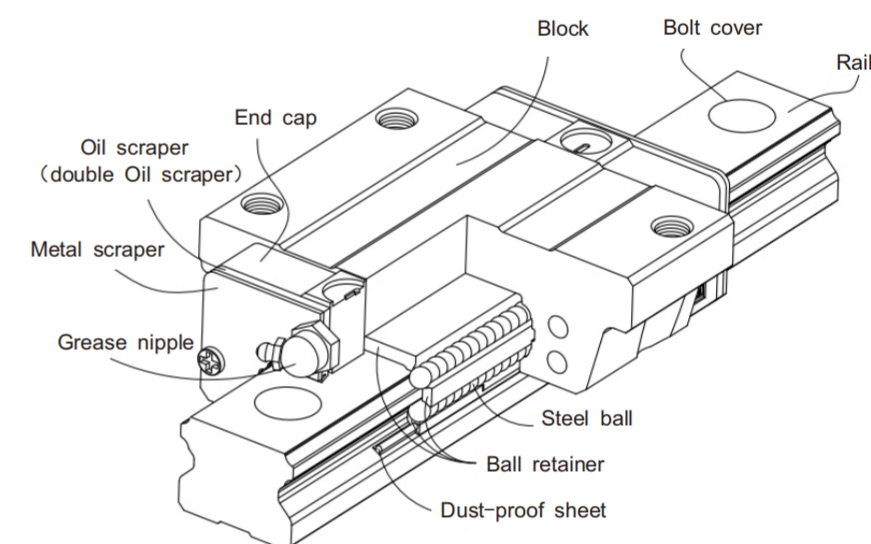


2. TT Series - Low Profile Ball Type Linear Guideway

2.1 Features of TT Series Linear Guideway

The TT series uses four rows of steel balls to bear the load design, which makes it have high rigidity and high load characteristics. It also has four-direction load characteristics and automatic centering functions, which can absorb assembly errors of the mounting surface and obtain high-precision requirements; In addition to reducing the combined height and shortening the length of the slider, it is very suitable for high-speed automation industrial machinery and small equipment with space requirements. The slider is equipped with a steel ball retainer to prevent the steel ball from falling off. This design not only facilitates the customer to install the linear guide, but also does not cause the steel ball to fall off when the slider is removed, and it is interchangeable when the accuracy permits.

2.2 TT Series Body Structure

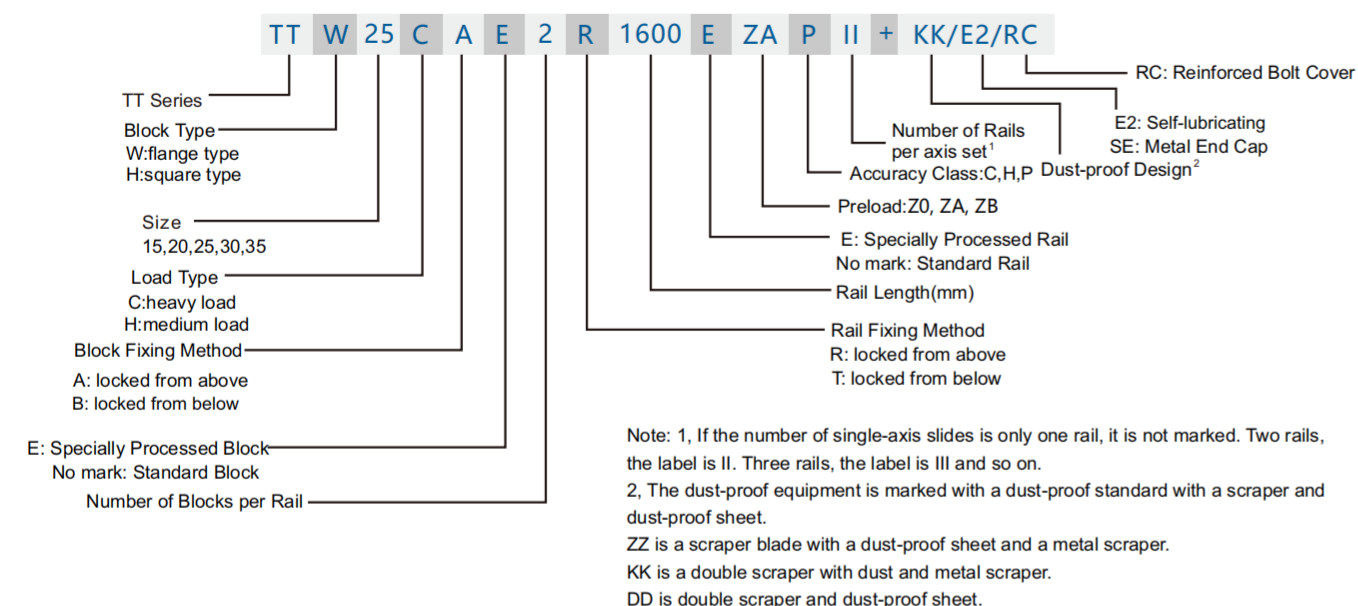


- Rolling circulation system: slider, rail, end cap, steel ball, steel ball retainer
- Lubrication system: grease nipple, oil pipe joint
- Dust-proof system: oil scraper, dust-proof sheet, rail bolt cover, metal scraper

2.3 TT Series Type Specification

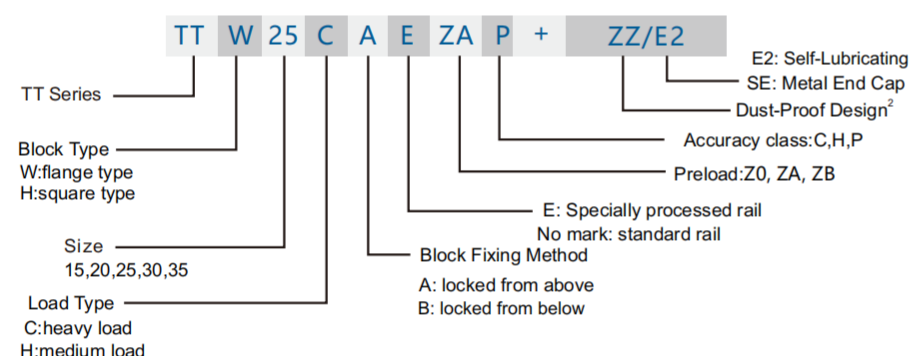
The TT series is divided into two types: non-interchangeable and interchangeable. The two specifications are the same. The main difference is that the interchangeable model blocks and rails can be used interchangeably, which is convenient, but the combination accuracy cannot be achieved as non-interchangeable 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

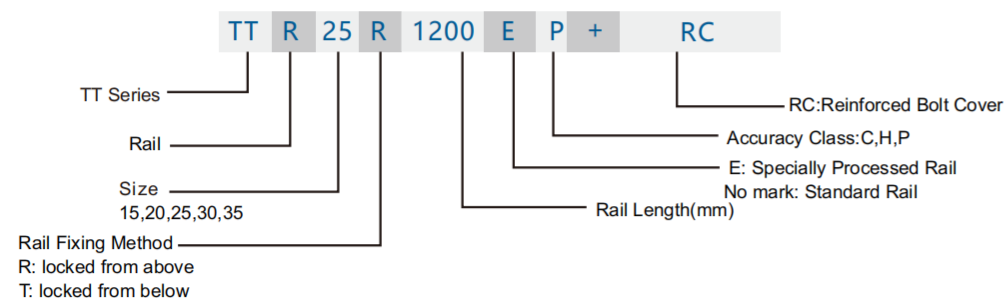


(2)Interchangeable linear guide product model

○ Interchangeable block product model



○ Interchangeable rail product model



2.4 TT Series Type

(1) Block type

IMTEK provides two types of blocks, flange type(W) and square type(H).

Table 2.27 Slider type

Type	Spec.	Shape	Height (mm)	Length (mm)	Application
Square	TTH-SA TTH-CA		24	100	- Automation device - High-speed transportation equipment - Precision measuring instruments - Semiconductor equipment
			↓	↓	
Flange	TTW-SA TTW-CA		24	100	
			↓	↓	
	TTW-SB TTW-CB		24	100	
			↓	↓	

(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.

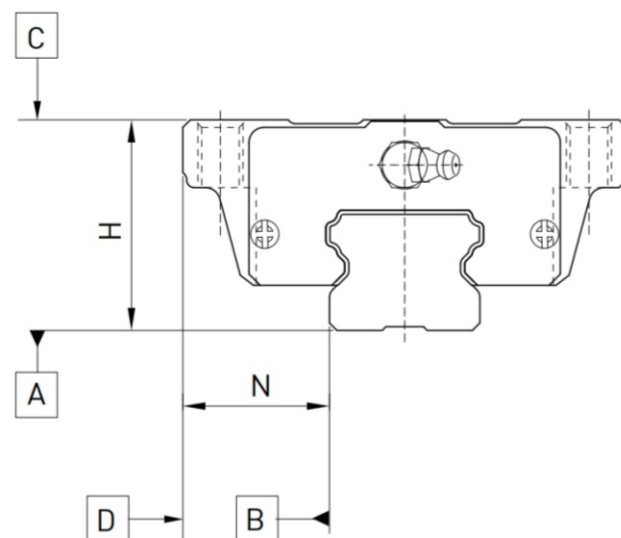
Table 2.28 Rail type

Above locking bolt hole	Bottom locking bolt hole

2.5 Accuracy class

The precision of TT 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 2.29 Accuracy table of matched complete sets

Unit:mm

Spec.	TT-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 2.33)				
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.33)				

Table 2.30 Accuracy table of matched complete sets

Unit:mm

Spec.	TT-25,30				
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 2.33)				
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.33)				

(2) Accuracy of Interchangeable Linear Guide

Table 2.31 Accuracy table of complete sets (or separate parts)

Unit: mm

Spec.	TT-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 2.33)		
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.33)		

Table 2.32 Accuracy table of complete sets (or separate parts)

Unit: mm

Spec.	TT-25, 30		
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 2.33)		
Running parallelism of block surface D to surface B	Running Parallelism (See table 2.33)		

(3) Accuracy of Running parallelism

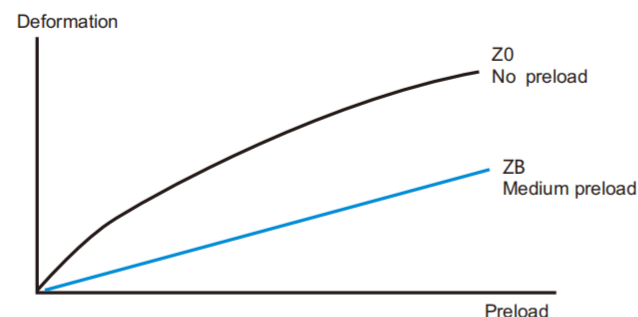
Table 2.33 Parallelism of running

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

2.6 Preload

(1) Preload Definition

Preload refers to preload 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 load 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. ($P=0.07C$ preload).



(2) Preload Level

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

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

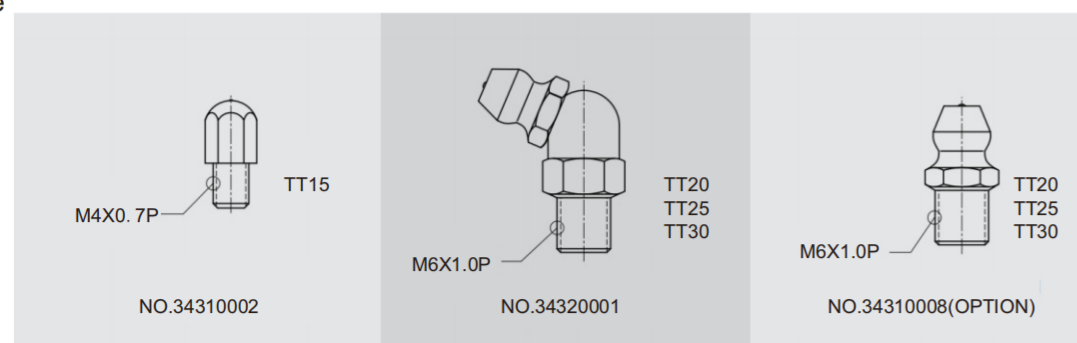
Table 2.34 Preload level

Preload Level	Mark	Preload Value	Using Condition
Very Light Preload	Z0	$0 \sim 0.02C$	Certain load direction, low impact, low precision required
Light Preload	ZA	$0.03 \sim 0.05C$	Low load and high precision required
Medium Preload	ZB	$0.06C \sim 0.08C$	High rigidity required, with vibration and impact

Level	Interchangeable Guideway	Non-interchangeable Guideway
Preload level	Z0, ZA	Z0, ZA, ZB

2.7 Lubrication Method

○ Nipple Type



○ Position

According to customer needs, install a grease nipple at the front or rear end of the slider for manual lubrication. The TT series has a reserved position on the side of the end cover to install a grease nipple (usually a straight grease nipple) to provide lateral lubrication. It is recommended that the position of the lateral lubrication be on the non-side reference side, but it can also be placed on the side reference side if there are special needs. If customers have the above requirements, please contact us. The TT series also reserve the oil hole position at the top of the end cover. If the customer wants to supply oil from the top of the end cover, please use a metal needle with a diameter of 0.8mm to preheat the oil hole at the specified position and then seal it. The ring can be installed in the recess. Avoid using a drill to penetrate the oil hole, as debris may contaminate the oil passage. If you use a linear guide that automatically supplies lubricating grease to the pipe, you can install the oil pipe joint according to the connecting pipe type.

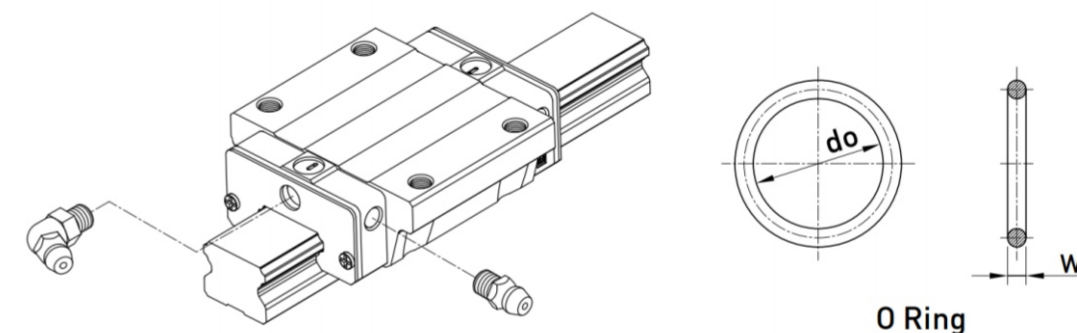


Table 2.36 O-Ring specifications and the maximum allowable depth of perforation

Specification	O-Ring Spec. d_o (mm)	W (mm)	Maximum allowable depth of perforation T_{max} (mm)
TT15	2.5 ± 0.15	1.5 ± 0.15	6.9
TT20	4.5 ± 0.15	1.5 ± 0.15	8.4
TT25	4.5 ± 0.15	1.5 ± 0.15	10.4
TT30	4.5 ± 0.15	1.5 ± 0.15	10.4

○ The Oil amount for a block filled with grease

Table 2.37 The oil amount for a block filled with grease

Specification	Medium load (cm^3)	Heavy load (cm^3)	Specification	Medium load (cm^3)	Heavy load (cm^3)
TT15	0.8	1.4	TT25	2.8	4.6
TT20	1.5	2.4	TT30	3.7	6.3

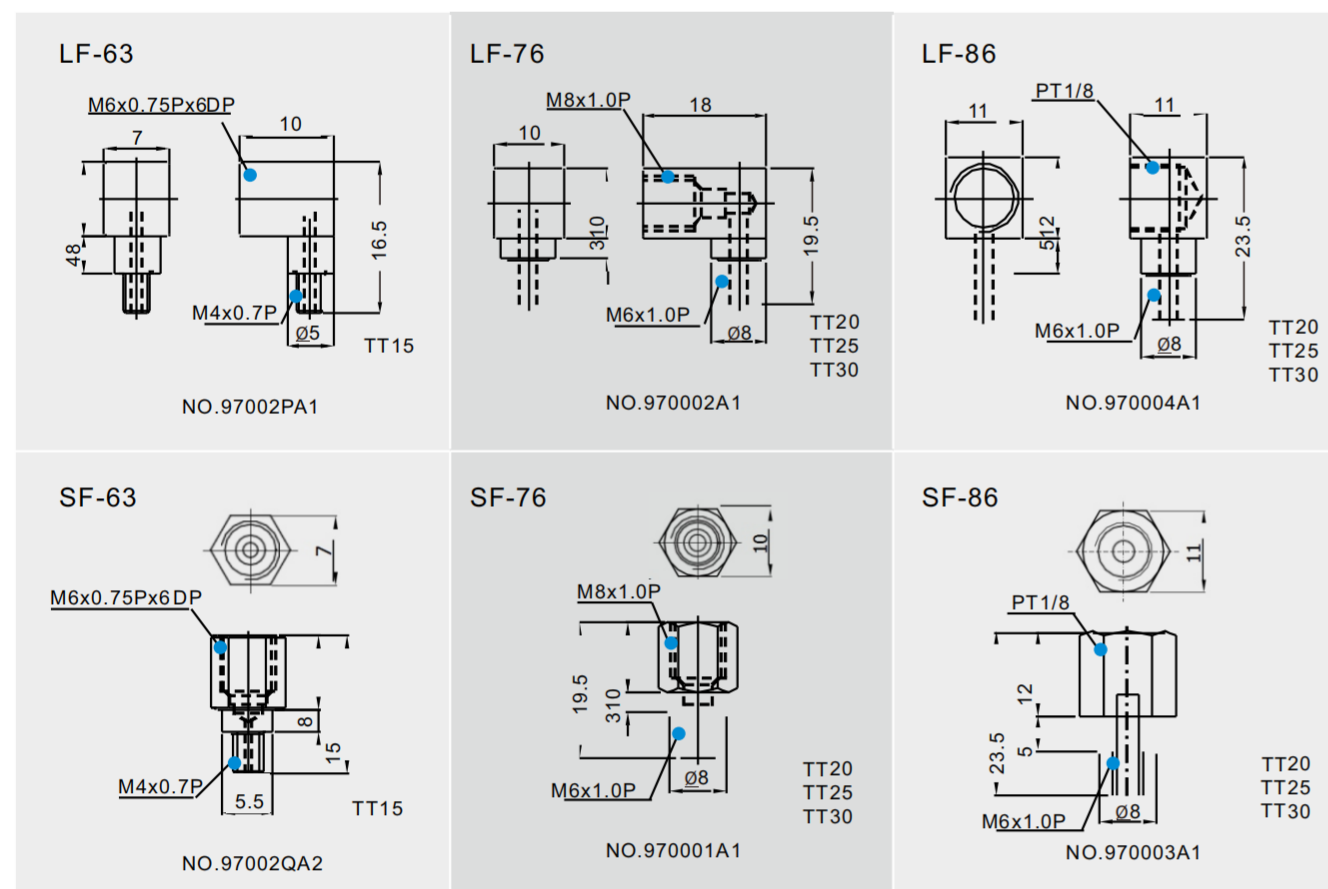
Lubrication frequency

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

Oil

The recommended viscosity of oil is about 32-150cSt. If you need to use oil-type lubrication, please inform us.

Types of Oil piping joint



Oil supply rate

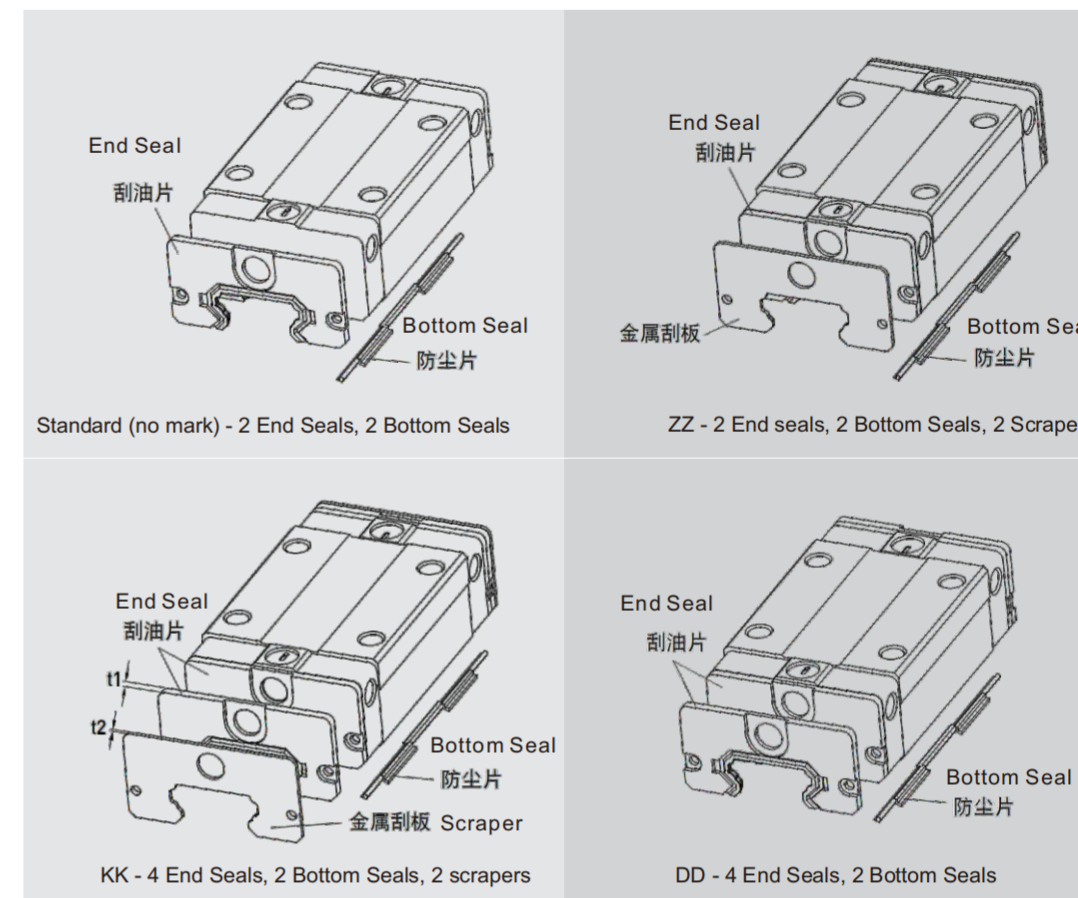
Table 2.38 oil supply rate

Specification	Supply rate (cm ³ /hr)	Specification	Supply rate (cm ³ /hr)
TT15	0.1	TT25	0.167
TT20	0.133	TT30	0.2

Dust-proof Equipment

(1) Dust-proof Equipment Code

If the following dust-proof equipment is 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 2.39 oil scraper

Specification	Increased thickness (t ₁) (mm)	Specification	Increased thickness (t ₁) (mm)
TT15ES	2	TT25ES	2
TT20ES	2	TT30ES	2

(4)Metal scraper

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

Table 2.40 Thickness of metal scraper

Specification	Increased thickness (t_2) (mm)	Specification	Increased thickness (t_2) (mm)
TT15SC	0.8	TT25SC	1
TT20SC	0.8	TT30SC	1

(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.

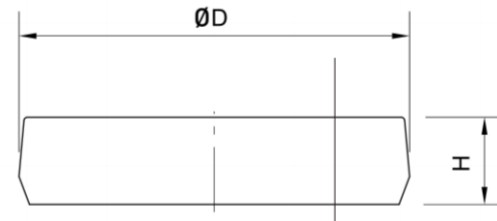


Table 2.41 Bolt cover of the rail

Rail Specification	Bolt Size	Diameter(D) (mm)	Thickness(H) (mm)
TTR15R	M3	6.15	1.1
TTR15U	M4	7.65	1.2
TTR20R	M5	9.65	2.2
TTR25R	M6	11.15	2.5
TTR30R	M6	11.15	2.5
TTR30U	M8	14.20	3.5

2.9 The Accuracy Tolerance of Mounting Surface

TT 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:

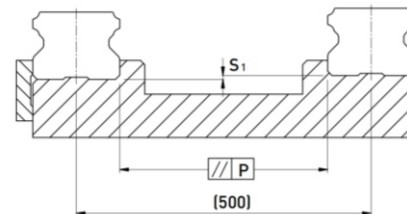


Table 2.42 Allowable parallelism error(P)

Unit:µm

Specification	Preload		
	Z0	ZA	ZB
TT15	25	18	-
TT20	25	20	18
TT25	30	22	20
TT30	40	30	27

Table 2.43 Allowable up and down level error (S_1)

Unit:µm

Specification	Preload		
	Z0	ZA	ZB
TT15	130	85	-
TT20	130	85	50
TT25	130	85	70
TT30	170	110	90

2.10 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 fillet part of the rail or block. As long as the recommended shoulder heights and fillets are followed, installation inaccuracies should be eliminated.

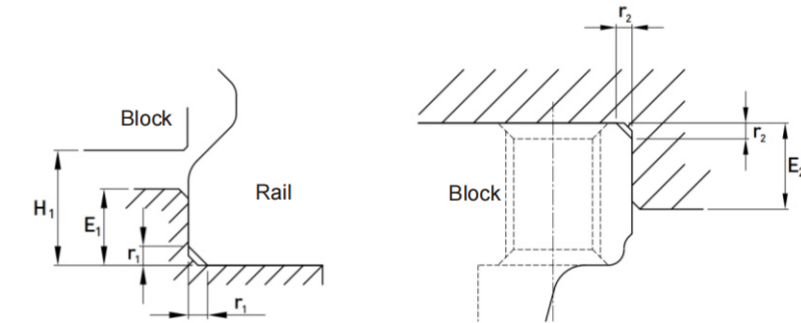


Table 2.44 Shoulder height and fillet

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)
TT 15	0.5	0.5	2.7	5.0	4.5
TT 20	0.5	0.5	5.0	7.0	6.0
TT 25	1.0	1.0	5.0	7.5	7.0
TT 30	1.0	1.0	7.0	7.0	10.0

(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.

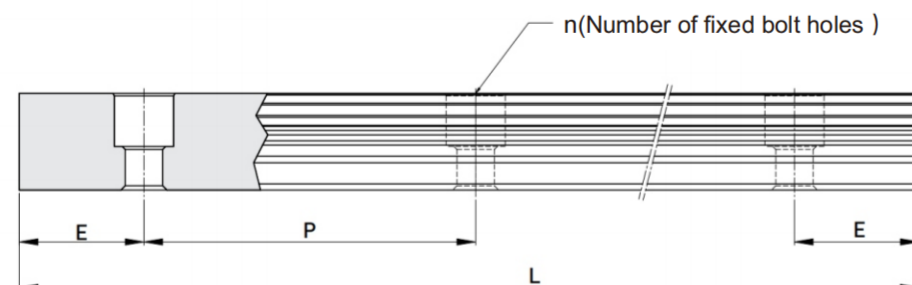
Table 2.45 Torque value

Specification	Screw spec.	Torque value N·cm(kgf·cm)	Specification	Screw spec.	Torque value N·cm(kgf·cm)
TT 15R	M3×0.5P×16L	186(19)	TT 25R	M6×1P×20L	1373(140)
TT 15U	M4×0.7P×16L	392(40)	TT 30R	M6×1P×25L	1373(140)
TT 20R	M5×0.8P×16L	883(90)	TT 30U	M8×1.25P×25L	3041(310)

Note: 1kgf=9.81N

2.11 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 2.46 Rail length

Item	TTR15	TTR20	TTR25	TTR30
Standard Length L(n)	160(3)	220(4)	220(4)	280(4)
	220(4)	280(5)	280(5)	440(6)
	280(5)	340(6)	340(6)	600(8)
	340(6)	460(8)	460(8)	760(10)
	160(8)	640(11)	640(11)	1000(13)
	640(11)	820(14)	820(14)	1640(21)
	820(14)	1000(17)	1000(17)	2040(26)
		1240(21)	1240(21)	2520(32)
		1600(27)	1600(27)	3000(38)
Spacing (P)	60	60	60	80
Standard End Distance (E)	20	20	20	20
Max length of standard end distance	4000(67)	4000(67)	4000(67)	3960(50)
The max length	4000	4000	4000	4000

Note:

1. 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.

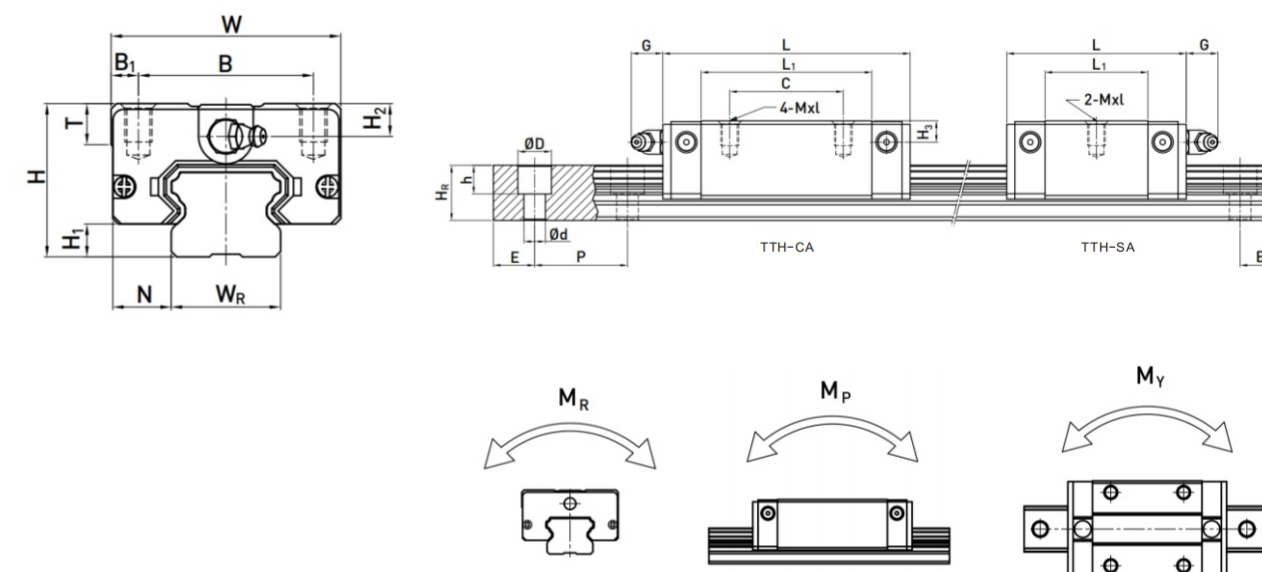
2. The maximum length of the standard end distance refers to the maximum length of the rail where the left and right end distances are both standard end distances.

3. If customers need different E size, please contact us.

4. Unit: mm

2.12 Dimensions for TT Series

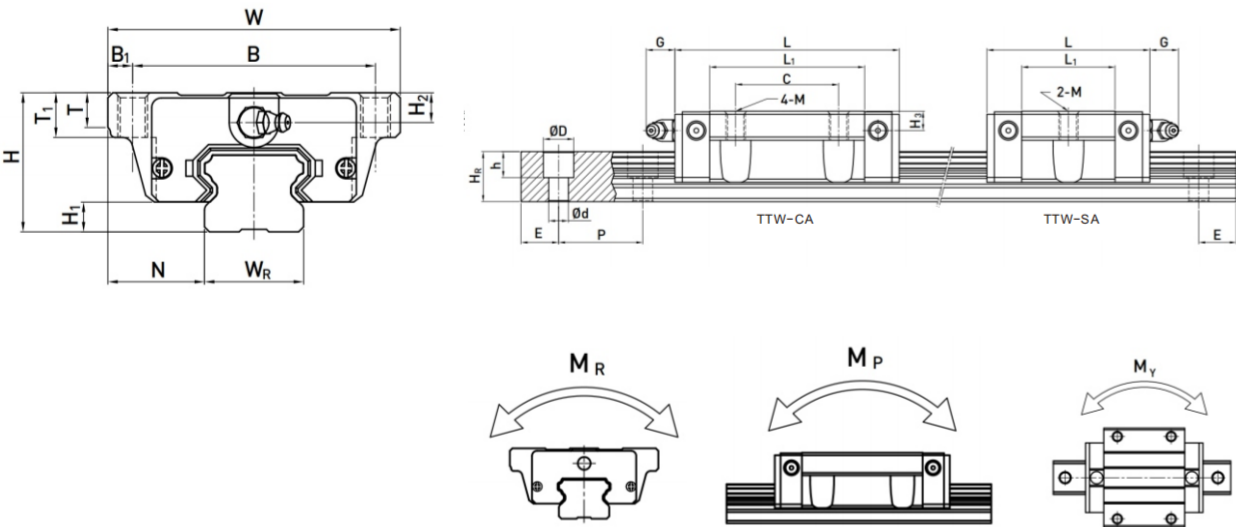
(1)TTH-SA/TTH-CA



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	M	T	H ₂	H ₃			C(KN)	Co(KN)	MR KN-m	MP KN-m	MY KN-m
TTH 15SA	24	4.5	9.5	15	12.5	6	4.5	4.5	60	20	M4×16	34	26	4	-	23.1	40.1	5.7	M4×6	6	5.5	6	5.35	9.40	0.08	0.04	0.04	0.09	1.25	
TTH 15CA															26	39.8	56.8						7.83	16.19	0.13	0.10	0.10	0.15		
TTH 20SA	28	6	11	20	15.5	9.5	8.5	6	60	20	M5×16	42	32	5	-	29	50	12	M5×7	7.5	6	6	7.23	12.74	0.13	0.06	0.06	0.15	2.08	
TTH 20CA															32	48.1	69.1						10.31	21.13	0.22	0.16	0.16	0.24		
TTH 25SA	33	7	12.5	22	18	11	9	7	60	20	M6×20	48	35	6.5	-	35.5	59.1	12	M6×9	8	8	8	11.40	19.50	0.23	0.12	0.12	0.25	2.67	
TTH 25CA															35	59	82.6						16.27	32.40	0.38	0.32	0.32	0.41		
TTH 30SA	42	10	16	28	23	11	9	7	80	20	M8×25	60	40	10	-	41.5	69.5	12	M8×12	9	8	9	16.42	28.10	0.40	0.21	0.21	0.45	4.35	
TTH 30CA															40	70.1	98.1						23.70	47.46	0.68	.055	.055	0.76		
TTH 35SA	48	11	18	34	27.5	14	12	9	80	20	M8×25	70	50	10	-	45	75	12	M8×12	10	8.5	8.5	22.66	37.38	0.56	0.31	0.31	0.66	6.14	
TTH 35CA															50	78	108						33.35	64.84	0.98	0.69	0.69	1.13		

Note: 1kgf=9.81N

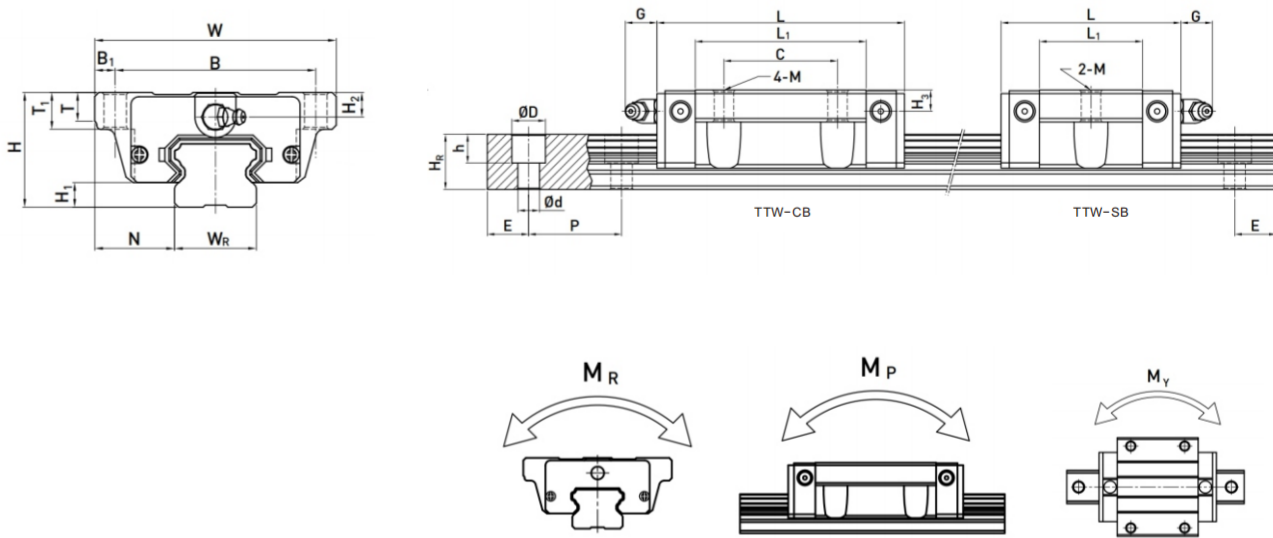
(2)TTW-SA/TTW-CA



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 _i	N	Wr	HR	D	h	d	p	E	(mm)	W	B	B _i	C	L _i	L	G	M	T	T _i	H ₂	H ₃	C(KN)	C ₀ (KN)	MR KN-m	MP KN-m	MY KN-m	Block kg	Rail kg/m
TTW 15SA	24	4.5	18.5	15	12.5	6	4.5	3.5	60	20	M4x16	52	41	5.5	-	23.1	40.1	5.7	M5	5	7	5.5	6	5.35	9.40	0.08	0.04	0.04	0.12	1.25
TTW 15CA															26	39.8	56.8							7.83	16.19	0.13	0.10	0.10	0.21	
TTW 20SA	28	6	19.5	20	15.5	9.5	8.5	6	60	20	M5x16	59	49	5	-	29	50	12	M6	7	9	6	6	7.23	12.74	0.13	0.06	0.06	0.19	2.08
TTW 20CA															32	48.1	69.1							10.31	21.13	0.22	0.16	0.16	0.32	
TTW 25SA	33	7	25	23	18	11	9	7	60	20	M6x20	73	60	6.5	-	35.5	59.1	12	M8	7.5	10	8	8	11.40	19.50	0.23	0.12	0.12	0.35	2.67
TTW 25CA															35	59	82.6							16.27	32.40	0.38	0.32	0.32	0.59	
TTW 30SA	42	10	31	28	23	11	9	7	80	20	M8x25	90	72	9	-	41.5	69.5	12	M10	7	10	8	9	16.42	28.10	0.40	0.21	0.21	0.62	4.35
TTW 30CA															40	70.1	98.1							23.70	47.46	0.68	.055	.055	1.04	
TTW 35SA	48	11	33	34	27.5	14	12	9	80	20	M8x25	100	82	9	-	45	75	12	M12	10	13	8.5	8.5	22.66	37.38	0.56	0.31	0.31	0.84	6.14
TTW 35CA															50	78	108							33.35	64.84	0.98	0.69	0.69	1.45	

Note: 1kgf=9. 81N

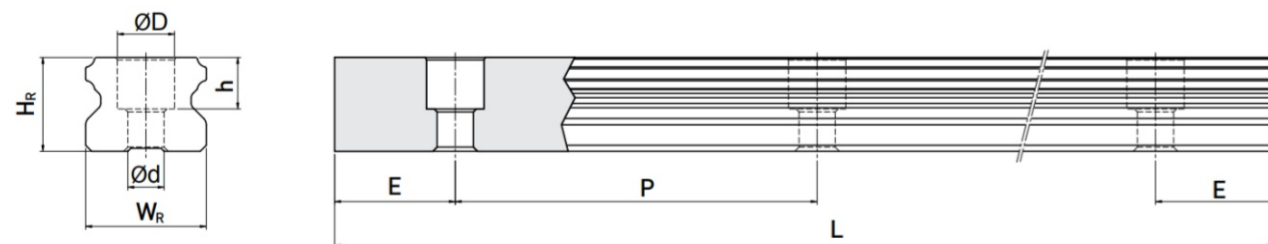
(3)TTW-SB/TTW-CB



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 _i	N	WR	HR	D	h	d	p	E	(mm)	W	B	B _i	C	L ₁	L	G	M	T	T _i	H ₂	H ₃	C(KN)	Co(KN)	MR KN-m	MP KN-m	MY KN-m	Block kg	Rail kg/m	
TTW15SB	24	4.5	18.5	15	12.5	6	4.5	3.5	60	20	M4×16	52	41	5.5	-	23.1	40.1	5.7	f 4.5	5	7	5.5	6	5.35	9.40	0.08	0.04	0.04	0.12	1.25	
TTW 15CB															26	39.8	56.8							7.83	16.19	0.13	0.10	0.10	0.21		
TTW 20SB	28	6	19.5	20	15.5	9.5	8.5	6	60	20	M5×16	59	49	5	-	29	50	12	f 5.5	7	9	6	6	7.23	12.74	0.13	0.06	0.06	0.19	2.08	
TTW 20CB															32	48.1	69.1							10.31	21.13	0.22	0.16	0.16	0.32		
TTW 25SB	33	7	25	23	18	11	9	7	60	20	M6×20	73	60	6.5	-	35.5	59.1	12	f 7	7.5	10	8	8	11.40	19.50	0.23	0.12	0.12	0.35	2.67	
TTW 25CB															35	59	82.6							16.27	32.40	0.38	0.32	0.32	0.59		
TTW 30SB	42	10	31	28	23	11	9	7	80	20	M8×25	90	72	9	-	41.5	69.5	12	f 9	7	10	8	9	16.42	28.10	0.40	0.21	0.21	0.62	4.35	
TTW 30CB															40	70.1	98.1							23.70	47.46	0.68	.055	.055	1.04		
TTW 35SB	48	11	33	34	27.5	14	12	9	80	20	M8×25	100	82	9	-	45	75	12	f 11	10	13	8.5	8.5	22.66	37.38	0.56	0.31	0.31	0.84	6.14	
TTW 35CB															50	78	108							33.35	64.84	0.98	0.69	0.69	1.45		

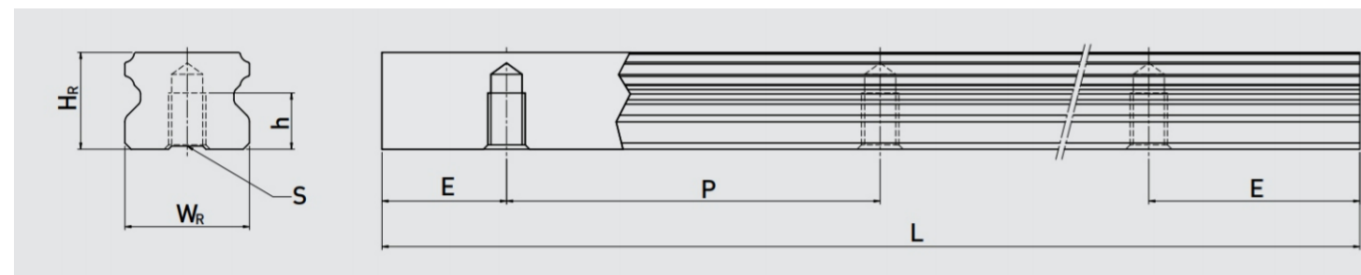
Note: 1kgf=9. 81N

(4) Rail Dimension table of locking from the top down type(increase bolt aperture)



Spec.	Dimension of rail retaining bolt (mm)	Dimension of Rail (mm)							Weight(kg/m)
		W _R	H _R	D	h	d	P	E	
TTR15U	M4x16	15	125	7.5	5.3	4.5	60	20	1.23
TTR30U	M8x25	28	23	14	12	9	80	20	4.23

(5) Rail Dimension table of locking from the bottom up type(increase bolt aperture)



Spec.	Dimension of Rail (mm)						Weight (kg/m)
	W _R	H _R	S	h	P	E	
TTR15T	15	12.5	M5 x 0.8P	7	60	20	1.26
TTR20T	20	15.5	M6 x 1P	9	60	20	2.15
TTR25T	23	18	M6 x 1P	10	60	20	2.79
TTR30T	28	23	M8 x 1.25P	14	80	20	4.42