



Roller Follower

THK General Catalog

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Features of the Roller Follower

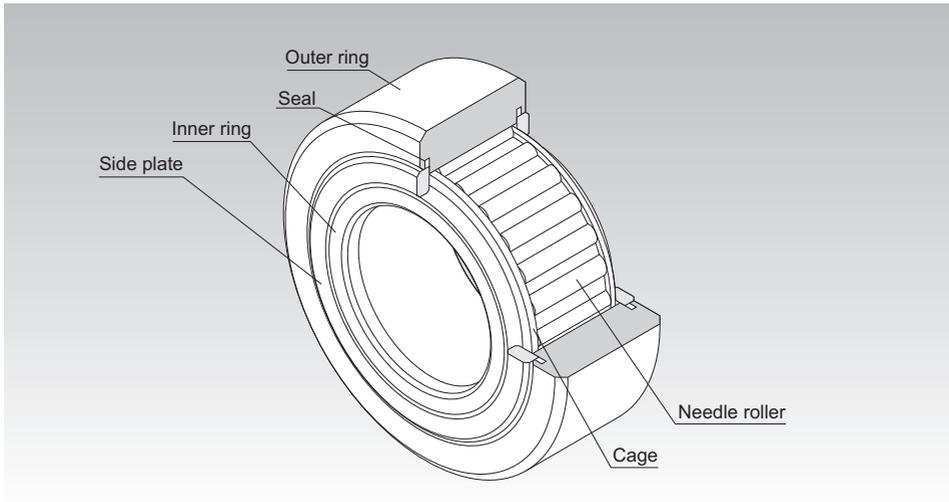


Fig.1 Structure of Roller Follower Model NAST-ZZUU

Structure and Features

The Roller Follower is a compact and highly rigid bearing system. It contains needle bearings and is used as a guide roller for cam discs and straight motion.

Since its outer ring rotates while keeping direct contact with the mating surface, this product is thick-walled and designed to bear an impact load.

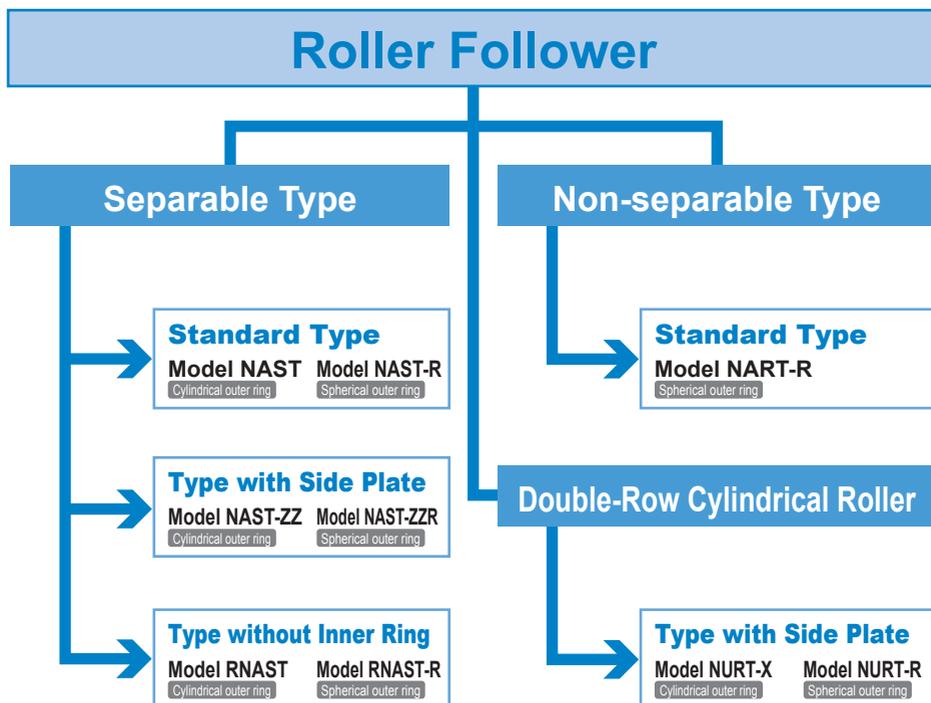
Inside the outer ring, needle rollers and a precision cage are incorporated. This prevents the product from skewing and achieves a superb rotation performance. And, as a result, the product is capable of easily withstanding high-speed rotation.

Roller Followers are divided into two types: separable type whose inner ring can be separated, and non-separable type whose inner ring cannot be separated.

There are two types of the outer ring in shape: spherical and cylindrical. The spherical outer ring easily absorbs a distortion of the shaft center when the cam follower is installed and helps lighten a biased load.

The Roller Follower is used in a wide range of applications such as cam mechanisms of automatic machines, dedicated machines as well as carrier systems, conveyors, bookbinding machines, tool changers of machining centers, pallet changers, automatic coating machines, and sliding forks of automatic warehouses.

Types of the Roller Follower



Types of the Roller Follower

Types and Features

Model NAST (Separable Type)

Model NAST is a separable type of bearing system that combines a thick-wall outer ring, an inner ring and needle rollers equipped with a precision cage.

Inner diameter: 6-50mm

Specification Table⇒ [A20-10](#)



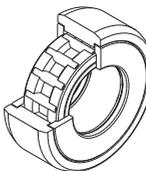
Model NAST

Model NAST-ZZ (Separable Type, with Side Plates)

This separable type of bearing system has a labyrinth seal consisting of a pair of side plates formed on both sides of the inner ring of model NAST. (Model number of the type attached with seals is NAST-ZZUU.)

Inner diameter: 6-50mm

Specification Table⇒ [A20-11](#)



Model NAST-ZZ

Model RNAS (Separable Type, No Inner Ring)

This model is basically the same as model NAST, but does not have an inner ring.

Inner diameter: 7-60mm

Specification Table⇒ [A20-12](#)



Model RNAS

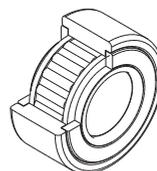
Model NART-R(Non-separable Type)

This model is a non-separable type of bearing system whose inner ring is fixed to the side plates.

Since the circumference of the outer ring is spherically ground, it helps lighten a biased load (symbol R). (Model number of the type attached with seals is NART-UUR.)

Inner diameter: 5-50mm

Specification Table⇒ **A** 20-13



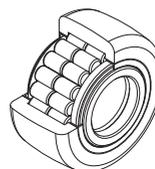
Model NART-R

Model NURT (Double-row Cylindrical Rollers)

This model, which employs a double row of cylindrical rollers, can accommodate high radial loads.

Inner diameter: 15-50mm

Specification Table⇒ **A** 20-14



Model NURT

Options

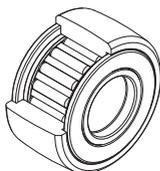
Note: Different features and options are available, depending on the model. For details, please refer to the dimension table for the product in question.

● Type of material

Carbon steel and stainless steel are available.

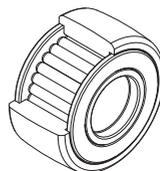
Stainless steel, which is more resistant to corrosion, is the best choice for use in clean rooms and other oil-free environments.

● Roller guide



With cage (No Symbol)

The caged format, which offers optimal lubrication conditions, is best for high-speed rotation.

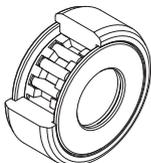


Full rollers (V)

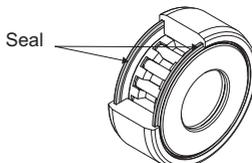
The full-complement roller format is best for low-speed rotation and heavy loads.

Note: Please make sure to follow the lubrication schedule.

● With/without a seal



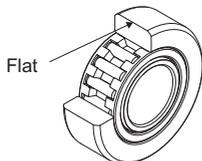
Without seal (No symbol)



With seal (UU)

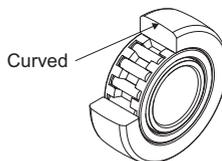
Equipped with a highly wear-resistant synthetic rubber seal to keep foreign matter out of the unit's interior.

● Outer ring outer surface configuration



Cylindrical outer ring (No Symbol)

This model offers an expansive area of contact between rolling surfaces and is therefore ideal for heavy loads and low-rigidity rolling surfaces.



Spherical outer ring (R)

This helps alleviate the effects of an eccentric load in the event of adverse conditions around the outer ring and rolling surface.

Nominal Life

[Static Safety Factor]

The basic static load rating C_0 refers to the static load with constant direction and magnitude, under which the calculated contact stress in the center of the contact area between the roller and the raceway under the maximum load is 4000 MPa. (If the contact stress exceeds this level, it will affect the rotation.) This value is indicated as “ C_0 ” in the specification tables. When a load is statically or dynamically applied, it is necessary to consider the static safety factor as shown below.

$$\frac{C_0}{P_0} = f_s$$

- f_s : Static safety factor (see Table1)
 C_0 : Basic static load rating (kN)
 P_0 : Radial load (kN)

Table1 Static Safety Factor (f_s)

Load conditions	Lower limit of f_s
Normal load	1 to 3
Impact load	3 to 5

* The minimum value for the static safety factor is based on the presumption of appropriate lubrication and optimal conditions for mounting and assembly. It is not possible to calculate the effect on internal loads that may be caused by improper mounting, deformation of mounting components, or the like. Please take all necessary action to ensure safety.

[Nominal Life]

The service life of the Roller Follower is obtained from the following equation.

$$L = \left(\frac{f_r \cdot C}{f_w \cdot P_c} \right)^{\frac{10}{3}} \times 10^6$$

- L : Nominal life
 (The total number of revolutions that 90% of a group of identical Roller Follower units independently operating under the same conditions can achieve without showing flaking from rolling fatigue)
- C : Basic dynamic load rating* (kN)
 P_c : Radial load (kN)
 f_r : Temperature factor
 (see Fig.1 on **A20-8**)
- f_w : Load factor (see Table2 on **A20-8**)

* The basic dynamic load rating (C) of the Roller Follower shows the load with interlocked direction and magnitude, under which the nominal life (L) is 1 million revolutions when a group of identical Roller Follower units independently operate. The basic dynamic load rating (C) is indicated in the corresponding specification table.

[Calculating the Service Life Time]

When the nominal life (L) has been obtained, the service life time (L_h) is obtained from the following equation.

● For Linear Motion

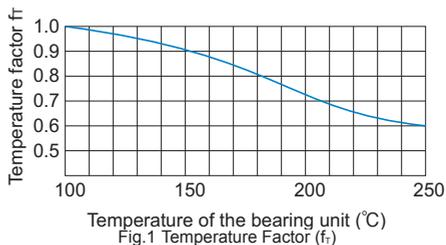
$$L_h = \frac{D \cdot \pi \cdot L}{2 \times l_s \cdot n_1 \times 60}$$

- L_h : Service life time (h)
 L : Nominal life
 D : Bearing outer diameter (mm)
 l_s : Stroke length (mm)
 n_1 : Number of reciprocations per minute (min⁻¹)

● For Rotary Motion

$$L_h = \frac{D \cdot L}{D_1 \cdot n \times 60}$$

- D_1 : Outer ring contact average diameter of the cam (mm)
 n : Rotation speed per minute of the cam (min⁻¹)



Note) The normal service temperature is 80°C or below. If the product is to be used at a higher temperature, contact THK.

Table2 Load Factor (f_w)

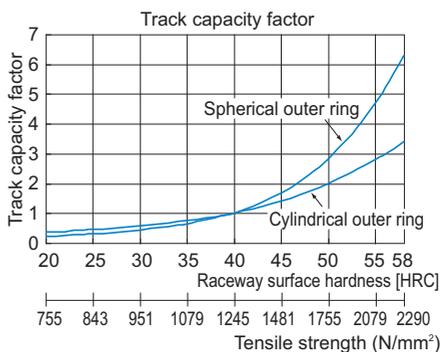
Service condition	f_w
Smooth motion without impact	1 to 1.2
Normal motion	1.2 to 1.5
Motion with severe impact	1.5 to 3

Track Load Capacity

Track load capacity refers to the permissible load which the outer ring of the roller follower and its mating surface material can withstand given repeated use over a long period.

The track load capacity provided in the specification table, indicates the value when using a steel material with tensile strength of 1.2 kN/mm² as the mating material. Therefore, it is possible to increase the track load capacity by increasing the hardness of the material. Fig.2 shows the hardness of the mating material and the track capacity factor in relation to tensile strength. To obtain the track load capacity of each mating material, multiply the track load capacity shown in the corresponding specification table by the respective track load factor.

Note) For the mating material, we recommend using those materials with the raceway hardness of 20 HRC or higher and the tensile strength of 755 N/mm² or higher.



Accuracy Standards

Roller Followers are manufactured with accuracies in accordance with the following.

- (1) Dimensional tolerance of the spherical outer ring in outer diameter D: $\begin{matrix} 0 \\ -0.05 \end{matrix}$
- (2) Dimensional tolerance of model RNAS in inscribed bore diameter dr: F6
- (3) Dimensional tolerance of model NART and NURT in bearing width B: Table3
- (4) Accuracy of the inner ring and accuracy of the outer ring in width: Table4
- (5) Accuracy of the outer ring: Table5

Table4 Accuracy of the Inner Ring and Accuracy of the Outer Ring in Width (JIS Class 0)

Unit: μm

Nominal dimension of the bearing inner diameter (di) (mm)	Tolerance of the bearing in outer diameter (dm) ^(note)	Tolerance of the inner ring (or outer ring) in width		Tolerance of the inner ring in radial runout (max)
		Upper	Lower	
Above	Or less	Upper	Lower	
2.5	10	0	-8	0
10	18	0	-8	0
18	30	0	-10	0
30	50	0	-12	0

Note) "dm" represents the arithmetic average of the maximum and minimum diameters obtained in measuring the bearing inner diameter at two points.

Table3 Dimensional tolerance of model NART and NURT in bearing width B
Unit: μm

Model No.	Dimensional tolerance (h12)	
	Min.	Max.
5 to 12	0	-0.18
15 to 35	0	-0.21
40 to 50	0	-0.25

Table5 Accuracy of the Outer Ring (JIS Class 0)

Unit: μm

Nominal dimension of the bearing outer diameter (D) (mm)		Tolerance of the bearing in outer diameter (Dm) ^(note)		Tolerance of the outer ring in radial runout (max)
Above	Or less	Upper	Lower	
6	18	0	-9	15
18	30	0	-9	15
30	50	0	-11	20
50	80	0	-13	25
80	120	0	-15	35

Note) "Dm" represents the arithmetic average of the maximum and minimum diameters obtained in measuring the bearing outer diameter at two points.

Radial Clearance

The radial clearances of caged type Roller Followers are based on the values indicated in the tables below (both full-roller type and caged type of model NART share the same radial clearance).

Model NAST, NAST-ZZ Unit: μm

Model No.	Radial clearance (with cage)	
	Min.	Max.
6	5	20
8 to 12	5	25
15 to 25	10	30
30 to 40	10	40
45 to 50	15	50

Model NURT Unit: μm

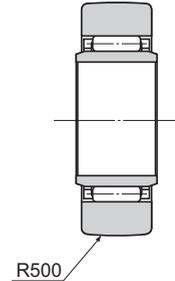
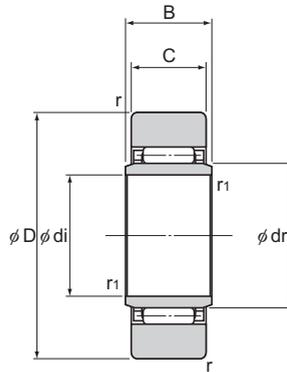
Model No.	Radial Clearance	
	Min.	Max.
15 to 30-1	0	25
35 to 40-1	5	30
45 to 50-1	5	35

Model NART Unit: μm

Model No.	Radial clearance (caged type and full-roller type)	
	Min.	Max.
5 to 6	5	20
8 to 12	5	25
15 to 20	10	30
25 to 40	10	40
45 to 50	15	50

Model NAST (Separable Type)

Optional specifications		Symbol
Material	Carbon steel	No Symbol
	Stainless steel	M
Roller guide	With cage	No Symbol
Seal	Without seal	No Symbol
Outer ring shape	Cylindrical outer ring	No Symbol
	Spherical outer ring	R



Model NAST

Model NAST-R

Unit: mm

Model No.	Main dimensions								Basic load rating		Track load capacity		Rotational speed limit* min ⁻¹	Mass g
	Inner diameter di	Inscribed bore diameter dr	Outer diameter D	B	C	r _{min}	r _{1min}	C	C ₀	Cylindrical outer ring kN	Spherical outer ring kN			
NAST 6	6	10	19	10	9.8	0.3	0.3	4.12	4.55	3.53	1.37	20000	17.8	
NAST 8	8	12	24	10	9.8	0.6	0.3	5.68	5.89	4.02	1.86	17000	28	
NAST 10	10	14	30	12	11.8	1	0.3	9.7	9.67	5.59	2.45	15000	50	
NAST 12	12	16	32	12	11.8	1	0.3	10.4	10.9	5.98	2.74	13000	58	
NAST 15	15	20	35	12	11.8	1	0.3	12.3	14.3	6.57	3.14	10000	62	
NAST 17	17	22	40	16	15.8	1	0.3	17.4	20.9	10.9	3.72	9500	110	
NAST 20	20	25	47	16	15.8	1	0.3	19.2	24.5	12.7	4.61	8500	155	
NAST 25	25	30	52	16	15.8	1	0.3	20.7	28.4	14.1	5.29	7000	180	
NAST 30	30	38	62	20	19.8	1	0.6	30.3	45.4	22.1	6.66	5500	320	
NAST 35	35	42	72	20	19.8	1	0.6	32.2	50.6	25.7	8.13	5000	440	
NAST 40	40	50	80	20	19.8	1.5	1	35.7	61.6	26.9	9.31	4000	530	
○ NAST 45	45	55	85	20	19.8	1.5	1	37.1	66.4	28.5	10.1	4000	580	
NAST 50	50	60	90	20	19.8	1.5	1	38.7	71.8	30.2	11	3500	635	

Note1) ○: Model NAST45 is available only in carbon steel.

Note2) The rotation speed limit value in the table (*) applies to models using grease lubrication. With those models using oil lubrication, up to 130% of this value is permitted.

For information on accuracy standards, please refer to **A20-9**.

Model number coding

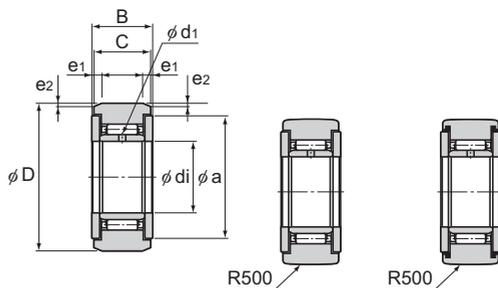
NAST 25 M R

No Symbol : Cylindrical outer ring
R : Spherical outer ring

No symbol: Carbon steel
M : Stainless steel

Model NAST-ZZ (Separable Type, with Side Plates)

Optional specifications		Symbol
Material	Carbon steel	No Symbol
	Stainless steel	M
Roller guide	With cage	No Symbol
Seal	Without seal	No Symbol
	With seal	UU
Outer ring shape	Cylindrical outer ring	No Symbol
	Spherical outer ring	R



Model NAST-ZZ

Model NAST-ZZR

Model NAST-ZZUUR

Unit: mm

Model No.	Main dimensions								Basic load rating		Track load capacity		Rotational speed limit* min ⁻¹	Mass g
	Inner diameter di	Outer diameter D	B	C	a	e ₁	e ₂	Oil hole d ₁	C kN	C ₀ kN	Cylindrical outer ring kN	Spherical outer ring kN		
NAST 6ZZ	6	19	14	13.8	14	2.5	0.8	1.5	4.12	4.55	3.53	1.37	20000	24.5
NAST 8ZZ	8	24	14	13.8	17.5	2.5	0.8	1.5	5.68	5.89	4.51	1.86	17000	39
NAST 10ZZ	10	30	16	15.8	23.5	2.5	0.8	2.0	9.7	9.67	6.86	2.45	15000	65
NAST 12ZZ	12	32	16	15.8	25.5	2.5	0.8	2.0	10.4	10.9	7.35	2.74	13000	75
NAST 15ZZ	15	35	16	15.8	29	2.5	0.8	2.0	12.3	14.3	8.04	3.14	10000	83
NAST 17ZZ	17	40	20	19.8	32.5	3	1	2.0	17.4	20.9	11.8	3.72	9500	135
NAST 20ZZ	20	47	20	19.8	38	3	1	2.5	19.2	24.5	13.8	4.61	8500	195
NAST 25ZZ	25	52	20	19.8	43	3	1	2.5	20.7	28.4	15.3	5.29	7000	225
NAST 30ZZ	30	62	25	24.8	50.5	4	1.2	3.0	30.3	45.4	22.1	6.66	5500	400
NAST 35ZZ	35	72	25	24.8	53.5	4	1.2	3.0	32.2	50.6	25.7	8.13	5000	550
NAST 40ZZ	40	80	26	25.8	61.5	4	1.2	3.0	35.7	61.6	30.3	9.31	4000	710
○ NAST 45ZZ	45	85	26	25.8	66.5	4	1.2	3.0	37.1	66.4	31.1	10.1	4000	760
NAST 50ZZ	50	90	26	25.8	76	4	1.2	3.0	38.7	71.8	34	11	3500	830

Note1) ○: Model NAST45ZZ is available only in carbon steel.

Note2) The rotation speed limit value in the table (*) applies to models that have no seal and use grease lubrication. With those models using oil lubrication, up to 130% of this value is permitted. With those attached with seals, up to 70% of this value is permitted.

For information on accuracy standards, please refer to **A20-9**.

Model number coding

NAST 25 M ZZ UU R

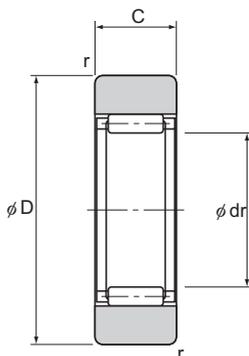
No symbol: Carbon steel
M : Stainless steel

No Symbol : Cylindrical outer ring
R : Spherical outer ring

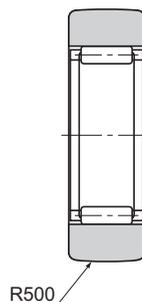
No symbol: Without seal
UU : With seal

Model RNAST (Separable Type, No Inner Ring)

Optional specifications		Symbol
Material	Carbon steel	No Symbol
	Stainless steel	M
Roller guide	With cage	No Symbol
Seal	Without seal	No Symbol
Outer ring shape	Cylindrical outer ring	No Symbol
	Spherical outer ring	R



Model RNAST



Model RNAST-R

Unit: mm

Model No.	Main dimensions				Basic load rating		Track load capacity		Rotational speed limit* min ⁻¹	Mass g
	Inscribed bore diameter dr	Outer diameter D	C	r_{\min}	C kN	C_0 kN	Cylindrical outer ring kN	Spherical outer ring kN		
RNAST 5	7	16	7.8	0.3	2.74	2.39	2.35	1.08	30000	8.9
RNAST 6	10	19	9.8	0.3	4.12	4.55	3.53	1.37	20000	13.9
RNAST 8	12	24	9.8	0.6	5.68	5.89	4.02	1.86	17000	23.5
RNAST 10	14	30	11.8	1	9.7	9.67	5.59	2.45	15000	42.5
RNAST 12	16	32	11.8	1	10.4	10.9	5.98	2.74	13000	49.5
RNAST 15	20	35	11.8	1	12.3	14.3	6.57	3.14	10000	50
RNAST 17	22	40	15.8	1	17.4	20.9	10.9	3.72	9500	90
RNAST 20	25	47	15.8	1	19.2	24.5	12.7	4.61	8500	135
RNAST 25	30	52	15.8	1	20.7	28.4	14.1	5.29	7000	152
RNAST 30	38	62	19.8	1	30.3	45.4	22.1	6.66	5500	255
RNAST 35	42	72	19.8	1	32.2	50.6	25.7	8.13	5000	375
RNAST 40	50	80	19.8	1.5	35.7	61.6	26.9	9.31	4000	420
○ RNAST 45	55	85	19.8	1.5	37.1	66.4	28.5	10.1	4000	460
RNAST 50	60	90	19.8	1.5	38.7	71.8	30.2	11	3500	500

Note1) ○: Model RNAST45 is available only in carbon steel.

Note2) The rotation speed limit value in the table (*) applies to models using grease lubrication. With those models using oil lubrication, up to 130% of this value is permitted.

For information on accuracy standards, please refer to **A20-9**.

Model number coding

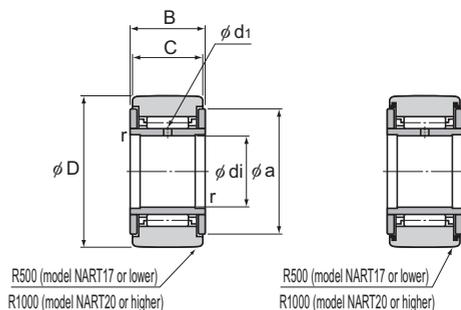
RNAST 25 M R

No symbol: Cylindrical outer ring
R : Spherical outer ring

No symbol: Carbon steel
M : Stainless steel

Model NART-R (Non-separable Type)

Optional specifications		Symbol
Material	Carbon steel	No Symbol
	Stainless steel	M
Roller guide	With cage	No Symbol
	Full rollers	V
Seal	Without seal	No Symbol
	With seal	UU
Outer ring shape	Spherical outer ring	R



Model NART-R

Model NART-UUR

Unit: mm

Model No.	Main dimensions							Basic load rating				Track load capacity Spherical outer ring kN	Rotational speed limit*		Mass	
	Inner diameter	Outer diameter	B	C	a	r_{min}	Oil hole d_1	With cage		Full rollers			With cage	Full rollers	With cage	Full rollers
	d_i	D						C ₀ kN	C ₀ kN	C ₀ kN	C ₀ kN	min ⁻¹	min ⁻¹	g	g	
NART 5R	5	16	12	11	12	0.3	1.5	2.84	2.65	6.46	7.81	1.08	25000	10500	14.5	15.1
NART 6R	6	19	12	11	14	0.3	1.5	3.33	3.35	7.58	10.2	1.37	20000	8700	20.5	21.5
NART 8R	8	24	15	14	17.5	0.3	1.5	5.68	5.89	11.7	15.6	1.86	17000	7000	41.5	42.5
NART 10R	10	30	15	14	23.5	0.6	2	7.94	7.59	15.8	18.5	2.45	15000	5700	64.5	66.5
NART 12R	12	32	15	14	25.5	0.6	2	8.53	8.44	17	21	2.74	13000	5200	71	73
NART 15R	15	35	19	18	29	0.6	2	13.7	16.4	25.3	36.9	3.14	10000	4300	102	106
NART 17R	17	40	21	20	32.5	1	2	17.4	19.3	32	46.6	3.72	9500	3900	149	155
NART 20R	20	47	25	24	38	1	2.5	22.9	30.6	41.7	67.7	7.15	8000	3400	250	255
NART 25R	25	52	25	24	43	1	2.5	24.6	33.3	45.4	79.5	8.23	7000	3000	285	295
NART 30R	30	62	29	28	50.5	1	3	33.4	51.4	60	111	10.5	5500	2400	470	485
NART 35R	35	72	29	28	53.5	1	3	35.5	57.3	63.2	123	12.9	5000	2200	640	655
NART 40R	40	80	32	30	61.5	1	3	44.6	81.4	76.4	166	14.9	4000	1900	845	865
○ NART 45R	45	85	32	30	66.5	1	3	46.6	88.6	80.5	183	16.1	4000	1700	915	935
NART 50R	50	90	32	30	76	1	3	48.3	95.7	84.4	200	17.3	3500	1600	980	1010

Note1) ○: Model NART45R is available only in carbon steel.

Note2) The rotation speed limit value in the table (*) applies to models that have no seal and use grease lubrication. With those models using oil lubrication, up to 130% of this value is permitted. With those attached with seals, up to 70% of this value is permitted.

For information on accuracy standards, please refer to **A20-9**.

Model number coding

NART 25 M UU V R

No symbol: Carbon steel
M : Stainless steel

R : Spherical outer ring

No symbol: With cage

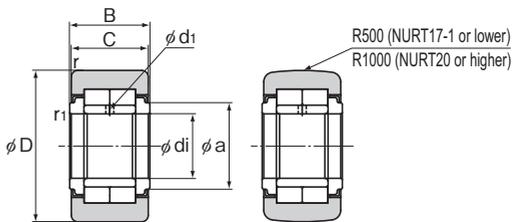
V : Full-roller Type

No symbol: Without seal

UU : With seal

Model NURT (Double-row Cylindrical Rollers)

Optional specifications		Symbol
Material	Carbon steel	No Symbol
Roller guide	Full rollers	No Symbol
Seal	Without seal	No Symbol
Outer ring shape	Cylindrical outer ring	X
	Spherical outer ring	R



Model NURT-X

Model NURT-R

Unit: mm

Model No.	Main dimensions								Basic load rating		Maximum permissible load F_0 kN	Track load capacity		Rotational speed limit min^{-1}	Mass g
	Inner diameter d_i	Outer diameter D	B	C	a	r_{amin}	r_{1amin}	Oil hole d_1	C kN	C_0 kN		Cylindrical outer ring kN	Spherical outer ring kN		
NURT 15	15	35	19	18	20	0.6	0.3	2	23.4	27.2	11.5	11.2	3.14	5200	100
NURT 15-1	15	42	19	18	20	0.6	0.3	2	23.4	27.2	27.2	13.3	4.06	5200	160
NURT 17	17	40	21	20	22	1	0.5	2.5	25.2	30.9	21.2	14.4	3.72	4700	150
NURT 17-1	17	47	21	20	22	1	0.5	2.5	25.2	30.9	30.9	16.9	4.72	4700	225
NURT 20	20	47	25	24	27	1	0.5	2.5	38.9	48.9	24.8	21	7.15	3800	245
NURT 20-1	20	52	25	24	27	1	0.5	2.5	38.9	48.9	42.7	23.2	8.23	3800	310
NURT 25	25	52	25	24	31	1	0.5	2.5	43	58.1	27.1	23.2	8.23	3300	285
NURT 25-1	25	62	25	24	31	1	0.5	2.5	43	58.1	58.1	27.6	10.5	3300	450
NURT 30	30	62	29	28	38	1	0.5	2.5	57.5	74.3	34.3	32.9	10.5	2800	465
NURT 30-1	30	72	29	28	38	1	0.5	2.5	57.5	74.3	74.3	38.2	12.9	2800	695
NURT 35	35	72	29	28	44	1.1	0.6	3	63.3	87.5	52.4	38.2	12.9	2300	635
NURT 35-1	35	80	29	28	44	1.1	0.6	3	63.3	87.5	87.5	42.4	14.9	2300	840
NURT 40	40	80	32	30	51	1.1	0.6	3	86.9	124	45.7	44.1	14.9	1900	820
NURT 40-1	40	90	32	30	51	1.1	0.6	3	86.9	124	96.5	49.6	17.3	1900	1130
NURT 45	45	85	32	30	55	1.1	0.6	3	91.7	137	48	46.9	16.1	1700	890
NURT 45-1	45	100	32	30	55	1.1	0.6	3	91.7	137	132	55.2	20.5	1700	1400
NURT 50	50	90	32	30	60	1.1	0.6	3	96.3	149	50.1	49.6	17.3	1500	960
NURT 50-1	50	110	32	30	60	1.1	0.6	3	96.3	149	149	60.7	23.3	1500	1690

Note) For information on accuracy standards, please refer to **A20-9**.

Model number coding

NURT 25 X

X: Cylindrical outer ring
R: Spherical outer ring

Fit

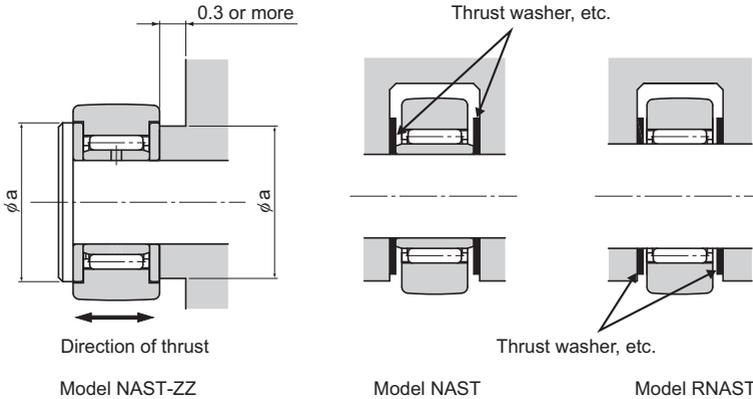
For the fitting of the Roller Follower with the shaft, we recommend the combinations indicated in Table1.

Table1 Fitting with the Shaft

No Inner Ring	Inner Ring
k5, k6	g6, h6

Mounting Section

- The Roller Follower is designed to accommodate a radial load; subjecting it to a thrust load could result in damage to the side plate or outer ring. Care must be taken in the design and assembly of the application to avoid or minimize any thrust component.
- For models NART, NAST-ZZ, and NURT, the specification table shows the minimum permissible diameter (“a”) for the mounting section that comes into contact with the side plate. To protect the side plate, please make sure the mounting section has the appropriate diameter. If the outer ring were to move in the thrust direction, due to installation error or the like, it could come into contact with the mounting, causing wear and dust from abrasion. To avoid this, THK recommends using a mounting with the configuration and specifications shown below.



- The surface hardness of the shaft to be used with a Roller Follower without inner ring must be between 54 and 64 HRC. For the surface roughness, we recommend $0.2 \mu\text{m Ra}$ or below.
- For the mating raceway, see “Track Load Capacity” on **A20-8**.
- If the outer ring unilaterally or unevenly contacts the mating raceway, we recommend using a type whose outer ring circumference is spherically ground.
- The side plate of model NART is press-fit onto the inner ring. If the plate is pressed under an external force, it may cause abnormal rotation. Do not use the product in the manner that the side plate is pressed.

Model Number Coding

Model number configurations differ depending on the model features. Refer to the corresponding sample model number configuration.

[Roller Follower]

● Models NAST and RNAS

NAST 25 M R

No symbol: Carbon steel
M : Stainless steel

No Symbol : Cylindrical outer ring
R : Spherical outer ring

● Model NAST-ZZ

NAST 25 M ZZ UU R

No symbol: Carbon steel
M : Stainless steel

No symbol: Without seal
UU : With seal

No Symbol : Cylindrical outer ring
R : Spherical outer ring

● Model NART

NART 25 M UU V R

No symbol: Carbon steel
M : Stainless steel

No symbol: Without seal
UU : With seal

No symbol: With cage
V : Full-roller Type

R : Spherical outer ring

● Model NURT

NURT 25 X

X: Cylindrical outer ring
R: Spherical outer ring

[Handling]

- (1) Do not disassemble the parts. This will result in loss of functionality.
- (2) Take care not to drop or strike the Roller Follower. Doing so may cause injury or damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
- (3) When handling the product, wear protective gloves, safety shoes, etc., as necessary to ensure safety.

[Precautions on Use]

- (1) Do not use the product at temperature of 80°C or higher. Exposure to higher temperatures may cause the resin/rubber parts to deform/be damaged.
- (2) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
- (3) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
- (4) Roller Followers are designed for use under a radial load. Do not use the product under a thrust load.
- (5) Micro-oscillation makes it difficult for oil film to form on the raceway in contact with the rolling element, and may lead to fretting. Accordingly, use grease offering excellent fretting toughness. It is also recommended that the Cam Follower be turned once or so on a regular basis to make sure oil film is formed between the raceway and rolling element.
- (6) Insufficient rigidity or accuracy of mounting members causes the bearing load to concentrate on one point and the bearing performance will drop significantly. Accordingly, give sufficient consideration to the rigidity/accuracy of the housing and base and strength of the fixing bolts.

[Lubrication]

- (1) Some types of the Roller Follower do not contain grease depending on the model number. Carefully refer to **B20-10**, and if the desired model does not contain grease, apply grease to the product as necessary before using it. Lithium soap-based grease No. 2 is available as standard.
- (2) Do not mix different lubricants. In addition, replenish a lubricant also during operation as necessary. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
- (3) Prior to using the product, apply lubricant between the Roller Follower and the rolling contact surface as well.
- (4) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
- (5) The consistency of grease changes according to the temperature. Take note that the slide resistance of the Roller Follower also changes as the consistency of grease changes.
- (6) After lubrication, the slide resistance of the Roller Follower may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
- (7) Even when the unit is equipped with seals, excess grease may spatter during initial use and immediately after lubrication. If necessary, wipe off any spattered grease.
- (8) The properties of grease deteriorate and its lubrication performance drops over time, so grease must be checked and added properly according to the use frequency of the machine.
- (9) The greasing interval varies depending on the use condition and service environment. Set the final lubrication interval/amount based on the actual machine.

[Storage]

When storing the Roller Follower, enclose it in a package designated by THK and store it in a room while avoiding high temperature, low temperature and high humidity.

After the product has been in storage for an extended period of time, lubricant inside may have deteriorated, so add new lubricant before use.

[Disposal]

Dispose of the product properly as industrial waste.



Accessories for Lubrication

THK General Catalog

B Support Book

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When using an LM system, it is necessary to provide effective lubrication. Without lubrication, the rolling elements or the raceway may be worn faster and the service life may be shortened.

A lubricant has effects such as the following.

- (1) Minimizes friction in moving elements to prevent seizure and reduce wear.
- (2) Forms an oil film on the raceway to decrease stress acting on the surface and extend rolling fatigue life.
- (3) Covers the metal surface to prevent rust formation.

To fully bring out an LM system's functions, it is necessary to provide lubrication according to the conditions.

It is necessary to consider the mounting positions of the grease nipple and piping joint according to the installation direction.

(If the installation direction of the LM Guide is other than horizontal installation, the lubricant may not reach the raceway completely. Be sure to let THK know the mounting orientation and the exact position in each LM block where the grease nipple or the piping joint should be attached. For the mounting position of the LM Guide, see [B1-28](#).)

Even with an LM system with seals, the internal lubricant gradually seeps out during operation. Therefore, the system needs to be lubricated at an appropriate interval according to the conditions.

Types of Lubricants

LM systems mainly use grease or sliding surface oil for their lubricants.

The requirements that lubricants need to satisfy generally consist of the following.

- (1) High oil film strength
- (2) Low friction
- (3) High wear resistance
- (4) High thermal stability
- (5) Non-corrosive
- (6) Highly anti-corrosive
- (7) Minimal dust/water content
- (8) Consistency of grease must not be altered to a significant extent even after it is repeatedly stirred.

For lubricants that meet these requirements, see [B24-3](#).

Grease Lubrication

Greasing intervals vary depending on the conditions and environments. For normal use, we recommend greasing the system approximately every 100 km of travel distance.

Normally, replenish grease of the same group from the grease nipple or greasing hole provided on the LM system. Mixing different types of grease may deteriorate the system's performance, such as increased consistency.

Lubricant	Type	Brand name
Grease	Lithium-based grease (JIS No. 2) Urea-based grease (JIS No. 2)	AFA Grease (THK) see B24-7 AFB-LF Grease (THK) see B24-8 AFC Grease (THK) see B24-10 AFE-CA Grease (THK) see B24-12 AFF Grease (THK) see B24-14 AFG Grease (THK) see B24-18 AFJ Grease (THK) see B24-20 Alvania Grease S No.2(Showa Shell Sekiyu) Eponex Grease No.2(Idemitsu) or equivalent

*Recommended greases vary according to the conditions and environment. See [B24-6](#) to [B24-23](#) for details.

Oil Lubrication

LM systems that require oil lubrication are shipped with only anti-rust oil applied. When placing an order, specify the required lubricant oil.

(If the installation direction of the LM Guide is other than horizontal installation, the lubricant may not reach the raceway completely. Be sure to let THK know the mounting orientation of the LM Guide.

For the mounting position of the LM Guide, see [B1-28](#).)

- The amount of oil to be supplied varies with stroke length. For a long stroke, increase the lubrication frequency or the amount of oil so that an oil film reaches the stroke end of the raceway.
- In environments where a liquid coolant is splattered, the lubricant will be mixed with the coolant, and this can result in the lubricant being emulsified or washed away, causing significantly degraded lubrication performance. In such settings, apply a lubricant with high viscosity (kinematic viscosity: approx. 68 cst) and high emulsification-resistant, and adjust the lubrication frequency or the amount of the feed lubricant.

For machine tools and similar devices that are subject to heavy loads and require high rigidity and operate at high speed, it is advisable to apply oil lubrication.

- Make sure that lubrication oil normally discharges from the ends of your lubrication piping, i.e., the oiling ports that connect to your LM system.

Lubricant	Type	Brand name
Oil	Sliding surface oil or turbine oil ISOVG32 to 68	Super Multi 32 to 68 (Idemitsu) Vactra No.2SLC (Exxon Mobil) DTE Oil (Exxon Mobil) Tonna Oil S (Showa Shell Sekiyu) or equivalent

Lubrication under Special Environments

For use under special conditions, such as continual vibrations, clean room, vacuum, low temperature and high temperature, normal grease may not be used in some cases. For lubricants that meet such conditions, contact THK.

Table1 Lubricants Used under Special Environments

Service environment	Lubricant characteristics	Brand name
High-speed moving parts	Grease with low torque and low heat generation	AFG Grease (THK) see B24-18 AFA Grease (THK) see B24-7 AFJ Grease (THK) see B24-20 NBU15(NOK Kluba) Multemp (Kyodo Yushi) or equivalent
Vacuum	Fluorine based vacuum grease or oil (vapor pressure varies by brand) <small>Note 1</small>	Fomblin Y-VAC2/3 (Solvay) Demnum L-65/200 (Daikin Industries, Ltd) Barrierta IEL/V (NOK Kluba) Logenest lambda (Nippon Koyu)
Clean room	Grease with very low dust generation	AFE-CA Grease (THK) see B24-12 AFF Grease (THK) see B24-14
Environments subject to microvibrations or microstrokes, which may cause fretting corrosion	Grease that easily forms an oil film and has high fretting resistance	AFC Grease (THK) see B24-10
Environments subject to a spattering coolant such as machine tools	Highly anti-corrosive, refined mineral oil or synthetic oil that forms a strong oil film and is not easily emulsified or washed away by coolant Water-resistant grease <small>Note 2</small>	Super Multi 68 (Idemitsu) Vactra No.2SLC (Exxon Mobil) or equivalent

Note1) When using a vacuum grease, be sure that some brands have starting resistances several times greater than ordinary lithium-based greases.

Note2) In an environment subject to a spattering water-soluble coolant, some brands of intermediate viscosity significantly decrease their lubricity or do not properly form an oil film. Check the compatibility between the lubricant and the coolant.

Note3) Do not mix greases with different physical properties.

Lubrication Methods

There are roughly three methods of lubricating LM systems: manual lubrication using a grease gun or manual pump; forced oiling with the aid of an automatic pump; and oil-bath lubrication.

To achieve efficient lubrication, it is necessary to mount the grease nipple or the piping joint according to the installation direction.

(If the installation direction of the LM Guide is other than horizontal installation, the lubricant may not reach the raceway completely. Be sure to let THK know the mounting orientation and the exact position in each LM block where the grease nipple or the piping joint should be attached. For the mounting position of the LM Guide, see [B1-28](#).)

Manual Lubrication

Generally, grease is replenished periodically, fed through a grease nipple provided on the LM system, using a grease gun. (Fig.1)

For systems that have many locations to be lubricated, establish a centralized piping system and periodically provide grease from a single point using a manual pump. (Fig.2)

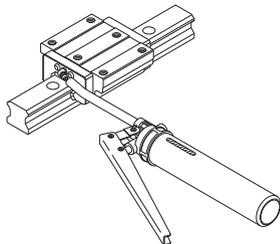


Fig.1 Lubrication Using a Grease Gun

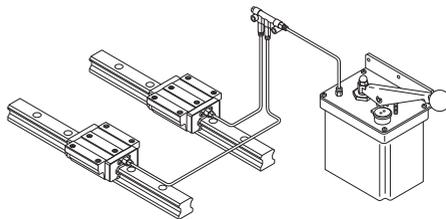


Fig.2 Lubrication through a Centralized Piping System

Note) When a centralized piping system is used, lubricant may not reach the pipe end due to the viscous resistance inside the pipe. Select the right type of grease while taking into account the consistency of the grease and the pipe diameter.

Forced Lubrication Method

In this method, a given amount of lubricant is forcibly fed at a given interval. Normally, the lubricant is not collected after use. (Fig.3)

Although a special lubrication system using a piping or the like needs to be designed, this method reduces the likelihood of forgetting to replenish lubricant.

This method is used mainly for oil lubrication. If using grease, it is necessary to examine the appropriate piping diameter and the required grease consistency.

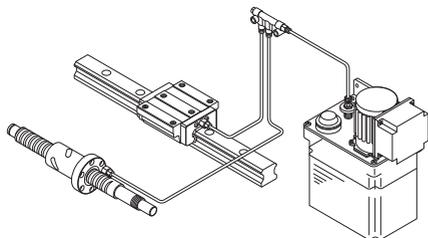


Fig.3 Forced Lubrication Method

Lubrication Accessory Series for LM Systems

THK provides a wide array of lubrication accessories such as grease, grease guns, grease nipples and plumbing fixtures available for various applications. (B24-7 to B24-24)

THK Original Grease

THK provides various types of THK original grease needed for the lubrication of LM systems. They are available for various conditions and environments.

[Table for Grease Selection]

Refer to the table below that allows you to select a type of grease according to the application of the LM system. Also note that the color of the decorative package varies according to the type (both 70 g and 400 g).

Name of grease	AFA Grease	AFB-LF Grease	AFC Grease	AFC-CA Grease	AFF Grease	AFG Grease	AFJ Grease
Features	Low-Resistance grease	All-purpose grease	High-speed/micro-vibration grease	Grease for clean environment	Grease for clean environment	Grease for heat of Ball Screw	Grease suited to a wide range of speeds
Base oil	high-grade synthetic oil	refined mineral oil	high-grade synthetic oil	high-grade synthetic oil	high-grade synthetic oil	high-grade synthetic oil	refined mineral oil
Consistency enhancer	Urea-based	Lithium-based	Urea-based	Urea-based	Lithium-based	Urea-based	Urea-based
Industrial machinery	General industrial machinery	—	◎	—	—	—	—
	High Speed	◎	—	—	—	◎	○
	High Load	—	◎	—	—	—	—
Machine tool	General machine tools	—	◎	—	—	—	—
	High Speed	○	—	—	—	◎	○
	High acceleration/deceleration	—	—	—	—	—	◎
	Micro-vibration	—	—	◎	—	—	—
Semiconductor manufacturing equipment	General semiconductor fabrication equipment	—	◎	—	—	—	—
	High Speed	◎	—	—	—	○	○
	Micro-vibration	—	—	◎	—	○	—
	High acceleration/deceleration	—	—	—	—	—	◎
	Clean environments	—	—	—	◎	◎	—
Special environments	Low-resistance	◎	—	—	—	○	○
	Low heat generation	—	—	—	—	◎	—
	Wide range of speeds	—	—	—	—	—	◎
	Wide temperature range	—	—	◎	—	—	—
Color of decorative package	Green	Orange	Mazarine	Lime green	Light blue	Blue	Yellow
Reference page	B24-7	B24-8	B24-10	B24-12	B24-14	B24-18	B24-20

Model number coding

•Type of packing···bellows cartridge

AFC + 70

Cartridge capacity (70 g / 400 g)

Type of grease (AFA Grease, AFB-LF Grease, AFC Grease, AFC-CA Grease, AFF Grease, AFG Grease, AFJ Grease)

THK Original Grease

AFA Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFA Grease is a high-grade, long-life grease developed with a urea-based consistency enhancer using a high-grade synthetic oil as the base oil.

[Features]

(1) Long service life

Unlike ordinary soap based grease for metal lubrication, AFA Grease excels in antioxidant stability and therefore can be used for a long period of time.

(2) Wide temperature range

The lubricating performance remains high over a wide range of temperatures from -45°C to $+160^{\circ}\text{C}$.

Even at low temperatures, AFA Grease requires only a low starting torque.

(3) High water resistance

AFA Grease is less vulnerable to moisture penetration than other types of grease because of its high water resistance.

(4) High mechanical stability

AFA Grease is not easily softened and demonstrates excellent mechanical stability even when used for a long period of time.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	high-grade synthetic oil	
Base oil kinematic viscosity: mm^2/s (40°C)	25	JIS K 2220 23
Worked penetration (25°C , 60W)	285	JIS K 2220 7
Mixing stability (100,000 W)	329	JIS K 2220 15
Dropping point $^{\circ}\text{C}$	261	JIS K 2220 8
Evaporation amount: mass% (99°C , 22h)	0.2	JIS K 2220 10
Oil separation rate: mass% (100°C , 24h)	0.5	JIS K 2220 11
Copper plate corrosion (B method, 100°C , 24h)	Accepted	JIS K 2220 9
Low temperature torque: N-m (-20°C)	Start	170
	(revolutions)	70
4-ball testing (burn-in load): N	3089	ASTM D2596
Service Temperature Range $^{\circ}\text{C}$	-45 to 160	
Color	Brown	

[Rotation Torque Testing with Ball Screw Grease]

<Test method>

Apply 1 cc of grease to the LM Guide of KR4620A+640L and 2 cc to the Ball Screw (initial lubrication only), and then measure the torque at each motor rotation speed.

In torque measurement, output values on the driver torque monitor are used.

Comparative Table of Rotation Torque of Ball Screws by Grease

Unit: N-cm

Grease	Central value of dynamic viscosity CST (mm^2/s)(40°C)	Dynamic viscosity range CST (mm^2/s)(40°C)	Rotational speed			
			100min^{-1}	1000min^{-1}	2000min^{-1}	4000min^{-1}
AFA Grease	25	22.5 to 27.5	11.27	11.27	12.25	14.6
Grease of manufacturer I	130	117 to 143	14.6	23.13	31.16	43.12
Grease of manufacturer K	15.3	13.8 to 16.8	12.64	12.05	13.03	14.41
Lubricant VG32	32	28.8 to 35.2	11.17	10.78	13.43	14.7

Note) The values of the competitors' greases are that of low-torque greases.

THK Original Grease

AFB-LF Grease

- Base oil: refined mineral oil
- Consistency enhancer: lithium-based



AFB-LF Grease is a general-purpose grease developed with a lithium-based consistency enhancer using refined mineral oil as the base oil. It excels in extreme pressure resistance and mechanical stability.

[Features]

- (1) High extreme pressure resistance
Compared with lithium-based greases available on the market, AFB-LF Grease has higher wear resistance and outstanding resistance to extreme pressure.
- (2) High mechanical stability
AFB-LF Grease is not easily softened and demonstrates excellent mechanical stability even when used for a long period of time.
- (3) High water resistance
Compared with ordinary lithium grease, this product is a highly water resistant grease with minimal softening due to moisture penetration and very little deterioration under extreme pressures.
- (4) Long service life
It provides many times the lubrication life of lithium soap-based greases. As a result, it offers a lower maintenance workload and greater economy due to the longer intervals between greasing.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Lithium-based	
Base oil	refined mineral oil	
Base oil kinematic viscosity: mm ² /s (40°C)	170	JIS K 2220 23
Worked penetration (25°C, 60W)	275	JIS K 2220 7
Mixing stability (100,000 W)	345	JIS K 2220 15
Dropping point °C	193	JIS K 2220 8
Evaporation amount: mass% (99°C, 22h)	0.4	JIS K 2220 10
Oil separation rate: mass% (100°C, 24h)	0.6	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24h)	Accepted	JIS K 2220 9
Low temperature torque: N·m (-20°C)	Start	130
	(revolutions)	51
4-ball testing (burn-in load): N	3089	ASTM D2596
Service Temperature Range °C	-15 to 100	
Color	Yellowish brown	

[Comparison of Grease Service Life Data]

<Test products>

LM Guide HSR25CA1SS + 600L

<Test conditions>

Load : 9.8 kN/block

Stroke : 350mm

Speed : 30m/min (MAX)

Time constant : 200msec

Greasing quantity : 4g/block (initial lubrication only)

Travel distance until flaking occurs by grease type

Grease	Distance (km)							
	0	100	200	300	400	500	600	700
AFB-LF Grease								
Ordinary lithium-soap based grease								

THK Original Grease

AFC Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFC Grease has high fretting-corrosion resistance due to a special additive and a urea-based consistency enhancer using a high-grade synthetic oil as the base oil.

[Features]

- (1) High fretting-corrosion resistance
AFC Grease is designed to be highly effective in preventing fretting corrosion.
- (2) Long service life
Unlike ordinary soap based grease for metal lubrication, AFC Grease excels in antioxidant stability and therefore can be used for a long period of time. As a result, maintenance work is reduced.
- (3) Wide temperature range
Since a high-grade synthetic oil is used as the base oil, the lubricating performance remains high over a wide range of temperatures from -54 °C to +177 °C.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	high-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	25	JIS K 2220 23
Worked penetration (25°C, 60W)	288	JIS K 2220 7
Mixing stability (100,000 W)	341	JIS K 2220 15
Dropping point °C	269	JIS K 2220 8
Evaporation amount: mass% (99°C, 22h)	0.2	JIS K 2220 10
Oil separation rate: mass% (100°C, 24h)	0.6	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24h)	Accepted	JIS K 2220 9
Low temperature torque: N·m (-20°C)	Start	JIS K 2220 18
	(revolutions)	
4-ball testing (burn-in load): N	3089	ASTM D2596
Service Temperature Range °C	-54 to 177	
Color	Brown	

[Test Data on Fretting-corrosion Resistance]

● Test Data on AFC Grease (Comparison of Raceway Conditions)

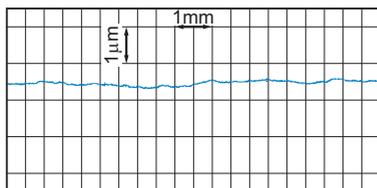
The test data in the figure shows the results of comparing this product with an ordinary bearing grease.

<Test conditions>

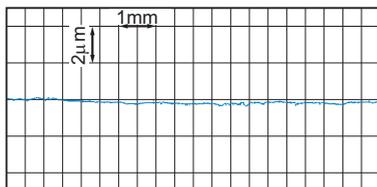
Item	Description
Stroke	3mm
Number of strokes per minute	200min ⁻¹
Total number of strokes	2.88 × 10 ⁵ (24 hours)
Surface pressure	1118MPa
Grease quantity	12g/1LM block (replenished every 8 hours)

AFC Grease

Before travel

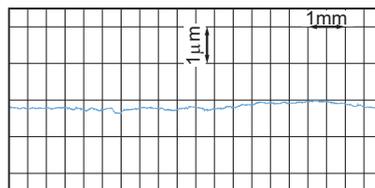


After travel

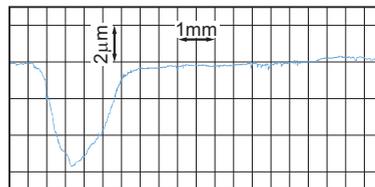


General-purpose bearing grease

Before travel



After travel



THK Original Grease

AFE-CA Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFE-CA Grease uses urea as a consistency enhancer and a high-grade synthetic oil as the base oil. It has low dust generative characteristics and is therefore a suitable grease for clean room environments.

[Features]

(1) Low dust generation

Compared with vacuum greases in conventional use, AFE-CA Grease generates less dust and therefore is ideal for use in clean rooms.

(2) Long service life

Unlike ordinary soap based grease for metal lubrication, AFE-CA Grease excels in anti-oxidation stability and therefore can be used for a long period of time. As a result, maintenance work is reduced.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	high-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	99	JIS K 2220 23
Worked penetration (25°C, 60W)	280	JIS K 2220 7
Mixing stability (100,000 W)	310	JIS K 2220 15
Dropping point °C	260	JIS K 2220 8
Evaporation amount: mass% (99°C, 22h)	0.1	JIS K 2220 10
Oil separation rate: mass% (100°C, 24h)	0.1	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24h)	Accepted	JIS K 2220 9
Low temperature torque: N·m (-20°C)	Start	130
	(revolutions)	76
4-ball testing (burn-in load): N	1236	ASTM D2596
Service Temperature Range °C	-40 to 180	
Color	Light yellowish brown	

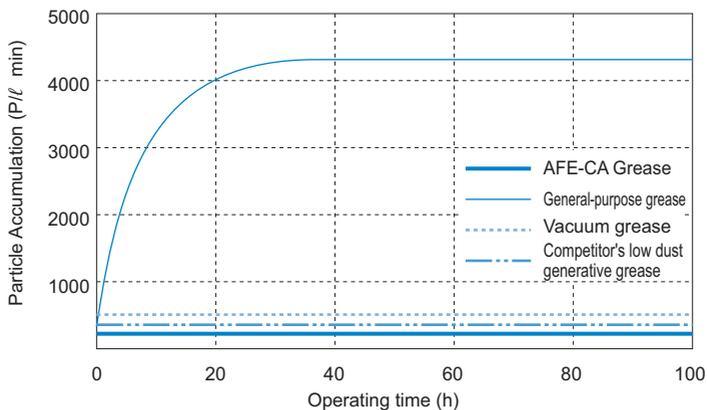
[Test Data on Low Dust Generative Characteristics]

● Test Data on AFE-CA Grease (Comparison of Particle Accumulation)

The test data in the figure compares the results of particle accumulation testing on this product and other greases.

<Test conditions>

Item	Description
Sample model No.	THK KR4610
Screw Ball rotational speed	1000min ⁻¹
Stroke	210mm
Grease quantity	2 cc in both the Ball Screw and the LM Guide
Flow rate during measurement	1ℓ/min
Measuring instrument	Dust counter
Particle size	0.5μm



THK Original Grease

AFF Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: lithium-based



AFF Grease uses a high-grade synthetic oil, lithium-based consistency enhancer and a special additive. It achieves stable rolling resistance, low dust generation and high fretting resistance, at a level that conventional vacuum greases or low dust generation greases have not reached.

[Features]

- (1) Stable rolling resistance
Since the viscous resistance is low, the rolling resistance fluctuation is also low. Thus, superb conformity is achieved at low speed.
- (2) Low dust generation
AFF Grease generates little dust, making itself an ideal grease for use in clean rooms.
- (3) Fretting resistance
Since AFF Grease is more resistant to wear from microvibrations than other low particle generative grease, it allows the greasing interval to be extended.

[Representative Physical Properties]

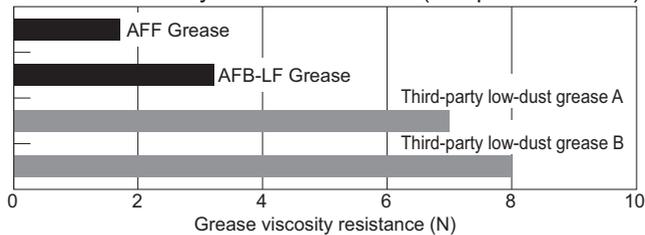
Item	Representative value	Test method
Consistency enhancer	Lithium-based	
Base oil	high-grade synthetic oil	
Base oil kinematic viscosity: mm ² /s (40°C)	100	JIS K 2220 23
Worked penetration (25°C, 60W)	315	JIS K 2220 7
Mixing stability (100,000 W)	345	JIS K 2220 15
Dropping point °C	220	JIS K 2220 8
Evaporation amount: mass% (99°C, 22h)	0.7	JIS K 2220 10
Oil separation rate: mass% (100°C, 24h)	2.6	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24h)	Accepted	JIS K 2220 9
Low temperature torque: N-m (-20°C)	Start	220
	(revolutions)	60
4-ball testing (burn-in load): N	1236	ASTM D2596
Service Temperature Range °C	-40 to 120	
Color	Reddish brown	

[Grease viscosity resistance measurements]

<Test conditions>

Item	Description
Model No.	HSR25A1C1+580LP
Grease quantity	3cm ³ / LM block (initial lubrication only)
Feeding speed	10mm/s

• Grease viscosity resistance (Temperature: 23°C)



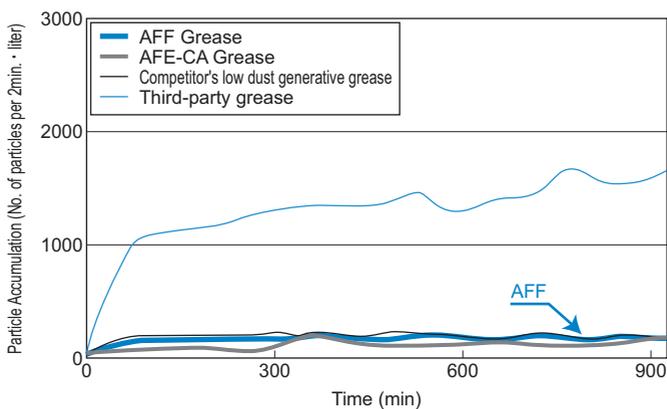
[Test Data on Low Dust Generative Characteristics]

● Test Data on AFF Grease (Comparison of Particle Accumulation)

The test data in the figure compares the results of particle accumulation testing on this product and other greases.

<Test conditions>

Item	Description
Model No.	SR20W1+280LP
Grease quantity	1cm ³ / LM block (initial lubrication only)
Amount of air supplied	500cm ³ /min
[Measurement instrument]	Particle counter
Diameter of particle measured	0.3μm or more
Feeding speed	30m/min
Stroke	200mm



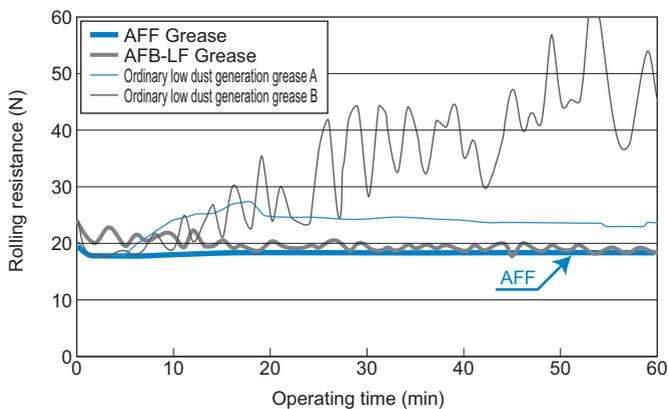
[Rolling Resistance Characteristics at Low Speed]

● Rolling Resistance at Low Speed

The data in the figure represent the test results of comparing rolling resistances at low speed between AFF Grease and other greases.

<Test conditions>

Item	Description
Model No.	HSR35RC0+440LP
Grease quantity	4cm ² / LM block (initial lubrication only)
Feeding speed	1mm/s
Stroke	3mm



THK Original Grease

AFG Grease

- Base oil: high-grade synthetic oil
- Consistency enhancer: urea-based



AFG Grease is a high-grade grease for Ball Screws that uses a high-grade synthetic oil as the base oil and a urea-based consistency enhancer. It excels in low heat generation and supports a wide temperature range from low to high temperature.

[Features]

- (1) Low heat generation
Since the viscous resistance is low, the grease generates only a minimal level of heat even during high-speed operation.
- (2) Low viscosity
Since the viscosity is low, a stable rotational torque is achieved.
- (3) Wide temperature range
Maintains a high level of lubricity in a wide temperature range of -45°C to $+160^{\circ}\text{C}$.
- (4) Long service life
AFG Grease is not easily softened and excels in antioxidation stability even after a long-term operation.
- (5) Water resistance
AFG Grease is a highly water resistant grease that is less vulnerable to moisture penetration and little decreases resistance to extreme pressure.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	high-grade synthetic oil	
Base oil kinematic viscosity: mm^2/s (40°C)	25	JIS K 2220 23
Worked penetration (25°C , 60W)	285	JIS K 2220 7
Mixing stability (100,000 W)	329	JIS K 2220 15
Dropping point $^{\circ}\text{C}$	261	JIS K 2220 8
Evaporation amount: mass% (99°C , 22h)	0.2	JIS K 2220 10
Oil separation rate: mass% (100°C , 24h)	0.5	JIS K 2220 11
Copper plate corrosion (B method, 100°C , 24h)	Accepted	JIS K 2220 9
Low temperature torque: N-m (-20°C)	Start	JIS K 2220 18
	(revolutions)	
4-ball testing (burn-in load): N	3089	ASTM D2596
Service Temperature Range $^{\circ}\text{C}$	-45 to 160	
Color	Brown	

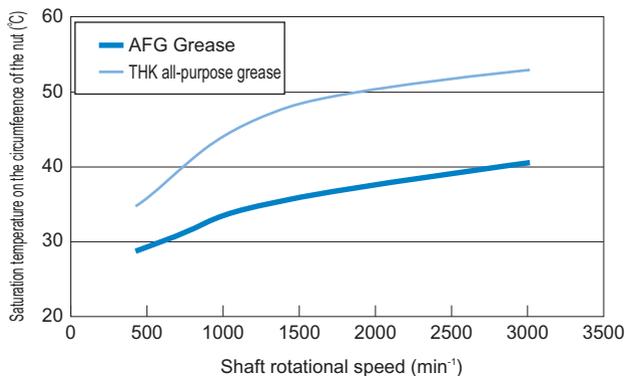
[Test Data on Low Heat Generation Characteristics]

● Test Data on AFG Grease (Comparison of Heat Generation)

The test data in the figure represent the results of comparing heat generation between AFG Grease and other greases.

<Test conditions>

Item	Description
Shaft diameter/lead	32/10mm
Feeding speed	67 to 500mm/s
Shaft rotation speed	400 to 3000 min ⁻¹
Stroke	400mm
Grease quantity	12cm ³
Temperature measurement point	Nut circumference



THK Original Grease

AFJ Grease

- Base oil: refined mineral oil
- Consistency enhancer: urea-based



The THK AFJ grease uses refined mineral oil as its base and contains urea-based consistency enhancer and other special additives that give excellent lubrication properties at a wide range of speeds, from low to high.

[Features]

- (1) Wide range of speeds
Provides consistent and even lubrication at both high and low work speeds.
- (2) Wear Resistance
Even at low speeds, it has excellent oil film formation characteristics to reduce wear.
- (3) Resistant to vibration
Reduces wear caused by machine vibration during high-speed operation.
- (4) Low rolling resistance
Reduces rolling resistance in LM guides and ball screws over a wide range of speeds.

[Representative Physical Properties]

Item	Representative value	Test method
Consistency enhancer	Urea-based	
Base oil	refined mineral oil	
Base oil kinematic viscosity: mm ² /s (40°C)	20	JIS K 2220 23
Worked penetration (25°C, 60W)	325	JIS K 2220 7
Mixing stability (100,000 W)	360	JIS K 2220 15
Dropping point °C	185	JIS K 2220 8
Evaporation amount: mass% (99°C, 22h)	0.6	JIS K 2220 10
Oil separation rate: mass% (100°C, 24h)	7.0	JIS K 2220 11
Copper plate corrosion (B method, 100°C, 24h)	Accepted	JIS K 2220 9
Low temperature torque: N·m (-20°C)	Start	380
	(revolutions)	130
4-ball testing (burn-in load): N	3089	ASTM D2596
Service Temperature Range °C	-20 to 120	
Color	Yellowish brown	

[Test data for LM guide block wear resistance]

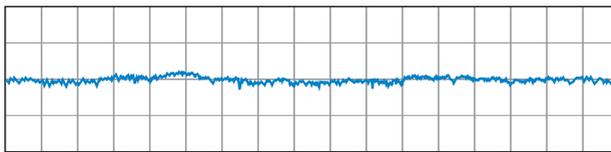
● AFJ grease test data (comparing the amount of wear)

The test data in the figure compares the test results for the amount of wear for this product and other greases.

<Test conditions>

Item	Description
Model No.	NRS55B2SS+780LP
Applied load	5.9kN
Feeding speed	0.1m/min
Stroke	200mm
Grease quantity	12cm/ LM block (initial lubrication only)
Test duration	480 hours

THK AFJ Grease



Other urea-based grease



[Test data for LM guide rail vibration resistance]

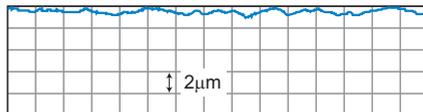
● AFJ grease test data (comparing the amount of vibration)

The test data in the figure compares the test results for the amount of vibration for this product and other greases.

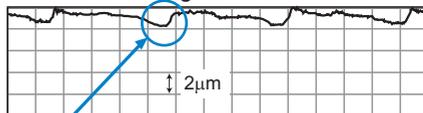
<Test conditions>

Item	Description
Model No.	SHS25R1UU+580LP
Applied load	11.05 kN (0.35C)
Feeding speed	60 m/min
Acceleration/deceleration	9.8 m/s ²
Stroke	350mm
Grease quantity	2 cm ³ /block

THK AFJ Grease After traveling 434km



Other urea-based grease After traveling 86km



"Wear Occurrence Mechanisms"

Patterns of high-speed and high acceleration/deceleration operation

Occurrence of machine vibration

Occurrence of wear in roll grooves

[Measurement data for LM guide rolling resistance]

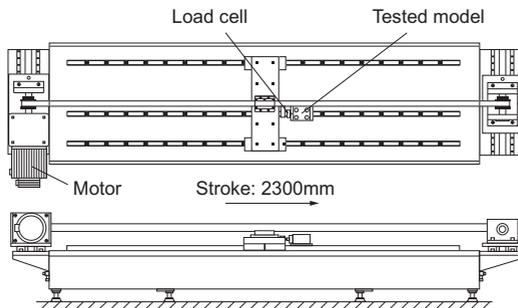
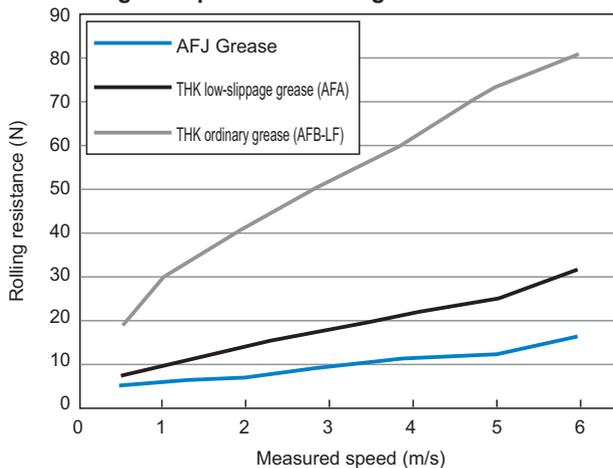
● AFJ grease test data (rolling resistance comparison)

The test data in the figure compares the results of rolling resistance testing on this product and other greases.

<Test conditions>

Item	Description
Model No.	SHS25R1UU+3000L
Applied load	No load
Acceleration	29.4 m/s ² (3G)
Stroke	2300mm
Test temperature	21 °C
Grease quantity	2 cm ³ /block
Measurement speed	0.5, 1, 2, 3, 4, 5, 6 m/s

LM guide speeds and rolling resistance



Lubrication Equipment

Grease Gun Unit MG70



● For detailed dimensions, see [A24-24](#).

Grease Gun Unit MG70 is capable of lubricating small to large types of LM Guides by replacing dedicated nozzles (attached). For small LM Guides, MG70 is provided with dedicated attachments. The user can select from these attachments according to the model number and the installation space.

MG70 has a slit window, allowing the user to check the remaining amount of grease.

It is equipped with a bellows cartridge that can hold 70 g of grease and is replaceable without smirching your hand. It supports a wide range of grease products, including AFA Grease, AFB-LF Grease, AFC Grease and AFE-CA Grease, to meet varied conditions. This enables you to make a selection according to the area requiring grease. (See [B24-7](#) to [B24-23](#).)

Grease not included with the MG70 Grease Gun Unit. Grease sold separately.

Accessories for Lubrication

Special Plumbing Fixtures

● For detailed dimensions, see [A24-25](#).

For centralized greasing and oil lubrication, special plumbing fixtures are available from THK. When ordering an LM system, specify the model number, mounting orientation and piping direction. We will ship the LM system attached with the corresponding fixture.

Accessories for Lubrication

Grease Nipple

● For detailed dimensions, see [A24-26](#).

THK provides various types of grease nipples needed for the lubrication of LM systems.

Model Number Coding

Model number configurations differ depending on the model features. Refer to the corresponding sample model number configuration.

[Grease Gun]

- Model MG70
-

MG70

(THK offers grease guns only for a 70g cartridge.)

[THK Original Grease]

- Models AFA, AFB-LF, AFC, AFE-CA, AFF, AFG and AFJ
-

- Type of packing···bellows cartridge

AFC + 70

Cartridge capacity (70 g / 400 g)

Type of grease (AFA Grease, AFB-LF Grease, AFC Grease, AFE-CA Grease, AFF Grease, AFG Grease, AFJ Grease)
