

# Operating and Assembly Instructions

## Incremental hollow shaft encoder FG14

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

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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

Incremental hollow shaft encoder FGH 14, 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 Intended use

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

Series FGH 14 hollow shaft encoders are used for measurement of rotations, for instance of electrical and mechanical drives and shafts.

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

## 2.3 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.

## 2.4 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.

## 2.5 Personnel

Only trained, specialized personnel is allowed to perform installation, mounting, disassembly and commissioning work.

### 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



**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 standstill.

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



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

- Manufacturer, Address
- Type
- CE marking
- Serial number (S/N)
- Year of construction
- Pulse rate
- Protection class
- Power supply

### 3.2 Electrical and mechanical data

Pulse rates	Value
Preferred Pulse Rates	700, 1024, 3000, 3600
Special pulse rates	1000, 1800

Connection data	
Supply voltage	12 V ... 30 V DC, Ripple max. 10 %
No load-current	approx. 100 mA at 30 V (without Option)
Outputs <sup>1)</sup>	Push-pull final stages, resistant to short-circuit
Pulse height (HTL)	approx. as supply voltage
Rated load	50 mA per output
Internal resistance	50 Ω per output
Slew rate	50 V / μs

**<sup>1)</sup> Special output voltage 5V**

(specify on order)

Supply voltage: 12 V...20 V DC or 20 V...30 V DC

Output: push-pull output stages with inverted signals.

Pulse height: 5 V to RS 422.

Duty cycle	1 : 1 ± 5 %
Square wave displacement 0°, 90°	to 50 kHz < 3 % to 150 kHz < 5 %
Max. frequency	0 to 100 kHz (150 kHz on request)
<b>Encoder temperature ranges</b>	
Standard	0°C ... 70°C
Special temperature ranges	-25°C...+ 85°C
<b>Special output voltage 5V (TTL)</b>	
Signal amplitude	5V, RS422-compatible (TIA/EIA-Standard)
Supply voltage	12...30 V DC
<b>Temperature range</b>	
<b>The max. permissible ambient temperature depends on the speed and the degree of protection of the device.</b>	

Protection class DIN EN 60529	Sealing	Mechanical speed	Description	Breakaway torque
IP 54	Special seal	≤ 2500 min <sup>-1</sup>	Protection against dust and water spray	approx. 120...200 Ncm
IP 66 both sides	Radial shaft seal	≤ 800 min <sup>-1</sup>	Protection against dust and water spray	approx. 180...330 Ncm depending on type
IP 66	Radial shaft seal		Protection against dust and water spray	approx. 160...190 Ncm

Weight	Type EK	approx. 27...32 kg
	Type EEK	

Signalausgänge																			
<p><b>Basic version</b> (n = pulses/revolution) One pulse channel (basic) with n direct square wave pulses, corresponding to the segment division and LED monitoring output. (optional).</p>																			
<p><b>Option 90</b> 2<sup>nd</sup> pulse channel as basic version, but with 90° electrical phase shift.</p>																			
<p><b>Option N / N2</b> Marker pulse, mechanically fixed. One square wave pulse per revolution.</p>																			
<p><b>Option G</b> Additional inverted output signals for basic and 90° channels, marker pulse LED check.</p>																			
<p><b>Option F</b> With 2 or 4 times as many pulses as the basic version. No direction of motion can be derived from the multiple number of pulses. Required: Option 90°</p>																			
<p><b>Option B</b> Fast and precise sensing of rotational direction at each edge of the basic and 90° channels, Required: option 90°.</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Output</th> <th rowspan="2"></th> </tr> <tr> <th>L</th> <th>R</th> </tr> </thead> <tbody> <tr> <td>cw</td> <td>0</td> <td>1</td> <td>Option B, B2</td> </tr> <tr> <td>ccw</td> <td>1</td> <td>0</td> <td>Option B2</td> </tr> <tr> <td>Still stand</td> <td>0</td> <td>0</td> <td>Option B2</td> </tr> </tbody> </table>		Output			L	R	cw	0	1	Option B, B2	ccw	1	0	Option B2	Still stand	0	0	Option B2
	Output																		
	L	R																	
cw	0	1	Option B, B2																
ccw	1	0	Option B2																
Still stand	0	0	Option B2																
<p><b>Option B2</b> As option B, but with standstill sensing.</p>																			
<p><b>Option V</b> Electronic pulse doubling of basic and 90° channels by multiple evaluation.</p>																			
<p><b>Option L</b> Power output up to 150 mA for basic channel, 90° channel and the corresponding inverted signals.</p>																			
<p><b>Option J</b> Reduced rotational frequency modulation by means of optically adjusted pulse disk.</p>																			
<p><b>Option S</b> Electronic overspeed switch with 2 programmable switching outputs, EGS4 version.</p>																			

## 3.3 Type code

	FGH	14	EK	1000	G 90G	NG	2F	S	J	140P
<b>Incremental Hollow Shaft Encoder</b>										
<b>Series</b>										
<b>Connections</b>										
2x Connection = redundant encoder z.B. EEK: 2x terminal box EK/EEK: terminal box ES/EES: EMC Industrial plug ER/EER: 12-pole. round plug EC/EEC: 2 m connection cable										
<b>Pulses per Revolutiion</b>										
<b>Basic signal output</b>										
Basic channel 0° (A) Pulse channel 90° (B) Each with inverted signals										
NG: Reference pulse with inverted signal										
2F: Option 2F 4F: Option 4F B: Option B B2: Option B2										
S: Option S (EGS 4 Technic in 2nd scanning head ) L2: Option L2										
V: Option V J: Option J (J can be combined with V)										
<b>Hollow shaft bore</b>										
Only for hollow shaft Ø 93 ... Ø 150										
<b>Drive shaft connection</b>										
P: keyway K: clamping S: pressure sleeve C: taper										

## 4 Transport, packaging and storage

### 4.1 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.

### 4.2 Incoming goods inspection

Check delivery immediately upon receipt for completeness and possible transport damage.

Inform the forwarder directly on receipt of the goods about existing transport damages (prepare pictures for evidence).

### 4.3 Packaging / disposal

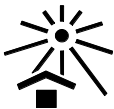
The packaging is not taken back and must be disposed of in accordance with the respective statutory regulations and local guidelines.

### 4.4 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 stored for longer periods (> 6 months) we recommend sealing the devices in foil, possibly with a desiccant.



**NOTES!**

Turn encoder shafts every 6 months 10 times to prevent a possible hardening of the grease-filling of the ball bearings, which may lead to the destruction of the device.

## 5 Installation and commissioning

### 5.1 Safety instructions

#### Personnel

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



#### NOTES!

Observe the safety instructions contained in **Chapter 2** when installing or working on the device!

### 5.2 Mounting of the encoder (mechanical)

Mounting and disassembly by means of a hammer or similar tools is not permitted (warranty void).

#### 5.2.1 Mounting Instruction for hollow shaft encoder

1. Adapter flange has to be mounted and to be aligned by dial gauge, if necessary optimize by ball thrust adjusting screws.
2. Ball thrust screws to be fastened with Loctite, remove non-fastened screws or fasten with Loctite! Max. torque for M12 approx. MD 25 Nm / M16 approx. MD 35 Nm.

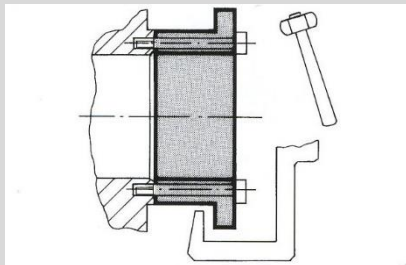


Fig. 1

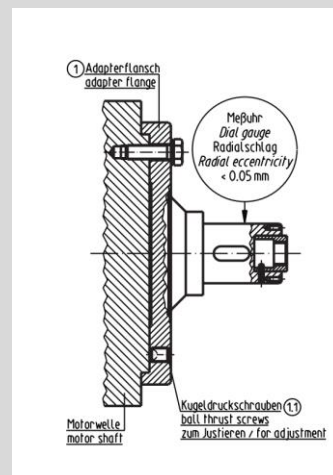


Fig. 2

The hollow shafts have tapped holes on both sides at the front. For removal use screws to attach the mounting sleeve (Fig. 1), and then use a puller to draw off the unit. A suitable mounting sleeve is recommended for each plant area (specify on ordering). Remove hollow shaft encoders using mounting sleeve only:

Mounting / removal sleeves for standard bores	
<b>FGH 14... / 140P</b>	Drg. no. D-52 833a-I
<b>FGH 14... / 93 S and 150 K</b> See separate assembly and disassembly instructions Nr.54728 (see Annex)	Drg. no. D-52 833a-II



**NOTES!**

The radial deviation of the shaft (Fig. 2, Pos. 1) should not exceed 0,05 mm.

3. Use feather keys in accordance with DIN 6885.
4. Mount the torque bracket / torque arm on the housing.



**NOTES!**

Comply with the information provided in the supplemental data sheet entitled "Mounting Accuracy of hollow shaft encoders".

5. Check the mounting position relative to the terminal boy, adjust if necessary.
6. Push the device onto the shaft that has been lightly greased.



**CAUTION!**

**Danger of damage to shaft and device if improperly handled.**

Ensure that there are no hard impacts on hollow shaft and housing.  
Use the mounting sleeve.

7. Secure the device with axial tightening plate and 4x M5-DIN 912 fastening screw (coated with micro-adhesive).
8. Tighten the fastening screws on the link head of the torque bracket. Fix the nuts in place with locknuts.
9. Check the attached torque brackets: The link rod must be easy to turn within the link head, and the link heads should not tilt. If this instruction is not followed there is a danger of bearing damage.
10. Connect the cabling in the terminal box (⇒ Appendix, Connecting diagrams).

## 5.3 Connecting the encoder

### 5.3.1 Connections

Cable glands are closed with a stopper to protect the devices on transport and storage.

#### Cable connections:

Have to be executed according to the encoder type.

#### Connection diagrams have to be considered!

See chapter 12 and in the terminal box cover. Use of connection cables with diameter of min. 11 mm max. 20 mm is essential to ensure the protection class. Cable outlet should show preferably downwards.

#### Option:

R: 12-pole round plug

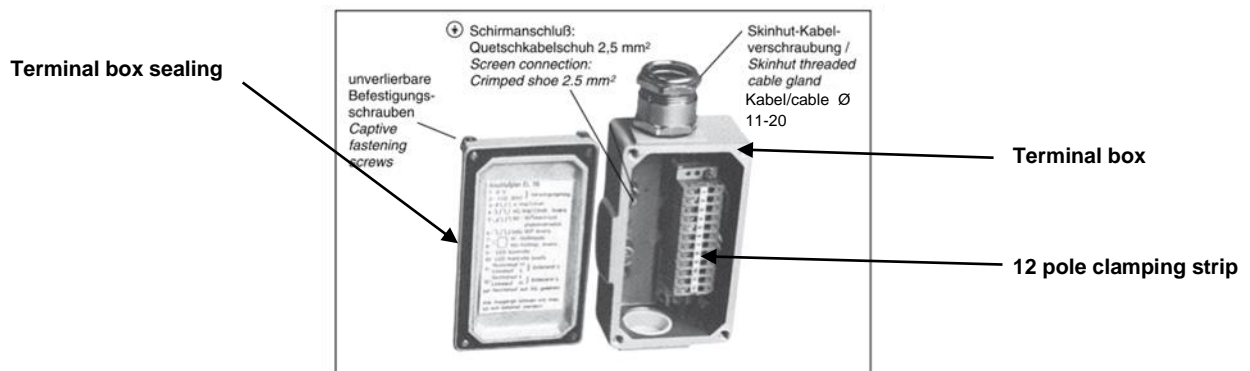
S: Industrial plug

C: Connecting cable

#### Wiring arrangement and shielding

(EMI measurement)

- The cable shield must be connected at both ends!
- The shield of the signal cable can be connected directly to the housing of the encoder by the cable gland.
- The general guidelines for EMC-compliant wiring must be observed.



#### Special Hint!

The encoder must be connected only by skilled technical staff.

Closing the terminal box cover.

Check the seal of the terminal box cover, clean it if soiled. Then duly close the cover.



#### Cable must not be pinched.

#### Attention with open terminal boxes:

Moisture should not get into the terminal box when connecting the cable.



## 5.3.2 Technical information

### 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 3.2).

### Degree of protection

To fulfill degree of protection requirements the diameter of the connection cable must correspond to that of the cable gland (please refer to Chapter 5.3.1)

## 6 Dismantling

### 6.1 Safety instructions

#### Personnel

Dismantling must be carried out by skilled technical staff only.



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



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

### 6.2 Dismantling the encoder

To dismantling the encoder follow the instructions given in Chapter 5.2 in the reverse order.

## 7 Faults

### 7.1 Faults table

Faults	Possible cause	Remedy
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
No output signals	Supply voltage not connected	Connect supply voltage
	Connection cable reversed	Wire correctly
Output signals subject to interference	Unsuitable cable	Use data cable with conductors arranged as twisted pairs and common shield
	Cable shield not connected	Connect cable shield at both ends
	Cable routing not EMC compliant	Observe applicable EMC guidelines when routing cables
Signal interruptions	Signal end stage overloaded	Check pin assignment; observe connection diagram
		Do not assign unused outputs
	Outputs short-circuited	Do not connect outputs with supply voltage or GND

Contact Hubner-Service (page 2) if none of the remedies listed above provides a solution)!

## 8 Inspections

### 8.1 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!

### 8.2 Maintenance information

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

### 8.3 Inspection schedule

Interval	Inspections	Tasks
Yearly	Check coupling	Qualified person
	Check the fastening screws for firm seat	Qualified person
	Check the cable connections	Qualified person
After approx. 16000 to 20000 operating hours and high long-term loading	Check deep-groove ball bearing for ease of movement and noise.	Qualified person
	Worn ball bearings have to be replaced only by the Manufacturer	Hubner – Giessen Service

## 9 Incremental encoder with replaceable scanning head

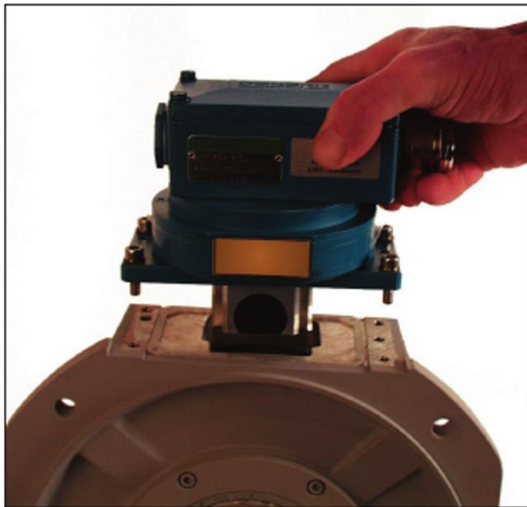
**Hollow shaft incremental encoder with bores  
from Ø 93 mm up to Ø 150 mm**

Suitable for harsh ambient conditions, such as in opencast mining, steel and rolling mills.

**Pulse rate up to 4069 and**  
high enclosure protection, up to IP66.

### **This replaceable scanning head**

can be exchanged on site without having to dismantle the whole encoder from the motor shaft.



**Very advantageous for critical and involved  
mounting situations e.g. in restricted space.**

The replaceable scanning head is provided with a  
mechanical stop and **adjustment** on site is **not  
necessary**.

#### Electrical connections:

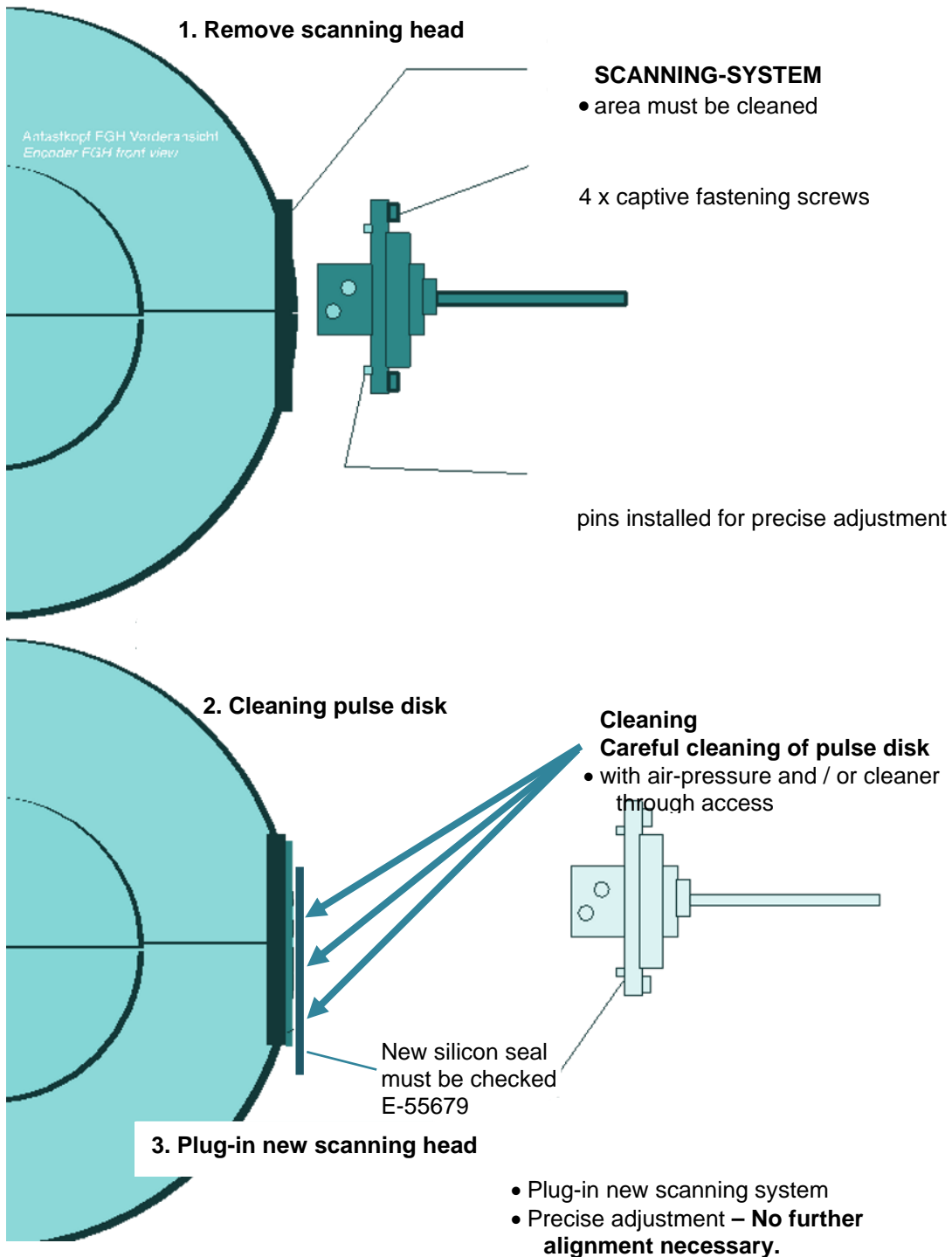
Terminal box, connection cable for plug or data  
transmission by fibre optic LWL immune to  
interferences.

Moreover, under extreme ambient conditions (oily mist  
or fine dust) the pulse disk can be cleaned through the  
access opening that is provided.

The encoder is equipped with dimensionally oversized  
bearings thus creating a **very solid base for add-ons**.

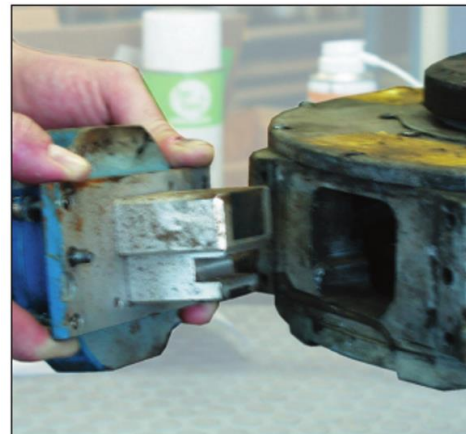
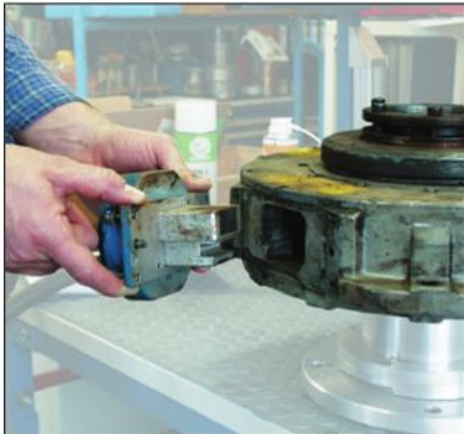
## 9.1 Exchange of scanning-system

of Encoder FGH 14. Easy exchange of all optical and electronic components without removal of the encoder form motor shaft.



## 9.2 Pictures

Photo No. 1 to 6: Sequence of disassembly / exchange = Scanning - System



Vorsichtiges Reinigen mit rückstandsfreiem Spray  
*Careful cleaning with residue-free-spray*

## 10 Disposal

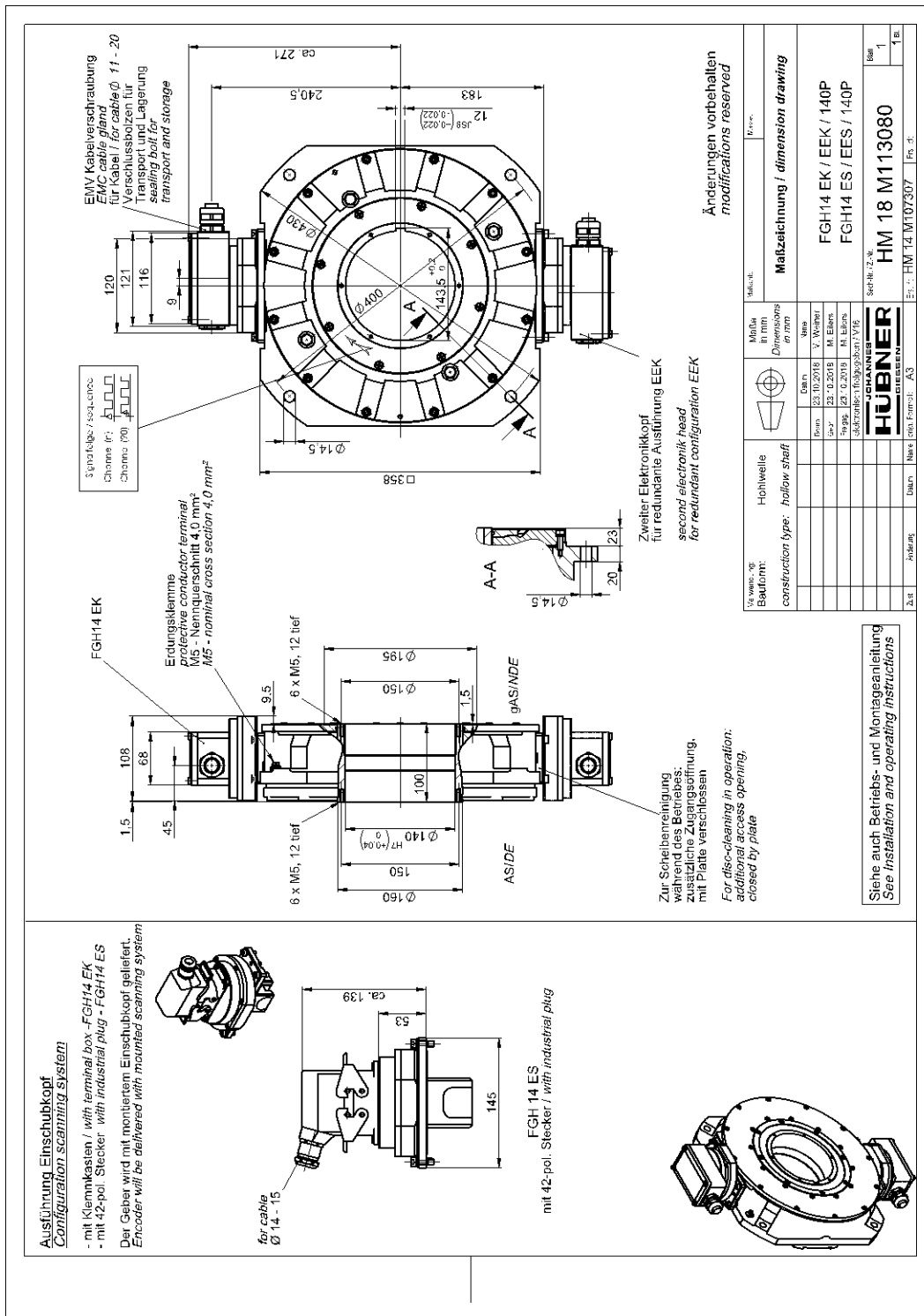
### 10.1 Disposal procedure

The manufacturer is not obliged to take back the device.

The device is classed as electronic equipment and subject to the WEEE Directive; observe local, country-specific laws when disposing of the device.

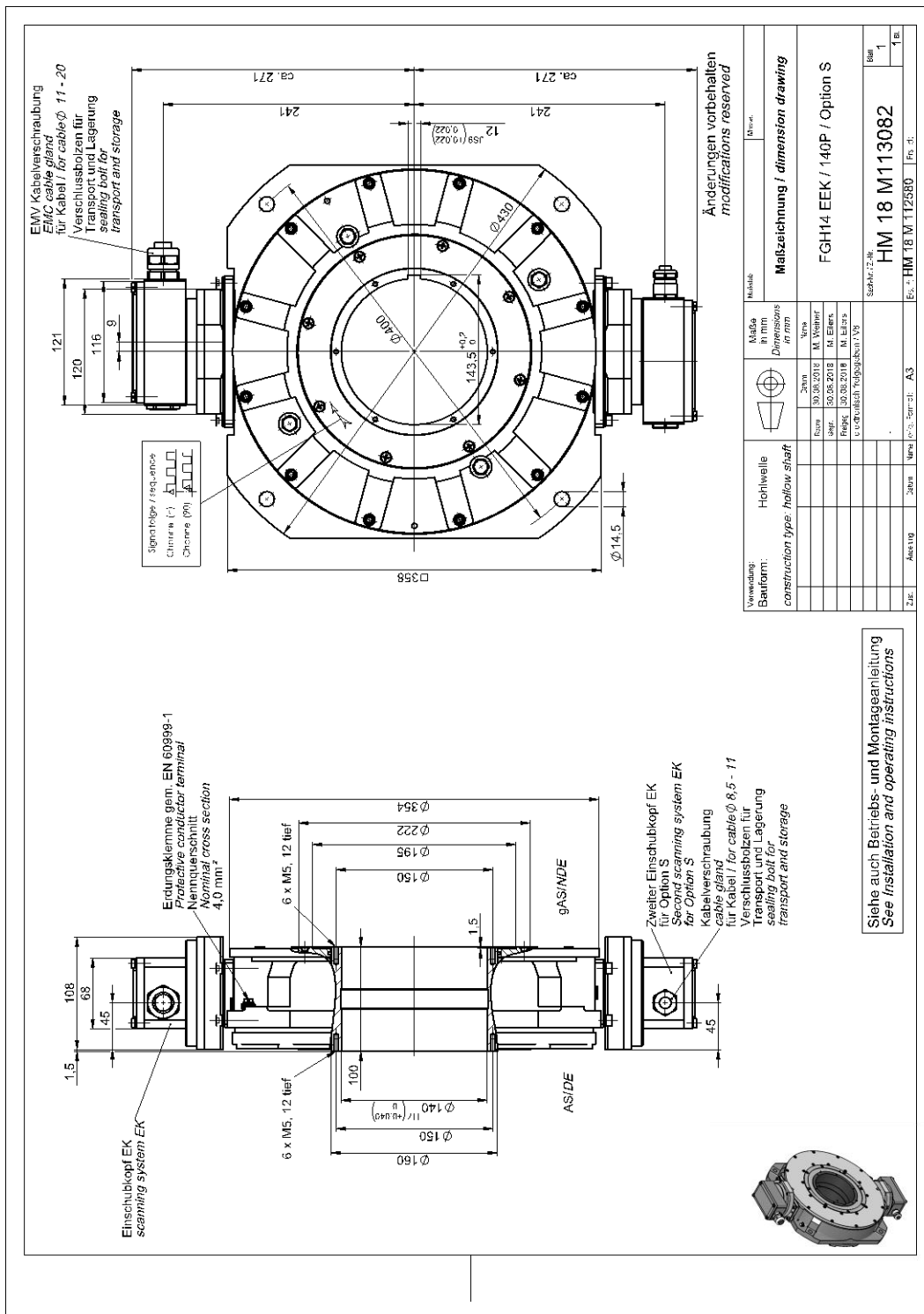
For information on environmentally sound disposal please contact your local authority or a specialist disposal company.

11 Dimension drawings





# Incremental Hollow Shaft Encoder FGH 14

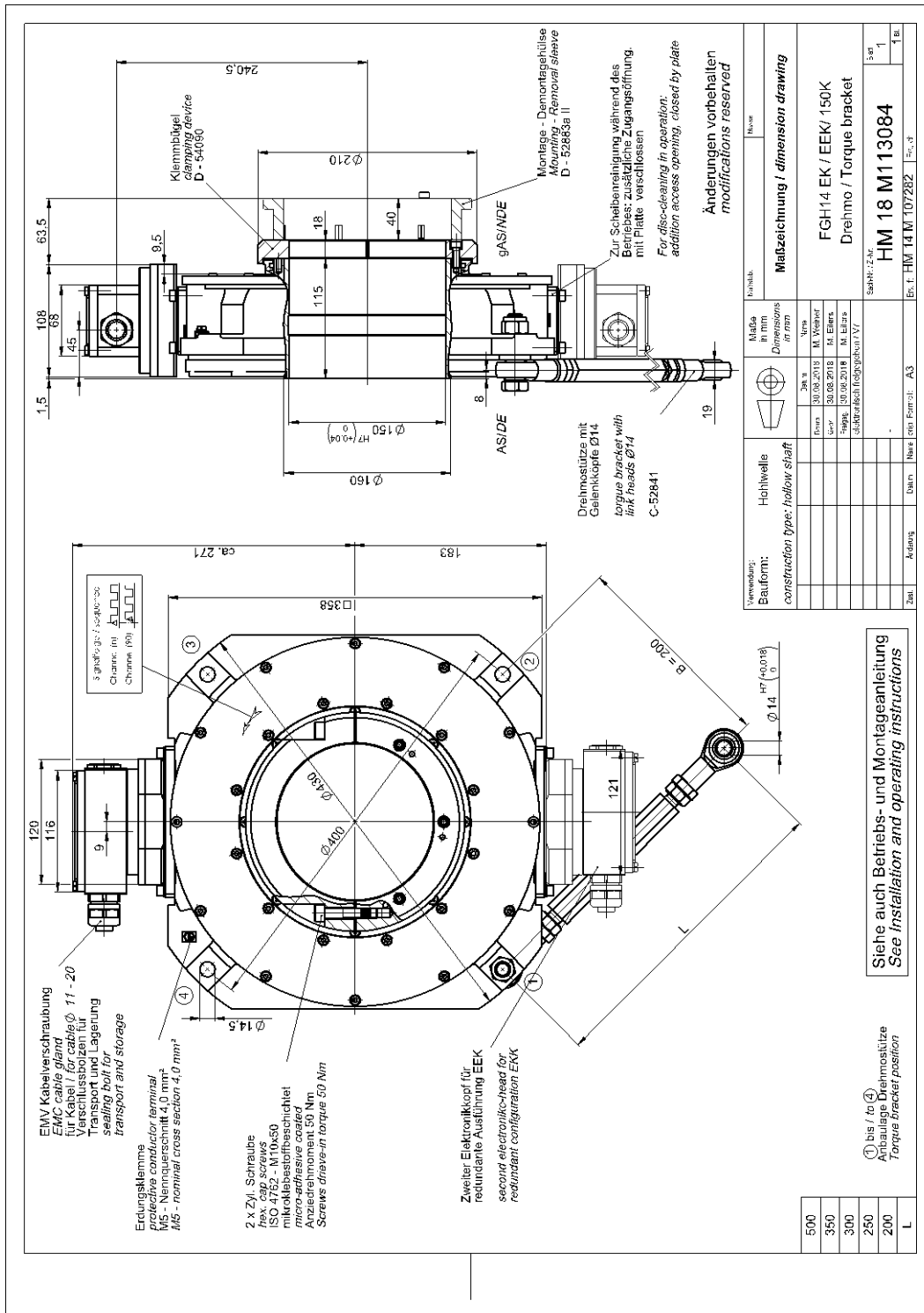


Siehe auch Betriebs- und Montageanleitung  
 See installation and operating instructions

FGH 14 EEK... / 140P

Option S

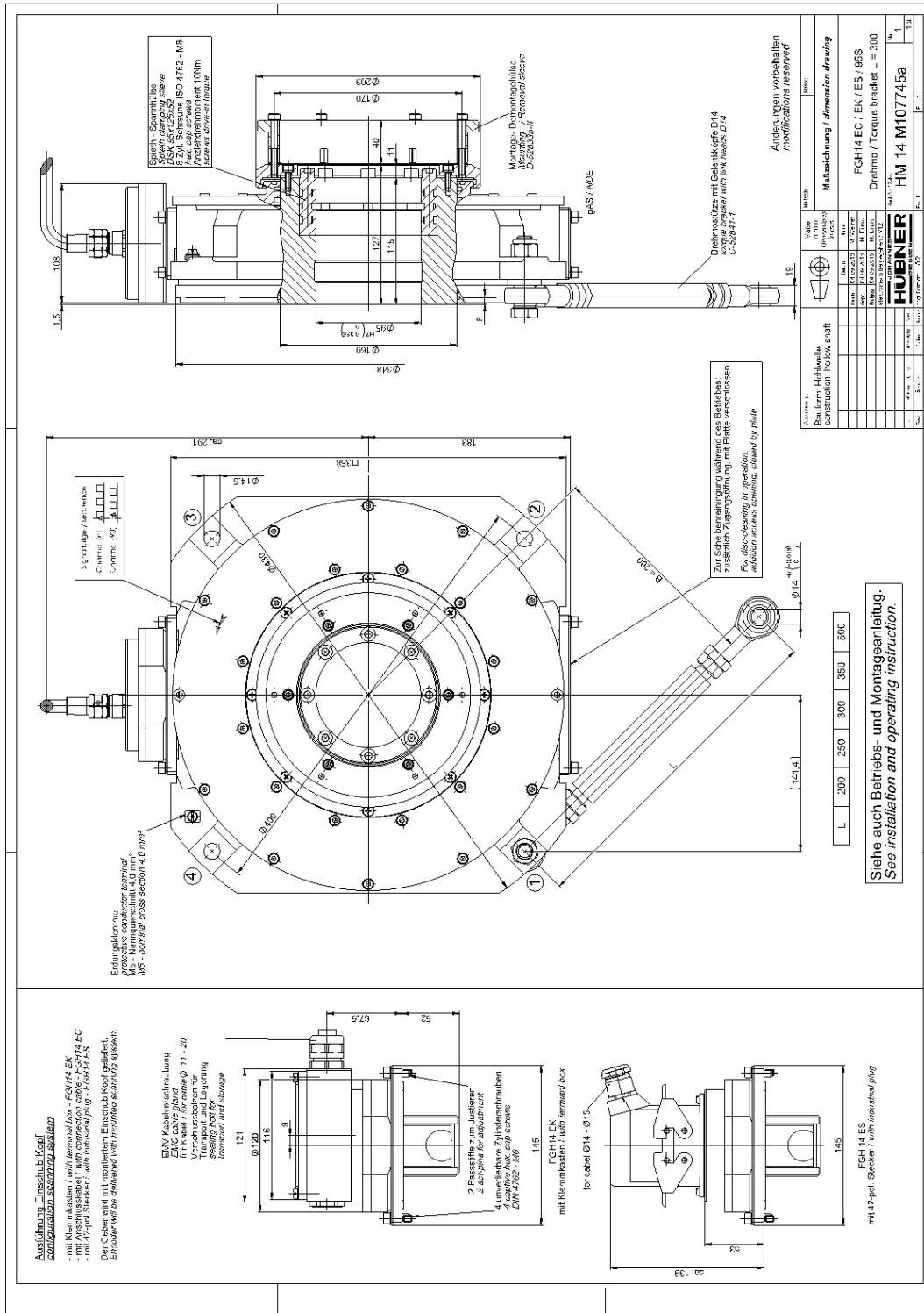
HM 18 M 113082



FGH 14 EK... / 150 K mod

Assembly with torque bracket

HM 18 M 113084

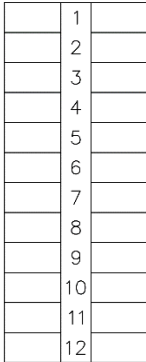


FGH 14 EC / 95 S

HM 14 M 107745a

## 12 Connection diagrams

12-pol. Bandklemme Typ Phoenix  
12-pole strip clamping type Phoenix



Schirmung:  
Der Schirm der Signalleitung ist über die Kabelverschraubung direkt mit dem Gehäuse verbunden.

Shield:  
The shield of the signal cable is directly connected with the housing of the encoder by the cable gland.

	EL 816	EL 816-1	EL 816-2	EL 816-3	EL 816-4	EL 816-5	EL 816-6	EL 816-7
0V	1	1	1	1	1	1	1	1
+ ... V <sup>1)</sup>	2	2	2	2	2	2	2	2
0°	3	3; 7	3	3	3	3	3	3
0°	4	4; 8	4	4	4	4	4	4
90°	5	5; 9	5	5	5	5	5	5
90°	6	6; 10	6	6	6	6	6	6
N	7	---	---	7	7	7	---	7
N	8	---	---	8	---	8	---	8
M	9	11	9	9	8	9	9	---
M	10	12	10	10	---	10	10	---
2F	---	---	7	11	9	---	---	11
4F	---	---	8	12	10	---	7	12
4F	---	---	---	---	---	---	8	---
R	11	---	11	---	11	---	11	9
L	12	---	12	---	12	---	12	10
Schaltgang 1	---	---	---	---	---	11	---	---
Schaltgang 2	---	---	---	---	---	12	---	---

+ ... V<sup>1)</sup> Versorgungsspannung nach Typenschildangabe  
supply voltage see rating plate

Verwendung: FG .. (A)K

Allgemein-toleranzen DIN ISO 2768m

OFZ nach DIN ISO 1302

Maßstab:

Werkstoff:

Benennung: Anschlussplan  
Connection diagram

Datum: 03.06.14

Name: Diriam

Zeichnungs Nr.: EL 816

Blatt: BI

Zust. Änderung Datum: Name

Die Belegung der Anschlüsse ist aus der Typenbezeichnung ersichtlich

z.B. e.g.: FG.K-1000 G - 90 G - N G

0° channel A  
0° inv. channel A inv.  
90° channel B  
90° inv. channel B inv.  
Nullimpuls marker  
Nullimp.inv. marker inv.

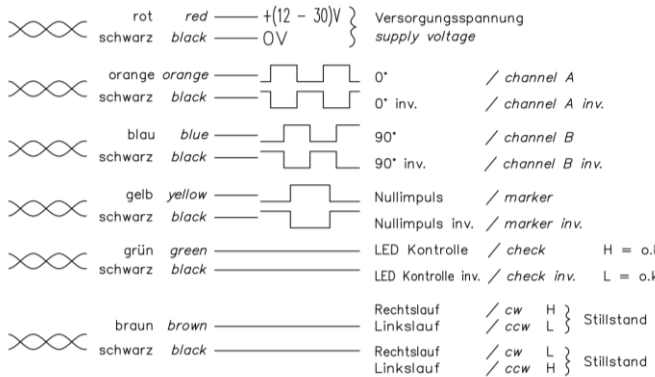
### FGH 14

### Standard

### Terminal box

Anschlusskabel direkt angelötet  
6x2x0,56 paarig verseilt, geschirmt

Connection cable soldered-on directly  
6x2x0,56 twin-stranded, shielded



rot red — + (12 - 30)V } Versorgungsspannung  
schwarz black — 0V } supply voltage

orange orange — 0° / channel A  
schwarz black — 0° inv. / channel A inv.

blau blue — 90° / channel B  
schwarz black — 90° inv. / channel B inv.

gelb yellow — Nullimpuls / marker  
schwarz black — Nullimpuls inv. / marker inv.

grün green — LED Kontrolle / check H = o.k.  
schwarz black — LED Kontrolle inv. / check inv. L = o.k.

braun brown — Rechtslauf / cw H } Stillstand L  
schwarz black — Linkslauf / ccw L }  
braun brown — Rechtslauf / cw L } Stillstand L  
schwarz black — Linkslauf / ccw H }

Schirm ist mit Gehäuse verbunden  
shield is connected to casing  
alternativ/alternative

Der Schirm der Signalleitung ist über die Kabelverschraubung direkt mit dem Gehäuse verbunden.  
The shield of the signal cable is directly connected with the housing of the encoder by the cable gland.

Typ : HE-2LVCC-CY AWG 20b

VDE 0881 zugelassen  
acc. to VDE 0881

Querschnitt: 0,56 mm?  
cross-section

Temperatur: -30°C bis +105°C  
temperature

fest verlegt  
fixed installation

-10°C bis +105°C  
bewegt  
flexing

Außendurchmesser: 10,1 mm  
Outside dia

Verwendung: FG...C

Allgemein-toleranzen DIN ISO 2768m

OFZ nach DIN ISO 1302

Maßstab:

Werkstoff:

Benennung: Anschlussplan  
Connection diagram

Datum: 22.05.92

Name: Oz

Zeichnungs Nr.: EL 205

Blatt: BI

Zust. Änderung Datum: Name

Die Belegung der Anschlüsse ist aus der Typenbezeichnung ersichtlich

z.B. e.g.: FG.C-1000 G - 90 G - N G

0° channel A  
0° inv. channel A inv.  
90° channel B  
90° inv. channel B inv.  
Nullimpuls marker  
Nullimp.inv. marker inv.

### FGH 14

### Standard

### Connection cable

Ansicht auf Steckdoseneinsatz  
Socket insert view

Crimpkontakte für Drahtquerschnitte 0,52 bis 1,5 mm<sup>2</sup>  
Crimp contacts for cross-sectional data of wire from 0.52 up to 1.5 mm<sup>2</sup>

	0V	EL 161	EL 161-1	EL 161-2
+ ... V <sup>1)</sup>	B	B	B	B
0°	C	C	C	C
0̄°	D	D	D	D
90°	E	E	E	E
90̄°	F	F	F	F
N	G	G	G	G
N̄	H	H	H	H
M	J	J	---	---
M̄	K	K	---	---
2F	---	---	---	J
4F	---	---	---	K
R	L	---	---	L
L	M	---	---	M
Schaltgang 1	---	---	---	---
Schaltgang 2	---	---	---	---

Schirmung: Der Schirm der Signalleitung ist direkt mit dem Steckergehäuse zu verbinden.  
Shield: The shield of the signal cable is directly to be connected with the socket housing

Crimpzange: Burndy Nr. MR 8 GE 5  
Crimping tool: Burndy No. MR 8 GE 5

Die Belegung der Anschlüsse ist aus der Typenbezeichnung ersichtlich  
Availability of options see type description

z.B. e.g.: FG..R-1000 G - 90 G - N G

0° channel A  
0° inv. channel A  
90° channel B  
90° inv. channel B  
Nullimpuls marker  
Nullimp.inv. marker inv.

Verwendung:	FG .. R	Allgemeintoleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab:	
α	EL 161-2	17.05.94	Ma	Datum:	Name
				Bearb.	12.06.91
				Gepr.	Martis
				Norm	
Zust:	Änderung	Datum:	Name		

Benennung: Anschlußplan  
Connection diagram

Zeichnungs Nr.: EL 161

Blatt: BI

+ ... V<sup>1)</sup> Versorgungsspannung nach Typenschildangabe  
supply voltage see rating plate

## FGH 14

## Standard

## 12 – pole round plug

Ansicht auf Steckdoseneinsatz HAN 42DD  
Socket insert view HAN 42DD

Crimpkontakte für Drahtquerschnitte 0,75 bis 1,0 mm<sup>2</sup>  
Crimp contacts for cross-sectional data of wire from 0.75 up to 1.0 mm<sup>2</sup>

Crimpzange: Harting Nr. 09 99 000 0110  
Ausdrückwerkzeug: Harting Nr. 09 99 000 0012  
Crimping tool: Harting No. 09 99 000 0110  
Removal tool: Harting No. 09 99 000 0012

Schirmung: Der Schirm der Signalleitung ist direkt mit dem Steckergehäuse zu verbinden.  
Shield: The shield of the signal cable is directly to be connected with the socket housing

Die Belegung der Anschlüsse ist aus der Typenbezeichnung ersichtlich  
Availability of options see type description

z.B. e.g.: FG..S-1000 G - 90 G - N G

0° channel A  
0° inv. channel A  
90° channel B  
90° inv. channel B  
Nullimpuls marker  
Nullimp.inv. marker inv.

	0V	EL 482
+ ... V <sup>1)</sup>	2	2
0°	3	3
0̄°	4	4
90°	5	5
90̄°	6	6
N	7	7
N̄	8	8
M	9	9
M̄	10	10
2F	11	11
4F	12	12
R	13	13
L	14	14
Schaltgang 1	15	15
Schaltgang 2	16	16

Verwendung:	FG .. S	Allgemeintoleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab:	
α				Datum:	Name
				Bearb.	17.03.98
				Gepr.	Martis
				Norm	
Zust:	Änderung	Datum:	Name		

Benennung: Anschlußplan  
Connection diagram

Zeichnungs Nr.: EL 482

Blatt: BI


+ ... V<sup>1)</sup> Versorgungsspannung nach Typenschildangabe  
supply voltage see rating plate

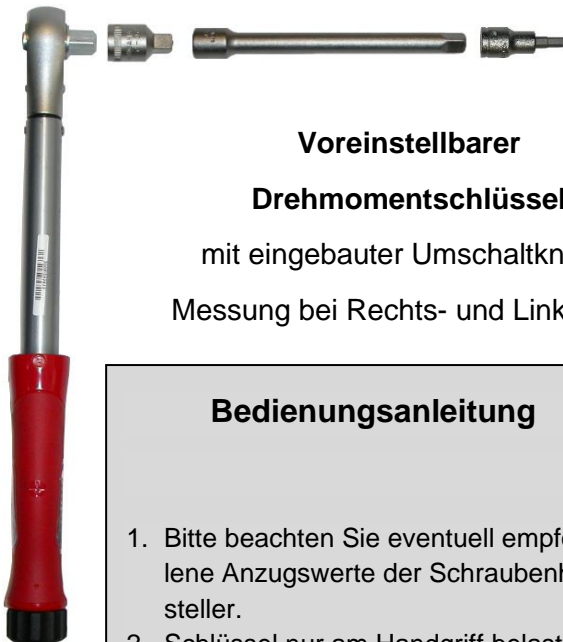
## FGH 14

## Standard

## 42 pole industry plug

13 Annex

 ideas and solutions	<b>Mounting and Removal Instruction</b> of Incremental Hollow Shaft Encoder <b>Encoder TYPE: FGH 14.../ .S</b> <b>Mounting Tool: with torque wrench</b>	<b>2010-01-04</b>
Type: <b>FGH 14... / .S</b> bore: Ø 93, Ø 107,95 – Spieth clamp- bore: Ø 95 – Spieth clamp-	<b>TQ = 25 Nm or</b> TQ = 18,5 ft lbs TQ = 10 Nm TQ = 7,5 ft lbs	Type: <b>FGH 14... / 150 K</b> bore: Ø 150 <b>TQ = 50 Nm or</b> TQ = 37 ft lbs
Torque wrench of type 10-60 Nm 1/2", hexagonal bore 6 mm	Torque wrench or type 10-60 Nm 1/2", hexagonal bore 8 mm	



**Voreinstellbarer Drehmomentschlüssel**  
mit eingebauter Umschaltknarre  
Messung bei Rechts- und Linksgang



**Pre-set Torque Wrench**  
with reversible ratchet  
right and left side measuring

**Bedienungsanleitung**

1. Bitte beachten Sie eventuell empfohlene Anzugswerte der Schraubenhersteller.
2. Schlüssel nur am Handgriff belasten.
3. Den Drehmomentschlüssel vor Belastung mit vollem Anzugswert zunächst nur mit 75% betätigen, dann mit vollem Wert nachsetzen.
4. Schlüssel langsam und stetig steigend belasten, keinesfalls ruckartig, da sonst fehlerhafte Anzeige.
5. Das voreingestellte Drehmoment ist erreicht, wenn der Schlüssel ein hör- und fühlbares „KLICK“ –Signal abgibt.
6. Falls Schlüssel nicht mehr in Gebrauch, auf kleinste Skalaanzeige zurückstellen.

**Operating instruction**

1. Please, obey any recommended tightening torques.
2. Apply torque loads only by using the plastic handle.
3. Firstly, pre-set torque wrench at a lower load – about 75% than required – re-set the wrench and tighten again.
4. Use wrench by smooth and continuous pull to ensure more accurate results.
5. The pre-set torque is reached as soon as the audible and sensible “CLICK” –Signal is noticed.
6. Reduce torque setting to its lowest figure when the wrench is not in use.





## Wartungs- und Bedienungsanleitung Maintenance and operation instructions for encoders Type: FG../EGS../AM../UO..

Ergänzung 01/2007

### Wartungs- und Bedienungsanleitung für Drehgeber

#### Aufstellung und Inbetriebnahme:

- sorgfältige Behandlung: beim Transportieren, Lagern; Anbau
- lagern: trocken, evtl. mit Trockenmittel, vakuumverpackt, nicht über 40 °C; nicht über 4 – 6 Monate, sonst Rücksprache mit = HÜBNER-GIESSEN =
- Kupplung leichtgängig auf Geberwelle aufziehen eventuell Kupplungsbohrung nachreiben (Passung G7)
- Kupplungsnahe mit Gewindestift fixieren
- verdrehsteife und spielfreie Kupplung verwenden
- **keine harten Schläge auf Gebergehäuse und Geberwelle**
- genauer zentrischer Anbau, besonders bei Bauform B3 beachten
- für Hohlwellengeber FGH...: Rundlauf der Antriebswelle Genauigkeit < 0,05mm siehe Montageanleitung Nr. 54570-1  
- Axialbewegung verursacht Drehbewegung des Gehäuses  
- längerer Drehmo-Stützarm reduziert Gehäuseverdrehwinkel

Montage / Demontage nur mittels Montagehülse bzw. Abziehvorrichtung.

**Hohe Impulszahl erfordert hohe Rundlaufpräzision.**  
Verspannungsfreier Anbau der Drehmomentstütze mit **spielarmen Gelenkköpfen**.

**BEACHTET! WARTUNG! Gelenkköpfe**  
1 – 2 mal im Jahr auf Leichtgängigkeit prüfen, von Hand drehbar! Behandeln mit Teflonspray oder leicht einölen. Bei Reparaturen Gelenkköpfe mitsenden!

Zur Erfüllung der Schutzart muß das Anschlusskabel passend zur Kabelverschraubung / Tülle sein (siehe Maßbildangabe).

#### Wartung: Keine erforderlich!

- Lebensdauer geschmierte Rillenkugellager haben eine Standzeit von ca. 20.000 – 35.000 Stunden (Abhängig von Umgebungsbedingungen, Drehzahl und Belastung).

Die **justierte Geberoptik** erlaubt **keine Demontage** beim Kunden, **Eingriff** in den Geber **bewirkt Verlust des Garantieanspruchs**.  
Deshalb Lagerwechsel nur durch HÜBNER-GIESSEN

#### Beachte:

- max. zulässige Drehzahl
- Umgebungstemperatur
- Versorgungsspannung
- Anschluss nach Schaltbild
- Abnehmbares Steckerteil, Crimpkontakte und Schaltbild sind in einer Tüte am Gerät angebracht
- Seitliche Kabelzugkräfte am Stecker können Auflage bzw. Schutzart beeinträchtigen
- Abgeschirmtes Anschlusskabel **passend** zur Verschraubung, wichtig zur Einhaltung der Schutzart.

Diese, obig dargestellte, allgemeine Wartungs- und Bedienungsanleitung mit Anschlußplan liegt jeder Lieferung bei!

### Maintenance and operation instructions for encoders

#### Installation and commissioning:

- carefully handling during transport, storage, fitting
- **store dry, if necessary use desiccant vacuum packing, storing temperature: max. 40 °C,**
- **storing duration: not more than 4 – 6 months.**  
For other conditions ask = HÜBNER GIESSEN =
- fit the coupling smoothly onto the shaft  
if necessary finish ream the coupling bore (fit G7)
- use a set screw to lock the coupling hub
- use a torsion resistant backlash-free coupling
- **no hard blows on encoder casing and shaft**
- ensure precisely centered mounting, especially with construction type B3
- for hollow shaft encoder FGH...: max. drive shaft concentricity tolerance < 0,05 mm see mounting instructions No. 54570-1  
Axial motion will cause rotational frequency modulation on housing. Longer lever arms will reduce the housing twist.

Mounting / removal using mounting sleeve or puller tool only

**High pulse rate requires high concentricity.**  
Stress-free mounting of the torque bracket with **low-play heads**.

**IMPORTANT FOR MAINTENANCE! link heads**  
to be checked once or twice a year. Must be manually easily turnable! Treat with Teflon spray or grease slightly! Please attach link heads for repair shipments!

To comply with protection requirements, the connecting cable must fit the inlet Pg cable gland (see dimension drawings).

#### Servicing: none needed!

- Permanently lubricated grooved ball bearings have a working life of approx. 20.000 – 35.000 hours (depending on environmental conditions, speed and load)

The **adjusted encoder optics** must not be disassembled by the customer. **Tempering with the encoder invalidates the warranty.** For this reason, bearings may only be changed by HÜBNER-GIESSEN.

#### Note:

- max. permissible speed
- ambient temperature
- supply voltage
- connection according to circuit diagram
- detachable plug parts, crimp contacts and circuit diagram are supplied in a bag attached to the unit
- Lateral cable stresses at the plug may impair connection and degree of protection
- screened connection cable **matched** to cable gland is important to comply with protection requirements.


The a.m. general maintenance and operating instructions, including connection scheme will accompany the goods to be delivered.

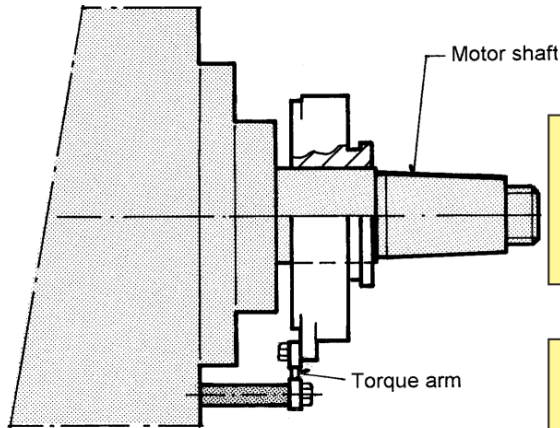
JOHANNES HÜBNER · Fabrik elektrischer Maschinen GmbH

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	<b>Mounting and Removal Instructions</b> <i>of Incremental Hollow Shaft Encoder</i> <b>all Versions TYPE: FGH 14...</b> <b>or FGH 14 EC...</b>	<b>No. 54 728</b>
		02-07

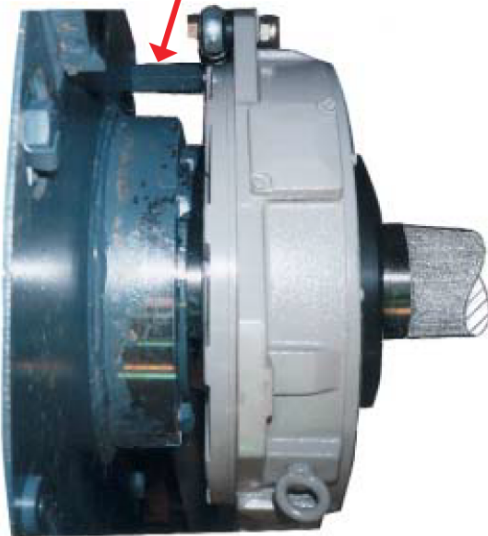


**Spacer length of Type FGH 14..mod. only für modified unit**

**ATTENTION!!**

*check spacer length on encoder exchange!!!*

Motor	Motor-shaft Ø	Spacer-length
Hoist	150	3,65"
Crowd	93	2,92"
Swing	93	2,14"



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 www.huebner-giessen.com



<p>JOHANNES <b>HÜBNER</b> GIESSEN</p>	<p><b>Mounting and Removal Instructions</b> of Incremental Hollow Shaft Encoder All Versions TYPE: FGH 14...</p>	<p><b>No. 54 728</b></p>
-----------------------------------------------	--------------------------------------------------------------------------------------------------------------------------	--------------------------



Remove fastening screw M 14 of torque bracket

Fasten fitting sleeve with captive hexagonal cap screws M6 (Drwg-No. D 52833a-II)  
**Remove encoder by means of removal tool!!**

**Note:**  
**Don't remove by blows or force directly on housing, this may cause considerable damage!!**



Clean motor shaft extension, remove it from rust and finish smoothly particularly the bore holes of old radial set screws

**Note:**  
**Easy mounting of encoder on shaft by means of Spieth-pressure sleeve or clamping device!**


**Grease shaft surface slightly!!**

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	<p><i>Mounting and Removal Instructions of Incremental Hollow Shaft Encoder</i> <b>TYPE: FGH 14.../S</b></p>	<p><b>No. 54 728</b></p>
<p>bore: <math>\varnothing</math> 93, <math>\varnothing</math> 107,95 = Spieth clamp = bore: <math>\varnothing</math> 95</p>		

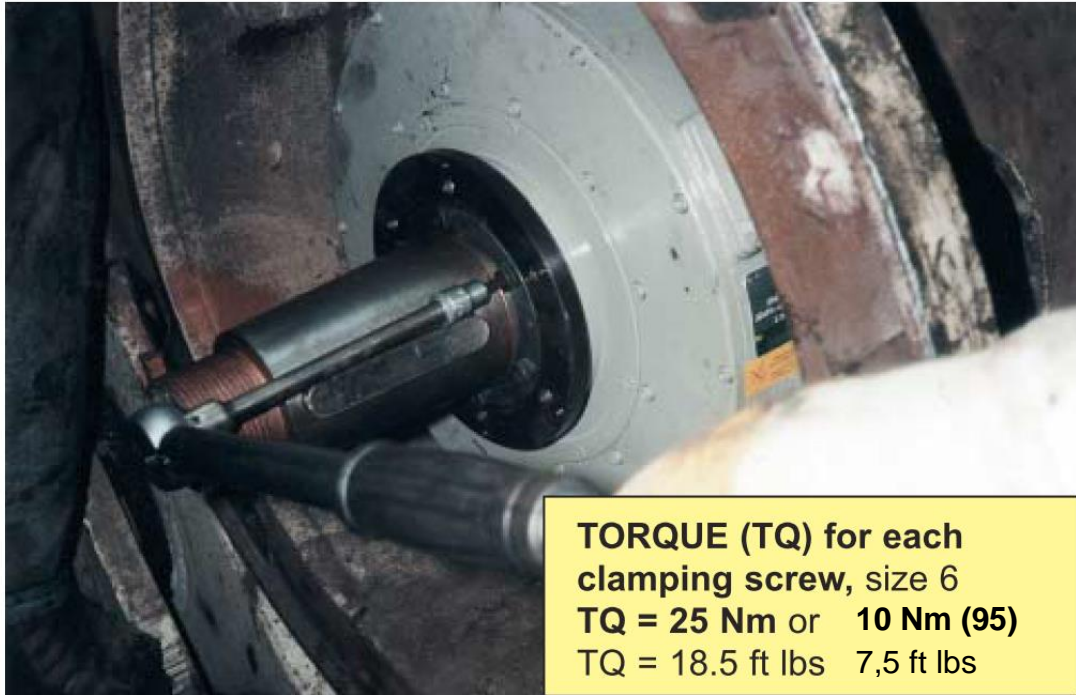


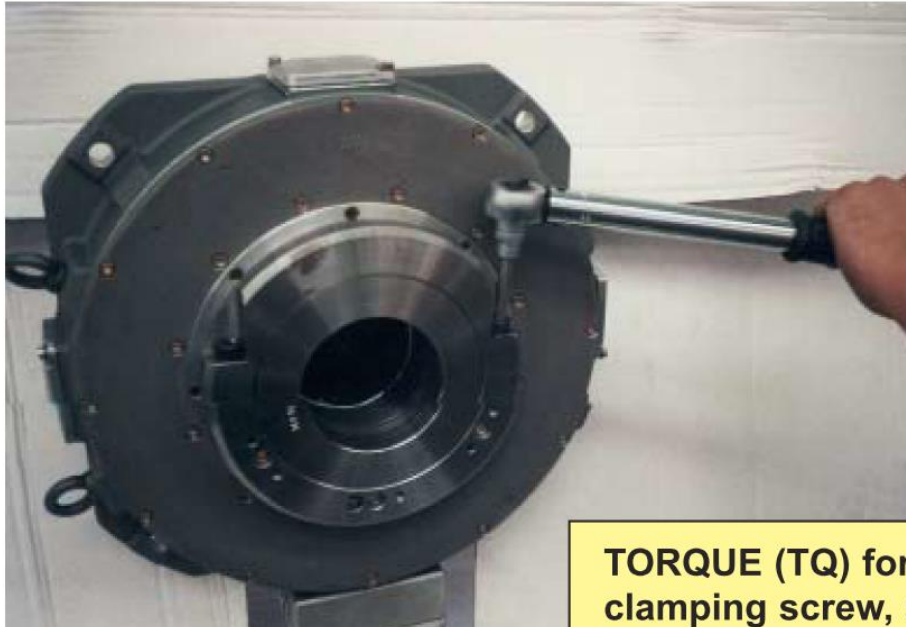
Foto shows: **Spieth-Clamp** of type DS 93.125.52  
with hexagonal head cap screws M 8

1. Push the clamping sleeve between motor shaft and hollow shaft bore without using force
- 2. Use no hard blows on transmitter casing and shaft**
3. Tighten the clamping screws evenly in diagonal order until initial assembly play is eliminated
4. Continue tightening evenly and gradually in diagonal sequence until you have achieved full torque of 25 Nm / 18.5 ft lbs
5. **Use torque wrench** of type 10-60 Nm 3/8, hexagonal bore 6 mm
6. Fasten torque bracket
7. Take care of spacer length and bracket arm length (on exchange)
8. Test of mounted torque bracket:  
link rod must be easily turnable in link rod head, no distorsion!!

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	<p><i>Mounting and Removal Instructions of Incremental Hollow Shaft Encoder TYPE: FGH 14.../150K</i></p>	<p><b>No. 54 728</b></p>
<p><i>bore: ø 150</i></p>		



*Foto shows: Clamping device bore: ø 150  
with hexagonal head cap screws M 10*

**TORQUE (TQ) for each  
clamping screw, size 8**  
**TQ = 50 Nm or**  
**TQ = 37 ft lbs**

1. Push the clamping device between motor shaft and hollow shaft bore without using force
2. **Use no hard blows on transmitter casing and shaft**
3. Tighten the clamping screws M10 DIN 912 (micro-adhesive coated)  
Torque of 50 Nm / 37 ft lbs
4. **Torque wrench** of type 10-60 Nm 3/8, hexagonal bore 8 mm
6. Fasten torque bracket
7. Take care of spacer length and bracket arm length (on exchange)
8. Test of mounted torque bracket:  
link rod must be easily turnable in link rod head, no distortion!!

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