

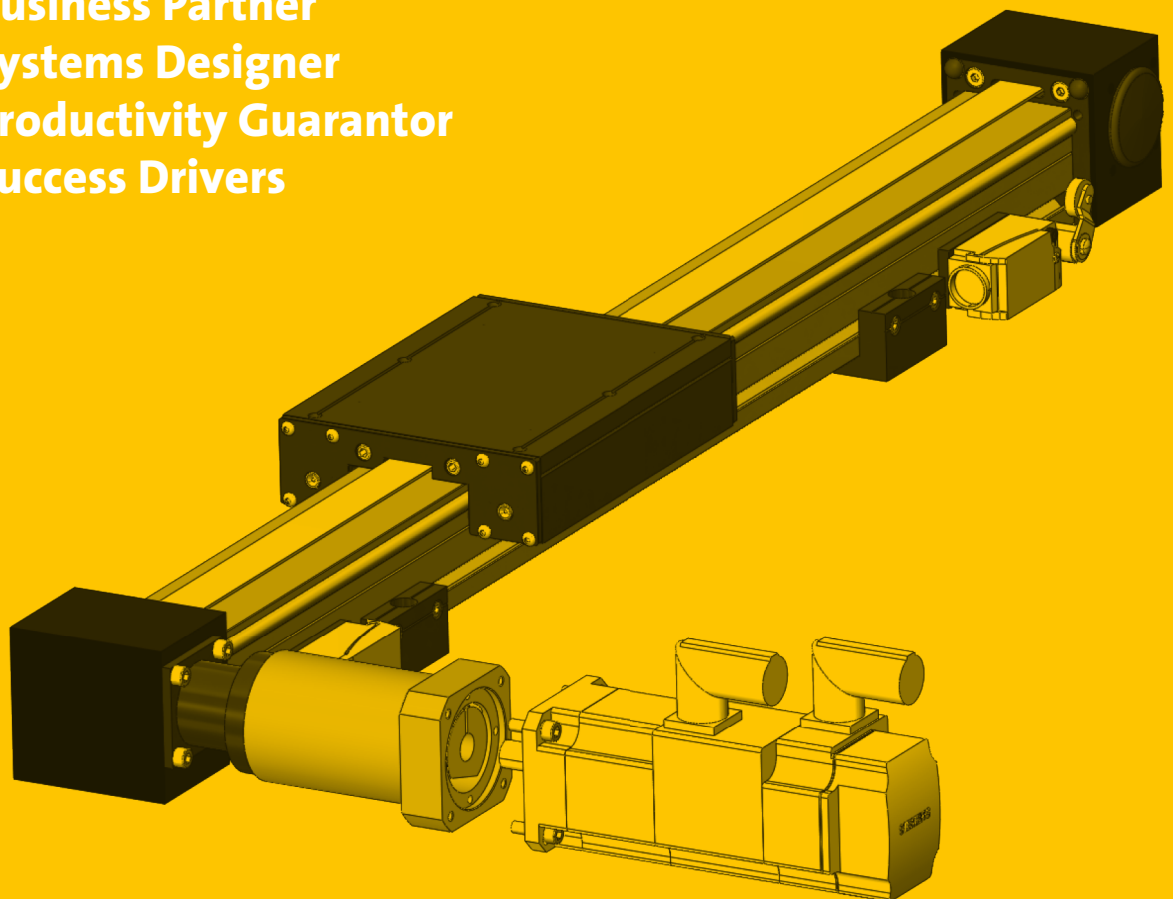
Assembly Instructions



The sum of the features makes the superiority.

A system's superiority is demonstrated by its day to day reliability in the most demanding production environments. max® GmbH's products and services ensure best suitability in the automation industry by outstanding support as

- Business Partner
- Systems Designer
- Productivity Guarantor
- Success Drivers



Assembly Instructions

Linear Units

Types

With timing belt drive

- axis type MZK 40/60/90
- axis type MZKD 40/60
- axis type MZV 60
- axis type MZKU 90
- axis type GZKR 90/120
- axis type GZKS 70/90/120
- axis type MZS 40/60/90
- axis type MZSO 60/90
- axis type MSP 60 (+pneumatic)

With pneumatic drive

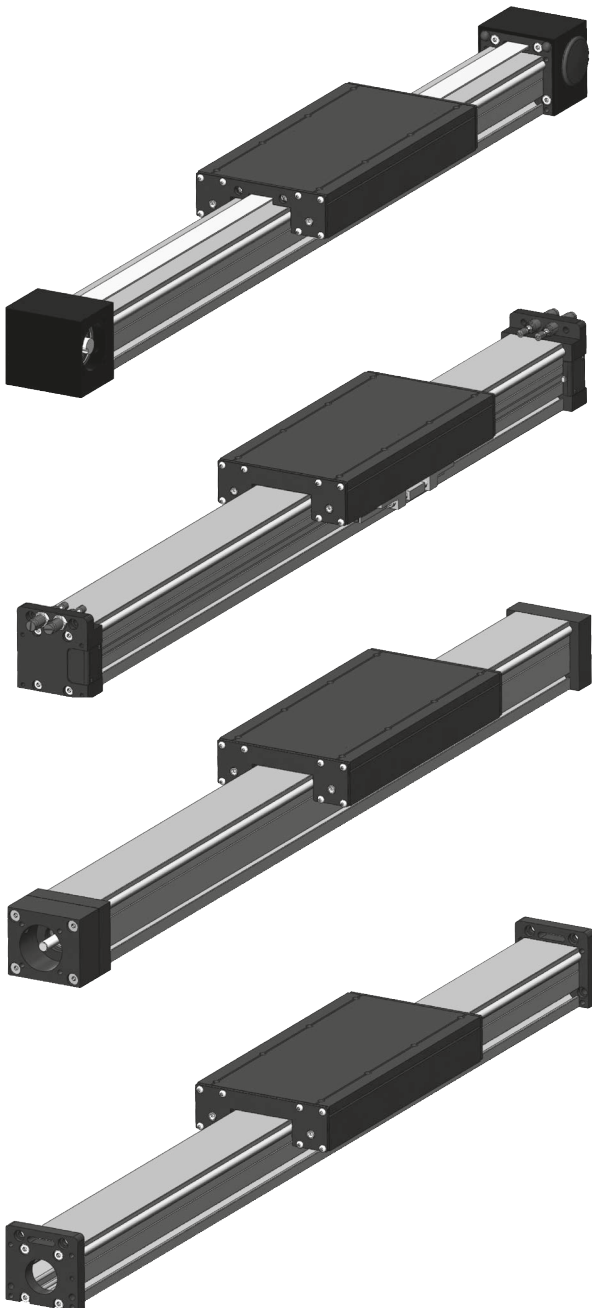
- axis type MP 60

With spindle drive

- axis type MKR 60
- axis type MTR 60
- axis type MTRL 60

Without drive

- axis type MO 40/60/90
- axis type GOR 90/120
- axis type GOS 70/90/120



max® GmbH
Rotäcker 9
D-88271 Wilhelmstadt

Phone +49 (0) 75 03 / 12 13
Fax +49 (0) 75 03 / 12 17

E-Mail info@max-gmbh.com
Internet www.max-gmbh.com

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1.o		Predecessor document
2.o.doc	28.07.2011	Document updated regarding new machinery directive (MRL 2006/42/EC)
3.o.doc	01.05.2018	Document updated regarding new or no longer available products and regarding new ex-protection-standard

On these instructions

The present instructions apply for the following linear axes:

With timing belt drive and roller guide

- axis type GZKR 90/120 with drive at the axis head (closed version)
- axis type MZK 40/60/90 with drive at the axis head (open version)
- axis type MZKD 40/60 with counter-running carriage
- axis type MZV 60 with covered timing belt
- axis type MZKU 90 with two timing belt drives at the axis heads
- axis type MZS 40/60/90 with drive at the carriage
- axis type MZSO 60/90 double axis with drive at the carriage
- axis type MSP 60 with drive at the carriage and pneumatic cylinder

With timing belt drive and rail guide

- axis type GZKS 70/90/120 with timing belt drive and rail guide

With pneumatic drive and roller guide

- axis type MP 60 pneumatic drive

With spindle drive and roller guide

- axis type MKR 60 drive via ball roller spindle
- axis type MTR 60 drive via trapezoid thread spindle
- axis type MTRL 60 drive via spindle with right-left-hand thread

Without drive

- axis type MO 40/60/90 with roller guide
- axis type GOR 90/120 with roller guide
- axis type GOS 70/90/120 with rail guide

Table of Contents

Linear units	1
1. Safety Notes	5
1.1. Safety	5
1.2. Definition of warning notes	5
1.3. General warning notes	5
1.4. Special danger notes	6
1.5. General Safety	6
2. Intended use	7
3. Users benefits from the linear axes with roller guides	8
4. Technical Data	9
5. Technical data timing belt drive	11
6. Technical structure of the linear axes	12
6.1. Carrier profiles	12
6.2. Profile weights	12
6.3. Guide rods	12
6.4. Guide carriage	12
6.5. Adapter plate	12
6.6. Axis head MZK	13
6.7. Drive block MZS	13
6.8. Flange and couplings (accessories)	13
6.9. Planetary gear	14
7. Maintenance intervals	15
8. Setting the timing belt tension of the MZK axis	15
9. Setting the timing belt tension for the MZS/MSP axis	16
10. Setting the timing belt tension for the GZKR/GZKS axis	16
11. Lubricants and tools	18
12. Linear modules with threaded spindle	18
13. Spare part components linear axes	20
13.1. Load profile complete Pos 1	20
13.2. 2 Pcs. adapter plate Pos 2 (for all axes)	20
13.3. Axis head MZK/MZV/GZK/SZK complete Pos 3	20
13.4. Axis head MZS cpl. Pos 4	20
13.5. Carriage complete Pos 5	21
13.6. Timing belt Pos 6	21
13.7. Pneumatic cpl. Pos 7.0 – 7.6	21
14. Accessories	21
15. Gear 27	27
15.1. Transmissible torque from motor to gear input	27
15.2. Motor construction	27
15.3. Note	28
16. Use in explosion-risk areas	28
17. Transport and Storage	31
18. Installation declaration	32
19. Problem solving	33
20. Notes	34

1. Safety Notes

1.1. Safety

The assembly instructions are part of the linear axes and always have to be kept ready for reference at all times. The instructions must be passed on as well if the linear axes are passed on.

Always contact the manufacturer, if something in the assembly instructions is not perfectly clear.

1.2. Definition of warning notes



Warning

Indicates a potentially dangerous situation. Non-observance of the safety provisions may lead to death or serious injury.



Caution

Indicates a potentially dangerous situation. Non-observance of the safety provisions may lead to property damage or injury.



Provides additional information

1.3 General warning notes

Commissioning of the linear axes must only be performed by specialist staff who received safety-technical instruction and is able to estimate potential danger. Additionally, all chapters of these assembly instructions must have been read and understood completely.



Warning

When using linear axes in other than horizontal applications, the carriage or carrier profiles may move independently by their dead weight, e.g. when the motor or compressed air is switched off (or at unpacking).
At a vertical installation position, use of a parking brake or pneumatic load compensation is required.



Caution

Linearmodules generally must be operated in connection with suitable safety faces (e.g. safety cell, protective space, protective enclosure, light curtain).
Unprotected operation is not permissible.



Caution

The permissible timing belt and spindle forces must not be exceeded. See tables page 11. This may occur, e.g. at excessive motor acceleration or emergency stop deceleration. Only use the original timing belt by max®GmbH.



Caution

Our planetary gears are connected to the drive shaft with a coupling aligned with the permissible torques. Therefore, only use original couplings and flanges. Never exceed the torque of the selected coupling. See couplings table, see page 14.



Observe the installation instructions (see section installation declaration, page 32).

1.4 Special danger notes

This original assembly instruction also contains the following special danger notes:



Danger from crushing

In this position of the components, there is a danger of crushing of limbs in operation.

1.5 General Safety

Technical condition of the linear systems

The linear systems correspond to the current state of the art and the applicable provisions, on this, see page 32 (installation declaration).

Time of commissioning

The linear axis must only be taken into operation once the machine or system into which it is installed complies with the following directives, laws, ordinances and standards:

- relevant accident prevention provisions
- generally recognised safety-technical rules
- EU-directives
- other applicable standards
- country-specific provisions

Safe operation

For safe operation, observe the following documentation:

- present assembly instructions of the linear unit, in particular the technical data
- operating instructions of the overall system

2. Intended use

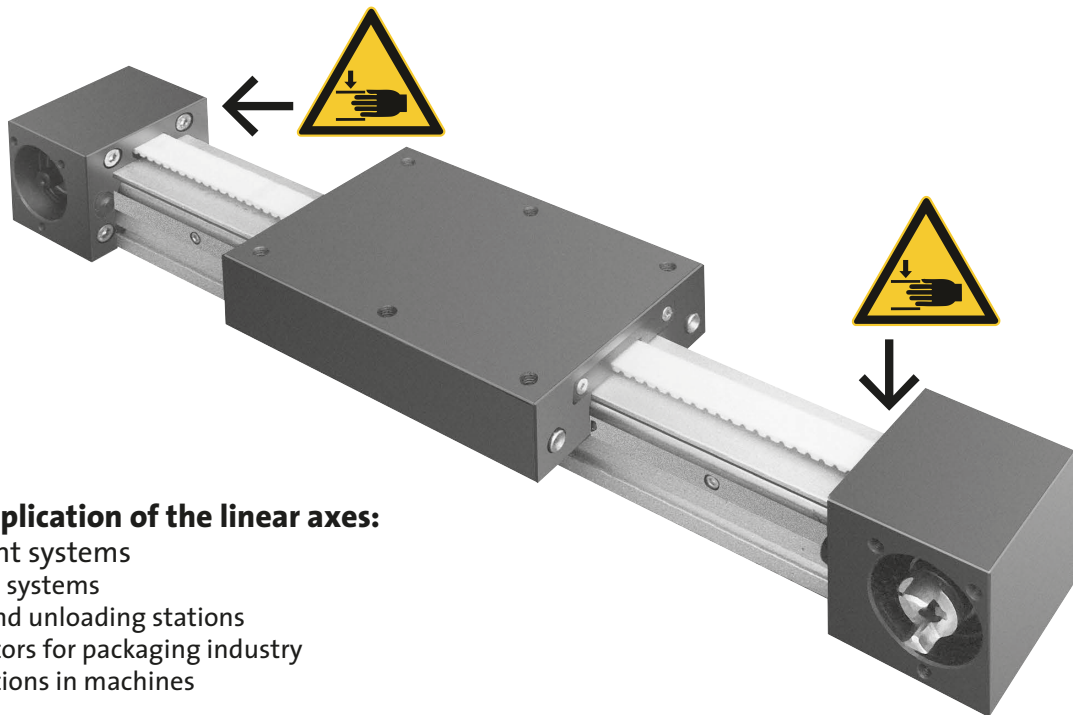
Linear axes are guide units without drive or with integrated drive. They serve as operating equipment for use in an industrial environment. Special designs for other environments are available (e.g. corrosion protection, explosion protection).

The linear axes must not be changed in their construction or safety devices without our written approval.

When using special components, the assembly provisions of the manufacturer must be observed.

The manufacturer shall not be liable for any non-intended use and any damage resulting from this. The risk shall be solely with the user. Intended use also includes observance of the assembly instructions.

Figure 1: timing belt axes



Areas of application of the linear axes:

- Equipment systems
- Palletising systems
- Loading and unloading stations
- Manipulators for packaging industry
- Other motions in machines
- etc.

2.1 Reasonably expected misuse

Linear axes are not suitable for certain application cases, transport of persons and animals and as a pressing and bending device for cold processing of metal.

Linear axes also must not be used in special application areas like chemistry, foodstuffs or explosive area without any additional measures. Work with the usual safety factors.

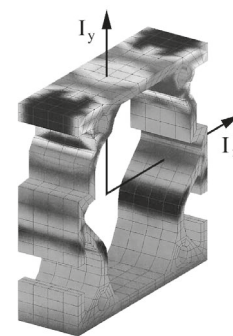
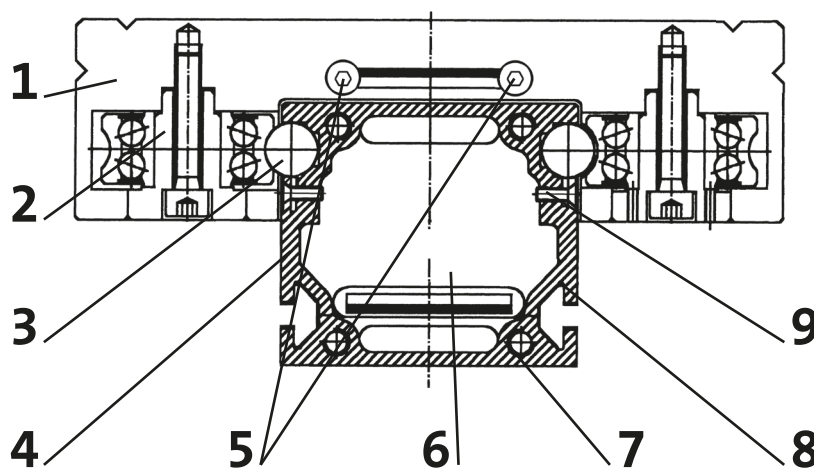
In doubt, ask our specialist staff at service- hotline +49 (0) 75 03 / 12 13

3. Users benefits from the linear axes with roller guides

High mechanic resilience of the axis and carriage at high repetitive accuracy are decisive for the successful use of linear axes.

max® components are precisely aligned with each other and can be combined in systems easily and cost-efficiently. You will receive all components from a single source – interface problems are avoided.

max® components meet the highest demands regarding quality and easy assembly.



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Typ	I_x 10F mmE	I_y 10F mmE
040	1,3	1,5
060	6,4	6,1
090	20,1	25,2

moment of inertia

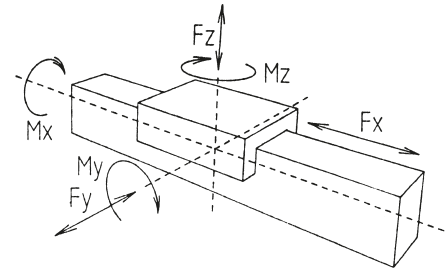
High resilience and precision:

1. Very massive carriagemodel to prevent lateral bending open of the ledge shanks
2. Eccentric elements permitting play-free adjustment of the felt-wiper protected rollers
3. Guides placed in the most stable position, preventing compression of the profile. Beneficial torque absorption by large guide distance
4. Optimised axis profile at low weight via finite element calculation up to a length of 7m
5. Carriage adjustable in length via belt receptacle
6. Highest motion accuracy by AT-timing belt with steel insert or spindle drive
7. Prevention of deformation because support area continually supported
8. Attachment grooves for aluminium profile systems
9. Precision guide screwed in along the entire length
10. Low maintenance and repair effort

4. Technical Data

Interface loads (dynamic)

$$\left(\frac{F_y}{F_y(\max)} + \frac{F_z}{F_z(\max)} + \frac{M_x}{M_x(\max)} + \frac{M_y}{M_y(\max)} + \frac{M_z}{M_z(\max)} \right) \leq 1$$



Axis profile	Carriage mm	Rollers	For horizontal load*	Fx (max) N	Fy N	Fz N	Mx Nm	My Nm	Mz Nm
MZ 40	100	4	10 kg	700/1150**	1200	930	20	20	40
	150							30	60
	250							50	100
MZ 60	115	4	50 kg	1150/2100**	2500	1600	43	70	100
	150							90	130
	200							120	170
	300	6			3100	2200	54	180	250
	500	8					65	300	400
MZ 90	200	4	200 kg	2100/5200**	6500	3800	190	250	500
	300							375	600
	400	6	300 kg		8500	5000	240	550	800
	500							700	1000

* reference values

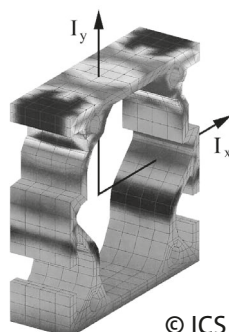
** see (catalogue page 11)

F_x (nominal) = F_x (max) / 2

Carriage loads are reference values; speed and acceleration referring to the specific load case are decisive.
We will gladly consult you.

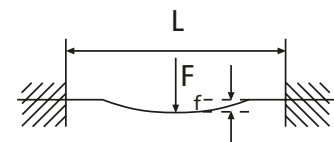
Type	I _x 10 ⁵ mm ⁴	I _y 10 ⁵ mm ⁴
MZ 40	1,3	1,5
MZ 60	6,4	6,1
MZ 90	20,1	25,2

moment of inertia



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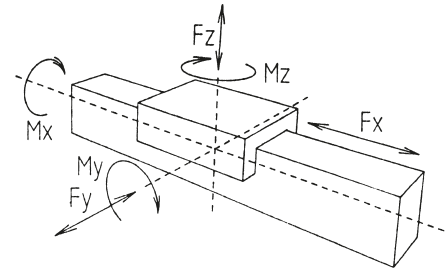
$$f = \frac{F \cdot L^3}{E \cdot I \cdot 192}$$



f = bend (mm)
F = load (N)
L = free length (mm)
E = elasticmodulus 70000 (N/mm²)
I = inertia (mm⁴)

Carriage forces (dynamic) for closed axes

$$\left(\frac{F_y}{F_y(\max)} + \frac{F_z}{F_z(\max)} + \frac{M_x}{M_x(\max)} + \frac{M_y}{M_y(\max)} + \frac{M_z}{M_z(\max)} \right) \leq 1$$



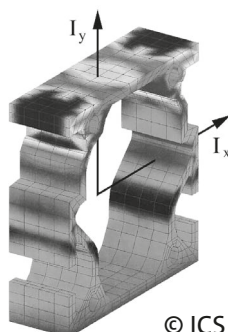
Axis profile	Carriage mm	Rollers	For horizontal load*	F _x (max) N	F _y N	F _z N	M _x Nm	M _y Nm	M _z Nm
GZKR 90	250	6	50 kg	4160	3100	2200	18	80	120
GZKR 120	300	4	200 kg	4160	6500	3800	40	250	450
	400	6	300 kg	4160	8500	5000	50	400	600

Axis profile	Carriage mm	Rail carriages	for horizontal load*	F _x (max) N	F _y N	F _z N	M _x Nm	M _y Nm	M _z Nm
GZKS 70	200	2	75 kg	2500	3700	5000	200	250	250
GZKS 90	250	1	100 kg	4160	7500	10000	300	300	300
GZKS 120	300	4	200 kg	4160	15000	20000	500	800	800

* reference values

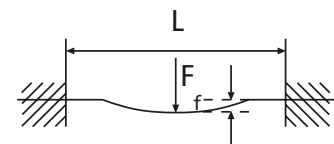
Carriage loads are reference values; speed and acceleration referring to the specific load case are decisive.
We will gladly consult you.

Type	I _x 10 ⁵ mm ⁴	I _y 10 ⁵ mm ⁴
GZKS 70	8,4	12,2
GZK 90	18,7	29,3
GZK 120	25,2	70,5



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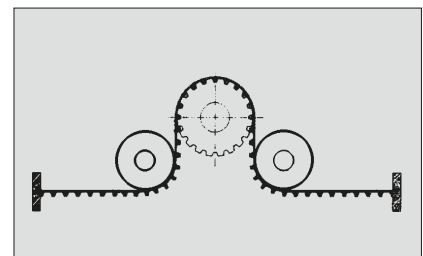
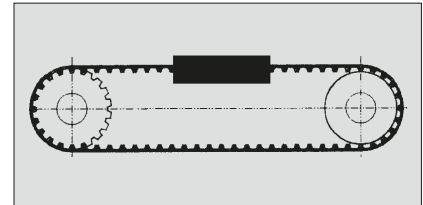
$$f = \frac{F \cdot L^3}{E \cdot I \cdot 192}$$



f = bend (mm)
F = load (N)
L = free length (mm)
E = elasticmodulus 70000 (N/mm²)
I = inertia (mm⁴)

5. Technical data timing belt drive

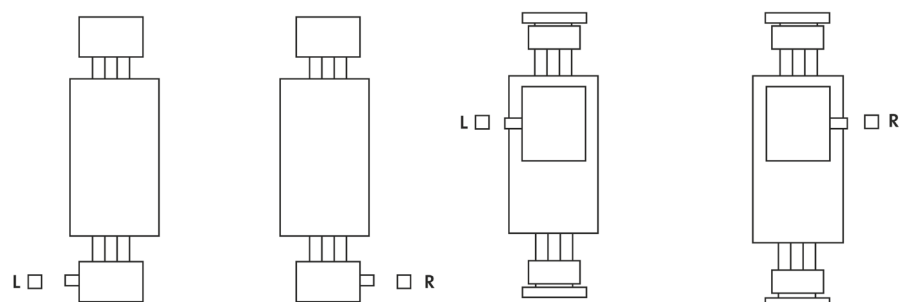
Axis	Belt width	Pitch	Max. traction load F _x
MZK 040	16 mm	5 mm	700 N
MZK 060	25 mm	5 mm	1150 N
MZK 090	50 mm	10 mm	5200 N
GZKS 070	32 mm	10 mm	2500 N
GZKS 090	50 mm	10 mm	4160 N
GZKS 120	50 mm	10 mm	4160 N
MZS 040	16 mm	5 mm	700 N
MZS 040.1	25 mm	5 mm	1150 N
MZS 060			
MSP 060			
MZS 060.1	50 mm	10 mm	2100 N
MSP 060.1			
MZS 090			
MZS 090.1	50 mm	10 mm	5200 N



$F_x (\text{nominal}) = F_x (\text{max}) / 2$

Axis	perimeter pulley	diameter pulley	basic resistance Nm	max. torque Nm	Speed at 1000 r/min at pulley	Speed at 600 r/min at pulley
MZK 040	100 mm	31,8 mm	0,3 Nm	10 Nm	1,67 m/s	1,0 m/s
MZS 040			0,7 Nm			
MSP 040			0,6 Nm			
MZK 060	130 mm	44,1 mm	0,9 Nm	17 Nm	2,17 m/s	1,3 m/s
MZS 040.1			0,9 Nm			
MZS 060			0,9 Nm			
MSP 040.1			0,9 Nm			
MSP 060			0,9 Nm			
MZS 060.1	200 mm	63,6 mm	1,1 Nm	60 Nm	3,33 m/s	2,0 m/s
MSP 060.1			1,1 Nm	60 Nm		
MZS 090			0,9 Nm	120 Nm		
MZK 090			0,9 Nm	120 Nm		
MZS 090.1			1,4 Nm	60 Nm		
GZKS 070	170 mm	54,1 mm	0,9 Nm	60 Nm	2,83 m/s	1,7 m/s
GZKR 90/120	200 mm	63,6 mm	0,9 Nm	120 Nm	3,33 m/s	2,0 m/s
GZKS 90/120			1,5 Nm			

Motor position



6. Technical structure of the linear axes

6.1. Carrier profiles

Extruded profile pursuant to DIN 1748 from ALMGSI 0.5 anodized E6/EV1.
Straightness longitudinally: 0.3mm/1000mm
Levelness (twist): 0.3mm/1000mm

6.2. Profile weights including guiding shafts or rails

■ Type MO MZK, MZS 40:	2,2 kg/m
■ Type MO, MZK, MZS 60:	4,0 kg/m
■ Type MO, MZK, MZS 90:	8,1 kg/m
■ Type MZKD 40:	4,2 kg/m
■ Type MP, MSP, MZKD 60:	7,8 kg/m
■ Type GZKS 070, GOS 070:	6,8 kg/m
■ Type GZKR, GOR 90:	9,4 kg/m
■ Type GZKR, GOR 120:	13,0 kg/m

6.3. Guide rods

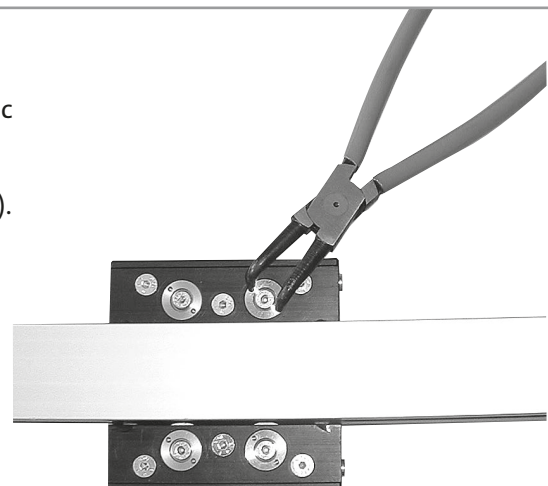
The guide rods (hardened and polished steel shafts) are inserted and screwed in the carrying profile.
They can be turned or replaced if worn out.

Option: corrosion-protected shafts (.3)

6.4. Guide carriage

Massive carriage to take up high forces (values page 9)
Suspended on 4, 6 or 8 rollers.
The rollers can be set play-free with circlips tongs at the eccentric element after opening of the screw. The max. pre-tension is achieved when the carriage can still be moved easily by hand.
Then the screw must be tightened again (see figure on the right).

Option: corrosion-protected rollers (.3)
The inner extraction thread is used for removal of the runners.



Setting at the eccentric element

6.5. Adapter plate

End plate with rubber points as emergency stop screwed on either side of the supporting profile – not suitable for continuous operation.

For pneumatic axes, an end position buffer must be provided. The end plates have 2 threaded bores M12 x 1 each for shock absorber installation.

6.6. Axis head MZK

Screwed on an adapter plate (see 6.5) for head-driven axes, single-part drive shaft with integrated pulley – axially fastened with circlips.

6.7. Drive block MZS

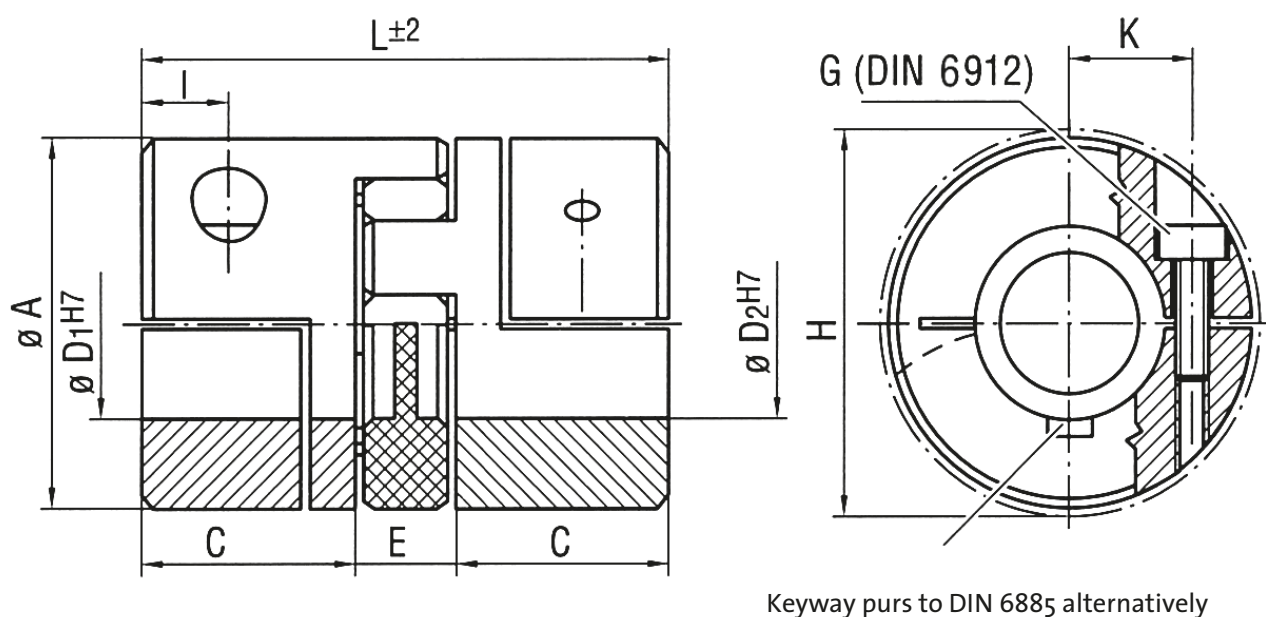
Screwed on the carriage for carriage-driven axes, single-part drive shaft with integrated pulley – axially fastened with circlips. Pulley idlers for Omega deflection integrated. All shafts with ball bearings.

6.8. Flange and couplings (accessories)

Flange and coupling serve for precise and play-free connection of the drive and gear shafts. In original spare parts, the flange length was selected for the coupling to be completely supported on the shaft stubs and for correct installation. There is a bore in the axis head or drive block to access the coupling screw. The coupling consists of two clamp parts, partially with a keyway and a buffer and plastic compensation part between (sprocket).

Please observe the following table. The torques must not be exceeded. Work with the usual safety factors of 1.5 (for light impact) to 2.5 (for hard impact).

Option: Ex-protection



		MKU 40 MKU 60	MKU 60.1 MKU 90	MKU 90.1	MKU 120
Max. torque (Nm) TKN(98Sh A)		12,5	17	60	160
Inertia (10 ³ kgm ²) J per hub		0,0055	0,035	0,143	0,332
Screw torque (Nm)MA		1,5	11	11	25
Mass per hub (approx .kg) m		0,021	0,067	0,143	0,225
Max. speed at V = 30m/s (min ⁻¹) nmax		13000	10000	7000	6000
L		35	66	78	90
A		30	40	55	65
C		11	25	30	35
ØD ₁ ^{H7} / ØD ₂ ^{H7}	min	5	8	10	14
	max	16	20	28	38
K		11	14,5	20	24,5
E		13	16	18	20
I		5	12	10,5	11,5
GF (DIN 912)		M3	M6	M6	M8
H (interference diameter)		32,2	46	57	71

PF = keyway (motor-side option)

6.9. Planetary gear

Single- or two-stage design (two-stage as of i = 15). Protection type IP 64 at correct assembly of the closing plug in the adapter plate.

Observe the technical data listed in the catalogue and do not exceed them. Observe the attachment provisions and degrease the motor shaft before assembly so that the motor can fully transfer its torque to the gear.

The gears are filled with grease (service life-time lubrication)

Option: grease suitable for use in the foodstuffs area

Option: Ex-protection for type MPD

7. Maintenance intervals



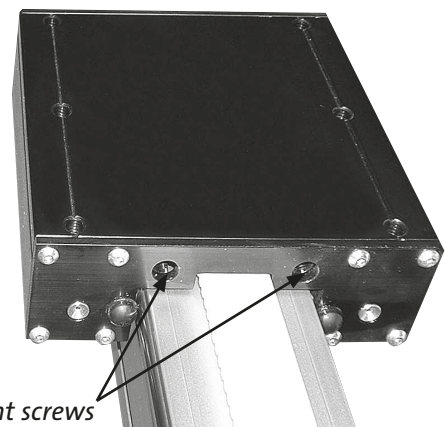
Caution

Maintenance, lubrication and repairs must only be performed by specialists who have read and understood the assembly instructions.
Only use original spare parts, or max® GmbH cannot assume any warranty.

Pos.	Part	weekly	monthly	annually	Mileage	Comment
1	Roller guides of the linear axes				50.000 – 100.000 km	
2	Rail guides of the linear axes				20.000 km	then replacement of lubrication elements
3	Check carriage play, if required adjust eccentric elements			■		depending on load at once at overload
4	Check timing belt tension, adjust if required		■			depending on load
5	Lubrication of felts		■			with max-oil
6	Wiping the guide shafts	■				with oiled rag
7	Check pneumatic tightness		■			

8. Setting the timing belt tension of the MZK-axis

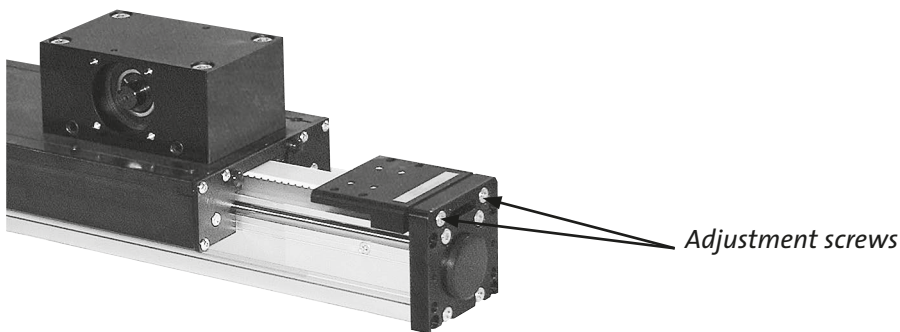
1. The timing belt can be tensioned on either front of the carriage.
2. Push carriage to an end position.
3. Turn the two threaded pins (front of carriage) clockwise to tension the timing belt.
Caution! Both threaded pins must be turned by the same number of turns.
4. Check belt tension with commercially available tensionmeter. The belt must only be tensioned until the carriage can still be easily moved by hand.
5. Axis positions may have to be re-programmed.



Adjustment screws

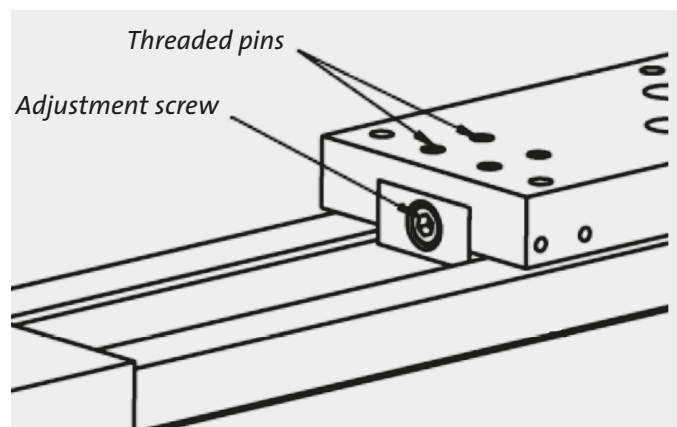
9. Setting the timing belt tension for the MZS / MSP axis

1. The timing belt can be tensioned at one front of the axis.
2. Push carriage to an end position.
3. Evenly tension timing belt by the tensioning screws of the adapter plate.
4. Check that the tension plate is parallel to the adapter plate.
5. Check belt tension with commercially available tensionmeter
6. Tighten counter nuts
7. Axis positions may have to be re-programmed



10. Setting the timing belt tension for the GZKR/GZKS axis

1. The timing belt can be tensioned on either front of the carriage
2. Push carriage to an end position
3. Loosen the threaded pins (top of carriage)
4. Turn the adjustment screw (front of carriage) clockwise to tension the timing belt.
5. Check belt tension with commercially available tensionmeter. The belt must only be tensioned until the carriage can still be easily moved by hand.
6. Tighten threaded pins
7. Axis positions may have to be re-programmed



Technical Belt data:

Timing belt	Timing distance	Axis type	Weight per meter	Permissible belt tension* / N	Pretension / N+/-10% (default)	Breakage load / N
16 mm	5 mm	MZK 040 MZS 040	48 g	700*	300	5500
25 mm	5 mm	MZK 060 MZS 060 MSP 060	75 g	1150*	600	9180
50 mm	10 mm	MZS 060.1 MSP 060.1 MZS 090	300 g	2100*	1200	19150
50 mm	10 mm	MZS 090.1 MZK 090	300 g	5200*	1800	41350
50 mm	10 mm	GZK 090 GZK 120	300 g	4160*	1800	33000
32 mm	10 mm	GZKS 070	190 g	2500*	1100	26000

* Observe the usual safety factors in engineering!

11. Lubricants and tools

We recommend use of the following lubricants and tools to lubricate and set and guide shafts and rollers:

- max®-Öl Omega 580, very good adhesion, food-compliant purs. to FDA
- max®-Öl spindle grease o85, highly stable, food-compliant purs. to FDA (for trapezoid and ball roller spindles)
- ball bearings and gears are life-time lubricated
- oil press for the hopper lubrication nipple at the carriage
- eccentric key or circlips tong

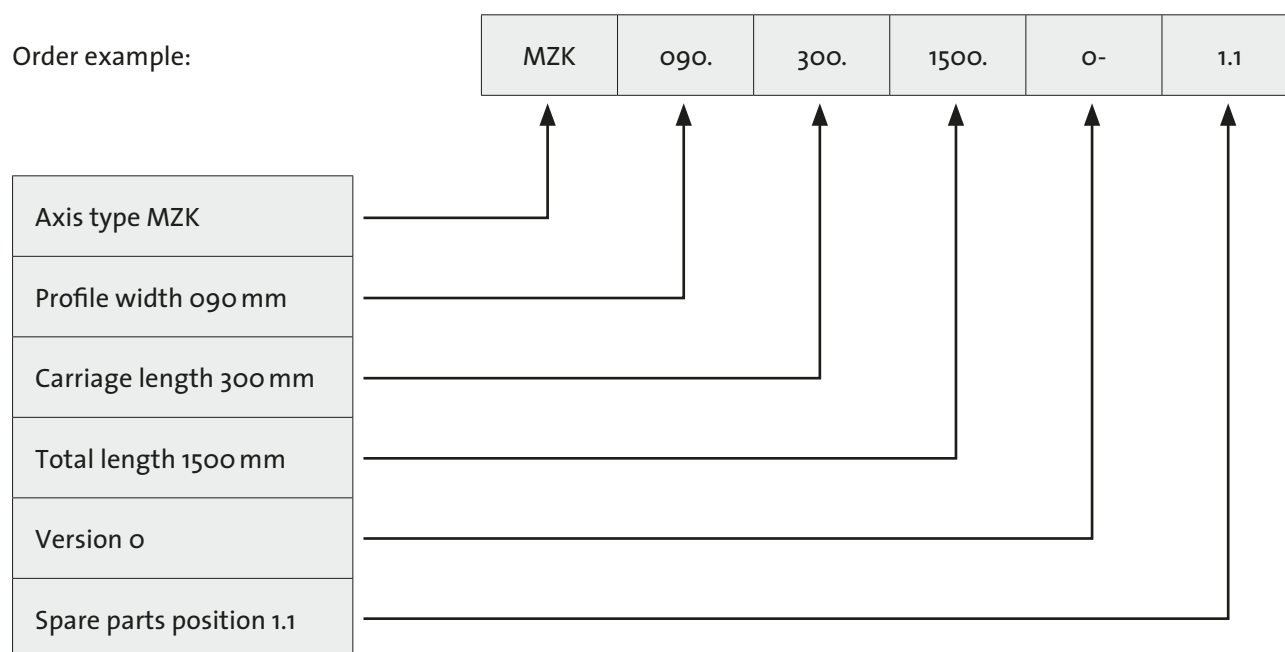
12. Linear modules with threaded spindle

- max® linearmodules with spindle drive are suitable for generation of precise drivingmotions (ball roller spindles) and for adjustment and re-equipment tasks (trapezoid thread spindles). Use for high forces, e.g. as press-in spindles, is not intended.
- The threaded spindles are designed as ball roller spindles (linearmodule type MKR) or trapezoid thread spindles (linearmodule Type MTR) made of Cf 53, hardness HRC 60 +/-2.
- **Efficiency and speed range:**
Ball roller spindle at pitch 10mm: approx. 90 %
Trapezoid thread at pitch 4 - 5mm: approx. 20 %
- **Application:**
The high efficiency of ball roller spindles leads to low heating only. Therefore, they are suitable for continuous operation and constant precision because they cause only low hear expansion.
Trapezoid threaded drives are preferred for adjustment units. They have a high area press-on surface and good self-inhibition due to their low efficiency.
- **Accuracy:**
Pitch accuracy (essential for absolute accuracy) is 0.052 mm / 300 mm spindle length (ball roller spindle).
Repeat accuracy depends on the resolution of themotor and is at up to +/- 0.02 mm/m stroke.
- **Lubrication:**
max® grease Omega o85 MF, highly stable, food-compliant purs. to FDA.

Lubrication is performed directly at the spindle with a brush after loosening of the steel covering tape.

- Relubrication is required every 500 to 1000 operating hours. The actual movement time of the axis is decisive here, so that relubrication is not necessary for a very long time in many cases. Old grease must be removed before relubrication. A special sleeve is required for disassembly of the nut to prevent the ball from falling out (ball roller spindle only).

13. Spare part components linear axes



13.1 Load profile complete

Pos 1

1 pc. load profile.	Pos 1.1
2 pcs. guide shafts	Pos 1.2

13.2 2 pcs. adapter plate

Pos 2 (for all axes)

13.3 Axis head MZK / MZV / GZK / SZK complete

Pos 3

2 pcs. axis head	Pos 3.1
2 pcs. drive shaft	Pos 3.3
4 pcs. safety ring	Pos 3.4
4 pcs. grooved ball bearing	Pos 3.5
2 pcs. fixed bearing MKR	Pos 3.6
1 pcs. floating bearing	Pos 3.7

13.4 axis head MZS cpl.

Pos 4

1 pc. drive block	Pos 4.1
2 pcs. deflection unit cpl.	Pos 4.2
1 pc. drive shaft	Pos 4.3
2 pcs. safety ring	Pos 4.4
2 pcs. grooved ball bearing	Pos 4.5

13.5 carriage complete

Pos 5

1 pc. basic body (partially several parts)	Pos 5.1
4/6/8 pcs. eccentric element with screw	Pos 5.2
4/6/8 pcs. runner	Pos 5.3
4 pcs.wiper felts with key.	Pos 5.4
Tappet (for internal drive elements).	Pos 5.5
Guide carriage (for rail guide).	Pos 5.6
Lubrication felt for guide carriage.	Pos 5.6.1

13.6 Timing belt

Pos 6

2 pcs. timing belt clamp	Pos 6.1
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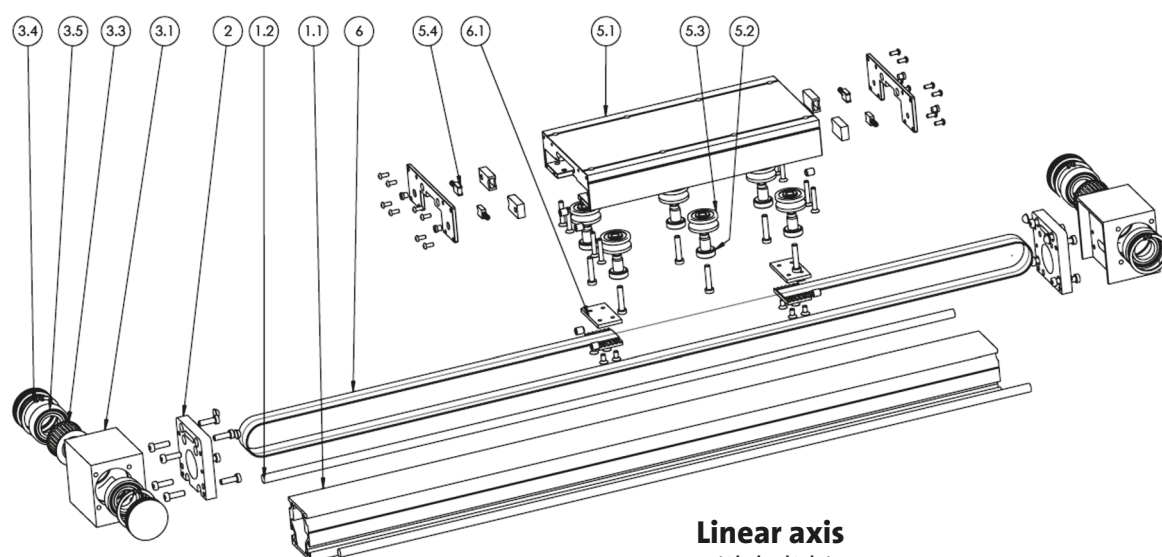
13.7 Pneumatic cpl.

Pos 7.0 – 7.6

1 piston with seals	Pos 7.0
1 pc. sealing tape	Pos 7.1
1 pc. masking tape	Pos 7.2
1 pc. tape clamp.	Pos 7.3
2 pcs. O-Ring set for Pos. 2	Pos 7.5
2 pcs deflecting wiper formasking tape	Pos 7.6

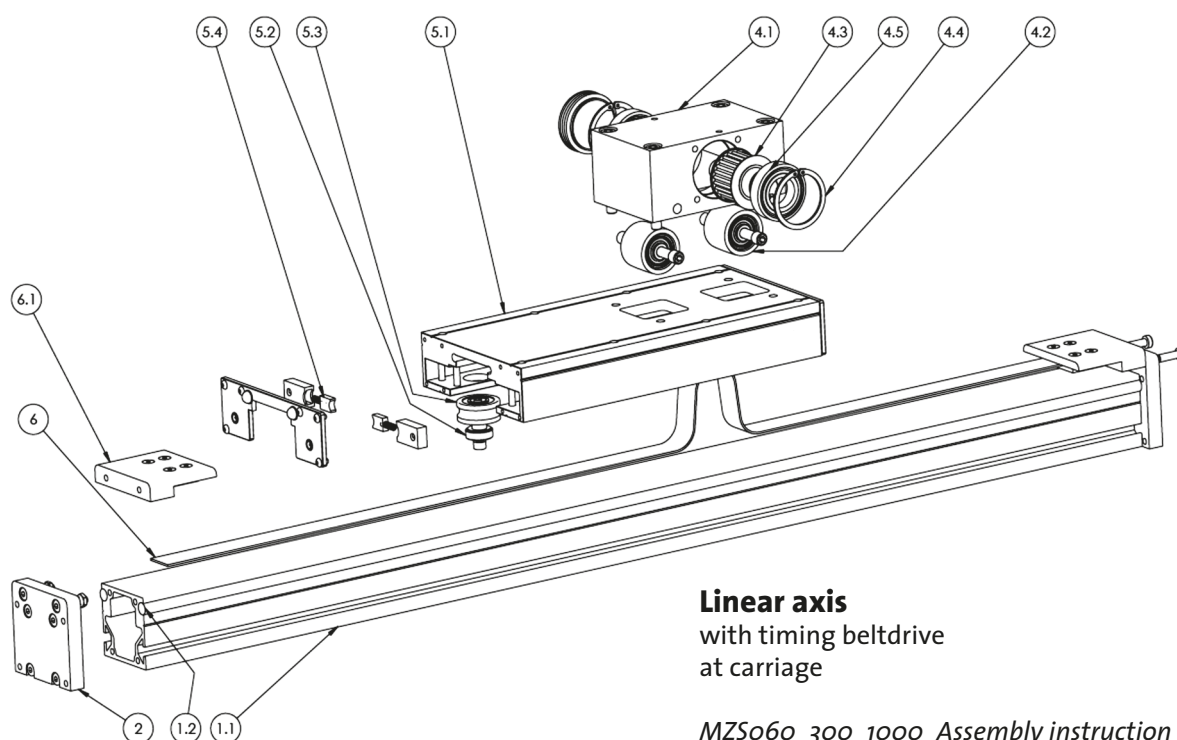
14. Accessories

For designations for the accessories, like attachment brackets, initiators, connection elements, etc., see the catalogue.



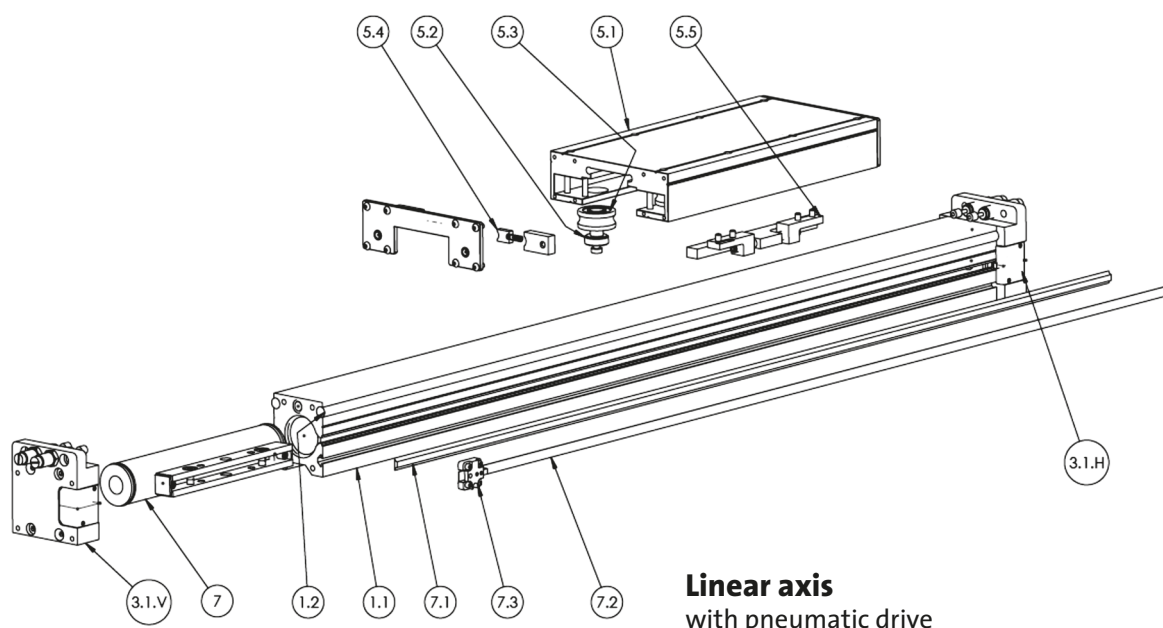
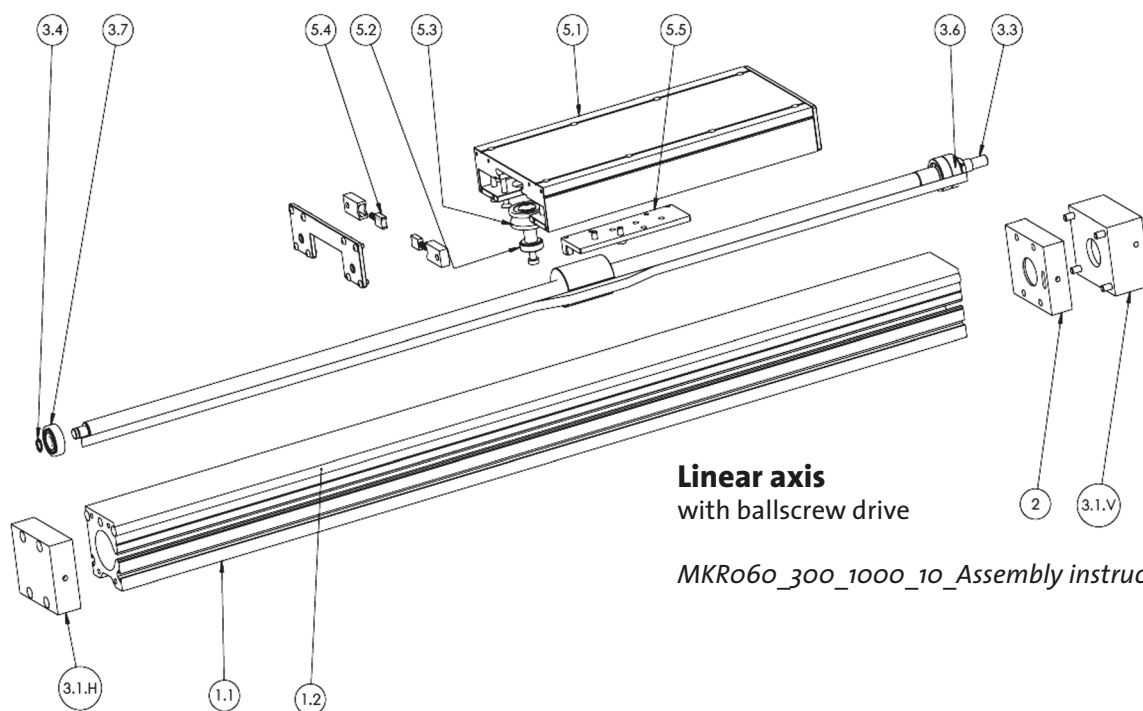
Linear axis
with belt drive
at axis head

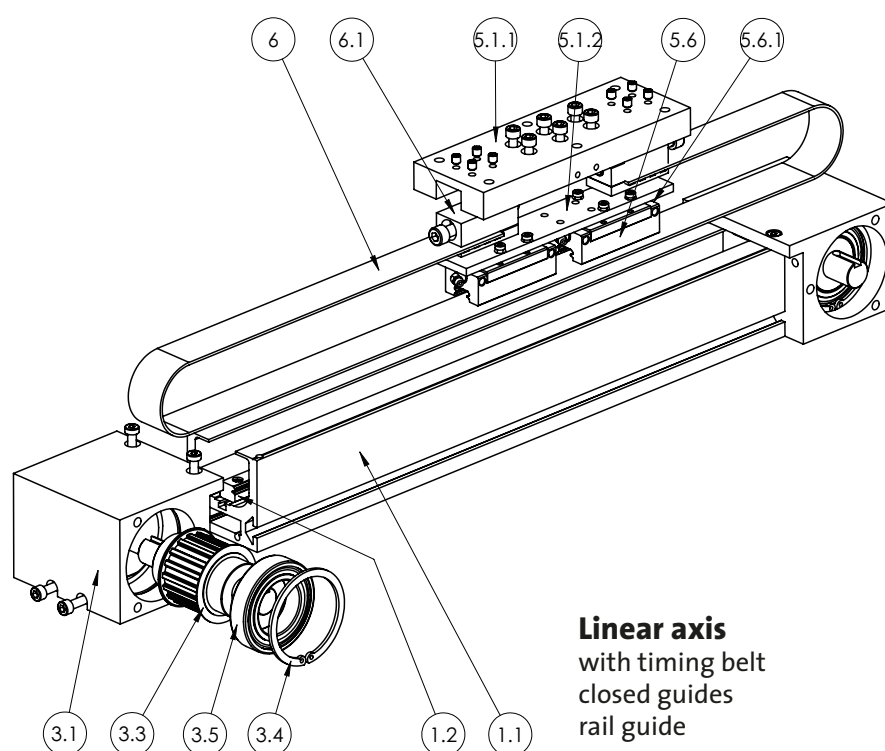
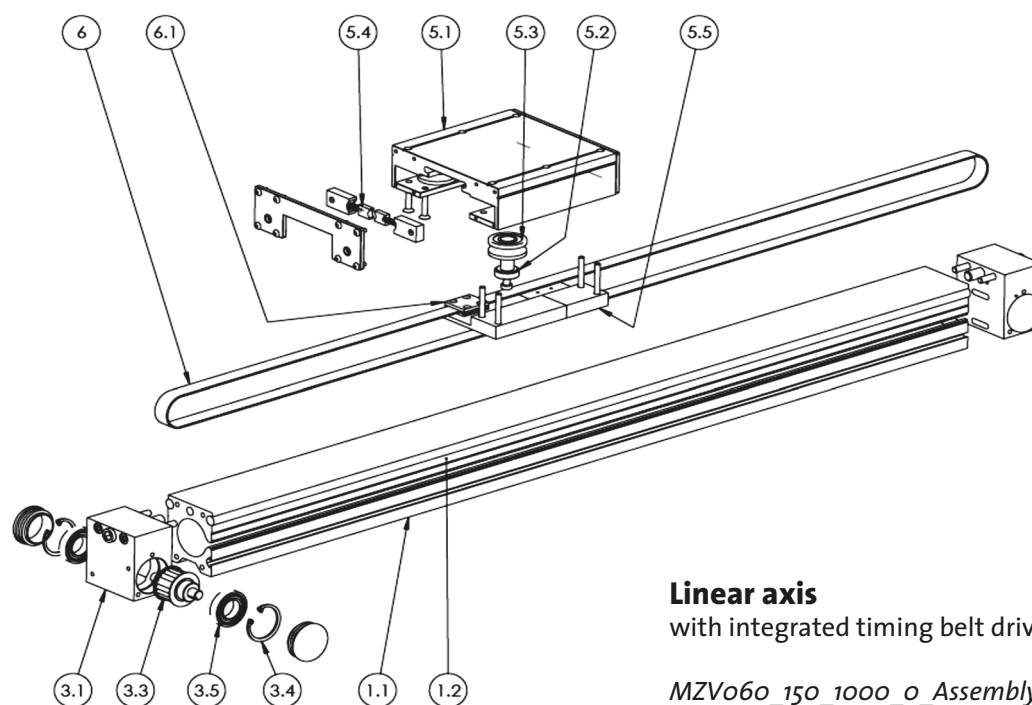
MZKo60_300_1000_o_Assembly instruction

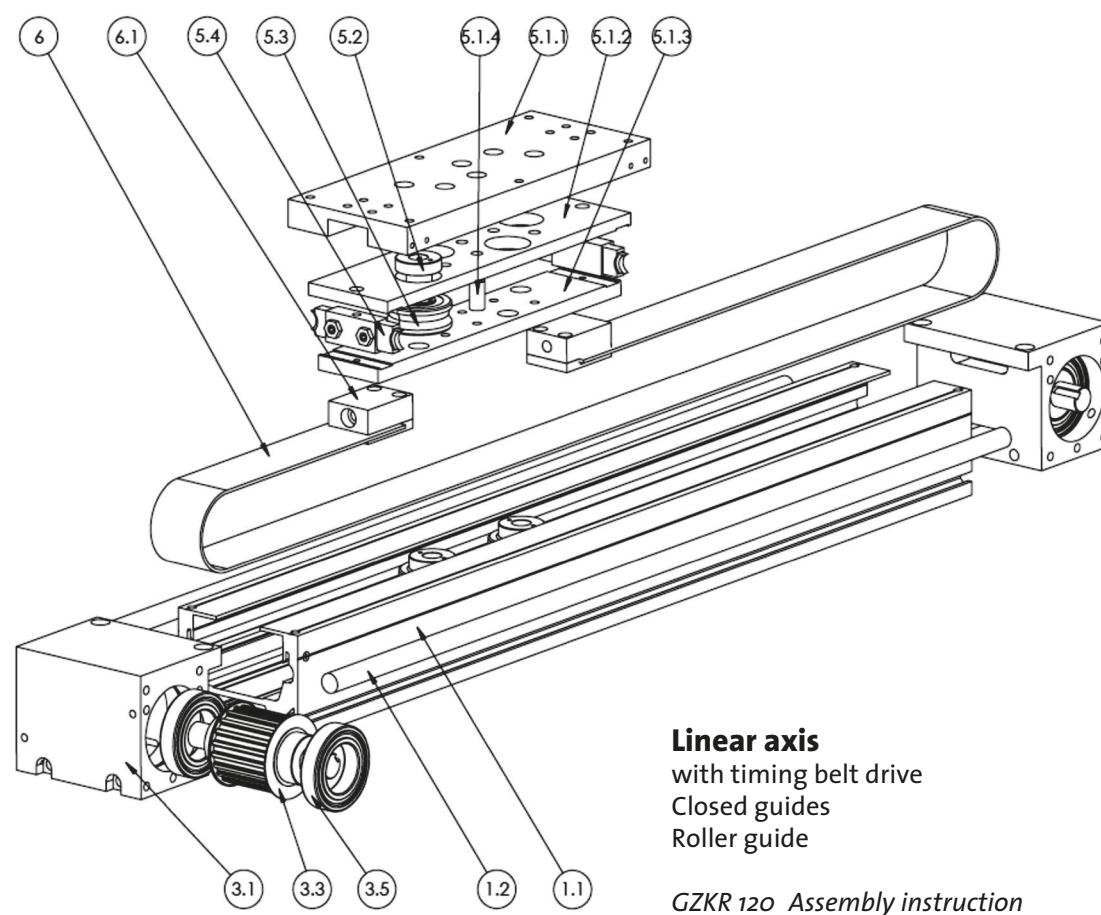
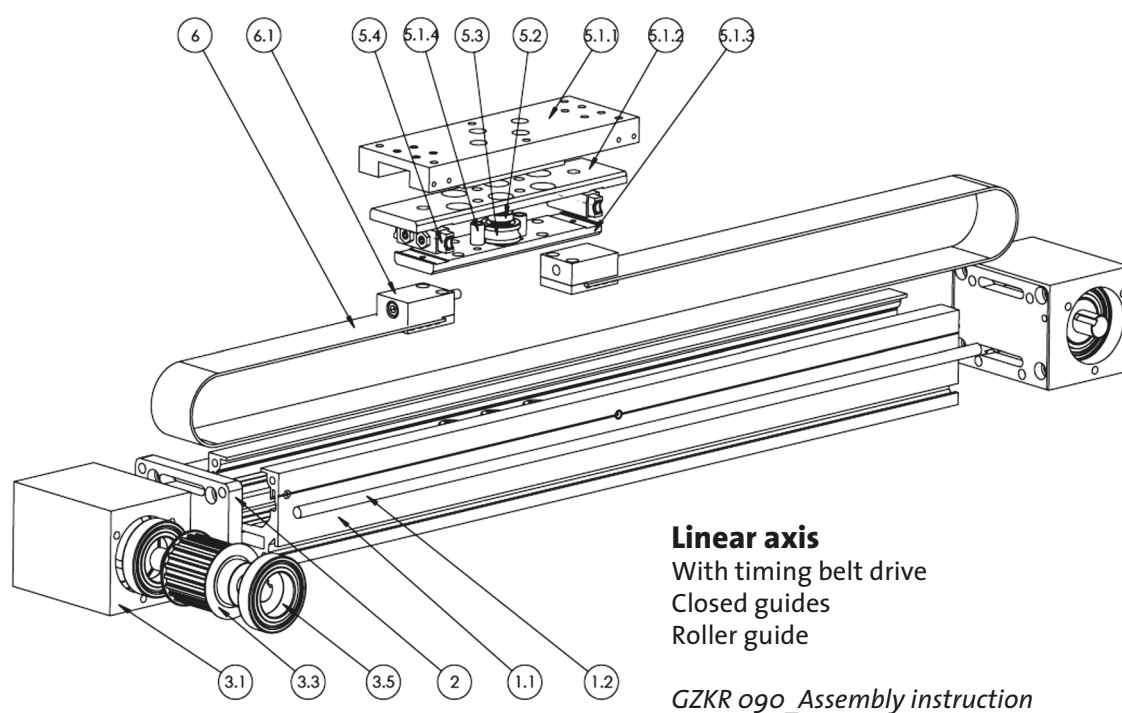


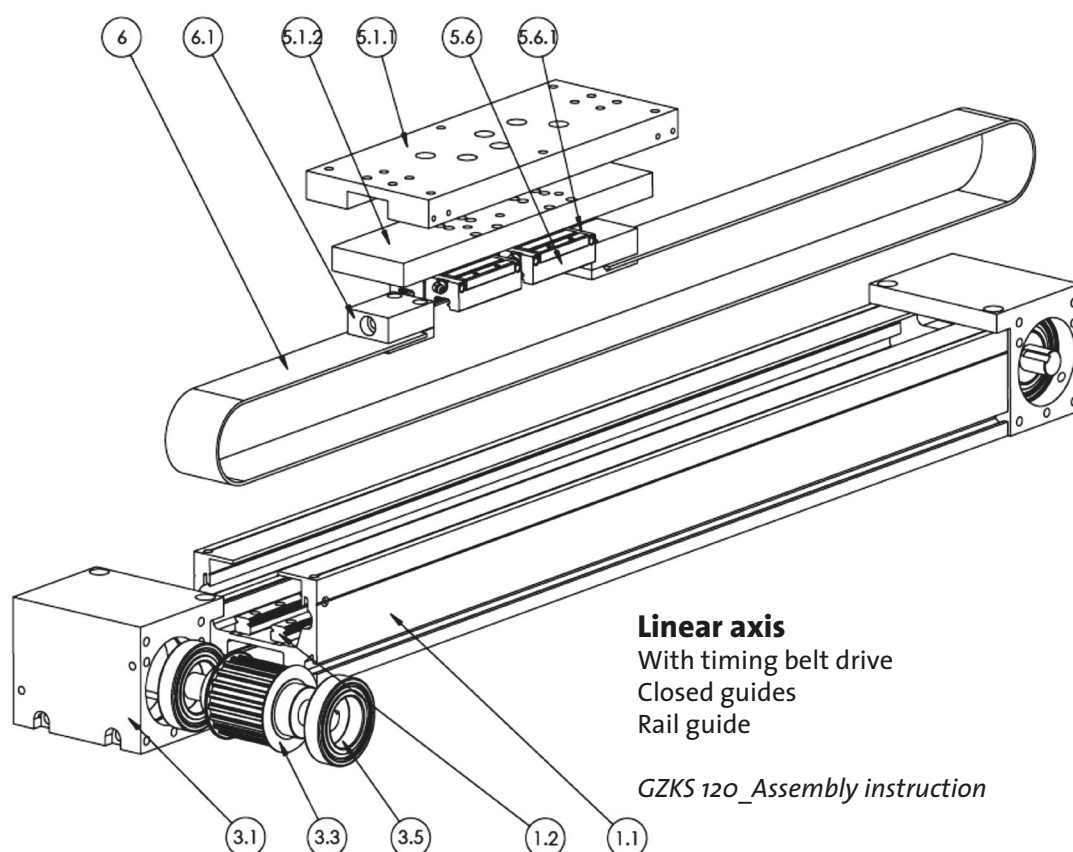
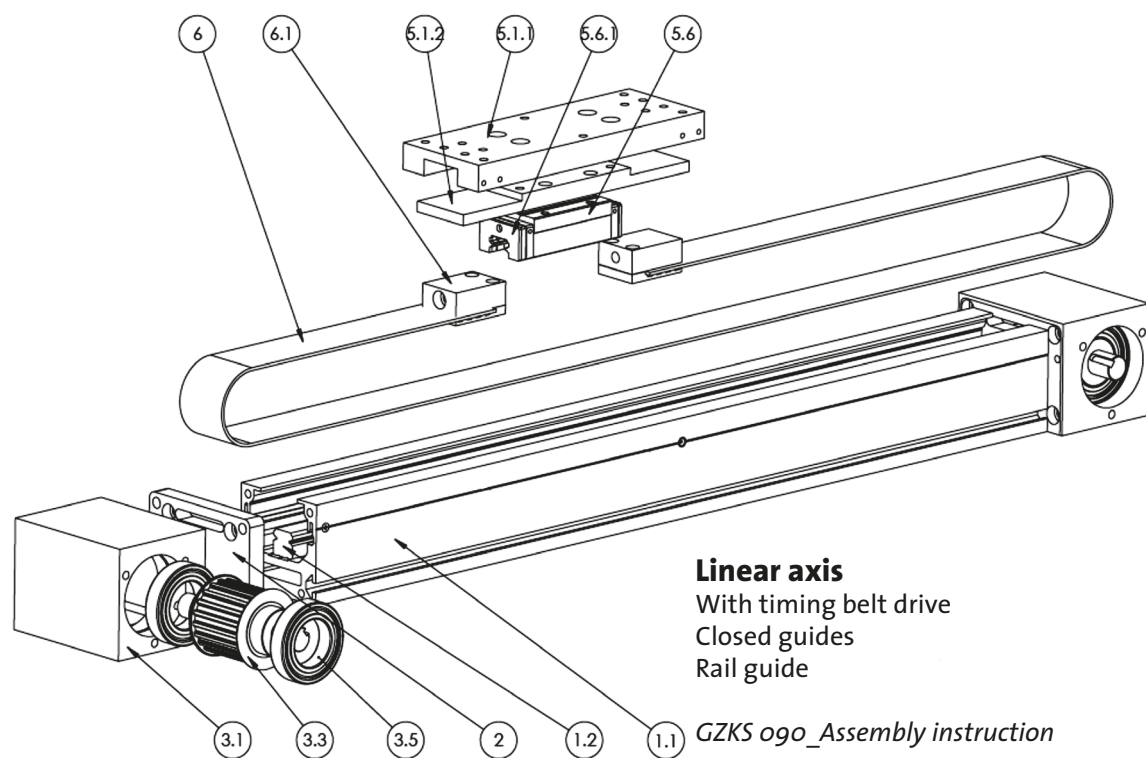
Linear axis
with timing belt drive
at carriage

MZSo60_300_1000_Assembly instruction









15. Gear

15.1 Transmissible torque from motor to gear input

Gear	Motor shaft diameter	Drive torque Nm	Motor shaft	Drive torque Nm
MPG 040	Ø 9	2	Ø 11	3
MPD 040	Ø 9	2	Ø 11	2
MPG 060	Ø 9	4	Ø 14	5
MPD 065	Ø 9	4	Ø 14	4
MPG 090	Ø 14	12	Ø 19	20
MPD 085	Ø 14	12	Ø 19	12
MPG 120	Ø 19	50	Ø 28	50
MPD 120	Ø 19	28	Ø 24	28

15.2 Motor construction

1. Clean (degrease) motor shaft, push-on contact bore and spacer sleeve, the support surfaces of the motor and gear.
2. Turn push-on contract until the threaded pin can be reached through the bore in the adapter plate. Loosen the threaded pin.
3. Gear MPG: check that the slot in the spacer sleeve is turned by 90° to the threaded pin (align if required). Observe colourmarking!
4. Plugmotor (vertically if possible) onto the gear without exertion of force. Tighten clamping screw.

max. assembly force (axial force):

5. Tighten the 4 screws for motor attachment crosswise.
6. Loosen clamping screw or threaded pin again and tighten with torque according to table.

Gear	Max. axial force / N
MPG / MWG / MPD 040	40
MPG / MWG / MPD 060	60
MPG / MWG / MPD 090	90
MPG / MWG / MPD 120	120

Planetary gear

Gear	Tightening torque	Key size	Gear	Tightening torque	Screw
MPG 040	5,6 Nm	3	MPD 040	2,1 Nm	M3
MPG 060	9,5 Nm	4	MPD 060	4,2 Nm	M4
MPG 090	23 Nm	5	MPD 090	8,3 Nm	M5
MPG 120	45 Nm	6	MPD 120	43 Nm	M8

Angular gear

Gear	Tightening torque	Key size
MPG 040	2 Nm	2,5 mm
MPG 060	4,5 Nm	3 mm
MPG 090	9,5 Nm	4 mm
MPG 120	16,5 Nm	5 mm

7. Close bore in the adapter plate with sealing plug.

15.3 Note

Clean input and output flange, centring piece and support area thoroughly. When installing the gear, observe tension-free assembly. Couplings must be installed on the output flange without force; they must never be pulled on by driving or impact. Only use suitable tools or devices. The gears are suitable for any installation position.

16. Use in explosion-risk areas

Assembly instructions for max® timing belt axes type MZK 40/60/90 In special design for warranty of explosion protection

The timing belt axes of types MZK, dimensions 040, 060 and 090, including deflection-capable timing belt (like timing belt of type ...-M-. (manufacturer: Elatech S.r.l., Milano)) comply with the requirements to non-electrical devices or components of device group II, category 2G and the requirements of temperature category T4 and explosion group (gas group) IIB.



This accordingly results in the following ex-category according to the standards EN 13463-1 and 13463-5 as used for construction and relevant from the point of view of explosion protection:

II 2G Exh IIB T4 Gb X

In the ex-classification, the following components have the following meaning:

- II** Device or component of device group II »non-mining«
- 2G** The product complies with the requirements of device category 2G (use in explosionrisk areas of zone 1, explosion danger from flammable gases of vapours or mists of flammable liquids)
- GB**

- Exh** Explosion protection is warranted by application of ignition protection type "c" (protection by constructional safety)
- IIB** The timing belt axes may be used in potentially explosive areas where the explosion risk is caused by substances of explosion group IIB (includes explosion group IIA).
- T4** The timing belt axes meet the requirements for temperature category T4.
- X** The X in the designation indicates that secure operation of the timing belt axes requires special conditions (also see the indications in the type-examination certificate in [17] and the corresponding information in the user information).

Explanation:

For non-electrical devices or components of category 2, the »X« for the ex-designation is required because these devices or components have no statutory obligation for issuing a type-examination certificate so that the user is not already alerted to special conditions when using the device of components that the number of the type-examination certificate, behind which the »X« would be placed, would indicate in addition to the number behind the type-examination certificate.

The indication of Ta (permissible ambience or operating temperature range) in the ex-designation is dispensed with, because it corresponds to the "usual" temperature range of -20°C to +40°C according to RL 94/9/EC.

Notes on "special conditions for secure use in 'potentially explosive areas'"

The following provides safety-technical legal notes that must be observed in production and installation, operation and maintenance of the timing belt axes:

- The timing belt axes are only intended for installation in linear systems for placement tasks.
- The timing belt axes must only be used when their materials and lubricants are resistant against mechanic and / or chemical influences or corrosion under their respective operating conditions that the explosion protection is not removed.
- To warrant lubrication, the lubricants used (roller bearing grease and lubrication oil for the guides) must be compatible with the materials and the gases and vapours expected in potentially explosive areas.
- The drives must be aligned with the performance parameters of the respective type and dimensions of the timing belt axes.
- The timing belt axes must be installed and operated so that no impacting or scraping of the carriage and the parts attached to/on it with/along any other equipment parts is possible.
- The notes indicated in the user information regarding warranting lubrication must be observed by the operator under all circumstances.
- The timing belt axes must be included in the potential balance of the entire linear system.
- There must be electrically conductive connections between the metal parts of the timing belt axes.
- The timing belts used must be electrostatically dissipative (see, e.g., BGR 132).
- The timing belt axes must only be operated in an atmosphere free of foreign bodies and larger solids particles.

-
- The following apply deviating from the usual maintenance and test intervals:
 - The bearings at the drive shafts and running shafts in the carriage must be inspected for unusual noise and the timing belt for correct timing belt tension every month.
 - The 4 hopper lubrication nipples at the carriage must be filled with max[®]-oil every month.
 - The roller service life of 100,000 km mileage is securely achieved if the average carriage load does not exceed the following values:
MZK 040: 100 N
MZK 060: 250 N
MZK 090: 1000 N
 - After a mileage of 100.000 km, the drive shaft bearings and rollers in the carriage must be replaced.
 - The screws are applied with a medium threadlocker at assembly and thus secured against loosening. This is also required if the customer performs any maintenance.

17. Transport and Storage



Caution

The mechanic linear unit is a high-precision device. Its mechanical parts can be damaged by hard impact, impairing their function.

Damage from hart impact or bending!

Transport assembled linear unit only with transport protection.

To prevent damage during storage and transport, the linear unit must be protected from impact and slipping as follows:

- place in a sufficiently dimensioned box
- use cushioned packaging
- relieve z-axes

The devices must be protected from:

- dirt
- corrosion
- water
- heat in excess of 80°C
- and aggressive atmosphere

max® GmbH
Rotäcker 9
D-88271 Wilhelmsdorf
Germany

Telefon +49 (0) 75 03 / 12 13
Fax +49 (0) 75 03 / 12 17

E-Mail info@max-gmbh.com
Internet www.max-gmbh.com

18. Installation declaration

Installation declaration pursuant to EG directive 2006/42EC on machinery (Annex II B)

The manufacturer:

max® GmbH
Rotäcker 9
88271 Wilhelmsdorf

declares that the »incomplete machine« designated in the following corresponds to the relevant basic safety and health requirements of the EC machinery directives 2006/42/EC in its design and build.
We also state that the special technical documents were generated according to Annex VII B of this directive. Any modifications of the machine that were not coordinated with us will render this declaration void.
The incomplete machine must only be taken into operation as intended after it was determined that the entire system into which the incomplete machine is installed corresponds to the basic safety and health protection requirements according to Annex I of the above EC directive 2006/42/EC.

Build of the linear axes:

Type: MZK, MZKD, MZV, MZKU, MZS, MZSO, MSP, MP, MKR, MTR, MTRL, MO, GZKR, GZKS, GOS, GOR

The following standards and directives were observed in construction, production and assembly:

EC-directive: Machinery directive (2006/42/EC)

Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX) 2014/34/EU

The following harmonised standards were applied:

DIN EN ISO 12100-1

Safety of machinery– Basic concepts, general principles for design
Part 1 Basic terminology

DIN EN ISO 12100-2

Safety of machinery– Basic concepts, general principles for design
Part 2 Technical principles and specification

Authorised person for assembly of the relevant technical documents:
See manufacturer's address.

Wilhelmsdorf, 20.04.2016



Michael Müller (Manager)

19. Problem solving

Advice for problem-solve:

Problem:	Possible cause(s):	Remedy:
metal running noise	runners worn out	replace runners
	guide shafts worn out	turn or replace guide shafts
	guide shafts not lubricated	lubrication of felts at carriage
squeaky running noise	felts not lubricated	lubrication of felts at carriage
tearing running noise	belt sucking on drive shaft	treat belt (toothed side) with silicon spray
scraping noise in flange	screw of coupling is scraping in flange housing	check flange / tighten screw of coupling
drive shaft: increased wearing out of bearings	axial pressure on bearings due to too short flange	check dimension (if max-flange: see drawing "Flanschmontage")
	axial pressure on bearings due to wrong mounted coupling	check mounting of coupling (if max-flange: see drawing "Flanschmontage")
belt: abrasion of particles	vibration of motor in operation or stoppage	check and adjust motor parameters
belt: lateral abrasion	belt tension one-sided or too low	check and adjust belt tension
belt: dirt on non-toothed side	dirt brought in through belt and idlers (MZS-axes)	clean or replace belt and idlers
lateral clearance of carriage	runners not adjusted or worn out	adjust runners with eccentrics, replace runners if needed
carriage can be moved hardly	bearings of drive shafts broken	replace bearings of drive shafts
irregular lapse of position of carriage	belt tension too low	check and adjust belt tension
	increased backlash due to broken coupling or plastic sprocket	replace coupling (plastic sprocket)
	connection between motor and gearbox loose	degrease spacer sleeve and motor shaft tighten clamp
lapse of position according to belt pitch	belt skips over due to low belt tension	check and adjust belt tension
belt worn out rapidly	overload or punch due to drive overload or punch due to application	check acceleration choose smaller motor check periphery check calculation
coupling broken		
runners broken		
guide shafts worn out		

We recommend to purchase spare part sets which are available at max® GmbH.
We are pleased to support you!

20. Notes

This image shows a full page of blank graph paper. The grid consists of thin, light gray horizontal and vertical lines that intersect to form small squares across the entire surface. There are no margins, text, or other markings on the paper.

Notes

This image shows a full page of blank graph paper. The grid consists of small, uniform squares formed by thin, light gray lines. There are no margins, text, or other markings on the page.



You will find our catalogue, pricelist and
CAD-Data on our Homepage!

www.max-gmbh.com

max® GmbH
Rotäcker 9
D-88271 Wilhelmsdorf

Phone +49 (0) 75 03 / 12 13
Fax +49 (0) 75 03 / 12 17

E-Mail info@max-gmbh.com
Internet www.max-gmbh.com