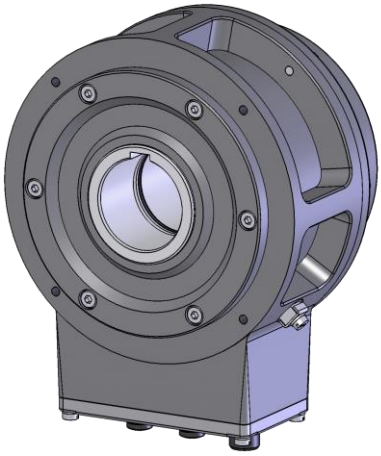
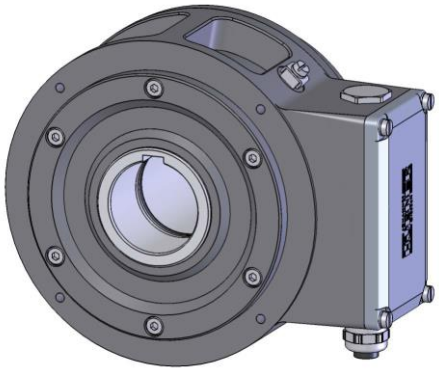
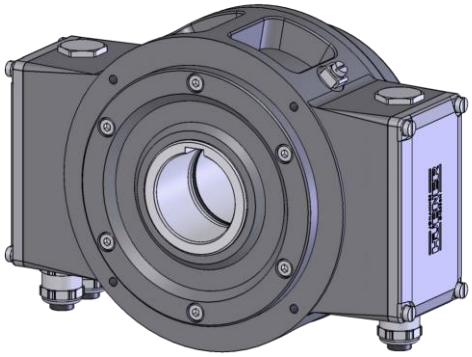
English

JOHANNES HÜBNER GIESSEN

ideas and solutions







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# Operating and Assembly Instructions

## Hollow shaft absolute encoder

## ASEH 60 EtherCAT®

## ASPAH 60 Parallel

## ASSH 60 SSI

**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
ASEH-ASPAH-ASSH_60_MANUAL-en-R4(2024-05-05)ID78858.docx

ID-78858-R4

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**UL File Number: E351535**
**UL model No. ASYH 60 X**

Subject to errors and changes due to technical improvements.


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# Table of contents

# 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

Hollow shaft absolute encoder ASEH 60, ASPAH 60, ASSH 60
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 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 ASEH 60, ASPAH 60, ASSH 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.

**For UL and CSA:** For the use in NFPA 79 applications only.

## 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

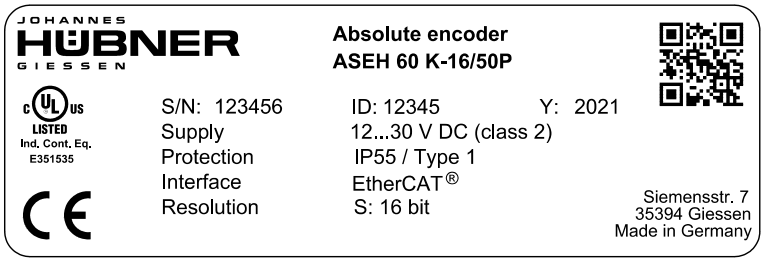
**DANGER!**

**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.

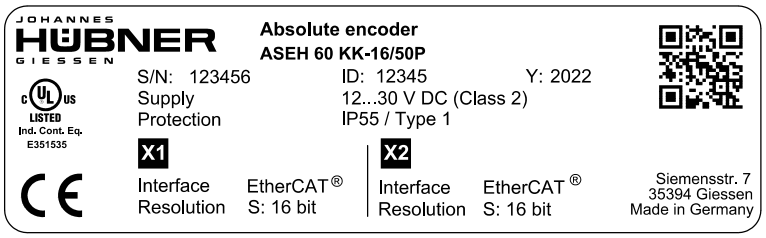
# 3 Technical data

## 3.1 Type plate examples

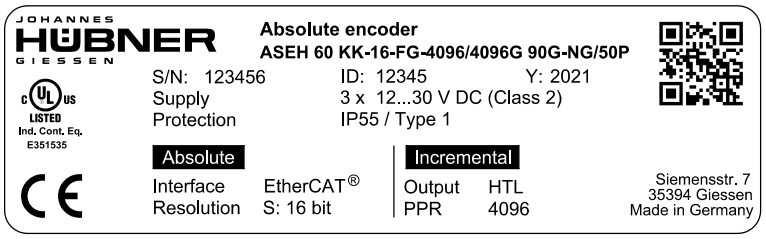
### Type K




### Type KK




### Type KK – FG




The type plate and UKCA label are located on the side of the housing and contain the following information:

- Manufacturer, address
- Type, year of construction
- CE-mark
- Serial number (S/N)
- Item (ID)
- Max. speed
- Degree of protection
- Supply voltage
- Interface, Code
- Singleturn resolution
- Number of pulses (Devices with additional incremental outputs )
- Outputs (Devices with additional incremental outputs)
- Certification
- QR-Code

## 3.2 Type key

| ASEH | 60 | KK | 16 | FG | 4096/4096G | 90G | NG | /50P |
|---|---|---|---|---|---|---|---|---|

Absolute encoder
in hollow shaft design
ASEH = EtherCAT® interface
ASPAH = Parallel interface
ASSH = SSI interface

Series

Connection
K = 1 x terminal box
KK = 2 x terminal box

Resolution single turn 16 bit

**Optional**
Two separate incremental outputs
in the second terminal box

Number of pulses (pulses per revolution)
Incremental output 1 / incremental output 2

Basic signal output
Basic channel 0° (A)
Pulse channel 90° (B)
each with inverted signals

NG: Option reference pulse with inverted signal

Hollow shaft diameter
50P = Ø50 H7 with keyway

## 3.3 Electrical data ASEH 60 (EtherCAT®)

| | |
|---|---|
| Supply voltage | 12 V … 30 V DC<br>For UL and CSA Class 2 supplied |
| Power consumption | max. 4 W |
| Interface | Ethernet 100 MBit |
| Protocol | EtherCAT® |
| Resolution single turn | 16 Bit (65536 Steps per revolution) |

## 3.4 Electrical data ASPAH 60 (Parallel)

| | |
|---|---|
| Supply voltage | 12 V … 30 V DC<br>For UL and CSA Class 2 supplied |
| No-load power consumption | approx. 1 W |
| Resolution single turn | 13 Bit (8192 steps per revolution) |
| Data format | Parallel, Gray-Code |
| Outputs | current limited Push – Pull – line drivers Bit 1 to Bit 13, Error<br>Examples: 13 Bit: (internal connector 1-15)<br>10 Bit: (internal connector 1-12) |
| Signal amplitude (HTL) | approx. supply voltage |
| Output current | max. 50 mA |
| Error output | low active |

## 3.5 Electrical data ASSH 60 (SSI)

| | |
|---|---|
| Supply voltage | 12 V … 30 V DC<br>For UL and CSA Class 2 supplied |
| No-load power consumption | approx. 1 W |
| Resolution single turn | 13 Bit (8192 steps per revolution) |
| Data format | SSI, binär / Gray-Code (see type plate) |
| **SSI-Interface** | |
| Clock input | RS 422 / 5 V |
| Input current | 6 mA |
| Clock frequency | 80 kHz … 1 MHz |
| Clock rate / transmission | 13 |
| SSI time out | > 30 µs (without data repetition)<br>< 20 µs (with data repetition) |
| Data output | RS 422 / 5 V |
| **Control-I/O** | |
| V/R, Z (input) | 5 … 30 V / 6 mA |
| State (output) | HTL |

## 3.6 Electrical data optional incremental outputs

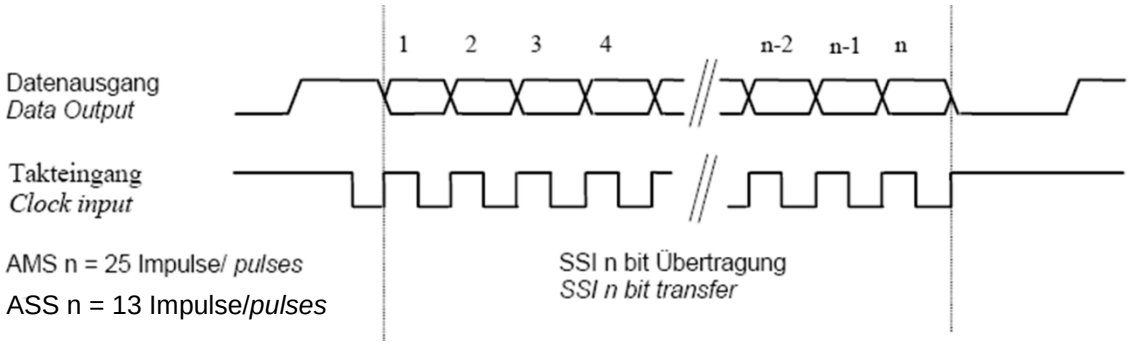
| **Incremental output 1 and 2** | |
|---|---|
| Supply voltage | 12 V … 30 V DC<br>For UL and CSA Class 2 supplied |
| No load power consumption | approx. 2 W |
| Number of pulses | 2048, 4096, 8192 (siehe Typenschild) |
| Outputs | current limited push-pull line driver<br>0°, 90°, N, Error, each with 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 ± 3% |
| Phase shift | 90° ± 3% |
| Error output | low active |

## 3.7 Data transmission modes using the example of an AMS 40-1312 encoder

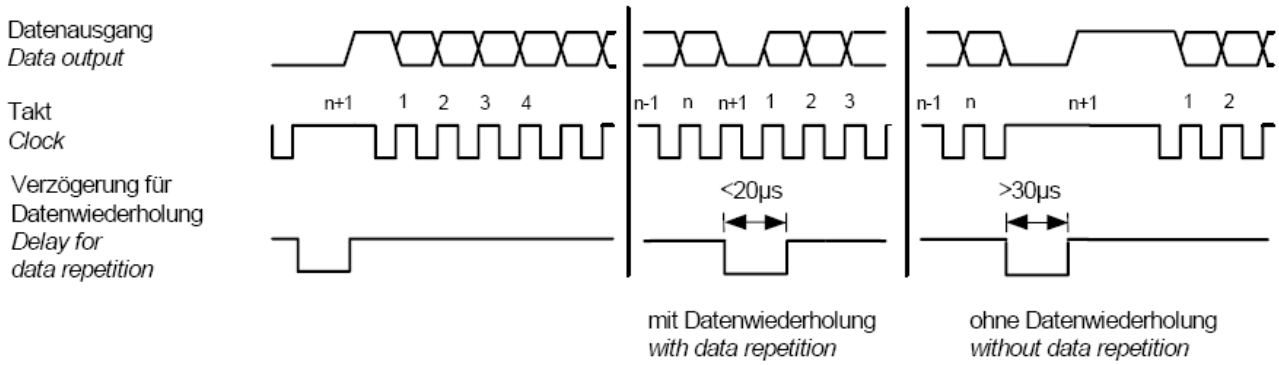
The data transmission is affected according to the SSI procedure (Serial Synchronous Interface). The encoder is supplied with 25 clock pulses (AMS) or 13 clock pulses (ASS) at the inputs "CLCK" and "CLCKG" (inverted) via an optocoupler input. Synchronously to this, 25 data bits (AMS) or 13 data bits (ASS) are output via an RS 422 interface at the "DATA" output and inverted at the "DATAG" output.

The inactive level of clock signal is normally set at HIGH. On first falling edge the encoder position will be read from the code discs. The first transmission bit will then be supplied to the encoder output with the rising edge of clock 1 enabling the receiver unit to read the transmission bit with the falling edge of clock 1. This procedure will be repeated up to clock 13 and in this manner all data bits will be transmitted.

Data transmission will end at rising edge of clock input. In normal operation the output will be set to level „HIGH“ after approx. 25 µs and readyness for next data transmission will be indicated to the receiver unit.




If a new data transfer is started within 20 µs, no data reading from the code discs will be made but data of the previous cycle will be transmitted again (data repetition).



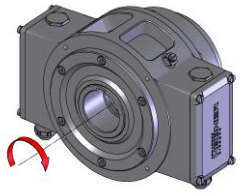
**Status-output**
A signal indicating operation of the encoder will be generated on the output „Status“ as follows:
While operating accurately a high level will be generated on „Status“. Low on signal „Status“ indicates non-correct operating of the SSI encoder.

**Control input V/R**
Position values when the shaft rotates clockwise.

**Control input V/R**
Position values when the shaft rotates clockwise.

Standard:
0 V to terminal V/R
or no available connection : Position increasing ↑

Reversion:
$U_B$ to terminal V/R: Position decreasing ↓



**Control input Z**
The current position data is set to the preset value when having a pulse from min. 100 ms length (+10 V … +30 V)

# 4 Mechanical Data

| **Device temperature range** | | |
|---|---|---|
| Standard | -25°C … + 85°C | For UL and CSA -25°C … + 70°C |

| **Degree of protection acc. to DIN EN 60529** | **Sealing** | **Mech. permissable speed** | **Rotor moment of inertia** | **Breakaway torque** |
|---|---|---|---|---|
| IP 55<br>(UL/CSA Type 1) | Gap Seal | 4000 rpm (*) | approx. 28 kgcm² | approx. 30 Ncm |

| | | |
|---|---|---|
| Weight | Type K<br>Type KK | approx. 7,4 kg<br>approx. 8 kg |

(*) The permissible speed may be lower for devices with additional incremental outputs depending on the number of pulses (see nameplate).

# 5 Transport, packaging and storage

## 5.1 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.

## 5.2 Goods inward inspection

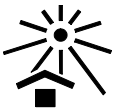
Check the delivery immediately upon receipt for transit damage or short delivery.
Inform the carrier immediately on receipt if you determine that damage has occurred during transit (take photos as proof).

## 5.3 Packaging (disposal)

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

## 5.4 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!

# 6 Installation and commissioning

## 6.1 Safety instructions

**NOTES!**

During installation and commissioning, the safety instructions in **chapter 2** must be observed!

**Personnel**

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

## 6.2 Technical information

**NOTES!**

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

**Ambient temperature**

The max. permissible ambient temperature depends on the speed and the mounting situation.

**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 12 dimension drawings).

**Deep groove ball bearings**

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

**Screw retention**

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

## 6.3 Required tools

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

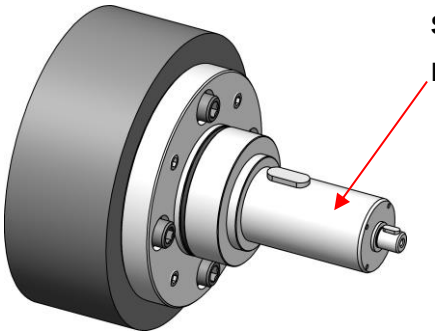
## 6.4 Mounting preparations

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

**NOTES!**
The earth cable is not included in the range of supply.

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

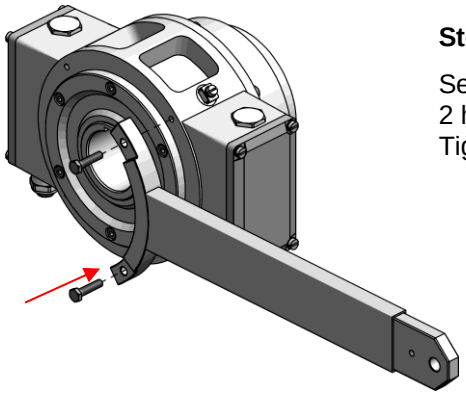
## 6.5 Mounting the hollow shaft absolute encoder (example ASPAH 60 KK-FG)



**Step 1:**

Lightly grease the adapter shaft.

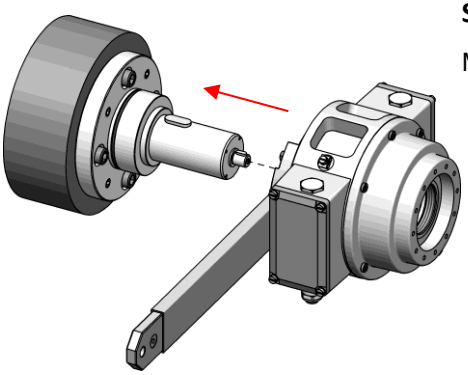
**NOTES!**
Follow with the assembly to the scope of supply of the adapter shaft belonging assembly instructions. It contains tips to the alignment and to the necessary cultivation exactness of the adapter shaft.



**Step 2:**

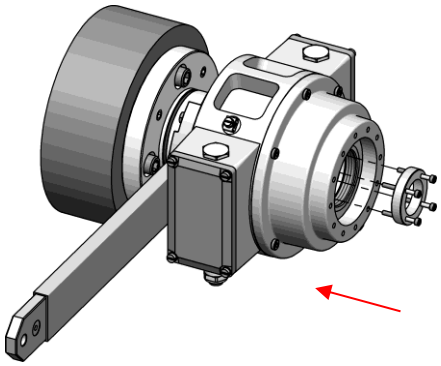
Secure the bracket arm to the hollow shaft absolute encoder with 2 hexagon head screws M6 x 25.
Tightening torque: 10 Nm

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



**Step 3:**

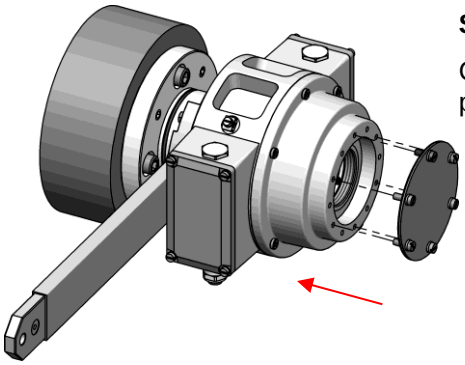
Mount the hollow shaft absolute encoder to the adapter shaft



**Step 4:**

Secure the hollow shaft absolute encoder with the aid of the axial tensioning ring and 4 hexagon socket head cap screws M4 to the adapter shaft.

Tightening torque: 3 Nm

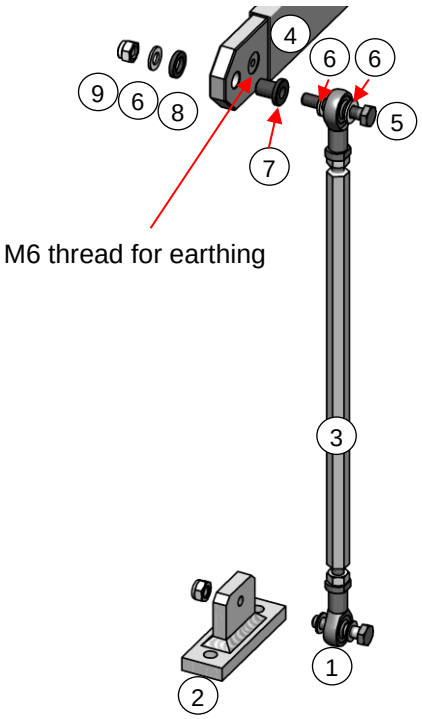


**Step 5:**

Close the hollow shaft absolute rotary encoder with a cover plate and 6 x M6 cylinder head screw and DUBO® screw lock.

**NOTES!**

The hollow shaft absolute encoder must be closed with the cover plate with flat gasket to ensure the degree of protection.




**Step 6:**

Fasten the torque rod (3) to the bracket arm (4) using the M8 hexagon socket screw (5), two washers (6), insulating sleeve (7), insulating washer (8), washer (6) and M8 hexagon nut (9).

Tightening torque: 10 Nm

Fastening the torque bracket to the motor:

Fastening without base plate:
Secure the link rod head (1) of the link rod to a fixed point (for example on the motor housing).

Fastening with base plate:
Secure the base plate (2) to a fixed point (for example on the motor housing or the foundations).

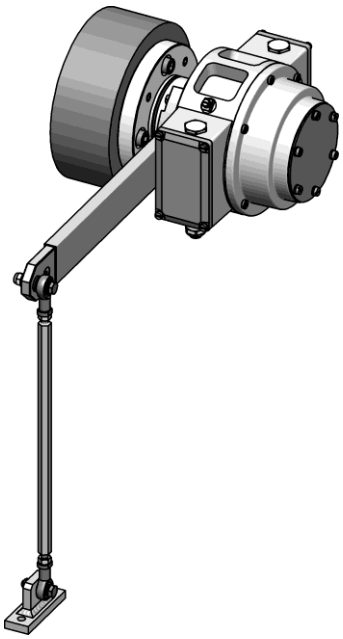
**NOTE!**

Observe with the assembly of the torque bracket also the information of the brochure “Considerations for the choice of the torque arms”.

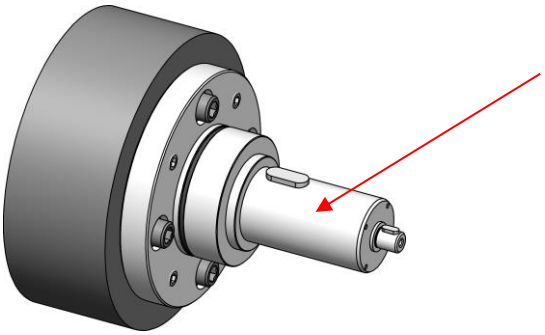
Once fitted the link rod must rotate easily around the link rod heads!

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! It must not be tilted under any circumstances in order to avoid damage to the ball bearings.

Fastening screws for the base plate are not included in the range of supply.

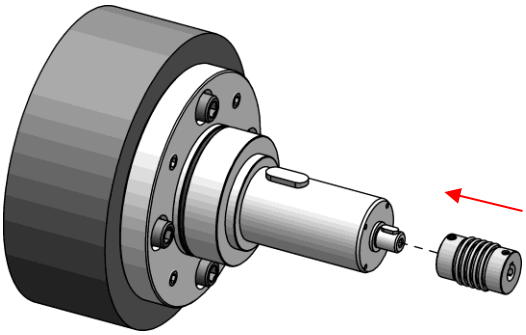


## 6.6 Mounting the hollow shaft absolute encoder and another encoder in construction type B5



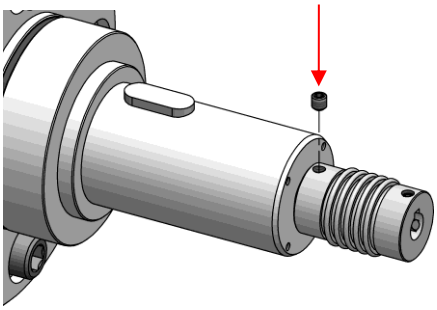
**Step 1:**

Lightly grease the adapter shaft.



**Step 2:**

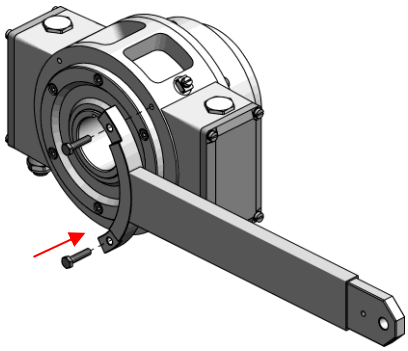
Push the torsion resistant coupling onto the Ø14 shaft journal of the adapter shaft.



**Step 3:**

Secure the torsion resistant coupling on the adapter shaft with the M6 grub screw.

Tightening torque: 3 Nm

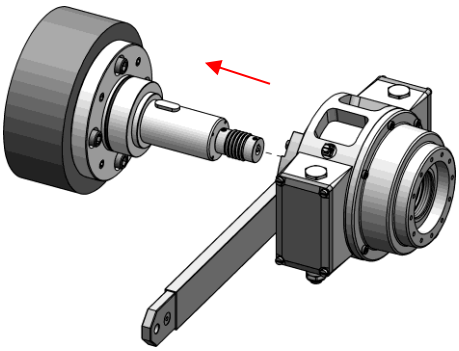


**Step 4:**

Secure the bracket arm to the hollow shaft absolute encoder with 2 hexagon head screws M6 x 25.
Tightening torque: 10 Nm

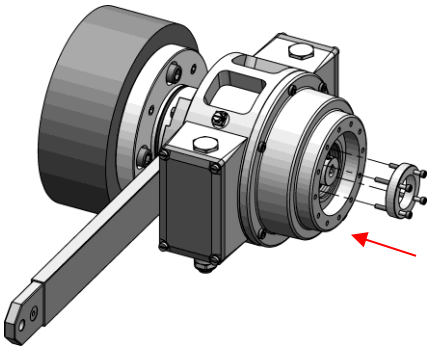
**NOTES!**

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



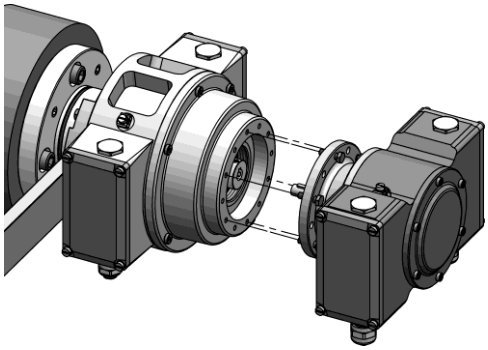
**Step 5:**

Mount the hollow shaft absolute encoder to the adapter shaft.



**Step 6:**

Secure the hollow shaft absolute encoder with the aid of the axial tensioning ring and 4 hexagon socket head cap screws M4 to the adapter shaft.
Tightening torque: 3 Nm



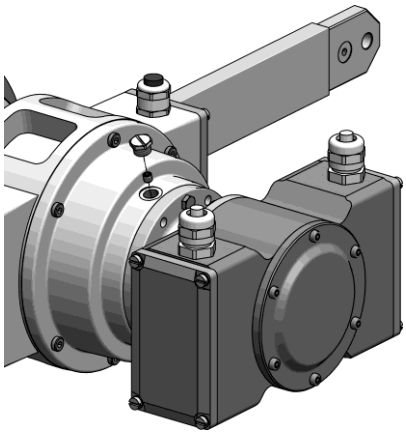
**Step 7:**

Lightly grease the encoder shaft and centering. Install the encoder in the centering and coupling hub at the same time.

**NOTE!**

If possible, mount the encoder so that the cable glands point downwards.

If necessary, swap the position of the cable gland and the blind plug.

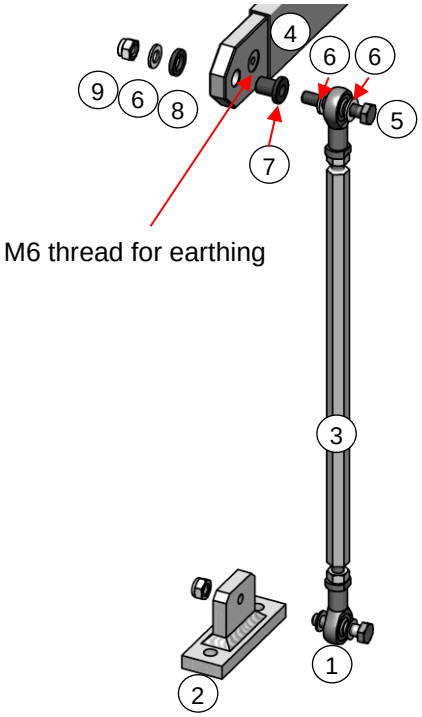


**Step 8:**

Remove the screw plug from the access opening to the coupling. Fix the coupling hub to the encoder shaft with grub screw M6.
Tightening torque: 3 Nm
Close the access opening to the coupling again.

**HINWEIS!**

For this step, it may be necessary to turn the hollow shaft absolute encoder to the corresponding angular position.




**Step 9:**

Fasten the torque rod (3) to the bracket arm (4) using the M8 hexagon socket screw (5), two washers (6), insulating sleeve (7), insulating washer (8), washer (6) and M8 hexagon nut (9).

Tightening torque: 10 Nm

Fastening the torque bracket to the motor:

Fastening without base plate:
Secure the link rod head (1) of the link rod to a fixed point (for example on the motor housing).

Fastening with base plate:
Secure the base plate (2) to a fixed point (for example on the motor housing or the foundations).

**NOTE!**

Observe with the assembly of the torque bracket also the information of the brochure “Considerations for the choice 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! It must not be tilted under any circumstances in order to avoid damage to the ball bearings.

Fastening screws for the base plate are not included in the range of supply.

# 7 Inspections

## 7.1 Safety instructions

**NOTES/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 | Execution |
|---|---|---|
| Yearly | 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. | |

# 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 parts | Bemerkung |
|---|---|
| Cover | Cover for the 2nd shaft end or for the hollow shaft bore (NDE) |
| Axial tensioning disk/ring | 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 Connecting the hollow shaft absolute encoder (electrically)

## 10.1 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 connection diagram and in the terminal box.

Use of connection cables with diameter of min. 9 mm – max. 13 mm is essential to ensure the protection class. Cable outlet should show preferably downwards.

**Wiring arrangement and shielding:**

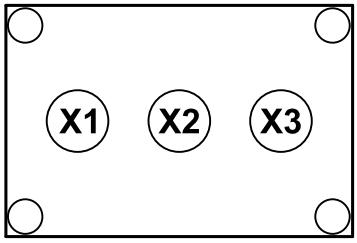
(EMC measurement)
The cable shielding has to be connected on both ends!
The shield of the signal cable can be connected directly to the housing of the encoder by the cable gland.
The common guidelines for EMC concerned cable routing have to be considered!

**NOTES for UL and CSA!**
Do only use copper cables.

# 11 Connection diagrams

## 11.1 Connection diagram ASEH 60 (EtherCAT®)

Steckerzuordnung
*connector assignment*



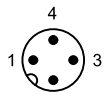
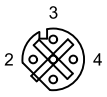
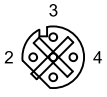

Kabelspezifikation / *Cable specification*

Versorgungsspannung / *Supply voltage*

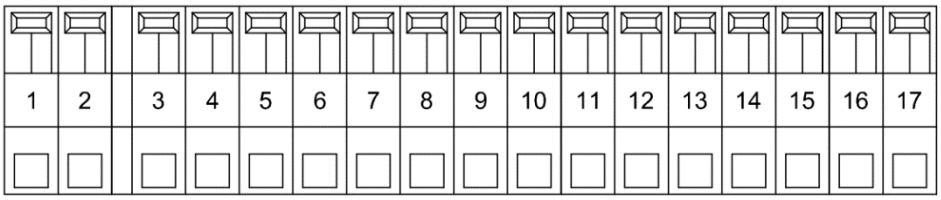
Kabelspezifikation: min. 0,5mm$^2$, paarig verseilt und geschirmt
*Cable specification: min. 0.5mm$^2$, stranded in pairs and shielded*

Datenleitung / *Data cable*

Kabelspezifikation: min. 0,25mm$^2$, paarig verseilt und geschirmt
*Cable specification: min. 0.25mm$^2$, stranded in pairs and shielded*

| | M12-Stecker<br>*M12 plugs* | Anschlussplan<br>*Connection diagram* | PN139-410<br>*PN139-410* | | | |
|---|---|---|---|---|---|---|
| Versorgung / *Power supply* | | | | | | |
| X1 | Stift, M12x1, 4 polig<br>*Pin, M12x1, 4 pole*<br>A-coded |  | 1 | +24V DC (12...30V DC) | Versorgungsspannung | *supply voltage* |
| | | | 2 | N.C. | - | - |
| | | | 3 | 0V | GND | *GND* |
| | | | 4 | N.C. | - | - |
| EtherCAT / *EtherCAT* | | | | | | |
| X2 | Buchse, M12x1, 4 polig<br>*Socket, M12x1, 4 pole*<br>D-coded |  | PORT 2 ( Out ) | | | |
| | | | 1 | TxD+ | Sendedaten + | *Transmission Data +* |
| | | | 2 | RxD+ | Empfangsdaten + | *Receive Data +* |
| | | | 3 | TxD- | Sendedaten - | *Transmission Data -* |
| | | | 4 | RxD- | Empfangsdaten - | *Receive Data -* |
| X3 | Buchse, M12x1, 4 polig<br>*Socket, M12x1, 4 pole*<br>D-coded |  | PORT 1 ( In ) | | | |
| | | | 1 | TxD+ | Sendedaten + | *Transmission Data +* |
| | | | 2 | RxD+ | Empfangsdaten + | *Receive Data +* |
| | | | 3 | TxD- | Sendedaten - | *Transmission Data -* |
| | | | 4 | RxD- | Empfangsdaten - | *Receive Data -* |

## 11.2 Connection diagram ASPAH 60 (Parallel)




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

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

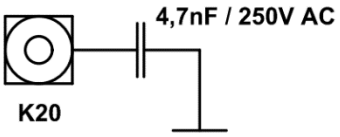
***Connection data:***
*wire section*
*0.25-0.5 [ $mm^2$ ]*

| 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 |

**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.*

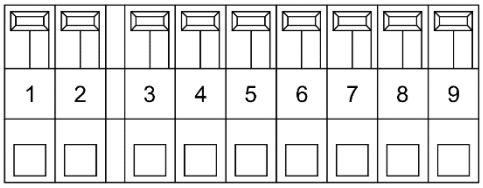
**Alternativer Schirmanschluss**
***Alternative Shielding***



| Connection diagram PN171-401 | | |
|---|---|---|
| **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 | |

**ASPAH 60** **Cable** **PN 171-401**

## 11.3 Connection diagram ASSH 60 (SSI)




**Anschlussdaten:**
**K1,K2**
Aderquerschnitt
0,25-1,5 [ $mm^2$ ]
**K3...K9**
Aderquerschnitt
0,25-0,5 [ $mm^2$ ]

***Connection data:***
***K1,K2***
*wire section*
*0.25-1.5 [ $mm^2$ ]*
***K3...K9***
*wire section*
*0.25-0.5 [ $mm^2$ ]*

| Connection diagram PN178-410 | |
|---|---|
| **Internal connector** | **Function** |
| 1 | GND |
| 2 | +UB |
| 3 | CLCK |
| 4 | CLCKG |
| 5 | DATA |
| 6 | DATAG |
| 7 | STATUS |
| 8 | V/R |
| 9 | Z |

| ASSH 60 | Terminal box | PN 178-410 |
|---|---|---|

Anschlusskabel

6x2x0,56 paarig verseilt, geschirmt
eine Seite offene Enden

*Connection cable*

*6x2x0.56 twin-stranded, shielded*
*one side open ends*

Typ: HE-2LVCC-CY AWG 20b
VDE 0881 zugelassen
*acc. to VDE 0881*

| | |
|---|---|
| Querschnitt: | 0,56 $mm^2$ |
| *Cross-section:* | *0.56 $mm^2$* |
| Temperatur: | -20°C bis +105°C |
| *Temperature:* | *-20°C up to +105°C* |
| Aussendurchmesser: | 10,1mm |
| *Outside dia:* | *10.1mm* |

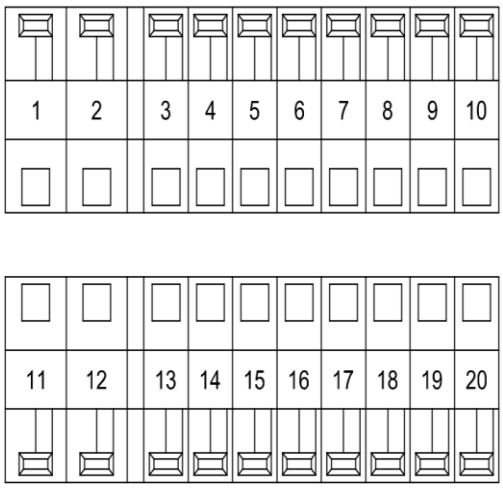
Schirm ist mit Gehäuse verbunden
*shield is connected to casing*

| Connection diagram PN178-411 | | | | |
|---|---|---|---|---|
| | black | 0V | | GND |
| | red | 12..30V | | Power Supply |
| | orange | CLCK | | SSI clock input |
| | black | CLCKG | | SSI clock input Inverse |
| | blue | DATA | | SSI data output |
| | black | DATAG | | SSi data output Inverse |
| | green | STATE | | State Output (Low = Error) |
| | black | - | | n.c. |
| | yellow | V/R | | counting direction |
| | black | - | | n.c. |
| | brown | Z | | Zero point setting |
| | black | - | | n.c. |

n.c. = not connected

| ASSH 60 | Cable | PN 178-411 |
|---|---|---|

## 11.4 Connection diagram optional incremantal outputs




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 [ $mm^2$ ]

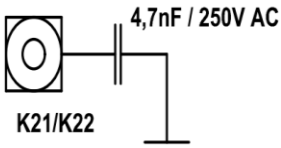
***Connection data:***
***K1,K2 / K11,K12***
*wire section*
*0.25-1.5 [ $mm^2$ ]*
***K3...K10 / K13...K20***
*wire section*
*0.25-0.5 [ $mm^2$ ]*

| 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***



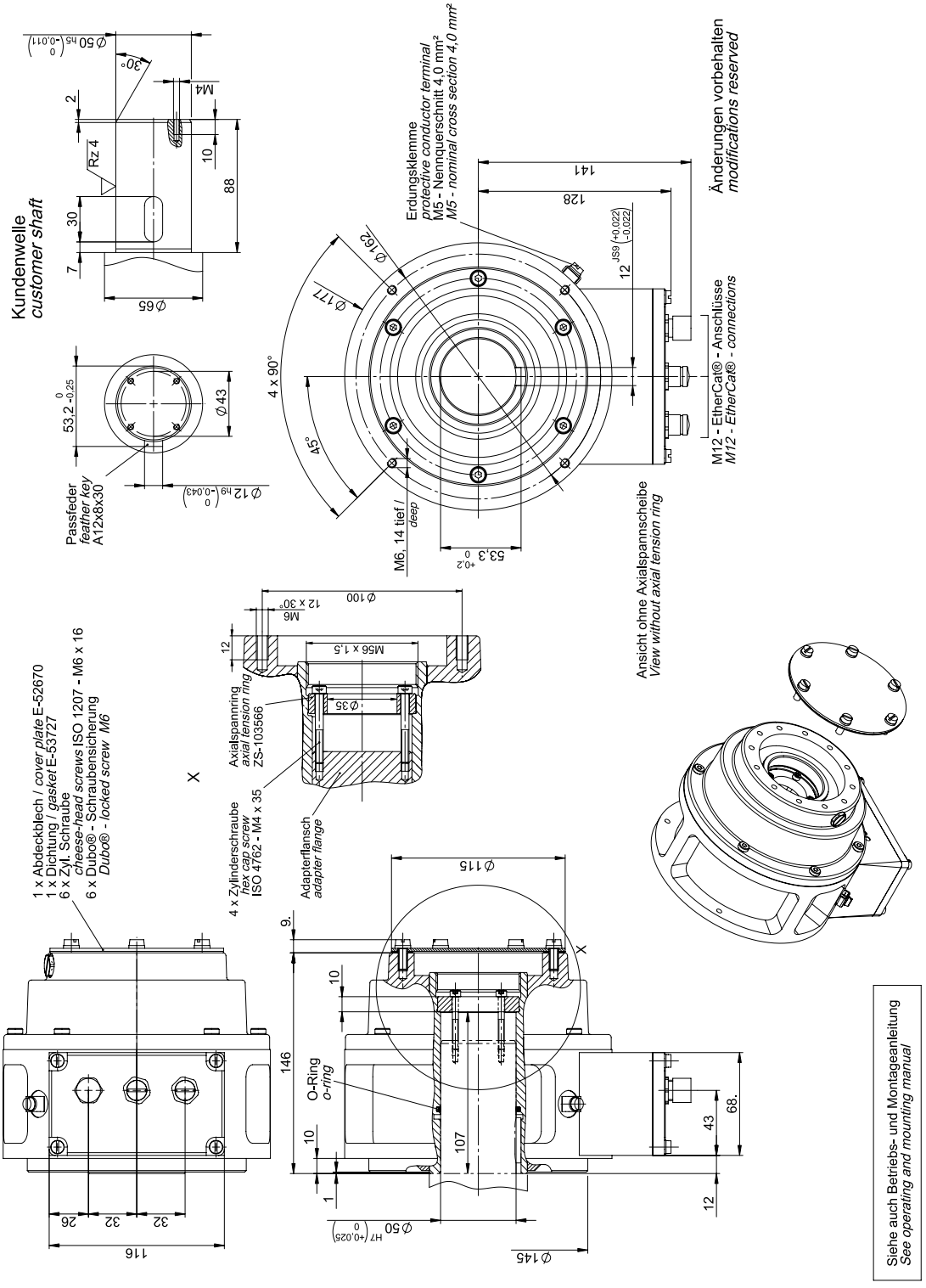

**Incremental outputs** **Terminal box** **PN 171-420**

| 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) |

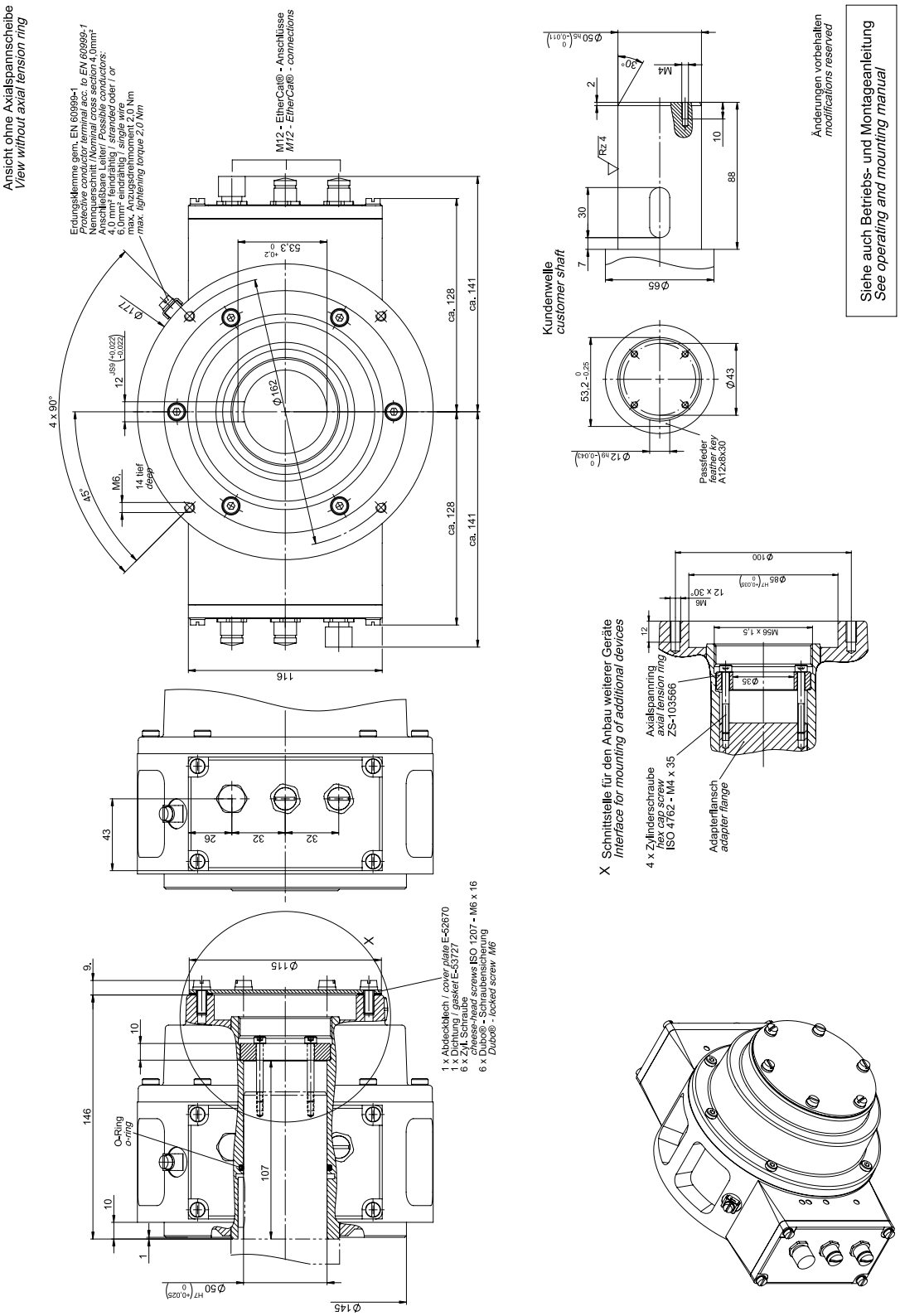
| Connection cable 2 | | | | | |
|---|---|---|---|---|---|
| 11 | | black | 0V | | GND |
| 12 | | red | 12..30V | | Power Supply |
| 13 | | orange | 0° | | Incr. Output 0° |
| 14 | | black | $\overline{0°}$ | | Incr. Output 0° Inverse |
| 15 | | blue | 90° | | Incr. Output 90° |
| 16 | | black | $\overline{90°}$ | | 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) |

**Incremental outputs** **Cable** **PN 171-421**

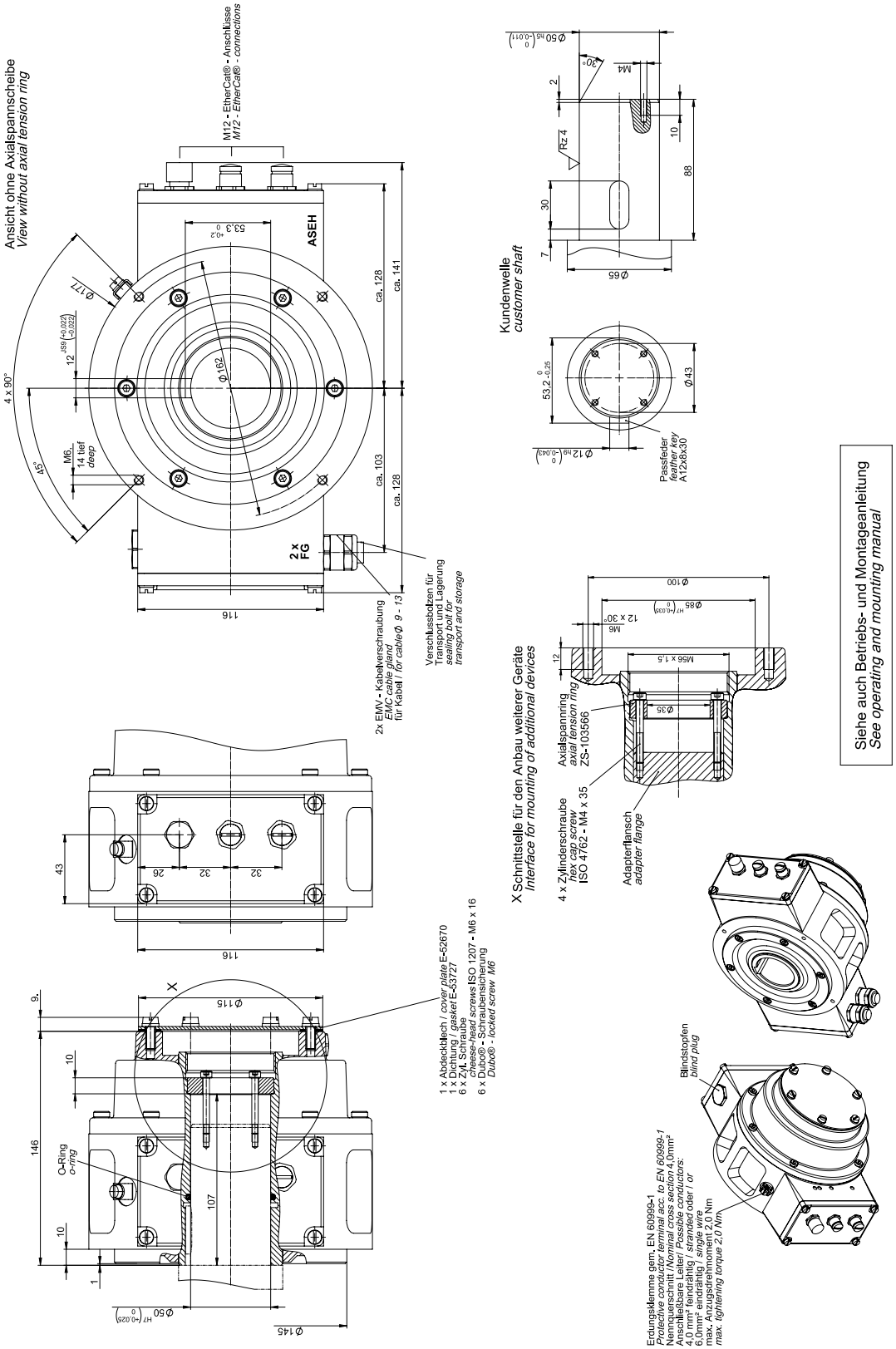
# 12 Dimension drawings ASEH 60 (EtherCAT®)



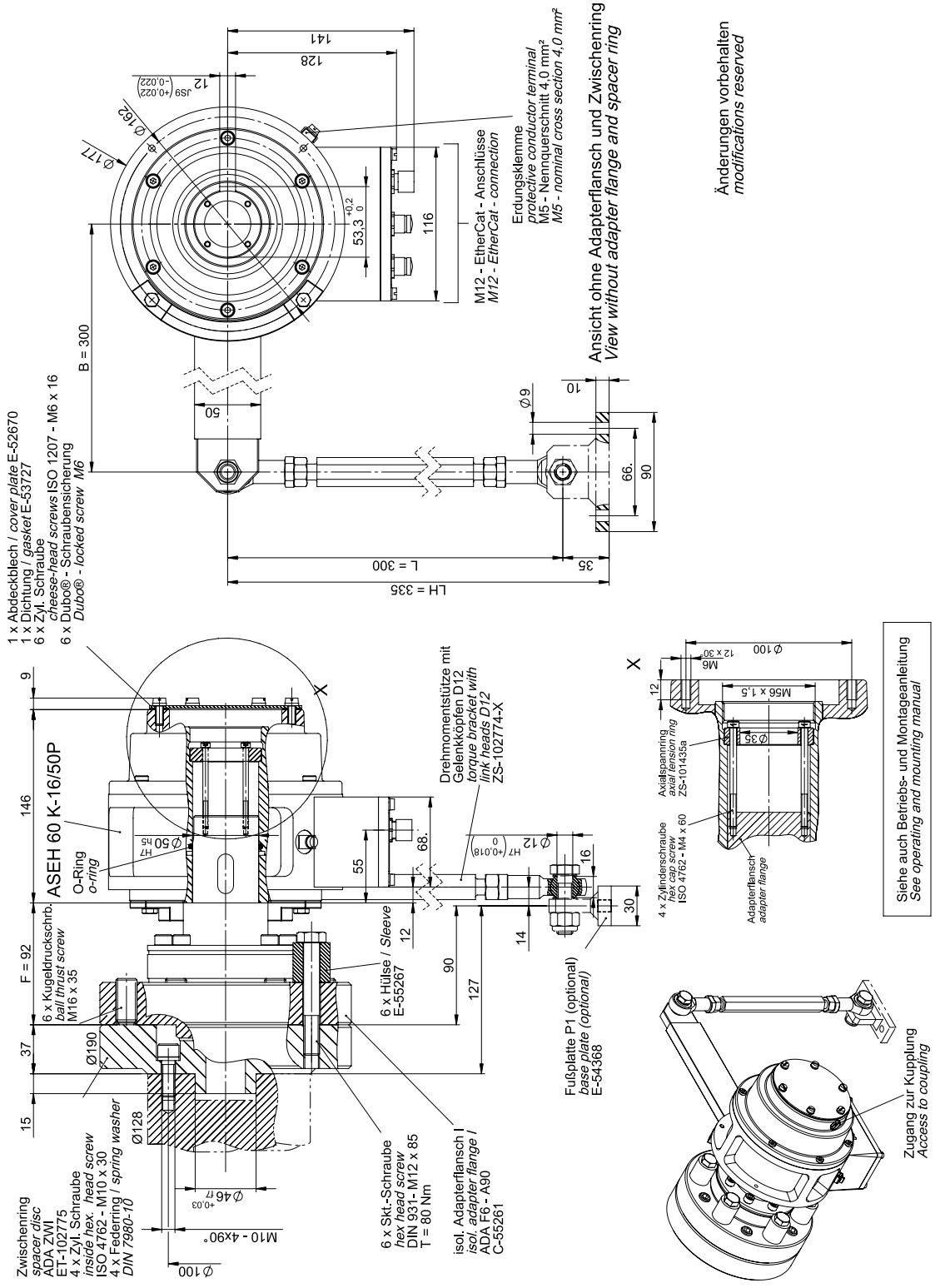

**ASEH 60 K** **HM 10 M 102772a**



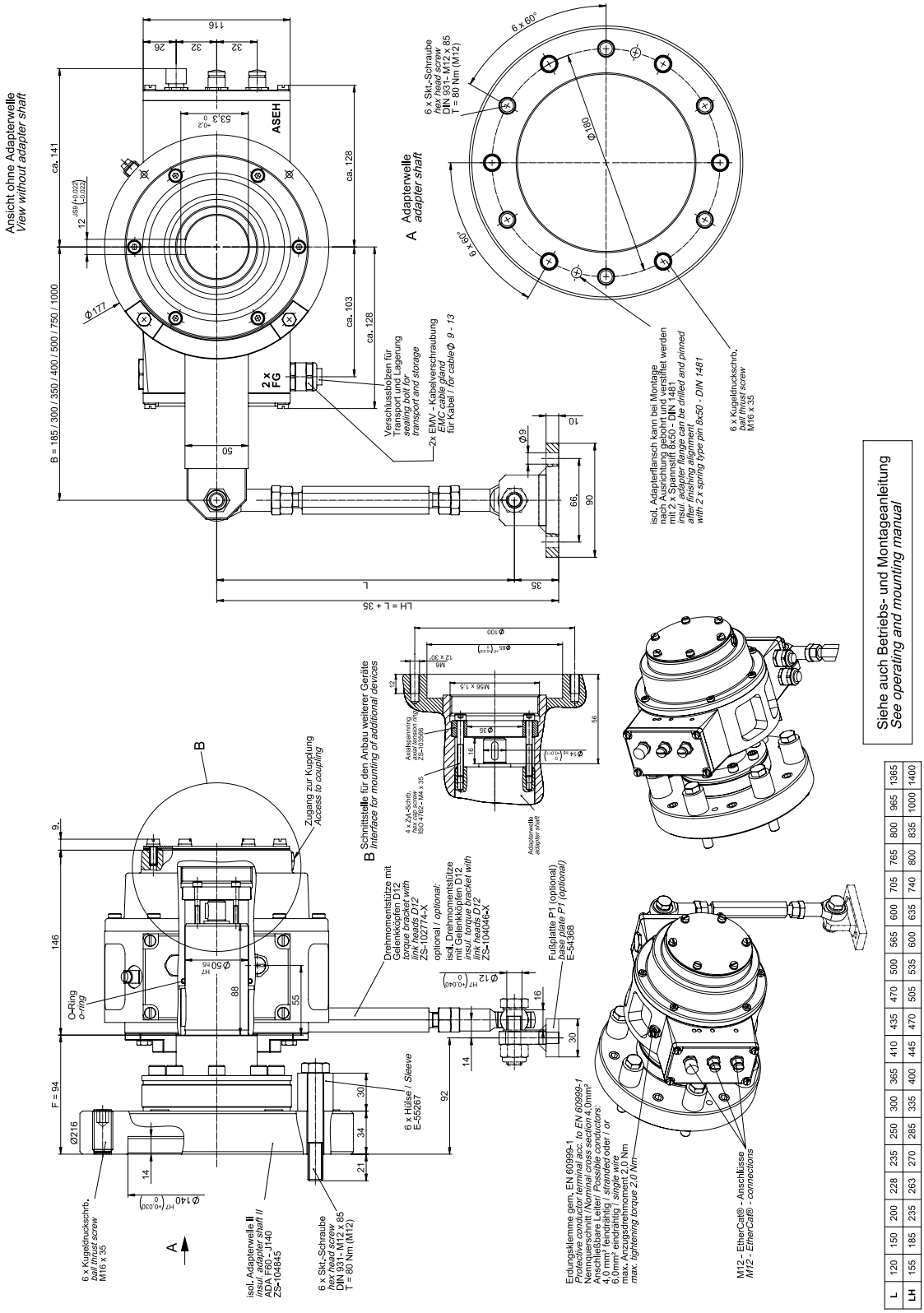

**ASEH 60 KK** **HM 21 M 116718**




**ASEH 60 KK – FG** **HM 19 M 113497**




**ASEH 60 K** **With isol. ADA F6-A90 + ADAZWI** **HM 10 M 102776a**

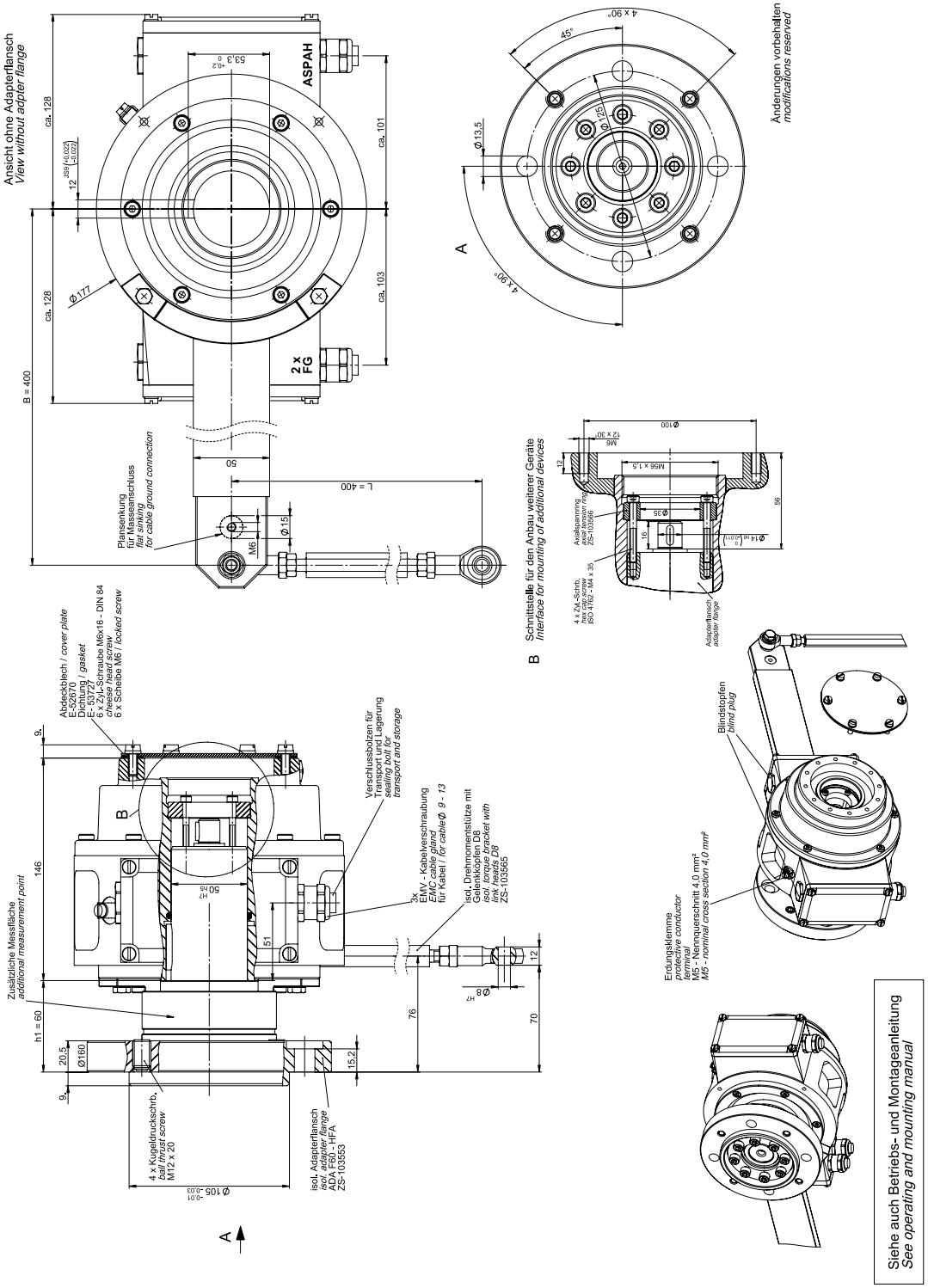



Siehe auch Betriebs- und Montageanleitung
*See operating and mounting manual*

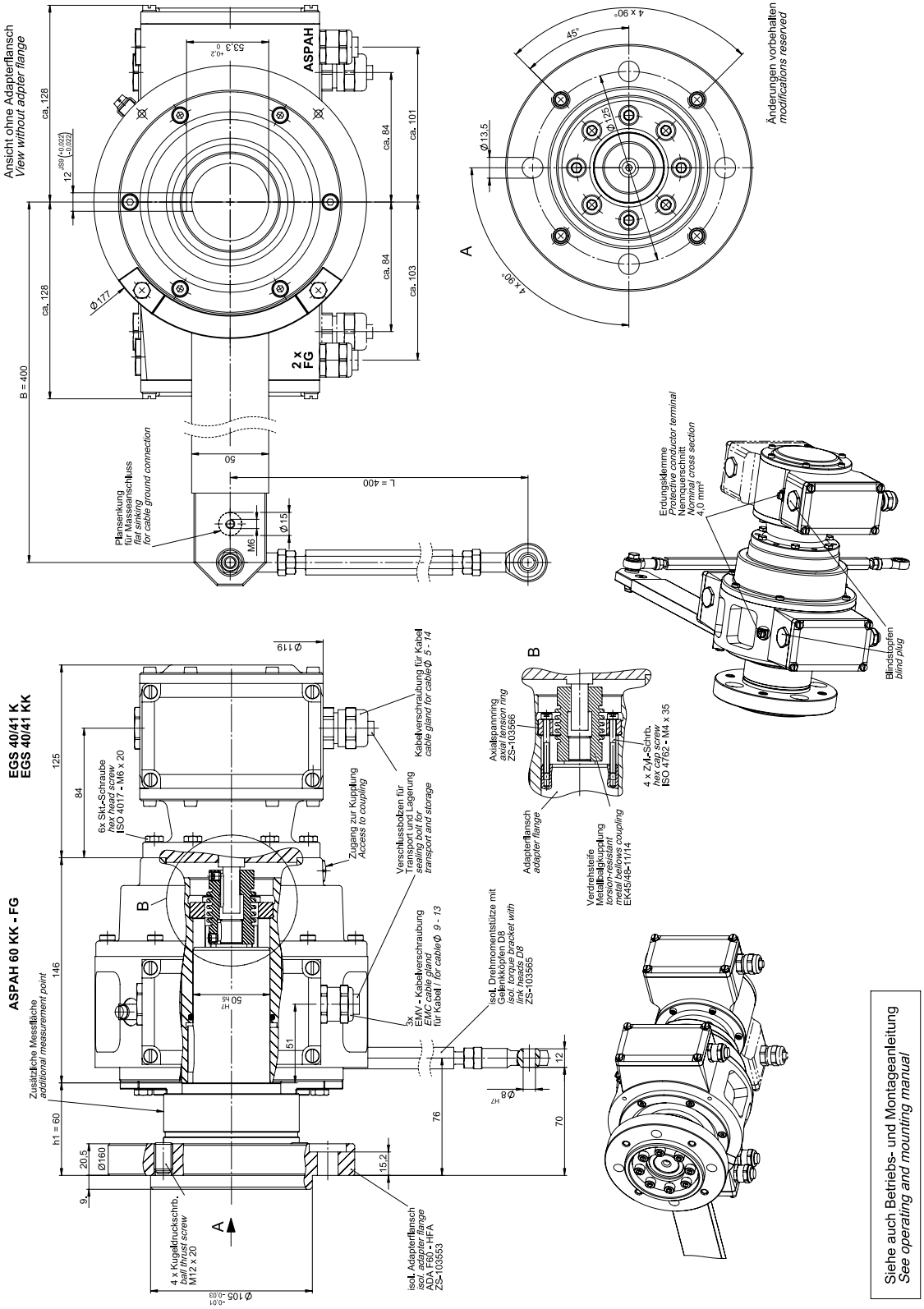
| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | 120 | 150 | 200 | 228 | 235 | 250 | 300 | 365 | 410 | 435 | 470 | 500 | 565 | 600 | 705 | 765 | 800 | 965 | 1365 |
| LH | 155 | 185 | 235 | 263 | 270 | 285 | 335 | 400 | 445 | 470 | 505 | 535 | 600 | 635 | 740 | 800 | 835 | 1000 | 1400 |

**ASEH 60 KK – FG** **With isol. adaptershaft ADA F60-J140** **HM 19 M 113498**

# 13 Dimension drawings ASPAH 60 (Parallel)

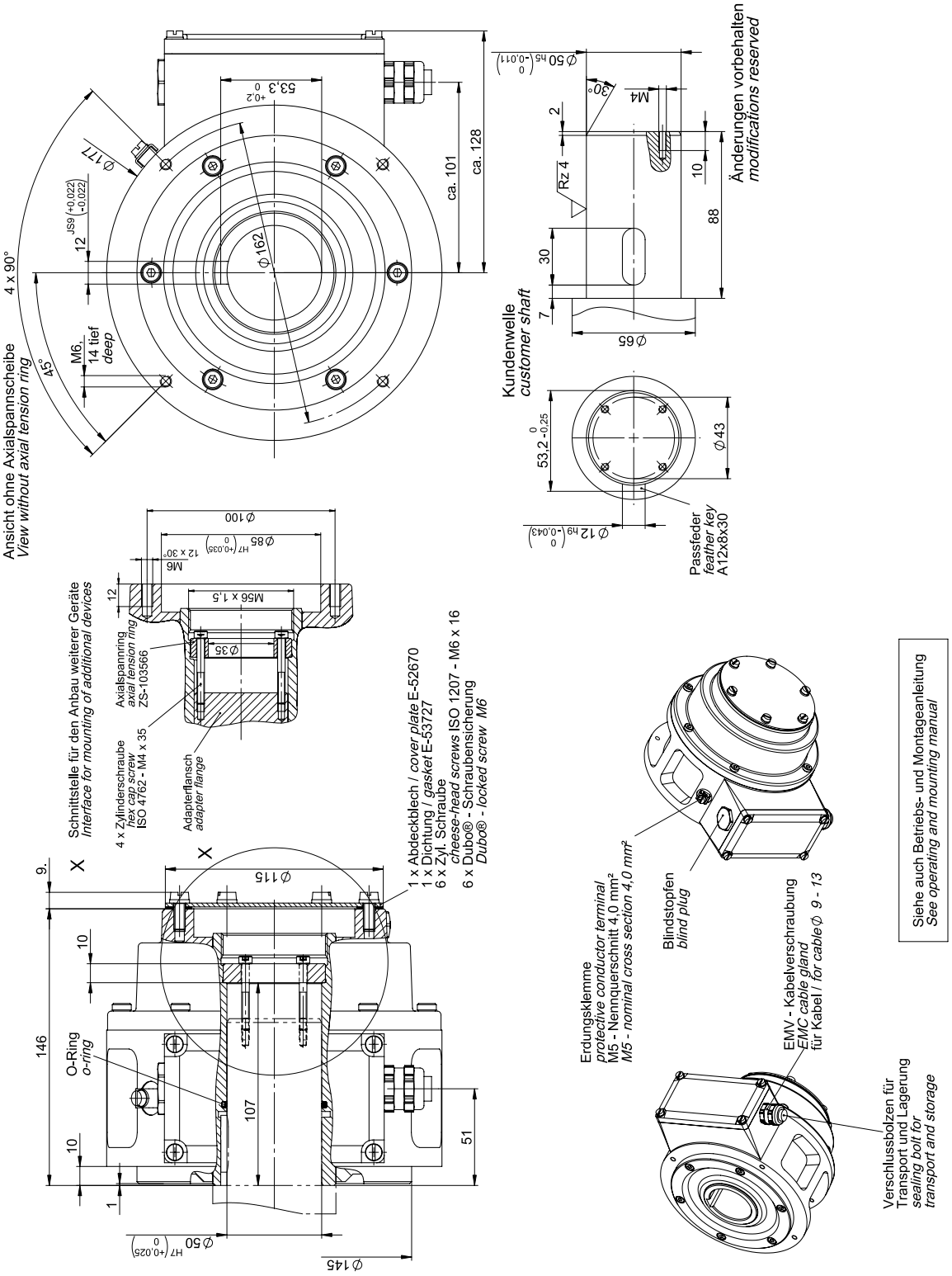



**ASPAH 60 KK – FG** **With adapter shaft** **HM 11 M 103743a**

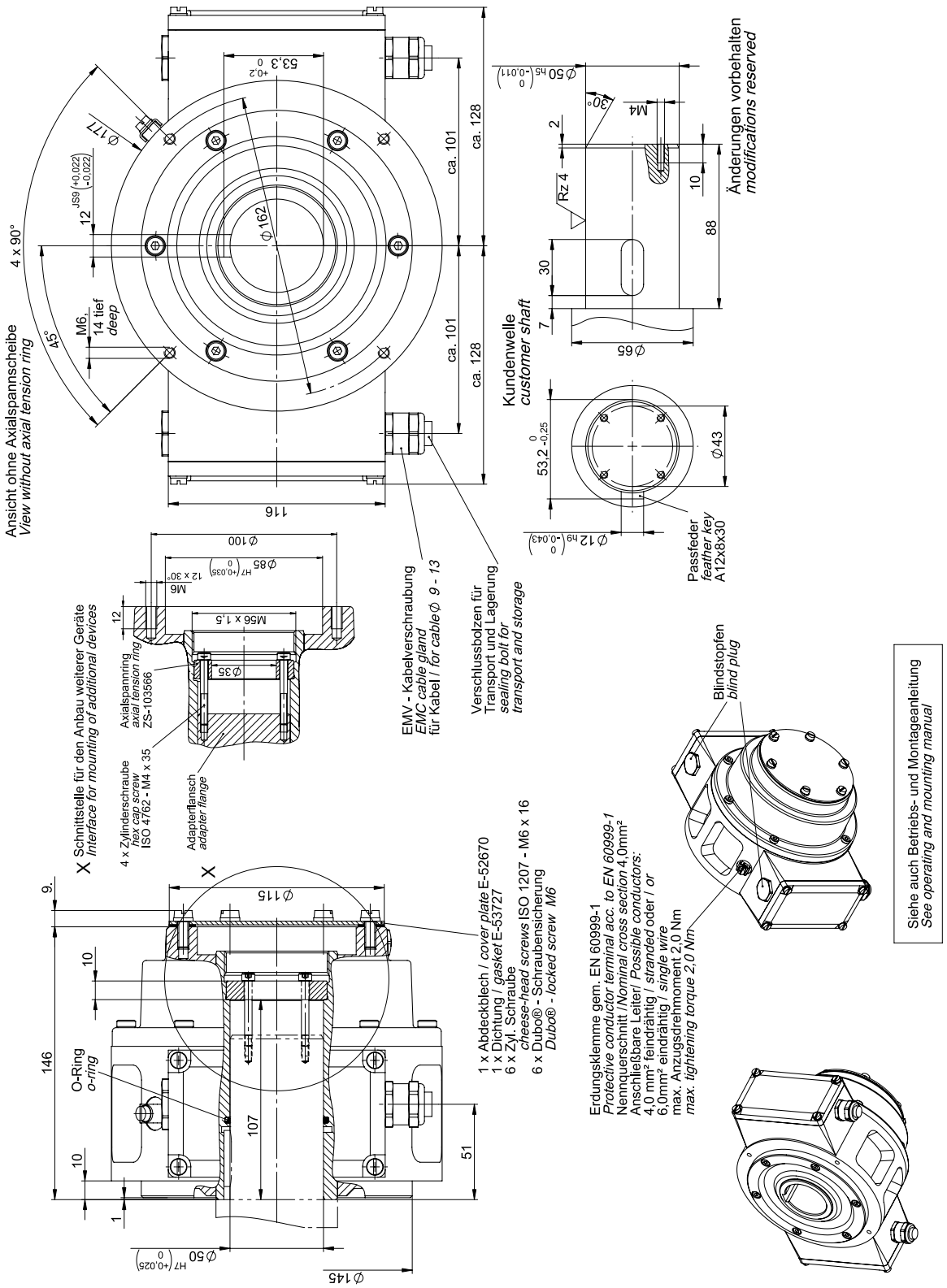



**ASPAH 60 KK – FG + EGS 41** **With adapter shaft** **HM 11 M 103559a**

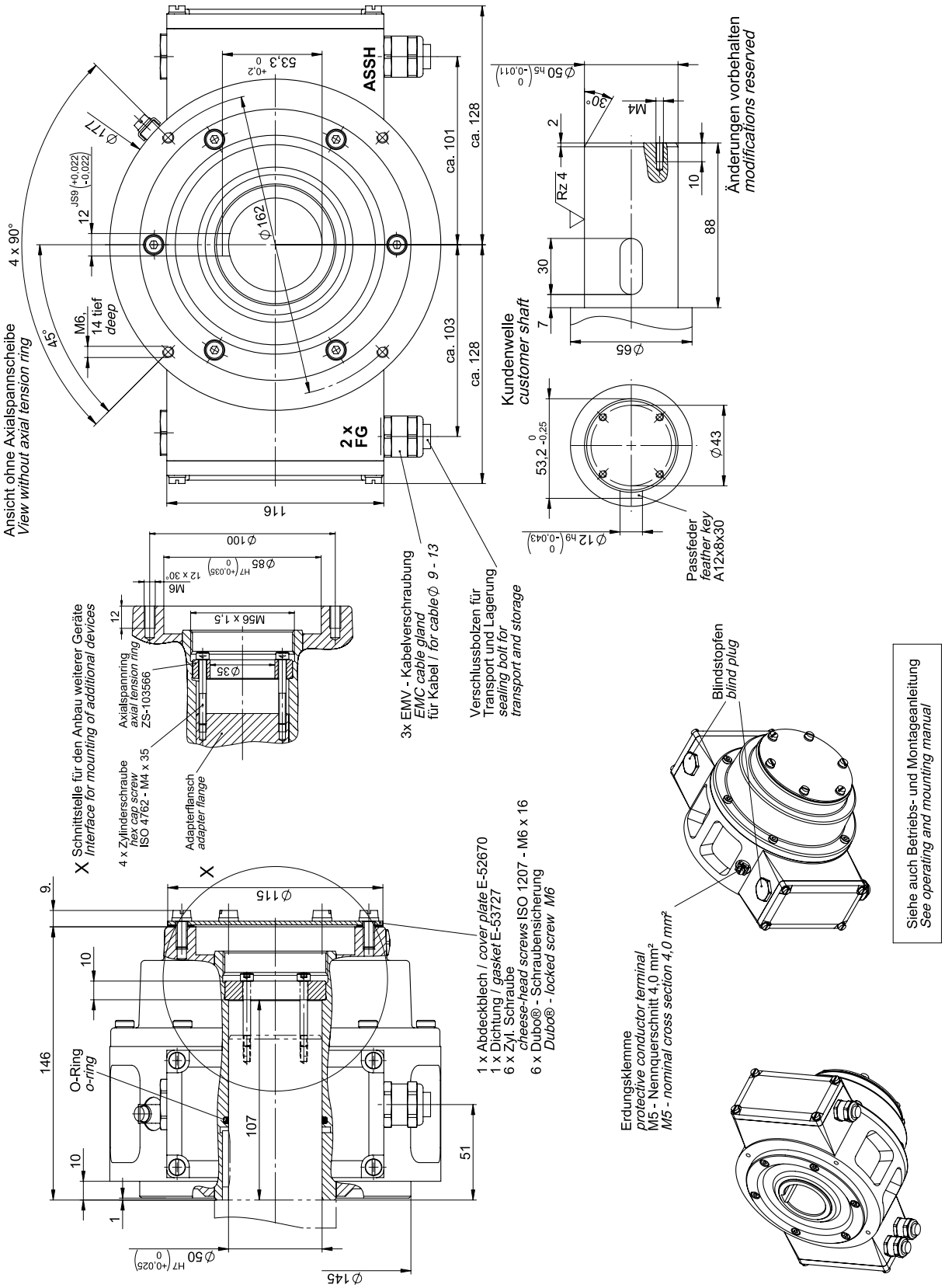
# 14 Dimension drawings ASSH 60 (SSI)




**ASSH 60 K** **HM 14 M 107037**




**ASSH 60 KK** **HM 22 M 117520**




**ASSH 60 KK – FG** **HM 13 M 106301**