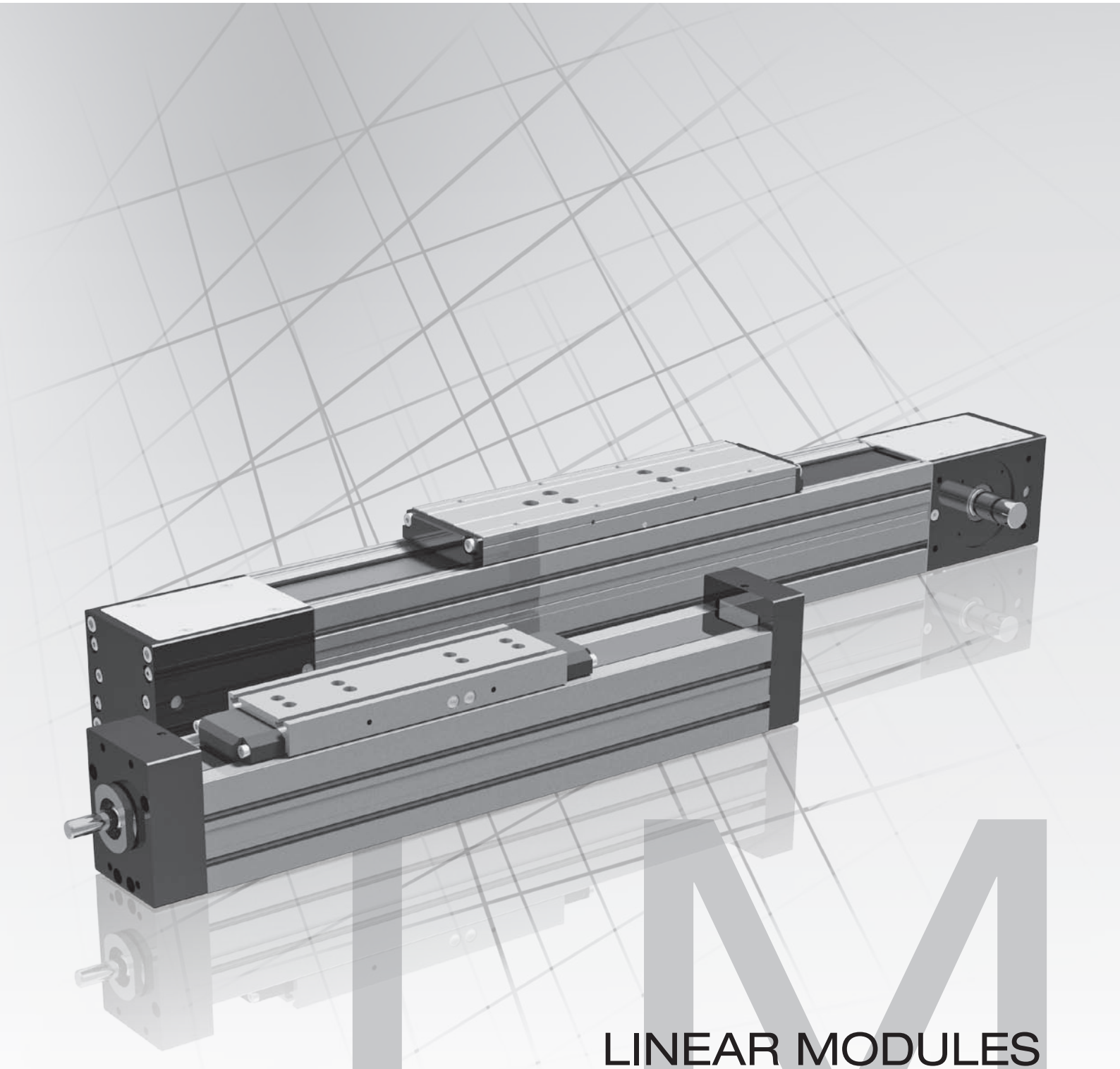
LINE TECH



LM

LINEAR MODULES

EXCERPT FROM MAIN CATALOGUE

V 11-15

SWISS MADE LINEAR TECHNOLOGY

LINETECH LINEAR MODULES LM

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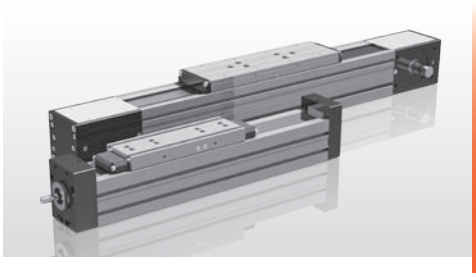

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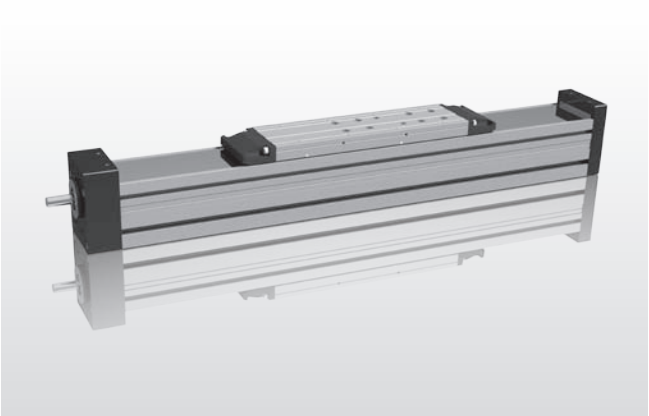
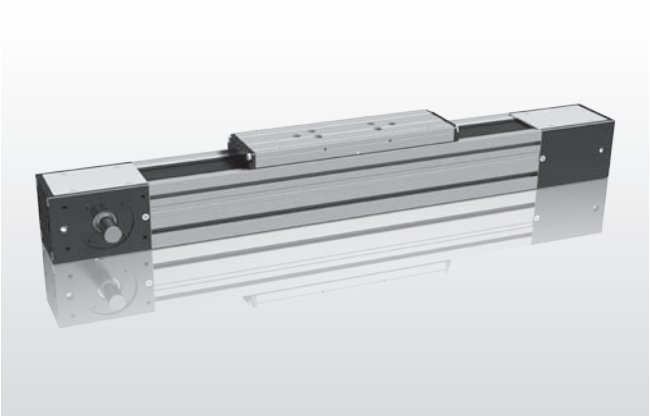
LINEAR MODULES

Product overview

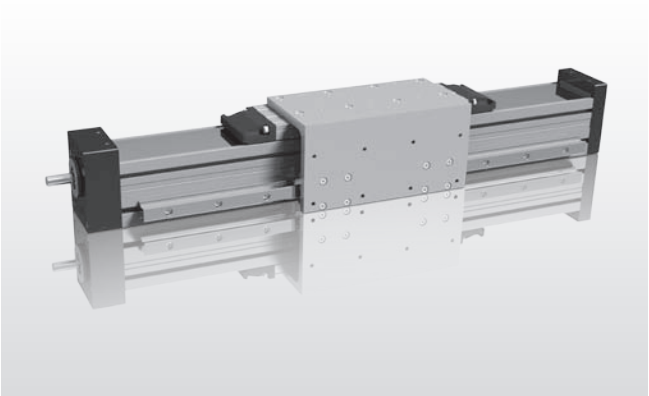
LM...R...N
Linear module with ball screw drive



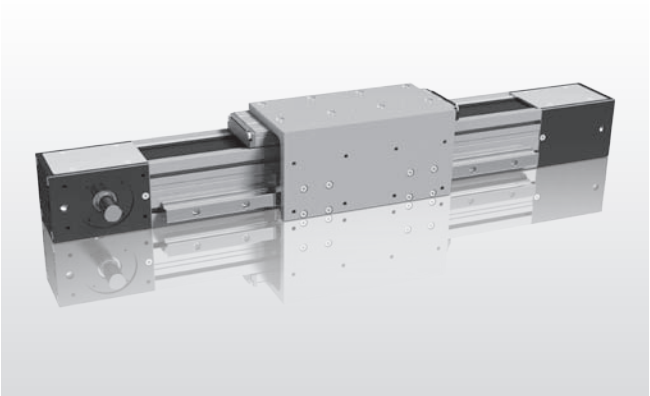
LM...Z...N
Linear module with toothed belt drive



LM...R...L/R
Linear module with ball screw drive and
lateral support rail left/right



LM...Z...L/R
Linear module with drive belts and
lateral support rail left/right



LINEAR MODULES

Product overview

LINE TECH linear modules are precision, ready-to-install, modular linear systems with linear guide and two drive variants, ball screw or toothed belt drive. Linear systems with longer strokes and high movement speeds are typical application areas. Three sizes are currently available (LM**3**, LM**4** und LM**5**).

Advantages

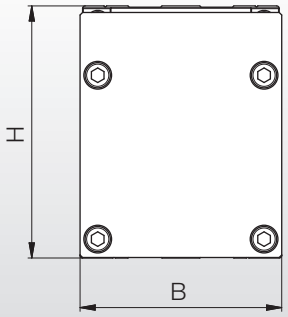
- Compact dimensions
- Optimum running performance together with high load ratings and high level of rigidity with either one or two integrated, no-play linear guides
- Either ball screw or toothed belt drive
- Simple motor mounting by centering and thread on driving head
- Greasing by central grease points
- Design aligned to application possible

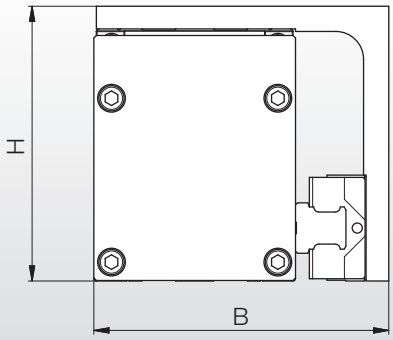
Structure

- Compact aluminium base profile
- Ready-to-install linear modules in any lengths
- Carriage made of aluminium

Customised options

- Motor mounting
- Limit switch
- Multi-axis systems





Linear modul	Dimensions	Load ratings	
Type	B x H [mm]	C_0 [kN]	C [kN]
LM3...N	60 x 85	35.0	18.0
LM3...L/R	98 x 94	70.0	36.0
LM4...N	80 x 100	59.9	34.2
LM4...L/R	117 x 109	119.9	68.4
LM5...N	110 x 129	85.0	49.6
LM5...L/R	155 x 141	170.0	99.2

Please refer to pages 12 to 17 for load capacities.

LINEAR MODULES

Design fundamentals / Lubrication / Maintenance

LINE TECH linear modules

LINE TECH linear modules with ball screw or toothed belt drive are modular, ready-to-install linear units with drive. Sealed rail guiding elements are employed in all sizes.
Guides and drive are protected from external factors (such as dirt and chippings) by a steel strip / the toothed belt.
The base profile is made of aluminium alloy and manufactured with the extrusion process.
Additional limit switches fitted on the outside, in conjunction with motors and a controller, ensure correct positioning of the carriage and provide protection against overrun.
The selected design provides for a high level of performance with the most compact dimensions.

Lubrication

LINE TECH linear modules are lubricated with Microlube GBU Y 131 at the factory. This quality grease offers outstanding properties for the guidance and screw drive elements as well.
Greasing should be carried out at regular intervals, depending on the load and area of operation. On an average, re-greasing is required every 500 hours.
All roller bearings are greased for life and thus do not require any maintenance.
Correct and sufficient greasing can substantially prolong the life of linear modules.

Note: Also follow here the instructions on the lubrication points (pages 60/61).

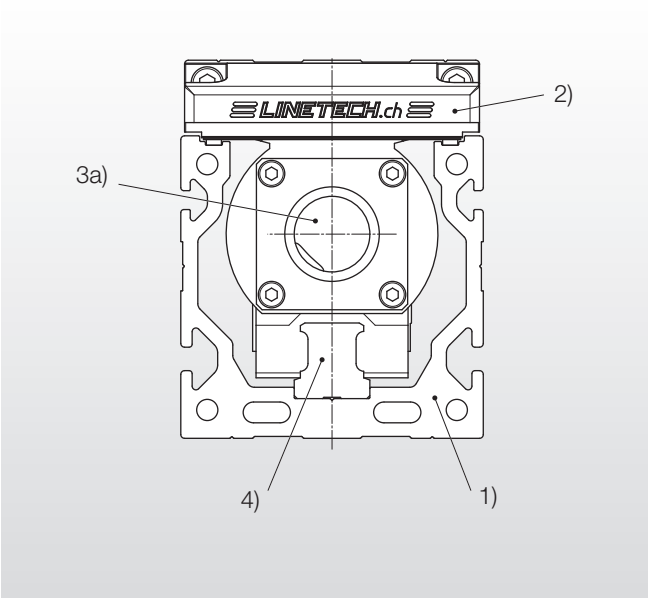
Maintenance

LINE TECH linear modules are maintenance-free (apart from re-greasing required).

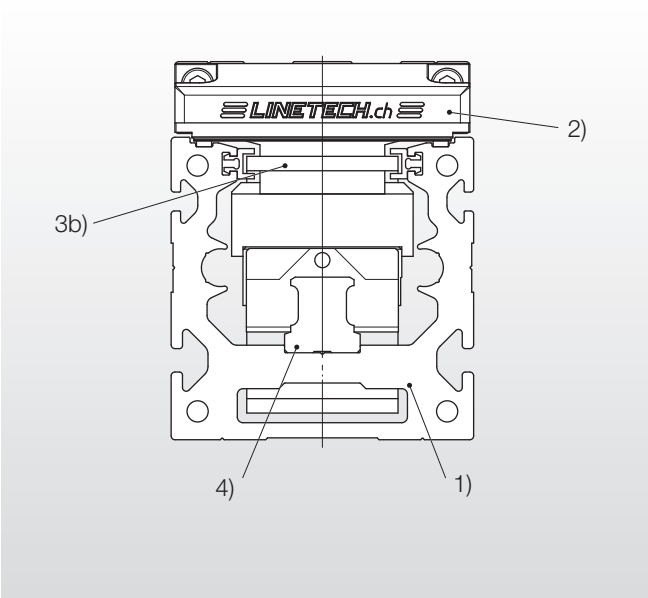
Service temperature

The permissible operating temperature (between 5 and 80 °C) is determined by the synthetic materials used.
The specifications of the relevant manufacturers apply for motors and control units.

LM...R...
with ball screw drive



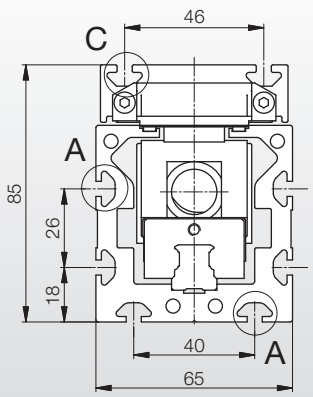
LM...Z...
with toothed belt drive



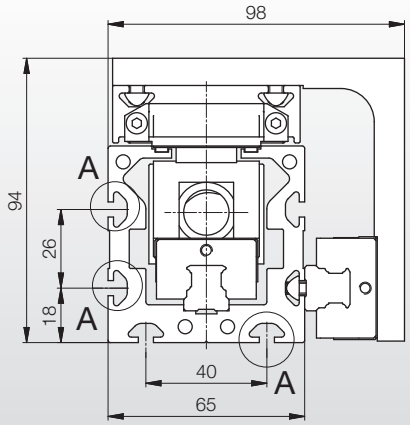
1) Base profile
2) Carriage
3a) Ball screw drive
3b) Toothed belt drive
4) Linear guide

Profile cross-sections LM3...R/Z...

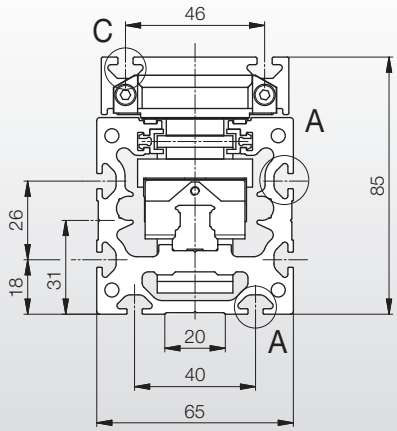
LM3...R...N



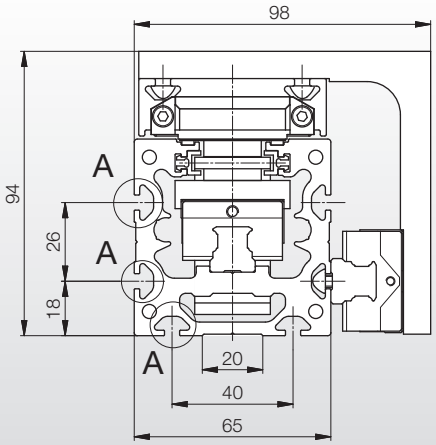
LM3...R...L/R
with lateral support rail left/right



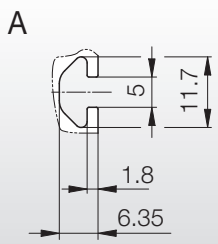
LM3...Z...N

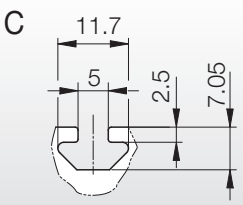


LM3...Z...L/R
with lateral support rail left/right



Grooves LM3...

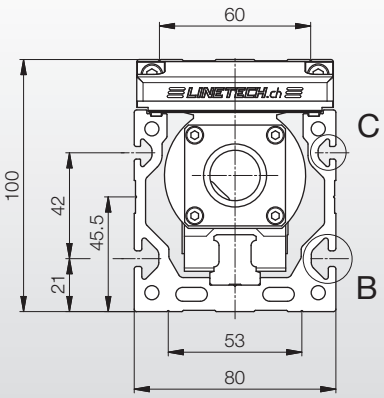




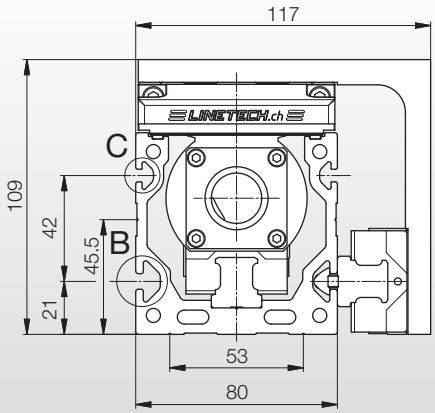
LINEAR MODULES

Profile cross-sections LM4...R/Z...

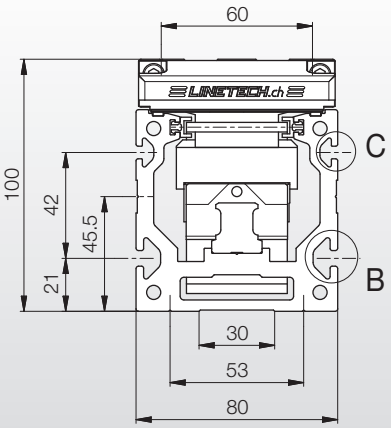
LM4...R...N



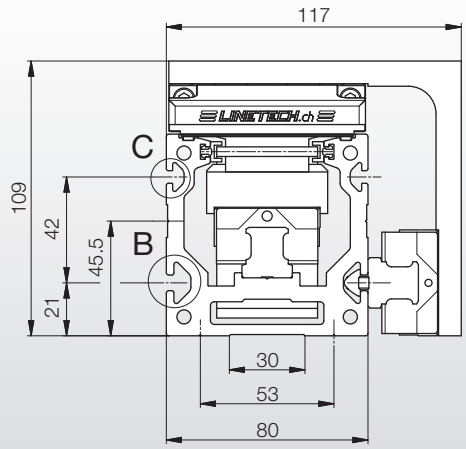
LM4...R...L/R
with lateral support rail left/right



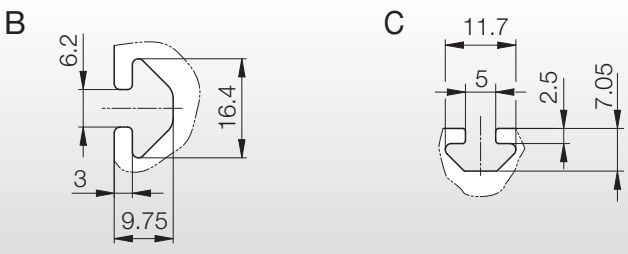
LM4...Z...N



LM4...Z...L/R
with lateral support rail left/right

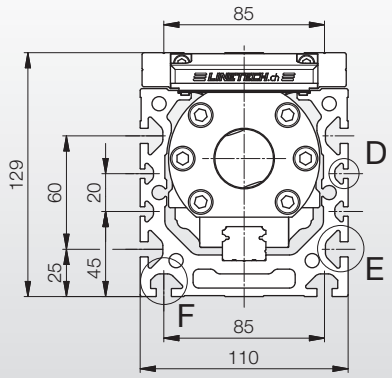


Grooves LM4...

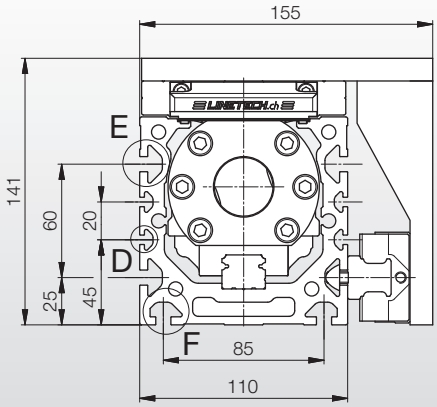


Profile cross-sections LM5...R/Z...

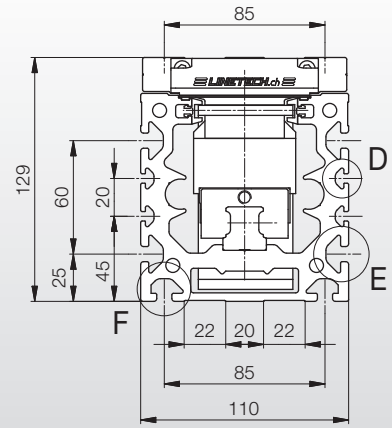
LM5...R...N



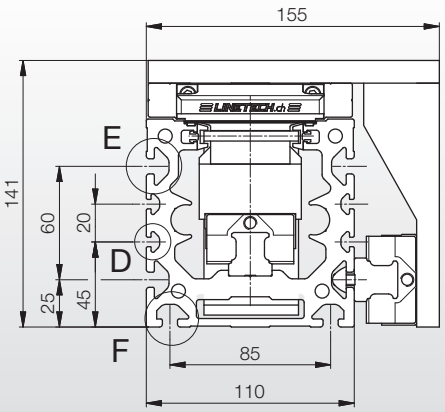
LM5...R...L/R
with lateral support rail left/right



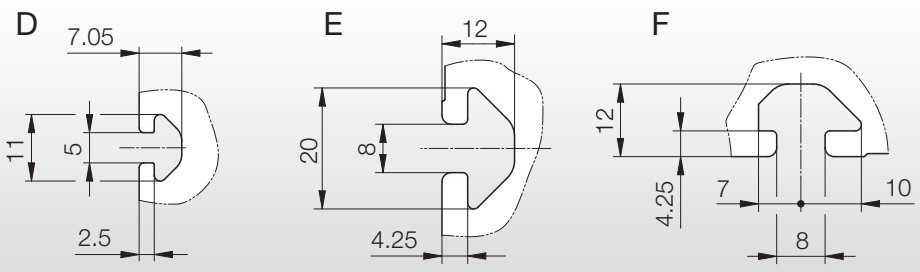
LM5...Z...N



LM5...Z...L/R
with lateral support rail left/right

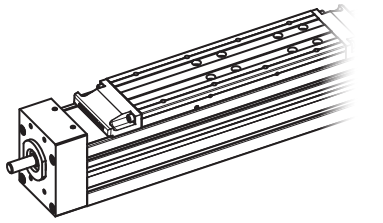


Grooves LM5...



LINEAR MODULES WITH BALL SCREW DRIVE

Details for ball screw drive



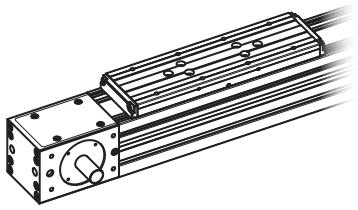
Details for ball screw drive (BSD)

LM	BSD	Axial load rates		Positioning accuracy	Repeating accuracy	Accelera-tion	Axial play		Idle torque
Size	d x p [mm]	C_0 [N]	C_{dyn} [N]	[µm/mm]	[mm]	a_{max} [m/s²]	Type	Axial play [mm]	[Nm]
LM3...R...	16 x 5	4551	4327	52/300	< 0.03 [1]	10.0	R	< 0.02	0.030
					< 0.01 [1]		V	—	0.100
	16 x 10	4551	4327	52/300	< 0.03 [1]	10.0	R	< 0.02	0.060
					< 0.01 [1]		V	—	0.200
	16 x 16	4551	4327	52/300	< 0.03 [1]	10.0	R	< 0.02	0.120
					< 0.01 [1]		V	—	0.320
LM4...R...	20 x 5	5705	4912	52/300	< 0.03 [1]	10.0	R	< 0.02	0.050
					< 0.01 [1]		V	—	0.120
	20 x 20	5705	4912	52/300	< 0.03 [1]	10.0	R	< 0.02	0.200
					< 0.01 [1]		V	—	0.400
LM5...R...	32 x 5	11538	8947	52/300	< 0.03 [1]	10.0	R	< 0.02	0.080
					< 0.01 [1]		V	—	0.200
	32 x 10	11538	8947	52/300	< 0.03 [1]	10.0	R	< 0.02	0.160
					< 0.01 [1]		V	—	0.400
	32 x 32	11538	8947	52/300	< 0.03 [1]	10.0	R	< 0.02	0.600
					< 0.01 [1]		V	—	1.200

d x p = screw diameter x thread pitch
[1] backlash not factored in
R = reduced axial play
V = preloaded

LINEAR MODULES WITH TOOTHED BELT DRIVE

Details for toothed belt drive



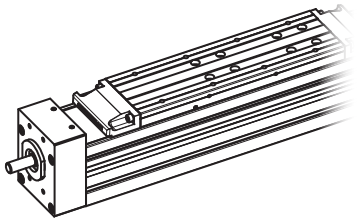
Details for toothed belt drive

LM	Toothed belt drive				Axial load	Positioning accuracy	Repeating accuracy	Accel-eration
Size	Type/division	Pinion $d_3 \times l_R$ [mm]	Stroke/rev [mm]	Tension [3] [mm/m]	F [N]	[µ/mm]	…/1000 mm [mm]	a_{max} [m/s²]
LM3…Z…	HTD 5 M	49.34 x 31	155	0.245	… [1]	200/1000 [2]	< 0.20 [2]	50.0 [1]
LM4…Z…	HTD5M	65.25 x 45	205	0.105	… [1]	200/1000 [2]	< 0.20 [2]	50.0 [1]
LM5…Z…	STD8M	94.22 x 60	296	0.059	… [1]	200/1000 [2]	< 0.20 [2]	50.0 [1]

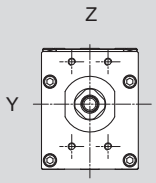
$d_3 \times l_R$ = pinion diameter x pinion width
[1] dependent on speed and load → see diagram on page 19
[2] backlash not factored in
[3] belt tension/metre [mm/m] per 100 N tensile force

LINEAR MODULES WITH BALL SCREW DRIVE

General technical details for linear modules



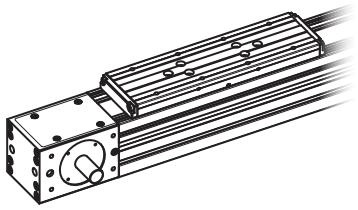
General technical details for linear modules with ball screw drive

LM	Movement speed		Moments of inertia		Stroke max.	Steel strip	Feed and friction force	Moved mass
								
Type	Guide v_{max} [m/s]	Drive v_{max} [m/s]	I_Y [cm⁴]	I_Z [cm⁴]	[mm]		F_V [N]	m_b [kg]
LM3...R...N	5.0	2)	64.5	81.7	2000	without	20.00	1.410
						with	30.00	
LM3...R...L/R	5.0	2)	64.8	81.9	2000	without	40.00	2.515
						with	50.00	
LM4...R...N	5.0	2)	106.5	152.7	3000	without	25.00	2.500
						with	35.00	
LM4...R...L/R	5.0	2)	107.6	153.4	3000	without	50.00	4.225
						with	60.00	
LM5...R...N	5.0	2)	432.7	594.0	3000	without	30.00	5.330
						with	40.00	
LM5...R...L/R	5.0	2)	434.6	595.3	3000	without	60.00	8.820
						with	70.00	

2) for ball screw drive, dependent on rotational speed characteristics, spindle length and relevant critical rotational speed.

LINEAR MODULES WITH TOOTHED BELT DRIVE

General technical details for linear modules



General technical details for linear modules with toothed belt drive

LM	Movement speed		Moments of inertia		Stroke max.	Steel strip	Feed and friction force	Moved mass
Type	Guide v_{max} [m/s]	Drive v_{max} [m/s]	I_Y [cm⁴]	I_Z [cm⁴]	[mm]		F_V [N]	m_b [kg]
LM3...N...N [5]	5.0	[4]	66.9	82.4	7650	without	20.00	1.030
						with	30.00	1.040
LM3...Z...N	5.0	[4]	66.9	82.4	7650	without	20.00	1.100
						with	30.00	1.110
LM3...Z...L/R	5.0	[4]	67.2	82.6	7650	without	40.00	2.205
						with	50.00	2.215
LM4...N...N [5]	5.0	[4]	131.2	197.8	7580	without	25.00	2.090
						with	35.00	2.100
LM4...Z...N	5.0	[4]	131.2	197.8	7580	without	25.00	2.150
						with	35.00	2.165
LM4...Z...L/R	5.0	[4]	132.3	198.5	7580	without	50.00	3.875
						with	60.00	3.890
LM5...N...N [5]	5.0	[4]	451.9	623.9	7530	without	30.00	4.000
						with	40.00	4.040
LM5...Z...N	5.0	[4]	451.9	623.9	7530	without	30.00	4.100
						with	40.00	4.140
LM5...Z...L/R	5.0	[4]	453.8	625.2	7530	without	60.00	7.590
						with	70.00	7.630

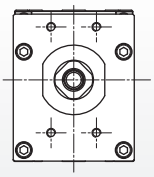
[4] for toothed belt drive, dependent on load and speed and permissible movement speed of the linear guide
→ see diagram on page 19

[5] variant without drive

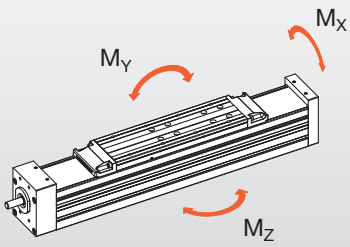
LINEAR MODULES WITH BALL SCREW DRIVE

Torques and load ratings

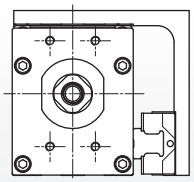
LM...R...N

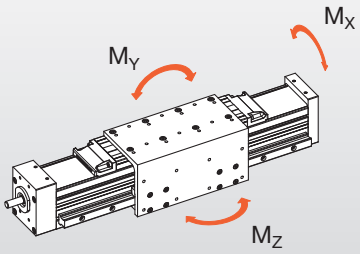


Torques

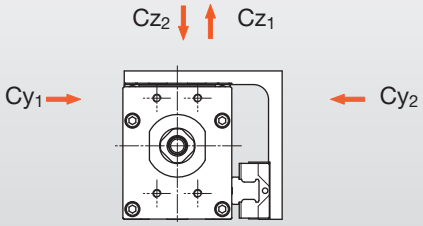


LM...R...L/R
with lateral support rail





Load ratings



Linear modul	Maximum permissible load [kN]				Maximum permissible torque [Nm]					
Type	static		dynamic		static			dynamic		
	$C_{y0\,1,2}$	$C_{z0\,1,2}$	$C_{y1,2}$	$C_{z1,2}$	M_{x0}	M_{y0}	M_{z0}	M_x	M_y	M_z
LM3...R...N	35.0	35.0	18.0	18.0	286	1353	1353	160	1030	880
LM3...R...L/R	70.0	70.0	36.0	36.0	1456	2778	2778	808	2016	2016
LM4...R...N	59.9	59.9	34.2	34.2	646	1573	1573	400	1446	1446
LM4...R...L/R	119.9	119.9	68.4	68.4	3030	3860	3860	1868	3432	3432
LM5...R...N	85.0	85.0	49.6	49.6	1080	2316	2316	684	2290	2290
LM5...R...L/R	170.0	170.0	99.2	99.2	5588	8715	8715	3552	7659	7659

Note on dynamic load ratings and torques

The determination of dynamic load ratings and torques is based on a 50,000 m stroke. If comparative values must be calculated for a 100,000 m stroke, the values for M_x, M_y, M_z and C must be divided by the factor 1.26.

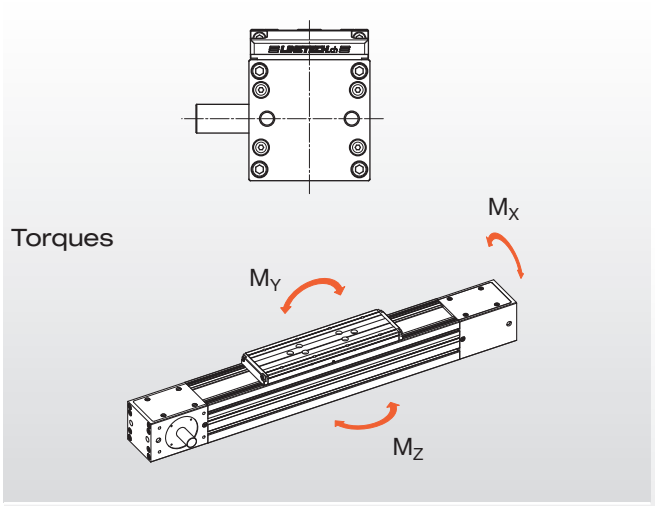
Expedient load

With a view to service life, loads of less than 20% of the dynamic load ratings have generally proved to be expedient.

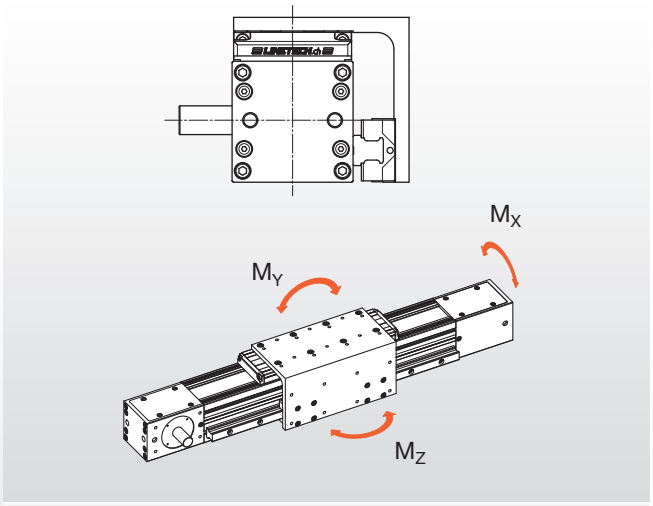
LINEAR MODULES WITH TOOTHED BELT DRIVE

Torques and load ratings

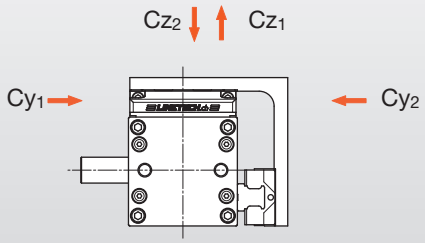
LM...Z...N



LM...Z...L/R
with lateral support rail



Load ratings



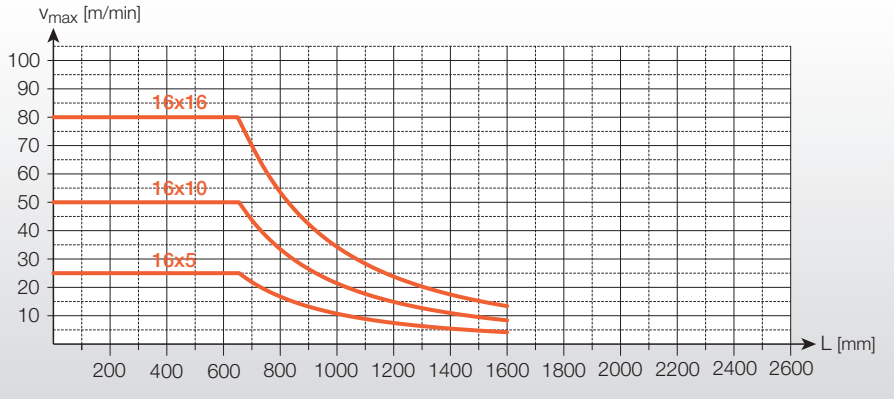
Linear modul	Maximum permissible load [kN]				Maximum permissible torque [Nm]					
Type	static		dynamic		static			dynamic		
	$C_{y0\,1,2}$	$C_{z0\,1,2}$	$C_{y1,2}$	$C_{z1,2}$	M_{x0}	M_{y0}	M_{z0}	M_x	M_y	M_z
LM3...Z...N	35.0	35.0	18.0	18.0	286	1185	1185	160	923	923
LM3...Z...L/R	70.0	70.0	36.0	36.0	1457	2610	2610	808	1998	1998
LM4...Z...N	59.9	59.9	34.2	34.2	646	2484	2484	400	2130	2130
LM4...Z...L/R	119.9	119.9	68.4	68.4	3030	4772	4772	1868	4115	4115
LM5...Z...N	85.0	85.0	49.6	49.6	1080	6115	6115	684	5170	5170
LM5...Z...L/R	170.0	170.0	99.2	99.2	3356	12513	12513	2136	10541	10541

Permissible speeds

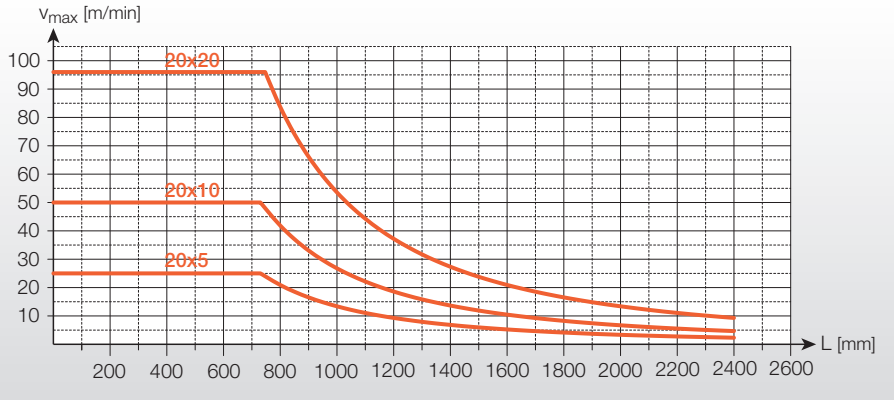
Permissible speeds...

Caution:
For ball screw drive, note the rotational speed characteristics, spindle length and relevant critical rotational speed.

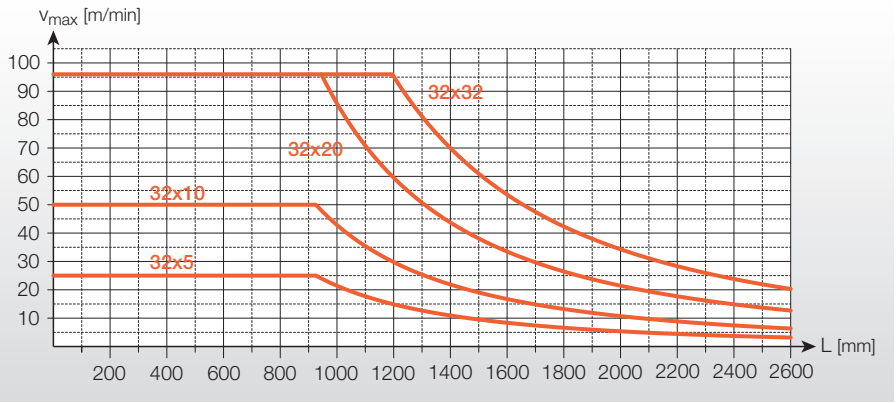
... for linear module LM3...R... with ball screw drive ø 16 x ... [1)]



... for linear module LM4...R... with ball screw drive ø 20 x ... [1)]



... for linear module LM5...R... with ball screw drive ø 32 x ... [1)]



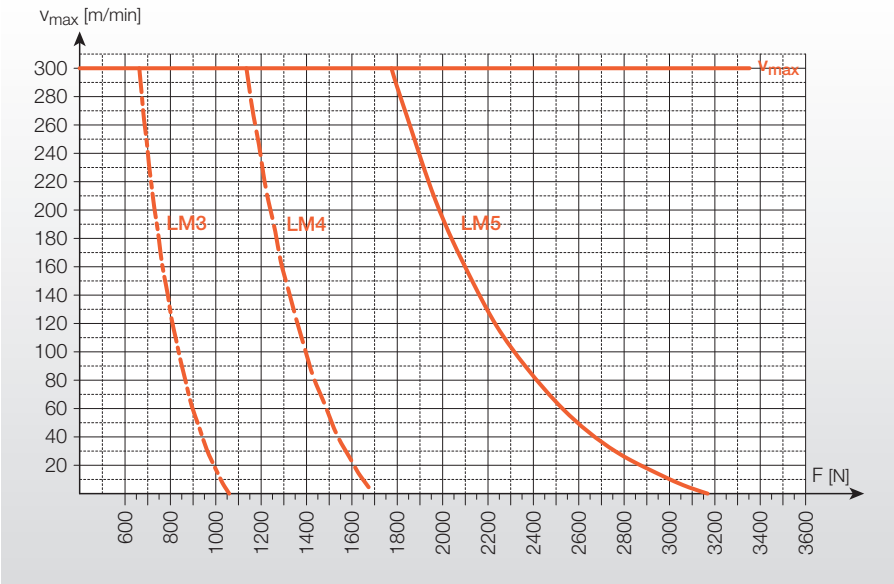
Please also pay attention to the motor speeds.

[1)] greater accuracy on request
L = overall length of the linear module

Permissible speeds

Permissible speeds...

... for linear module LM...Z... with toothed belt drive



F = axial load

Caution:
For toothed belt drive, the permitted movement speed of the linear guide, and load, are authoritative.

Please also pay attention to the motor speeds.

Permissible deflection

Permissible deflection with ball screw drive

Linear modules may be assembled self-supporting. However, the deflection (which limits the possible load) must be taken into consideration.

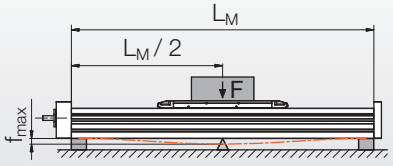
If the maximum permissible deflection is exceeded, the linear modules must be additionally supported.

The maximum permissible deflection is limited by the maximum deflection angle of 5'. Exceeding this value without support will have a negative effect on the unit's service life.

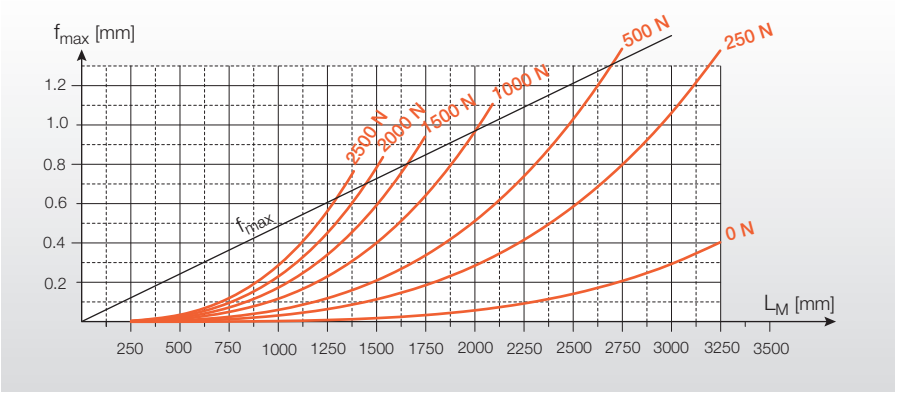
If increased demands are made on system accuracy we recommend supporting the linear modules along its entire length.

The following diagrams apply for:
- firm clamping (40–50 mm per side)
- 3–4 screws per side
- solid base

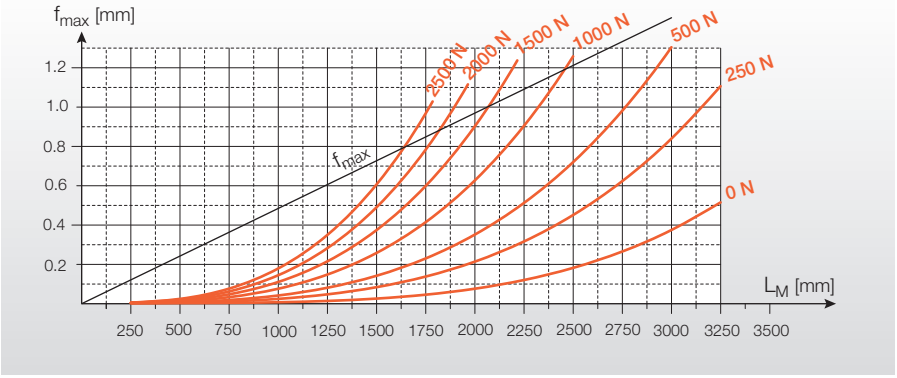
Mounting position: horizontal



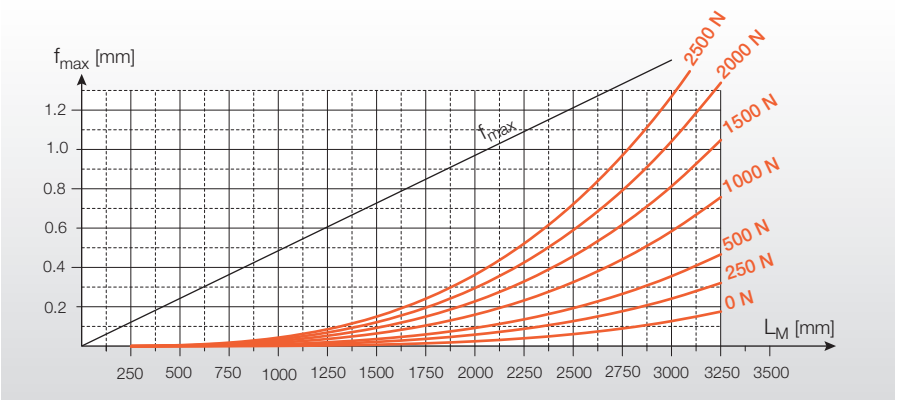
LM3...R...N resp. LM3...R...L/R



LM4...R...N resp. LM4...R...L/R



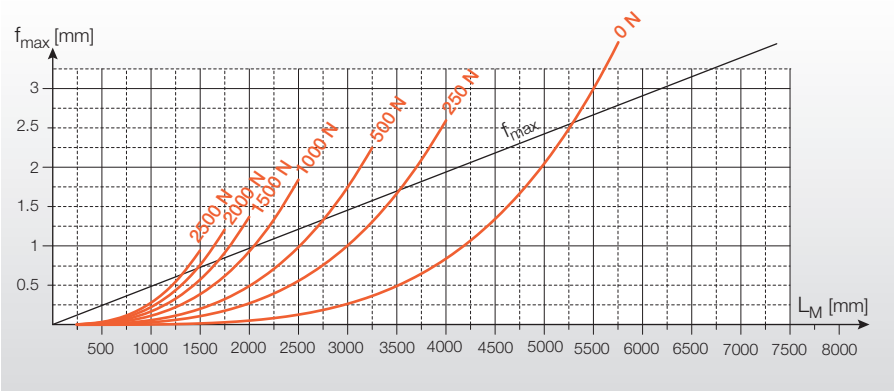
LM5...R...N resp. LM5...R...L/R



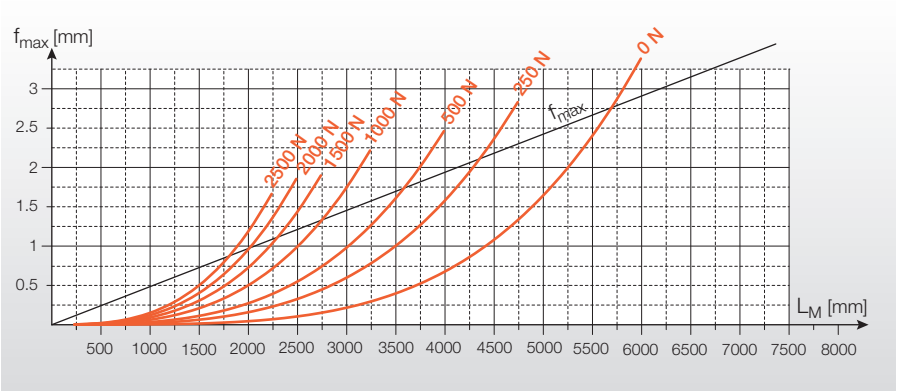
Permissible deflection

Permissible deflection with toothed belt drive

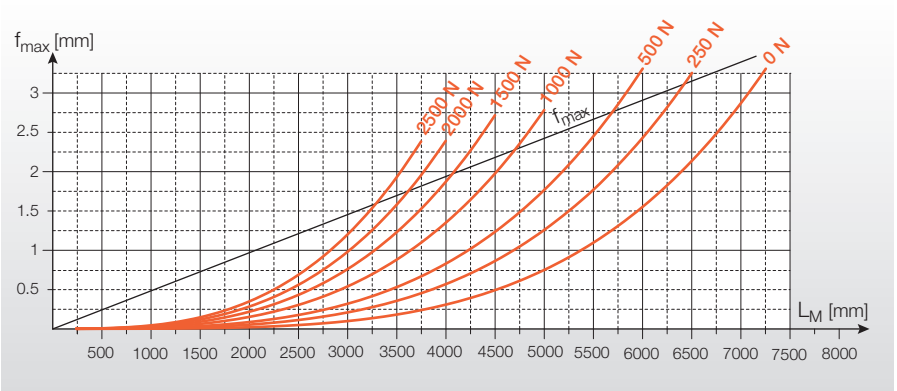
LM3...Z...N resp. LM3...Z...L/R



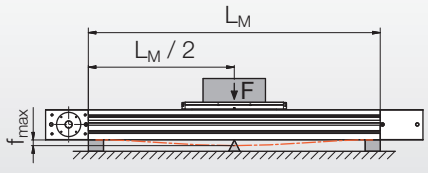
LM4...Z...N resp. LM4...Z...L/R



LM5...Z...N resp. LM5...Z...L/R



Mounting position: horizontal



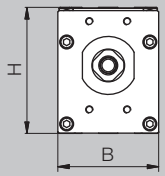
LINEAR MODULES WITH BALL SCREW DRIVE

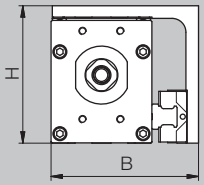
Designation system

Linear module (designation example) **LM 4 . 2 . 0500 B R 005 . 1**

Design
LM = linear module with linear guide

Size
3 = size 65 mm
4 = size 80 mm
5 = size 110 mm





Size	LM...N B x H [mm]	LM...L/R B x H [mm]
3	65 x 85	98 x 94
4	80 x 100	117 x 109
5	110 x 129	155 x 141

Configuration
2 = 2 runner blocks (1 carriage) ***
... = special execution [1)]

Stroke absolut [mm]

Protective covering
B = with steel strip ***
N = without protective strip [1)]

Drive
R = rolled ball screw ***
N = without drive

Stroke per revolution [mm]
005 / 010 / 016 = size 3; ball screw with a pitch of 5, 10 or 16 mm
005 / 020 = size 4; ball screw with a pitch of 5 or 20 mm
005 / 010 / 032 = size 5; ball screw with a pitch of 5, 10 or 32 mm
... = other pitch [1)]

Limit switches
0 = without limit switch
1 = 2 limit switches, reference point at front (drive side)
2 = 2 limit switches, reference point at rear (opposite drive side)
3 = 2 limit switches + additional reference switch at front (drive side)
4 = 2 limit switches + additional reference switch at rear (opposite drive side)

* seen from motor opposite side towards motor
** available for lateral motor mounting only
*** standard version
1) on request
2) new designation system from 01.01.2015

. 01 . 0 N - S 7 R L N N

5 8 3 _ _ _ → 583... = drawing type

Lateral support rail
- **N** = without lateral support rail ***
- L = lateral support rail left
- R = lateral support rail right

Connector box
- **N** = without connector box (loose cable L = 2.0 m) ***
- S = with connector box

Mounting position of limit switches / connector box
- **N** = without limit switches / connector box ***
- L = limit switches / connector box mounting left *
- R = limit switches / connector box mounting right *

Preload ball screw drive (BSD)
- **R** = BSD with reduced play ***
- V = BSD preloaded
- N = without drive

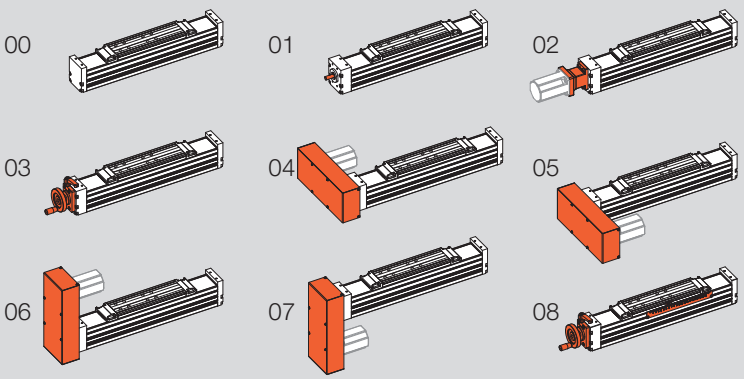
Tolerance class ball screw drive (BSD)
- **7** = Tolerance class BSD: T7 (52 µm/300 mm) ***
- N = without drive

Material protective strip
- **S** = steel strip ***
- R = stainless steel strip
- N = without protective strip

Motor mounting
- **N** = without motor mounting ***
- F = mounting plate for standard motor
- S = mounting plate for special motor

Reduction [2)]
- **0** = without reduction (1:1) ***
- 1 = reduction 1:1.5 **
- 2 = reduction 1:2 **
- (3 = reduction 1:2.5) **

Assembly stage
- 00 = without drive
- **01** = free spindle end ***
- 02 = with coupling and intermediate plate
- 03 = with crank and clamp
- 04 = set up for lateral motor mounting right *
- 05 = set up for lateral motor mounting left *
- 06 = set up for lateral motor mounting top
- 07 = set up for lateral motor mounting bottom
- 08 = with crank, clamp and lateral millimetre scale



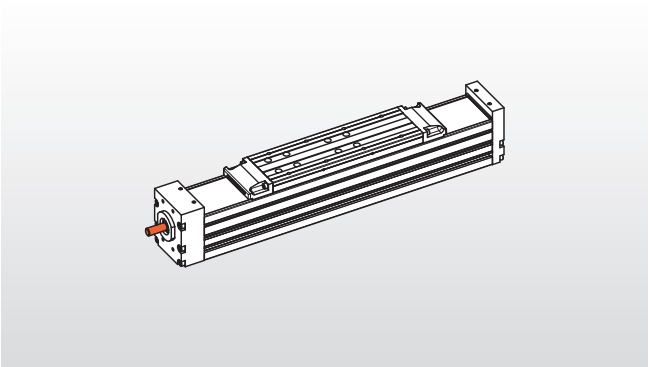
LINEAR MODULES WITH BALL SCREW DRIVE

Information for selection » Motor mounting preparation

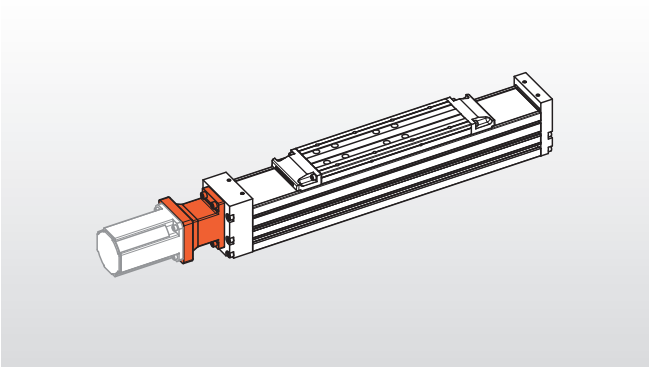
Motor fitting preparation – assembly stages with ball screw drive

LINE TECH linear modules with ball screw drive can be supplied with different motor mount preparations.
Refer to pages 52 and 53 for dimensions.

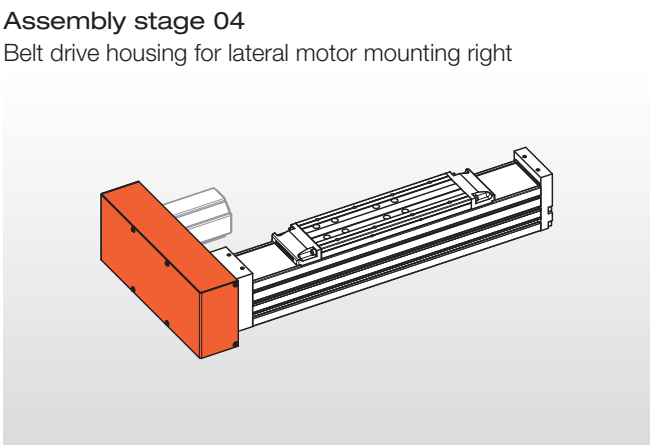
Assembly stage 01
Free spindle end



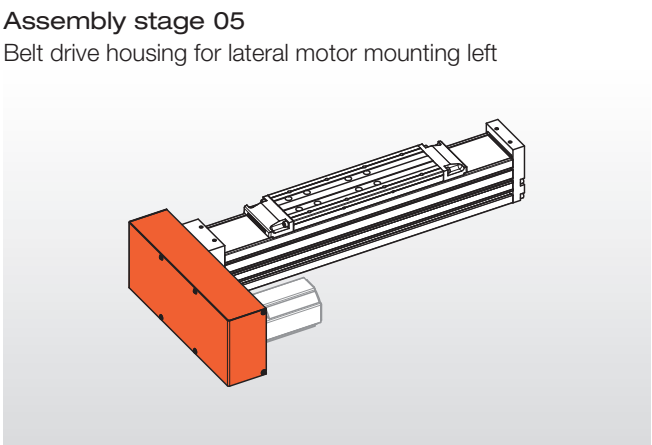
Assembly stage 02
With coupling and intermediate plate



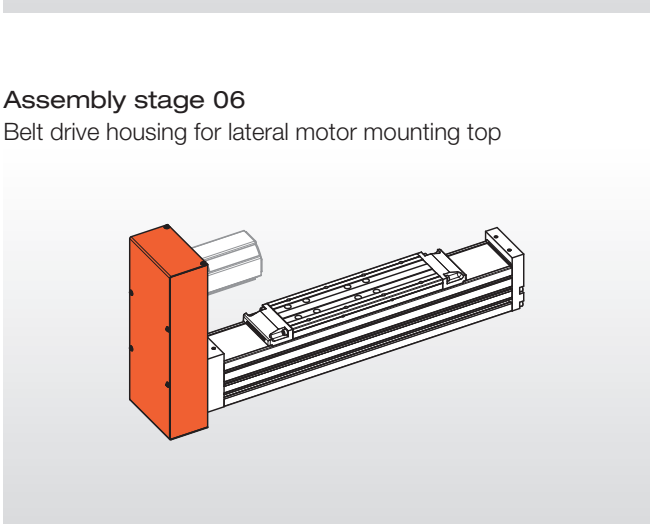
Assembly stage 04
Belt drive housing for lateral motor mounting right



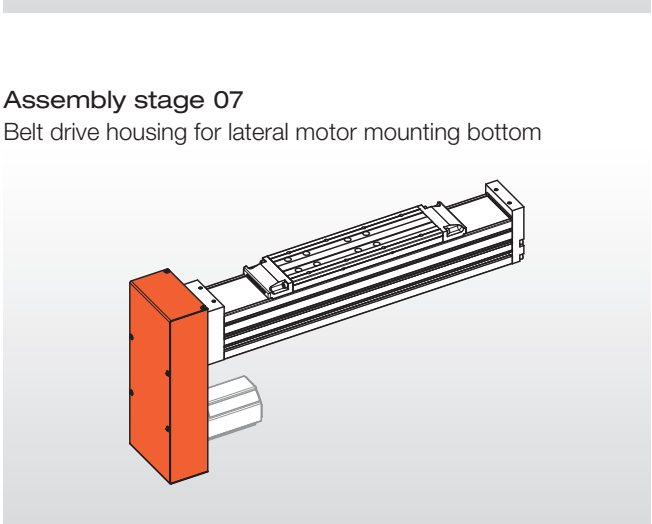
Assembly stage 05
Belt drive housing for lateral motor mounting left



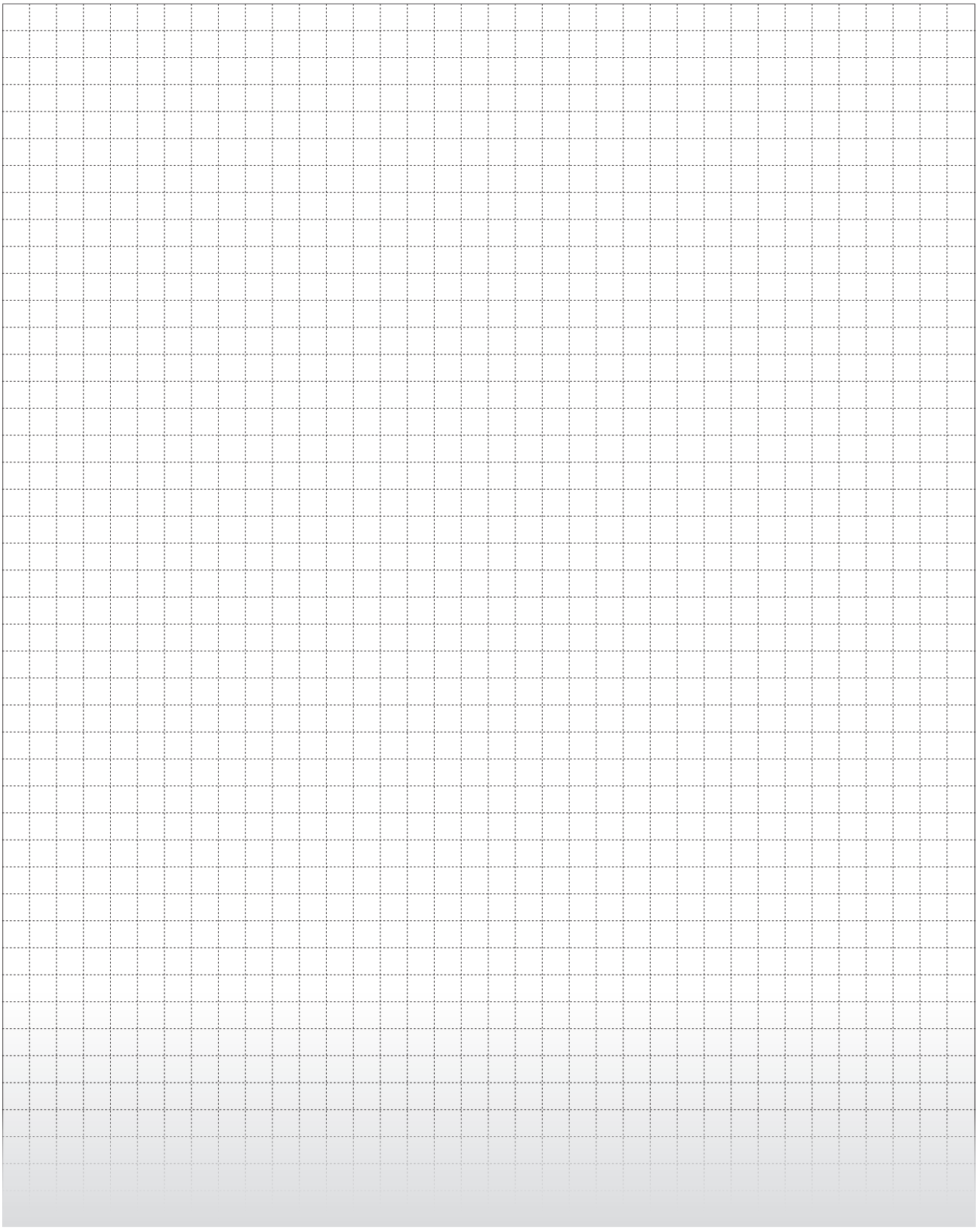
Assembly stage 06
Belt drive housing for lateral motor mounting top



Assembly stage 07
Belt drive housing for lateral motor mounting bottom

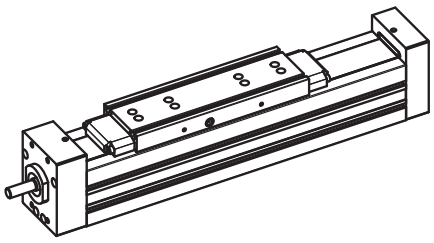


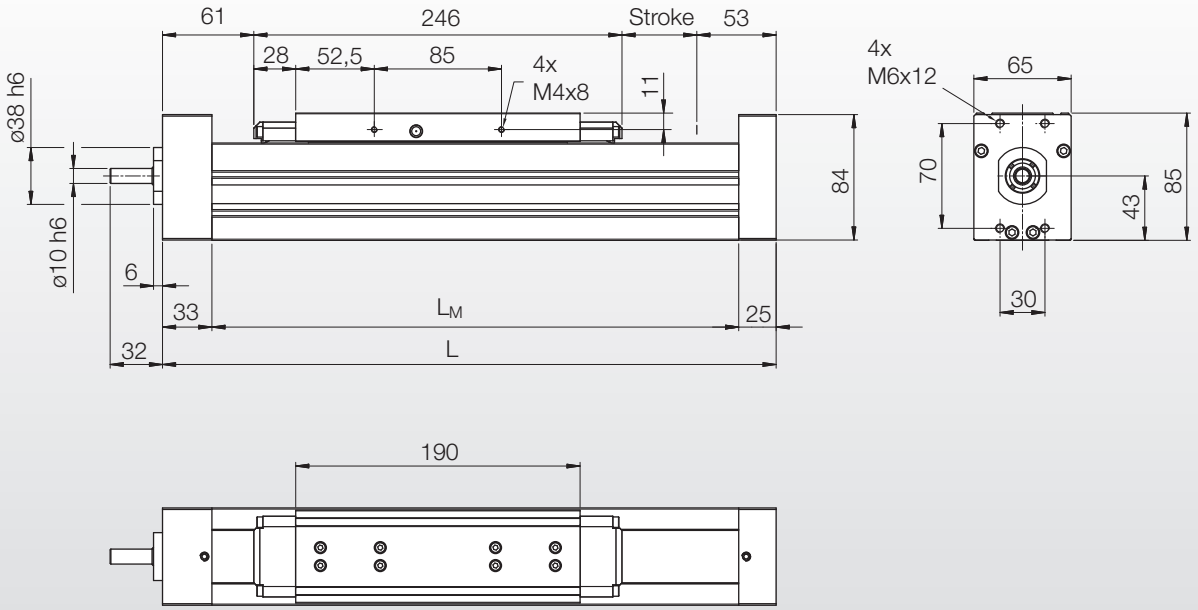
NOTES



LINEAR MODULE LM3...BR...N

with ball screw drive, with steel strip



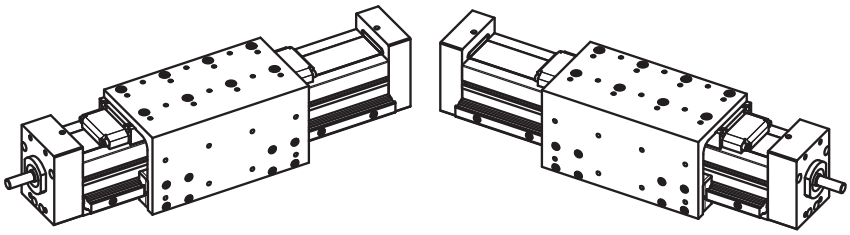


Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Length ball screw [mm]	Length steel strip [mm]	Weight [kg]
LM3...BR...N	Stroke + 360	L – 58	L + 22	L – 22	4.60 kg + 0.65 kg/100 mm stroke

CAD data is available from www.linetech.ch

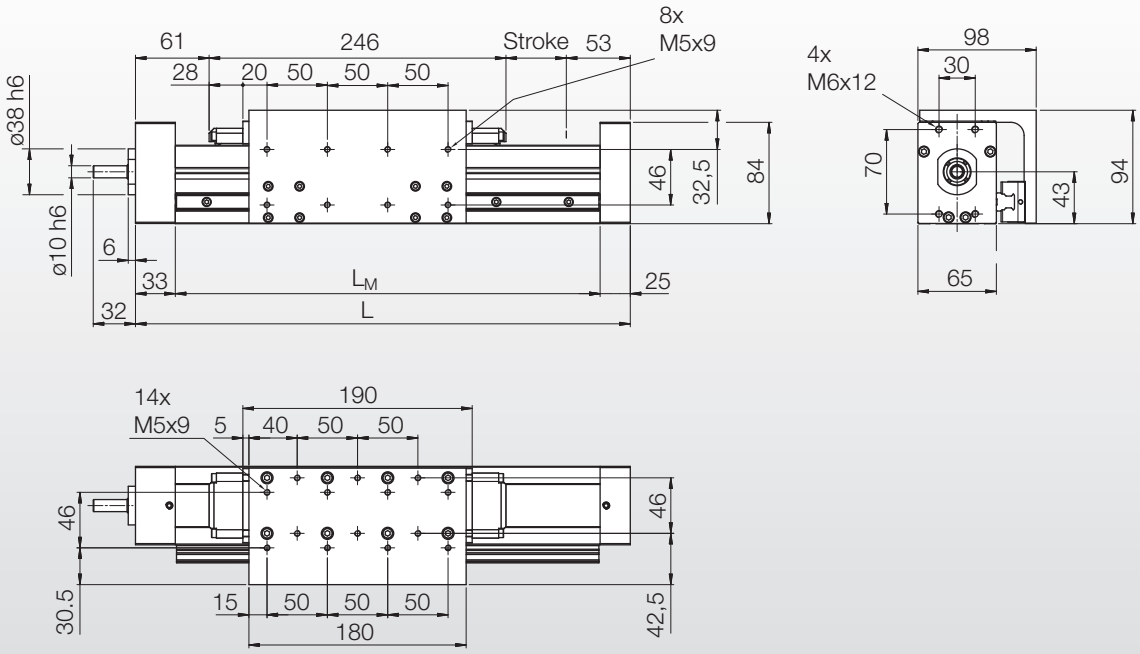
LINEAR MODULE LM3...BR...L/R

with ball screw drive and lateral support rail left/right, with steel strip



LM3...BR...L

LM3...BR...R

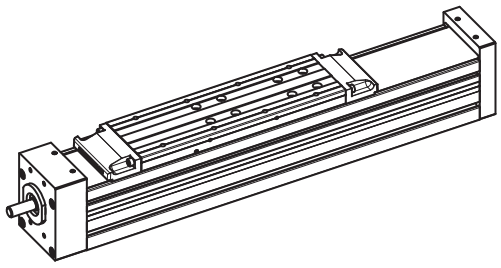


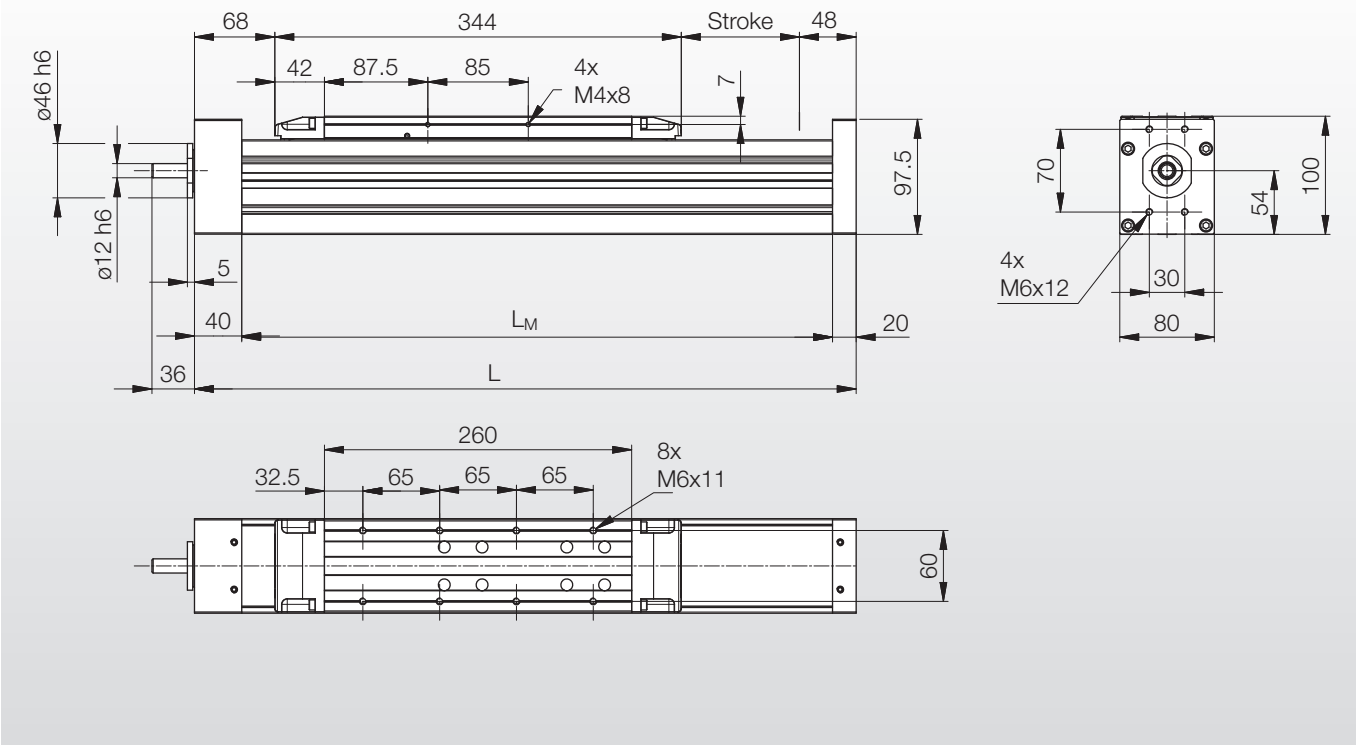
Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Length ball screw [mm]	Length steel strip [mm]	Weight [kg]
LM3...BR...L/R	Stroke + 360	L – 58	L + 22	L – 22	6.11 kg + 0.78 kg/100 mm stroke

CAD data is available from www.linetech.ch

LINEAR MODUE LM4...BR...N

with ball screw drive, with steel strip



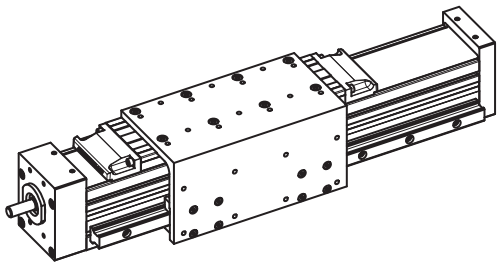


Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Length ball screw [mm]	Length steel strip [mm]	Weight [kg]
LM4...BR...N	Stroke + 460	L – 60	L + 30	L – 22	7.8 kg + 0.95 kg/100 mm stroke

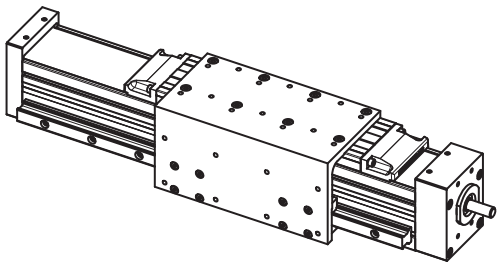
CAD data is available from www.linetech.ch

LINEARMODUL LM4...BR...L/R

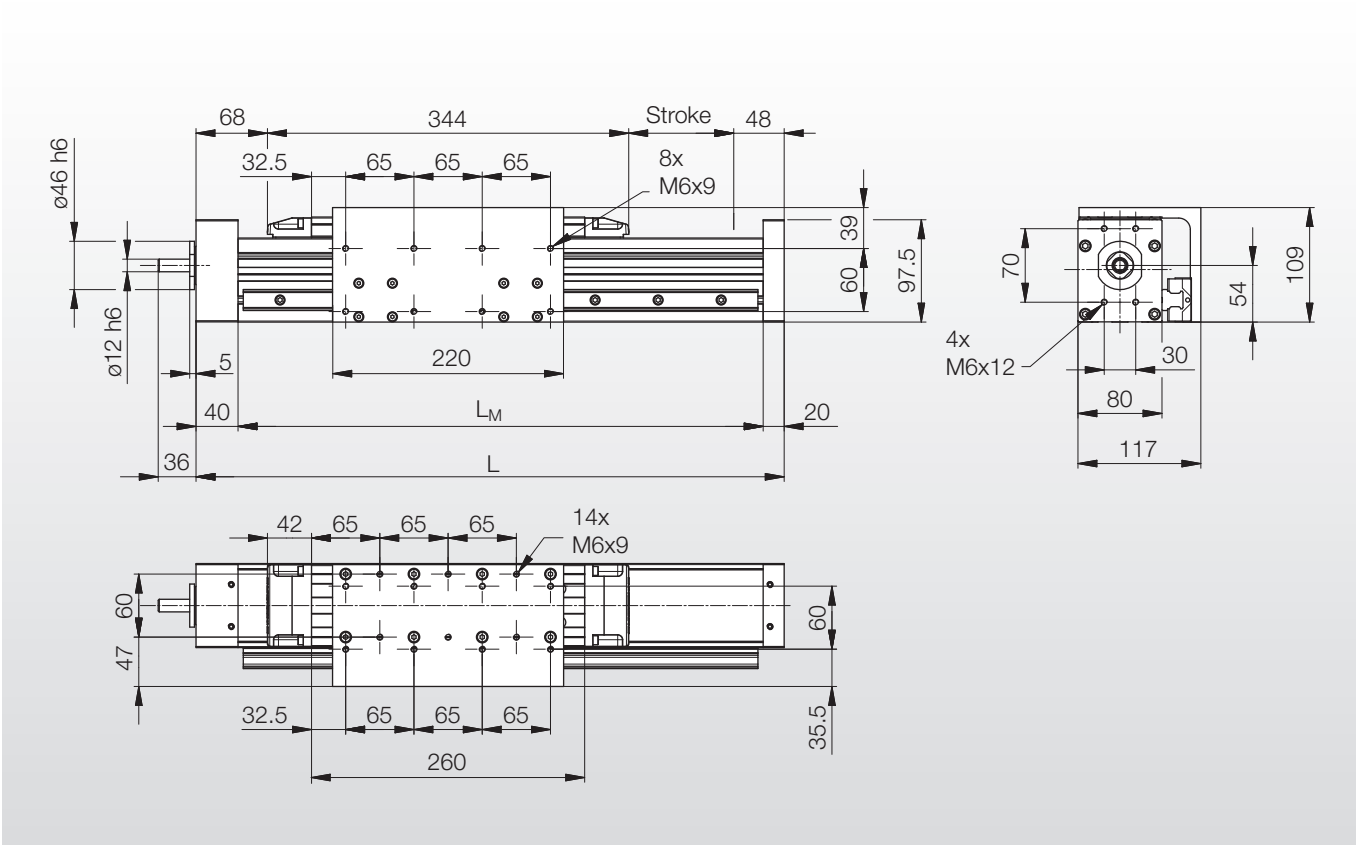
with ball screw drive and lateral support rail left/right, with steel strip



LM4...BR...L



LM4...BR...R

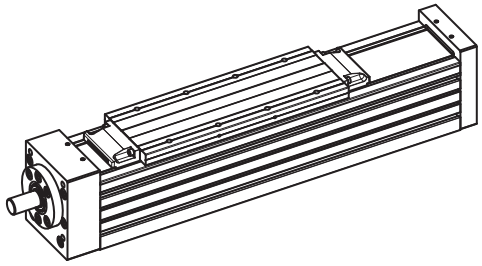


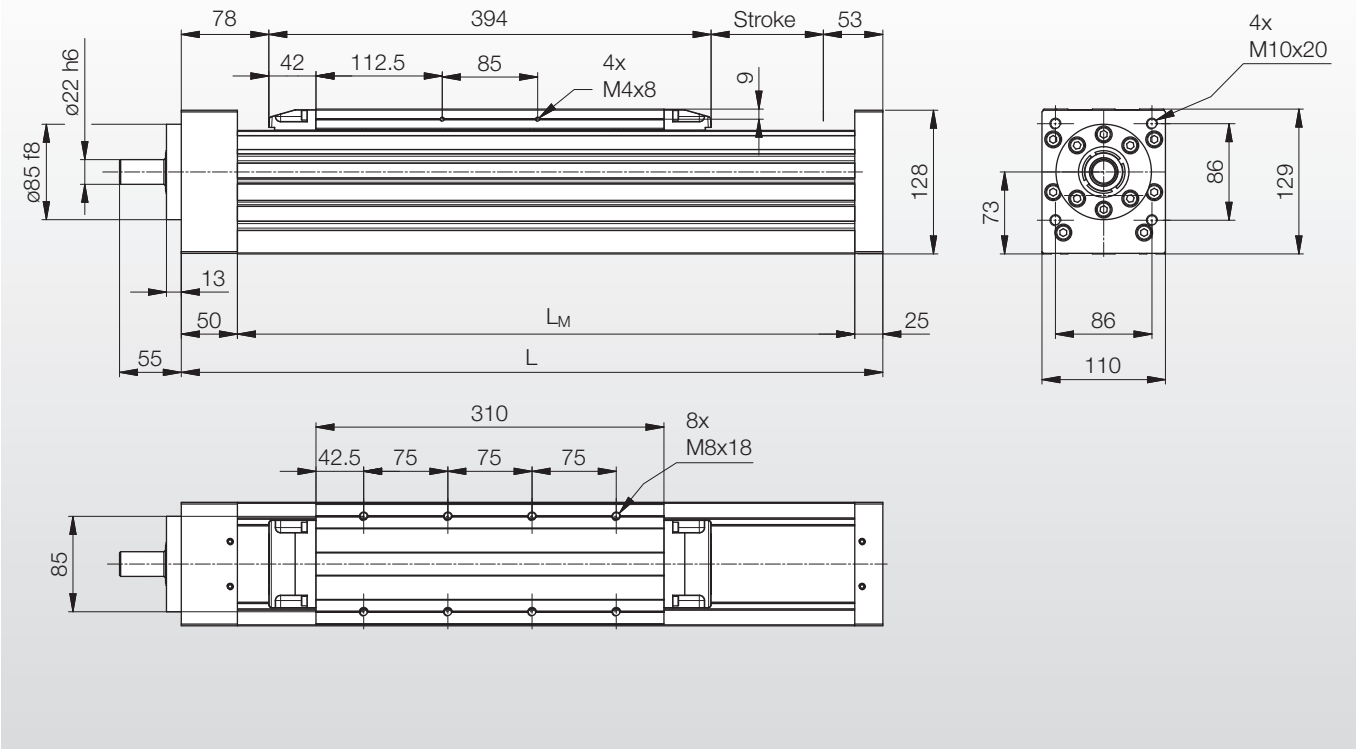
Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Length ball screw [mm]	Length steel strip [mm]	Weight [kg]
LM4...BR...L/R	Stroke + 460	L – 60	L + 30	L – 22	10.46 kg + 1.18 kg/100 mm stroke

CAD data is available from www.linetech.ch

LINEAR MODULE LM5...BR...N

with ball screw drive, with steel strip



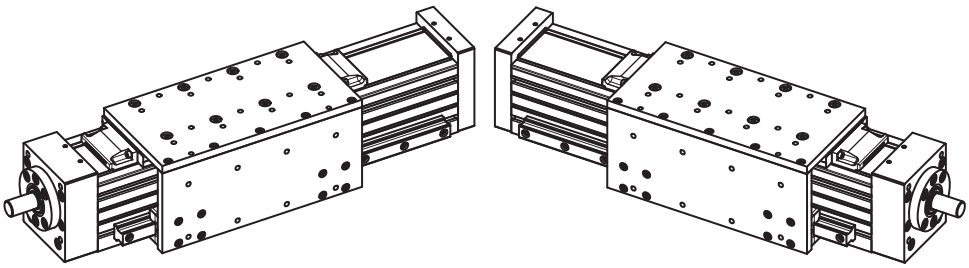


Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Length ball screw [mm]	Length steel strip [mm]	Weight [kg]
LM5...BR...N	Stroke + 525	L – 75	L + 50	L – 44	16.8 kg + 1.9 kg/100 mm stroke

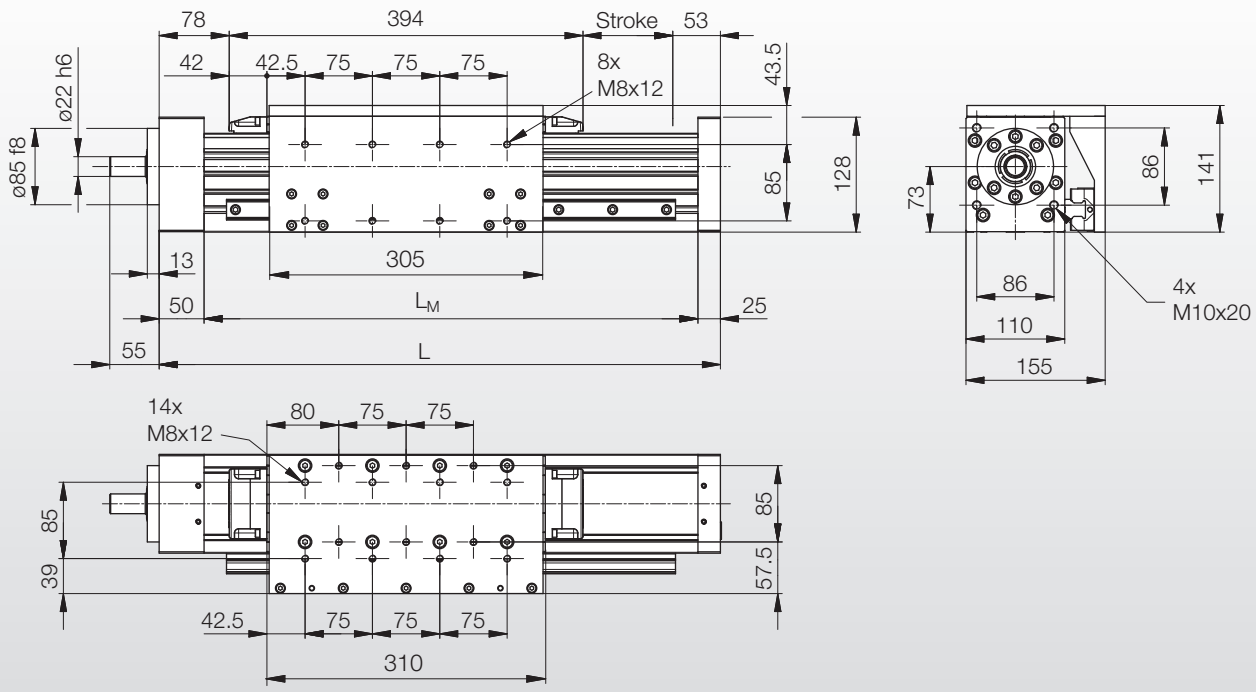
CAD data is available from www.linetech.ch

LINEAR MODULE LM5...BR...L/R

with ball screw drive and lateral support rail left/right, with steel strip



LM5...BR...L LM5...BR...R



Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Length ball screw [mm]	Length steel strip [mm]	Weight [kg]
LM5...BR...L/R	Stroke + 525	L – 75	L + 50	L – 44	21.75 kg + 2.21 kg/100 mm stroke

CAD data is available from www.linetech.ch

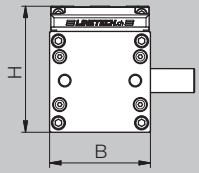
LINEARMODULE WITH TOOTHED BELT DRIVE

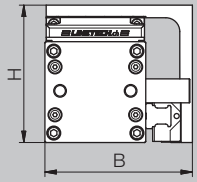
Designation system

Linear module (designation example) **LM 4 . 2 . 0500 N Z 205 . 1**

Design
LM = linear module with linear guide

Size
3 = size 65 mm
4 = size 80 mm
5 = size 110 mm





Size	LM...N B x H [mm]	LM...L/R B x H [mm]
3	65 x 85	98 x 94
4	80 x 100	117 x 109
5	110 x 129	155 x 141

Configuration
2 = 2 runner blocks (1 carriage) ***
… = special execution [1)]

Stroke absolut [mm

Protective covering
B = with steel strip
N = without protective strip ***

Drive
Z = toothed belt drive ***
N = without drive

Stroke per revolution [mm]
155 = size 3; toothed belt drive with 155 mm stroke per revolution
205 = size 4; toothed belt drive with 205 mm stroke per revolution
296 = size 5; toothed belt drive with 296 mm stroke per revolution
… = other stroke per revolution [1)]

Limit switches
0 = without limit switch
1 = 2 limit switches, reference point at front (drive side)
2 = 2 limit switches, reference point at rear (opposite drive side)
3 = 2 limit switches + additional reference switch at front (drive side)
4 = 2 limit switches + additional reference switch at rear (opposite drive side)

* seen from motor opposite side towards motor
** available for lateral motor mounting only
*** standard version
[1)] on request
[2)] details see gear mounting, pages 55/56

. 12 . 0 N - N N N L N N

5 8 3 _ _ _ → 583... = drawing type

Lateral support rail

N = without lateral support rail
L = lateral support rail left
R = lateral support rail right

Connector box

N = without connector box (loose cable L = 2.0 m) ***
S = with connector box

Mounting position of limit switches / connector box

N = without limit switches / connector box ***
L = limit switches / connector box mounting left *
R = limit switches / connector box mounting right *

Gear box mounting

N =	without gear ***	F =	back / bottom	K =	front / bottom
D =	top / rear	G =	rear / top	L =	bottom / front
E =	top / front	H =	front / top	M =	bottom / back

Drive shaft

N = standard shaft ***
S = shaft for standard worm gear FH [2)]
H = shaft for high-performance servo worm gear AE [2)]
O = without drive shaft

Material protective strip

N = without protective strip ***
S = steel strip
R = stainless steel strip

Motor mounting

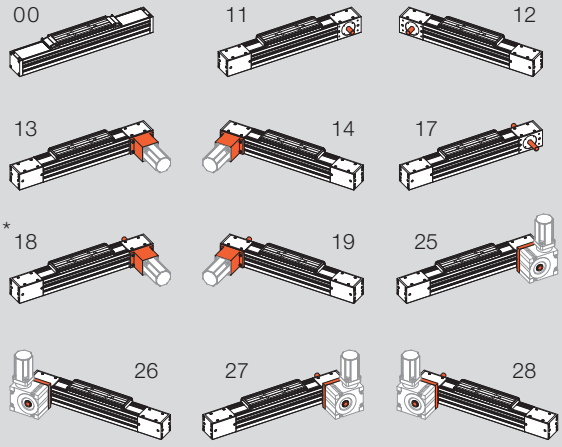
N = without motor mounting ***
F = mounting plate for standard motor
S = mounting plate for special motor

Reduction

0 = without reduction ***
X = i = _____ (in conjunction with gear type FH or AE) [2)]

Assembly stage

00 = without drive
11 = free shaft end right *
12 = free shaft end left *
13 = shaft end right with coupling and intermediate plate *
14 = shaft end left with coupling and intermediate plate *
17 = free shaft ends on both sides (passing shaft)
18 = shaft end on both sides, with coupling and intermediate flange right *
19 = shaft end on both sides, with coupling and intermediate flange left *
25 = shaft end right with gear mounting *
26 = shaft end left with gear mounting *
27 = shaft end on both sides, right with gear mounting *
28 = shaft end on both sides, left with gear mounting *



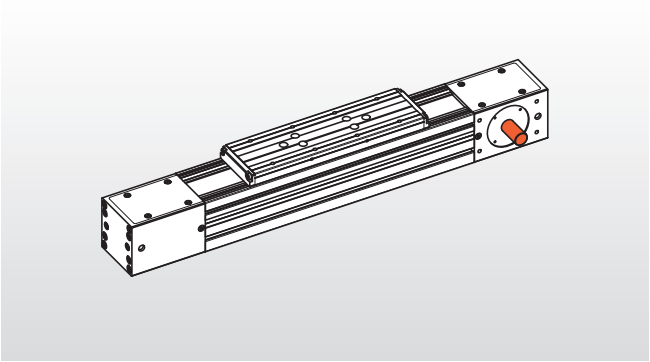
LINEAR MODULES WITH TOOTHED BELT DRIVE

Information for selection » Motor mounting preparation (1/3)

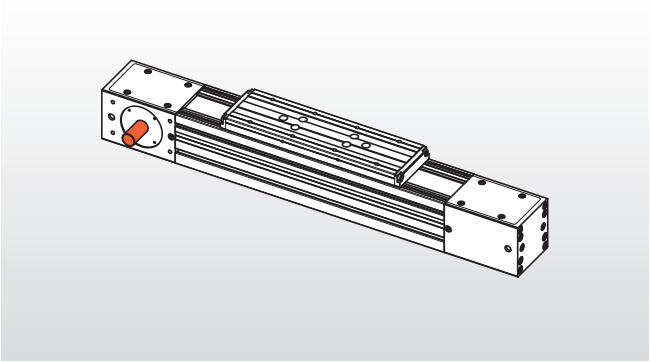
Motor mounting preparation – assembly stages with toothed belt drive

LINE TECH linear modules with toothed belt drive can be supplied in different assembly stages as preparation for motor mounting.
Refer to pages 54 to 56 for dimensions.

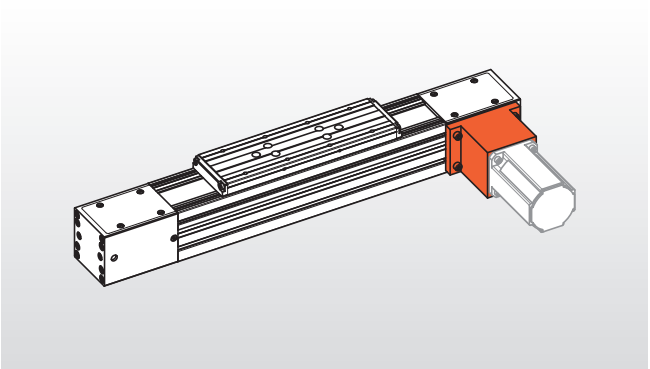
Assembly stage 11
Free shaft end right*



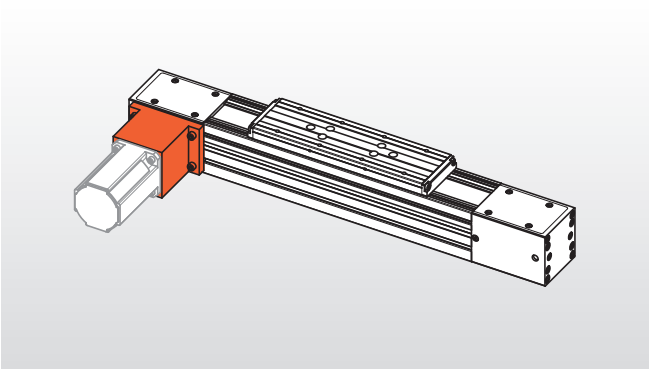
Assembly stage 12
Free shaft end left*



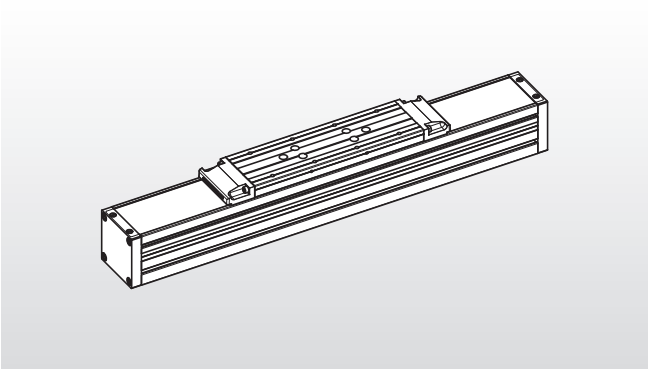
Assembly stage 13
Shaft end right* with coupling and intermediate flange



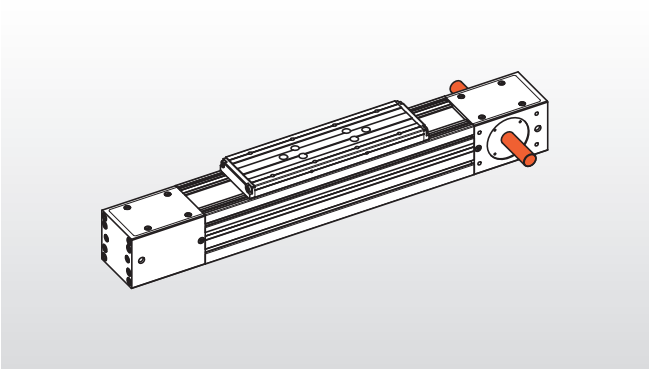
Assembly stage 14
Shaft end left* with coupling and intermediate flange



Assembly stage 00
Without drive



Assembly stage 17
Free shaft ends on both sides

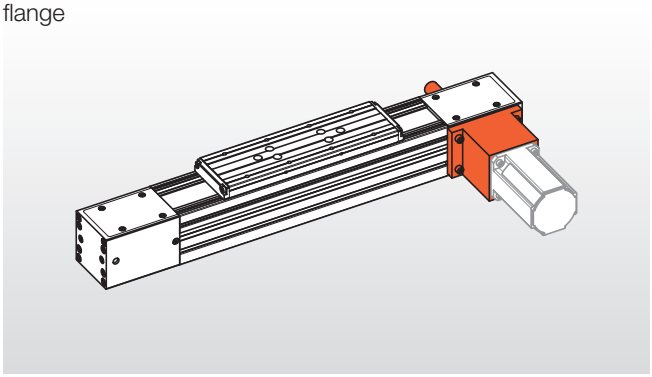


* seen from motor opposite side towards motor

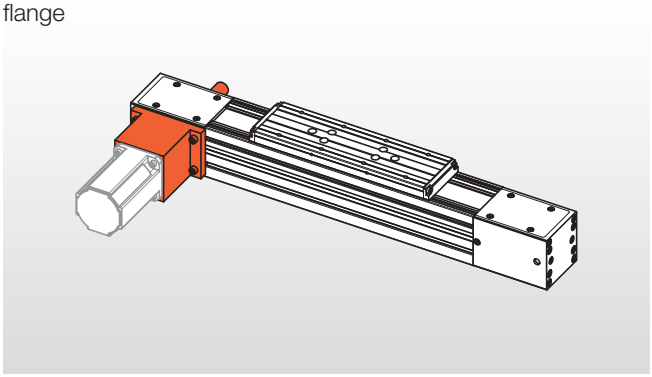
LINEAR MODULES WITH TOOTHED BELT DRIVE

Information for selection » Motor mounting preparation (2/3)

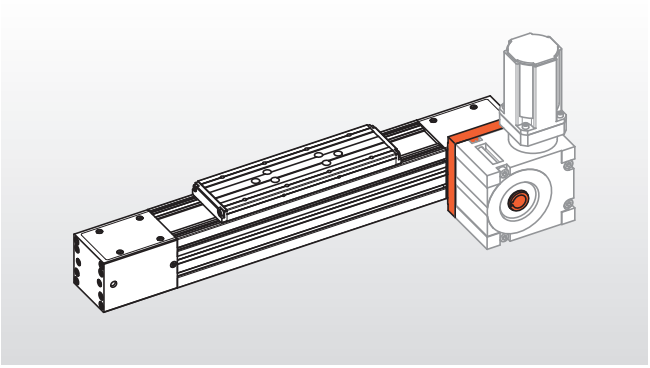
Assembly stage 18
Shaft ends on both sides, right* with coupling and intermediate flange



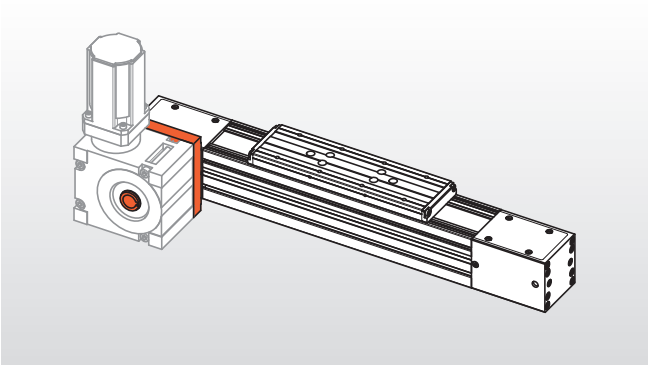
Assembly stage 19
Shaft ends on both sides, left* with coupling and intermediate flange



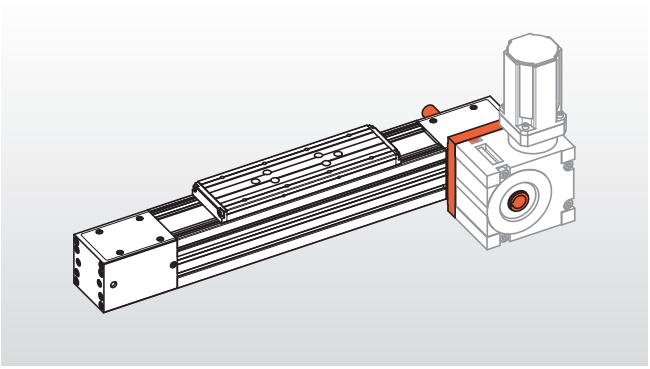
Assembly stage 25
Shaft end right* with gear mounting plate



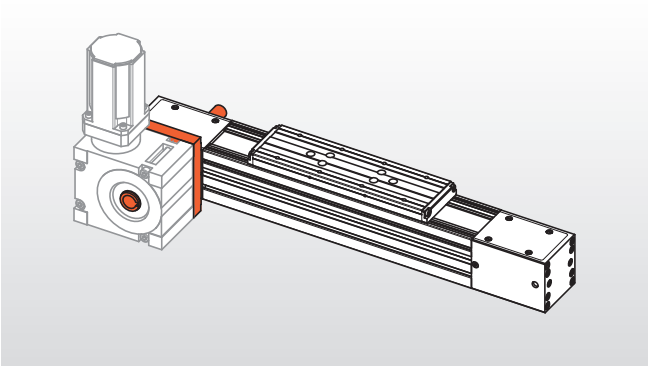
Assembly stage 26
Shaft end left* with gear mounting plate



Assembly stage 27
Shaft ends on both sides, right* with gear mounting plate



Assembly stage 28
Shaft ends on both sides, left* with gear mounting plate



* seen from motor opposite side towards motor

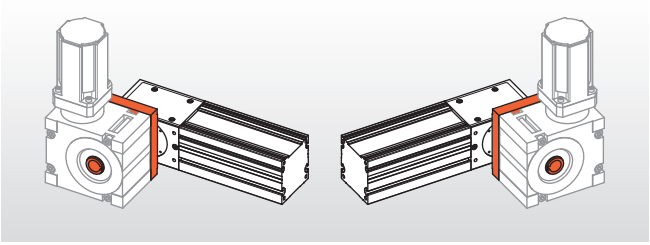
LINEAR MODULES WITH TOOTHED BELT DRIVE

Information for selection » Motor mounting preparation (3/3)

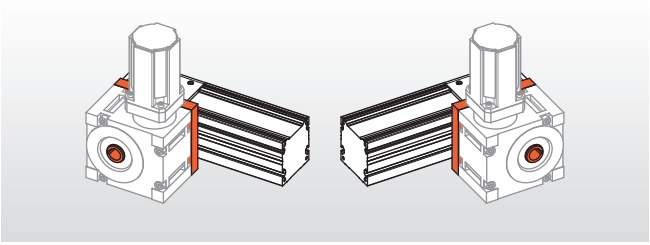
Motor mounting preparation – mounting options (alignment) of worm drives

For assembly stages 25 to 28 (see page 35), the gear mounting plate can be pre-mounted differently depending on gear mounting and motor alignment required:

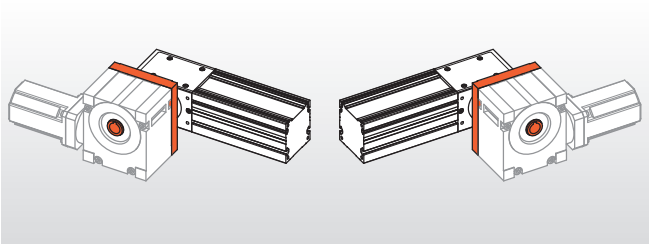
Gear box mounting D
Gear towards back* and top



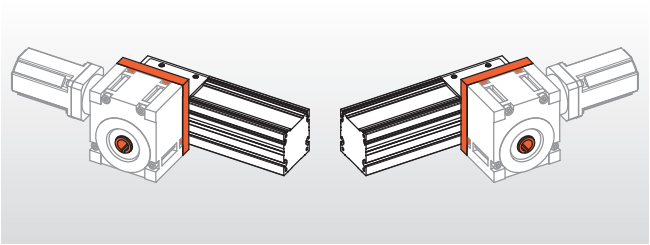
Gear box mounting E
Gear towards front* and top



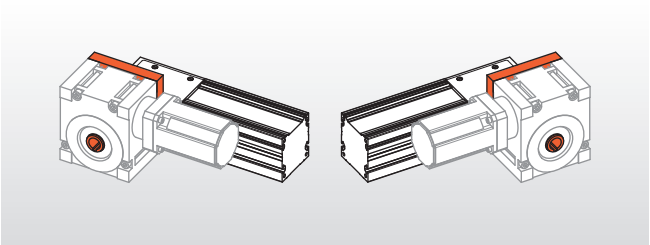
Gear box mounting F
Gear towards back* and bottom



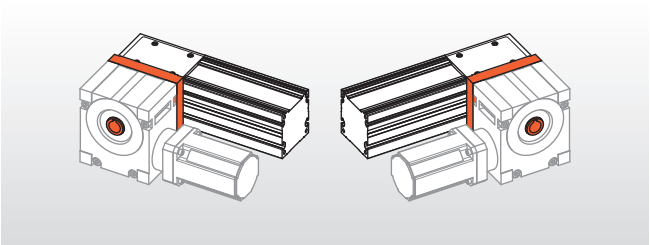
Gear box mounting G
Gear towards back* and top



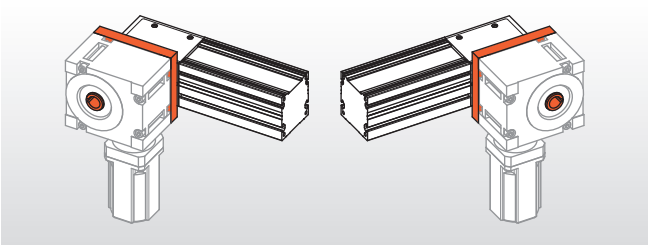
Gear box mounting H
Gear towards front* and top



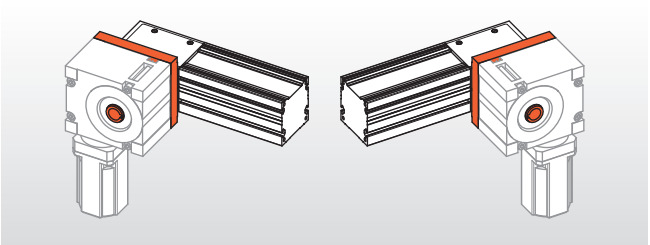
Gear box mounting K
Gear towards front* and bottom



Gear box mounting L
Gear towards front* and bottom



Gear box mounting M
Gear towards back* and bottom

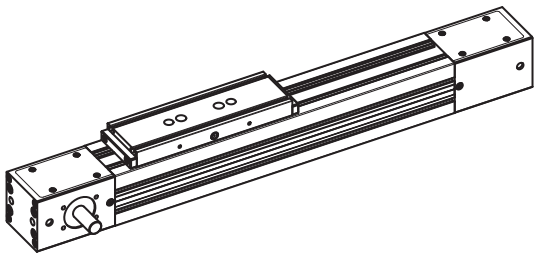


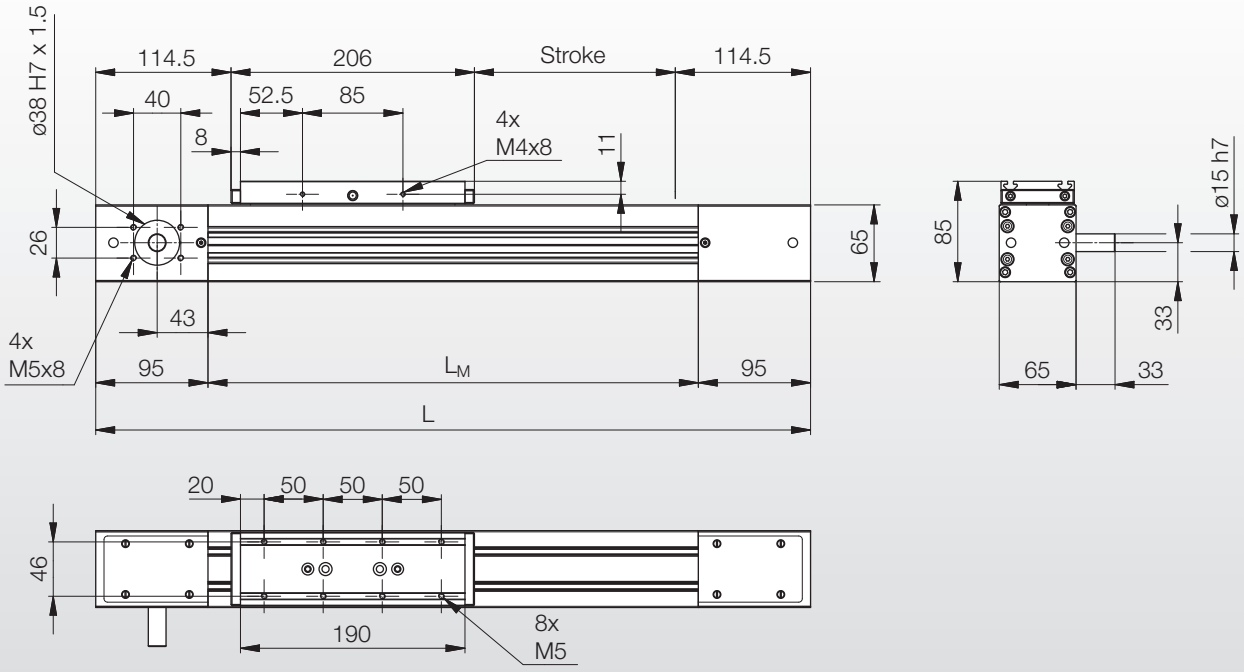
* seen from motor opposite side towards motor

NOTES

LINEAR MODULES LM3...NZ...N

with toothed belt drive, without protective strip



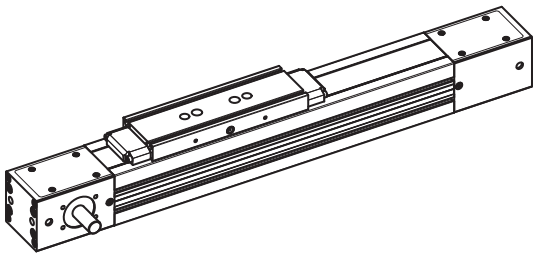


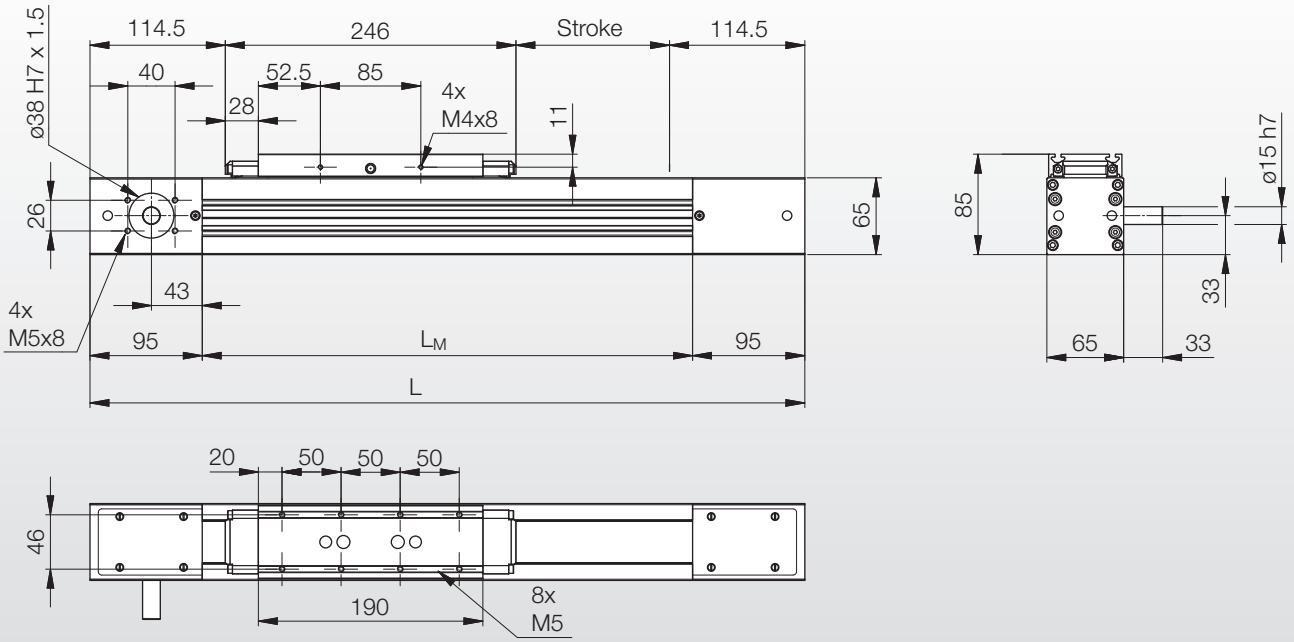
Nominal size	Dimensions			
Designation	L [mm]	L_M [mm]	Belt length [mm]	Weight [kg]
LM3...NZ...N	Stroke + 435	L – 190	2 x Stroke + 730	4.50 kg + 0.60 kg/100 mm Stroke

CAD data is available from www.linetech.ch

LINEAR MODULES LM3...BZ...N

with toothed belt drive, with steel strip



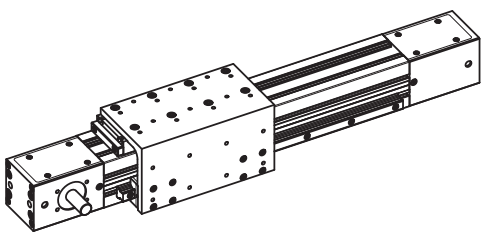


Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Belt length [mm]	Length steel strip [mm]	Weight [kg]
LM3...BZ...N	Stroke + 475	L – 190	2 x Stroke + 810	L – 10	4.80 kg + 0.61 kg/100 mm Stroke

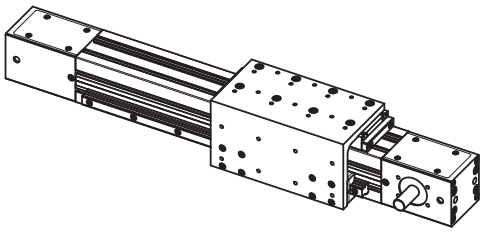
CAD data is available from www.linetech.ch

LINEAR MODULES LM3...NZ...L/R

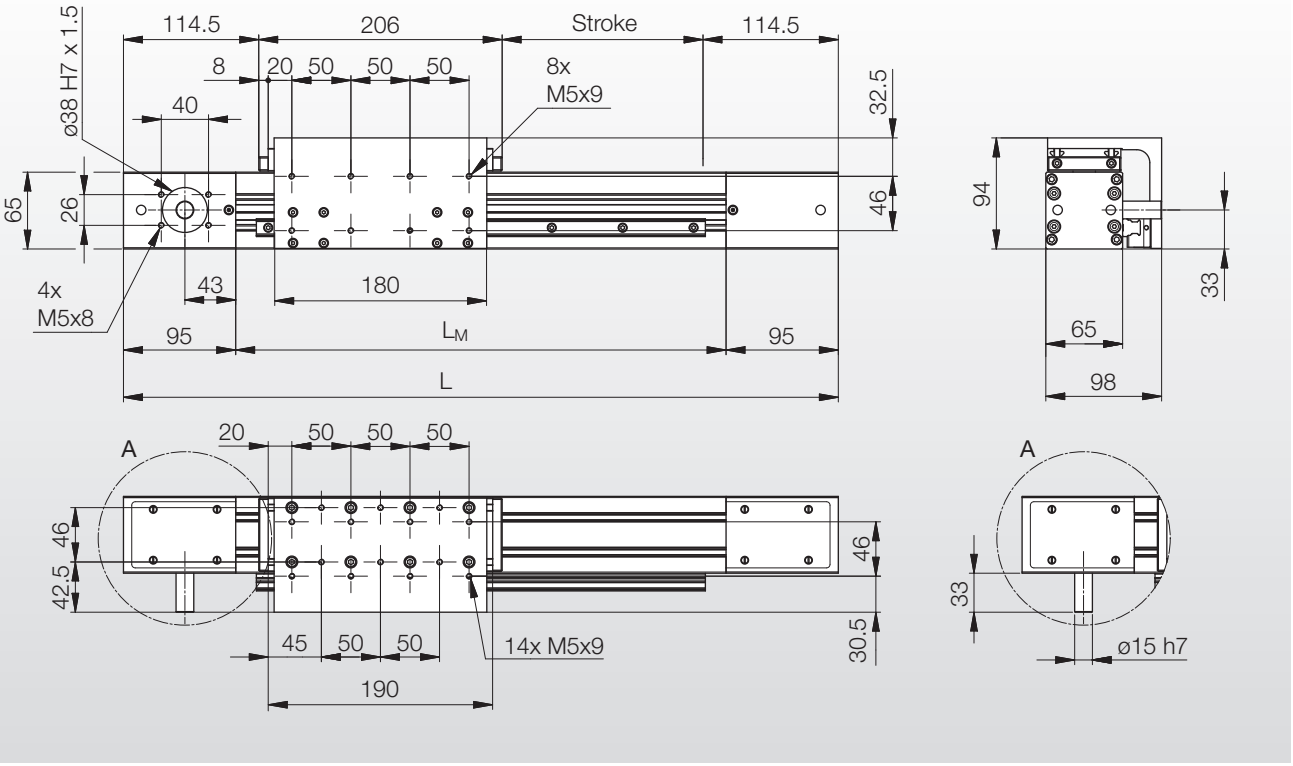
with toothed belt drive and lateral support rail left/right, without protective strip



LM3...NZ...L



LM3...NZ...R

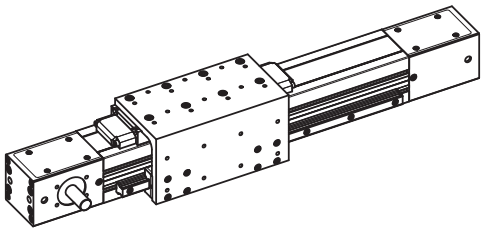


Nominal size	Dimensions			
Designation	L [mm]	L_M [mm]	Belt length [mm]	Weight [kg]
LM3...NZ...L/R	Stroke + 435	L – 190	2 x Stroke + 730	5.94 kg + 0.73 kg/100 mm Stroke

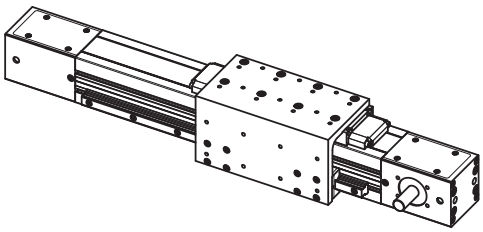
CAD data is available from www.linetech.ch

LINEAR MODULES LM3...BZ...N

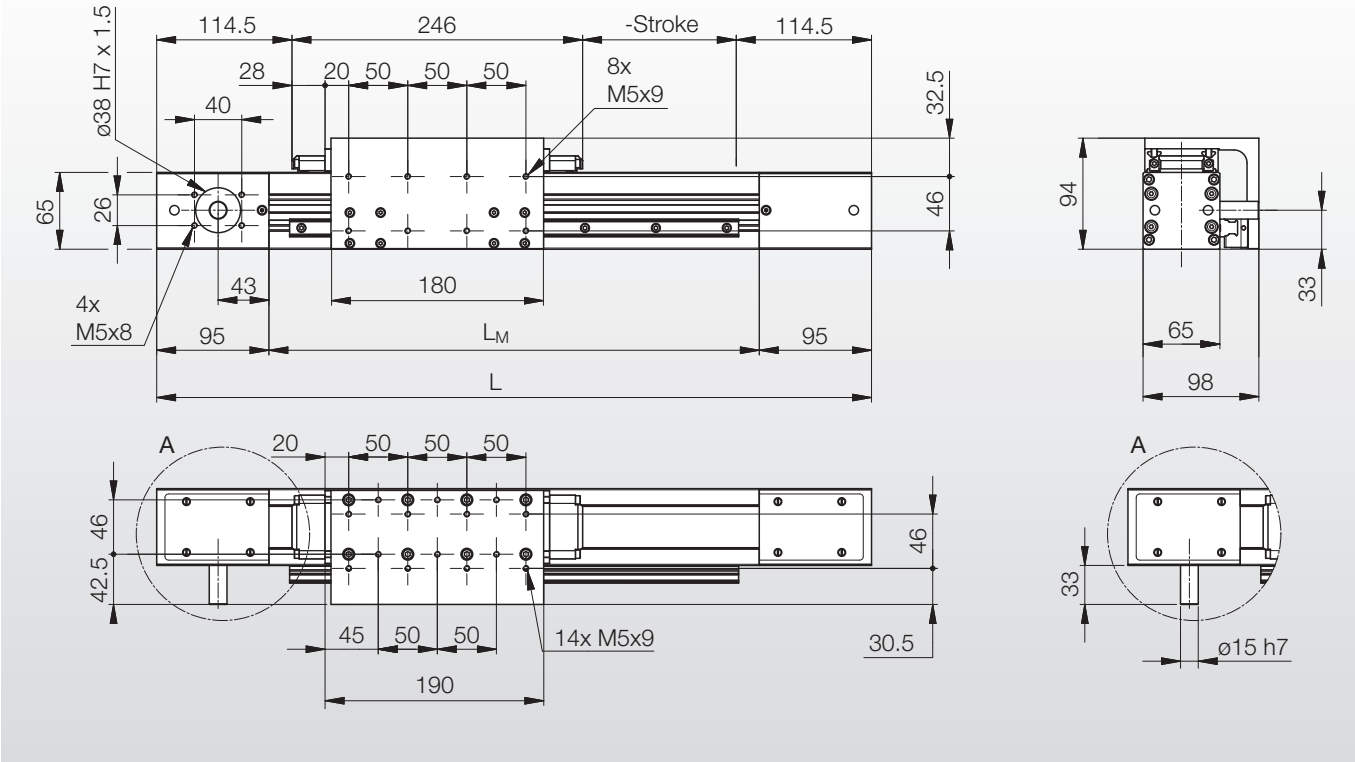
with toothed belt drive and lateral support rail left/right, with steel strip



LM3...BZ...L



LM3...BZ...R

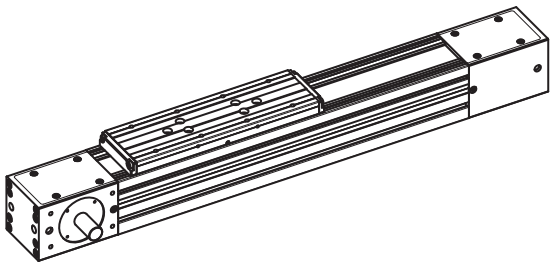


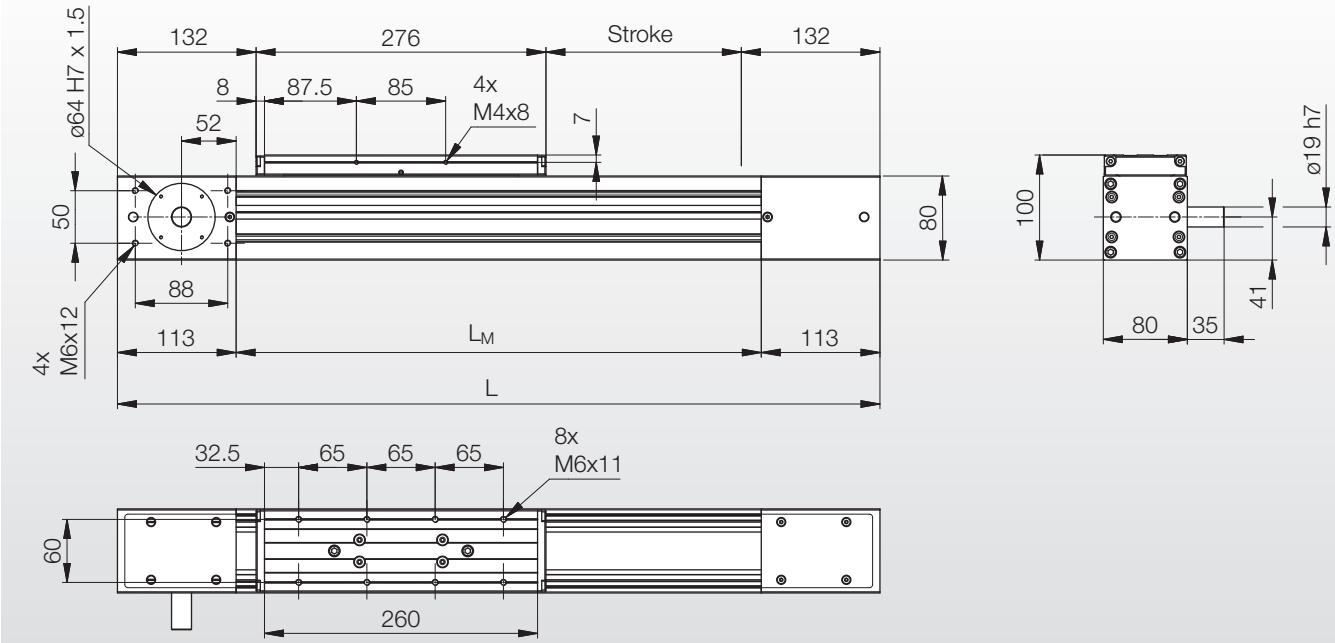
Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Belt length [mm]	Length steel strip [mm]	Weight [kg]
LM3...BZ...L/R	Stroke + 475	L – 190	2 x Stroke + 810	L – 10	6.30 kg + 0.74 kg/100 mm Stroke

CAD data is available from www.linetech.ch

LINEAR MODULE LM4...NZ...N

with toothed belt drive, without protective strip



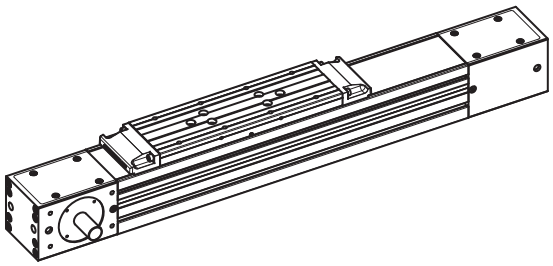


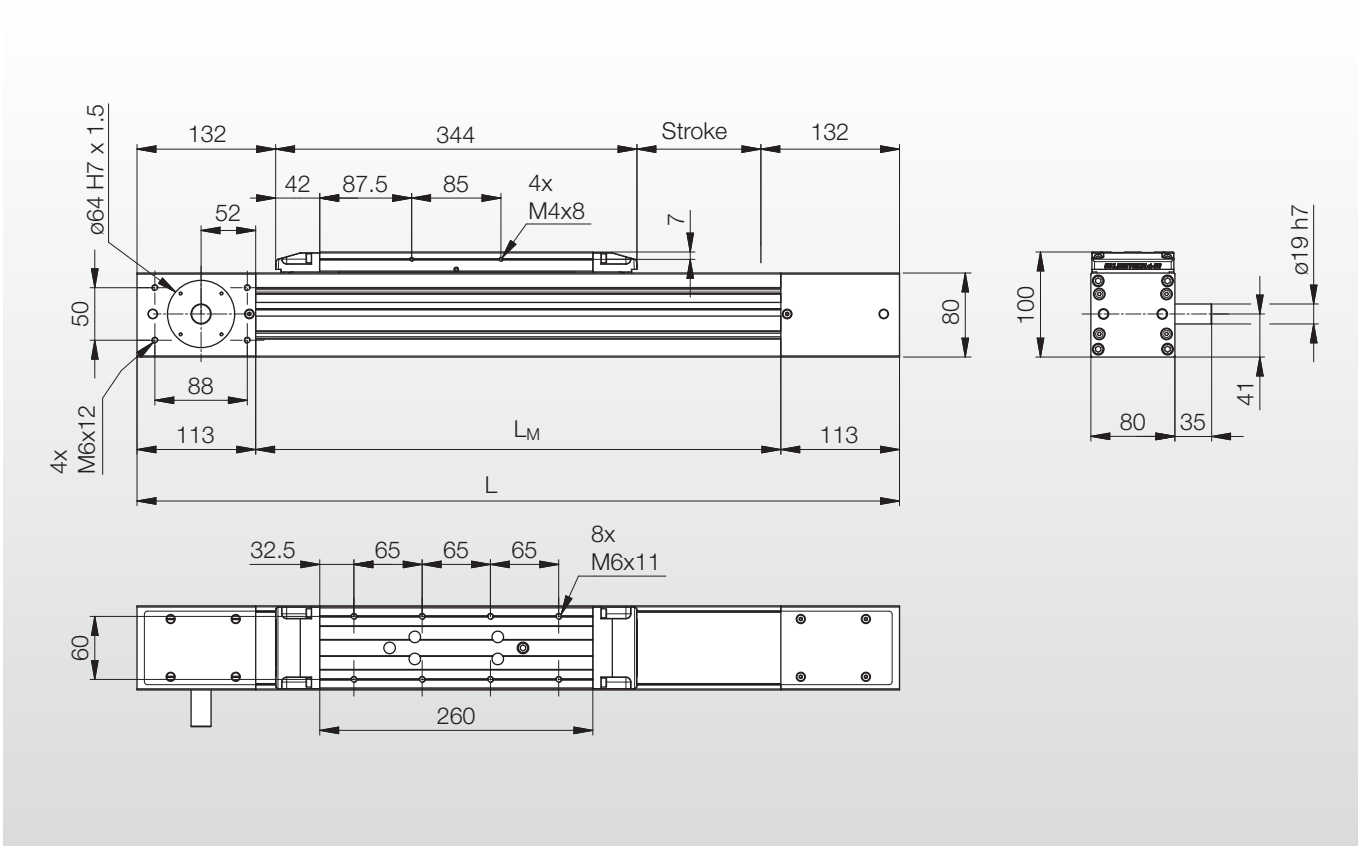
Nominal size	Dimensions			
Designation	L [mm]	L_M [mm]	Belt length [mm]	Weight [kg]
LM4...NZ...N	Stroke + 540	L – 226	2 x Stroke + 900	8.40 kg + 0.93 kg/100 mm Stroke

CAD data is available from www.linetech.ch

LINEAR MODULE LM4...BZ...N

with toothed belt drive, with steel strip



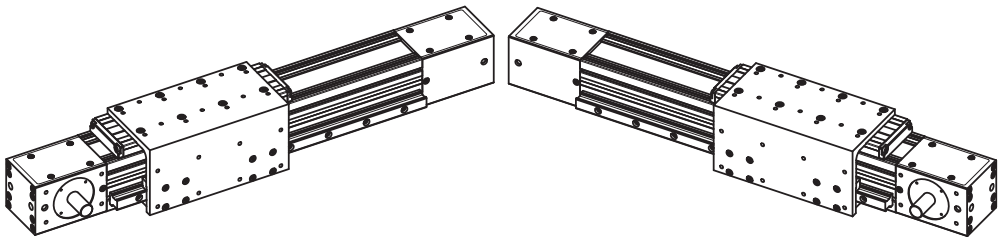


Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Belt length [mm]	Length steel strip [mm]	Weight [kg]
LM4...BZ...N	Stroke + 608	L – 226	2 x Stroke + 1040	L – 12	9.10 kg + 0.95 kg/100 mm Stroke

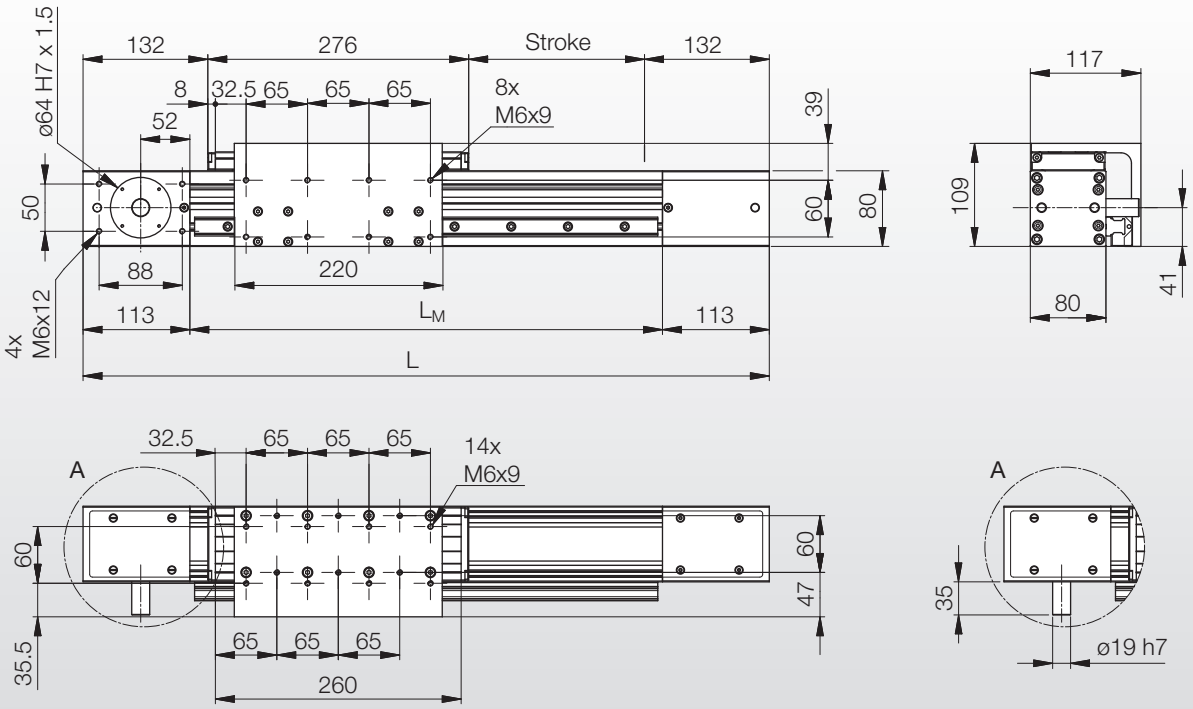
CAD data is available from www.linetech.ch

LINEAR MODULE LM4...NZ...L/R

with toothed belt drive and lateral support rail left/right, without protective strip



LM4...NZ...L LM4...NZ...R

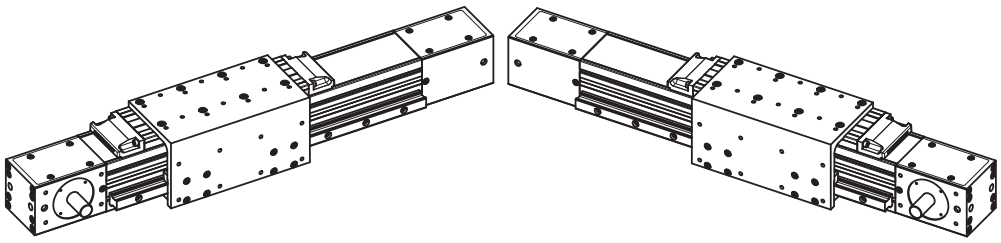


Nominal size Designation	Dimensions L [mm]	 L_M [mm]	 Belt length [mm]	 Weight [kg]
LM4...NZ...L/R	Stroke + 540	L – 226	2 x Stroke + 900	10.86 kg + 1.16 kg/100 mm Stroke

CAD data is available from www.linetech.ch

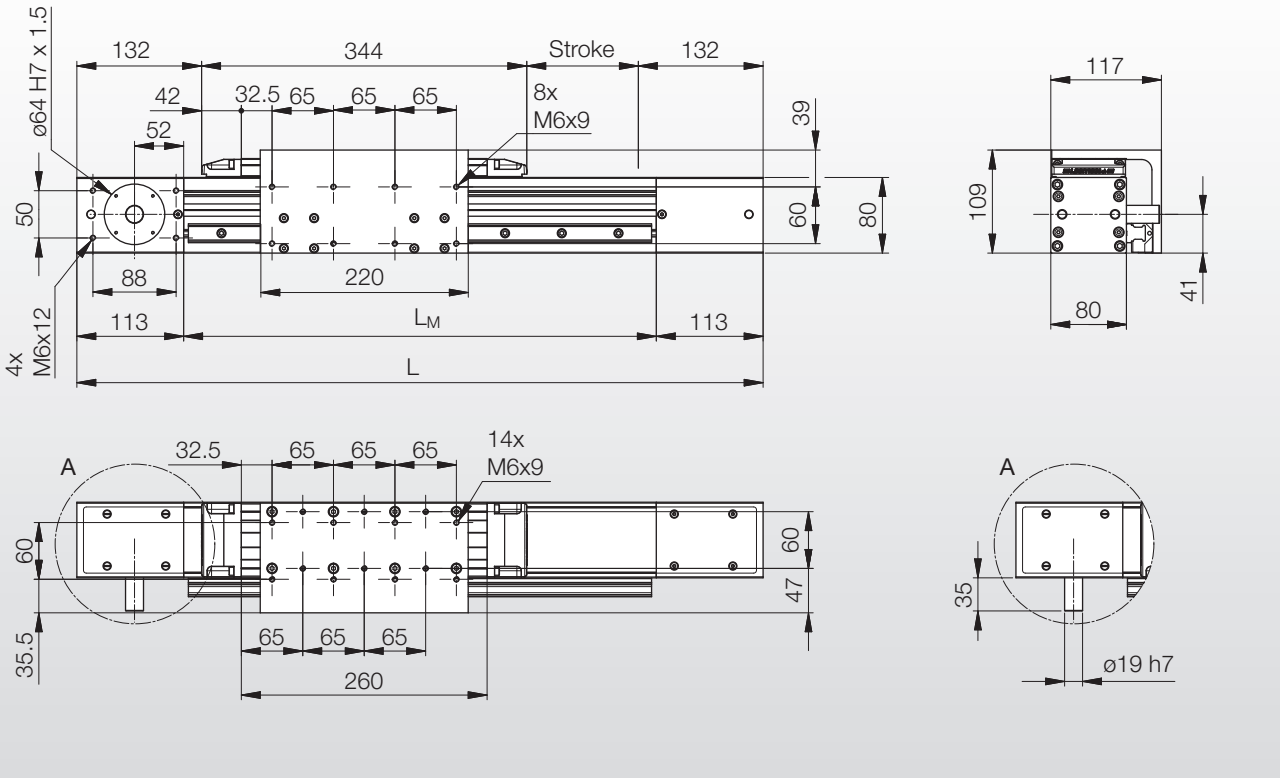
LINEAR MODULE LM4...BZ...L/R

with toothed belt drive and lateral support rail left/right, with steel strip



LM4...BZ...L

LM4...BZ...R

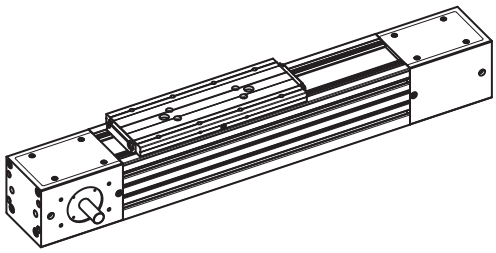


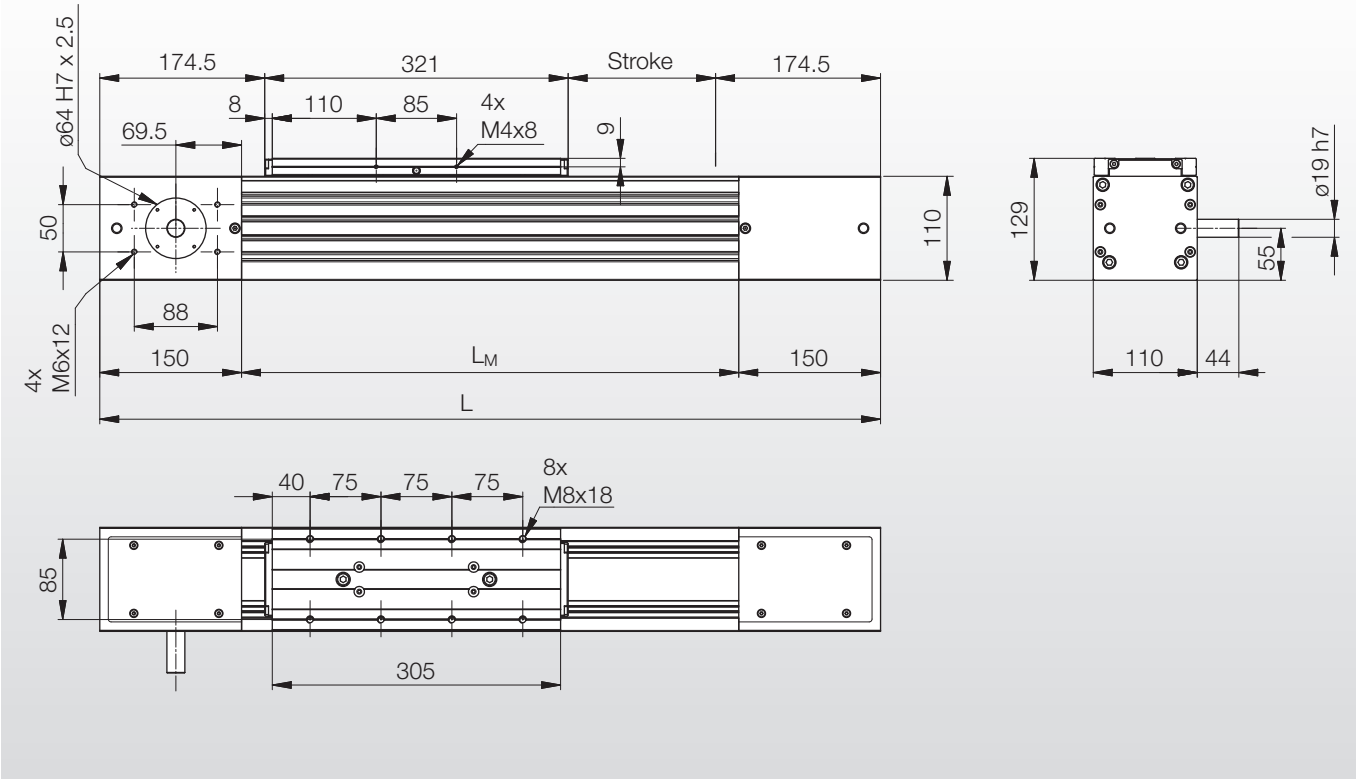
Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Belt length [mm]	Length steel strip [mm]	Weight [kg]
LM4...BZ...L/R	Stroke + 608	L – 226	2 x Stroke + 1040	L – 12	11.72 kg + 1.18 kg/100 mm Stroke

CAD data is available from www.linetech.ch

LINEAR MODULE LM5...NZ...N

with toothed belt drive, without protective strip



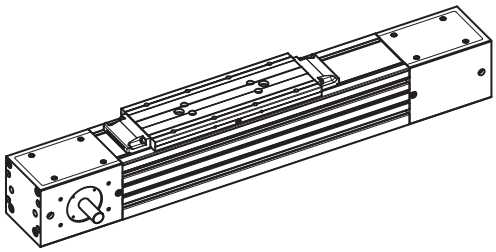


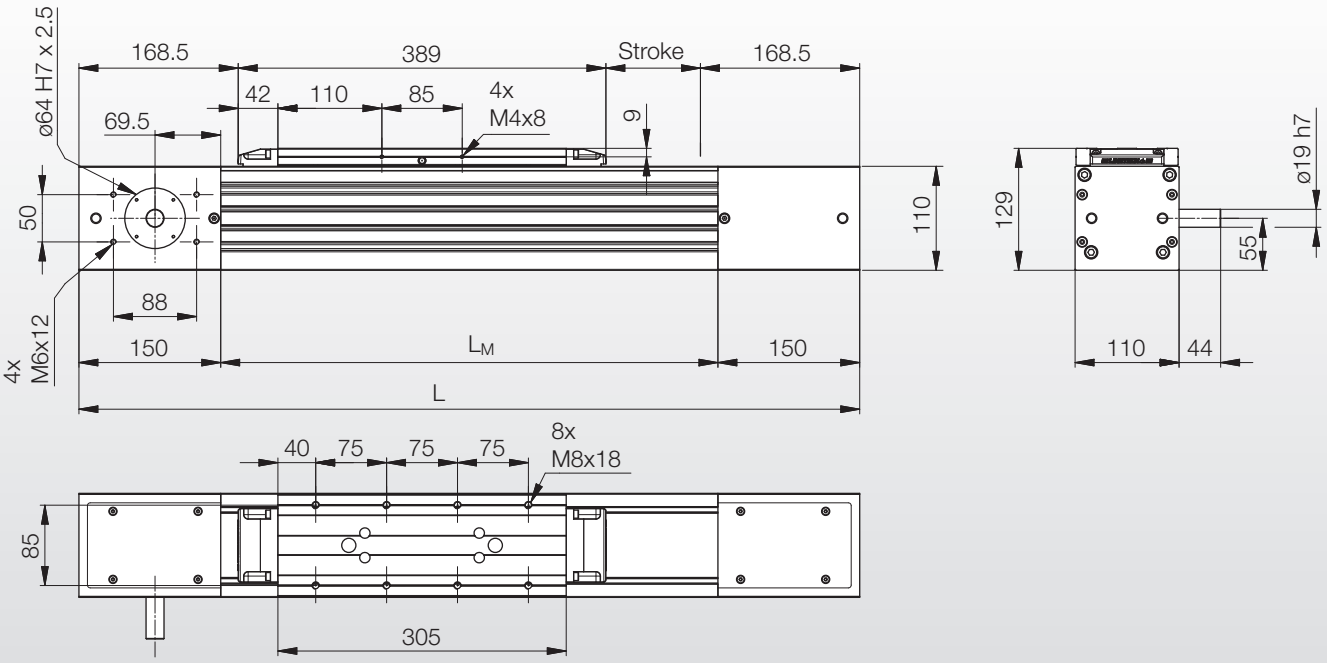
Nominal size	Dimensions			
Designation	L [mm]	L_M [mm]	Belt length [mm]	Weight [kg]
LM5...NZ...N	Stroke + 670	L – 300	2 x Stroke + 1144	18.60 kg + 1.48 kg/100 mm Stroke

CAD data is available from www.linetech.ch

LINEAR MODULE LM5...BZ...N

with toothed belt drive, with steel strip



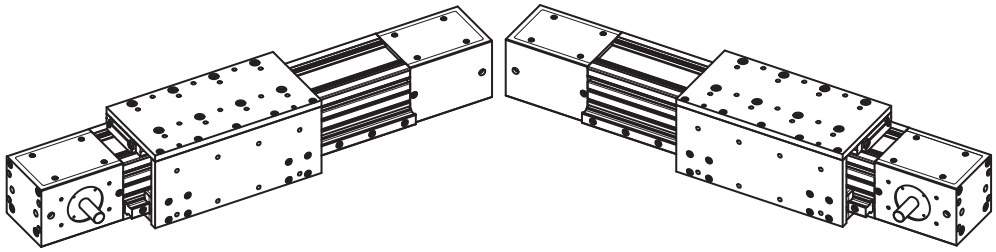


Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Belt length [mm]	Length steel strip [mm]	Weight [kg]
LM5...BZ...N	Stroke + 726	L – 300	2 x Stroke + 1256	L – 14	19.50 kg + 1.50 kg/100 mm Stroke

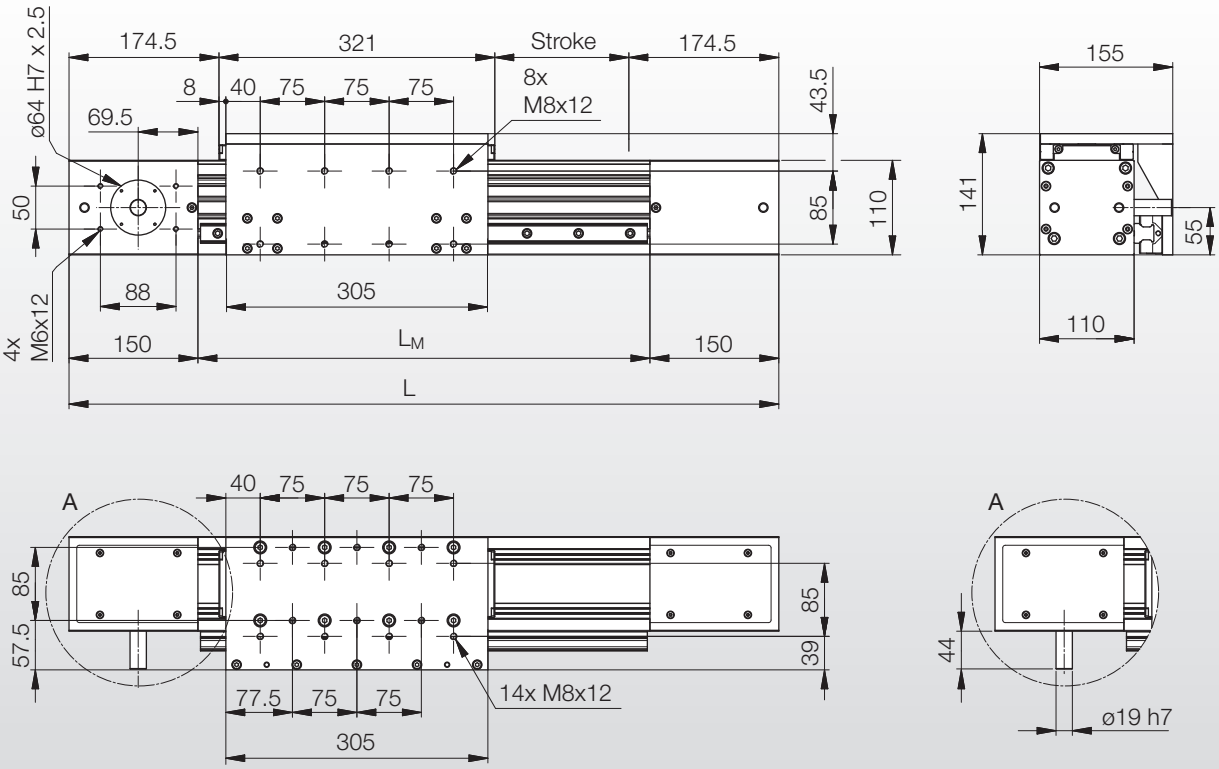
CAD data is available from www.linetech.ch

LINEAR MODULE LM5...NZ...L/R

with toothed belt drive and lateral support rail left/right, without protective strip



LM5...NZ...L LM5...NZ...R

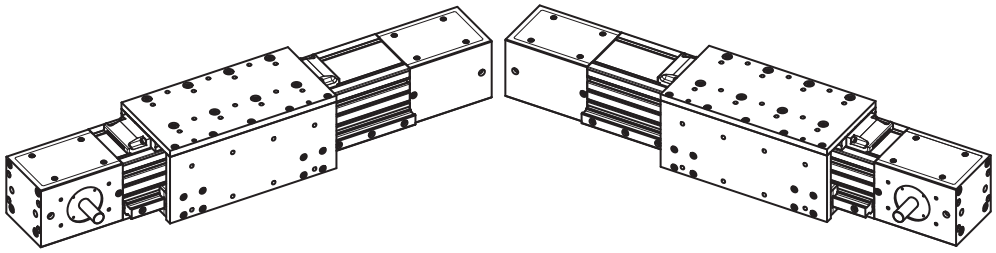


Nominal size	Dimensions			
Designation	L [mm]	L_M [mm]	Belt length [mm]	Weight [kg]
LM5...NZ...L/R	Stroke + 670	L – 300	2 x Stroke + 1144	23.31 kg + 1.79 kg/100 mm Stroke

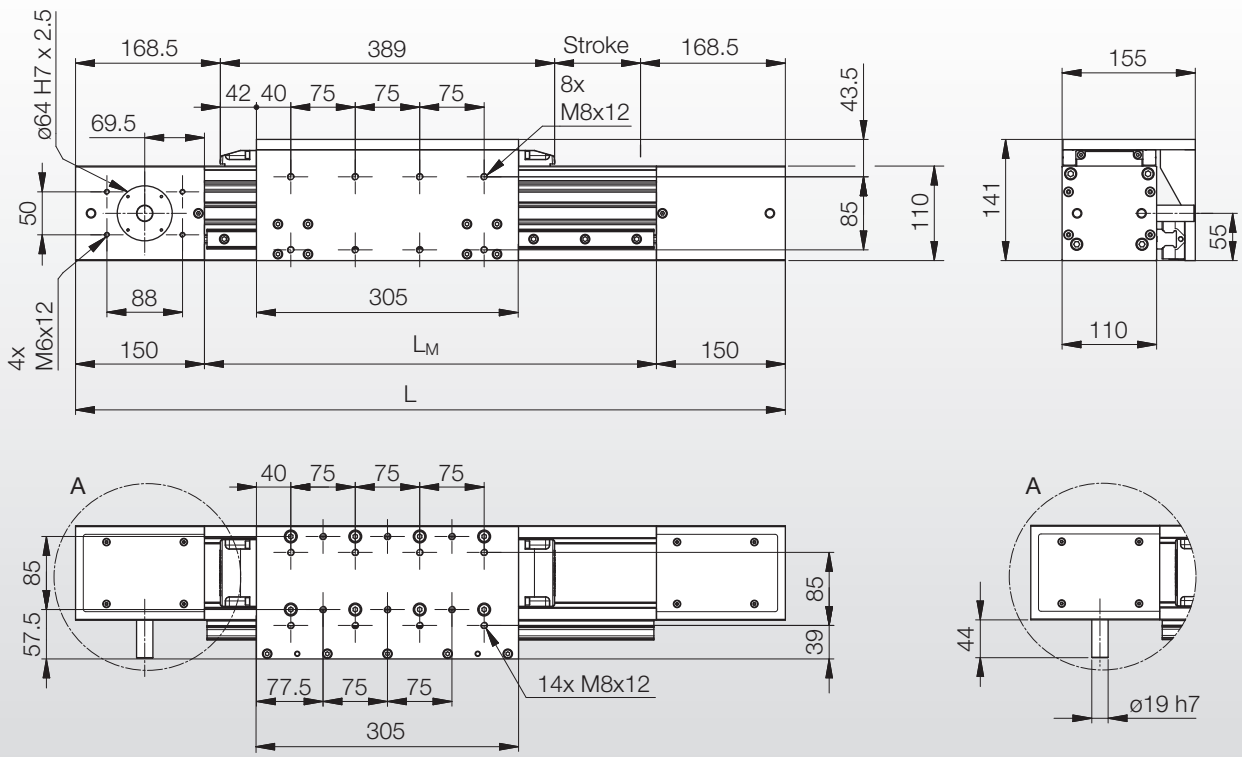
CAD data is available from www.linetech.ch

LINEAR MODULE LM5...BZ...L/R

with toothed belt drive and lateral support rail left/right, with steel strip



LM5...BZ...L LM5...BZ...R



Nominal size	Dimensions				
Designation	L [mm]	L_M [mm]	Belt length [mm]	Length steel strip [mm]	Weight [kg]
LM5...BZ...L/R	Stroke + 726	L – 300	2 x Stroke + 1256	L – 14	24.38 kg + 1.81 kg/100 mm Stroke

CAD data is available from www.linetech.ch

Limit switch mounting

Limit switches

The limit switches are used in conjunction with a control unit to limit the stroke (prevent overrunning of the carriage) and to define the reference position.

LINE TECH employs the following standard inductive limit switches:

– PNP openers (PNP-NC)
  Supply: 10...30 V DC
  Current consumption off-load: < 10 mA
  Load: max. 200 mA

On request the following non standard limit switches are available:

– PNP make type (PNP-NO)
– NPN break type (NPN-NC)
– NPN make type (NPN-NO)
– Reed switches
– mechanical switches

Note: At the factory the plus and minus limit switches are preset to a nominal stroke of 0 to +5 mm.

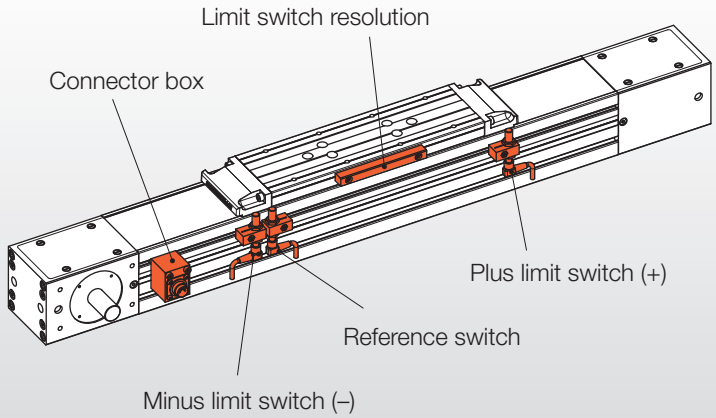
Fitting position of limit switches

The following diagrams show the mounting position of the limit switches. The reference position can be allocated either to the plus (+) or to the minus (-) limit switch.

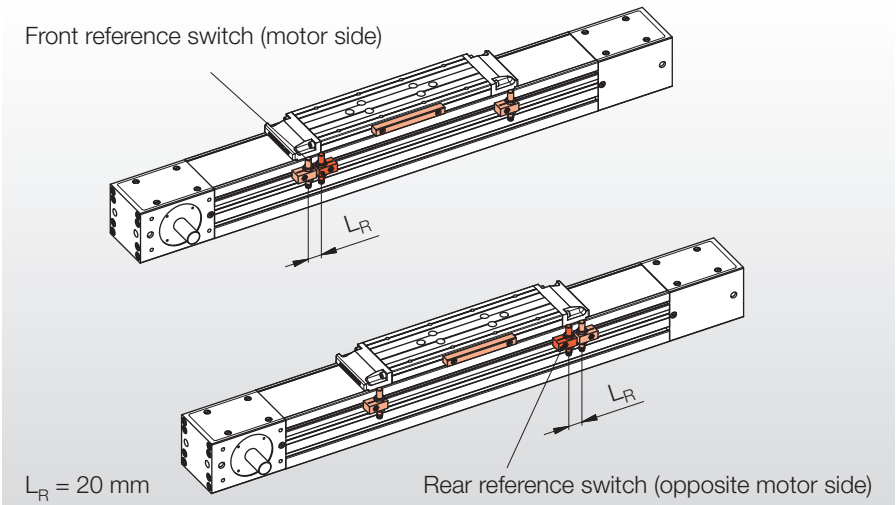
Special applications often require a separate reference point switch to be mounted between the positive and negative limit switches. The limit switch closest to the motor mounting (limit switch controller interface) is known as the forward limit switch.

Note: If a lateral support rail is selected (type LM…L/R), the limit switches can only be fitted on the opposite side.

Limit switches / reference switch mounting overview

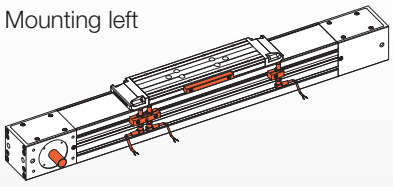


Position of reference switch (L_R)

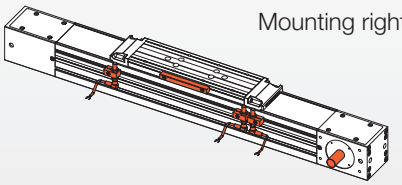


Limit switch mounting

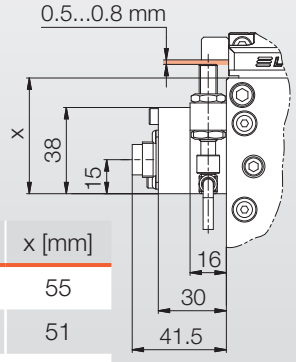
Mounting left



Mounting right



Dimensions / switch gap:



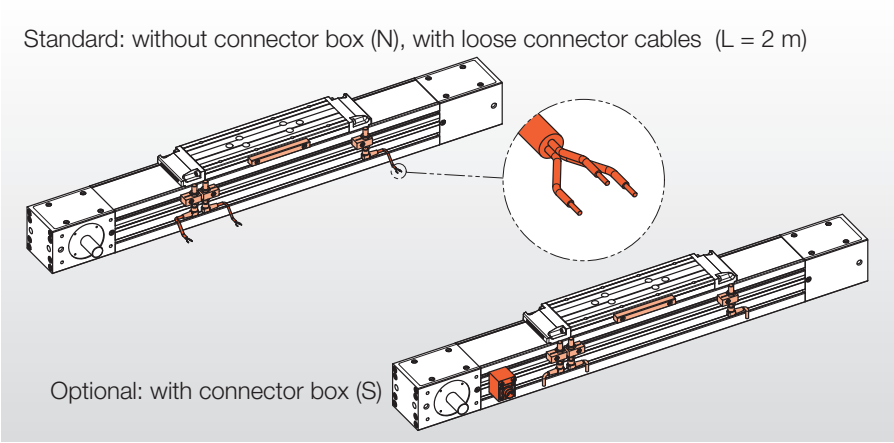
Size	x [mm]
LM3	55
LM4	51
LM5	59

Limit switch with/without connector box

Limit switch preparation

Limit switches are supplied as standard without connector box with 2 metre long cables (order code N); a connector box with completed cabling is available as an option (order code S).

Limit switch mating connectors and cables are not included in the delivery but can be ordered ready-made from LINE TECH.



Plug connector

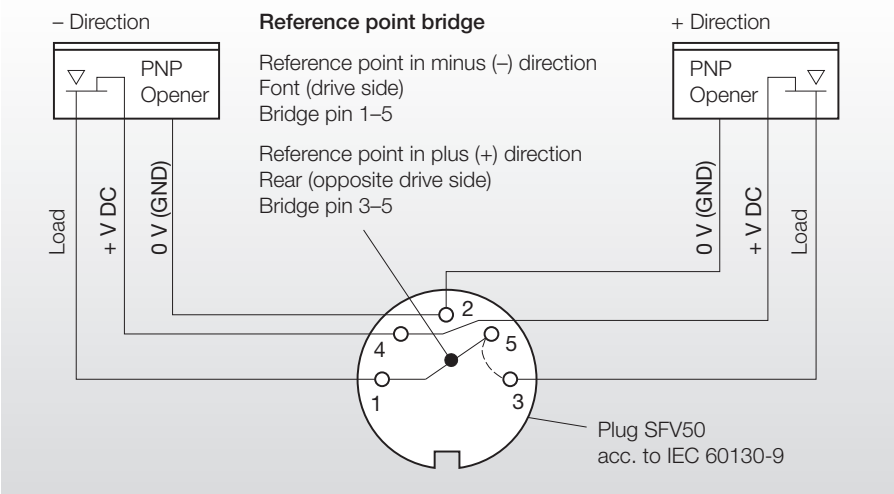
The connector pin assignment when using a connector box is shown in the diagram on the right. The individual pins are assigned as follows:

Pin 1	Minus (–) direction (load)
Pin 2	0 V (GND)
Pin 3	Plus (–) direction (load)
Pin 4	+10...30 V (DC)
Pin 5	Reference (load)

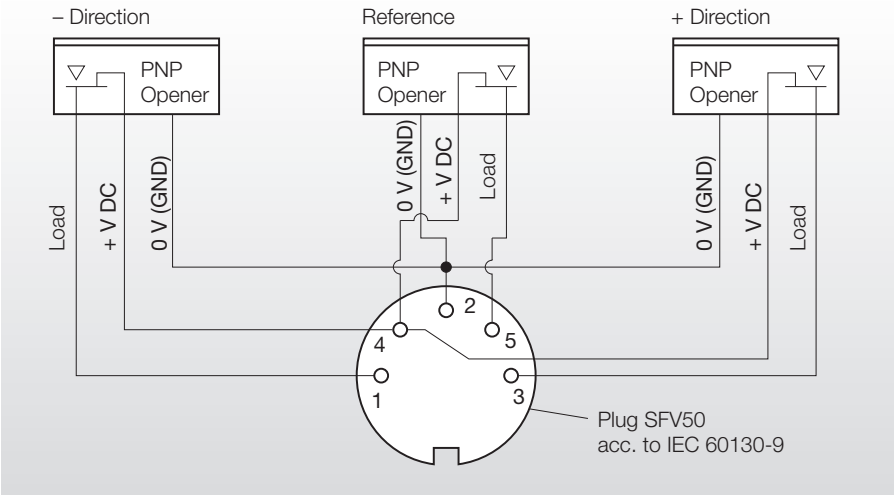
Colour code key for the diagrams:

Load	= black
+V DC	= brown
0 V (GND)	= blue

Plug connector with reference point bridge



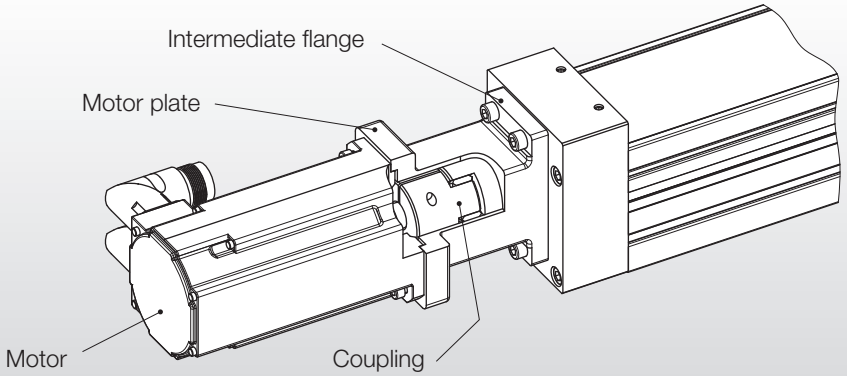
Plug connector with additional reference switch



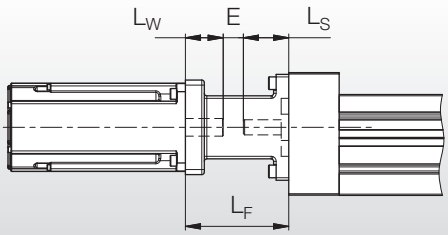
LINEAR MODULES WITH BALL SCREW DRIVE

Dimensions for motor mounting; straight fit

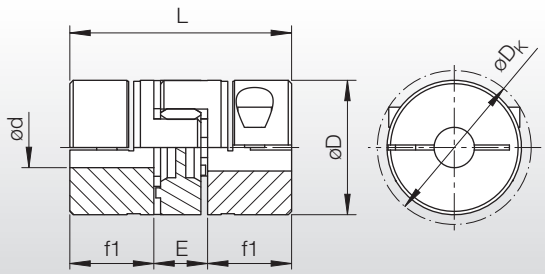
Straight motor mounting



Length of straight motor mounting



Coupling

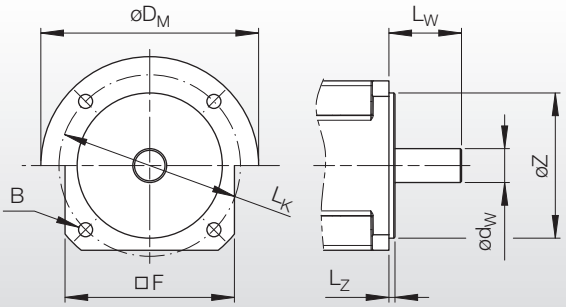


Nominal size	Dimensions L_F ±2 [mm]	L_S [mm]	Weight * [kg]	Coupling if L_W > f1
LM3...	$L_S + E + L_W$	32	0.500	Size 14
LM3...		32	0.580	Size 19
LM4...		36	0.640	Size 19
LM5...		55	1.800	Size 24

* Flange including coupling

Dimensions [mm] Size	L	øD	ød	f1	E	øDK	Drive torque [Nm] TN	Tmax
14	35	30	≤16	11	13	32.2	6.3	25
19	66	40	≤20	25	16	43	17	34
24	78	55	≤28	30	18	57	40	120

Motor dimensions **



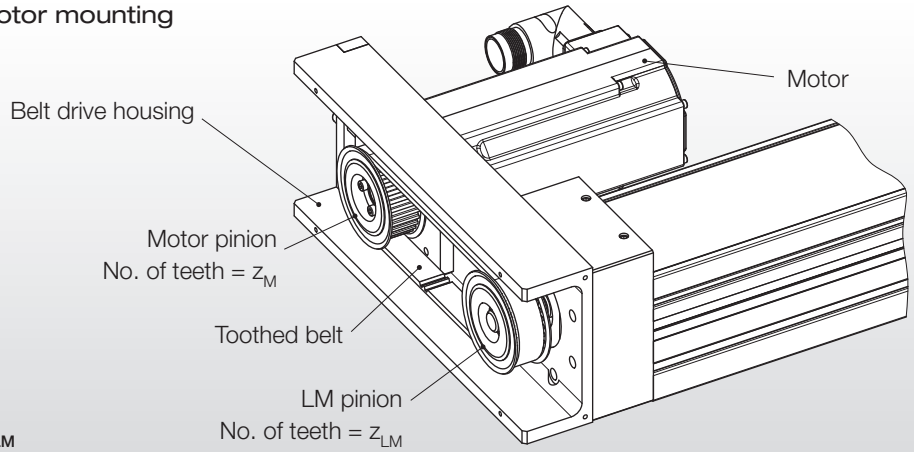
** The following dimensions

$øD_M$ _____ [mm]		L_W _____ [mm]	
B _____ [mm]		$ød_W$ _____ [mm]	
□F _____ [mm]		L_Z _____ [mm]	
L_K _____ [mm]		øZ _____ [mm]	

are required to determine the motor mounting.

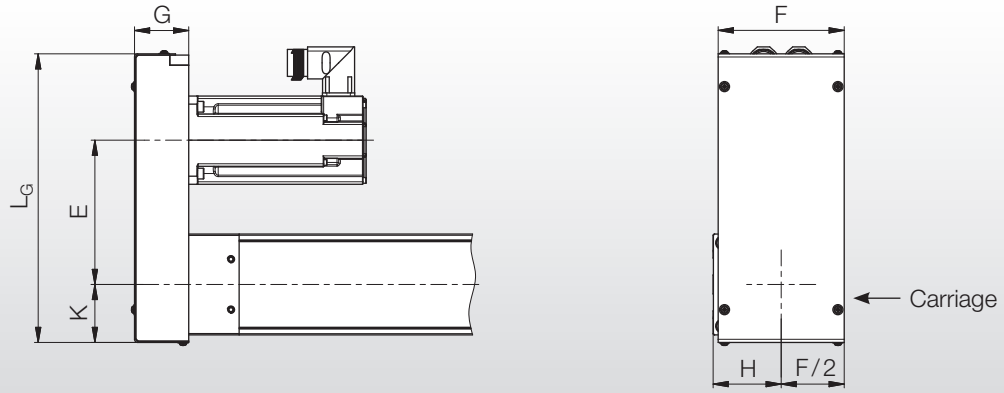
Dimensions for motor mounting; lateral fit

Lateral motor mounting



$i = z_M : z_{LM}$

Dimensions for lateral motor mounting

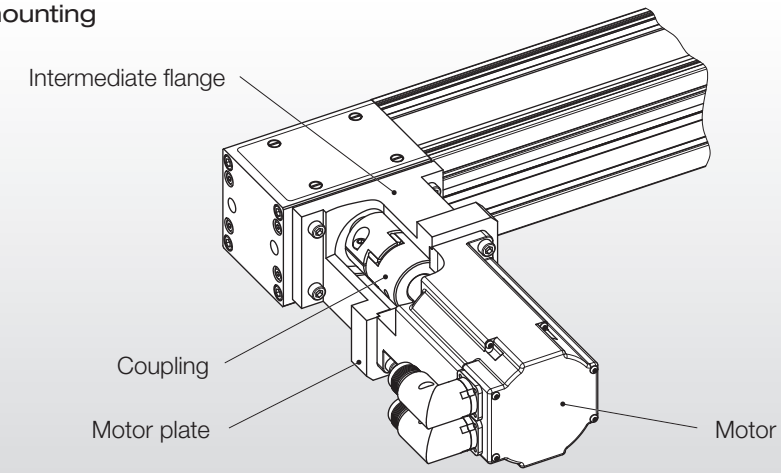


Nominal size	Dimensions [mm]							No. of teeth		Max.	Belt length	Weight
	i	E	F	G*	H	K	L_G	z_M	z_{LM}	ød_W	[mm]	[kg]
	1:1	130…135 (132.5)						32	32	ø19	425	1.600
LM3…	1:1.5	131…139 (135)	100	43	43	46	247	32	48	ø19	475	1.800
	1:2	131.5…135.5 (133.5)						24	48	ø12	450	1.700
	1:1	130...135 (132.5)						32	32	ø19	425	1.600
LM4…	1:1.5	131...139 (135)	100	43	54	46	247	32	48	ø19	475	1.800
	1:2	131.5...135.5 (133.5)						24	48	ø12	450	1.700
	1:1	163.5...171.5 (167.5)						48	48	ø25	575	2.910
LM5…	1:1.5	170.5...178.5 (174.5)	120	60	73	65	300	32	48	ø19	550	2.800
	1:2	168.5...176.5 (172.5)						27	54	ø14	550	2.900

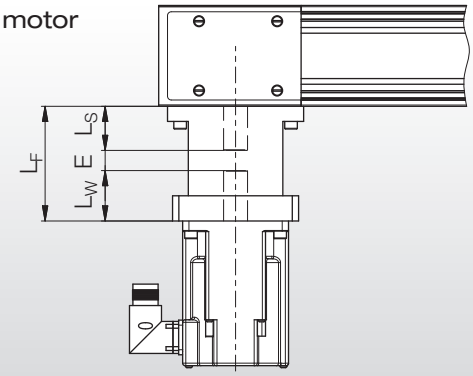
LINEAR MODULES WITH TOOTHED BELT DRIVE

Dimensions for motor mounting; straight fit

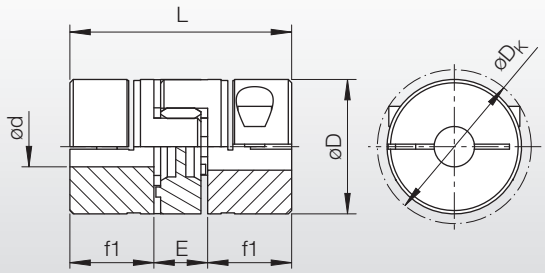
Straight motor mounting



Length of motor mounting



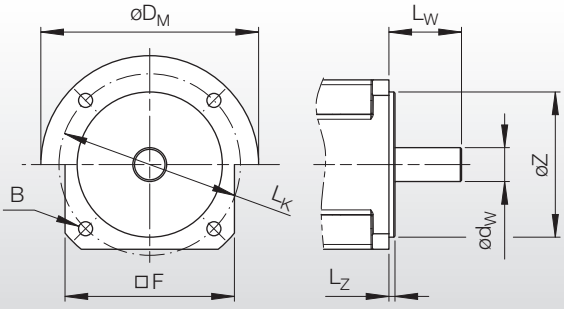
Coupling



Nom. size	Dimensions L_F ±2 [mm]	L_S [mm]	Weight * [kg]	Coupling if L_W > f1
LM3...		33	0.780	Size 19
LM4...		35	1.150	Size 19
LM4...	L_S + E + L_W	35	1.250	Size 24
LM5...		44	1.100	Size 19
LM5...		44	1.400	Size 24

Dimensions [mm]							Drive torque [Nm]	
Size	L	øD	ød	f1	E	øD_K	T_N	T_{max}
19	66	40	≤20	25	16	43	17	34
24	78	55	≤28	30	18	57	40	120

Motor dimensions **



* Flange including coupling

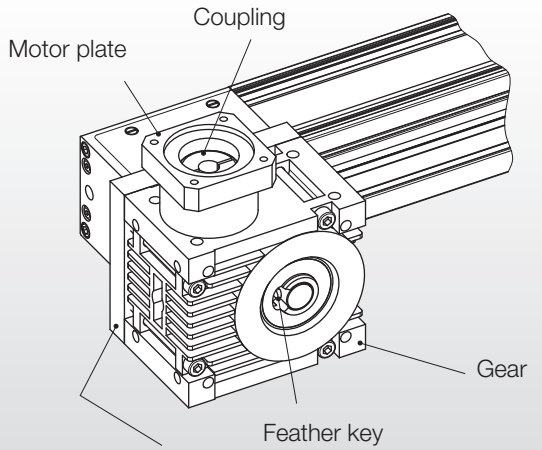
** The following dimensions

øD_M _____ [mm]		L_W _____ [mm]	
B _____ [mm]		ød_W _____ [mm]	
□F _____ [mm]		L_Z _____ [mm]	
L_K _____ [mm]		øZ _____ [mm]	

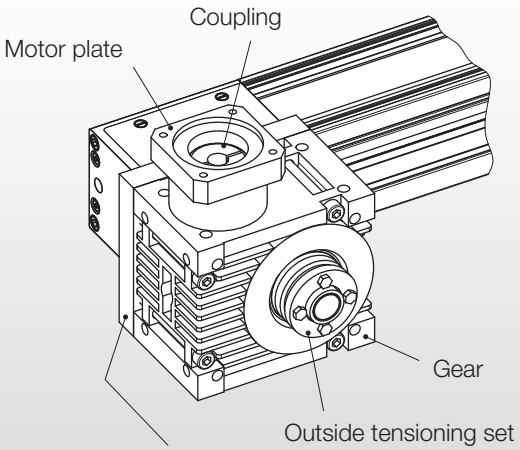
are required to determine the motor mounting.

Dimensions for motor fitting; gear mounting (1/2)

Standard worm drive
HPG...-A7... (FH) [1)]



High-performance servo worm drive
HPG...-A1... / HPG...-A2... (AE) [1)]

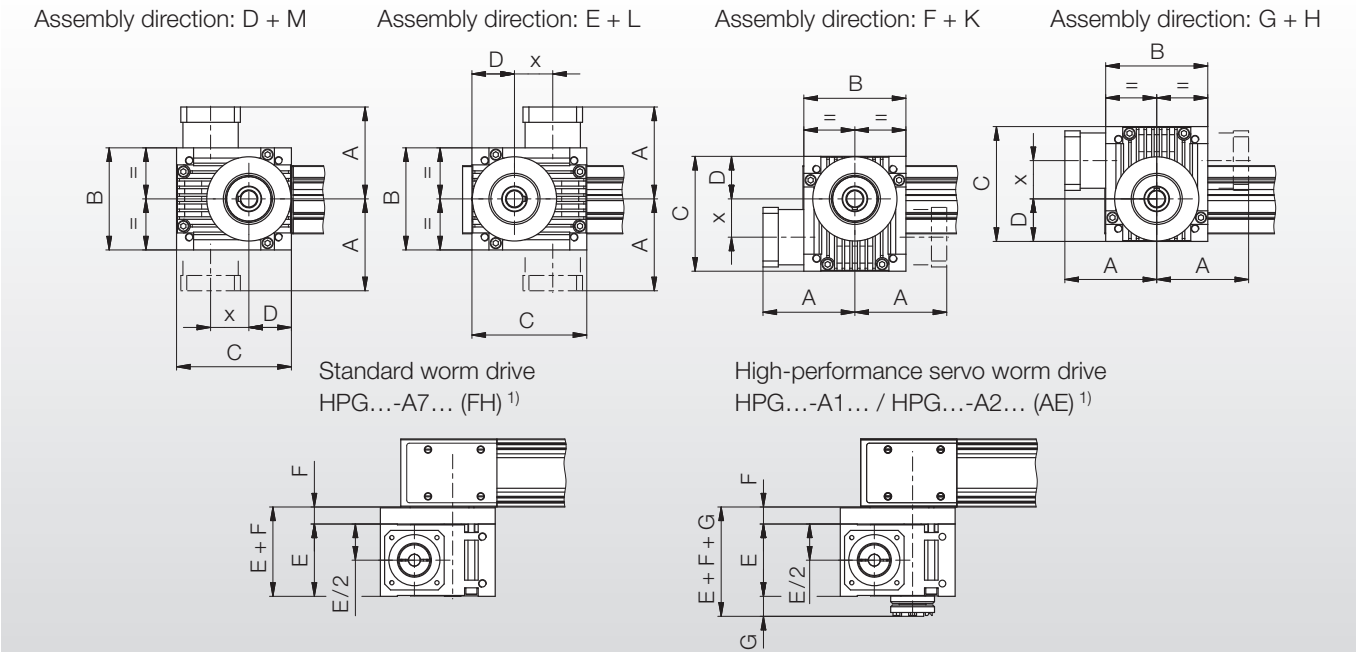


[1)] Possible gear reductions: 1:2/3/4/5/6/8/10/13.33/16/24/30/47/60

LINEAR MODULES WITH TOOTHED BELT DRIVE

Dimensions for motor fitting; gear mounting (2/2)

Dimensions for gear mounting



Nominal size	Gear box type	Casing dimensions [mm]									Weight	Gear
		x	L_W	A	B	C	D	E	F	G*	[kg]	[kg]
LM3…	HPG…-A7… (FH) 1)	30	20…33	85	90	100	40	65	12	–	0.500	1.900
	HPG…-A1/2… (AE) 1)	30	20…33	85	90	100	40	65	12	18.5	0.500	2.020
LM4…	HPG…-A7… (FH) 1)	45	20…33	98	120	135	50	85	20	–	1.200	3.900
		45	33…43	108								4.000
	HPG…-A1/2… (AE) 1)	45	20…33	98	120	135	50	85	20	23.5	1.200	4.100
		45	33…43	108								4.200
	HPG…-A7… (FH) 1)	60	25…40	120	150	180	65	110	25	–	2.200	8.500
		60	40…50	130								8.650
		60	50…65	145								8.700
	HPG…-A1/2… (AE) 1)	60	25…40	120	150	180	65	110	25	25.0	2.200	8.800
		60	40…50	130								8.850
		60	50…65	145								8.900
LM5…	HPG…-A7… (FH) 1)	90	40…62	172	200	250	100	150	25	–	3.800	22.800
		90	62…82	192								22.900
	HPG…-A1/2… (AE) 1)	90	40…62	172	200	250	100	150	25	30.0	3.800	23.700
		90	62…82	192								23.800

1) Possible gear reductions: 1:2/3/4/5/6/8/10/13.33/16/24/30/47/60

NOTES

Attachment accessories; clamps

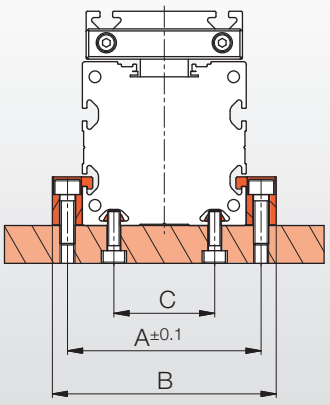
Mounting options

The linear modules are secured with clamps or sliding blocks.

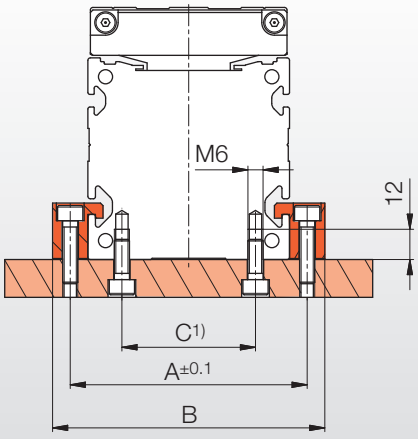
Caution: Only attach and support the linear modules on the base profile, not on the end plates.

Nominal size	Dimensions [mm]		
	A	B	C
LM3...	76.8	88.8	40
LM4...	94.0	108.0	53[1)]
LM5...	132.0	150.0	85

LM3.../LM5...



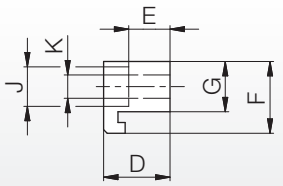
LM4...

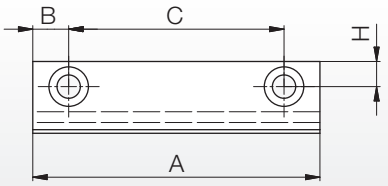


1) possible for size LM4 with planning by LINE TECH during production

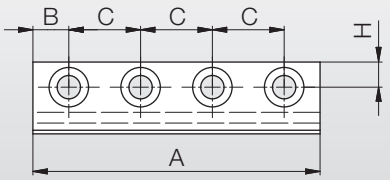
Clamps

Recommended number of clamps:
4 per metre and side





Type I



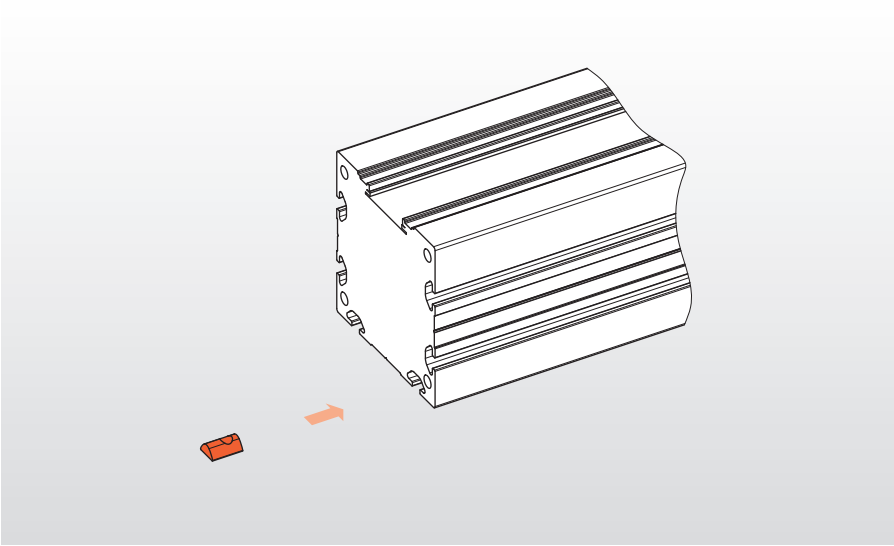
Type II

Nominal size	Type	Dimensions [mm] A	B	C	D	E	F	G*	H	J	K	Weight [kg]	Art. No.
LM3...	I	80	10	...	19.0	12.0	16	11.9	6	ø11	ø6.5	.....	.....
	II			20								0.118	P-54376/1
LM4...	I	80	10	60	22.0	15.0	20	14.0	7	ø11	ø6.5	0.195	M-40023/1
	II			...								.....	.....
LM5...	I	108	19	70	25.7	16.7	28	20.0	9	ø15	ø9.0	0.412	M-50158/1
	II			...								.....	.....

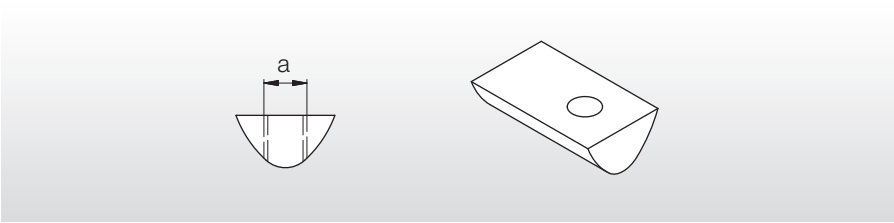
Attachment accessories; sliding blocks

Sliding blocks

Sliding blocks having the relevant groove width can be used to mount add-on parts to the base profile.



Sliding block types NS5, NS6 and NS8 can be used in line with the groove width (see profile cross-sections, pages 9 to 11).
Sliding blocks are available from LINE TECH. Size, material and connection thread as per the following order system (e.g. NS6 St M5) must be defined as the order number.
The available types are listed opposite.



Dimensions [mm]		Material
Groove width	a (thread)	
5	M3 / M4 / M5	steel / stainless steel
6	M4 / M5 / M6	steel / stainless steel
8	M4 / M5 / M6 / M8	steel / stainless steel

Order designation for sliding blocks

Examples: NS6 St M5

NS 6 St M5

Sliding block NS

Groove width
5
6
8

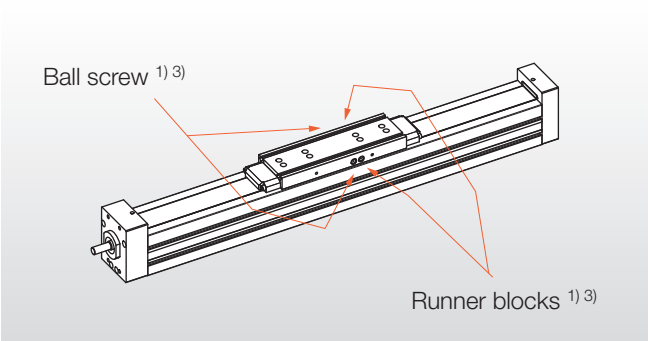
Thread size (dim. “a”)
M3 / M4 / M5 / M6 / M8

Material
St = steel
Inox = stainless steel

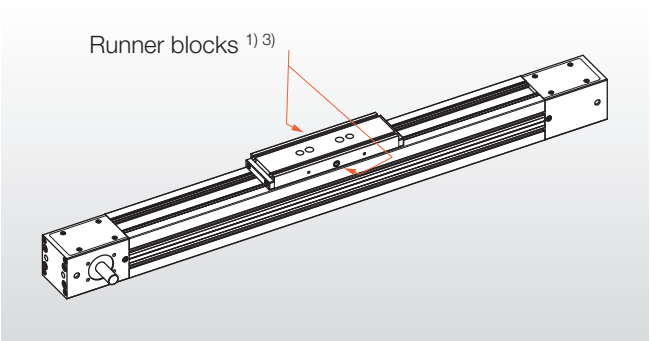
LINEAR MODULES

Grease points (1/2)

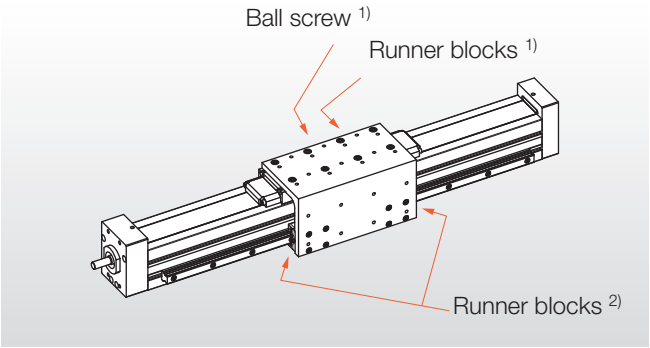
LM3..R..N



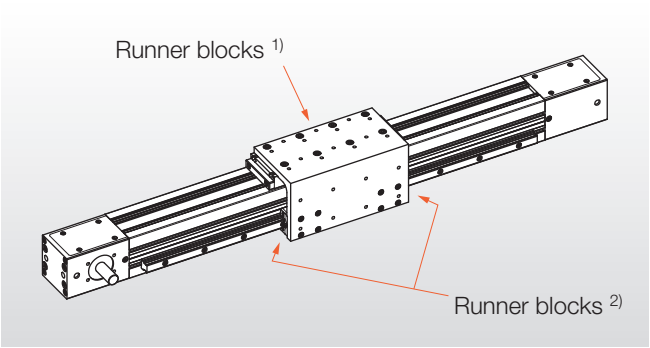
LM3..Z..N



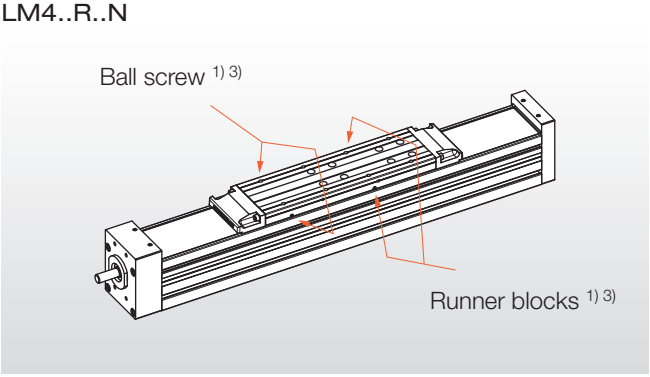
LM3..R..L/R



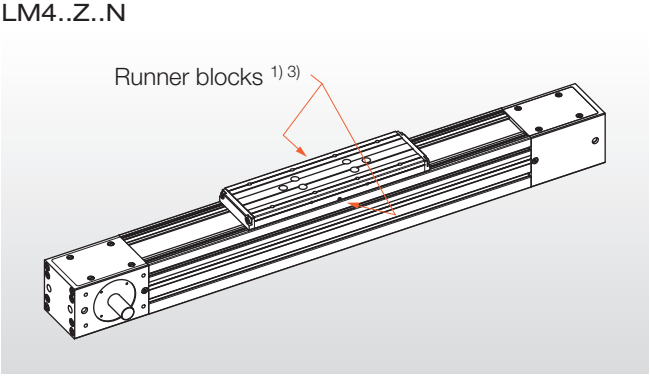
LM3..Z..L/R



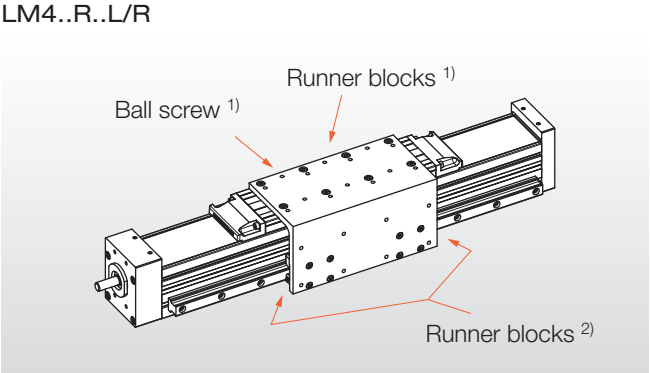
LM4..R..N



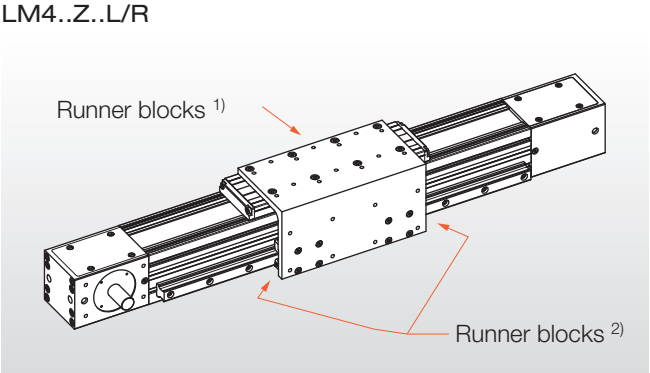
LM4..Z..N



LM4..R..L/R

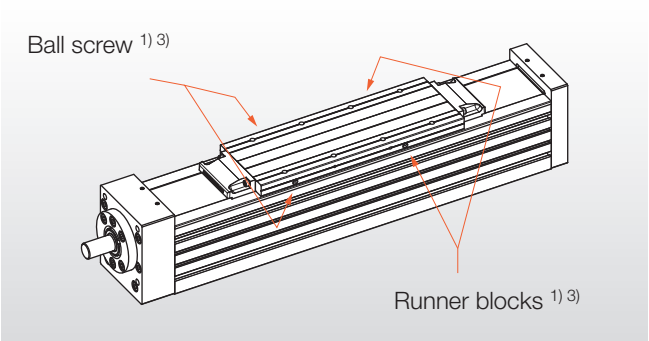


LM4..Z..L/R



Grease points (2/2)

LM5..R..N



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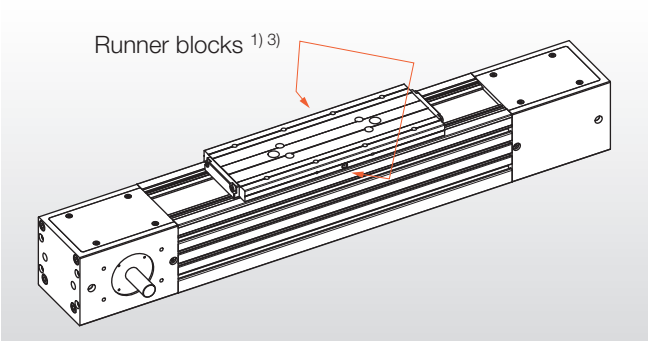
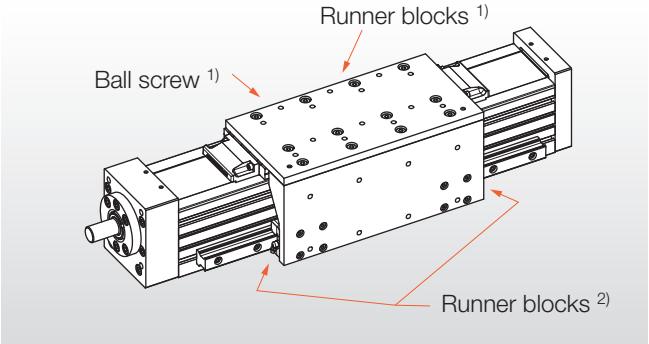
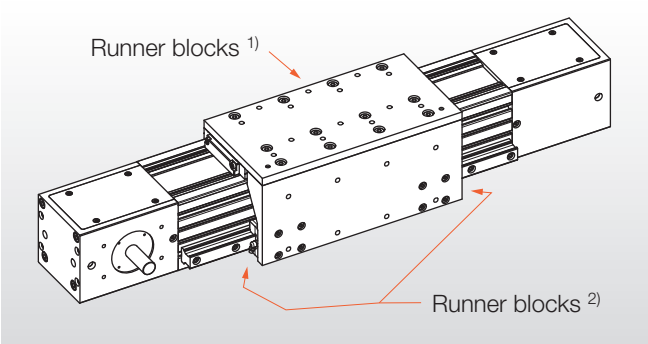


LM5..R..L/R



LM5..Z..L/R



Grease points

Different lubricating nipples are on the linear module carriages:

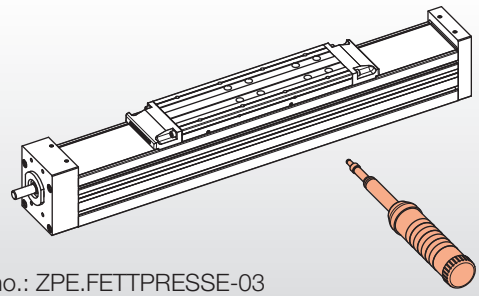
1) Lubricating nipple to DIN 3405
2) Lubricating nipple to DIN 71412
3) Lubrication either on left or right side

Greasing positions are not dependent on stroke.

Standard grease

LINE TECH recommends the following grease for lubrication:
Microlube GBU Y 131

Grease gun



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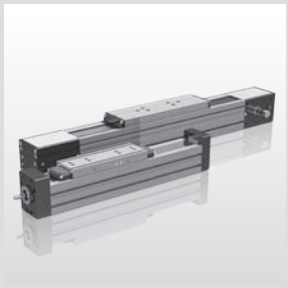

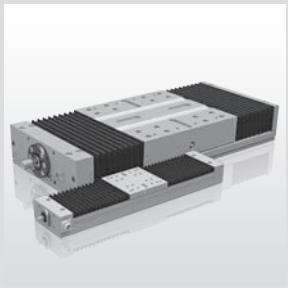
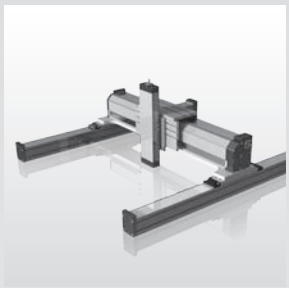






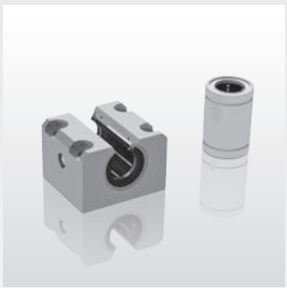
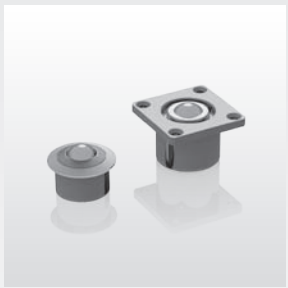

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