

LINEAR MODULES WITH TOOTHED BELT DRIVE

ASSEMBLY AND MAINTENANCE INSTRUCTIONS

(ENGLISH)



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These instructions contain standard illustrations, so representations may deviate from the original. The scope of delivery for special designs, options or technical changes may differ from the explanations described here. We reserve the right to make changes for the purposes of technical improvement.

Despite taking great care when creating these assembly and maintenance instructions, printing errors cannot be excluded. We are grateful for any information alerting us to errors or poorly formulated/represented information in this document. All rights reserved. No part of these instructions may be reproduced or may be processed, duplicated or distributed in any form using electronic means without the written consent of LINE TECH AG.



1. General

Warranty:

LINE TECH AG warrants compliance with the specifications expressly agreed upon in the confirmation and in general the execution of the order with the due care customary in the industry. The warranty covers the function of the Linear Module and includes all defects that are demonstrably due to manufacturing or material defects.

Warranty period:

The warranty period (factory warranty) is twelve months from the date of delivery according to the general terms and conditions of sale and delivery, provided a longer period has not been agreed upon.

Warranty exclusion:

Excluded from the warranty are defects and faults for which LINE TECH AG is not responsible, such as natural wear, force majeure, improper handling, interventions on the part of the customer or third parties, excessive and improper use, unsuitable operating equipment, extreme environmental conditions and non-compliance with assembly, operating and maintenance instructions. Any warranty claims shall expire in such cases.

LINE TECH AG is only liable for customer damages that are directly related to the breach of contractual obligations and that have been caused by LINE TECH AG due to gross negligence. The liability for slight negligence on the part of LINE TECH AG or for actions of auxiliary persons commissioned by LINE TECH AG is excluded to the legally permitted extent. In no case is LINE TECH AG liable for direct or indirect consequential damages or third party damages. The exclusion or limitation of liability of LINE TECH AG also apply for the personal liability of its employees, workers, representatives and vicarious agents.

2. Use in Accordance with the Regulations

LINE TECH Linear Modules with toothed belt drive (ZR) are particularly well-suited for applications with larger strokes and high travel speeds due to their structural features. The Linear Module with toothed belt drive (incomplete machine in the sense of the Machinery Directive 2006/42/EC) is intended to be installed in machines and is used exclusively to move, precisely position and transport lightweight to medium-weight loads.

Linear Modules with toothed belt drive (ZR) can be installed in any position (horizontal, vertical or overhead). The generally applicable technical safety and accident prevention regulations must always be observed and complied with. All relevant safety regulations, such as DIN EN ISO 12100 (machine safety), must be observed when installing the incomplete machine in a complete machine.

The linear unit with toothed belt may only be used in accordance with the intended use provided by LINE TECH AG. Any other use beyond this is considered improper. The manufacturer is not liable for any personal injury and/or property damage that results from said improper use. The risk is borne solely by the user. The assembly and maintenance instructions prescribed by the manufacturer must be observed to ensure use in accordance with the regulations. Only qualified specialist personnel may carry out the commissioning, assembly, maintenance and repair work.

In general, LINE TECH Linear Modules are intended for linear movement as occurs during positioning, processing, transporting, palletising, loading, unloading, clamping, tensioning, testing, measuring, handling and manipulating workpieces or tools. In the process, the type-specific load data from the respective catalogue documents or supplementary technical calculations from our company are to be taken into consideration.

3. Use Not in Accordance with the Regulations

Use in application areas with special operating conditions, such as in the presence of moisture, dirt, dust (fibre glass and wood), aggressive atmospheres, potentially explosive environments, extreme climatic conditions and/or extreme temperature fluctuations, short-stroke and others are not considered proper and intended use. For special solutions, please contact LINE TECH AG.





4. Declaration of incorporation

Declaration of incorporation

within the meaning of the EC Machinery Directive 2006/42/EC, annex II B

The manufacturer

Line Tech AG
Europastrasse 19
8152 Glattbrugg

hereby declares that for the incomplete machine

Designation: Linear Module with toothed belt drive (LM)
Material number: according to the nameplate LINE TECH AG

these basic requirements of the Machinery Directive 2006/42/EC have been applied and complied with:

- | | |
|--|---|
| - 1.1.2 Principles for the integration of safety | - 1.5.6 Fire |
| - 1.1.3 Materials and products | - 1.5.8 Noise |
| - 1.1.5 Machine design with respect to handling | - 1.5.13 Emission of hazardous materials and substances |
| - 1.3.2 Risk of breakage during operation | - 1.6.1 Maintenance of the incomplete machine |
| - 1.3.3 Risks from falling or ejected objects | - 1.7.2 Warning of residual risks |
| - 1.3.4 Risks from surfaces, edges and corners | |
| - 1.3.7 Risks from moving parts | |
| - 1.3.9 Risk of uncontrolled movements | |
| - 1.5.1 Electrical power supply | |
| - 1.5.2 Static electricity | |
| - 1.5.4 Assembly error | |
| - 1.5.5 Extreme temperature | |

Furthermore, it is stated that the specific technical documentation has been prepared according to annex VII part B. These will be transmitted to market surveillance authorities in the form of paper documents/in electronic form upon request.

Compliance with the provisions of additional EU guidelines, standards or specifications:

- | | |
|---------------------|---|
| - EN ISO 12100:2010 | Safety of Machinery - General Principles for Design -
Risk assessment and risk reduction |
|---------------------|---|

The incomplete machine may then first be put into operation once it has been determined that the machine in which the incomplete machine is to be installed meets the provisions of the EC Machinery Directive 2006/42/EC, if relevant under this guideline.

The following person is authorised to compile the relevant technical documentation:

Name: Rolf Bünzli
Address: Europastrasse 19, CH-8152 Glattbrugg

Glattbrugg, 03 Nov. 2017

Michael Schilbach
Technical Sales Manager

Rolf Bünzli
Head of Quality Management

5. Safety, References, Symbols

5.1 Safety Instructions

The following safety and hazard instructions are for your personal protection, the protection of third parties and the protection of the Linear Module. They must therefore be observed.

The following pictograms are used in these assembly and maintenance instructions as safety and hazard instructions:



DANGER
Indicates an imminent danger. Failure to observe this notice may result in death or serious injury.



WARNING
Indicates a potential hazardous situation. If this information is ignored, it could result in property damage or physical injury.



CAUTION
Indicates a possible hazard. Ignoring this information may result in injuries, such as cuts and crushing, etc. Make sure any sources of hazards are secured.



CAUTION
Indicates a possible hazard. Ignoring this information may lead to eye injuries. Wear protective goggles.



CAUTION
Indicates a possible hazard. De-energise the module. Secure the power supply from unintentional or unauthorised commissioning.



CAUTION
Indicates a possible hazard. Ignoring this information may lead to skin burns. Avoid skin contact and wear protective gloves.



Note
Indicates general information and work recommendations.

5.2 Identification of references

References are made to repeated or further information as follows:

 2.1 Reference to section 2.1

  5.1.1 Reference to image 5.1.1 (image 1 in section 5.1)

5.3 Symbols



Commissioning



Assembly



Travel speed



Securing with adhesive
(Observe the safety data sheet)



Maintenance



RPM



Tightening torque



Screw



Thermometer



Excerpt from the LINE TECH AG product catalogue



6. Transport

6.1 Transport, packaging and storage

The mechanics of Linear Modules can be damaged from heavy impacts and bending, which can greatly impair its function. Axes with a length of more than 700 mm must always be supported during transport. In order to avoid transport damage, LINE TECH AG Linear Modules are sufficiently packaged and protected against slipping and vibrations.

For storage, the Linear Module should be placed in a well-padded sturdy crate and sufficiently protected against moisture, dirt and aggressive atmosphere.

6.2 Scope of delivery

The scope of delivery of the product includes:

- Linear Module according to the order confirmation
- Assembly and maintenance instructions
- Additional and special accessories according to the order

7. Linear Module (LM) with toothed belt drive (ZR)

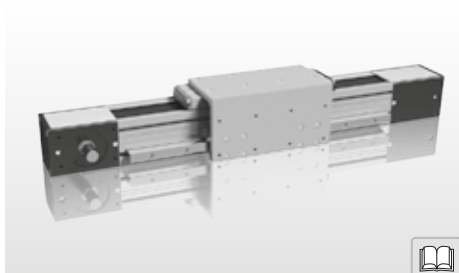
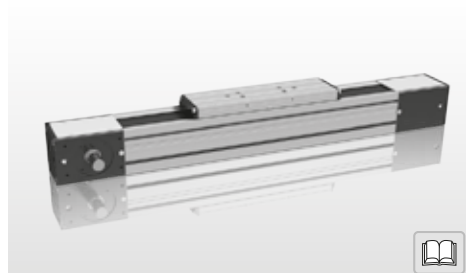
7.1 Product overview

LM...Z...N

Linear Module with toothed belt drive

LM...Z...L/R

Linear Module with toothed belt drive and lateral support rail left/right



LINE TECH Linear Modules with toothed belt drive are of modular conception, ready-to-install linear systems with drive. Sealed guide elements in all sizes are employed. 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 compact dimensions.



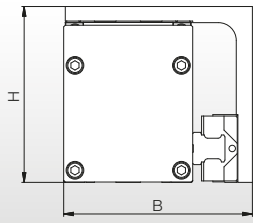
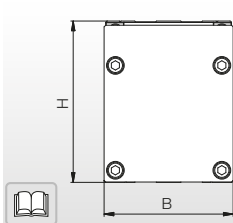
Design

- Compact aluminium base profile
- Ready-to-install Linear Modules in any lengths
- Carriages made of aluminium



Linear Modules can be installed and assembled by qualified personnel using these assembly and maintenance instructions.

The units must not be opened under any circumstances. If a unit is opened, safe operation can no longer be guaranteed!



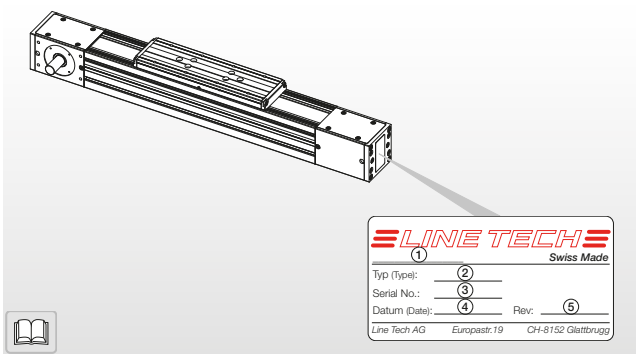
Linear Module	Dimensions	Load ratings	
Type	W x H [mm]	C ₀ [kN]	C [kN]
LM3...N	60 x 85	35.0	18.0
LM3...L/R	98 x 94	70.0	36.0
LM4...N	80 x 100	59.9	34.2
LM4...L/R	117 x 109	119.9	68.4
LM5...N	110 x 129	85.0	49.6
LM5...L/R	155 x 141	170.0	99.2

7.2 Nameplate “Ordering of spare parts and accessories”



The following information is to be taken from the nameplate in order to get a clear identification of the unit. This information is to be given to the manufacturer immediately if there are problems with the Linear Module:

1. Name of the unit
2. Type designation
3. Serial number
4. Date of production (calendar week/year)
5. Date of repair (If available)



7.3 Tightening torques for screws



Screws of the strength class 8.8 are used by default. If other screws are used, these are specially labelled. The tightening torques recommended by LINE TECH AG are defined in the table below.

Tightening torque $M_{A\ max.}$ [Nm]		Friction factor for screws $\mu = 0.120$								
Screw according to	Material class	Thread size								
		M2	M2.5	M3	M4	M5	M6	M8	M10	M12
ISO 4762	8.8	0.36	0.73	1.27	3.00	5.90	10.10	24.60	48.00	84.00
ISO 4762	12.9	0.60	1.23	2.14	5.10	10.00	17.40	42.20	83.00	144.00
ISO 7380-1	10.9	0.25	0.50	0.90	2.00	4.00	7.20	12.00	23.00	58.00

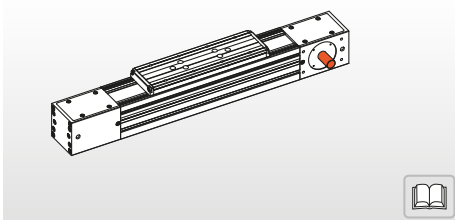
8. Design and assembly of Linear Modules with toothed belt drive

8.1 Assembly design versions with different motor mountings

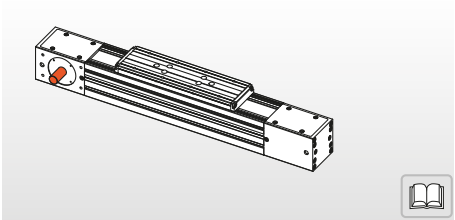


LINE TECH Linear Modules with toothed belt drive can be delivered in various design versions and with different prepared motor mountings $\Rightarrow$ 13 Dimensions of Bridge Modules BM4 $\Rightarrow$ 9.1-9.3

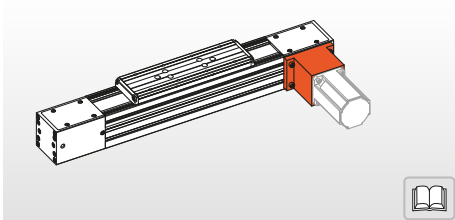
Assembly stage 11
Free shaft end right*



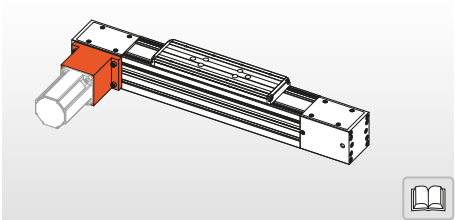
Assembly stage 12
Free shaft end left*



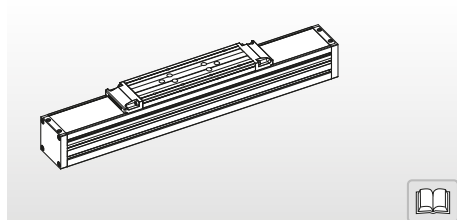
Assembly stage 13
Shaft end right* with coupling and intermediate flange



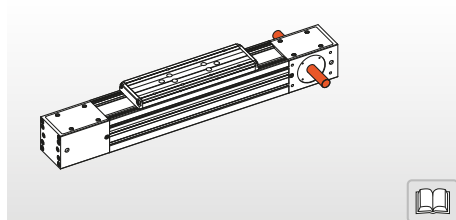
Assembly stage 14
Shaft end left* with coupling and intermediate flange



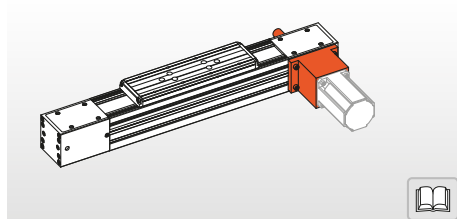
Assembly stage 00
Without drive



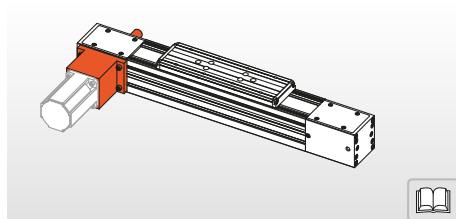
Assembly stage 17
Free shaft ends on both sides
(passing shaft)



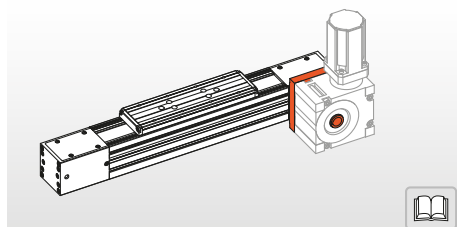
Assembly stage 18
Shaft end on both sides, with coupling
and intermediate flange right*



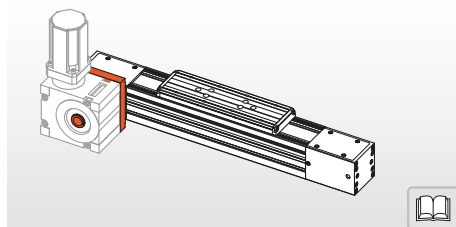
Assembly stage 19
Shaft end on both sides, with coupling
and intermediate flange left*



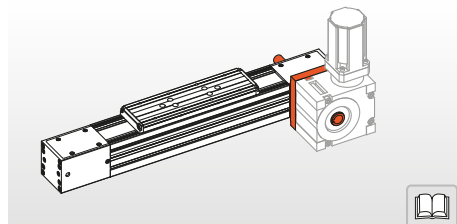
Assembly stage 25
Shaft end right* with gear mounting



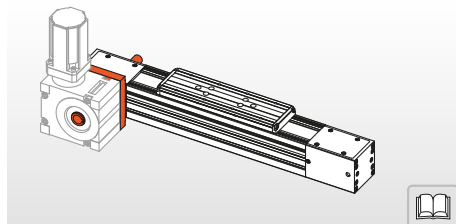
Mounting condition 26
Shaft end left* with gear mounting



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



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



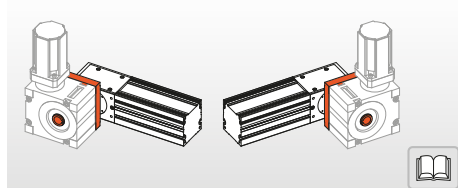
*seen from motor opposite side towards motor

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

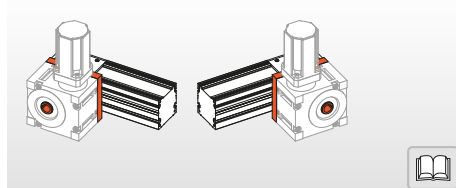


For assembly stages 25 to 28 → 8.1 , the gear mounting plate can be pre-mounted differently depending on gear mounting and motor alignment required. Assembly of gear mountings → 13.2 / 13.3

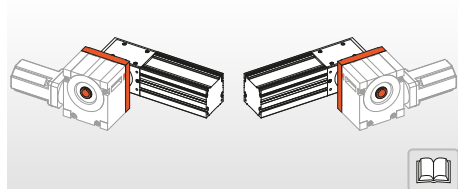
Gear box mounting D
Gear towards back* and top



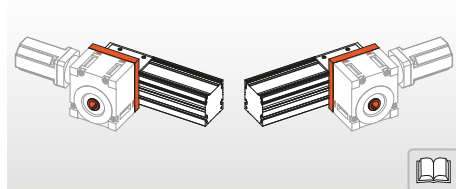
Gear box mounting E
Gear towards front* and top



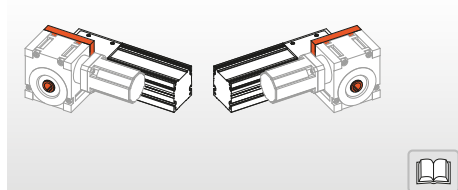
Gear box mounting F
Gear towards back* and bottom



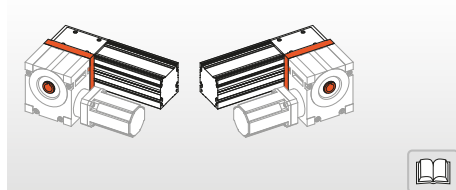
Gear box mounting G
Gear towards back* and top



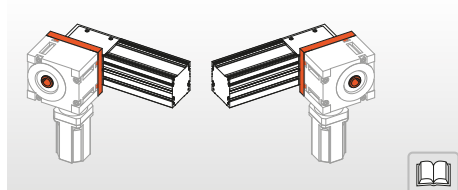
Gear box mounting H
Gear towards front* and top



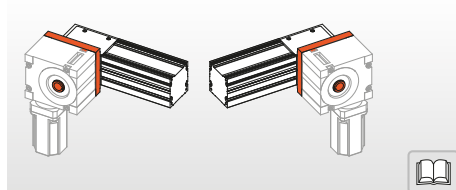
Gear box mounting K
Gear towards front* and bottom



Gear box mounting L
Gear towards front* and bottom

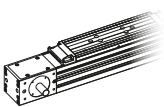


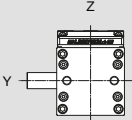
Gear box mounting M
Gear towards back* and bottom



*seen from motor opposite side towards motor

8.3 General technical details for Linear Modules (toothed belt drive)



LM	Movement speed		Moments of inertia		Stroke max.	Cover	Feed and friction force	Moved mass
Type	Guide v_{max} [m/s]	Drive v_{max} [m/s]	 I_y [cm ⁴]	I_z [cm ⁴]	[mm]		F_v [N]	m_b [kg]
LM3...N...N ⁵⁾	5.0	4)	66.9	82.4	7 650	without	20.00	1.030
						with	30.00	1.040
LM3...Z...N	5.0	4)	66.9	82.4	7 650	without	20.00	1.100
						with	30.00	1.110
LM3...Z...L/R	5.0	4)	67.2	82.6	7 650	without	40.00	2.205
						with	50.00	2.215
LM4...N...N ⁵⁾	5.0	4)	131.2	197.8	7 580	without	25.00	2.090
						with	35.00	2.100
LM4...Z...N	5.0	4)	131.2	197.8	7 580	without	25.00	2.150
						with	35.00	2.165
LM4...Z...L/R	5.0	4)	132.3	198.5	7 580	without	50.00	3.875
						with	60.00	3.890
LM5...N...N ⁵⁾	5.0	4)	451.9	623.9	7 530	without	30.00	4.000
						with	40.00	4.040
LM5...Z...N	5.0	4)	451.9	623.9	7 530	without	30.00	4.100
						with	40.00	4.140
LM5...Z...L/R	5.0	4)	453.8	625.2	7 530	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

⁵⁾ variant without drive



8.4 Technical data of the toothed belt drive (ZR)

LM	Toothed belt drive				Axial load	Positioning accuracy	Repeating accuracy	Acceleration
Size	Type Division	Pinion $d_3 \times l_R$ [mm]	Stroke/ rev [mm]	Tension ³⁾ [mm/m]	F [N]		.../1000 mm [mm]	a_{max} [m/s ²]
LM3	HTD5M	49.34 x 31	155	0,245	... ¹⁾	200/1000 ²⁾	< 0.20 ²⁾	50.0 ¹⁾
LM4	HTD5M	65.25 x 45	205	0,105	... ¹⁾	200/1000 ²⁾	< 0.20 ²⁾	50.0 ¹⁾
LM5	STD8M	94.22 x 60	296	0,059	... ¹⁾	200/1000 ²⁾	< 0.20 ²⁾	50.0 ¹⁾

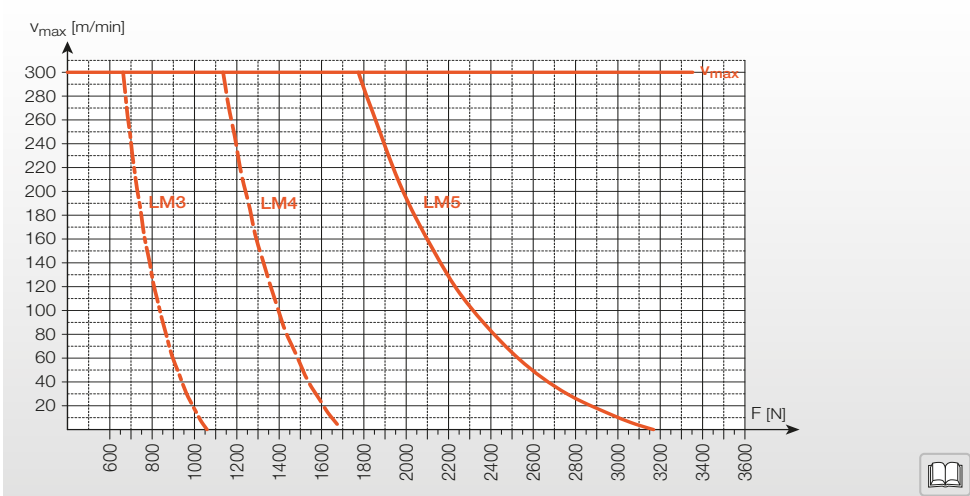
$d_3 \times l_R$ = pinion diameter x pinion width
1) dependent on the rotational speed and load
2) backlash not factored in
3) belt tension/metre [mm/m] per 100 N tensile force

8.5 Permissible speeds



For toothed belt drive, the permitted movement speed of the linear guide, and load, are authoritative.
Please also pay attention to the motor speed!

... for Linear Module LM...Z... with toothed belt drive



F = axial load

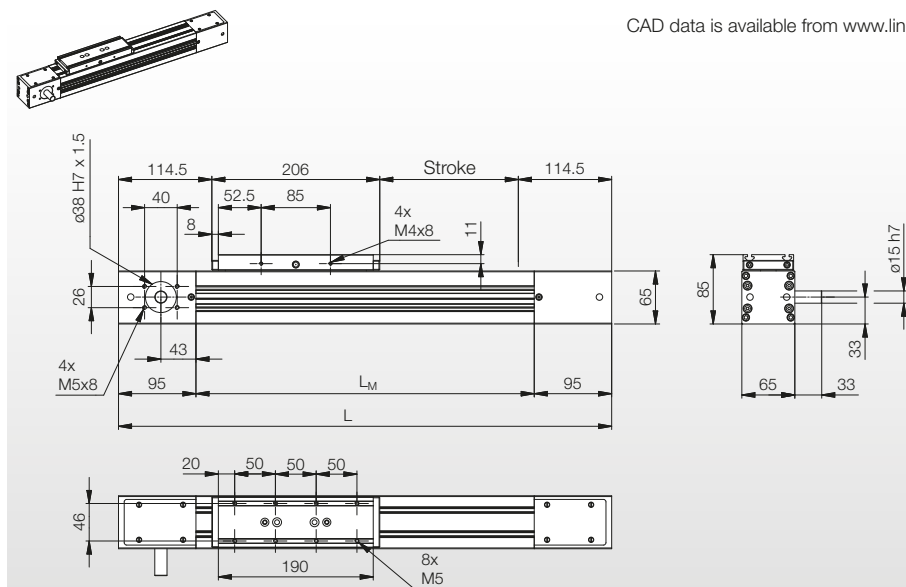


9. Dimensions, exploded views and parts lists

9.1 Dimensions of Linear Module LM3...NZ...N

with toothed belt drive, without protective strip

CAD data is available from www.linetech.ch



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

9.1.1 Parts list for exploded view



Assembly of attachments according to the corresponding chapters ➡ 11 / 12 / 13

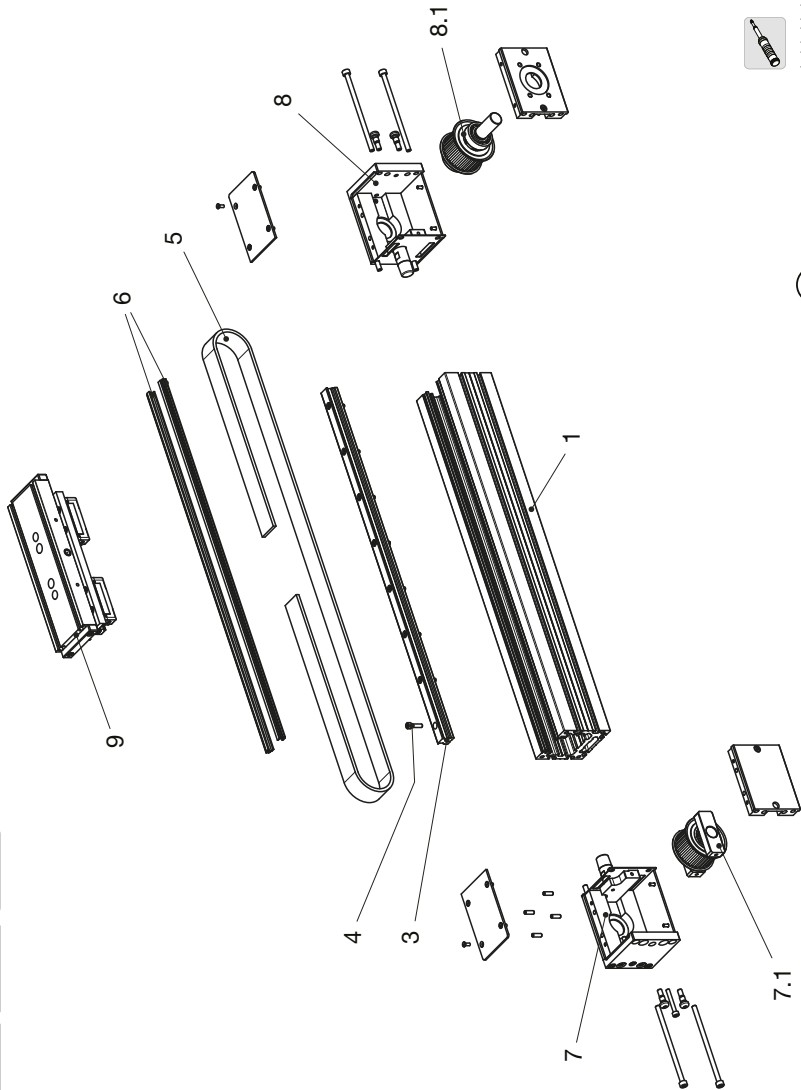
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate ➔ 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	-	9	Carriage
3	Linear rail	10	-
4	Screw on linear rail	11	-
5	Toothed belt	12	-
6	Toothed belt guide profile	13	-
7	Deflection housing	14	-
7.1	Deflection pinion assembly kit	15	-
8	Drive housing	16	-



9.1.2 Setup and assembly of the Linear Module (exploded view)



Initial lubrication:
Quantity corresponds to
2x relubrication amount
(Pos.: 9) → 17.1

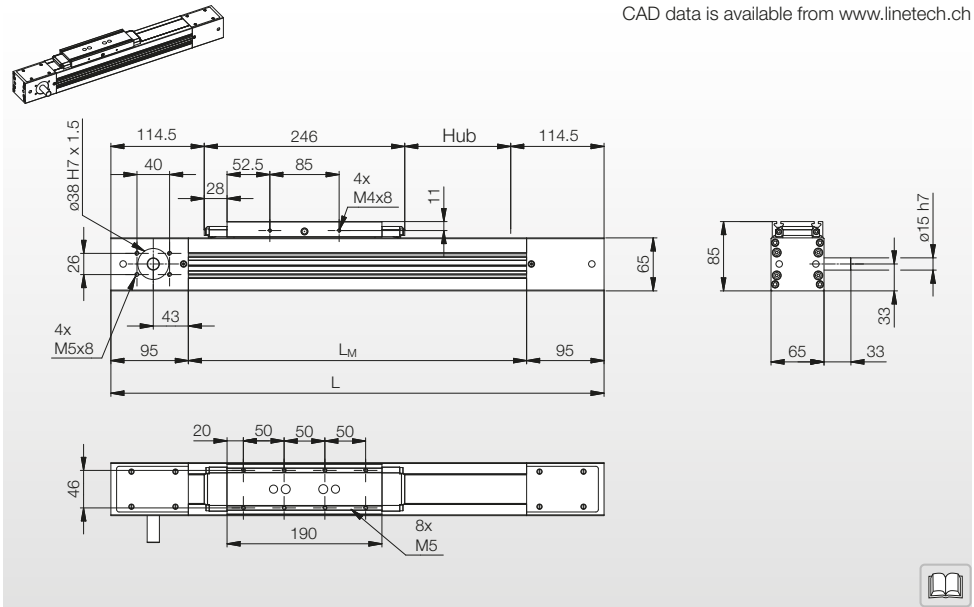


Tightening torque of
screws → 7.3

9.2 Dimensions of Linear Module LM3...BZ...N

with toothed belt drive, with cover

CAD data is available from www.linetech.ch



Nominal size	Dimensions				
Designation	L [mm]	L _M [mm]	Belt length [mm]	Length of protective ribbon [mm]	Weight [kg]
LM3...BZ...N	Stroke + 475	L – 190	2x stroke + 810	L – 10	4.80 kg + 0.61 kg/100 mm stroke

9.2.1 Parts list for exploded view

➡ 9.2.2



Assembly of attachments according to the corresponding chapters ➡ 11 / 12 / 13

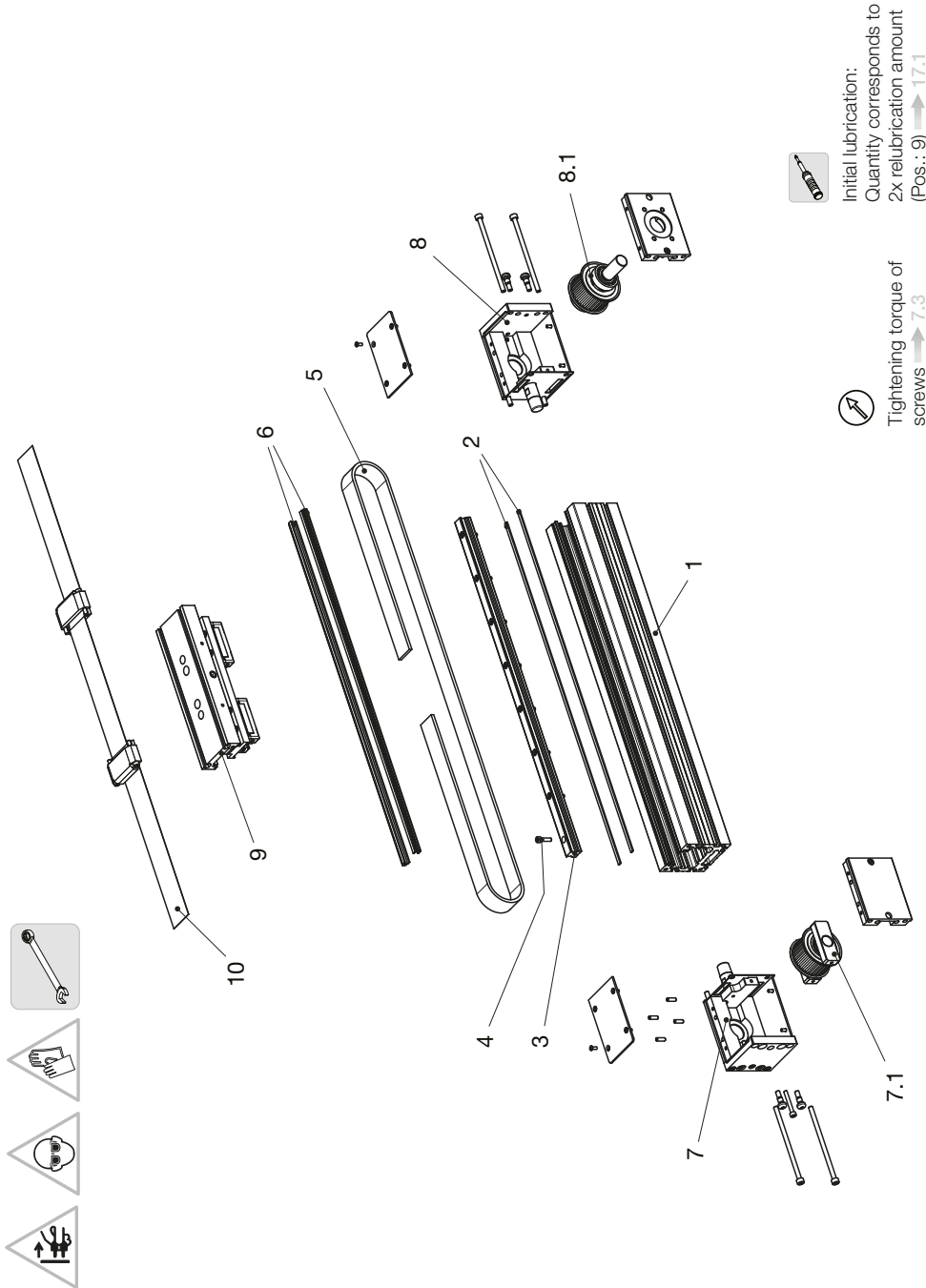
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate ➡ 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	Magnetic tape	9	Carriage
3	Linear rail	10	Complete cover
4	Screw on linear rail	11	-
5	Toothed belt	12	-
6	Toothed belt guide profile	13	-
7	Deflection housing	14	-
7.1	Deflection pinion assembly kit	15	-
8	Drive housing	16	-



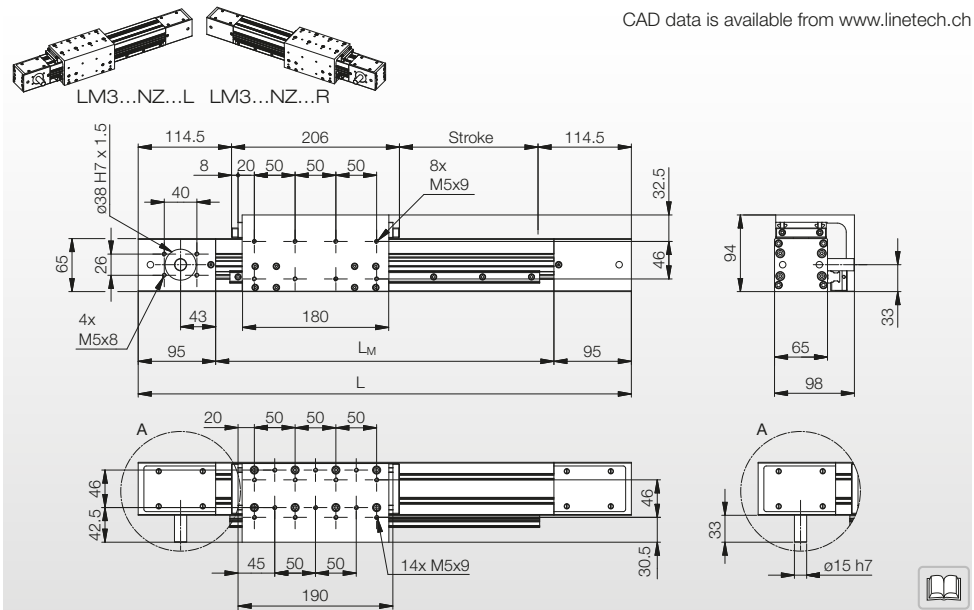
9.2.2 Setup and assembly of the Linear Module (exploded view)



9.3 Dimensions of Linear Module LM3...NZ...L/R

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

CAD data is available from www.linetech.ch



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

9.3.1 Parts list for exploded view

 9.3.2



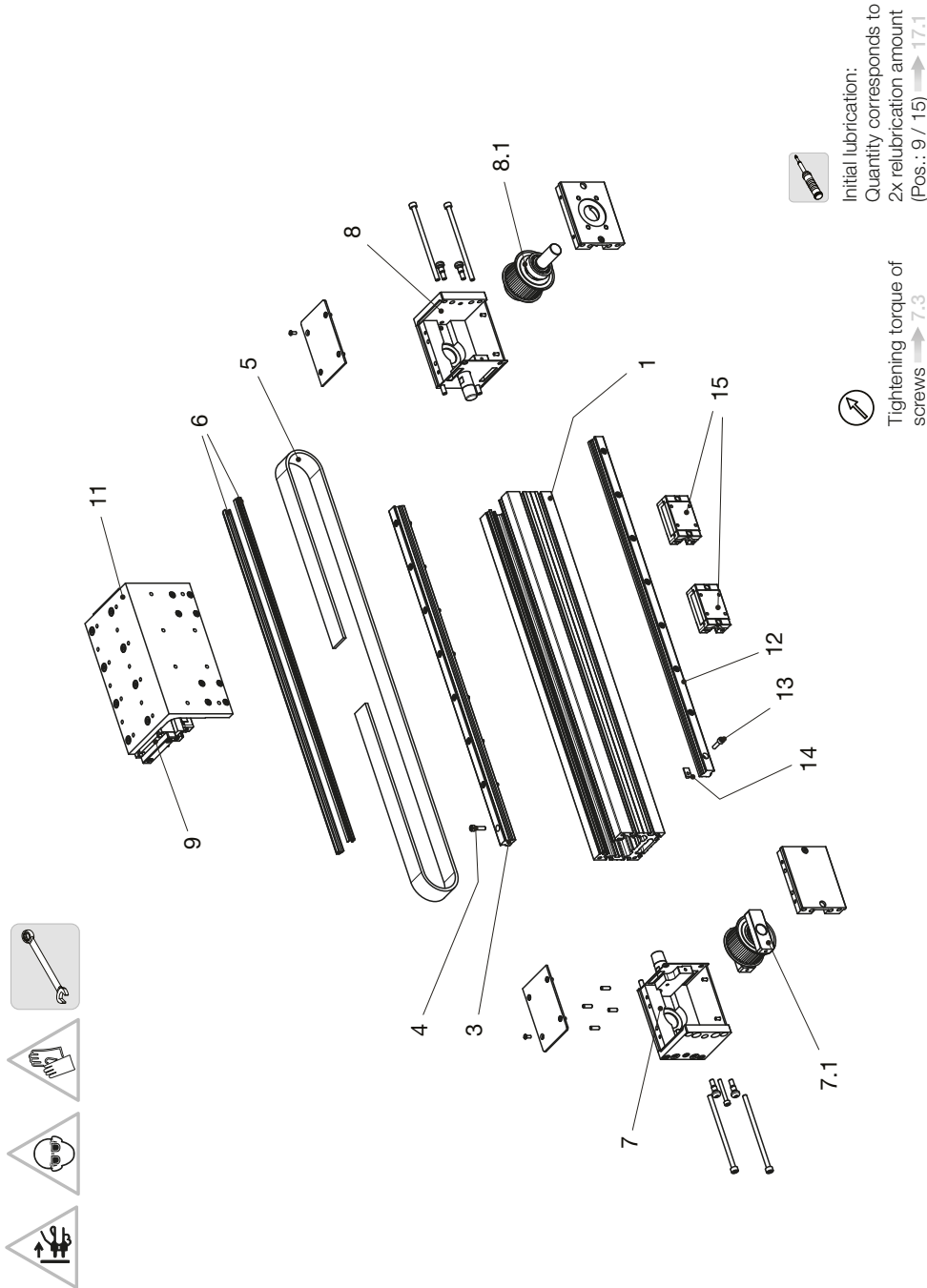
Assembly of attachments according to the corresponding chapters ➡ 11 / 12 / 13

Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate ➡ 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	-	9	Carriage
3	Linear rail	10	-
4	Screw on linear rail	11	Angle to the support rail
5	Toothed belt	12	Support rail
6	Toothed belt guide profile	13	Screw to the support rail
7	Deflection housing	14	Sliding block to the support rail
7.1	Deflection pinion assembly kit	15	Runner block to the support rail
8	Drive housing	16	-

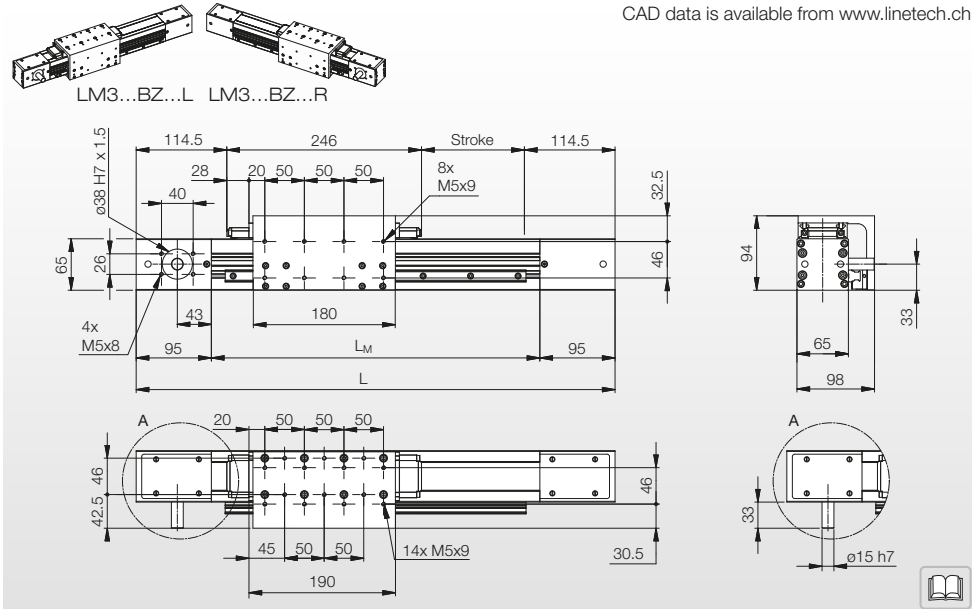
9.3.2 Setup and assembly of the Linear Module (exploded view)



9.4 Dimensions of Linear Module LM3...BZ...L/R

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

CAD data is available from www.linetech.ch



Nominal size	Dimensions				
Designation	L [mm]	L _M [mm]	Belt length [mm]	Length of protective ribbon [mm]	Weight [kg]
LM3...BZ...L/R	Stroke + 475	L – 190	2x stroke + 810	L – 10	6.30 kg + 0.74 kg/100 mm stroke

9.4.1 Parts list for exploded view

→ 9.4.2



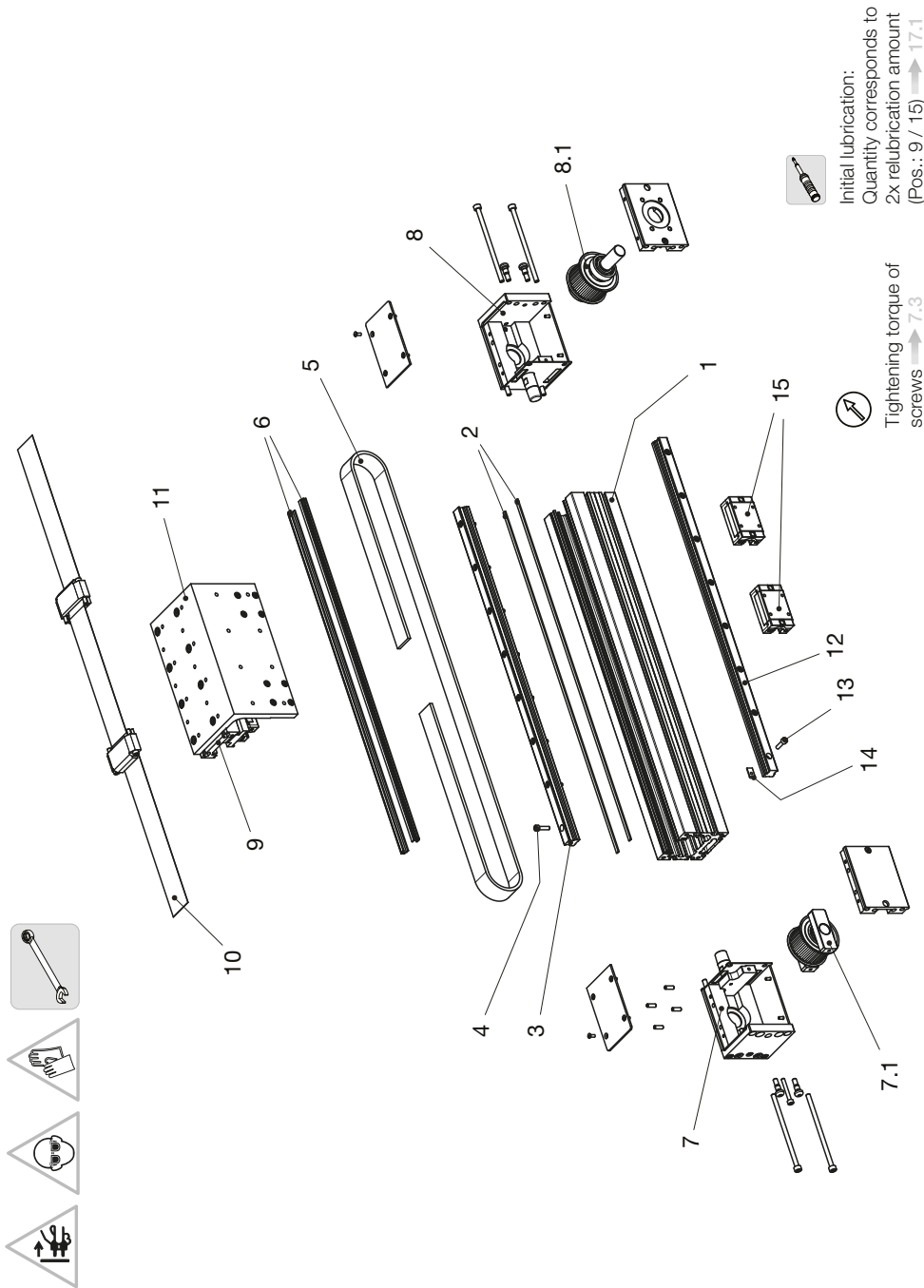
Assembly of attachments according to the corresponding chapters → 11 / 12 / 13

Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate → 7.2

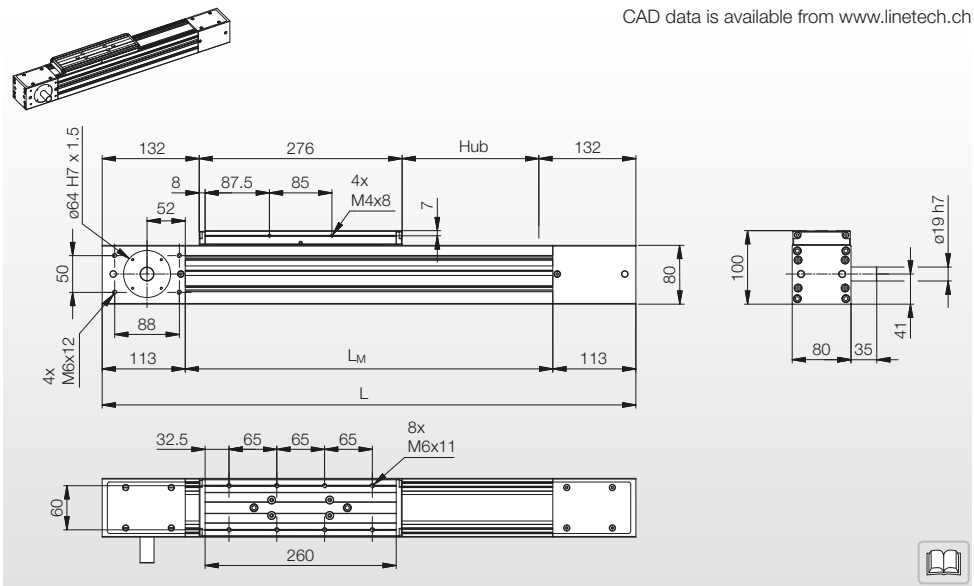
Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	Magnetic tape	9	Carriage
3	Linear rail	10	Complete cover
4	Screw on linear rail	11	Angle to the support rail
5	Toothed belt	12	Support rail
6	Toothed belt guide profile	13	Screw to the support rail
7	Deflection housing	14	Sliding block to the support rail
7.1	Deflection pinion assembly kit	15	Runner block to the support rail
8	Drive housing	16	-

9.4.2 Setup and assembly of the Linear Module (exploded view)



9.5 Dimensions of Linear Module LM4...NZ...N
with toothed belt drive, without protective strip

CAD data is available from www.linetech.ch



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

9.5.1 Parts list for exploded view ➡ 9.5.2



Assembly of attachments according to the corresponding chapters ➡ 11 / 12 / 13

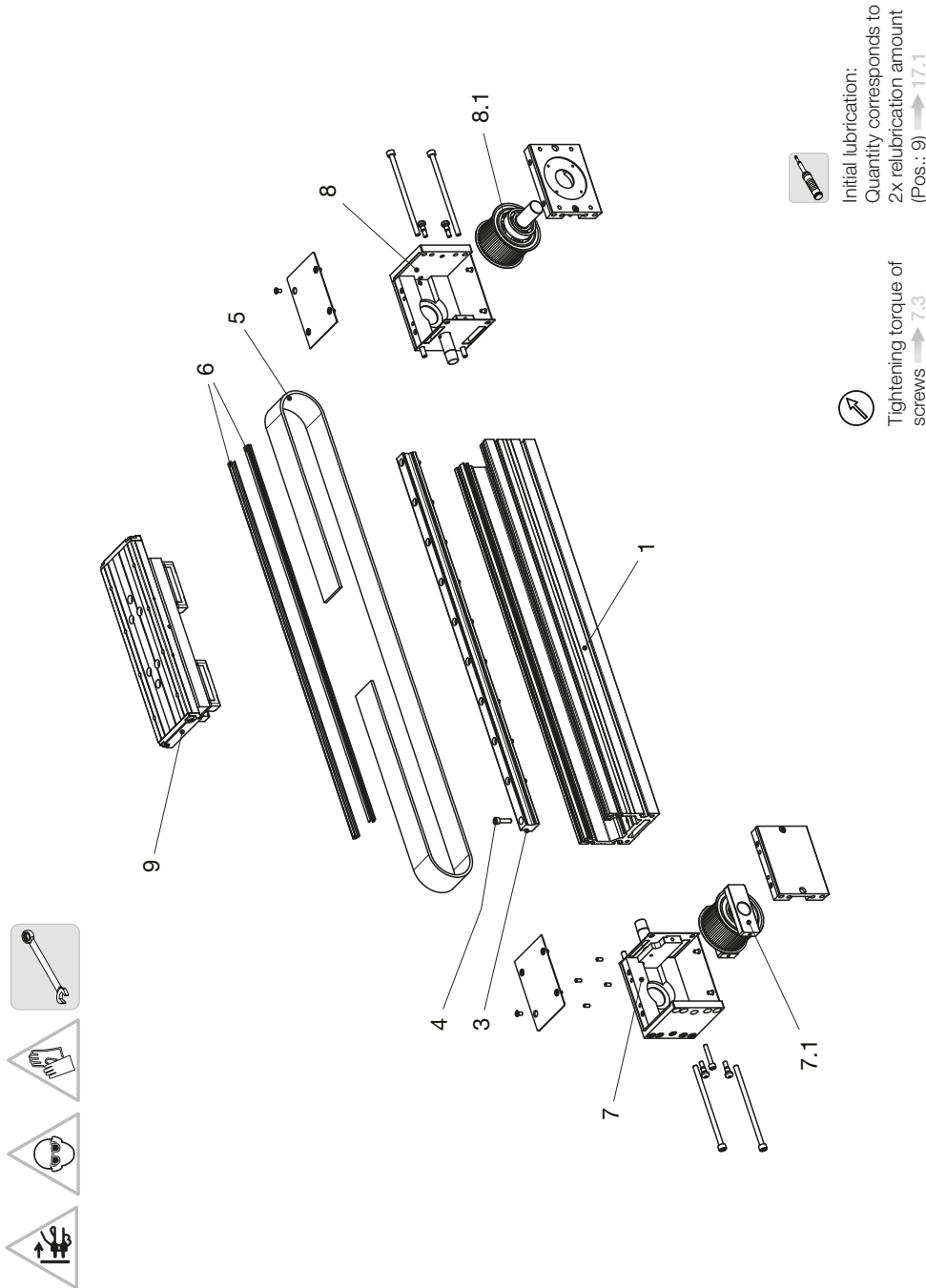
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate ➡ 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	-	9	Carriage
3	Linear rail	10	-
4	Screw on linear rail	11	-
5	Toothed belt	12	-
6	Toothed belt guide profile	13	-
7	Deflection housing	14	-
7.1	Deflection pinion assembly kit	15	-
8	Drive housing	16	-

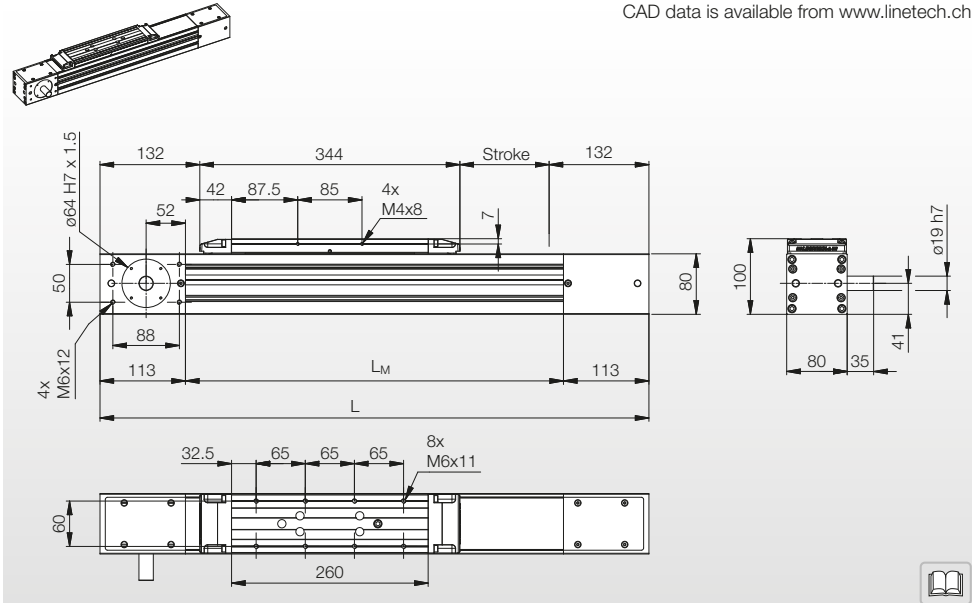


9.5.2 Setup and assembly of the Linear Module (exploded view)



9.6 Dimensions of Linear Module LM4...BZ...N
with toothed belt drive, with cover

CAD data is available from www.linetech.ch



Nominal size	Dimensions				
Designation	L [mm]	L _M [mm]	Belt length [mm]	Length of protective ribbon [mm]	Weight [kg]
LM4...BZ...N	Stroke + 608	L – 226	2x stroke + 1040	L – 12	9.10 kg + 0.95 kg/100 mm stroke

9.6.1 Parts list for exploded view → 9.6.2

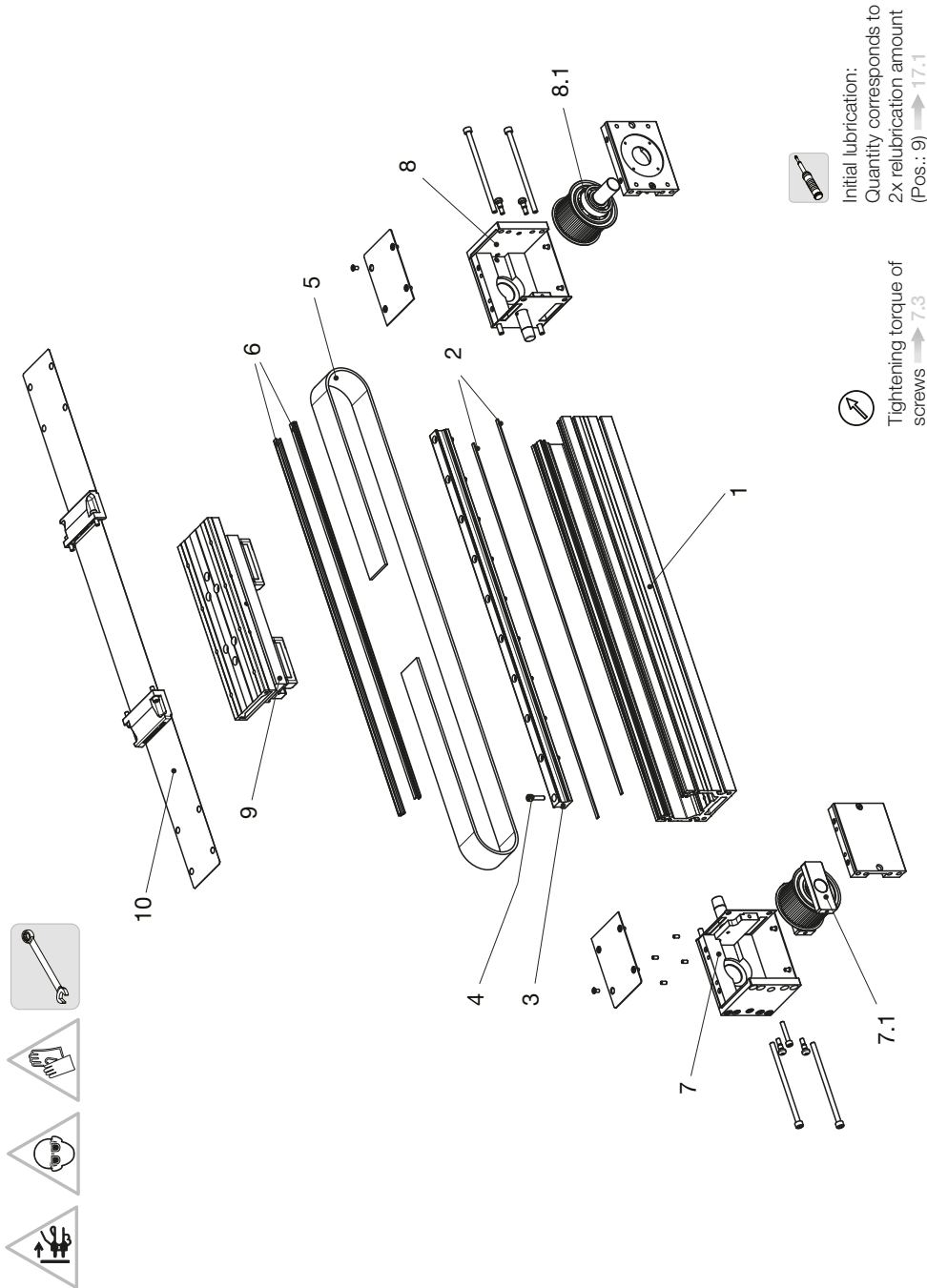
Assembly of attachments according to the corresponding chapters → 11 / 12 / 13

Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate → 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	Magnetic tape	9	Carriage
3	Linear rail	10	Complete cover
4	Screw on linear rail	11	-
5	Toothed belt	12	-
6	Toothed belt guide profile	13	-
7	Deflection housing	14	-
7.1	Deflection pinion assembly kit	15	-
8	Drive housing	16	-

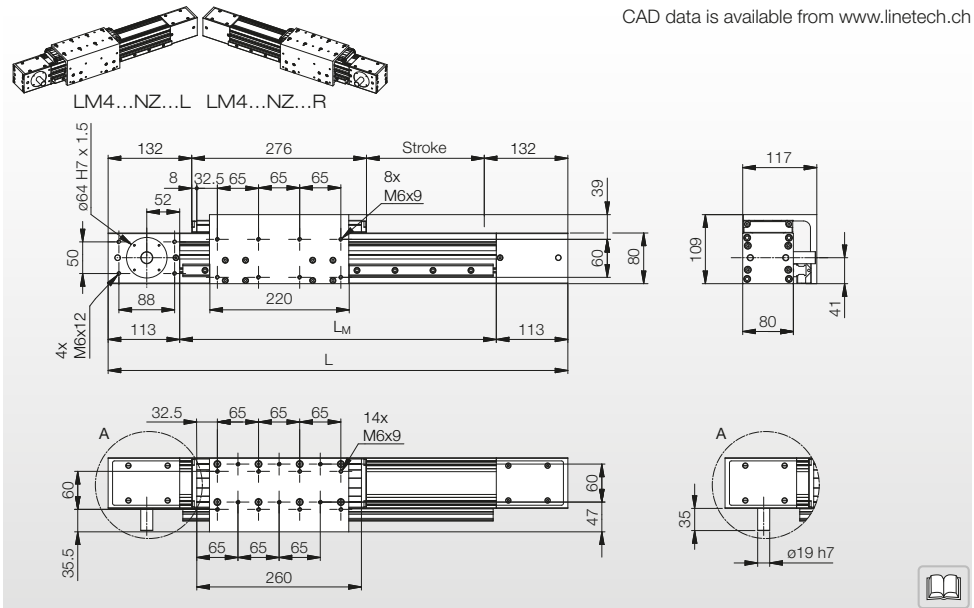
9.6.2 Setup and assembly of the Linear Module (exploded view)



9.7 Dimensions of Linear Module LM4...NZ...L/R

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

CAD data is available from www.linetech.ch



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

9.7.1 Parts list for exploded view

 9.7.2



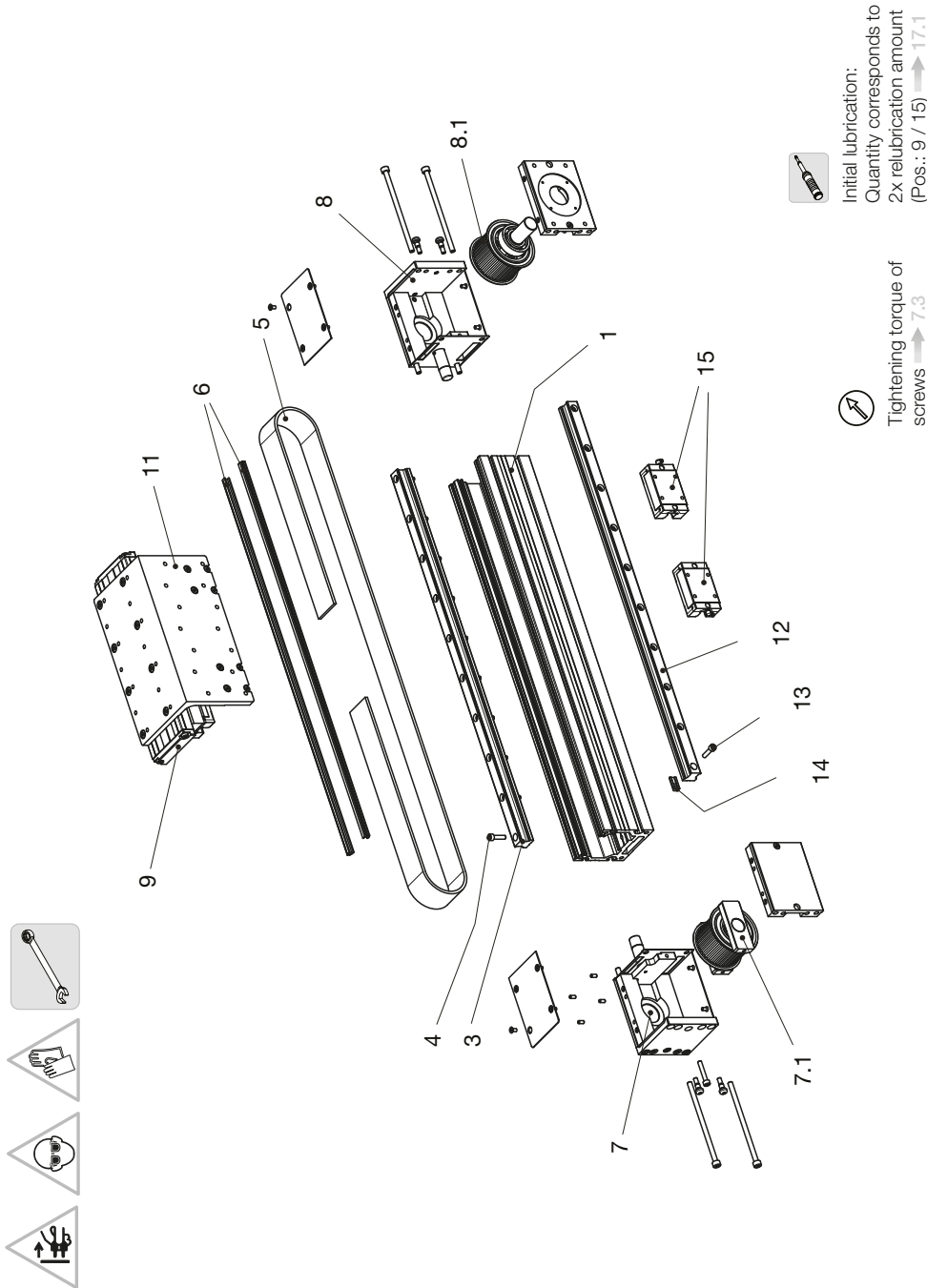
Assembly of attachments according to the corresponding chapters ➡ 11 / 12 / 13

Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate ➡ 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	-	9	Carriage
3	Linear rail	10	-
4	Screw on linear rail	11	Angle to the support rail
5	Toothed belt	12	Support rail
6	Toothed belt guide profile	13	Screw to the support rail
7	Deflection housing	14	Sliding block to the support rail
7.1	Deflection pinion assembly kit	15	Runner block to the support rail
8	Drive housing	16	-

9.7.2 Setup and assembly of the Linear Module (exploded view)

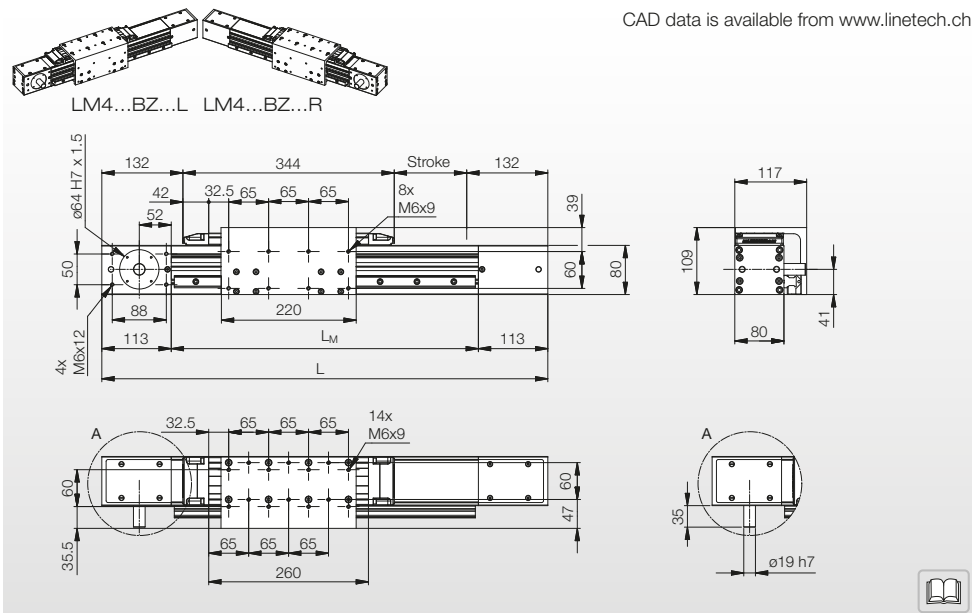


9.8

Dimensions of Linear Module LM4...BZ...L/R

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

CAD data is available from www.linetech.ch



Nominal size	Dimensions				
Designation	L [mm]	L _M [mm]	Belt length [mm]	Length of protective ribbon [mm]	Weight [kg]
LM4...BZ...L/R	Stroke + 608	L – 226	2x stroke + 1040	L – 12	11.72 kg + 1.18 kg/100 mm stroke

9.8.1

Parts list for exploded view

→ 9.8.2



Assembly of attachments according to the corresponding chapters → 11 / 12 / 13

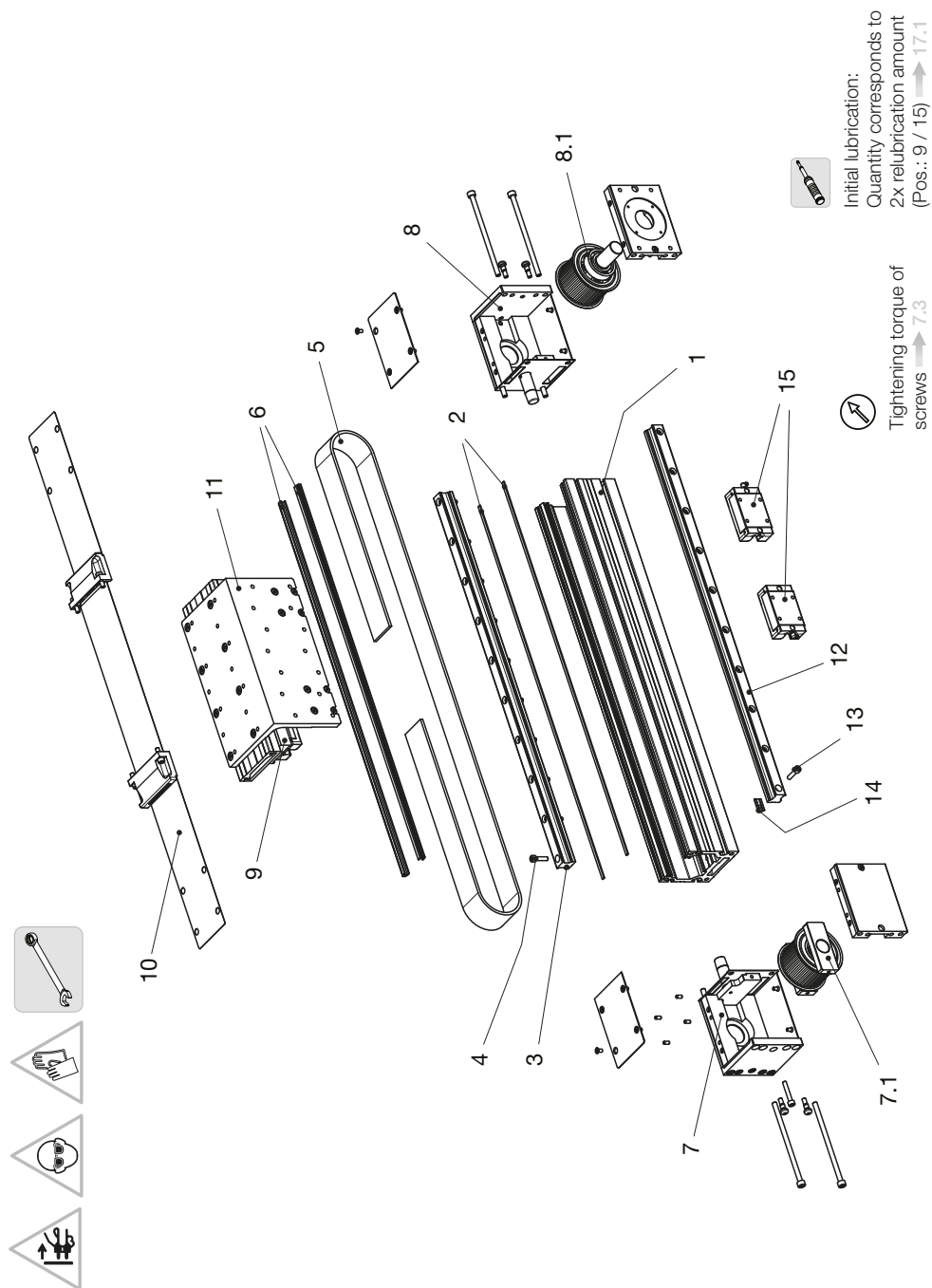
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate → 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	Magnetic tape	9	Carriage
3	Linear rail	10	Complete cover
4	Screw on linear rail	11	Angle to the support rail
5	Toothed belt	12	Support rail
6	Toothed belt guide profile	13	Screw to the support rail
7	Deflection housing	14	Sliding block to the support rail
7.1	Deflection pinion assembly kit	15	Runner block to the support rail
8	Drive housing	16	-



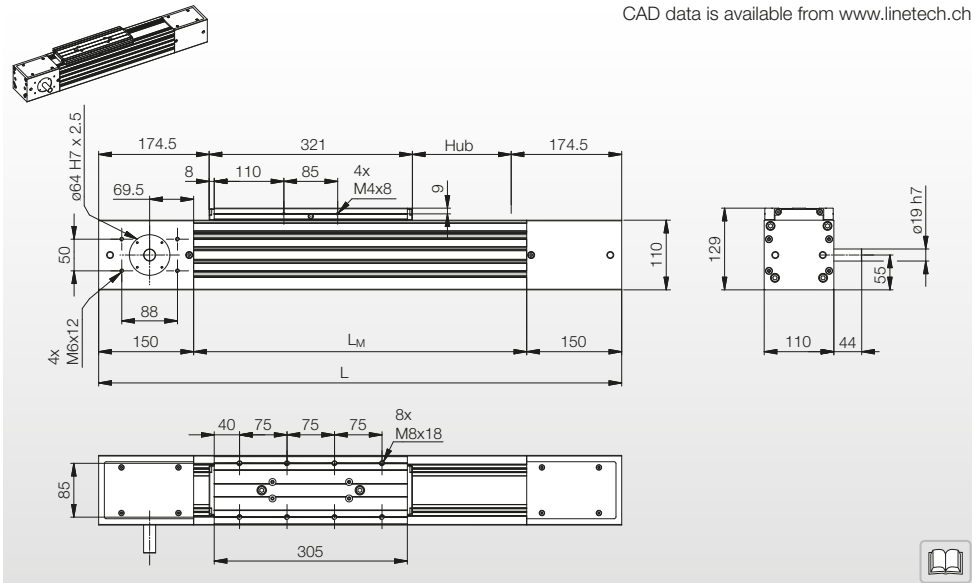
9.8.2 Setup and assembly of the Linear Module (exploded view)



9.9 Abmessungen Linearmodul LM5...NZ...N

with toothed belt drive, without protective strip

CAD data is available from www.linetech.ch



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

9.9.1 Parts list for exploded view

→ 9.9.2



Assembly of attachments according to the corresponding chapters → 11 / 12 / 13

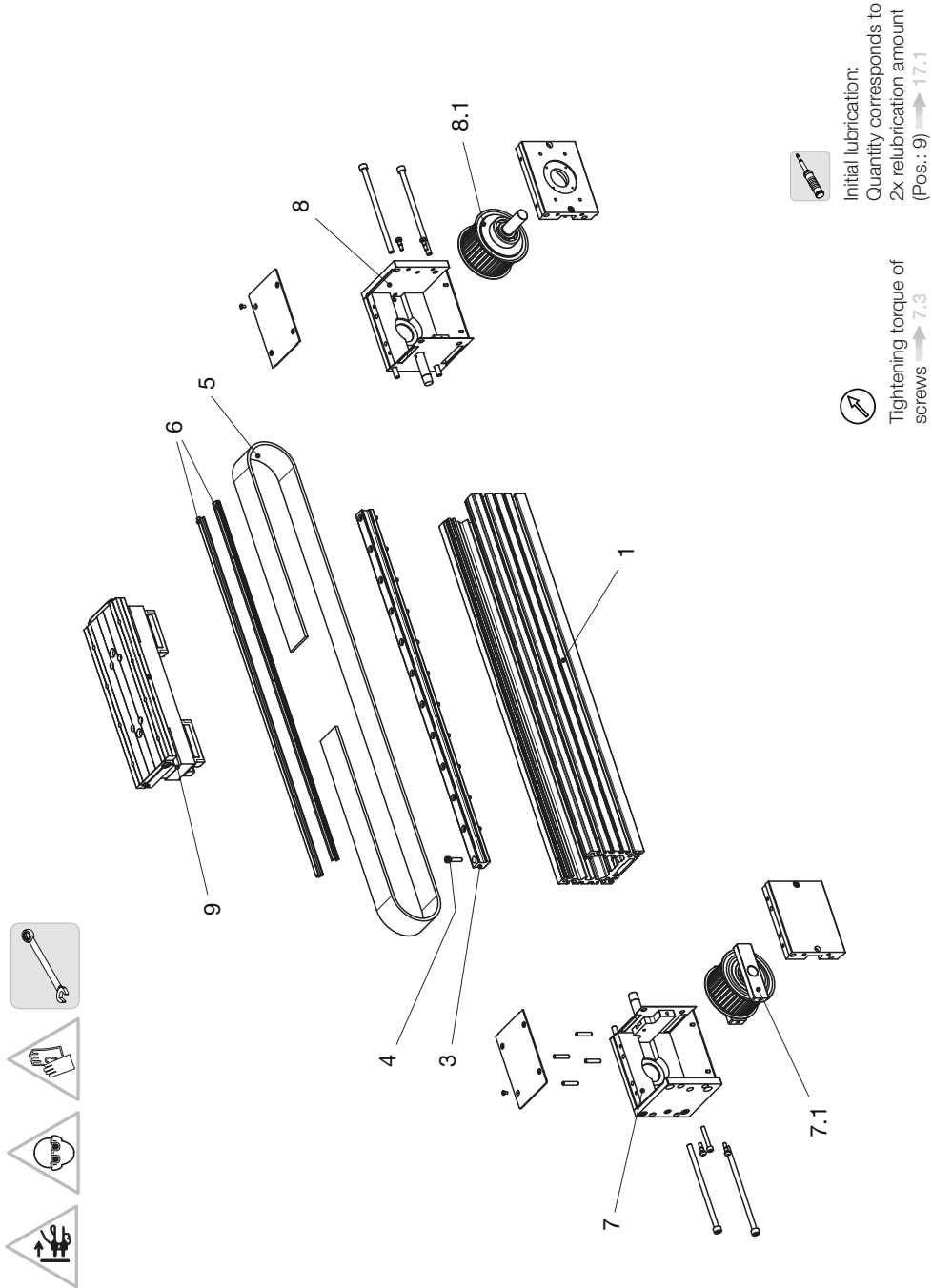
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate → 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	-	9	Carriage
3	Linear rail	10	-
4	Screw on linear rail	11	-
5	Toothed belt	12	-
6	Toothed belt guide profile	13	-
7	Deflection housing	14	-
7.1	Deflection pinion assembly kit	15	-
8	Drive housing	16	-

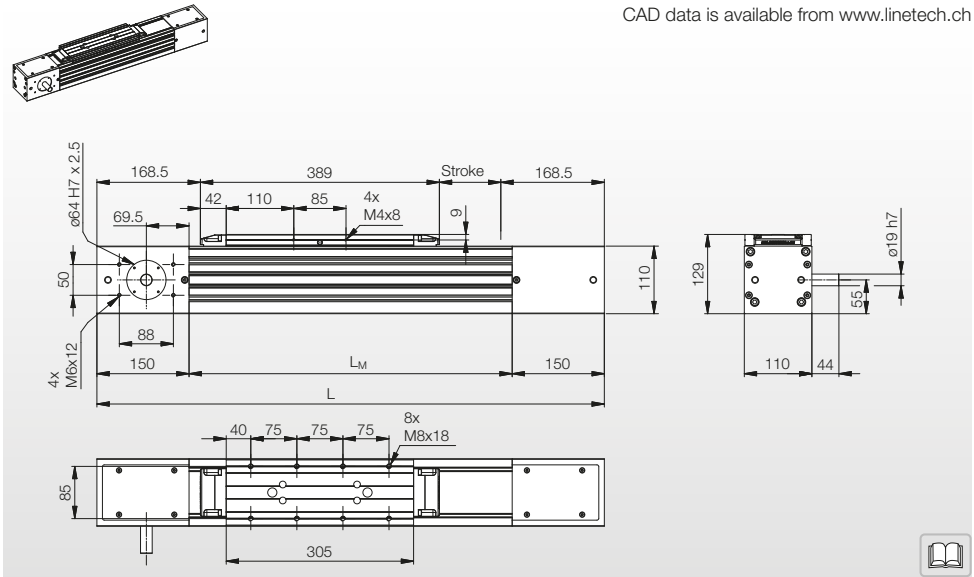


9.9.2 Setup and assembly of the Linear Module (exploded view)



9.10 Dimensions of Linear Module LM5...BZ...N
with toothed belt drive, with cover

CAD data is available from www.linetech.ch



Nominal size	Dimensions				
Designation	L [mm]	L _M [mm]	Belt length [mm]	Length of protective ribbon [mm]	Weight [kg]
LM5...BZ...N	Stroke + 726	L - 300	2x stroke + 1256	L - 14	19.50 kg + 1.50 kg/100 mm stroke

9.10.1 Parts list for exploded view → 9.10.2



Assembly of attachments according to the corresponding chapters → 11 / 12 / 13

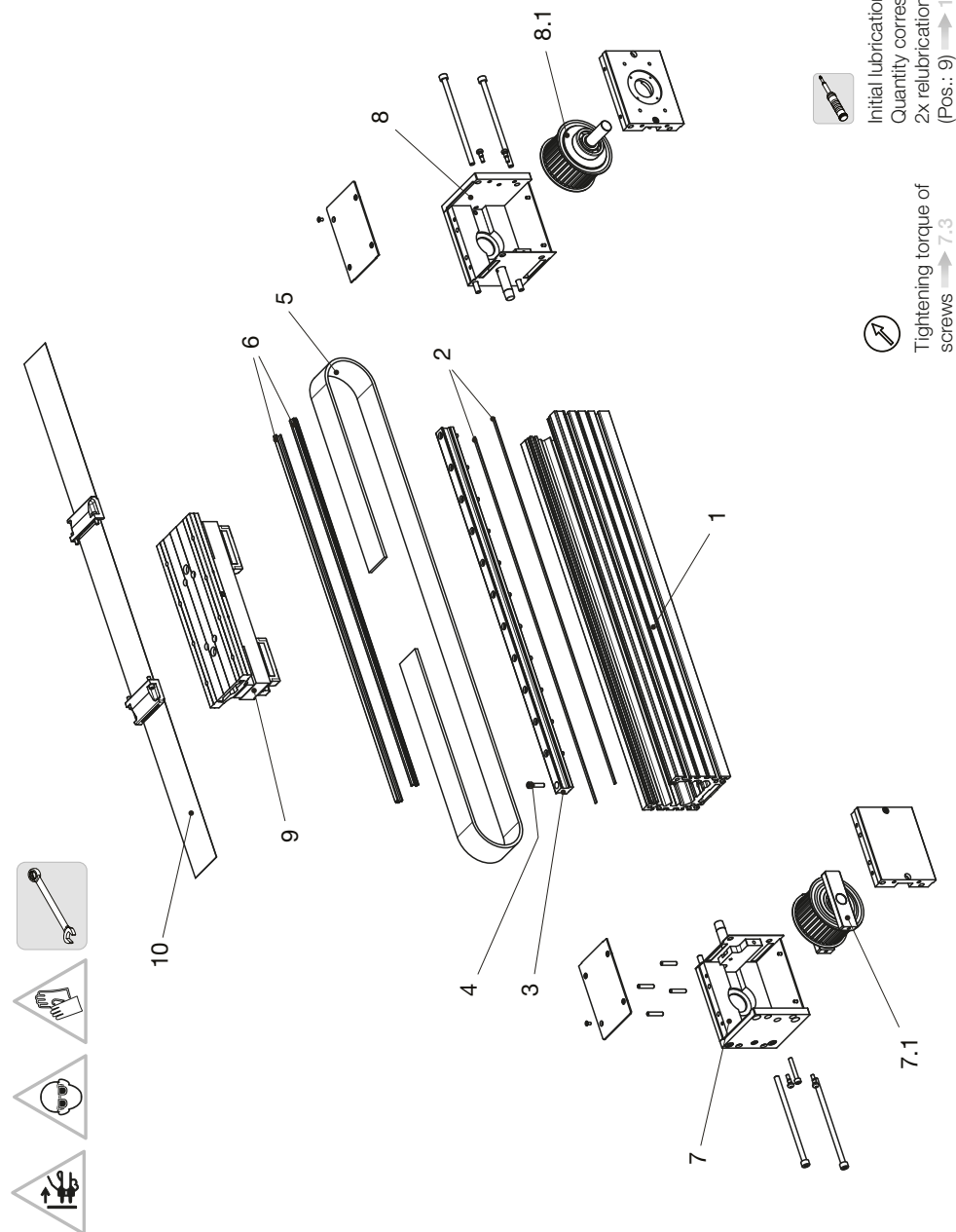
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate → 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	Magnetic tape	9	Carriage
3	Linear rail	10	Complete cover
4	Screw on linear rail	11	-
5	Toothed belt	12	-
6	Toothed belt guide profile	13	-
7	Deflection housing	14	-
7.1	Deflection pinion assembly kit	15	-
8	Drive housing	16	-



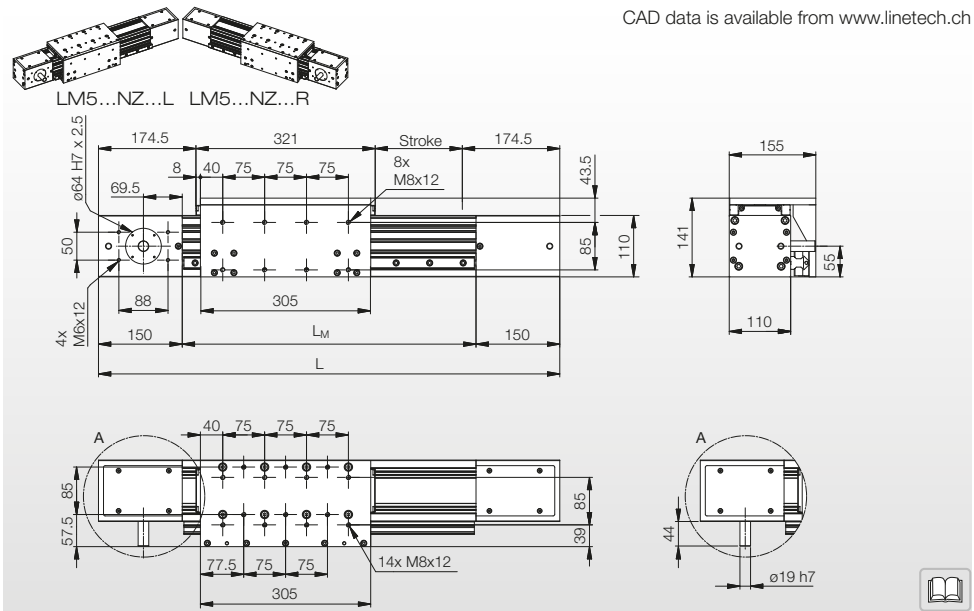
9.10.2 Setup and assembly of the Linear Module (exploded view)



9.11 Dimensions of Linear Module LM5...NZ...L/R

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

CAD data is available from www.linetech.ch



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

9.11.1 Parts list for exploded view

→ 9.11.2



Assembly of attachments according to the corresponding chapters → 11 / 12 / 13

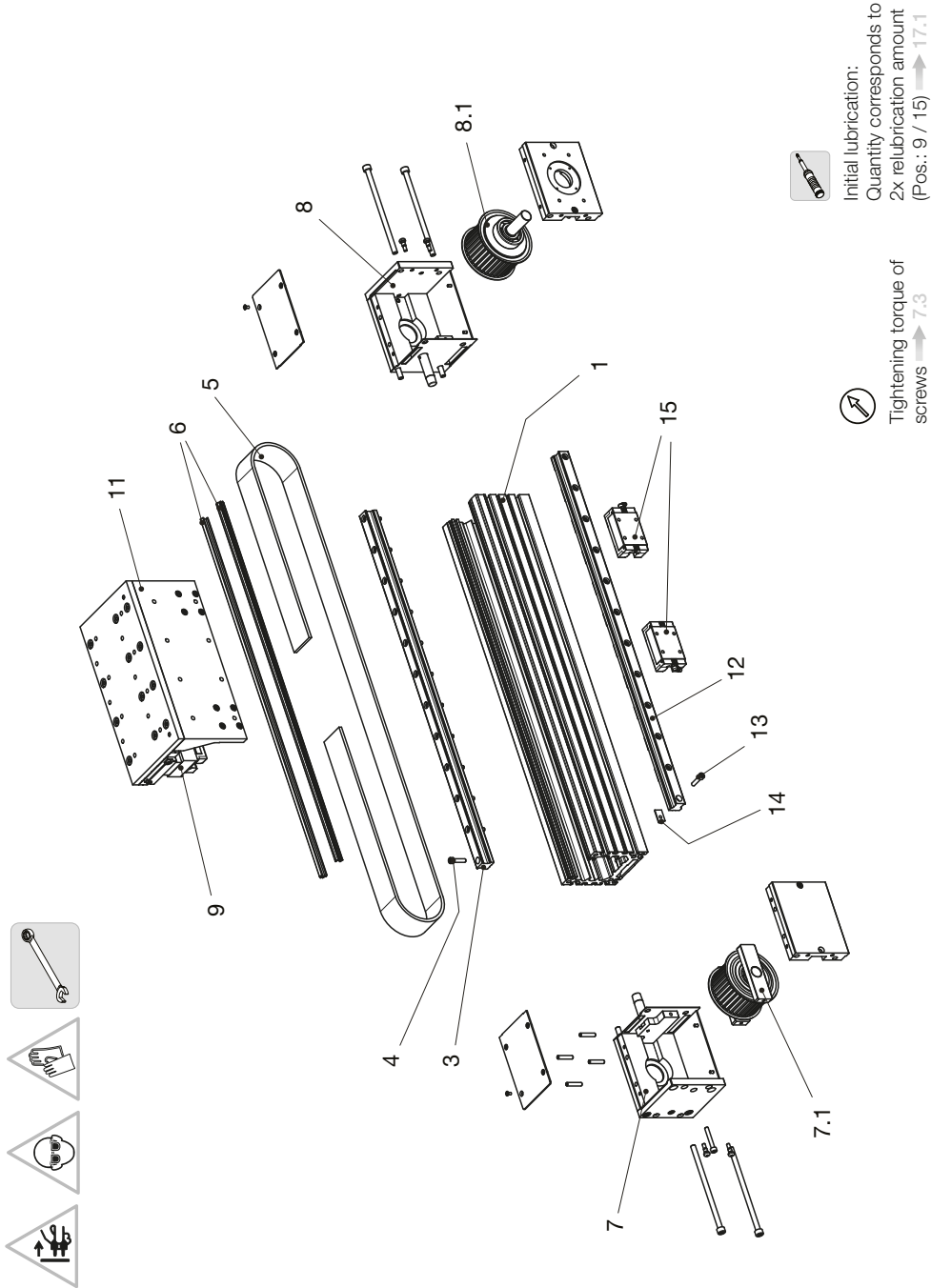
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate → 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	-	9	Carriage
3	Linear rail	10	-
4	Screw on linear rail	11	Angle to the support rail
5	Toothed belt	12	Support rail
6	Toothed belt guide profile	13	Screw to the support rail
7	Deflection housing	14	Sliding block to the support rail
7.1	Deflection pinion assembly kit	15	Runner block to the support rail
8	Drive housing	16	-



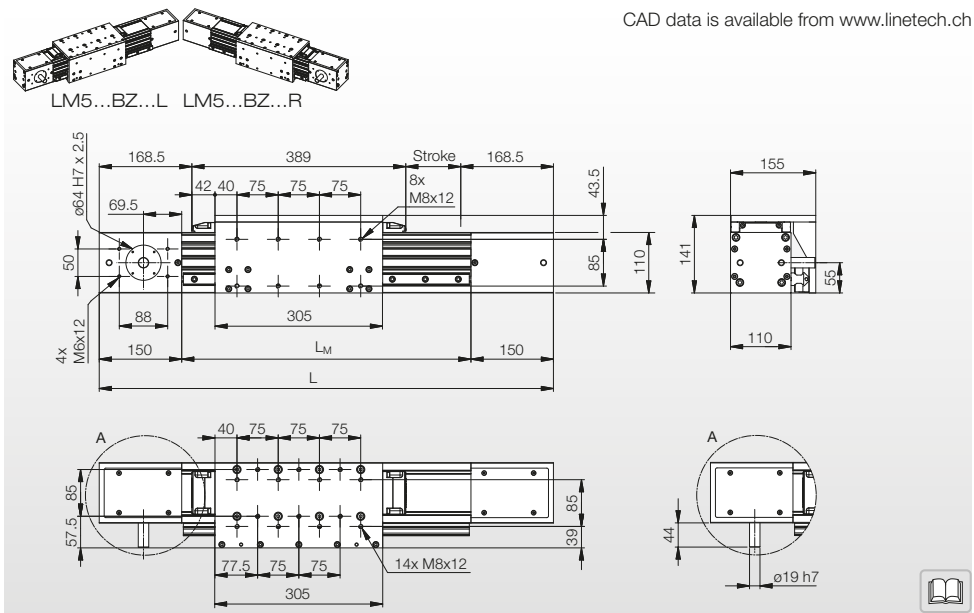
9.11.2 Setup and assembly of the Linear Module (exploded view)



9.12 Dimensions of Linear Module LM5...BZ...L/R

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

CAD data is available from www.linetech.ch



Nominal size	Dimensions				
Designation	L [mm]	L _M [mm]	Belt length [mm]	Length of protective ribbon [mm]	Weight [kg]
LM5...BZ...L/R	Stroke + 726	L – 300	2x stroke + 1256	L - 14	24.38 kg + 1.81 kg/100 mm stroke

9.12.1 Parts list for exploded view

 9.12.2



Assembly of attachments according to the corresponding chapters ➡ 11 / 12 / 13

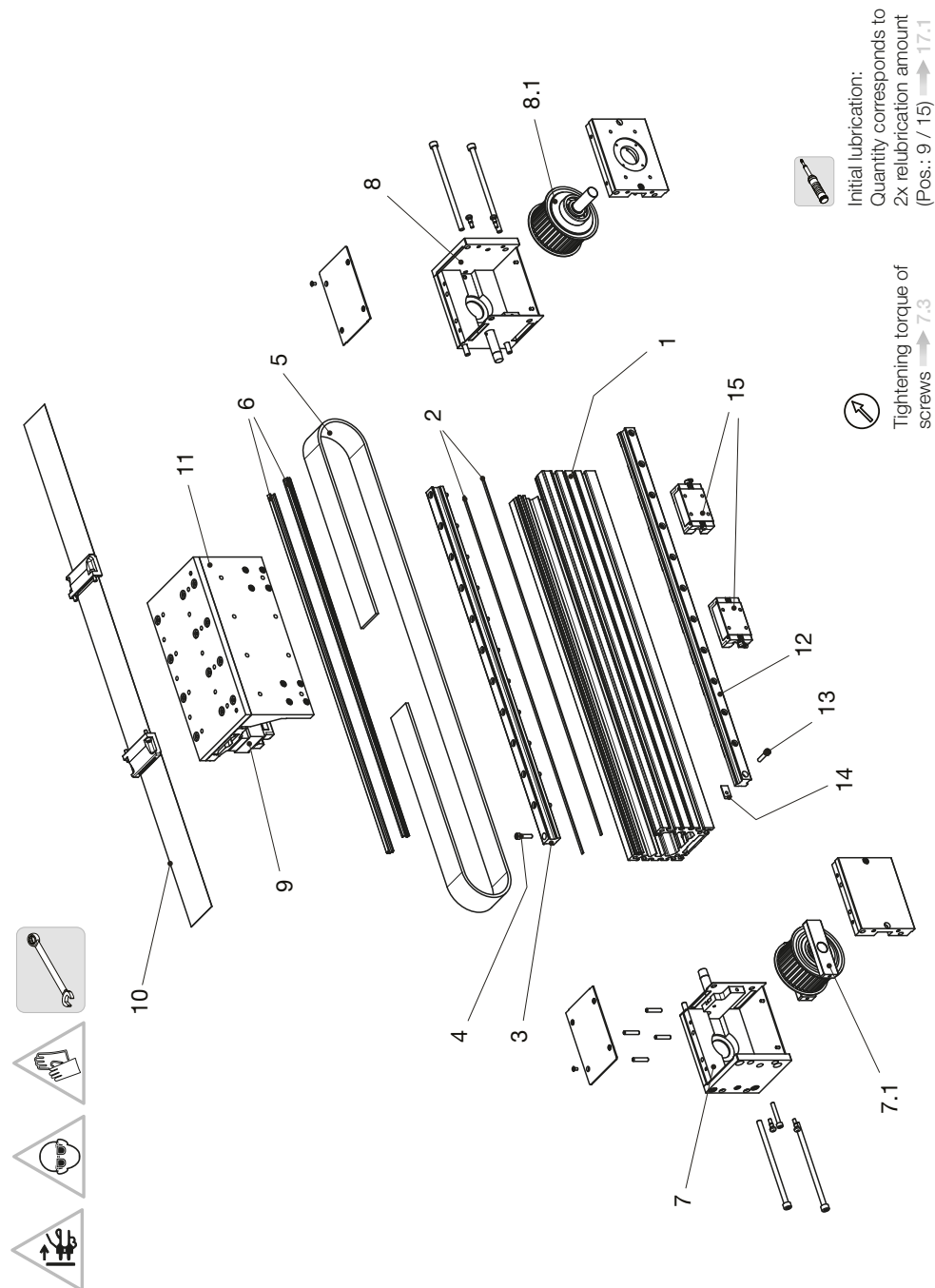
Line Tech AG recommends ordering the superordinate assemblies

Ordering spare parts and accessories requires the information from the nameplate ➡ 7.2

Position	Designation	Position	Designation
1	Base profile	8.1	Drive pinion set assembly kit
2	Magnetic tape	9	Carriage
3	Linear rail	10	Complete cover
4	Screw on linear rail	11	Angle to the support rail
5	Toothed belt	12	Support rail
6	Toothed belt guide profile	13	Screw to the support rail
7	Deflection housing	14	Sliding block to the support rail
7.1	Deflection pinion assembly kit	15	Runner block to the support rail
8	Drive housing	16	-



9.12.2 Setup and assembly of the Linear Module (exploded view)





10. Deflection of Linear Module (LM) with toothed belt drive (ZR)

10.1 Permissible deflection



Permissible deflection with toothed belt drive

Linear Modules may be assembled self-supporting. However, the deflection must be noted in the process, as this limits the possible load.

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'. If this value is exceeded without support, it will affect the service life.

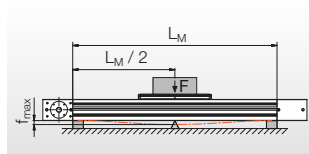
If increased demands are made on system accuracy we recommend supporting the Linear Modules along their entire length.

The following diagrams apply for:

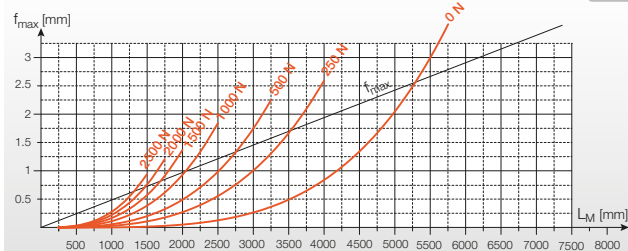
- fixed clamping
(40–50 mm per side)
- 3–4 screws per side
- fixed substructure

Mounting positions:

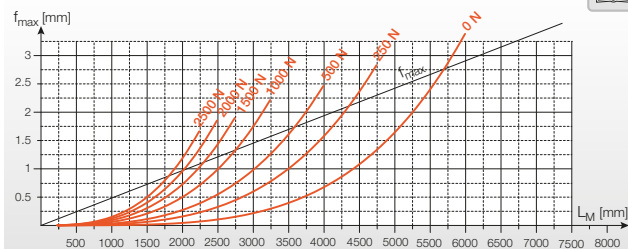
- horizontal



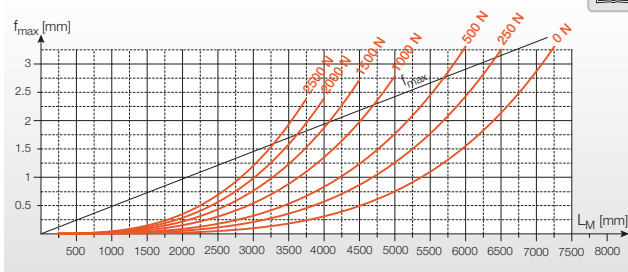
LM3... Z... N or LM3... Z... L/R



LM4... Z... N... or LM4... Z... L/R



LM5... Z... N... or LM5... Z... L/R





Notes

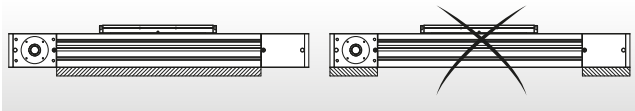
11. Fastening accessories

11.1 Securing the Linear Module with clamps



Caution: The end plates may not be used as supporting elements. Only attach and support the Linear Modules on the base profile, not on the end plates.

The aluminium base profile is the main supporting body of the unit. This must be supported across the entire length if possible.

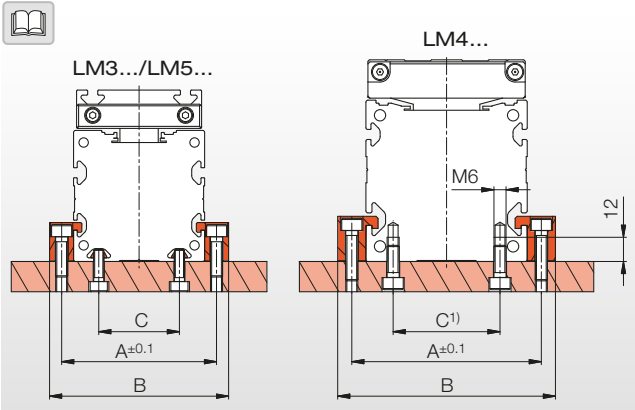


The Linear Modules are secured with clamps or sliding blocks.

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



The screws are to be secured with Loctite. For the recommended tightening torques $M_{A'}$, see → 7.3

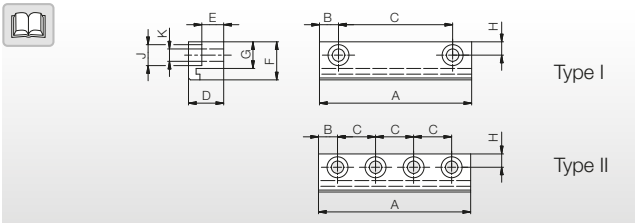


1) possible for size LM4 with planning by LINE TECH during production.

Mounting options

Recommended number of clamps:
- 4 clamps per metre (type I)
- 3 clamps per metre (type II)

The clamps pursuant to the following table can be purchased from LINE TECH AG.



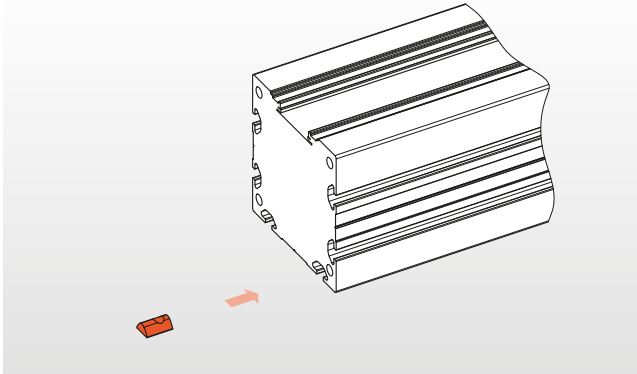
Nominal size	Dimensions [mm]											Weight [kg]	Item no.
	Type	A	B	C	D	E	F	G	H	J	K		
LM3...	I	80	10	 20	19.0	12.0	16	11.9	6	ø11	ø6.5	0.118	P-54376/1
	II	80	10	60	22.0	15.0	20	14.0	7	ø11	ø6.5	0.195	M-40023/1
LM4...	I	108	19	70	25.7	16.7	28	20.0	9	ø15	ø9.0	0.412	M-50158/1
	II	108	19										

11.2 Securing the Linear Module with sliding blocks



Caution:

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



Sliding block types NS5 and NS8 can be used in line with the groove width.

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. The sliding blocks pursuant to the following table can be purchased from LINE TECH AG.

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

Example: NS6 St M5

NS

6

St

M5

Sliding block NS

Groove width

5

6

8

Thread size (Mass "a")

M3 / M4 / M5 / M6 / M8

Material

St = Steel

stainless = stainless



12. Limit switch

12.1 Attachment / assembly / plug connection

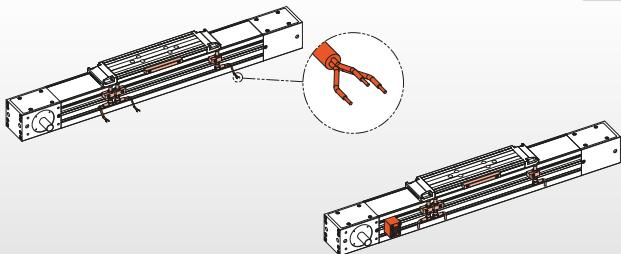


Limit switch preparation

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 AG.

Standard: without connector box (N), with connector cable (L = 2m)



Optional: with connector box (S)

12.2 Limit switches / reference switch mounting overview



Limit switch

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.

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

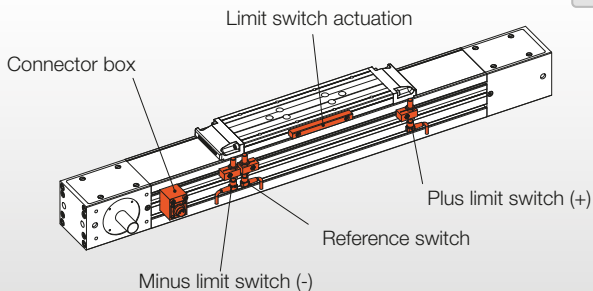
Line Tech AG employs the following standard inductive limit switches:

- PNP normally closed
- Supply: 10...30 V DC
- Current consumption off-load: < 10 mA
- Load mx. 200 mA

On request the following non standard limit switches are available:

- PNP normally open (PNP-NO)
- NPN normally closed (NPN-NC)
- NPN normally open (NPN-NO)
- Reed switches
- Mechanical switches

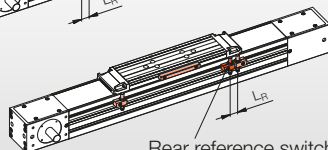
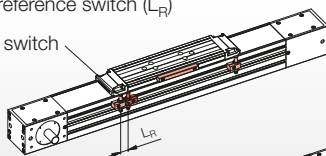
Limit switches / reference switch mounting overview



Position of the reference switch (L_R)



Front reference switch (motor side)



$L_R = 20 \text{ mm}$

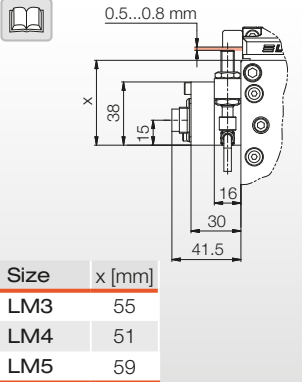
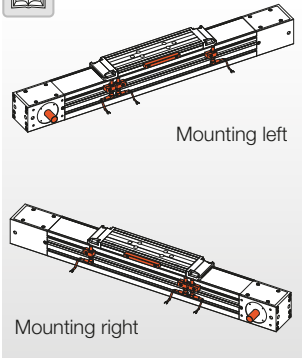
Rear reference switch (motor side)



Fitting position of limit switches

The installation position of the limit switches. is evident from the following images. The reference point can be assigned to the positive (+) or the negative 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 the lateral support rail (type LM...L/R) is selected, the limit switches may only be added to the respective opposite side.



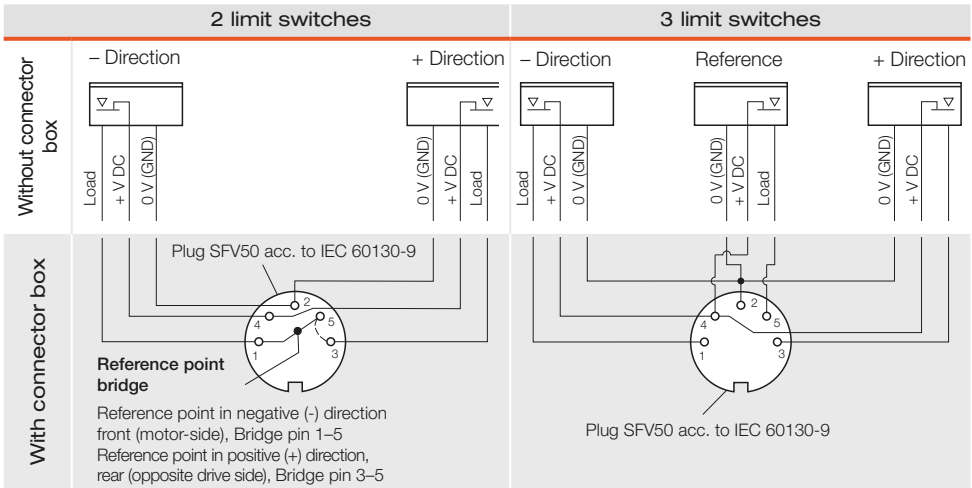
The plug pin assignment when using a connector box is shown in the diagram below.

The individual pins are assigned as follows:

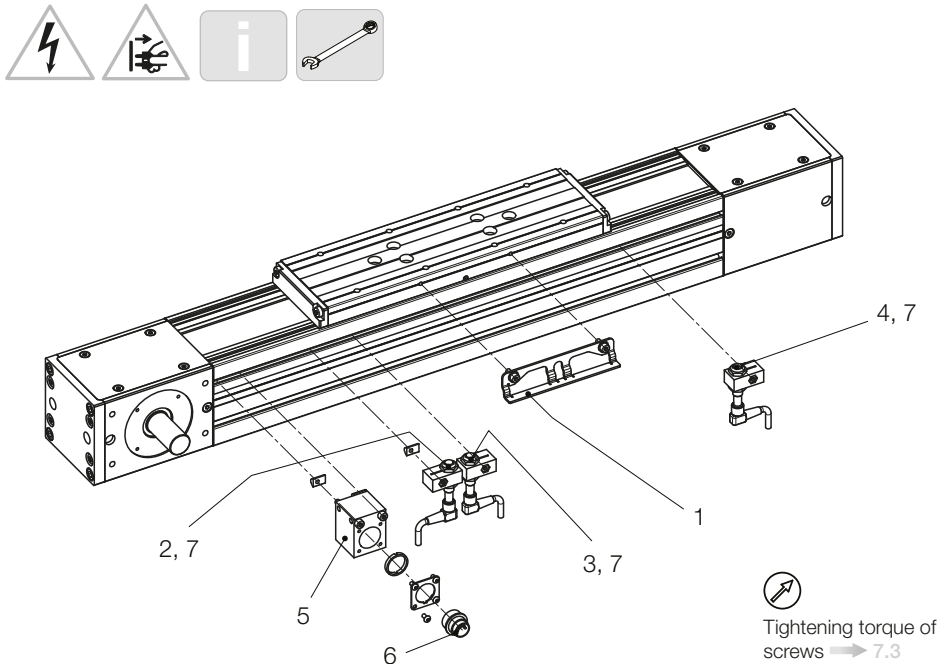
- Pin 1 = negative (-) direction (load)
- Pin 2 = 0 V (GND)
- Pin 3 = Positive (+) direction (load)
- Pin 4 = +10...30 V DC
- Pin 5 = Reference (load)

Colour code key for the diagrams below:

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



12.2.1 Limit switch mounting (exploded view)



12.2.2 Parts list for exploded view ➡ □ 12.2.1



Ordering spare parts and accessories requires the information from the nameplate ➡ 7.2

Position	Designation	Position	Designation
1	Limit switch actuation	5	Connector box
2	Minus limit switch (-)	6	Plug (including nut)
3	Reference switch	7	Limit switch cable (3-pole)
4	Plus limit switch (+)	8	-

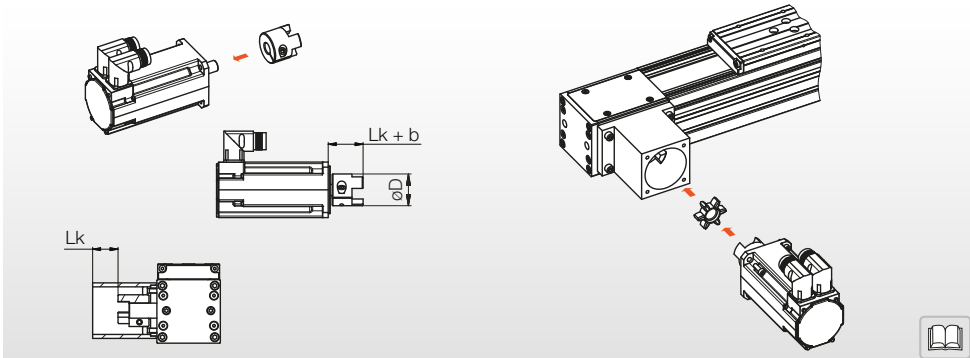


13. Motor and gear mountings

13.1 Straight, with toothed belt drive



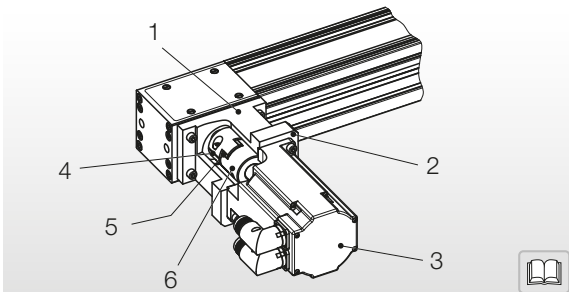
Note the motor manufacturer’s operating instructions prior to mounting a motor



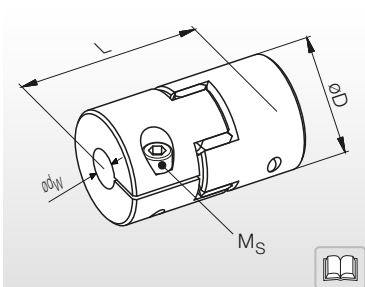
- 1) Measure the spacing of the Lk on the unit
- 2) Attach the clamping hub to the motor mounting in the spacing Lk + b. Tightening torque of the clamping screw → 13.1.2
- 3) Attach the preassembled motor with gear ring to the unit

13.1.1 Motor attachments and parts list, straight with toothed belt drive

Position	Designation
1	Intermediate flange
2	Motor plate
3	Motor
4	“LM” clamping hub
5	Sprocket
6	“Motor” clamping hub



13.1.2 Tightening torque of the clamping screws

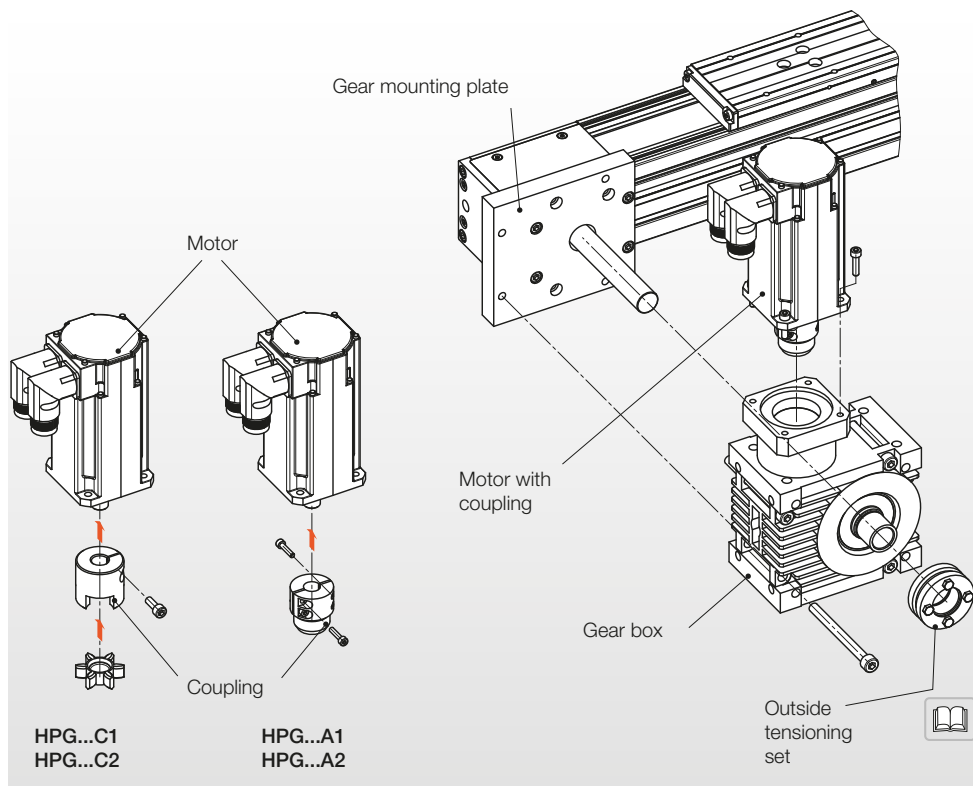


Tightening torque of the clamping screws								
Size	Dimensions				Tightening torque of the clamping screw		Drive torque	
	L	øD	b	ød	Type	M _S	T _N	T _{max}
19	66	40	12	≤20	ISO 4762	10.10	17.0	34
19	66	40	12	≤20	ISO 7380	7.20	17.0	34
24	78	55	14	≤28	ISO 4762	10.10	40.0	120

13.2 Gear mounting HPG ...x1 and HPG...x2



Observe the gear box manufacturer's instructions prior to mounting the gear box!
Note the motor manufacturer's operating instructions prior to mounting a motor!



- 1) Assemble the coupling on the motor
- 2) Assemble the fitted key
- 3) Mount the gear box on the gear mounting plate
- 4) Mount the motor to the gear box with the coupling

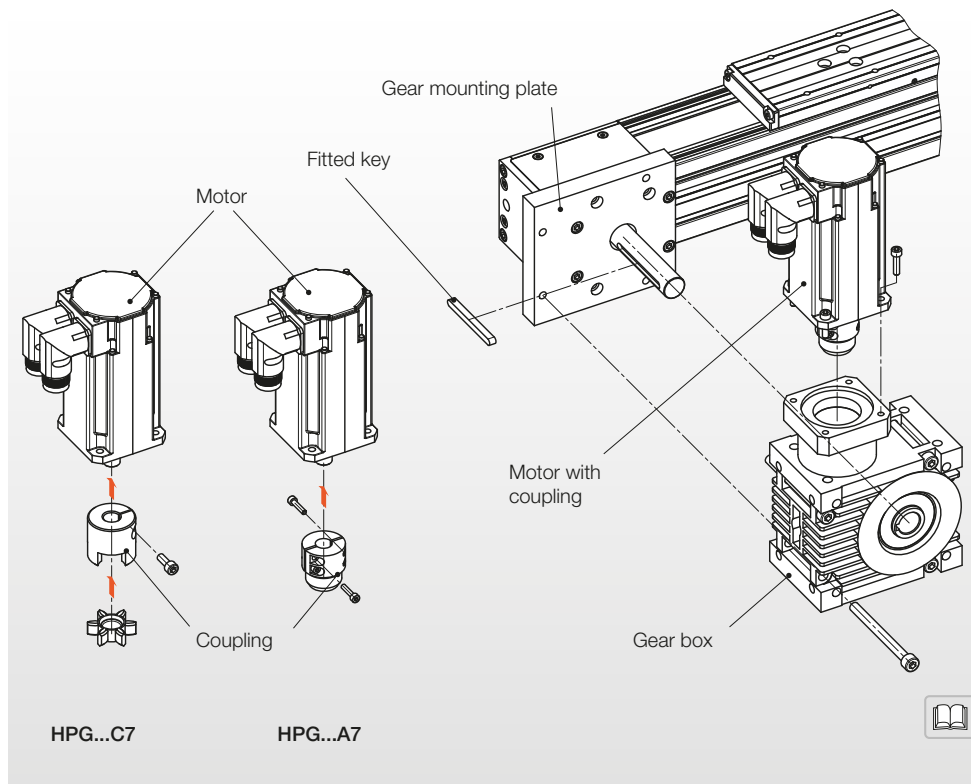
The gear box manufacturer's instructions can be accessed at:
German: <http://www.de.gudel.com/service/produktservice/downloads>



13.3 Gear box mounting HPG ...x7



Observe the gear box manufacturer's instructions prior to mounting the gear box!
Note the motor manufacturer's operating instructions prior to mounting a motor!



- 1) Assemble the coupling on the motor
- 2) Assemble the fitted key
- 3) Mount the gear box on the gear mounting plate
- 4) Mount the motor to the gear box with the coupling

The gear box manufacturer's instructions can be accessed at:
German: <http://www.de.gudel.com/service/produktservice/downloads>



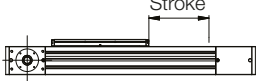
14. Commissioning

14.1 Operating conditions



Contact LINE TECH AG prior to commissioning for application areas with special operating conditions, such as in the presence of moisture, dirt, dust (fibre glass and wood), aggressive atmospheres, extreme climatic conditions and/or extreme temperature fluctuations, short-stroke and others.

Before commissioning the unit, check that the mounting means of the installed axis match the manufacturer’s specifications with respect to the mass and acceleration and that they are secured.

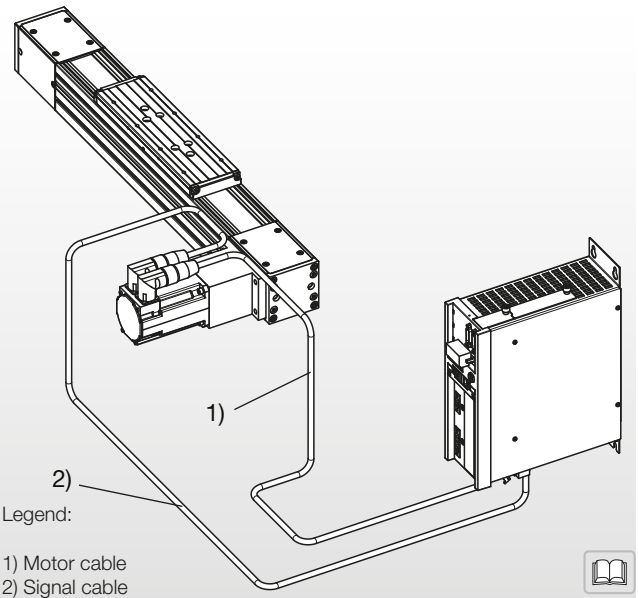
Normal operating conditions		
Ambient temperature	5°C... 80°C	 °C
Movement speed	≤ m/s	
Rotational speed of the drive pinion		
Load		
Minimal stroke	Type	Minimal stroke
	LM3	≥ 45 mm
	LM4	≥ 55 mm
	LM5	≥ 65 mm

14.2 Electrically connect the LM



Observe the safety regulations when working on electrical systems! The AC/DC supply must be connected by a qualified electrician.

Install the power cables and signal cables so that they are spatially separated! Do not install the product near devices that generate strong electromagnetic fields. This could impair the function. Observe the documentation of the controller used.





Check the EMERGENCY OFF switch prior to the first test run! Note the technical data about the Linear Modules with toothed belt drive ➔ 8.2 - 8.4

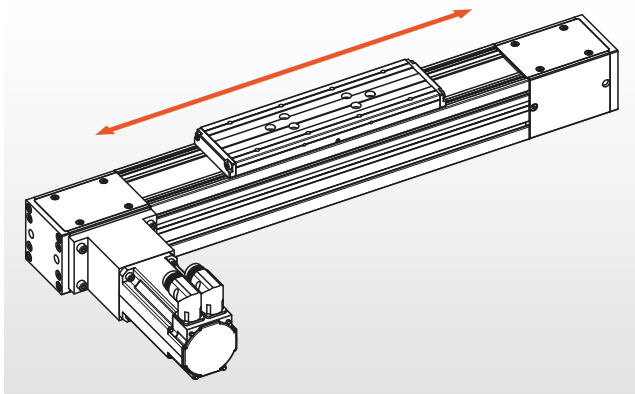
Carry out a trial run only in the installed state combined with linear guides.

Check the internal protective equipment.

Check all screw connections to ensure they are tight.

Carry out the entire stroke at a low speed.

Check the setting and function of the limit switch ➔ 12.2



15. Operation



The Linear Module with toothed belt drive may only be used in accordance with the intended use provided by LINE TECH AG ➔ 2

The Linear Module with toothed belt drive may only be operated under operating conditions that are approved by the manufacturer ➔ 14.1

The Linear Module with toothed belt drive must be checked for externally visible damage and defects. Externally attached mounting means, electrical cables and plug connections must be visually checked to ensure they are in a flawless condition.

If changes occur that put the safety of people and systems at risk, these are to be taken out of operation immediately.

16. Decommissioning



Disconnect the machine/system from the mains supply. To secure the machine from being switched on again without authorisation, actuate the emergency stop and attach the warning sign "Machine/system disconnected from mains supply".

Remove the drive from the unit.

Unscrew the linear unit from the machine/system.

17. Maintenance - Service - Upkeep

17.1 Lubricant Quantities, Lubrication Points, Lubrication Interval



The Linear Modules may only be lubricated with grease.

The initial greasing is performed by LINE TECH AG. The bearings used are usually maintenance-free and do not have to be re-lubricated under normal conditions.

The Linear Modules may only be lubricated with grease. LINE TECH AG recommends MICROLUBE GBU-Y 131 as a standard grease. If using other greases (other brands), the compatibility with the standard grease must be checked first. Observe the safety data sheet.

In the event of special operating conditions, inquire about the lubricant quantities. Values and information about lubricant quantities can be found in the adjacent table, corresponding to use under normal operating conditions ➔ 13.1
There are grease nipples on both sides of the carriage parts. It is sufficient if the amount of grease is pressed in from one side only.

Type	Grease	Grease relubrication	
		Runner blocks (cm ³)	
		Grease point ¹⁾	Grease point ²⁾
LM3	Klüber Microlube GBU-Y 131	3.50	1.75 (per carriage)
LM4		3.50	1.75 (per carriage)
LM5		4.40	2.20 (per carriage)



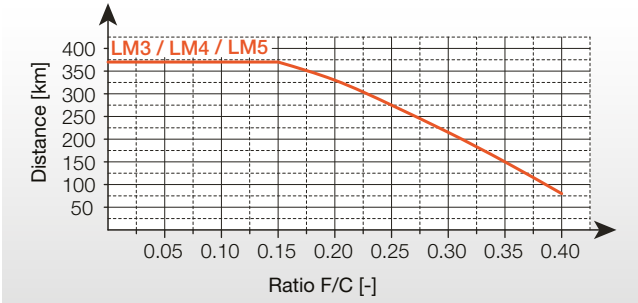
Depending on which value is reached first, the linear guides are to be relubricated according to the adjacent table

Type	Time interval (months)	Running interval (km)
LM3	3 - 6	Depending on the F/C ratio
LM4	3 - 6	Depending on the F/C ratio
LM5	3 - 6	Depending on the F/C ratio

F/C ratio

The F/C ratio results from the customer's calculated load F divided by the corresponding load rating C.

Linear Module	Load ratings
Type	C [N]
LM3...N	18,000
LM3...L/R	36,000
LM4...N	34,200
LM4...L/R	68,400
LM5...N	49,600
LM5...L/R	99,200





Various grease nipples exist on the Linear Modules.

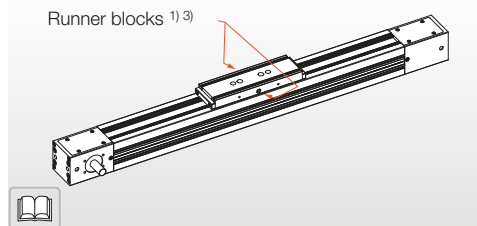
- ¹⁾ Grease nipple according to DIN 3405; The carriage positions for the purposes of lubrication are independent of the stroke.
- ²⁾ Grease nipple according to DIN 71412; The carriage positions for the purposes of lubrication are independent of the stroke.
- ³⁾ Lubrication is possible either from the left or right

For pressing in the lubricant, we recommend the grease gun with the item number: ZPE.GREASEGUN-03

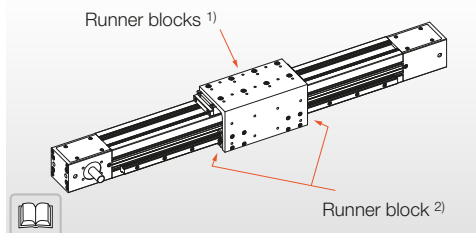
Procedure:

- Lubricate the table part(s)
- Calculate the amount of grease per stroke when lubricating with a hand press
- After the lubrication, remove the excess grease with a clean cloth.

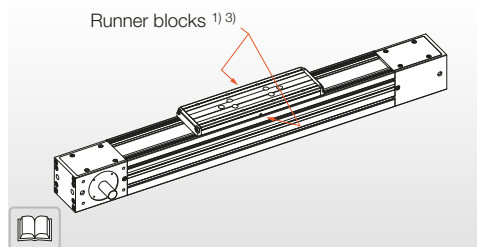
LM3..Z..N



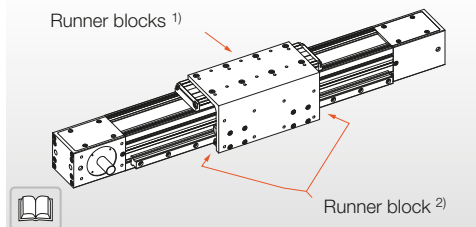
LM3..Z..L/R



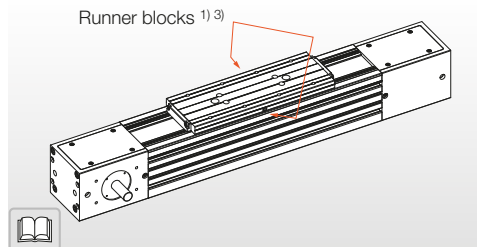
LM4..Z..N



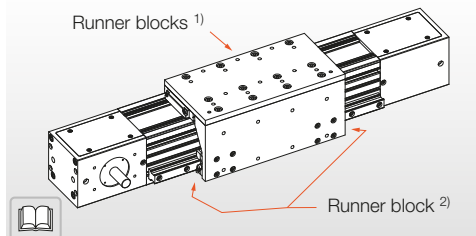
LM4..Z..L/R



LM5..Z..N



LM5..Z..L/R



Linear movements are the backbone of modern, industrial production systems. LINE TECH AG has been involved in linear technology solutions for more than 20 years. A comprehensive range of components as well as linear and positioning systems, combined with the specialist expertise of our employees, is the stand-out benefit of LINE TECH AG.

Matured services, from engineering to design, in conjunction with flexible production, complement the product offering, thereby offering customers a high level of benefit.

In-house products

In-house products from LINE TECH are modular, ready-to-install linear axes:

- Linear Modules
- Bridge Modules
- Compact Units
- Positioning Units

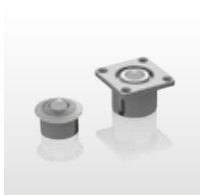
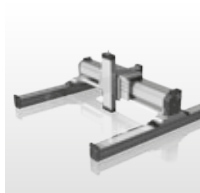
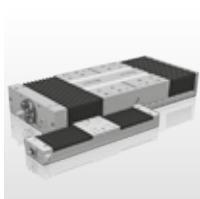
Systems / Assemblies

Our engineering team develops tailor-made solutions in accordance with customer requirements.

Components

Trade products complement the product offering with linear guides, drives and components:

- Linear guides
- Ball screws
- Roller linear guides
- Ball bushings and shafts
- Ball casters
- Extensive range of accessories
- Megatorque motors
- Linear motors



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