

Operating and Assembly Instructions

Electronic overspeed switch EGS 2

Straightforward monitoring of overspeed or zero speed detection

**Read the Operating and Assembly Instructions prior to assembly, starting installation and handling!
Keep for future reference!**

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UL certificates can be requested from us.

An overview of our UL devices can be found at the following link:

<https://iq.ulprospector.com/info>

UL File Number: E351535

| Type | UL model No. |
|-------|---------------|
| EGS 2 | EGS 2 AK-XXXX |

Subject to errors and changes due to technical improvements.

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1 General

1.1 Information about the Operating and Assembly Instructions

These Operating and Assembly Instructions provide important instructions for working with the device. They must be carefully read prior to starting all tasks, and the instructions contained herein must be followed.

In addition, applicable local regulations for the prevention of industrial accidents and general safety regulations must be complied with.

1.2 Scope of delivery

Electronic overspeed switch EGS 2, Operating and Assembly Instructions.

1.3 Explanation of symbols

Warnings are indicated by symbols in these Operating and Assembly Instructions. The warnings are introduced by signal words that express the scope of the hazard.

The warnings must be strictly heeded; you must act prudently to prevent accidents, personal injury, and property damage.



WARNING!

Indicates a possibly dangerous situation that can result in death or serious injury if it is not avoided.



CAUTION!

Indicates a possibly dangerous situation that can result in minor injury if it is not avoided.



CAUTION!

Indicates a possibly dangerous situation that can result in material damage if it is not avoided.



NOTES!

Indicates useful tips and recommendations as well as information for efficient and trouble-free operation.



NOTES!

Do not use a hammer or similar tool when installing the device due to the risk of damage occurring to the bearings or coupling!



DANGER!

Life-threatening danger due to electric shock!

Indicates a life-threatening situation due to electric shock. If the safety instructions are not complied with there is danger of serious injury or death. The work that must be executed should only be performed by a qualified electrician.

1.4 Disclaimer

All information and instructions in these Operating and Assembly Instructions have been provided under due consideration of applicable guidelines, as well as our many years of experience.

The manufacturer assumes no liability for damages due to:

- Failure to follow the instructions in the Operating and Assembly Instructions
- Non-intended use
- Deployment of untrained personnel
- Opening of the device or conversions of the device

In all other aspects the obligations agreed in the delivery contract as well as the delivery conditions of the manufacturer apply.

1.5 Copyright



NOTES!

Content information, text, drawings, graphics, and other representations are protected by copyright and are subject to commercial property rights.

It is strictly forbidden to make copies of any kind or by any means for any purpose other than in conjunction with using the device without the prior written agreement of the manufacturer. Any copyright infringements will be prosecuted.

1.6 Guarantee terms

The guarantee terms are provided in the manufacturer's terms and conditions.

1.7 Customer service

For technical information personnel is available that can be contacted by telephone, fax or email. See manufacturer's address on page 2.

2 Safety



DANGER!

This section provides an overview of all the important safety aspects that ensure protection of personnel, as well as safe and trouble-free device operation.

If these safety instructions are not complied with significant hazard can occur.

2.1 Responsibility of the owner

The device is used in commercial applications. Consequently the owner of the device is subject to the legal occupational safety obligations and subject to the safety, accident prevention and environmental protection regulations that are applicable for the device's area of implementation.

2.2 Personnel

Installation and commissioning as well as disassembly routines must be carried out by skilled technical staff only.

2.3 Intended use

The device has been designed and constructed exclusively for the intended use described here.

Series EGS 2 electronic overspeed switches are used for speed monitoring, for instance of electrical and mechanical drives, hoisting gear, and conveying machines.

The electronic overspeed switch EGS 2 is a overspeed switch, which generates a switching signal for a superior control system. This is realized with opening of a switch contact. As an alternative to this function, the device can also be used for zero speed detection. Not in addition.

Claims of any type due to damage arising from non-intended use are excluded; the owner bears sole responsibility for non-intended use.

For UL and CSA:

For the use in NFPA 79 applications only.

2.4 Improper use

Do not use the device in potentially explosive areas.

The device must not be subjected to mechanical loads in addition to its own weight and unavoidable vibration and shock loads that arise during normal operations.

Examples for non-permitted mechanical loads (incomplete list):

- Fastening transport or lifting tackle to the device, for example a crane hook to lift a motor.
- Fastening packaging components to the device, for example ratchet straps, tarpaulins etc.
- Using the device as a step, for example by people to climb onto a motor.

2.5 Personal protective equipment

For tasks such as assembly, disassembly or commissioning the use of personal protective equipment such as safety footwear and protective work clothing is required.

The regulations specified by the owner and that are locally specified apply.

2.6 Special dangers

Residual risks that have been determined based on a risk assessment are cited below.

2.6.1 Electrical current



DANGER!

Life-threatening danger due to electrical shock!

There is an imminent life-threatening hazard if live parts are touched. Damage to insulation or to specific components can pose a life-threatening hazard.

Therefore:

Immediately switch off the device and have it repaired if there is damage to the insulation of the power supply.

De-energize the electrical equipment and ensure that all components are connected for all tasks on the electrical equipment.

Keep moisture away from live parts. Moisture can cause short circuits.

2.6.2 Rotating shafts / hot surfaces



WARNING!

Danger of injury due to rotating shafts and hot surfaces!

Touching rotating shafts can cause serious injuries.

Therefore:

Do not reach into moving parts/shafts or handle moving parts/shafts during operation. Close to protect from injury all access openings in flanges with the corresponding plug screw, and provided you exposed rotating components with protective covers.

Do not open covers during operation. Prior to opening the covers ensure that all parts have come to a zero speed.

The encoder can become hot during prolonged use.

In case of contact risk of burns is existing.

2.6.3 Safeguarding against restart



DANGER!

Life-threatening danger if restarted without authorization!

When correcting faults there is danger of the power supply being switched on without authorization.

This poses a life-threatening hazard for persons in the danger zone.

Therefore:

Prior to starting work, switch off the system and safeguard it from being switched on again.

3 Technical Data

3.1 Type plate

Type plate example:



The type plate is located on the outside of the housing and contains the following information:

| Englisch | Deutsch |
|---------------------------------------|---------------------------------------|
| Manufacturer, address | Hersteller, Anschrift |
| Type: Overspeed switch | Typ: Grenzdrehzahlschalter |
| Year of manufacture | Baujahr |
| CE mark | CE-Kennzeichnung |
| Item (ID) | Artikel (ID) |
| Serial number (S/N) | Seriennummer (S/N) |
| Degree of protection | Schutzart |
| Supply voltage | Versorgungsspannung |
| Max. speed | Max. Drehzahl |
| Switching speed | Schaltdrehzahl |
| Certification (only encoders with UL) | Zertifizierung (nur Drehgeber mit UL) |
| Switching voltage / switching current | Schaltspannung / Schaltstrom |
| QR-Code | QR-Code |

3.2 Type code

| | | | |
|-----------------------------|-----|---|----|
| | EGS | 2 | AK |
| Electronic overspeed switch | | | |
| Series | | | |
| Connection | | | |
| AK = Axial terminal box | | | |

3.3 Electrical and mechanical data

| Connection data | | | |
|---------------------------------------|---|------------------------------|---------------------------------|
| Supply voltage | 12 V ... 30 V DC For UL and CSA Class 2 supplied | | |
| No load-current | approx. 50 mA at 24 V | | |
| Connection | Spring-cage terminal strip type Phoenix ZFKDS 1,5-W-5,08 (0,25 mm ² - 1,5 mm ²) | | |
| Device temperature range | -25°C ... + 85°C | | |
| Degree of protection acc.DIN EN 60529 | Sealing | Rotor moment of inertia | Breakaway torque |
| IP 66 (UL/CSA Type 1) | with radial shaft seal | approx. 100 gcm ² | approx. 3 Ncm |
| Vibration resistance | DIN EN 60068-2-6 / IEC 68-2-6 (10 ... 2000 Hz) | | 20 g (=200 m/s ²) |
| Shock resistance | DIN EN 60068-2-27 / IEC 68-2-27 (6 ms) | | 200 g (=2000 m/s ²) |
| Max. encoder shaft load | F _{a, max.} (axial) = 100 N F _{r, max.} (radial) = 120 N | | |
| Max. speed: AK solid shaft | 7000 rpm | | |
| Shaft dimensions | 11j6 x 30 mm | | |
| Weight | approx. 2 kg | | |

4 Switching speed range

The electronic overspeed switch EGS 2 has a galvanically insulated switching output. The switching function is realized with a semiconductor, the switching speed is set in our factory (switching hysteresis 10%). Possible values for switching speed is any whole number between 1 and 5400 rpm. If the set switching speed is exceeded, the switch opens.

It is recommended to save the switch circuit against an overcurrent with a fuse (0,5A).

| Specification | Value |
|------------------------------------|---|
| Switching speed range, factory-set | AK with solid shaft max. 6300 rpm AK with hollow shaft max. 5400 rpm |
| Deviation from switch: | Accuracy of measurement: 2% Switching time $T_{sw} < 3ms$ |
| Switch data | 0...30V DC/max 500mA Max. voltage drop at closed switch: 0,7V |

4.1 Zero speed monitoring

The zero speed monitoring is a function for the control of rotary movements. This function is available as an alternative to overspeed monitoring, not in addition. The galvanically isolated switching contact changes the state as soon as the shaft leaves the zero speed.

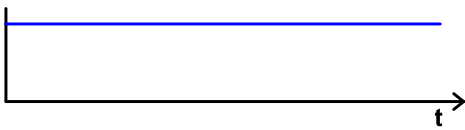
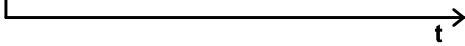

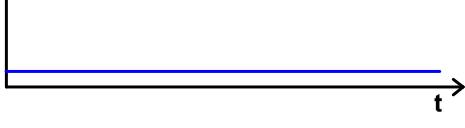


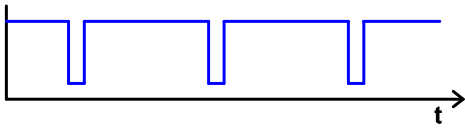
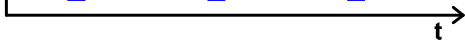
Functionality:

At a speed of less than 0.25 rpm the zero speed monitoring is activated and the switching contacting contact is closed. When the zero speed monitoring is activated, the current position value is stored and monitored for possible changes in the angle of rotation. As a result, very slow or creeping wave movements can also be detected. In the speed range from 0 to 0.25 rpm, the switching contact opens for approx. 200 - 400 milliseconds after a change in the angular position of $\pm 5^\circ$. The possible switching contact states are shown in the following table.

The switching contact is closed at zero speed ($n = 0$ rpm).

For rotary movement ($n \geq 0.25$ rpm), the switching contact is open.

At a creep motion ($0 < n < 0.25$ rpm), the switching contact opens as soon as a change in the angle of rotation of more than $\pm 5^\circ$. After 200 to 400 ms, the switching contact is closed again as long as the speed is less than 0.25 rpm.

| Rotation speed n [rpm] | State | Switching contact |
|--------------------------------|---|--|
| n = 0 (zero speed) | On  Off  |  |
| n ≥ 0,25 (rotary motion) | On  Off  |  |
| 0 < n < 0,25 (creep motion) | On  Off  | switching contact opens for approx. 200 - 400 milliseconds after a change in the angular position of $\pm 5^\circ$ |

5 Transport, packaging and storage

5.1 Safety instructions for transport



CAUTION!

Material damage caused by improper transport!

Observe the symbols and information on the packaging:

- Do not throw - risk of breakage
- Keep dry
- Do not expose to heat above 40 °C or direct sunlight.

5.2 Goods inward inspection

Check the delivery immediately upon receipt for transit damage or short delivery.

Inform the carrier immediately on receipt if you determine that damage has occurred during transit (take photos as proof).

5.3 Packaging / disposal

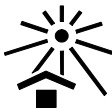
The packaging is not taken back and must be disposed of in accordance with the respective statutory regulations and local guidelines.

5.4 Storage of packages (devices)



Keep dry

Keep packages dry and free from dust; protect from moisture.



Protect against heat

Protect packages from heat above 40 °C and direct sunlight.

If you intend to store the device for a longer period of time (> 6 months) we recommend you use protective packaging (with desiccant).



NOTES!

Turn the shaft of the device every 6 month to prevent the bearing grease solidifying!

6 Installation and commissioning

6.1 Safety instructions



WARNING!

Observe the safety instructions contained in **Chapter 2** when dismantling the device!

Personnel

Installation and commissioning must be carried out by skilled technical staff only.

6.2 Technical information



NOTES!

Do not use a hammer or similar tool when installing the device due to the risk of damage occurring to the bearings or coupling!

Ambient temperature

The max. permissible ambient temperature depends on the speed and degree of protection of the device, the signal frequency, the length of the signal cable and the place of installation (please refer to Chapter 3.3).

Degree of protection

To fulfil degree of protection requirements the diameter of the connection cable must correspond to that of the cable gland (please refer to Chapter 12 Dimension drawings)!

Deep groove ball bearings

EGS 2 overspeed switches are fitted with maintenance-free, greased "for-life" deep groove bearings. Bearings must be changed by the manufacturer only. Opening the encoder renders the guarantee null and void.

Screw retention

We recommend using Loctite® 243 threadlocker (medium strength) on all fastening screws to prevent loosening.

6.3 Required tools

- Spanners: 10 mm, 22 mm
- Allen keys: 2 mm, 3 mm
- Flat-blade screwdrivers:
- Assembly grease
- Loctite® 243 (medium strength threadlocker)

6.4 Mounting preparations

1. Ensure all accessories are available (please refer to Chapter 12 Dimension drawings).



NOTES!

Fastening screws and earth cable are not included in the range of supply.

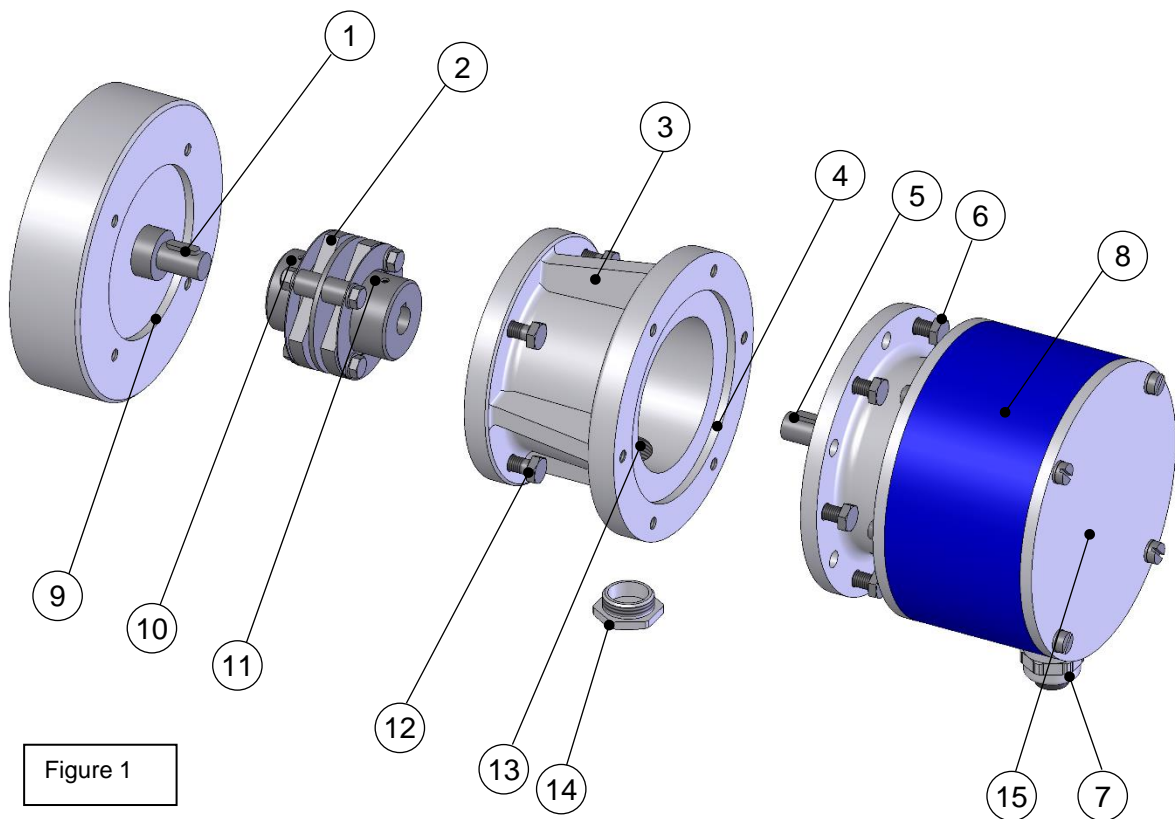
2. Preparing the place of attachment: Clean the (motor) shaft, centering, bolting surfaces and fastening threads; check for damage. Repair any damage!

6.5 Mounting the electronic overspeed switch



NOTES!

For a mounting example please refer to dimension drawing HM 17 M 111276 Chapter 12



1. Lightly grease the (motor) shaft (1) and Centering (9).
2. Fit coupling (2) onto (motor) shaft.



NOTES!

You must be able to mount the coupling without force. Ream out the bores of used couplings, if necessary! We recommend our zero-backlash, torsion-resistant **HK 5 coupling** to attach the overspeed switch. Please refer to the catalogue Torsion Resistant Couplings for encoders.

3. Secure the coupling hub on the (motor) shaft with a grub screw or cheese head screw (10) (depending on the coupling type).
4. Fasten the intermediate flange (3) to the motor using the fastening screws (12).



NOTES!

If possible, fit the intermediate flange in a manner that ensures the screwed sealing plug (14) points downwards!

5. Lightly grease the encoder shaft (5) and centering (4).
6. Fit the encoder (8) into both the centering (4) and coupling hub at the same time.



NOTES!

You must be able to mount the coupling without force. Ream out the bores of used couplings, if necessary!



NOTES!

If possible, fit the device in a manner that ensures the cable gland (7) points downwards.

7. Secure the encoder with 6 screws (6).
8. Remove the sealing plug (14) from the access bore (13) to the coupling.
9. Secure the coupling hub on the encoder shaft with a grub screw or cheese head screw (11) (depending on the coupling type).



NOTES!

To carry out this task, it may be necessary to turn the (motor) shaft to the correct position.

10. Replace the sealing plug (14) to seal the access bore to the coupling.

6.6 Mounting tolerances



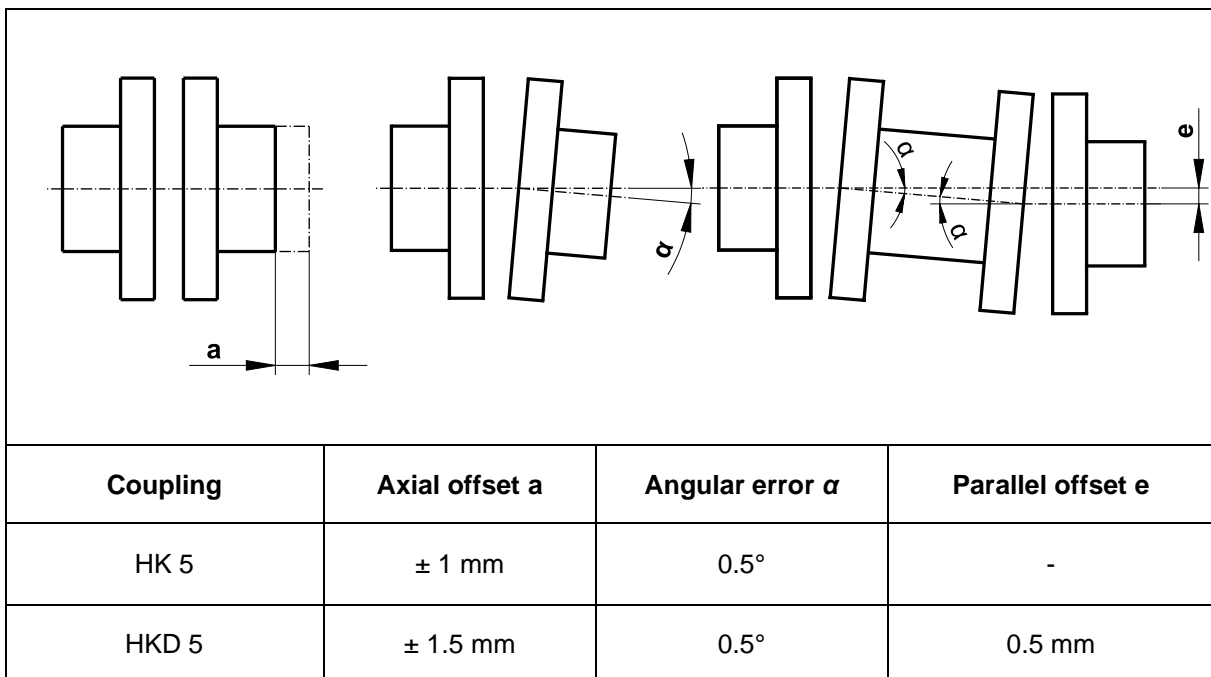
NOTES!

Angle misalignment and parallel displacement between the (motor) shaft and the encoder shaft are mounting errors and should be kept as small as possible.

Mounting errors

- Cause radial forces to act on the encoder shaft.
- Reduce the service life of the bearings and the coupling.
- Degrade the quality of the signals (harmonic content).

Mounting tolerances for our zero-backlash, torsion-resistant couplings HK 5 and HKD 5:



6.7 Electrical connection and start up



NOTES!

You must observe applicable EMC guidelines when routing cables!



NOTES for UL and CSA!

Do only use copper cables!

6.7.1 Preparing cables

1. Strip cable insulation. The cable for the signal and supply line is shielded, the cable for the option S and the cable for LWL will not be shielded.
2. Crimp wire-end ferrules.

6.7.2 Electrical connection

1. Open the terminal box cover (15, Fig.1).



CAUTION!

Do not allow moisture to enter the terminal box when the cover is open!

2. Remove the cap of the cable glands (17, Fig.1).
3. Feed the cable into the terminal box trough the cable glands.



NOTES!

The signal cable shielding has to be connected directly to the housing via the EMC cable gland.

To achieve an effective shielding the cable shield must also be connected in the electrical cabinet.

4. Tighten the cable gland using a spanner.



NOTES!

Prior to delivery cable glands and blanking plugs are tightened finger tight only. To ensure that the terminal box is reliably sealed tighten all cable glands and blanking plugs before starting up for the first time.

5. Use a spanner to tighten the cable gland until the cables are securely clamped and properly sealed.



NOTES!

Prevent lateral pulling forces acting on the cable so as not to impair the degree of protection of the cable gland.

6. Connect the supply voltage and the switch cable (please refer to the connection diagrams, Chapter 13).
7. Close the terminal box cover.



NOTES!

Before closing the terminal box cover check and if necessary clean both seal surfaces and the gasket.



CAUTION!

Ensure when closing the terminal box cover that no cable becomes jammed.

7 Dismantling

7.1 Safety instructions

Personnel

Dismantling must be carried out by skilled technical staff only.



WARNING!

Observe the safety instructions contained in **Chapter 2** when dismantling the device!



NOTES!

Do not use a hammer or similar tool when dismantling the device due to the risk of damage occurring to the bearings or coupling!

7.2 Dismantling the electronic overspeed switch

Disconnect all electrical cable prior to beginning any work.

To dismantling the electronic overspeed switch follow the instructions given in Chapter 6.5 in the reverse order.

8 Faults

8.1 Faults table

| Faults | Possible cause | Remedy |
|---|---|---|
| Switch does not close | No supply voltage <u>Control</u> : LED in the terminal box does not shine | Check connection cable and supply voltage |
| | <u>Error LED does not shine</u> : Rotation speed above the switching speed | Adjust the suitable rotation speed |
| | <u>Error LED is shining</u> : Evaluation of rotation speed is faulty. | Disconnect power supply and switch on again |
| Moisture in the terminal box | Soiled terminal box gasket or seal surfaces | Clean terminal box gasket and seal surfaces |
| | Damaged terminal box gasket | Replace terminal box gasket |
| | Cable gland/blanking plug not tightened | Tighten cable gland/blanking plug |
| | Unsuitable cable for cable gland | Use suitable cable and cable glands |
| Contact Hübner-Service (page 2) if none of the remedies listed above provides a solution! | | |

9 Inspections

9.1 Safety instructions



WARNING!

Skilled technical staff only are permitted to inspect the device and its installation. Observe the safety instructions contained in **Chapter 2** when inspecting or working on the device!

9.2 Maintenance information

The device is maintenance-free. However, to guarantee optimum fault-free operations we recommend that you carry out the following inspections.

9.3 Inspection schedule

| Interval | Inspections |
|--|--|
| Yearly | Inspect the coupling for damage and ensure it is free of play |
| | Ensure the fastening screws are properly tightened |
| | Ensure cable connections and connection terminals are securely seated |
| Following approx 16 000 – 20 000 hours of operation / higher levels of continuous load | Check deep groove ball bearings are running smoothly and listen for running noises |

10 Disposal

10.1 Disposal procedure

The manufacturer is not obliged to take back the device.

The device is classed as electronic equipment; observe local country-specific laws when disposing of the device.

For information on environmentally sound disposal please contact your local authority or a specialist disposal company.

11 Replacement parts

The replacement parts listed below can be obtained via the service address on page 2.

| Replacement parts | Comment |
|--------------------|--|
| Cable gland | M 20 x 1.5, cable Ø 5...14 mm |
| Terminal box cover | Including O-Ring and screws |
| Screw plug | For closing the access to the coupling |

12 Dimension drawings

Änderungen vorbehalten
modifications reserved

$12,5 \begin{smallmatrix} 0 \\ -0,13 \end{smallmatrix}$

$4 \text{ h9} \begin{smallmatrix} 0 \\ -0,03 \end{smallmatrix}$

$\phi 100$

$12 \times 30^\circ$

$\phi 7$

Klemmkastendeckel
mit O-Ring
mit 4 x unverlierbaren
Zyl.-Schrb. M5 mit Schlitz
terminal box cover
with O-ring seal
with 4 x slotted captive
cheese head screw M5

Kabelverschraubung für Kabel
 $\phi 5 - 14$
Verschlussbolzen für
Transport und Lagerung
sealing bolt for
transport and storage

142

106

36

30

$\phi 115$

$\phi 115 \begin{smallmatrix} 0 \\ -0,022 \end{smallmatrix}$

$\phi 11 \begin{smallmatrix} +0,008 \\ -0,003 \end{smallmatrix}$

3

7

$\phi 119$

79

Welle aus nichtrostendem Stahl
shaft of stainless steel

Maßstab:

Maßzeichnung / dimension drawing

Bauform / construction type
B5

| Bearb. | Datum | Name |
|-------------------------------|------------|-----------|
| 06.04.2017 | 06.04.2017 | M. Engels |
| Gepr. | 06.04.2017 | M. Eilers |
| Freigegeben | 06.04.2017 | M. Eilers |
| elektronisch freigegeben / V5 | | |

JOHANNES HÜBNER GIESSEN

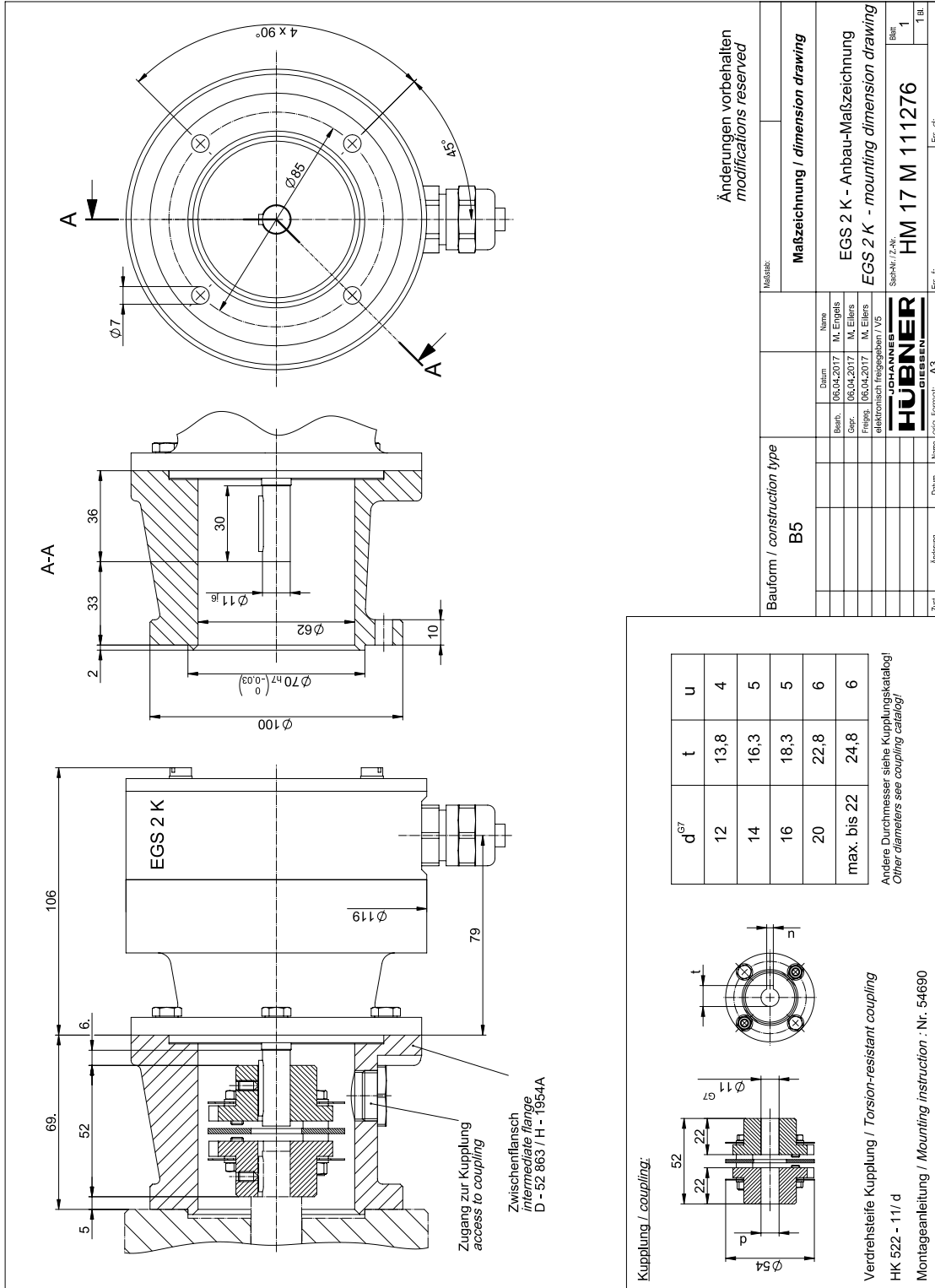
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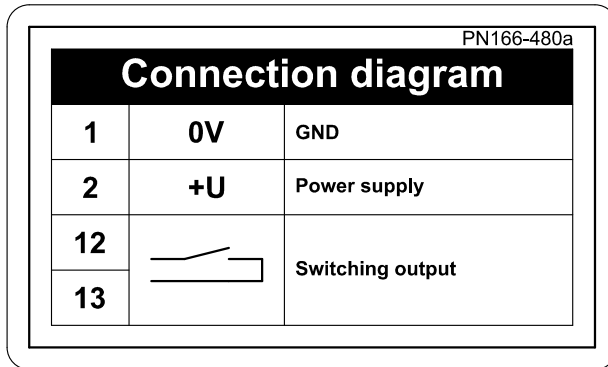
13 Connection diagrams

13.1 Terminal box



NOTES!

The connection diagrams are displayed in each terminal box cover!



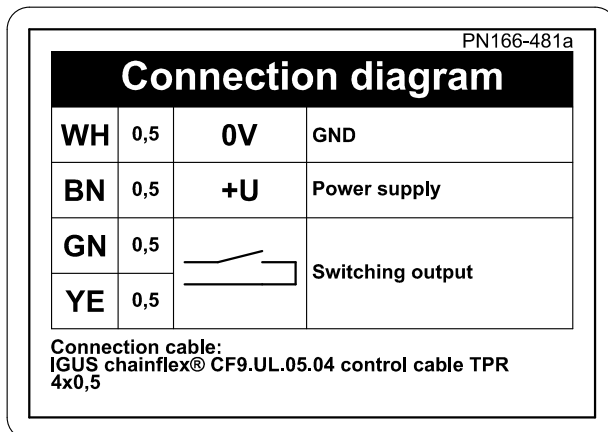
Connection diagram PN166-480a

13.2 Connection cable



NOTES!

The connection diagrams are attached to each cable!



Connection diagram PN166-481a