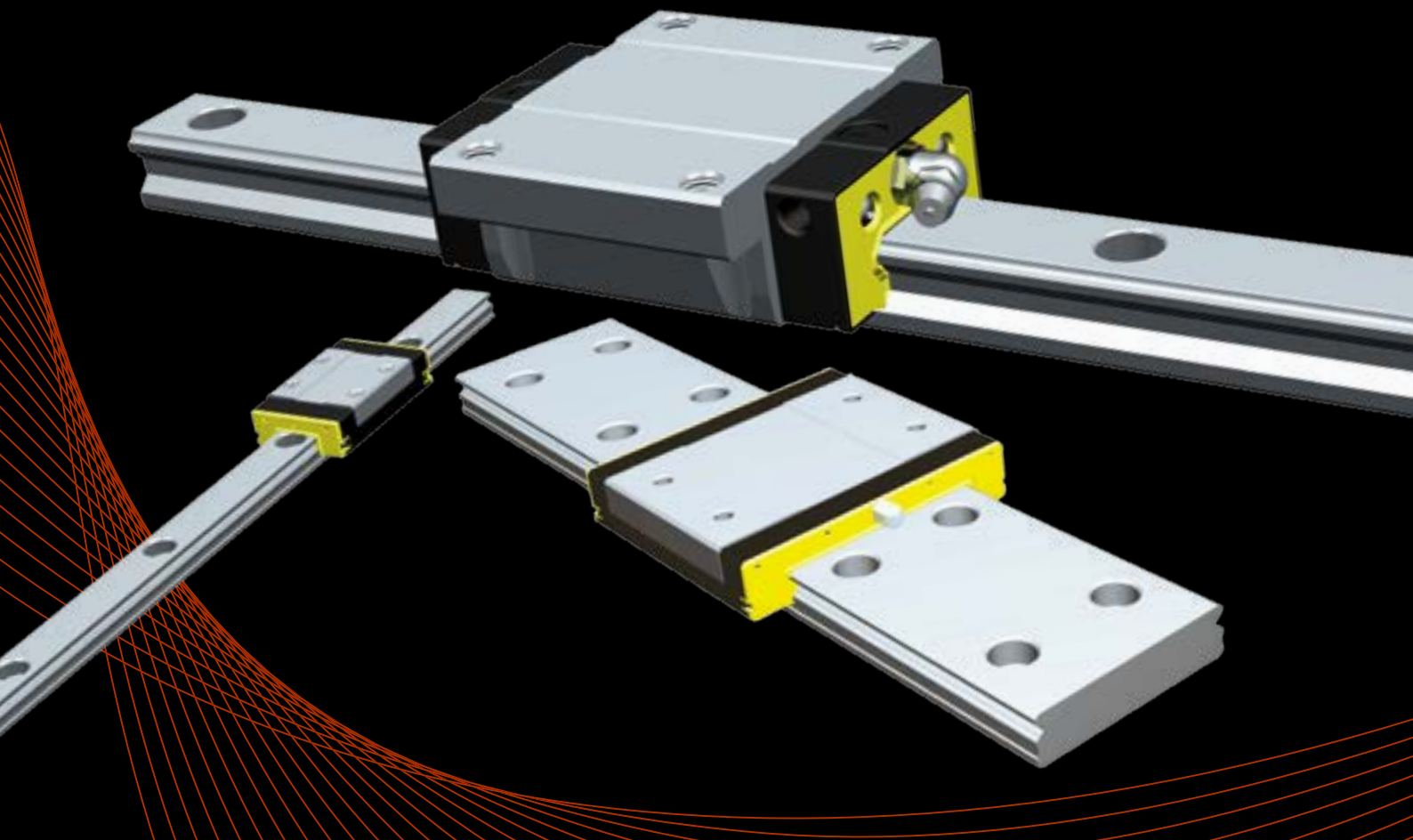# A●TAK

ATAK Technology Co, LTD.

Precision Linear Guideway

Standard Type GA Series

Miniature Type GN&GW Series

Patents

1. Preface

A linear guideway allows a type of linear motion that utilizes rolling elements such as balls or rollers. By using rolling elements between the rail and the carriages can achieve much lower friction that is compared with the traditional slide and provide much smoother running. Furthermore, depending to our outstanding process capability, we can offer the interchange of high accuracy to customers for easy maintenance and replacing.

2. Characteristics

2.1 Lower Frictional Resistance

With using the rolling element to replace of the traditional sliding one, the friction coefficient is only 1/50 of tradition friction.

2.2 High Positioning Accuracy

The rolling motion with a low friction coefficient, and the difference between dynamic and static friction is very small. Therefore, there would be no slip while the load is moving.

2.3 Low Power Consumption

Due to the characteristic of low frictional resistance, the required driving force is much lower than in other systems, thus the power consumption is small. Moreover, the temperature rising effect is small even under high speed operation.

2.4 Four-way Equal Load

The optimum design of geometric mechanics makes the linear guideway to bear the load in all four directions, radial, reversed radial, and two lateral directions.
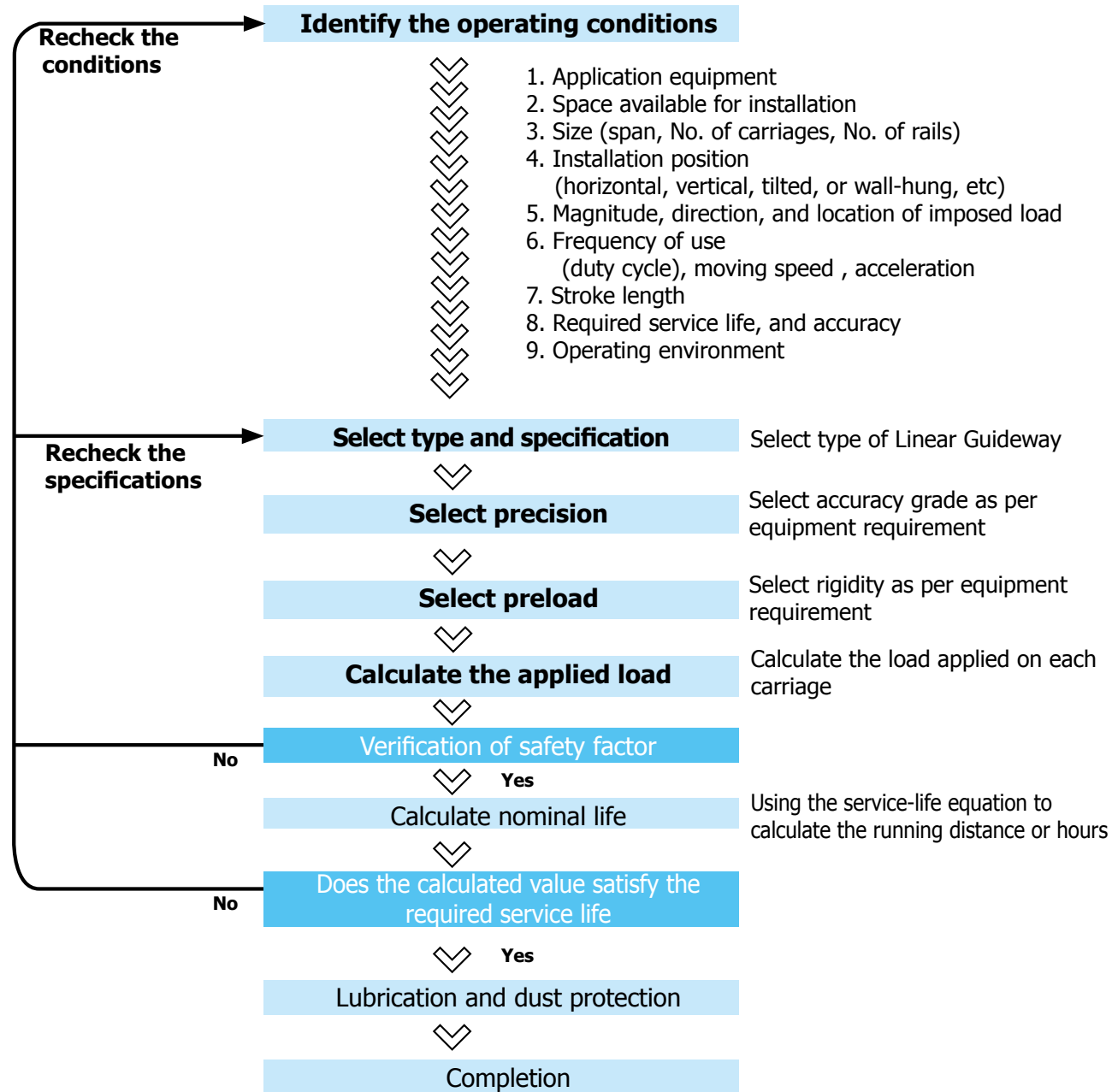
2.5 Interchangeability

Superior processing ability can offer the linear guideway high precision and make customers use and maintain easily, and also achieve original highly accurate linear motion.

2.6 Easy Lubrication

With a special lubricating design of the linear guideway, it is possible to equip various grease nipples and piping joints, and then to effectively fill the grease or lubrication oil into the carriages.

3. The Procedure of Select Linear Guideway

Identify the operating conditions

Recheck the conditions

1. Application equipment
2. Space available for installation
3. Size (span, No. of carriages, No. of rails)
4. Installation position
   (horizontal, vertical, tilted, or wall-hung, etc)
5. Magnitude, direction, and location of imposed load
6. Frequency of use
   (duty cycle), moving speed , acceleration
7. Stroke length
8. Required service life, and accuracy
9. Operating environment

Recheck the specifications

Select type and specification — Select type of Linear Guideway

Select precision — Select accuracy grade as per equipment requirement

Select preload — Select rigidity as per equipment requirement

Calculate the applied load — Calculate the load applied on each carriage

Verification of safety factor

No / Yes

Calculate nominal life — Using the service-life equation to calculate the running distance or hours

Does the calculated value satisfy the required service life

No / Yes

Lubrication and dust protection

Completion

4. Load Rating and Service Life of Linear Guideway

4.1 Basic Static Load Rating (C$_0$)

The basic static load rating (C$_0$) refers to a static load in a given direction with a specific magnitude applied at the contact area under the most stress where the sum of permanent deformation develops between the raceway and rolling elements is 0.0001 times of the diameter of rolling ball. Therefore, the basic static load rating sets a limit on the static permissible load.

4.2 Static Permissible Moment (M$_0$)

When a moment is applied to a linear guideway, the rolling balls on both ends will receive the most stress among the stress distribution over the rolling elements in the system. The static permissible moment (M$_0$) refers to a static moment in a given direction with specific magnitude applied at the contact area under the most stress where the sum of permanent deformation develops between the raceway and rolling elements is 0.0001 times the diameter of rolling elements. Therefore, the static permissible moment sets a limit on the static moment. In linear guideway system, the static permissible moment is dened as M$_P$, M$_Y$, M$_R$ three directions. See the gure below.

M_P M_Y M_R
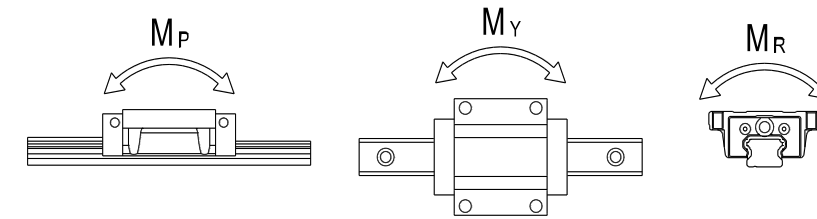
4.3 Static Safety Factor(fs)

Due to the impact and vibration while the guideway at rest or moving, or the inertia from start and stop, the linear guideway may encounter with an unexpected external force. Therefore, the safety factor should be taken into consideration for effects of such operating loads. The static safety factor (fs) is a ratio of the basic static load rating (C$_0$) to the calculated working load. The static safety factor for different kinds of application is shown as Table.

$$fs = \frac{C_0}{P} \quad Or \quad fs = \frac{M_0}{M}$$

fs : Static safety factor
C$_0$: Static load rating (N)
M$_0$: Static permissiable moment (N-m)
P   : Working load (N)
M : Bearing momnet (N-m)

Loading Conditon	fs min.
Normal loading conditon	1~3
With impact and vibration	3~7

4.4 Basic Dynamic Load Rating

The basic dynamic load rating (C) is dened as a load in a given direction and with a given magnitude that when a group of linear guideways operate under the same conditions. As the rolling element is ball, the nominal life of the linear guideway is 50 km.

4.5 Calculation of Nominal Life

The life of linear guideway is defined as the total distance traveled until fatigue flaking appears on the surface of the raceway or rolling elements. Even when the linear guideways are manufactured in the same way or operated under the same motion conditions. For this reason, nominal life is used as the criteria for prediction the service of a linear guideway. The nominal life is the total distance that 90% of a group of identical linear guideways, operated under the identical conditions, can travel without flaking. Based on the selected basic dynamic rated load(C) and actual load(P), the nominal life of linear guideway can be calculated.

$$L=\left(\frac{f_h \times f_t \times C}{f_w \times P}\right)^3 \times 50 \ (km)$$

L : Nominal life (km)
C : Basic dynamic load rating (N)
P : Working load (N)

f_h : Hardness factor
f_t : Tempature factor
f_w : Loading factor

4.6 Factors of normal life

As the above mentioned about the calculation of nominal life of the linear guideway, which the factors about the hardness, temperature and load will affect the nominal life of the linear guideway, the related coefficient is as the following explanation.

4.6.1 Hardness factor

In order to ensure the optimum load capacity of linear guideway system, the hardness of raceway must be HRC58~64. If the hardness is lower than this range, the permissible load and nominal life will be decreased. For this reason, the basic dynamic load rating and the basic static load rating should be multiplied by hardness factor for rating calculation. See figure below. The hardness requirement of ATAK linear guideway is above HRC58~64, thus the f_H=1.0.

4.6.2 Temperature factor

When operating temperature higher than 100 ℃ , the nominal life will be degraded. Therefore, the basic dynamic and static load rating should be multiplied by temperature factor for rating calculation. See figure below. The assemble parts of ATAK guideway are made of plastic and rubber, therefore, the operating temperature below 100℃ is strongly recommend. For special need, please contact us.

4.6.3 Load factor

Although the working load of linear guideway system can be obtained by calculation, the actual load is mostly higher than calculated value. This is because the vibration and impact, caused by mechanical reciprocal motion, are difficult to be estimated. This is especially true when the vibration from high speed operation and the impact from repeated start and stop. Therefore, for consideration of speed and vibration, the basic dynamic load rating should be divided by the empirical load factor. See the table below.

Load Condition	Feed Speed (m/min)	f_w
No impact and smooth	V ≤ 15	1.0~1.2
Slight impact and vibration	15 < V ≤ 60	1.2~1.5
Moderate impact and vibration	60 < V ≤ 120	1.5~2.0
Strong impact and vibration	120 < V	2.0~3.5

5. Preload and Rigidity

The rigidity of a linear guideway could be enhanced by increasing the preload. The preload is represented by negative clearance resulting from the increase of rolling element diameter. Therefore, the preload should be considered in calculation service life. Selecting proper preload from table below to adapt the specific application and condition.

Preload Grade	Preload	Operating Condition	Application
Light Preload Z0	0 ~ 0.02C	• The loading direction is fixed, vibration and impact are light,and two axes are applied in parallel. • High precision is not equired, and the low frictional resistance is needed.	Semiconductor Manufacturing, Medical equipment, Punching press, Welding machine, Industrial Robot, Auto packing machine, XY axis of ordinary industrial machine, Pallet changer, material handling equipment, and other small sliding systems
Medium Preload Z1	0.03C ~ 0.05C	• Applied in one-axis configuration • The need of light preload and high precision	Z axis of industrial machines, precision XY table, Industrial Robot, NC Lathe, measuring equipment, grinding achine, auto painting machine, recision XY table
Heavy Preload Z2	0.06C ~ 0.08C	• Machine is subjected to vibration and impact, and high rigidity required. • Application of heavy load or heavy cutting	Machining center, NC Lathe, Milling machine, Boring machine, Z axis of industrial machines

6. Accuracy

The accuracy of linear guideway includes the dimensional tolerance of height, width, and the running accuracy of the carriage on the rail. The standard of the dimension difference is built for two or more carriages on a rail or a number of rails are used on the same plane. The accuracy of linear guideway is divided into 5 classes, normal grade (C), high precision (H), precision (P), super precision (SP), and ultra precision (UP).
When two or more linear guideways are used on the same plane, the tolerance of N and difference of ΔW is applicable to master rail only. The accuracy is measured at the center or central area of carriage. The accuracy grade for different applications shown as table below.

	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Presision (UP)
GA Series	●	●	●	●	●
GN & GW Series	●	●	●		

7. Lubrication

Supplying the sufficient lubrication to the linear guideway will greatly reduce the rolling friction and increase the service life. Otherwise, the lubrication also prevent from corrosion. Generally, the linear guideway usually use lubrication grease and lubrication oil. It will be chosen by customers' options.

7.1 Grease
After the linear guideway installed, we recommend the guideway be re-lubricated every 100 km. It is possible to carry out the lubrication through the grease nipple. Generally, grease is applied for speed that do not exceed 60 m/min faster speed will require high-viscosity oil with a lubricant. The standard grease is lithium-based grease No.2.

7.2 Oil
The recommend viscosity of oil is about 30~150 cst, and the recommend oil feed rate is approximate 0.3 cm3/hr.

7.3 Grease nipples and piping joints
ATAK offers the following various grease nipples and piping joints to customers' options.

Grease Type
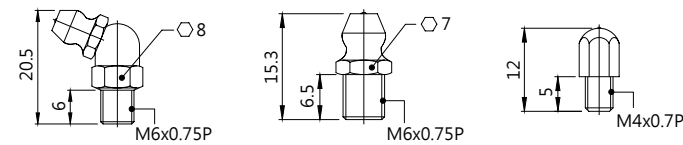
Piping Type
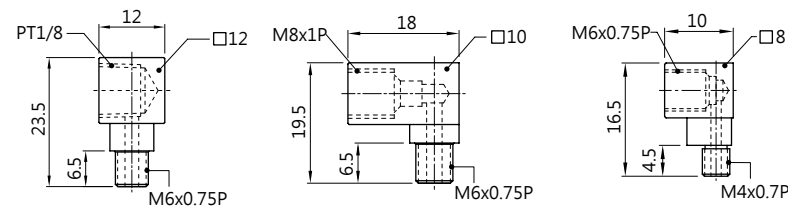
8. Dust proof

ATAK offers various contamination protection against different environments for linear guideway.

Code	Dust proof	Application
No Symbol	Metallic Scraper (Both side)	Low resistance and cleaner environments
UU	Bidirectional end seal(both ends)	Low resistance
SS	Bidirectional end seal + Bottom seal	Normal environments
ZZ	SS + Inner seal+ Metallic scraper	Prevent large steel chips
DD	Double bidirectional end seal + Bottom seal + Inner seal	Highly dust-proof requirement
KK	DD + Metallic scraper	Prevent large steel chips and highly dust-proof requirement

SS Layout

ZZ Layout
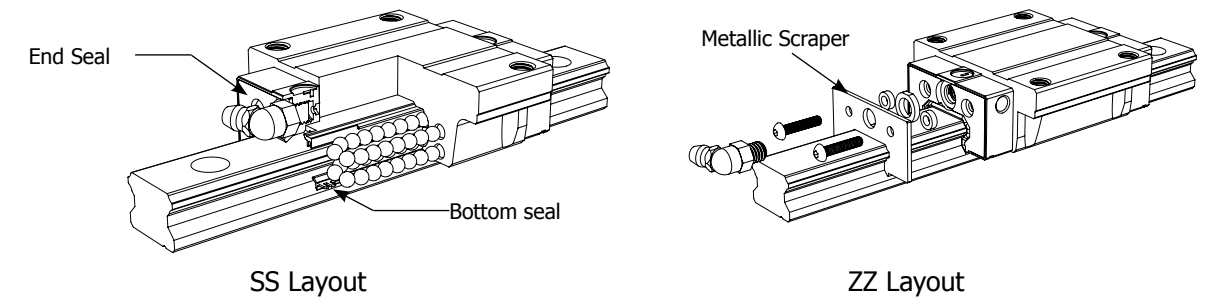
9. Standard Linear Guideway
GA Series

GA Series linear guideway are designed with load capacity and rigidity higher than other similar product with circular-arc groove and structure optimization. It features equal load rating, reverse radial and lateral direction, self-aligning to absorb the installation-error, and use and install easily.

9.1 Characteristics of GA Series

9.1.1 Self Alignment Capability
With the design of DF circular-arc groove, GA Series can absorb most installation errors due to surface irregularities and provide the smooth linear motion through the shift of contact points and the elastic deformation of rolling elements.

9.1.2 Four-way Equal Load
Because of the four-row design, the GA Series linear guideway has equal load rating in the radial and lateral direction.

9.1.3 Optimal Design
It reduces the overall contact height between the carriage and rail as well as uses a larger diameter of the ball. Compared to our Spec. 20 which can provide about more 30% of load rating and rigidity than other lower specification of other factories. Moreover, compared to the standard specifications of other factories, the anti-twisted capacity is higher 12%. Also, in order to provide high locking force, we offer the longest screw depth of carriage installation.

9.1.4 Interchangeability
Because of precision dimensional control, the dimensional tolerance of GA Series can be kept in the reasonable range, which means that the blocks and any rails in specific series can be used together while maintaining dimensional tolerance.

9.1.5 Common rail
Rail is designed for different high carriages, moreover, we use big balls for heavy loading. So this is easy for customer's stock and selection.

9.1.6 High smoothness
With a special grinding process, the balls will roll smoothly even when the rolling surface is not discontinuities. Whether the preload with, any vibration can be effectively reduced by about 20% during operation, lowering the ram through the ball, and to improve the life.

9.1.7 Short Stroke Lubrication
Patented oil circuit design, which provides choosing to lubricate the ball directly when using the short stroke and to prevent lack of lubrication caused service life to reduce.

9.2 Constructions

Carriage
End Seal
Grease Nipple
Rail
Ball
Inner Seal
Bottom Seal
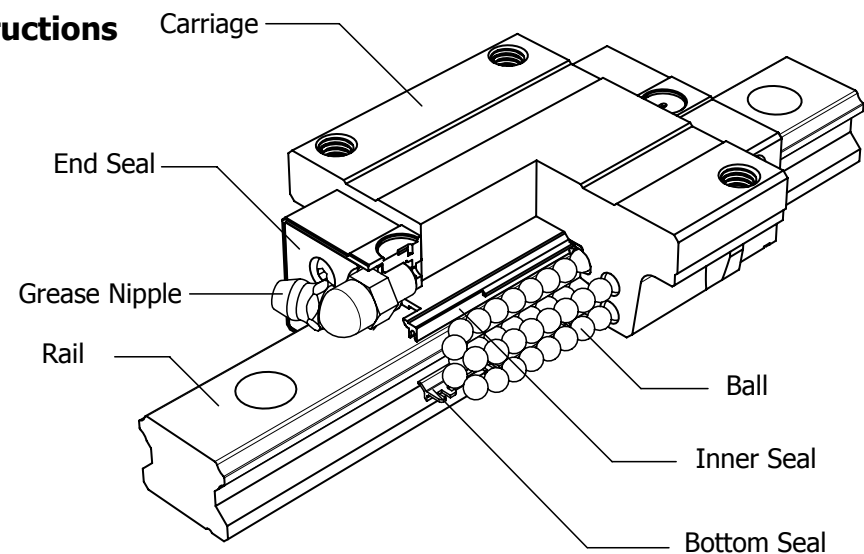
9.3 Description of Specification

GA Series guideway can be classified into non-interchangeable and interchangeable types. The size is identical. The only difference between the two types is that the interchangeable type of blocks and rails can be freely exchanged, and their accuracy reaches up to P class. The model number of GA Series contains the size, type, accuracy, class, preload class, and so on.

9.3.1 Non-Interchangeable Type of Guideway

GA H 15 W 2 SS +R3000 -20 / 40 Z0 P II A

- GA Series
- Assembly Type
  - H: Hight
  - V: Medium
  - L: Low
- Size
  - 15,20,25
- Carriage Type
  - (L,S)W: Flange Type (long, Short)
  - (L,S)H: Square Type (long, Short)
- No. of Carriages per Rail
- Special Code
- No. of Rail per Axis Set
- Accuracy
  - C, H, P, SP, UP
- Preload
  - Z0(light), Z1(Medium), Z2(Heavy)
- Rail Hole Pitch from End Side (mm)
- Rail Hole Pitch from Start Side (mm)
- Assembly Hole and Rail Length (mm)
  - R: Mounting Hole from Top
  - T: Mounting Hole from Bottom
- Dust Proof
  - UU, SS, DD, ZZ, KK

9.3.2 Interchangeable Type of Carriage

GA H 15 W SS Z0 H A

- GA Series
- Assembly Type
  - H: Hight
  - V: Medium
  - L: Low
- Size
  - 15,20,25
- Special Code
- Accuracy
  - C, H, P
- Preload
  - Z0(light), Z1(Medium), Z2(Heavy)
- Dust Proof
  - UU, SS, DD, ZZ, KK
- Carriage Type
  - (L,S)W: Flange Type (long, Short)
  - (L,S)H: Square Type (long, Short)

9.3.3 Interchangeable Type of Rail

GA R 15 +R 3000 -20 / 40 H A

- GA Series
- Rail
- Size
  - 15,20,25
- Assembly Hole
  - R: Mounting Hole from Top
  - T: Mounting Hole from Bottom
- Special Code
- Accuracy
  - C, H, P
- Rail Hole Pitch from End Side (mm)
- Rail Hole Pitch from Start Side (mm)
- Rail length

9.4 Accuracy Grade

The accuracy of GA series is divided into five classes, normal grade (N), high precision (H), precision (P), super precision (SP) and ultra precision (UP), as shown in Table.

Non-Interchangeable Type
Unit: mm

| Model	Item	Accuracy Grade				
		Normal C	High H	Precision P	Super Precision SP	Ultra Precision UP
15 20	Tolerance for height H	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Height difference (ΔH)	0.02	0.01	0.006	0.004	0.003
	Tolerance for width N	±0.1	±0.03	0 -0.03	0 -0.015	0 -0.008
	Width difference (ΔN)	0.02	0.01	0.006	0.004	0.003
	Running parallelism of surface C with surface A	ΔC (Table 9.1)				
	Running parallelism of surface D with surface B	ΔD (Table 9.1)				
25	Tolerance for height H	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Height difference (ΔH)	0.02	0.015	0.007	0.005	0.003
	Tolerance for width N	±0.1	±0.04	0 -0.04	0 -0.02	0 -0.01
	Width difference (ΔN)	0.03	0.015	0.007	0.005	0.003
	Running parallelism of surface C with surface A	ΔC (Table 9.1)				
	Running parallelism of surface D with surface B	ΔD (Table 9.1)				

Interchangeable Type
Unit: mm

Model	Item	Accuracy Grade		
		Normal C	High H	Precision P
15 20	Tolerance for height H	±0.1	±0.03	0 -0.03
	Height difference (ΔH)	0.02	0.01	0.006
	Tolerance for width N	±0.1	±0.03	0 -0.03
	Width difference (ΔN)	0.02	0.01	0.006
	Running parallelism of surface C with surface A	ΔC (Table 9.1)		
	Running parallelism of surface D with surface B	ΔD (Table 9.1)		
25	Tolerance for height H	±0.1	±0.04	0 -0.04
	Height difference (ΔH)	0.02	0.015	0.007
	Tolerance for width N	±0.1	±0.04	0 -0.04
	Width difference (ΔN)	0.03	0.015	0.007
	Running parallelism of surface C with surface A	ΔC (Table 9.1)		
	Running parallelism of surface D with surface B	ΔD (Table 9.1)		

Running Parallelism
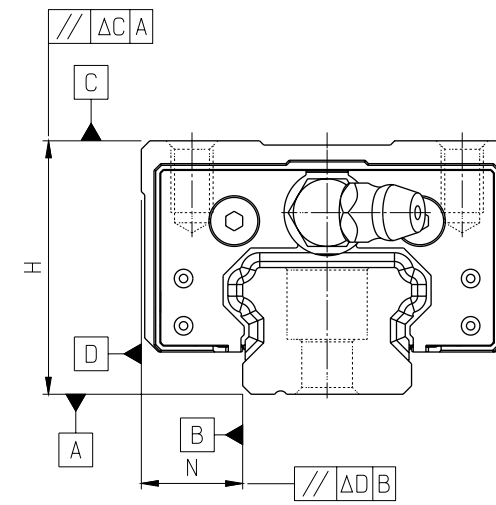
Rail lengh(mm)		Parallelism (µm)				
Above	Below	C	H	P	SP	UP
0	100	12	7	3	2	2
100	200	14	9	4	2	2
200	300	15	10	5	3	2
300	500	17	12	6	3	2
500	700	20	13	7	4	2
700	900	22	15	8	5	3
900	1100	24	16	9	6	3
1100	1500	26	18	11	7	4
1500	1900	28	20	13	8	4
1900	2500	31	22	15	10	5
2500	3000	33	25	18	11	6

Table 9.1

9.5 The Recommended Tightening Torque for Rails

The improper tightening torque could affect the mounting accuracy, so tightening the bolts by torque wrench to specified torque is highly recommended.

Model	Bolt Spec.	Torque N-m (kgf-cm)		
		Iron	Cast Iron	Aluminum
GA 15	M4x0.7Px16L	4(41)	2.7(28)	2(20)
GA 20	M5x0.8Px16L	8.8(89)	5.9(60)	4.4(45)
GA 25	M6x1Px20L	13.7(140)	9.2(94)	6.8(69)

9.6.1 Dimensions of Series GAH-H

Unit : mm

Model	Assembly dimension			Carriage dimension												
	Hight H	Width W	Length L	N	H₁	B	C	M×l	L₁	T	H₂	H₃	G	K₁	K₂	Grease Nipple
GAH15 H	28	34	58.5	9.5	4.5	26	26	M4×7	39	6	9	8	7	10.3	3.5	M4
GAH20 H	30	44	75	12	5	32	36	M5×8	52	6	8.5	7	12	12.8	4.5	M6
GAH20 LH	30	44	89.4	12	5	32	50	M5×8	66.4	6	8.5	7	12	12.7	4.5	M6
GAH25 H	40	48	84	12.5	6.5	35	35	M6×9	58.5	8	14	13.5	12	16.8	5	M6
GAH25 LH	40	48	103.3	12.5	6.5	35	50	M6×9	77.8	8	14	13.5	12	18.8	5	M6

Model	Rail dimension					Basic load rating		Static moment rating					Weight	
	Width W_R	Hight H_R	Pitch P	E std. E	Hole Dimension D×h×d	Dynamic C KN	Static C₀ KN	M_P (KN-m) 1*	M_P (KN-m) 2*	M_Y (KN-m) 1*	M_Y (KN-m) 2*	M_R (KN-m)	Carriage Kg	Rail Kg/m
GAH15 H	15	13	60	20	7.5×5.3×4.5	11.6	18.7	0.13	0.77	0.13	0.77	0.15	0.18	1.28
GAH20 H	20	15	60	20	9.5×8.5×6	19.6	31.7	0.29	1.67	0.29	1.67	0.33	0.33	1.90
GAH20 LH	20	15	60	20	9.5×8.5×6	22.7	38.9	0.44	2.35	0.44	2.35	0.40	0.40	1.90
GAH25 H	23	18	60	20	11×9×7	27.3	42.1	0.43	2.47	0.43	2.47	0.50	0.54	2.64
GAH25 LH	23	18	60	20	11×9×7	33.5	56.0	0.76	3.97	0.76	3.97	0.67	0.71	2.64

∗Static moment rating (1)one carriage using (2) two carriage closed using

9.6.2 Dimensions of Series GAV-H

Unit : mm

Model	Assembly dimension			Carriage dimension												
	Hight H	Width W	Length L	N	H₁	B	C	M×l	L₁	T	H₂	H₃	G	K₁	K₂	Grease Nipple
GAV25 H	36	48	84	12.5	6.5	35	35	M6×9	58.5	8	10	9.5	12	16.8	5	M6
GAV25 LH	36	48	103.3	12.5	6.5	35	50	M6×9	77.8	8	10	9.5	12	18.8	5	M6

Model	Rail dimension					Basic load rating		Static moment rating					Weight	
	Width W_R	Hight H_R	Pitch P	E std. E	Hole Dimension D×h×d	Dynamic C KN	Static C₀ KN	M_P (KN-m) 1*	M_P (KN-m) 2*	M_Y (KN-m) 1*	M_Y (KN-m) 2*	M_R (KN-m)	Carriage Kg	Rail Kg/m
GAV25 H	23	18	60	20	11×9×7	27.3	42.1	0.43	2.47	0.43	2.47	0.50	0.46	2.64
GAV25 LH	23	18	60	20	11×9×7	33.5	56.0	0.76	3.97	0.76	3.97	0.67	0.60	2.64

∗Static moment rating (1)one carriage using (2) two carriage closed using
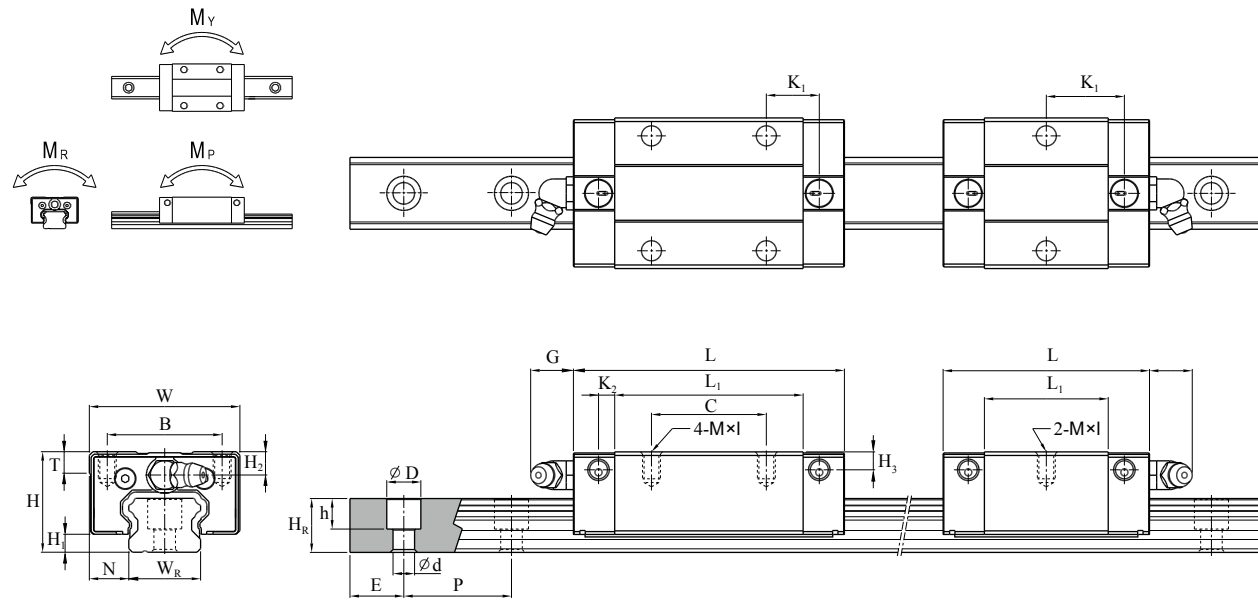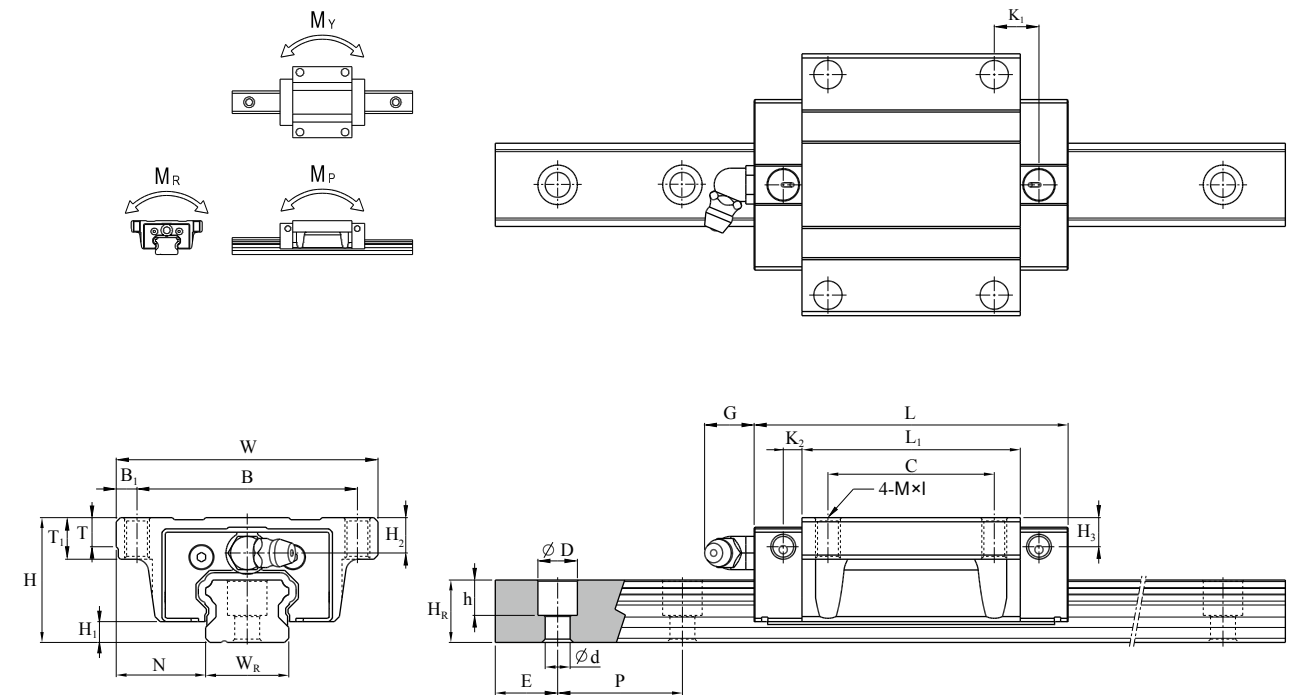
9.6.3 Dimensions of Series GAL-H

Unit : mm

Model	Assembly dimension					Carriage dimension											
	Hight H	Width W	Length L	N	H1	B	C	M×l	L1	T	H2	H3	G	K1	K2	Grease Nipple
GAL15 SH	24	34	41	9.5	4.5	26	-	M4×7	21.5	6	5	4	7	14.5	3.5	M4
GAL15 H	24	34	58.5	9.5	4.5	26	26	M4×7	39	6	5	4	7	10.3	3.5	M4
GAL20 SH	28	42	47	11	5	32	-	M5×8	24	6	6.5	5	12	16.8	4.5	M6
GAL20 H	28	42	75	11	5	32	32	M5×8	52	6	6.5	5	12	14.8	4.5	M6
GAL25 SH	33	48	60.1	12.5	6.5	35	-	M6×9	34.6	8	7	6.5	12	22.3	5	M6
GAL25 H	33	48	84	12.5	6.5	35	35	M6×9	58.5	8	7	6.5	12	16.8	5	M6

Model	Rail dimension					Basic load rating		Static moment rating					Weight	
	Width WR	Hight HR	Pitch P	E std. E	Hole Dimension D×h×d	Dynamic C KN	Static C0 KN	MP (KN-m) 1*	MP (KN-m) 2*	MY (KN-m) 1*	MY (KN-m) 2*	MR (KN-m)	Carriage Kg	Rail Kg/m
GAL15 SH	15	13	60	20	7.5×5.3×4.5	7.2	9.3	0.03	0.27	0.03	0.27	0.07	0.09	1.28
GAL15 H	15	13	60	20	7.5×5.3×4.5	11.6	18.7	0.13	0.77	0.13	0.77	0.15	0.15	1.28
GAL20 SH	20	15	60	20	9.5×8.5×6	11.5	14.7	0.07	0.52	0.07	0.52	0.15	0.14	1.90
GAL20 H	20	15	60	20	9.5×8.5×6	19.6	31.7	0.29	1.67	0.29	1.67	0.33	0.28	1.90
GAL25 SH	23	18	60	20	11×9×7	18.8	24.6	0.16	1.08	0.16	1.08	0.29	0.25	2.64
GAL25 H	23	18	60	20	11×9×7	27.3	42.1	0.43	2.47	0.43	2.47	0.50	0.40	2.64

∗Static moment rating (1)one carriage using (2) two carriage closed using

9.6.4 Dimensions of Series GAH-W

Unit : mm

Model	Assembly dimension					Carriage dimension												
	Hight H	Width W	Length L	N	H1	B	C	M×l	L1	T	T1	H2	H3	G	K1	K2	Grease Nipple
GAH15 W	24	47	58.5	16	4.5	38	30	M5×8	39	5.5	8	5	4	7	8.3	3.5	M4
GAH20 W	30	63	75	21.5	5	53	40	M6×10	52	7	10	8.5	7	12	10.8	4.5	M6
GAH20 LW	30	63	89.4	21.5	5	53	40	M6×10	66.4	7	10	8.5	7	12	17.7	4.5	M6
GAH25 W	36	70	84	23.5	6.5	57	45	M8×14	58.5	9	13	10	9.5	12	11.8	5	M6
GAH25 LW	36	70	103.3	23.5	6.5	57	45	M8×13	77.8	9	13	10	9.5	12	21.3	5	M6

Model	Rail dimension					Basic load rating		Static moment rating					Weight	
	Width WR	Hight HR	Pitch P	E std. E	Hole Dimension D×h×d	Dynamic C KN	Static C0 KN	MP (KN-m) 1*	MP (KN-m) 2*	MY (KN-m) 1*	MY (KN-m) 2*	MR (KN-m)	Carriage Kg	Rail Kg/m
GAH15 W	15	13	60	20	7.5×5.3×4.5	11.6	18.7	0.13	0.77	0.13	0.77	0.15	0.18	1.28
GAH20 W	20	15	60	20	9.5×8.5×6	19.6	31.7	0.29	1.67	0.29	1.67	0.33	0.40	1.90
GAH20 LW	20	15	60	20	9.5×8.5×6	22.7	38.9	0.44	2.35	0.44	2.35	0.40	0.50	1.90
GAH25 W	23	18	60	20	11×9×7	27.3	42.1	0.43	2.47	0.43	2.47	0.50	0.59	2.64
GAH25 LW	23	18	60	20	11×9×7	33.5	56.0	0.76	3.97	0.76	3.97	0.67	0.77	2.64

∗Static moment rating (1)one carriage using (2) two carriage closed using

10. Miniature Linear Guideway GN & GW Series

GN & GW series with Gothic-arch groove and designed to contact angle of 45° which enables it to bear an equal load in radial, reversed radial and lateral directions. Furthermore, ultra compact and low friction resistance design is suit to compact equipment. The lubrication route makes the lubricant evenly distribute in each circulation loop. Therefore, the optimum lubrication can be achieved in any installation direction, and this promotes the performance in running accuracy, service life, and reliability.

10.1 Characteristics

10.1.1 Two ways with Gothiic-arch contact
The two trains of balls are allocated to a Gothic-arch groove contact angle at 45°, thus each train of balls can take up an equal rated load in all four directions.

10.1.2 Optimum process design
Rails and carriages are using roll forming and then become a lamellar continuous organization with better fatigue strength, and also with a special heat treatment, can form a 100% martensite organization on surface and with hardness up to HRC58~62, and which is an ability to provide good wear resistance as well as increase service life.

10.1.3 Ball Retainer
With a patent ball retainer design, compared to the design of point to point by of other factories, it can prevent ball from dropping when the carriage is off the rail by using point to plane.

10.1.4 Easy to Use
The ultra-compact design is suit to the compact application with limited in space, and with a groove on the side of rail for riveting.

10.1.5 High Smoothness
The simplified design of circulating system with strengthened synthetic resin accessories makes the movement smooth and quiet. The lubrication route makes the lubricant evenly distribute in each circulation loop. Therefore, the optimum lubrication can be achieved in any installation direction, and this promotes the performance in running accuracy, service life, and reliability

10.1.6 Interchangeability
For interchangeable type of linear guideway, the dimensional tolerances are strictly maintained within a reasonable range, and this has made the random matching of the same size of rails and carriages possible. Therefore, the similar preload and accuracy can be obtained even under the random matching condition. As a result of this advantage, the linear guideway can be stocked as standard parts, the installation and maintenance become more convenient. Moreover, this is also beneficial for shortening the delivery time.
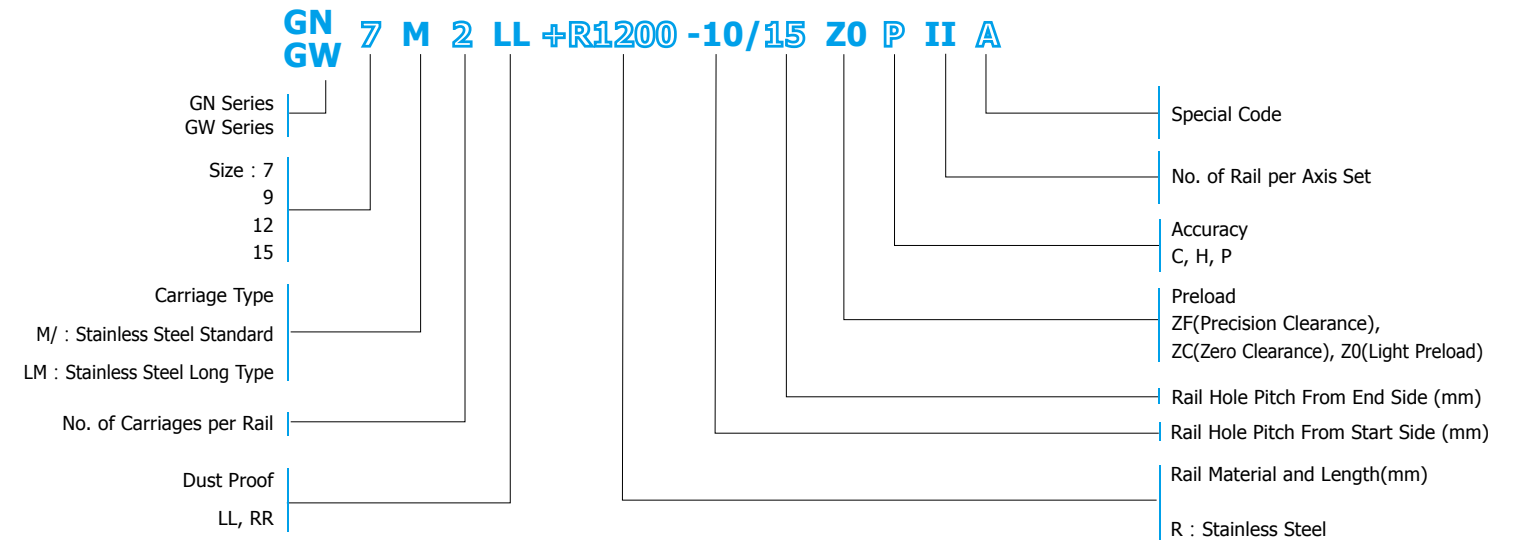
10.2 Constructions

Carriage
Ball Retainer
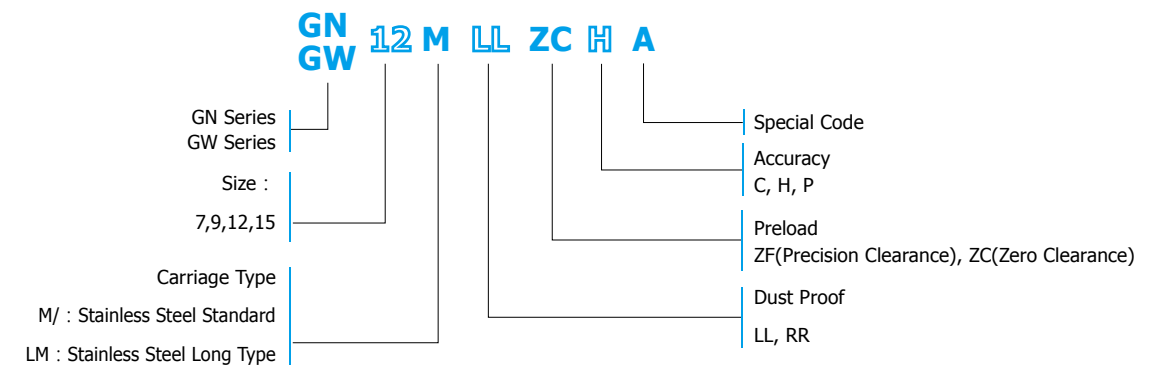End Seal
Rail
Ball
Bottom Seal

GN Standard

GW Wide Type
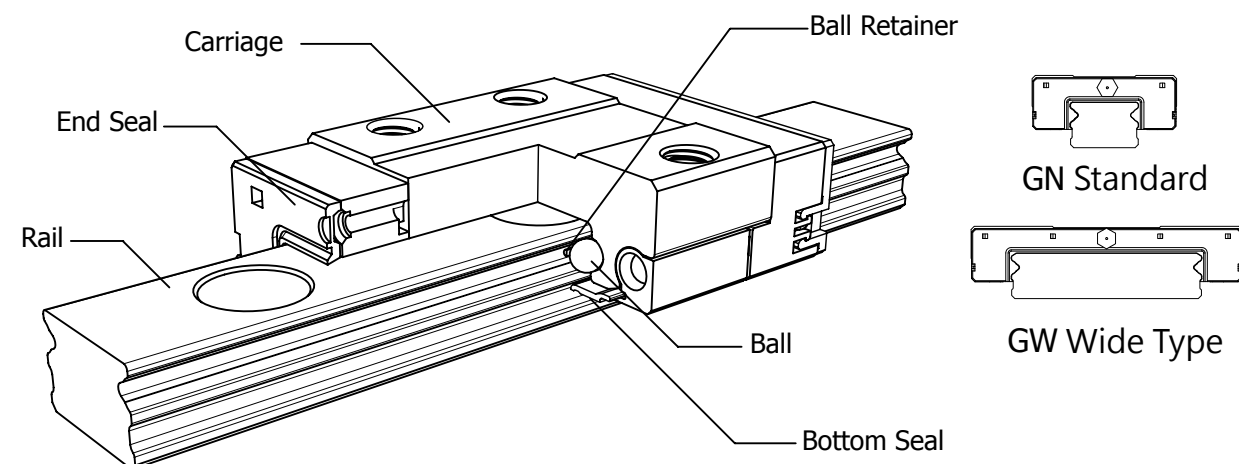
10.3 Description of Specification

GN & GW Series guideway can be classified into non-interchangeable and interchangeable types. Forinterchangeable type of linear guideway, the dimensional tolerances are strictly maintained within a reasonable range, and this has made the random matching of the same size of rails and carriages possible. The model number of GA Series contains the size, type, accuracy, class, preload class, and so on.

10.3.1 Non-Interchangeable Type of Guideway

GN / GW 7 M 2 LL +R1200 -10/15 Z0 P II A

- GN Series / GW Series
- Size : 7, 9, 12, 15
- Carriage Type
  - M/ : Stainless Steel Standard
  - LM : Stainless Steel Long Type
- No. of Carriages per Rail
- Dust Proof LL, RR
- Rail Material and Length(mm)
  - R : Stainless Steel
- Rail Hole Pitch From Start Side (mm)
- Rail Hole Pitch From End Side (mm)
- Preload
  - ZF(Precision Clearance), ZC(Zero Clearance), Z0(Light Preload)
- Accuracy C, H, P
- No. of Rail per Axis Set
- Special Code

10.3.2 Interchangeable Type of Carriage

GN / GW 12 M LL ZC H A

- GN Series / GW Series
- Size : 7,9,12,15
- Carriage Type
  - M/ : Stainless Steel Standard
  - LM : Stainless Steel Long Type
- Dust Proof LL, RR
- Preload ZF(Precision Clearance), ZC(Zero Clearance)
- Accuracy C, H, P
- Special Code

10.3.3 Interchangeable Type of Rail

GN / GW R 12 +R 1200 -10/15 H A

- GN Series / GW Series
- Interchangeable Rail
- Size : 7,9,12,15
- Rail Material
  - R : Stainless Steel
- Rail Length (mm)
- Rail Hole Pitch From Start Side (mm)
- Rail Hole Pitch From End Side (mm)
- Accuracy C, H, P
- Special Code

10.4 Accuracy Grade

The accuracy of GN & GW Series can be classified into three classes: normal(C), high(H), precision(P). Choices for different classes are available according to various requirements.

Non-Interchangeable Type

Unit : mm

| Model	Item	Accuracy Grade		
		Normal C	High H	Precision P
7 9 12 15	Tolerance for height H	±0.04	±0.02	±0.01
	Height difference (ΔH)	0.03	0.015	0.007
	Tolerance for width N	±0.04	±0.025	±0.015
	Width difference (ΔN)	0.03	0.02	0.01
	Running parallelism of surface C with surface A	ΔC (Table 10.1)		
	Running parallelism of surface D with surface B	ΔD (Table 10.1)		

Interchangeable Type

Unit : mm

Model	Item	Accuracy Grade		
		Normal C	High H	Precision P
7 9 12 15	Tolerance for height H	±0.04	±0.02	±0.01
	Height difference per rail (ΔH)	0.03	0.015	0.007
	Height difference per set (ΔH)	0.07	0.04	0.02
	Tolerance for width N	±0.04	±0.025	±0.015
	Width difference (ΔN)	0.03	0.02	0.01
	Running parallelism of surface C with surface A	ΔC (Table 10.1)		
	Running parallelism of surface D with surface B	ΔD (Table 10.1)		

Running Parallelism
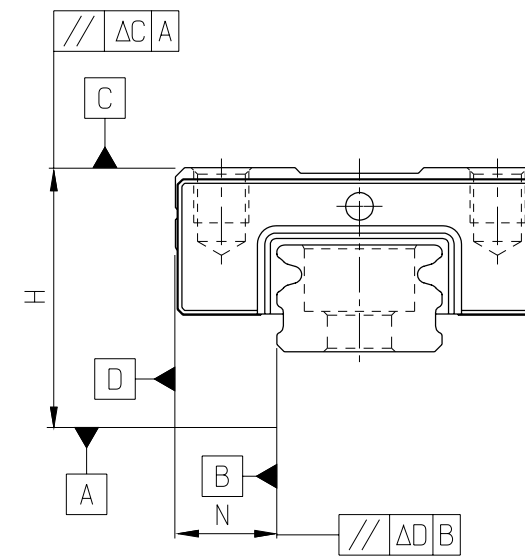
Rail Length (mm)		Running Parallelism (μm)		
Above	Below	C	H	P
0	50	12	6	2
50	80	13	7	3
80	125	14	8	3
125	200	15	9	4
200	250	16	10	5
250	315	17	11	5
315	400	18	11	6
400	500	19	12	6
500	630	20	13	7
630	800	22	14	8
800	1000	23	16	9
1000	1200	25	18	11

Table 10.1

10.5 The Recommended Tightening Torque for Rails

The improper tightening torque could affect the mounting accuracy, so tightening the bolts by torque wrench to specified torque is highly recommended.

Model	Bolt Spec.	Torque N-m (kgf-cm)		
		Iron	Cast Iron	Aluminum
GN 7	M2x0.4Px6L	57(5.9)	39.2(4)	29.4(3)
GN 9	M3x0.5Px8L	186(19)	127(13)	98(10)
GN 12	M3x0.5Px8L	186(19)	127(13)	98(10)
GN 15	M3x0.5Px10L	186(19)	127(13)	98(10)
GW 7	M3x0.5Px8L	186(19)	127(13)	98(10)
GW 9	M3x0.5Px8L	186(19)	127(13)	98(10)
GW 12	M4x0.7Px10L	392(40)	265(27)	196(20)
GW 15	M4x0.7Px10L	392(40)	265(27)	196(20)

10.6 Dimensions of GN Series
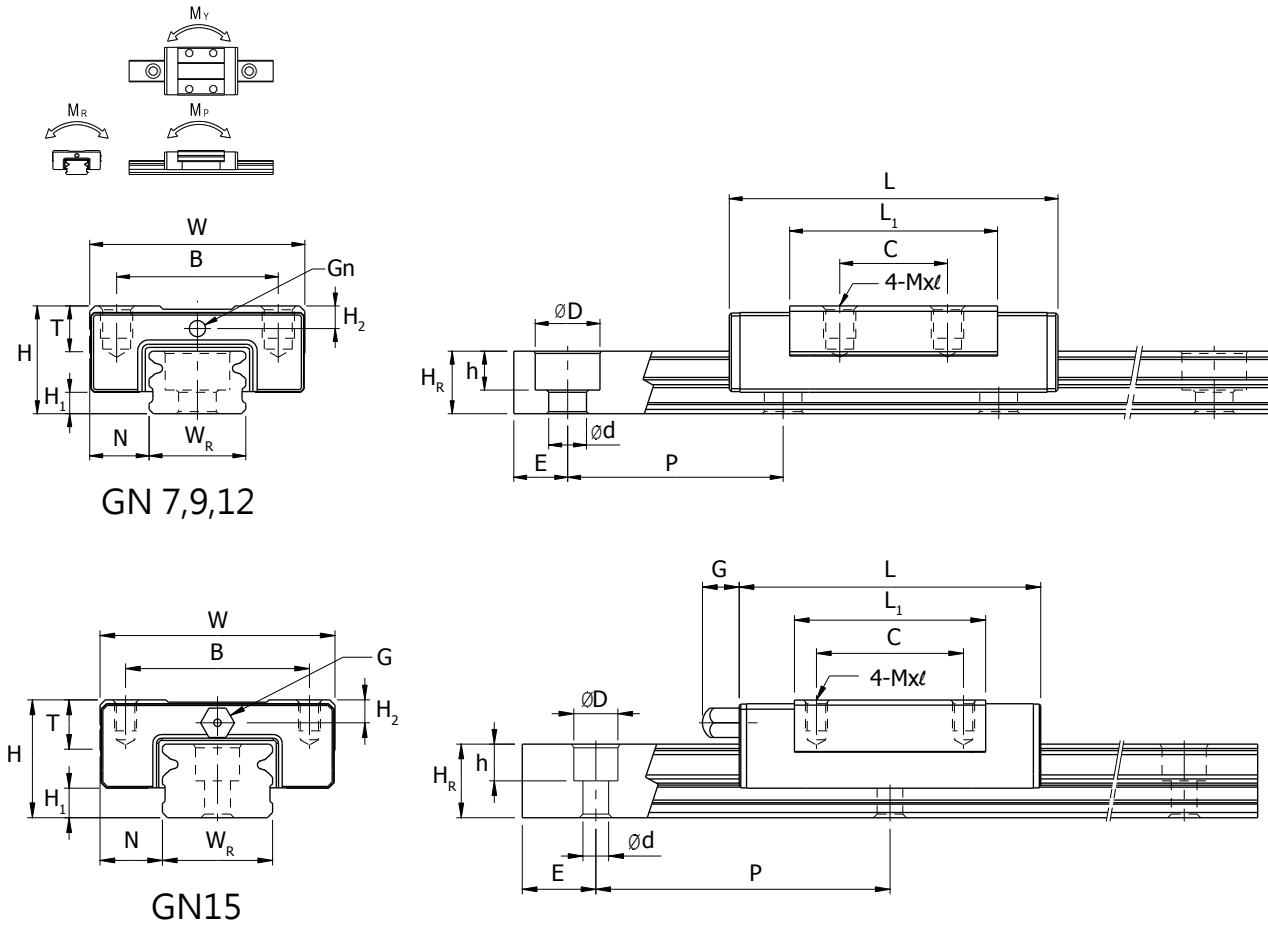
GN 7,9,12

GN15

Unit : mm

Model	Assembly Dimension					Carriage Dimension							
	Hight	Width	Length										
	H	W	L	N	H_1	B	C	M×l	L_1	T	H_2	Gn	G
GN7 M	8	17	23.8	5	1.5	12	8	M2x2.5	13.4	3.5	1.5	Φ1.5	-
GN7 LM	8	17	32	5	1.5	12	13	M2x2.5	21.6	3.5	1.5	Φ1.5	-
GN9 M	10	20	30.5	5.5	2	15	10	M3x3	19.3	4.5	2.1	Φ1.5	-
GN9 LM	10	20	41.5	5.5	2	15	16	M3x3	30.3	4.5	2.1	Φ1.5	-
GN12 M	13	27	34	7.5	3	20	15	M3x3.6	20.8	6	2.7	Φ1.5	-
GN12 LM	13	27	45.9	7.5	3	20	20	M3x3.6	32.7	6	2.7	Φ1.5	-
GN15 M	16	32	41	8.5	4	25	20	M3x4.2	26	7	3.1	-	G3
GN15 LM	16	32	58.4	8.5	4	25	25	M3x4.2	43.4	7	3.1	-	G3

Model	Rail dimension					Basic load rating		Static moment rating					Weight
	Width	Hight	Pitch	E std.	Hole Dimension	Dynamic	Static	M_P (N-m)		M_Y (N-m)		M_R (N-m)	Rail Kg/m
	W_R	H_R	P	E	D×h×d	C KN	C_0 KN	1*	2*	1*	2*		
GN7 M	7	4.8	15	5	4.2x2.4x2.4	0.96	1.27	2.9	21.2	2.9	21.2	4.7	7.5	0.24
GN7 LM	7	4.8	15	5	4.2x2.4x2.4	1.42	2.22	8.3	49.4	8.3	49.4	8.2	11.5	0.24
GN9 M	9	5.8	20	7.5	6x3.6x3.5	1.93	2.54	8.5	53.9	8.5	53.9	12.2	14.9	0.38
GN9 LM	9	5.8	20	7.5	6x3.6x3.5	2.75	4.23	22.6	122.0	22.6	122.0	20.3	22.6	0.38
GN12 M	12	7.8	25	10	6x4.8x3.5	2.58	3.20	11.4	75.8	11.4	75.8	20.2	28.3	0.69
GN12 LM	12	7.8	25	10	6x4.8x3.5	3.62	5.20	28.9	162.1	28.9	162.1	32.8	42.8	0.69
GN15 M	15	10	40	15	6x5x3.5	4.75	5.69	27.1	167.5	27.1	167.5	44.4	49.4	1.09
GN15 LM	15	10	40	15	6x5x3.5	6.69	9.25	68.5	365.7	68.5	365.7	72.2	78.9	1.09

*Static moment rating (1)one carriage using (2) two carriage closed using

10.7 Dimensions of GW Series
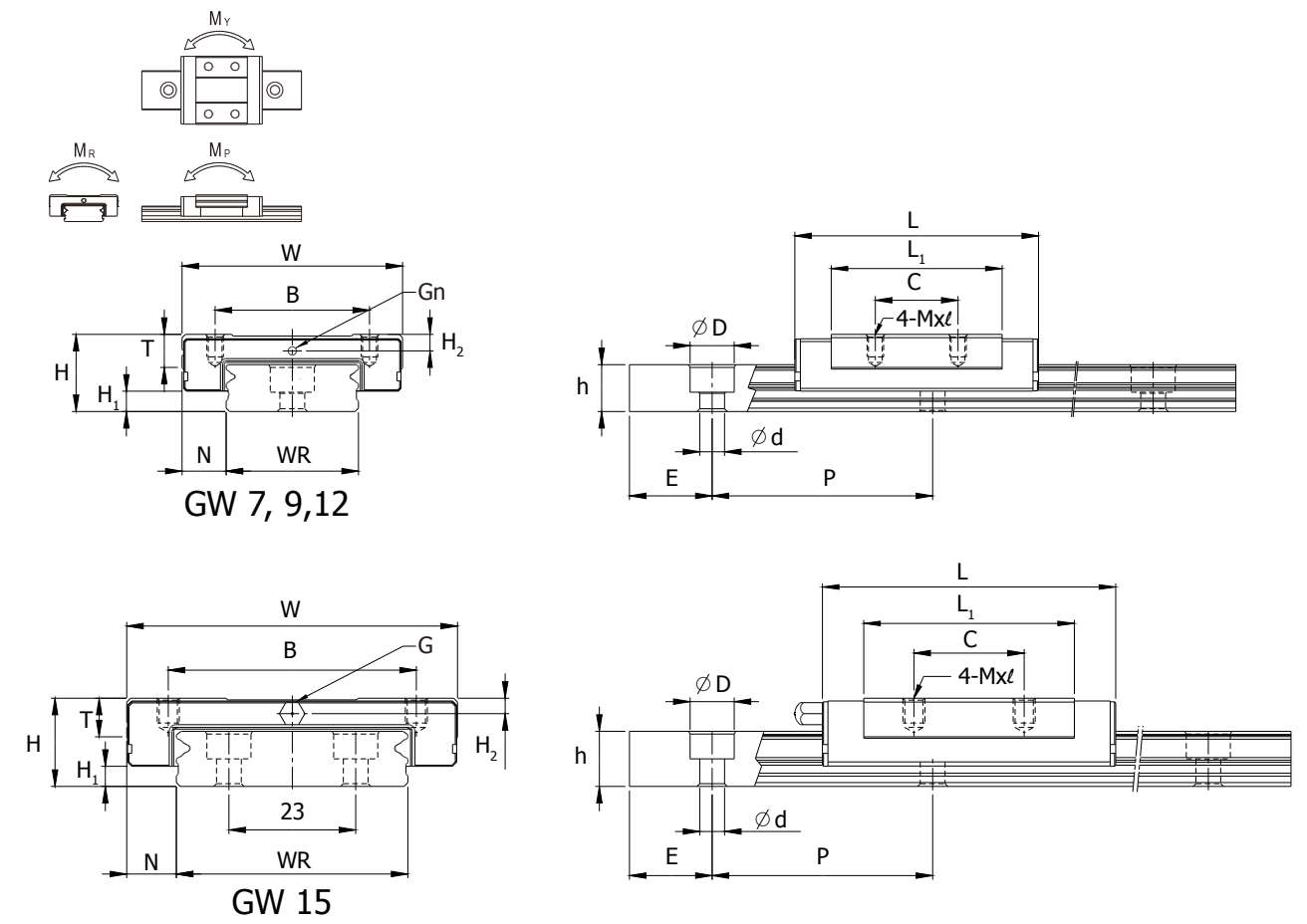
GW 7, 9,12

GW 15

Unit : mm

Model	Assembly Dimension					Carriage Dimension							
	Hight	Width	Length										
	H	W	L	N	H_1	B	C	M×l	L_1	T	H_2	Gn	G
GW7 M	9	25	31.5	5.5	1.9	19	10	M3x3	21.1	4	2.1	Φ1.5	-
GW7 LM	9	25	40.5	5.5	1.9	19	19	M3x3	30.5	4	2.1	Φ1.5	-
GW9 M	12	30	38	6	2.7	21	12	M3x3	26.8	5.5	2.4	Φ1.5	-
GW9 LM	12	30	50	6	2.7	23	24	M3x3	38.8	5.5	2.4	Φ1.5	-
GW12 M	14	40	44.2	8	3.7	28	15	M3x4	31	6	3	Φ1.5	-
GW12 LM	14	40	58.5	8	3.7	28	28	M3x4	45.3	6	3	Φ1.5	-
GW15 M	16	60	53.2	9	3.7	45	20	M4x4.5	38.2	7	2.8	-	G3
GW15 LM	16	60	71.1	9	3.7	45	35	M4x4.5	56.1	7	2.8	-	G3

Model	Rail dimension					Basic load rating		Static moment rating					Weight
	Width	Hight	Pitch	E std.	Hole Dimension	Dynamic	Static	M_P (N-m)		M_Y (N-m)		M_R (N-m)	Rail Kg/m
	W_R	H_R	P	E	D×h×d	C KN	C_0 KN	1*	2*	1*	2*		
GW7 M	14	5.2	30	10	6x3.2x3.5	1.56	2.45	9.2	42.5	9.2	42.5	17.6	20.1	0.54
GW7 LM	14	5.2	30	10	6x3.2x3.5	2.00	3.49	18.3	97.8	18.3	97.8	25.1	25.3	0.54
GW9 M	18	6.5	30	10	6x4.5x3.5	2.74	4.04	18.9	106.1	18.9	106.1	37.6	38.7	0.88
GW9 LM	18	6.5	30	10	6x4.5x3.5	3.58	5.90	39.3	200.9	39.3	200.9	54.9	50.2	0.88
GW12 M	24	8.5	40	15	8x5x4.5	3.97	5.72	31.8	178.3	31.8	178.3	70.3	62.5	1.54
GW12 LM	24	8.5	40	15	8x5x4.5	5.18	8.36	55.4	338.0	55.4	338.0	102.7	81.5	1.54
GW15 M	42	10	40	15	8x5x4.5	6.94	9.39	64.60	352.0	64.60	352.0	200.1	123.8	3.19
GW15 LM	42	10	40	15	8x5x4.5	8.87	13.30	112.6	635.7	112.6	635.7	283.5	162.8	3.19

*Static moment rating (1)one carriage using (2) two carriage closed using

ATAK Linear Guideway Request Form

Customer Name :	Address :
Tel :	
Fax :	Machine Type :
E-mail :	Drawing No. :

Installation Direction	□ H Type	□ R Type	□ V Type	□ K Type	□ T Type	□ RV Type	□ Other
Carriage Type	Series : □ GA - □ GN - □ GW -						
Size	□ 7 □ 9 □12 □ 15 □ 20 □25						
No. of Carriages	□ 1 □ 2 □3 □ 4 □ Other						
Dust Proof for Carriage	□ None □ UU □SS □ ZZ □ DD □ KK						
Dust proof for rail	□ None □ Plastic Cap □ Metalic Cap						
Preload Grade	□ Z0 □ Z1 □Z2						
Rail Type	□ Counter-bore □ Tapped hole						
Rail Length & Pithch	Length : E1 : E2 : E3 : E4 :						
Accuracy Grade	□ C □ H □P □ SP □ UP						
Rail per Axis	□ 1 □ 2 □3 □ 4 □ Other						
Lubrication Type	□ Grease □ Oil						
Lubrication Fitting	□ Grease nipple (Code:) □ Oil piping joint (Code:)						
Full Code of Specication							
Required Quantity							

Lubrication Location and direction

Master rail□
Subsidiary rail□

E1 E2

Master rail□
Subsidiary rail□

E3 E4

Memo

ATAK was established in 2013, dedicated to the manufacture of high precision linear guideway, members have development and manufacturing capabilities linear guideway over 20 years and open up a new generation of processes for customer requirements.

Furthermore, **ATAK** also have obtained various patents to enhance the smoothness of products as well as to increase the applications for the different environments.
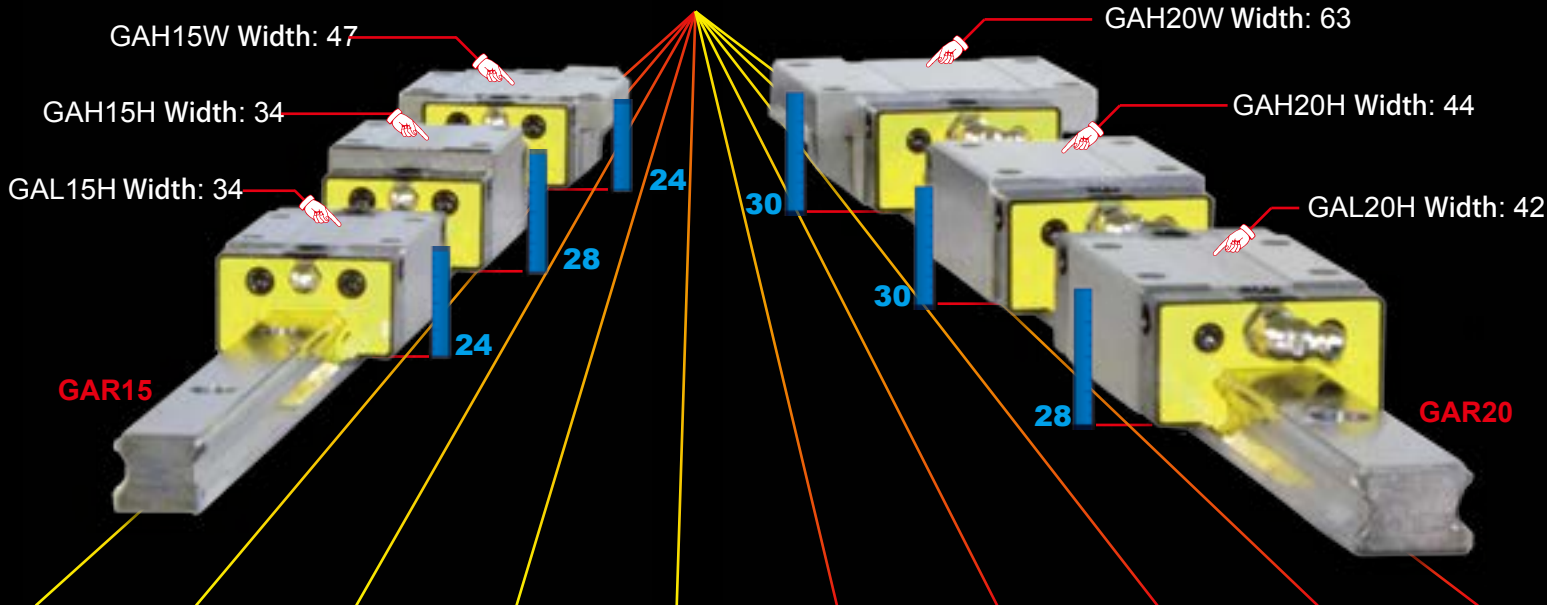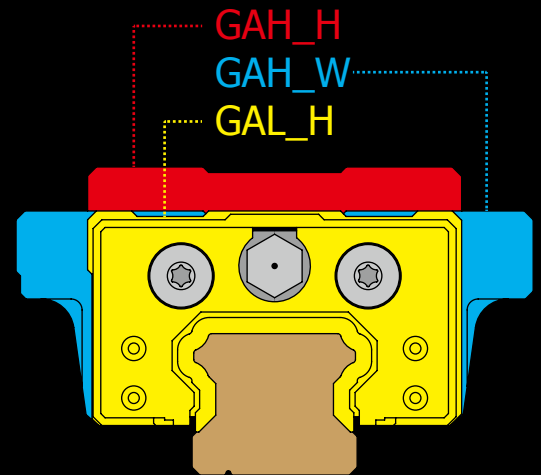
Main productions :
Standard linear guideway from size 15 to 25.
Miniature linear guiedway from size 7 to 15.

Characteristics of productions :
Standard linear guideway are designed not only with four-way equal load but also with high load capacity. To adopt the common rail for different high carriages, it is more convenient in use for the customers to increase selections and changes.

Common Rail Design

GAH_H
GAH_W
GAL_H

GAH15W Width: 47
GAH15H Width: 34
GAL15H Width: 34
GAR15
24
28
24

GAH20W Width: 63
GAH20H Width: 44
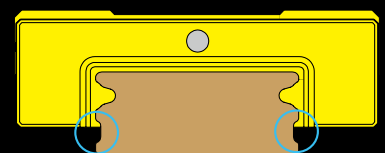GAL20H Width: 42
30
30
28
GAR20

Miniature linear guiedway are provided with the ball retainer to prevent ball from dropping and equipped with the sliding chute on the both sides of the rail which can be easy for customers to insert.

Sliding Chute Design
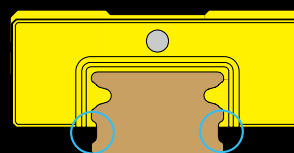
GN Standard

GW Wide Type

A●TAK

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