



# **MEGAMAT 2 (MCZ)**

## **Installation Instructions**

**(Translation of the original installation instructions)**



# Foreword

## Document revision history

| Version | Date    | Modification, change   |
|---------|---------|--|
| (-)     | 12/2014 | Replacement for ID No. 47017   |
| 2.0     | 11/2018 | Ratings plate, Disposal, Declaration of Incorporation, Declaration of Conformity, Additional information |
| 3.0     | 09/2019 | Installation, ratings plate, declaration of conformity and installation                                  |

## Disclaimer and exclusion of liability

DewertOkin is not responsible for damage resulting from:

- failure to observe these instructions,
- changes made to this product which have not been approved by DewertOkin, or
- the use of replacement parts which have not been approved or manufactured by DewertOkin.

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## Creation of a complete operating instruction manual for the entire end product

These instructions are only intended to be used by the end-product manufacturer. They should not be given to the operator of the end product. The factual information contained within may be used as a basis when creating the end-product manual.

The warning and danger notices are best suited for use in the end product's manual. However it is not sufficient to simply follow these notices. You should also carry out an internal risk assessment for your end product. This can then be used as the basis for the safety notices in your manual.

These installation instructions do not contain all information required to safely operate the end product. They only describe the installation and operation of the drive as partially completed machinery.

The instructions are intended for the technicians responsible for manufacturing an end product and not for the operators of the end product.

**Notice for customers in EU nations****German Inspection Authority (TÜV SÜD Product Service) testing label**

The construction of the MEGAMAT 2 (MCZ) drive has been inspected by the German TÜV SÜD Product Service Inspection Authority. TÜV SÜD Product Service also monitors the production of the MEGAMAT 2 (MCZ). The official German TÜV SÜD Product Service certifies this construction inspection and production monitoring.



Figure 1 TÜV SÜD Product Service Safety Mark

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# 1. General Information

## 1.1 Configurations



The MEGAMAT MCZ drive can be used in several different facility configurations. The term MEGAMAT MCZ also refers to the following facility versions:

- MEGAMAT MCZ
- MEGAMAT MC1
- MEGAMAT MC2

## 1.2 About these installation instructions

These installation instructions must be followed closely in order to install this drive successfully and safely in the end product. These instructions are not an operating manual for the end product.

These instructions will help you to minimize danger, repair costs and down times. They will also help you to maximize the reliability and lifespan of the end product.

|  |  |
|--|--|
|  |  <b>CAUTION</b>   |
|  | <p>The notices in these instructions must be followed! Following the guidelines during installation and connection procedures will help to minimize:</p> <ul style="list-style-type: none"><li>• the risk of accident and injury, and</li><li>• damage to the drive system or the end product.</li></ul> |

These installation instructions have been written with due care and attention. However, we cannot guarantee that the data, images and drawings are complete and correct nor do we accept any liability for the information contained therein, unless required by law.

- We reserve the right to make unannounced technical changes in the course of our continual product improvement process!

## 1.3 Availability of this document






As manufacturer of the end product, you are obligated to comply with Machinery Directive 2006/42/EC. This directive stipulates that the installation instructions must be kept on file for governmental inspection purposes.

## 1.4 Conventions used

Notices which do not relate to safety are indicated in these instructions with a triangle:

- Triangular notice symbol

### Safety notice explanations

|   |  |
|---|--|
|    |  <b>WARNING</b><br>WARNING indicates a hazardous situation which, if not avoided, <i>could</i> result in death or serious injury. |
|    |  <b>CAUTION</b><br>CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.       |
|  | <b>NOTICE</b><br>NOTICE is used to address practices which are not related to personal injury but may result in damage to the product or surroundings.   |





## 2. Safety notices

### 2.1 Proper and intended usage



The MEGAMAT MCZ drive is meant to be installed in an end product.



- It provides motor adjustment capabilities for movable furniture. It should be used in conjunction with suitable fittings and mechanics.
- It can be used for care purposes (CARE).
- It can be used in a hospital (HOSP).
- It can be used for furniture applications (in beds, reclining chairs, etc.).

|   |   |
|---|---|
|  |  <b>CAUTION</b>  |
|   | This drive should only be used for the applications described above. Any other use is forbidden. Improper usage can lead to accidents or destruction of the unit. Such non-approved applications will lead immediately to the expiration of all guarantee and warranty claims on the part of the end-product manufacturer against the manufacturer. |

#### Improper usage

Be sure to follow the notices below concerning improper usage. You should include them in your product manual in order to inform the users of your end product.



|   |   |
|---|---|
|  |  <b>WARNING</b>  |
|   | The MEGAMAT MCZ drive should not be used: <ul style="list-style-type: none"> <li>• in any environment where combustible or explosive gases or vapours (e.g., anaesthesiology) may be present,</li> <li>• with pulling or pushing forces that exceed those specified on the ratings plate,</li> <li>• in a moist environment,</li> <li>• outdoors,</li> <li>• in any application that will be cleaned with an automated washing system.</li> </ul> |

|   |  |
|---|--|
|  |  <b>CAUTION</b>   |
|   | The MEGAMAT MCZ drive may not be operated: <ul style="list-style-type: none"> <li>• by small children,</li> <li>• by frail or infirm persons without supervision, or</li> <li>• in the proximity of small children.</li> </ul> |

The MEGAMAT MCZ drive can be used by children of 8 years and older, persons with reduced physical, sensory or mental capabilities, or persons with lack of experience or knowledge when they are supervised or instructed concerning the safe use of the device and when they understand the resulting risks. Do not allow children to play with this device. The cleaning and user maintenance must not be carried out by children without supervision.

You should only use spare parts which have been manufactured or approved by DewertOkin. Only these parts will guarantee a sufficient level of safety.

**Optional: Mechanical reset function (ER) or clevis quick release (GQR)**

|   |   |
|---|---|
|  | <div data-bbox="395 421 593 474">  <b>CAUTION</b> </div> <div data-bbox="395 497 1343 528"> The mechanical reset function is not a safety system and does not avert danger. </div> |
|---|---|

DewertOkin does not guarantee that the drive will function in the event of a power outage. It is always possible to lower the unit using either the mechanical release (ER) or the clevis quick release (GQR).

If the end-product manufacturer chooses to guarantee the functionality of the end product during a power outage, then the end-product manufacturer is responsible for arranging a mechanism to ensure this functionality.

## 2.2 Safety notices within the installation instruction and the operating instructions for the entire machine

The manufacturer of the end product is only permitted to operate the MEGAMAT MCZ drive (by itself an incomplete machine)

- when the end product (for which the MEGAMAT MCZ drive is intended) is in compliance with all protective measures specified in the Machinery Directive 2006/42/EC, and
- when the manufacturer expressly declares the compliance of the end product.

The manufacturer of the end product must create a manual for the users of that product. The safety notices in the end-product manual must be written based on the end product's risk assessment.

## 2.3 Selection and qualification of personnel

This drive should only be installed into the end product by someone who has completed training in electronic motor assembly or has equivalent qualifications.

You should only install this drive when you are qualified to do so. Otherwise, a properly qualified person should be found for this task.

## 2.4 Notice on safety during operations

Basic safety rules must be followed in order to ensure that the end product can be continually operated in a safe manner. These rules must be observed while using the end product and while installing the drive.

These rules and safety measures can be categorized as follows:

- Construction measures before the installation (refer to the "Ensuring operational reliability during installation" section in Chapter "Installation").
- Safety fundamentals during the drive installation and during cable and wire routing (refer to the "Safety notices to observe during installation" section in the "Installation" Chapter).
- Using the drive in intermittent duty (refer to the "General information" section in the "Operating notes" chapter).
- Basic safety rules during operation (refer to the "Operating notes" Chapter).
- The creation of a manual for the end product which contains these and other safety rules.

### Creating a user's manual

The manufacturer of the end product must create a manual for the users of that product. The safety notices in the end-product manual must be written based on the end product's risk assessment.

## 2.5 Product identification

### 2.5.1 Ratings plate

A ratings plate on each drive specifies the exact name and serial number of the drive. It also states the technical specifications valid for that particular drive. The following illustration shows where the specifications are located on the drive's ratings plate.

- The ratings plate shown is an example; the specifications for your drive may differ from this illustration.

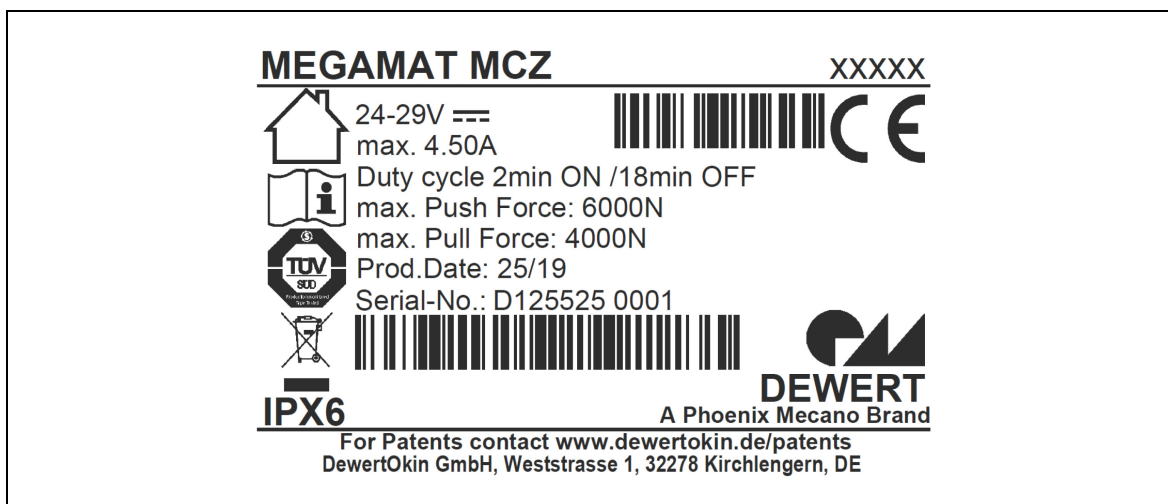





Figure 2 Ratings plate example

|   |   |
|---|---|
| Megamat MCZ   | Model name                                      |
| xxxxx   | Article number                                  |
| 24 – 29V ~  | Input voltage                                   |
| Max. 4.50A  | Current consumption                             |
| Duty cycle: 2 min ON / 18 min OFF   | Intermittent operations: 2 minutes / 18 minutes |
| max. Push Force   | Push force                                      |
| max. Pull Force   | Pull force                                      |
| Prod.date   | Calendar week / year                            |
| Serial No.  | Serial number for your drive                    |
| IPX6  | Protection degree                               |
|  | Use in dry rooms only!                          |
|  | Follow all special disposal instructions!       |
|  | Mark of CE conformity                           |

### 3. Possible combinations

The MEGAMAT MCZ single drive can be combined for use with other single drives, double drives or control units. The following basic combinations are possible:

- a MEGAMAT MCZ with handset and control unit,
- a MEGAMAT MCZ in combination with other drives with an additional control unit or double drive.

Systems can be customized by combining drives with the handset and control units as needed. Make sure that you switch off the electricity before connecting any components (connect while in a voltage-free state).

DewertOkin has separate system instruction manuals containing all information and instructions needed for these systems.

- ▶ Only a DewertOkin device should be used to control the drive since they have already been verified to work together.
- ▶ A control unit or a double drive is needed to operate the MEGAMAT MCZ single drive. A handset is also required.



#### NOTICE

Check with DewertOkin for approval concerning any special device configurations that are customized for your requirements.

## 4. Description

The MEGAMAT MCZ drive is an electrically driven motor that is responsible for moving the end product in a linear direction. This adjustment is created by the in and out movement of a stroke pipe. The movements of the MEGAMAT MCZ drive are controlled using a control unit or a double drive which is connected to a DewertOkin handset.

The different drive models vary according to their:

- the clevis,
- power of the drive,
- mounting of the stroke pipe,
- electrical connection.
- pushing and pulling forces,
- dimensions and stroke,
- mechanical reset option.

► We reserve the right to make unannounced technical changes in the course of our continual product improvement process!

### 4.1 Components

The main components of the MEGAMAT MCZ drive are the motor and the stroke pipe. The stroke pipe is protected by the drive housing when it is retracted. Mounting fixtures are located at the outer end of the stroke pipe and at the opposite end of the drive. They are used to mount the drive in the end product.

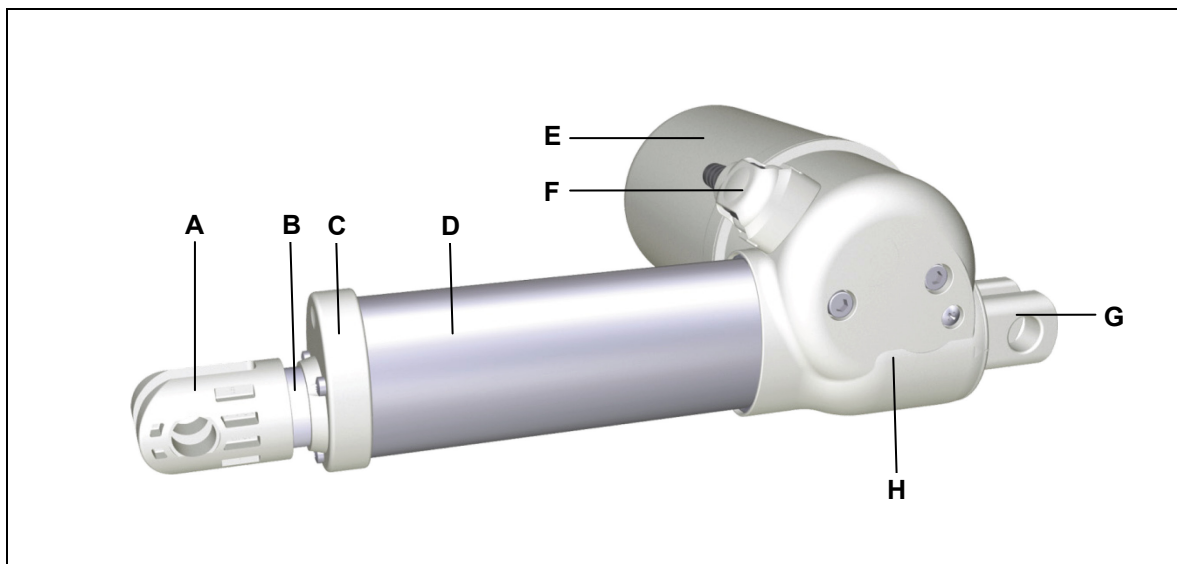




Figure 3 Main components of the MEGAMAT MCZ drive

- |   |                                |
|---|--------------------------------|
| <b>A</b> Clevis (example: stroke pipe clevis) | <b>B</b> Stroke pipe           |
| <b>C</b> Guiding cap                          | <b>D</b> Guidance profile      |
| <b>E</b> motor casing cover                   | <b>F</b> Electrical connection |
| <b>G</b> Gear clevis                          | <b>H</b> gear housing          |

#### 4.1.1 Stroke pipe options

There are two types of stroke pipes available for different types of applications. The stroke pipe can be screwed onto the spindle screw or it can be mounted unattached. The drive only exerts pushing force when the stroke pipe is mounted loosely (unattached). The motions of the drives for these two versions are shown in the following illustrations.

|   |  |
|---|--|
|  | <div data-bbox="395 568 1434 633"> <b>CAUTION</b></div> <p data-bbox="395 645 1434 779">If the stroke pipe is unattached, then the end product must be designed to prevent the stroke pipe from coming out during operations. This can be accomplished by implementing a fixed end-stop mechanism (refer to the "Safety notices to observe during installation" in the "Installation" chapter).</p> |
|---|--|

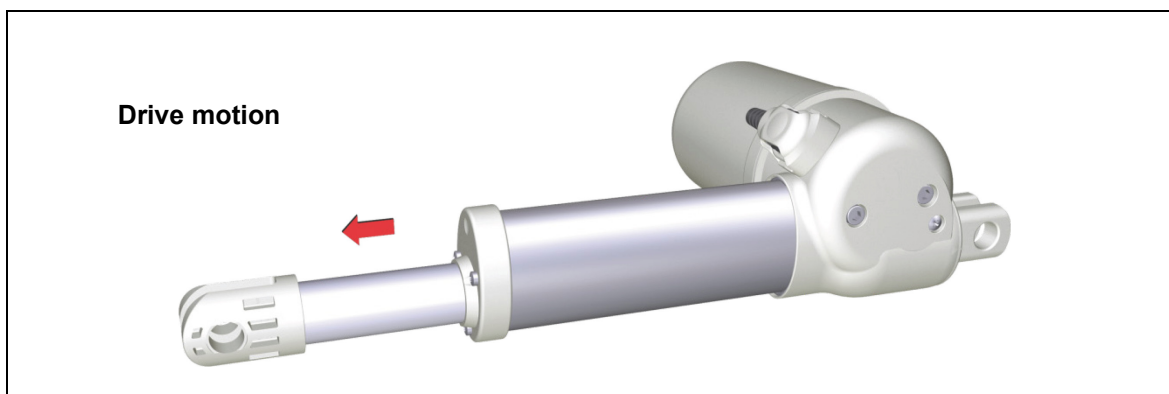


Figure 4 Loose fastening nut (stroke pipe not secured): only pushing forces

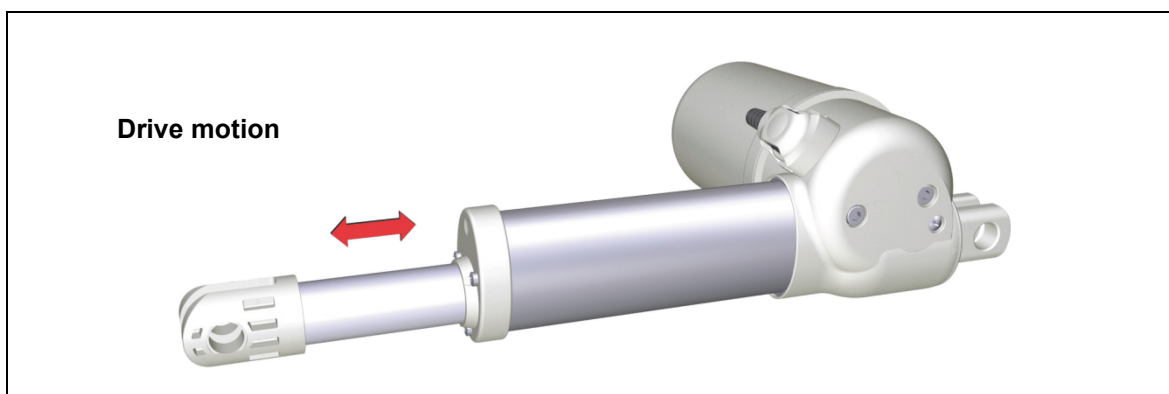


Figure 5 Stroke pipe screwed onto the spindle screw (attached): both pushing and pulling forces

#### 4.1.2 Clevis variants

##### Stroke pipe clevis

There are various stroke pipe clevis variants available for the MEGAMAT MCZ drive:

- Stroke pipe clevis (plastic version),
- Stroke pipe clevis (die-cast version).

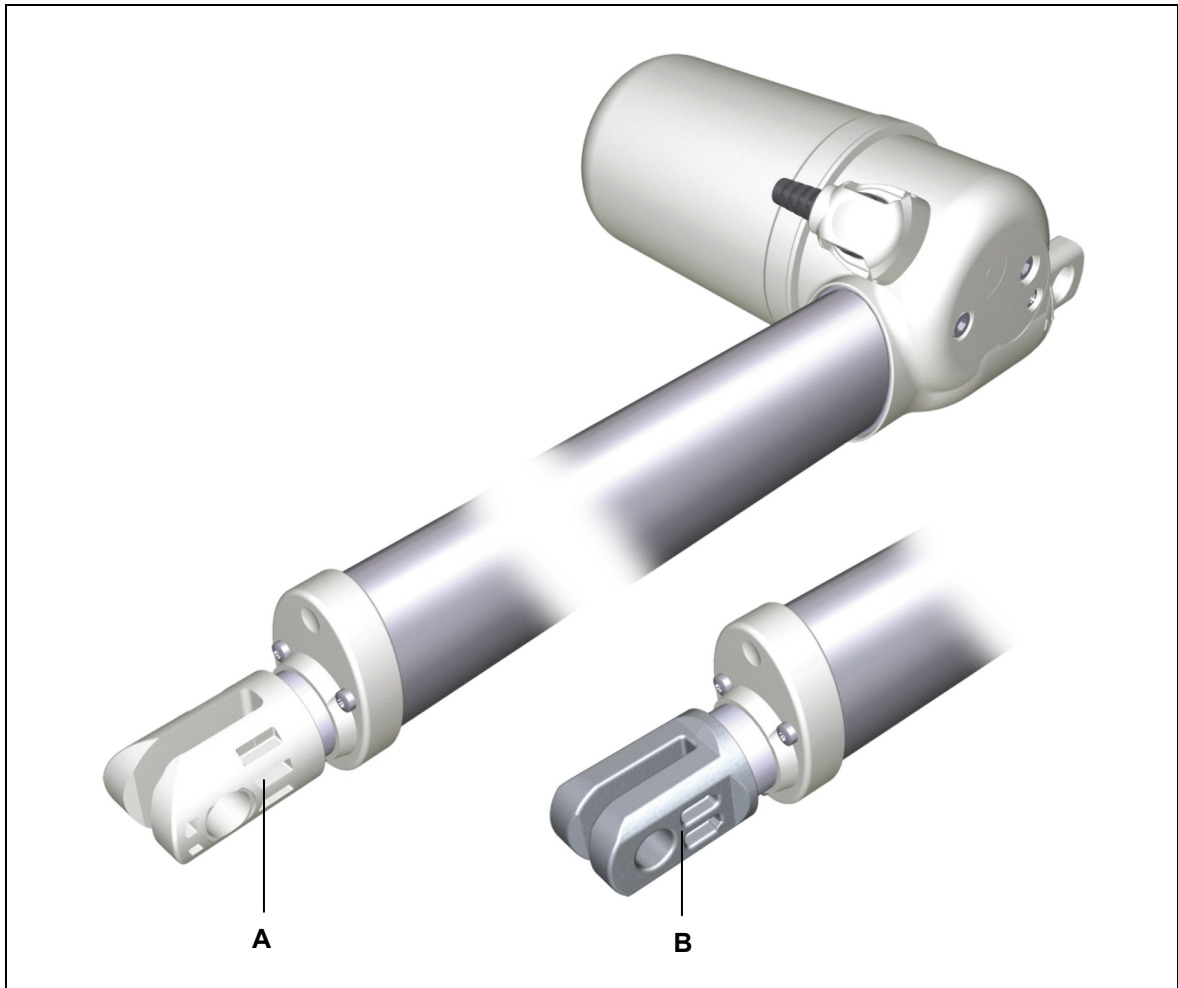


Figure 6 Clevis variants

**A** Stroke pipe clevis: Plastic version

**B** Stroke pipe clevis: Die-cast version

**Clevis quick release (GQR)**

The clevis quick release (GQR) is a mechanical reset function that is used to manually lower the unit (during a power or voltage outage, for example). The clevis quick release (GQR) function is designed for continuous use.

|   |                |
|---|----------------|
|   | <b>CAUTION</b> |
| The mechanical reset function is not a safety system and does not avert danger. |                |

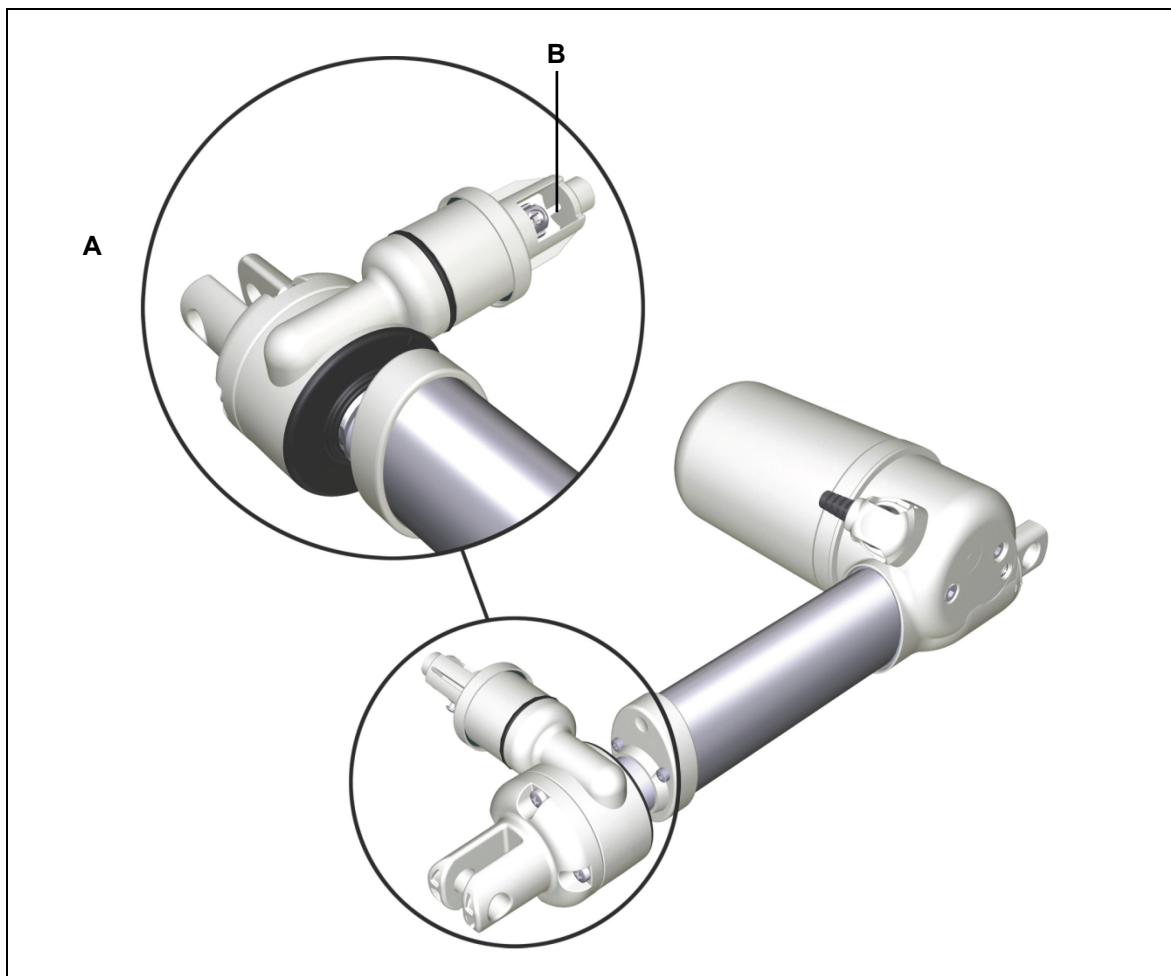


Figure 7 The GQR clevis model

**A** Clevis quick release (GQR)

**B** Bowden cable holder

|   |               |
|---|---------------|
|   | <b>NOTICE</b> |
| Follow all instructions for mounting the clevis quick release (GQR). Carry out the installation according to the steps listed in the installation chapter (refer to page 30 - 34 ). |               |



**Gear clevis variants**

There are various gear clevis variants available for the MEGAMAT MCZ drive:

- Plastic version of the gear clevis,
- Die-cast version of the gear clevis.

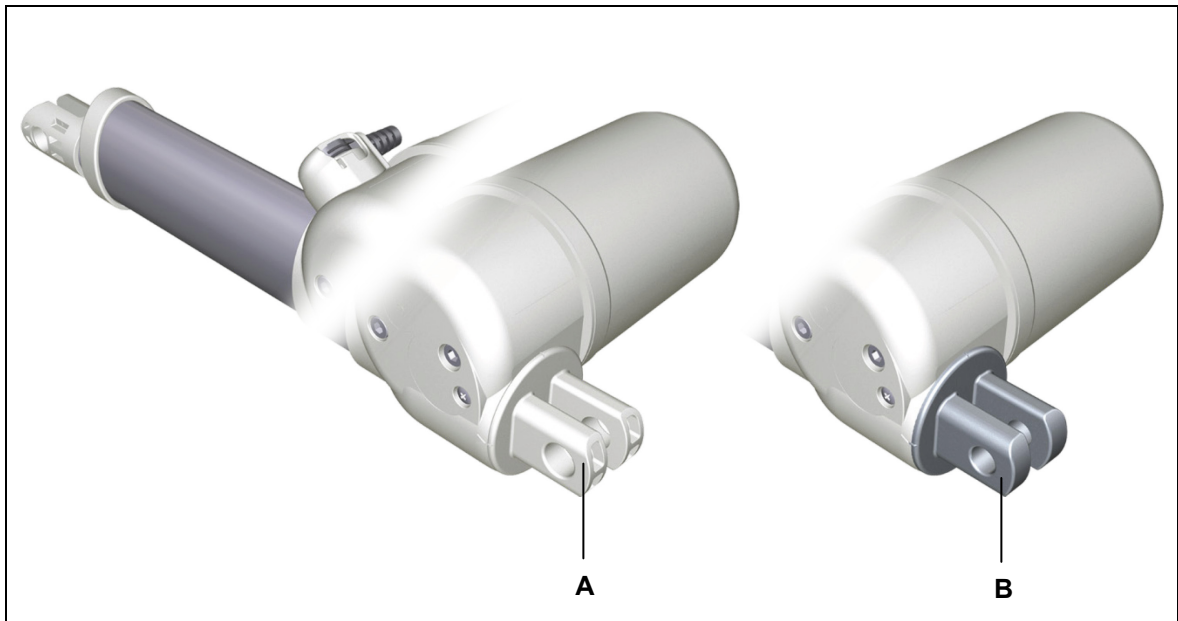


Figure 8      Gear clevis variants

**A** Plastic version of the gear clevis

**B** Die-cast version of the gear clevis

#### 4.1.3 Guidance profile cap variants

There are various guidance profile cap variants available for the MEGAMAT MCZ drive:

- Normal guidance profile cap,
- Two-part guidance profile cap (6000 N drives),
- Two-part guidance profile cap with permanent lubrication (GQR drive).

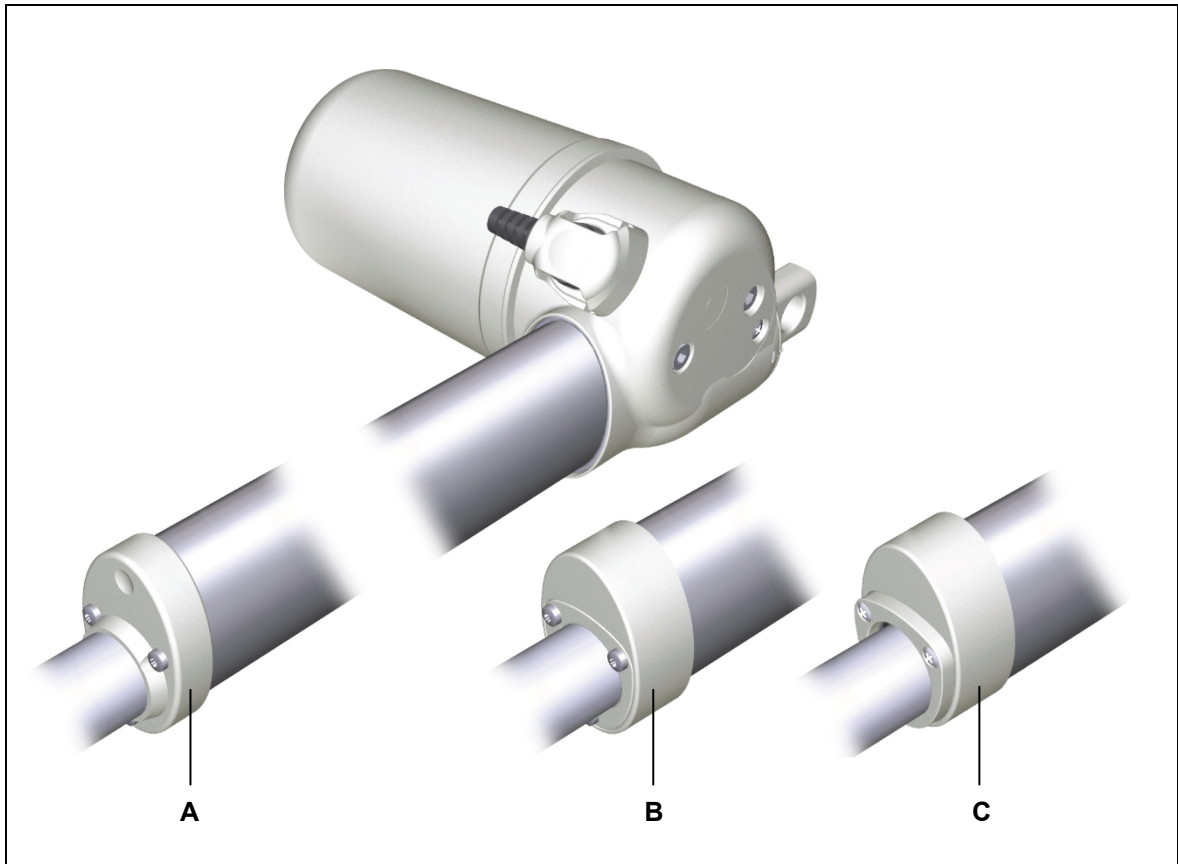




Figure 9 Guidance profile cap variants

**A** Normal guidance profile cap

**B** Two-part guidance profile cap

**C** Two-part guidance profile cap with permanent lubrication

#### 4.1.4 Option: MEGAMAT MCZ with reset function (ER)

|   |  |
|---|--|
|  | <div data-bbox="395 434 593 488"> <b>CAUTION</b></div> <p data-bbox="395 510 1347 582">The mechanical reset function is not a safety system and does not avert danger.<br/>This ER reset function is not designed for continuous use.</p> |
|---|--|

The mechanical reset function is used for lowering the unit manually (e.g. during a power outage). There are various reset functions available for the MEGAMAT MCZ drive:

- With a Bowden cable connection,
- Without a Bowden cable connection.

#### Option: MEGAMAT MCZ with reset function (ER) and Bowden cable connection

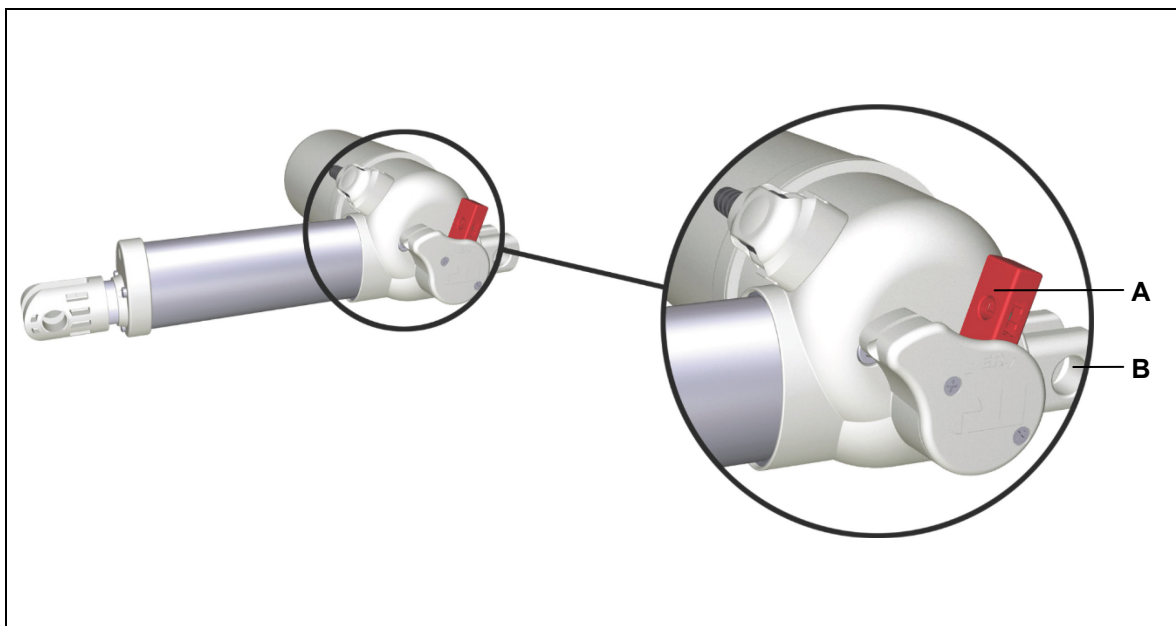


Figure 10 MEGAMAT MCZ with reset function (ER) and Bowden cable connection

**A** Release lever for the ER reset function

**B** Gear clevis

Option: MEGAMAT MCZ with reset function (ER) and no Bowden cable connection

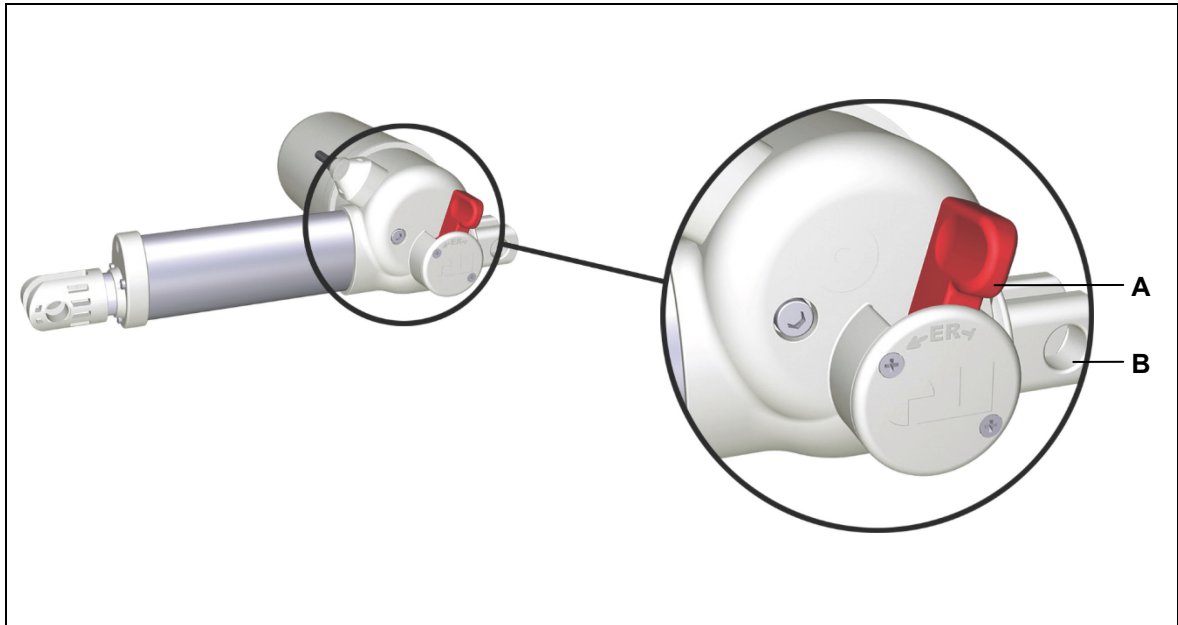



Figure 11 MEGAMAT MCZ drive with reset function (ER) and no Bowden cable connection



**A** Release lever for the ER reset function

**B** Gear clevis

#### 4.1.5 Electrical connection options

There are two different electrical connection options available: Connections with a plug-in motor cable (detachable snap-on cap) or a fixed motor cable (non-detachable cap). For the non-detachable cap, the electrical connection is permanently attached at the factory and cannot be opened. With the detachable snap-on cap, the electrical connection may be opened by a qualified specialist. In this case, the snap-on cap has openings on the side, through which a screwdriver can be inserted to release the snap connection.

| NOTICE  |  |
|---|--|
|  | <p>If the motor connection cable needs to be replaced:</p> <ul style="list-style-type: none"><li>• Carefully loosen the snap-on cap using a suitable tool.</li><li>• Replace the snap-on cap if it is damaged.</li><li>• Check that there is a secure connection between the snap-on cap and the gear housing.</li></ul> |

|  CAUTION |  |
|---|--|
|          | <p>You must stop using the drive if the snap-on cap or the connection between the snap-on cap and the gear housing is damaged.</p> |

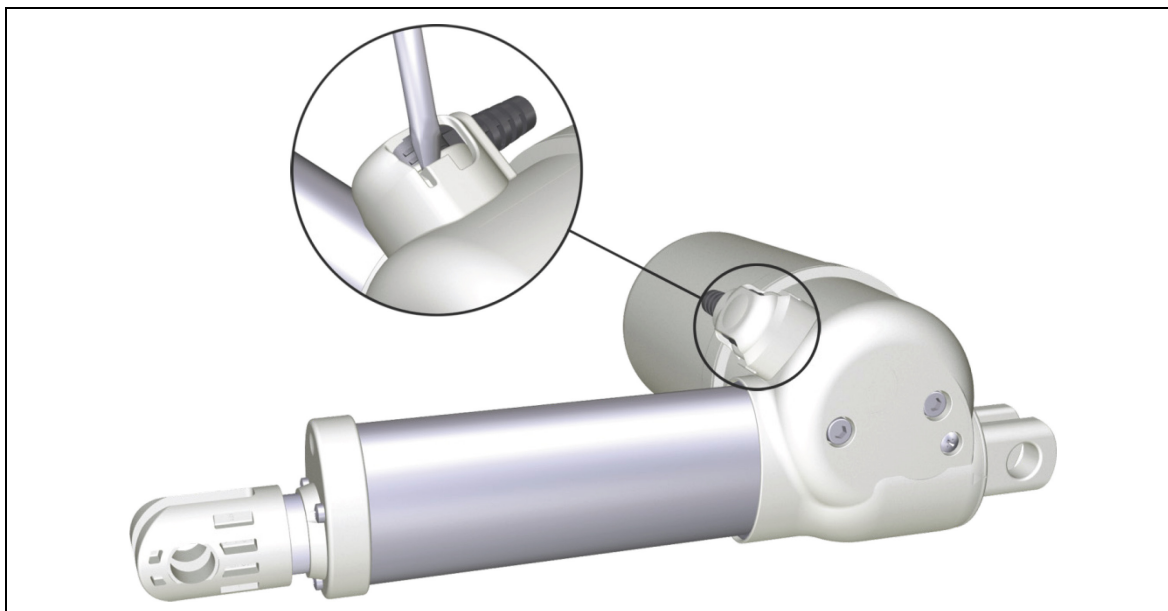


Figure 12 Detachable snap-on cap for plug-in motor cable

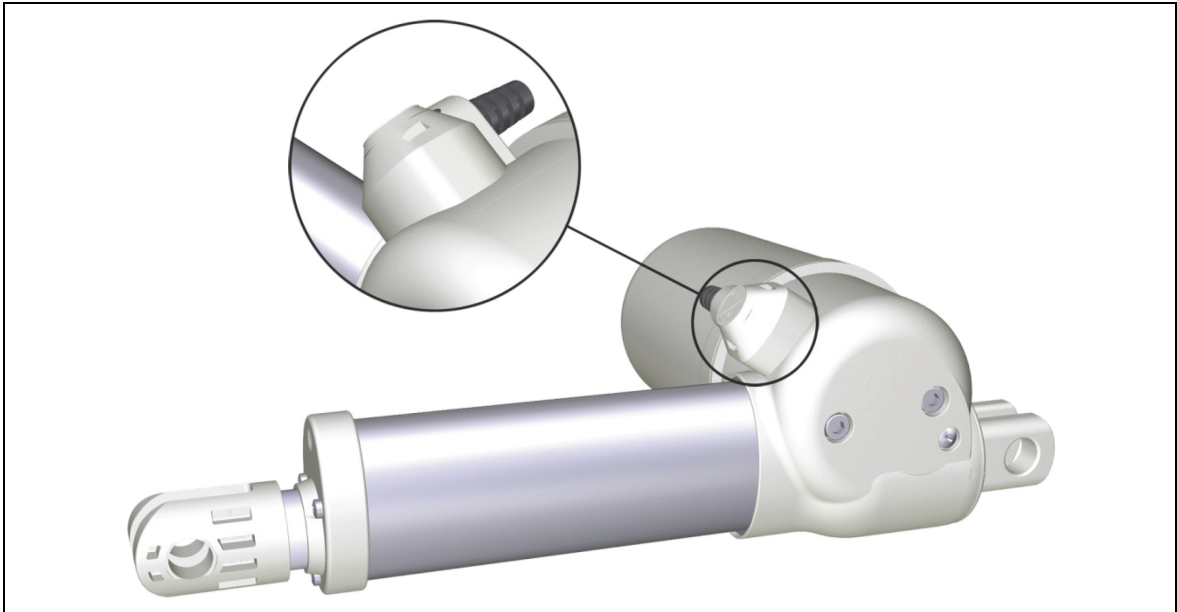


Figure 13 Fixed cap for fixed motor cable

The following symbol can be found on the MEGAMAT MCZ drive's snap-on cap.



This symbol indicates that the unit should only be opened by qualified specialists!

## 5. Technical specifications

|  |   |
|--|---|
| Rated voltage  | 24 V DC – 29 V DC   |
| Current consumption at rated load                              | Max. 5 A, depending on version (refer to the ratings plate)         |
| Permitted push force   | Max. 6000 N depending on version (refer to the ratings plate)       |
| Permitted pull force   | Max. 3000 N depending on version (refer to the ratings plate)       |
| Permitted pushing force (with ER reset function)               | Max. 2000 N depending on version (refer to the ratings plate)       |
| Permitted pushing force (with clevis quick release GQR)        | Max. 3000 N depending on version (refer to the ratings plate)       |
| Triggering force for GQR                                       | Approx. 340 N   |
| Mode of operation <sup>1</sup> at max. rated load              | Intermittent duty: 2 min/18 min (max 5 switching cycles per minute) |
| Protection class <sup>2)</sup>                                 | III   |
| Noise level  | ≤ 65 dB(A)  |
| Drive type   | Single drive  |
| Load type  | Push / pull   |
| Stroke   | Max. 500 mm (depending on power)                                    |
| Adjustment speed <sup>3)</sup>                                 | Up to 28 mm/second, depending on the version                        |
| Protection degree  | IP20, IPX4, IPX6  |
| <b>Dimensions and weight</b>                                   |   |
| Length x width x height  | Min. 191 mm x 160 mm x 88 mm  |
| Length x width x height (with ER reset function)               | Min. 191 mm x 176 mm x 88 mm  |
| Length x width x height (with GQR clevis quick release)        | Min. 232 mm x 160 mm x 88 mm  |
| Weight   | Approx. 1.7 kg, depending on version                                |
| <b>Ambient conditions for operation, storage and transport</b> |   |
| Transport / storage temperature                                | From -20 °C to +50 °C<br>From -4 °F to +122 °F                      |
| Operating temperature  | From +10 °C to +40 °C<br>From +50 °F to +104 °F                     |
| Relative humidity  | From 30% to 75%   |
| Air pressure   | From 800 hPa to 1060 hPa  |
| Height   | < 2000 m  |

<sup>1)</sup> Mode of operation: intermittent duty 2 min./18 min. This means that after the unit is operated with its rated load for up to two minutes it must then be paused for 18 minutes. The system can malfunction if this pause is not observed!

<sup>2)</sup> Safety extra-low voltage

<sup>3)</sup> Adjustment speed: the speed at which the clevis can move under no load (the speed varies depending on the load).

- Version with "long" motor casing cover: Dimensions for width: + 16 mm.

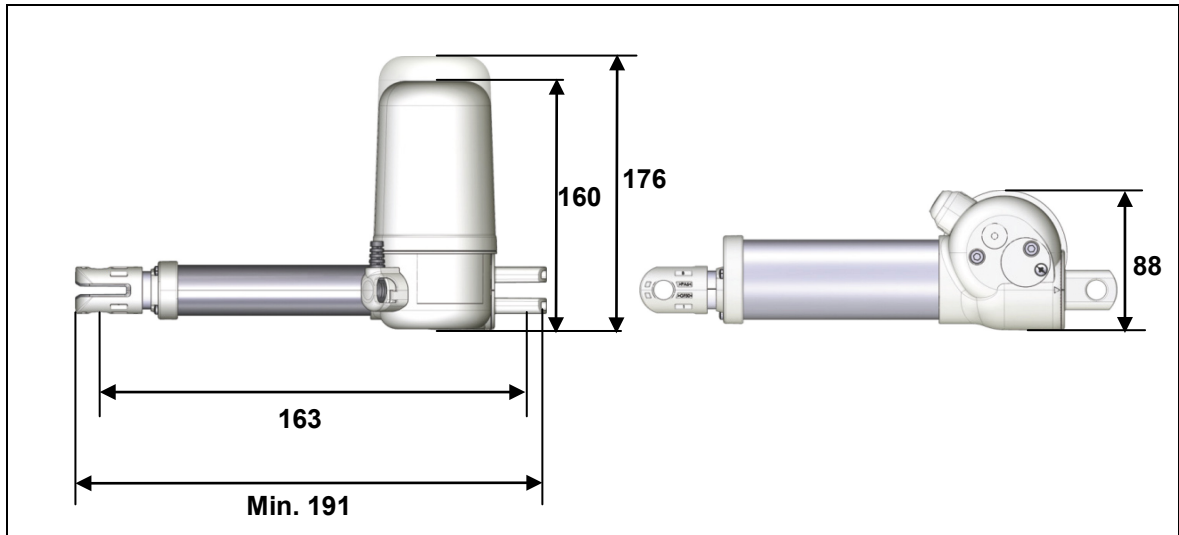


Figure 14 Dimensions of MEGAMAT MCZ drive (in mm), minimum installation dimensions: 163 mm

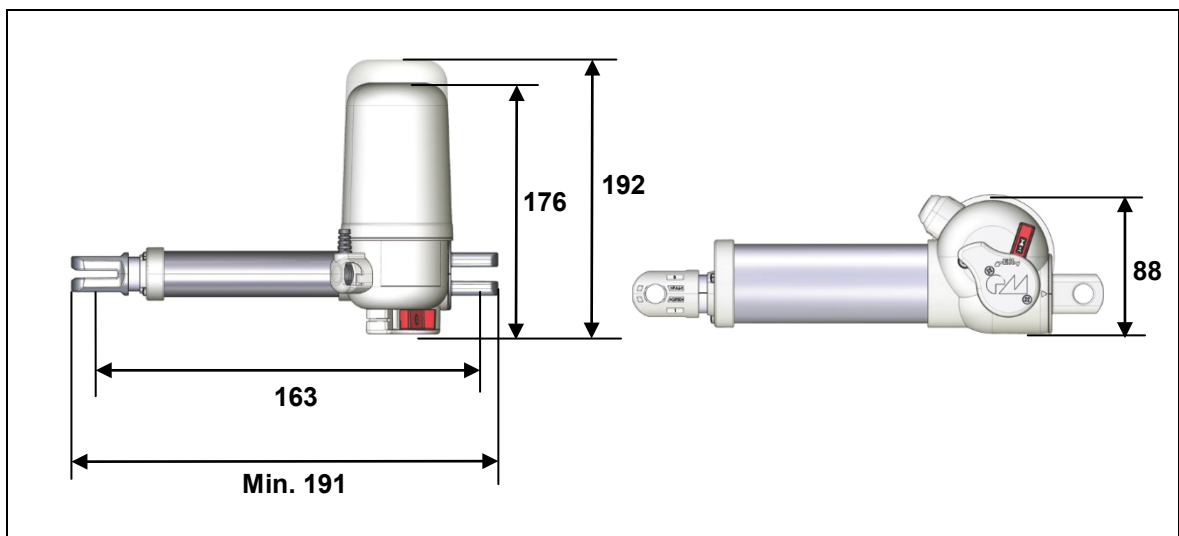


Figure 15 Dimensions of the MEGAMAT MCZ drive with ER reset function and Bowden cable connection (in mm), minimum installation dimensions: 163 mm



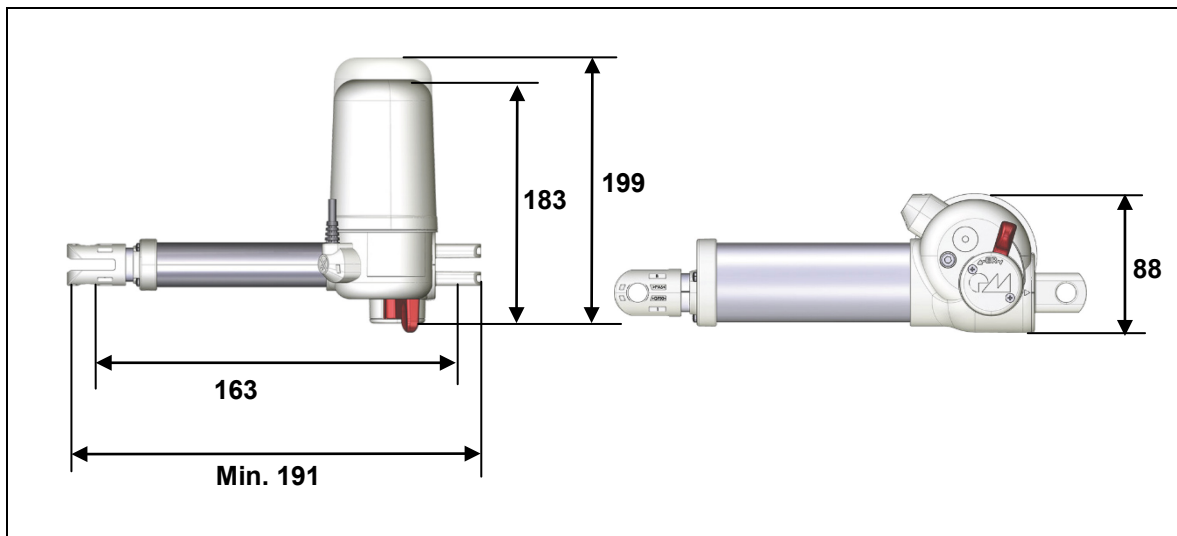


Figure 16 Dimensions of the MEGAMAT MCZ drive with ER reset function and no Bowden cable connection (in mm), minimum installation dimensions: 163 mm

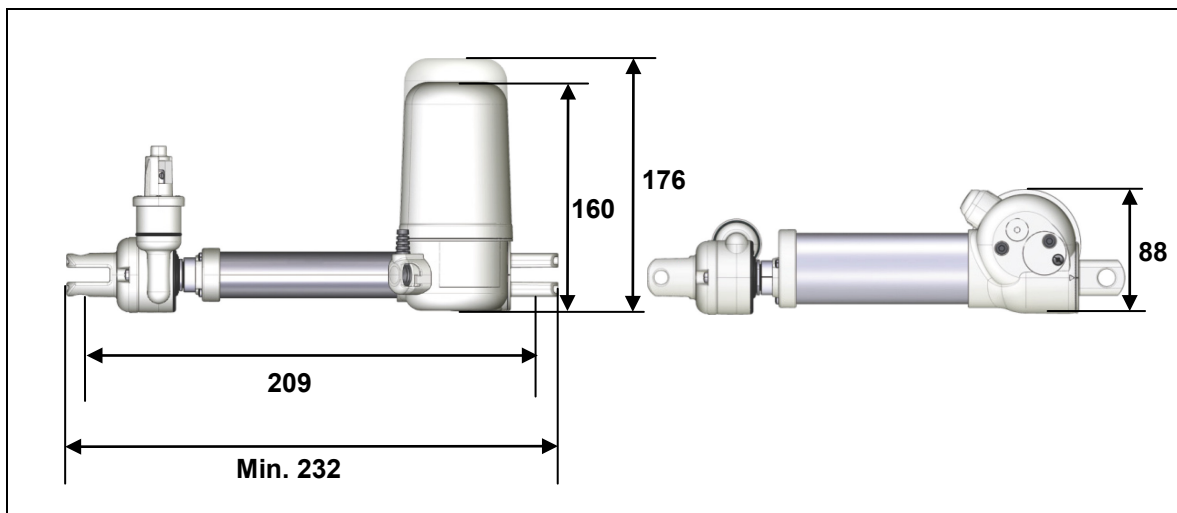


Figure 17 Dimensions of MEGAMAT MCZ drive with GQR clevis quick release (in mm), minimum installation dimensions: 209 mm

## 6. Installation



### 6.1 Safety notices to observe during installation

Basic safety rules must be followed in order to ensure that the end product can be continually operated in a safe manner. These rules must be observed while using the end product and while installing the drive.



#### 6.1.1 Ensuring operational reliability during installation

The safety and reliability of the end product containing the DewertOkin drive can be ensured by using the proper construction methods described below.

##### Avoiding fatigue fractures



|  |  CAUTION  |
|--|--|
|  | <p>Drives that are incorrectly installed can undergo fatigue fractures which then create a risk of injury.</p> <ul style="list-style-type: none"> <li>• Install the drive in the end product so that it is properly aligned. This will help prevent shear stress.</li> <li>• Do not position the drive at a slanted angle when installing it in the end product. A slanted angle between the intended direction of movement of the end product and the drive's direction will create shear stress and could lead to a fatigue fracture.</li> <li>• Be sure to install the drive so that it can always move freely in all operative states.</li> <li>• You should never screw the stroke pipe into the drive (versions with fixed nuts).</li> </ul> |

##### Avoiding a pinching hazard

|  |  CAUTION  |
|---|--|
|   | <p>A stroke pipe is used to provide the drive motion. When designing your product, you should take this into account with passive safety mechanisms and with the appropriate safety notices in your operating instructions:</p> <ul style="list-style-type: none"> <li>• Installation methods for ensuring passive safety: Install the MEGAMAT MCZ drive so that none of the positions where shear and pinch hazards exist are accessible externally.</li> </ul> |

When preparing safety notices for the operator, Make sure that your operating instructions inform the user of these safety points.

##### Avoiding an over-extension of the stroke pipe (when mounted unattached)


|  |  CAUTION   |
|---|---|
|   | <p>There must be a fixed mechanical end stop built into the end product for MEGAMAT MCZ drive models where the stroke pipe is not attached to the spindle screw. If no fixed mechanical end stop exists, the stroke pipe can over-extend. This can cause malfunctions, personal injury, and damage to the drive system.</p> |

**Avoiding an overrun of the stop point with the end product**

Your end product should contain mechanical end stops. These will limit the drive movement and significantly increase operational safety. DewertOkin recommends that you build such mechanical end stops into your end product.

If, for technical or cost reasons, you choose not to use end stops, then we strongly recommend the use of an additional safety limit switch whenever the DewertOkin drive is being used for at-risk functions. A safety limit switch will protect the drive from a critical failure and overrun in the event that the top end switch malfunctions.

- The safety end switch shuts the drive down as soon as the normal end switch is passed over. The safety end switch is integrated directly into the drive and does not require any additional installation. The drive may take up an extra 23 mm when installed with the safety limit switch.

|   |               |
|---|---------------|
|    | <b>NOTICE</b> |
| When installing the optional GQR clevis quick release or ER reset function, you must use mechanical end stops (both for the upper limit and for the lower limit) in your end product in order to prevent mechanical damage to the drive system. |               |

- The mechanical end stops or stroke limiters in the end product must be adjusted to fit the retracted and extended dimensions of the drive. Make sure that the drive does not reach the mechanical end stop position before it has been fully extended.

## 6.2 Installation procedure

### NOTICE

Mount the drive in its unloaded position within your end product.  
The drive must either be completely retracted or extended at its end position.  
Damage to the drive can **only** be avoided if the drive is installed in its unloaded position. This ensures safe installation.

### 6.2.1 An installation example

Before installing the drive, make sure that you are observing all of the safety notices found in the "Safety notices to observe during installation" section.



### CAUTION

The plug for the connecting cable should be unplugged during the installation.

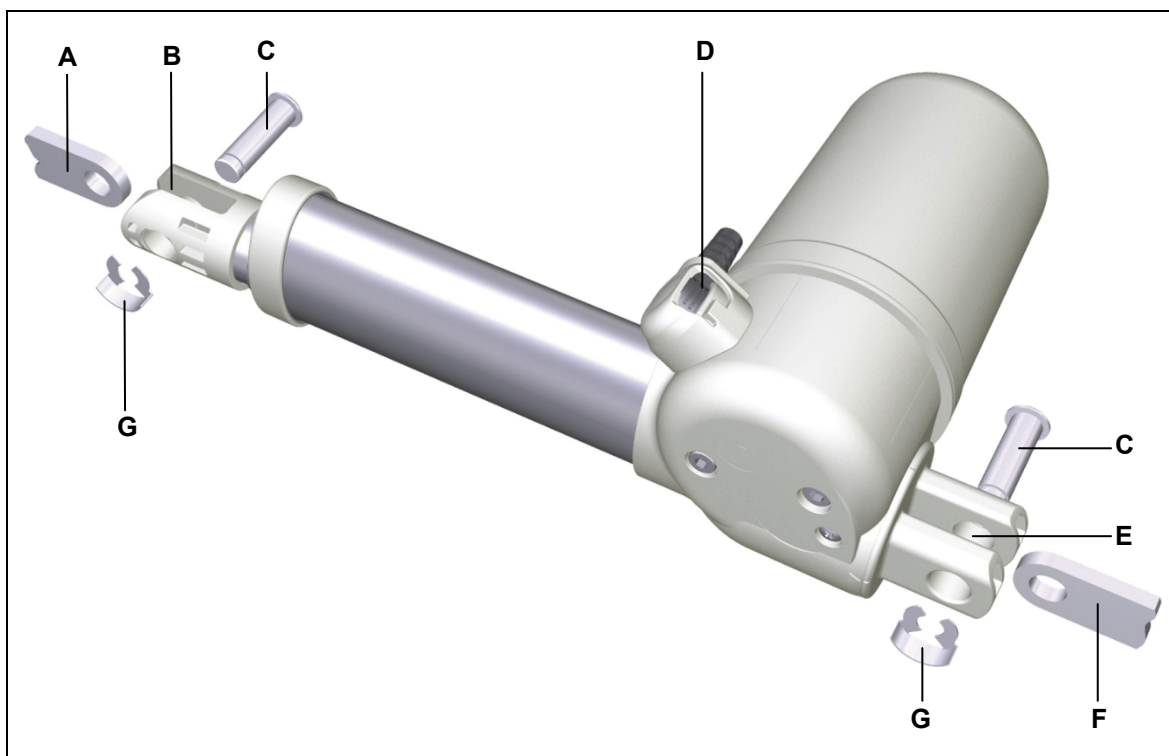


Figure 18 Installing the drive (example)

**A** Bracket for securing the drive (on the stroke pipe side)

**B** Stroke pipe clevis

**C** Mounting bolt

**D** Electrical connection / cable

**E** Gear clevis

**F** Bracket for securing the drive (on the motor side)

**G** Safety clip

**NOTICE**

The support brackets for the clevises must be in alignment.

In the following example, installation of the MEGAMAT MCZ drive into the end product is shown using mounting bolts.

► Certain details may change based on the variation in use and technical modifications.

- 1 Move your product into a position where it is supporting no load.
- 2 Push the drive's gear clevis (E) onto the bracket (F).
- 3 Insert the mounting bolt (C) into the bracket (F).
- 4 Secure the mounting bolt (C) with the safety clip (G).

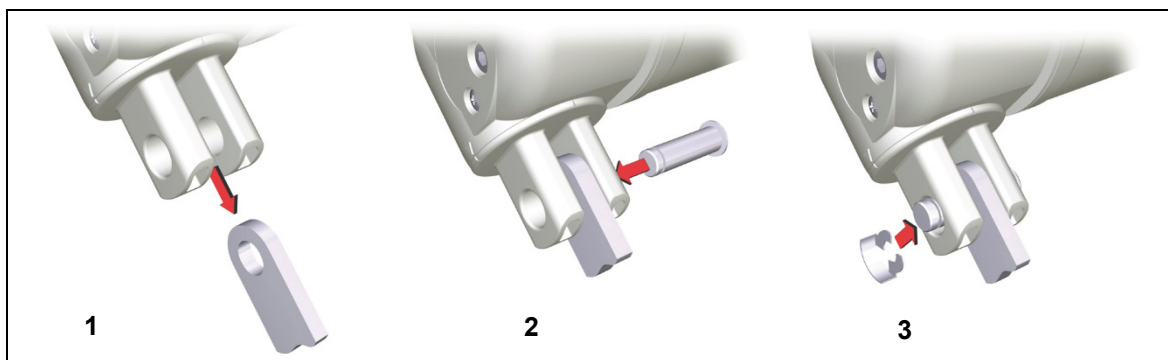


Figure 19 Steps for installing the gear clevis (example)

**CAUTION**

Versions with fixed nuts: You should never screw the stroke pipe into the drive. A stroke pipe that has been screwed into the drive can result in fatigue fractures.

- 5 If the stroke pipe clevis/head (B) does not align exactly with the gear clevis (E), the stroke pipe may be unscrewed out of the drive by no more than a half turn.

**CAUTION**

Versions with fixed nuts: The stroke pipe may only be turned one half rotation out of the drive. Do not rotate the stroke pipe further out. An over-rotation can lead to unsafe operations. The stroke pipe clevis must not be detached from the stroke pipe!

- 6 Attach the stroke pipe clevis (B) using a mounting bolt (C) to the mounting bracket (A).
- 7 Secure the mounting bolt (C) with the safety clip (G).
- 8 Now connect the drive to the control unit or the double drive. Ensure that the electrical connection cable (D) cannot be pulled out.

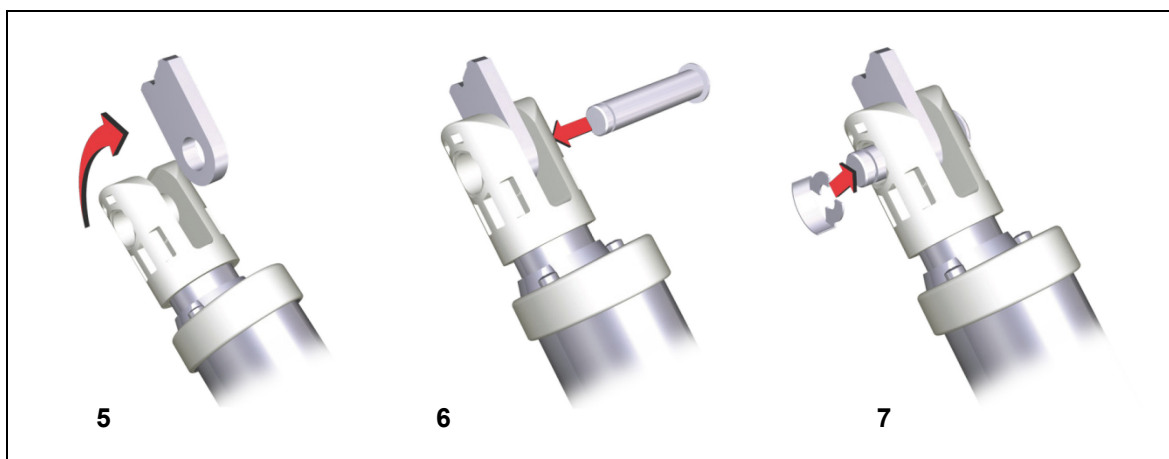




Figure 20 Steps for installing the stroke pipe clevis (example)

- If the hand switch will be used to control two drives, you must first connect both drives electrically to each other (for example, over a control unit or double drive). Then you can connect the handset.

#### 6.2.2 Information on installing the MEGAMAT MCZ drive with clevis quick release (GQR)

|   |  |
|---|--|
|  |  <b>CAUTION</b>   |
|   | <p>Installation errors (due to deviations in the brackets or fittings, for example) can significantly alter the release forces of the GQR. Improper installation can lead to significantly increased release forces which may far exceed the specifications.</p> |

##### Position and alignment of the bracket on the clevis quick release (GQR)

The support brackets for the clevis must be properly aligned (refer to Figure 21). If they do not line up, additional lateral forces will be exerted on the drive unit. If the brackets are out of alignment by only one degree, the release forces can increase significantly. Ideally the brackets should be fitted at almost zero degrees alignment.

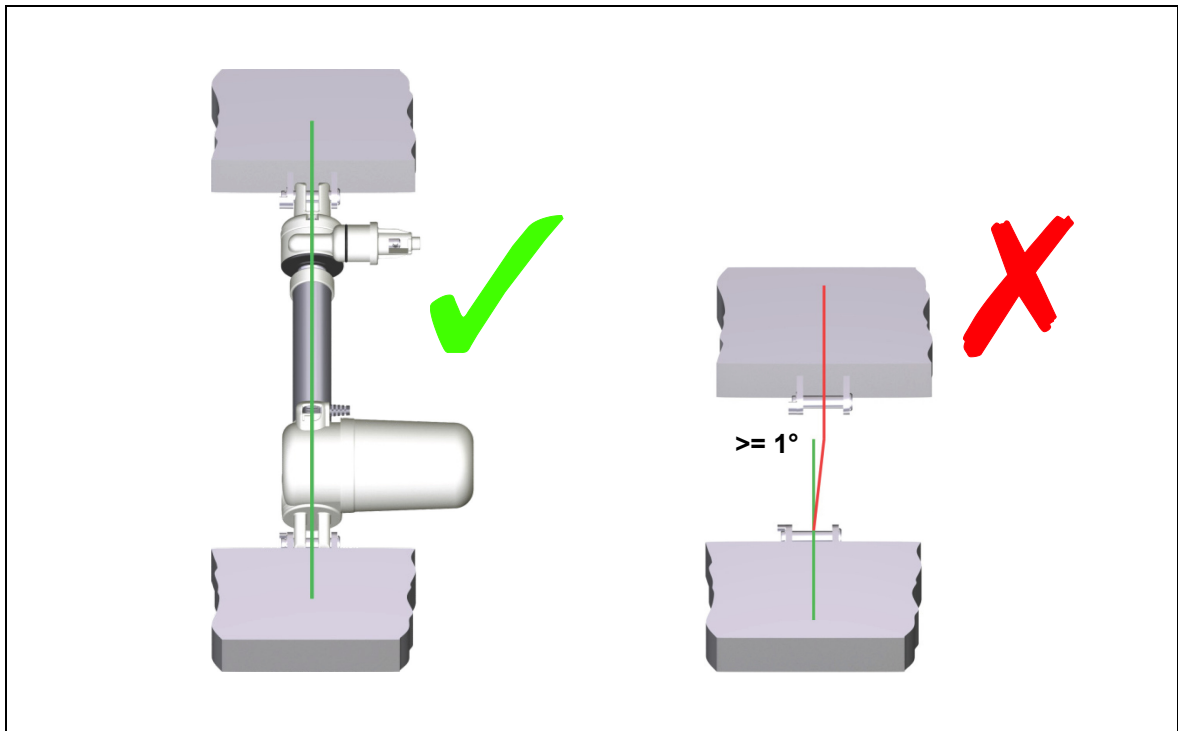


Figure 21 Position and alignment of the brackets

#### Installation position of the clevis quick release (GQR)

- The release force will increase, for example, if the drive unit is subjected to a lateral force from other attachments. The resulting release force may be far over the specification. (Figure 22 shows a horizontally installed drive unit with a lateral force acting upon it.)

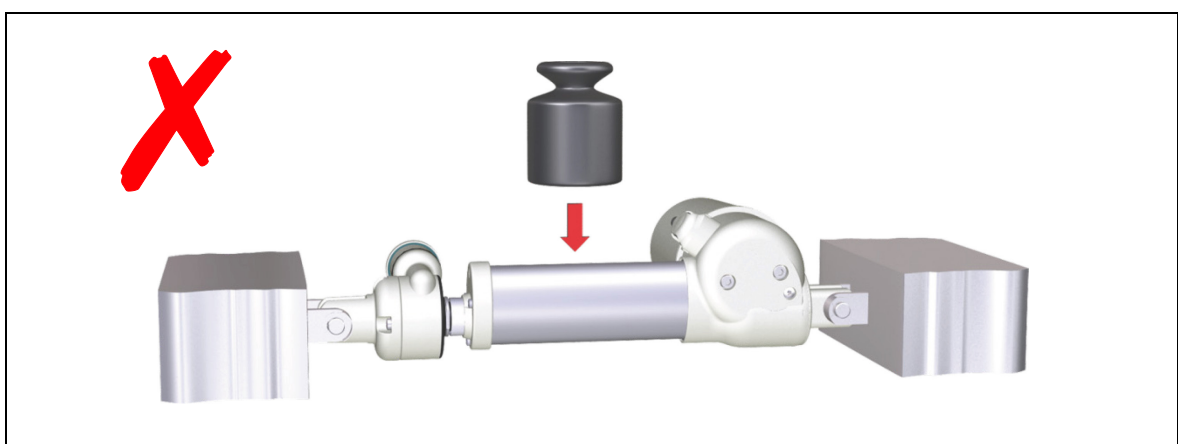


Figure 22 The effect of the installation position

**Recommended bracket position for the clevis quick release (GQR)**

The brackets should be aligned precisely with each other. We recommend that only one mounting bracket is used on both sides of the drive (as shown by **A** in Figure 23). When two mounting brackets are used, there is a greater risk that they are not properly aligned, resulting in a tilted drive unit.

The drive must be firmly attached, but there should also be a certain degree of movability at the mounting points. The drive must be mounted so that it is protected in all positions against twisting and bending. You can also use brackets with two mounting holes (as shown by **B** in Figure 23), but these must be exactly aligned so that the release force is not increased.

The mounting bracket should have an elongated oval hole so that you can compensate for any deviations in the installation dimensions of the drive and your end product.

- We recommend: an oval slot (as shown by **C** in Figure 23) should have at least 2 millimetres of extra room.

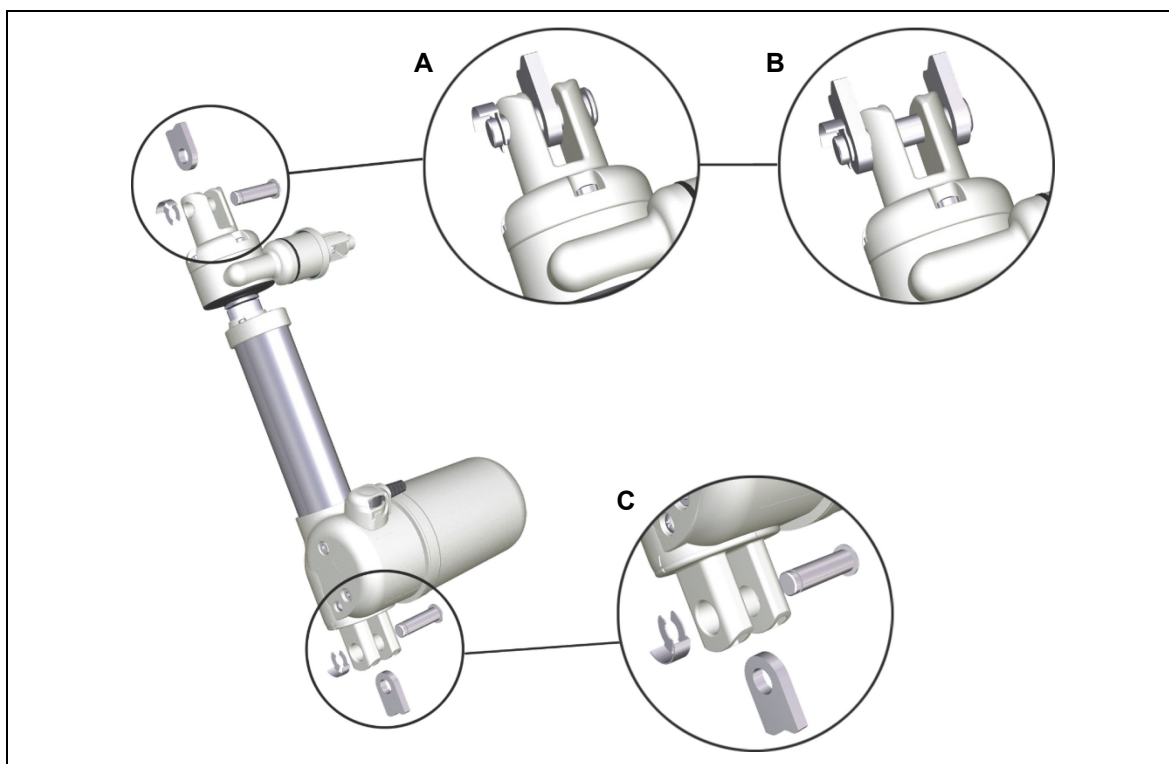


Figure 23 Recommended design of bracket



### 6.2.3 Installation of the Bowden cable for the optional clevis quick release (GQR) function



#### NOTICE

When installing the GQR, use a Bowden cable with some type of length compensation mechanism (for example, attach a spring to the Bowden cable).

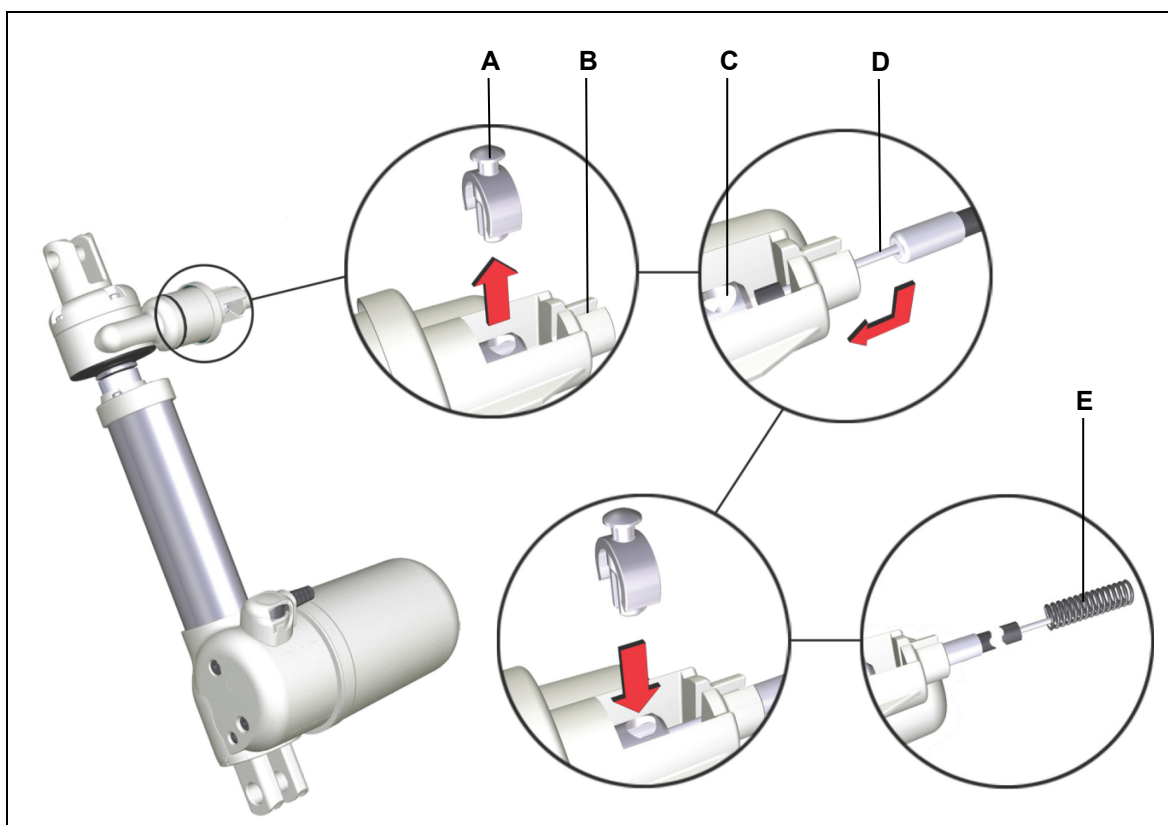


Figure 24 Installation of the Bowden cable for the mechanical reset function GQR (optional)

- A** Bowden cable lock
- C** Bowden cable holder
- E** Length compensation mechanism (e.g. a spring)

- B** Groove in the GQR
- D** Bowden cable

- 1 Guide the Bowden cable (**D**) through the slot in the GQR (**B**).
- 2 Place the Bowden cable (**D**) into the cable holder (**C**).
- 3 Secure the cable in position using the locking mechanism (**A**).



#### CAUTION

Do not put too much tension on the Bowden cable. An over-strained Bowden cable could cause an accidental adjustment to occur by triggering the mechanical reset function.

- The Bowden cable holder (**C**) must be pulled until it reaches the end stop (all the way up) in order to ensure that the GQR functions properly. The GQR's clutch opens up when the pull force reaches 110 N. The pull force must not exceed 250 N; otherwise the GQR could be damaged and the release force would be increased.
- 4 Mount the Bowden cable to your end product. A spring (**E**) should be attached to the Bowden cable mechanism to prevent damage to the GQR and to ensure proper functionality.

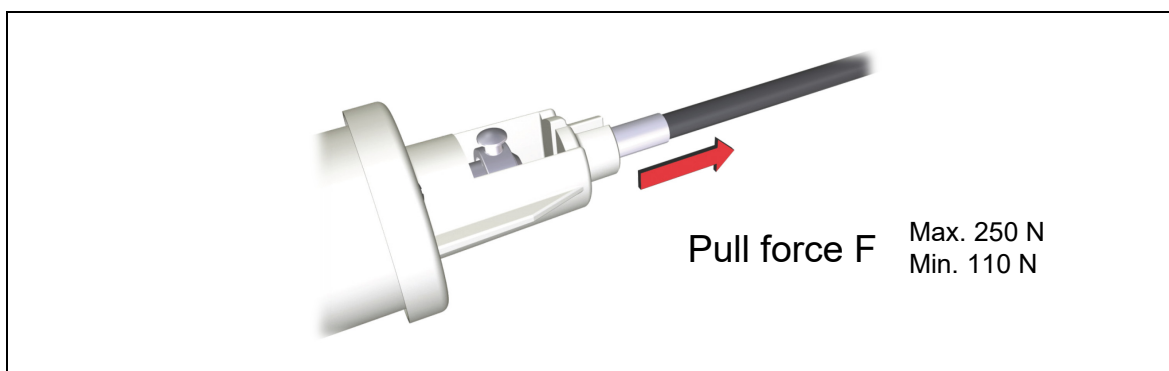


Figure 25 Clevis quick release

- 5 Verify that the mechanical reset function is functioning properly.

#### 6.2.4 Installing the Bowden cable for the optional ER mechanical reset function

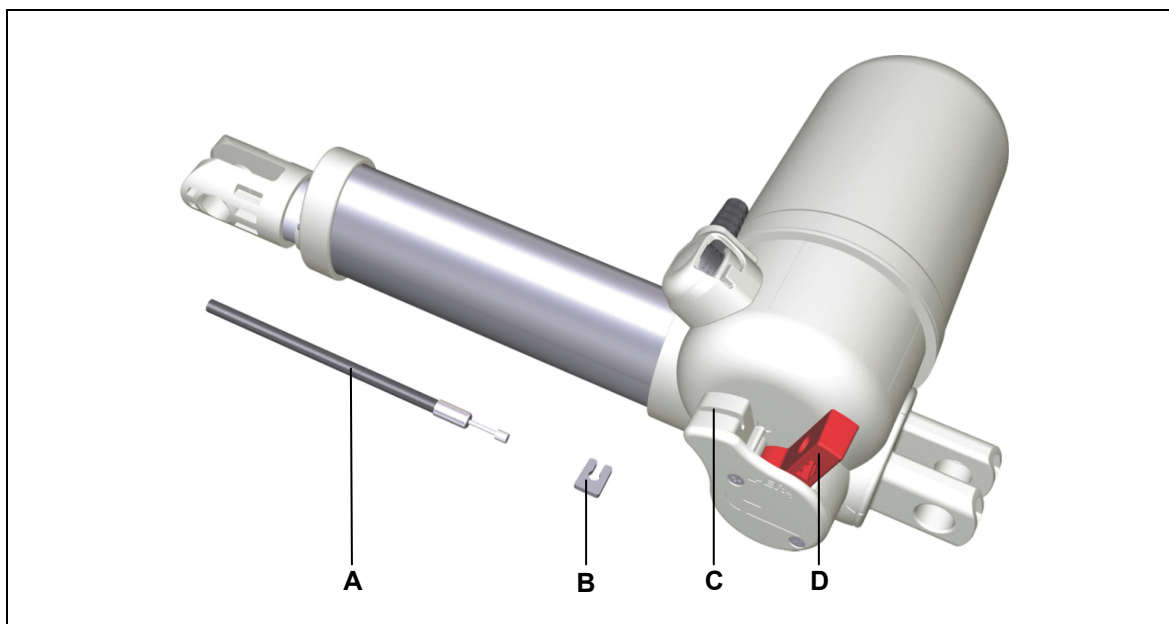


Figure 26 Mounting the drive with ER mechanical reset function

- |                                   |  |
|-----------------------------------|--|
| <b>A</b> Bowden cable             | <b>B</b> Safety clip                             |
| <b>C</b> Groove in the ER housing | <b>D</b> Release lever for the ER reset function |

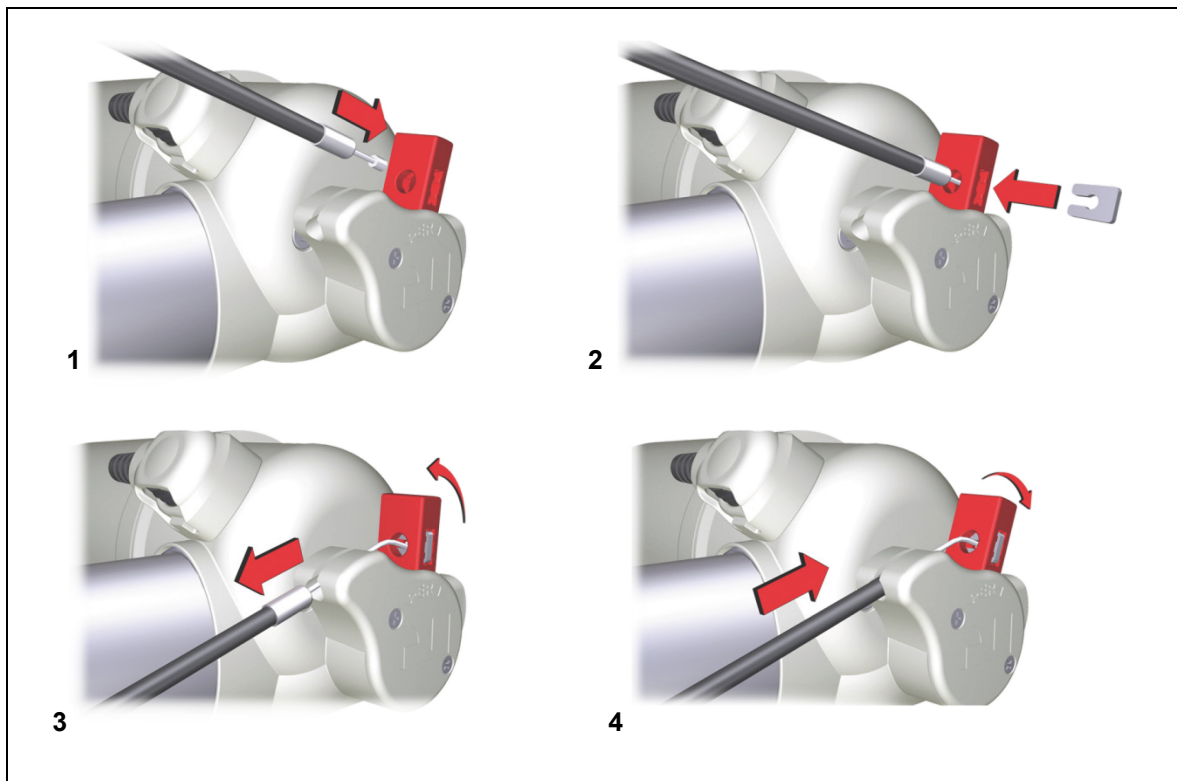






Figure 27 Installation of the Bowden cable for the ER mechanical reset function (optional)

- 1 Guide the Bowden cable (**A** in Figure 26) through the release lever of the ER (**D**), as shown in Figure 27.
- 2 Use the safety clip (**B**) to secure the Bowden cable in position.
- 3 Guide the Bowden cable (**A**) through the slot in the ER (**C**).
- 4 Place the Bowden cable (**A**) into the cable holder.

|   |   |
|---|---|
|  |  <b>CAUTION</b>  |
|   | Do not put too much tension on the Bowden cable. An over-strained Bowden cable could cause an accidental adjustment to occur by triggering the mechanical reset function. |

- 5 Mount the Bowden cable to your end product.
- 6 Verify that the mechanical reset function is functioning properly.

### 6.2.5 Electrical connection

|   |  |
|---|--|
|  |  <b>CAUTION</b>   |
|   | Electrical components should be connected or disconnected only when the mains power plug and the battery plug (when present) are both unplugged. |



#### Routing the electrical cables

When routing the cables, be sure that:

- the cables cannot get jammed,
- no mechanical load (such as pulling, pushing or bending) will be put on the cables, and
- the cables cannot be damaged in any way.

Fasten all cables (especially the mains cable) to the end product using sufficient strain relief and kink prevention methods. Be sure that the design of the end product prevents the mains cable from coming into contact with the floor during transport.

### 6.2.6 Connection option: Drive with detachable snap-op cap covering the electrical access

|   |   |
|---|---|
|  |  <b>CAUTION</b>  |
|   | <p>Only personnel with the following training are qualified to work on the electrical connections:</p> <ul style="list-style-type: none"><li>• someone who has completed training in electronic motor assembly,</li><li>• someone with equivalent qualifications, or</li><li>• someone who has successfully completed the appropriate DewertOkin training program.</li></ul> <p>You should only work on the electrical connections if you are qualified to do so. Otherwise, a properly qualified person should be found for this task.</p> |

The snap-on cap has openings on the side, through which a screwdriver can be inserted to release the snap connection.

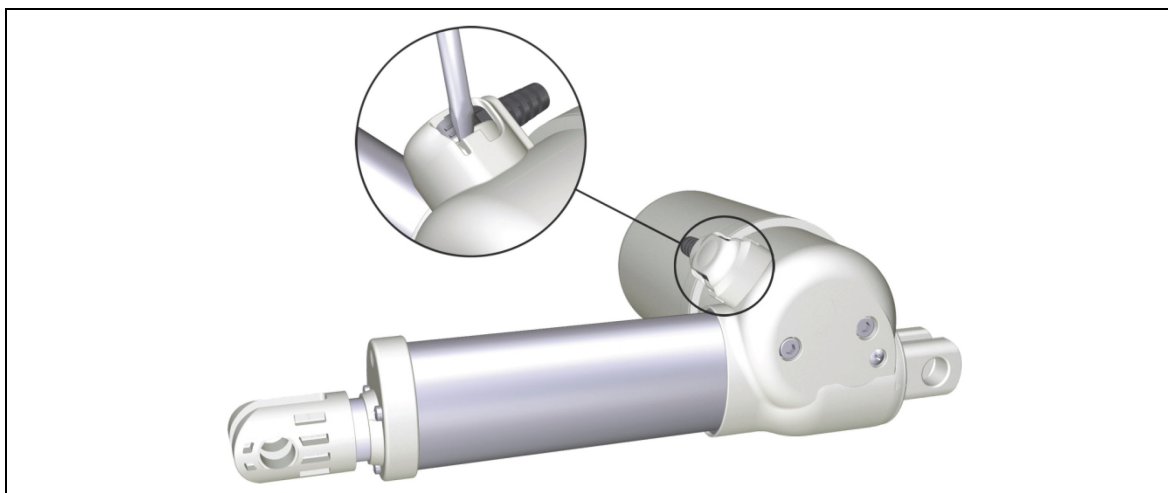







Figure 28 Detachable snap-on cap

|   | <b>NOTICE</b>  |
|---|--|
|  | <p>If the motor connection cable needs to be replaced:</p> <ul style="list-style-type: none"> <li>• Carefully loosen the snap-on cap using a suitable tool.</li> <li>• Replace the snap-on cap if it is damaged.</li> <li>• Check that there is a secure connection between the snap-on cap and the gear housing.</li> </ul> |

|   |  <b>CAUTION</b>                                 |
|---|--|
|  | <p>You must stop using the drive if the snap-on cap or the connection between the snap-on cap and the gear housing is damaged.</p> |

#### 6.2.7 Connection option: Drives with a fixed cap covering the electrical access



|   |  <b>CAUTION</b>   |
|---|--|
|  | <p>You may not open up the electrical access connection if the electrical access is covered with a permanent cap instead of a snap-on cap.</p> |



The following symbol can be found on the MEGAMAT MCZ drive's snap-on cap.



This symbol indicates that the unit should only be opened by qualified specialists!


### 6.2.8 Removing the drive

|   |  |
|---|--|
|  |  <b>CAUTION</b>   |
|   | Electrical components should be connected or disconnected only when the mains power plug and the battery plug (when present) are both unplugged. |

|   |   |
|---|---|
|  |  <b>CAUTION</b>  |
|   | Be sure to carry out work on the drive in a position so that no loads are bearing on it. Only in this way can you be sure to avoid any risks of crushing or injury. |

► Certain details may change because of technical changes.



- 1 Move your product into a position where it is supporting no load.
- 2 Remove the connecting cable from the controller or double drive.
- 3 If multiple drives are connected electrically, they should be disconnected from each other.
- 4 For the GQR / ER options: Loosen the Bowden cable by pulling the Bowden cable lock or the safety clip out. Remove the Bowden cable.

|   |   |
|---|---|
|  | <b>NOTICE</b>   |
|   | Be sure to support the drive's weight while you are loosening the bolt. |

- 5 Remove the security clips and the mounting bolt.
- 6 Remove the drive from the end product.

## 7. Operating notes

The factual information contained within may be used when you are creating the end-product manual. The installation instructions do not contain all information required for the safe operation of the end product. They only describe the installation and operation of the drive as a partially assembled piece of machinery.

|   |  |
|---|--|
|  |  <b>CAUTION</b>   |
|   | When creating the operating instructions, remember that the installation instructions are intended for qualified specialists and are not for typical users of the end product. |

### 7.1 General information



- ▶ Only a DewertOkin device should be used to control the drive since they have already been verified to work together.

#### Power-on time / intermittent operations

The MEGAMAT MCZ drive has been designed for intermittent operations. Intermittent operation is an operational mode where the drive must pause after a specified maximum period of operation (power-on time). This protects the drive from overheating. Extreme overheating can cause a malfunction.



- ▶ The ratings plate specifies the maximum power-on time and the required pause intervals.

#### Avoiding electrical risks



|   |  |
|---|--|
|  |  <b>WARNING</b>   |
|   | Make sure that all live (current-carrying) parts of the drive system and power supply cannot be touched. In particular, be sure that unused power and control unit connections are covered adequately. |

#### Avoiding cable damage

Be sure that your operating instructions inform the user about the possible cable risks.



|   |   |
|---|---|
|  |  <b>CAUTION</b>  |
|   | The cables (particularly the connecting cable) should not be run over. In order to prevent injuries or drive damage, no mechanical strain should be placed on the cables. |



#### Shutting off the drive

|   |   |
|---|---|
|  |  <b>CAUTION</b>  |
|   | In order to shut off the drive, unplug the mains power plug and the battery plug (when present). The power plug (of the control unit or double drive) must always be accessible during operations so that emergency shut-off is possible. |



## 7.2 Notice for operating with optional configuration

### Configuration: Attached nut

|   |   |
|---|---|
|  | <div style="background-color: yellow; padding: 5px;"> <b>CAUTION</b></div> <p>You should never screw the stroke pipe into the drive. A stroke pipe that has been screwed into the drive can result in fatigue fractures.</p> |
|---|---|

|   |  |
|---|--|
|  | <div style="background-color: yellow; padding: 5px;"> <b>CAUTION</b></div> <p>The stroke pipe may only be turned one half rotation out of the drive. Do not rotate the stroke pipe further out. An over-rotation can lead to unsafe operations. The stroke pipe clevis must not be detached from the stroke pipe!</p> |
|---|--|

### Configuration: Mechanical reset function (clevis quick release: GQR)


|   |  |
|---|--|
|  | <div style="background-color: yellow; padding: 5px;"> <b>CAUTION</b></div> <p>The mechanical reset function (GQR) is not a safety system and does not avert danger.</p> |
|---|--|

Note the following information when operating the MEGAMAT MCZ with the mechanical reset function GQR (clevis quick release):

- There should be no external dirt on the drive. Contaminants could prevent the mechanical quick release function (GQR) from functioning reliably. We therefore recommend that a visual inspection (refer to section 9.1), cleaning, and a quick-release functionality check all be included in the service plan for your end product.
- The GQR is equipped with a high-quality clutch system, which can be actuated at any time, even when under load.
- In an emergency, you can move the drive mechanically using the mechanical release. Use the mechanical release mechanism to return the drive to its home position.
- A conventional Bowden cable, which is secured in the GQR's cable holder (refer to section 6.2.3), is used for providing this mechanical release. The Bowden cable is not included in our delivery.
- The Bowden cable holder must be pulled until it reaches the end stop (all the way up) in order to ensure that the GQR functions properly. The GQR's clutch opens up when the pull force reaches 110 N. The pull force must not exceed 250 N; otherwise the GQR could be damaged and the release force would be increased.
- ▶ Depending on the implementation of your end product, it may be possible to lower the product simply using gravity. If your end product does not lower under its own weight, then you should apply gentle pressure on it to help it go down.
- After the mechanical reset function has been carried out, the clutch will engage automatically when the drive system is moved back into position. The drive system is then ready.





Make sure that your operating instructions inform the user about how to avoid damaging the GQR system:

|   | NOTICE   |
|---|--|
|  | <p>The GQR system is designed to be used for the push direction of the drive. When actuating the GQR, make sure that the manual adjustment motion takes place in the pushing direction. Otherwise the GQR could be damaged.</p> <p>The GQR is also normally fitted with a mechanism that protects it from getting stuck. If this mechanism is actuated improperly (for example, a quick release in an unintended direction without operating the Bowden cable), then there will be increased wear and tear on the system which could result in a premature system failure.</p> |

#### Configuration: ER mechanical reset option

Make sure that your operating instructions inform the user about how to avoid damaging the ER system:

|   | NOTICE   |
|---|--|
|  | <p>The release lever for the ER mechanical reset function must be pressed down completely during the entire resetting movement. If the lever is not completely pressed down, the clutch mechanism may engage or partially engage during the reset motion. This can wear out the mechanics and result in premature system malfunctions.</p> |

|   | NOTICE   |
|---|--|
|  | <p>The ER system is designed to be used in the push direction of the drive. When actuating the ER, make sure that the manual adjustment motion takes place in the proper direction. Otherwise the ER mechanism could be damaged.</p> |

- Depending on the implementation of your end product, it may be possible to lower the product simply using gravity. If your end product does not lower under its own weight, then you should apply gentle pressure on it to help it go down.

### 7.2.1 Implementing the manual release mechanism for the optional ER mechanical reset function without Bowden cable connection

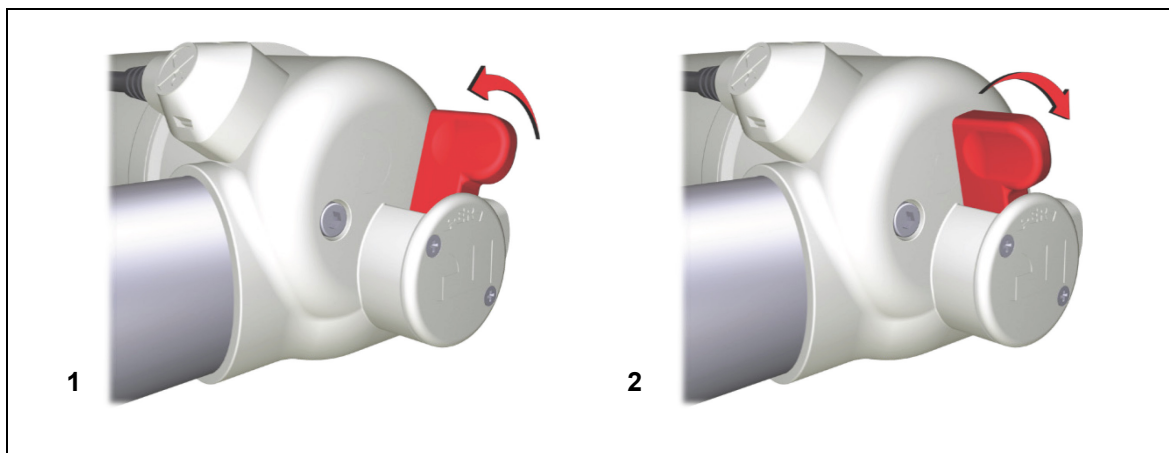






Figure 29 Manual release for the ER mechanical reset function (optional)

|   |   |
|---|---|
|   |  <b>CAUTION</b>   |
|  | <b>Danger of getting stuck or jammed!</b><br>Depending on your end product, there may be a danger of getting stuck or jammed while the release function is operating. Be sure that your operating instructions inform the user about all possible dangers related to getting stuck or jammed in your end product. |

- 1 Press the release lever to the left in order to manually trigger the ER reset function. As long as the release lever is pressed, the reset function is enabled and the end product is not locked.
- 2 Let go of the release lever to end the reset function. The drive re-engages and the end product is ready for use.

## 8. Troubleshooting

This chapter describes troubleshooting methods for fixing problems. If you experience an error that is not listed in this table, please contact your supplier.

|   |   |
|---|---|
|  |  <b>CAUTION</b>                |
|   | Only qualified specialists who have received electrician training should carry out troubleshooting and repairs. |

| Problem   | Possible cause   | Solution   |
|---|--|--|
| The handset or drive system is not functioning.   | There is no mains supply voltage.  | Connect the mains power.   |
|   | The hand switch or drive system is defective.  | Please contact your supplier or sales agent.   |
| The drive is suddenly not capable of movement.  | Possibly the thermal circuit breaker on the transformer has been triggered.  | The drive system should be allowed to pause for 20 to 30 minutes.  |
|   | The thermal fuse on the transformer may have been triggered.   | Please contact your supplier or sales agent.   |
|   | The unit's fuse may have been triggered.   | Please contact your supplier or sales agent.   |
|   | There is no mains supply voltage.  | Connect the mains power.   |
|   | A lead-in connection has been interrupted (mains power, hand switch or auxiliary drive).                           | Check the cables and reinsert them, if required.   |
| GQR / ER<br>The motor is running but there is no adjustment motion.                                     | The Bowden cable is not in its home position. There is too much tension on the Bowden cable.                       | Adjust the Bowden cable.   |
| GQR<br>The motor is running but there is no adjustment motion.<br>or:<br>The drive is resetting itself. | The override function of the drive has been used continuously for adjusting the end product.                       | Replace the drive. (The internal override function on the GQR is malfunctioning. It is a protective function and not suitable for making adjustments.) |
| The drive or the GQR function no longer functions after several cycles.                                 | The mechanical end stops in your end product are missing or do not fit within the drive's installation dimensions. | Check the end stops.<br>Do the end stops fit within the installation dimensions of the drive? Redesign the end stops if necessary.                     |

## 9. Maintenance

- You should only use spare parts which have been manufactured or approved by DewertOkin. Only these parts will guarantee a sufficient level of safety.

### 9.1 Maintenance

| Type of check  | Explanation  | Time interval   |
|--|--|---|
| Check the function and safety of the electrical system.  | A qualified electrician should carry out this inspection. (Refer to the "Electrical connection" section in the "Installation" Chapter.)                      | Periodic inspections can be carried out at intervals based on the risk assessment which you conduct for your end product. |
| Look over the housing periodically for any signs of damage.  | Check the housing for breaks or cracks. The IP-class protection will be impaired by any breakage or cracks.  | At least every six months.  |
| Look over the plug-in connections and electrical access points for signs of damage.                                | Check that all electrical cables and connections are firmly seated and correctly positioned.   | At least every six months.  |
| Look over the cables for any signs of damage.  | Check the connecting cables for pinching or shearing. Also check the strain relief and kink protections mechanisms, in particular after any mechanical load. | At least every six months.  |
| Periodic functional test of the end switches.  | Move the drive to the end positions in order to test the end switches.   | At least every six months.  |
| Periodic check of the ER mechanical reset and GQR clevis quick release functions.                                  | Check the ER mechanical reset and GQR clevis quick release by using the Bowden cable.  | At least every six months.  |
| Periodic visual inspections, cleaning, and then a mechanical-reset functionality test (clevis quick release, GQR). | Check to see if the GQR clevis quick release is dirty. Clean and check function again.   | At least every six months.  |
| Visually inspect the seals for the GQR clevis quick release.   | Check that the seals on the GQR clevis quick release are firmly seated and complete.   | At least every six months.  |

## 9.2 Cleaning and care

The MEGAMAT MCZ drive was designed so that it would be easy to clean. Its smooth surfaces simplify the cleaning process.

**NOTICE**

Never clean the drive in an automated washing system or with a high-pressure cleaner. Do not allow fluids to penetrate the drive. Damage to the system could result.

- 1 Always disconnect the mains power plug of the control unit or double drive (and the battery plug if present) before you start to clean the unit!
- 2 Clean the MEGAMAT MCZ drive using a moist cloth while it is in its retracted position.
- 3 Make sure that you do not damage the drive's connecting cable.

**NOTICE**

Do not use a cleanser that contains benzene, alcohol or similar solvents.

## 10. Disposal

### 10.1 Packaging material

The packaging material should be sorted into recyclable components and then disposed of in accordance with the appropriate national environmental regulations (in Germany according to the recycling law KrWG from 01.06.2012; internationally according to the EU Directive 2008/98/EC (Waste Framework Directive WFD as of 12.12.2008)).

### 10.2 Drive components

The MEGAMAT MCZ drive consists of electronic components, cables and metal and plastic parts. You should observe all corresponding national and regional environmental regulations when disposing of the MEGAMAT MCZ drive.

The disposal of the product is regulated in Germany by Elektro-G, internationally by the EU Directive 2012/19/EC (WEEE), or by any applicable national laws and regulations.



The MEGAMAT MCZ drive should not be disposed of with normal household waste!

## Einbauerklärung

nach Anhang II der EU-Maschinenrichtlinie  
2006/42/EG

Der Hersteller

## Declaration of Incorporation

*According to Appendix II of the EU Machinery  
Directive 2006/42/EC*

*The manufacturer:*

DewertOkin GmbH  
Weststraße 1  
32278 Kirchlingern  
Deutschland - Germany

erklärt hiermit, dass nachstehend beschriebene  
unvollständigen Maschinen

*declares that the incomplete machines described  
below*

### **MEGAMAT MCZ MEGAMAT MC(n)<sup>1)</sup>**

die folgenden grundlegenden Anforderungen der  
Richtlinie Maschinen (2006/42/EG) erfüllt:

*complies with the following basic requirements of the  
Machinery Directive (2006/42/EC):*

Abschnitt:

*Sections:*

1.1.3; 1.3.3; 1.3.4; 1.3.7; 1.5.1; 1.5.2; 1.5.5; 1.5.6; 1.5.7; 1.5.8; 1.5.9; 1.5.10; 1.5.13

Die unvollständige Maschine darf erst dann in Be-  
trieb genommen werden, wenn festgestellt wurde,  
dass die Maschine, in die die unvollständige Ma-  
schine eingebaut werden soll, den Bestimmungen  
der Richtlinie Maschinen (2006/42/EG) entspricht.

*You may only operate this incomplete machine after  
you have confirmed that the end product (into which  
this machine will be installed) complies with the  
Machinery Directive 2006/42/EC.*

Der Hersteller verpflichtet sich, die speziellen Unter-  
lagen zur unvollständigen Maschine einzelstaatli-  
chen Stellen auf begründetes Verlangen elektronisch  
zu übermitteln. Die zur Maschine gehörenden  
speziellen technischen Unterlagen nach Anhang VII  
Teil B wurden erstellt.

*On reasonable request, the manufacturer is obliged  
to send the special documentation accompanying the  
partially completed machinery in electronic form to  
the appropriate national institution. The special  
technical documents corresponding to the machine  
have been created according to Appendix VII, part B.*

Für die Zusammenstellung der technischen Unter-  
lagen ist bevollmächtigt: DewertOkin GmbH  
Weststraße 1  
32278 Kirchlingern  
Tel.: 05223 979-0  
Deutschland - Germany

*For preparation of the technical documentation is  
authorized:* DewertOkin GmbH  
Weststraße 1  
32278 Kirchlingern  
Tel.: 05223 979-0  
Deutschland - Germany



Kirchlingern, Germany 25 November 2019

Dr.-Ing. Josef G. Groß  
Geschäftsführer / Managing Director

<sup>1)</sup> (n) steht für/stands for 1 – 5

## EG-Konformitätserklärung

Nach Anhang IV der EMV-Richtlinie 2014/30/EU

Nach Anhang IV der EU-Niederspannungsrichtlinie 2014/35/EU

Nach Anhang VI der RoHS-Richtlinie 2011/65/EU  
(inkl. Delegierte Richtlinie (EU) 2015/863)

Der Hersteller

## EU Declaration of Conformity

*In compliance with Appendix IV of the EMC-Directive 2014/30/EU*

*In compliance with Appendix IV of the LVD-Directive 2014/35/EU*

*In compliance with Appendix VI of the EU RoHS Directive 2011/65/EU  
(incl. Commission delegated Directive (EU) 2015/863)*

*The manufacturer*

DewertOkin GmbH  
Weststraße 1  
32278 Kirchlegern  
Deutschland - Germany

erklärt hiermit, dass das Produkt

*declares that the following product*

### **MEGAMAT MCZ MEGAMAT MC(n)<sup>1)</sup>**

**mit DewertOkin Steuerung / with DewertOkin control unit**

die Anforderungen folgender EG-Richtlinien erfüllt:

*meets the requirements of the following EU directives:*

**Richtlinie über elektromagnetische Verträglichkeit  
2014/30/EU**

***Electromagnetic Compatibility Directive 2014/30/EU***

**Niederspannungsrichtlinie 2014/35/EU**

***Low Voltage Directive 2014/35/EU***

**DELEGIERTE RICHTLINIE (EU) 2015/863 DER  
KOMMISSION vom 31. März 2015 zur Änderung von  
Anhang II der Richtlinie 2011/65/EU des Euro-  
päischen Parlaments und des Rates hinsichtlich der  
Liste der Stoffe, die Beschränkungen unterliegen.**

***COMMISSION DELEGATED DIRECTIVE (EU)  
2015/863 of 31 March 2015 amending Annex II to  
Directive 2011/65/EU of the European Parliament  
and of the Council as regards the list of restricted  
substances.***

Angewendete Normen

*Applied standards:*

- EN 60335-1:2012/A11:2014
- EN 55014-1:2006/A1:2009/A2:2011
- EN 55014-2:1997/A1:2001/A2:2008
- EN 61000-3-2:2014
- EN 61000-3-3:2013
- EN 62233:2008

Konstruktive Änderungen, die Auswirkungen auf die in der Montageanleitung angegebenen technischen Daten und den bestimmungsgemäßen Gebrauch haben, das Produkt also wesentlich verändern, machen diese Konformitätserklärung ungültig!

*This declaration of conformity is no longer valid if constructional changes are made which significantly change the drive system (i.e., which influence the technical specifications found in the instructions or the intended use)!*



Kirchlegern, Germany 25 November 2019

Dr.-Ing. Josef G. Groß  
Geschäftsführer / Managing Director

<sup>1)</sup> (n) steht für/stands for 1 – 5



## Additional information

### MEGAMAT MCZ drive system

The following standards and norms were used in the versions with at least IPX4 and higher in according to

- EN 60601-1:2006 + A1:2013, IEC 60601-1:2005 + A1:2012 (short description: Edition 3.1), Medical electrical equipment.
- EN 60601-1-2:2015, IEC 60601-2-2:2014 (short description: Edition 4.0), EMC

|   |  |
|---|--|
| IEC/EN60601-1, Section 4                    | General requirements   |
| IEC/EN60601-1, Section 6                    | Classification   |
| IEC/EN60601-1, Section 7.1                  | Labelling – general  |
| IEC/EN60601-1, Section 7.2                  | Labelling – inscriptions   |
| IEC/EN60601-1, Abschnitt 8                  | Protection against electrical danger                             |
| IEC/EN60601-1, Section 11.1                 | Overheating protection   |
| IEC/EN60601-1, Section 11.2                 | Fire prevention  |
| IEC/EN60601-1, Section 11.3                 | Design requirements for fire-resistant housing                   |
| IEC/EN60601-1, Section 13                   | Dangerous situations and error conditions                        |
| IEC/EN60601-1, Section 16.6                 | Leakage current  |
| IEC/EN60601-1, Section 17                   | Electromagnetic compatibility                                    |
| IEC/EN60601-2-52,<br>Section 201.11.6.5.101 | Protection against water ingress: only applied for at least IPX4 |
| IEC/EN60601-2-52,<br>Section 201.9.8.3.2    | Static load  |

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ID No.: 80195