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MOTION & CONTROL  
**NSK**

# Maintenance-free Series NSK Ball Screw, Standard Inventory WFA Series

Environment-friendly maintenance-free ball screws.  
Low-cost and standard inventory for quick delivery.  
Compatible with stringent environmental concerns.





**NSK K1**

## WFA Series Overview, NSK K1™ Equipped Maintenance-free Series Ball Screw

The WFA series ball screw is a new member of the highly regarded NSK maintenance-free series ball screw product line, incorporating the NSK K1 lubrication unit.

### 1. Features

Ball screw with NSK K1, a new compact and efficient lubricating unit, exhibits excellent performance.

#### 1. Long-term, maintenance-free usage

In mechanical environments where lubrication is difficult to apply, long-term running efficiency is maintained by using the NSK K1 in combination with grease.

#### 2. Short lead time

Maintained in standard inventory to ensure fast delivery.

#### 3. Low Cost

Costs the same as the A series, a conventional standard inventory item. The low-cost series provides improved cost performance through long-term maintenance-free operation.

#### 4. Prevention of oil-related environmental pollution

In locations where oil adversely affects the environment, or in mechanisms with severe hygienic restrictions, sufficient lubrication is provided using the NSK K1 in combination with minimal grease.

#### 5. Effective in environments where the lubricant is washed away

In facilities where mechanisms are washed down with water, or subject to severe weather conditions, long service life is ensured by using the NSK K1 in combination with grease.

#### 6. Maintains efficiency in dusty environments

In environments where oil and grease-absorbing dust is produced, long-term lubrication efficiency is maintained by using the NSK K1 in combination with grease.

## 2. Performance

### Comparative endurance test of ball screw with/without NSK K1

#### Test material and conditions

Ball screw	20 mm shaft diameter, 20 mm lead
Lubrication	Comparison of unit with/without NSK K1
Speed	4,000 rpm (80 m/min)
Stroke	600 mm

#### Test results

Without lubrication, operation is no longer possible at 8.5 km, while with lubrication by NSK K1, operation is possible beyond 21,000 km.

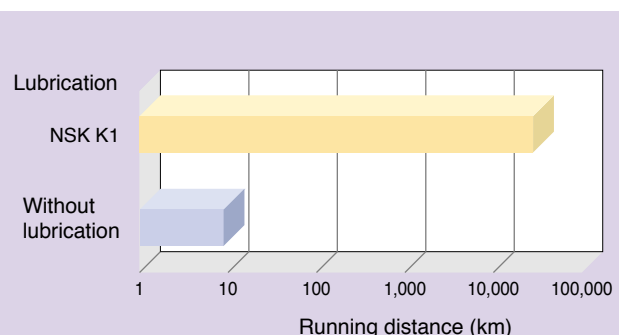


Figure 1 Results of endurance test without lubrication

NSK also conducts various tests under other conditions. Please contact NSK for details.

# Maintenance-free Series NSK Ball Screw, Standard Inventory WFA Series

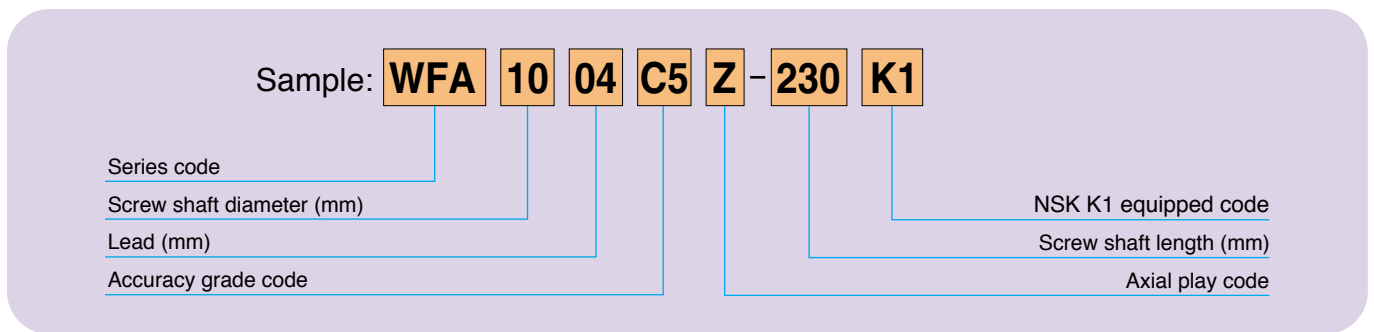
## 3. Specifications

- In the standard specification, K1 is equipped between the ball screw nut and the labyrinth seal; therefore, the overall nut length is slightly longer than conventional length.
- In the standard specification, lubrication is achieved with a combination of NSK standard grease, which fills the nut, and Lubricating Unit NSK K1.
- Accuracy, clearance, and preload are the same specifications as with conventional units; torque is slightly increased due to the equipped NSK K1.
- Accuracy and preload specification

Accuracy grade	Preload symbol
JIS C5	Z (Clearance 0)

\* Dynamic frictional torque increases slightly due to the equipped NSK K1. (Please refer to the ball screw specification notes, p. 4-10.)

## 4. Reference number



\* As to nut type code and reference number, K1 is added to the end of a conventional code and number.

## 5. Examples of applications

NSK K1 Equipped Ball Screws are maintenance-free over a longer period of time and support a wide variety of applications.



## Handling instructions

To maintain the high efficiency of NSK K1 over a long period of time, please follow these instructions.

### 1. Permissible temperature range

- Max. operating temperature: 50°C
- Max. peak temperature: 80°C

### 2. Use of chemicals

- Never leave the ball screw in close proximity to grease-removing organic solvents such as hexane, thinners, etc.
- Never immerse the ball screw in kerosene or rust preventative oils which contain kerosene.

Note: The following oils are compatible for use with NSK K1: water-based cutting oil, oil-based cutting oil, grease (mineral oil-AV2, ester-PS2).

# Maintenance-free Series NSK Ball Screw, Standard Inventory WFA Series

## 6. Reference numbers for stroke and shaft diameter × lead combination

(Unit: mm)

Shaft dia. × lead (page)		$\phi 10 \times 04$ (4)	$\phi 12 \times 05$ (5)	$\phi 12 \times 10$ (6)	$\phi 15 \times 10$ (7)	$\phi 15 \times 20$ (8)	$\phi 20 \times 10$ (9)	$\phi 20 \times 20$ (10)
Nominal stroke	Stroke limit							
80	83			WFA1210C5Z-230K1				
	94		WFA1205C5Z-230K1					
	98.5	WFA1004C5Z-230K1						
190	198.5	WFA1004C5Z-330K1						
	205					WFA1520C5Z-371K1		
210	213				WFA1510C5Z-371K1			
230	233			WFA1210C5Z-380K1				
	244		WFA1205C5Z-380K1					
290	298.5	WFA1004C5Z-430K1						
400	411						WFA2010C5Z-599K1	
430	433			WFA1210C5Z-580K1				
	444		WFA1205C5Z-580K1					
600	605					WFA1520C5Z-771K1		
	613				WFA1510C5Z-771K1			
	626							WFA2020C5Z-820K1
700	711						WFA2010C5Z-899K1	
1000	1005					WFA1520C5Z-1171K1		
	1013				WFA1510C5Z-1171K1			
	1026							WFA2020C5Z-1220K1
1200	1211					WFA2010C5Z-1399K1		
1400	1426							WFA2020C5Z-1620K1
Reference numbers for recommended support unit (fixed side)	WBK10-01A	○	○	○				
	WBK10-10	○	○	○				
	WBK12-01A				○	○		
	WBK12-11				○	○		
	WBK15-01A						○	○
	WBK15-11						○	○

### K1 Kit

NSK provides the K1 Kit—a lubrication unit which can be equipped onto the standard inventory NSK ball screw.

Only A series specification numbers containing FA, as shown below, are applicable.

Sample: **W2507** **FA** - **3P** - **C5Z25**

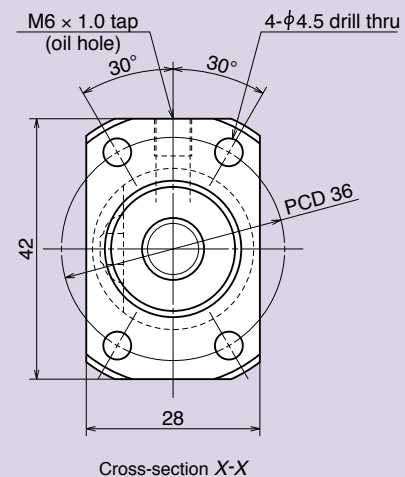
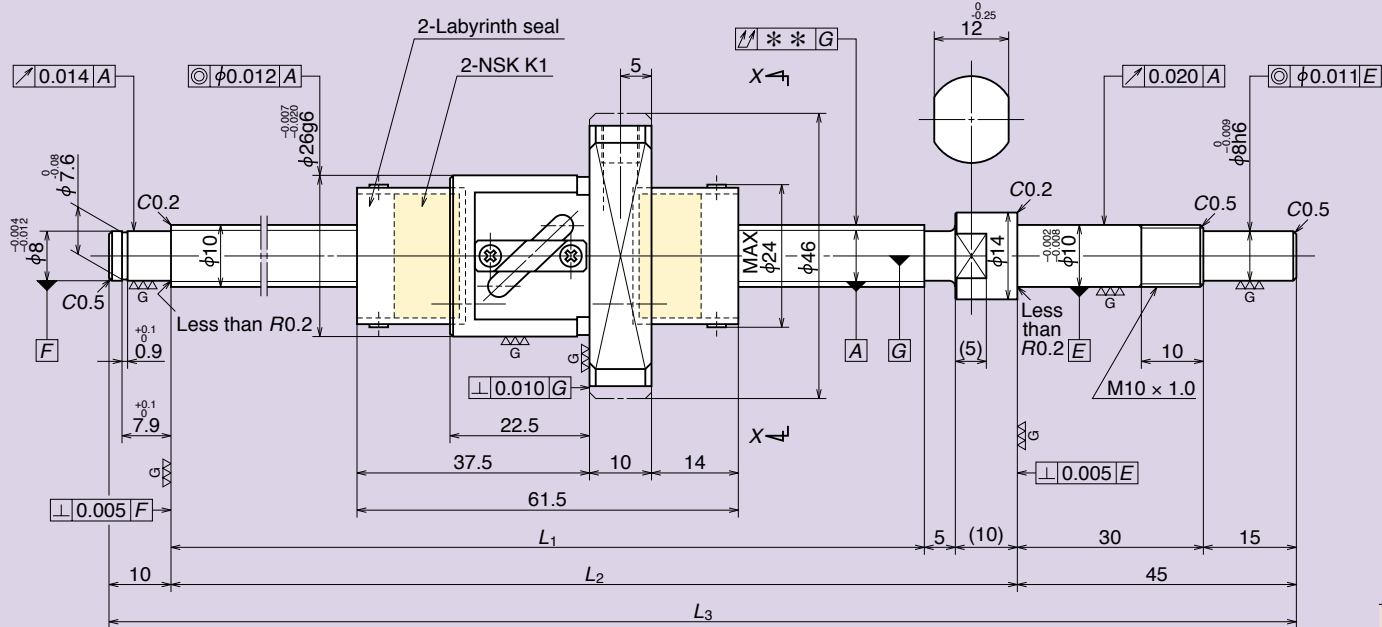
The K1 Kit must be equipped by NSK. Please consult NSK for details.

# 7. Dimensions



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## Screw shaft $\phi 10$ , lead 4



(Unit: mm)

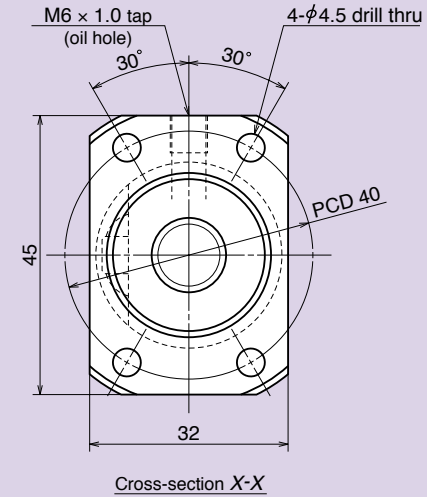
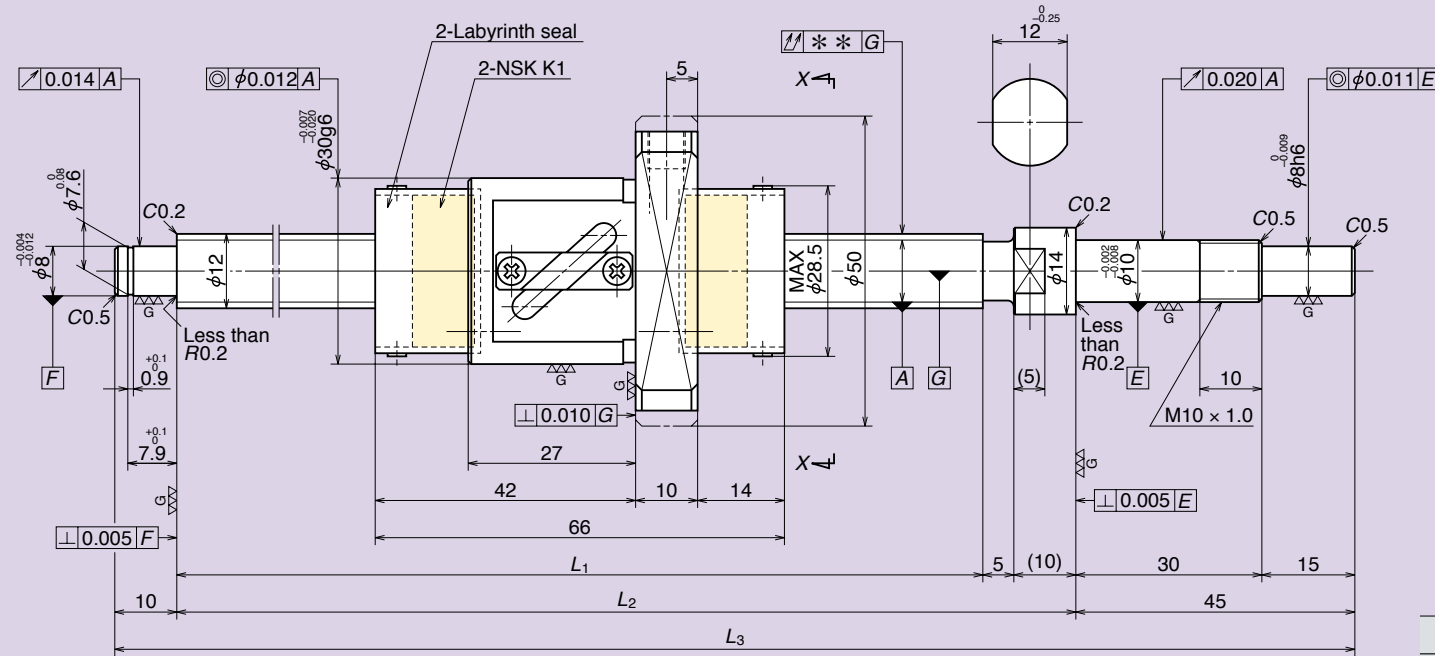
Ball screw specifications	
Shaft diameter × Lead/Direction of turn	10 × 4/Right
Ball recirculation	Return tube
Ball diameter	2.000
Effective turns of balls	2.5 × 1
Accuracy grade/Axial play code	C5/Z
Basic dynamic load rating N (kgf)	1730 (175)
Basic static load rating N (kgf)	2230 (225)
Axial play	0
Dynamic friction torque N · cm (kgf · cm)	0.2–3.3* (0.02–0.34)
Spacer ball	Yes
Factory-packed grease	NSK grease PS2

\* Indicates torque control value of ball screw; NSK K1 adds approximately 0.5 N · cm torque.

(Unit: mm)

Reference number	Stroke		Screw shaft length			Lead accuracy			Shaft runout**
	Nominal	Limit (L <sub>1</sub> –Nut length)	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	T	e <sub>p</sub>	v <sub>u</sub>	
WFA1004C5Z-230K1	80	98.5	160	175	230	0	0.020	0.018	0.045
WFA1004C5Z-330K1	190	198.5	260	275	330	0	0.023	0.018	0.060
WFA1004C5Z-430K1	290	298.5	360	375	430	0	0.025	0.020	0.080

Screw shaft  $\phi 12$ , lead 5



(Unit: mm)

Ball screw specifications	
Shaft diameter x Lead/Direction of turn	12 x 5/Right
Ball recirculation	Return tube
Ball diameter	2.381 (3/32)
Effective turns of balls	2.5 x 1
Accuracy grade/Axial play code	C5/Z
Basic dynamic load rating N (kgf)	2370 (240)
Basic static load rating N (kgf)	3160 (320)
Axial play	0
Dynamic friction torque N · cm (kgf · cm)	0.4–4.9* (0.04–0.50)
Spacer ball	Yes
Factory-packed grease	NSK grease PS2

\* Indicates torque control value of ball screw; NSK K1 adds approximately 0.6 N · cm torque.

(Unit: mm)

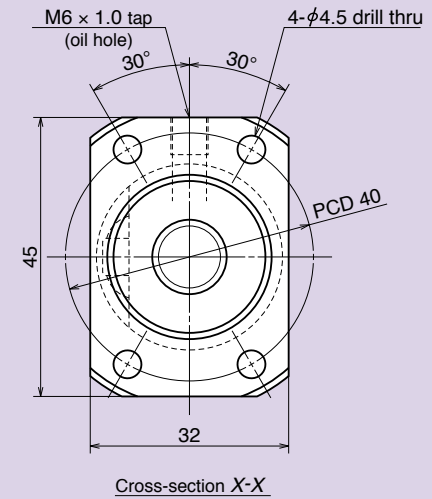
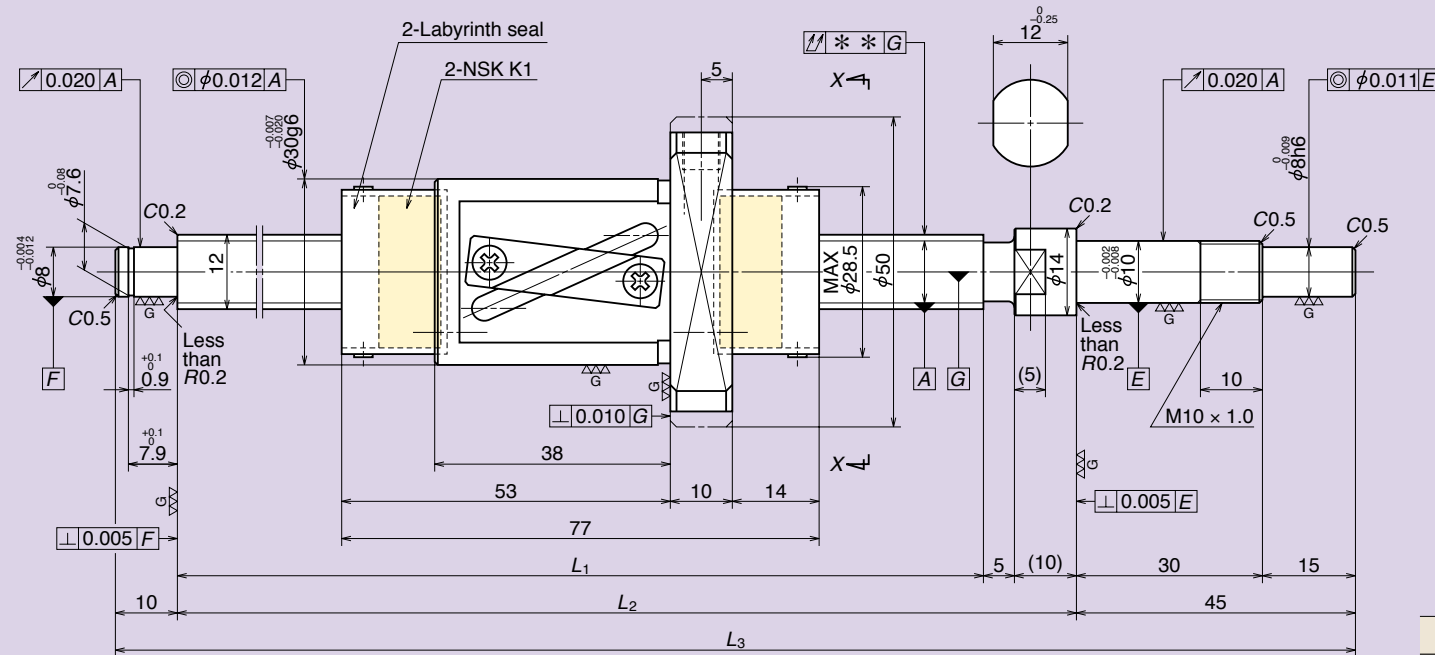
Reference number	Stroke		Screw shaft length			Lead accuracy			Shaft runout**
	Nominal	Limit ( $L_1$ -Nut length)	$L_1$	$L_2$	$L_3$	$T$	$e_p$	$v_u$	
WFA1205C5Z-230K1	80	94	160	175	230	0	0.020	0.018	0.045
WFA1205C5Z-380K1	230	244	310	325	380	0	0.023	0.018	0.060
WFA1205C5Z-580K1	430	444	510	525	580	0	0.030	0.023	0.100



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## Screw shaft $\phi 12$ , lead 10



(Unit: mm)

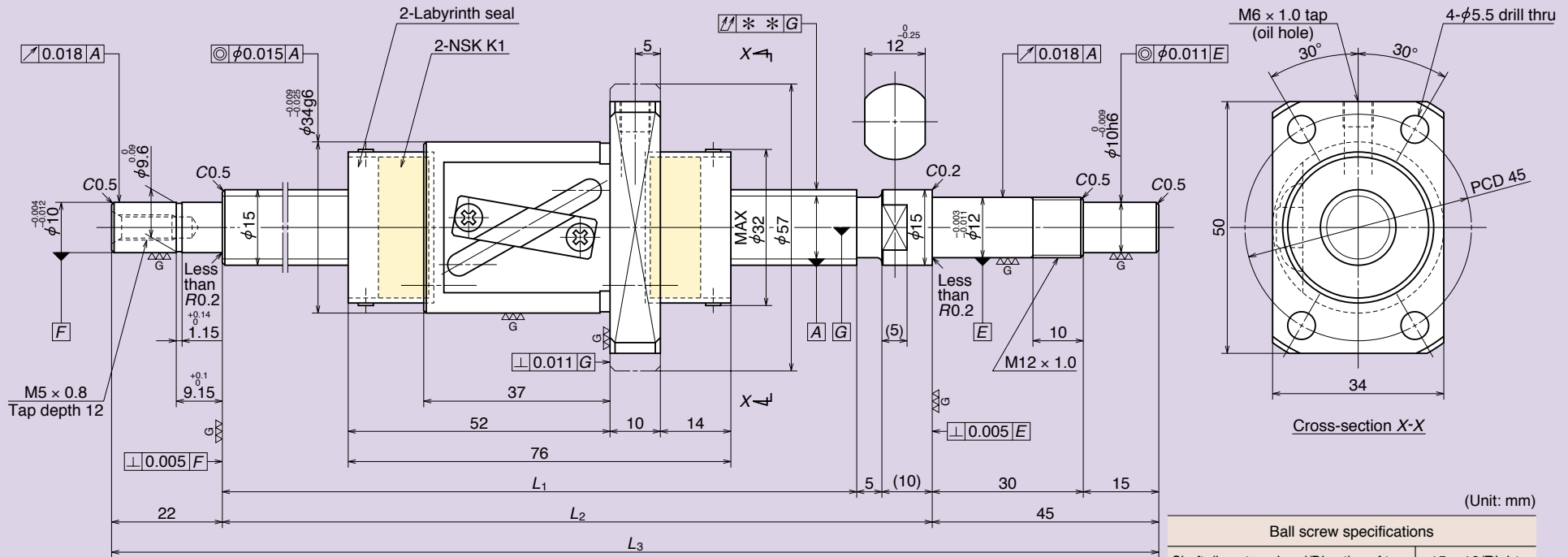
Ball screw specifications	
Shaft diameter x Lead/Direction of turn	12 x 10/Right
Ball recirculation	Return tube
Ball diameter	2.381 (3/32)
Effective turns of balls	2.5 x 1
Accuracy grade/Axial play code	C5/Z
Basic dynamic load rating N (kgf)	2360 (240)
Basic static load rating N (kgf)	3240 (330)
Axial play	0
Dynamic friction torque N · cm (kgf · cm)	0.4–4.9* (0.04–0.50)
Spacer ball	Yes
Factory-packed grease	NSK grease LR3

\* Indicates torque control value of ball screw; NSK K1 adds approximately 0.6 N · cm torque.

(Unit: mm)

Reference number	Stroke		Screw shaft length			Lead accuracy			Shaft runout**
	Nominal	Limit ( $L_1$ -Nut length)	$L_1$	$L_2$	$L_3$	$T$	$e_p$	$v_u$	
WFA1210C5Z-230K1	80	83	160	175	230	0	0.020	0.018	0.045
WFA1210C5Z-380K1	230	233	310	325	380	0	0.023	0.018	0.060
WFA1210C5Z-580K1	430	433	510	525	580	0	0.030	0.023	0.100

Screw shaft  $\phi 15$ , lead 10



(Unit: mm)

Ball screw specifications	
Shaft diameter x Lead/Direction of turn	15 x 10/Right
Ball recirculation	Return tube
Ball diameter	3.175 (1/8)
Effective turns of balls	2.5 x 1
Accuracy grade/Axial play code	C5/Z
Basic dynamic load rating N (kgf)	4450 (455)
Basic static load rating N (kgf)	6380 (650)
Axial play	0
Dynamic friction torque N · cm (kgf · cm)	0.9–5.4* (0.09–0.55)
Spacer ball	Yes
Factory-packed grease	NSK grease LR3

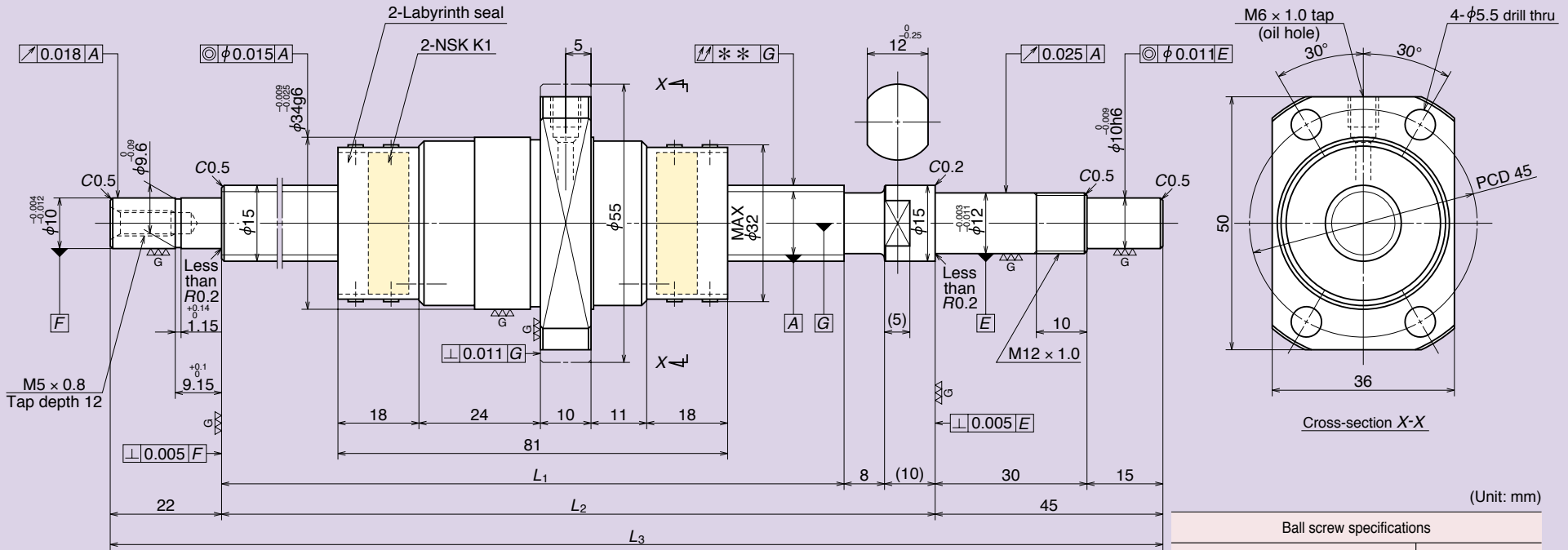
\* Indicates torque control value of ball screw; NSK K1 adds approximately 0.75 N · cm torque.

(Unit: mm)

Reference number	Stroke		Screw shaft length			Lead accuracy			Shaft runout**
	Nominal	Limit (L <sub>1</sub> –Nut length)	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	T	e <sub>p</sub>	V <sub>u</sub>	
WFA1510C5Z-371K1	210	213	289	304	372	0	0.023	0.018	0.045
WFA1510C5Z-771K1	600	613	689	704	771	0	0.035	0.025	0.085
WFA1510C5Z-1171K1	1000	1013	1089	1104	1171	0	0.046	0.030	0.140



## Screw shaft $\phi 15$ , lead 20



(Unit: mm)

Ball screw specifications	
Shaft diameter × Lead/Direction of turn	15 × 20/Right
Ball recirculation	End cap
Ball diameter	3.175 (1/8)
Effective turns of balls	1.7 × 1
Accuracy grade/Axial play code	C5/Z
Basic dynamic load rating N (kgf)	3870 (395)
Basic static load rating N (kgf)	5280 (595)
Axial play	0
Dynamic friction torque N · cm (kgf · cm)	1.6–7.4* (0.16–0.75)
Spacer ball	Yes
Factory-packed grease	NSK grease LR3

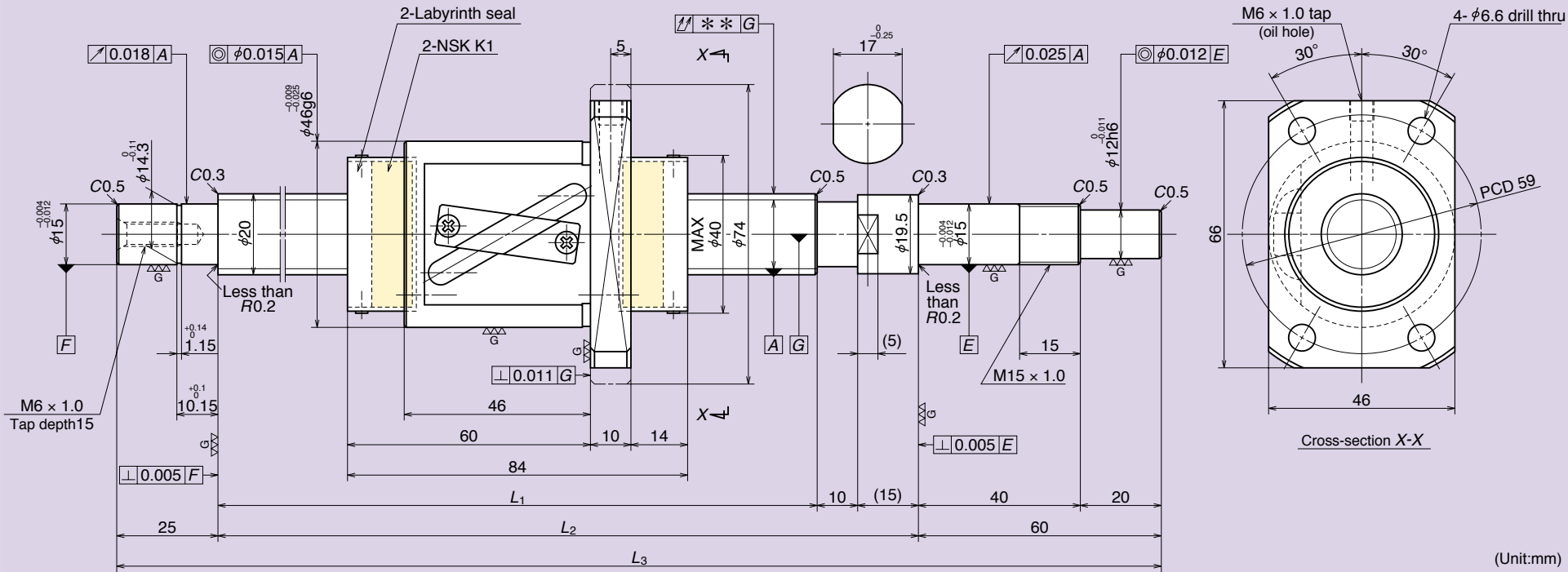
\* Indicates torque control value of ball screw; NSK K1 adds approximately 0.75 N · cm torque.

(Unit: mm)

Reference number	Stroke		Screw shaft length			Lead accuracy			Shaft runout**
	Nominal	Limit ( $L_1$ -Nut length)	$L_1$	$L_2$	$L_3$	$T$	$e_p$	$v_u$	
WFA1520C5Z-371K1	190	205	286	304	371	0	0.023	0.018	0.045
WFA1520C5Z-771K1	600	605	686	704	771	0	0.035	0.025	0.085
WFA1520C5Z-1171K1	1000	1005	1086	1104	1171	0	0.046	0.030	0.140



# Screw shaft $\phi 20$ , lead 20



(Unit:mm)

Ball screw specifications	
Shaft diameter × Lead/Direction of turn	20 × 20/Right
Ball recirculation	Return tube
Ball diameter	3.969 (5/32)
Effective turns of balls	1.5 × 1
Accuracy grade/Axial play code	C5/Z
Basic dynamic load rating N (kgf)	5370 (550)
Basic static load rating N (kgf)	8450 (860)
Axial play	0
Dynamic friction torque N · cm (kgf · cm)	2.4–9.8* (0.24–1.00)
Spacer ball	Yes
Factory-packed grease	NSK grease LR3

\* Indicates torque control value of ball screw; NSK K1 adds approximately 1.0 N · cm torque.

(Unit: mm)

Reference number	Stroke		Screw shaft length			Lead accuracy			Shaft runout**
	Nominal	Limit (L <sub>1</sub> –Nut length)	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	T	e <sub>p</sub>	v <sub>u</sub>	
WFA2020C5Z-820K1	600	626	710	735	820	0	0.035	0.025	0.110
WFA2020C5Z-1220K1	1000	1026	1110	1135	1220	0	0.046	0.030	0.140
WFA2020C5Z-1620K1	1400	1426	1510	1535	1620	0	0.054	0.035	0.180

