

(Assembly) Instructions

Incremental Encoder FG 4

**Read the (assembly) instructions prior to
assembly, starting installation and handling!
Use for future using!**



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1 General

1.1 Information about the operating manual

These (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 Encoder FG 4, (assembly) instructions.

1.3 Explanation of symbols

Warnings are indicated by symbols in these (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 (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 (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 Manufacturer's Declaration

The device is tested in accordance with EG Directive 2006/42/EC. A separate Manufacturer's Declaration is provided in the.

1.6 Copyright



NOTE!

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

1.7 Guarantee terms

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

1.8 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



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 FG 4 Incremental Encoder 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 Non- intended use

The device may not be used in explosion-threatened areas.

On the device no other mechanical load may be exercised except his dead weight and the oscillations without fail appearing during the company and pushes.

Examples of inadmissible mechanical charges (incomplete listing):

- Connection of transport or lifting means in the device, e.g., load hook for raising of an engine.
- Connection of packaging parts in the device, e.g., instep belts, tarpaulin, etc.
- Use of the device as a step, e.g., for going up of a person on an engine.
- Its use over 3000 m above sea level.

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 should perform installation, mounting, disassembly and commissioning work.

2.6 Special dangers

Residual risks that have been determined based on a risk analysis 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!

Touching rotating shafts can cause serious injuries.

Therefore:

Do not reach into moving parts/shafts or handle moving parts/shafts during operation.

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

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 side of the housing and contains the following information:

- Manufacturer
- Type
- Serial number
- max. speed
- Operating range
- Supply voltage
- Operational voltage / max. switching current

3.2 Electrical and mechanical data

Pulse rates	Account
Preferred pulse rates (nickel disks)	1024, 2000
Pulse rates available	45, 50, 57, 60, 64, 65, 67, 70, 75, 89, 90, 95, 100, 101, 102, 106, 110, 114, 120, 122, 128, 134, 150, 157, 160, 161, 168, 174, 180, 188, 192, 200, 205, 240, 250, 256, 268, 286, 300, 360, 384, 400, 425, 432, 453, 480, 500, 504, 508, 512, 520, 616, 625, 640, 652, 700, 720, 750, 768, 800, 900, 933, 1000, 1040, 1080, 1100, 1300, 1414
Preferred pulse rates glass disk	2000, 2048, 3000, 3600, 4096, 5000, 8192

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 cycle	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 to + 70°C
Special temperature	-25°C to + 85°C

Special output voltage 5V (TTL)

Pulse height	5V, RS422 compatible (TIA/EIA-Standard)
Supply voltage	12 to 30 V DC

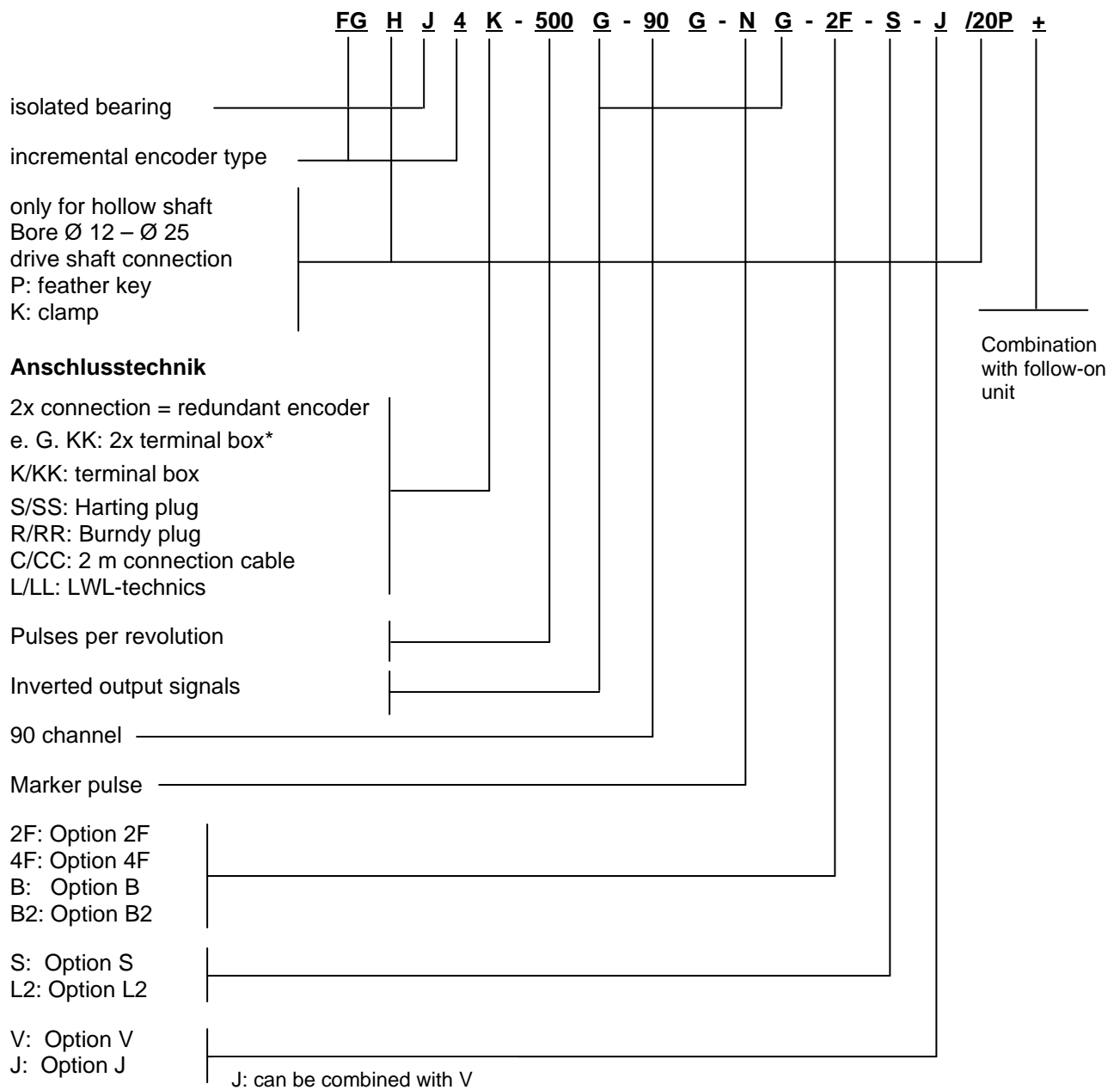
Protection class acc. to DIN EN 60529	Sealing	Mechanical speed	Description	Breakaway torque
IP 55	Standard	$\leq 6000 \text{ min}^{-1}$ (9000) min^{-1}	Protection against dust and water spray	6 Ncm
IP 66	axial or radial shaft seal	$\leq 4000 \text{ min}^{-1}$	Protection against dust and water spray	8/9 Ncm
IP 66 i	see IP 66	$\leq 4000 \text{ min}^{-1}$	see IP 66 with additional "Viton®" sealings and sealed terminal box (oil mist resistant) and special color treatment.	8/9 Ncm
IP 66 ü	see IP 66	$\leq 4000 \text{ min}^{-1}$	see IP 66 for overpressure sealing	8/9 Ncm

Vibration resistance	DIN EN 600068-2-6/IEC 68-2-6 (10-2000 Hz)	20 g (=200 m/s ²)
Shock resistance	DIN EN 600068-2-27/IEC 68-2-27 (10...2000 Hz)	150 g (=1500 m/s ²)
Weight	Type K Type KK	2,5 kg 3 kg
Max. axial shaft load Max. radial shaft load Shaft	$F_a, \text{ max. (axial)} = 100 \text{ N}$ $F_a, \text{ max. (radial)} = 120 \text{ N}$ 11j6 x 30 = 80 – 120 N 14j6 x 30	

Signal outputs																			
<p>Basic version (n = pulses/revolution) One pulse channel (basic) with n direct square wave pulses, corresponding to the segment division and LED monitoring output.</p>																			
<p>Option 90 2nd pulse channel as basic version, but with 90° electrical phase shift.</p>																			
<p>Option N Marker pulse, mechanically fixed. One square wave pulse per revolution.</p>																			
<p>Option G Additional inverted output signals for basic and 90° channels, marker pulse plus LED check.</p>																			
<p>Option 2F / 4F 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>Option B Fast and precise sensing of rotational direction at each edge of the basic and 90° channels. Required: option 90.</p>	<table border="1"> <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>Clockwise</td> <td>0</td> <td>1</td> <td>Option B</td> </tr> <tr> <td>Counterclockwise</td> <td>1</td> <td>0</td> <td></td> </tr> <tr> <td>Standstill</td> <td>0</td> <td>0</td> <td>Opt. D + B2</td> </tr> </tbody> </table>		output			L	R	Clockwise	0	1	Option B	Counterclockwise	1	0		Standstill	0	0	Opt. D + B2
			output																
		L	R																
Clockwise		0	1	Option B															
Counterclockwise		1	0																
Standstill	0	0	Opt. D + B2																
<p>Option B2 As option B, but with standstill sensing.</p>																			
<p>Option D Simple rotational direction sensing at every rising edge of the basic channel. Includes standstill sensing. Required: option 90.</p>																			
<p>Option V Electronic pulse doubling of basic and 90° channels by multiple evaluation.</p>																			
<p>Option L2 Power output up to 150 mA for basic channel and option 1 to option 3.</p>																			
<p>Option J Reduced rotational frequency modulation by means of optically adjusted pulse disk.</p>																			
<p>Option S ¹⁾ Speed indicator with 2 switching outputs.</p>																			

¹⁾ mech. extension (K) on FGH 4 to be considered.

3.3 Type code



*Standard

4 Transport, packaging and storage

4.1 Safety instructions for transport



CAUTION!

Improper transport can cause property damage!

Comply with the symbols and warnings on the packaging.

- Handle with care
- Protect from moisture
- Protect from heat over 40°C and 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

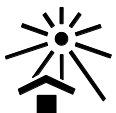
The packaging is not taken back and must be disposed of in accordance with the respective statutory regulations and local guidelines.

4.4 Storage of packages (devices)



Protect from moisture

Keep packed goods dry and protected against moisture.



Protect from heat

Protect packaged goods from heat over 40°C and direct sunlight.

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



Attention:

Turn encoder shafts every 6 months to prevent a possible hardening of the grease-filling of the ball bearings.

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

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



Always grease the shaft slightly before mounting.

Encoder in flange construction B5 have to be fixed with 4 to 6 screws (M6x20) equally spaced on the circumference on the flange.

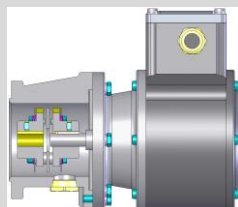
(see dimension drawings chapter 11)



Encoder in foot construction B35 have to be fixed with 4 screws M6 at the foot, screw – in depth min 12 mm

Attention: Mounting surface of the foot and the base must be clean and even.

(see dimension drawings chapter 11)



Encoder with spacer flange and coupling.

See mounting instructions No. 54 690 for couplings.

This mounting manual is provided with the order by accessories (coupling) separately.

5.3 Connecting the encoder (electrically)

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.

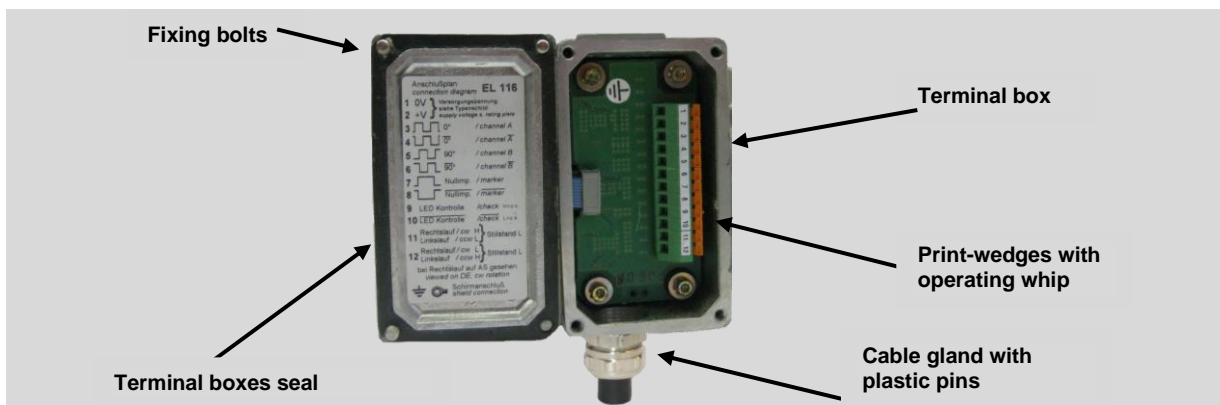
Wiring arrangement and shielding:

(EMV measurement)

The cable shielding to be connected on both ends.

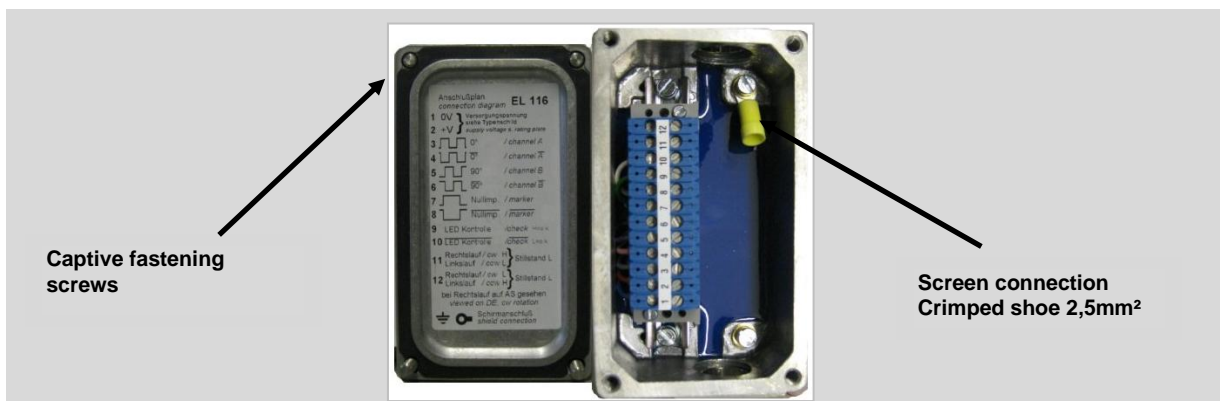
The shield of the signal cable can be connected directly to the housing of the encoder by the cable gland.

The common guidelines for EMI concerned cable routing have to be considered!



Important instruction

The encoder can only be connected by competent persons.



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 3.3.

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



Personnel

Only trained, specialized personnel should perform any disassembly.

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.

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 Hübner 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	Output stages overloads Short – circuit of output signals	Check connections Check with connection diagram
Hübner – Service address see page 2		

8 Testing

8.1 Safety instructions



Personnel

Only trained, specialized personnel should perform tests.

Attention: Observe safety instructions 2 before starting any tasks.

8.2 Maintenance information

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

8.3 Quality control plan



Interval	Tests	Tasks
Every 12 month	Check couplung	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	Hübner – 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.

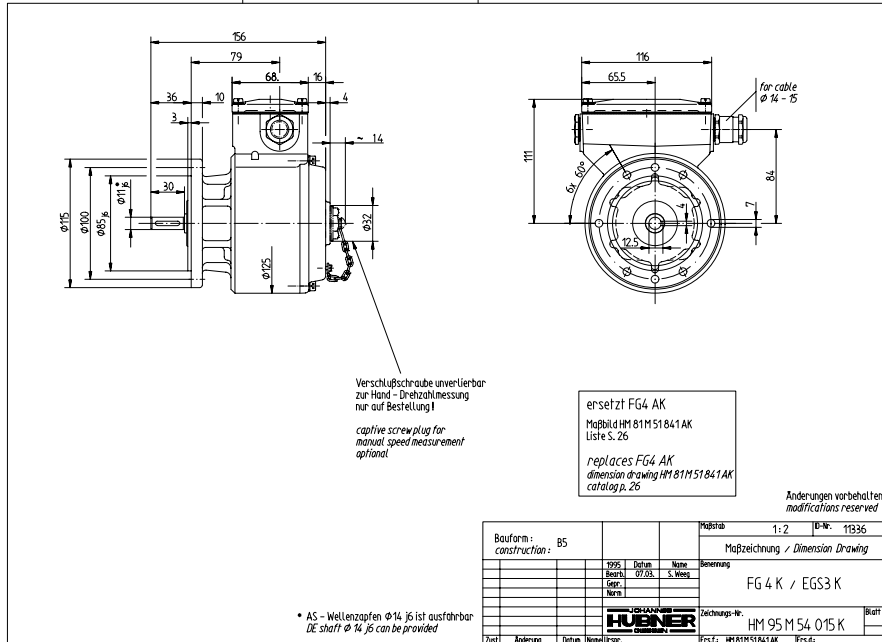
Local municipal authorities or specialized disposal companies provide information on environmentally responsible disposal.

10 Declaration of Conformity

		
EC-Declaration of Incorporation of Partly Completed Machinery In accordance with the EC machine directive 2006/42/EG of 17. May 2006, appendix II B		
<p>We hereby certify that the following described machine in it's conception, construction and form put by us into circulation is in accordance with all the relevant essential health and safety requirements of the EC machinery directive 2006/42/EEC as amended and the national laws and regulations adopting this directive. This declaration is no longer valid if the machine is modified without our consent. Commissioning of machine is permitted only provided that the components installed in the machine do comply with the relevant directive standards 2006/42/EG).</p>		
<p>Manufacturer: Johannes Hübner Fabrik elektrischer Maschinen GmbH Siemensstrasse 7 D-35394 Giessen/Germany</p>		
<p>Description of the machine: function: incremental encoder type/model: FG 4</p>		
<p>The agreement includes the conformity declaration guidelines/regulations of the following products: EMV – directive (2004/108/EC) of December 15, 2004 EEC low – voltage directive 2006/95/EC of December 12, 2006</p>		
<p>Applied harmonized standards in particular are as follows: EN 12100-1 2003-11 Safety of machinery, basic concepts, general principles for design, Part 1 Basic terminology, methodology EN 12100-2 2003-11 Safety of machinery, basic concepts, general principles for design Part 2 Technical principles IEC 60204-1 2005-modified Safety of machinery – Electrical equipment of machines Part 1: General Requirements</p>		
<p>We declare that special technical information for this incomplete machine is according to appendix VII, part B and we obligate us, to submit this information through the Head of QM to the market supervisory authorities on demands.</p>		
<p>Authorized person for the technical documentation: Gerhard Esch QMD (Head of QM) at the above address</p>		
Signature: 	Thomas Brandenburger member of the board	Date: 28.10.2010

11 Dimension drawings

11.1.1 Construction Type B5

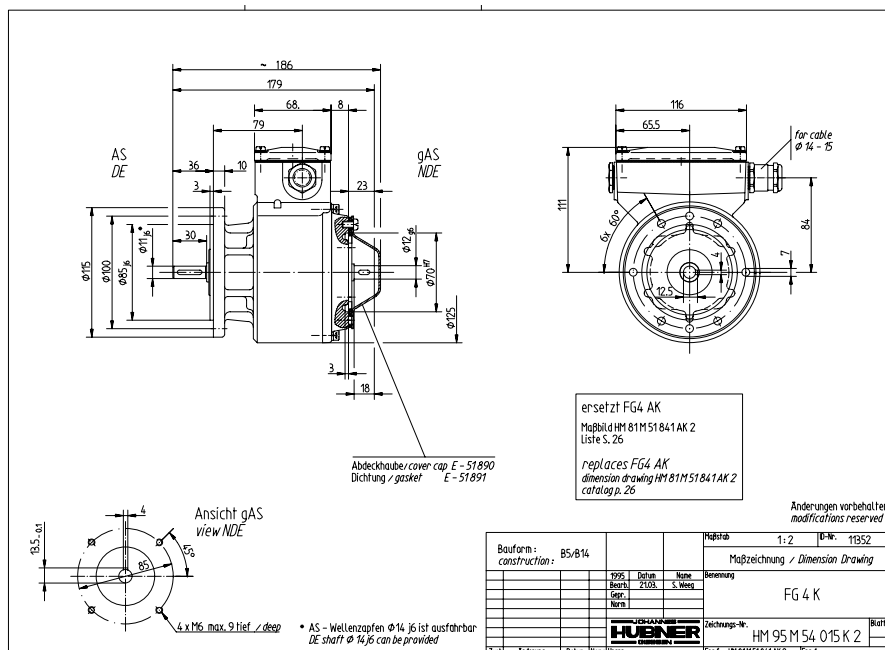


FG 4 K

With radial terminal box

HM 95 M 54 015 K

11.1.2 Construction type B5 / B14 2nd shaftend and B14-flange g AS

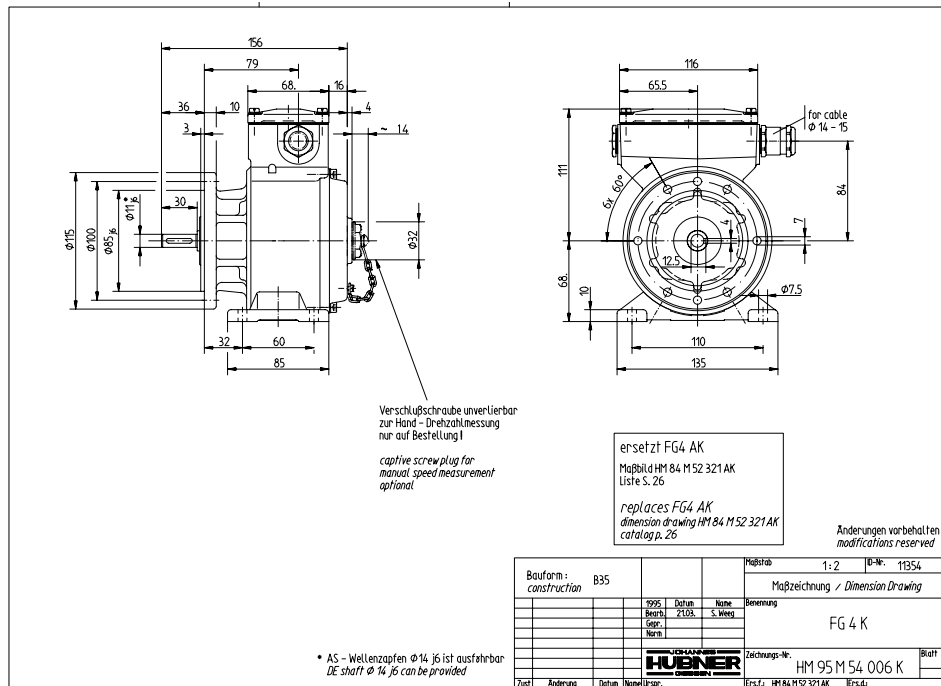


FG 4 K

With radial terminal box

HM 95 M 54 015 K 2

11.1.3 Construction type B35 flange and foot

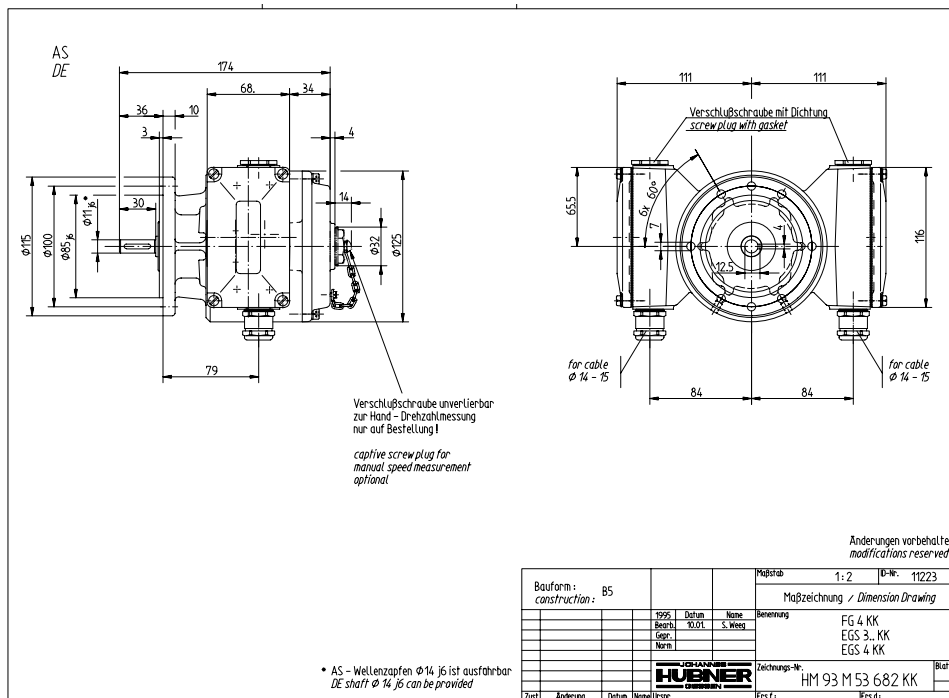


FG 4 K

With radial terminal box

HM 95 M 54 006 K

11.1.4 Construction type B35 (flange)

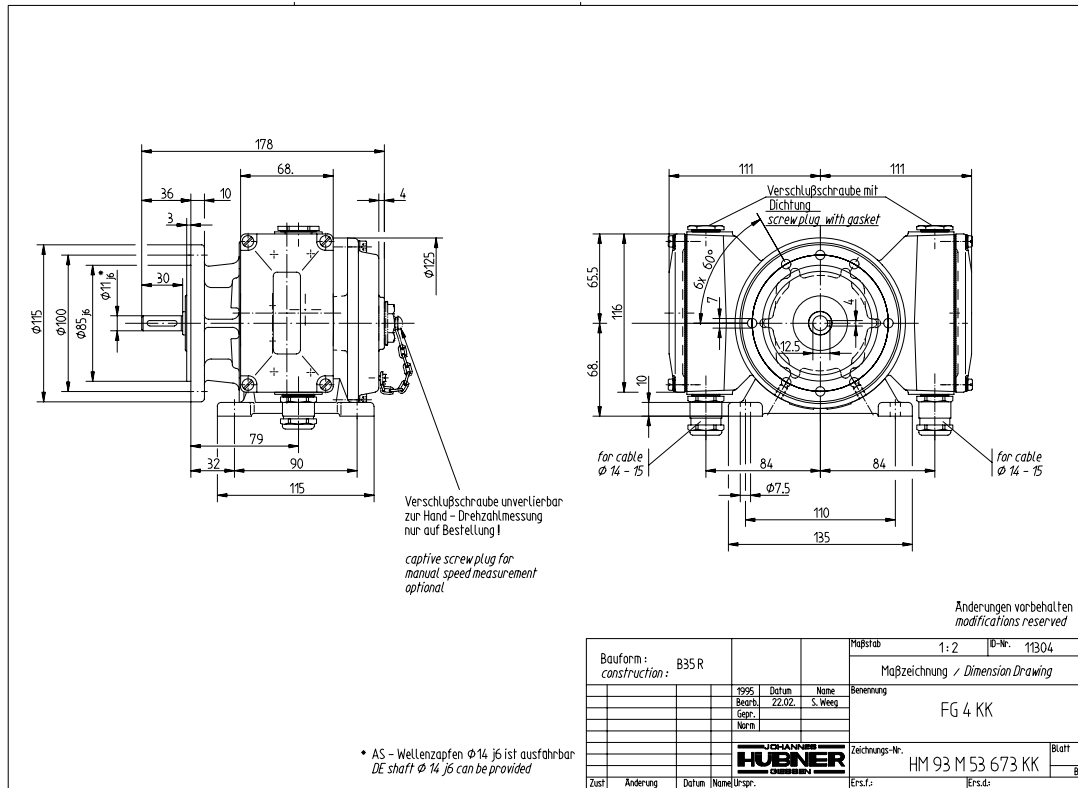


FG 4 KK

**Redundant version or with
integrated option S**

HM 93 M 53 682 KK

11.1.5 Construction type B35 flange and foot



FG 4 KK

Redundant version or with
integrated option S

HM 93 M 53 673 KK

Special dimension drawings on request or see internet.

12 Mounting instructions for coupling



Montageanleitung für Kupplungen Mounting Instructions for Couplings

NR. 54 690 S.1

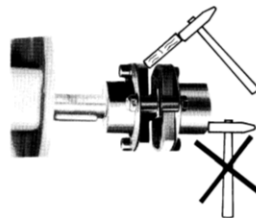
Datum: 06/2009

Kupplungsbohrung – Passung G7 oder H7 –
d. h.: Toleranzfeld liegt oberhalb der Nulllinie.
= **Kupplung muß leichtgängig aufziehbar
sein =**

Bohrungen vor der Endmontage prüfen evtl.
nachreiben, dann leicht einfetten.

Mindestens eine Nabe, mit Radialgewindestift
mit Spitze/Ringschneide, gegen
Axialverschiebung befestigen. Gewindestift
drückt auf Paßfeder, damit Welle nicht
beschädigt wird.

Beachte: **zulässige Nachgiebigkeiten!**
sind voneinander abhängig – siehe Rückseite



Coupling bore – fit – G7 or H7
i. e.: tolerance range is above the reference line
= **Fit the coupling smoothly =**

Please refinish coupling bores prior to final
mounting, if necessary finish-ream and grease
bores slightly.

Provide axial fastening on shaft by radial set
screw. Fasten at least one set screw with coned
point/cupped gripping point to avoid axial offset.
Set screw pushes onto the feather key to
prevent shaft from damage.

Note: **admissible resiliences!**
are dependent on each other see backside

Anbaufehler:

- bewirken Radialkräfte, diese können die Geberlager und die Kupplung beschädigen oder zerstören!
- Verschlechtern **Signalqualität!** Verstärkt **Oberwelligkeit und Drehschwebung!**

Je genauer der Anbau, um so höher die Lebensdauer der Kupplung/Geberlager, um so präziser die Ausgangssignale!

Mounting failures!

- **Misalignment** can cause radial forces which may damage the coupling or destroy the encoder bearings!
- **Signal quality** can be affected, **rotational frequency modulation and interferences (ripple)** may occur.

The more precise the mounting, the higher the service life of the coupling and the bearings of the encoders.

Kupplung Typ HK.. 5-

durch Deformation bei Montage, beim Überschreiten der zulässigen Nachgiebigkeiten kann der **Federstahl-Ausgleichsring Ø 54 mm** beschädigt werden.



Coupling Type HK.. 5-

by deformation caused by wrong mounting and if permissible resiliences will be exceeded, spring steel compensating element dia 54 mm can be damaged.

Balgkupplungen Typ EK.. / DKN..:

Bei der **Montage/Demontage kritisch**
– **Bruchgefahr des Faltenbalges** – vor allem bei der Demontage festsitzender Wellenzapfen.

Verwendung von rostlösendem Gleitspray o.ä.,
Radialgewindestchrauben vorher lösen. Kupplung
vorsichtig an den Naben abdrücken.
Reservekupplung einplanen.



Metal bellows coupling type EK/DKN..

Critical fitting/removal
Bellows may brake above all while removing from the tight shaft extension.

For removal it is recommended to use an antirust/
anticorrosion spray and to unscrew the radial set screw.
Press on the hubs carefully when removing the coupling.
Spare coupling should be available

Steckkupplungen Typ HK7-HK45:

Bei der Montage ist die **axiale Lage** der
Kupplungshälften zu beachten, ein **ausreichender
Abstand** von 1 – 2 mm zum Kunststoffstern sind
einzuhalten, damit dieser **nicht gequetscht** wird und
die elektrische Isolierung erhalten bleibt.

Abstandsverhältnisse müssen ausgemessen werden,
damit **keine** zusätzliche **axiale Verspannkraft** entsteht, die sich
sehr **nachteilig** auf die **Lagerlaufzeit** und auf die
Ausgangssignale auswirkt!



Push-on coupling HK7 up to HK 45

For mounting please consider **axial position** of coupling
halves. A **distance** of 1 – 2 mm to the Plastic tooth
ring must be maintained in order to **prevent it from
squeezing** and to protect the electrical insulation.
**Distance relation of coupling parts must be
measured** to avoid axial forces affecting both the
service life of the bearings and the output signals!

JOHANNES HÜBNER · Fabrik elektrischer Maschinen GmbH

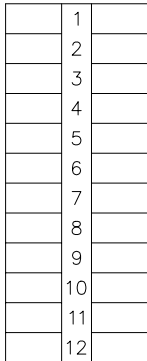
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13 Connection Diagrams

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



Schirmung:
Der Schirm der Signalleitung ist direkt mit dem Gebergehäuse zu verbinden.

Shield:
The shield of the signal cable is directly to be connected with the housing of the encoder

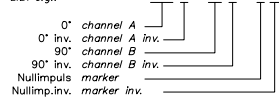
	0V	EL 116	EL 116-1	EL 116-2	EL 116-3	EL 116-4	EL 116-5	EL 116-6
+ ... V ¹⁾	2	2	2	2	2	2	2	2
0°		3	3; 7	3	3	3	3	3
0° inv.		4	4; 8	4	4	4	4	4
90°		5	5; 9	5	5	5	5	5
90° inv.		6	6; 10	6	6	6	6	6
N		7	---	---	7	7	7	---
N inv.		8	---	---	8	---	8	---
M		9	11	9	9	8	9	9
M inv.		10	12	10	10	---	10	10
2F		---	---	7	11	9	---	---
4F		---	---	8	12	10	---	7
4F		---	---	---	---	---	---	8
R		11	---	11	---	11	---	11
L		12	---	12	---	12	---	12
Schaltgang 1		---	---	---	---	---	11	---
Schaltgang 2		---	---	---	---	---	12	---

+ ... V¹⁾ Versorgungsspannung nach Typenschildangaben
supply voltage see rating plate

Verwendung: FG .. (A)K	Allgemein-toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab: Werkstoff:
a Text: Schirmung.. 19.08.94 Ma	Datum: Name	Benennung:	
b Diverses 21.03.96 Ma	Bearb. 06.02.93 Martis	Anschlußplan Connection diagram	
c EL116-1 30.06.03 Ko	Gepr. Norm		
d EL116-6 24.03.04 Ko	Norm	Zeichnungs Nr.: EL 116	
Zust. Änderung Datum: Name	Blatt Bl.		

Die Belegung der Anschlüsse Availability of options
ist aus der Typen- see type description
bezeichnung ersichtlich

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

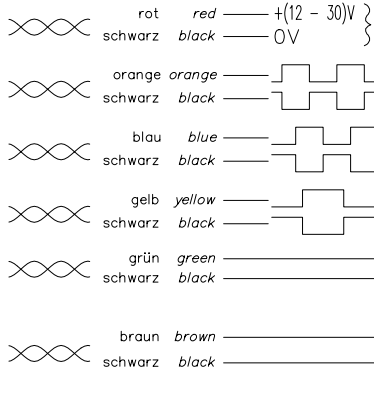


FG 4

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

Schirm ist mit Gehäuse verbunden
shield is connected to casing

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 } Stillstand L

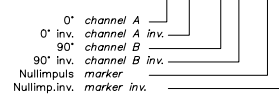
Rechtslauf / cw L } Stillstand L
Linkslauf / ccw H } Stillstand L

Typ : HE-2LVCC-CY AWG 20b
VDE 0881 zugelassen
acc. to VDE 0881
Querschnitt: 0,56 mm?
cross-section
Temperatur: -20°C bis +105°C
Außendurchmesser: 10,1 mm
Outside dia

Verwendung: FG...C	Allgemein-toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab: Werkstoff:
a Text (Schirm...) 22.05.92 Öz	Datum: Name	Benennung:	
b Kabel,Text (Schirm...) 14.02.94 Ma	Bearb. 11.12.91 Martis	Anschlußplan Connection diagram	
	Gepr. Norm		
Zust. Änderung Datum: Name	Zeichnungs Nr.: EL 205		Blatt Bl.

Die Belegung der Anschlüsse Availability of options
ist aus der Typen- see type description
bezeichnung ersichtlich

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



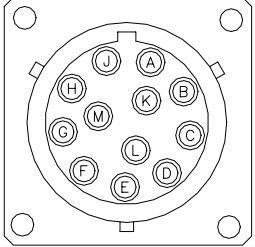
FG 4

Standard

Connection cable

Incremental Encoder FG 4

Ansicht auf Steckdoseneinsatz
Socket insert view



Crimpkontakte für Drahtquer-
schnitte 0,52 bis 1,5 mm²

*Crimp contacts for cross-sectional
data of wire from 0.52 up to 1.5 mm²*

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 Availability of options
ist aus der Typen- see type description
bezeichnung ersichtlich

z.B. e.g.: FG.R-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.

	0V	EL 161	EL 161-1	EL 161-2
+ ... V ¹⁾		A	A	A
0°		B	B	B
0°		C	C	C
90°		D	D	D
90°		E	E	E
N		F	F	F
N		G	G	G
M		H	H	H
M		J	J	---
2F		K	K	---
4F		---	---	J
R		---	---	K
L		L	---	L
L		M	---	M
Schallausgang 1		---	---	---
Schallausgang 2		---	---	---

+ ... V¹⁾ Versorgungsspannung nach Typenschildangabe
supply voltage see rating plate

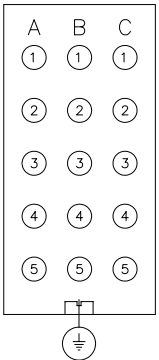
Verwendung: FG .. R	Allgemein- toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab: Werkstoff:
a EL 161-2	17.05.94	Ma	Datum: Name
			Bearb. 12.06.91 Martis
			Gepr. Norm
			Benennung: Anschlußplan Connection diagram
			Zeichnungs Nr.: EL 161
Zust.	Änderung	Datum: Name	Blatt Bl.

FG 4

Standard

12 pole Burndy plug

Ansicht auf Steckdoseneinsatz
Socket insert view



Crimpkontakte für Drahtquer-
schnitte 0,75 bis 1,0 mm²

*Crimp contacts for cross-sectional
data of wire from 0.75 up to 1.0 mm²*

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 Availability of options
ist aus der Typen- see type description
bezeichnung ersichtlich

z.B. e.g.: FG.S-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.

	0V	EL 064	EL 064-1
+ ... V ¹⁾		C5	C5
0°		A5	A5
0°		A1	A1
90°		A2	A2
90°		A3	A3
N		A4	A4
N		B3	B3
M		B4	B4
M		B5	B5
2F		C3	C3
4F		C4	C4
R		B2	---
L		C1	C1
L		C2	C2
Schallausgang 1		---	B1
Schallausgang 2		---	B2

+ ... V¹⁾ Versorgungsspannung nach Typenschildangabe
supply voltage see rating plate

Verwendung: FG .. S	Allgemein- toleranzen DIN ISO 2768m	OFZ nach DIN ISO 1302	Maßstab: Werkstoff:
a dt. / engl.	20.03.96	Ma	Datum: Name
			Bearb. 24.09.92 Martis
			Gepr. Norm
			Benennung: Anschlußplan Connection diagram
			Zeichnungs Nr.: EL 064
Zust.	Änderung	Datum: Name	Blatt Bl.

FG 4

Standard

15 pole Harting plug

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