	+6 -12	-4 -15	0 -18	-9 -20	-5 -23	-3 -30	0 -43	-15 -26	-11 -29	-18 -45	-18 -61	-16 -34	-21 -39
14	18																
18	24	±6.5	±10.5	+2 -11	+6 -15	-4 -17	0 -21	-11 -24	-7 -28	-3 -36	0 -52	-18 -31	-14 -35	-22 -55	-22 -74	-20 -41	-27 -48
24	30																
30	40	±8	±12.5	+3 -13	+7 -18	-4 -20	0 -25	-12 -28	-8 -33	-3 -42	0 -62	-21 -37	-17 -42	-26 -65	-26 -88	-25 -50	-34 -59
40	50																
50	65	±9.5	±15	+4 -15	+9 -21	-5 -24	0 -30	-14 -33	-9 -39	-4 -50	0 -74	-26 -45	-21 -51	-32 -78	-32 -106	-30 -60	-42 -72
65	80															-32 -62	-48 -78
80	100	±11	±17.5	+4 -18	+10 -25	-6 -28	0 -35	-16 -38	-10 -45	-4 -58	0 -87	-30 -52	-24 -59	-37 -91	-37 -124	-38 -73	-58 -93
100	120															-41 -76	-66 -101

Unit: μm

Dimensional division		Fit tolerance grade for shafts															
over	up to	js5	js6	js7	k5	k6	k7	m5	m6	n6	p6	r6	s6	t6	u6	x6
—	3	±2	±3	±5	+4 0	+6 0	+10 0	+6 +2	+8 +2	+10 +4	+12 +6	+16 +10	+20 +14	—	+24 +18	+26 +20
3	6	±2.5	±4	±6	+6 +1	+9 +1	+13 +1	+9 +4	+12 +4	+16 +8	+20 +12	+23 +15	+27 +19	—	+31 +23	+36 +28
6	10	±3	±4.5	±7.5	+7 +1	+10 +1	+16 +1	+12 +6	+15 +6	+19 +10	+24 +15	+28 +19	+32 +23	—	+37 +28	+43 +34
10	14	±4	±5.5	±9	+9 +1	+12 +1	+19 +1	+15 +7	+18 +7	+23 +12	+29 +18	+34 +23	+39 +28	—	+44 +33	+51 +40
14	18													—		+56 +45
18	24	±4.5	±6.5	±10.5	+11 +2	+15 +2	+23 +2	+17 +8	+21 +8	+28 +15	+35 +22	+41 +28	+48 +35	—	+54 +41	+67 +54
24	30													+54 +41	+61 +48	+77 +64
30	40	±5.5	±8	±12.5	+13 +2	+18 +2	+27 +2	+20 +9	+25 +9	+33 +17	+42 +26	+50 +34	+59 +43	+64 +48	+76 +60	—
40	50													+70 +54	+86 +70	—
50	65	±6.5	±9.5	±15	+15 +2	+21 +2	+32 +2	+24 +11	+30 +11	+39 +20	+51 +32	+60 +41	+72 +53	+85 +66	+106 +87	—
65	80											+62 +43	+78 +59	+94 +75	+121 +102	—
80	100	±7.5	±11	±17.5	+18 +3	+25 +3	+38 +3	+28 +13	+35 +13	+45 +23	+59 +37	+73 +51	+93 +71	+113 +91	+146 +124	—
100	120											+76 +54	+101 +79	+126 +104	+166 +144	—

Appended table

General tolerances

●General tolerances for linear dimensions　JIS B 0405

Unit：mm

Tolerance grade		Dimensional division					
Symbol	Remark	0.5 or over up to 3	over 3 up to 6	over 6 up to 30	over 30 up to 120	over 120 up to 400	over 400 up to 1000
f	Fine	±0.05	±0.05	±0.1	±0.15	±0.2	±0.3
m	Medium	±0.1	±0.1	±0.2	±0.3	±0.5	±0.8
c	Coarse	±0.2	±0.3	±0.5	±0.8	±1.2	±2
v	Very coarse	—	±0.5	±1	±1.5	±2.5	±4

●General tolerances for chamfer dimensions　JIS B 0405

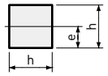
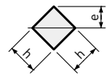
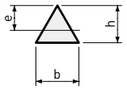
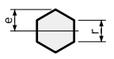
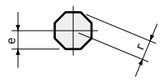
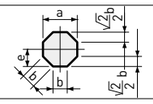
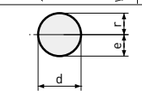
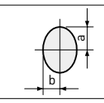
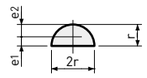
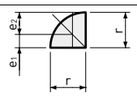
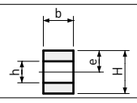
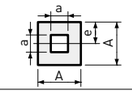
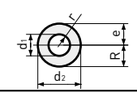
Unit：mm

Tolerance grade		Dimensional division		
Symbol	Remark	0.5 or over up to 3	over 3 up to 6	over 6
f	Fine	±0.2	±0.5	±1
m	Medium	±0.2	±0.5	±1
c	Coarse	±0.4	±1	±2
v	Very coarse	±0.4	±1	±2

●General tolerances for angular dimensions　JIS B 0405

Tolerance grade		Length division of shorter side formed angle(mm)				
Symbol	Remark	up to 10	over 10 up to 50	over 50 up to 120	over 120 up to 400	over 400
f	Fine	±1°	±30′	±20′	±10′	±5′
m	Medium	±1°	±30′	±20′	±10′	±5′
c	Coarse	±1°30′	±1°	±30′	±15′	±10′
v	Very coarse	±3°	±2°	±1°	±30′	±20′

Area・Center of gravity・Moment of Inertia of area

Cross section	Sectional area A	Distance to center of gravity e	Moment of Inertia of area I	Section modulus Z=I/e
	bh	$\frac{h}{2}$	$\frac{bh^3}{12}$	$\frac{bh^2}{6}$
	h^2	$\frac{h}{2}$	$\frac{h^4}{12}$	$\frac{h^3}{6}$
	h^2	$\frac{h}{2}\sqrt{2}$	$\frac{h^4}{12}$	$0.1179h^3=\frac{\sqrt{2}}{12}h^3$
	$\frac{bh}{12}$	$\frac{2}{3}h$	$\frac{bh^3}{36}$	$\frac{bh^2}{24}$
	$\frac{3\sqrt{3}}{2}r^2$	$\sqrt{\frac{3}{4}}r$	$\frac{5\sqrt{3}}{16}r^4$	$\frac{5}{8}r^3$
		r		$\frac{5\sqrt{3}}{16}r^3$
	$2.828r^2$	$0.924r^2$	$\frac{1+2\sqrt{2}}{6}r^4$	$0.6906r^3$
	$0.8284a^2$	$b=\frac{a}{1+\sqrt{2}}$	$0.0547a^4$	$0.1095a^3$
	$\pi r^2=\frac{\pi d^2}{4}$	$\frac{d}{2}$	$\frac{\pi d^4}{64}=\frac{\pi r^4}{4}$	$\frac{\pi d^3}{32}=\frac{\pi r^3}{4}$
	πab	a	$\frac{\pi}{4}ba^3$	$\frac{\pi}{4}ba^2$
	$\frac{\pi}{2}r^2$	$e_1=0.4244r$ $e_2=0.5756r$	$\left(\frac{\pi}{8}-\frac{8}{9\pi}\right)r^4$	$z_1=0.2587r^3$ $z_2=0.1908r^3$
	$\frac{\pi}{4}r^2$	$e_1=0.4244r$ $e_2=0.5756r$	$0.055r^4$	$z_1=0.1296r^3$ $z_2=0.0956r^3$
	b (H-h)	$\frac{H}{2}$	$\frac{b}{12}(H^3-h^3)$	$\frac{b}{6H}(H^3-h^3)$
	A^2-a^2	$\frac{A}{2}$	$\frac{A^4-a^4}{12}$	$\frac{1}{6}\frac{A^4-a^4}{A}$
	$\frac{\pi}{4}(d_2^2-d_1^2)$	$\frac{d_2}{2}$	$\frac{\pi}{64}(d_2^4-d_1^4)$ $=\frac{\pi}{4}(R^4-r^4)$	$\frac{\pi}{32}\left(\frac{d_2^4-d_1^4}{d_2}\right)$ $=\frac{\pi}{4}\frac{R^4-r^4}{R}$

Technical Data Sheet

As customer's request, KSS selects Ball Screws. For selection of Ball Screws, please let us know detail of usage condition as much as possible and it enables precise selection.
Prompt selection can be possible by using technical data sheet below.

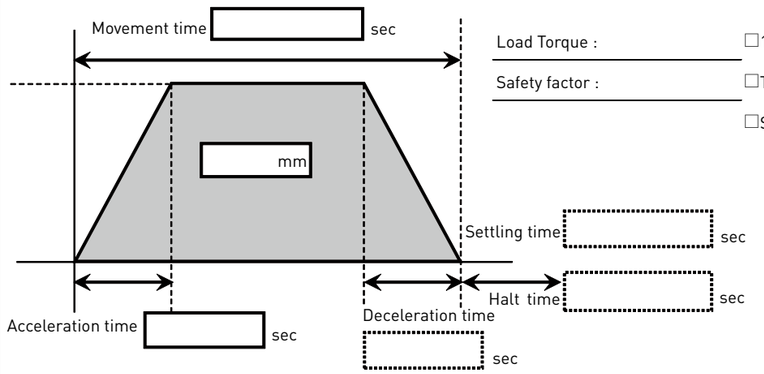
Technical data sheet

Date	/ /		Person in charge			
Company Name						
Telephone No.			E-mail address			
Industry Field	☐ Semiconductor ☐ LCD ☐ Measuring Equipment ☐ Stage ☐ Optical ☐ Food ☐ Medical ☐ Aero space ☐ Automobile ☐ Military affairs ☐ Others ( )					
Products	☐Ball Screw ☐ Lead Screw ☐ Resin Lead Screw ☐ Direct Motor Drive Ball Screw ☐Actuator ☐ Others( )					
Operating Condition	Machine Name		Shaft dia. (mm)		Lead (mm)	
	Application		Accuracy Grade		Axial play (μm)	
	Position	☐ Hor. ☐ Vert. ☐ ( ) deg	Travel (mm)		Lubrication	
	Operating Temp.	☐Room Temp. ☐Others( ) deg	Load (max/mean)		Speed (max/mean)	
	Remarks					
Reqd. accuracy	Absolute Positioning μm		Repeatability μm		Lost motion μm	

●Operating Pattern●

Crucial items

Optional Items



Load Torque :

Safety factor :

☐1 pulse feed operation (μm)

☐Triangle drive motion

☐Starting operation

Memorandum

Request items	☐Ball Screw life time ☐ Ball Screw Model selection ☐Motor Model selection ☐ Others ( )		
Calculated Ball Screw Life	(hours/days/years)	Recommended Ball Screw/Motor	
Resistered No.			

KSS CO.,LTD.

Appended table

Advanced Technology of "Miniature"

Contact us

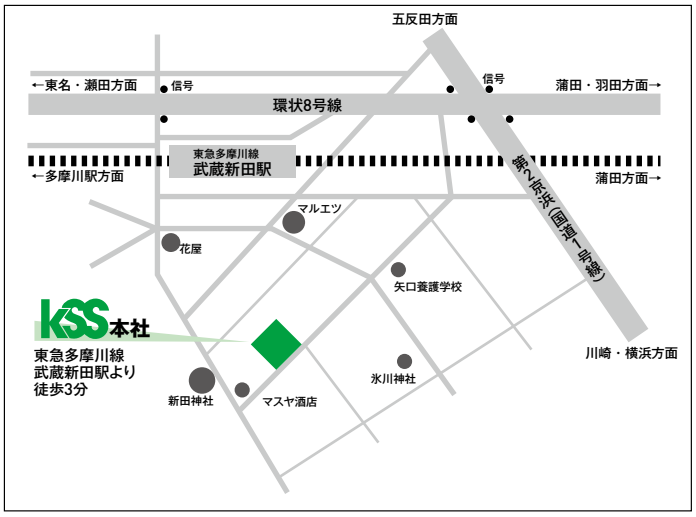
KSS CO.,LTD.

International sales dept.
TEL:03-3756-3921
FAX:03-3756-3191

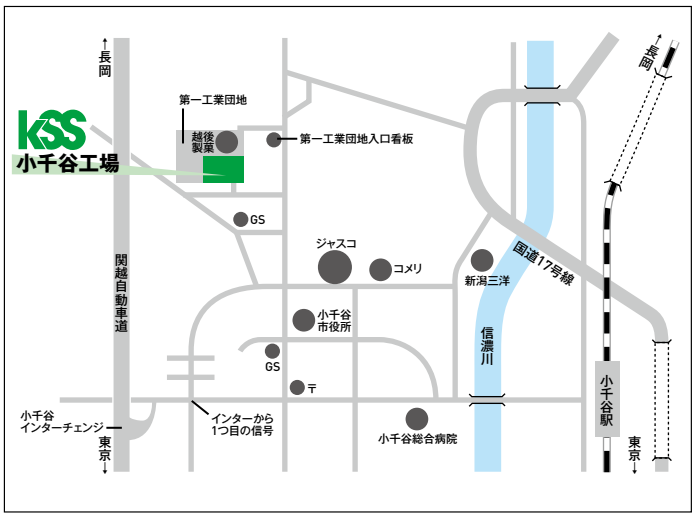
URL:https://www.ballscrew.com
E-mail : intldept@kss-superdrive.co.jp

Network

Head office
1-22-14 Yaguchi, Ota-ku, Tokyo Japan 146-0093



Ojiya plant
Ojiya office
Aza Shinbo 4-14, Oaza Yamaya, Ojiya City, Niigata Japan 947-0043



Edited & Prined in August, 2019 masahiro higatani