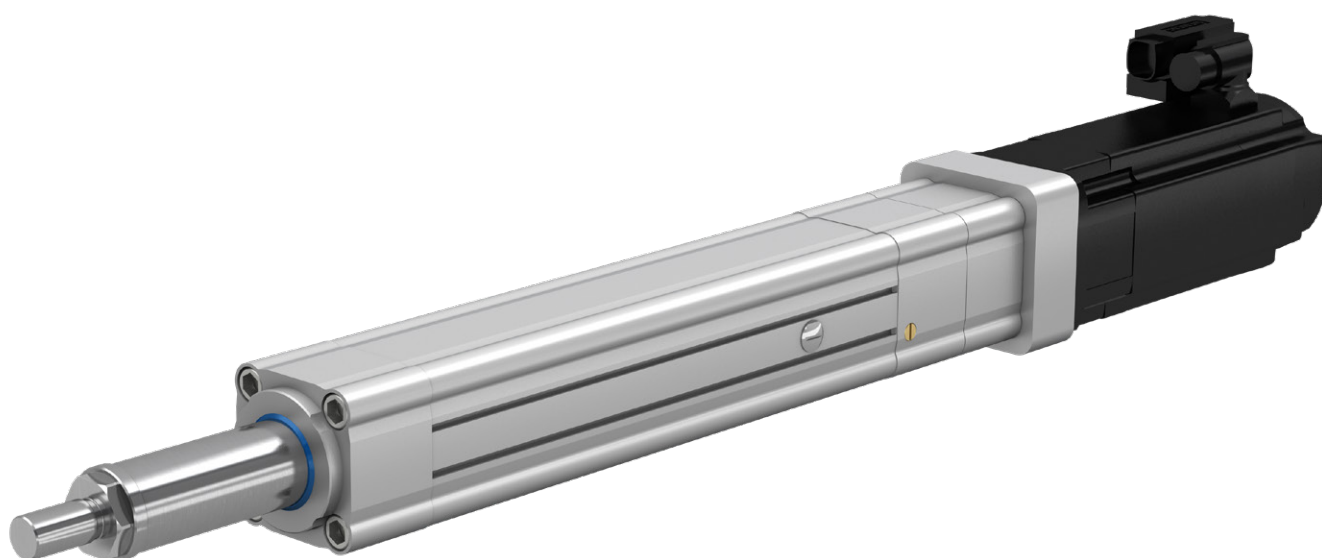


EWELLIX

A Schaeffler Company

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

EMA-100



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⚠ WARNING

Read this manual before installing, operating or maintaining this actuator. Failure to follow safety precautions and instructions could cause actuator failure and result in serious injury, death or property damage.

1. General information

1.1 Information about this manual

This manual provides important information on how to work with the actuator safely and efficiently.

The manual is part of the device, must always be kept in the device's direct proximity and should be available for personnel to read at any time. All personnel working with the device must read and understand this manual before starting any work. Strict compliance with all specified safety notes and instructions is a basic requirement for safety at work.

Moreover, the accident prevention guidelines and general safety regulations applicable at the place of use of the device must also be complied with.

For a better representation of the circumstance of use, the illustrations used are not necessarily to scale and may vary from the actual design of the device.

1.2 Explanation of symbols and signal words

Safety precautions

Safety precautions are identified by symbols and signal words as shown to the right. The signal words indicate the severity of the hazard and the chance it could occur.

Follow these safety precautions and act cautiously in order to avoid accidents, personal injury and damage to property.

DANGER

Indicates a dangerous situation, which will lead to death or serious personal injury, if the precautionary measures are ignored.

WARNING

Indicates a dangerous situation, which can lead to minor or moderate injury or property damage, if the precautionary measures are ignored.

CAUTION

Indicates a dangerous situation, which can lead to minor or moderate injury, if the precautionary measures are ignored.

NOTICE

Indicates information considered important, but not hazard-related (e.g. messages relating to property damage).

NOTE

Emphasizes useful hints and recommendations as well as information for efficient and trouble-free operation.

1.3 Limitation of liability

All information and notes in this manual were compiled under due consideration of valid standards and regulations, the present status of technology and our years of knowledge and experience.

The manufacturer will not be liable for damage resulting from:

- disregarding this manual
- unintended use
- employment of untrained personnel
- unauthorized conversions
- technical modifications
- manipulation or removal of the screws on the actuator
- use of unapproved spare parts

In case the actuator is customised, the actual product delivered may be different from what is described in the manual. In this case, ask Ewellix for any additional instructions or safety precautions relevant to these actuators.

We reserve the right to make technical modifications to the actuator to improve usability.

1.4 Spare parts

The EMA-100 linear actuator is not meant to be repaired by customer personnel. All warranty and service claims become void without notice if any screws on the linear actuator have been loosened or removed (see chapter [9. Malfunctions, page 39](#)).

WARNING

Safety hazard caused by use of non-genuine spare parts

Wrong or faulty spare parts can adversely affect safety and cause serious injury, damage, malfunction or total failure.

Therefore:

Spare parts in/on the device may only be replaced by the manufacturer.

The device must be dismantled and sent to the manufacturer for repair and replacement of spare parts.

1.5 Warranty terms

The applicable and effective warranty terms are those contained in the manufacturer's terms and conditions of sale.

2. Safety

This chapter provides an overview of all important safety precautions for protection of personnel as well as safe and trouble-free operation.

Disregarding this manual and the safety precautions specified therein may result in increased risk of serious injury or death.

2.1 Intended use

The device has been designed and built exclusively for its intended purpose as described in these instructions.

Actuators are electric axis, which convert rotary motion into linear motion. The device has been designed to perform linear movement in machines.

WARNING

Risk from misuse!

Any utilization of this actuator beyond its intended purpose may lead to potentially hazardous situations.

Therefore:

Strictly adhere to all safety precautions and instructions in this manual.

Do not allow this actuator to be subjected to weather conditions, strong UV rays, corrosive or explosive air media as well as other aggressive media.

Do not modify, retool or change the structural design or individual components of the actuator.

Never use the actuator outside of the technical application and operational limits.

2.2 Responsibility of the owner and processor

The device is designed for personal use and is also used in commercial applications by owner or processors.

The processor is the contracting partner of the reseller or the manufacturer. The processor installs the device in a complete system (application).

Any injury, damage or loss caused by violation of these instructions will be the responsibility of the customer.

In addition to following the safety instructions in this manual, the owner or processor must do the following concerning the safety and accident prevention guidelines and environmental protection regulations applicable to the site of the system's installation:

- Inform themselves of applicable industrial safety regulations and use risk assessment to determine additional hazards that arise due to the specific working conditions prevailing at the site where the device is installed. The risk assessment must be implemented in the form of work instructions for device operation.
- Must confirm that the work instructions created for the system including the device satisfy current legal requirements and modify the instructions if they don't.
- Clearly regulate and specify the responsibilities for installation, operation, maintenance, and cleaning the system.
- Ensure that all employees who deal with the device have read and understood this manual.
- Provide personnel with the required protective equipment.
- Must train personnel at regular intervals and inform personnel of the hazards .

In addition, owner must ensure that the device is in adequate working condition. They must do the following:

- Ensure that the maintenance intervals described in these instructions are complied with.
- Have all safety devices inspected regularly for function and completeness.

2.3 Personnel requirements

⚠️ WARNING

Improper installation, operation and maintenance can result in serious injury, death or property damage.

Use only qualified, trained personnel (as described below) who have read, understand and follow these instructions.

2.3.1 Qualifications

The following qualifications are specified for different areas of activity listed in the manual.

- **A trained person (Operator)**
has been instructed by the customer in an orientation session on the assigned tasks and possible dangers in case of improper behaviour.
- **Qualified personnel**
based on their professional training, know-how and experience as well as knowledge of the applicable standards and regulations are able to perform assigned work activities and to detect and avoid possible dangers on their own.

Only persons who are expected to perform their tasks reliably are permitted as personnel. Persons whose reaction capability is impaired, e.g. through drugs, alcohol or medication, are not permitted.

2.4 Safety equipment

⚠️ WARNING

Danger due to malfunctioning safety equipment

For safe operation, be sure all features are in good working order.

Therefore:

Always check functionality of safety equipment according to the maintenance plan.

Never disengage safety equipment.

Safety equipment may never be bypassed or modified.

Integration of an emergency-stop system required (for certain applications).

The device is only intended for installation into an application or system. It does not have its own operating control elements and does not have its own emergency-stop-function.

Install the device so that it is part of an emergency shut-off system and can be stopped if necessary.

The emergency shut-off system has to be connected in such a way that a disruption of the power supply or the reactivation of the power supply after a power disruption cannot cause a hazardous situation for persons and objects.

The emergency shut-off system must always be easily accessible.

NOTE

The processor must decide which applications require the installation of an emergency shut-off system.

2.5 Modifications to the device

To avoid hazardous situations and to ensure optimal performance, do not make any changes or modifications to the device unless they have been specifically authorized by Ewellix.

2.5.1 Warning labels



The symbol to the left can be found on the actuator near the hot surface danger.

Hot surfaces on actuator can cause burns and should not be touched. Protection must be provided against accidental contact if necessary.

⚠️ WARNING

Danger because of illegible symbols

Over the course of time stickers and decals may become dirty or illegible for some other reason.

Therefore:

Keep any safety, warning and operation related decals in legible condition at all times.

Replace damaged decals or stickers immediately.

3. Technical data

NOTE

The technical data (dimensions, weight, output, connection values, etc.) can be found in the drawings and data sheets at the end of this manual (see chapter [11. Appendix, page 42](#)).

3.1 Operating conditions

Environment Information	Value	Unit
Temperature range	-20 to +50	°C
Relative atmospheric humidity, maximum (no build up of condensation)	95	%

⚠ WARNING

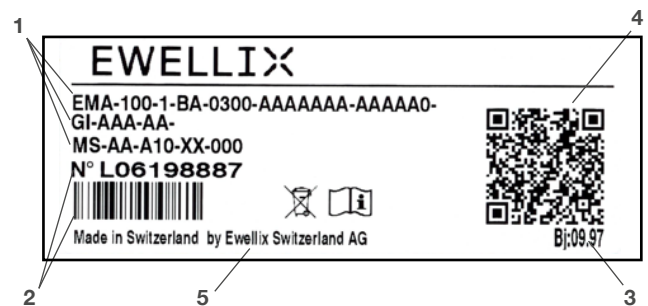
The surface temperature of the actuator should not exceed 60°C. Exceeding this temperature will decrease the life rating of the actuator as described in the performance diagram.

⚠ WARNING

The actuator is not intended to be applied with side loads. Side loads must be avoided by proper guiding and mounting. If side loads occur, this might result in decreased lifetime or structural damage of the actuator.

3.2 Product labels

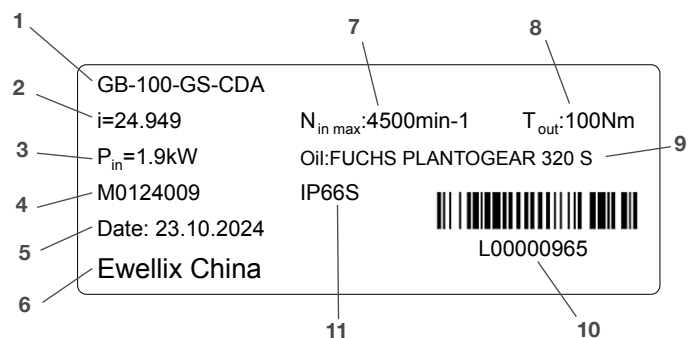
3.2.1 Linear unit label



The product label provides the following information:

1. Type designation
Line 1: Linear unit
Line 2: Gearbox
Line 3: Motor kit
2. Serial number
3. Manufacturing date (month/year)
4. QR-code (with type designation)
5. Manufacturer and country of origin

3.2.2 Gearbox label

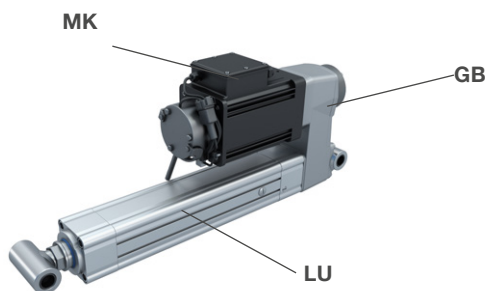


The gearbox product label can always be found on the product, also if the gearbox was ordered separately. The product label provides the following information:

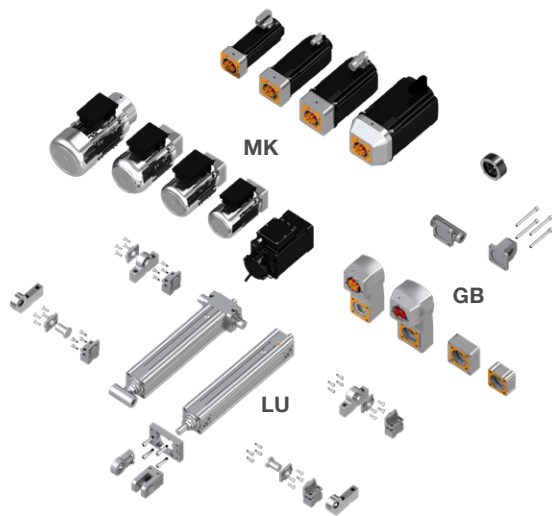
- | | |
|--------------------------------------|-------------------------------|
| 1. Type designation | 7. Maximum input speed |
| 2. Ratio | 8. Nominal output torque |
| 3. Maximum input power | 9. Lubrication and quantity |
| 4. Article number | 10. Serial number |
| 5. Manufacturing date | 11. Ingress protection rating |
| 6. Manufacture and country of origin | |

4. Structure and function

4.1 Product and option overview



LU: Linear Unit
 GB: Gearbox
 MK: Motor Kit



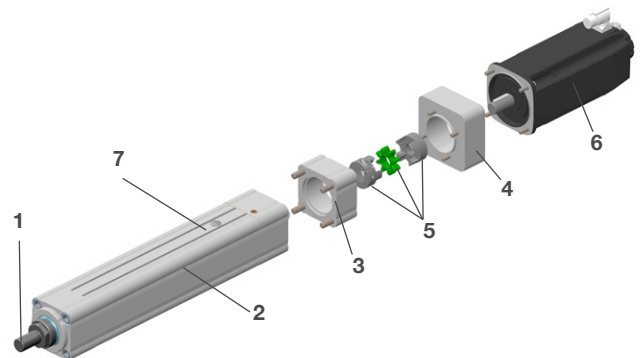
4.2 Brief description

The EMA-100 is a mechanical drive designed to work in various types of machines. The drive is used exclusively for dynamic center compression or traction movement.

The linear unit (7) is powered thru a coupling (5) by a motor (6). The motor (6) sets in motion either a ball or a roller screw system. Via the screw mount, the system transforms the rotation of the motor (6) into a linear motion of the actuator.

The push tube (1) and the other accessories transmit the actuator power into the application.

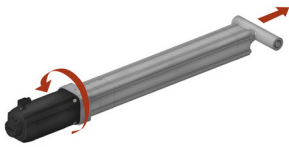
4.2.1 EMA-100 actuator overview



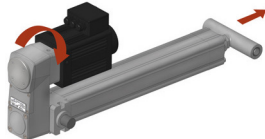
EMA-100

1. Push tube with front end
2. Protection tube
3. Inline gearbox (option)
4. Motor adapter (option)
5. Coupling (option)
6. Siemens motor 1FK7 (option)
7. Linear unit

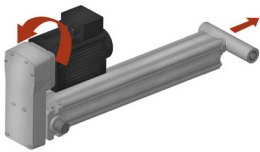
4.3 Direction of motor during extension of the cylinder



GB-100-GI; inline gearbox



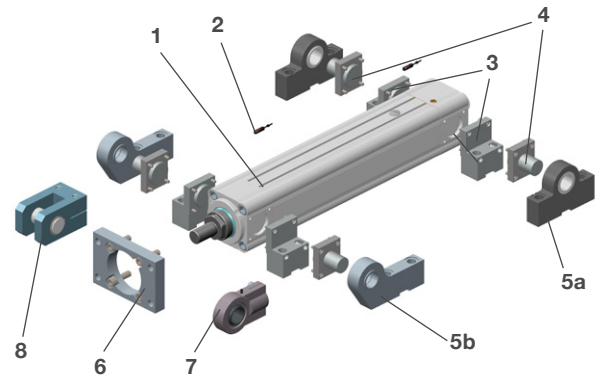
GB-100-GS; Spur gearbox



GB-100-GB; Belt gearbox

4.4 Overview

4.4.1 EMA-100 linear unit accessories overview

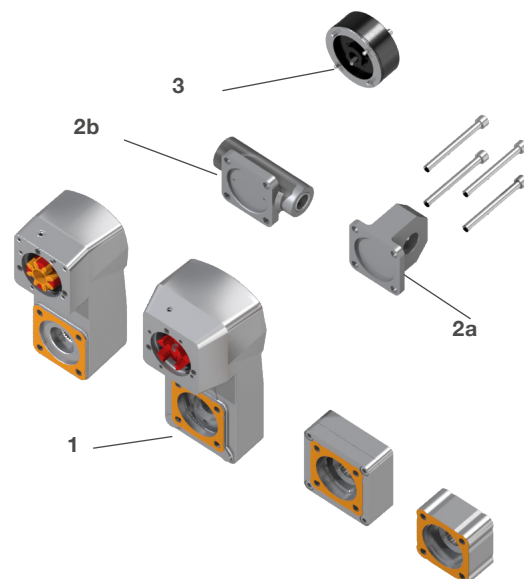


EMA-100 accessories

1. Linear unit
2. Proximity sensor
3. Foot mount
4. Pivot pin (pair)
- 5a. Trunnion bracket centric (pair)
- 5b. Trunnion bracket eccentric (pair)
6. Front flange
7. Rod end
8. Rod clevis

4.4.2 GB-100-G gearbox accessories overview

GB-100-G accessories



1. Gearbox
- 2a. Rear attachment
- 2b. Rear attachment bar type
3. Centrifugal brake

5. Delivery, packaging and storage

5.1 Safety information for transport

NOTICE

Damage due to improper transporting

Significant material damage can occur in conjunction with improper transport.

Therefore:

Proceed carefully during the unloading and delivery of the packaged items to its final destination and comply with the information shown on the packaging.

Only remove the actuator from its packaging right before installation.

Note storage requirements if actuator needs to be returned to the manufacturer (see chapter [5.5 Storage, page 11](#)).

5.2 Delivery inspection

The EMA-100 linear actuator is delivered as one packaged unit in a box or on pallets.

Check the delivery for completeness and damage immediately upon receipt.

Check completeness of delivery:

- Unpack drive.
- Check that the options are mounted or packed.
- Check the drive for damage, scratches, dents.

Proceed as follows in conjunction with visible exterior transport damage:

- Do not accept delivery or do so only with reservations.
- Record scope of damage on the transport documents or on the bill of delivery of the shipping company.
- Initiate complaint.

NOTE

Report any damage as soon as it has been recognized. Damage claims can only be asserted within the transporter's applicable complaint period.

5.3 Returning actuator to the manufacturer

Proceed as follows for the return transport:

1. Dismantle the device if necessary (see chapter [10. Dismantling, page 41](#)).
2. Pack device in its original packaging. Follow storage conditions (see chapter [5.5 Storage, page 11](#)).
3. Send to manufacturer.

5.4 Packaging

The individual packaged pieces have been packaged appropriately according to the expected transport conditions.

The packaging is supposed to protect the individual components from damage caused by the transport, corrosion and other damage until they are ready for installation. Therefore, do not destroy the packaging and only remove it shortly prior to the installation. Keep packaging for possible return shipment to the manufacturer (see chapter [5.3 Returning actuator to the manufacturer, page 10](#)).

If you want to dispose of the packaging, please note and adhere to the following:

NOTE

Environmental damage due to incorrect disposal

Packaging material consists of valuable raw materials and in many cases they can be sensibly recycled and reused.

Therefore:

Dispose of packaging material in an environmentally correct way. Comply with locally applicable disposal regulations.

5.5 Storage

Pack the actuator in its original packaging for storage.

- Do not store outside.
- Storage should be dry and dust-free.
- Keep away from any aggressive media.
- Protect from UV radiation.
- Avoid mechanical vibrations.
- Storage temperature: -40 to 50 °C.
- Relative atmospheric humidity: max. 95 % (no build up of condensation).
- To store longer than three months, check the general condition of all parts of the packaging on a monthly basis. If necessary, refresh or renew the conservation.
- Perform a re-lubrication of the actuator if it was stored for longer than 3 years.

NOTE

It is possible that there are notices on the packaging concerning storage which go beyond the requirements listed here. If so, follow those notices

5.6 Handling

Handle the actuator in a safe manner to avoid injuries or damage to material and environment. For long actuators, use appropriate tools for lifting and moving the actuator such as safety strings and cranes due to the increased weight.

NOTE

If ordered with a motor adapter, the actuator is equipped with a M12 thread for handling. It is recommended to use an eye bolt and clevis to attach the lifting equipment by a safety string.

6. Installation and initial operation

Authorized personnel

The installation and initial operation may only be conducted by qualified personnel.

⚠ WARNING

Risk of injury and material damage due to incorrect installation of the accessories.

Therefore:

Optional devices may only be installed in accordance with their respective instructions.

6.1 Installation location

Install in a location where the actuator is not exposed to strong UV radiation or corrosive or explosive air media.

6.2 Inspections prior to initial operation

Performed by professional electrician.

Prior to the initial operation, a professional electrician must perform and document the following tests and readings:

- Check visual condition
- Function check of operating features and safety features

NOTE

See additional information concerning inspections and readings (see chapter [8.3 Measures after maintenance completed, page 37](#)).

6.3 Installation

Installation is to be performed by trained personnel.

⚠ WARNING

Risk of injury and material damage due to loosening or removal of the screws on the device.

Removal or loosening of the screws on the linear unit may lead to injuries and material damage during the operation.

Therefore:

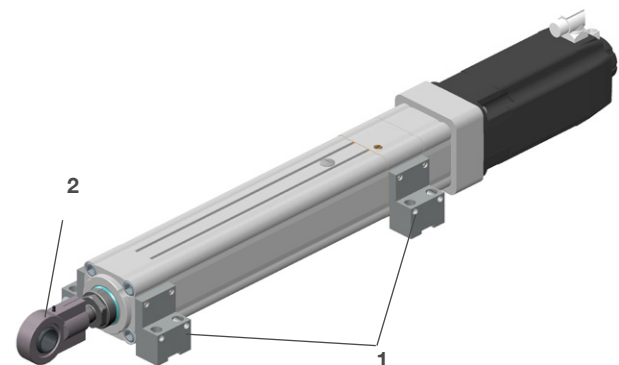
Never loosen or remove screws on the linear unit.

The EMA-100 Linear actuator (see image below) is attached to two elements via the push tube and the mounting accessories.

1. Assemble the gearbox and motor onto the linear unit if the product is not premounted (see chapter [7.5 Final installation instruction of actuator, page 15](#)).
2. Screw the rod clevis or rod end (2) on the push tube and tighten up the two screws.



3. Bolt the mounting accessories to the actuator if not pre-mounted (see chapter [4.4.1 EMA-100 linear unit accessories overview, page 9](#)).
4. Secure elements of the application in which the linear actuator will be installed.
5. Connect the rod end (2) and the mounting accessories (1) and the elements of the application with the fastening bolts (see image below).



⚠ WARNING**Risk of injury and material damage due to insufficient fastening!**

Only use fastening bolts and secure them adequately. Do not use screws to install. Never loosen or remove screws on the actuator.

6. During installation, ensure that the applied force is always directed on the center of the actuator.

⚠ WARNING**Risk of injury and material damage due to incorrect installation!**

During installation, do not subject the actuator to side-impact or to turning forces.

7. Ensure that the linear actuator is not impacted in its movement over the entire stroke area. Consider collision tests of the application.
8. Ensure that the installation requirements of the options have been met.
9. Affix prohibition and warning labels for the application onto the linear actuator, if necessary (see chapter [2.5.1 Warning labels, page 6](#)).
10. Preferably the actuator is driven manually for the end stop detection. If not possible, the speed and the torque of the screw must be lower than 125 mm/s respectively 20 Nm (input torque at Linear Unit). Higher speed or torque could cause damage to the actuator.

NOTICE

Do not reach the mechanical limit of the drive during operation. Doing so will result in irreversible damage to the drive.

7. Operation

7.1 Safety

⚠ DANGER

Risk of crushing

While moving onto solid objects, the force of the device may cause injuries.

Therefore:

Ensure that there are no persons in the stroke area of the device while in operation.

Take note of maximum permissible operating parameters for the device (see chapter [11. Appendix, page 42](#)).

Do not touch elements connected to the device while the device is in operation.

⚠ DANGER

If a part of the actuator fails (screw fracture, loss of input torque), the working mass will drop.

Therefore:

Additional safety features must be in place to protect the workplace.

When there is no input torque, the push tube can be moved manually or by gravity. A motor with fail safe brake is highly recommended, particularly for vertical application.

Check the drive regularly for signs of excessive wear (see chapter [8.2 Maintenance work, page 36](#)).

⚠ CAUTION

Material damage due to static and dynamic overload of the device

Static and dynamic overload can lead to damage and failure of the device.

Therefore:

Adhere to maximum permissible operating parameters for the device (see chapter [11. Appendix, page 42](#)).

Never exceed nominal load.

⚠ WARNING

Noise hazard.

Hearing protection may be recommended.

NOTICE

Actuator may be damaged if liquids penetrate the actuator during extension and retraction. Keep liquids away.

NOTICE

Material damage through overheating.

An overheating of the device can cause damage.

Therefore:

Only use control integrated thermal switch.

NOTICE

Actuator may be damaged if chemical substances penetrate the actuator or get in touch with the actuator's surface. Keep chemical substances away.

7.2 Turn on

NOTE

The device does not feature its own operating control elements. The operation takes place via a separate operating element (see separate operating manual).

7.3 Turn off

NOTE

The device does not feature its own operating control elements. The operation takes place via a separate operating element (see separate operating manual).

7.4 Action before use

Ensure that there are no persons or objects in the stroke area of the device.

NOTICE

Contamination of the devices can cause serious damage

Therefore:

Clean dirty parts immediately after they become dirty (see chapter [8.2.1 Cleaning, page 36](#)).

7.5 Final installation instruction of actuator

7.5.1 Motor adapter

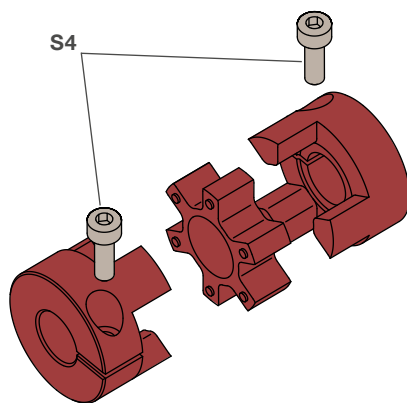
The motor adapter is to install a motor with an axially designed shaft (see chapter [7.5.2 Recommended motors, page 15](#)) to a EMA-100 linear unit.

7.5.2 Recommended motors

The Siemens motors provided by Ewellix come with a differential resolver or multi-turn encoder, a shaft-end with keyway (1FK7044 without) and a holding brake. In addition, they are equipped with a Drive-CLiQ interface. A rotating plug adapter simplifies the connection and cable routing in all installation positions.

Motor types		1FK7044-4CH71-1U	1FK7064-4CF71-1RB0	1FK7086-4CF71-1RB0	1FK7105-2AF71-1RB0)
Designation	Unit				
Rated power (100 K)	kW	1,4	2,5	3,75	8,2
Rated speed	min ⁻¹	4 500	3 000	3 000	3 000
Rated current	A	3,9	7,6	5,7	18
Rated torque (100 K)	Nm	3	8	6,5	26
Static torque (100 K)	Nm	4,5	12	28	48
Peak torque	Nm	13	32	105	150
Inertia with brake	10 ⁻⁴ kgm ²	1,62	8,5	25,5	162
Weight with brake	kg	8	16,8	26	43,5

7.5.3 Coupling installation



- Push the first coupling hub with spline onto the screw shaft of the linear unit as far as possible.
- Push the coupling hub on the motor shaft and align the coupling bore with the end of the motor shaft.

NOTE

Use PU – compatible grease such as e.g. vaseline to grease the coupling elastomer insert. A light coating of oil on the shaft is recommended to ease the mounting process and will not affect the clamping force of the hub.

NOTE

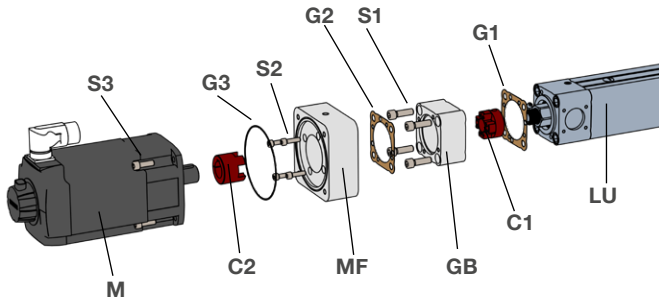
The relevant seal must always be fitted between all components to ensure the requisite degree of IP protection.

NOTE

For the following steps, check the required screw size and the tightening torques using the values indicated in [table 1](#) and [2](#).

7.5.4 Synchronous Servo Motors

Inline mounting



- Attach the coupling (**C1**) on the linear unit (**LU**) using screw (**S4**) as described in 7.5.3.
- Fit the inline gearbox (**GB**) on the linear unit (**LU**) by inserting the gasket (**G1**) between the two components and tightening the housing using four screws (**S1**).
- First put the gasket (**G2**) on the inline gearbox (**GB**) then attach the motor flange (**MF**) to the inline gearbox (**GB**) and tighten the screws (**S2**).
- Attach the coupling (**C2**) to the motor (**M**) using screw (**S4**).
- Put the sealing (**G3**) into the groove in the motor flange (**MF**) and tighten the screws (**S3**) to secure the motor (**M**) to the motor flange (**MF**).

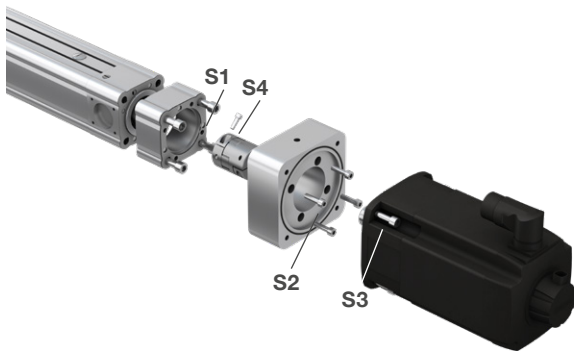
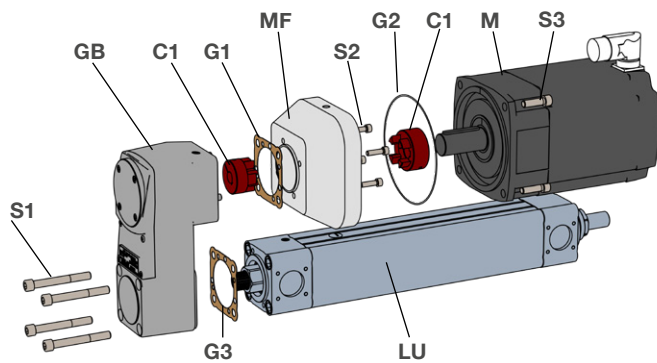


Table 1

Screw size/tightening torques (parallel)								
Siemens Motor type	S1 (Gearbox)		S2 (Motor adapter)		S4 (Coupling)		S3 (Motor)	
	Screw	Torque M_A	Screw	Torque M_A	Screw	Torque M_A	Screw	Torque M_A
1FK704X	M12×40	75 Nm	M8×30	20 Nm	M6×20	15 Nm	M6×30	10 Nm
1FK706X	M12×40	75 Nm	M8×30	20 Nm	M6×20	15 Nm	M8×30	20 Nm
1FK708X	M12×40	75 Nm	M8×30	20 Nm	M6×20	15 Nm	M10×30	40 Nm
1FK710X	M12×40	75 Nm	M8×30	20 Nm	M6×20	15 Nm	M12×40	75 Nm

Parallel mounting - Spure gearbox - Servo motor



- Fit the linear unit (**LU**) onto the gearbox (**GB**) by inserting the gasket (**G3**) between the two components and tighten the screws (**S1**).
- Attach the coupling (**C1**) to the motor (**M**) using screw (**S4**) as described in 7.5.3.
- Fit the motor flange (**MF**) onto the gearbox (**GB**) by inserting the gasket (**G1**) between the two components and tighten the screws (**S2**).
- Put the sealing (**G2**) into the recess in the motor flange (**MF**) and tighten the flange with four screws (**S3**).

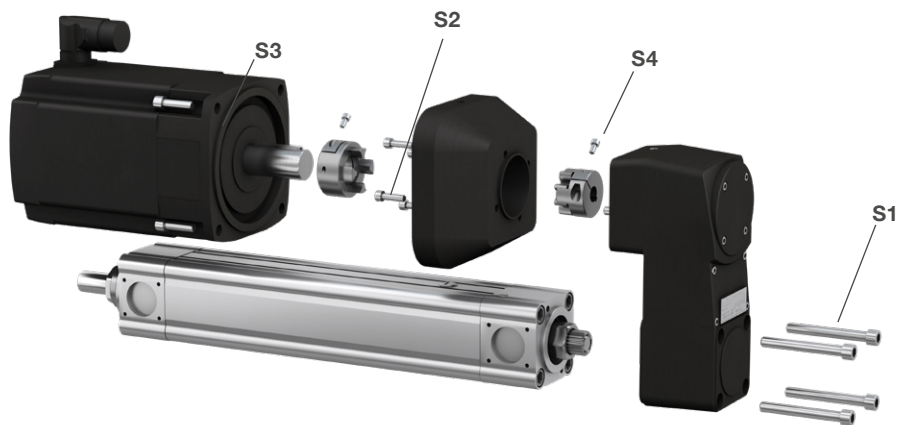


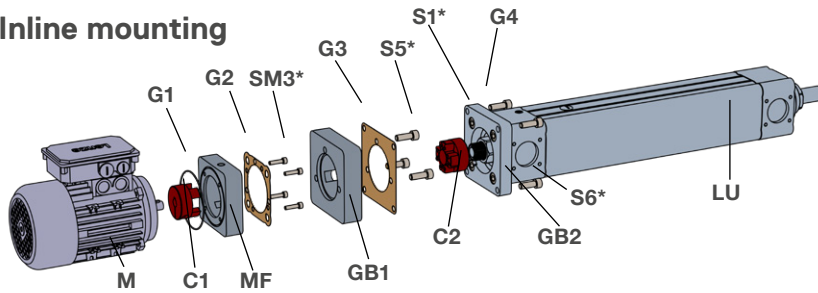
Table 2

Screw size/tightening torques (parallel)								
Siemens Motor type	S1 (Gearbox)		S2 (Motor adapter)		S4 (Coupling)		S3 (Motor)	
	Screw	Torque M_A	Screw	Torque M_A	Screw	Torque M_A	Screw	Torque M_A
1FK704X	M12×110 M12×140*	40 Nm 75 Nm	M8×30	20 Nm	M6×20	15 Nm	M6×30	10 Nm
1FK706X	M12×110 M12×140*	40 Nm 75 Nm	M8×30	20 Nm	M6×20	15 Nm	M8×30	20 Nm
1FK708X	M12×110 M12×140*	40 Nm 75 Nm	M8×30	20 Nm	M6×20	15 Nm	M10×30	40 Nm
1FK710X	M12×110 M12×140*	40 Nm 75 Nm	M8×30	20 Nm	M6×20	15 Nm	M12×40	75 Nm

* Screw and torque when using rear attachment

7.5.5 Asynchronous Motors

Inline mounting



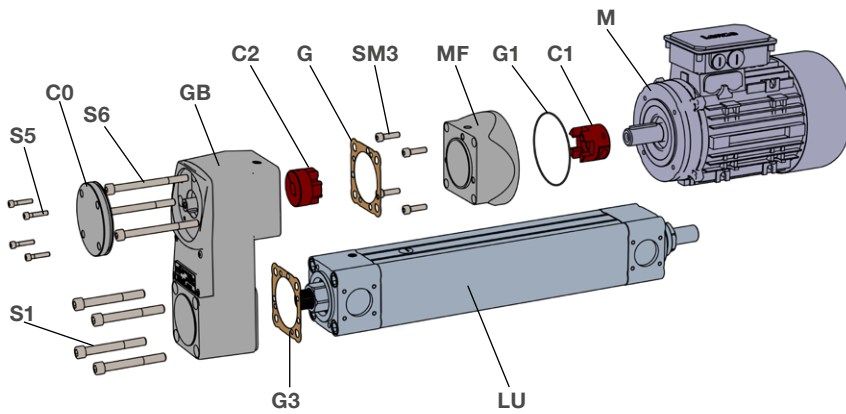
*These screws depend on the motor type they do not correspond to the same indices as in table 1

- Attach the coupling (**C1**) to the motor (**M**) using screw (**S4**) as described in **7.5.3**.
- Put the sealing (**G1**) into the groove in the motor flange (**MF**) and tighten the flange with four screws (**SM3**).
- Fit the inline gearbox (**GB1**) onto the motor flange (**MF**) by inserting the gasket (**G2**) between the two components and tighten the screws (**S5**).
- Attach the coupling (**C2**) to the linear unit (**LU**) using screw (**S4**).
- Fit the inline gearbox (**GB2**) onto the linear unit (**LU**) by inserting the gasket (**G4**) between the two components and tighten the screws (**S1**).
- Screw the linear unit (**LU**) and the inline gearbox (**GB2**) with the inline gearbox (**GB1**) and the gasket (**G3**) together with the four screws (**S6**)

Table 3

Screw size / tightening torques (inline)								
Interface Type	S1		SM3		S5		S6	
	Screw	Torque	Screw	Torque	Screw	Torque	Screw	Torque
AC71 / B14	M12×40	75 Nm	M6	10 Nm	M10×30	40 Nm	M10×30	40 Nm
AC80 / B14	M12×40	75 Nm	M6	10 Nm	M10×30	40 Nm	M10×30	40 Nm
AC90 / B14	M12×40	75 Nm	M8	20 Nm	M10×30	40 Nm	M10×30	40 Nm
AC100 / B14	M12×40	75 Nm	M8	20 Nm	M10×30	40 Nm	M10×30	40 Nm

Parallel mounting - Spure gearbox



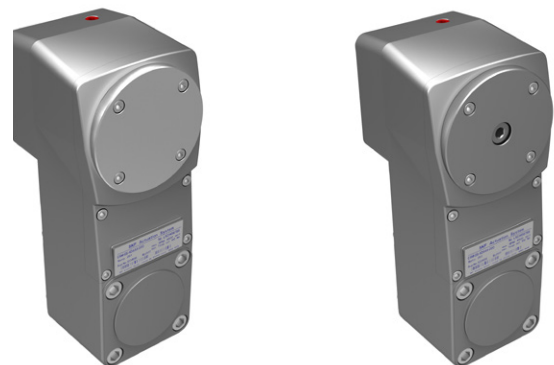
- Attach the coupling (C1) to the motor (M) using screw (S4) as described in 7.5.3.
- Put the sealing (G1) into the groove in the motor flange (MF) and tighten the flange with four screws (SM3).
- Fit the linear unit (LU) onto the gearbox (GB) by inserting the gasket (G3) between the two components and tighten the screws (S1).
- Fit the motor flange (MF) with motor (M) onto the gearbox (GB) by inserting the gasket (G2) between the two components and tighten the screws (S6).
- Fit the cover (CO) onto the gearbox (MF) and tighten the screws (S5).

Table 4

Screw size / tightening torques (inline)								
Interface Type	S1		SM3		S5		S6	
	Screw	Torque	Screw	Torque	Screw	Torque	Screw	Torque
AC71 / B14	M12×110	40 Nm	M6	10 Nm	M6×25	6 Nm	M10×130	40 Nm
	M12×140*	75 Nm						
AC80 / B14	M12×110	40 Nm	M6	10 Nm	M6×25	6 Nm	M10×130	40 Nm
	M12×140*	75 Nm						
AC90 / B14	M12×110	40 Nm	M8	20 Nm	M6×25	6 Nm	M10×130	40 Nm
	M12×140*	75 Nm						
AC100 / B14	M12×110	40 Nm	M8	20 Nm	M6×25	6 Nm	M10×130	40 Nm
	M12×140*	75 Nm						
N11	M12×110	40 Nm	-	-	M6×25	6 Nm	M10×130	40 Nm
	M12×140*	75 Nm						

Manual override

The parallel gearbox features a manual override as built-in functionality. The gearbox can be manually operated through a hexagonal key located on the gearbox motor axis. As standard, the access to this key is covered by a plate. On request, it's possible to have a round opening for direct access. The override can be used as safety feature in case of power failures or as manual adjustment for an easier actuator installation in the application.



Manual override hole is only available on request. Standard cover is without hole

NOTICE

For operating with gearbox's override the electromechanical motor brake has to be released!

7.6 Belt gearbox mounting

7.6.1 Parallel mounting

Delivery scope – Complete actuator with Belt gearbox mounted and without motor

Belt gear with linear unit, with motor adapter kit and without motor.

Start at step 2

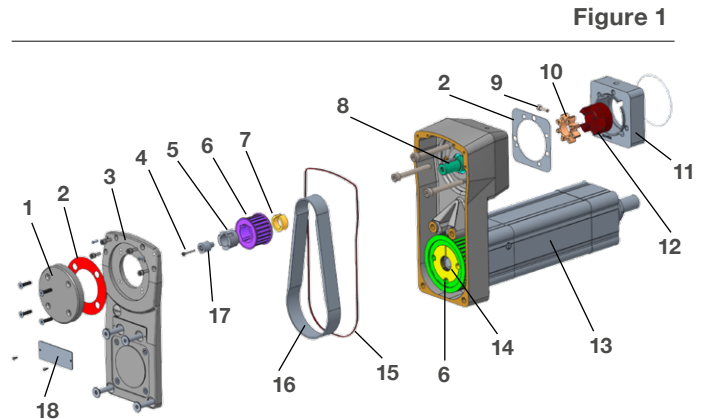


Figure 1

Delivery scope - Belt gearbox only

Belt gear without linear unit, without motor kit and without motor.

Start at step: 1

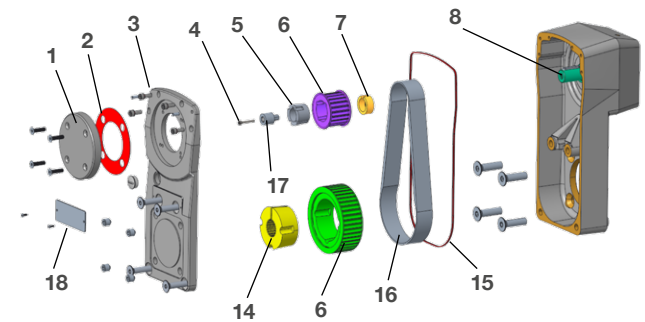


Figure 2

Delivery scope - Belt gearbox with motor adapter kit

Belt gear without linear unit, with motor adapter kit and without motor.

Start at step: 1

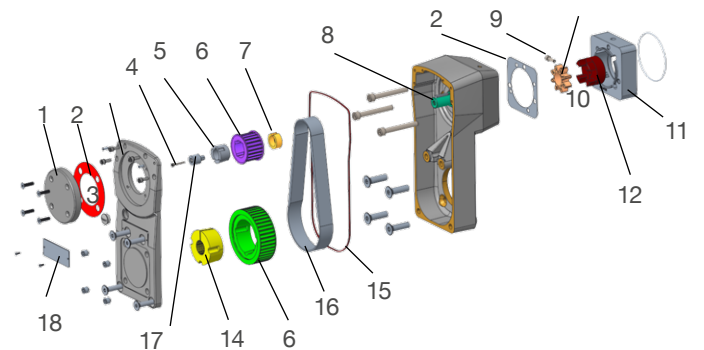


Figure 3

- | | |
|-------------------------|------------------------------------|
| 1. Rear cover interface | 11. Motor flange |
| 2. Gasket | 12. Coupling |
| 3. Rear cover | 13. Linear unit |
| 4. Screw | 14. Taper lock bushing with spline |
| 5. Taper lock bushing | 15. Seal |
| 6. Pulley | 16. Belt |
| 7. Sleeve | 17. Adapter |
| 8. Shaft | 18. Plate |
| 9. Coupling screw | |
| 10. Spider element | |

7.6.2 Tools needed

Not included in kit from Ewellix

1. Torque wrench 0-81 Nm with Allen key sockets 3, 4, 5, 6, 7, 8, 10 mm
2. T10 torx.
3. Allen keys, 3, 4, 5, 6, 7, 8 and 10mm.
4. Flat head screwdriver (5-10 mm)
5. Plastic mallet or rubber mallet.
6. Loctite 243 and Loctite 574

Provided in kit by Ewellix

7. Taper bushing mounting tool
8. Belt pulley locking tool

Figure 4



7.6.3 Step-by-step instructions

Following is a step-by-step instructions how to mount the belt gearbox, the linear unit, the motor adapter and the motor together. Depending on your order all or some components can already be assembled, and steps can then be skipped.

Step 1: Mount belt gear housing on linear unit

1. Read the order key for information on how the linear unit should be oriented.
2. Location of the letter affecting rotation of linear unit in the order key:
EMA-100-#-xx-0100-Axxxxxx-xxxx00-GB-Cxx-xx-MA-xx-xxx-Ax-000
3. Check the sinter filter on the linear unit and orient it with the belt gear according to the letter in the order key (see **Figure 5**).
4. Place linear unit with the spline end hanging of the table.
5. Place gasket on the linear unit.
6. Mount the Belt gear housing on the linear unit using 4x screws (M12x45). Apply Loctite 243 to the first 10 threads of the screws all the way around.
7. Tighten the screws in a criss-cross pattern and torque them to 81 Nm using a torque wrench.

WARNING

Control

Double check that the belt gear housing is in its correct orientation compared to the order key.

Figure 5

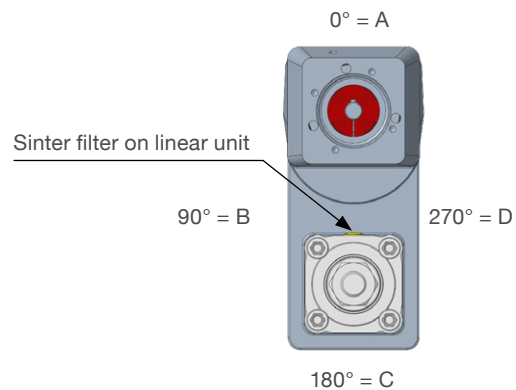


Figure 6

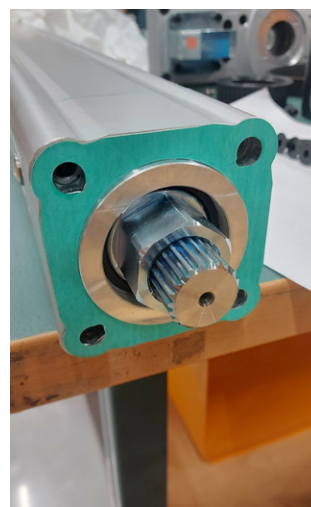
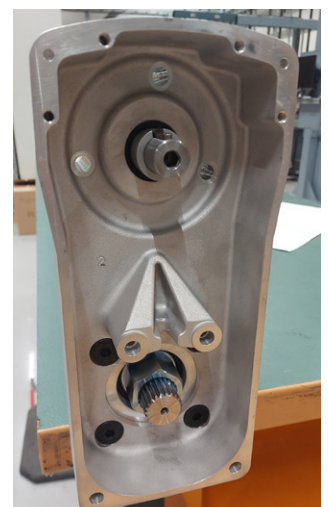


Figure 7

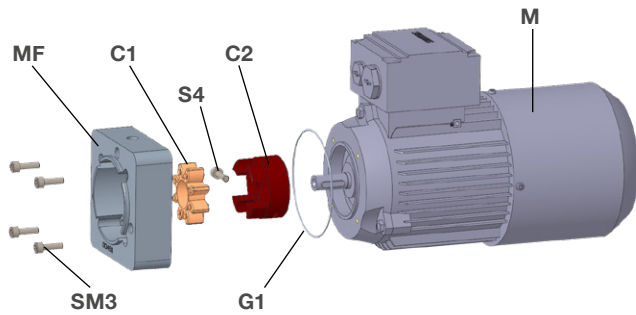


Step 2: Mount motor adapter kit, AC-motor.

Only valid for AC-motor, if Servo motor skip to step 4.

⚠ WARNING

Ingoing parts can vary depending on motor kits and motor type



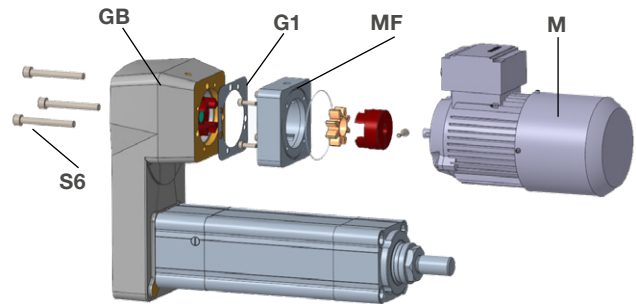
1. Insert spider element (C1) in the coupling (C2).
2. Mount coupling on the motor (M).
3. Tighten the coupling screw (S4) (M6x20) to fasten the coupling to the motor shaft, torque to 15 Nm.
4. Place seal/gasket (G1) between the motor flange and the motor.
5. Apply Loctite 243 all the way around the motor screws (SM3).
6. Mount the motor flange (MF) to the motor using the motor screws and torque the screws according to **table 5**.

Step 3: Mount motor flange, AC-motor.

Only valid for AC-motor4.

⚠ WARNING

Ingoing parts can vary depending on motor kits and motor type



1. Mount motor adapter kit to the belt gear housing. The kit contains: screws (S6), flange (MF) and gasket (G1) needed to mount the flange.
2. Place the gasket (G1) on the belt gear housing (GB).
3. If the flange (MF) has a hole for a lifting device, orient it facing up like shown in the picture.
4. Add Loctite 243 to the first 10 threads of the screws (S6) used to fasten the flange (MF).
5. Torque the screws to specified torque in the motor adapter kit.

Table 5

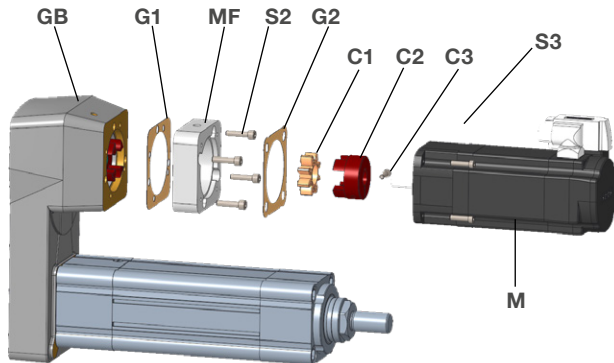
Interface Type	SM3	Torque	S6	Torque
	Screw		Screw	
AC71 / B14	M6	10 Nm	M10×80	40 Nm
AC80 / B14	M6	10 Nm	M10×80	40 Nm
AC90 / B14	M8	20 Nm	M10×80	40 Nm
AC100 / B14	M8	20 Nm	M10×80	40 Nm
N11	N/A		M10×80	40 Nm

Step 4: Mount servo motor

Only valid for servo motor.

⚠ WARNING

Ingoing parts can vary depending on motor kits and motor type



1. Mount spider element (**C1**) into the coupling (**C2**).
2. Secure the coupling (**C2**) to the motor (**M**) using coupling screw (M6x20) (**C3**) and torque the screw to 15 Nm.
3. Place gasket (**G1**) between the motor flange (**MF**) and the belt gear housing (**GB**).
4. Fasten the motor flange to the housing using the flange screws (**S2**).
5. Torque the screws to the torque specified in the motor adapter kit.
6. Place the gasket (**G2**) between motor and motor flange.
7. Fasten the motor to the motor flange using the motor screws (**S3**) and torque them to their specified torque (see **table 6**).

Table 6

Interface Type	S3		S2	
	Screw	Torque	Screw	Torque
1FK704X	M6x30	10 Nm	M8x30	20 Nm
1FK706X	M8x30	20 Nm	M8x30	20 Nm
1FK708X	M10x30	40 Nm	M8x30	20 Nm
1FK710X	M12x40	75 Nm	M8x30	20 Nm

Step 5: Mount belt pulley and taper bushing on linear unit.

1. Place belt pulley with the side plates removed, around the spline shaft. The pulley will only fit one way.
2. Mount taper lock bushing with spline all the way up against the linear unit spline and nut.
3. Take the setscrews and degrease the screws using Loctite SF 7063.

NOTE

Set screws included in taper bushing with spline.

4. Take a control measurement and measure the distance between the end of the taper bushing with spline and the spline shaft (see **figure 8**). Write down the measurement to compare with later steps.
5. Apply Loctite 243 to the set screws (see **figure 9**).

Figure 8



Figure 9



Figure 10



Step 6: Secure taper bushing on linear unit.

1. Insert Belt pulley locking tool between the belt pulley and the belt gear housing (see **figure 11**).
2. Fasten the pulley with the set screws, start by hand tightening them.
3. Be sure to torque the screws using multiple passes and as even as possible to avoid vibrations in the pulley when spinning. Torque to 30 Nm using a torque wrench.
4. Remove the belt pulley locking tool.
5. Make sure that the taper bushing with spline sits all the way up against the nut by measuring from the top of the pulley to the top of the spline on the linear unit again. The result should be the same as measured before. The dimension can vary $\pm 0,1$ mm (see **figure 12**).

Figure 11

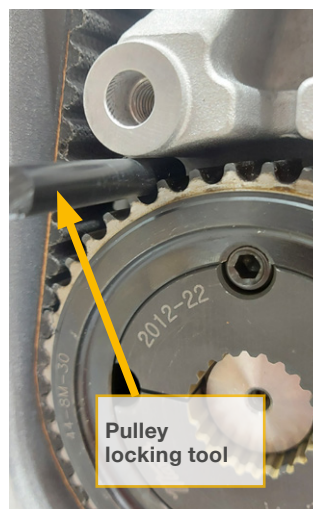


Figure 12



Step 7: Mount belt pulley and belt on shaft.

1. For belt gear 1:1 do not install the sleeve. On belt gear 2:1, install sleeve on the shaft (see **figure 14**).
2. Place belt pulley around shaft.
3. Place belt around both pulleys.
4. Take 1x taper bushing and push it on to the shaft. Use Taper bushing mounting tool and a plastic mallet to gently tap the bushing all the way on to the shaft.
5. Degrease taper lock bushing set screws.

NOTE

Set screws included in taper bushing .

6. Apply Loctite 243 to the set screws, the first 5 threads all the way around

Figure 13

For gear ratio 1:1



Figure 14

For gear ratio 2:1



Figure 15



Figure 16



Figure 17



Figure 18



Step 8: Secure belt pulley on shaft

1. The bushing has 3 or 4 holes depending on the bushing type, 2 of them has threads. Insert the set screws in the threaded ones to tighten the bushing. The hole that is threaded in the pulley is used for loosening the bushing.
2. Slide the pulley on to the bushing.
3. Insert the belt pulley locking tool (see **figure 19**).
4. Tighten the set screws to fasten it on the shaft.
5. Torque the set screws to 30 Nm on the 1:1 belt gear and 5,7 Nm on the 2:1.
6. Remove the belt pulley locking tool

Figure 19

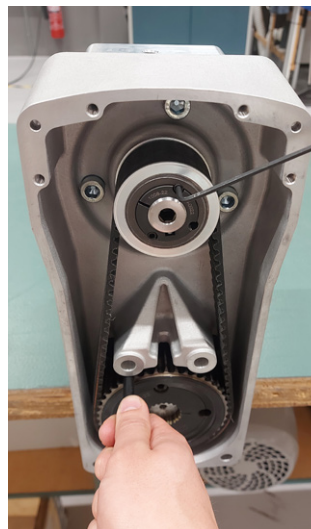


Figure 20



Control for step 8: Pulley alignment

To make sure that the belt is mounted correctly and that the belt is properly tensioned, perform the following steps:

1. Insert an 8 mm Allen key in the shaft like the picture shows (see **figure 22**).
2. Turn the pulley assembly with the key by hand.
3. Check for misalignment in the belt or wobble in the pulley wheels.
4. Make sure that the assembly can be easily turned by hand and that the pulleys do not rub on the belt gear housing.

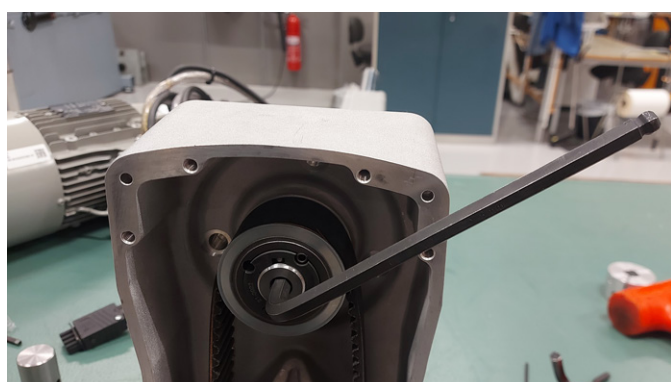
Figure 21



NOTE

The linear unit will extend and retract when turning the Allen key. Be careful not to run the actuator to its endpoints as this could damage the linear unit.

Figure 22



Step 9: Mount interface adapter.

Only valid for thick cover, if thin cover skip to step 16.

1. Apply Loctite 243 to the first 10 threads of 1x screw (M4x25).
2. Insert adapter in the shaft.
3. Torque the screw to 2,9 Nm using a torque wrench

Figure 23



Figure 24

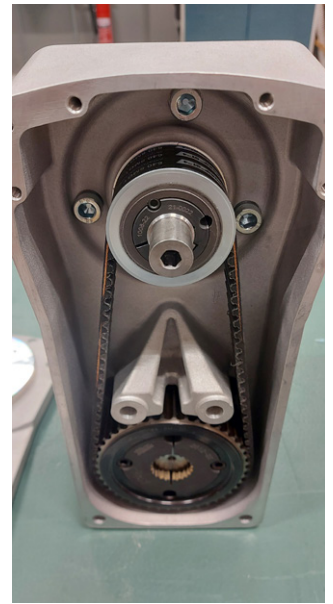


Figure 25



Step 10: Mount interface cover on thick cover.

1. Apply gasket to the cover, make sure to line up the holes in the cover with the holes in the gasket.
2. Mount interface cover on the belt gear cover, using 4x screws (MF6S 6x25). Apply Loctite 243 to the first 5 threads all the way around and tighten with a torque wrench to 10 Nm.
3. Install plug to the cover using a flat head screwdriver. Tighten to 1 Nm.

Figure 26

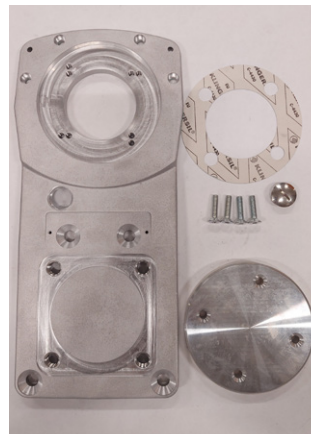
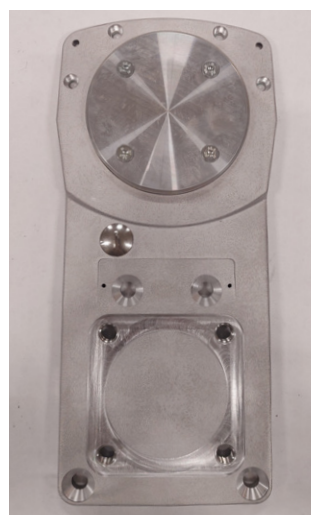


Figure 27



Figure 28



Step 11: Fit rubber seal on thick cover.

1. Mount Seal in the cover.
2. Orient the seal with the flat part of the seal facing down in the groove like the picture shows (see **figure 31**).
3. Make sure that it sits in the intended groove all the way around (see **figure 29**).

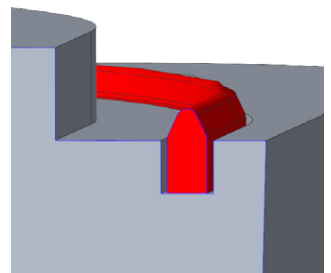
Figure 29



Figure 30



Figure 31



Step 12: Mount set screws on thick cover, if no rear attachment.

Only valid if no rear attachment, if rear attachment skip to step 13.

1. EMA-100-#-xx-0100-Axxxxxx-xxxx00-GB-Cxx-0x-MA-xx-xxx-xx-000
0= No rear attachment, B= 0° and C= 90°
2. If the rear attachment is not mounted, plug the rear attachment mounting holes using 4x set screws. Glue the first 5 threads all the way around the set screw with Loctite 243 and screw them in so they sit flat with the inside of the cover. It is very important that the set screws do not stick up through the inside of the cover, because they risk hitting the belt pulley (see **figure 33**).

Figure 32



Figure 33

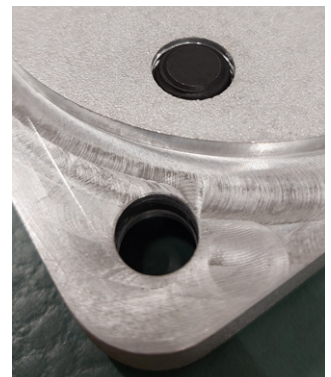


Figure 34



Step 13: Mount casted cover

1. Place 2x pins in their designated holes marked with red on the **figure 35** in the belt gear housing. If the pin will not go in easily, use a plastic mallet and gently tap it in.
2. Mount the belt cover on the belt housing, using 4x washers and 4x screws (MC6S 6x16). Place the washers under the screws. Hand tighten the screws.
3. Apply Loctite 243 to the first 8-10 threads all the way around of 4x (MFT ISO14581 10x45).
4. Add Loctite 574 all around the 4x countersunk holes in the cover (see **figure 36**).
5. Apply Loctite 243 to the first 8-10 threads all the way around of 4x screws (MFT ISO14581 10x45) and mount them, screw them on hand tight.
6. Use a torque wrench to tighten all the screws in a criss-cross square pattern, tighten the 4x screws (MC6S 6x16) to 10 Nm and the 4x screws (MFT ISO14581 10x45) to 34 Nm.

Figure 35

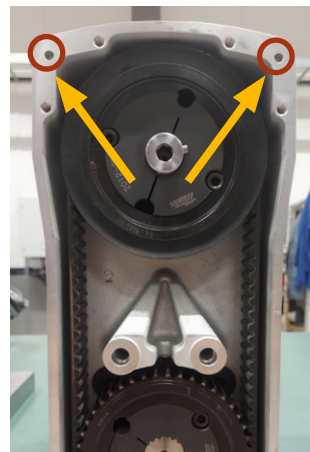


Figure 36

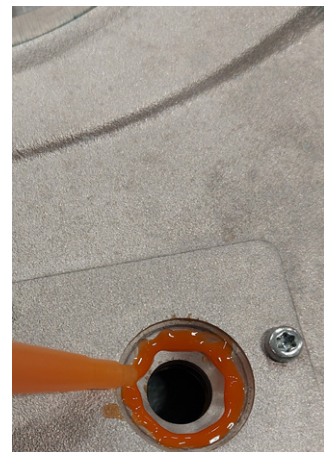


Figure 37



Figure 38

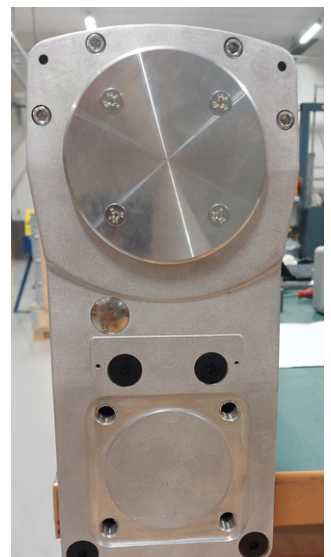


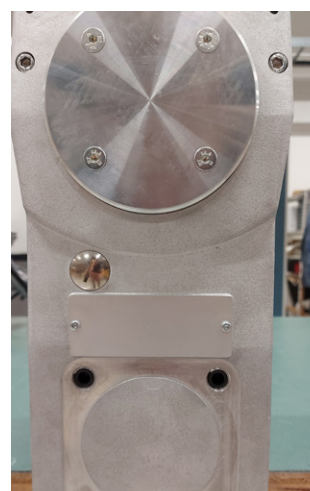
Figure 39



Step 14: Mount label plate.

1. Fasten label plate with 2x screws (M3x8) to the casted cover (see **figure 40**).
2. Torque the screws to 0,25 Nm with a T10 torx.

Figure 40



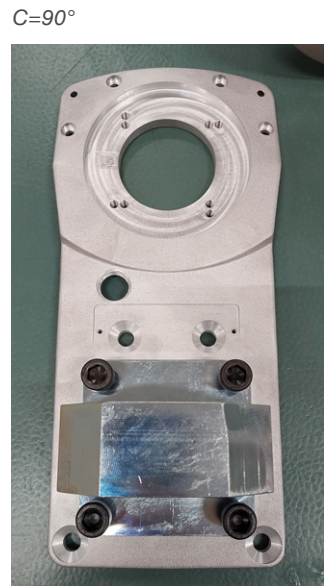
Step 15: Mount rear attachment.

1. EMA-100-#-xx-0100-Axxxxxx-xxxx00-GB-Cxx-0x-MA-xx-xxx-xx-000
0= No rear attachment, B= 0° and C= 90°
2. Apply Loctite 243 to the first 10 threads all the way around 4x screws (M12x25).
3. Study the order key to check the orientation of the attachment.
4. Mount rear attachment using 4x screws (M12x25).
5. Torque the screws to 75 Nm in a criss-cross square pattern.

Figure 41



Figure 42



Step 16: Mount thin cover

1. Mount thin belt cover on the belt housing, using 4x screws (MC6S 6x16). Glue the first 5-8 threads all the way around with Loctite 243 and hand tighten the screws.
2. Apply Loctite 243 to the first 5 threads all the way around 4x screws (MF6S 10x45).
3. Mount 4x screws (MC6SLS 10x30), screw them on hand tight.
4. Use a torque wrench to tighten all the screws in a criss-cross pattern, tighten 4x screws (MC6S 6x16) to 10 Nm and 4x screws (MC6SLS 10x30) to 47 Nm (see **figure 45**).

Figure 43



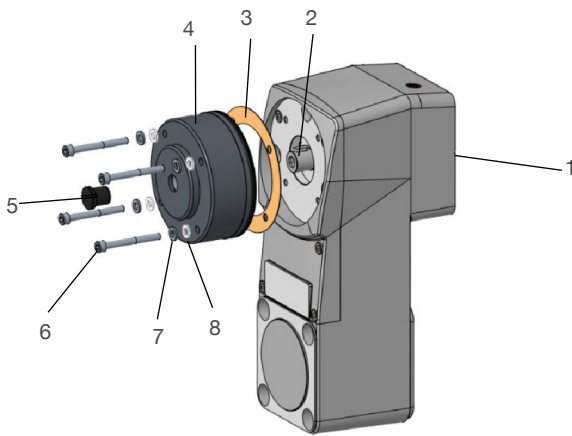
Figure 45



Figure 44

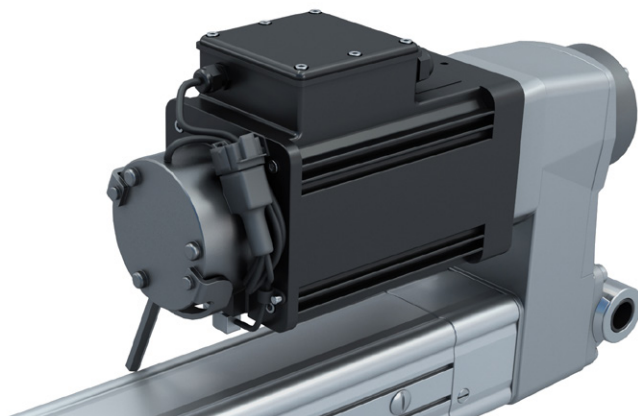


7.7 Centrifugal brake mounting



- Remove cover from gearbox (1) and insert key (2) into groove in gearbox input shaft.
- Place gasket (3) on gearbox and put centrifugal brake (4) on gearbox input shaft
- Place washer (7) and sealing washer (8) underneath screw head. Secure screws (6) with Loctite 241 and fix the centrifugal brake (4) to the gearbox (1). Tighten the screws (6) with 5 Nm.
- Install cap (5) into centrifugal brake housing.

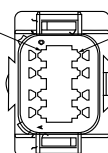
7.8 Motor N11 connector and pinning



Connector Pinning

DEUTSCH DT04 - 08PA

- 1 power supply 4.5 - 18V
- 2 channel A
- 3 channel B
- 4 ground



- 8 brake (ground)
- 7 brake (+24V)
- 6 PT1000 (ground)
- 5 PT1000 (+5V)

Matching connector housing is DT06-08SA from TE Connectivity

Connecting U V W power wires

Assembly sequence for washers, spring-washer and M6 nut:

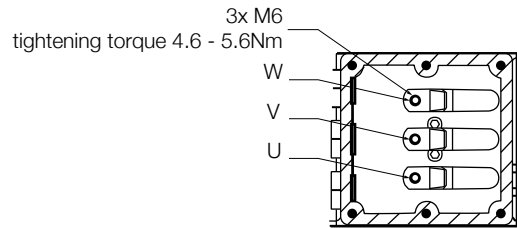


Figure 46

Install cable, install washer

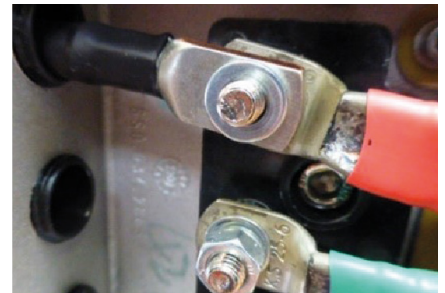


Figure 47

Install spring-washer

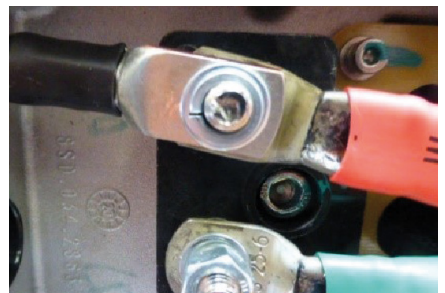
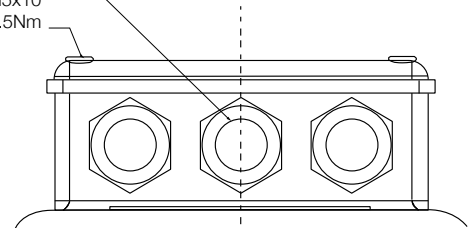


Figure 48

Install nut



3x cable gland M20x1.5
6x M5x10
tightening torque 2.5 - 3.5Nm



⚠ DANGER

Risk of electric shock

When connecting cable to motor

- Make sure all cables are unplugged and free of charge.

7.9 Detection of mechanical end stops

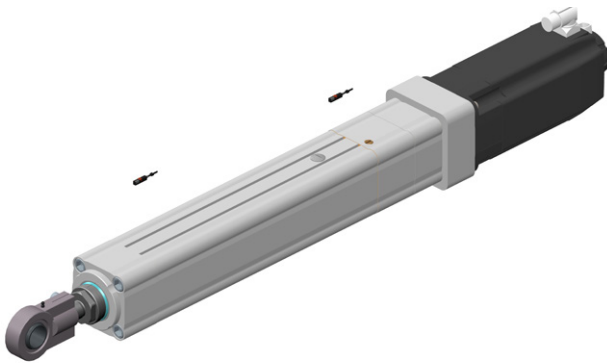
- Preferably the actuator is driven manually for the end stop detection. If not possible, the speed and the torque of the screw must be lower than 125 mm/s respectively 20 Nm (input torque at linear unit). Higher speed or torque could cause damage to the actuator.
- When installing limit switches, a safety distance from the mechanical end stops should be considered to allow for sufficient overtravel.

WARNING

Since the linear unit's mechanical end stops are not designed to take impacts on a regular use, limit switches need to be placed so that the end stops are not hit during regular use.

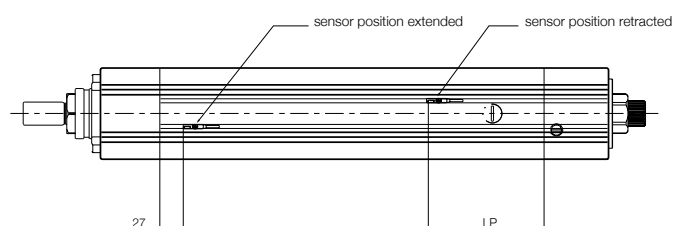
7.9.1 Sensor mounting

- Sensor can be inserted in two slots s on the EMA-100 electro cylinder (see **figure 48**).
- Install the sensors: the sensors can be inserted into the slots from above. The cable ends should lead into the drive direction. Push the sensors to their approximate positions in the slots of the cylinder body. Tighten the fixing screws on the limit switches slightly and lead the cable along the profile slots.



Type	Note	LP
EMA-100-1-XX-...	all screw types	156,5
EMA-100-1-CB-...	with backup nut	170,5

Figure 49



This sensor placement allow for a usable sensor field of 40 mm (+20/-20mm) from centre of sensor field and leaves 10 mm on both ends unused for tolerance stack-up to be covered.

NOTE

Instructions to install the sensor can be found on the supplier's website.

Supplier: Balluff (www.balluff.com)

Sensor Type: BMF 235K-H-PO-C-A2-....

7.10 Screw with Back-up nut

EMA-100-1-CB-####-....

The back-up nut is a feature that is added to the main nut. It is not in contact with the screw during normal operation and will prevent the actuator from collapsing if the main nut fails. It can be used to safely retract the actuator but creates high friction on the screw. Means to detected engage back-up nut need to be put in place (e.g. limit motor torque or current). Once the back-up nut is engaged the actuator must be replaced. Back-up nut is only working for push load.

⚠ DANGER

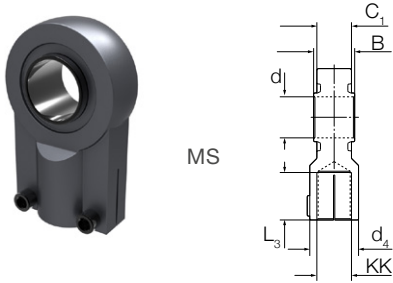
Risk of collapsing

Back-up nut is not design for regular operation. Extended use can lead to actuator collapse.

7.11 Accessories

7.11.1 Linear unit accessories

Rod End

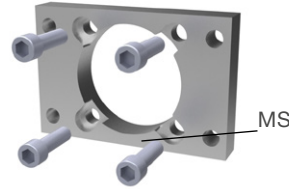


Type	Screw MS	Torque	d
ZBE-377900	M10×25	48 Nm	32 H7

NOTICE

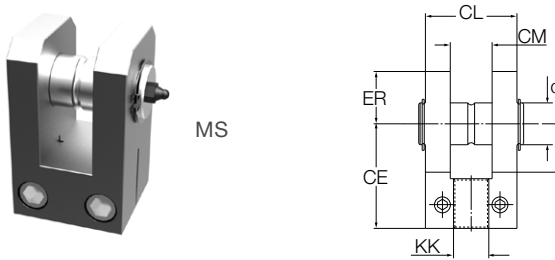
T-bar can rotate to aid assembly. The rotation feature is for installation purpose only. Constant rotation during regular operation should be prevented.

Front Attachment T-Bar



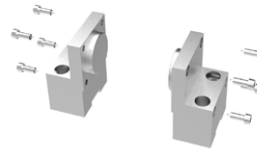
Type	Screw MS	Torque
ZBE-377918	M12×40	75 Nm

Rod Clevis



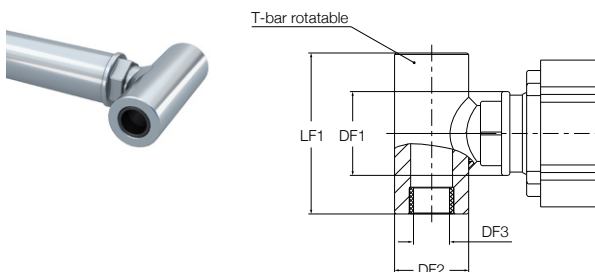
Type	Screw MS	Torque	d
ZBE-377917	M12×40 (10,9)	99 Nm	32 f8

Foot Mount



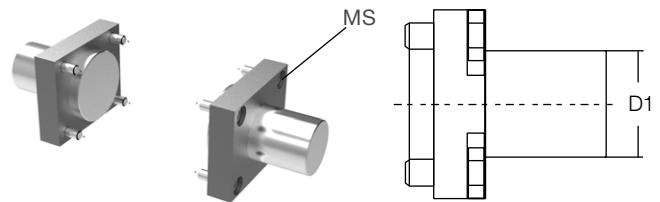
Type	Screw MS	Torque	Secure it with
ZBE-377920	M8×18	20 Nm	Loctite 648

Front Attachment T-bar



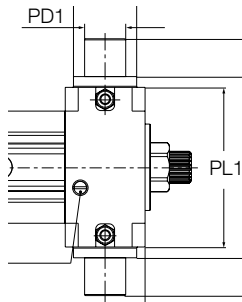
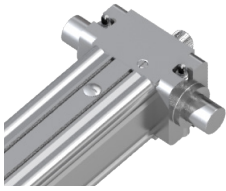
Type	LF1	DF3	Recommended shaft diameter:
EMA-100-1-xx-xxxx-Cxxxxxx	115±1	Ø25,53-25,73	Ø25,38-25,43
EMA-100-1-xx-xxxx-Dxxxxxx	155±1	Ø25,53-25,73	Ø25,38-25,43

Pivot Attachment



Type	Screw MS	Torque	Secure it with	D1
ZBE-377919	M8×18	20 Nm	Loctite 648	32f7

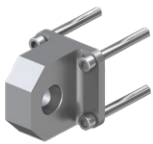
Pivot housing



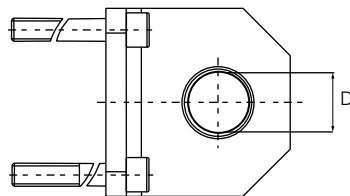
Type	PD1	Recommended Bushing diameter
EMA-100-1-xx-xxxx-xxxE1xx	Ø38.1 ^{+0.02} _{-0.03a}	Ø38,23-38,48

7.1.2 Gearbox accessories

Rear Attachment

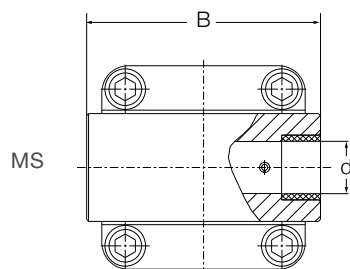
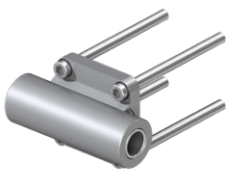


MS



Type	Gearbox type	Screw MS	Torque	Secure it with	D	Recommended shaft tolerance:
ZBE-377921	Spur gearbox	M12×140	75 Nm		32 ^{+0.085} _{-0.01}	f7
ZBE-00521333	Belt gearbox	M12×25	75 Nm	Loctite 243	32 ^{+0.085} _{-0.01}	f7

Rear Attachment – Bar Type



Type	Gearbox type	Screw MS	Torque	B	D	Recommended shaft tolerance:
ZBE-377933-0115	Spur gearbox	M12×140	75 Nm	115	Ø25,53-25,73	Ø25,38-25,43
ZBE-377933-0155	Spur gearbox	M12×140	75 Nm	155	Ø25,53-25,73	Ø25,38-25,43

8. Maintenance

Personnel

- Daily maintenance work described herein can be performed by the operator.
- Some maintenance tasks should only be performed by specially trained, qualified personnel employed by the product owner, or exclusively by personnel of the manufacturer; specific reference will be made in each case in the description of the respective maintenance task.
- Only professional electrician.

8.1 Maintenance plan

Maintenance tasks that are required for optimal and trouble-free operation are described in the sections below.

If increased wear is detected during regular inspections, shorten the required maintenance intervals according to the actual indications of wear.

EMA-100 linear actuator maintenance plan		
Interval	Maintenance work	To be carried out by
Daily	Check actuator for visible damage (see chapter 8.2.3 Check of visual condition, page 36). Clean off dust and dirt if necessary (see chapter 8.2.1 Cleaning, page 36).	Operator
Monthly	Check tight fit of the rod and options, correct if necessary. Check connection for tight fit. Check relubrication interval (see chapter 8.2.4 Relubrication interval, page 36).	Qualified personnel
Annually	Check labels and warning notices for legibility and replace if necessary. Check sealings for damage (see chapter 8.2.2 Check sealing function, page 36). Check relubrication interval (see chapter 8.2.4 Relubrication interval, page 36). Check belt for visible damage (see chapter 8.2.3 Check of visual condition, page 36).	Qualified personnel
Semi-annually	Check options for visible damage Check relubrication interval (see chapter 8.2.4 Relubrication interval, page 36).	Qualified personnel

EMA-100 belt gearbox maintenance plan		
Interval	Maintenance work	To be carried out by
Every six years	Replace the belt in the EMA-100 belt gearbox	Qualified personnel

NOTICE

If the linear actuator is used outside of the environmental conditions specified earlier in this manual, check such components once a month for any changes such as oxidation or sedimentation.

8.2 Maintenance work

8.2.1 Cleaning

To be performed by operator.

NOTICE

Damage due to incorrect cleaning.

Therefore:

Do not use any aggressive cleaning agents. Water used for cleaning, including chemical additives, must be pH-neutral. Liquids must not touch the actuator during retraction or extension.

Only use the auxiliary materials.

No steam jets or pressure washers may be used for cleaning. Other cleaning agents or cleaning devices may only be utilized with the manufacturer's approval.

Clean actuator

Clean dirty parts with a damp cloth.

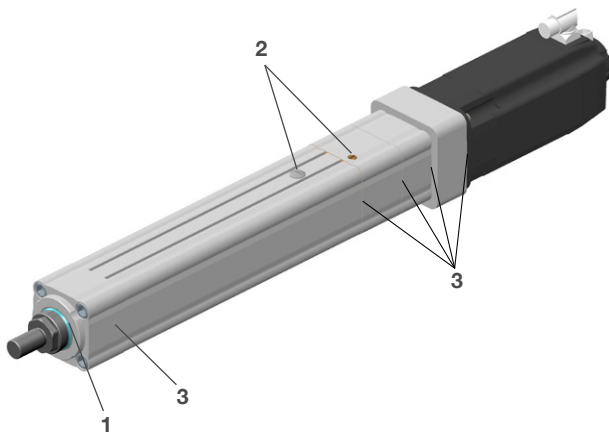
8.2.2 Check sealing function

To be performed by qualified personnel.

Device must be stopped and secured.

1. Check seal for damage (1)
2. Check filter and plug for damage and blockage (2)
3. Check gaskets for damage (3)

Check for potential leakage in the actuator. If there is no damage, you can restart the application.



NOTICE

Material damage due to damaged or incorrect sealing

Damaged or incorrect seals cannot guarantee protection pursuant to IP54S or higher.

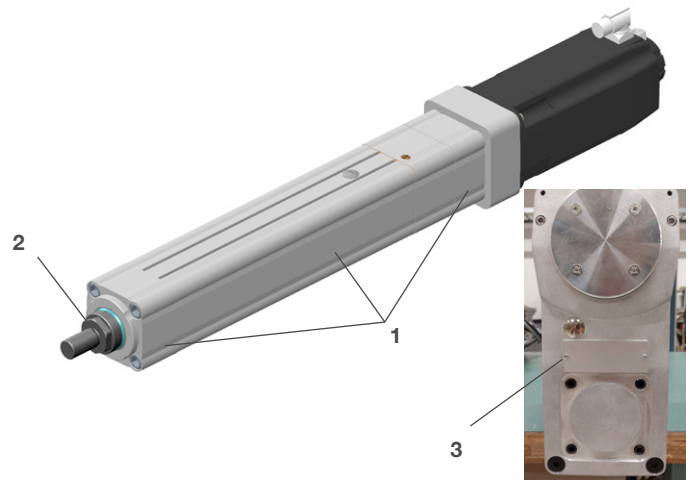
Therefore:

Ask the manufacturer to replace the damaged seals immediately.

8.2.3 Check of visual condition

To be performed by qualified personnel.

1. Separate the device from the energy supply.
2. Check the following structural components for visual external damage:
 - Check profile and housing for cracks and gaps (1)
 - Check centrifugal brake housing for damage. In case of damage of the coating layer replace centrifugal brake
 - Check push tube for scratches and indentations (2)
 - Check belt for excessive wear and cracks by opening the plug in the housing (3)



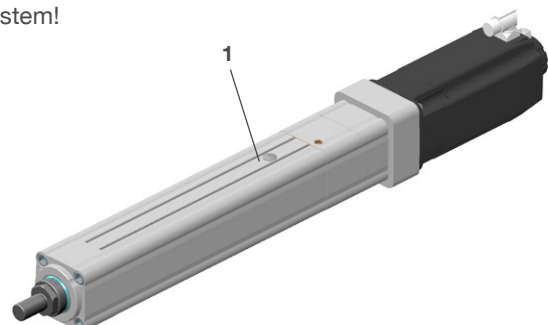
Notify original equipment manufacturer or actuator manufacturer in case of damage. If there is no damage and the processor/manufacturer has not communicated any concerns, reconnect the device to the power supply.

8.2.4 Relubrication interval

To be performed by qualified personnel.

The relubrication device is optional. Check if the EMA-100 is equipped with a relubrication plug on the protection tube (1).

1. Run the the actuator to the relubrication position (see table 7, page 38).
2. Stop and secure the actuator/application
3. Open the plug (1)
4. Relubricate the EMA-100 with the specified type and amount of lubricant (see table below). Compatibility cannot be granted if other greases are used.
5. Close the relubrication bore before you restart the system!



⚠ WARNING**Risk of injury and material damage!**

Only open the relubrication bore when the actuator is stopped and powered off.

Table 7

EMA-100 linear actuator relubrication interval

Type	Relubrication position	Relubrication interval	Amount of lubricant	Screw type
EMA-100-1-BA-...	Nominal stroke: 40 mm From mechanical end stop: 43 mm	Every 10 Mrev or 100 km **	8 cm ³	BS 32×10
EMA-100-1-BB-...	Nominal stroke: 3 mm From mechanical end stop: 6 mm	Every 10 Mrev or 100 km **	17 cm ³	BS 40×10
EMA-100-1-CB-...	Nominal stroke: 3 mm From mechanical end stop: 6 mm	Every 10 Mrev or 100 km **	17 cm ³	BS 40×10
EMA-100-1-BC-...	Nominal stroke: 3 mm From mechanical end stop: 6 mm	Every 5 Mrev or 100 km **	7 cm ³	BS 40×20
EMA-100-1-RA-...	Nominal stroke: 2 mm From mechanical end stop: 5 mm	Every 20 Mrev or 200 km *	14 cm ³	RS 30×10

* First relubrication after 100 000 revolutions

** Relubricate the actuator at least in a 3 years interval

NOTE

Type BA, BB, CB and BC: Use only the following grease to relubricate the linear unit: BERUTOX FH 28 EPK / II
Manufacturer: Bechem (www.bechem.de)

Type RA: Use only the following grease to relubricate the linear unit: STABUTHERM GH 461.
Manufacturer: Klueber (www.klueber.com)

8.3 Measures after maintenance completed

Upon completion of the maintenance work, the following steps have to be performed prior to restarting the device:

1. Check all screw connections for a tight fit.
2. Ensure that all used tools, materials and other equipment have been removed from the work area.
3. Clean work area and remove potential spills such as liquids and processing material.
4. Ensure that all safety measures of the system work without a problem.
5. Check functions.
6. Document completion of the inspections in the service log.

8.4 Maintenance checks

During each service interval, the following measurement/check needs to be done:

- BS/RS: excessive wear of the ball screw could lead to a noise increase and a potential blockage of the drive.

8.5 Belt maintenance – How to replace the belt

⚠ WARNING**IMPORTANT**

The linear unit needs to be removed from the application and can under no circumstances be subjected to load. Disregarding these conditions could lead to personal injuries.

8.5.1 Tools needed for opening the gearbox and replacing the belt

- Allen keys 3-10mm.
- T10 torx.
- Torque wrench.
- Taper bushing mounting tool (included in belt maintenance kit)
- Belt pulley locking tool (included in belt maintenance kit)

8.5.2 Parts:

1x Belt maintenance kit

8.5.3 Consumables needed

- Loctite 243 or similar thread lock
- Loctite 574 or similar sealant

8.5.4 Instructions for replacing the belt

Step 1: Remove the rear cover of the belt gear.

1. Remove the two bolts holding the label plate.
2. Remove all bolts holding the belt cover (4x M6 and 4x M10).
3. Leave the 4x bolts holding the brake cover.
4. Remove the belt cover from the belt gear housing.

Step 2: Remove the upper belt pulley and the belt

1. Insert an 8 mm Allen key in the shaft like the picture shows (see **figure 50**) and hold it to stop the pulley from rotating when removing the set screws.
2. Loosen the two set screws from the pulley, the set screws are glued from the factory with thread lock (Loctite 243).
3. To loosen the pulley from the taper bushing, take one of the set screws and screw it into the hole in the pulley that is threaded. When the set screw is tightened, the pulley will release from the bushing.
4. Loosen the taper bushing from the shaft. If the bushing wont slide of easily, use a flat head screwdriver and carefully force it into the gap in the pulley, allowing for easy disassembly.
5. Remove the belt from both pulleys.

Step 3: Remount belt.

1. Take a new belt and place it around the lower pulley.
2. Mount the upper pulley around the shaft and place the belt around it.
3. Insert the taper bushing on the shaft, make sure that it sits all the way on to the shaft. Use a hammer and the Taper bushing mounting tool to gently tap it in place on the shaft.
4. Degrease and clean the set screws from old thread lock.
5. Apply thread lock to approximately the first 5-8 threads of the set screws, for example Loctite 243.
6. Insert the two set screws into the taper bushing. Be sure to use the 2x holes with thread in the bushing.
7. Insert the 8 mm allen key to keep the shaft from rotating when tightening the set screws.
8. Torque the set screws to 30 Nm on 1:1 and 5,7 Nm on 2:1, be sure to torque them evenly.

Step 4: Remount the rear cover

1. Mount the new bolts included with the kit.
2. Apply Loctite 243 to all the new bolts, apply the glue all around the thread to approximately the first 8-10 threads.
3. Add Loctite 574 to the countersunk holes for the M10 bolts. This is to make sure that the gearbox meets the requirements for IP54.
4. Torque the 4x M6 to 10 Nm and the 4x M10 to 47 Nm.
5. Mount the plate by using the 2x M3x10 screws and tighten hand tight (0,25 Nm).

Figure 50

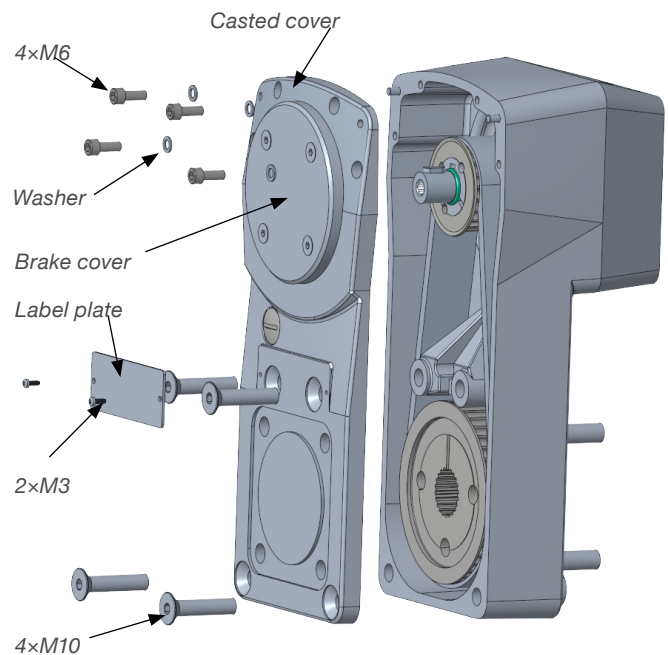
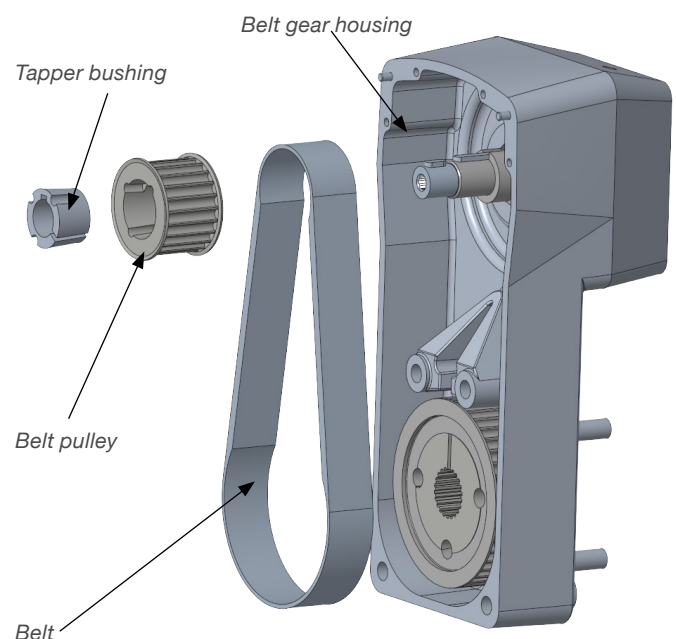


Figure 51



Figure 52



9. Malfunctions

The following chapter describes potential causes for disruptions and the work that is necessary to restore operation.

In the event of more frequent malfunctions, shorten the maintenance intervals.

Contact the manufacturer concerning malfunctions which are not solved by the repair suggestions in the table below; see service address on the back cover.

Personnel

- Unless indicated otherwise, the work described herein to solve malfunctions may be performed by the operator.
- Some work may only be carried out by qualified personnel, which is specifically indicated in the description of the individual malfunction.

Work on the electric system may only be performed by professional electricians.

⚠ DANGER

Risk of injury and material damage due to incorrect repair of malfunction

The EMA-100 linear actuator is not designed to be repaired by the customer in most situations. Incorrect repair of a malfunction may lead to personal injury or material damage. Therefore:

Never loosen the screws on the linear actuator or try to open the linear actuator.

In the event of a malfunction that cannot be fixed by adhering to the suggestions in the table below, dismantle the device and send it to the manufacturer for repair (see chapter [5. Delivery, packaging and storage, page 10](#)).

Actions during malfunctions

1. In the event of a malfunction that may present an immediate danger to persons or assets, turn off the actuator.
2. Determine cause of malfunction.
3. Depending on the type of a malfunction, have it repaired by qualified personnel.
4. Inform responsible party on-site concerning malfunction.

NOTE

The following malfunction table provides information as to who is authorized to perform the repair and how it is to be performed.

9.1 Malfunction table

Malfunction	Possible cause	Repair malfunction	To be repaired by
Linear actuator doesn't move	Obstacle in the stroke area of the linear actuator.	Remove all obstacles in the stroke area.	Operator.
	Incorrect load.	Measure static and dynamic load and compare with information concerning the product label. If the load capacity is exceeded, check the nominal load and install stronger actuator if necessary.	Qualified personnel.
	Lifespan of the device is exceeded.	See performance diagram in the EMA-100 brochure.	Qualified personnel.
	Linear actuator cannot be set in motion by any of the above listed measures.	Exchange device.	Qualified personnel.
	Belt has snapped in belt gearbox, motor turns but linear unit does not move.	Order belt spare part kit and replace belt inside gearbox.	Operator.
Linear actuator cannot be lifted	Obstacle in the stroke area of the linear actuator.	Remove all obstacles in the stroke area.	Operator.
	Incorrect load.	Remove all loads that are on the elements.	Operator.
	Defective screw nut.	Exchange device.	Qualified personnel.
	Engaged back-up nut	Exchange device.	Qualified personnel.
Significant reduced speed	Obstacle in the stroke area of the linear actuator.	Remove all obstacles in the stroke area.	Operator.
	Incorrect load.	Remove all loads that are on the elements.	Operator.
	Defective motor, gear or screw nut.	Exchange device.	Qualified personnel.
Significant increase of noises during operation	Obstacle in the stroke area of the linear actuator.	Remove all obstacles in the stroke area.	Operator.
	Incorrect load.	Remove all loads that are on the elements.	Operator.
	Defective motor, gear or ball screw nut.	Exchange device.	Qualified personnel.

9.2 Start of operation after fixing malfunction

After the malfunction has been fixed, perform the steps from the chapter Installation prior to restart.

10. Dismantling

Personnel

- The dismantling may only be carried out by specifically qualified personnel.
- Work on the electric system may only be performed by professional electricians.

⚠ WARNING

Risk of injury due to incorrect dismantling!

Stored residual power, sharp-edged components, pins and corners on the individual components or at the required tools can cause serious injuries.

Therefore:

Ensure there is ample space for dismantling prior to starting with the work.

Use caution when working with open, sharp-edged structural components.

Ensure order and cleanliness at the dismantling site! Loosely stacked structural components or structural components and tools on the floor may present a source for accidents.

Dismantle structural components professionally pursuant to applicable local regulations.

Secure structural components in a way so they would not be able to fall or tip over.

Contact the manufacturer if you have any questions or concerns.

10.1 Dismantling of EMA-100

1. Secure elements of the application in such a fashion that no loads can impact the fork and the hinge head.
2. Loosen and remove fastening bolts from trunnion or flange and rods.
3. Separate linear actuator from application elements.
4. Clean device.
5. Carefully package for shipment to the manufacturer.
6. For disposal, disassemble device according to applicable local occupational health and environmental regulations.

10.2 Disposal

To the extent that no take-back or disposal agreement has been put in place, disassembled components should be recycled.

- Dispose of metals and plastic components at an appropriate recycling centre.
- Sort remaining components based on the respective material and dispose of according to applicable local occupational health and environmental regulations.

NOTICE

Damage can be caused to the environment due to incorrect disposal!

Electronic waste, electronic components, lubricants and other additives are subject to special waste treatment regulations and may only be disposed of by approved specialized companies!

The local municipal authorities or specialized waste management companies can provide information concerning environmentally appropriate disposal .

11. Appendix

A complete description of the actuator’s performance can be found in the following document:

Technical data

PUB IL-07016 EN Electric cylinder EMA-100

For further technical information please contact Ewellix.

For quick reference, the most relevant performane parameters are shown in the following section.

11.1 Liner Unit

11.1.1 Ingress Protection

The following position in the type key defines the rated ingress protection:

EMA-100-#-##-####-#####-X####-...

X	Ingress protection	Lifetime reduction
B	IP54S	
C	IP65 if sinter filter is protected	Reduced to 100km
D	IP65	Reduced to 100km

For option D, a hose needs to be connected to the delivered hose adapter valve. The hose needs to be connected to clean air in order to let the actuator breathe during extraction and detraction movements.

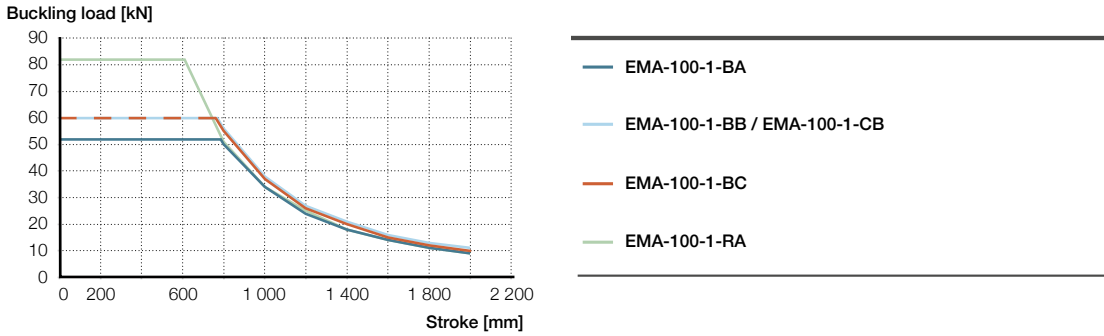
11.1.2 Permissible force

Below are the force limitation in therms of the max force applicable in both directions (push & pull) for the linear unit

Load

EMA-100-1-XX-####-##Y##Z#-...

Screw type XX	Screw	Max. dynamic axial force	Max. dynamic axial force L10	Max. static axial force
BA	32×10 Ball screw	23 kN	22 kN	52 kN
BB	40×10 Ball screw	57 kN	57 kN	60 kN
CB	40×10 Ball screw	57 kN	57 kN	60 kN
BC	40×20 Ball screw	60 kN	60 kN	60 kN
RA	30×10 Roller screw	82 kN	50 kN	82 kN

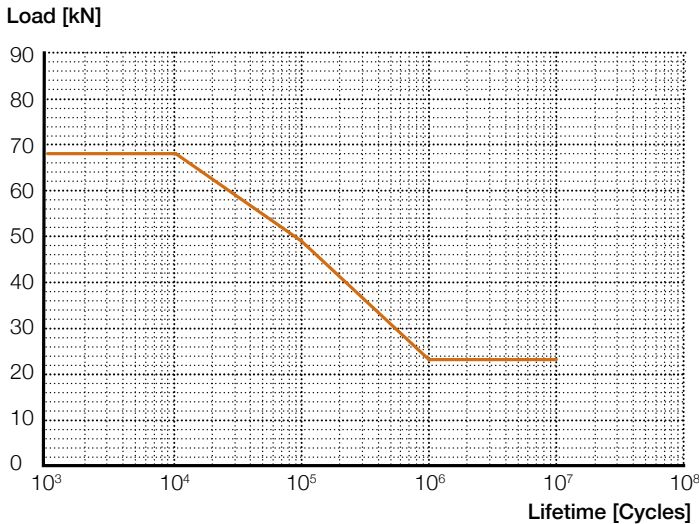


Depending on front and rear attachments used there can be additional limitations

Front housing attachment [Y]	Rear housing attachment [Z]	Load
C, D, E	Any	See fig. "Housing Attachment Lifetime Chart"
Any	C, D, E	See fig. "Housing Attachment Lifetime Chart"

C Pivot attachment (trunnion brackets to be ordered separately)
 D Foot mount, 0° mounting position
 E Foot mount, 180° mounting position

Housing Attachment Lifetime Chart



11.1.3 Linear Speed

EMA-100-1- XX-####-#####-Z#####-...

Screw type [XX]	Sealing [Z]	Max. linear speed
BA	B - IP54S	260 mm/s
BB	B - IP54S	210 mm/s
CB	B - IP54S	210 mm/s
BC	B - IP54S	750 mm/s
RA	B - IP54S	890 mm/s
Any	C or D - IP65	35 mm/s

11.2 Gearbox

11.2.1 Output Torque

If a gearbox is selected, the following maximum output torques must be respected:

EMA-100-#-##-####-#####-#####-GX-YY#-##-...

Gearbox Type [X]	Gear ratio [YY]	Nominal output torque	Max. Output Torque
I - Inline	-	75 Nm	150 Nm
S - Spur	CB (4:1), CC (10:1), CD (25:1)	100 Nm	300 Nm
B - Belt	CA (1:1)	63 Nm	90 Nm
B - Belt	CE (2:1)	90 Nm	117 Nm

11.2.2 Input speed and power parallel gearboxes

EMA-100-#-##-####-#####-#####-GX-YY#-##-...

Gearbox Type [X]	Gear ratio [YY]	Input speed	Input power
S - Spur	BA, CA, DA bio degradable oil	4 500 rpm	3 000 W
S - Spur	BB, CB, DB grease lubrication	4 500 rpm	2 100 W
B - Belt	AC, AD 1:1	8 000 rpm	9 500 W
B - Belt	EC, ED 2:1	8 000 rpm	6 000 W

11.2.3 Permissible force gearboxes

Depending on gearbox attachments used there can be limitations

EMA-100-#-##-####-#####-#####-GX-#YY-##-...

Gearbox Type [X]	Rear attachment [YY]	Max. push load	Max. pull load
B - Belt	CB, CC - Rear attachment	36 kN	30 kN





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