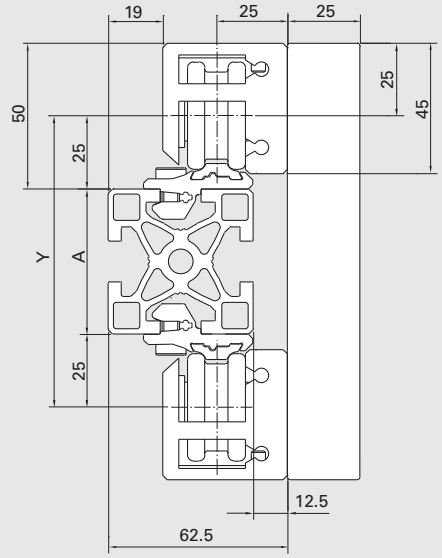
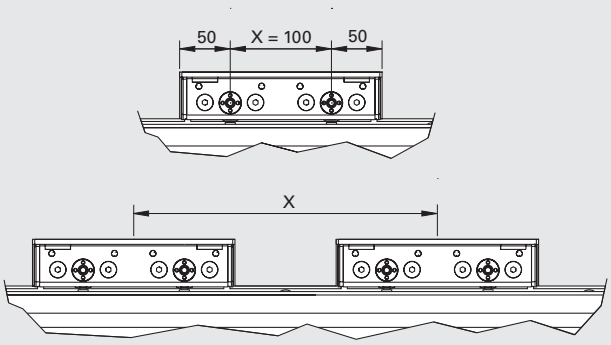
Linear Motion System Description Key

$F_{(x,y,z)\ max.}$	[N]	maximum rated external static load
$F_{(x,y,z)}$	[N]	actual external static load
F_R	[N]	maximum rated load / roller - radial (max. 1500 N)
F_A	[N]	Maximum rated load / roller - axial (max. 750 N)
$M_{(x,y,z)\ max.}$	[Nm]	maximum rated static torque load
$a_{max.}$	[m/s²]	maximum rated acceleration
X	[m]	distance between rollers in direction of motion
Y	[m]	distance between rollers perpendicular to direction of motion
A	[m]	extrusion width between rollers
g	[m/s²]	gravitational acceleration (approx. 9.81 m/s2)
m_1	[kg]	mass of carriage and lever
m_2	[kg]	mass of mounted parts
$F_{a\ req.}$	[N]	required drive power
$M_{d\ hor\ req.}$	[Nm]	required drive torque in horizontal direction
$M_{d\ ver\ req.}$	[Nm]	required drive torque in vertical direction
L_1	[m]	distance of center of gravity of carriage plate and lever
L2	[m]	distance of center of gravity of mounted parts and/or distance of forces F (x,y,z)

Linear Motion System Dimensions

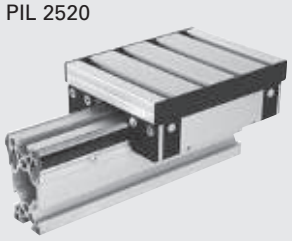


	LIN 1501	LIN 2001
Y	0.1	0.15



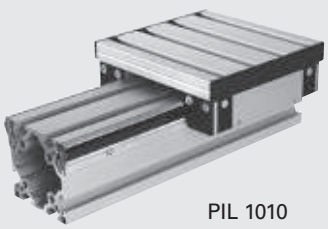
Linear Motion System Carriage Combination Examples

PIL 2520



PIL 5010

PIL 2520

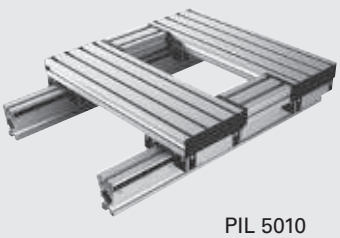


PIL 1010

PIL 2520

PIL 5020

PIL 5020



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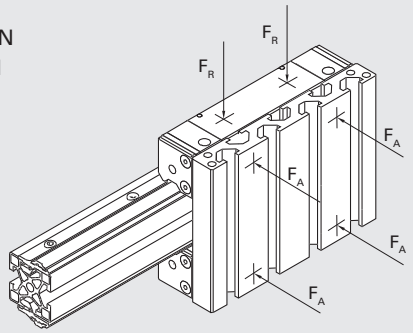
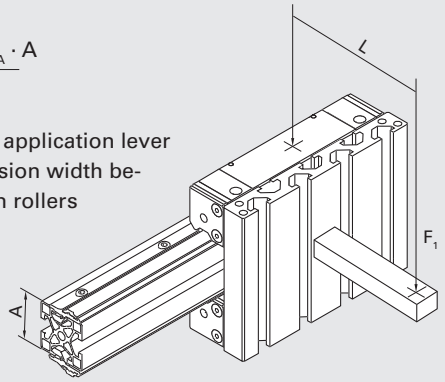
Linear Motion System Load Capacity

F_R < 1500 N
F_A < 750 N



$$F_1 \leq \frac{2 \cdot F_A \cdot A}{L}$$

L = Force application lever
A = extrusion width between rollers

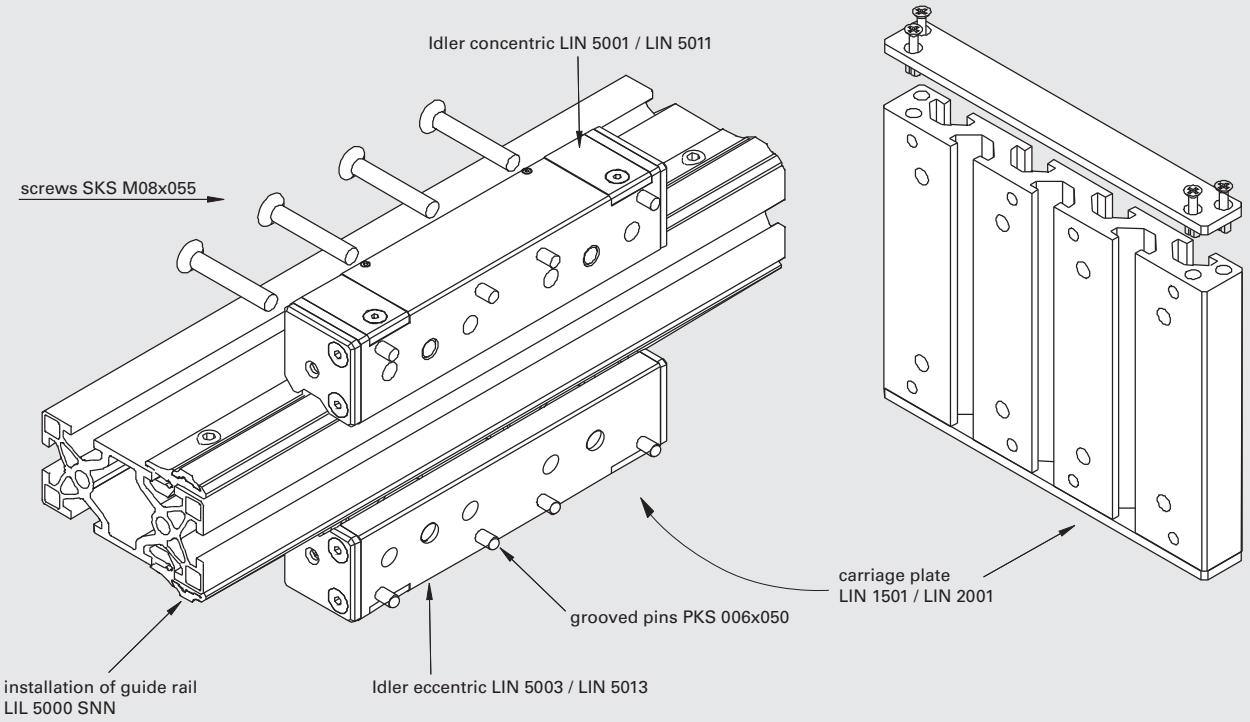


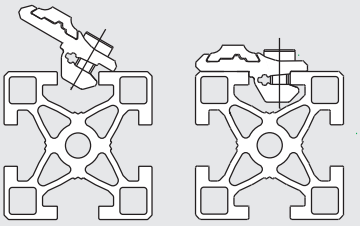
Technical Data
Acceleration: $a_{max.}$ < 15m/s2
Max. drive torque: 60 Nm
Forces: F_R [N] permissible load / roller - radial (max. 1500 N)
F_A [N] permissible load / roller - axial (max. 750 N)

Maintenance:
Lubrication: In order to ensure maximum service life of the guide-rail make sure that it is sufficiently lubricated.
Check the scraper and lubrication devices on a regular basis and re-lubricate as needed.

Load: Load data is valid for one type of load and one direction of load.
“Static design” refers to weight and operation forces. “Dynamic design” refers to weight and acceleration forces.

Linear Motion System Assembly Tips



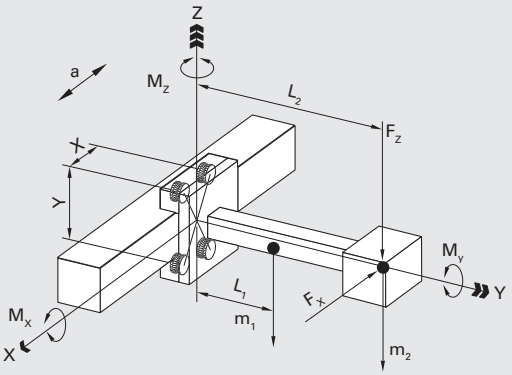


insert

press to right-hand side and tighten

Linear Motion System Calculations

Application A (horizontal)



Static design:

$$M_{X\,max.} = 2 \cdot F_A \cdot A$$

$$F_{Z\,max.} = \frac{M_{X\,max.} - g\,(m_1 \cdot L_1 + m_2 \cdot L_2)}{L_2}$$

$$M_{Z\,max.} = 2 \cdot F_A \cdot X$$

$$F_{X\,max.} = \frac{M_{Z\,max.}}{L_2}$$

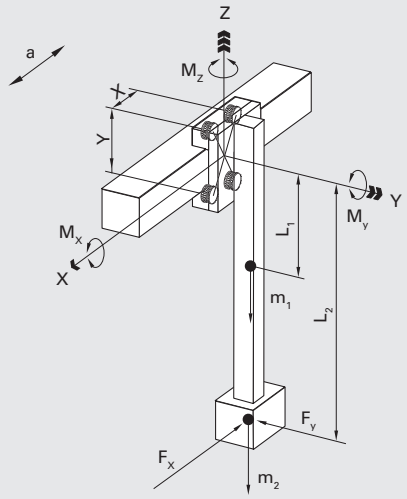
Dynamic design:

$$a_{max.} = \frac{F_A \cdot X}{(m_1 \cdot L_1 + m_2 \cdot L_2) \cdot 4} - \frac{g \cdot X}{9 \cdot Y}$$

$$F_{a\,req.} = (m_1 + m_2) \cdot a_{max.} + 10N$$

$$M_{d\,hor\,req.} = F_{a\,req.} \cdot 0.035\ m \cdot 1.8$$

Application B (horizontal)



Static design:

$$M_{X\,max.} = 2 \cdot F_A \cdot A$$

$$F_{Y\,max.} = \frac{M_{x\,max.}}{L_2}$$

$$M_{Y\,max.} = (F_R - \frac{(m_1 + m_2) \cdot g}{2}) \cdot (\sqrt{x^2 + y^2} - 0.036)$$

$$F_{X\,max.} = \frac{M_{Y\,max.}}{L_2}$$

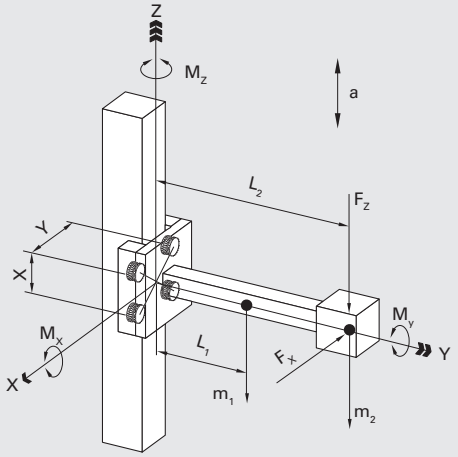
Dynamic design:

$$a_{max.} = \frac{(F_R - \frac{(m_1 + m_2) \cdot g}{2}) \cdot (\sqrt{x^2 + y^2} - 0.036)}{(m_1 \cdot L_1 + m_2 \cdot L_2) \cdot 2}$$

$$F_{a\,req.} = (m_1 + m_2) \cdot a_{max.} + 10N$$

$$M_{d\,hor\,req.} = F_{a\,req.} \cdot 0.035\ m \cdot 1.8$$

Application C (vertical)



Static design:

$$M_{X\,max.} = 2 \cdot F_A \cdot X$$

$$F_{Z\,max.} = \frac{M_{x\,max.} - g \cdot (m_1 \cdot L_1 + m_2 \cdot L_2)}{L_2}$$

$$M_{Z\,max.} = 2 \cdot F_A \cdot Y$$

$$F_{X\,max.} = \frac{M_{Z\,max.}}{L_2}$$

Dynamic design:

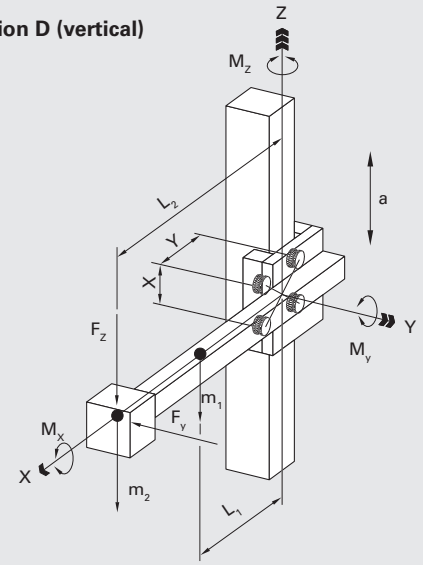
$$a_{max.} = \frac{2 \cdot F_A \cdot X}{(m_1 \cdot L_1 + m_2 \cdot L_2) \cdot 2} - g$$

$$F_{a\,req.} = (m_1 + m_2) \cdot (a_{max.} + g) + 10N$$

$$M_{d\,ver\,req.} = F_{a\,req.} \cdot 0.035\ m \cdot \frac{}{1.8}$$

Linear Motion System Calculations

Application D (vertical)



Static design:

$$M_{Y\,max.} = FR * \sqrt{(x^2+y^2} - 0.036)$$

$$F_{Z\,max.} = \frac{M_{Y\,max.} - g\,(m_1 \cdot L_1 + m_2 \cdot L_2)}{L_2}$$

$$M_{Z\,max.} = 2 \cdot F_A \cdot Y$$

$$F_{Y\,max.} = \frac{M_{Z\,max.}}{L_2}$$

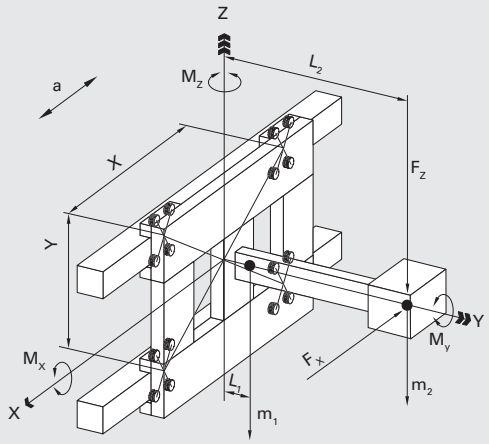
Dynamic design:

$$a_{max.} = \frac{F_R \cdot (\sqrt{x^2 + y^2} - 0.036)}{(m_1 \cdot L_1 + m_2 \cdot L_2) \cdot 2} - g$$

$$F_{a\,req.} = (m_1 + m_2) \cdot (a_{max.} + g) + 10N$$

$$M_{d\,ver\,req.} = F_{a\,req.} \cdot 0.035\ m \cdot 1.8$$

Application E (horizontal)



Static design:

$$M_{X\,max.} = 8 * F_A * (y - 0.15)$$

$$F_{Z\,max.} = \frac{M_{X\,max.} - g\,(m_1 \cdot L_1 + m_2 \cdot L_2)}{L_2}$$

$$M_{Z\,max.} = 4 * F_A * X$$

$$F_{X\,max.} = \frac{M_{Z\,max.}}{L_2}$$

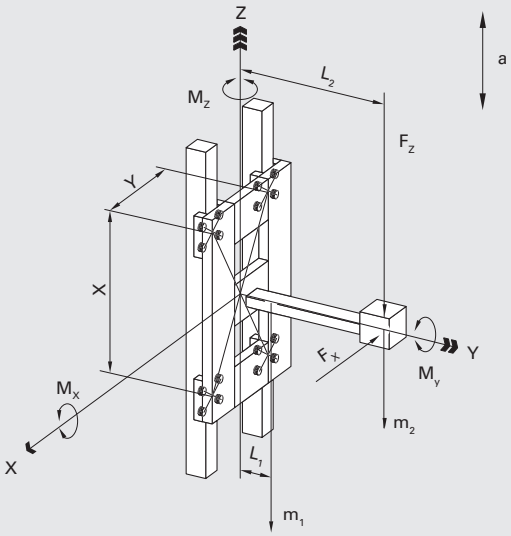
Dynamic design:

$$a_{max.} = \frac{4 \cdot F_A \cdot X}{(m_1 \cdot L_1 + m_2 \cdot L_2) \cdot 2}$$

$$F_{a\,req.} = (m_1 + m_2) \cdot a_{max.} + 40N$$

$$M_{d\,hor\,req.} = F_{a\,req.} \cdot 0.035\ m \cdot 1.8$$

Application F (vertical)



Static design:

$$M_{X\,max.} = 4 \cdot F_A \cdot X$$

$$F_{Z\,max.} = \frac{M_{X\,max.} - g \cdot (m_1 \cdot L_1 + m_2 \cdot L_2)}{L_2}$$

$$M_{Z\,max.} = 4 \cdot F_A \cdot Y$$

$$F_{X\,max.} = \frac{M_{Z\,max.}}{L_2}$$

Dynamic design:

$$a_{max.} = \frac{4 \cdot F_A \cdot X}{(m_1 \cdot L_1 + m_2 \cdot L_2) \cdot 2} - g$$

$$F_{a\,req.} = (m_1 + m_2) \cdot (a_{max.} + g) + 40N$$

$$M_{d\,ver\,req.} = F_{a\,req.} \cdot 0.035\ m \cdot 1.8$$