

AG Series

Angle Linear Guideway

2-12 AG Series - Angle Linear Guideway

AG series angle linear guideway is designed with circular-arc groove and the same structure as HG series, and are ground with special procedure to make sure the X-Y translation is in high perpendicularity. The integrated design increases the stiffness by 50%, reduces weight and lowers the assembly height by 15%, which contributes to higher precision translation and achieves higher production quality.

2-12-1 Product Features

(1)More compact design

Eliminates fastener plate for saving equipment weight and increasing work space.

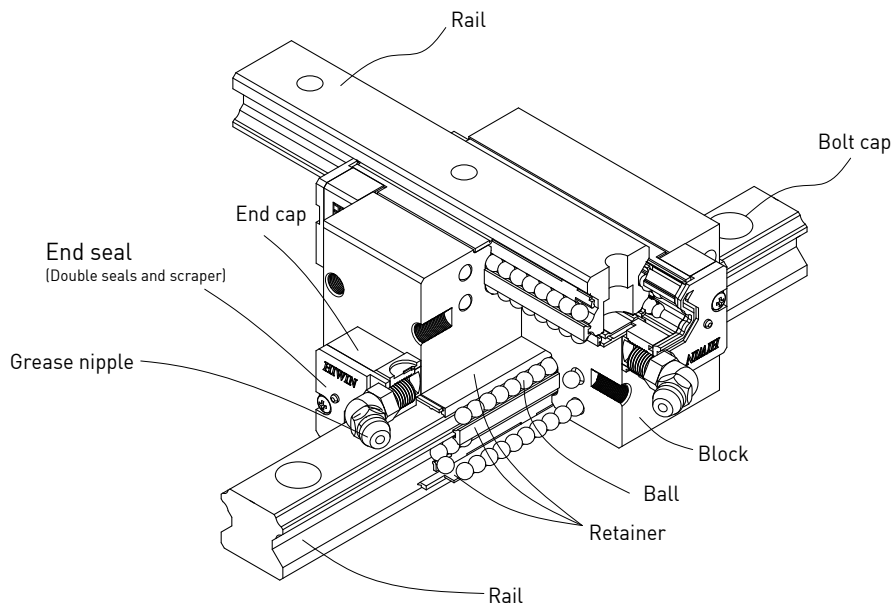
(2)High positional accuracy

Two rails are machined with high precision in relative straightness. Extremely high accuracy in verticality is achieved.

(3)High torsional rigidity

The rigidity of AG block is 50% higher than a combination of two HG blocks which secured back to back together.

2-12-2 Construction of AG Series



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

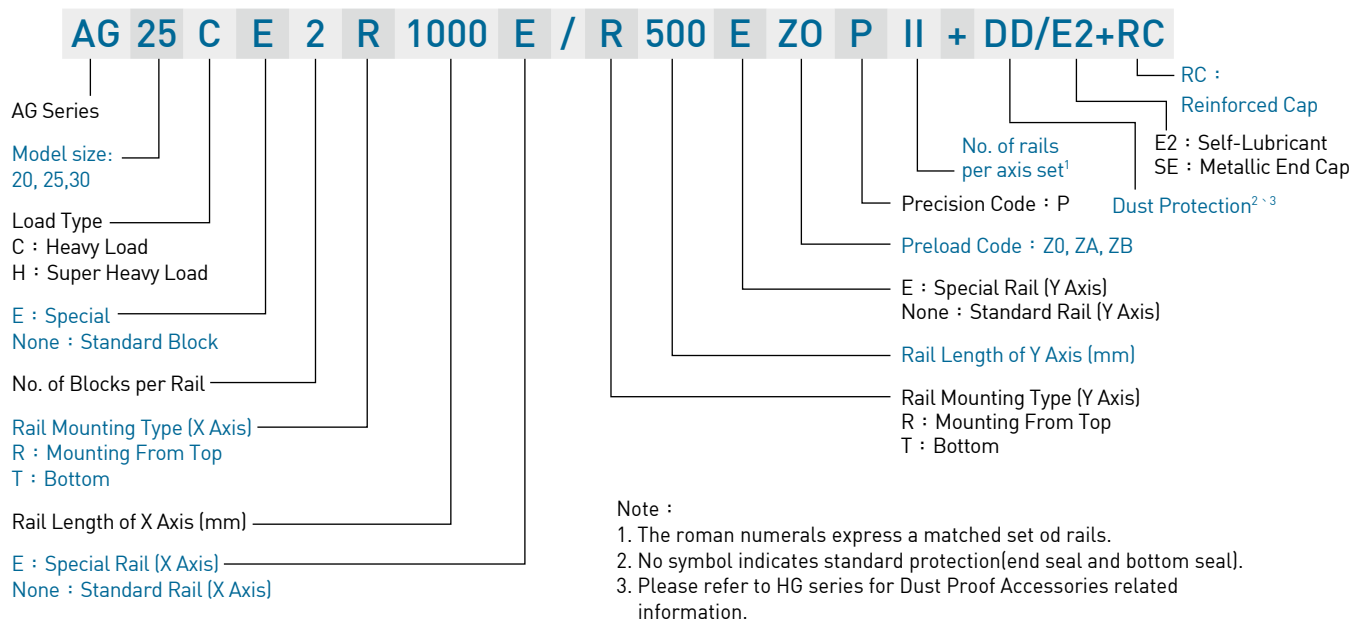
2-12-3 Model Number of AG Series

The AG series linear guideway only has non-interchangeable type to ensure perpendicularity of two rails.

If other accuracy grade is required, please contact HIWIN.

The model number of AG series contains the size, type, accuracy and preload class, etc.

○ Non-interchangeable type

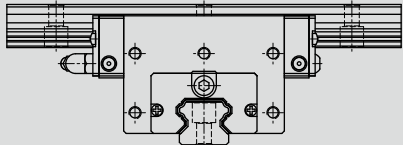
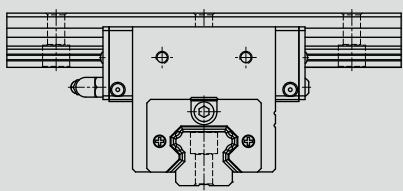


2-12-4 Types

(1) Block Types

HIWIN provides AG series linear guideway in cross and rectangular type, which has high accuracy in perpendicularity of two rails.

Table 2-12-1 Block Types

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Application
Square	AG-H		57	100	<ul style="list-style-type: none"> ○ Sliding Head Lathe (Swiss lathe) ○ Vibration Test Machine ○ Automated Robot Dispenser ○ XY moving platform ○ Measuring instrument ○ Vertical Lathe ○ Slant Bed Lathes
			↓	↓	
	AG-C		82	1200	
			↓	↓	
			70	100	
			↓	↓	
			82	1200	

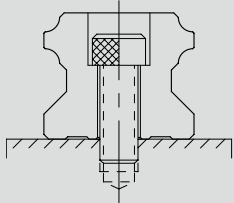
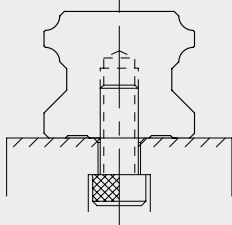
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(2) Rail types

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

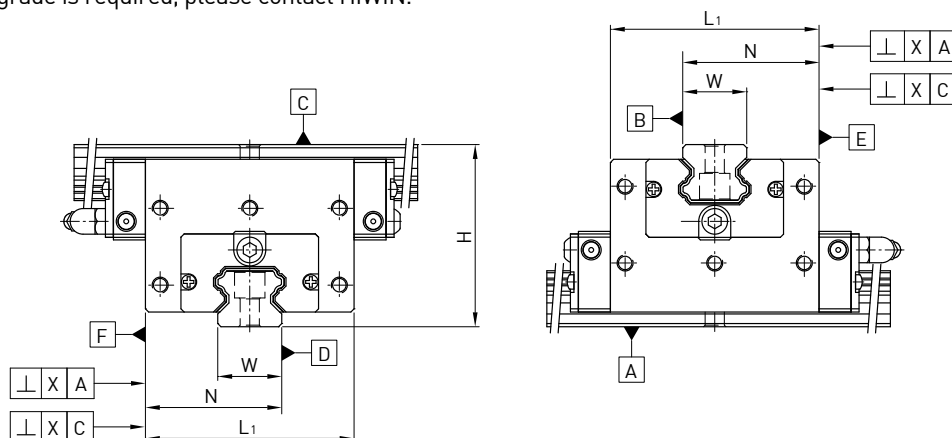
Table 2-12-2 Rail Types

Mounting from Top	Mounting from bottom
	

Note: Please refer to the HG series for relevant rail dimensions.

2-12-5 Accuracy Classes

Accuracy of AG series linear guideway has only one accuracy grade to ensure the perpendicularity of two rails. If other accuracy grade is required, please contact HIWIN.



(1) Accuracy of non-interchangeable guideways

Table 2-12-3 Accuracy Standards

Unit: mm

Item	AG20	AG25	AG30	Size	Block length (mm)
Accuracy Classes	Precision (P)	Precision (P)	Precision (P)		
Pair variation of height H	0.01	0.01	0.01	AG20H	65.2
Pair variation of height N	0.01	0.01	0.01	AG25C	58
Perpendicularity of rail surface B to rail surface D	0.005 / Block length	0.008 / Block length	0.01 / Block length	AG25H	78.6
Running parallelism of rail surface C to rail surface A	See Table 2-12-4			AG30C	70
Running parallelism of rail surface A to rail surface C	See Table 2-12-4			AG30H	93
Running parallelism of block surface F to rail surface D	See Table 2-12-4				
Running parallelism of block surface E to rail surface B	See Table 2-12-4				

(2) Accuracy of running parallelism

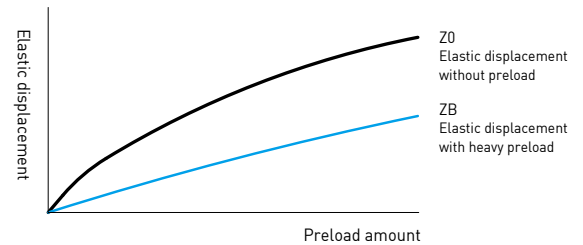
Table 2-12-4 Accuracy of Running Parallelism

Rail Length (mm)	Accuracy (μm) P	Rail Length (mm)	Accuracy (μm) P
~ 100	2	500 ~ 700	4
100 ~ 200	2	700 ~ 900	5
200 ~ 300	3	900 ~ 1,100	6
300 ~ 500	3	1,100 ~ 1,200	7

2-12-6 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.



(2) Preload classes

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

Table 2-12-5 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, Precision 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	Non-Interchangeable Guideway
Preload classes	Z0, ZA, ZB

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

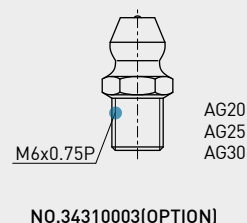
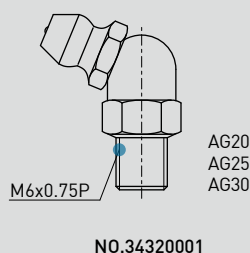
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2-12-7 Lubrication

(1) Grease

Grease nipple



Mounting location

- (1) The standard location of the grease fitting is at either end of the block.
- (2) Alternatively, the nipple may be mounted on the side of the block. For side installation, contact HIWIN to pre-drill the block at the desired location.
- (3) Mounting the nipple on the top of the block requires an adaptor or o-ring depending on different series. HIWIN will pre-drill the holes to accommodate the application's requirement. For non-standard location, please contact HIWIN.
- (4) Oil piping joints may also be used at these locations for lubrication. For customers who need to lubricate from the top on a standard block, HIWIN will pre-tap the block and add a recessed o-ring. Please contact HIWIN for more information.

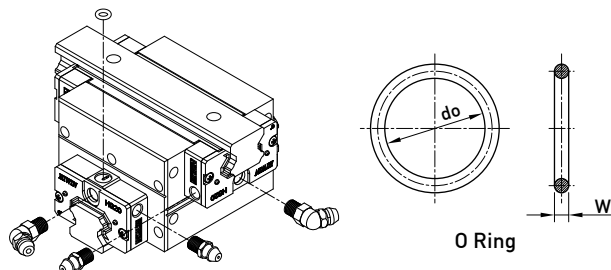
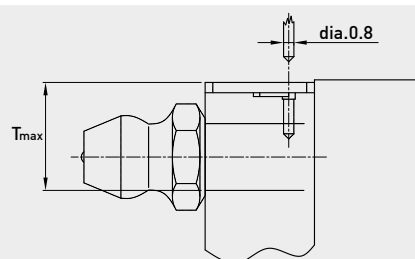


Table 2-12-6 O-Ring size and max. permissible depth for piercing

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T _{max} (mm)
AG 20	4.5±0.15	1.5±0.15	5.7
AG 25	4.5±0.15	1.5±0.15	5.8
AG 30	4.5±0.15	1.5±0.15	6.3



The lubricant amount for a block filled with grease

Table 2-12-7 The lubricant Amount for a Block Filled with Grease

Size	Heavy load (cm ³)	Super heavy load (cm ³)
AG 20	4	6
AG 25	10	12
AG 30	14	16

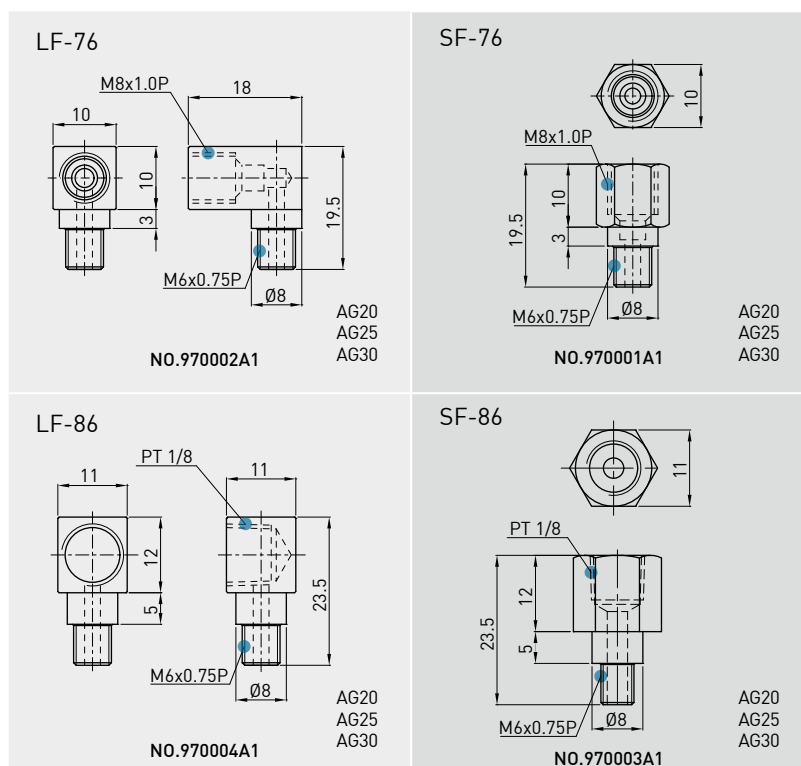
Frequency of replenishment

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

[2] Oil

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

Types of oil piping joint



[3] Dimensions of block equipped with the parts

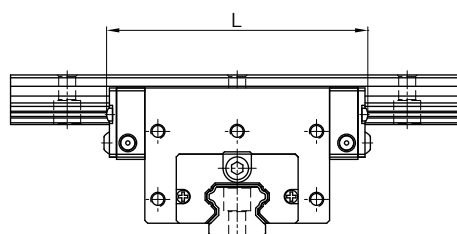


Table 2-12-8 Overall block length

unit: mm

Size	Overall block length (L)					
	SS/SH	ZZ/ZH	DD/DH	KK/KH	SW	ZW
*AG20H	92.2 [94.0]	97.2 [99.2]	97.5 [99.0]	102.2 [104.2]	93.2 [93.2]	101.0 [102.4]
*AG25C	84.0 [85.0]	89.0 [91.0]	89.0 [90.0]	94.0 [96.0]	85.0 [85.0]	92.8 [94.8]
*AG25H	104.6 [105.6]	109.6 [111.6]	109.6 [110.6]	114.6 [116.6]	105.6 [105.6]	113.4 [115.4]
*AG30C	97.4 [99.4]	105.4 [107.4]	104.8 [106.8]	112.8 [114.8]	99.0 [100.4]	107.2 [109.2]
*AG30H	120.4 [122.4]	128.4 [130.4]	127.8 [129.8]	135.8 [137.8]	122.0 [123.4]	130.2 [132.2]

Note : 1. For the marking of "*", it means this specification is available for SH/ZH/DH/KH dust proof accessories.

2. The marking of "[]" denotes the maximum block length with screws, lips of end seals, etc.

2-12-8 Friction

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

Table 2-12-9 Seal Resistance

Size	Resistance N (kgf)
AG20	2.75 [0.28]
AG25	3.14 [0.32]
AG30	3.53 [0.36]

Note: 1. 1kgf=9.81N

2. Please inform HIWIN if low friction request is required.

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2-12-9 The Accuracy Tolerance of Mounting Surface

Because of the circular-arc contact design, the AG linear guideway can compensate for some surface-error on installation and still maintain smooth linear motion.

As long as the accuracy requirements for the mounting surface are followed, high accuracy and rigidity of linear motion of the guideway can be obtained without any difficulty. For fast installation and smooth movement, HIWIN offers the normal clearance type of preload to customers of its high absorption ability of the deviation in mounting surface accuracy.

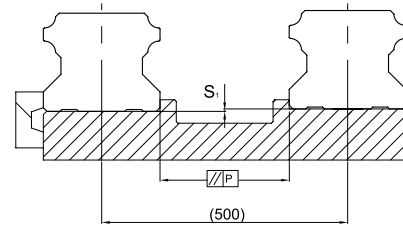


Table 2-12-10 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
AG20	25	20	18
AG25	30	22	20
AG30	40	30	27

Table 2-12-11 Max. Tolerance of Reference Surface Height (S_1)

unit: μm

Size	Preload classes		
	Z0	ZA	ZB
AG20	130	85	50
AG25	130	85	70
AG30	170	110	90

Note : Permissible value is proportional to the axial distance

2-12-10 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 rail or block. As long as the recommended shoulder heights and fillets are followed, installation inaccuracies should be eliminated.

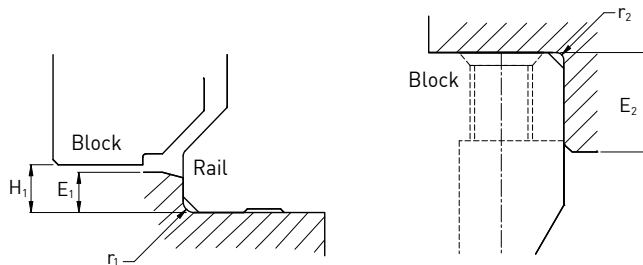


Table 2-12-12 Shoulder Heights and Fillets

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height beside the rail E_1 (mm)	Shoulder height beside the block E_2 (mm)	Clearance under block H_1 (mm)
AG20	0.5	0.5	3.5	5.0	4.6
AG25	1.0	1.0	5.0	5.0	5.5
AG30	1.0	1.0	5.0	5.0	6.0

(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 2-12-13 Tightening Torque of Mounting Bolts for Rail Installation

Size	Bolt size	Torque N-cm (kgf-cm)		
		Iron	Casting	Aluminum
AG 20	M5×0.8P×16L	883 (90)	588 (60)	441 (45)
AG 25	M6×1P×20L	1373 (140)	921 (94)	686 (70)
AG 30	M8×1.25P×25L	3041 (310)	2010 (205)	1470 (150)

Note: 1 kgf=9.81 N

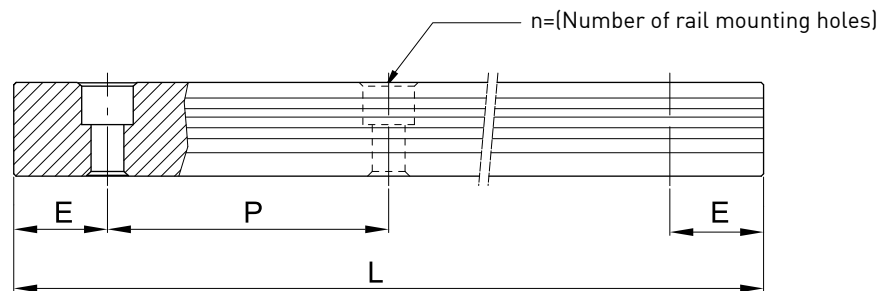
Table 2-12-14 Tightening Torque of Mounting Bolts for Block Installation

Size	Bolt size	Torque N-cm (kgf-cm)
		Iron
AG20	M5×0.8P	883 (90)
AG25	M6×1P	1373 (140)
AG30	M6×1P	1373 (140)

Note: 1 kgf=9.81 N

2-12-11 Standard and Maximum Lengths of Rail

HIWIN offers standard rail lengths for customer needs. For non-standard E-values, the recommended dimension should no greater than 1/2 of the pitch (P) dimension. This will prevent an unstable rail end.



$$L = (n-1) \times P + 2 \times E \quad \text{Eq.2.1}$$

L : Total length of rail (mm)

n : Number of mounting holes

P : Distance between any two holes (mm)

E : Distance from the center of the last hole to the edge (mm)

Table 2-12-15 Rail Standard Length and Max. Length

unit: mm

Item	AG20	AG25	AG30
Standard Length L(n)	220 (4)	220 (4)	280 (4)
	280 (5)	280 (5)	440 (6)
	340 (6)	340 (6)	600 (8)
	460 (8)	460 (8)	760 (10)
	640 (11)	640 (11)	1,000 (13)
	820 (14)	820 (14)	1,640 (21)
	1,000 (17)	1,000 (17)	2,040 (26)
Pitch (P)	60	60	80
Distance to End (E _s)	20	20	20
Max. Standard Length	1,180 (19)	1,180 (19)	1,160 (14)
Max. Length	1,200	1,200	1,200

Note : 1. Tolerance of E value for standard rail is 0.5~0.5 mm. Tolerance of E value for jointed rail is 0~0.3 mm.

2. Maximum standard length means the max. rail length with standard E value on both sides.

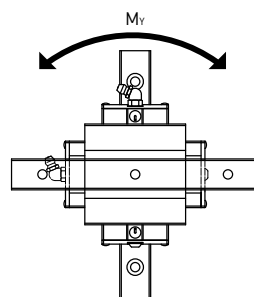
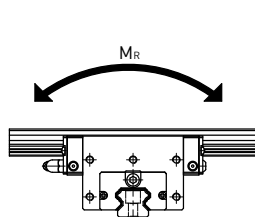
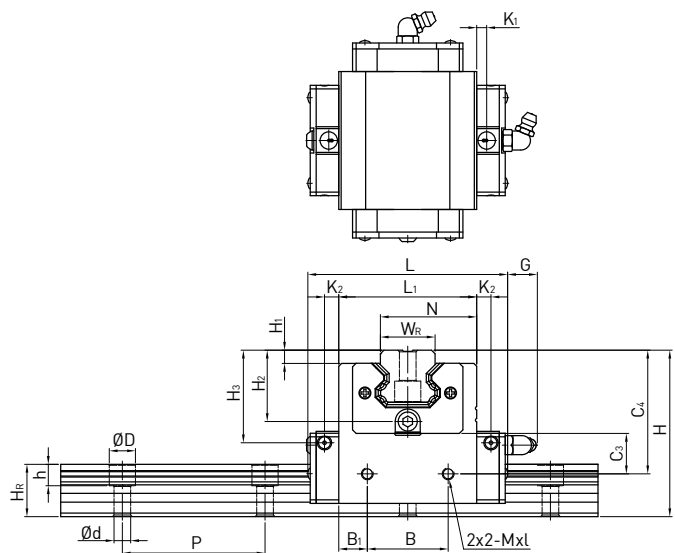
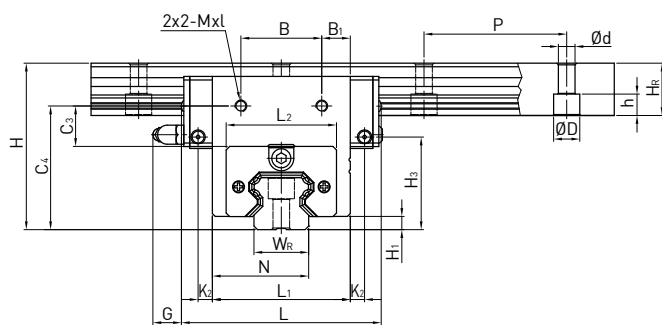
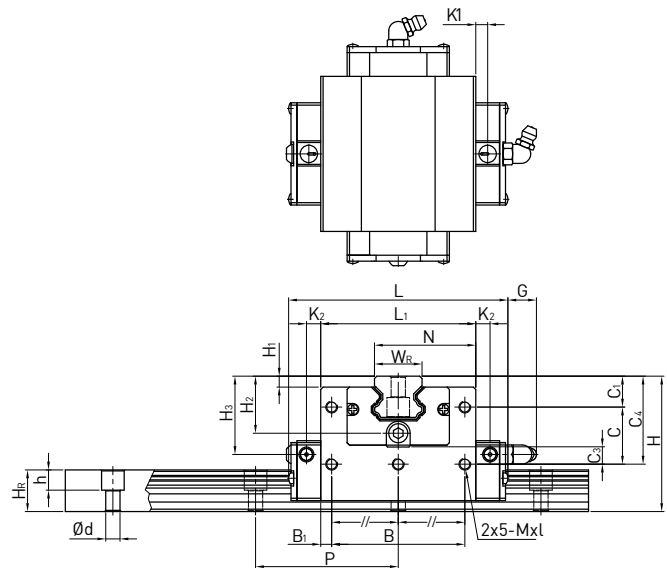
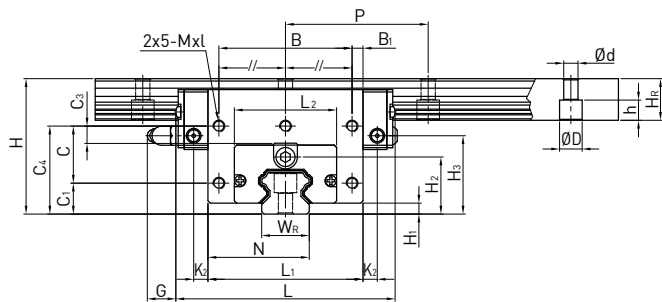
3. If different E value is needed, please contact HIWIN.

4. AG20/25 of stainless steel is supplied with the maximum length of 1200mm.

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2-12-12 Dimensions for AG Series



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)																Dimensions of Rail (mm)						Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment	
	H	H ₁	N	L	L ₁	L ₂	K ₁	K ₂	B	B ₁	C	C ₁	C ₃	C ₄	M x l	H ₂	H ₃	G	W _R	H _R	D	h	d	P	C [kN]	C ₀ [kN]	M _R kN-m	M _Y kN-m	
AG20H	57	4.6	42.6	92.2	65.2	43	5	6	56	4.6	24	13	7.2	37	M5x8	24	34	12	20	17.5	9.5	8.5	6	60	32.7	47.96	0.35	0.35	
AG25C	70	5.5	40.5	84	58	46.4	4.2	6	34	12	-	-	16.2	52	M6x10	30	31	12	23	22	11	9	7	60	34.9	52.82	0.42	0.33	
AG25H			50.8	104.6	78.6				64	7.3	26	18	8.2	44											42.2	69.07	0.56	0.57	
AG30C	82	6	49	97.4	70	58	5.25	6	40	15	-	-	19.2	61	M6x10	35.5	31.2	12	28	26	14	12	9	80	48.5	71.87	0.66	0.53	
AG30H			60.5	120.4	93				76	8.5	32	21	11.2	53											58.6	93.99	0.88	0.92	

Note: 1 kgf = 9.81 N