

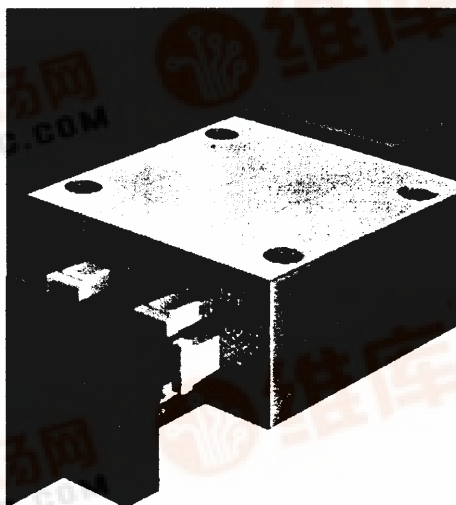
DryLin® T Adjustable Slide Rail Guide

Introduction

DryLin® T slide guide rails were developed for applications in the automation and handling industries.

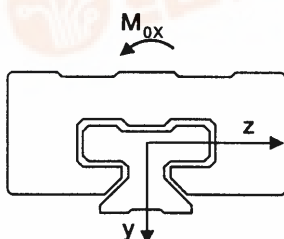
Rather than extreme precision the development objective was a robust linear guide system for reliable use in the widest range of different - environments. DryLin® T guide rails are shock resistant and have an extremely low weight design.

DryLin® T slide guide rails are exceptionally quiet in operation because there are no moving parts or metallic rollers.



Special Characteristics

- No lubrication necessary
- adjustable clearance
- replaceable sliding inserts
- quiet operation
- resistant to dust, dirt and moisture
- corrosion resistant
- high static load rating in all directions
- low weight
- shock and vibration resistant
- excellent wear resistance



Static load-bearing capacity

Type	C_{0y} [N]	$C_{0(-y)}$ [N]	C_{0z} [N]	M_{0x} [Nm]
15	4000	4000	2000	32
20	7400	7400	3700	85
25	10000	10000	5000	125

Design

DryLin® T slide guide rails consist of carriages mounted on the rail.

1. The rail, together with the basic body of the wagon, is made of aluminium Al Mg Si 0,5. The rail is hard anodised and the aluminium body of the slide is clear anodised.
2. The guide bearing consists of six opposing pairs of slide inserts made of iglidur J.
3. One side of each of the three guide bearings can be infinitely adjusted in height.
4. All steel parts are galvanised
5. The end covers are made of plastic

Dimensions

The mounting dimensions of the DryLin® T slide guide rails are interchangeable with the usual recirculating ball guides. The DryLin® T slide rail guides offer further advantages compared to other linear guides:

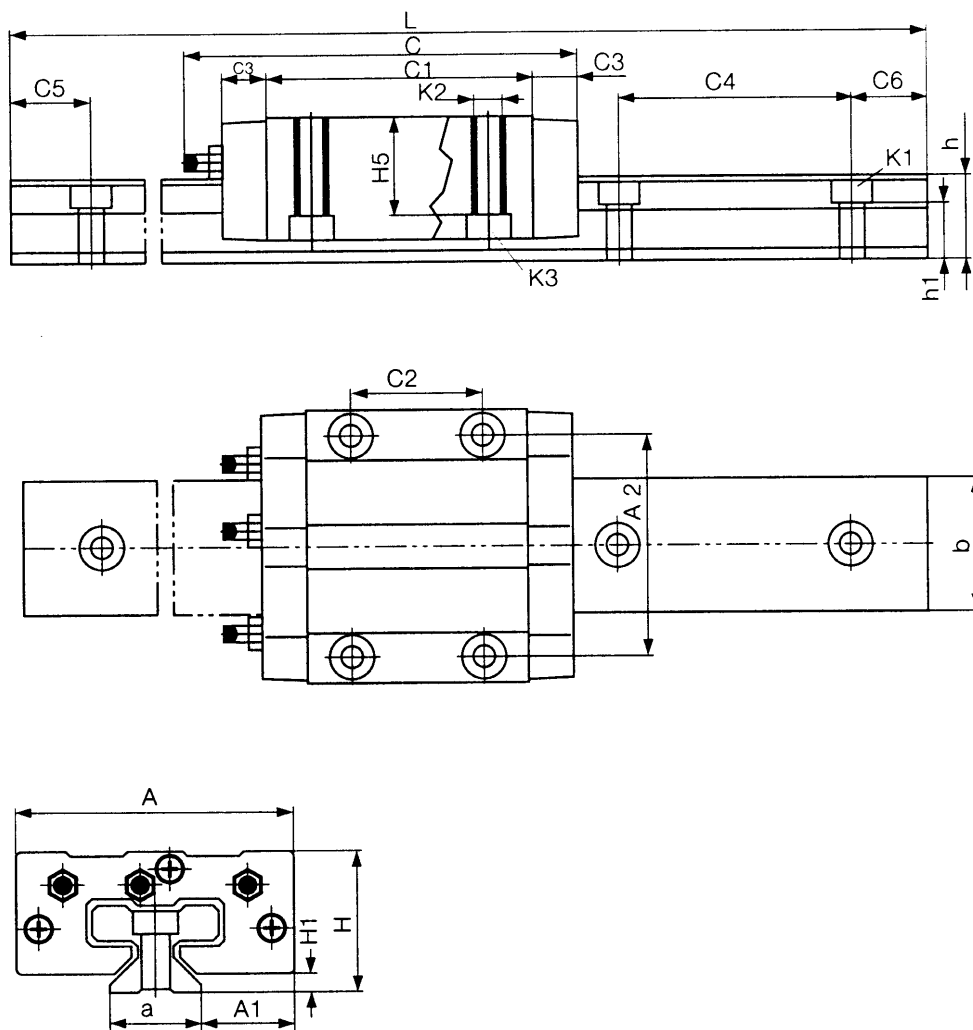
- Very high accelerations possible
- extreme speeds can be attained quickly
- minimum effort for assembly
- replaceable slide inserts
- maintenance free

igus® DryLin® T

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Slide rail dimension table

Part. No.	weight kg/m	L max.	a -0,2	C4	C5 min.	C5 max.	C6 min.	C6 max.	h	h1	K1 for screw DIN 912	b	I _y mm ⁴	I _z mm ⁴
TS- 01-15	0,6	3960	15	60	20	49	20	49	15,5	10	M4	22	6440	4290
TS-01-20	1,0	3960	20	60	20	49	20	49	19	12,3	M5	31	22570	11520
TS-01-25	1,3	3960	23	60	20	49	20	49	21,5	13,8	M6	34	34700	19300
TS-01-30	1,9	3960	28	80	20	59	20	59	26	15,8	M8	40	70040	40780

Slide carriage dimension table

Part. No.	weight kg	H +0,35	A	C max.	A1 +0,35	A2	C1	C2	C3	H1 +0,35	H5	K2 thread	Nm max.	K3 for screw DIN 912
TW-01-15	0,11	24	47	72	16	38	50	30	9	4	16	M5	1,5	M4
TW-01-20	0,19	30	63	95	21,5	53	61	40	10	5	19,8	M6	2,5	M5
TW-01-25	0,29	36	70	105	23,5	57	68	45	11	5	24,8	M8	6	M6
TW-01-30	0,50	40	80	110	21	70	70	50	12	6,5	27	M10	15	M8

Ordering Information



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DryLin® T slide rail guides are delivered ready for installation. The slides are mounted on the rails and the tolerance is pre-adjusted.

As standard the rails of the DryLin® T guides are cut with a symmetrical bore pattern (C5=C6).

If you require another bore pattern please specify this in the order.

Please specify in the order how many slides per rail should be fitted. It is also necessary that you specify whether the guide is to be fitted as a fixed or floating bearing.

Example:

The requirement is a 550-mm-long, complete size 25 system, consisting of 2 guides, each fitted with 2 slides, and one side is to have a loose bearing:

Order

1 piece TK-01-25-2, length: 550m
+ 1 piece TK-01-25-2, length: 550mm, LB

Order number for individual guide carriage (Clearance only preset)

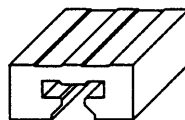
TW-01-15

TW-01-20

TW-01-25

TW-01-30

Suffix for floating bearing: LB



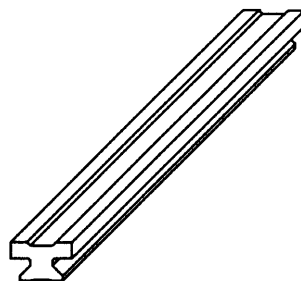
Order number for guide rails

TS-01-15, length in mm

TS-01-20, length in mm

TS-01-25, length in mm

TS-01-30, length in mm



Order number for pre-mounted DryLin® T slide rail guides (Assembled and clearance set)

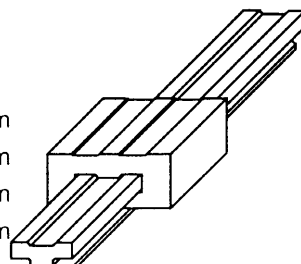
TK-01-15 - specification on number of wagons, length in mm

TK-01-20 - specification on number of wagons, length in mm

TK-01-25 - specification on number of wagons, length in mm

TK-01-30 - specification on number of wagons, length in mm

Suffix for floating bearing: LB

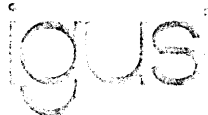


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Calculation

For the exact calculation of the DryLin® T linear guide system it is essential to find out whether the position of the forces is within the allowed limits and if the sliding element where the highest forces occur is not overloaded. The calculation of the possible driving force and the maximum speed allowed is important. The position of the guiding system leads to different formulas for calculation. Factors concerning shocks and acceleration forces are not included in the calculation, therefore the distance between maximum load and allowable load has to be observed.

This analysis cannot provide information regarding the wear or lifetime of the system.

Procedure

Preparation

1. Step:

Change the position of the system (p. 8-10)

2. Step:

Control of the distances between the forces and comparison with the maximum distances allowed

Calculation

3. Step:

Calculation of the necessary driving force (page 8-10)

4. Step:

Calculation of the maximum load on the bearings in y- and z-direction

Result

5. Step:

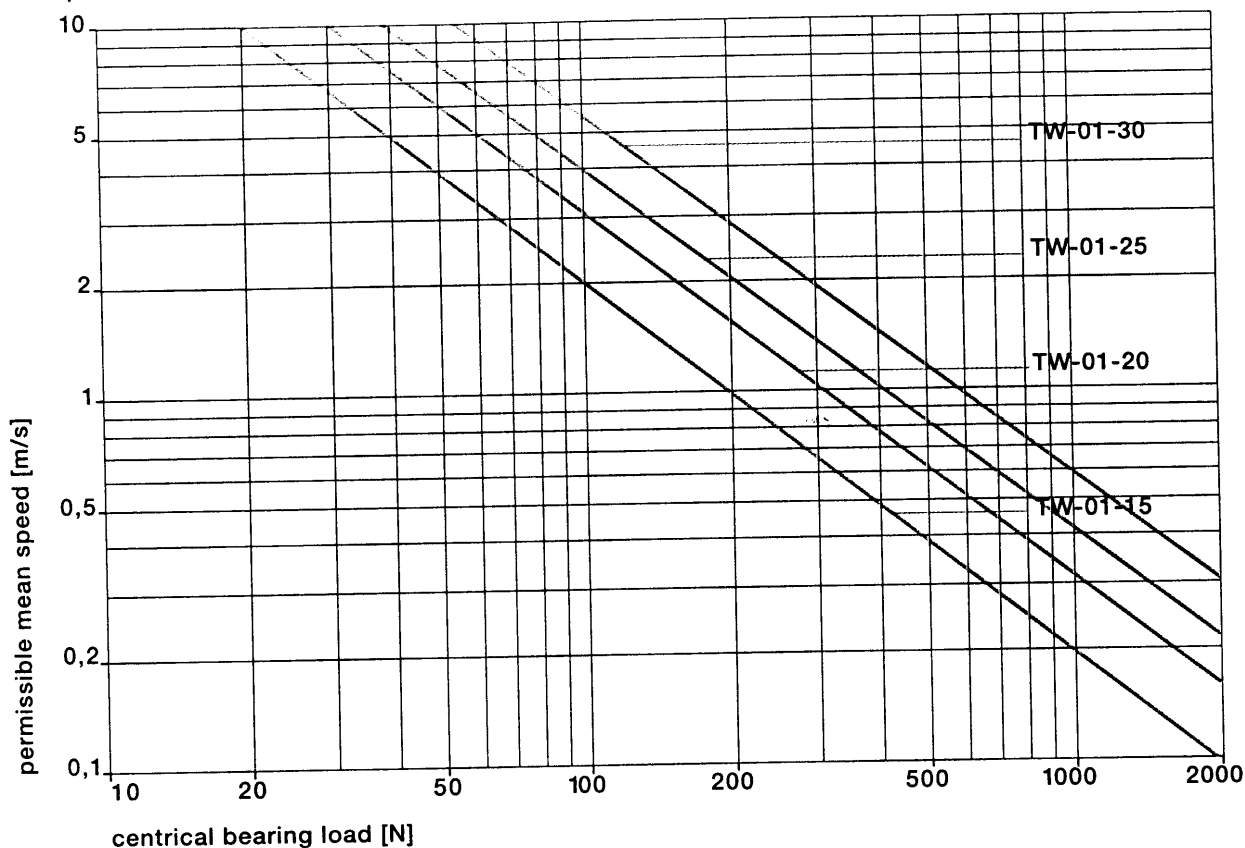
Control of the maximum load on the bearings (table page 7), the sliding element where the biggest load occurs (step 4)

6. Step:

Establishing the maximum speed allowed for the calculated loads of step 4. (diagram



6. step:



5. step

maximum permissible load

Constant factors to allow calculation

Part. No.	$F_{y\max}, F_{z\max}$ [N]	Pat. No.	L_x [mm]	Z_M [mm]	Y_0 [mm]
TW-01-15	2000	TW-01-15	29	16	11,5
TW-01-20	3700	TW-01-20	35	23	15
TW-01-25	5000	TW-01-25	41	25	19
TW-01-30	7000	TW-01-30	49	29	21,5

 $\mu = 0,2$ dynamic application $\mu = 0$ static application

F_a	:	driving force
F_s	:	applied mass force
F_y, F_z	:	bearing load in y or z direction
s_x, s_y, s_z	:	distance of mass force in xy or z direction
a_y, a_z	:	distance of driving force in xy or z direction
w_x	:	distance of carriages on a rail
L_x	:	constant from table
Z_M	:	constant from table
Y_0	:	constant from table
b	:	distance of guide rails
μ	:	coefficient of friction

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2. step:

maximum allowable distances between the acting forces

Part No.	S _x [mm]	S _y , a _y [mm]	S _z , a _z [mm]
TW-01-15	14	44	55
TW-01-20	17	52	67
TW-01-25	20	59	78
TW-01-30	24	72	93

Horizontal mounting:

3. step: calculate required driving force

$$F_a = \frac{F_s \mu L_x (Z_M + 2S_z)}{Z_M (L_x - 2a_z \mu)}$$

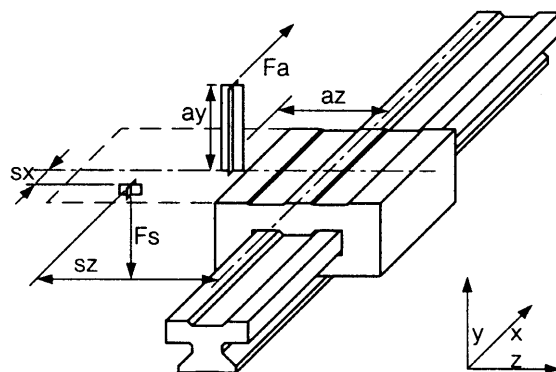
4. step:

maximum bearing load in y direction

$$F_{y_{max}} = F_s \left[\frac{S_x}{L_x} + \frac{S_z}{Z_M} + 0,5 + \frac{\mu (a_y + Y_o) (Z_M + 2S_z)}{Z_M (L_x - 2a_z \mu)} \right]$$

maximum bearing load in z direction

$$F_{z_{max}} = \frac{2F_s \mu a_z (Z_M + 2S_z)}{Z_M (L_x - 2a_z \mu)}$$



Vertical mounting:

3. step: calculate required driving force

$$F_a = \frac{F_s \mu L_x (Z_M + 2S_y)}{Z_M [L_x - 2\mu (a_y + Y_o)]}$$

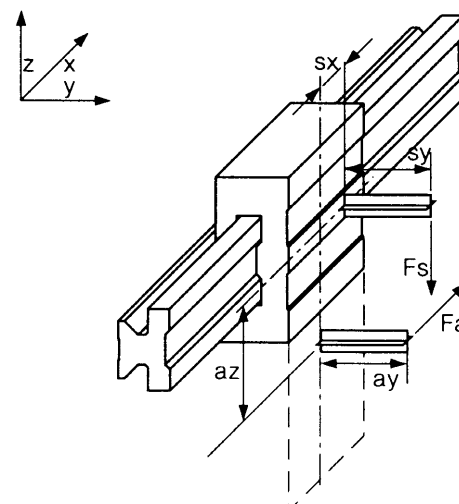
4. step:

maximum bearing load in y direction

$$F_{y_{max}} = \frac{F_s}{Z_M} \left[S_y + Y_o + \frac{\mu (a_y + Y_o) (Z_M + 2S_y)}{L_x - 2\mu (a_y + Y_o)} \right]$$

maximum bearing load in z direction

$$F_{z_{max}} = F_s \left[1 + \frac{2S_x}{L_x} + \frac{2\mu a_z (Z_M + 2S_y)}{Z_M [L_x - 2\mu (a_y + Y_o)]} \right]$$



One rail and two carriages



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2. step

maximum allowable distances between the acting forces

Part. No.	s_y, a_y [mm]	s_z, a_z [mm]
TW-01-15	$2w_x - 11,5 \text{ mm}$	$2w_x$
TW-01-20	$2w_x - 15 \text{ mm}$	$2w_x$
TW-01-25	$2w_x - 19 \text{ mm}$	$2w_x$
TW-01-30	$2w_x - 21,5 \text{ mm}$	$2w_x$

Horizontal mounting:

3. step: calculate required driving force

$$F_a = \frac{F_s \mu w_x (Z_M + 2s_z)}{Z_M (w_x - 2a_z \mu)}$$

4. step

maximum bearing load in y direction

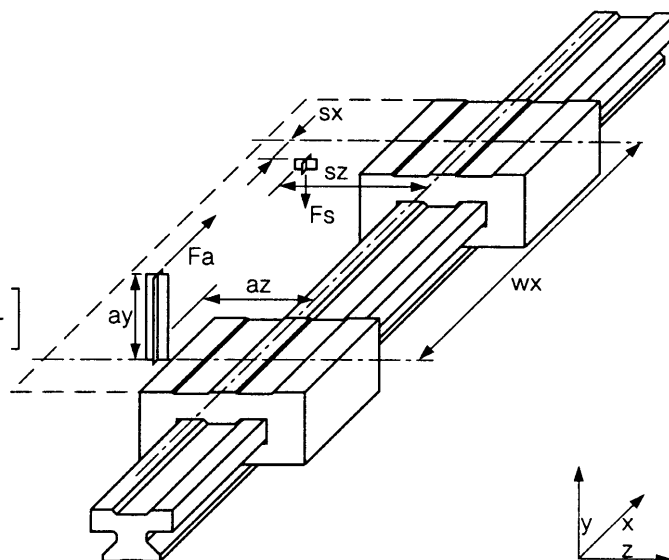
$$F_{y_{\max}} = \frac{F_s}{2} \left[\frac{s_{xk}}{w_x} + \frac{s_z}{Z_M} + \frac{2\mu (a_y + Y_o) (Z_M + 2s_z)}{Z_M (w_x - 2a_z \mu)} \right]$$

$$s_{xk} = w_x - s_x \quad (\text{if } s_x < 0,5 w_x)$$

$$s_{xk} = s_x \quad (\text{if } w_x > s_x > 0,5 w_x)$$

maximum bearing load in z direction

$$F_{z_{\max}} = \frac{F_s \mu a_z (Z_M + 2s_z)}{Z_M (w_x - 2a_z \mu)}$$



Vertical mounting:

3. step: calculate required driving force

$$F_a = \frac{F_s \mu w_x [Z_M + 2(s_y + Y_o)]}{Z_M [w_x - 2\mu (a_y + Y_o)]}$$

4. step

maximum bearing load in z direction

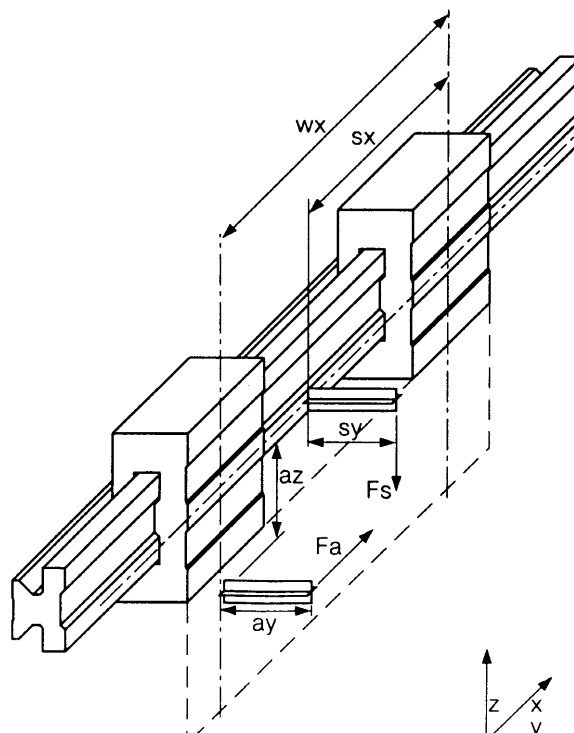
$$F_{y_{\max}} = F_s \left[1 - \frac{s_{xk}}{w_x} + \frac{s_y + Y_o}{2Z_M} + \frac{\mu a_z [Z_M + 2(s_y + Y_o)]}{Z_M [w_x - 2\mu (a_y + Y_o)]} \right]$$

$$s_{xk} = w_x - s_x \quad (\text{if } s_x < 0,5 w_x)$$

$$s_{xk} = s_x \quad (\text{if } w_x > s_x > 0,5 w_x)$$

maximum bearing load in y direction

$$F_{y_{\max}} = \frac{F_s}{2} \left[\frac{s_y}{Z_M} + \frac{\mu (a_y + Y_o) [Z_M + 2(s_y + Y_o)]}{Z_M [w_x - 2\mu (a_y + Y_o)]} \right]$$



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Horizontal mounting:

3. step: calculate required driving force

$$F_a = \frac{F_s \mu w_x}{w_x - 2 a_z \mu}$$

4. step

maximum bearing load in y direction

$$F_{y\max} = \frac{F_s}{2} \left[\frac{S_{xk} \cdot S_{zk}}{w_x \cdot b} + \frac{\mu (a_y + Y_o)}{2 (w_x - 2 a_z \mu)} \right]$$

$$S_{xk} = w_x - S_x \quad (\text{if } S_x < 0,5 w_x)$$

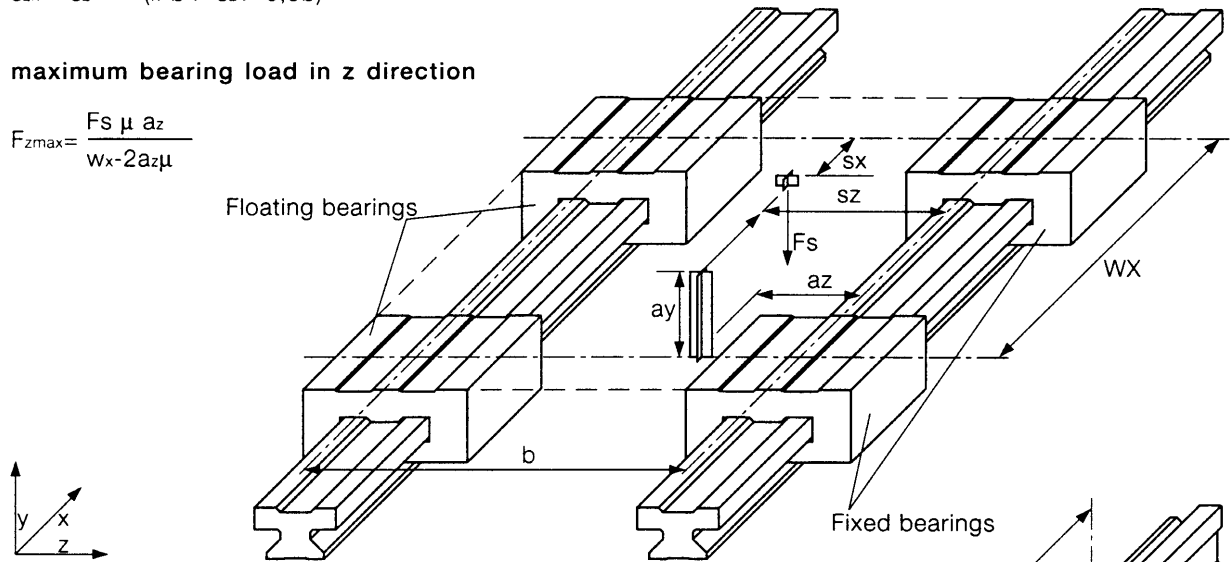
$$S_{xk} = S_x \quad (\text{if } w_x > S_x > 0,5 w_x)$$

$$S_{zk} = b - S_z \quad (\text{if } S_z < 0,5 b)$$

$$S_{zk} = S_z \quad (\text{if } b > S_z > 0,5 b)$$

maximum bearing load in z direction

$$F_{z\max} = \frac{F_s \mu a_z}{w_x - 2 a_z \mu}$$



vertical mounting:

3. step: calculate required driving force

$$F_a = \frac{F_s \mu w_x [b + 2 (S_y + Y_o)]}{b [w_x - 2 \mu (a_y + Y_o)]}$$

4. step

maximum bearing load in y direction

$$F_{y\max} = \frac{F_s}{4} \left[\frac{(S_y + Y_o)}{b} + \frac{\mu (a_y + Y_o) [b + 2 (S_y + Y_o)]}{b [w_x - 2 \mu (a_y + Y_o)]} \right]$$

maximum bearing load in z direction

$$F_{z\max} = F_s \left[\frac{S_{xk}}{w_x} + \frac{\mu a_z [b + 2 (S_y + Y_o)]}{b [w_x - 2 \mu (a_y + Y_o)]} \right]$$

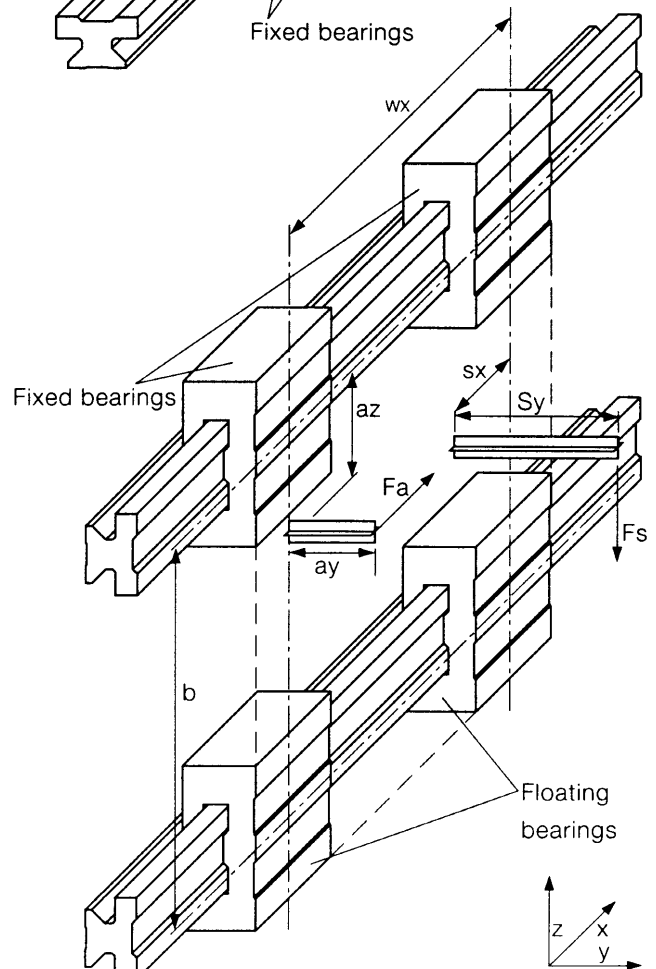
$$S_{xk} = w_x - S_x \quad (\text{if } S_x < 0,5 w_x)$$

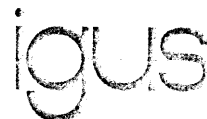
$$S_{xk} = S_x \quad (\text{if } w_x > S_x > 0,5 w_x)$$

2. step

maximum allowable distances between the acting forces

Part No.	S _y , a _y [mm]	S _z , a _z [mm]
TW-01-15	2w _x - 11,5 mm	2w _x
TW-01-20	2w _x - 15 mm	2w _x
TW-01-25	2w _x - 19 mm	2w _x
TW-01-30	2w _x - 21,5 mm	2w _x





The iglidur J material with hard anodised aluminium achieved the best results by far in our tests.

Comprehensive investigations showed that for the relevant loads of linear guides the slide bearings made of iglidur J are the most suitable.

They offer the greatest wear resistance and at the same time guarantee very favourable abrasion values.

Compared to slide partners made of hardened steel it even proved possible to further improve the abrasion resistance by a factor of 3 using gliding partners made of hard anodised aluminium.

Special Characteristics of iglidur J

- very low abrasion values during dry operation
- excellent wear resistance
- maintenance-free dry operation
- vibration damping
- very low moisture absorption

Operating Temperatures

igidur J slide bearings can be used under temperatures of -40° to a maximum of +90° C. The excellent heat conduction of the aluminium rail means that it is only necessary to take note of the generated friction heat during very high speeds for prolonged periods of time.

Chemical Resistance

igidur J is resistant to weak acids, diluted alkalis, as well as fuels and all types of lubricants.

The very low moisture absorption allows them to be used in wet or moist environments.

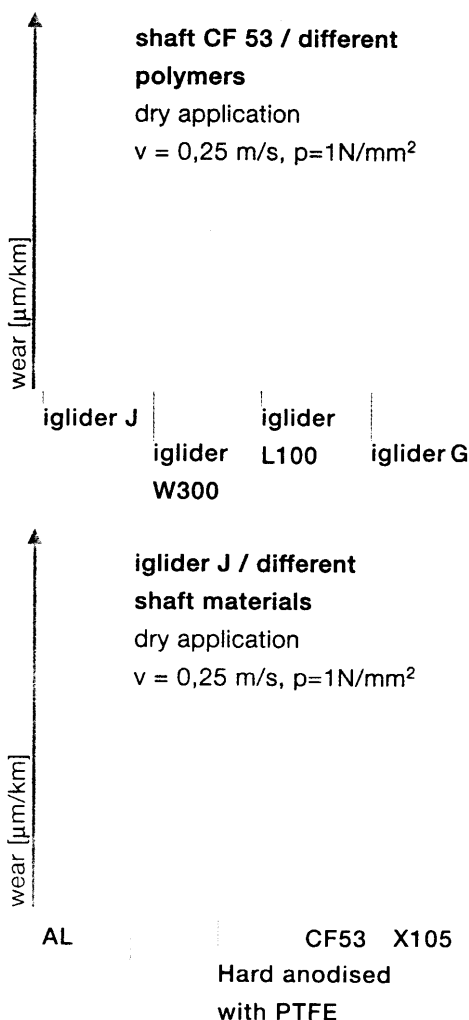
The resistance to alkalis allows them to be used in applications in which plants or parts of them have to be frequently cleaned.

Medium

Alcohols
Chlorinated hydrocarbons
Ester
Fats, oils
Ketone
Fuels
Weak acids
Strong acids
Weak lyes
Strong lyes
Water

Resistance

resistant
resistant
not resistant
resistant
resistant to an extent
resistant
resistant to an extent
not resistant
resistant
resistant
resistant



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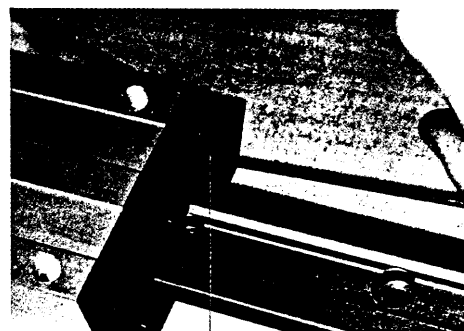
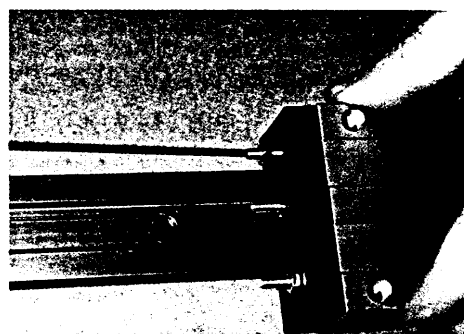
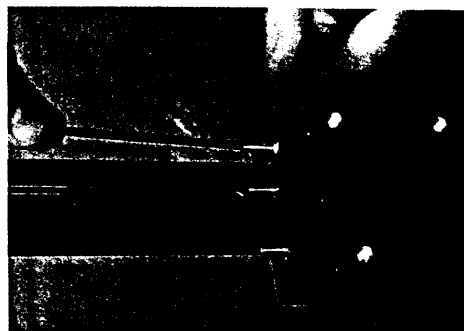
DryLin® T are delivered ready for mounting. The setting of the bearing clearance is carried out at the factory.

The pre-adjustment is carried out on the basis of the displacement force per slide.

If you have special requirements please indicate in your order whether particularly limited or extended bearing play is to be preset.

If required the bearing play of the Dry-Lin® T slides can be readjusted. This should always take place without any additional load:

1. First loosen the lock nuts
2. The guide play for the 3 bearing points can then be readjusted with an Allen key. In doing so please check the effectiveness via the sliding forces.
3. After you have adjusted all 3 bearing levels the play on the guide inserts should be checked once again.
4. There is a danger that the excessive reduction of the clearance seizes the slide elements and that the play cannot be re-set simply by loosening the Allen screws. The sliding elements are then loosened again by pressing the **re-set button** on the opposite side. Please use a 3 mm pin for models 25 and 30 and a 2.5 mm pin for the models 15 and 20 to press strongly against the readjusting spring. You must already have loosened the respective hexagon socket screws.



re-set button

Fitting Instructions



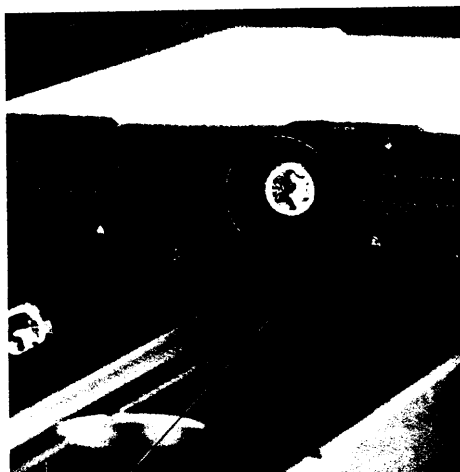
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The DryLin® T slide guide rail always requires a small clearance between the slide and rail.

The connecting surface which is screwed to the slide must be very flat, otherwise there is a danger that the slide will be subjected to tension.

When two parallel rails are used one slide must be fitted as a fixed bearing and one slide must be fitted as a floating bearing. When you order we will therefore ask you to describe the fitting situation, preferably on the special order form.

DryLin® T slide rail guides are supplied in assembled and pre-set conditions.



marked

If necessary the slides can be removed for better mounting of the rails.

Please note that the side with endcover which has the part number on the bottom right-hand edge must be first pushed onto the rail.

The setting of the bearing clearance is also to adjust the slide exactly to match the slide rail. Both the rails and the plastic cover of the slide are **marked** to avoid accidentally turning the slide around when mounting.

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Technical Data

Slide Rail	Material	Aluminium, extruded
	Construction material	Al Mg Si 0,5
	Coating	Hard anodised, 50 µm
	Hardness	500 HV
Slide Wagon	Basic body	Aluminium, extruded profile
	Construction material	Al Mg Si 0,5
	Coating	Anodised, E6/EV1
	Slide inserts	Maintenance-free sliding bearing material iglidurJ
	Screws	Galvanised steel
	Springs	Galvanised steel
	Cover	Plastic

Max. Sliding Speed

10 m/s

40° - 120°C