FIFE GUIDING SOLUTIONS

MAXCESS

FIFE

GMA-1 / GMA-3
Linear actuator
Assembly instructions

EN

MI 1045 1 D

1 INTRODUCTION

About these assembly instructions

These assembly instructions describe the procedure for assembling, commissioning and maintaining GMA-1 and GMA-3 linear actuators. They also provide important information relating to proper usage.

The assembly instructions must be kept in a safe place and must be available for reference throughout the service life of the linear actuator.

Translation of the original assembly instructions:
These assembly instructions are a translation. The original assembly instructions were composed in German.

Target groups

These assembly instructions are directed to both the *system construction master* as well as the *operator* who uses the linear actuators in production.

Read assembly instructions
The assembly instructions must be read and used by *all persons* who have the responsibility of installing, commissioning, operating and maintaining GMA-1/GMA-3 linear actuators.

Proper usage

Linear actuators are extremely precise electro-mechanical actuators with ball screws that can be implemented in a variety of possible applications. A Fife-Tidland GmbH web guide controller must be used when operating the GMA-1 and GMA-3 linear actuators.

The GMA-1 and GMA-3 linear actuators are implemented for a variety of controlling and guiding functions:

- Swivel and offset pivot guide control
- Positioning and slave guidance

Other applications include the control and positioning of

- Coils
- Blades/cutter bars
- Cutting tables
- Angle bars etc.

The GMA-1 and GMA-3 linear actuators must only be used for their intended purpose and must be in flawless technical condition.

The linear actuators are designed for continuous use. A variety of transmission ratios, strokes and installations are available.

Designs with flanges, fork heads or joint heads are available so that the linear actuator can be adapted to the customer's system.

Use of the linear actuator should not present any hazards as defined by EU Directive 2006/42/EC.

Note:
⇨ If the device is opened, no claims under the warranty will be honoured.

⇨ The ball screw must not be unscrewed.

EC Declaration of Incorporation

GMA-1 /GMA-3 linear actuator has been designed and constructed in accordance with the standards and regulations of the European Union. A Declaration of Incorporation is attached to this documentation.

Improper usage

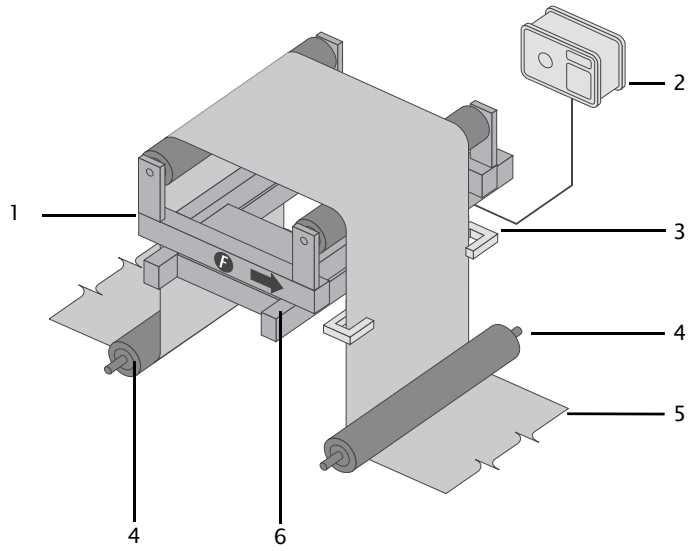
GMA-1 and GMA-3 linear actuators must not be used to raise and lower loads.

Operating principle

The GMA-1 and GMA-3 linear actuators complete translatory movements. The rotational movement of the DC motor being used is reduced by a synchronous belt actuator and then transmitted to a ball screw that transforms the rotational movement into a linear one.

The *figure 1.1* shows a web course control system.
The FIFE Symat is aligned parallel to the rollers of the customer's system. The sensors (3) monitor the web position. When the material web leaves the target position, the sensors generate a signal. The web guide controller (2) records this signal and activates the linear actuator, which continues realigning the offset pivot guide (1) until the web position has been corrected. The rotational movement is around an axis positioned perpendicular to the assembly frame (6) on the outer edge of the infeed roller.

Note:
In *figure 1.1* , the linear actuator required to control the material web is concealed by the material web.



1	Offset pivot guide	4	Deflection roller
2	Web guide controller	5	Material web
3	Sensors	6	Assembly frame

Figure 1.1: Operating principle of a web guiding system

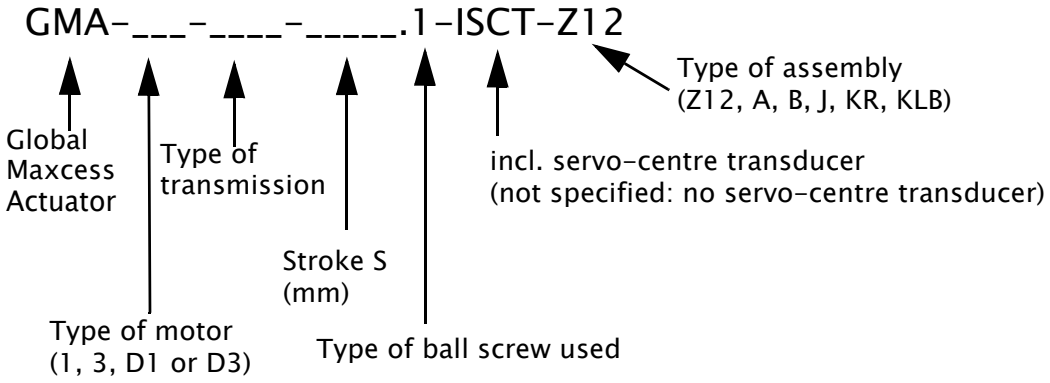
Features

All electro-mechanical actuators have ball screws. Typical distortions at the stroke end do not occur. Stroke limit switches are not necessary when using Fife-Tidland GmbH web guide controllers. No regular maintenance is required. The low-friction operation offers simple, precise control. All actuators can be equipped with an ISCT - **I**nductive **S**ervo **C**entre **T**ransducer.

Designs including a stroke alarm are available to record certain positions independently from the web guide controller (such as the end position).

The linear actuators are available with different transmission configurations, motor types and assembly versions, making them suitable for a diverse range of applications.

Model number code



Versions

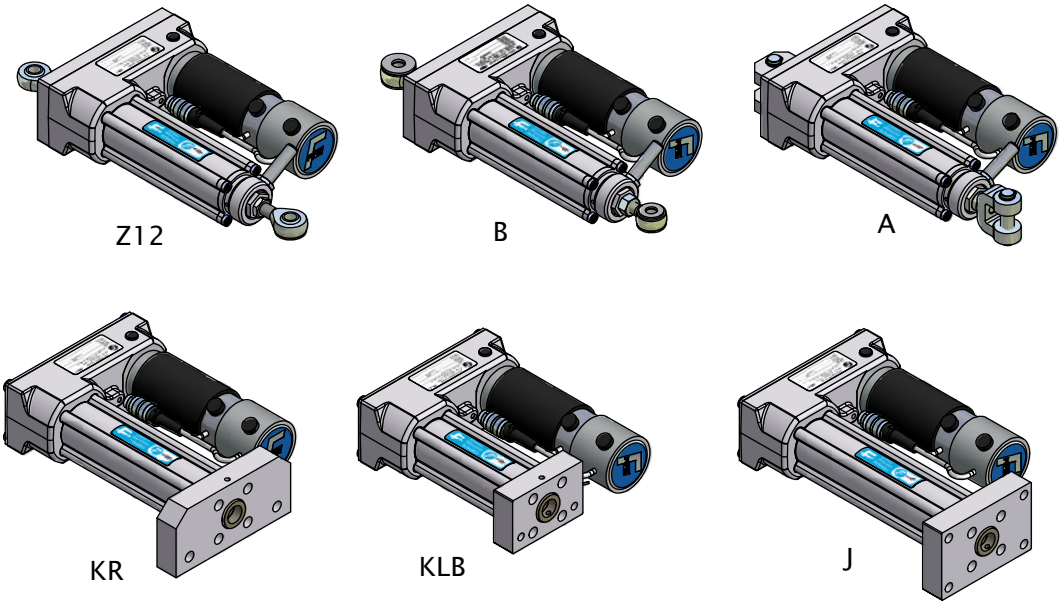


Figure 1.2: Overview of the various GMA-1/GMA-3 linear actuator assembly types

2 SAFETY INSTRUCTIONS

Important information

Flawless and reliable operation of the GMA-1 /GMA-3 linear actuators is dependent upon the linear actuators being

- properly shipped and stored,
- properly mounted and placed in operation,
- properly used and carefully maintained.

Only persons who are acquainted with the assembly, commissioning and maintenance of the linear actuators and who possess the necessary qualifications for their activities may work on them.

Full compliance with the following is required:

- The content of these assembly instructions
- Any safety instructions printed on the unit
- The machine manufacturer's specifications
- National, state and local requirements for accident prevention and environmental protection
- **The safety instructions shown on the associated drawings**

Information about safety instructions

The safety instructions and symbols described in this section are used in these assembly instructions. They are used to avoid possible dangers for users and to prevent material damage.

SIGNAL WORD:
Source of danger and its results.

⇨ Avoiding dangers

Signal words

The signal word **DANGER** indicates an immediate danger of serious injury or death.

The signal word **WARNING** indicates a possible danger which could lead to serious injury or death.

The signal word **CAUTION** refers to a possible danger which could lead to slight to moderate injury.

The signal word **ATTENTION** refers to a possible danger which could lead to material damage.

Symbols

Reference to general hazards that may result in bodily injuries

Refers to danger of injury caused by crushing

Refers to danger of injury caused by cutting

Refers to danger of injury caused by burning

Refers to general hazards that will result in damage to the device or system

Read operating instructions
Follow these operating instructions for proper and safe use.
Keep for future use.

Additional markings

- Bulleted list
- Instructions

1. Instructions which must be processed in the specified order
2. End of the instructions

→ Reference or cross-reference

Note:
Reference to important information.

Personnel requirements

The tasks listed in these operating instructions may only be carried out by appropriately qualified personnel commissioned by the operator. The responsibilities of the personnel for the work on the system must be clearly defined by the operator.

Transport, assembly, maintenance, troubleshooting, disassembly:

- Specialized staff
  → Mechatronics engineer, industrial mechanic, etc.

Electrical connection or disconnection:

- Specialized staff
  → Only by a qualified electrician

Control during operation:

- Specialized staff
  → Machine and system operators, etc.
- Personnel or trainees trained and supervised by the system operator

Repair:

- Specialized staff
  → Service technician of Fife-Tidland GmbH

Residual risk

Installing the product in a machine/system makes it possible to form clamping, squeezing and cutting points.

Despite a safe design and supplementary protective measures, residual risks may remain for the machine/system in which the product is installed. These risks must be recorded in a risk assessment by the machine/system builder and taken into consideration in the operating instructions.

Safety instructions

Assembly

- A damaged GMA-1 /GMA-3 linear actuator must not be installed or commissioned.
- All assembly tasks on the linear actuators must be performed when the power is turned off.
- Assembly tasks and mechanical settings must only be performed when the machine has been stopped and secured against restart.
- Linear actuators must only be commissioned if they have been securely assembled.

- Electrical connections on the linear actuators must only be made or disconnected when the power is turned off.
- Only accessories and replacement parts that have been approved by Fife-Tidland GmbH may be used.
- Modifications to the linear actuators are not permitted.
- If accessory devices are installed (e.g. the offset pivot guide and the sensors), the applicable instructions must be observed.

Operation

- Danger of injury due to cutting on the edge of the material web

  ⇨ Do not place your hands on the edge of the (moving) material web during operation.

- There is a risk of burning from the motor surface.

  ⇨ The motor must not be touched during operation. The motor surface may remain hot for some time after being switched off.

Maintenance

- Maintenance work must only be performed on the linear actuators when the power is tuned off, and the machine has been stopped and secured against restarting.

3 TECHNICAL DATA

The GMA-1 and GMA-3 linear actuators have the following properties::

GMA		Thrust [N]		Speed [mm/sec]		
Type of motor	Type of transmission	stat.	dyn.	D-MAX 24V	D-MAX/48V DP-30	DP-20
1, D1	1	188	121	41,7	108,3	108,3
	2	422	272	18,5	48,1	48,1
	3	563	363	13,9	36,1	36,1
	4	635	410	11,6	30,1	30,1
	5	907	585	8,1	21,1	21,1
	6	1059	683	6,9	18,1	18,1
	8	1361	878	5,4	14,1	14,1
	11	1884	1216	3,7	9,5	9,5
	14	2326	1501	3,0	7,7	7,7
	16	2586	1668	2,7	6,9	6,9
3, D3	1	271	175	100,0	125,0	
	2	609	393	44,4	55,6	
	3	812	524	33,3	41,7	
	4	917	592	27,8	34,7	
	5	1310	845	19,5	24,3	
	6	1529	986	16,7	20,8	
	8	1965	1268	13,0	16,2	
	11	2721	1755	8,8	11,0	
	14	3359	2167	7,1	8,9	
	16	3734	2409	6,4	8,0	

All linear actuators are available with different strokes, irrespective of the type of transmission and motor.

Standard stroke [mm]
50
100
160
203
254
305

Other strokes are also available.

4 ASSEMBLY

Transport and storage

- The device must be protected against slipping during transport.
- The device must be stored in a cool and dry place.
- The device must not be stored in the vicinity of powerful magnetic fields. The electronic components of the device may be damaged.

Assembly

Assembly location

- Protection type according to DIN EN 60529: IP40
- Ambient temperature: 0°C to 50°C
  Relative humidity: 10% to 95%, non-condensing
  Height above sea level: maximum 3000 m
- Do not place in the vicinity of powerful magnetic fields
  The electronic components may be damaged.
- Protect from falling objects
  The device may be damaged or perform unregulated operations.

WARNING:

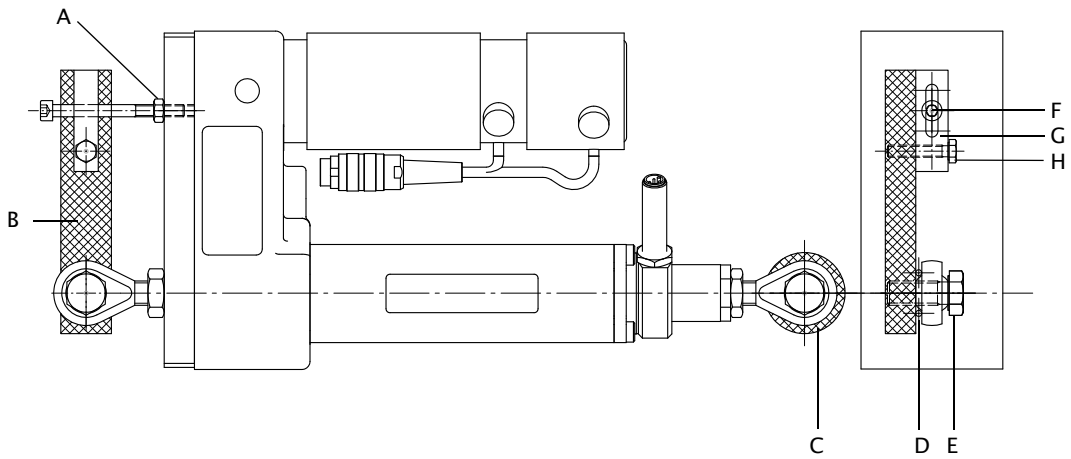
⇨ All assembly tasks on the linear actuators must be performed when the power is turned off.

⇨ Assembly tasks and mechanical settings must only be performed when the machine has been stopped and secured against restart.

⇨ The motor and transmission of the linear actuators are not self-locking. When turned off, uncontrolled movements caused by external forces may occur.

Mechanical fastening

Fastenings to the machine must be attached securely to avoid swinging during operation. The linear actuator and connecting rod must be secured from twisting to ensure flawless control. The actuator must be secured to the connector elements shown in the dimensional drawing using suitable connection elements



A	M6 nut, e.g. DIN 934	E	M12 screw, e.g. DIN 931-8.8
B	Fixed machine part	F	M6 cylinder head screw, e.g. DIN 912
C	Moveable machine part	G	Plastic coating
D	Anti-twist device	H	M6 screw, e.g. DIN 931

Figure 4.1: Example of GMA assembly with joint head type Z12

Please refer to the dimensional drawing in the system documentation for precise details for assembly on site.

Power supply

The linear actuator does not have a power switch. The device is connected to the power supply via a Fife-Tidland GmbH web guide controller.

WARNING:

The linear actuator does not have an EMERGENCY STOP button.

⇨ Observe the documentation provided with the connected web guide controller.

Before commissioning

The following assembly and electrical connection tasks must be performed before commissioning:

- The connected web guide controller must be turned off.
- The linear actuator must be assembled properly.

Adjustment of the servo-centre transducer/setting the servo-centre position

- The servo-centre position can be changed by amending the nominal distance between the servo-centre transducer and the connecting rod.
- The nominal distance is approx. 1 mm.
- To adjust, loosen the terminal and change the distance to the connecting rod.
- If the distance is too great, the connecting rod of the linear actuator is extended.
- The position must be saved once set.
- The travel speed in servo-centring mode must be approximately the same in both directions.

Commissioning

Before commissioning, ensure that

- The GMA-1 and GMA-3 linear actuators are commissioned while the system is switched off,
- no one is in the danger zone of the linear actuators ,
- the linear actuator and connecting rod are secured from twisting.

Once all of the assembly and connection tasks have been checked and everything is in proper working condition, the GMA-1 or GMA-3 linear actuator can be commissioned.

5 OPERATION

Safety instructions

WARNING:
There is a risk of burning from the motor surface.

⇨ The motor must not be touched during operation. The motor surface may remain hot for some time after being switched off.

WARNING:
Danger of injury due to cutting on the edge of the material web

⇨ Do not place your hands on the edge of the (moving) material web during operation.

Settings

As soon as the GMA-1 or GMA-3 linear actuator has been connected to the Fife-Tidland GmbH web guide controller, the controller automatically detects the actuator.

All of the settings for the operation of the GMA-1 and GMA-3 linear actuators are actuated via the web guide controller (e.g. amplification, polarity, speed). Further information can be found in the web guide controller instructions.

Noise

The device should not make any excessive noise if kept in proper technical condition and used in normal operation.

6 MAINTENANCE

Safety instructions

WARNING:
⇨ Maintenance tasks must only be performed when the machine has been stopped and secured against restart.

Maintenance

No maintenance measures are required for the linear actuators. Only the motor carbon brushes may need to be replaced.

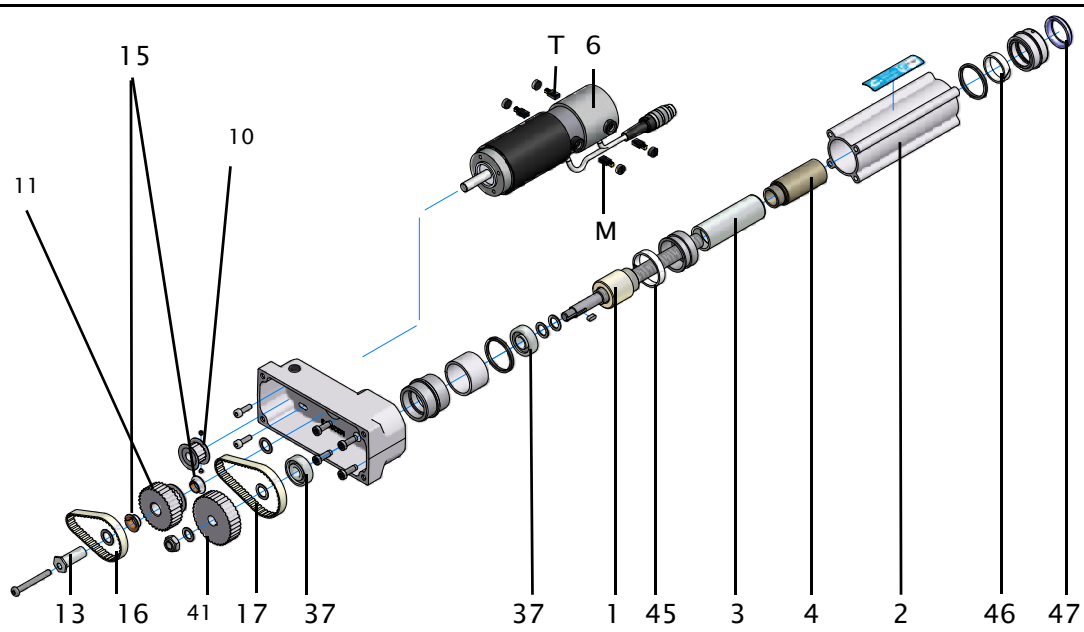
Note:
Some of the joint head models feature a grease nipple. This does not need to be relubricated.

Carbon brushes

CAUTION:
The carbon brushes for the DC motor can be rough-ground to suit the radius of the commutator.

⇨ When replacing the carbon brushes, ensure that they are fitted according to the radius; otherwise, the carbon brushes will wear more quickly and motor performance will be impaired.

Layout



1	Ball screw	16	Synchronous belt
2	Housing tube	17	Synchronous belt
3	Thrust tube	37	Ball bearing
4	Connecting rod	41	Timing belt pulley
6	DC motor	45	Guide ring
10	Timing belt pulley	46	Guide ring
11	Timing belt sprocket	47	Deflector
13	Eccentric bolt	M	Motor carbon brushes
15	Flanged bush	T	Tachometer carbon brushes

Figure 6.1: Layout of the GMA–1 and GMA–3 linear actuators

Replacement part

Replacement part list (i=transmission ratio)						
Pos.	Description	i=1	i=2	i=3	i=4	i=5
1-4	dependent on stroke, seek advice from sales department (+49-6195-7002-0)					
6	DC motor	see motor table				
10	Timing belt pulley	M133389	M133389	M328022	M159745	M159743
11	Timing belt sprocket	-	-	-	M330400	M330400
13	Eccentric bolt	-	-	-	M326645	M326645
15	Flanged bush	-	-	-	M134044	M134044
16	Synchronous belt	-	-	-	M134067	M153831
17	Synchronous belt	M153834	M133390	M133390	M134051	M134051
37	Angular ball bearing	M133800				
41	Timing belt pulley	M133392	M133391	M133391	M133391	M133391
45	Piston guide ring	M159575				
46	Piston guide ring	M159574				
47	Deflector	M133384				

Replacement part list (i=transmission ratio)						
Pos.	Description	i= 6	i= 8	i=11	i=14	i=16
1-4	dependent on stroke, seek advice from sales department (+49-6195-7002-0)					
6	DC motor	see motor table				
10	Timing belt pulley	M328022	M328022	M133389	M133389	M328022
11	Timing belt sprocket	M330400	M328023	M328023	M328023	M328023
13	Eccentric bolt	M326645				
15	Flanged bush	M134044				
16	Synchronous belt	M153831	M327611	M355212	M328311	M328311
17	Synchronous belt	M134051	M328311	M134067	M134067	M134067
37	Angular ball bearing	M133800				
41	Timing belt pulley	M133391				
45	Piston guide ring	M159575				
46	Piston guide ring	M159574				
47	Deflector	M133384				

Motor table				
Type of motor	I_{max}	Motor designation	Part number	Carbon brush set
1	1,3 A	2233-MT3384	M126688	M403379
		PM 471-40/5 A	M136103	
		DPP24T-40-010Z	M376744	
3	2,0 A	2234-MT3418	M252255	M403379
		PM 471-65/5 A	M136111	
		DPP24T-50-003Z	M377019	
D1	3,3 A	2234-M4784	M281466	M403383
		DPP24-50-002Z		
D3	4,0 A	2234-M4875	M315031	M403383

7 DECOMMISSIONING

The following work must be performed when decommissioning the device:

1. The web guide controller (to which the linear actuator is connected) must be turned off.
2. The linear actuator must be disassembled.
3. The linear actuator must be stored in a cool, clean and dry place. The device must not be stored in the vicinity of powerful magnetic fields.

   OR

   The linear actuator must be disposed of in line with the applicable national regulations.
   Linear actuators, accessories and packaging must be recycled in an environmentally sound manner.