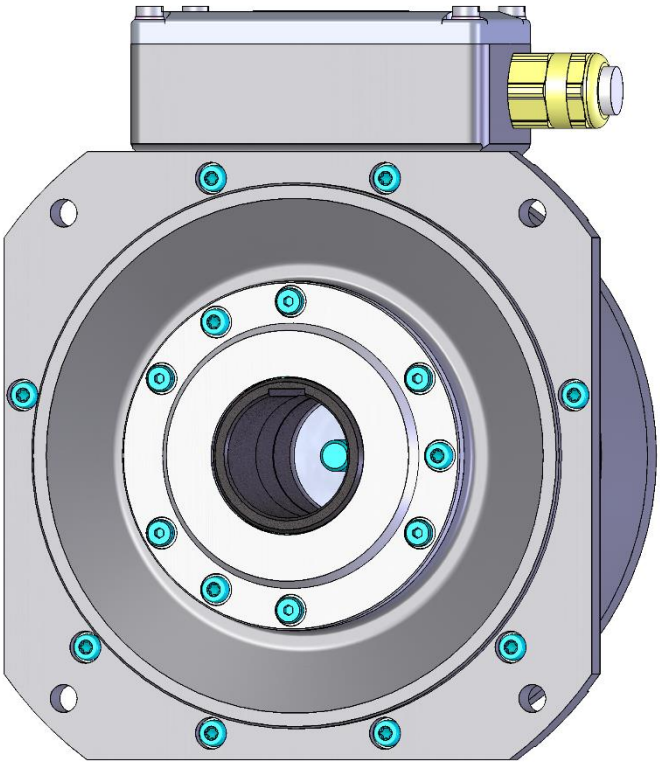
English



Operating and Assembly Instructions
Incremental hollow shaft encoder FGHJ 5

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

Translation of the original Operating and Assembly Instructions FGHJ5_MANUAL-en_R4(2018-11-05)ID74524.docx
ID 74524

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Directory

1 General

1.1 Information about the operating manual

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

Hollow shaft encoder FGHJ 5, 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
- 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 are available that can be reached per telephone, fax, email, or via the Internet, 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 FGHJ 5 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 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.

2.4 Personnel

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

2.5 Special dangers

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

2.5.1 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.

2.5.2 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 standstill.
The encoder can become hot during prolonged use.
In case of contact risk of burns is existing.

2.5.3 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 side of the housing and contains the following information:

- Manufacturer, Address
- Type
- CE-mark
- Serial number
- Year of construction
- Number of pulses
- Degree of protection
- Supply voltage
- ID number

3.2 Electrical and mechanical data

Pulse rates	**Account**
Preferred pulse rates (nickel disks)	1024, 2000
Pulse rates available	512, 1000, 1200, 1800, 2048, 2500

Connection data	
Supply voltage	12 … 30 V DC (Option: 5 VDC)
No load-current	approx. 100 mA at 30 V (without Option)
Outputs	Differential line-driver, resistant to sustained short-circuit, current limited, short-circuit.
Pulse height (HTL)	approx. as supply voltage
Internal resistance	50 Ω per output
Pulse height (TTL)	5 V to RS 422
Slew rate	50 V / µs

Pulse duty factor	1 : 1 ± 5 %
Square wave displacement 0°, 90°	to 50 KHz < 3 % to 150 KHz < 5 %
Max. frequency	0 to 100 kHz. (to 150 kHz on request)
Encoder temperature ranges	
Standard	0°C … + 70°C
Special temperature	-25°C… + 85°C
Special output voltage 5V (TTL)	
Pulse height	5V, RS422 compatible (TIA/EIA-Standard)
Supply voltage	12 … 30 V DC

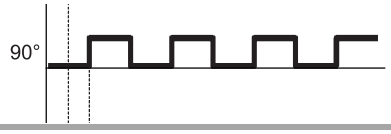
Protection class DIN EN 60529	Sealing	Mechanical speed	Description	Breakaway torque
IP 66 only AS	Radial shaft seal	≤ 1200 rpm	Protection against dust and water spray	approx. 56…60 Ncm
IP 66 both sides	Radial shaft seal	≤ 1100 rpm	Protection against dust and water spray	approx. 70 Ncm

Weight	Type K	7,5 kg

Signal outputs

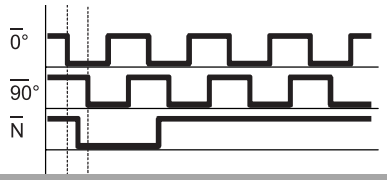
Basic version (n = pulses / revolution).
One pulse channel (basic) with n direct square wave pulses, corresponding to the segment division and LED monitoring output. (optional).

Option 90
2 nd pulse channel as basic version, but with 90°electrical phase shift.

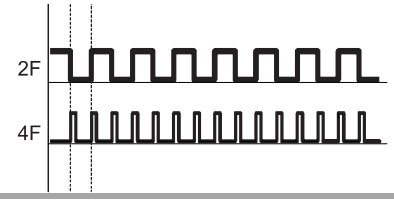


Option N / N2
Marker pulse, mechanically fixed. One square wave pulse per revolution.

Option G
Additional inverted output signals for basic and 90°channels, marker pulse puls LED check.



Option F
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.



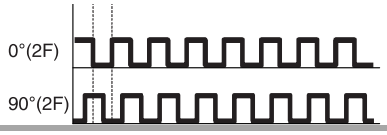
Option B
Fast and precise sensing of rotational direction at each edge of the basic and 90°channels.
Required: option 90.

Output

	L	R	
cw	0	1	Option B, B2
ccw	1	0	
Stillstand	0	0	Option B2

Option B2
As option B, but with standstill sensing..

Option V
Electronic pulse doubling of basic and 90°channesl by multiple evaluation.



Option L2
Power output up to 150 mA for basic channel, 90° channel and the corresponding inverted signals.

Option J
Reduced rotational frequency modulation by means of optically adjusted pulse disk.

3.3 Type code

FGH	J	5	K	1024	G	90G	NG	2F	J	40P

Incremental hollow shaft encoder

Encoder with isolated bearings

Series

Connection method

K: Terminal box
S: EMC industrial plug
R: 12-pol. round plug
C: 2 m cable connection
L: Fibre optic connection

Pulses per revolution

1024, 2048

Basic signal output

Basic channel 0° (A)
Pulse channel 90° (B)
Each with inverted signals

NG: Option reference pulse with inverted signal

2F: Option 2F
4F: Option 4F
B: Option B
B2: Option B2

V: Option V
J: Option J (J can be combined with V)

Hollow shaft bore

Only with hollow shafts
Ø 40

Drive shaft connection
P: feather key

4 Transport, packaging, and storage

4.1 Instruction 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 Goods inward inspection

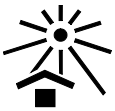
Check the delivery immediately upon receipt for transit damage or short delivery.
Inform the carrier immediately on receipt if you determine that damage has occurred during transit (take photos as proof).

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 Storing 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 10 times to prevent the bearing grease solidifying, which may lead to the destruction of the device.

5 Installation and commissioning

5.1 Safety instructions

Personnel

Only trained, specialized personnel should perform installation and commissioning work.

Observe safety instructions of **chapter 2** before starting any tasks (installation/testing).

5.2 Mounting of the encoder (mechanically)

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

5.2.1 Assembly instruction for hollow shaft devices

1. Mount the adapter flange and align precisely with dial gauge; if necessary optimize the alignment with ball pressure adjusting screws.

2. Secure the ball pressure screws with Loctite. Remove pressure screws that are not used, or likewise secure them with a thread-lock lacquer.
   Max. tightening torque for M12 approximately 25 Nm; for M16 approximately 35 Nm.

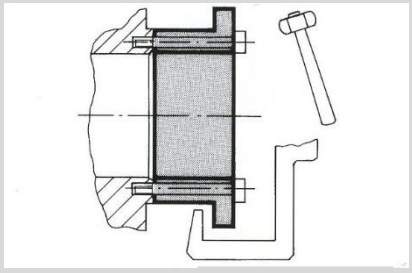
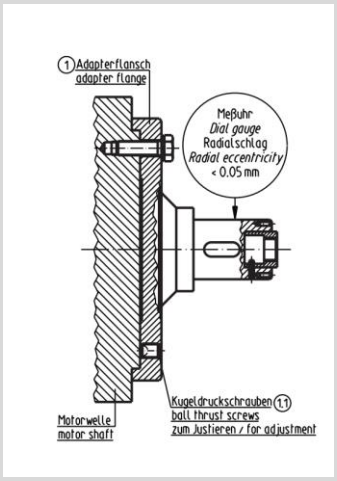


Abb. 1

Abb. 2



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

Mount hollow shaft encoders using mounting sleeve only.

NOTE!
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.

NOTE!
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 box, 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. Fastening Axial tightening disc with 4x M4 on the adapter shaft.
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

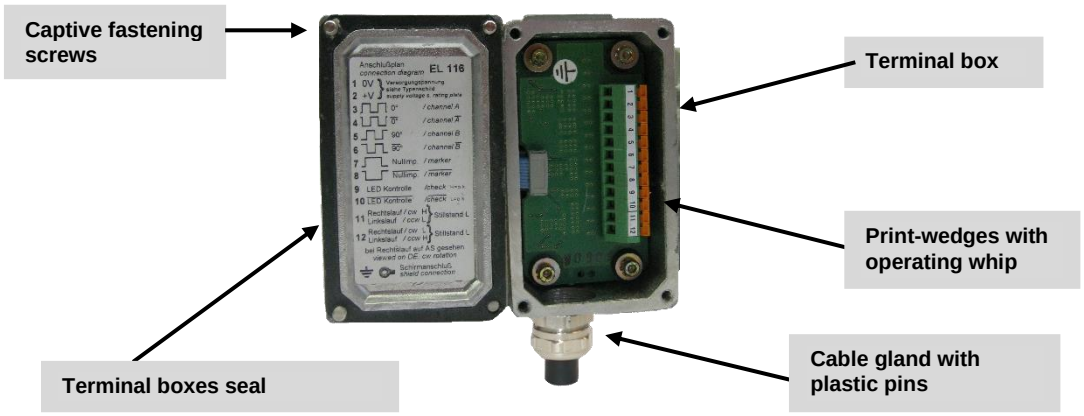
Cable glands are closed with a stopper to protect the devices on transport and storage.

Cable connections:
Have to be executed according to the encoder type.

Connection diagrams have to be considered!
Use of connection cables with diameter of min. 14 mm – max. 15 mm is essential to ensure the protection class. Cable outlet should show preferably downwards.

Option:
R: 12 – pole round plug
S: EMC industrial plug
C: Connection cable

Wiring arrangement and shielding:
(EMC measurement)
The cable shielding to be connected on both ends.
The shield of the signal cable can be connected directly to the housing of the encoder by the cable gland.
The common guidelines for EMC concerned cable routing have to be considered!



Importend instruction!
Competent persons may only connect the encoder.

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 notes

Ambient temperature
The max. perm. ambient temperature depends on speed and protection class (shaft sealing) of the encoder as well as on frequency, signal cable length and mounting situation. See chapter 3.2.

Protection class
To comply with the protection class the signal cable diameter must be appropriate to the cable gland! See chapter 5.3.1.

6 Disassembly

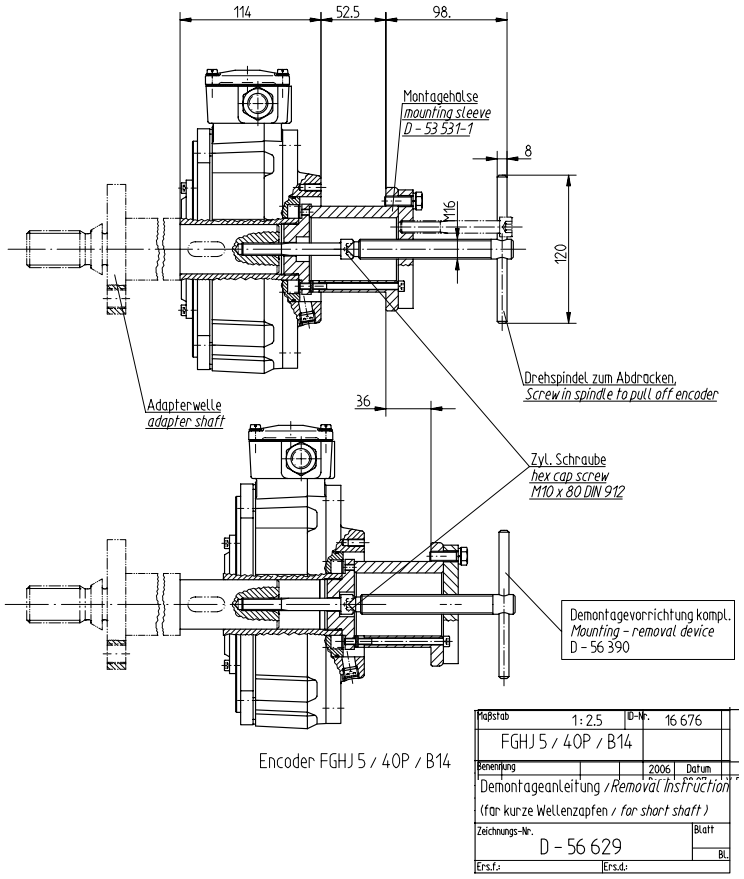
6.1 Safety instructions

Cable must not be pinched
Attention with open terminal boxes.
Moisture should not get into the terminal box when connecting the cable.

Personnel
Dismantling must be carried out by skilled technical staff only.
Attention: Observe safety instructions 2 before starting any tasks. (Installation/maintenance/disassembly).

6.2 Disassembly of the encoder

Disassembly of the hollow shaft encoder has to be done in reverse sequence.
For short adapter shafts the disassembly with the dismantling device can be done completely.



Encoder FGHJ 5 / 40P / B14

7 Troubles

7.1 Troubles table

Malfunction	Possible cause	Trouble shooting
Moisture in the terminal box	Seal of terminal box cover Cable gland Cable dia too small	Contact Hubner Service Check by specialized personnel Change cables
No output signals	No supply voltage Mixed connection cables	Connect supply voltage Check polarity
Disturbed output signals	Improper control cable shield not connected	Use data cables, pairwise drilled and common shielded
Missing output signals	Ouptut stages overloads Short – circuit of output signals	Check connections Check with connection diagram

Hubner – Service address see page 2

8 Inspections

8.1 Safety instructions

Personnel
Dismantling must be carried out by skilled technical staff only.
Attention: Observe safety instructions 2 before starting any tasks. (Installation/maintenance/disassembly).

8.2 Maintenance information

The device is maintenance free. However the following tests are recommended to ensure optimal, problem free operation.

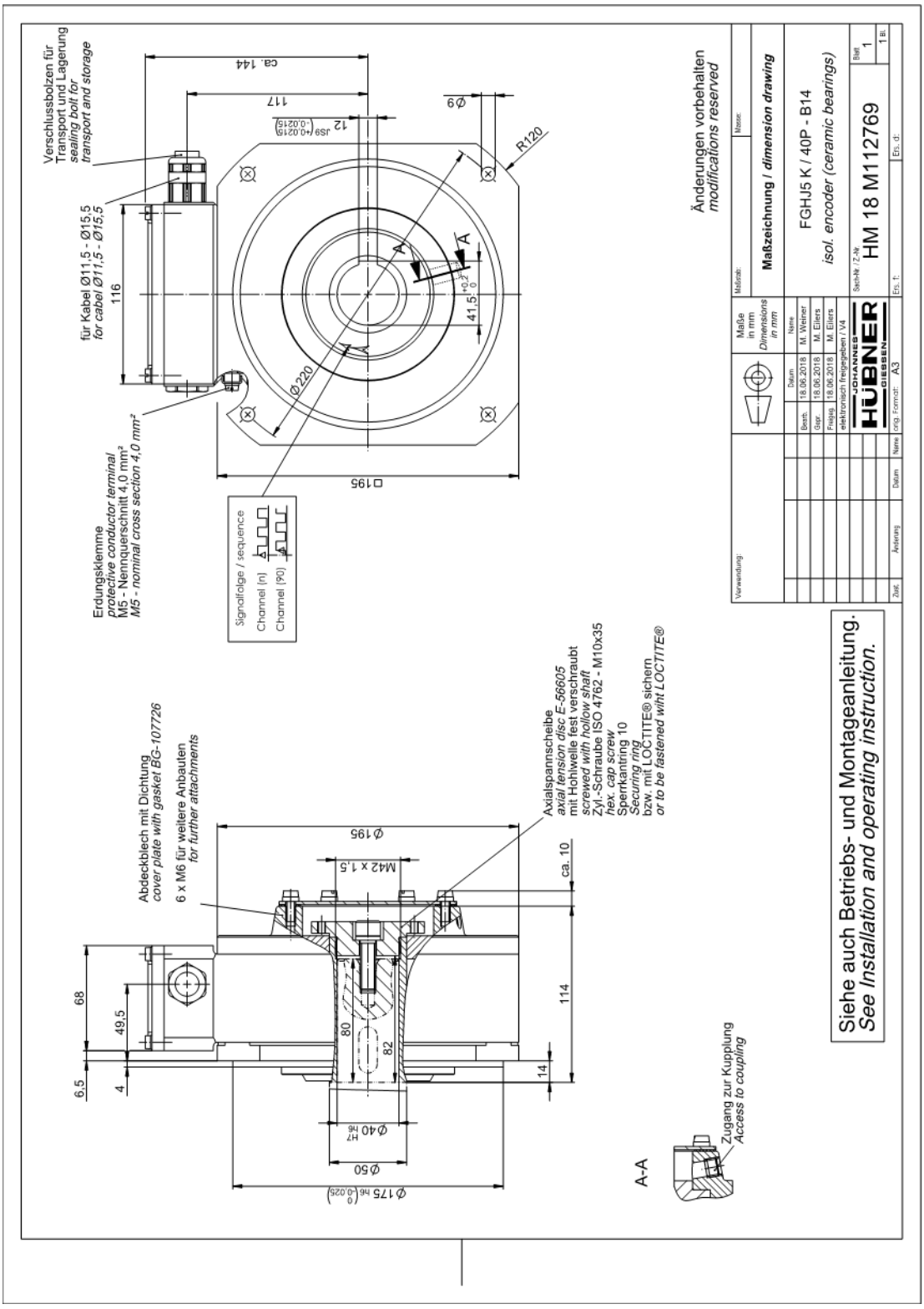
8.3 Inspection schedule

Interval	Tests	Tasks
Every 12 month	Check coupling	Qualified person
Every 12 month	Check the fastening screws for firm seat	Qualified person
Every 12 month	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

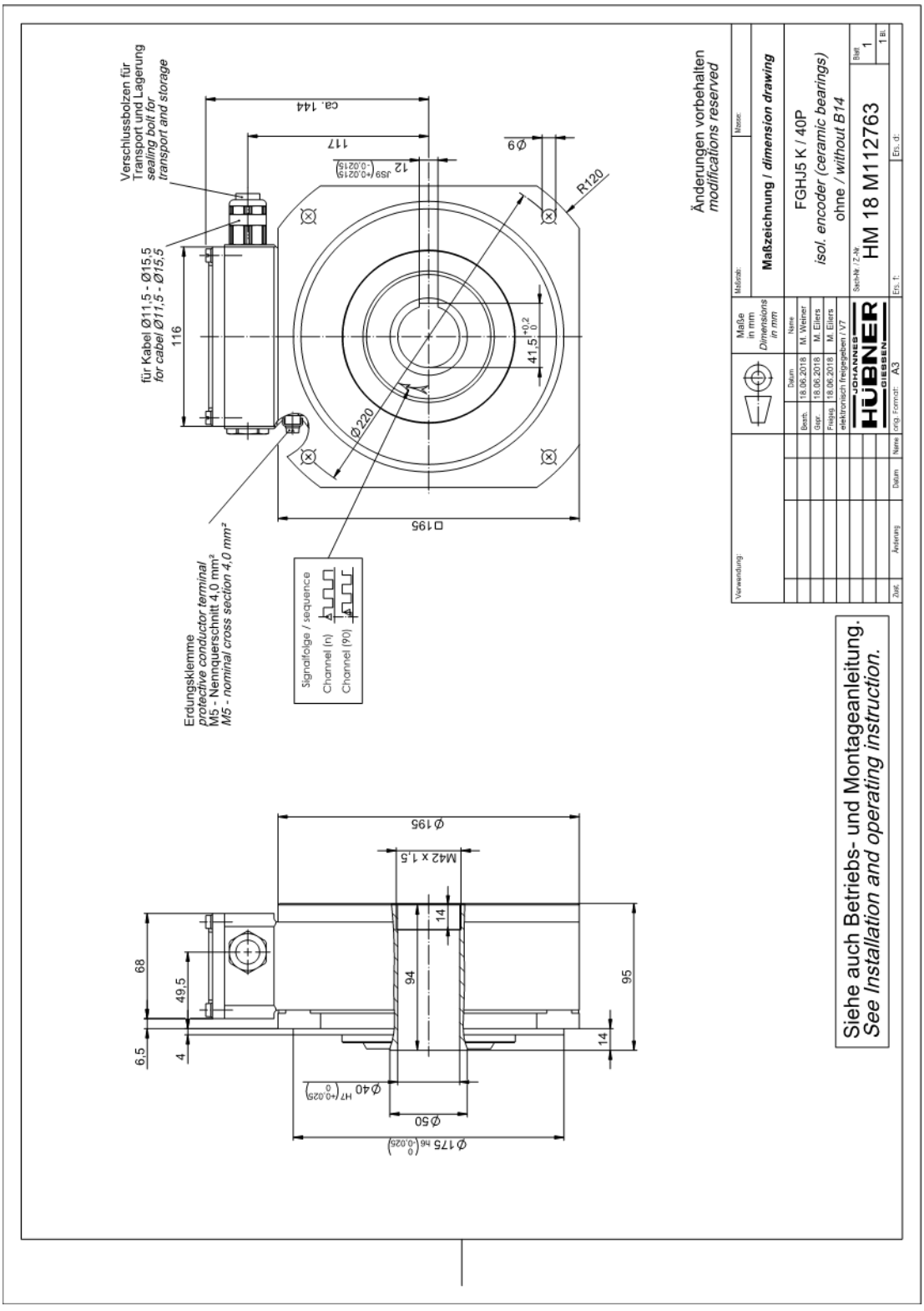
9 Disposal

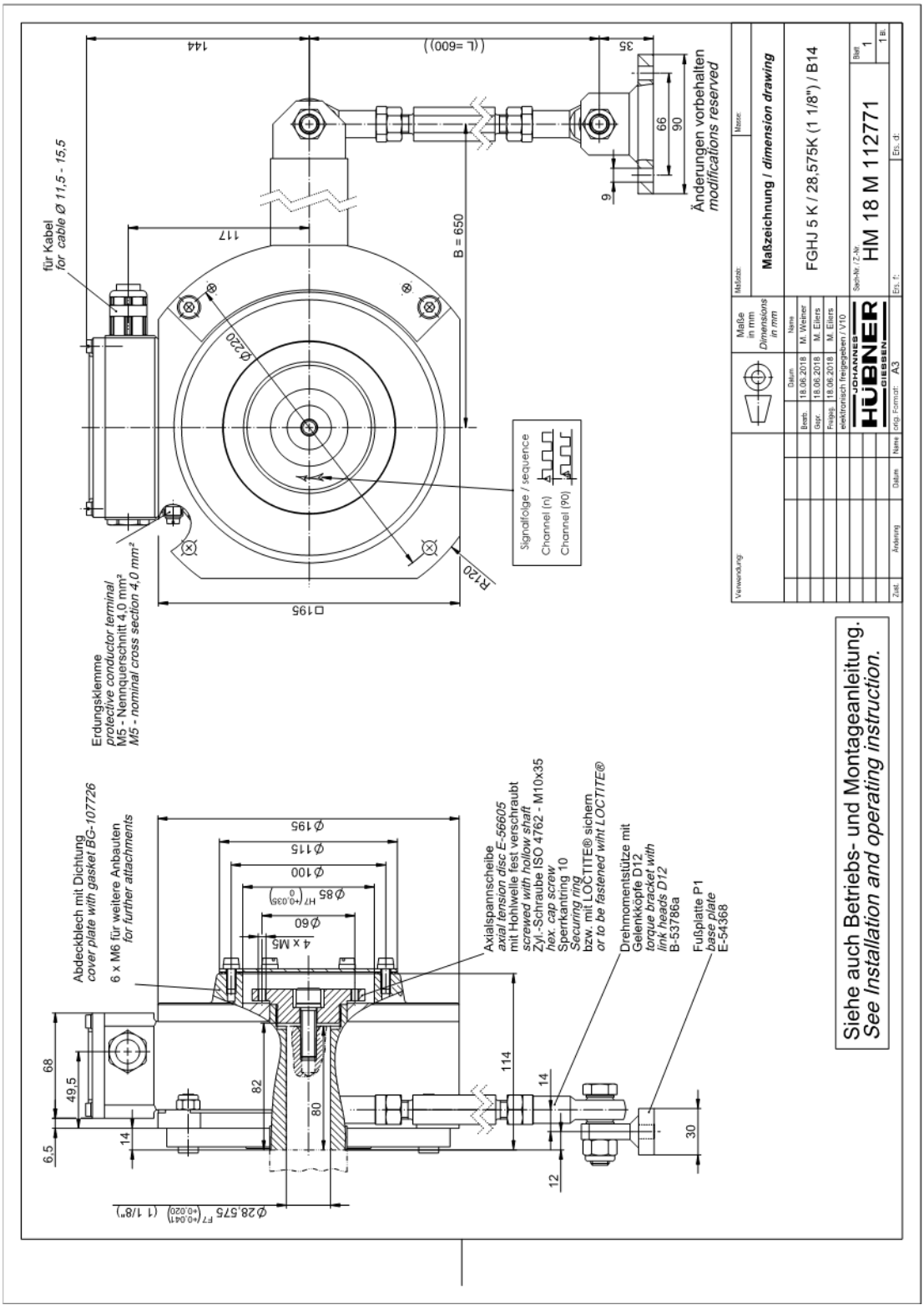
The manufacturer is not obligated to take back electronics waste. The device consists of hybrid components, and in part must be disposed of as special waste (electronic scrap) according to country-specific legislation.
Local municipal authorities or specialized disposal companies provide information on environmentally responsible disposal.

10 Dimension drawings

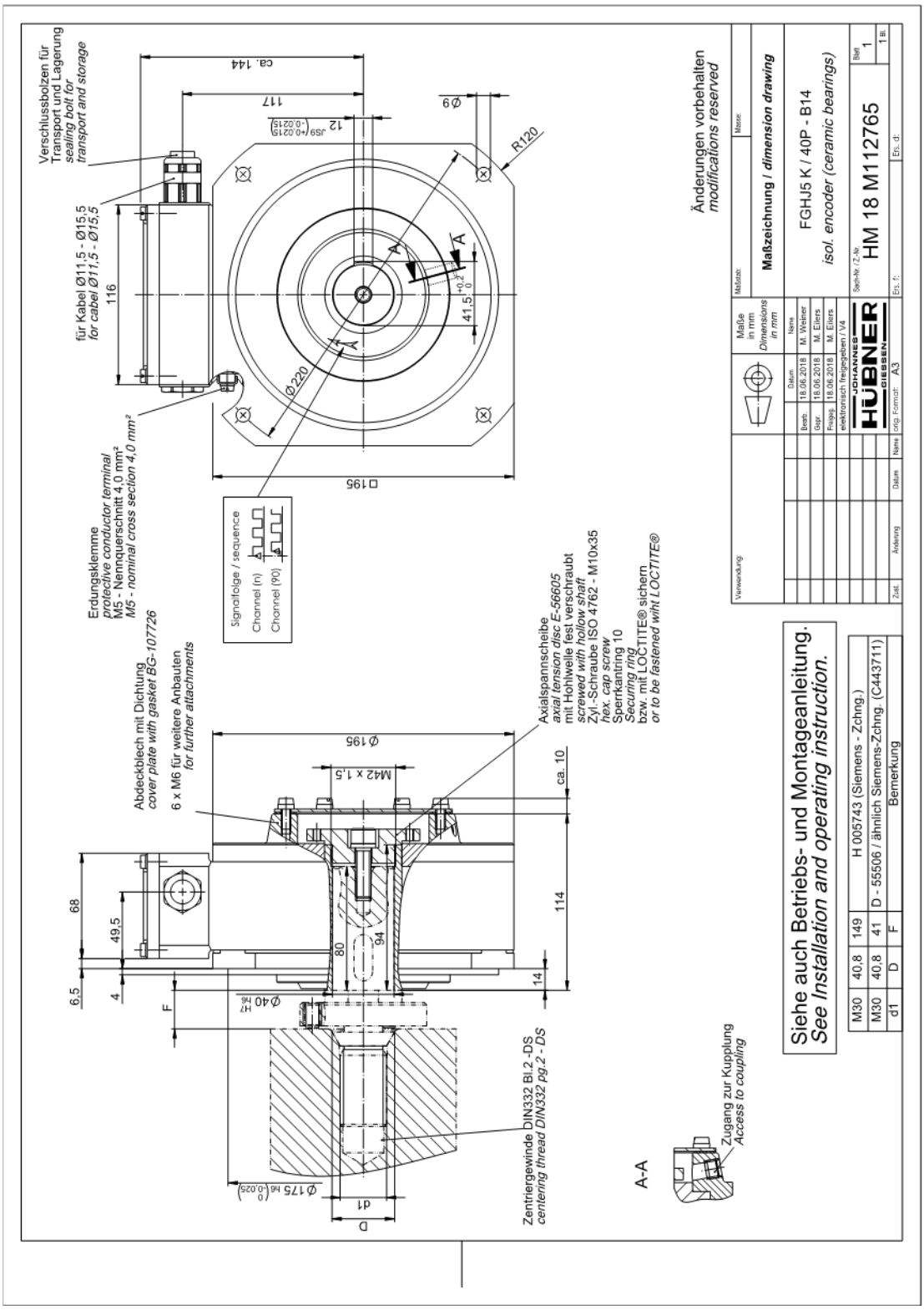


FGHJ 5 K… 40P/ B14 **HM 18 M 112769**

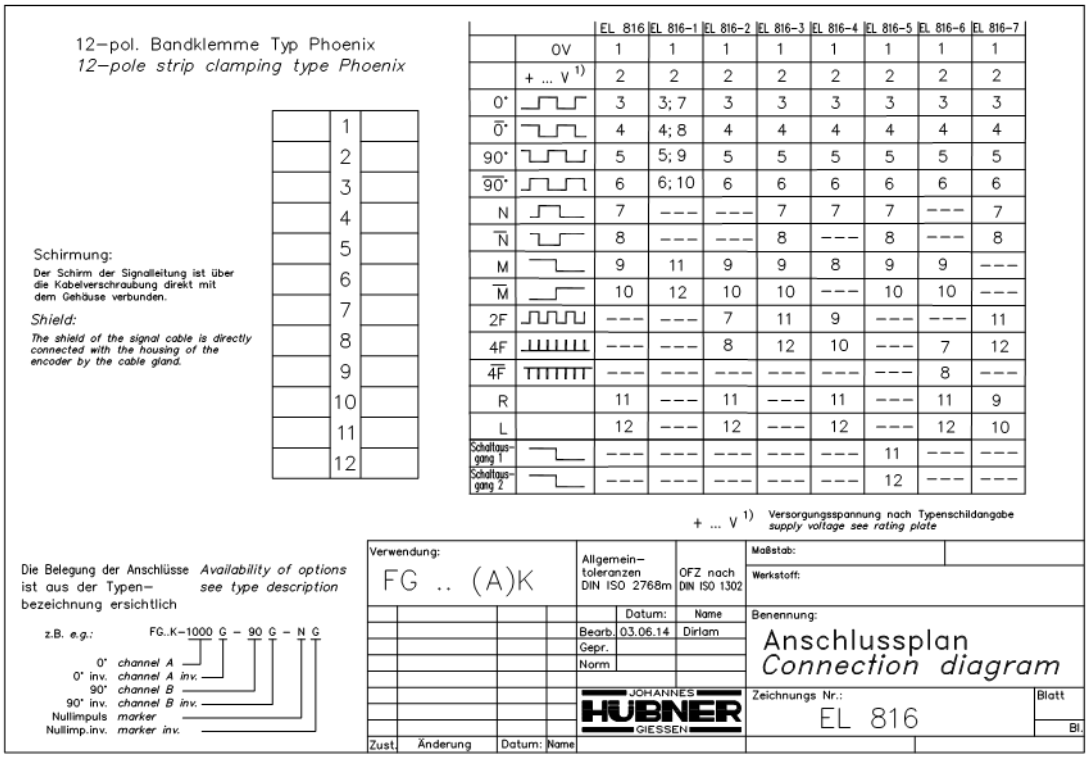

Änderungen vorbehalten
modifications reserved
Maßzeichnung / dimension drawing
FGHJ5 K / 40P
isol. encoder (ceramic bearings)
ohne / without B14
HM 18 M112763
Verschlussbolzen für Transport und Lagerung
sealing bolt for transport and storage
für Kabel Ø11,5 - Ø15,5
for cabel Ø11,5 - Ø15,5
Erdungsklemme
protective conductor terminal
M5 - Nennquerschnitt 4,0 mm²
M5 - nominal cross section 4,0 mm²
Signalfolge / sequence
Channel (n)
Channel (n0)
Siehe auch Betriebs- und Montageanleitung.
See Installation and operating instruction.



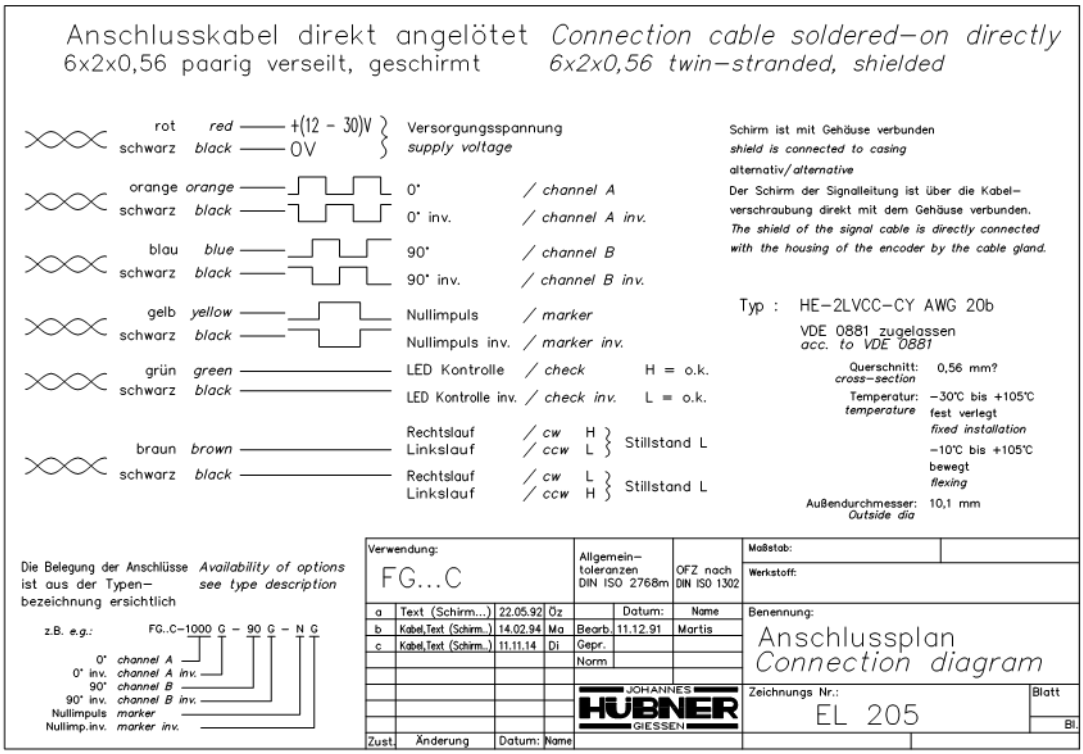
FGHJ 5 K/28,575K (1 1/8“) **HM 18 M 112771**


Änderungen vorbehalten
modifications reserved
Maßzeichnung / dimension drawing
FGHJ5 K / 40P - B14
isol. encoder (ceramic bearings)
HM 18 M112765
Siehe auch Betriebs- und Montageanleitung.
See Installation and operating instruction.
Verschlussbolzen für Transport und Lagerung
sealing bolt for transport and storage
für Kabel Ø11,5 - Ø15,5
for cabel Ø11,5 - Ø15,5
Erdungsklemme
protective conductor terminal
M5 - Nennquerschnitt 4,0 mm²
M5 - nominal cross section 4,0 mm²
Signalfolge / sequence
Channel (n)
Channel (90)
Abdeckblech mit Dichtung
cover plate with gasket BG-107726
6 x M6 für weitere Anbauten
for further attachments
Axialspannscheibe
axial tension disc E-56605
mit Hohlwelle fest verschraubt
screwed with hollow shaft
Zyl.-Schraube ISO 4762 - M10x35
hex. cap screw
Sperrkantring 10
Securing ring
bzw. mit LOCTITE® sichern
or to be fastened with LOCTITE®
Zentriergewinde DIN332 Bl.2 -DS
centering thread DIN332 pg.2 - DS
Zugang zur Kupplung
Access to coupling
A-A
M30 40,8 149 H 005743 (Siemens - Zchng.)
M30 40,8 41 D - 55506 / ähnlich Siemens-Zchng. (C443711)
d1 D F Bemerkung

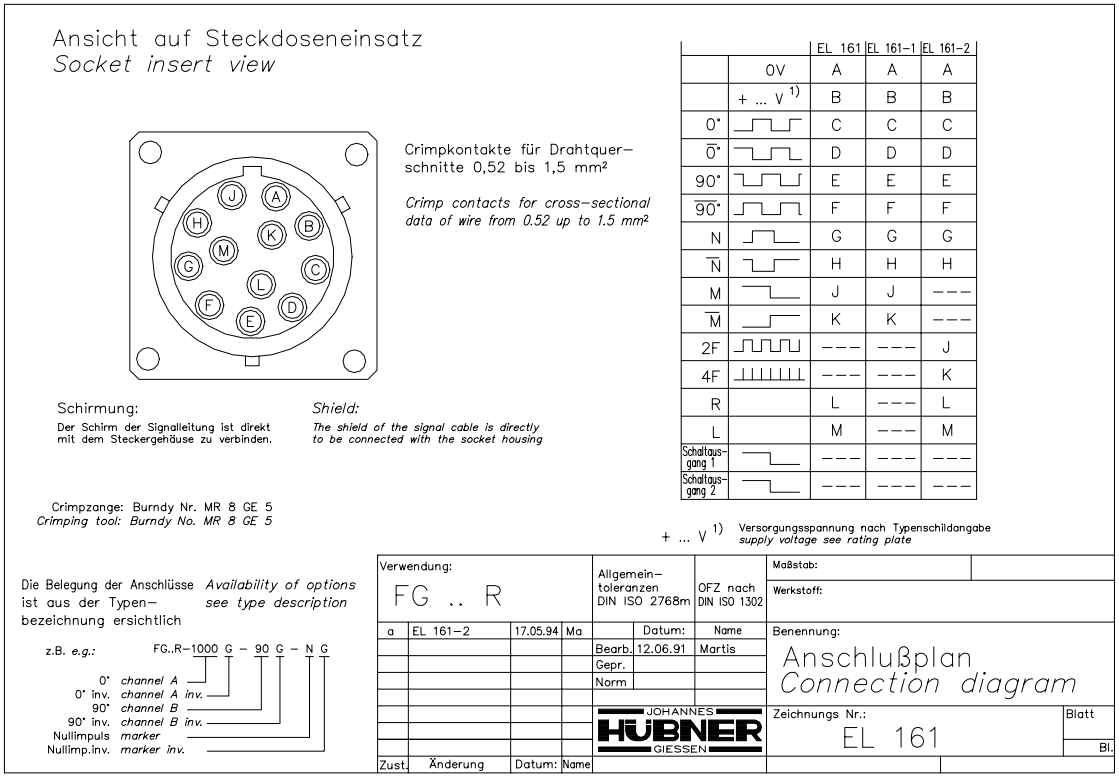
11 Connection Diagrams



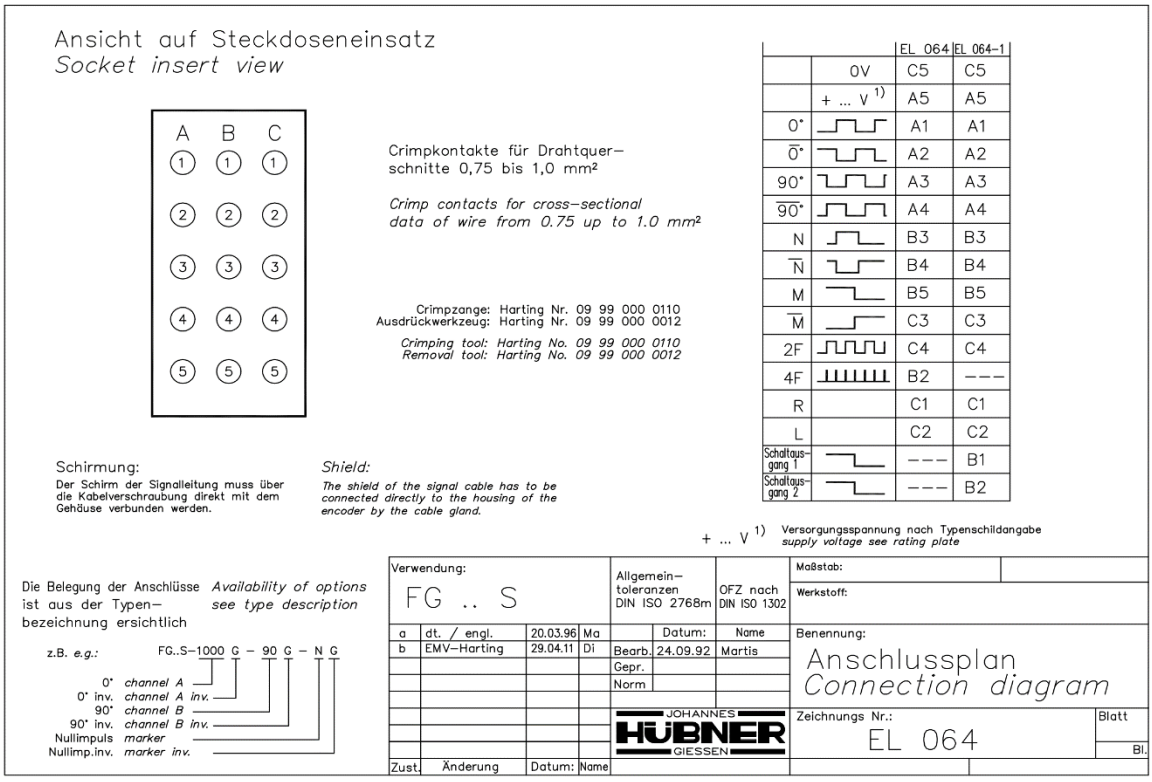
FGHJ 5 **Standard** **Terminal box**



FGHJ 5 **Standard** **Connection cable**



FGHJ 5 **Standard** **12 pol. round plug**



FGHJ 5 **Standard** **EMC industrial plug**