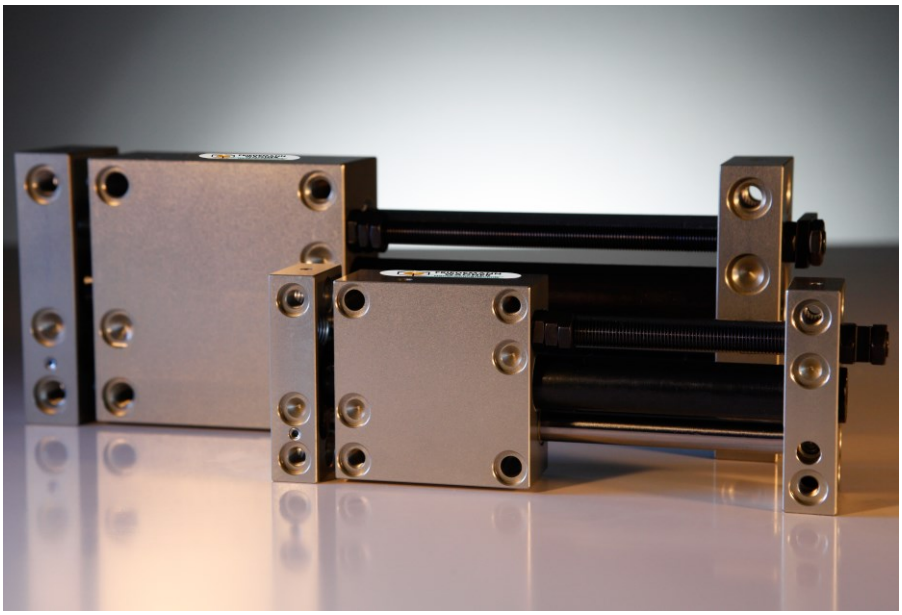
FRIEDEMANN WAGNER
Handhabungstechnik

Installation and Operating Instructions

Linear Unit

Type: LEM; LEK; LE; LES



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Edition 04/2017

Translation of Original Installation and Operating Instructions

NOTICE

Important! – Read carefully before use – Keep for future reference!

The installation and operating instructions are an integral part of the device and must be available to the operating and maintenance personnel at all times. The safety information contained in them must be heeded accordingly.

If the device is resold, these installation and operating instructions must always be delivered with it as well. The latest version is to be found on the Internet at the manufacturer's website: http://www.wagnerautomation.de

Warranty and guarantee conditions:
See chapter 6.1, Warranty and guarantee conditions.

The **warning and safety symbols** are explained in chapters 3.1 and 3.1.1.

Translation
If the device is sold to a country in the EEA, these installation and operating instructions must be translated into the language of the country in which the device is to be used. Should the translated text be unclear, the original installation and operating instructions (German) must be consulted or the manufacturer contacted for clarification.

Copyright

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Dss737 BA_722_Lineareinheit-LE_LEM_LEK_LES-04_08_2016 Druckversion gez_7_2016.doc

1 Contents

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1.4 Declaration of incorporation

Friedemann Wagner GmbH
Robert-Bosch-Straße 5
D-78559 Gosheim / Germany

Declaration of incorporation

pursuant to the

- **EC Machinery Directive 2006/42/EC**
- **EC EMC Directive 2014/30/EU**

We hereby declare that the design of the

Designation: Linear Unit

Type: LEM-X-X-X-X-X-X-P / LEK-X-X-X-X-X-X-P
LE-X-X-X-X-X-X-P / LES-X-X-X-X-X-X-P

as delivered complies with the above directives.
Harmonized DIN EN standards applied pursuant to the Official Journals for the directives:

Directive / Standard	Title
DIN EN ISO 82079-1 :2012	Preparation of instructions for use – Structuring, content and presentation – Part 1: General principles and detailed requirements
2006/42/EC	**EC Directive: Machinery** *effective from 2009-12-29*
DIN EN ISO 12100 :2010	Safety of machinery – General principles for design – Risk assessment and risk reduction

- This declaration only applies to the linear unit in the state in which it was placed on the market.
- The essential health and safety requirements according to Annex I of the Machinery Directive were applied and are fulfilled.
- The following chapters in Annex I of the Machinery Directive 2006/42/EC were considered in the risk assessment:
  1.1.2, 1.1.3, 1.1.5, 1.2.6, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.6, 1.3.7, 1.3.8.2, 1.3.9,
  1.4.1, 1.4.2.1, 1.5.3, 1.5.4, 1.5.9, 1.5.11, 1.5.15, 1.6.1, 1.6.4, 1.7.1, 1.7.2, 1.7.3, 1.7.4.
- The special technical file according to Annex VII B was compiled and will be presented to the competent national authorities in electronic form on demand.
- **The linear unit may not be put into service until the final machinery into which it is incorporated has been declared in conformity with the provisions of the directives.**
- The person authorized to compile the technical documentation is:
  Name: Mr. Andreas Wagner
  Address: Robert-Bosch-Straße 5, D-78559 Gosheim / Germany

Gosheim, April 2017

Authorized Signature
(A. Wagner, Managing Director)

2 Overview and intended use

2.1 Overview of the device

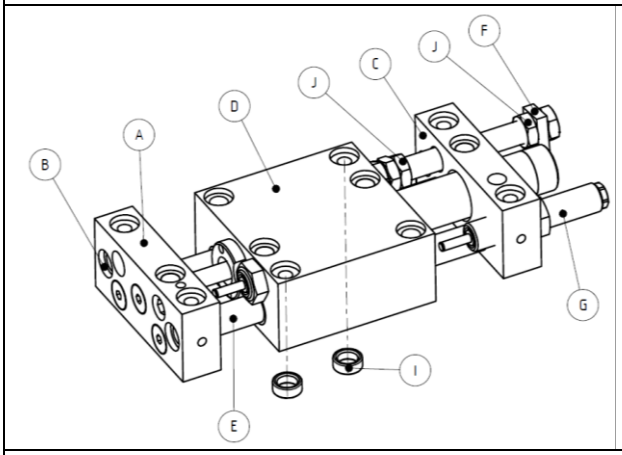
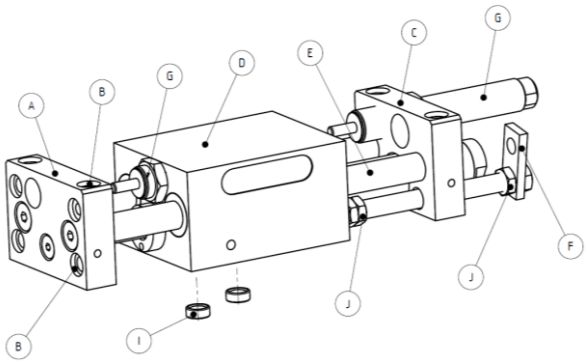
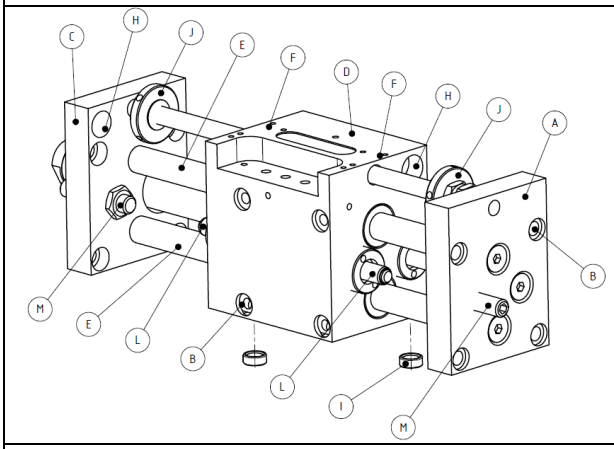
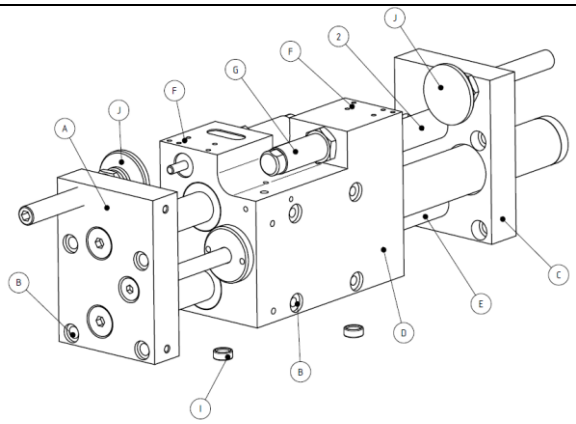
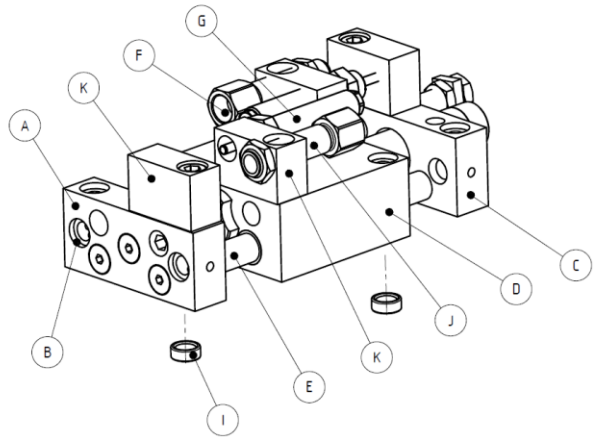
LEM-X	LEK
	
LE	**LES**
	
Special version LEM-X-MS, side stop	**The LEM / LEK / LE / LES linear units consist of the following main components:**
	**(A)** Head plate **(B)** Bores for fastening with centering rings **(C)** End plate **(D)** Guide head **(E)** Guide shafts **(F)** Mount for proximity switch **(G)** Hydraulic shock absorber **(H)** Threaded bore for shock absorber **(I)** Centering rings **(J)** Stops/Stroke adjustment **(K)** External stops in LEM-6-SA **(L)** Pneumatic shock absorber **(M)** Stop screw for pneumatic shock absorber

Fig. 2-1 Diagram of the parts of the linear unit

2.2 Intended use

The linear units were developed to move components or superstructures a defined distance horizontally or vertically. They are suitable for positioning in assembly work or processing of components.

This device was developed, designed and built exclusively for industrial and light-industrial use. Private use is prohibited.

DANGER

This device is intended solely for the purpose described above. Any other use or modification of the device without the written consent of the manufacturer is deemed improper.
Modification without written agreement will lead to ***serious to deadly injuries****.*
The manufacturer accepts no liability for resultant damage. The risk is borne solely by the operator. The device may only be put into operation when it has been ensured that all safety devices have been installed and are fully functional.

Proper use of the device in accordance with its intended purpose includes compliance with the manufacturer's instruction handbooks and operating manuals and performance of all specified maintenance and service work.

Foreseeable misuse:

NOTICE

Products that could form explosive dust/air or gas/air mixtures may not be processed in critical concentrations (above LEL)!
The device does not fulfil any EX requirements and may therefore also not be installed and operated in ATEX zones!
**) LEL = Lower Explosive Limit*

The device is not suitable for use in machining operations, especially of aluminum, titanium and magnesium, as, depending on product compositions, particle sizes, chip sizes and distribution of quantities, potentially explosive atmospheres can result. The final decision on use lies in the end user's judgment.

2.2.1 Product identification

The type key is laser-engraved on the connection side of the linear unit. The following table explains the type key:

Module	Design size	Version	Stroke	Shock absorber	Energy feedthrough	Drive
LEM	6	M MA MS	30 60 90	K H	0--0	-P
LEK	6	K KA	55 115 175	K H	0--0	-P
LE	6	N Z	100 200 300	K* H P	0--0	-P
LES	6	S SA	100 200 300 400	H	0--0	-P
LEM	9	M MA MS	50 110 170	K H	0--0	-P
LE	9	N Z	100 200 300 400	K* H P	0--0	-P
LES	9	S SA	100 200 300 400 500	H	0--0	-P
LE linear units		**A** with cover **K=**compact **M= m**ini **MS=**mini + stop at side **N=**normal **S=**heavy **Z=**2nd cylinder		**K** unavailable **H** hydraulic **P** pneumatic **K*** together with version Z	**0-** pneumatic **-0** electric	**-P** pneumatic

2.2.2 Incorporation information (for the partly completed machinery) for the constructor of the final machinery

- Control is effected via a 4/2 or 5/2 directional-control valve (not included in the delivery).
- The threaded bores and centering rings enable easy mounting.
- The speed can be adjusted freely with an external exhaust regulator (not included in the delivery).
- There are external stop systems available for linear units of the type LEM-6 and LEM-9. If the spatial installation situation is not critical and a cover is not needed, these external stops facilitate installation and use of the system.

After considering the above points, the integrator of the final machinery can put this device into service as a safe device.

He must supply overall instructions for use and a declaration of conformity for the complete machinery and affix a type plate with CE marking to the machinery. The responsibility for the risk assessment for the complete machinery lies internally with the integrator.

2.3 Technical data

2.3.1 Dimensions and weight

	LEM-6-M	LEM-6-MS	LEM-6-MA	LEK-6-K	LEK-6KA	LE-6-N	LE-6-Z
Guide	Plain bearing bushing			Linear bushing, sealed		Linear bushing, sealed	
Design	M= mini, for small installation spaces			Compact		Normal	
Stop	At end plate	Side	At end plate	At end plate		At guide head via spindle	
Cover	○	-	●	○	●	-	-
Stroke lengths [mm]	30/60/90			55/115/175		100/200/300	
Adjustment range [mm] Type	Complete way			Complete way		Complete way	
Repeatability [mm]	±0.05	±0.03	±0.05	±0.03		±0.02	
Push force at 6 bar [N]	45			95		80	160
Retraction force at 6 bar [N]	33			80		45	90
Shock absorbers unavailable	Load-dependent			Load-dependent		Load-dependent	
Shock absorbers hydraulic	○			○		○	○
Shock absorbers pneumatic	-			-		●	-
Cylinder Ø [mm]	12			16		16	
2nd cylinder	-			-		-	●
Drive	Compressed air (4-8 bar), constant, filtered (10 µm) and dry						
Connection	M5			M5/G1/8		M5/G1/8	
Control	4/2; 5/2 directional-control valve, bistable						
Housing material	High strength aluminum, anodized						
Stop system material	Steel						
Sideways stop system material		Hardened steel					

	LES-6-S	LES-6-SA	LEM-9-M	LEM-9-MS	LEM-9-MA
Guide	Super linear bushing, sealed		Linear bushing, sealed		
Design	Heavy		Mini		
Stop	At guide head by stop screws		At end plate	Side	At end plate
Cover	○	●	○	-	●
Stroke lengths [mm]	100/200 300/400	100/200 300/385*	50/110/170		
Adjustment range [mm] Type	50 mm both sides		Complete way		
Repeatability [mm]	±0.02		±0.03	±0.02	±0.03
Push force at 6 bar [N]	150		135		
Retraction force at 6 bar [N]	125		110		
Shock absorbers unavailable	-		Load-dependent		
Shock absorbers hydraulic	●		○		
Shock absorbers pneumatic	-		-	-	-
Cylinder Ø [mm]	20		20		
2nd cylinder	-		-	-	-
Drive	Compressed air (4-8 bar), constant, filtered (10 µm) and dry				
Connection	M5		M5		
Control	4/2; 5/2 directional-control valve, bistable				
Housing material	High strength aluminum, anodized				
Stop system material	Steel				
Sideways stop system material				Hardened steel	

* Restricted stroke due to gaiter

○ Option /● Included in delivery

Linear Unit Type: LEM; LEK; LE; LES

	LE-9-N	LE-9-Z	LES-9-S	LES-9-SA
Guide	Linear bushing, sealed		Super linear bushing, sealed	
Design	Normal		Heavy	
Stop	At guide head by spindle		At guide head by stop screws	
Cover	○	○	○	●
Stroke lengths [mm]	100/200/300/400		100/200/300 400/500	100/200/300 400/489*
Adjustment range [mm] Type	Complete way		50 mm both sides	
Repeatability [mm]	±0.02		±0.02	
Push force at 6 bar [N]	220	440	380	
Retraction force at 6 bar [N]	170	340	340	
Shock absorbers unavailable	Load-dependent		-	
Shock absorbers hydraulic	○	○	●	
Shock absorbers pneumatic	●	-	-	
Cylinder Ø [mm]	25		32	
2nd cylinder	-	●	-	
Drive	Compressed air (4-8 bar), constant, filtered (10 µm) and dry			
Connection	G1/8			
Control	4/2; 5/2 directional-control valve, bistable			
Housing material	High strength aluminum, anodized			
Stop system material	Steel			
Sideways stop system material				

* Restricted stroke due to gaiter

○ Option /● Included in delivery

Module	LEM-6-M LEM-6-SM LEM-6-MA			LEK-6-K LEK-6-KA			LE-6-N			LE-6-Z		
Stroke length [mm]	30	60	90	55	115	175	100	200	300	100	200	300
Weight [kg]	0.64	0.68	0.72	1.08	1.28	1.48	1.9	2.0	2.1	1.9	2.0	2.1
Air consumption double stroke [cm^3]	6.8	13.6	20.4	22.1	46.2	70.4	40.2	80.4	121	80.4	160.8	242
Max. payload [kg]	4	3	2	6	4.5	3.2	5	2.8	2	5	2.8	2.0

Module	LES-6-S LES-6-SA				LEM-9-M LEM-9-MA LEM-9-MS				LE-9-N				LE-9-Z		
Stroke length [mm]	100	200	300	400	55	110	170	100	200	300	400	100	200	300	400
Weight [kg]	3.4	3.8	4.3	5.1	1.65	1.86	2.1	4.7	5.4	6.2	6.9	4.7	5.4	6.2	6.9
Air consumption double stroke [cm3]	63	126	189	252	31.4	69.1	107	98	196	295	393	196	392	590	786
Max. payload [kg]	18.5	11	8	6	7.2	5.2	3.7	18	10	8	6	18	10	8	6

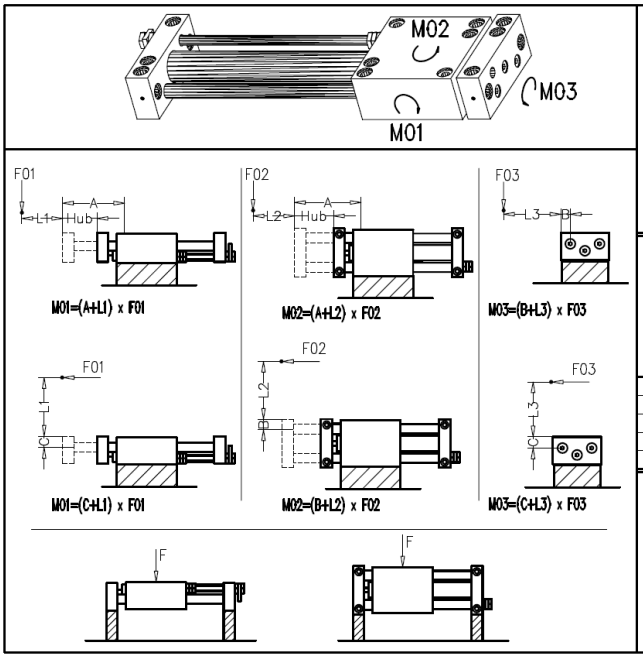
Module	LES-9-S LES-9-SA				
Stroke length [mm]	100	200	300	400	500
Weight [kg]	9.2	10.3	11.4	12.5	13.6
Air consumption double stroke [cm3]	161	322	483	644	805
Max. payload [kg]	70	42	30.5	24	19.5

2.3.2 Environmental conditions

- Operation only in closed rooms and low-vibration environments (no potentially explosive or condensing atmospheres).
- No operation in environments with spray water, vapors, process dusts or abrasion dusts.
- Linear units with proximity switches should not be used in areas with static discharges, high-frequency oscillations or strong magnetic fields. Otherwise it can happen that the proximity switches for recognition of the end positions deliver wrong signals.
- The linear units are only suitable for use in environments with spray water to a limited extent. It might be necessary to protect them against ingressing spray water with a suitable cover.

2.3.3 Characteristics and allowable loads

LEM-6



Linereinheit LEM-6-..-30/60/90

Zulässige Belastungen statisch/dynamisch
Allowable loads static/dynamic

M01zul [Nm]	M02zul [Nm]	M03zul [Nm]	$C_{st/dyn}$ [N]	A [mm]	B [mm]	C [mm]
17/5,2	17/5,2	9,5/3,2	168/50	25+Hub	17	7

Lebensdauerberechnung mit Momenten
Lifetime calculation with moments

$$L=\left(\frac{M_{zul.}}{M_{eff}}\right)^3 \times 10^5$$

Lebensdauerberechnung mit Kräften
Lifetime calculation with forces

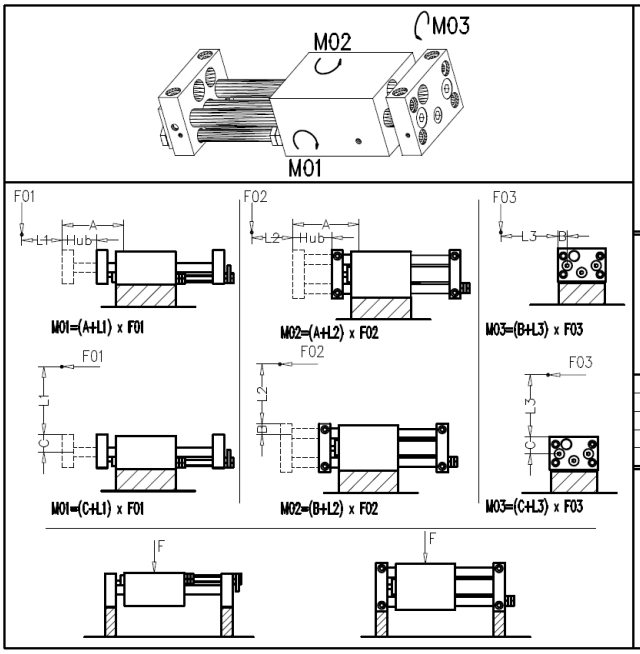
$$L=\left(\frac{C}{F}\right)^3 \times 10^5$$

L	Lebensdauer [m]	lifetime [m]
M_{zul}	zulässiges Moment [Nm]	allowable moment [Nm]
M_{eff}	effektives (benötigtes) Moment [Nm]	effective (needed) moment [Nm]
C	dynamische Tragzahl [N]	dynamic load rating [N]
F	dynamische Belastung [N]	dynamic load force [N]

Bei kombinierten Belastungen muss folgende Gleichung erfüllt sein:
In combined loads situations the next equation must be met:

$$\frac{M01_{eff}}{M01_{zul}}+\frac{M02_{eff}}{M02_{zul}}+\frac{M03_{eff}}{M03_{zul}} \leq 1$$

LEK-6



Linereinheit LEK-6-..-50/110/170

Zulässige Belastungen statisch/dynamisch
Allowable loads static/dynamic

M01zul [Nm]	M02zul [Nm]	M03zul [Nm]	$C_{st/dyn}$ [N]	A [mm]	B [mm]	C [mm]
34/47	34/47	26/36	1364/1897	40+Hub	12.5	21

Lebensdauerberechnung mit Momenten
Lifetime calculation with moments

$$L=\left(\frac{M_{zul.}}{M_{eff}}\right)^3 \times 10^5$$

Lebensdauerberechnung mit Kräften
Lifetime calculation with forces

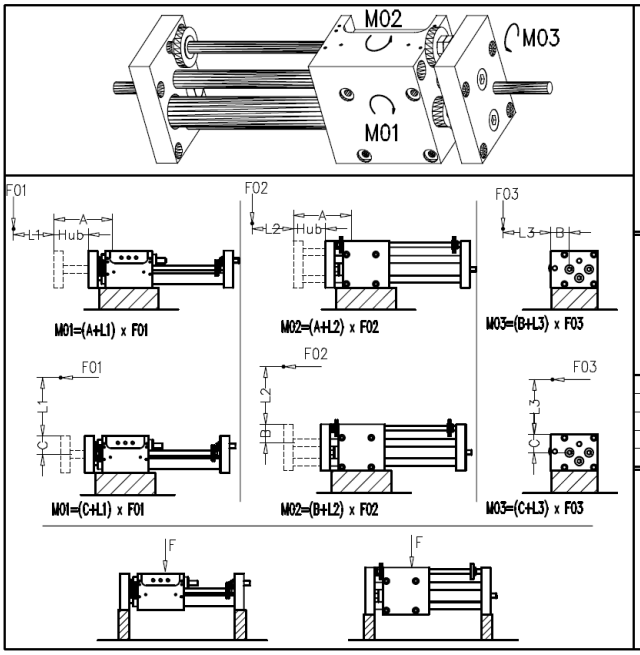
$$L=\left(\frac{C}{F}\right)^3 \times 10^5$$

L	Lebensdauer [m]	lifetime [m]
M_{zul}	zulässiges Moment [Nm]	allowable moment [Nm]
M_{eff}	effektives (benötigtes) Moment [Nm]	effective (needed) moment [Nm]
C	dynamische Tragzahl [N]	dynamic load rating [N]
F	dynamische Belastung [N]	dynamic load force [N]

Bei kombinierten Belastungen muss folgende Gleichung erfüllt sein:
In combined loads situations the next equation must be met:

$$\frac{M01_{eff}}{M01_{zul}}+\frac{M02_{eff}}{M02_{zul}}+\frac{M03_{eff}}{M03_{zul}} \leq 1$$

LE-6



Linear unit LE-6-..-100/200/300

Zulässige Belastungen statisch/dynamisch
Allowable loads static/dynamic

M01zul [Nm]	M02zul [Nm]	M03zul [Nm]	$C_{st/dyn}$ [N]	A [mm]	B [mm]	C [mm]
32/45	32/45	21/30	1364/1897	42+Hub	30	30

Lebensdauerberechnung mit Momenten
Lifetime calculation with moments

$$L=\left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

Lebensdauerberechnung mit Kräften
Lifetime calculation with forces

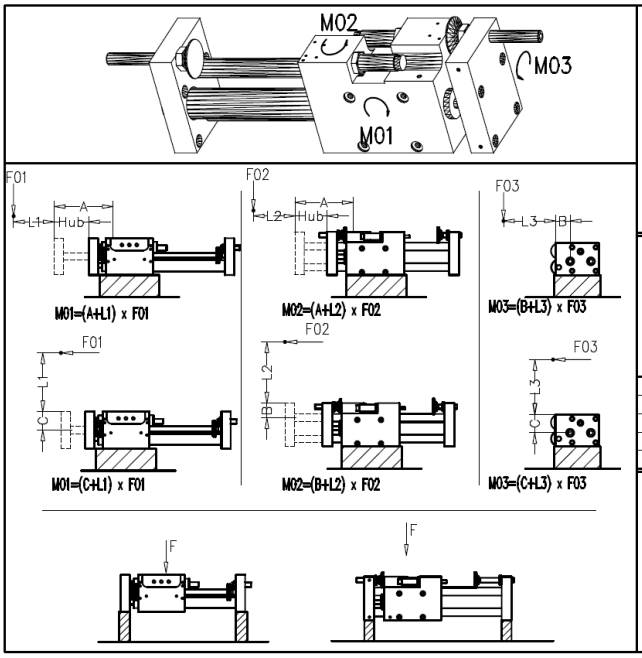
$$L=\left(\frac{C}{F}\right)^3 \times 10^5$$

L	Lebensdauer [m]	lifetime [m]
M_{zul}	zulässiges Moment [Nm]	allowable moment [Nm]
M_{eff}	effektives (benötigtes) Moment [Nm]	effective (needed) moment [Nm]
C	dynamische Tragzahl [N]	dynamic load rating [N]
F	dynamische Belastung [N]	dynamic load force [N]

Bei kombinierten Belastungen muss folgende Gleichung erfüllt sein:
In combined loads situations the next equation must be met:

$$\frac{M01_{eff}}{M01_{zul}}+\frac{M02_{eff}}{M02_{zul}}+\frac{M03_{eff}}{M03_{zul}} \leq 1$$

LES-6



Linear unit LES-6-..-100/200/300/400

Zulässige Belastungen statisch/dynamisch
Allowable loads static/dynamic

M01zul [Nm]	M02zul [Nm]	M03zul [Nm]	$C_{st/dyn}$ [N]	A [mm]	B [mm]	C [mm]
67/95	67/95	36/51	1721/2443	56+Hub	30	37

Lebensdauerberechnung mit Momenten
Lifetime calculation with moments

$$L=\left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^5$$

Lebensdauerberechnung mit Kräften
Lifetime calculation with forces

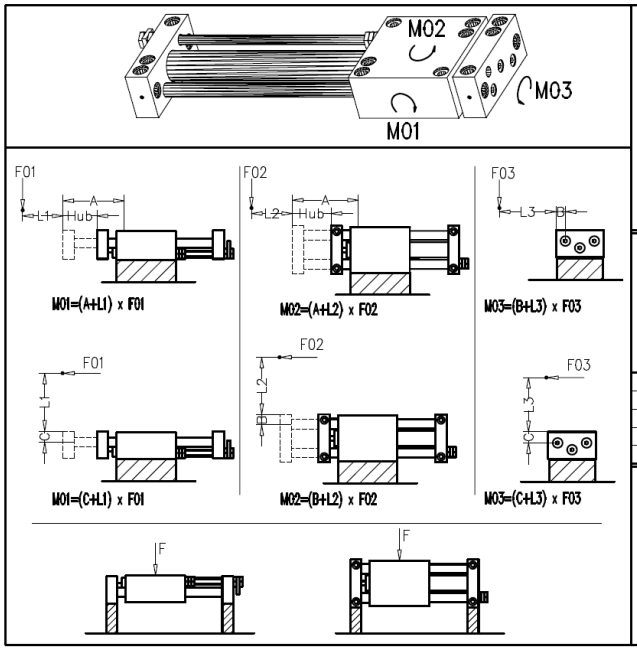
$$L=\left(\frac{C}{F}\right)^3 \times 10^5$$

L	Lebensdauer [m]	lifetime [m]
M_{zul}	zulässiges Moment [Nm]	allowable moment [Nm]
M_{eff}	effektives (benötigtes) Moment [Nm]	effective (needed) moment [Nm]
C	dynamische Tragzahl [N]	dynamic load rating [N]
F	dynamische Belastung [N]	dynamic load force [N]

Bei kombinierten Belastungen muss folgende Gleichung erfüllt sein:
In combined loads situations the next equation must be met:

$$\frac{M01_{eff}}{M01_{zul}}+\frac{M02_{eff}}{M02_{zul}}+\frac{M03_{eff}}{M03_{zul}} \leq 1$$

LEM-9



Linereinheit LEM-9-..-50/110/170

Zulässige Belastungen statisch/dynamisch
Allowable loads static/dynamic

M01zul [Nm]	M02zul [Nm]	M03zul [Nm]	$C_{st/dyn}$ [N]	A [mm]	B [mm]	C [mm]
42/59	42/59	30/42	1364/1897	44+Hub	25	31

Lebensdauerberechnung mit Momenten
Lifetime calculation with moments

$$L=\left(\frac{M_{zul.}}{M_{eff}}\right)^3 \times 10^3$$

Lebensdauerberechnung mit Kräften
Lifetime calculation with forces

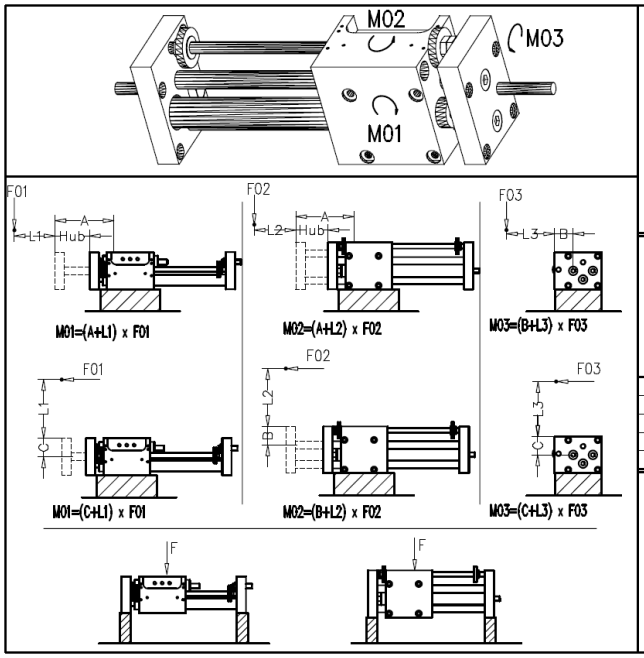
$$L=\left(\frac{C}{F}\right)^3 \times 10^3$$

L	Lebensdauer [m]	lifetime [m]
M_{zul}	zulässiges Moment [Nm]	allowable moment [Nm]
M_{eff}	effektives (benötigtes) Moment [Nm]	effective (needed) moment [Nm]
C	dynamische Tragzahl [N]	dynamic load rating [N]
F	dynamische Belastung [N]	dynamic load force [N]

Bei kombinierten Belastungen muss folgende Gleichung erfüllt sein:
In combined loads situations the next equation must be met:

$$\frac{M01_{eff}}{M01_{zul}}+\frac{M02_{eff}}{M02_{zul}}+\frac{M03_{eff}}{M03_{zul}} \leq 1$$

LE-9



Linereinheit LE-9-..-100/200/300/400

Zulässige Belastungen statisch/dynamisch
Allowable loads static/dynamic

M01zul [Nm]	M02zul [Nm]	M03zul [Nm]	$C_{st/dyn}$ [N]	A [mm]	B [mm]	C [mm]
59/87	59/87	49/72	1982/2911	50+Hub	32	45

Lebensdauerberechnung mit Momenten
Lifetime calculation with moments

$$L=\left(\frac{M_{zul.}}{M_{eff}}\right)^3 \times 10^3$$

Lebensdauerberechnung mit Kräften
Lifetime calculation with forces

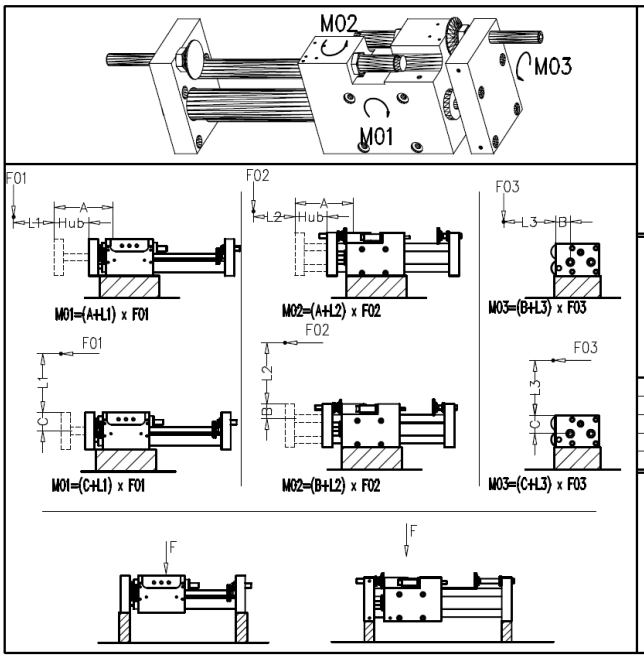
$$L=\left(\frac{C}{F}\right)^3 \times 10^3$$

L	Lebensdauer [m]	lifetime [m]
M_{zul}	zulässiges Moment [Nm]	allowable moment [Nm]
M_{eff}	effektives (benötigtes) Moment [Nm]	effective (needed) moment [Nm]
C	dynamische Tragzahl [N]	dynamic load rating [N]
F	dynamische Belastung [N]	dynamic load force [N]

Bei kombinierten Belastungen muss folgende Gleichung erfüllt sein:
In combined loads situations the next equation must be met:

$$\frac{M01_{eff}}{M01_{zul}}+\frac{M02_{eff}}{M02_{zul}}+\frac{M03_{eff}}{M03_{zul}} \leq 1$$

LES-9



Linereinheit LES-9-...-100/200/300/400/500

Zulässige Belastungen statisch/dynamisch
Allowable loads static/dynamic

M01zul [Nm]	M02zul [Nm]	M03zul [Nm]	$C_{st/dyn}$ [N]	A [mm]	B [mm]	C [mm]
393/525	393/525	198/265	7082/9461	73+Hub	40	51

Lebensdauerberechnung mit Momenten
Lifetime calculation with moments

$$L=\left(\frac{M_{zul}}{M_{eff}}\right)^3 \times 10^3$$

Lebensdauerberechnung mit Kräften
Lifetime calculation with forces

$$L=\left(\frac{C}{F}\right)^3 \times 10^3$$

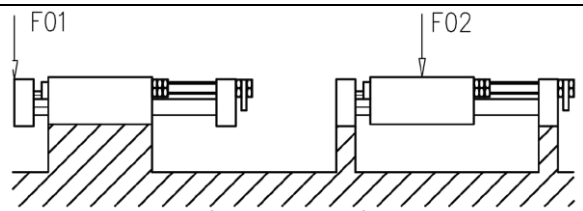
L	Lebensdauer [m]	lifetime [m]
M_{zul}	zulässiges Moment [Nm]	allowable moment [Nm]
M_{eff}	effektives (benötigtes) Moment [Nm]	effective (needed) moment [Nm]
C	dynamische Tragzahl [N]	dynamic load rating [N]
F	dynamische Belastung [N]	dynamic load force [N]

Bei kombinierten Belastungen muss folgende Gleichung erfüllt sein:
In combined loads situations the next equation must be met:

$$\frac{M01_{eff}}{M01_{zul}}+\frac{M02_{eff}}{M02_{zul}}+\frac{M03_{eff}}{M03_{zul}} \leq 1$$

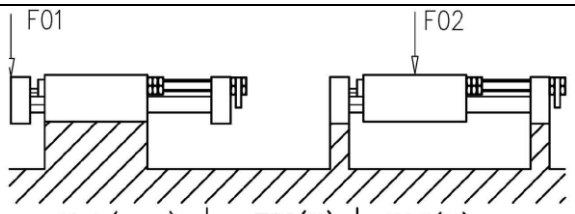
Recommended payload

LEM-6



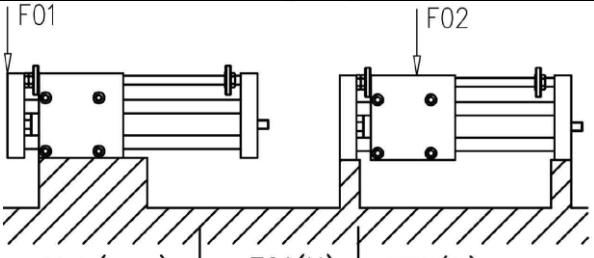
Hub(mm)	F01(N)	F02(N)
30	40N	180N
60	30N	130N
90	20N	100N

LEK-6



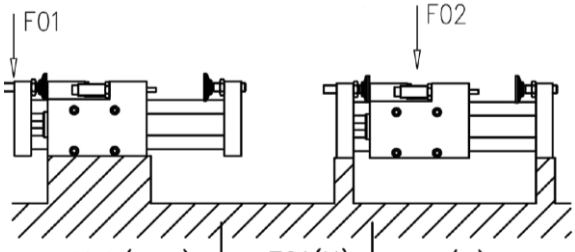
Hub(mm)	F01(N)	F02(N)
55	60N	170N
115	45N	140N
175	32N	110N

LE-6



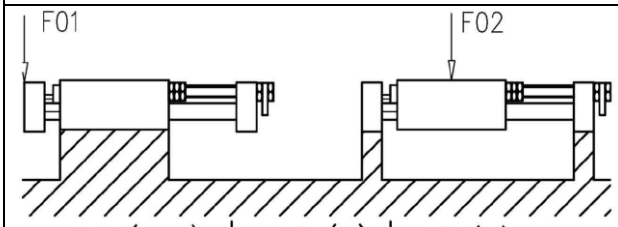
Hub(mm)	F01(N)	F02(N)
100	50N	150N
200	28N	100N
300	20N	70N

LES-6



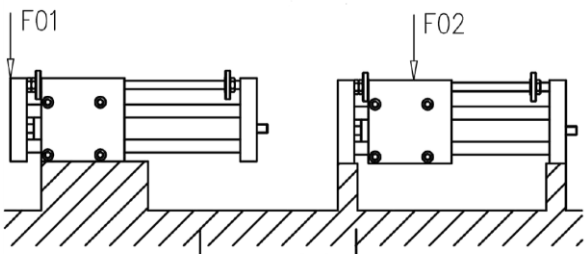
Hub(mm)	F01(N)	F02(N)
100	185N	430N
200	110N	285N
300	80N	195N
400	60N	150N

LEM-9



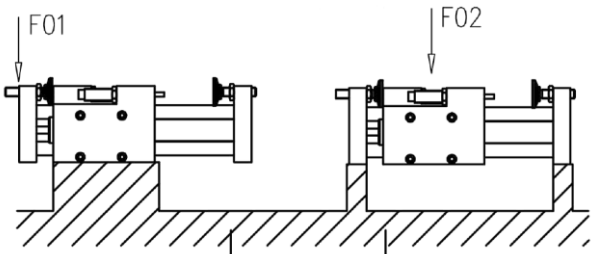
Hub(mm)	F01(N)	F02(N)
50	72N	192N
110	52N	160N
170	37N	126N

LE-9



Hub(mm)	F01(N)	F02(N)
100	180N	300N
200	100N	240N
300	80N	160N
400	60N	100N

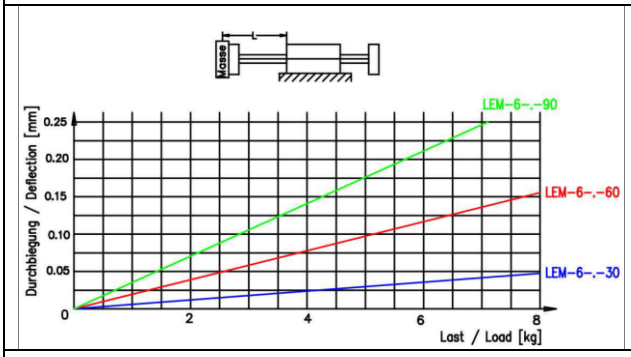
LES-9

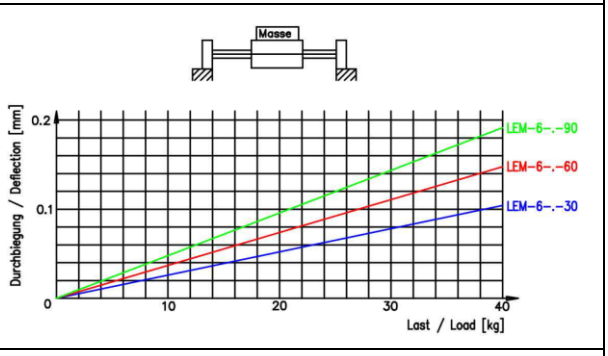


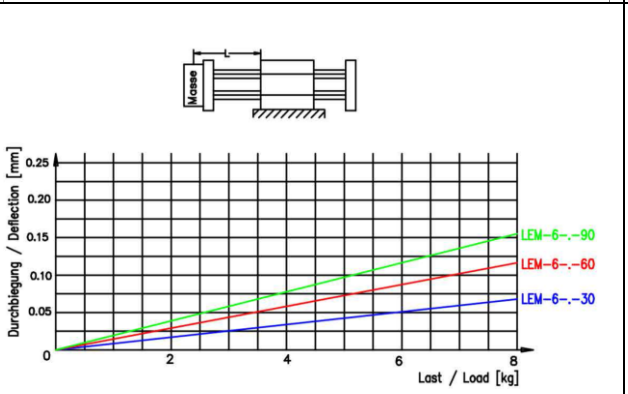
Hub(mm)	F01(N)	F02(N)
100	700N	1330N
200	420N	825N
300	305N	600N
400	240N	460N
500	195N	375N

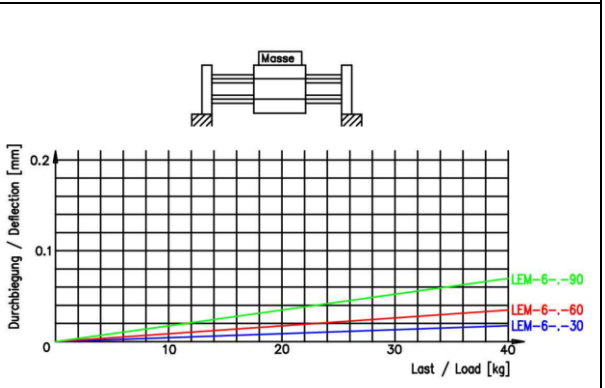
Deflection

LEM-6

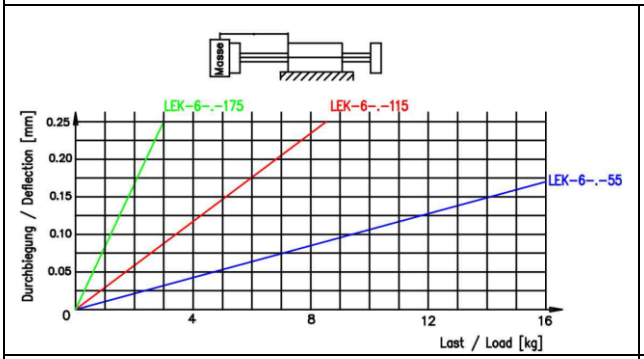


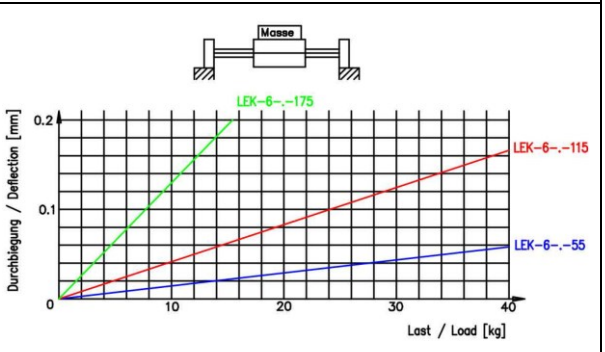


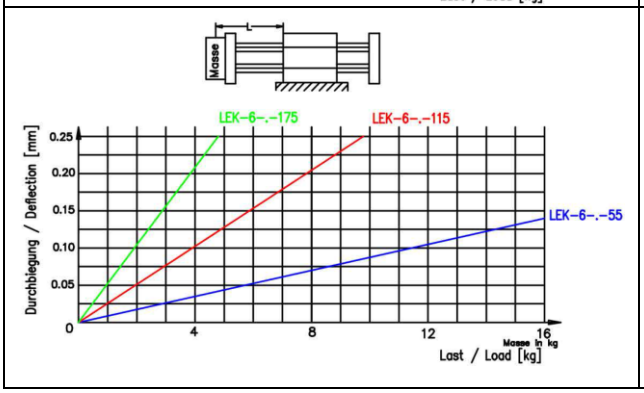


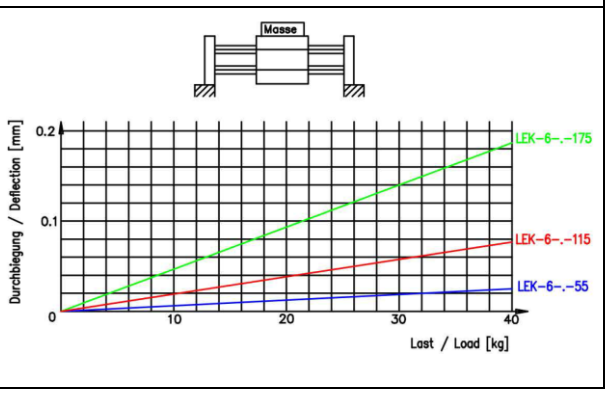


LEK-6

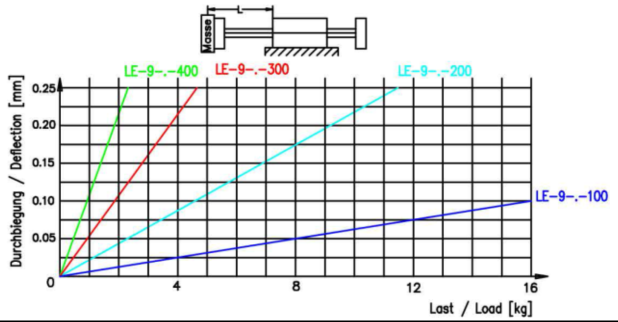


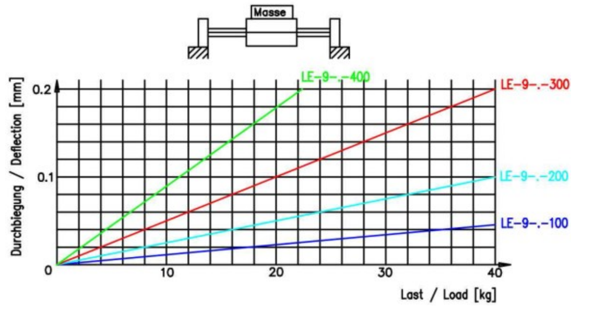


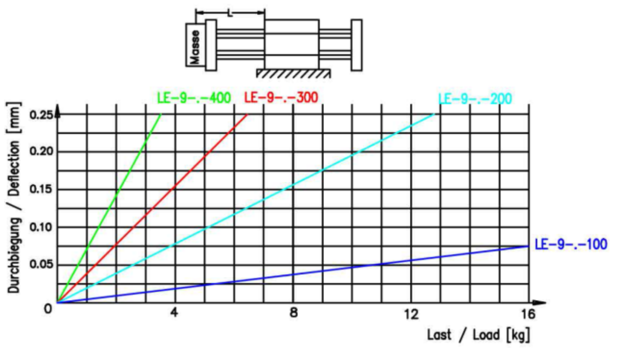


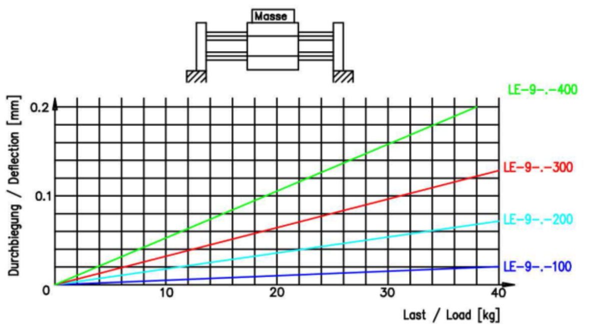


LE-6

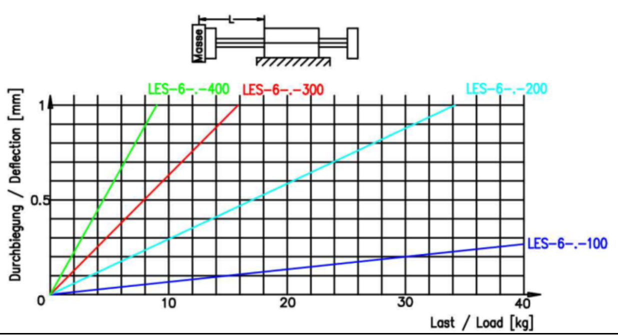

Masse
L
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

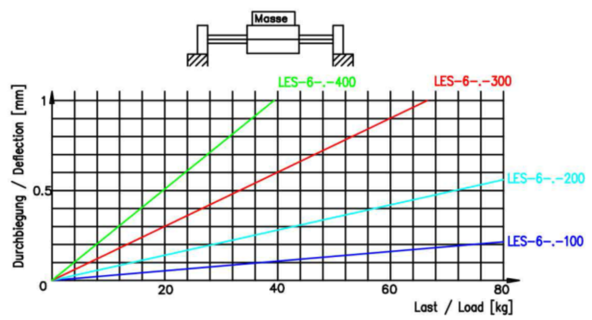

Masse
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

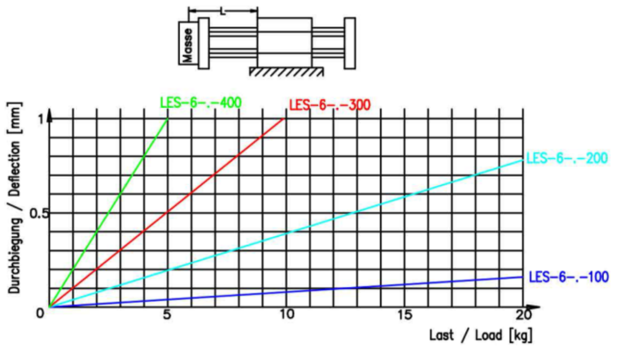

Masse
L
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

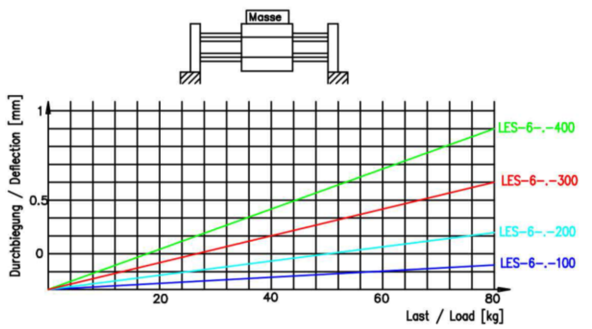

Masse
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

LES-6

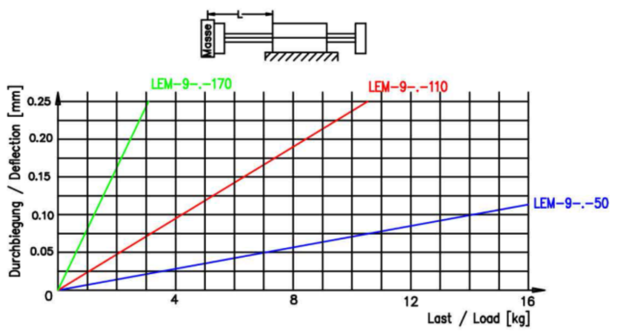

Masse
L
LES-6-.-400
LES-6-.-300
LES-6-.-200
LES-6-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

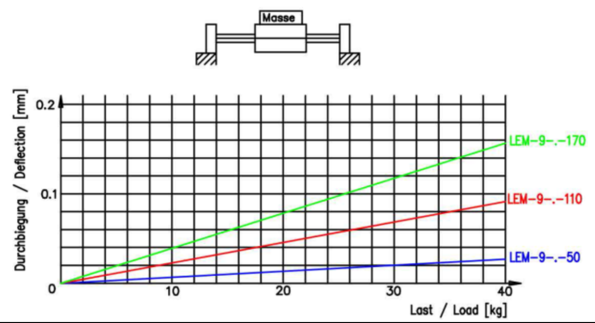

Masse
LES-6-.-400
LES-6-.-300
LES-6-.-200
LES-6-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

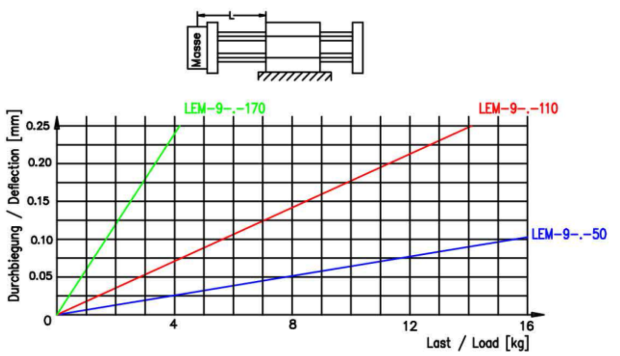

Masse
L
LES-6-.-400
LES-6-.-300
LES-6-.-200
LES-6-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

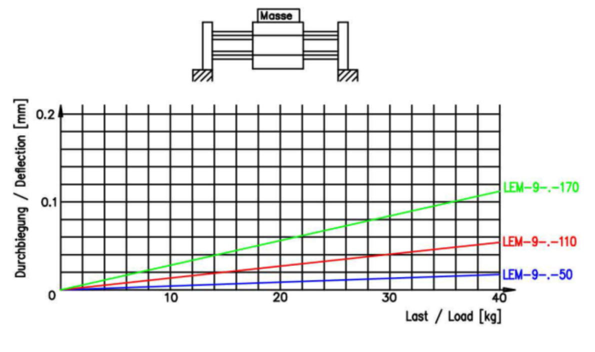

Masse
LES-6-.-400
LES-6-.-300
LES-6-.-200
LES-6-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

LEM-9

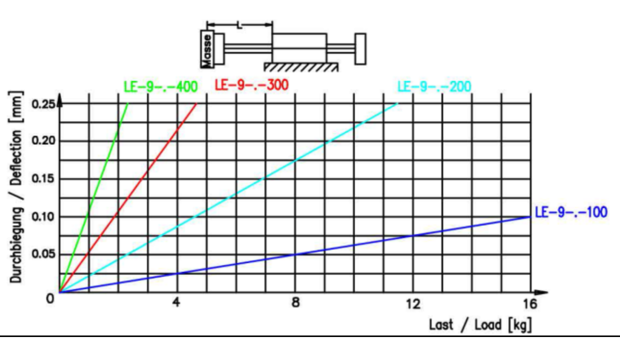

Masse
L
LEM-9-.-170
LEM-9-.-110
LEM-9-.-50
Durchbiegung / Deflection [mm]
Last / Load [kg]

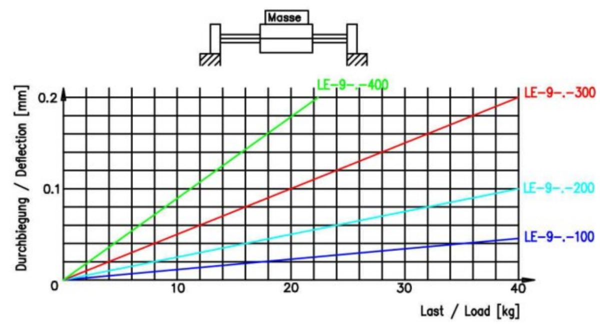

Masse
LEM-9-.-170
LEM-9-.-110
LEM-9-.-50
Durchbiegung / Deflection [mm]
Last / Load [kg]

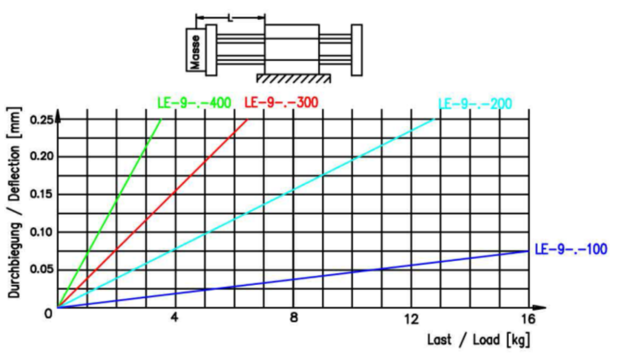

Masse
L
LEM-9-.-170
LEM-9-.-110
LEM-9-.-50
Durchbiegung / Deflection [mm]
Last / Load [kg]

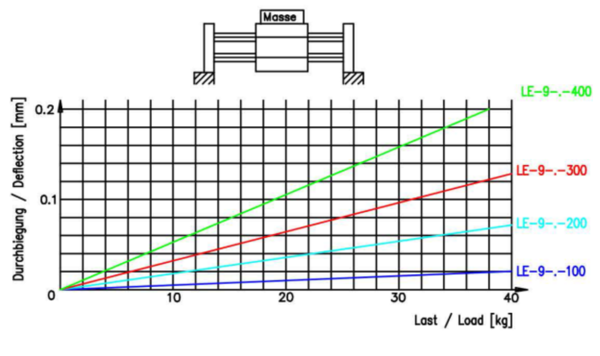

Masse
LEM-9-.-170
LEM-9-.-110
LEM-9-.-50
Durchbiegung / Deflection [mm]
Last / Load [kg]

LE-9


Masse
L
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]


Masse
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]


Masse
L
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]


Masse
LE-9-.-400
LE-9-.-300
LE-9-.-200
LE-9-.-100
Durchbiegung / Deflection [mm]
Last / Load [kg]

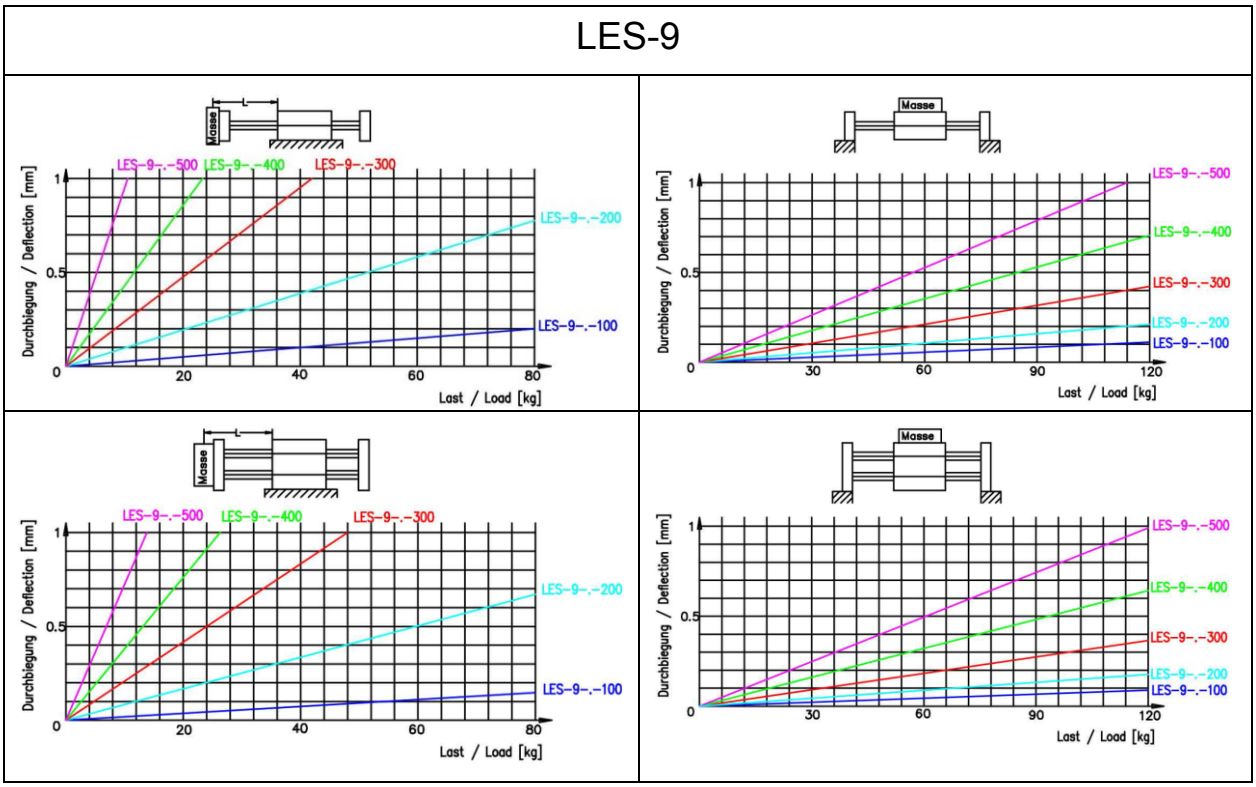


Fig. 2-2 Characteristics and loads

2.3.4 General data

Operating temperature range:

Temperature range device:	+ 5° … + 65° C
Relative air humidity:	max. 70 %, non-condensing

Storage conditions:

Minimum temperature:	- 10° C
Maximum temperature:	+ 50° C
Relative air humidity:	max. 70 %, non-condensing

3 Safety

3.1 Notes and explanations

DANGER

"DANGER" warns of dangerous situations. Avoid these dangerous situations!

Otherwise serious injuries or death will result.

WARNING

"WARNING" warns of dangerous situations. Avoid these dangerous situations!

Otherwise serious injuries or death can result.

CAUTION

"CAUTION" in combination with the warning symbol warns of dangerous situations. Avoid these dangerous situations!

Otherwise minor or light injuries could result.

NOTICE

"NOTICE" gives recommendations on how to proceed. Ignoring these recommendations will ***not lead to personal injuries****.*

Follow the recommendations to ***avoid damage to the unit*** *and problems in general!*

NOTICE

References to installation and operating instructions / documentation are marked with a book symbol (see external documentation).

Follow the recommendations to ***avoid damage to the unit*** *and problems in general!*

3.1.1 Explanation of safety symbols used

DANGER

Crushing hazards, dangers of injuries to the hands *(closing movements of mechanical parts).*

Ignoring this warning will result in serious injuries or death.
Do not carry out any manual work on such parts during movements.

WARNING

Mandatory: Safety boots *must be* ***worn.***

Ignoring this warning could result in serious injuries or death.
Take note of the dangers to the lower limbs.

WARNING

Mandatory: Protective gloves *must be* ***worn.***

Ignoring this warning could result in serious injuries or death.
Take note of the dangers to the hands.

WARNING

Mandatory: Hands *must be* ***washed.***

Ignoring this warning could result in serious injuries or death.
Take note of the dangers due to deficient hygiene.

NOTICE

The ***environment sign*** *marks actions to protect the environment (warning of environmental pollution, in the chapter Disposal).*

Damage to the environment will result if ignored.
Improper disposal can result in serious damage to the environment.

3.2 Safety precautions (to be carried out by the operator)

- The linear units may only be installed, serviced and modified by qualified skilled personnel. This personnel must have read and understood the operating instructions.
- The energy and compressed air supply must be disconnected from the linear unit before any service, maintenance or modification work. Make sure there are no residual energies present.
- Only use the linear units if they are in perfect technical condition and do not carry out any unauthorized modifications.
- The linear units can be heavy. Secure them so that they cannot fall down.
- In the event of an emergency, malfunction or other irregularity, switch off the linear unit, disconnect it from the energy and compressed air supply and lock against reconnection.
- Carry out a visual inspection of the compressed air lines regularly. Operation with damaged compressed air lines is prohibited.
- Make sure that the technical specifications and environmental conditions specified in the product documentation are adhered to.
- The linear unit may only be operated in accordance with its intended use.
- Take note of the valid regulations on accident prevention and environmental protection.
- Implement the safeguards required by EC directives.
- Pressurize your complete equipment with compressed air slowly to avoid uncontrolled movements.
- Only put your equipment into service if you are sure that no personnel or foreign objects can be caught by the moving parts.

3.3 Safety inspections and tests

Factory inspections and tests by the manufacturer.

1. Risk assessment according to Machinery Directive 2006/42/EC (to Annex I) and to DIN EN ISO 12100:2010.

4 General warnings

4.1 Dangers

The safety systems and safety instructions described in these installation and operating instructions are to be heeded accordingly.

DANGER

*Pay attention to the possible **danger of injuries to the hands and/or body** when carrying out adjustment, maintenance and repair work!*

Otherwise serious injuries or death will result.
The machine builder must implement safety equipment to ensure safe operation.

4.2 Spare and wearing parts

Spare parts and accessories that have not been supplied by us have also not been tested and approved by us. The fitting and/or use of such products could therefore negatively affect the design characteristics of your device.
We accept no liability whatsoever for damage arising from the use of non-original parts and accessories.

Standard parts can be bought through the specialized trade.

NOTICE

***Part lists** and **technical data sheets** are to be found in the **technical reference documents**.*

Otherwise the unit will be damaged.
Damage can arise if the technical reference documents are ignored.

NOTICE

***Lists** of **spare parts** and **wearing parts** are to be found in the **technical reference documents**.*

Otherwise the unit will be damaged.
Damage can arise if the technical reference documents are ignored.

Service

When necessary, these parts can be obtained from:

Friedemann Wagner GmbH
Robert-Bosch-Straße 5
D-78559 Gosheim / Germany
Telephone: +49 (0) 7426 / 94900-0
Fax: +49 (0) 7426 / 94900-9
Email: info@wagnerautomation.de

5 Installation

5.1 Scope of delivery

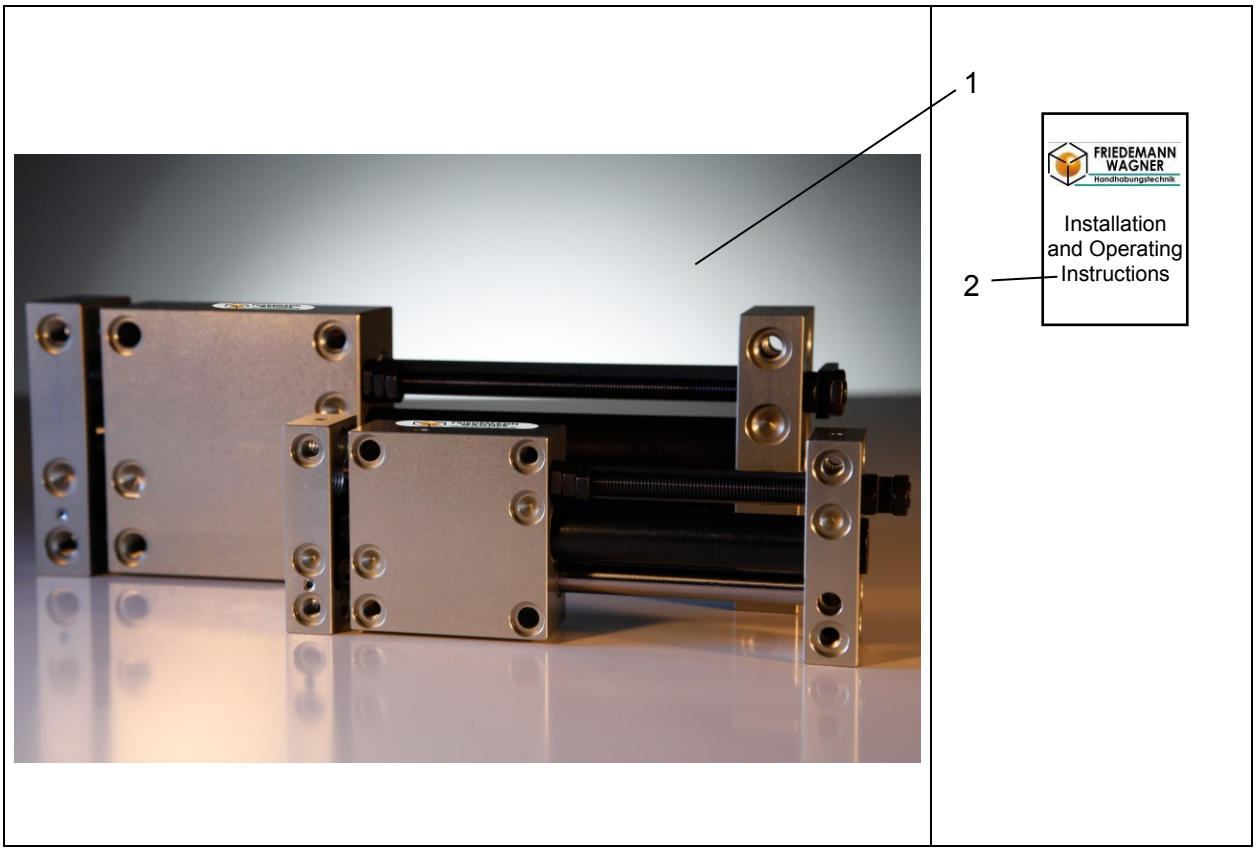


Fig. 5-1 Scope of delivery of the device

The scope of delivery comprises:

1 Linear unit
2 These installation and operating instructions with declaration of incorporation
3 Centering ring
4 Cardboard packaging

5.2 Transport and packaging

The customer is sent a specification of the scope of delivery before shipment begins. It contains details on:

- date of delivery,
- number and type of transport units.

The devices are carefully inspected and packed before shipment, but it is nevertheless still possible that they might become damaged during transit.

5.2.1 Delivery (also of spare and replacement parts)

Receiving inspection:

- Check the shipment against the delivery note to ensure that it is complete!

If the packaging is damaged

- Check the shipment itself for damage (visual inspection)!

Complaints

If the shipment was damaged during transit:

- Immediately contact the last carrier!
- Keep the packaging material (for possible inspection by the carrier or for return shipment).

Packaging for return shipment

Use the original packaging material as far as possible.

5.2.2 Temporary storage/Storage conditions

The freight packaging of the device and spare and replacement parts is designed for a storage period of 3 months from delivery.

After dismantling of the device, it must be stored properly to enable reuse.

NOTICE

Temporary storage: Store with desiccant in a dry factory hall.

Otherwise the unit will be damaged.
Moisture could penetrate into the device and cause major damage.

Storage conditions

- No direct sunlight.
- No exposure to direct rain, condensation, water.

5.3 Mounting

WARNING

Disconnect the linear unit from the compressed air supply and lock against reconnection.

Otherwise light to serious injuries can result.

Avoid these dangerous situations!

5.3.1 Mounting of the linear unit

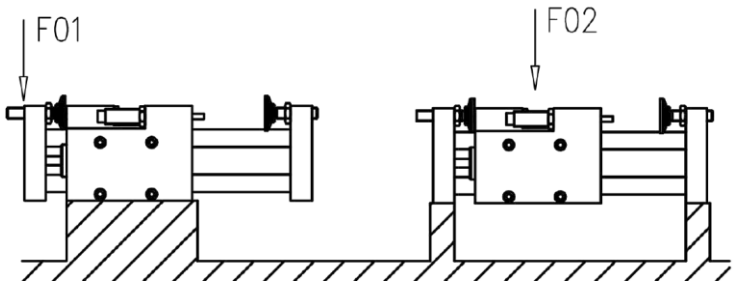
WARNING

When mounting in a vertical position, the slide must always be moved to bottommost position before mounting.

Otherwise light to serious injuries can result from sudden moving masses.

Avoid these dangerous situations!

- ▶ Place at least 2 diagonally offset centering rings (I) (are included in the delivery) in the holes (B) provided.
- ▶ Screw the linear unit tight with screws.
- ▶ The linear units can, if the application requires, also be used for portal operation. If used as such, note the allowable loads specified in chapter 2.3.3.



Schematic mounting diagram and forces using the LES-6 in normal mode (left) and portal mode (right) as example

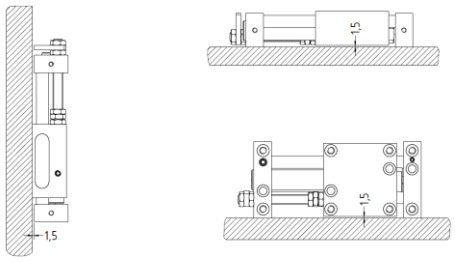
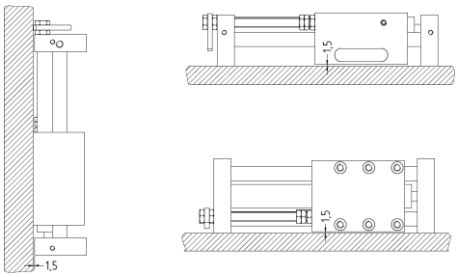
Fig. 5-2 Schematic mounting diagram

NOTICE

If the linear unit is mounted vertically, it must be checked whether the push force and end-position damping suffice for the respective application in question.

NOTICE

Linear units of the type LEM-6 /-9 and LEK-6 have an offset of 1.5 mm between the surfaces of the guide head and head plates. These units can therefore be mounted directly on a plane surface.

Fastening possibilities	
LEM	*LEK*
	

NOTICE

If a centering ring (I) is stuck in a hole, you can remove it from the hole easily with a threaded screw. The centering rings have an internal thread specifically for this purpose. Simply screw a suitable screw into the thread of the centering ring and pull the screw plus centering ring out of the hole.

Centering ring	Internal thread
ZR-4	M5
ZR-6	M8
ZR-9	M10

5.3.2 Mounting of superstructures

	WARNING
	Disconnect the linear unit from the compressed air supply and lock against reconnection. ***Otherwise light to serious injuries can result.*** *Avoid these dangerous situations!*

▶ Fasten the superstructures with screws in the threaded holes (B) with the centering rings provided.

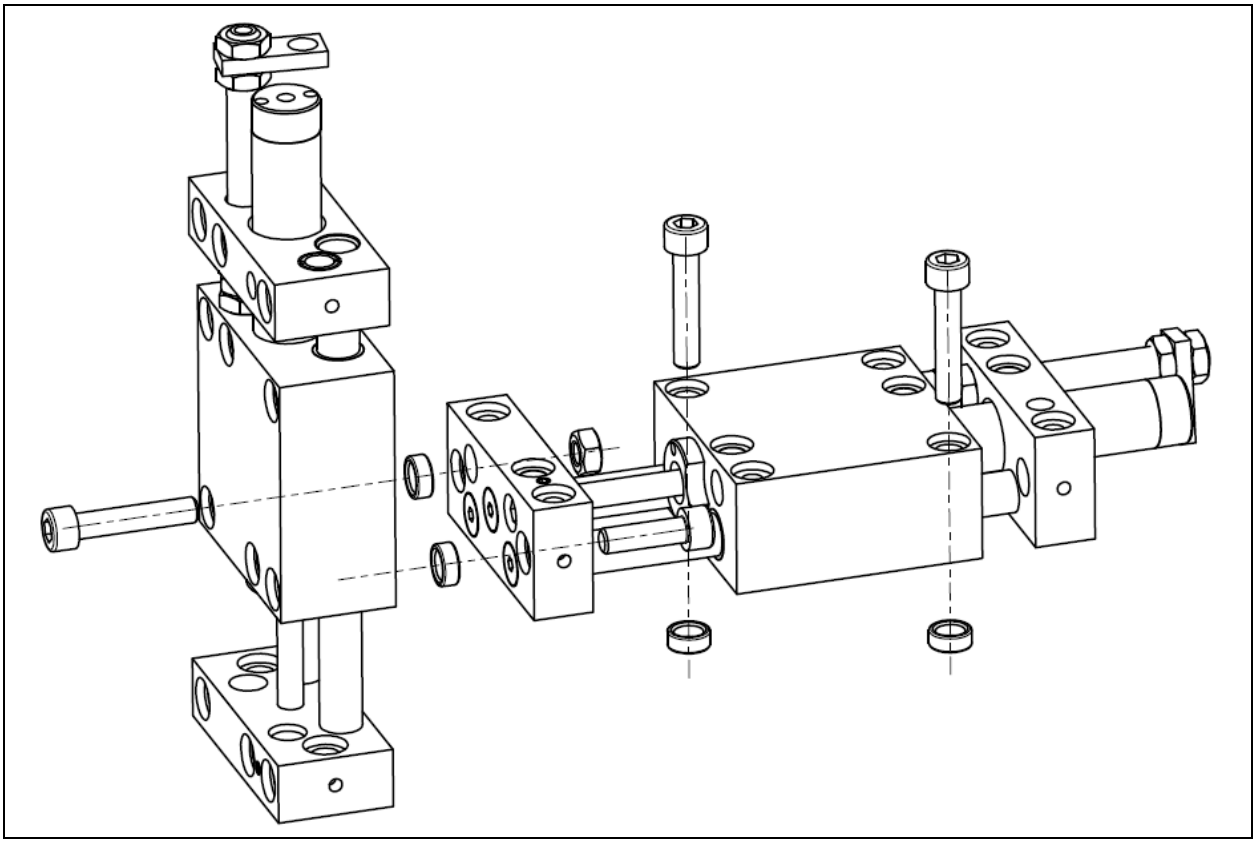


Fig. 5-3 Mounting of superstructures using two linear units of the type LEM as example

5.3.3 Connection examples

WARNING

Disconnect the linear unit from the compressed air supply and lock against reconnection.

Otherwise light to serious injuries can result.

Avoid these dangerous situations!

NOTICE

The following figures show connection examples and illustrate how the linear unit can be connected.

NOTICE

A function check must be carried out with compressed air after connection.

5.3.3.1 Example of standard pneumatic connection

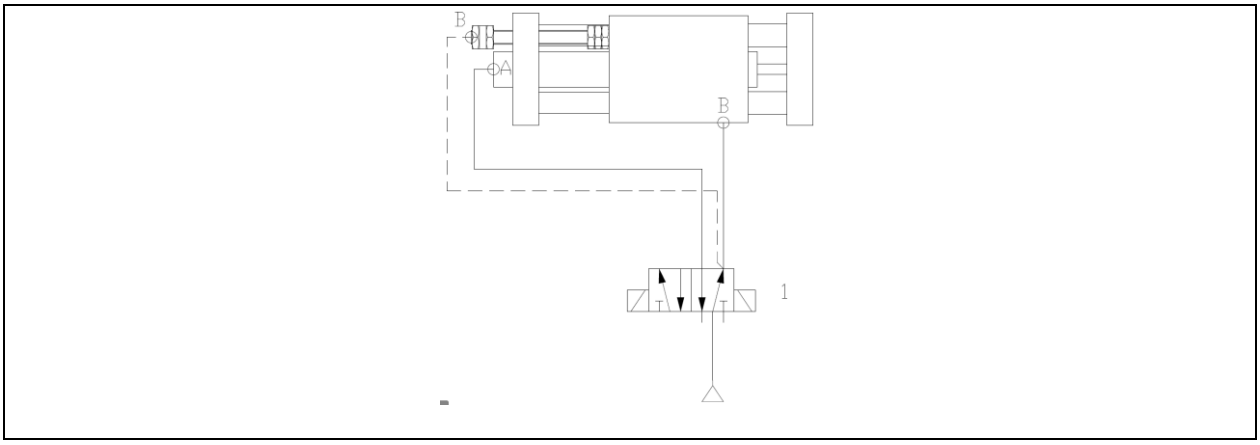


Fig. 5-4 Standard circuit

A. Compressed air connection (extended)

B. Compressed air connection B (retracted)

1. 5/2 control valve, bistable

Connection	LEM-6	LEK-6	LE-6	LES-6	LEM-9	LE-9	LES-9
A (extend)	•	•	•	•	•	•	•
B (retract)	•	•	•	•	•	•	•
Optional B, face, at air tube / threaded rod	•	•	-	-	•	-	-

5.3.3.2 Example of pneumatic connection with EMERGENCY STOP circuit

WARNING

In the event of a sudden loss of pressure the payload can drop uncontrolled into one end position. To prevent this, piloted non-return valves are recommended.

Otherwise light to serious injuries can result.

Avoid these dangerous situations!

NOTICE

Please note that suitable emergency stop systems (e.g. systematic shutdown) and restart systems (e.g. correct valve switching sequence, pressure buildup valves) are needed for pneumatic actuators. Unwanted blocking of the compressed air supply can lead to unwanted situations.

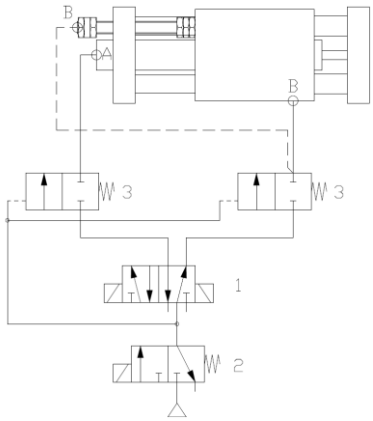
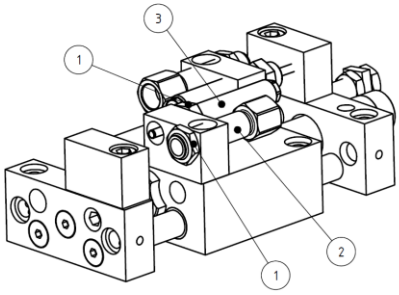
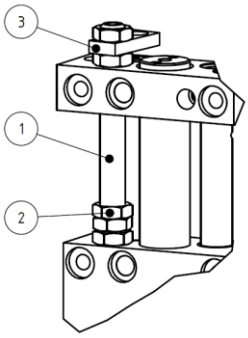
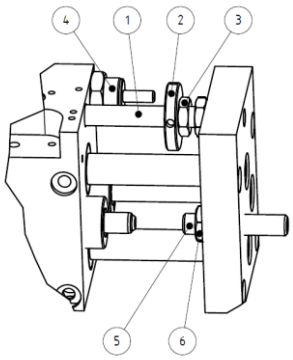


Fig. 5-5 Emergency stop circuit

A. Compressed air connection A (extend, cf. table 5-4)
B. Compressed air connection B (retract, cf. table 5-4)
1. 5/2 control valve, bistable
2. 3/2 control valve, monostable / emergency stop
3. Piloted non-return valve

5.3.4 Adjustment possibilities for the linear unit

The device is always delivered in its respective “maximum stroke” setting. To adjust, proceed as follows: After adjusting the stroke, it might be necessary to readjust the shock absorber, cf. 5.3.4.2.

LEM-6 with sideways stop LEM-9 with sideways stop  	▶ Loosen the hexagonal nut (1) that locks the stop screw (2) and, if applicable, the shock absorber (3). ▶ Adjust the stop screws (2) as needed on one or both sides to limit the stroke. ▶ When retrofitting the sideways stop, take note of any restrictions that have been set in the internal stop system (threaded rod) and adjust them as necessary. ▶ Set the shock absorbers (3) (cf. separate chapter 5.3.4.2). ▶ Lock the stop screws (2) and shock absorbers (3) again with the hexagonal nuts (1).
LEM-6 / LEM-9 / LEK-6  	▶ The stop systems works by way of a continuous threaded rod (1). ▶ The inner stop is implemented by way of a nut (2). The outer stop consists of the mount (3) for the proximity switch. ▶ Loosen the lock nuts of the stops and adjust the stops and thus the stroke by turning the threaded rod. ▶ Then lock the stops again with the lock nuts.
LE-6 / LE-9  	▶ The stop system works by way of large toroidal area on a continuous threaded rod (1). ▶ Loosen the lock nuts (3) and adjust the stops by turning the large toroidal area (2) on the threaded rod (1). ▶ Lock the hexagonal nuts (3) against the toroidal area (2) again.

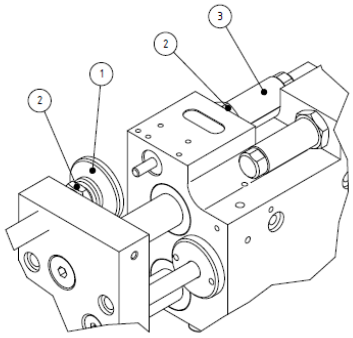
LES-6 / LES-9  	▶ The stop system works by way of stop screws with large toroidal areas (1). ▶ Loosen the respective lock nut (2) of the stop screw and adjust the stroke by turning in or out. ▶ Lock the stop screw again with the hexagonal nut.

Fig. 5-6 Adjustment possibilities for the linear units

5.3.4.1 Set speed

	***WARNING*** *Take special care whenever carrying out adjustment work and keep sufficiently far away from danger zones.* ***Otherwise light to serious injuries can result.*** *Wear personal protective equipment such as gloves or safety glasses if necessary.*

The speed can be adjusted to the load by an external exhaust regulator (not included in the delivery). If the regulator is set too fast, this will cause hard stopping and bouncing. This can also have a negative effect on the lifetime of the linear unit and even result in destruction of its mechanical components.

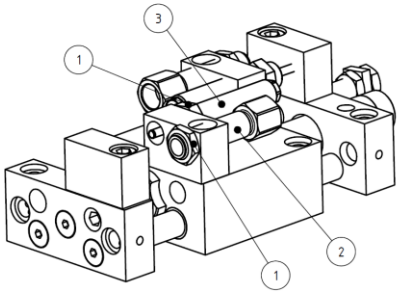
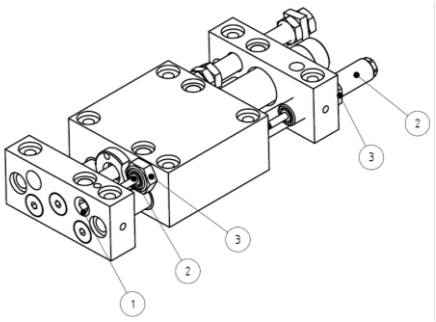
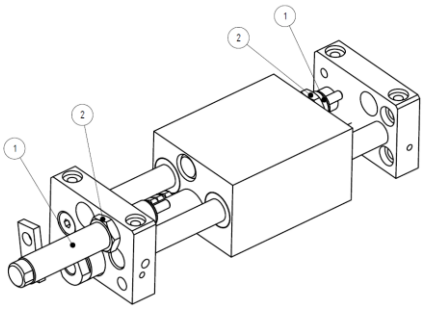
5.3.4.2 Set shock absorber

	***WARNING*** *Take special care whenever carrying out adjustment work and keep sufficiently far away from danger zones.* ***Otherwise light to serious injuries can result.*** *Wear personal protective equipment such as gloves or safety glasses if necessary.*

The strength of the shock absorber must be adjusted to the load. If the shock absorber is set too hard, it is possible for the linear unit to bounce and it does not reach end position. If the shock absorber is set too soft, this will cause hard stopping and bouncing. This can

also have a negative effect on the lifetime of the linear unit and even result in destruction of its mechanical components.

- ▶ Depending on the mass being moved and the speed, there are kinetic energies in the system that are absorbed by hydraulic shock absorbers.

Unit	Mount for shock absorber
LEM-6 / LEM 9 with side stop 	▶ The mount for the shock absorber (3) is located in the external stop system. See also chapter 5.3.4.2 Adjustment. ▶ When retrofitting the sideways stop, take note of any restrictions that have been set in the internal stop system (threaded rod) and adjust them as necessary.
LEM-6 / LEM-9 	▶ The mounts for the shock absorber (2) are located in the head plate or end plate and in the guide head. They are locked with hexagonal nuts (3). ▶ The end-position damping of the shock absorbers in the guide head can be influenced by turning the stop screw (1) in or out.
LEK-6 	▶ The LEK-6 is equipped with bores in the head plate so that the shock absorbers (1) do not restrict the stroke in fitted state and are easier to mount. ▶ Lock the shock absorbers again with the lock nuts (2).

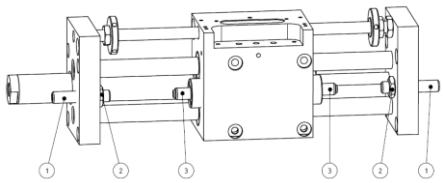
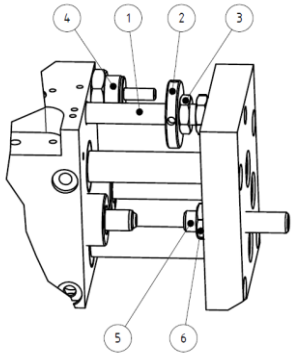
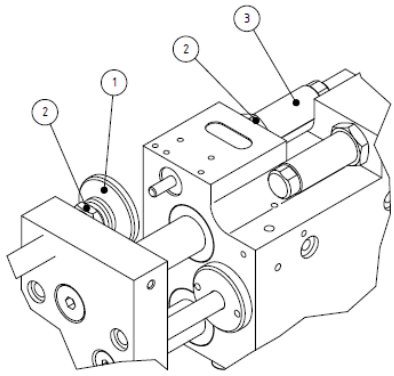
LE-6-X-X-**P**-X-X-P LE-9- X-X-**P**-X-X-P 	▶ These variants are already equipped with a pneumatic shock absorber (3) in their guide head. Make sure that the shock absorber is pressurized continuously with compressed air at connection P. Non-return regulator valves are needed for regulation (not included in the delivery). ▶ To adjust damping, turn the stop screw (1, hexagonal socket head) in the head and end plate in or out and then lock with the hexagonal nut (2). You should ideally use the full stroke of the shock absorber when making the adjustment. ▶ To avoid interfering edges, the stop screws should be shortened later if necessary.
LE-6 / LE-9 	▶ The mounts for the shock absorbers (4 and 5) are located in the end plate and in the guide head. ▶ The stop screws of the existing pneumatic shock absorbers can in this case be turned out and removed.
LES-6 / LES-9 	▶ The shock absorbers (3) positioned in the guide head strike directly against the toroidal areas (1) of the stop screws.

Fig. 5-7 Mounts for shock absorbers

▶ Move the head plate manually to end position and leave it there.

▶ To mount the shock absorber, screw it into the mount clockwise.

- ▶ Screw in the shock absorber until its housing rests against the stop.
- ▶ Then screw the shock absorber out again by at least half a revolution and lock the shock absorber with the hexagonal nut or available set screws.
- ▶ The action of the shock absorber can be influenced/set by screwing in or out. This is particularly necessary when shock absorbers that cannot be adjusted externally with an adjusting screw are used. In this case screw the shock absorber out until the optimal damping action is reached.
- ▶ To adjust the linear units of the type LEM and LEK, also use the stop screw in the head plate by turning in or out.
- ▶ Proceed in the same way to mount the second shock absorber.

Pressurize the system with compressed air and let the linear unit drive into the end positions. Adjustment is correct when the end positions are reached without visible delay and without bouncing.

NOTICE
The shock absorbers are pre-set on delivery. It is, however, possible that the damping action needs to be set softer or harder.

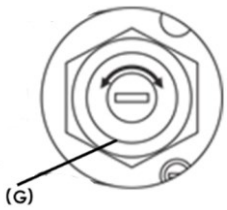


Fig. 5-8 Set shock absorber for STD-14

Set shock absorber harder

Turn the adjusting screw to the right.

Set shock absorber softer

Turn the adjusting screw to the left.

NOTICE
Only adjust the damping action with the adjusting screw (STD-14). If there is no adjusting screw at the shock absorber, it is adjusted via the shock absorber stroke.

5.4 Startup

WARNING

Risk of injury from moving masses.
Make sure that no personnel or foreign objects can be caught by moving parts.
Disconnect the linear unit from the compressed air supply.

Otherwise serious injuries or death can result.

Avoid these dangerous situations!

- ▶ Do not overload the devices.
- ▶ Adjust the stroke length (cf. chapter 5.3.4).
- ▶ Connect all air hoses and signal cables correctly.
- ▶ Pre-set the shock absorbers.
- ▶ Pre-set the sensors.
- ▶ Close all regulators and then open them again by one revolution.
- ▶ Make sure that no personnel or foreign objects can be caught by moving parts.
- ▶ Pressurize your equipment slowly with compressed air (extend / retract, cf. table in chapter 5.3.3.1).
- ▶ Start a trial run.
- ▶ Set the proximity switches (if available).
- ▶ Set the required speed.
- ▶ Set the shock absorbers.
- ▶ End the trial run.

5.4.1 Mounting of proximity switches (accessories)

WARNING

Disconnect the linear unit from the compressed air supply and lock against reconnection.

Otherwise light to serious injuries can result.

Avoid these dangerous situations!

NOTICE

The standard device does not come with proximity switches. However, to query end positions, it is necessary to retrofit proximity switches. The proximity switches can be obtained separately as accessories.

NOTICE

The linear units with proximity switches should not be used in areas with static discharges, high-frequency oscillations or strong magnetic fields. Otherwise it can happen that the proximity switches for recognition of the end positions deliver wrong signals.

NOTICE

Make sure that the proximity switches do not extend over the stop surface - this can lead to damage and destruction of parts.

NOTICE

The positions of the proximity switches are shown in the technical drawings in the catalogs.

Unit	Mounting
LEM-6 **LEK-6** **LEM-9**	Screw in the proximity switch. The M8 threaded bores are located on the connection side in the head plate, end plate and holder plate. Set the proximity switches so that the LED of the switch lights up when the respective end position is reached. Make sure that the switch signal does not set in too soon because otherwise the linear unit will not reach end position. To adjust, use the screws that are fitted in the units on the face sides of the proximity switches as signal transmitters.
LE-6; LES-6 **LE-9; LES-9**	The quadratic proximity switches are fastened at the corresponding threaded bores with M3x12 screws. No further adjustments must be made to these proximity switches.

Technical data

Type	NSI-M8-K-50	NSI-M8-S-55	NSI-Q8-K-44	NSI-Q8-S-59
Switching distance	1.5 mm	1.5 mm	1.5 mm	1.5 mm
Circuit type	PNP	PNP	PNP	PNP
Switching characteristic	NO	NO	NO	NO
Supply voltage	10-30 V DC	10-30 V DC	10-30 V DC	10-30 V DC
Current consumption	<10 mA	<10 mA	<10 mA	<10 mA
Switching current	Max. 200 mA	Max. 200 mA	Max. 200 mA	Max. 200 mA
Switching frequency	Max. 3 kHz	Max. 3 kHz	Max. 3 kHz	Max. 3 kHz
LED	Yes	Yes	Yes	Yes
Protected against polarity reversal	Yes	Yes	Yes	Yes
Short-circuit proof	Yes	Yes	Yes	Yes
Protection	IP 67	IP 67	IP 67	IP 67
LEM-6; LEK-6, LEM-9	●	●		
LE-6; LES-6; LE-9; LES-9			●	●

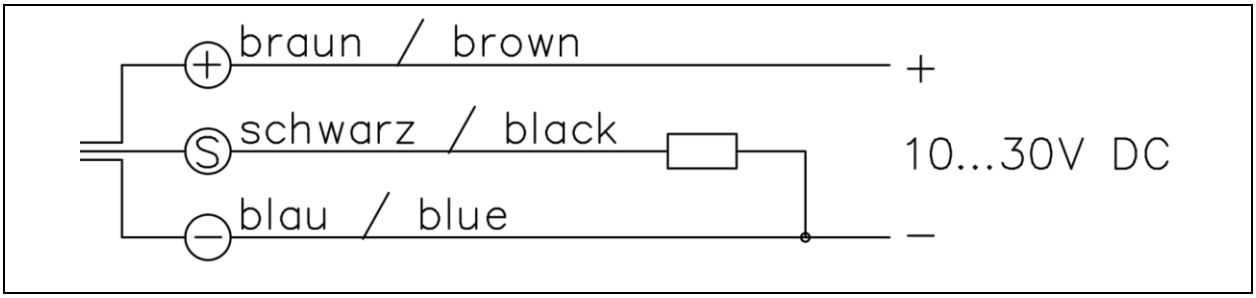


Fig. 5-9 Connection diagram for proximity switches

5.4.2 Repair / Replacement of the hydraulic shock absorber

	***WARNING***
	Work may only be carried out by specially trained personnel because the device is pressurized. ***Otherwise light to serious injuries can result.*** *Avoid these dangerous situations!*

▶ Loosen the hexagonal nut.

▶ To dismount the shock absorber (G), screw it out of the mount anticlockwise. Screw in the new shock absorber (G) until its housing rests against the stop. Cf. chapter 5.3.4.2 / Set shock absorber

▶ Then screw the shock absorber (G) out again by at least half a revolution and lock it with the hexagonal nut or available set screw.

- The action of the shock absorber can be influenced/set by screwing in or out. This is particularly necessary when shock absorbers that cannot be adjusted externally with an adjusting screw are used. In this case screw the shock absorber out!
- To adjust the linear units of the type LEM and LEK, also use the stop screw in the head plate by turning in or out.
- Proceed in the same way to replace the second shock absorber.
- Pressurize the system with compressed air and let the linear unit drive into the end positions. Adjustment is correct when the end positions are reached without visible delay and without bouncing.
- The pneumatic shock absorbers used in the variants LE-6-N-X-P-0-0-P und LE-6-N-X-P-0-0-P do not usually need to be replaced. They are not subject to wear; see chapter 6 for maintenance information.

Technical data

Type	STD-8-S	STD-10-S	STD-14-W	STD-20-S
Fastening	M8x1	M10x1	M14 x 1	M20x1.5
Stroke	5 mm	8 mm	12 mm	15 mm
Impact speed (min./max.)	1.8-3.5 m/s	1.8-3.5 m/s	0.4/5.0 m/s	1.8-3.5 m/s
Absorption	3 Nm	10 Nm	30 Nm	70 Nm
Damping work max.	8,000 Nm/h	18,000 Nm/h	50,000 Nm/h	70,000 Nm/h
Material	Steel			
Weight	0.013 kg	0.025 kg	0.065 kg	0.135 kg

Shock absorbers / Linear units	STD-8-S	STD-10-S	STD-14-W	STD-20-S
LEM-6-M-X-X-0-0-P	●			
LEM-6-MS-X-X-0-0-P		●		
LEM-6-MA-X-X-0-0-P	●			
LEK-6-K-X-X-0-0-P			●	
LE-6-X-X-X-X-X-P			●	
LES-6-S-X-H-X-X-P			●	
LEM-9-M-X-X-X-X-P			●	
LE-9-X-X-X-X-X-P			●	
LES-9-S-X-H-X-X-P				●

6 Maintenance/Servicing

WARNING

Disconnect the linear unit from the compressed air supply and lock against reconnection!

Otherwise light to serious injuries can result.

Make sure there are no residual energies present.

NOTICE

If you have opted for use with an oil/air mixture, the device should then later not be operated otherwise because the lubricating film could fail.

Shock absorbers

The hydraulic shock absorbers are wearing parts. They should therefore be inspected at regular intervals (about every 2,000,000 strokes). Defective shock absorbers can cause consequential damage. Our STD14 are reparable, and we therefore recommend you arrange the possibility of repair with our customer service.

Servicing

After a modification/repair, all moving parts and their guides should be smeared with our special grease.

The seals and the grease inside the linear unit can age depending on use; we therefore recommend that you send the device in to us for servicing every 3 years, after 20,000,000 cycles (for LE-6, LE-9, LES-6 and LES-9 after 10,000,000 cycles) or should you notice a fault in the movement.

Only clean the linear unit with soft cloths and agents that do not damage the material.

Contact with aggressive media and grinding dust should be avoided.

6.1 Warranty and guarantee conditions

The statutory warranty period of the manufacturer / distributor is 24 months from the date of delivery.
For spare parts, we guarantee delivery according to chapter (see also DIN EN 82079-1).

We grant a warranty of 24 months (from the date of delivery ex works) on the proviso that the device is treated correctly in 1-shift operation and the application and environmental conditions are complied with. This includes replacement or repair of defective parts of Friedemann Wagner GmbH.

Wearing parts (e.g. shock absorbers) are not covered by the warranty.

During the warranty period repairs may only be carried out or authorized by Friedemann Wagner GmbH.

7 Troubleshooting

Fault	Cause	Correction
Irregular movement	Regulator is turned in too far	Set regulator correctly
	Air ducts are blocked	Clean air ducts with compressed air
No movement	Connected incorrectly	Connect compressed air connections correctly
	Indexing unit controlled incorrectly	Check program and change
	Incorrect switching signal or signal sets in too soon	Set proximity switch correctly, see chapter 5.4.1.
	Faulty switching	Interchange compressed air connections and pressurize with compressed air
	Regulator is turned in too far	Set regulator correctly
Proximity switch emits incorrect signals No switching signal	Proximity switch is set incorrectly	Set proximity switch correctly, see chapter 5.4.1.
	Proximity switch is defective	Replace proximity switch, see chapter 5.4.1.
End-position stop too hard	Shock absorber (G) is set incorrectly	Set shock absorber (G) correctly, see chapter 5.3.4.2.
	Shock absorber (G) is defective	Replace shock absorber (G), see chapter 5.4.2.
End position is not reached No switching signal	Shock absorber turned in too far	Mount shock absorber (G) correctly, see chapter 5.4.2
	Pressure too low	Increase air pressure
	Load too high	Keep to technical data

Table 1 Troubleshooting

You can obtain further help from:

Friedemann Wagner GmbH, D-78559 Gosheim / Germany
Telephone: +49 (0) 7426 / 94900-0
Fax: +49 (0) 7426 / 94900-9
Email: info@wagnerautomation.de

8 Dismantling / Disposal

Dismantling

Dismantling work may only be carried out by skilled personnel. Make sure the shutdown procedure is followed before beginning dismantling work.
Further, the following must be followed where applicable / available:

- Release the energy in the pressure accumulator.
- Make sure there are no residual energies in the system.
- Release all tensioned springs.

Disposal

The device is primarily made of steel and to a certain extent also of aluminum (except for the electrical equipment) and is to be disposed of in accordance with local environmental protection regulations applicable **at the time** of disposal.
Dispose of according to properties, existing laws and regulations as, for example:

- electric and electronic scrap (circuit boards), PC system, keyboard, mouse, monitor (according to WEEE regulations);
- batteries, fluorescent lamps/energy-saving lamps (collection points);
- plastics (housing), rubber;
- metal, steel, copper, aluminum (separated by sorts).

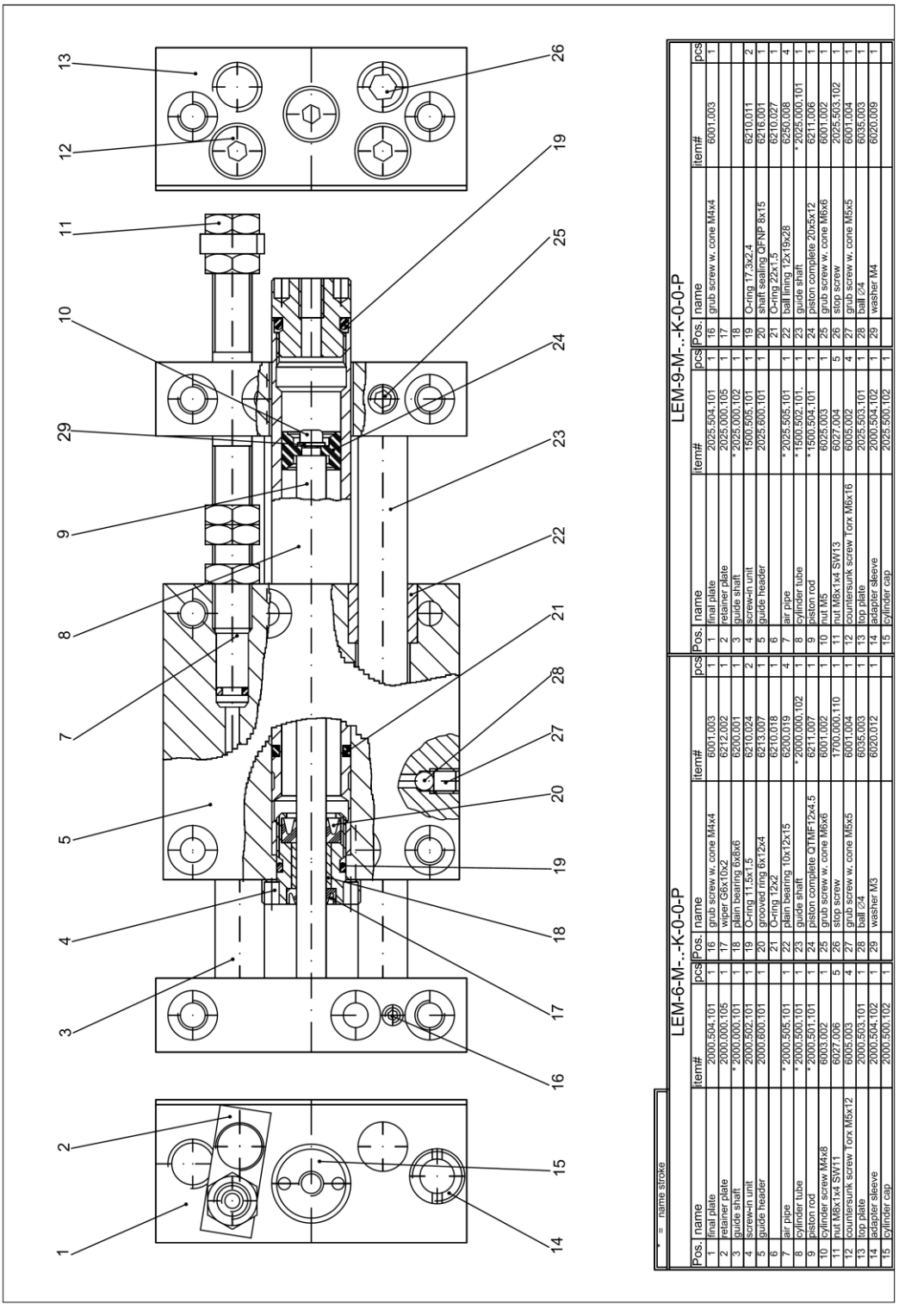
All parts touched by media must be decontaminated before disposal. Hazardous substances are to be removed from the device.
For proper disposal of hazardous substances, observe the material safety data sheets (MSDS) and current applicable disposal regulations.

Oils, solvents, cleaning agents and contaminated cleaning materials (brushes, cloths, etc.) must be disposed of according to local regulations, the applicable disposal codes and the information in the manufacturer's material safety data sheets.

9 Spare part lists and accessories

9.1 Spare part lists

LEM-6 and LEM-9



* = name stroke

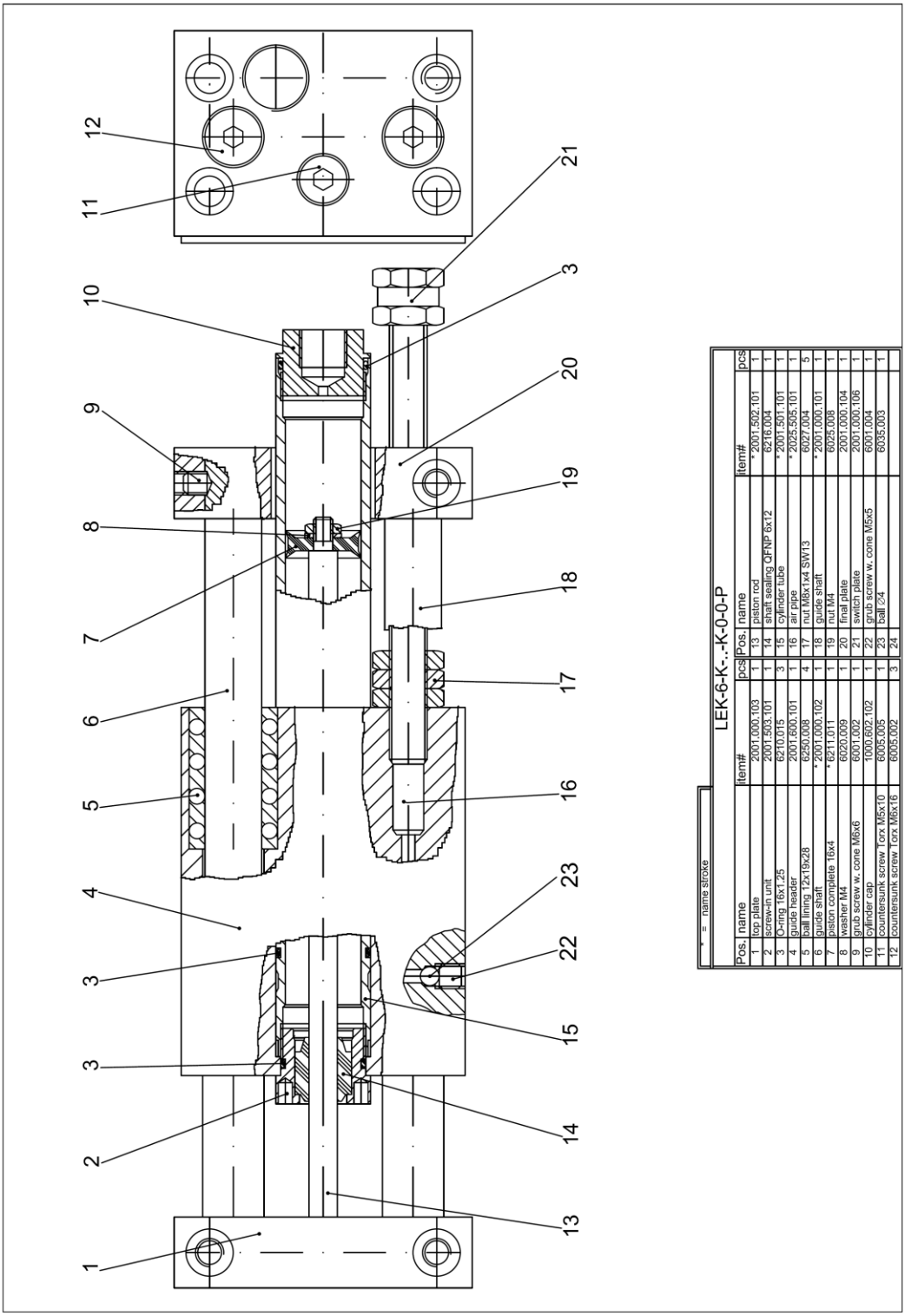
LEM-6-M-..-K-0-0-P

Pos.	name	item#	pcs
1	final plate	2000.504.101	1
2	retainer plate	2000.000.105	1
3	guide shaft	* 2000.000.101	1
4	screw-in unit	2000.502.101	1
5	guide header	2000.600.101	1
6			
7	air pipe	* 2000.505.101	1
8	cylinder tube	* 2000.500.101	1
9	piston rod	* 2000.501.101	1
10	cylinder screw M4x8	6003.002	1
11	nut M8x1x4 SW11	6027.006	5
12	countersunk screw Torx M5x12	6005.003	4
13	top plate	2000.503.101	1
14	adapter sleeve	2000.504.102	1
15	cylinder cap	2000.500.102	1
16	grub screw w. cone M4x4	6001.003	1
17	wiper Gbx10x2	6212.002	1
18	plain bearing 6x8x6	6200.001	1
19	O-ring 11.5x1.5	6210.024	2
20	grooved ring 6x12x4	6213.007	1
21	O-ring 12x2	6210.018	1
22	plain bearing 10x12x15	6200.019	4
23	guide shaft	* 2000.000.102	1
24	piston complete QTMF12x4.5	6211.007	1
25	grub screw w. cone M6x6	6001.002	1
26	stop screw	1700.000.110	1
27	grub screw w. cone M5x5	6001.004	1
28	ball Ø4	6035.003	1
29	washer M3	6020.012	

LEM-9-M-..-K-0-0-P

Pos.	name	item#	pcs
1	final plate	2025.504.101	1
2	retainer plate	2025.000.105	1
3	guide shaft	* 2025.000.102	1
4	screw-in unit	1500.505.101	1
5	guide header	2025.600.101	1
6			
7	air pipe	* 2025.505.101	1
8	cylinder tube	* 1500.502.101.	1
9	piston rod	* 1500.504.101	1
10	nut M5	6028.003	1
11	nut M8x1x4 SW13	6027.004	5
12	countersunk screw Torx M6x16	6005.002	4
13	top plate	2025.503.101	1
14	adapter sleeve	2000.504.102	1
15	cylinder cap	2025.500.102	1
16	grub screw w. cone M4x4	6001.003	1
17			
18			
19	O-ring 17.3x2.4	6210.011	2
20	shaft sealing QFNP 8x15	6216.001	1
21	O-ring 22x1.5	6210.027	1
22	ball lining 12x19x28	6260.008	4
23	guide shaft	* 2025.000.101	1
24	piston complete 20x5x12	6211.006	1
25	grub screw w. cone M6x6	6001.002	1
26	stop screw	2025.503.102	1
27	grub screw w. cone M5x5	6001.004	1
28	ball Ø4	6035.003	1
29	washer M4	6020.009	1

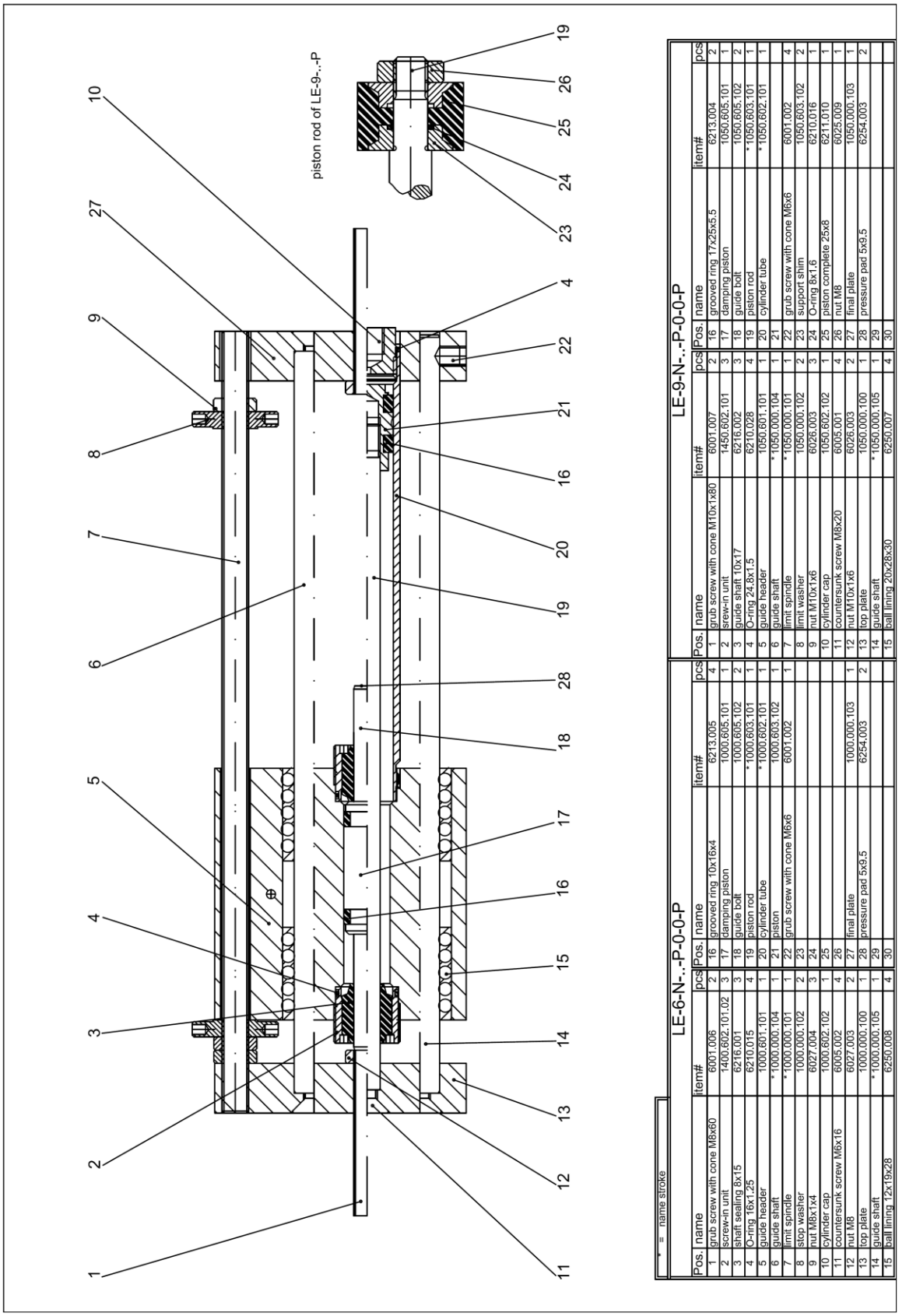
LEK-6



LEK-6-K-..-K-0-0-P

* = name stroke								
Pos.	name	item#	pcs	Pos.	name	item#	pcs
1	top plate	2001.000.103	1	13	piston rod	* 2001.502.101	1
2	screw-in unit	2001.503.101	1	14	shaft sealing QFNP 6x12	6216.004	1
3	O-ring 16x1,25	6210.015	3	15	cylinder tube	* 2001.501.101	1
4	guide header	2001.800.101	1	16	air pipe	* 2025.505.101	1
5	ball lining 12x19x28	6250.008	4	17	nut M8x1x4 SW13	6027.004	5
6	guide shaft	* 2001.000.102	1	18	guide shaft	* 2001.000.101	1
7	piston complete 16x4	* 6211.011	1	19	nut M4	6025.008	1
8	washer M4	6020.009	1	20	final plate	2001.000.104	1
9	grub screw w. cone M8x6	6001.002	1	21	switch plate	2001.000.106	1
10	cylinder cap	1000.602.102	1	22	grub screw w. cone M5x5	6001.004	1
11	countersunk screw Torx M5x10	6005.005	1	23	ball ⌀4	6035.003	1
12	countersunk screw Torx M6x16	6005.002	3	24			

LE-6 and LE-9



* = name stroke

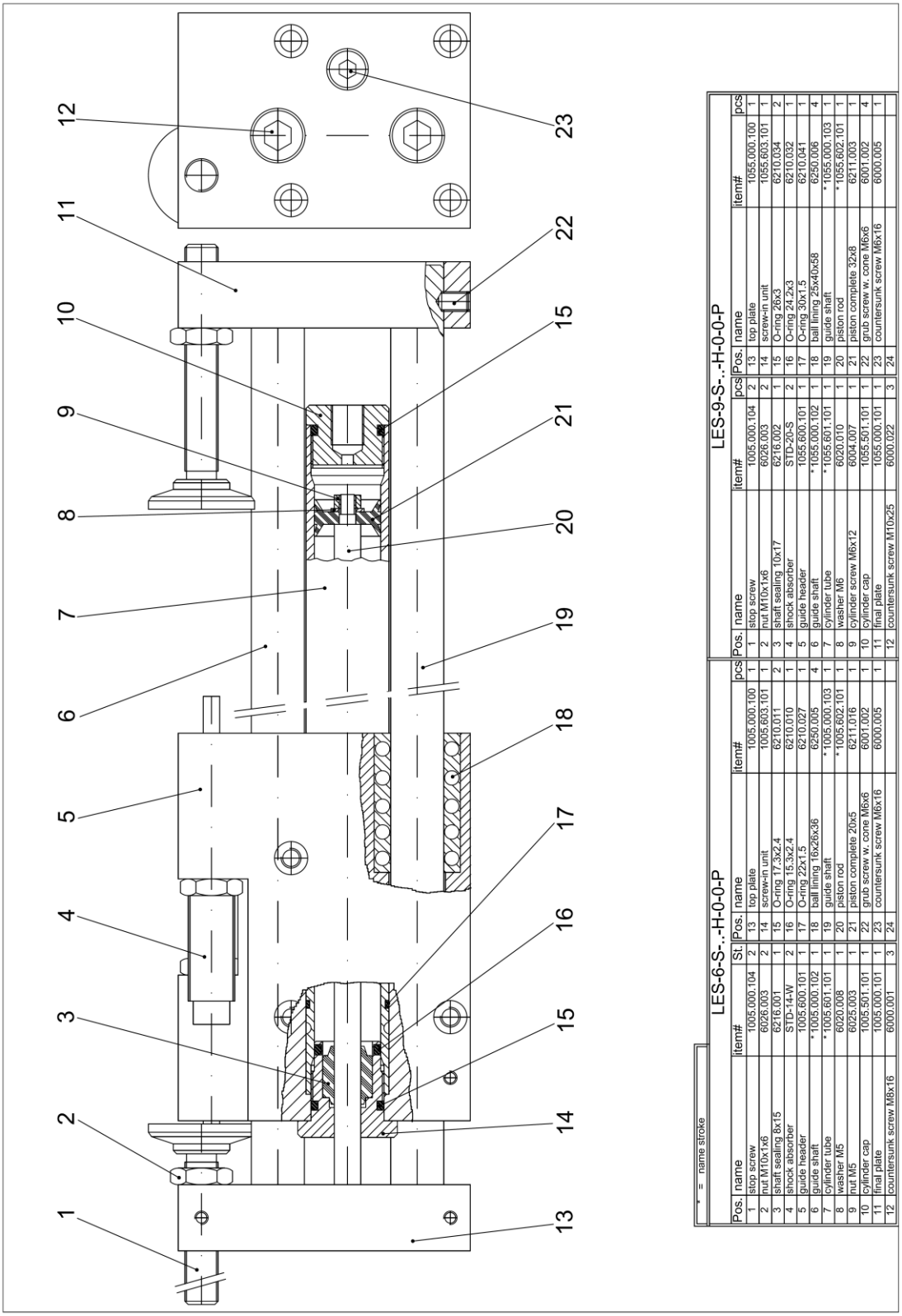
LE-6-N-..-P-0-0-P

Pos.	name	item#	pcs	Pos.	name	item#	pcs
1	grub screw with cone M8x60	6001.006	2	16	grooved ring 10x16x4	6213.005	4
2	screw-in unit	1400.602.101.02	3	17	damping piston	1000.605.101	1
3	shaft sealing 8x15	6216.001	3	18	guide bolt	1000.605.102	2
4	O-ring 16x1.25	6210.015	4	19	piston rod	*1000.603.101	1
5	guide header	1000.601.101	1	20	cylinder tube	*1000.602.101	1
6	guide shaft	*1000.000.104	1	21	piston	1000.603.102	1
7	limit spindle	*1000.000.101	1	22	grub screw with cone M6x6	6001.002	1
8	stop washer	1000.000.102	2	23			
9	nut M8x1x4	6027.004	3	24			
10	cylinder cap	1000.602.102	1	25			
11	countersunk screw M6x16	6005.002	4	26		1000.000.103	1
12	nut M8	6027.003	2	27	final plate	6254.003	2
13	top plate	1000.000.100	1	28	pressure pad 5x9.5		
14	guide shaft	*1000.000.105	1	29			
15	ball lining 12x19x28	6250.008	4	30			

LE-9-N-..-P-0-0-P

Pos.	name	item#	pcs	Pos.	name	item#	pcs
1	grub screw with cone M10x1x80	6001.007	2	16	grooved ring 17x25x5.5	6213.004	2
2	screw-in unit	1450.602.101	3	17	damping piston	1050.605.101	1
3	guide shaft 10x17	6216.002	3	18	guide bolt	1050.605.102	2
4	O-ring 24,8x1.5	6210.028	4	19	piston rod	*1050.603.101	1
5	guide header	1050.601.101	1	20	cylinder tube	*1050.602.101	1
6	guide shaft	*1050.000.104	1	21			
7	limit spindle	*1050.000.101	1	22	grub screw with cone M6x6	6001.002	4
8	limit washer	1050.000.102	2	23	support shim	1050.603.102	2
9	nut M10x1x6	6026.003	3	24	O-ring 8x1.6	6210.016	1
10	cylinder cap	1050.602.102	1	25	piston complete 25x8	6211.010	1
11	countersunk screw M8x20	6005.001	4	26	nut M8	6025.009	1
12	nut M10x1x6	6026.003	2	27	final plate	1050.000.103	1
13	top plate	1050.000.100	1	28	pressure pad 5x9.5	6254.003	2
14	guide shaft	*1050.000.105	1	29			
15	ball lining 20x28x30	6250.007	4	30			

LES-6 and LES-9



* = name stroke

LES-6-S-..-H-0-P

Pos.	name	item#	St.
1	stop screw	1005.000.104	2
2	nut M10x1x6	6026.003	2
3	shaft sealing 8x15	6216.001	1
4	shock absorber	STD-14-W	2
5	guide header	1005.600.101	1
6	guide shaft	* 1005.000.102	1
7	cylinder tube	* 1005.601.101	1
8	washer M5	6020.008	1
9	nut M5	6025.003	1
10	cylinder cap	1005.501.101	1
11	final plate	1005.000.101	1
12	countersunk screw M8x16	6000.001	3

Pos.	name	item#	pcs
13	top plate	1005.000.100	1
14	screw-in unit	1005.603.101	1
15	O-ring 17.3x2.4	6210.011	2
16	O-ring 15.3x2.4	6210.010	1
17	O-ring 22x1.5	6210.027	1
18	ball lining 16x26x36	6250.005	4
19	guide shaft	* 1005.000.103	1
20	piston rod	* 1005.602.101	1
21	piston complete 20x5	6211.016	1
22	grub screw w. cone M6x6	6001.002	1
23	countersunk screw M6x16	6000.005	1
24			

LES-9-S-..-H-0-P

Pos.	name	item#	pcs
1	stop screw	1005.000.104	2
2	nut M10x1x6	6026.003	2
3	shaft sealing 10x17	6216.002	1
4	shock absorber	STD-20-S	2
5	guide header	1055.600.101	1
6	guide shaft	* 1055.000.102	1
7	cylinder tube	* 1055.601.101	1
8	washer M6	6020.010	1
9	cylinder screw M6x12	6004.007	1
10	cylinder cap	1055.501.101	1
11	final plate	1055.000.101	1
12	countersunk screw M10x25	6000.022	3

Pos.	name	item#	pcs
13	top plate	1055.000.100	1
14	screw-in unit	1055.603.101	1
15	O-ring 26x3	6210.034	2
16	O-ring 24.2x3	6210.032	1
17	O-ring 30x1.5	6210.041	1
18	ball lining 25x40x58	6250.006	4
19	guide shaft	* 1055.000.103	1
20	piston rod	* 1055.602.101	1
21	piston complete 32x8	6211.003	1
22	grub screw w. cone M6x6	6001.002	4
23	countersunk screw M6x16	6000.005	1
24			

Fig. 9-1 Spare part list

9.2 Accessories

The following accessories are available from us for the linear units.

	LEM-6	LEK-6	LE-6	LES-6	LEM-9	LE-9	LES-9
Centering rings	ZR-6	ZR-6	ZR-6	ZR-6	ZR-9	ZR-9	ZR-9
Proximity switches	NSI-M8-K-50 NSI-M8-S-55	NSI-M8-K-50 NSI-M8-S-55	NSI-Q8-K-44 NSI-Q8-S-59	NSI-Q8-K-44 NSI-Q8-S-59	NSI-M8-K-50 NSI-M8-S-55	NSI-Q8-K-44 NSI-Q8-S-59	NSI-Q8-K-44 NSI-Q8-S-59
Cables for proximity switches	•	•	•	•	•	•	•
Shock absorbers	STD-8-S STD-10-S, for variant “MS”	STD-14-W	STD-14-W	STD-14-W	STD-14-W	STD-14-W	STD-20-S
Sideways stop system	•	-	-	-	•	-	-
Cover	Not for variant MS	•	-	•	Not for variant MS	-	•