NATECH

Linear Guideways

Information Index

The specifications in this catalogue are subject to change without notification.

Preface

A linear guideway allows a type of linear motion that utilizes rolling elements such as balls or rollers. By using re-circulating rolling elements between the rail and the block, a linear guideway can achieve high precision linear motion. Compared to a traditional slide, the coefficient of friction for a linear guideway is only 1/50. Because of the restraint effect between the rails and the blocks, linear guideways can take up loads in both the up/down and the left/right directions. With these features, linear guideways can greatly enhance moving accuracy, especially, when accompanied with precise ball screws.

1. General Information

1-1 Advantages and Features of NATECH Linear Guideways

(1) High positional accuracy
When a load is driven by a linear motion guideway, the frictional contact between the load and the bed desk is rolling contact. The coefficient of friction is only 1/50 of traditional contact, and the difference between the dynamic and the static coefficient of friction is small. Therefore, there would be no slippage while the load is moving.
(2) Long life with high motion accuracy
With a traditional slide, errors in accuracy are caused by the counter flow of the oil film. Insufficient lubrication causes wear between the contact surfaces, which become increasingly inaccurate. In contrast, rolling contact has little wear; therefore, machines can achieve a long life with highly accurate motion.
(3) High speed motion is possible with a low driving force
Because linear guideways have little friction resistance, only a small driving force is needed to move a load. This results in greater power savings, especially in the moving parts of a system. This is especially true for the reciprocating parts.
(4) Equal loading capacity in all directions
With this special design, these linear guideways can take loads in either the vertical or horizontal directions. Conventional linear slides can only take small loads in the direction parallel to the contact surface. They are also more likely to become inaccurate when they are subjected to these loads.
(5) Easy installation
Installing a linear guideway is fairly easy. Grinding or milling the machine surface, following the recommended installation procedure, and tightening the bolts to their specified torque can achieve highly accurate linear motion.
(6) Easy lubrication
With a traditional sliding system, insufficient lubrication causes wear on the contact surfaces. Also, it can be quite difficult to supply sufficient lubrication to the contact surfaces because finding an appropriate lubrication point is not very easy. With a linear motion guideway, grease can be easily supplied through the grease nipple on the linear guideway block. It is also possible to utilize a centralized oil lubrication system by piping the lubrication oil to the age occur. For high precision grades consider ordering a matched, non-interchangeable, assembly of a block and rail.

1-2 Selecting Linear Guideways

Identify the condition
- Type of equipment
- Space limitations
- Accuracy
- Stiffness
- Travel length
- Magnitude and direction of loads
- Moving speed, acceleration
- Duty cycle
- Service life
- Environment

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Selection of series
- H series - Grinding, milling, and drilling machine, lathe, machine center
- E series - Automatic equipment, high speed transfer device, semiconductor equipment, wood cutting machine, precision measure equipment

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Selection of accuracy
- Classes : C, H, P, SP, UP depends on the accuracy of equipment

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Determines the size & the number of blocks
- According to experience
- Dynamic load condition
- If accompanied with a ball screw, the size should be similar to the diameter of ball screw. For example, if the diameter of the ball screw is 35mm, then the model size of linear guideway should be H35

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Calculate the max. load of block
- Make reference to load calculation examples, and calculate the max load.
- Be sure that the static safety factor of selected guideway is larger than the rated static safety factor

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Choosing preload
- Depends on the stiffness requirement and accuracy of mounting surface

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Identify stiffness
- Calculate the deformation by using the table of stiffness values, choosing heavier preload and larger size linear guideways to enhance the stiffness

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Calculating service life
- Calculate the life time requirement by using the moving speed and frequency.
- Make reference to the life calculation example

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Selection of lubrication
- Grease supplied by grease nipple
- Oil supplied by piping joint

☑

Completion of selection

1-3 Basic Load Ratings of Linear Guideways

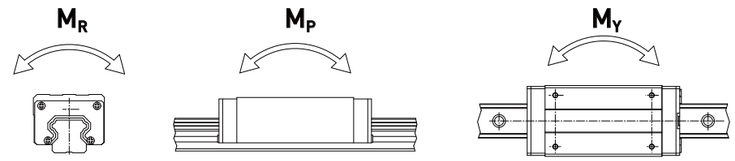
1-3-1 Basic Static Load

(1) Static load rating (C0)

Localized permanent deformation will be caused between the raceway surface and the rolling elements when a linear guideway is subjected to an excessively large load or an impact load while either at rest or in motion. If the amount of this permanent deformation exceeds a certain limit, it becomes an obstacle to the smooth operation of the linear guideway. Generally, the definition of the basic static load rating is a static load of constant magnitude and direction resulting in a total permanent deformation of 0.0001 times the diameter of the rolling element and the raceway at the contact point subjected to the largest stress. The value is described in the dimension tables for each linear guideway. A designer can select a suitable linear guideway by referring to these tables. The maximum static load applied to a linear guideway must not exceed the basic static load rating.

(2) Static permissible moment (M0)

The static permissible moment refers to a moment in a given direction and magnitude when the largest stress of the rolling elements in an applied system equals the stress induced by the Static Load Rating. The static permissible moment in linear motion systems is defined for three directions: MR, MP and MY.



(3) Static safety factor

This condition applys when the guideway system is static or under low speed motion. The static safety factor, which depends on environmental and operating conditions, must be taken into consideration. A larger safety factor is especially important for guideways subject to impact loads (See Table 1-1). The static load can be obtained by using Eq. 1.1

Table 1-1 Static Safety Factor

Load Condition	f_{SI}, f_{SM} (Min.)
Normal Load	1.0-3.0
With impacts/vibrations	3.0-5.0

$$f_{SL}=\frac{C_0}{P} \text{ or } f_{SM}=\frac{M_0}{M} \quad \text{Eq.1.1}$$

f_{SL} : Static safety factor for simple load
f_{SM} : Static safety factor for moment
C_0 : Static load rating (kN)
M_0 : Static permissible moment (kN•mm)
P : Calculated working load (kN)
M : Calculated appling moment (kN•mm)

1-3-2 Basic Dynamic Load

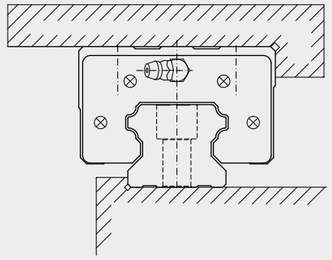
(1) Dynamic load rating (C)

The basic dynamic load rating is an important factor used for calculation of service life of linear guideway. It is defined as the maximum load when the load that does not change in direction or magnitude and results in a nominal life of 50km of operation for a ball type linear guideway and 100km for a roller type linear guideway. The values for the basic dynamic load rating of each guideway are shown in dimension tables. They can be used to predict the service life for a selected linear guideway.

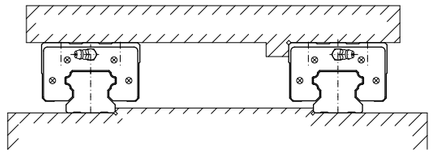
1-4 Mounting Configurations

Linear guideways have equal load ratings in the radial, reverse radial and lateral directions. The application depends on the machine requirements and load directions.
Typical layouts for linear guideways are shown below:

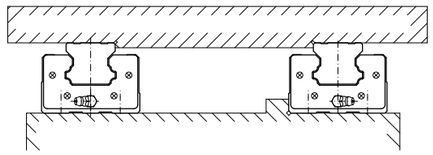
Use of one rail and mounting reference side



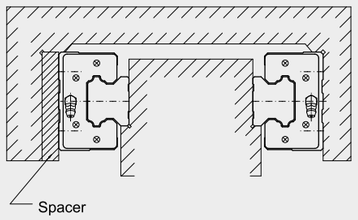
use of two rails(block movement)



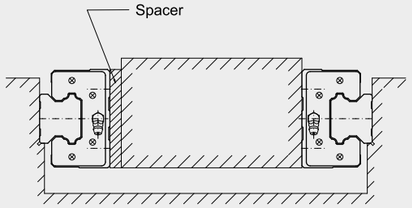
use of two rails(block fixed)



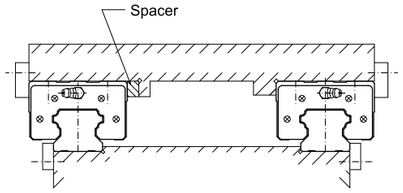
use of two external rails



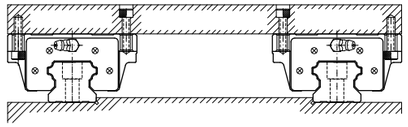
use of two internal rails



total surface fixed installation



NGW type block with mounting holes in different directions.

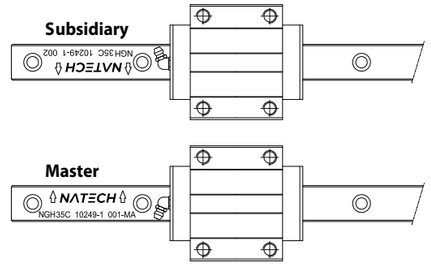


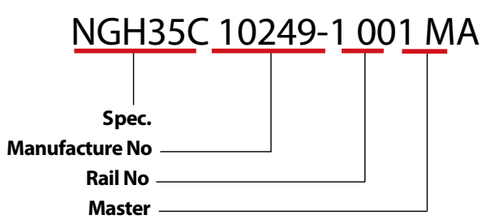
1-5 Mounting Procedures

Three installation methods are recommended based on the required running accuracy and the degree of impacts and vibrations.

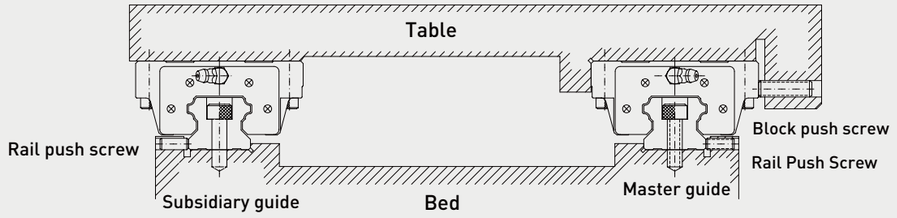
1-5-1 Master and Subsidiary Guide

For non-interchangeable type Linear Guideways, there are some differences between the master guide and subsidiary guide. The accuracy of the master guide's datum plane is better than the subsidiary's and it can be a reference side for installation. There is a mark "MA" printed on the rail, as shown in the figure below.





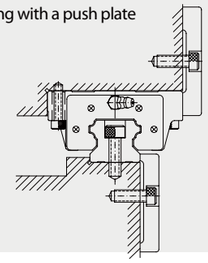
1-5-2 Installation to Achieve High Accuracy and Rigidity



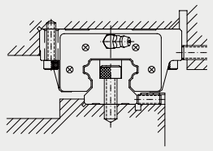
(1) Mounting methods

It is possible that the rails and the blocks will be displaced when the machine is subjected to vibrations and impacts. To eliminate these difficulties and achieve high running accuracy, the following four methods are recommended for fixing.

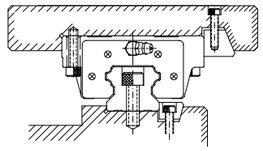
Mounting with a push plate



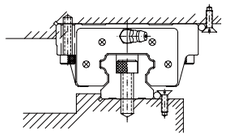
Mounting with push screws



Mounting with taper gib



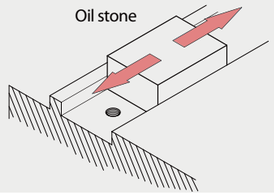
Mounting with needle roller



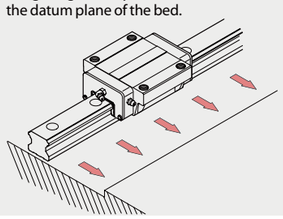
(2) Procedure of rail installation

1 Before starting, remove all dirt from the mounting surface of the machine.

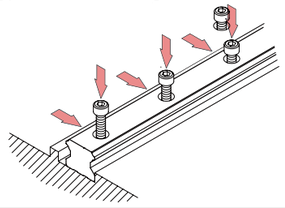
Oil stone



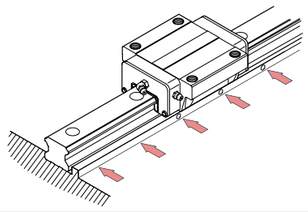
2 Place the linear guideway gently on the bed. Bring the guideway into close contact with the datum plane of the bed.



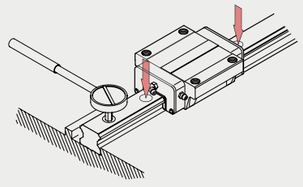
3 Check for correct thread engagement when inserting a bolt into the mounting hole while the rail is being placed on the mounting surface of the bed.



4 Tighten the push screws sequentially to ensure close contact between the rail and the side datum plane.

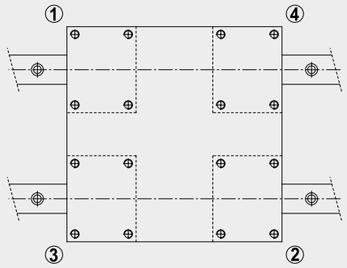


5 Tighten the mounting bolts with a torque wrench to the specified torque.



6 Install the remaining linear guideway in the same way.

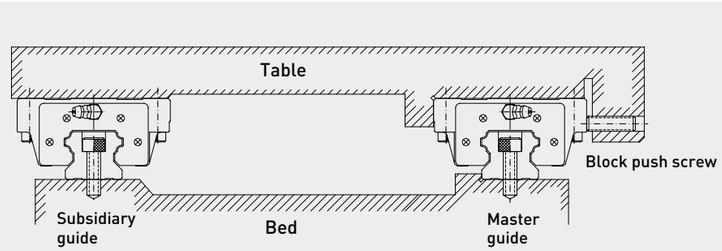
(3) Procedure of block installation



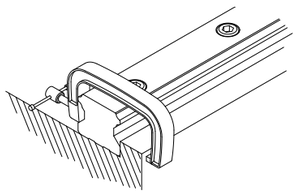
- Place the table gently on the blocks. Next, tighten the block mounting bolts temporarily.
- Push the blocks against the datum plane of the by tightening the push table and position the table screws.
- The table can be fixed uniformly by tightening the mounting bolts on master guide side and subsidiary side in 1 to 4 sequences.

1-5-3 Installation of the Master Guide without Push Screws

To ensure parallelism between the subsidiary guide and the master guide without push screws, the following rail installation methods are recommended . The block installation is the same as mentioned previously.

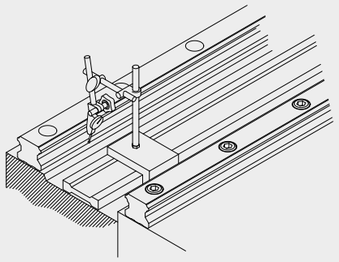


(1) Installation of the rail on the subsidiary guide side

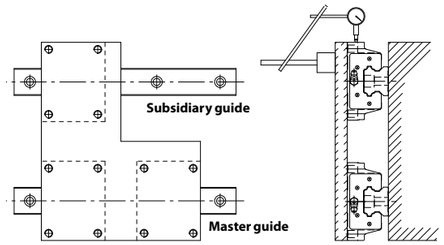


- **Using a vice**
  Place the rail into the mounting plane of the bed. Tighten the mounting bolts temporarily; then use a vice to push the rail against the side datum plane of the bed. Tighten the mounting bolts in sequence to the specified torque.

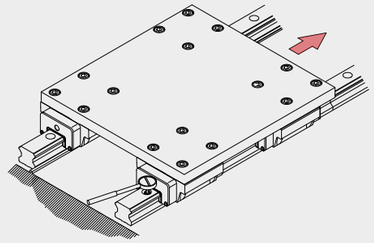
(2) Installation of the rail on the subsidiary guide side



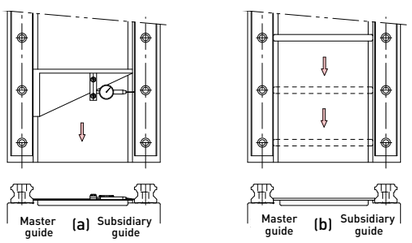
- Method with use of a straight edge
  Set a straight edge between the rails parallel to the side datum plane of the rail on the master guide side by using a dial gauge. Use the dial gauge to obtain the straight alignment of the rail on the subsidiary guide side. When the rail on the subsidiary guide side is parallel to the master side, tighten the mounting bolts in sequence from one end of the rail to the other.



- Method with use of a table
  Fix two blocks on the master guide side to the table. Temporarily fix the rail and one block on the subsidiary guide side to the bed and the table. Fix a dial gauge stand on the table surface and bring it into contact with the side of the block on the subsidiary guide side. Move the table from one end of the rail to the other. While aligning the rail on the subsidiary side parallel to the rail on the master guide side, tighten the bolts in sequence.



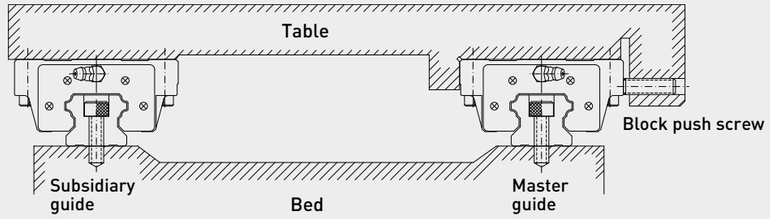
- Method following the master guide side
  When a rail on the master guide side is correctly tightened, fix both blocks on the master guide side and one of the two blocks on the subsidiary guide side completely to the table.
  When moving the table from one end of the rail, tighten the mounting bolts on the subsidiary guide side completely.



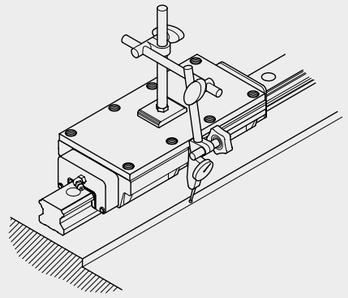
- Method with use of a jig
  Use a special jig to ensure the rail position on the subsidiary guide side. Tighten the mounting bolts to the specified torque in sequence.

1-5-4 When There Is No Side Surface of The Bed On The Master Guide Side

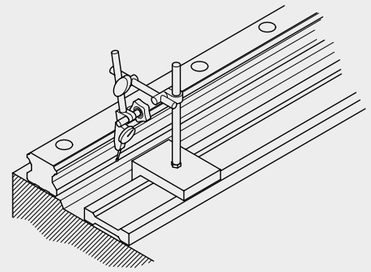
To ensure parallelism between the subsidiary guide and the master guide when there is no side surface, the following rail installation method is recommended. The installation of the blocks is the same as mentioned previously.



(1) Installation of the rail on the master guide side



- Using a provisional datum plane
  Two blocks are fixed in close contact by the measuring plate. A datum plane provided on the bed is used for straight alignment of the rail from one end to the other. Move the blocks and tighten the mounting bolts to the specified torque in sequence.



- Method with use of a straight edge
  Use a dial gauge and a straight edge to confirm the straightness of the side datum plane of the rail from one end to the other. Make sure the mounting bolts are tightened securely in sequence.

(2) Installation of the rail on the subsidiary guide side

The method of installation for the rail on the subsidiary guide side is the same as the case without push screws.

2. NATECH Linear Guideway Product Series

In an effort to meet customer's requirement and service needs Natech offers several different types of guides. We supply theNG series which is suitable for CNC machineries, the NE series for automation industries.

(1) Types & series

Table 2-1 Types & Series

Series	Assembly Height	Load	Square Taphole	Flange Taphole	Flange Drilledhole	Flange Combination
H	High	Heavy Load	NGH-CA	-	-	-
		Superer Heavy Load	NGH-HA	-	-	-
	Low	Heavy Load	-	NGW-CA	-	NGW-CC
		Superer Heavy Load	-	NGW-HA	-	NGW-HC
E	Low	Heavy Load	NEH -CA	NEW-CA	-	-

(2) Accuracy classes

Table 2-2 Accuracy Classes

Series	Assembly Type					Interchangeable Type		
	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)	Normal (C)	High (H)	Precision (P)
H	●	●	●	●	●	●	●	●
E	●	●	●	●	●	●	●	●

(3) Classification of preload

Table 2-3 Preload

Series	Non-interchangeable Type			Interchangeable Type	
	Light preload (Z0)	Medium Preload (ZA)	Heavy Preload (ZB)	Light Preload (Z0)	Medium Preload (ZA)
H	●	●	●	●	●
E	●	●	●	●	●

2-1 NG Series - Heavy Load Ball Type Linear Guideway

NG series linear guideways are designed with load capacity and rigidity higher than other similar products with circular-arc groove and structure optimization. It features equal load ratings in the radial, reverse radial and lateral directions, and self-aligning to absorb installation-error. Thus, Natech NG series linear guideways can achieve a longlife with high speed, high accuracy and smooth linear motion.

2-1-1 Features of NG Series

(1) Self-aligning capability

By design, the circular-arc groove has contact points at 45 degrees. NG series can absorb most installation errors due to surface irregularities and provide smooth linear motion through the elastic deformation of rolling elements and the shift of contactpoints. Self-aligning capability, high accuracy andsmooth operation canbe obtained with an installation.

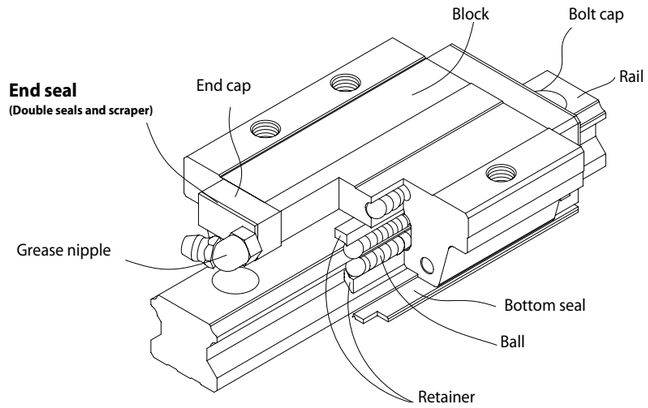
(2) Interchangeability

Because of precision dimensional control, the dimensional tolerance of H series can be kept in a reasonable range, which means that any blocks and any rails in a specific series can be used together while maintaining dimensional tolerance. And a retainer is added to prevent the balls from falling out when the blocks are removed from the rail.

(3) High rigidity in all four directions

Because of the four-row design, the H series linear guideway has equal load ratings in the radial, reverse radial easy and lateral directions. Furthermore, the circular-arc groove provides a wide-contact width between the balls and the groove raceway allowing large permissible loads and high rigidity.

2-1-2 Construction of NG Series



- Rolling circulation system: Block, Rail, End Cap and Retainer
- Lubrication system: Grease Nipple and Piping Joint
- Dust protection system: End seal, BottomSeal, Bolt Cap, Double Seals and Scraper

2-1-3 Model Number of NG Series

H series guideways can be classified into non-interchangeable and interchangeable types. The sizes are identical. The only difference between the two types is that the interchangeable type of blocks and rails can be freely exchanged, and their accuracy can reach up to P class. The model number of H series contains the size, type, accuracy class, preload class, etc..

(1) Non-interchangeable type

NG W 25 C A E 2 R 1600 E ZA P II + DD/E2

- H Series
- Block Type
  W : Flange Type
  H : Square Type
- Model size
  15, 20, 25, 30, 35, 45
- Load Type
  C : Heavy Load
  H : Super Heavy Load
- Block Mounting
  A : Mounting From Top
  C : Top or Bottom
- E: Special Block
  None: Standard Block
- No. of Blocks per Rail
- Rail Mounting Type
  R : Mounting From Top
  T : Bottom
- Rail Length (mm)
- E: Special Rail
  None: Standard Rail
- Preload Code: Z0, ZA, ZB
- Precision Code:
  C, H, P, SP, UP
- No.of rails per axis set 1
- Dust Protection [1]
- E2: Self-Lubricant
  SE: Metallic End Cap

Note: 1. The roman numerals express a matched set of rails.
2. No symbol indicates standard protection (end seal and bottom seal).
ZZ : End seal, bottom seal and scraper
KK: Double seals, bottom seal and scraper.
DD: Double seals and bottom seal

(2) Interchangeable type

- Model Number of H Block

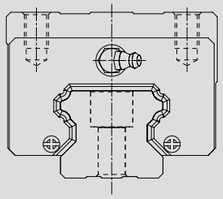
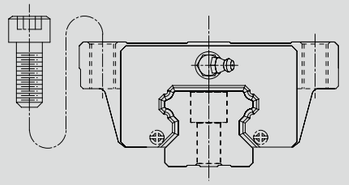
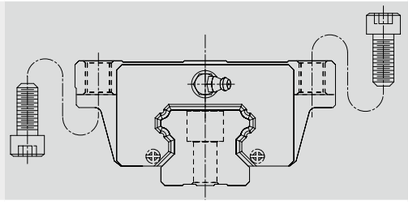
NG W 25 C A E ZA P + ZZ/E2

- H Series
- Block Type
  W : Flange Type
  H:Square Type
- Model size
  15, 20, 25, 30, 35, 45
- Load Type
  C : Heavy Load
  H : Super Heavy Load
- Block Mounting Type
  A : Mounting From Top
  B : Bottom, C : Top or Bottom
- E: Special Block
  None: Standard Block
- Preload Code : Z0, ZA
- Precision Code : C, H, P
- Dust Protection [2]
- E2: Self-Lubricant
  SE: Metallic End Cap

2-1-4 Types

(1) Block types
There're two types of blocks:flange and square. The flange type is suitable for heavy moment load application because of the lower assembly height and wider mounting surface.

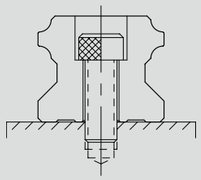
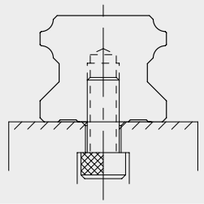
Table 2-1-1 Block Types

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Application
Square	NGH-CA NGH-HA		28 ↓ 90	100 ↓ 4000	○ Machine Centers ○ NC Lathes ○ Grinding Machines ○ Precision Machining Machines ○ Heavy Cutting Machines ○ Automation Devices ○ Transportation Equipment ○ Measuring Equipment ○ Devices Requiring High Positional Accuracy
Flange	NGW-CA NGW-HA		24 ↓ 90	100 ↓ 4000	
	NGW-CC NGW-HC		24 ↓ 90	100 ↓ 4000	

(2) Rail types

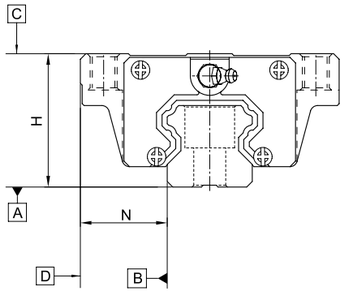
Besides the standard top mounting type, the bottom mounting type is also available.

Table 2-1-2 Rail Types

Mounting from Top	Mounting from bottom
	

2-1-5 Accuracy Classes

The accuracy of NG series can be classified into normal (C), high (H), precision (P), super precision (SP), ultra precision (UP), five classes. Please choose the class by referring the accuracy of applied equipment.



(1) Accuracy of non-interchangeable guideways

Table 2-1-3 Accuracy Standards

Unit: mm

Item	NG - 15, 20				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Dimensional tolerance of width N	± 0.1	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Variation of height H	0.02	0.01	0.006	0.004	0.003
Variation of width N	0.02	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-4 Accuracy Standards

Unit: mm

Item	NG - 25, 30, 35				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Dimensional tolerance of width N	± 0.1	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Variation of height H	0.02	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

Table 2-1-5 Accuracy Standards

Unit: mm

Item	NG- 45				
Accuracy Classes	Normal (C)	High (H)	Pr ecision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.05	0 - 0.05	0 - 0.03	0 - 0.02
Dimensional tolerance of width N	± 0.1	± 0.05	0 - 0.05	0 - 0.03	0 - 0.02
Variation of height H	0.03	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.02	0.01	0.007	0.005
Running parallelism of block surface C to surface A	See Table 2-1-9				
Running parallelism of block surface D to surface B	See Table 2-1-9				

(2) Accuracy of interchangeable guideways

Table 2-1-6 Accuracy Standards

Unit: mm

Item	NG - 15, 20		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.03	± 0.015
Dimensional tolerance of width N	± 0.1	± 0.03	± 0.015
Variation of height H	0.02	0.01	0.006
Variation of width N	0.02	0.01	0.006
Running parallelism of block surface C to surface A	See Table 2-1-9		
Running parallelism of block surface D to surface B	See Table 2-1-9		

Table 2-1-7 Accuracy Standards

Unit: mm

Item	NG - 25, 30, 35		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.04	± 0.02
Dimensional tolerance of width N	± 0.1	± 0.04	± 0.02
Variation of height H	0.02	0.015	0.007
Variation of width N	0.03	0.015	0.007
Running parallelism of block surface C to surface A	See Table 2-1-9		
Running parallelism of block surface D to surface B	See Table 2-1-9		

Table 2-1-8 Accuracy Standards

Unit: mm

Item	NG - 45		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.05	± 0.025
Dimensional tolerance of width N	± 0.1	± 0.05	± 0.025
Variation of height H	0.03	0.015	0.007
Variation of width N	0.03	0.02	0.01
Running parallelism of block surface C to surface A	See Table 2-1-9		
Running parallelism of block surface D to surface B	See Table 2-1-9		

(3) Accuracy of running parallelism

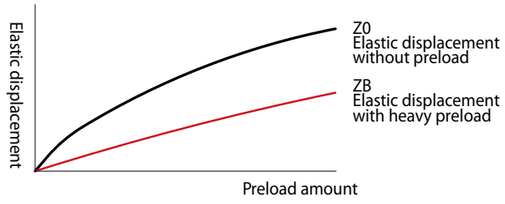
Table 2-1-9 Accuracy of Running Parallelism

Rail Length (mm)	Accuracy (μm)				
	C	H	P	SP	UP
~ 100	12	7	3	2	2
100 ~ 200	14	9	4	2	2
200 ~ 300	15	10	5	3	2
300 ~ 500	17	12	6	3	2
500 ~ 700	20	13	7	4	2
700 ~ 900	22	15	8	5	3
900 ~ 1,100	24	16	9	6	3
1,100 ~ 1,500	26	18	11	7	4
1,500 ~ 1,900	28	20	13	8	4
1,900 ~ 2,500	31	22	15	10	5
2,500 ~ 3,100	33	25	18	11	6
3,100 ~ 3,600	36	27	20	14	7
3,600 ~ 4,000	37	28	21	15	7

2-1-6 Preload

(1) Definition

A preload can be applied to each guideway. Oversized balls are used. Generally, a linear motion guideway has a negative clearance between groove and balls in order to improve stiffness and maintain high precision. The figure shows the load is multiplied by the preload, the rigidity is doubled and the deflection is reduced by one half. The preload no larger than ZA would be recommended for the model size under NG20 to avoid an over-preload affecting the guideway's life.



(2) Preload classes

NATECH offers three classes of standard preload for various applications and conditions.

Table 2-1-10 Preload Classes

Class	Code	Preload	Condition	Examples of Application
Light Preload	Z0	0~ 0.02C	Certain load direction,low impact, low precision required	Transportation devices, auto-packing machines, X-Y axis for general industrial machines, welding machines, welders
Medium Preload	ZA	0.05C~0.07C	High precision required	Machining centers, Z axis for general industrial, machines, EDM, NC lathes, P recision X-Y tables, measuring equipment
Heavy Preload	ZB	0.10C~ 0.12C	High rigidity required, with vibration and impact	Machining centers, grinding machines, NC lathes, horizontal and vertical milling machines, Z axis of machine tools, Heavy cutting machines

Class	Interchangeable Guideway	Non-Interchangeable Guideway
Preload classes	Z0, ZA	Z0, ZA, ZB

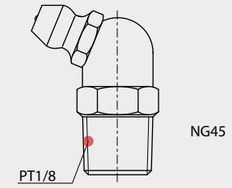
Note: The "C" in the preload column denotes basic dynamic load rating.

2-1-7 Lubrication

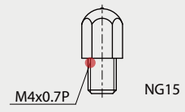
(1) Grease

- Grease nipple

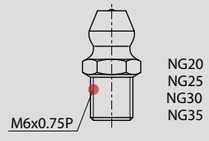
NO.34320001



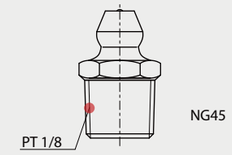
NO.34320003



N0.34310002



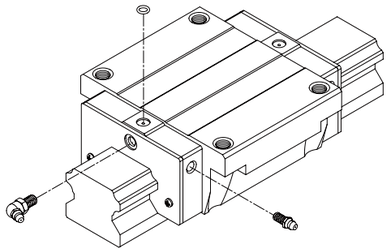
NO. 34310003(OPTION)

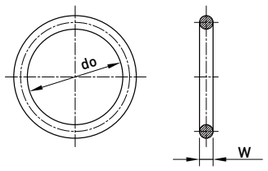


NO.3431000B(OPTION)

Mounting location

The standard location of the grease fitting is at both ends of the block, but the nipple can be mounted at each side of block. For lateral installation, we recommend that the nipple be mounted at the non-reference side, otherwise please contact us. It is possible to perform lubrication by using the oil-piping joint.

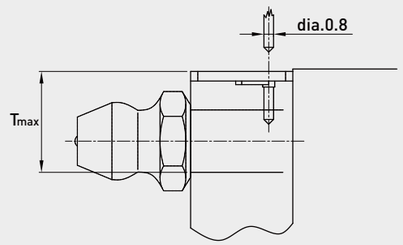




O Ring

Table 2-1-11 O-Ring size and max. permissible depth for piercing

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T_{max} (mm)
NG15	2.5±0.15	1.5±0.15	3.75
NG20	4.5±0.15	1.5±0.15	5.7
NG25	4.5±0.15	1.5±0.15	5.8
NG30	4.5±0.15	1.5±0.15	6.3
NG35	4.5±0.15	1.5±0.15	8.8
NG45	4.5±0.15	1.5±0.15	8.2



The lubricant amount for a block filled with grease

Table 2-1-12 The lubricant Amount for a Block Filled with Grease

Size	Heavy load (cm^3)	Super heavy load (cm^3)	Size	Heavy load (cm^3)	Super heavy load (cm^3)
NG15	1	-	NG35	10	12
NG20	2	3	NG45	17	21
NG25	5	6			
NG30	7	8			

Frequency of replenishment

Check the grease every 100 km, or every 3-6 months.

(2) Oil

The recommended viscosity of oil is about 30~150c St. If customers need to use oil-type lubrication, please inform us.

Oil refilling rate

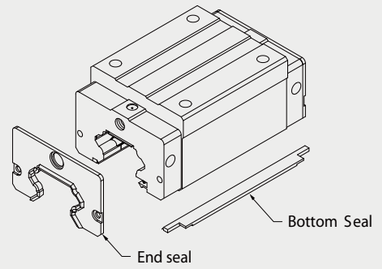
Table 2-1-13

Size	Refilling rate (cm^3/hr)	Size	Refilling rate (cm^3/hr)
NG15	0.2	H35	0.3
NG20	0.2	H45	0.4
NG25	0.3	-	-
NG30	0.3	-	-

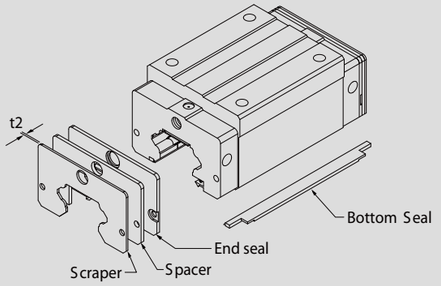
2-1-8 Dust Proof Accessories

(1) Codes of standard dust proof accessories

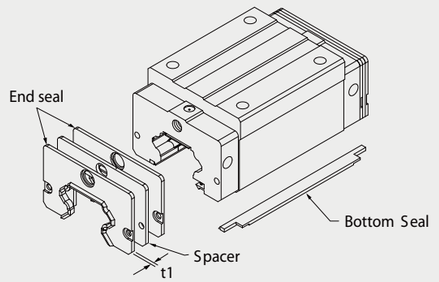
If the following accessories are needed, please add the code followed by the model number.



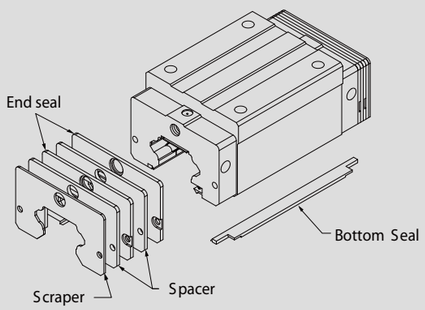
No symbol: Standard Protection (End seal + Bottom Seal)



ZZ (End seal + Bottom Seal + Scraper)



DD (Double seals + Bottom Seal)



KK (Double seals + Bottom Seal + Scraper)

(2) End seal and bottom seal

To prevent life reduction caused by iron chips or dust entering the block.

(3) Double seals

Enhances the wiping effect, foreign matter can be completely wiped off.

Table 2-1-14 Dimensions of end seal

Size	Thickness (t1) (mm)	Size	Thickness (t1) (mm)
NG15 ES	3	H35 ES	3.2
NG20 ES	3.5	H45 ES	4.5
NG25 ES	3.5	-	-
NG30 ES	3.2	-	-

(4) Scraper

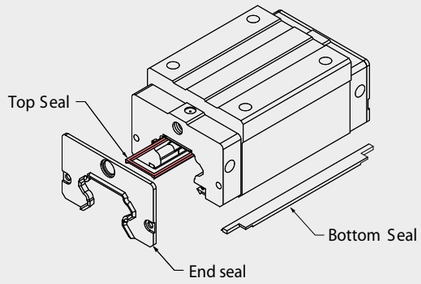
The scraper removes high-temperature iron chips and larger foreign objects.

Table 2-1-15 Dimensions of scraper

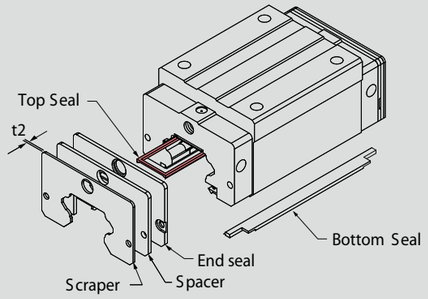
Size	Thickness (t2) (mm)	Size	Thickness (t2) (mm)
NG15 SC	1.5	H35 SC	1.5
NG20 SC	1.5	H45 SC	1.5
NG25 SC	1.5	-	-
NG30 SC	1.5	-	-

(5) Codes of high-dust proof accessories

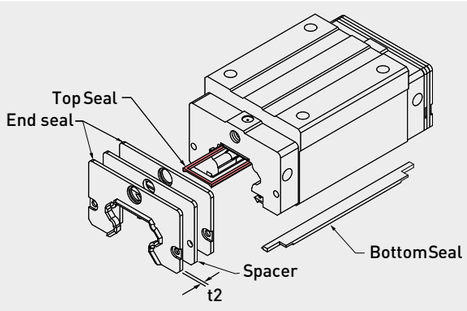
NATECH develops many kinds of dust proof accessories for different application and working environment to avoid dust or debris. If the following accessories are needed, please add the code followed by the model number.



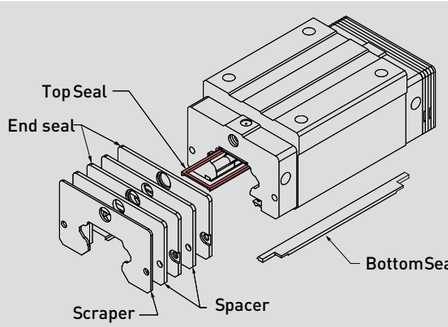
SH {End Seal (High-Dust Proof)
+ Bottom Seal (High Dust Proof) + Top Seal}



ZH {End Seal (High-Dust Proof)
+Bottom Seal (Hi gh Dust Proof) + Top Seal + Spacer}



DH {Double End Seal (High Dust Proof)
+Bottom Seal (High Dust Proof) + Top Seal}



KH {Double End Seal (High Dust Proof)
+ Bottom Seal (High Dust Proof) +Top Seal +Scraper}

Note: 1. The available size for high dust proof accessories are H20(C/H), 25(C/H), 30(C/H), 35(C/H) and 45C.
2. The value of fricton force will increase 0.6~1.2 kgf.
3. For higher demands of the anti-dust ability, please contact NATECH.

o Top Seal

Top seal can efficiently avoid dust from the surface of rail or tapping hole getting inside the block.

2-1-9 Friction

The maximum value of resistance per end seal are as shown in the table.

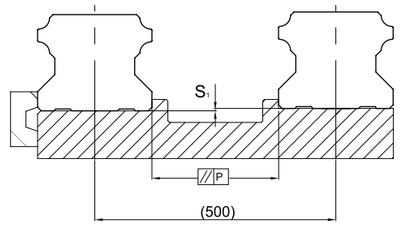
Table 2-1-16 Seal Resistance

Size	Resistance N (kgf)	Size	Resistance N (kgf)
NG15	1.18 (0.12)	NG35	3.04 (0.31)
NG20	1.57 (0.16)	NG45	3.83 (0.39)
NG25	1.96 (0.2)	-	-
NG30	2.65 (0.27)	-	-

Note:1kgf=9.81N

2-1-10 The Accuracy Tolerance of Mounting Surface

(1) The accuracy tolerance of rail-mounting surface
Because of the Circular-arc contact design, the H linear guideway can compensate for some surface-error on installation and still maintain smooth linear motion.



(2) The parallelism tolerance of reference surface (P)

Table 2-1-17 Max. Parallelism Tolerance (P) unit: μm

Size	Preload classes		
	Z0	ZA	ZB
NG15	25	18	-
NG20	25	20	18
NG25	30	22	20
NG30	40	30	27
NG35	50	35	30
NG45	60	40	35

(3) The accuracy tolerance of reference surface height

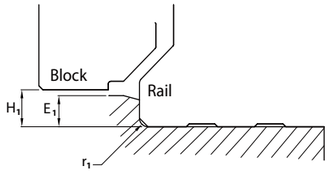
Table 2-1-18 Max. Tolerance of Reference Surface Height (S_1) unit: μm

Size	Preload classes		
	Z0	ZA	ZB
NG15	130	85	-
NG20	130	85	50
NG25	130	85	70
NG30	170	110	90
NG35	210	150	120
NG45	250	170	140

2-1-11 Cautions for Installation

(1) Shoulder heights and fillets

Improper shoulder heights and fillets of mounting surfaces will cause a deviation in accuracy and the interference with the chamfered part of the rail or block. As long as the recommended shoulder heights and fillets are followed, installation inaccuracies should be eliminated.



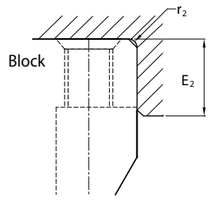


Table 2-1-19 Shoulder Heights and Fillets

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height of the rail E_1 (mm)	Shoulder height of the block E_2 (mm)	Clearance under block H_1 (mm)
NG15	0.5	0.5	3	4	4.3
NG20	0.5	0.5	3.5	5	4.6
NG25	1.0	1	5	5	5.5
NG30	1.0	1	5	5	6
NG35	1.0	1	6	6	7.5
NG45	1.0	1	8	8	9.5

(2) Tightening Torque of Bolts for Installation

Improper tightening of bolts will seriously influence the accuracy of Linear Guideway installation. The following tightening torques for different sizes of bolts are recommended.

Table 2-1-20 Mounting Torque

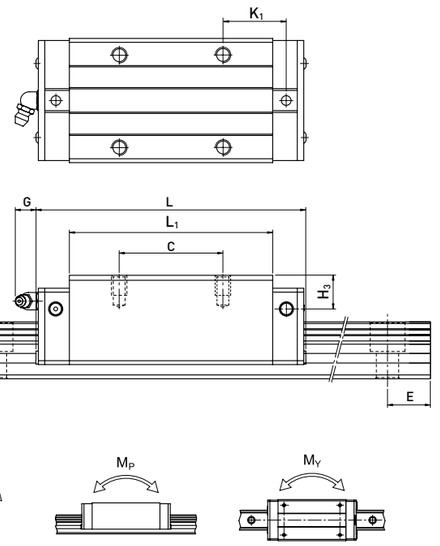
Size	Bolt size	Torque N-cm (kgf-cm)		
		Iron	Casting	Aluminum
NG15	M4×0.7P×16L	392 (40)	274 (28)	206 (21)
NG20	M5×0.8P×16L	883 (90)	588 (60)	441 (45)
NG25	M6×1P×20L	1373 (140)	921 (94)	686 (70)
NG30	M8×1.25P×25L	3041 (310)	2010 (205)	1470 (150)
NG35	M8×1.25P×25L	3041 (310)	2010 (205)	1470 (150)
NG45	M12×1.75P×35L	11772 (1200)	7840 (800)	5880 (600)

NATECH

Linear Guideways - NG Series

2-1- 12 Dimensions for NATECH H Series

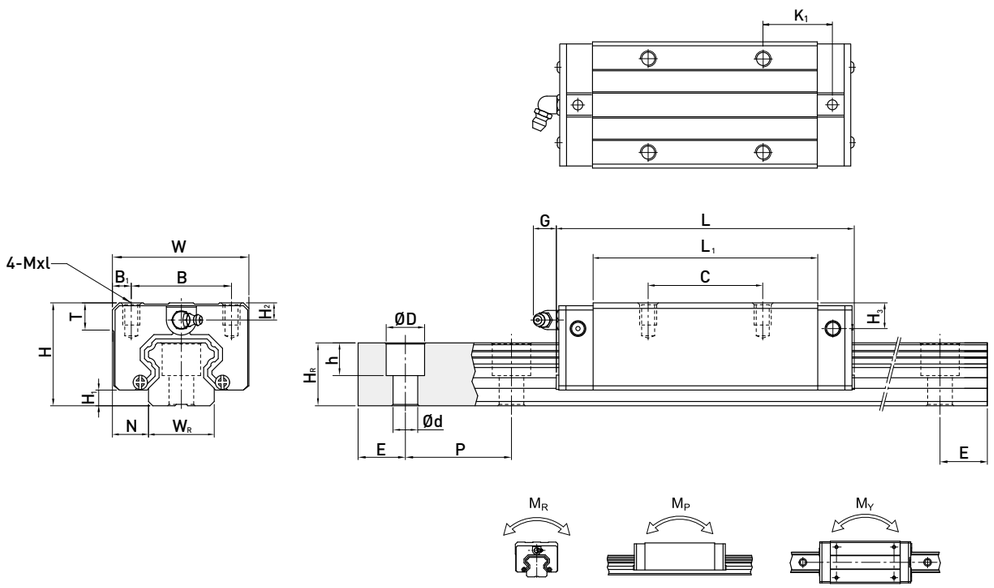
(1) NGH-CA / NGH-HA



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)								Dimensions of Rail (mm)									Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	G	MxI	T	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R	M_P	M_Y	Block	Rail
																										kN-m	kN-m	kN-m	kg	kg/m
NGH15CA	28	4.3	9.5	34	26	4	26	39.4	61.4	10	5.3	M4x5	6	7.95	7.7	15	15	7.5	5.3	4.5	60	20	M4x16	11.38	16.97	0.12	0.10	0.10	0.18	1.45
NGH20CA	30	4.6	12	44	32	6	36	50.5	77.5	12.25	12	M5x6	8	6	6	20	17.5	9.5	8.5	6	60	20	M5x16	17.75	27.76	0.27	0.20	0.20	0.30	2.21
NGH20HA							50	65.2	92.2	12.6														21.18	35.9	0.35	0.35	0.35	0.39	
NGH25CA	40	5.5	12.5	48	35	6.5	35	58	84	15.7	12	M6x8	8	10	9	23	22	11	9	7	60	20	M6x20	26.48	36.49	0.42	0.33	0.33	0.51	3.21
NGH25HA							50	78.6	104.6	18.5														32.75	49.44	0.56	0.57	0.57	0.69	
NGH30CA	45	6	16	60	40	10	40	70	97.4	20.25	12	M8x10	8.5	9.5	13.8	28	26	14	12	9	80	20	M8x25	38.74	52.19	0.66	0.53	0.53	0.88	4.47
NGH30HA							60	93	120.4	21.75														47.27	69.16	0.88	0.92	0.92	1.16	
NGH35CA	55	7.5	18	70	50	10	50	80	112.4	20.6	12	M8x12	10.2	16	19.6	34	29	14	12	9	80	20	M8x25	49.52	69.16	1.16	0.81	0.81	1.45	6.30
NGH45CA	70	9.5	20.5	86	60	13	60	97	139.4	23	12.9	M10x17	16	18.5	30.5	45	38	20	17	14	105	22.5	M12x35	77.57	102.71	1.98	1.55	1.55	2.73	10.41

Note : 1 kgf = 9.81 N

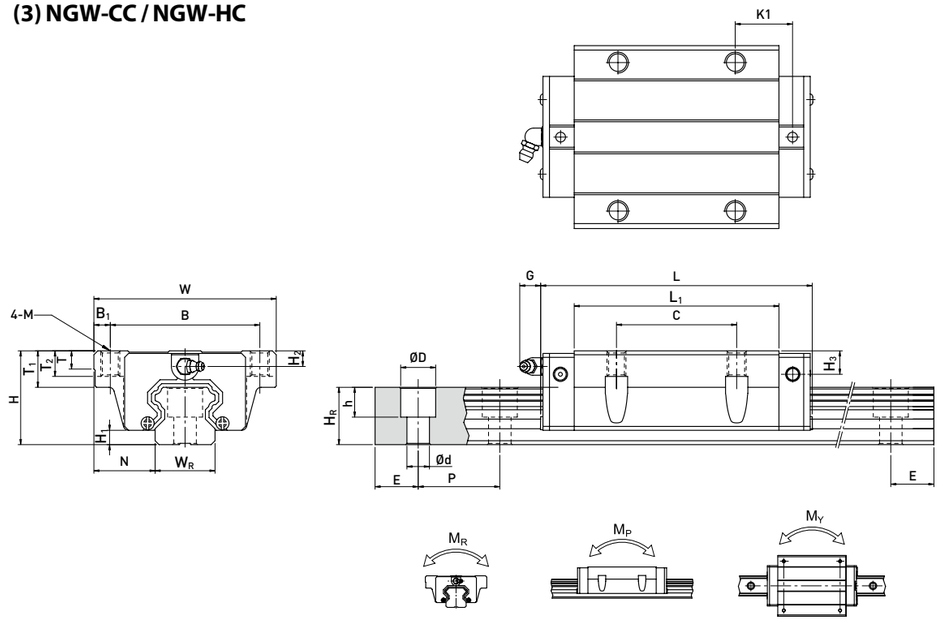
(2) NGL-CA / NGL-HA



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)												Dimensions of Rail (mm)						Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	G	Mxl	T	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
NGL15CA	24	4.3	9.5	34	26	4	26	39.4	61.4	10	5.3	M4x4	6	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4x16	11.38	16.97	0.12	0.10	0.10	0.14	1.45
NGL25CA	36	5.5	12.5	48	35	6.5	35	58	84	16.8	12	M6x6	8	6	9	23	22	11	9	7	60	20	M6x20	26.48	36.49	0.42	0.33	0.33	0.42	3.21
NGL25HA							50	78.6	104.6	19.6														32.75	49.44	0.56	0.57	0.57	0.57	
NGL30CA	42	6	16	60	40	10	40	70	97.4	20.25	12	M8x10	8.5	6.5	10.8	28	26	14	12	9	80	20	M8x25	38.74	52.19	0.66	0.53	0.53	0.78	4.47
NGL30HA							60	93	120.4	21.75														47.27	69.16	0.88	0.92	0.92	1.03	
NGL35CA	48	7.5	18	70	50	10	50	80	112.4	20.6	12	M8x12	10.2	9	12.6	34	29	14	12	9	80	20	M8x25	49.52	69.16	1.16	0.81	0.81	1.14	6.30
NGL35HA							72	105.8	138.2	22.5														60.21	91.63	1.54	1.40	1.40	1.52	
NGL45CA	60	9.5	20.5	86	60	13	60	97	139.4	23	12.9	M10x17	16	8.5	20.5	45	38	20	17	14	105	22.5	M12x35	77.57	102.71	1.98	1.55	1.55	2.08	10.41
NGL45HA							80	128.8	171.2	28.9														94.54	136.46	2.63	2.68	2.68	2.75	
NGL55CA	70	13	23.5	100	75	12.5	75	117.7	166.7	27.35	12.9	M12x18	17.5	12	19	53	44	23	20	16	120	30	M14x45	114.44	148.33	3.69	2.64	2.64	3.25	15.08
NGL55HA							95	155.8	204.8	36.4														139.35	196.2	4.88	4.57	4.57	4.27	

Note : 1 kgf = 9.81 N

(3) NGW-CC / NGW-HC



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)													Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	G	M	T	T_1	T_2	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
NGW15CC	24	4.3	16	47	38	4.5	30	39.4	61.4	8	5.3	M5	6	8.9	6.95	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4x16	11.38	16.97	0.12	0.10	0.10	0.17	1.45
NGW20CC	30	4.6	21.5	63	53	5	40	50.5	77.5	10.25	12	M6	8	10	9.5	6	6	20	17.5	9.5	8.5	6	60	20	M5x16	17.75	27.76	0.27	0.20	0.20	0.40	2.21
NGW20HC								65.2	92.2	17.6																21.18	35.9	0.35	0.35	0.35	0.52	
NGW25CC	36	5.5	23.5	70	57	6.5	45	58	84	10.7	12	M8	8	14	10	6	5	23	22	11	9	7	60	20	M6x20	26.48	36.49	0.42	0.33	0.33	0.59	3.21
NGW25HC								78.6	104.6	21																32.75	49.44	0.56	0.57	0.57	0.80	
NGW30CC	42	6	31	90	72	9	52	70	97.4	14.25	12	M10	8.5	16	10	6.5	10.8	28	26	14	12	9	80	20	M8x25	38.74	52.19	0.66	0.53	0.53	1.09	4.47
NGW30HC								93	120.4	25.75																47.27	69.16	0.88	0.92	0.92	1.44	
NGW35CC	48	7.5	33	100	82	9	62	80	112.4	14.6	12	M10	10.1	18	13	9	12.6	34	29	14	12	9	80	20	M8x25	49.52	69.16	1.16	0.81	0.81	1.56	6.30
NGW45CC	60	9.5	37.5	120	100	10	80	97	139.4	13	12.9	M12	15.1	22	15	8.5	20.5	45	38	20	17	14	105	22.5	M12x35	77.57	102.71	1.98	1.55	1.55	2.79	10.41

Note : 1 kgf = 9.81 N

NE Series

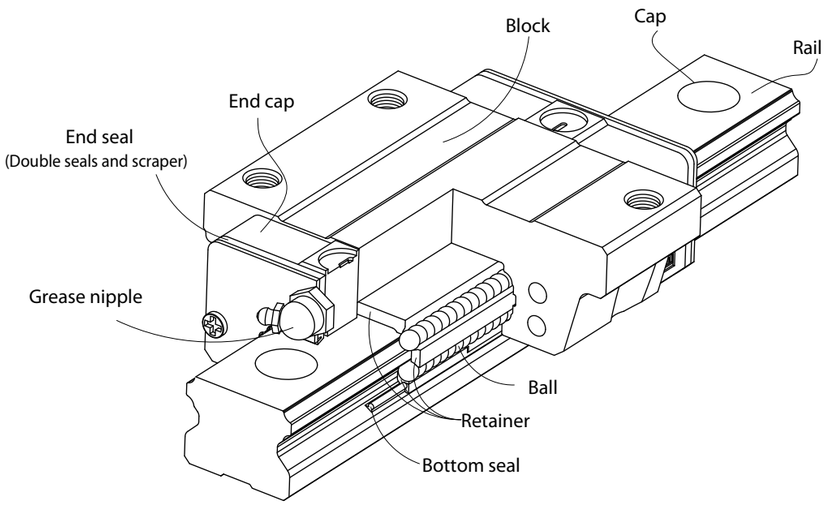
Low Profile Ball Type

2-2 NE Series - Low Profile Ball Type Linear Guideway

2-2-1 Features of the NE Series Linear Guideway

The design of the NE series offers a low profile, high load capacity, and high rigidity. It also features an equal load rating in all four directions and self-aligning capability to absorb installation-error, allowing for higher accuracies. Additionally, the lower assembly height and the shorter length make the E series more suitable for high-speed, automation machines and applications where space is limited.
The retainer is designed to hold the balls in the block even when it is removed from the rail.

2-2-2 Construction of NE Series



- Rolling circulation system: Block, rail, end cap and retainer
- Lubrication system: Grease nipple and piping Joint
- Dust protection system: End seal, bottom seal, cap and scraper

2-2-3 Model Number of NE Series

NE series linear guideways are classified into non-interchangeable and interchangeable types. The sizes of these two types are the same as one another. The main difference is that the interchangeable type of blocks and rails can be freely exchanged and they can maintain P-class accuracy. Because of strict dimensional control, the interchangeable type linear guideways are a wise choice for customers when rails do not need to be matched for an axis. The model number of the NE series identifies the size, type, accuracy class, preload class, etc.

(1) Non-interchangeable type

NE W 25 C A E 2 R 1600 E ZA P II + KK

- NE Series
- Block Type
  W : Flange Type
  H : Square Type
- Model size
  15, 20, 25, 30
- Load Type
  C : Heavy Load
- Block Mounting Type
  A : Mounting from Top
  C : Top or bottom
- E: Special Block
  None Standard Block
- No. of Blocks per Rail
- Rail Mounting Type
  R/U: Mounting From Top
  T : Bottom
- Rail Length (mm)
- Preload Code: Z0, ZA, ZB
- Precision Code:
  C, H, P, SP, UP
- No.of Rails per Axis set[1]
- Dust Protection[2]

Note: 1. The roman numerals are used to express the number of matched rails used in one axis. When a single rail is used in an axis, no symbol is indicated.
2. No symbol indicates standard protection (end seal and bottom seal).
ZZ : End seal, bottom seal and scraper
KK: Double seals, bottom seal and scraper.
DD: Double seals and bottom seal

(2) Interchangeable type

- Model Number of E Block

NE W 25 C A E ZA P + ZZ

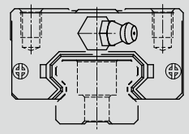
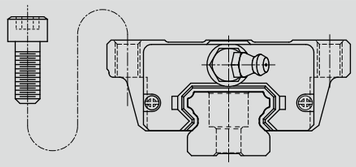
- NE Series
- Block Type
  W : Flange Type
  H : Square Type
- Model size
  15, 20, 25, 30
- Load Type
  C : Heavy Load
- Block Mounting Type
  A : Mounting From Top
  B : Bottom
- E: Special Block None: Standard block
- Preload Code : Z0, ZA
- Precision Code : C, H, P
- Dust Protection[2]

2-2-4 Types

(1) Block types

NATECH offers two types of linear guideways, flange and square types.

Table 2-2-1Block Types

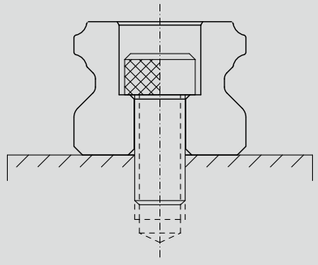
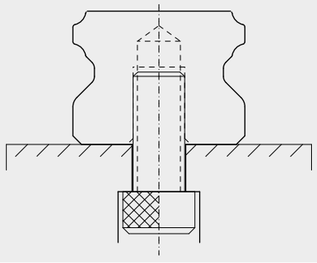
Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Applications
Square	NEH-CA		24 ↓ 48	100 ↓ 4000	○ Automation devices ○ High-speed transportation equipment ○ Precision measuring equipment ○ Semiconductor manufacturing equipment
Flange	NEW-CA		24 ↓ 48	100 ↓ 4000	

*Please refer to the chapter 2-2-12 for the dimensional detail.

(2) Rail types

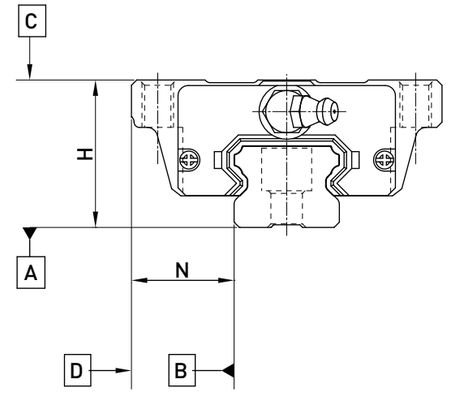
Besides the standard top mounting type,NATECH also offers bottom mounting type rails.

Table 2-2-2 Rail Types

Mountingfrom Top	Mountingfrom Bottom
	

2-2-5 Accuracy

The accuracy of the NE series can be classified into 5 classes: normal(C), high(H), precision(P), super precision(SP), and ultra precision(UP). Choose the class by referencing the accuracy of selected equipment.



(1) Accuracy of non-interchangeable guideways

Table 2-2-3Accuracy Standards

Unit: mm

Item	NE - 15, 20				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Dimensional tolerance of width N	± 0.1	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Variation of height H	0.02	0.01	0.006	0.004	0.003
Variation of width N	0.02	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2- 2-7				
Running parallelism of block surface D to surface B	See Table 2- 2-7				

Table 2-2-4 Accuracy Standards

Unit: mm

Item	NE- 25, 30				
Accuracy Classes	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.1	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Dimensional tolerance of width N	± 0.1	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Variation of height H	0.02	0.015	0.007	0.005	0.003
Variation of width N	0.03	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2- 2-7				
Running parallelism of block surface D to surface B	See Table 2- 2-7				

(2) Accuracy of interchangeable guideways

Table 2-2-5 Accuracy Standards Unit: mm

Item	NE - 15, 20		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.03	± 0.015
Dimensional tolerance of width N	± 0.1	± 0.03	± 0.015
Variation of height H	0.02	0.01	0.006
Variation of width N	0.02	0.01	0.006
Running parallelism of block surface C to surface A	See Table 2-2-7		
Running parallelism of block surface D to surface B	See Table 2-2-7		

Table 2-2-6 Accuracy Standards Unit: mm

Item	NE - 25, 30		
Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.1	± 0.04	± 0.02
Dimensional tolerance of width N	± 0.1	± 0.04	± 0.02
Variation of height H	0.02	0.015	0.007
Variation of width N	0.03	0.015	0.007
Running parallelism of block surface C to surface A	See Table 2-2-7		
Running parallelism of block surface D to surface B	See Table 2-2-7		

(3) Accuracy of running parallelism

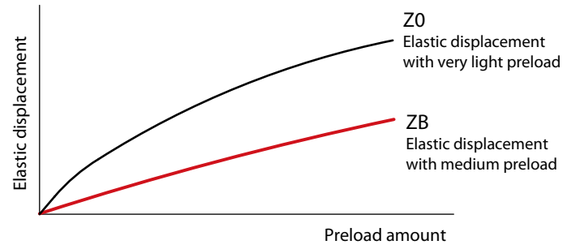
Table 2-2-7 Accuracy of Running Parallelism

Rail Length (mm)	Accuracy (μm)				
	C	H	P	SP	UP
~ 100	12	7	3	2	2
100 ~ 200	14	9	4	2	2
200 ~ 300	15	10	5	3	2
300 ~ 500	17	12	6	3	2
500 ~ 700	20	13	7	4	2
700 ~ 900	22	15	8	5	3
900 ~ 1,100	24	16	9	6	3
1,100 ~ 1,500	26	18	11	7	4
1,500 ~ 1,900	28	20	13	8	4
1,900 ~ 2,500	31	22	15	10	5
2,500 ~ 3,100	33	25	18	11	6
3,100 ~ 3,600	36	27	20	14	7
3,600 ~ 4,000	37	28	21	15	7

2-2-6 Preload

(1) Definition

A preload can be applied to each guideway. Generally, a linear motion guideway has a negative clearance between the groove and balls in order to improve stiffness and maintain high precision. The figure shows that adding a preload can improve stiffness of the linear guideway. A preload no greater than ZA would be recommended for model sizes smaller than E20. This will avoid an over-loaded condition that would affect guideway life.



(2) Preload classes

NATECH offers three standard preloads for various applications and conditions.

Table 2-2-8 Preload Classes

Class	Code	Preload	Condition
Very Light Preload	Z0	0~ 0.02C	Certain load direction,low impact, low precision required
Light Preload	ZA	0.03C~0.05C	low load and high precision required
Medium Preload	ZB	0.06C~ 0.08C	High rigidity required, with vibration and impact

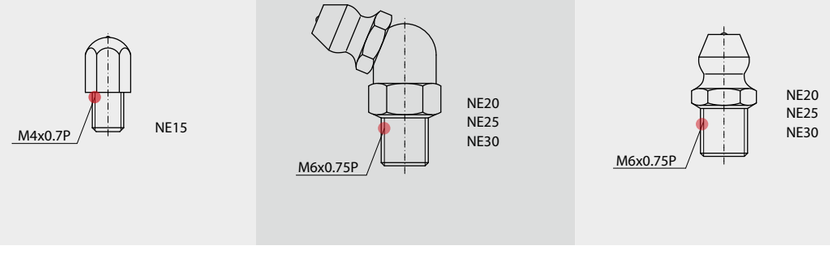
Class	Interchangeable Guideway	Non-Interchangeable Guideway
Preload classes	Z0, ZA	Z0, ZA, ZB

Note: The "C" in the preload column denotes basic dynamic load rating.

2-2-7 Lubrication

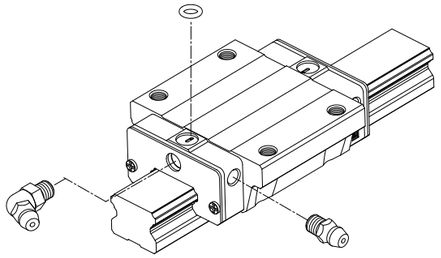
(1) Grease

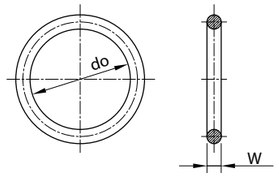
- Grease nipple



Mounting location

The standard location of the grease fitting is at both ends of the block, the nipple may be mounted in the side or top of the block. For lateral installation, we recommend that the nipple be mounted to the non-reference side, otherwise please contact us. When lubricating from above, in the recess for the O-ring, a smaller, preformed recess can be found. Preheat the 0.8 mm diameter metal tip. Carefully open the small recess with the metal tip and pierce through it. Insert a round sealing ring into the recess. (The round sealing ring is not supplied with the block) Do not open the small recess with a drill bit this may introduce the danger of contamination. It is possible to carry out the lubrication by using the oil-piping joint.

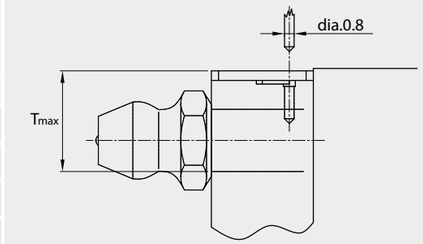




O Ring

Table 2-2-9 O-Ring size and max. permissible depth for piercing

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do(mm)	W (mm)	T_{max}(mm)
NE15	2.5±0.15	1.5±0.15	6.9
NE20	4.5±0.15	1.5±0.15	8.4
NE25	4.5±0.15	1.5±0.15	10.4
NE30	4.5±0.15	1.5±0.15	10.4



The oil amount for a block filled with grease

Table 2-2-10 **The oil amount for a block filled with grease**

Size	Medium Load (cm^3)	Heavy Load (cm^3)
NE15	0.8	1.4
NE20	1.5	2.4
NE25	2.8	4.6
NE30	3.7	6.3

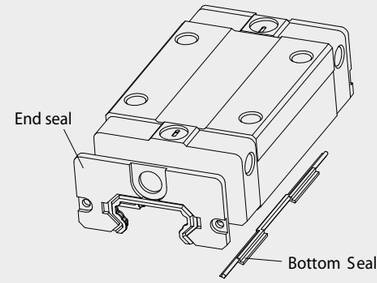
Frequency of replenishment

Check the grease every 100 km, or every 3-6 months.

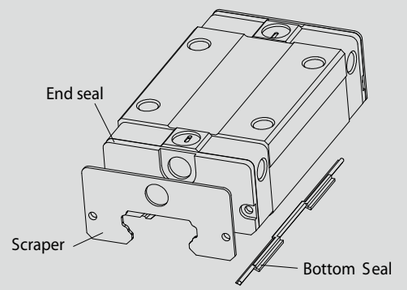
2-2-8 Dust Protection Equipment

(1) Codes of equipment

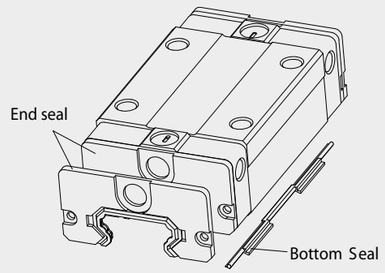
If the following equipment is needed, please indicate the code followed by the model number.



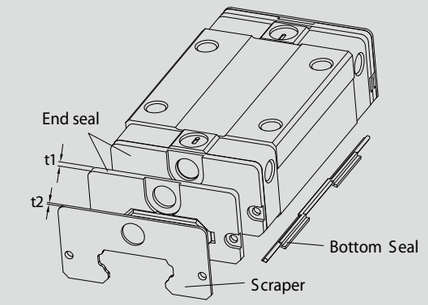
No symbol: Standard Protection
(End seal + Bottom seal)



ZZ(End seal + Bottom seal + Scraper)



DD (Double seals + Bottom Seal)



KK (Double seals + Bottom Seal + Scraper)

(2) End seal and bottom seal

Protects against contaminants entering the block. Reduces potential for groove damage resulting in a reduction of life ratings.

(3) Double seals

Removing foreign matters from the rail to prevent contaminants from entering the block.

Table 2-2-11 Dimensions of end seal

Size	Thickness (t1) (mm)
NE15	2
NE20	2
NE25	2
NE30	2

(4) Scraper

Clears larger contaminants, such as weld spatter and metal cuttings, from the rail. Metal scraper protects end seals from excessive damage.

Table 2-2-12 Dimensions of Scraper

Size	Thickness (t2) (mm)
NE15	0.8
NE20	0.8
NE25	1
NE30	1

2-2-9 Friction

The maximum value of resistance per end seal are as shown in the table.

Table 2-2-13 Seal Resistance

Size	Resistance N (kgf)
NE15	0.1
NE20	0.1
NE25	0.1
NE30	0.15

Note:1kgf=9.81N

2-2-10 Mounting Surface Accuracy Tolerance

Because of the circular-arc contact design, the E linear guideway can withstand surface-error installation and deliver smooth linear motion. When the mounting surface meets the accuracy requirements of the installation, the high a ccuracy and rigidity of the guideway will be obtained without any difficulty. For faster installation and smoother movement, NATECH offers a preload with normal clearance because of its ability to absorb higher deviations in mounting surface inaccuracies.

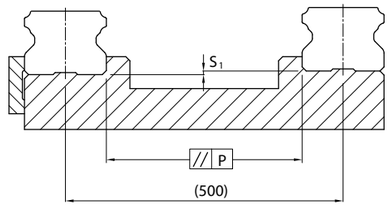


Table 2-2-14 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
NE15	25	18	-
NE20	25	20	18
NE25	30	22	20
NE30	40	30	27

Table 2-2-15 Max. Tolerance of Reference Surface Height (S_1)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
NE15	130	85	-
NE20	130	85	50
NE25	130	85	70
NE30	170	110	90

2-2-11 Cautions for Installation

(1) Shoulder heights and chamfers
Improper shoulder heights and chamfers of mounting surfaces will cause deviations in accuracy and rail or block interference with the chamfered part.
When recommended shoulder heights and chamfers are used, problems with installation accuracy should be eliminated.

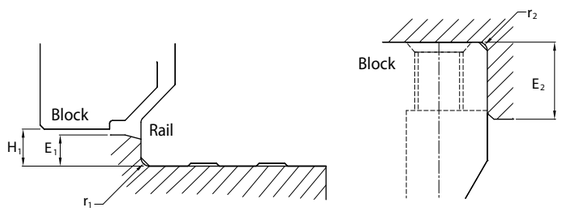


Table 2-2-16 Shoulder Heights and Chamfers

unit: mm

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height of the rail E_1 (mm)	Shoulder height of the block E_2 (mm)	Clearance under block H_1 (mm)
NE15	0.5	0.5	2.7	5.0	4.5
NE20	0.5	0.5	5.0	7.0	6.0
NE25	1.0	1.0	5.0	7.5	7.0
NE30	1.0	1.0	7.0	7.0	10.0

(2) Tightening Torque of Bolts for Installation
Improperly tightened mounting bolts will seriously affect the accuracy of linear guide installations. The following tightening torques for different sizes of bolts are recommended.

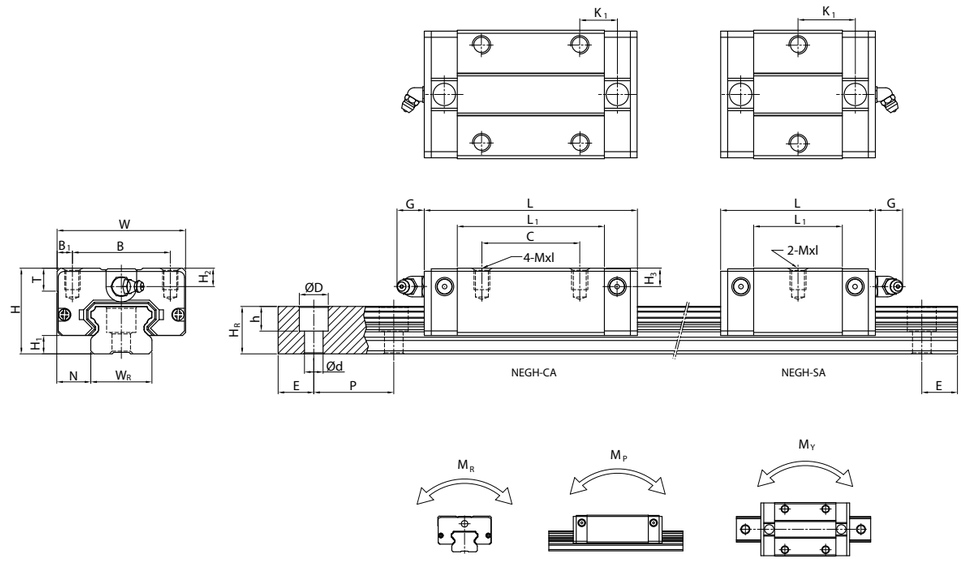
Table 2-2-17 Tightening Torque

Size	Bolt size	Torque N-cm(kgf-cm)
		Iron
NE15	M3×0.5P×16L	186 (19)
NE20	M5×0.8P×16L	883 (90)
NE25	M6×1P×20L	1373 (140)
NE30	M6×1P×25L	1373 (140)

Note: 1 kgf = 9.81 N

2-2-12 Dimensions for E Series

(1) NEH-CA

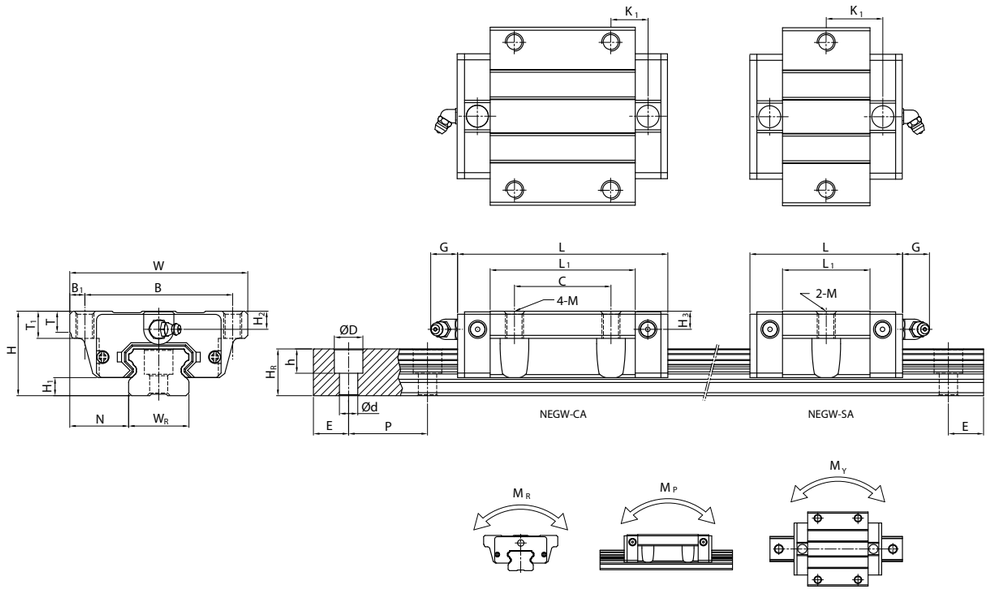


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)												Dimensions of Rail (mm)						Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	G	MxI	T	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
NEH15CA	24	4.5	9.5	34	26	4	26	39.8	56.8	10.15	5.7	M4x6	6	5.5	6	15	12.5	6	4.5	3.5	60	20	M3x16	7.83	16.19	0.13	0.10	0.10	0.15	1.25
NEH20CA	28	6	11	42	32	5	32	48.1	69.1	12.3	12	M5x7	7.5	6	6	20	15.5	9.5	8.5	6	60	20	M5x16	10.31	21.13	0.22	0.16	0.16	0.24	2.08
NEH25CA	33	7	12.5	48	35	6.5	35	59	82.6	16.15	12	M6x9	8	8	8	23	18	11	9	7	60	20	M6x20	16.27	32.40	0.38	0.32	0.32	0.41	2.67
NEH30CA	42	10	16	60	40	10	40	70.1	98.1	21.05	12	M8x12	9	8	9	28	23	11	9	7	80	20	M6x25	23.70	47.46	0.68	0.55	0.55	0.76	4.35

Note : 1 kgf = 9.81 N

NATECH

(2) NEW-CC



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)												Dimensions of Rail (mm)						Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	G	M	T	T_1	H_2	H_3	W_R	H_R	D	h	d	P	E				M_R	M_P	M_Y	Block	Rail
																											kN-m	kN-m	kN-m	kg	kg/m
NEW15CC	24	4.5	18.5	52	41	5.5	26	39.8	56.8	10.15	5.7	M5	5	7	5.5	6	15	12.5	6	4.5	3.5	60	20	M3x16	7.83	16.19	0.13	0.10	0.10	0.21	1.25
NEW20CC	28	6	19.5	59	49	5	32	48.1	69.1	12.3	12	M6	7	9	6	6	20	15.5	9.5	8.5	6	60	20	M5x16	10.31	21.13	0.22	0.16	0.16	0.32	2.08
NEW25CC	33	7	25	73	60	6.5	35	59	82.6	16.15	12	M8	7.5	10	8	8	23	18	11	9	7	60	20	M6x20	16.27	32.40	0.38	0.32	0.32	0.59	2.67
NEW30CC	42	10	31	90	72	9	40	70.1	98.1	21.05	12	M10	7	10	8	9	28	23	11	9	7	80	20	M6x25	23.70	47.46	0.68	0.55	0.55	1.04	4.35

Note : 1 kgf = 9.81 N

Type Comparison Table For The Linear Guide

Type	NATECH	HIWIN	THK	PMI	TBI	ABBA	STAF	CPC
NGH Series	NGH15CA	HGH15CA	HSR15R	MSA15S	TRH15VL	BRC15R0	BGXH15BN	HRC15MN
	NGH20CA	HGH20CA	HSR20R	MSA20S	TRH20VL	BRC20R0	BGXH20BN	HRC20MN
	NGH20HA	HGH20HA	HSR20LR	MSA20LS	TRH20VE	BRC20LR	BGXH20BL	HRC20ML
	NGH25CA	HGH25CA	HSR25R	MSA25S	TRH25VN	BRC25R0	BGXH25BN	HRC25MN
	NGH25HA	HGH25HA	HSR25LR	MSA25LS	TEH25VE	BRC25LR	BGXH25BL	HRC25ML
	NGH30CA	HGH30CA	HSR30R	MSA30S	TRH30VN	BRC30R0	BGXH30BN	HRC30MN
	NGH30HA	HGH30HA	HSR30LR	MSA30LS	TRH30VE	BRC30LR	BGXH30BL	HRC30ML
	NGH35CA	HGH35CA	HSR35R	MSA35S	TRH35VN	BRC35R0	BGXH35BN	HRC35MN
	NGH45CA	HGH45CA	HSR45R	MSA45S	TRH45VN	BRC45R0	BGXH45BN	HRC45MN
NGW Series	NGW15CA/C	HGW15CA/B/C	/	MSA15E/A	TRH15FN	BRC15A0	BGXH15FN	HRC15FN
	NGW20CA/C	HGW20CA/B/C	HSR20CA/B	MSA20E/A	TRH20FN	BRC20A0	BGXH20FN	HRC20FN
	NGW20HA/C	HGW20HA/B/C	HSR20HA/HB	MSA20LE/LA	TRH20FE	BRC20LA	BGXH20FL	HRC20FL
	NGW25CA/C	HGW25CA/B/C	HSR25CA/B	MSA25E/A	TRH25FN	BRC25A0	BGXH25FN	HRC25FN
	NGW25HA/C	HGW25HA/B/C	HSR25HA/HB	MSA25LE/LA	TRH25FE	BRC25LA	BGXH25FL	HRC25FL
	NGW30CA/C	HGW30CA/B/C	HSR30CA/B	MSA30E/A	TRH30FN	BRC30A0	BGXH30FN	HRC30FN
	NGW30HA/C	HGW30HA/B/C	HSR30HA/HB	MSA30LE/LA	TRH30FE	BRC30LA	BGXH30FL	HRC30FL
	NGW35CA/C	HGW35CA/B/C	HSR35CA/B	MSA35E/A	TRH35FN	BRC35A0	BGXH35FN	HRC35FN
	NGW45CA/C	HGW45CA/B/C	HSR45CA/B	MSA45E/A	TRH45FN	BRC45A0	BGXH45FN	HRC45FN
NEH series	NEH15CA	EGH15CA	SSR15WY/WMYSR15W/WM	MSB15S	TRS15VN	BRC15UO	BGXS15BN	ARC15MN
	NEH20CA	EGH20CA	SSR20WY/WMY,SR20W/WM	MSB20S	TRS20VN	BRC20UO	BGXS20BN	ARC20MN
	NEH25CA	EGH25CA	SSR25WY/WMY,SR25W/WM	MSB25S	TRS25VN	BRC25UO	BGXS25BN	ARC25MN
	NEH30CA	EGH30CA	SSR30XWYWMY,SR30W/WM	MSB30S	TRS30VN	BRC30UO	BGXS30BN	ARC30MN
NEW series	NEW15CA/C	EGW15CA/B	SR15TB/TBM	MSB15E	TRS15FN	/	BGXS15FN	ARC15FN
	NEW20CA/C	EGW20CA/B	SR20TB/TBM	MSB20E	TRS20FN	/	BGXS20FN	ARC20FN
	NEW25CA/C	EGW25CA/B	SR25TB/TBM	MSB25E	TRS25FN	/	BGXS25FN	ARC25FN
	NEW30CA/C	EGW30CA/B	SR30TB/TBM	MSB30E	TRS30FN	/	BGXS30FN	ARC30FN

Note