Technical information

Retrofit kit DISCcontrol

Retrofit kit for operation of disc rotor motors with ZAdyn4CS

1 Safety instructions

- Persons entrusted with the installation, commissioning, maintenance and servicing in connection with the device must have the corresponding qualifications and skills for these jobs.
- Based on their training, apprenticeship and experience as well as knowledge of the relevant standards, they must be able to judge the work transferred to them and be able to recognize possible hazards.
- During all maintenance and service work the installation must be de-energised and protected against unintentional restart.
- Work on electric components may only be carried out by trained electricians or by persons instructed in electricity under the supervision of an electrician in accordance with electrical engineering regulations.
- A second person must always be present when working on energized parts or lines who disconnects in case of emergency.
- Inspect electrical equipment periodically: retighten loose connections – immediately replace damaged lines and cables.
- Always keep switch cabinets and all electrical supply facilities locked. Access is only allowed for authorized persons using a key or special tool.

Danger!
It is forbidden to carry out work on the frequency inverter when it is live.
Even after disconnection, the DC-link (terminals X2: +DC / X2:-DC) are still live.
Through use of capacitors, danger of death exists even after switching off the device through directly touching the energized parts or due to parts that have become energized due to faults.
Wait at least **3 minutes** before working on the device.
The safe isolation from the supply must be checked using a **two-pole** voltage detector.

2 Mechanical and electrical installation of the ZAdyn4CS

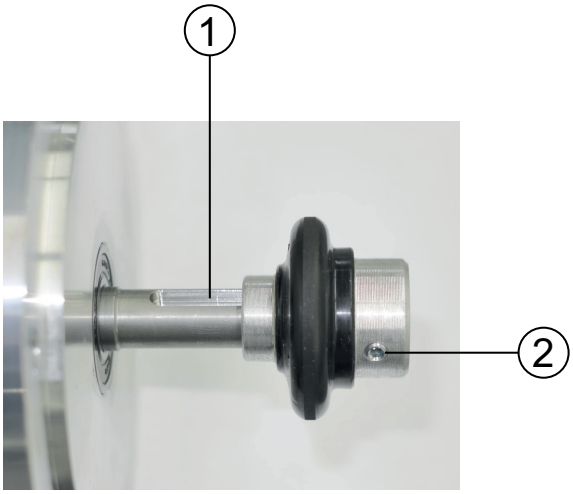
For mechanical and electrical installation of the ZAdyn4C, see the chapters "Mechanical Installation" and "Electrical Installation" in the ZAdyn4C operating instructions.

3 Enable load-free operation

▷ Load-free operation of the motor is necessary for start-up. Remove the cables from the traction sheave for this.

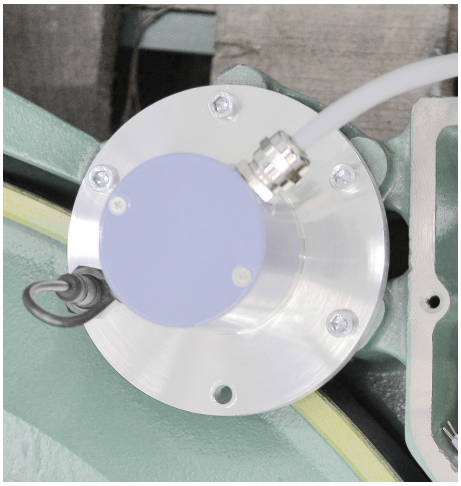
4 Install rotary encoder

▷ Remove tacho generator.
▷ If it is usable, remove the friction wheel and screw it onto the rotary encoder. Make sure that the screw of the friction wheel is offset to the fitting key groove in the rotary encoder shaft (see fig.). If the existing friction wheel is worn, use a new friction wheel (Part no. 00167177).

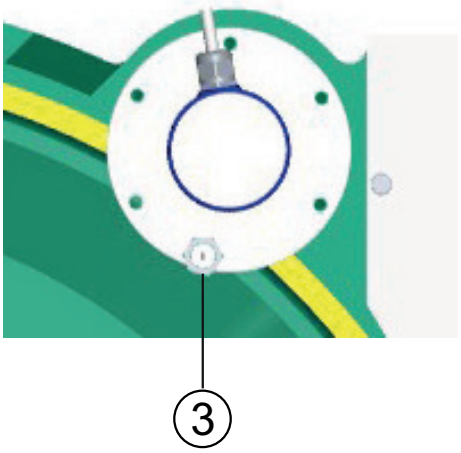


Mounting of friction wheel
1 Fitting key groove
2 Screw of the friction wheel

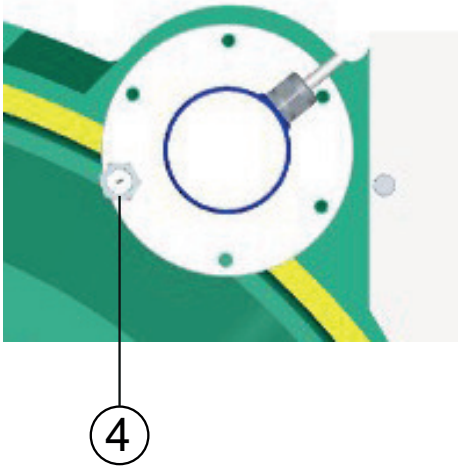
▷ Mount rotary encoder on the flange with 4 screws and tighten with a torque of 10 Nm (see fig.). See the illustrations below for mounting position.



Rotary encoder mounted



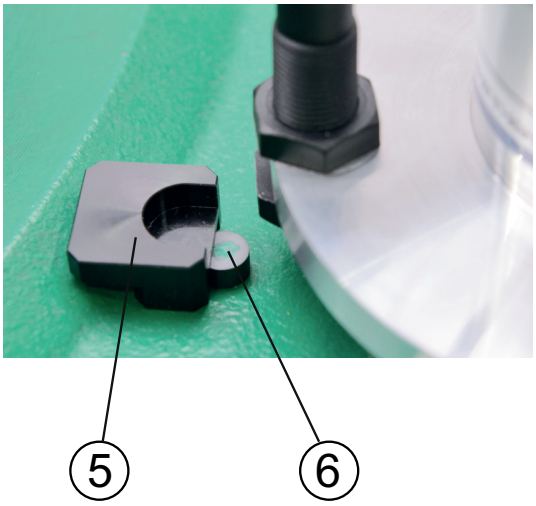
Mounting position rotary encoder for motor type MX06
3 Hall sensor



Mounting position rotary encoder for motor type MX10
4 Hall sensor

5 Position Hall sensor

▷ Loosen both nuts of the Hall sensor.
▷ Push magnet adhesion aid (5) and magnet (6) under the Hall sensor.
▷ Set screw-on aid of the Hall sensor by turning the lower nut. The sensor surface must touch the surface of the magnet adhesion aid.



▷ Tighten the upper nut hand-tight when the spacing has been set correctly.
▷ Connect rotary encoder to ZAdyn with the encoder cable L-GL-05-YY-ZA-EXT or L-GL-10-YY-ZA-EXT. Screw the plugs of the cables together.

6 Parameterisation of the ZAdyn4CS

▷ Switch on the system.
▷ Parameterise ZAdyn4CS as follows.

Parameterisation of the ZAdyn4CS

```
 ZAdyn4C
->Startup
 Statistics
 Memory Card
```

Select menu **"Startup"**

```
Startup
↳LCD     Deutsch
  ↳      English
Sprache - Language
```

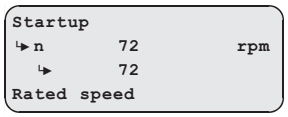
Select parameter **"LCD"**
Choose language
The languages German and English are integrated as standard.A third language can be loaded with the memory card.

```
Startup
↳USR_LEV Basic
  ↳      Advanced
User level
```

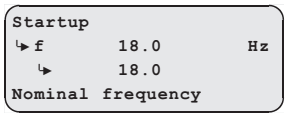
Select parameter **"USR_LEV"**
The level which is active after the controller start can be set by the parameter USR_LEV.

```
Startup
↳MOT_TYP MX06
  ↳      MX06
Motor
```

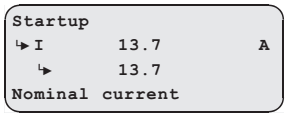
Select parameter **"MOT_TYP"**
Enter the operated motor type



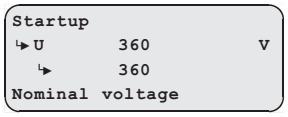
Select parameter **"n"**
Enter nominal speed of the motor



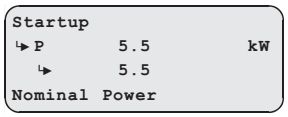
Select parameter **"f"**
Enter nominal frequency of the motor



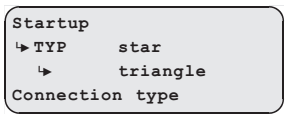
Select parameter **"I"**
Enter nominal current of the motor



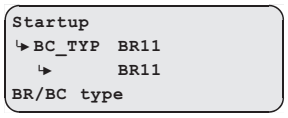
Select parameter **"U"**
Enter nominal voltage of the motor



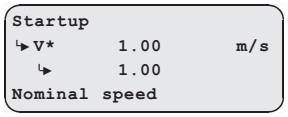
Select parameter **"P"**
Enter nominal power of the motor



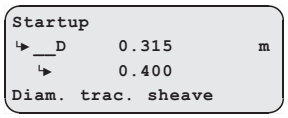
Select parameter **"TYP"**
Choose connection type of the motor



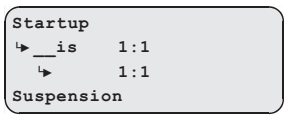
Select parameter **"BC_TYP"**
Enter the used brake resistor or brake chopper



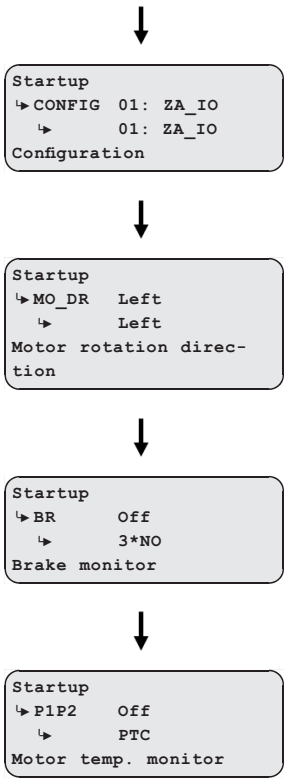
Select parameter **"V*"**
Enter the installation rated speed



Select parameter **"__D"**
Enter the diameter of the traction sheave



Select parameter **"__is"**
Enter the installation's type of suspension



Select parameter **"CONFIG"**
Configuration of the digital inputs according to the used control system and type of communication

Select parameter **"MO_DR"**
Changing the rotating direction of the motor
It must be observed the with triggering the input RV1 the cabin drives upwards

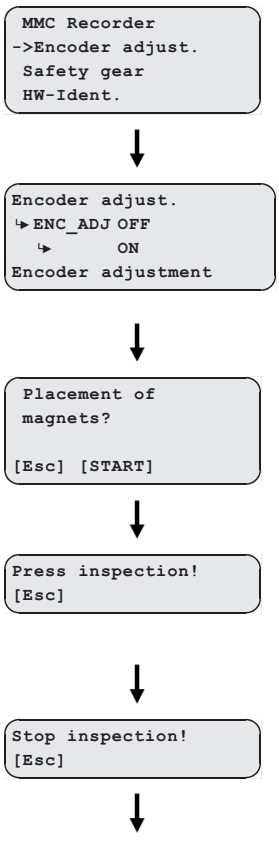
Select parameter **"BR"**
Definition of the brake monitoring

Select parameter **"P1P2"**
Motor temperature monitoring

7 Magnet adhesion process

▷ Clean the adhesive surface on the traction sheave (e.g. with white spirit).

Carry out the magnet adhesion process



Select menu **Encoder adjustment**

Select parameter **"ENC_ADJ"**
Switch on encoder adjustment with "ENC_ADJ=ON"

Start magnet adhesion process with **[START]**

Keep the inspection run push-button pressed.

The middle of the nearest pole pair is moved to.

Release inspection run push-button

```
 Fix magnet!
 When done...
...press inspection!
[Esc]
```

Stick on magnet as described in "Sticking the magnets".

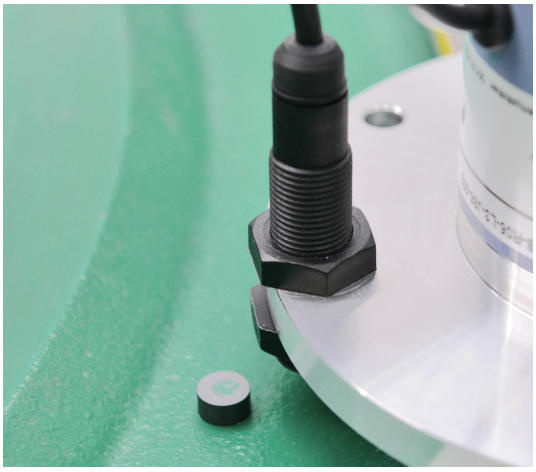
Check the direction of rotation of the motor after setting the first magnet: The direction of rotation must be to the right (clockwise) when looking at the traction sheave from the front. Otherwise switch two motor cables and start the adhesion process again.

Press the button for the inspection run and keep it pressed to move to the middle of the next pole pair. Then follow the instructions on the ZApad and release the button for the inspection run and set the magnet. Repeat this procedure for all pole pairs. The encoder check is complete when all magnets have been stuck.

Sticking the magnets

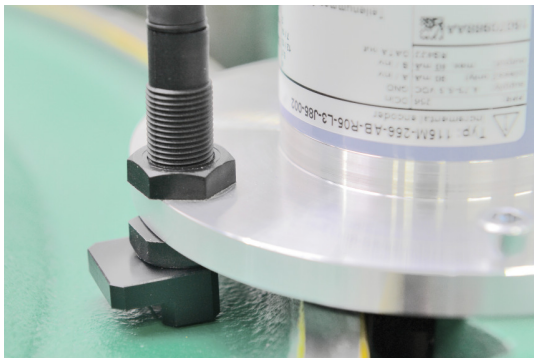
▷ Position the magnet about 1cm below the Hall sensor.

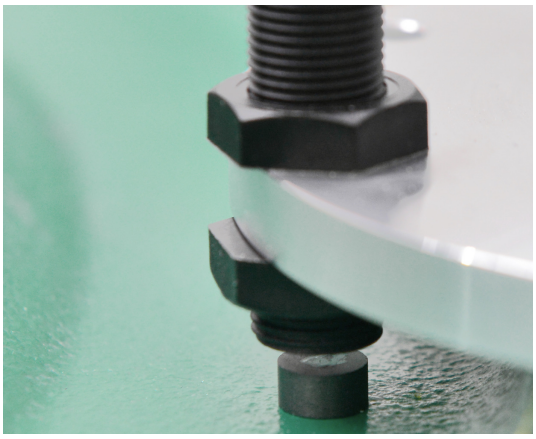
The green point on the magnet must be visible!



▷ Apply glue to the traction sheave under the Hall sensor (amount about the size of a pin head).

▷ Push magnet with magnet adhesion aid under the Hall sensor.





Checking the number of pole pairs
After the magnet adhesion process, check whether the number of magnets matches the number of pole pairs of the motor:

The magnet adhesion process must be ended after a 360° revolution of the traction sheave. The number of stuck magnets must be the same as the number of pole pairs in the parameter **Motor name plate/p**.

```
Motor name plate
 f 13.3 Hz
->p 10
 I 17.0 A
```

If not, the number of pole pairs calculated based on the motor data does not match the actual number of pole pairs.
In this case the nominal frequency of the motor in the parameter **Motor name plate/f** must be adapted so that the calculated number of pole pairs is equal to the number of stuck magnets (= actual number of pole pairs).

Example:
Motor name plate data:
f=19 Hz
n=95 1/min
-> p=12

Only 8 magnets can be stuck in a 360° revolution of the traction sheave. This means that the motor only has 8 pole pairs.
-> The motor data must be adapted, e.g.:

$$\text{Polpaarzahl} = \frac{\text{Frequenz} * 60}{\text{Drehzahl}}$$

$$\text{Frequenz} = \frac{\text{Drehzahl} * \text{Polpaarzahl}}{60}$$

$$f = \frac{n * p}{60} = \frac{95 * 8}{60} = 12{,}7\ \text{Hz}$$

old:

```
Motor name plate
 n 95 rpm
->f 19.0 Hz
 p 12
```

new:

```
Motor name plate
 n 95 rpm
->f 12.7 Hz
 p 8
```

8 Function test

Warning!
Uncontrolled rotor movement possible in the first start-up attempt
If the ZAdyn4CS was switched off and the rotor moved in the meantime, uncontrolled rotor movements and therefore cabin movements are possible at the first start-up attempt. This may result in medium or slight physical injury.
▷ No persons may stand in on on the elevator cabin during the first start-up attempt.

▷ Perform function test in no-load. Set parameter **Controller/SPD_KP=0.2** for this.

```
Controller
↳SPD_KP  1.00
  ↳      0.20
SPD_REG: Base gain-factor
```

▷ Check direction of rotation. The direction of travel specified by the travel command and the motor's direction of rotation must match.

9 Adaptation of brake opening time

▷ Determine the real brake opening time for several travels. It is displayed in the parameter **Start/T2_real**.

```
Start
 T_2     1.0 s
->T2_real 0.5 s
 T_3     2.0 s
```

▷ Form the average value from the determined real brake opening times.
▷ Set the parameter **Start/T2=average value + 200 ms**.

```
Start
↳T_2      1.0s
  ↳       0.7s
Mech. brake open time
```

10 Travel

Warning!
Uncontrolled rotor movement possible in the first start-up attempt
If the ZAdyn4CS was switched off and the rotor moved in the meantime, uncontrolled rotor movements and therefore cabin movements are possible at the first start-up attempt. This may result in medium or slight physical injury.
▷ No persons may stand in on on the elevator cabin during the first start-up attempt.

▷ Fit cables.
▷ Set the parameter **Controller/SPD_KP=1.0**.
▷ Perform function test under load.
▷ Optimise start-up behaviour if necessary.

Optimise start-up behaviour

```
Startup
↳SPD_KP  1.00
  ↳      1.00
Controller basic gain
```

Select parameter **"SPD_KP"**
Multiplication factor to modify the calculated basic amplification SPD_C

```
Startup
↳K_START 1.0
  ↳      1.0
Control vers. at start
```

Select parameter **"K_START"**
Start gain
Multiplicative factor for the parameter "Controller/SPD_KP"
Increasing the PI controller during the start-up

11 Brake monitoring

Since the drive has no micro-switch monitoring, a cyclic brake test must be performed by the elevator control system. This can be done, for example, by controlled opening of the brake at standstill as well as monitoring of the fault indication output of the ZAdyn4CS. As soon as the ZAdyn4CS detects a movement, an appropriate fault indication is output.

12 Position change with system switched off

If the position of the rotor is changed when the system is switched off or during a power failure, this is unknown after switching back on. There might therefore be uncontrolled movement of the cabin during the first travel. The ZAdyn detects this after an angle of maximum 360°/number of pole pairs and ends the travel. The maximum cabin travel is calculated as follows:

$$s_{max} = \frac{\pi * \text{Treibscheibendurchmesser}}{\text{Polpaarzahl} * \text{Aufhängung}}$$

This gives, for example, in a MX06 with a traction sheave diameter of 40 cm and 8 pole pairs as well as 2:1-mounting, a cabin movement of 8 cm.

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