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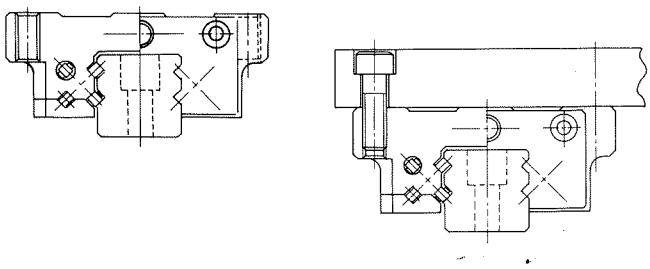
Find the *Union Tool TGC30-1240* at our website: ***Click HERE***

TRUE GUIDE
Features of each Series

The elements of the TG series are readily compatible with most monorail guide applications. The series TGA, TGB and TGC are selected to facilitate mounting on the carriage.

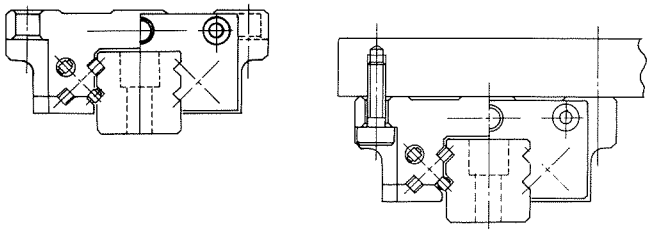
TGA Series

Carriage mounting holes are threaded.



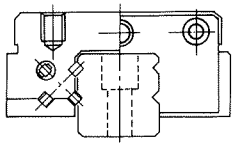
TGB Series

The carriage is fastened from below through smooth bore mounting holes.



TGC Series

Mounting is achieved by means of threaded blind holes.

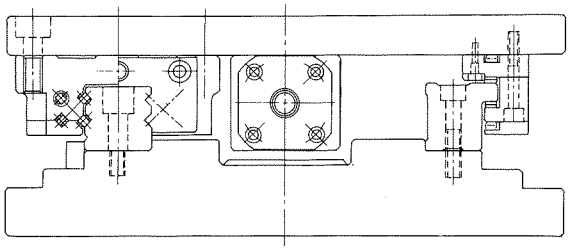


TGM Series

The TRUE GUIDE Mini has ultra-compact dimensions and a Crossed Roller Chain construction.

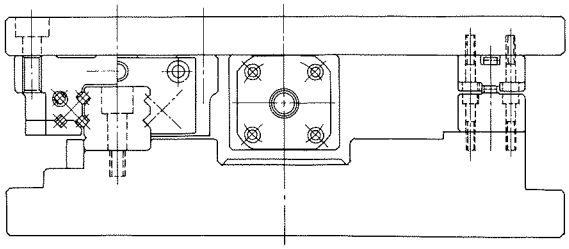
TGL Series

The series is used in combination with the TGA, TGB and TGC series. The straightness of the horizontal surface is assured by the series TGA (B, C). This combination is excellent for applications requiring an open construction such as locations subject fluctuations in ambient temperature.



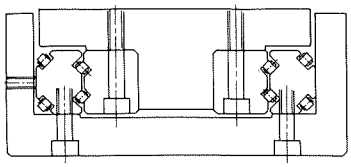
TGF Series

This guide is used in combination with the TG series. The TGF series is used in the same way as the TGL series but without the grip.



TGH Series

The TGH series combines the advanced design features of monorail guides with the advantages of the classic roller guide and cage. The stroke is unlimited and still allows a very compact guide system.



TRUE GUIDE
Precision

Continuous Running Test 400 km

Example 1

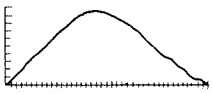
Results

Before test:
vertical straightness: 0.9 µm/480 mm
horizontal straightness: 1.5 µm/480 mm

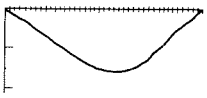
After test:
vertical straightness: 0.8 µm/480 mm
horizontal straightness: 2.0 µm/480 mm

Note: the slight improvement in pitching is probably due to equipment settledown.

Straightness immediately after manufacture



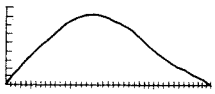
Vertical
Max. 0.9 µm
Min. 0.0 µm
Var. 0.9 µm



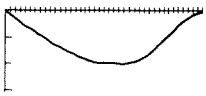
Horizontal
Max. 0.0 µm
Min. – 1.5 µm
Var. 1.5 µm

Calibration
x = 12 mm
y = 0.1 µm

After 400 km run



Vertical
Max. 0.8 µm
Min. 0.0 µm
Var. 0.8 µm



Horizontal
Max. 0.0 µm
Min. – 2.0 µm
Var. 2.0 µm

Test conditions

Load	ca. 1000 kgf (table weight 85 kgf)
Stroke:	300 mm
Speed:	17 m/min for first 200 km, 14 m/min for second 200 km
Drive:	AC servo motor and ball screw
Measuring instrument:	Nikon autocollimator

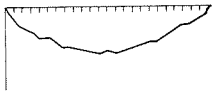
TRUE GUIDE
Precision

Example 2

Monorail TGA 25 – 2 – T2 – 1000 SP

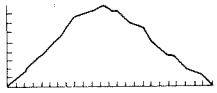
Precision

Vertical straightness	1.1 µm/350 mm
Horizontal straightness	0.9 µm/350 mm
Pitching	0° 0′ 3″ 9/660 mm
Yawing	0° 0′ 1″ 5/660 mm



Vertical straightness

Max. 0.0 µm
Min. – 1.1 µm
Var. 1.1 µm



Horizontal straightness

Max. 0.9 µm
Min. 0.0 µm
Var. 0.9 µm

Calibration

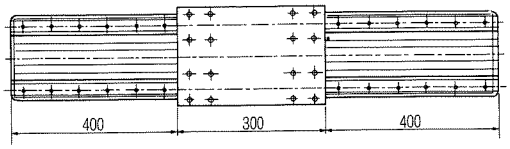
x = 20 mm
y = 0.1 µm

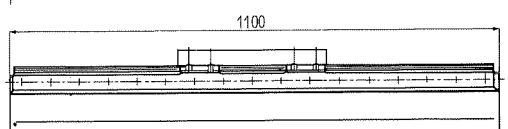
Pitching

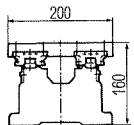
Position	Data	Cumulative (µm)	Corrected (µm)
0	–	0.0	0.0
1	–00′00″6	0.1	–0.2
2	–00′00″1	0.1	–0.4
3	–00′00″9	0.2	–0.5
4	–00′01″6	0.3	–0.6
5	–00′01″5	0.5	–0.7
6	–00′01″3	0.6	–0.8
7	–00′02″1	0.8	–0.9
8	–00′01″6	0.9	–0.9
9	–00′01″3	1.1	–1.0
10	–00′02″4	1.3	–0.9
11	–00′02″0	1.5	–1.0
12	–00′01″7	1.7	–1.0
13	–00′02″3	1.9	–1.0
14	–00′02″0	2.1	–1.1
15	–00′02″1	2.3	–1.1
16	–00′02″6	2.5	–1.1
17	–00′02″0	2.7	–1.1
18	–00′02″4	3.0	–1.1
19	–00′02″9	3.2	–1.0
20	–00′02″3	3.5	–1.0
21	–00′02″4	3.7	–1.0
22	–00′03″4	4.1	–0.8
23	–00′02″7	4.3	–0.8
24	–00′02″3	4.6	–0.9
25	–00′03″2	4.9	–0.7
26	–00′03″2	5.2	–0.7
27	–00′03″0	5.5	–0.6
28	–00′03″5	5.9	–0.5
29	–00′02″7	6.1	–0.4
30	–00′02″9	6.4	–0.4
31	–00′03″4	6.7	–0.3
32	–00′03″5	7.0	–0.2
33	–00′03″9	7.4	0.0

Yawing

Position	Data	Cumulative (µm)	Corrected (µm)
0	–	0.0	0.0
1	00′00″1	0.0	0.1
2	00′00″0	0.0	0.1
3	00′00″0	0.0	0.2
4	–00′00″2	0.0	0.3
5	–00′00″1	0.0	0.3
6	–00′00″1	0.0	0.4
7	00′00″0	0.0	0.5
8	–00′00″1	0.0	0.5
9	00′00″0	0.0	0.6
10	–00′00″3	0.1	0.7
11	–00′00″3	0.1	0.8
12	00′00″3	0.1	0.8
13	00′00″5	0.0	0.8
14	00′00″4	0.0	0.8
15	00′00″2	0.0	0.9
16	00′00″7	–0.1	0.9
17	00′01″0	–0.2	0.8
18	00′00″8	–0.3	0.8
19	00′01″2	–0.4	0.7
20	00′01″2	–0.5	0.7
21	00′01″0	–0.6	0.7
22	00′01″0	–0.7	0.6
23	00′01″4	–0.8	0.5
24	00′01″5	–1.0	0.5
25	00′01″2	–1.1	0.4
26	00′01″2	–1.2	0.3
27	00′01″0	–1.3	0.3
28	00′01″2	–1.4	0.3
29	00′01″2	–1.6	0.2
30	00′01″0	–1.6	0.2
31	00′01″0	–1.7	0.1
32	00′01″2	–1.9	0.1
33	00′01″3	–2.0	0.0







Bearing Life

1. Basic Dynamic Load Rating C

The basic dynamic load rating C is the load, invariable of direction and magnitude, under which 90 % of a group of the same type of bearings will travel 50 km without flaking when operated separately.

2. Calculating Service Life

The service life of UNION TOOL TRUE GUIDE monorails can be calculated from the basic dynamic load rating and the imposed bearing load with the following formula:

$$L = \left(\frac{C}{P}\right)^{\frac{10}{3}} \cdot 50 \quad \cdots\cdots (1)$$

L: Service life (km)
C: Basic dynamic load rating (kgf)
P: Bearing load (kgf)

The actual load acting on the bearing is greater than the calculated load due to mechanical vibration and shock.
The load factor compensates for this and can be determined as follows:

$$P = f_w F_c \quad \cdots\cdots (2)$$

f_w: Load factor (Dia. 1)
F_c: Calculated load, theoretical (kgf)

When the bearing is working under conditions with heat exceeding 100° C, the temperature factor must be taken into account (Dia. 3):

$$L = \left(\frac{f_t \cdot C}{f_w \cdot F_c}\right) \cdot 50 \quad \cdots\cdots (3)$$

The service life in hours can be obtained by entering the stroke distance and the number of strokes into the following formula:

$$L_h = \frac{L \cdot 10^3}{2 \cdot l_s \cdot n_1 \cdot 60} \quad \cdots\cdots (4)$$

L_h: Service life (hr)
L: Service life (km)
l_s: Stroke distance (m)
n_1: Number of strokes per min. (cpm)

3. Static Load and Static Safety Factor

If a bearing sustains an excessive load while either still or in motion, a permanent deformation in the guideway or the rolling element may result.
When extreme, the performance of the bearing may be affected. The basic static load is generally equal to the maximum static allowable load.
However, under certain circumstances the static safety factor for any given load must be given separately.

$$\frac{C_0}{P_0} \geqq f_s \quad \cdots\cdots (5)$$

C_0: Basic static load (kgf)
f_s: Static safety factor (Dia. 2)
P_0: Static load (kgf)

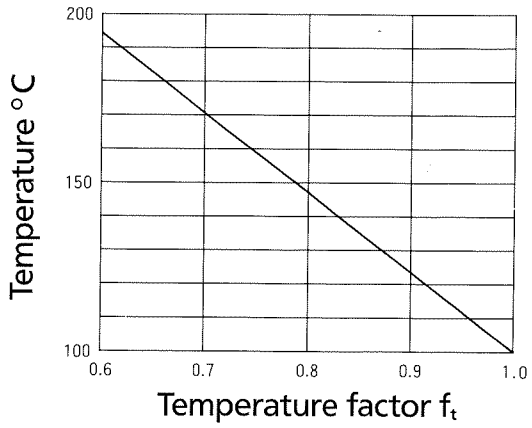
Dia. 1 Load Factor f_w

Condition	f_w
Movement without shock	1.0-1.2
Normal movement	1.2-1.5
Movement with shock and vibration	1.5-3.0

Dia. 2 Static Safety Factor f_s

Condition	f_s
Movement with shock & vibration	3-5
Smooth movement required	2-4
Normal movement	1.5-3

Dia. 3 Temperature Factor f_t



Examples of Guide Life Calculation

Example 1

Guide ..... TGA 30
Basic dynamic load ..... $C = 2420$ kgf
Calculated downwards load ..... $F_c = 250$ kgf
Stroke ..... $l_s = 1$ m
Strokes per min. ..... $n_1 = 6$ cpm
Load factor ..... $f_w = 1.5$
Temperature ..... Ambient

To calculate the rated life using the above figures and formula (1):

$$L = \left(\frac{2420}{1.5 \cdot 250}\right)^{\frac{10}{3}} \cdot 50 \fallingdotseq 25{,}018\,(\text{km})$$

From formula (3):

$$L_h = \frac{25{,}018 \cdot 10^3}{2 \cdot 1 \cdot 6 \cdot 60} \fallingdotseq 34{,}747\,(\text{hr})$$

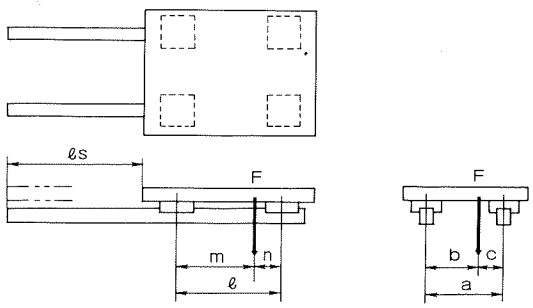
Thus, rated life is 34,747 hours.

Example 2

Load ..... (Dia. 1)
Table weight ..... $W = 100$ kgf
Stroke ..... $l_s = 1$ m
Strokes per min. ..... $n_1 = 6$ cpm
Load factor ..... $f_w = 2$
Temperature ..... Ambient

Select a guide that has a life of 20,000 hours when used under the above conditions.

Dia. 1



Bearing loads F_{cI}, F_{cII}, F_{cIII}, F_{cIV} are as follows:

$$F_{cI} = \frac{n}{l} \cdot \frac{c}{a} \cdot F + \frac{W}{4} = \frac{350}{750} \cdot \frac{150}{500} \cdot 750 + \frac{100}{4} = 130\,(\text{kgf})$$

$$F_{cII} = \frac{n}{l} \cdot \frac{b}{a} \cdot F + \frac{W}{4} = \frac{350}{750} \cdot \frac{350}{500} \cdot 750 + \frac{100}{4} = 270\,(\text{kgf})$$

$$F_{cIII} = \frac{m}{l} \cdot \frac{c}{a} \cdot F + \frac{W}{4} = \frac{400}{750} \cdot \frac{150}{500} \cdot 750 + \frac{100}{4} = 145\,(\text{kgf})$$

$$F_{cIV} = \frac{m}{l} \cdot \frac{b}{a} \cdot F + \frac{W}{4} = \frac{400}{750} \cdot \frac{350}{500} \cdot 750 + \frac{100}{4} = 305\,(\text{kgf})$$

a ..... 500 mm
b ..... 350 mm
c ..... 150 mm
l ..... 750 mm
m .... 400 mm
n ..... 350 mm
F ..... 750 kgf

Therefore, select a model so that a life of 20,000 hours is achieved for bearing that has the greatest load F_{cIV}.
The rated life when travelling time is 20,000 hours is derived from formula (3).

$$L = \frac{L_h \cdot 2 \cdot l_s \cdot n_1 \cdot 60}{10^3} = \frac{20{,}000 \cdot 2 \cdot 1 \cdot 6 \cdot 60}{10^3} = 14{,}400\,(\text{km})$$

The basic dynamic load is derived with formula (1) and formula (2).

$$C = P \cdot \left(\frac{L}{50}\right)^{\frac{3}{10}} = f_w \cdot F_{cIV} \cdot \left(\frac{L}{50}\right)^{\frac{3}{10}} \qquad C = 2 \cdot 305 \cdot \left(\frac{14{,}400}{50}\right)^{\frac{3}{10}} \fallingdotseq 3335\,(\text{kgf})$$

The bearing selected must have $C \geqq 3335$ kgf. Refering to the dimension table, TGA 35 is the smallest guide that fits the requirements.
Life when TGA 35 is used is as follows:

$$L = \left(\frac{3660}{2 \cdot 305}\right)^{\frac{10}{3}} \cdot 50 \fallingdotseq 19{,}625\,(\text{km}) \qquad L_h = \frac{19{,}625 \cdot 10^3}{2 \cdot 1 \cdot 6 \cdot 60} \fallingdotseq 27{,}256\,(\text{hr})$$

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