

EWELLIX

## EWELLIX Linear Actuator EMA-80M

Medical

Technical Product Information

We pioneer motion

**SCHAEFFLER**



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# 1 EWELLIX linear actuator EMA-80M

The EWELLIX linear actuator EMA-80M is a modular electromechanical linear actuator that has been specially developed for use in medical applications. It replaces hydraulic applications in medical imaging patient tables, offering a compact, energy-efficient, and maintenance-free alternative for demanding motion tasks.

## Features

Each component is designed for use in patient tables and meets the medical standard according to IEC 60601-1 for medical electrical equipment.

The following features enable reliable and safe use in medical technology:

- Linear unit
  - push tube with front attachment
  - ball screw drive with back-up nut
  - precise positioning thanks to encoder
  - sealing system conforms to degree of protection IP65M
- Gearbox
  - three-stage helical gearbox with gear ratio  $i = 15:1$
  - manual override for emergency adjustment in the event of a power failure
- Motor
  - either with DC-motor or AC-motor
  - magnetic, optical or mechanical encoder

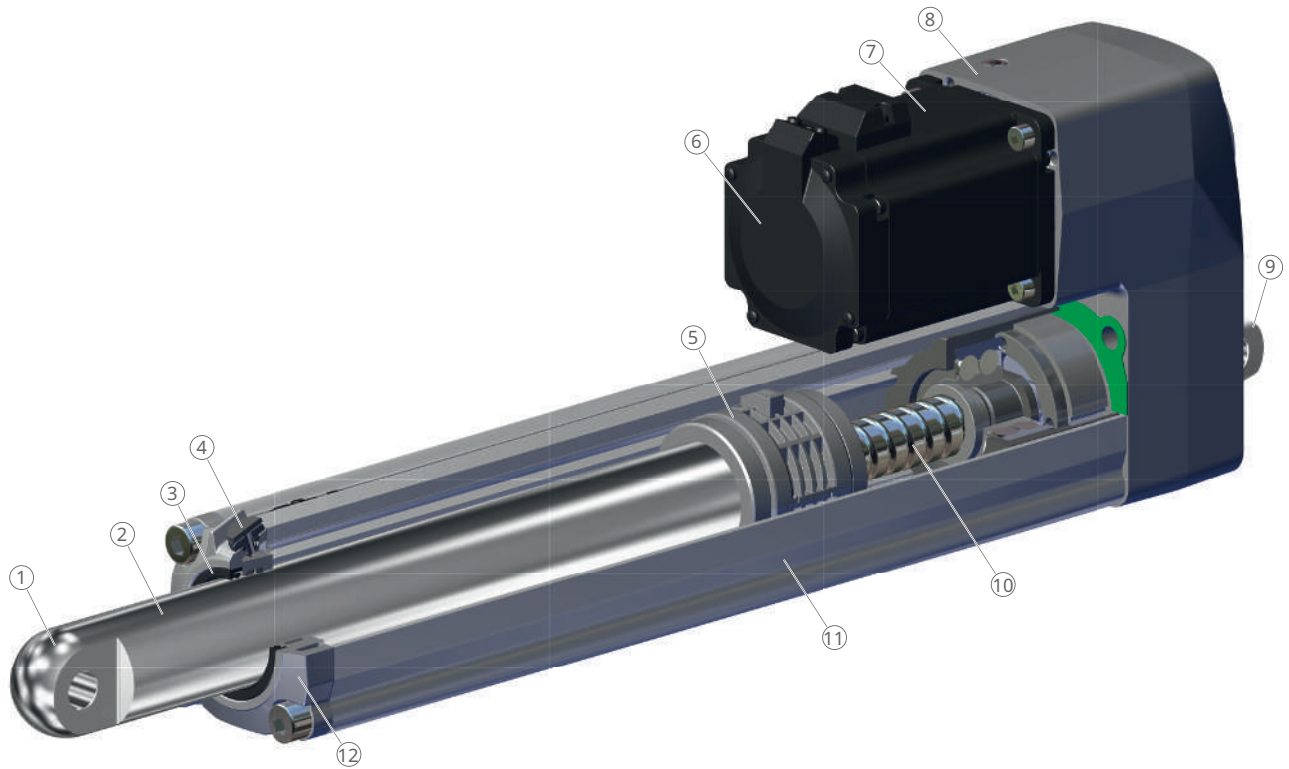
## Benefits

- optimal lifetime even in the presence of high forces
- precise positioning and repeat accuracy
- compact design with short installation length when retracted
- high static load safety factor and self-locking brake
- high speed and long duty cycle for increased productivity
- smooth, quiet movements

## Product assembly

1

## 1 Assembly of the linear actuator



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|    |                                          |    |                  |
|----|------------------------------------------|----|------------------|
| 1  | Front attachment                         | 2  | Push tube        |
| 3  | Sealing                                  | 4  | Vent plug        |
| 5  | Threaded nut with back-up nut and magnet | 6  | Encoder          |
| 7  | Motor                                    | 8  | Gearbox          |
| 9  | Rear attachment                          | 10 | Ball screw drive |
| 11 | Protection tube                          | 12 | Front cover      |

The interfaces and assemblies have the following functions:

- Front attachment:
  - mechanical connection between the push tube of the drive and the moving part of the application
  - Standard attachment with rod end
- Rear attachment:
  - mechanical connection between the gearbox of the linear actuator and the moving part of the application
  - Standard attachment with rod end
- Encoder:
  - precise motion control and operation monitoring

## Screw drive

The linear actuator is equipped with a ball screw drive.

The screw drive converts the rotary motion of the motor into precise and efficient linear motion, ensuring a high load carrying capacity and long lifetime.

## Back-up nut

The back-up nut is additionally integrated into the main nut as standard. During normal operation, the back-up nut is not in contact with the ball screw drive. The back-up nut prevents the linear actuator from collapsing if the threaded nut fails. If the back-up nut engages, the linear actuator can no longer be moved.

Once the back-up nut is engaged, the linear actuator must be replaced.

The function of the back-up nut is designed for both load directions.

## 1.1 Performance overview

The following table shows the performance data and the mechanical characteristic values of the linear actuator.

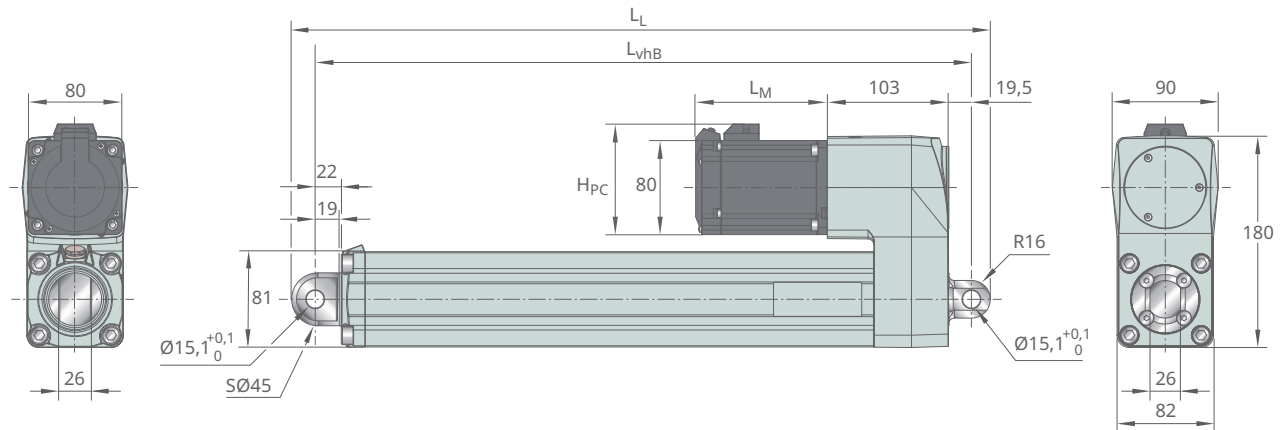
1 Performance overview of the EWELLIX linear actuator EMA-80M

| Characteristic              | Symbol     | Unit | Variant DC         | Variant AC         |
|-----------------------------|------------|------|--------------------|--------------------|
| <b>Performance data</b>     |            |      |                    |                    |
| max. linear speed           | $v_{\max}$ | mm/s | 25                 | 25                 |
| Duty cycle                  | $ED_L$     | %    | 20                 | 20                 |
| Voltage                     | –          | V    | 48                 | 220                |
| Power consumption           | –          | W    | 750                | 750                |
| Current consumption         | –          | A    | 18.7               | 5.5                |
| <b>Mechanical data</b>      |            |      |                    |                    |
| Rated push force            | –          | kN   | 20                 | 20                 |
| Rated pull force            | –          | kN   | 20                 | 20                 |
| Stroke                      | S          | mm   | 50 ... 700         | 50 ... 700         |
| Mass                        | m          | kg   | 13.2               | 13.2               |
| <b>Ambient data</b>         |            |      |                    |                    |
| Ambient temperature         | –          | °C   | +10 ... +40        | +10 ... +40        |
| Load capacity safety factor | –          | –    | 4                  | 4                  |
| Protection code (IP)        | –          | –    | IP65M              | IP65M              |
| Medical standard            | –          | –    | IEC 60601-1 ed 3.2 | IEC 60601-1 ed 3.2 |

## 1.2 Geometric data

1

2 Linear actuator dimensions



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2 Dimensions of linear actuator

| Characteristic   | Variant DC            | Variant AC            |
|------------------|-----------------------|-----------------------|
| H <sub>PC</sub>  | 93                    | 89                    |
| L <sub>M</sub>   | 90.9 ±1               | 90.9 ±1               |
| L <sub>vhB</sub> | H <sub>0</sub> + 258  | H <sub>0</sub> + 258  |
| L <sub>L</sub>   | L <sub>vhB</sub> + 36 | L <sub>vhB</sub> + 36 |

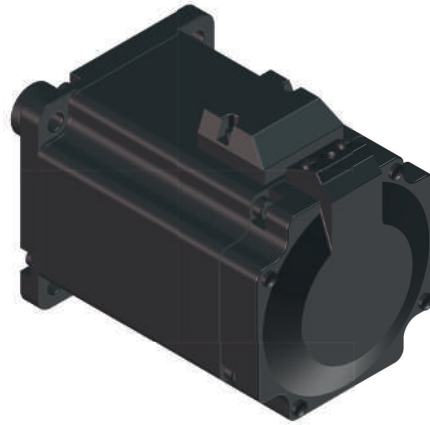
|                  |    |                                                 |
|------------------|----|-------------------------------------------------|
| H <sub>0</sub>   | mm | nominal stroke                                  |
| H <sub>PC</sub>  | mm | Height of connector                             |
| L <sub>L</sub>   | mm | Length from front attachment to rear attachment |
| L <sub>M</sub>   | mm | Length of motor                                 |
| L <sub>vhB</sub> | mm | Retracted length                                |

## 2 Motor

The electric motor is the primary drive element of the linear actuator and converts electrical energy into rotary motion. For the EWELLIX linear actuator EMA-80M, a motor in 2 configuration variants with direct current DC 48 V or alternating current AC 220 V is available.

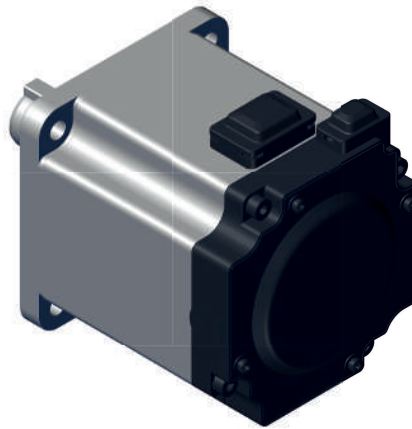
The alignment relative to the gearbox must be observed when ordering motors.

④3 Motor DC 48 V



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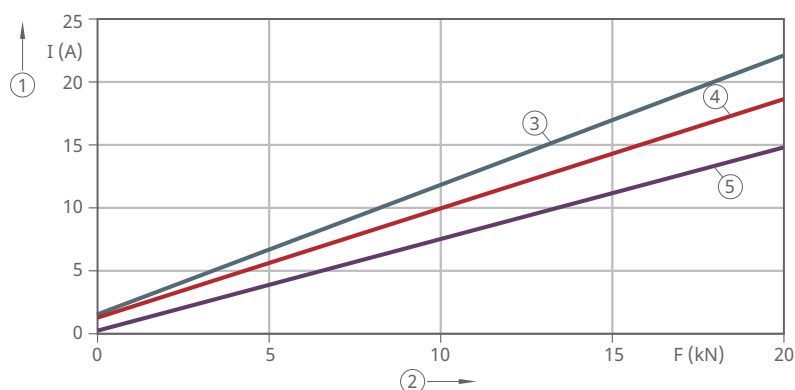
④4 Motor AC 220 V



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## 2.1 Diagrams force-current

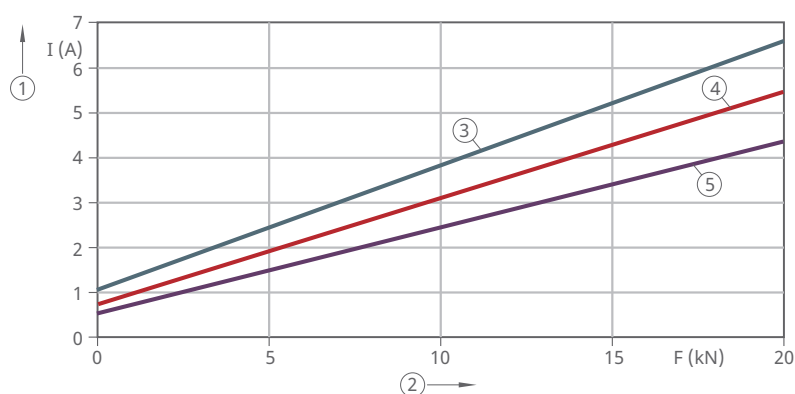
5 Diagram force-current DC 48 V



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|   |                       |   |                    |
|---|-----------------------|---|--------------------|
| 1 | Current consumption I | 2 | Force F            |
| 3 | I and F at 25 mm/s    | 4 | I and F at 20 mm/s |
| 5 | I and F at 15 mm/s    |   |                    |

6 Diagram force-current AC 220 V



001D0746

|   |                       |   |                    |
|---|-----------------------|---|--------------------|
| 1 | Current consumption I | 2 | Force F            |
| 3 | I and F at 25 mm/s    | 4 | I and F at 20 mm/s |
| 5 | I and F at 15 mm/s    |   |                    |

## 2.2 Encoder

Depending on the application requirements, various encoders are used for position feedback and speed feedback of the electromagnetic linear actuator to ensure precise control and reliable operation monitoring.

Three different encoders are available for the linear actuator:

- Hall sensor
- Optical rotary encoder
- Mechanical absolute encoder

## 3 Structure of the ordering designation

### 3.1 Notes on orientation

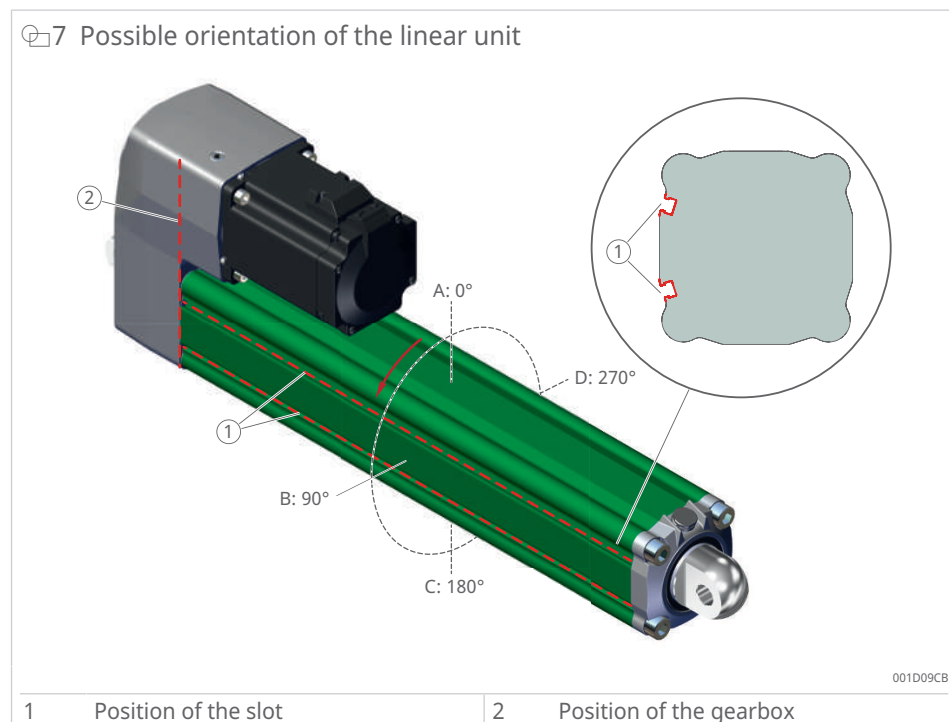
Various orientations are available for the linear actuator:

- entire linear unit relative to the gearbox (with vent plug)
- motor relative to the gearbox
- front cover with vent plug relative to the slot

#### 3.1.1 0° reference for the linear unit

The 0° reference for the linear unit is the gearbox.

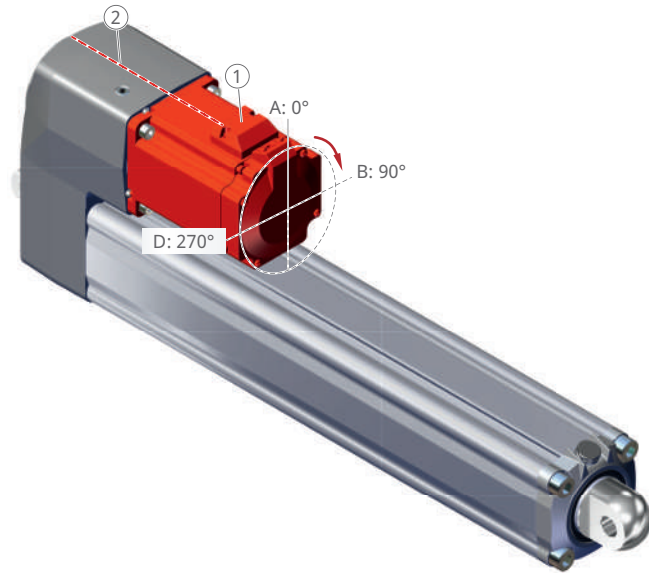
The linear unit can be rotated in 90° increments.



### 3.1.2 0° reference for the motor

The 0° reference for the motor is the gearbox position. The motor can be rotated to the 0° position, 90° position or 270° position. The motor cannot be positioned at 180° due to the location of the connectors.

8 Possible orientation of the motor



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1 Position of the connectors

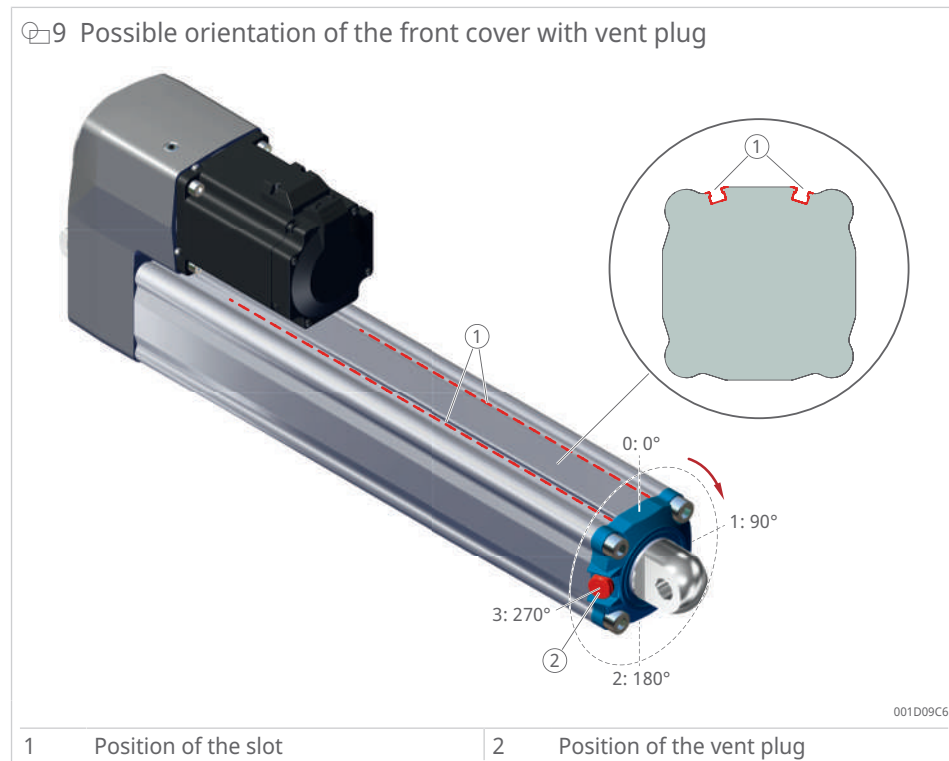
2 Position of the gearbox

### 3.1.3 0° reference for front cover with vent plug

The 0° reference for the front cover with vent plug is the slot. The front cover with vent plug can be rotated in 90° increments.

The front cover with vent plug must be protected against water accumulation. The orientation must be selected accordingly.

3



## 3.2 Ordering designation

### 10 Ordering designation EMA-80M

EMA80 - M B 0350 M 0 0 1 - MM 00 0 000 A 0 - 00

#### Product version

Linear actuator EMA-80

M Medical

#### Spindle type

B Ball screw drive 25×10 with back-up nut

#### Stroke

50...700 Stroke in mm (in 50-mm increments)

#### Push tube interface and front attachment

M Rod end with opening Ø15 mm, width 26 mm

#### Front cover with vent plug (relative to the slot)

- 0 Orientation vent plug 0°
- 1 Orientation vent plug 90°
- 2 Orientation vent plug 180°
- 3 Orientation vent plug 270°

#### Bearing housing (relative to the slot)

0 Standard with mechanical brake

#### Limit switch

- 0 None
- 1 2x magnetic sensor fitted, PNP normally closed (NC)

#### Gearbox type and ratio

MM Helical gearbox, 3-stage, i15

#### Rear attachment and orientation

- 00 No rear attachment
- MA Rod end with opening Ø15 mm, width 26 mm, 0°
- MB Rod end with opening Ø15 mm, width 26 mm, 90°

#### Options

- 0 Cover
- 1 Manual override

#### Motor

000 No motor

#### Motor included in the scope of delivery and fitted by Schaeffler.

- L41 Leadshine BLDC DC 48 V with 23-bit hall sensor on the motor
- L42 Leadshine BLDC DC 48 V with 23-bit optical rotary encoder on the motor
- L43 Leadshine BLDC DC 48 V with 23-bit absolute encoder (mechanical) on the motor
- L21 Leadshine BLDC AC 220 V with 23-bit hall sensor on the motor
- L22 Leadshine BLDC AC 220 V with 23-bit optical rotary encoder on the motor
- L23 Leadshine BLDC AC 220 V with 23-bit absolute encoder (mechanical) on the motor

#### Linear unit orientation (slot relative to the gearbox)

- A 0°
- B 90°
- C 180°
- D 270°

#### Motor orientation

- 0 No motor fitted
- A 0°
- B 90°
- D 270°

#### Customized options

00 No options

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