

1. TO Series - Heavy Load Ball Type Linear Guideway

TO series linear guides are four-row single-arc tooth-type contact linear guides. At the same time, they integrate super-heavy-load precision linear guides with optimized structural design. Compared with other linear guides, they have improved load and rigidity capabilities; Load characteristics such as direction and automatic centering function can absorb the assembly error of the mounting surface and obtain high-precision requirements. The concept of high speed, high load, high rigidity and high precision has become the development trend of industrial products all over the world in the future. IMTEK four-row super heavy-load linear guide is a product developed based on this concept.

1.1 Features of TO Series Linear Guideway

(1) Self-aligning Ability

The DF (45°-45°) combination from the arc groove can be absorbed by the inside of the linear guide even if the mounting surface is somewhat deviated by the elastic deformation of the steel ball and the transfer of the contact point during installation. The self-aligning ability can obtain high-precision and stable smooth movement.

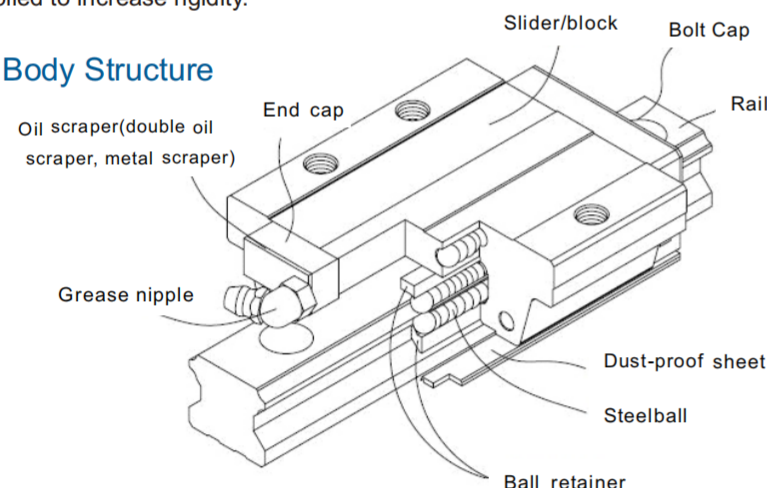
(2) Interchangeability

Due to the strict control of the manufacturing precision, the linear guide size can be maintained within a certain level, and the slider has a retainer design to prevent the steel ball from falling off. Therefore, the precision of some series is interchangeable. Customers can order rails and sliders according to their needs. Rails or sliders can also be stored separately to reduce storage space.

(3) High rigidity in four directions

The use of four-row arc grooves and a 45-degree contact angle of four rows of steel balls allows the steel balls to achieve an ideal two-point contact structure, which can withstand the load from up and down, left and right directions; when necessary, preload can be applied to increase rigidity.

1.2 TO Series Body Structure

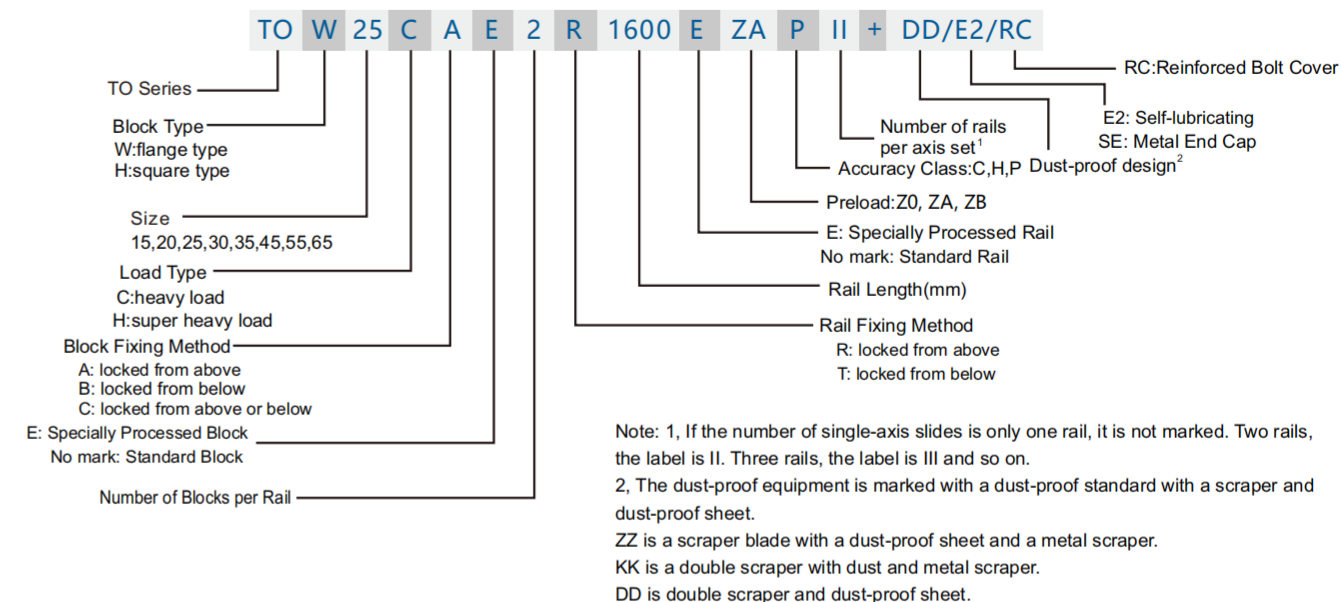


- Rolling circulation system: slider, rail, end cap, steel ball, steel ball retainer
- Lubrication system: grease nipple, oil pipe joint
- Dust-proof system: oil scraper, dust-proof sheet, rail bolt cover, metal scraper

1.3 TO Series Type Specification

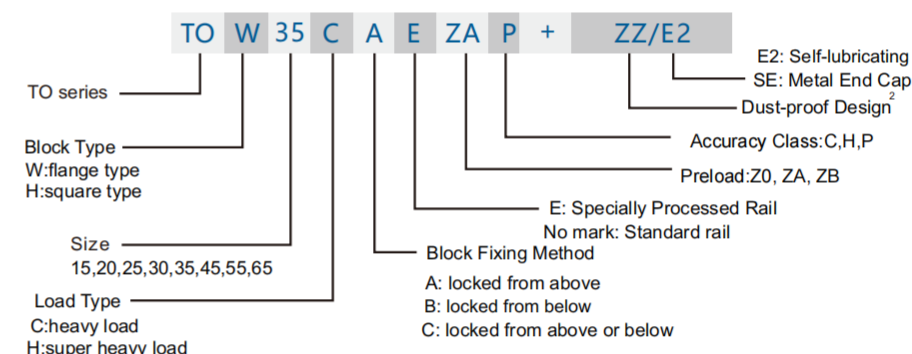
The TO series is divided into two types: non-interchangeable and interchangeable. The two specifications are the same. The main difference is that the interchangeable model blocks and rails can be used interchangeably, which is convenient, but the combination accuracy cannot be achieved as non-interchangeable ultra-high precision. However, because IMTEK has good dimensional control and strict quality requirements in manufacturing, the combination accuracy of interchangeable models has reached a certain level, for customers who do not need to pair with linear guides. It is a good choice. The product specifications of the linear guides mainly indicate the specifications of the linear guides, type, accuracy grade, preload, etc., so that both parties can confirm the products at the time of ordering.

(1) Non-interchangeable linear guide product model

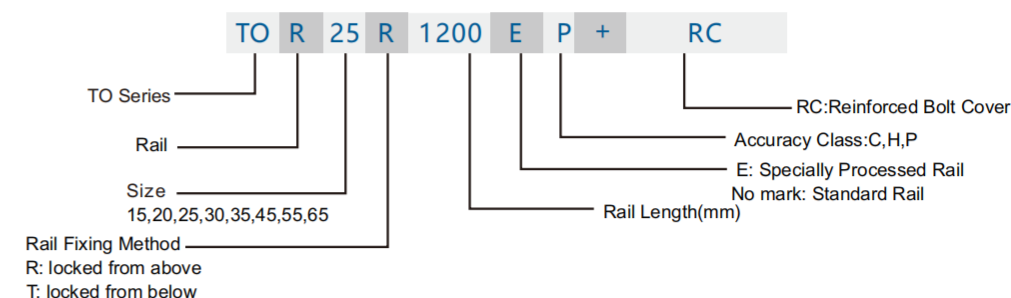


(2) Interchangeable linear guide product models

○ Interchangeable block product model



○ Interchangeable rail product model



1.4 TO Series Type

(1) Block type

IMTEK provides two types of sliders, flange type and square type. The flange type block has a low combined height and a large bearing area, which is suitable for the occasions that bear the load of the distance.

Table 2.4 block type

Type	Spec.	Shape	Height (mm)	Length (mm)	Application
Square	TOH-CA TOH-HA		28	100	- Machining Center - NC Lathes - Precision Processing Machine - Heavy Cutting Machines - Marble cutting machine - Grinding Machines - Injection Machines - Punch - Automation Devices - Transportation Equipment - Measuring Instrument
			↓	↓	
Flange	TOW-CA TOW-HA		90	4000	
			↓	↓	
	TOW-CB TOW-HB		24	100	
			↓	↓	
	TOW-CC TOW-HC		90	4000	
			↓	↓	
			24	100	
			↓	↓	
			90	4000	
			↓	↓	

(2) Rail type

In addition to the general(above) locking bolt hole rail, IMTEK also provides the bottom locking screw hole slide rail, which is convenient for customers to install and use.

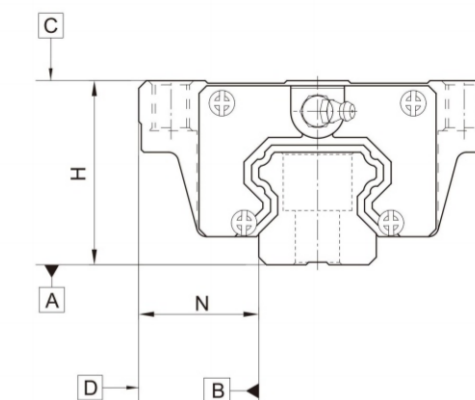
Table 2.5 Rail type

Above locking bolt hole	Bottom locking bolt hole

1.5 Accuracy class

The precision of TO series is divided into two levels:
H (high level) and P (precision level)

Customers can choose accuracy according to equipment accuracy requirements.



(1)Accuracy of non-interchangeable linear guides

Table 2.6 Accuracy table of matched complete sets

Unit:mm

Spec.	TO-15,20				
Accuracy Class	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimension Tolerance of Height H	±0.1	±0.03	0~-0.03	0~-0.015	0~-0.008
Dimension Tolerance of Width N	±0.1	±0.03	0~-0.03	0~-0.015	0~-0.008
Pair Variation of Height H	0.02	0.01	0.006	0.004	0.003
Pair Variation of Width N (reference rail)	0.02	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	Running parallelism(See table 2.14)				
Running parallelism of block surface D to surface B	Running parallelism(See table 2.14)				

Table 2.7 Accuracy table of matched complete sets

Unit: mm

Spec.	TO-25,30,35				
Accuracy Class	Normal (C)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimension Tolerance of Height H	±0.1	±0.04	0~-0.04	0~-0.02	0~-0.01
Dimension Tolerance of Width N	±0.1	±0.04	0~-0.04	0~-0.02	0~-0.01
Pair Variation of Height H	0.02	0.015	0.007	0.005	0.003
Pair Variation of Width N (reference rail)	0.03	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	Running parallelism(See table 2.14)				
Running parallelism of block surface D to surface B	Running parallelism(See table 2.14)				

Table 2.8 Accuracy table of matched complete sets

Spec.	TO-45,55				
Accuracy Class	Normal (C)	High (H)	Precision (P)	SuperPrecision (SP)	Ultra Precision (UP)
Dimension Tolerance of Height H	±0.1	±0.05	0~-0.05	0~-0.03	0~-0.02
Dimension Tolerance of Width N	±0.1	±0.05	0~-0.05	0~-0.03	0~-0.02
Pair Variation of Height H	0.03	0.015	0.007	0.005	0.003
Pair Variation of Width N (reference rail)	0.03	0.02	0.01	0.007	0.005
Running parallelism of block surface C to surface A	Running Parallelism (See table 2.14)				
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.14)				

Table 2.9 Accuracy table of matched complete sets

Spec.	TO-65				
Accuracy Class	Normal (C)	High (H)	Precision (P)	SuperPrecision (SP)	UltraPrecision (UP)
Dimension Tolerance of Height H	±0.1	±0.07	0~-0.07	0~-0.05	0~-0.03
Dimension Tolerance of Width N	±0.1	±0.07	0~-0.07	0~-0.05	0~-0.03
Pair Variation of Height H	0.03	0.02	0.01	0.007	0.005
Pair Variation of Width N (reference rail)	0.03	0.025	0.015	0.01	0.007
Running parallelism of block surface C to surface A	Running Parallelism (See table 2.14)				
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.14)				

(2)Accuracy of interchangeable linear guides

Table 2.10 Accuracy table of complete sets (or separate parts)

Spec.	TO-15、 20		
Accuracy Class	Normal (C)	High (H)	Precision (P)
Dimension Tolerance of Height H	±0.1	±0.03	±0.015
Dimension Tolerance of Width N	±0.1	±0.03	±0.015
Pair Variation of Height H	0.02	0.01	0.006
Pair Variation of Width N (reference rail)	0.02	0.01	0.006
Running parallelism of block surface C to surface A	Running Parallelism (See table 2.14)		
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.14)		

Table 2.11 Accuracy table of complete sets (or separate parts)

Spec.	TO-25、 30、 35		
Accuracy Class	Normal (C)	High (H)	Precision (P)
Dimension Tolerance of Height H	±0.1	±0.04	±0.02
Dimension Tolerance of Width N	±0.1	±0.04	±0.02
Pair Variation of Height H	0.02	0.015	0.007
Pair Variation of Width N (reference rail)	0.03	0.015	0.007
Running parallelism of block surface C to surface A	Running Parallelism (See table 2.14)		
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.14)		

Table 2.12 Accuracy table of complete sets (or separate parts)

Spec.	TO-45,55		
Accuracy Class	Normal (C)	High (H)	Precision (P)
Dimension Tolerance of Height H	±0.1	±0.05	±0.025
Dimension Tolerance of Width N	±0.1	±0.05	±0.025
Pair Variation of Height H	0.03	0.015	0.007
Pair Variation of Width N (reference rail)	0.03	0.02	0.01
Running parallelism of block surface C to surface A	Running Parallelism (See table 2.14)		
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.14)		

Table 2.13 Accuracy table of complete sets (or separate parts)

Spec.	TO-65		
Accuracy Class	Normal (C)	High (H)	Precision (P)
Dimension Tolerance of Height H	±0.1	±0.07	±0.035
Dimension Tolerance of Width N	±0.1	±0.07	±0.035
Pair Variation of Height H	0.03	0.02	0.01
Pair Variation of Width N (reference rail)	0.03	0.025	0.015
Running parallelism of block surface C to surface A	Running Parallelism (See table 2.14)		
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.14)		

(3) Accuracy of Running Parallelism

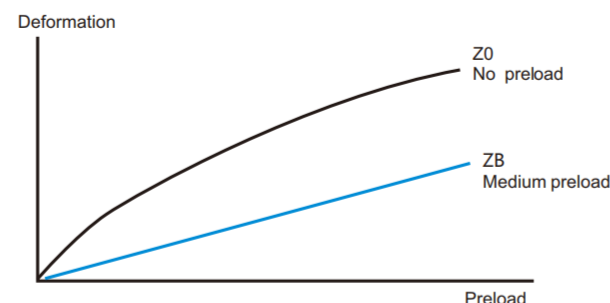
Table 2.14 Parallelism of running

Rail Length (mm)	Accuracy Level (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

1.6 Preload

(1) Preload Definition

No preload refers to pre-loading the steel ball, that is, increasing the diameter of the steel ball, Medium preload using the negative gap between the steel ball and the ball channel to give preload, which can improve Preload the rigidity of the linear guide and eliminate the gap; (see the picture on the right) Increasing the preload can increase the rigidity of the linear guide. However, for small specifications, it is recommended to choose a preload below ZA (light preload) to avoid shortening its service life due to excessive preload.



(2) Preload level

TO series linear guides provide three standard preload, which can be selected according to the applications.

Table 2.15 Preload level

Preload level	Mark	Preload value	Using conditions	Applications
No preload	Z0	0~0.02C	The load direction is fixed and the impact force is small, and the precision requirements are low	Conveyor, automatic packaging machine, automated industrial machinery, XY axis of general industrial machinery, welding machine, fuse machine, tool changer
Light preload	ZA	0.05~0.07C	Light load and require high precision	Z-axis of general industrial machinery, electric discharge machine, NC lathe, precision XY stage, measuring instrument, machining center, vertical machining center, industrial robot, automatic coating machine, various high-speed material supply devices
Medium preload	ZB	0.10~0.012C	In an environment with rigidity requirements, vibration and impact force	Machining center, grinder, NC lathe, vertical or horizontal milling machine, Z axis of machine tool, heavy cutting machine

Note:

1. C in the preload is the dynamic load rating.
2. Preload level of interchangeable linear guide: Z0, ZA.
Preload level of non-interchangeable linear guide: Z0, ZA, ZB

(3) Friction

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

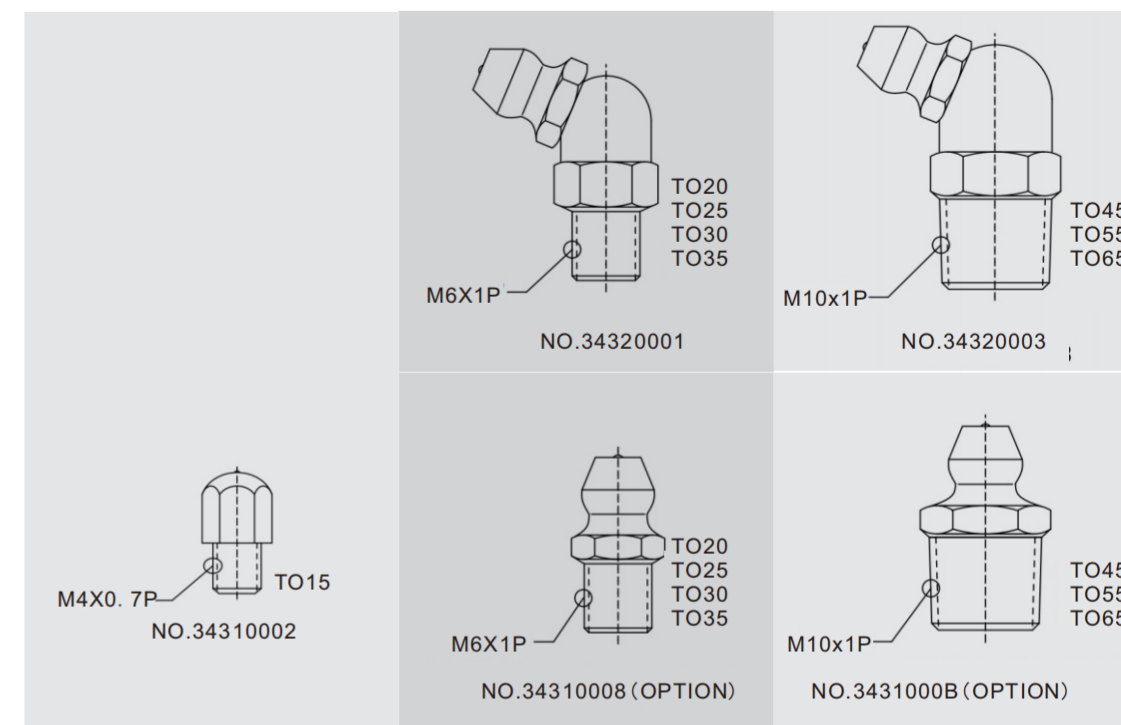
Table 2.16 TO Series Seal Resistance

Spec.	Seal Resistance N (kgf)	Spec.	Seal Resistance N (kgf)
TO 15	1.18(0.12)	TO 35	3.04 (0.31)
TO 20	1.57(0.16)	TO 45	3.83 (0.39)
TO 25	1.96(0.2)	TO 55	4.61 (0.47)
TO 30	2.65(0.27)	TO 65	5.79 (0.59)

1.7 Lubrication Method

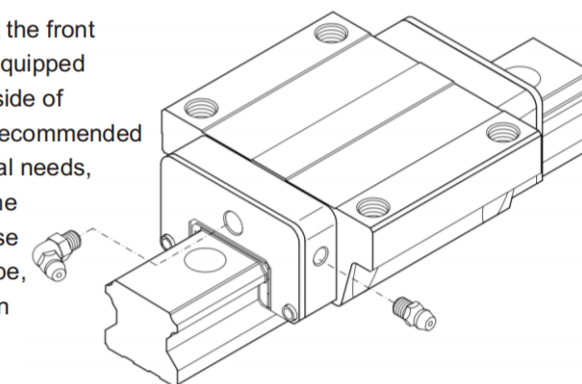
(1) Grease

○ Nipple type



○ Position

According to customer needs, a grease nipple can be installed at the front or back end of the slider for lubricating. The TO series is especially equipped with a lubricating nipple (usually a straight lubricating nipple) on the side of the end cover to provide side lubrication and lateral lubrication. It is recommended that the position be on the non-reference side, but if you have special needs, it can also be placed on the side reference side. If customers have the above-mentioned lateral refueling needs, please contact us. If you use a linear guide that automatically supplies lubricating grease to the pipe, you can choose to install the oil pipe joint according to the connection pipe type.



○ Amount of Lubricating Oil per block

Table 2.17 Amount of lubricating oil per block

Spec.	Heavy Preload (cm ³)	Super Preload (cm ³)	Spec.	Heavy Preload (cm ³)	Super Preload (cm ³)
TO 15	1	-	TO 35	10	12
TO 20	2	3	TO 45	17	21
TO 25	5	6	TO 55	26	33
TO 30	7	8	TO 65	50	61

○ Lubrication frequency

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

(2) Lubricating Oil

It is recommended to use lubricating oil with an oil viscosity of about 30~150cSt to lubricate linear guides. Customers can inform their requirements for lubricating oil. The linear guides shipped will not be sealed with lubricating grease.

Oil supply rate

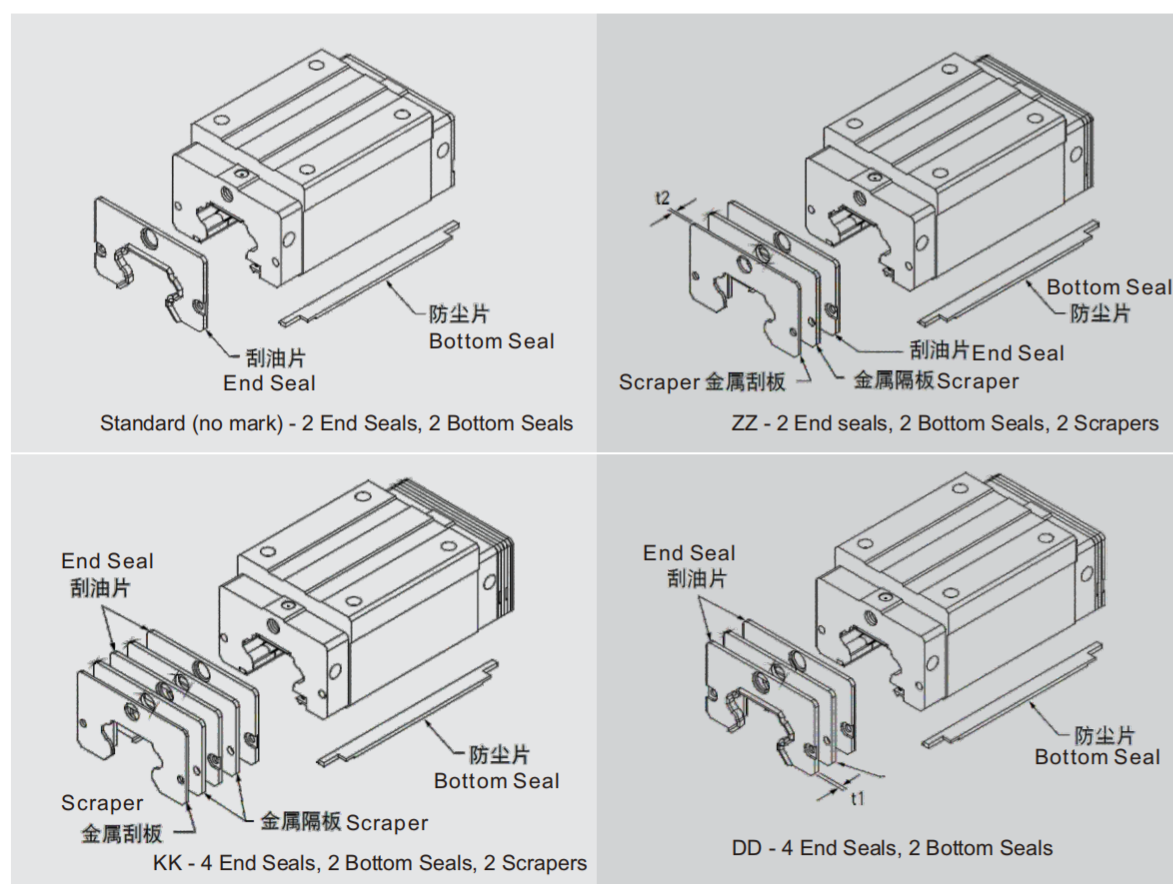
Table 2.18 oil supply rate

Specification	Supply rate (cm ³ /hr)	Specification	Supply rate (cm ³ /hr)
TO 15	0.2	TO 35	0.3
TO 20	0.2	TO 45	0.4
TO 25	0.3	TO 55	0.5
TO 30	0.3	TO 65	0.6

1.8 Dust-Proof Equipment

(1) Dust-proof Equipment Code

If the following dust-proof accessories are required, please add the code after the product model.



(2) Oil scraper and bottom dust-proof sheet

Prevent machining iron filings or dust particles from entering the slide block and destroying the surface of the bead channel and reducing the life of the linear guide.

(3) Double oil scraper

Double the effect of scraping, even in the environment of heavy cutting, foreign matter is completely excluded from the slider.

Table 2.19 Thickness of oil scraper

Specification	Thickness(t ₁)(mm)	Specification	Thickness(t ₁)(mm)
TO 15 ES	3	TO 35 ES	3.2
TO 20 ES	3.5	TO 45 ES	4.5
TO 25 ES	3.5	TO 55 ES	4.5
TO 30 ES	3.2	TO 65 ES	6

(4) Metal scraper

It can isolate high-temperature iron filings or machining sparks, and remove large-volume impurities.

Table 2.20 Thickness of metal scraper

Specification	Thickness(t ₂)(mm)	Specification	Thickness(t ₂)(mm)
TO 15 SC	1.5	TO 35 SC	1.5
TO 20 SC	1.5	TO 45 SC	1.5
TO 25 SC	1.5	TO 55 SC	1.5
TO 30 SC	1.5	TO 65 SC	1.5

(5) Bolt cover

In order to prevent cutting powder or foreign matter from entering the block through the bolt hole and affecting the accuracy, the customer must drive the bolt cover into the bolt hole when installing the rail. Each rail is equipped with a bolt cover when it leaves the factory.

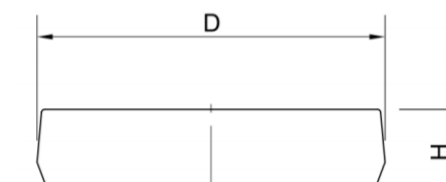


Table 2.21 Bolt cover of the rail

Rail specification	Bolt Screw	Diameter(D)(mm)	Thickness(H) (mm)
TOR 15	M4	7.65	1.1
TOR 20	M5	9.65	2.2
TOR 25	M6	11.15	2.5
TOR 30	M8	14.20	3.3
TOR 35	M8	14.20	3.3
TOR 45	M12	20.25	4.6
TOR 55	M14	23.25	5.5
TOR 65	M16	26.35	5.5

1.9 The Accuracy Tolerance of Mounting Surface

TO series is a circular arc two-point contact linear guide. Its self-aligning feature can absorb some errors of the installation surface without affecting the smoothness of linear motion; the allowable error value of the installation plane is indicated in the following table:

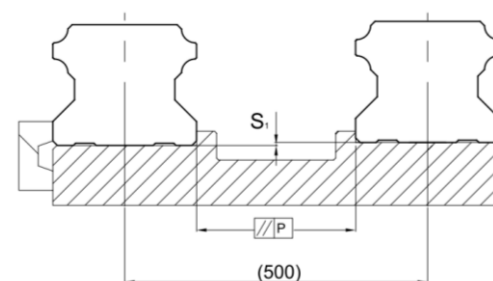


Table 2.22 Allowable parallelism error(P)

Unit: μm

Rail spec.	Preload		
	Z0 preload	ZA preload	ZB preload
TO 15	25	18	–
TO 20	25	20	18
TO 25	30	22	20
TO 30	40	30	27
TO 35	50	35	30
TO 45	60	40	35
TO 55	70	50	45
TO 65	80	60	55

Table 2.23 Allowable up and down level error (S_1)

Unit: μm

Rail spec.	Preload		
	Z0 preload	ZA preload	ZB preload
TO 15	130	85	–
TO 20	130	85	50
TO 25	130	85	70
TO 30	170	110	90
TO 35	210	150	120
TO 45	250	170	140
TO 55	300	210	170
TO 65	350	250	200

1.10 Installation Precautions

(1) Mounting surface shoulder height and Fillet

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

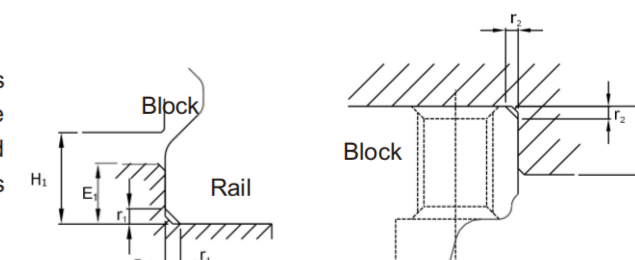


Table 2.24 Shoulder height and chamfer

Specification	Maximum fillet radius of rail end r_1 (mm)	Maximum fillet radius of slider end r_2 (mm)	Shoulder height of rail end E_1 (mm)	Shoulder height of slider end E_2 (mm)	Operating net height of the slider H_1 (mm)
TO 15	0.5	0.5	3	4	4.3
TO 20	0.5	0.5	3.5	5	4.6
TO 25	1.0	1.0	5	5	5.5
TO 30	1.0	1.0	5	5	6
TO 35	1.0	1.0	6	6	7.5
TO 45	1.0	1.0	8	8	9.5
TO 55	1.5	1.5	10	10	13
TO 65	1.5	1.5	10	10	15

(2) Torque Value of Rail Assembly Screws

Whether the rail is locked tightly to the flat reference surface when installing greatly affects the accuracy of the linear guide. Therefore, in order to achieve the purpose of locking each screw, it is recommended to use the following torque values to lock the assembly screws.

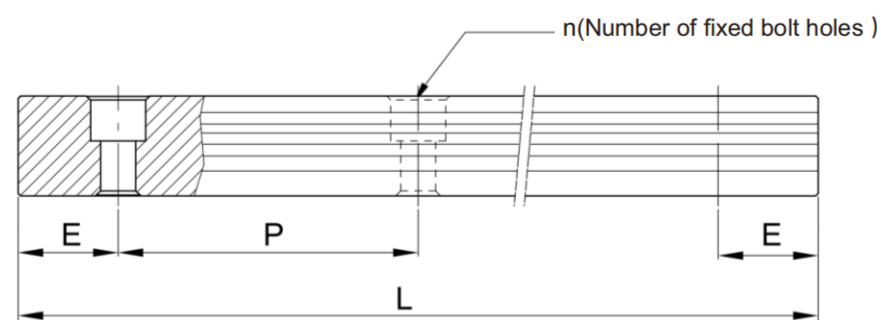
Table 2.25 Torque value

Specification	Screw spec.	Torque value N-cm(kgf-cm)	Specification	Screw spec.	Torque value N-cm(kgf-cm)
TO 15	M4×0.7P×16L	392(40)	TO 35	M8×1.25P×25L	3041(310)
TO 20	M5×0.8P×16L	883(90)	TO 40	M12×1.75P×35L	11772(1200)
TO 25	M6×1P×20L	1373(140)	TO 55	M14×2P×45L	15696(1600)
TO 30	M8×1.25P×25L	3041(310)	TO 65	M16×2P×50L	19620(2000)

Note: 1kgf=9.81N

1.11 Standard and Maximum lengths of Rail

IMTEK has stocks of standard lengths of rails to meet customer needs. If the customer orders non-standard length rails, the dimension of the end face distance E should not be greater than 1/2P to prevent the instability of the rear end of the rail assembly due to the excessive size of E, and reduce the accuracy of the linear guide.



$$L = (n-1) \times P + 2E$$

L: Total length of slide rail (mm)

n: Number of bolt holes

P: Distance between bolt holes (mm)

E: Distance from bolt hole to end face (mm)

Table 2.26 Rail length

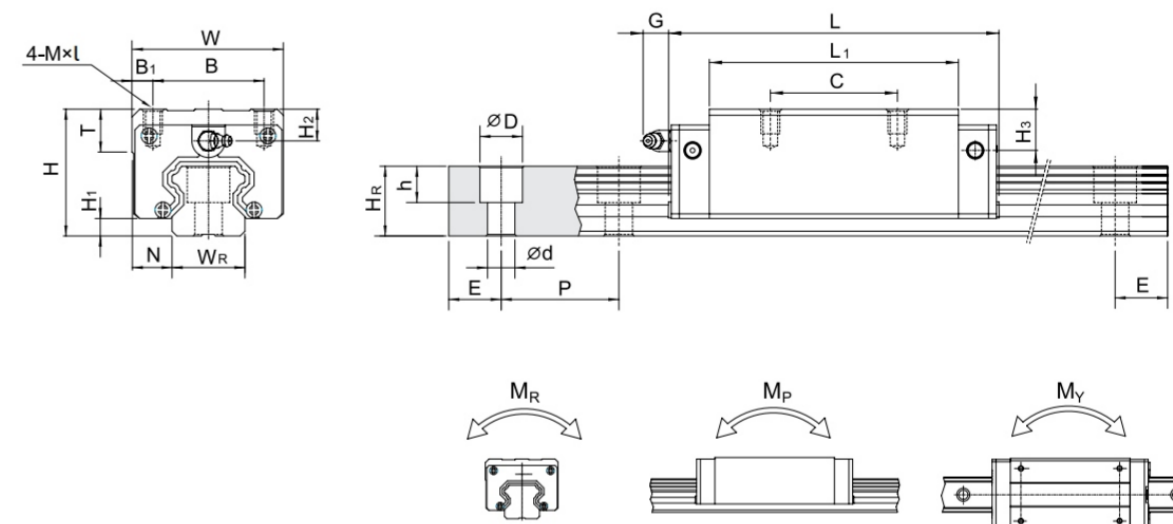
Spec.	TO15	TO20	TO25	TO30	TO35	TO45	TO55	TO65
Standard Length L(n)	160(3)	220(4)	220(4)	280(4)	280(4)	570(6)	780(7)	1270(9)
	220(4)	280(5)	280(5)	440(6)	440(6)	885(9)	1020(9)	1570(11)
	280(5)	340(6)	340(6)	600(8)	600(8)	1200(12)	1260(11)	2020(14)
	340(6)	460(8)	460(8)	760(10)	760(10)	1620(16)	1500(13)	2620(18)
	160(8)	640(11)	640(11)	1000(13)	1000(13)	2040(20)	1980(17)	
	640(11)	820(14)	820(14)	1640(21)	1640(21)	2460(24)	2580(22)	
	820(14)	1000(17)	1000(17)	2040(26)	2040(26)	2985(29)	2940(25)	
		1240(21)	1240(21)	2520(32)	2520(32)			
			1600(27)	3000(38)	3000(38)			
Spacing (P)	60	60	60	80	80	105	120	150
Standard end distance (E)	20	20	20	20	20	22.5	30	35
Max length of standard end distance	4000(67)	4000(67)	4000(57)	3960(50)	3960(50)	3930(38)	3900(32)	3970(26)
The max length	4000	4000	4000	4000	4000	4000	4000	4000

Note:

- In general, the dimension tolerance of E is 0.5~0.5 mm, and the dimension error tolerance of the end distance E of the rail connection piece is 0~0.3 mm.
- The maximum length of the standard end distance refers to the maximum length of the rail where the left and right end distances are both standard end distances.
- If customers need different E size, please contact us.
- Unit: mm

1.12 Dimensions for TO Series

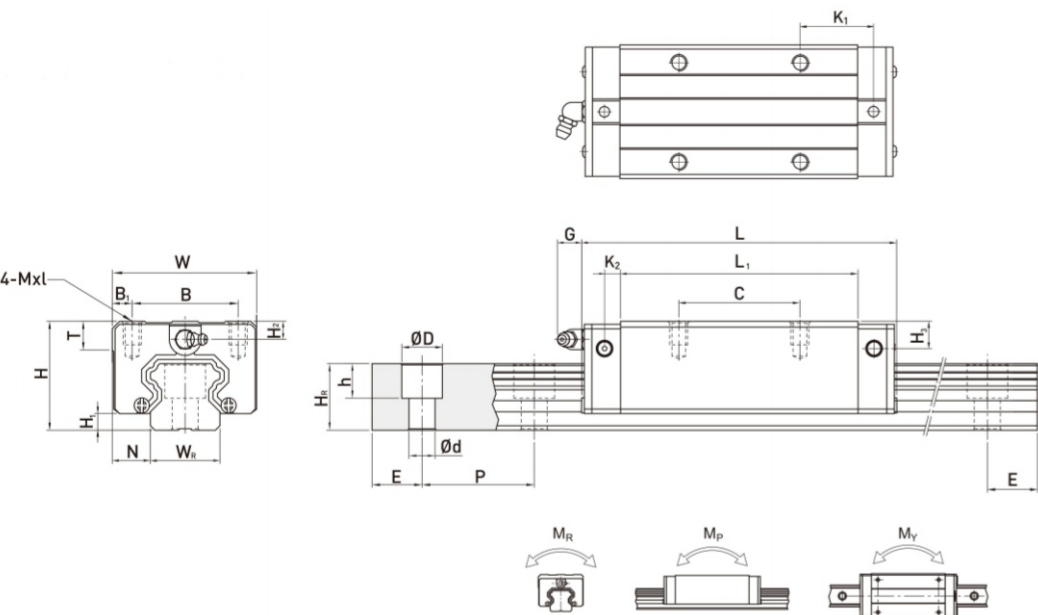
(1)TOH-CA/TOH-HA



Spec.	Dimension of Assembly (mm)			Dimension of Rail (mm)							Mounting Bolt for rail	Dimension of Block (mm)										Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight		
	H	H ₁	N	WR	HR	D	h	d	p	E		(mm)	W	B	B ₁	C	L ₁	L	G	MxL	T			H ₁	H ₂	C(KN)	C ₀ (KN)	MR KN-m	MP KN-m
TOH 15CA	28	4.3	9.5	15	15	7.5	5.3	4.5	60	20	M4x16	34	26	4	26	39.4	61.4	5.3	M4x5	6	7.95	7.7	14.7	23.47	0.12	0.10	0.10	0.18	1.45
TOH 20CA	30	4.6	12	20	17.5	9.5	8.5	6	60	20	M5x16	44	32	6	36	50.5	77.5	12	M5x6	8	6	6	27.1	36.68	0.27	0.20	0.20	0.3	2.21
TOH 20HA															50	65.2	92.2						32.7	47.96	0.35	0.35	0.35	0.39	
TOH 25CA	40	5.5	12.5	22	22	11	9	7	60	20	M6x20	48	35	6.5	35	58	84	12	M6x8	8	10	9	34.9	52.82	0.42	0.33	0.33	0.51	3.21
TOH 25HA															50	78.6	104.6						42.2	69.07	0.56	0.57	0.57	0.69	
TOH 30CA	45	6	16	28	26	14	12	9	80	20	M8x25	60	40	10	40	70	97.4	12	M8x10	8.5	9.5	13.8	48.5	71.87	0.66	0.53	0.53	0.88	4.47
TOH 30HA															60	93	120.4						58.6	93.99	0.88	0.92	0.92	1.16	
TOH 35CA	55	7.5	18	34	29	14	12	9	80	20	M8x25	70	50	10	50	80	112.4	12	M8x12	10.2	16	19.6	64.6	93.88	1.16	0.81	0.81	1.45	6.3
TOH 35HA															72	105.8	138.2						77.9	122.77	1.54	1.40	1.40	1.92	
TOH 45CA	70	9.5	20.5	45	38	20	17	14	105	22.5	M12x35	86	60	13	60	97	139.4	12.9	M10x17	16	18.5	30.5	103.8	146.71	1.98	1.55	1.55	2.73	10.41
TOH 45HA															80	128.8	171.2						125.3	191.85	2.63	2.68	2.68	3.61	
TOH 55CA	80	13	23.5	53	44	23	20	16	120	30	M14x45	100	75	12.5	75	117.7	166.7	12.9	M12x18	17.5	22	29	125.3	211.23	3.69	2.64	2.64	4.17	15.08
TOH 55HA															95	155.8	204.8						184.9	276.23	4.88	4.57	4.57	5.49	
TOH 65CA	90	15	31.5	63	53	26	22	18	150	35	M16x50	126	76	25	70	144.2	200.2	12.9	M16x20	25	15	15	213.2	287.48	6.65	4.27	4.27	7	21.18
TOH 65HA															120	203.6	259.6						277.8	420.17	9.38	7.38	7.38	9.82	

Note: 1kgf=9.81N

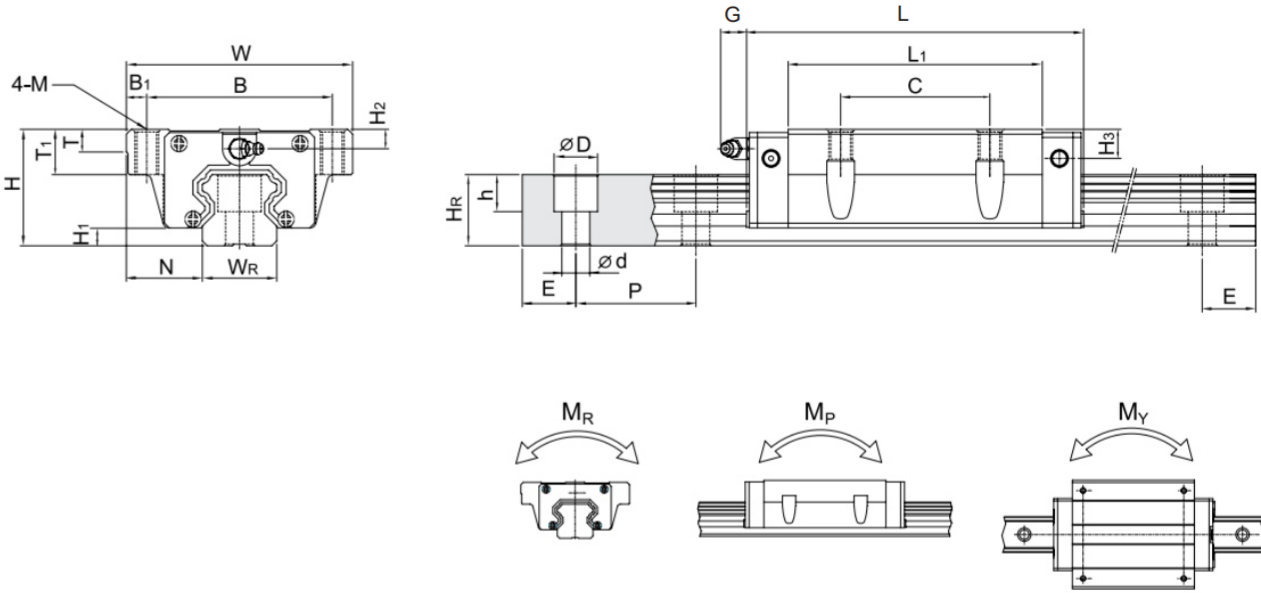
(2)TOL-CA/TOL-HA



Spec.	Dimension of Assembly (mm)			Dimension of Block (mm)										Dimension of Rail (mm)								Mounting Bolt for rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight		
	H	H _i	N	W	B	B _i	C	L _i	L	G	MxL	T	H ₂	H ₃	W _R	H _R	D	h	d	p	E				(mm)	C(KN)	C ₀ (KN)	MR KN-m	MP KN-m	MY KN-m
TOL 15CA	24	4.3	9.5	34	26	4	26	39.4	61.4	5.3	M4x4	6	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4x16		11.38	25.38	0.17	0.15	0.15	0.14	1.45
TOL 25CA	36	5.5	12.5	48	35	6.5	35	58	84	12	M6x6	8	6	5	22	22	11	9	7	60	20	M6x20		26.48	56.19	0.64	0.51	0.51	0.42	3.21
TOL 25HA							50	78.6	104.6															32.75	76	0.87	0.88	0.88	0.57	
TOL 30CA	42	6	16	60	40	10	40	70	97.4	12	M8x10	8.5	6.5	10.8	28	26	14	12	9	80	20	M8x25		38.74	83.06	1.06	0.85	0.85	0.78	4.47
TOL 30HA							60	93	120.4															47.27	110.13	1.4	1.47	1.47	1.03	
TOL 35CA	48	7.5	18	70	50	10	50	80	112.4	12	M8x12	10.2	9	12.6	34	29	14	12	9	80	20	M8x25		49.52	102.87	1.73	1.2	1.2	1.14	6.3
TOL 35HA							72	105.8	138.2															60.21	136.31	2.29	2.08	2.08	1.52	
TOL 45CA	60	9.5	20.5	86	60	13	60	97	139.4	12.9	M10x17	16	8.5	20.5	45	38	20	17	14	105	22.5	M12x35		77.57	155.93	3.01	2.35	2.35	2.08	10.41
TOL 45HA							80	128.8	171.2															94.54	207.12	4	4.07	4.07	2.75	
TOL 55CA	70	13	23.5	100	75	12.5	75	117.7	166.7	12.9	M12x18	17.5	12	19	53	44	23	20	16	120	30	M14x45		114.44	227.81	5.66	4.06	4.06	3.25	15.08
TOL 55HA							95	155.8	204.8															139.35	301.26	7.49	7.01	7.01	4.27	

Note:1kgf=9. 81N

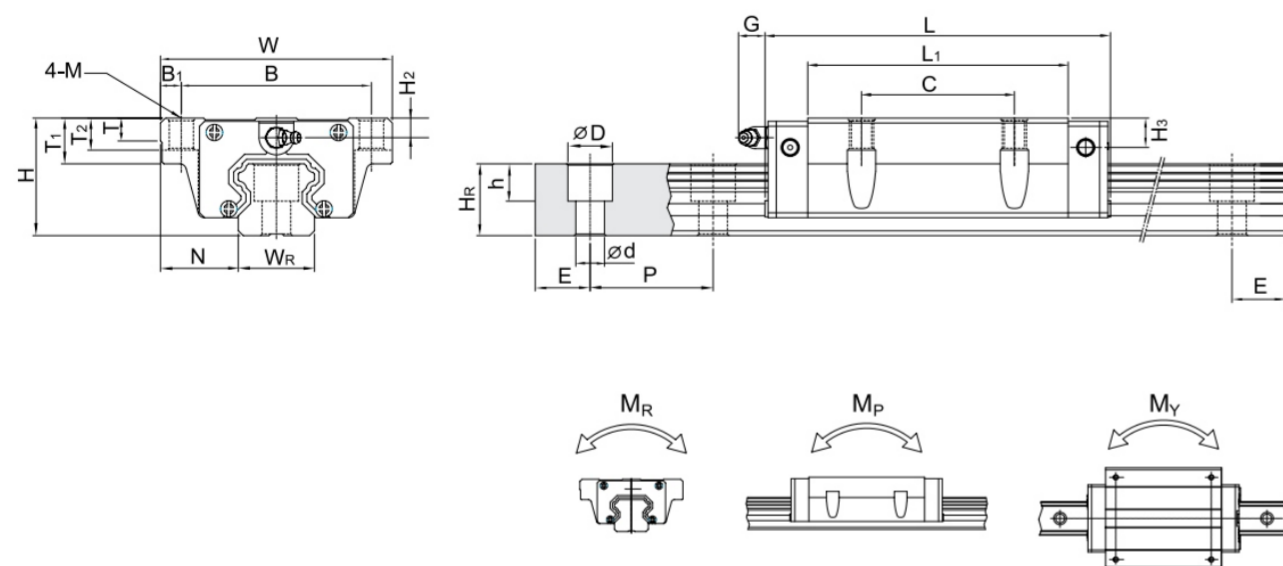
(3)TOW-CA/TOW-HA



Spec.	Dimension of Assembly (mm)			Dimension of Block (mm)												Dimension 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	G	M	T	T ₁	H ₂	H ₃	W _R	H _R	D	h	d	p	E	(mm)				C(kN)	Co(kN)	M _R kN-m	M _P kN-m	M _Y kN-m
TOW 15CA	24	4.3	16	47	38	4.5	30	39.4	61.4	5.3	M5	6	8.9	3.95	3.7	15	15	7.5	5.3	4.5	60	20	M4×16	14.7	23.47	0.12	0.1	0.1	0.17	1.45	
TOW 20CA	30	4.6	21.5	63	53	5	40	50.5	77.5	12	M6	8	10	6	6	20	17.5	9.5	8.5	6	60	20	M5×16	27.1	36.68	0.27	0.2	0.2	0.4	2.21	
TOW 20HA								65.2	92.2																32.7	47.96	0.35	0.35	0.35		0.52
TOW 25CA	36	5.5	23.5	70	57	6.5	45	58	84	12	M8	8	14	6	6	23	22	11	9	7	60	20	M6×20	34.9	52.82	0.42	0.33	0.33	0.59	3.21	
TOW 25HA								78.6	104.6																42.2	69.07	0.56	0.57	0.57		0.8
TOW 30CA	42	6	31	90	72	9	52	70	97.4	12	M10	8.5	16	6.5	6.5	28	26	14	12	9	80	20	M8×25	48.5	71.87	0.66	0.53	0.53	1.09	4.47	
TOW 30HA								93	120.4																58.6	93.99	0.88	0.92	0.92		1.44
TOW 35CA	48	7.5	33	100	82	9	62	80	112.4	12	M10	10.1	18	9	9	34	29	14	12	9	80	20	M8×25	64.6	93.88	1.16	0.81	0.81	1.56	6.3	
TOW 35HA								105.8	138.2																77.9	122.77	1.54	1.4	1.4		2.06
TOW 45CA	60	9.5	37.5	120	100	10	80	97	139.4	12.9	M12	15.1	22	8.5	8.5	45	38	20	17	14	105	22.5	M12×35	103.8	146.71	1.98	1.55	1.55	2.79	10.41	
TOW 45HA								128.8	171.2																125.3	191.85	2.63	2.68	2.68		3.69
TOW 55CA	70	13	43.5	140	116	12	95	117.7	166.7	12.9	M14	17.5	26.5	12	12	53	44	23	20	16	120	30	M14×45	125.3	211.23	3.69	2.64	2.64	4.52	15.08	
TOW 55HA								155.8	204.8																184.9	276.23	4.88	4.57	4.57		5.96
TOW 65CA	90	15	53.5	170	142	14	110	144.2	200.2	12.9	M16	25	37.5	15	15	63	53	26	22	18	150	35	M16×50	213.2	287.48	6.65	4.27	4.27	9.17	21.18	
TOW 65HA								203.6	259.6																277.8	420.17	9.38	7.38	7.38		12.89

Note:1kgf=9.81N

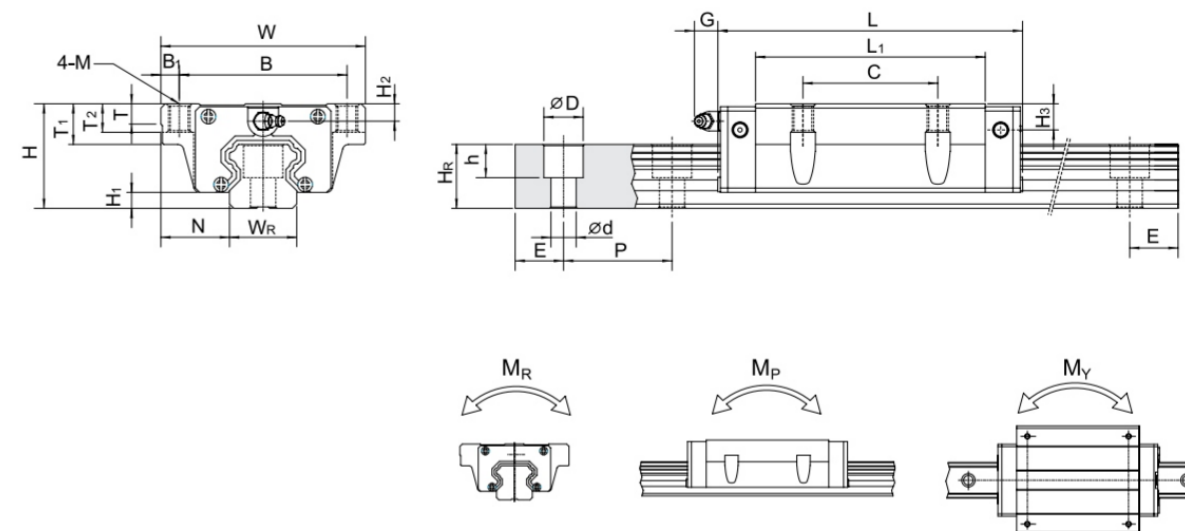
(4)TOW-CB/TOW-HB



Spec.	Dimension of Assembly (mm)			Dimension of Rail (mm)							Mounting Bolt for rail	Dimension of Block (mm)														Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment				Weight	
	H	H ₁	N	W _a	H _a	D	h	d	p	E	(mm)	W	B	B ₁	C	L ₁	L	G	M	T	T ₁	T ₂	H ₁	H ₂	C ₀ (kN)	C ₀ (kN)	MR kN-m	MP kN-m	MY kN-m	Block kg	Rail kg/m		
TOW 15CB	24	4.3	16	15	15	7.5	5.3	4.5	60	20	M4x16	47	38	4.5	30	39.4	61.4	5.3	f 4.5	6	8.9	7	3.95	3.7	14.7	23.47	0.12	0.10	0.10	0.17	1.45		
TOW 20CB	30	4.6	21.5	20	17.5	9.5	8.5	6	60	20	M5x16	63	53	5	40	50.5	77.5	12	f 6	8	10	9.5	6	6	27.1	36.68	0.27	0.20	0.20	0.40	2.21		
TOW 20HB																65.2	92.2								32.7	47.96	0.35	0.35	0.35	0.52			
TOW 25CB	36	5.5	23.5	23	22	11	9	7	60	20	M6x20	70	57	6.5	45	58	84	12	f 7	8	14	10	6	5	34.9	52.82	0.42	0.33	0.33	0.59	3.21		
TOW 25HB																78.6	104.6								42.2	69.07	0.56	0.57	0.57	0.80			
TOW 30CB	42	6	31	28	26	14	12	9	80	20	M8x25	90	72	9	52	70	97.4	12	f 9	8.5	16	10	6.5	10.8	48.5	71.87	0.66	0.53	0.53	1.09	4.47		
TOW 30HB																93	120.4								58.6	93.99	0.88	0.92	0.92	1.44			
TOW 35CB	48	7.5	33	34	29	14	12	9	80	20	M8x25	100	82	9	62	80	112.4	12	f 9	10.1	18	13	9	12.6	64.6	93.88	1.16	0.81	0.81	1.56	6.3		
TOW 35HB																105.8	138.2								77.9	122.77	1.54	1.40	1.40	2.06			
TOW 45CB	60	9.5	37.5	45	38	20	17	14	105	22.5	M12x35	120	100	10	80	97	139.4	12.9	f 11	15.1	22	15	8.5	20.5	103.8	146.71	1.98	1.55	1.55	2.79	10.41		
TOW 45HB																128.8	171.2								125.3	191.85	2.63	2.68	2.68	3.69			
TOW 55CB	70	13	43.5	53	44	23	20	16	120	30	M14x45	140	116	12	95	117.7	166.7	12.9	f 14	17.5	26.5	17	12	19	125.3	211.23	3.69	2.64	2.64	4.52	15.08		
TOW 55HB																155.8	204.8								184.9	276.23	4.88	4.57	4.57	5.96			
TOW 65CB	90	15	53.5	63	53	26	22	18	150	35	M16x50	170	142	14	110	144.2	200.2	12.9	f 16	25	37.5	23	15	15	213.2	287.48	6.65	4.27	4.27	9.17	21.18		
TOW 65HB																203.6	259.6								277.8	420.17	9.38	7.38	7.38	12.89			

Note:1kgf=9. 81N

(5)TOW-CC/TOW-HC



Spec.	Dimension of Assembly (mm)			Dimension of Rail (mm)							Mounting Bolt for rail	Dimension of Block (mm)													Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment				Weight	
	H	Ht	N	WR	Hr	D	h	d	p	E	(mm)	W	B	B1	C	L1	L	G	M	T	T1	T2	H2	H3	C0(kN)	C0(kN)	MR kN-m	MP kN-m	MY kN-m	Block kg	Ra kg/	
TOW 15CC	24	4.3	16	15	15	7.5	5.3	4.5	60	20	M4×16	47	38	4.5	26	39.4	61.4	5.3	M5	6	8.9	6.95	3.95	3.7	14.7	23.47	0.12	0.1	0.1	0.17	1.45	
TOW 20CC	30	4.6	21.5	20	17.5	9.5	8.5	6	60	20	M5×16	63	53	5	40	50.5	77.5	12	M6	8	10	9.5	6	6	27.1	36.68	0.27	0.2	0.2	0.4	2.21	
TOW 20HC	30	4.6	21.5	20	17.5	9.5	8.5	6	60	20	M5×16	63	53	5	40	65.2	92.2								32.7	47.96	0.35	0.35	0.35	0.52	0.5	
TOW 25CC	36	5.5	23.5	23	22	11	9	7	60	20	M6×20	70	57	6.5	45	58	84	12	M8	8	14	10	6	5	34.9	52.82	0.42	0.33	0.33	0.59	3.21	
TOW 25HC	36	5.5	23.5	23	22	11	9	7	60	20	M6×20	70	57	6.5	45	78.6	104.6								42.2	69.07	0.56	0.57	0.57	0.8		
TOW 30CC	42	6	31	28	26	14	12	9	80	20	M8×25	90	72	9	52	70	97.4	12	M10	8.5	16	10	6.5	10.8	48.5	71.87	0.66	0.53	0.53	1.09	4.47	
TOW 30HC	42	6	31	28	26	14	12	9	80	20	M8×25	90	72	9	52	93	120.4								58.6	93.99	0.88	0.92	0.92	1.44		
TOW 35CC	48	7.5	33	34	29	14	12	9	80	20	M8×25	100	82	9	62	80	112.4	12	M10	10.1	18	13	9	12.6	64.6	93.88	1.16	0.81	0.81	1.56	6.3	
TOW 35HC	48	7.5	33	34	29	14	12	9	80	20	M8×25	100	82	9	62	105.8	138.2								77.9	122.77	1.54	1.4	1.4	2.06		
TOW 45CC	60	9.5	37.5	45	38	20	17	14	105	22.5	M12×35	120	100	10	80	97	139.4	12.9	M12	15.1	22	15	8.5	20.5	103.8	146.71	1.98	1.55	1.55	2.79	10.41	
TOW 45HC	60	9.5	37.5	45	38	20	17	14	105	22.5	M12×35	120	100	10	80	128.8	171.2								125.3	191.85	2.63	2.68	2.68	3.69		
TOW 55CC	70	13	43.5	53	44	23	20	16	120	30	M14×45	140	116	12	95	117.7	166.7	12.9	M14	17.5	26.5	17	12	19	125.3	211.23	3.69	2.64	2.64	4.52	15.08	
TOW 55HC	70	13	43.5	53	44	23	20	16	120	30	M14×45	140	116	12	95	155.8	204.8								184.9	276.23	4.88	4.57	4.57	5.96		
TOW 65CC	90	15	53.5	63	53	26	22	18	150	35	M16×50	170	142	14	110	144.2	200.2	12.9	M16	25	37.5	23	15	15	213.2	287.48	6.65	4.27	4.27	9.17	21.18	
TOW 65HC	90	15	53.5	63	53	26	22	18	150	35	M16×50	170	142	14	110	203.6	259.6								277.8	420.17	9.38	7.38	7.38	12.89		

Note:1kgf=9.81N