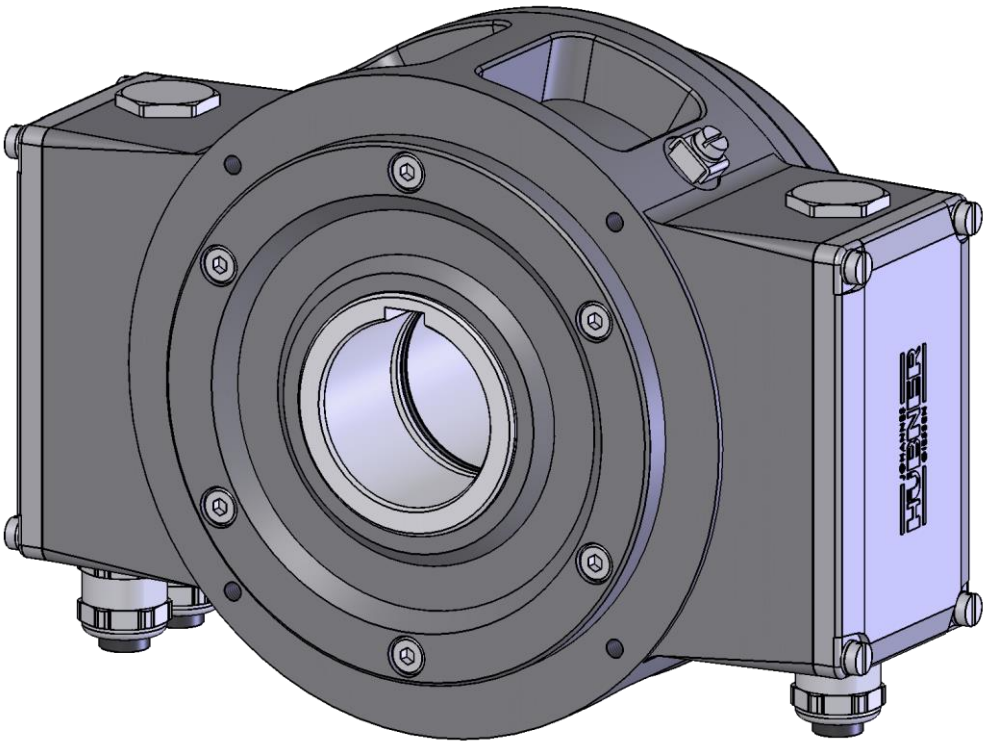
English

JOHANNES HÜBNER GIESSEN
ideas and solutions



Operating and Assembly Instructions

Hollow shaft absolute encoder ASPAH 60
Singleturn with parallel interface and dual incremental encoder output

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

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Directory

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

Scope of delivery includes the hollow shaft absolute encoder ASPAH 60, the Operating and 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 Copyright

NOTE!
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 reached per 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 devices area of implementation.

2.2 Intended use

The device has been designed and constructed exclusively for the intended use described here.
Series ASPAH 60 are used for position detection.

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.
- It is not permitted to use the device in nuclear plants and aircraft.

2.4 Personal protective equipment

Wear personal protective equipment such as safety shoes and safety clothing to minimise risks to health and safety when carrying out work such as installation, disassembly or commissioning. Adhere to all applicable statutory regulations as well as the rules and standards determined by the owner.

2.5 Personnel

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

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 / 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.

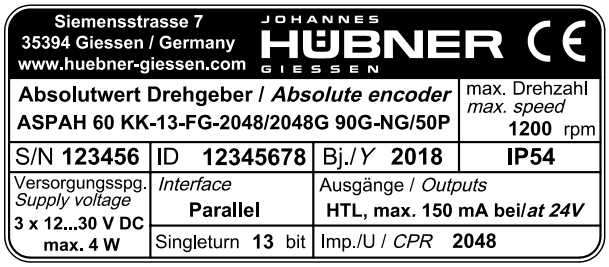
Close to protect from injury all access openings in flanges with the corresponding plug screw, and provided you exposed rotating components with protective covers.
Do not open covers during operation. Prior to opening the covers ensure that all parts have come to a standstill.
The encoder can become hot during prolonged use.
In case of contact risk of burns is existing.

2.6.3 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

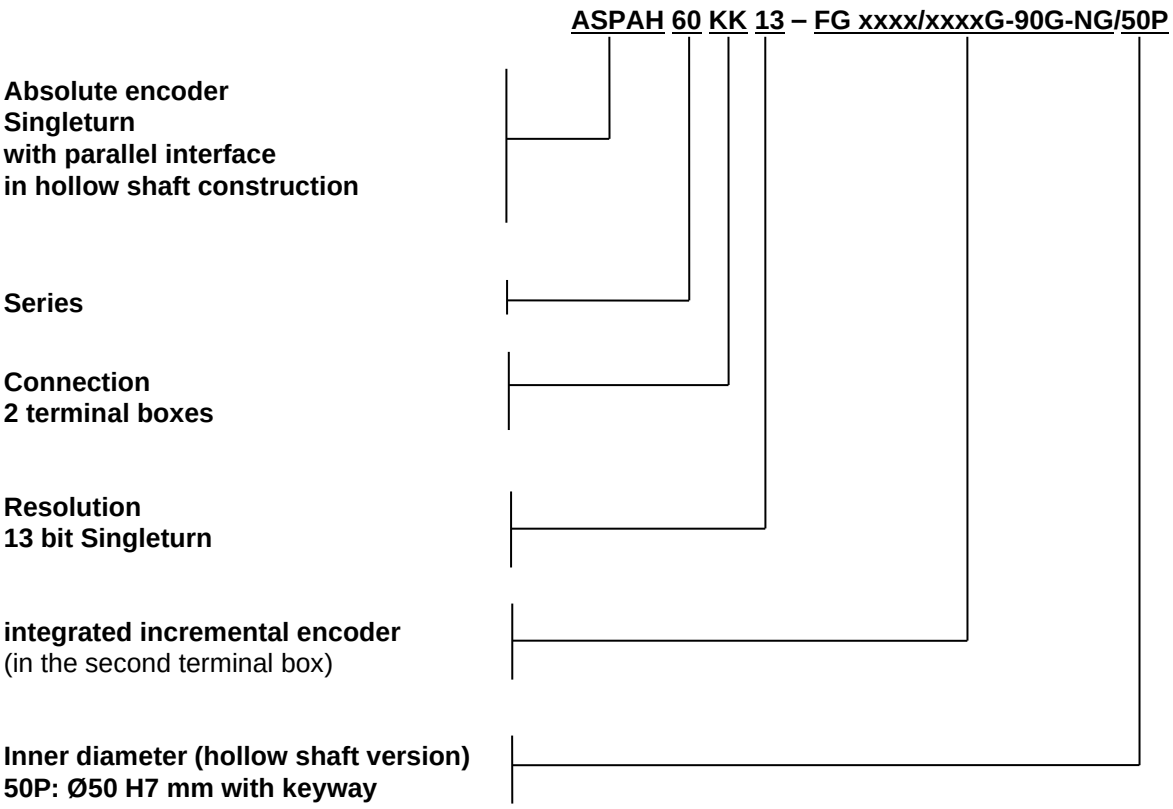
3.1 Type plate example



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

- Manufacturer, address
- Type, year of construction
- CE mark
- Serial number (S/N)
- Item (ID)
- Max. speed
- Degree of protection
- Supply voltage
- Singleturn-resolution
- Number of pulses
- Outputs

3.2 Type key


ASPAH 60 KK 13 – FG xxxx/xxxxG-90G-NG/50P
Absolute encoder
Singleturn
with parallel interface
in hollow shaft construction
Series
Connection
2 terminal boxes
Resolution
13 bit Singleturn
integrated incremental encoder
(in the second terminal box)
Inner diameter (hollow shaft version)
50P: Ø50 H7 mm with keyway

3.3 Electrical and mechanical data

Type	ASPAH 60
Absolute part (Scanning 1)	
Supply voltage	12 V … 30 V DC
No load power consumption	approx. 1 W
Resolution singleturn	13 bit (8192 steps/revoluion)
Data format	parallel, gray code
Outputs	current limited Push – Pull – line drivers Bit 1 to Bit 13, Error Examples: 13 Bit: (internal connector 1-15) 10 Bit: (internal connector 1-12)
Signal amplitude (HTL)	approx. supply voltage
Output current	max.50 mA
Error-output	low - aktiv

Incremental part (Scanning 2)	
Output 1	
Supply voltage	12 V … 30 V DC
No load power consumption	approx. 2 W
Number of pulses	2048, 4096,8192 (see type plate)
Outputs	current limited Push – Pull – line drivers 0°, 90°, N, Error with inverted signals
Signal amplitude (HTL)	approx. supply voltage
Output current 0°, 90°	approx. 150 mA
Output current N, ERR	approx. 50 mA
Duty cycle	1:1± 0,1
Phase shift	90°± 10°
Error output	low - aktiv
Output 2	
Supply voltage	12 V … 30 V DC
No load power consumption	approx. 2 W
Number of pulses	2048, 4096,8192 (see type plate)
Outputs	current limited Push – Pull - line drivers 0°, 90°, N Error, with inverted signals
Signal amplitude (HTL)	approx. supply voltage
Output current 0°, 90°	approx. 150 mA
Output current N, ERR	approx. 50 mA
Duty cycle	1:1± 0,1
Phase shift	90°± 10°
Error output	low - aktiv

Temperature range of device	
Standard	-25°C … + 85°C

Degree of protection DIN EN 60529	Sealing	Mech. max. permissible speedl	Rotor moment of inertia	Breakaway torque
IP 55	Gap seals	4000 rpm	approx. 28 kgcm^2	approx. 30 Ncm

Weight	Typ KK	approx. 8 kg

4 Transport, packaging and storage

4.1 Safety information concerning 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

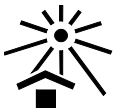
Check the delivery immediately upon receipt for transit damage or short delivery.
Inform the carrier immediately on receipt if you determine that damage has occurred during transit (take photos as proof).

4.3 Packaging (disposal)

The packaging is not taken back; dispose of according to the respective valid statutory provisions and local regulations.

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 to prevent the bearing grease solidifying!

5 Installation and commissioning

5.1 Safety instructions

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

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

5.2 Technical information

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

Ambient temperature

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

Degree of protection

To fulfill degree of protection requirements the diameter of the connection cable must correspond to that of the cable gland (please refer to Chapter 10 dimension drawings)

Deep groove ball bearings
The hollow shaft absolute encoder ASPAH 60 is fitted with maintenance-free, greased "for-life" deep groove bearings. Bearings must be changed by the manufacturer only. Opening the encoder renders the guarantee null and void.

Screw retention

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

5.3 Required tools

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

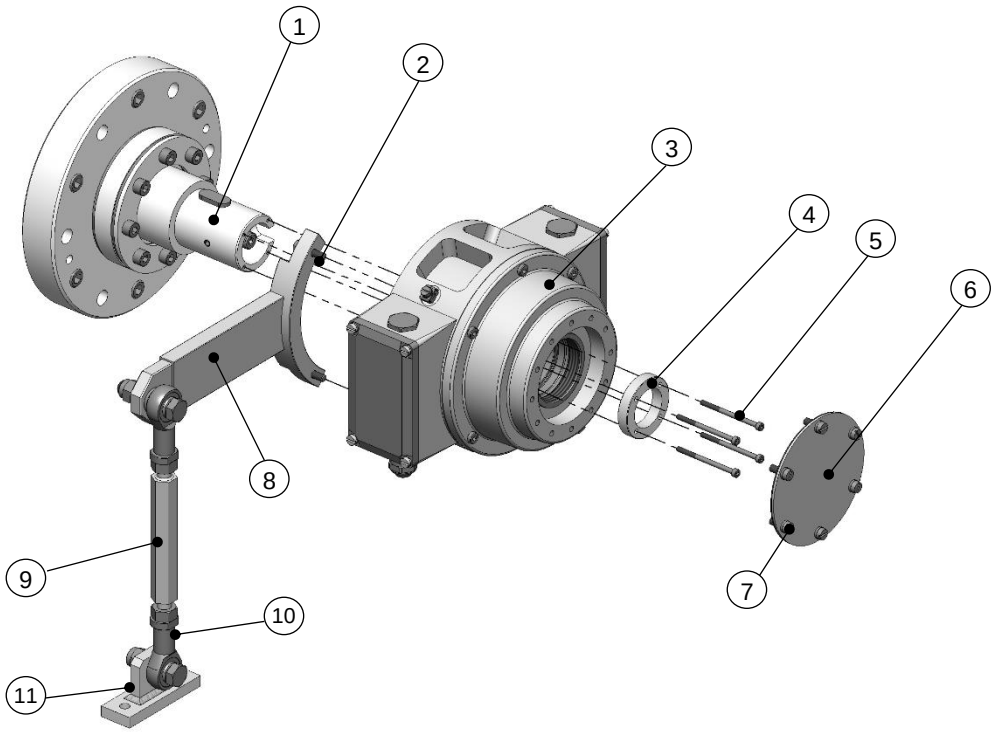
5.4 Mounting preparations

1. Ensure all accessories are available (please refer to Chapter 10 dimension drawings).

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

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

5.5 Mounting of hollow-shaft absolute encoder



NOTES!
Follow with the assembly to the scope of supply of the adapter shaft belonging assembly instructions. It contains tips to the alignment and to the necessary cultivation exactness of the adapter shaft.

1. Lightly grease the adapter shaft (1).
2. Secure the torque bracket (8) to the hollow-shaft device (3) with 2 tensilock screws (2).

NOTES!
When fitting to the device it is possible to align the torque bracket in four different directions. If possible fit the device in a manner that ensures the cable gland points downwards!

3. Mount the hollow-shaft device to the adapter shaft.
4. Secure the hollow-shaft device with the aid of the axial tensioning disc (4) and 4 hexagon socket head cap screws (5).
5. Close the hollow shaft encoder with cover plate (6) and 6 cheese-head screws (7).

6. Fastening the torque bracket:

Fastening without base plate:
Secure the link rod head (10) of the link rod (9) to a fixed point (for example on the motor housing).

Fastening with base plate:
Secure the base plate (11) to a fixed point (for example on the motor housing or the foundations).

NOTES!
Observe with the assembly of the torque bracket also the information of the brochure “Considerations for the choise of the torque arms”.
Once fitted the link rod must rotate easily around the link rod heads! Failure to observe this point may result in damage to the bearings!
The link heads are maintenance free. However, ensure they remain free from soiling and paint!

6 Dismantling

6.1 Safety instruction

Personnel

Dismantling must be carried out by skilled technical staff only.

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

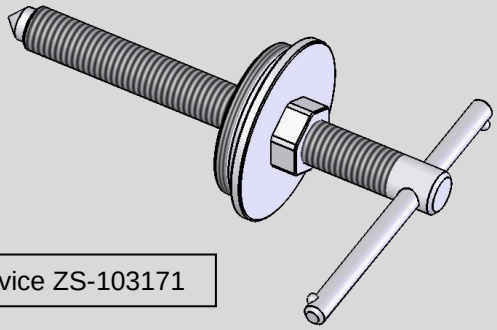
Do not use a hammer or similar tool when dismantling the device due to the risk of damage occurring to the bearings or coupling!

6.2 Dismantling of hollow shaft absolute encoder

Dismantle the hollow shaft device follow the instructions in Chapter 5.5 in the reverse order.

NOTES!

Use the withdrawal device ZS-103171 (available as an accessory) if you are unable to remove the device manually from the adapter shaft after having removed the axial tensioning disc)!



withdrawal device ZS-103171

Using the withdrawal device, which is screwed into the withdrawal thread of the hollow shaft allows you to remove the absolute encoder from the adapter shaft without risking damage of the bearings.

7 Inspections

7.1 Safety instructions personnel

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!

7.2 Maintenance information

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

7.3 Inspection schedule

Interval	Inspections
	Ensure the fastening screws are properly tightened
	Ensure cable connections and connection terminals are properly tightened
After approx. 16 000 – 20 000 hours of operation or higher levels of continuous load	Check deep groove ball bearings for noise, running smoothly. Bearings must be replaced by the manufacturer only.

8 Disposal

8.1 Disposal procedure

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.

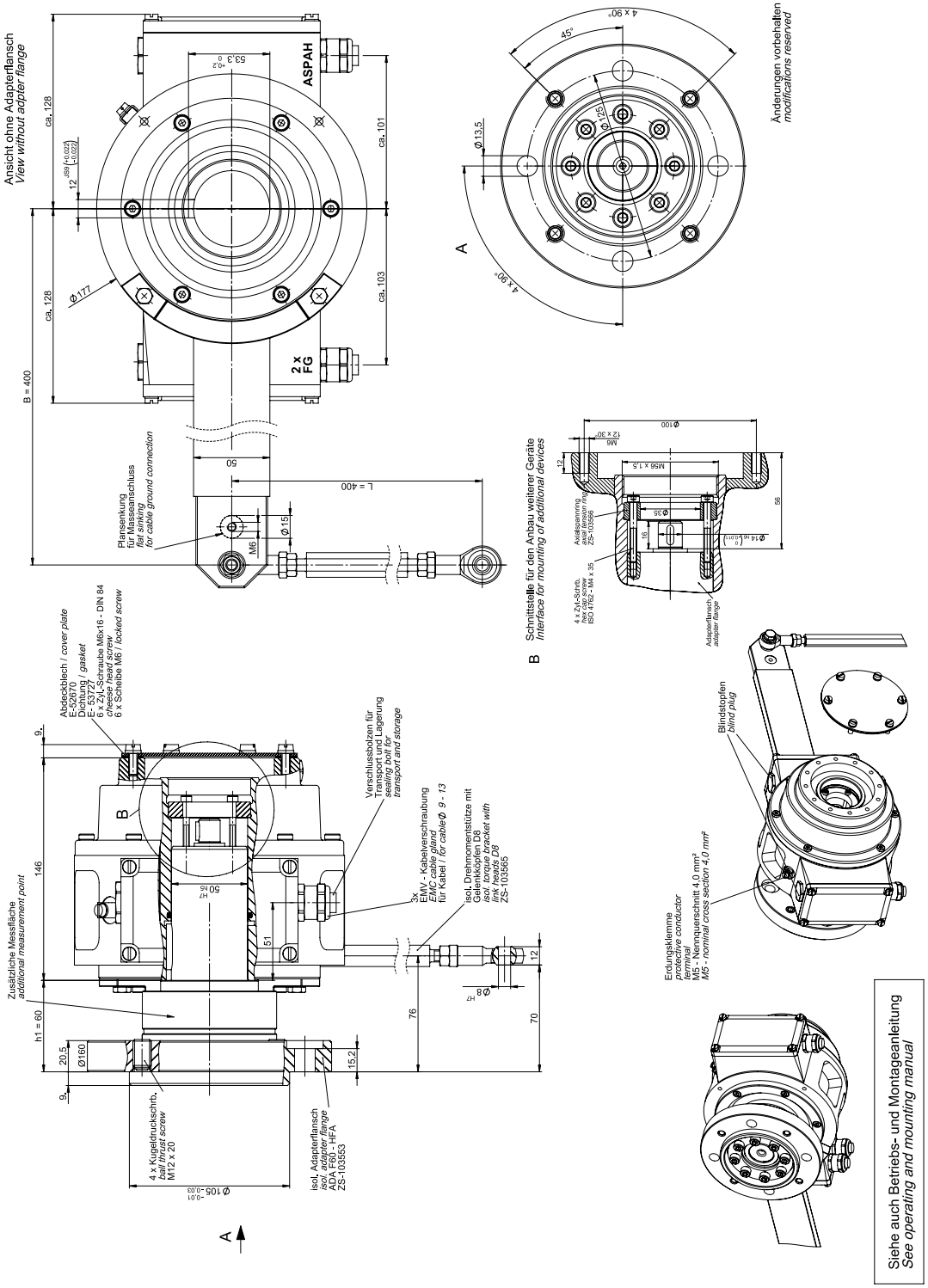
9 Replacement parts

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

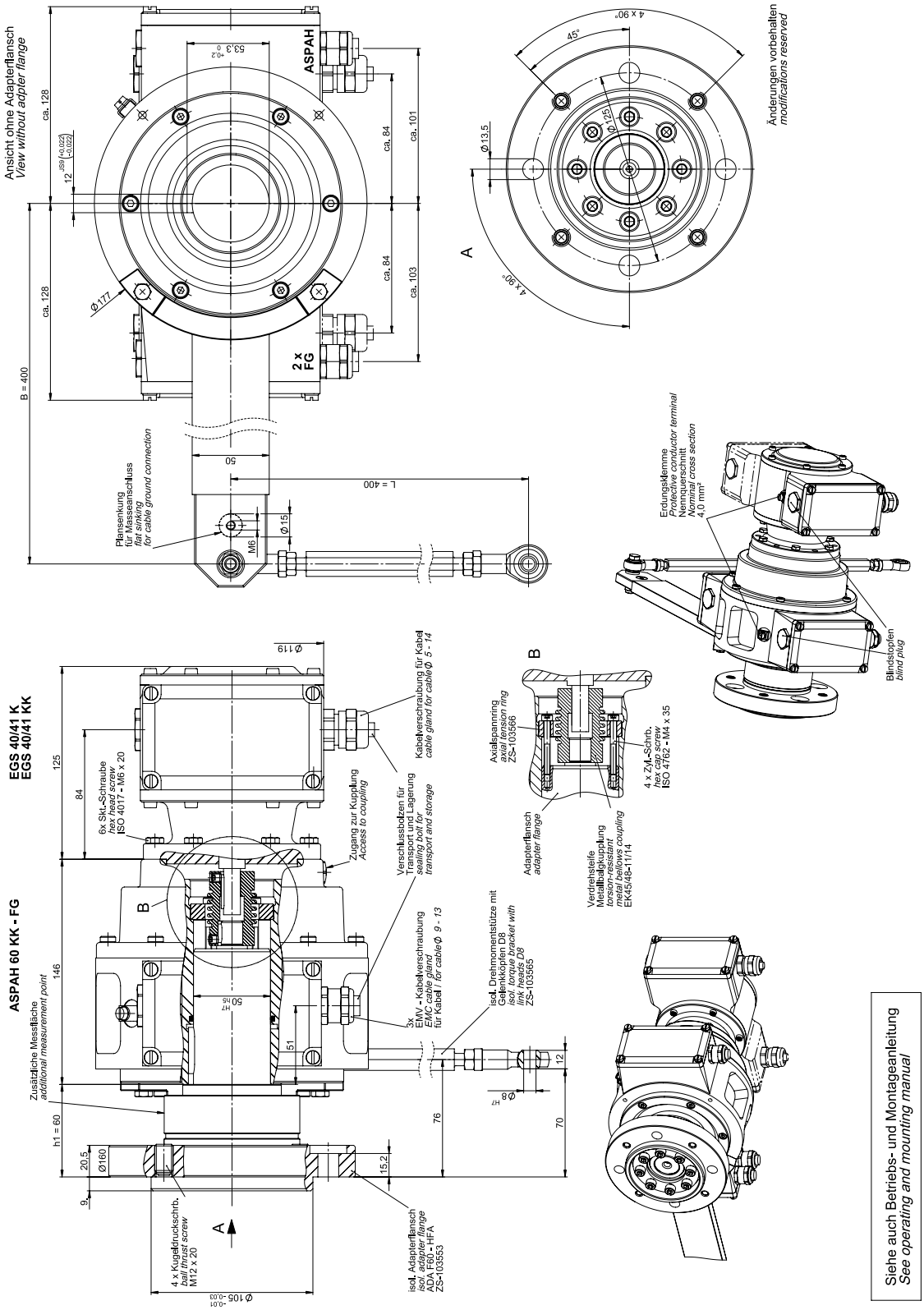
Replacement Part	Comment
Cover	Cover for the 2nd shaft end or for the hollow shaft bore (NDE)
Axial tensioning disk/ring	For hollow shaft design including screws
EMC cable gland	including closing plug for transport and storage
O-ring for hollow shaft	

NOTES!
When ordering replacement parts always specify the serial number of the device!

10 Dimension drawings



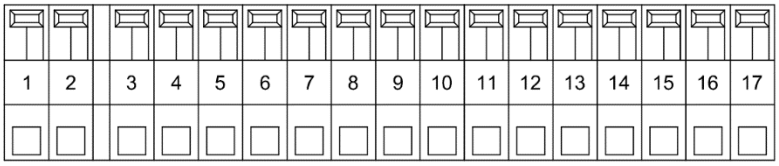
ASPAH 60 KK - FG **with adapter flange** **HM 11 M 103743a**



ASPAH 60 KK – FG + EGS 41 **with adapter flange** **HM 11 M 103559a**

11 Connection Diagram

11.1 Connections hollow shaft absolute encoder



17 pol. Print-Zugfederklemme Typ Phoenix ZFKDS
17 pole printed circuit spring terminal block type Phoenix ZFKDS

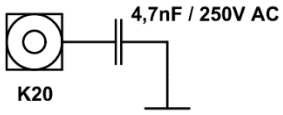
Anschlussdaten:
Aderquerschnitt
0,25-0,5 [mm^2]

Connection data:
wire section
0.25-0.5 [mm^2]

Schirmung:
Der Schirm der Signalleitung kann über die Kabelverschraubung
direkt mit dem Gehäuse verbunden werden.
Alternativ kann der Kabelschirm an K20 über einen Kondensator (4,7nF / 250V AC)
mit dem Gebergehäuse verbunden werden.

Shielding:
The shield of the signal cable can be connected
directly to the housing of the encoder by the cable gland.
Alternatively the shield of the signal cable can be connected to K20
via a capacitor (4.7nF / 250V AC) to the housing of the encoder.

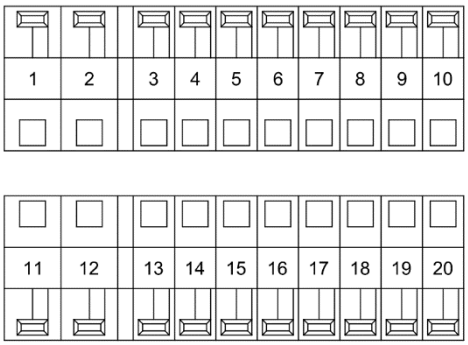
Alternativer Schirmanschluss
Alternative Shielding



Connection diagram PN171-400	
Internal connector	**Function**
1	0 Volt
2	+E Volt
3	Bit 1 (MSB)
4	Bit 2
5	Bit 3
6	Bit 4
7	Bit 5
8	Bit 6
9	Bit 7
10	Bit 8
11	Bit 9
12	Bit 10
13	Bit 11
14	Bit 12
15	Bit 13
16	——
17	Error

Connection diagram PN171-401		
Function	**Colour**	**Internal connector**
0 Volt	White	1
+E Volt	Brown	2
Bit 1 (MSB)	Brown/Green	3
Bit 2	White/Green	4
Bit 3	Blue/Red	5
Bit 4	Grey/Pink	6
Bit 5	Violet	7
Bit 6	Black	8
Bit 7	Red	9
Bit 8	Blue	10
Bit 9	Pink	11
Bit 10	Grey	12
Bit 11	Grey/Brown	13
Bit 12	White/Pink	14
Bit 13	Pink/Brown	15
Case	Shield	

11.2 Connections incremental output



2x10 pol. Print-Zugfederklemme Typ Phoenix ZFKDS
2x10 pole printed circuit spring terminal block type Phoenix ZFKDS

Anschlussdaten:
K1,K2 / K11,K12
Aderquerschnitt
0,25-1,5 [mm^2]
K3...K10 / K13...K20
Aderquerschnitt
0,25-0,5 [mm^2]

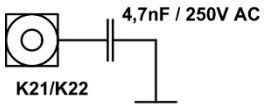
Connection data:
K1,K2 / K11,K12
wire section
0.25-1.5 [mm^2]
K3...K10 / K13...K20
wire section
0.25-0.5 [mm^2]

Klemmkasten *Terminal box*		Anschlussplan *Connection diagram*		PN171-420 *PN171-420*	
System 1	System 2				
1	11	0V		GND	*GND*
2	12	12...30V		Versorgungsspannung	*Power Supply*
3	13	0°		Inkr. Ausgang 0°	*Incr. Output 0°*
4	14	$\overline{0°}$		Inkr. Ausgang 0° Invers	*Incr. Output 0° Inverse*
5	15	90°		Inkr. Ausgang 90°	*Incr. Output 90°*
6	16	$\overline{90°}$		Inkr. Ausgang 90° Invers	*Incr. Output 90° Inverse*
7	17	N		Nullimpuls	*Reference*
8	18	$\overline{N}$		Nullimpuls Invers	*Reference Inverse*
9	19	ERR		Fehlerausgang (Low aktiv)	*Error Output (Low active)*
10	20	$\overline{ERR}$		Fehlerausgang (High aktiv)	*Error Output (High active)*

Schirmung:
Der Schirm der Signalleitung kann über die Kabelverschraubung direkt mit dem Gehäuse verbunden werden.
Alternativ kann der Kabelschirm an K21/K22 über einen Kondensator (4,7nF / 250V AC) mit dem Gebergehäuse verbunden werden.

Shielding:
The shield of the signal cable can be connected directly to the housing of the encoder by the cable gland.
Alternatively the shield of the signal cable can be connected to K21/K22 via a capacitor (4.7nF / 250V AC) to the housing of the encoder.

Alternativer Schirmanschluss
Alternative Shielding



Connection cable 1					
1		black	0V		GND
2		red	12..30V		Power Supply
3		orange	0°		Incr. Output 0°
4		black	$\overline{0°}$		Incr. Output 0° Inverse
5		blue	90°		Incr. Output 90°
6		black	$\overline{90°}$		Incr. Output 90° Inverse
7		yellow	N		Reference
8		black	$\overline{N}$		Reference Inverse
9		green	ERR		Error Output (Low activ)
10		black	$\overline{ERR}$		Error Output (High activ)

Connection cable 2					
11		black	0V		GND
12		red	12..30V		Power Supply
13		orange	0°		Incr. Output 0°
14		black	$\overline{0°}$		Incr. Output 0° Inverse
15		blue	90°		Incr. Output 90°
16		black	$\overline{90°}$		Incr. Output 90° Inverse
17		yellow	N		Reference
18		black	$\overline{N}$		Reference Inverse
19		green	ERR		Error Output (Low activ)
20		black	$\overline{ERR}$		Error Output (High activ)

ASPAH 60 KK **cable** **PN 171-421**