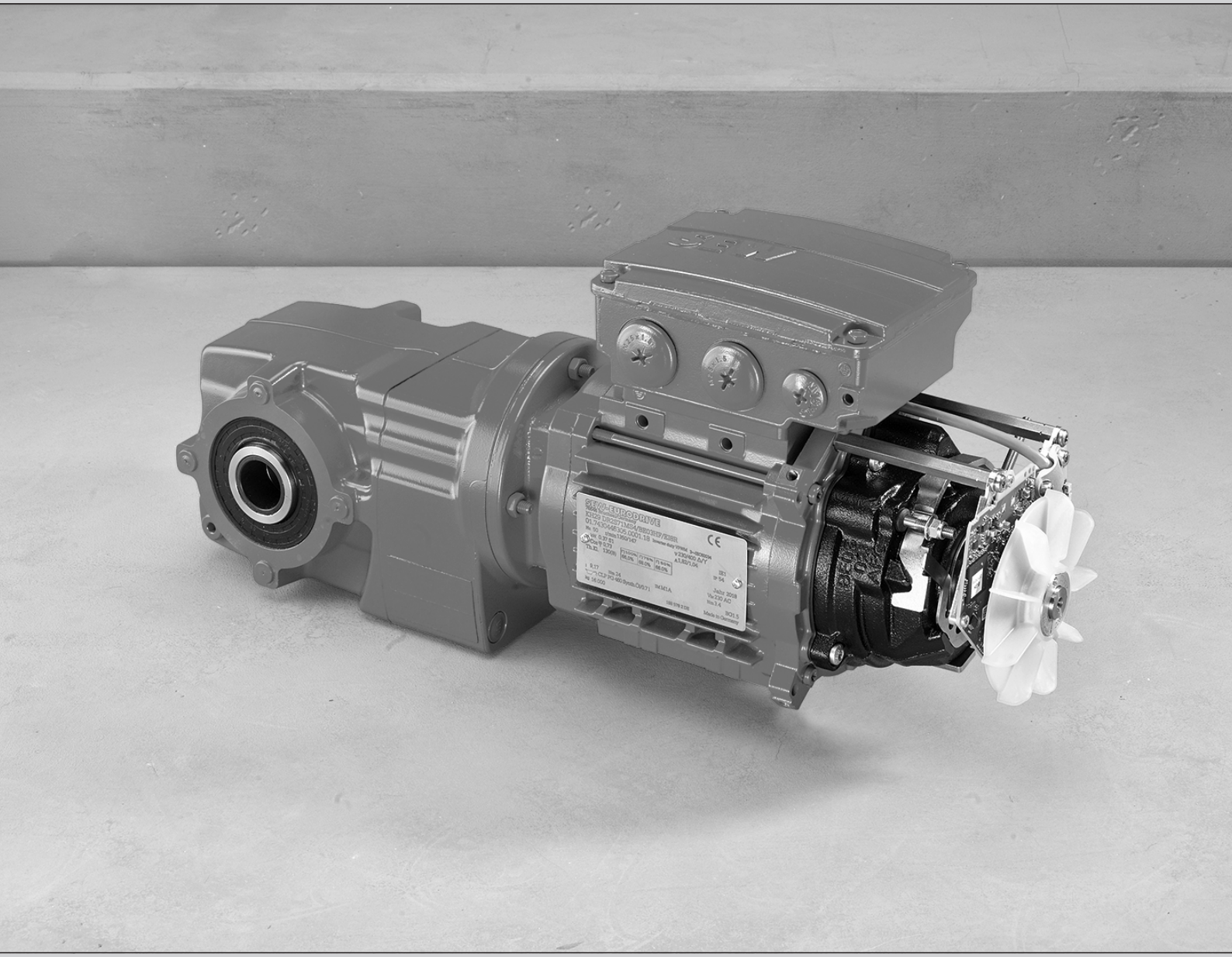
SEW EURODRIVE

Addendum to the Operating Instructions



Built-in Encoder, Add-on Encoder, and Safety Encoder

DR.., DRN.., DRU.., DR2.., EDR.., EDRN.. AC Motors

Integrated, Cone Shaft, Spread Shaft, Plug-in Shaft, Hollow Shaft, Encoder Mounting Adapters

Edition 10/2023

31543952/EN

Table of Contents

31543952/EN – 10/2023

31543952/EN – 10/2023

1 General information

1.1 About this documentation

The documentation at hand is the original.

This documentation is an integral part of the product. The documentation is intended for all employees who perform work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words in the safety notes.

Signal word	Meaning	Consequences if not observed
⚠ **DANGER**	Imminent danger	Death or severe injuries
⚠ **WARNING**	Possibly dangerous situation	Death or severe injuries
⚠ **CAUTION**	Possibly dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION	Useful information or tip: Simplifies handling of the product.	

31543952/EN – 10/2023

1.2.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous step.

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD!** Type and source of danger. Possible consequence(s) if disregarded. Measure(s) to prevent danger.

31543952/EN – 10/2023

1.3 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.4 Product names and trademarks

The product names mentioned in this documentation are trademarks or registered trademarks of the respective titleholders.

1.5 Copyright notice

1.6 Other applicable documentation

The corresponding documentation applies for all other components.

1.7 Recycling, reprocessing, reuse

SEW-EURODRIVE GmbH & Co KG strives to use as few new natural resources as possible in the production of its products. An important aspect of this is the circular economy with the recycling of materials as well as the inspection and/or reprocessing of returned components and their reuse in new products. SEW-EURODRIVE GmbH & Co KG only uses these processes if the resulting materials and components are of the same quality as new parts.

31543952/EN – 10/2023

2 Safety notes

2.1 Preliminary information

The following general safety notes serve the purpose of preventing injury to persons and damage to property. They primarily apply to the use of products described in this documentation. If you use additional components, also observe the relevant warning and safety notes.

2.2 Additional information

For information about this chapter, refer to the operating instructions.

In addition, the following information must be observed for the safety encoders described in this document.

2.3 Safety encoders

2.3.1 Designated use

- The safety encoders are designed for use with the described motors. It is not permitted to mount them on other motors.
- When installed in machines, start of the designated operation is prohibited until it is determined that the machine complies with the local laws and directives. Machinery Directive 2006/42/EC in particular must be followed in the respective validity.
- Before starting the designated use, make sure that the system complies with the specifications of this documentation, and in particular the technical data.
- In order to determine the achieved safety integrity (performance level PL and/or safety integrity level SIL) of a system's safety functions, the system manufacturer must perform an overall evaluation. This document contains the product-related specifications necessary for the evaluation.
- When using a safety encoder in combination with a motor brake, the brake may only be used as a holding brake. Braking during operation is not permitted. The designated use of the brake is to activate the brake at an idle state (brake application speed < 20 min^{-1}). Emergency stops from higher motor speeds are permitted. SEW-EURODRIVE recommends stopping the drive with stop category 1 according to EN 60204-1.
- Operation of the safety encoders is permitted at ambient temperatures of -30 °C to +60 °C.
- The safety encoders are rated for the following installation altitudes:
  - ES7S, AS7W, AS7Y: 4000 m above sea level
  - EG7S, AG7W, AG7Y: 4000 m above sea level
  - EK8S, AK8W, AK8Y: 4000 m above sea level
  - EI7C FS: 3800 m above sea level

  Installation altitudes that deviate from these and derating of the drives or frequency inverters must be noted.

31543952/EN – 10/2023

- For AS7W, AG7W, AS7Y, AG7Y, AK8Y and AK8W safety encoders, only the incremental interface is certified according to the PL d/SIL 2 approval. The absolute interface must not be used to implement safety functions without further measures in place.
- SEW-EURODRIVE recommends activating the monitoring functions lag error, speed, and encoder monitoring when configuring the inverter.
- The safety encoders described in this documentation are not capable of independently bringing about a safe state in the machine.
- In the event of a failure or malfunction of the safety encoder, injury and damage to the system or operating equipment must be prevented by means of suitable measures taken in the overall system.
- Protection against unintentional or automatic restarting of the machine must be ensured in the overall system, if necessary.
- The safety encoders described in this documentation are intended to be used in functional safety and are mounted on the motor. Fault exclusion in compliance with EN 61800-5-2 can be assumed on the mounting of the safety encoder.
- Motors with a safety encoder are not suitable for operation in areas with increased vibration stress of level 1 (vibration level 1).

2.3.2 Inspection/maintenance

The users can perform work themselves on a drive with functionally safe motor options (can be identified by the FS logo on the motor nameplate).

Any work on the safety encoder and/or the safety brake is carried out at your own risk. The user is responsible and liable for the proper performance of the work described in the corresponding documentation.

The user has to ensure the traceability of the work performed with regard to the functional safety. In the event of proven compliance with the work described in the documentation, the characteristics regarding functional safety described by the manufacturer are maintained.

Use only genuine spare parts in accordance with the valid spare parts list.

31543952/EN – 10/2023

3 Encoder technology in practice

3.1 What are encoder systems?

3.1.1 What are the tasks of encoder systems?

The basic function of encoders is to provide one of the following pieces of information:

- Absolute encoder: Motor shaft position of a rotary drive or linear motor
- Incremental encoder: Change in motor shaft position of a rotary drive or linear motor
- Absolute or incremental encoder: Change in motor shaft speed of a rotary drive or linear motor

The aforementioned information is used, for example, to enable one of the following functions:

- Position control in a closed loop system
- Speed control in a closed loop system
- Torque control in a closed loop system
- Realization of safety-related applications
- Monitoring of the position or speed

If the encoder system is operated in a closed loop system, the speed quality and control behavior can be significantly improved, even with major changes in load.

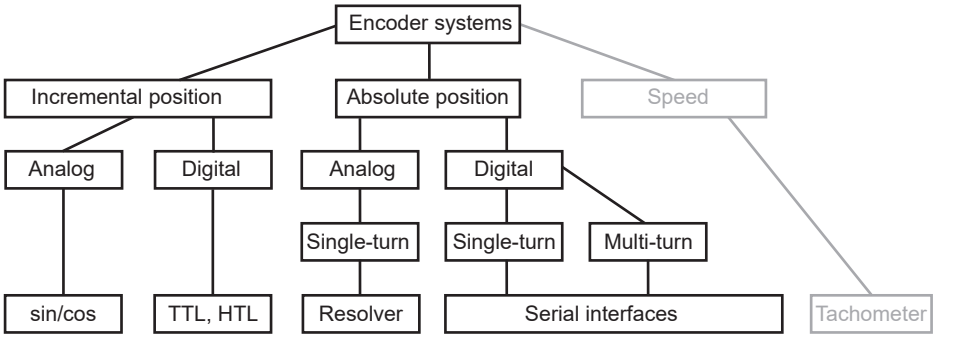
For dynamic control of synchronous motors under a wide range of load conditions, feedback of the rotor position is required to set the rotating field. By selecting the correct encoder and the optimum combination of signals for control processes and positioning, you can create an optimum drive system.

Due to control technology requirements, tacho-generators that determine direct information about a speed are rarely used today, as they do not enable positioning.

31543952/EN – 10/2023

3.1.2 Which types of encoder systems are there?

Overview of conventional encoder systems with respect to electrical interfaces



9007200771667595

The different encoders deliver the following data:

Encoder system	Delivered data		
	Rotor angle	Position	Speed
Single-turn absolute encoder	x	x	(x)
Multi-turn absolute encoder	x	x	(x)
Incremental encoder	(x)	(x)	(x)
Resolver	x	(x)	x
Tacho-generator	–	–	x

x can be directly evaluated, (x) available with additional evaluation

Benefits and drawbacks of the most important encoder systems

Encoder system	Advantages	Disadvantages
Incremental encoder	• Robust designs • Long cable lengths of up to 300 m are possible with TTL and HTL interfaces • Wide range of resolutions, mounting positions, and interfaces • Very high resolution possible • Built-in encoder: motor-integrated, compact design possible	• If a voltage drop occurs, the position information is lost

31543952/EN – 10/2023

Encoder system	Advantages	Disadvantages
Absolute encoder	• Position information is still available even after a voltage drop and restart • Very high resolution possible • Single-turn encoder design: A unique position is determined within one motor revolution. • Multi-turn encoder design: In the case of rotary encoders, a position must also be determined over numerous revolutions.	• High costs
Resolver	• Robust design • Insensitive to vibration and temperature • SEW-EURODRIVE's resolvers are single-turn encoders	• High evaluation overhead

An important criterion when selecting an encoder is the robustness of an encoder system. As some encoders are installed directly on the motor, they must be insensitive to temperature and vibration, otherwise the encoder could be damaged.

An encoder system's susceptibility to interference also plays a major role. In the event of a supply voltage failure, the absolute encoder retains its current path information, while the incremental encoder loses it. As a result, the absolute encoder is also resistant to external interference pulses. Once the interference fades away, it continues to work flawlessly since the saved path information has not been changed.

In the incremental encoder, a lost or excess counting pulse is not registered and leads to a permanent measurement error.

31543952/EN – 10/2023

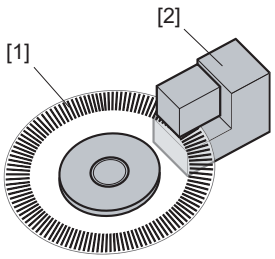
3.1.3 How do encoder systems work?

Rotary encoder systems

Incremental encoder

Optical system

Incremental rotary encoders convert the speed into a discrete number of electrical pulses. This is performed via a code disk with radial, transparent slots, which is opto-electronically scanned. During the process, the resolution is defined by the number of slots.



1369274507

[1] Optical code disk

[2] Light source and scanning unit

Magnetic system

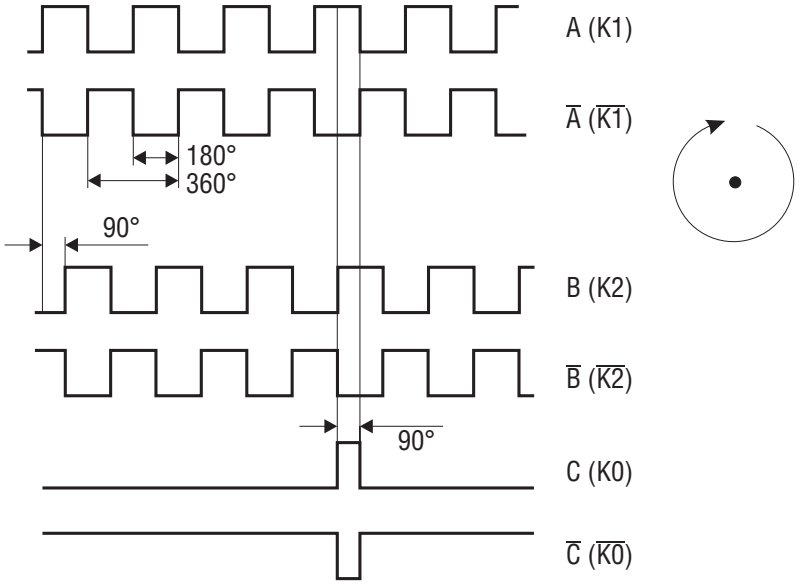
Sensors scan rotating magnets or ferromagnetic material measures and use them to generate a signal. These systems tend to be more mechanically robust than optical systems. It is also possible to deviate from the classic design. For example, in the case of built-in encoders from the E7. and EI8. family, magnetic pole rings are integrated in the fan. Magnetic field sensors on an encoder module detect these pole rings. This encoder module is integrated between the motor and fan in a space-saving manner and measures changes in position in a contactless and wear-free manner. The corresponding incremental signals are produced by interpreting the measured values.

31543952/EN – 10/2023

Design and operating principle

Incremental encoders normally have 2 tracks and a zero pulse track. Inverting the signals results in a total of 6 tracks. Two scanning elements in the incremental encoder, which are offset by 90°, deliver two signal tracks, A (K1) and B (K2). Track A (K1) is 90° ahead of track B (K2) when looking at the motor shaft. This phase shift is used to determine the motor's direction of rotation. The zero pulse (one pulse per revolution) is registered by a third scanning unit and made available on track C (K0) as a reference signal.

The signals A (K1), B (K2), and C (K0) are inverted in the encoder and provided as signals $\overline{A}$ (K1), $\overline{B}$ (K2), and $\overline{C}$ (K0).



1369276939

Signal level

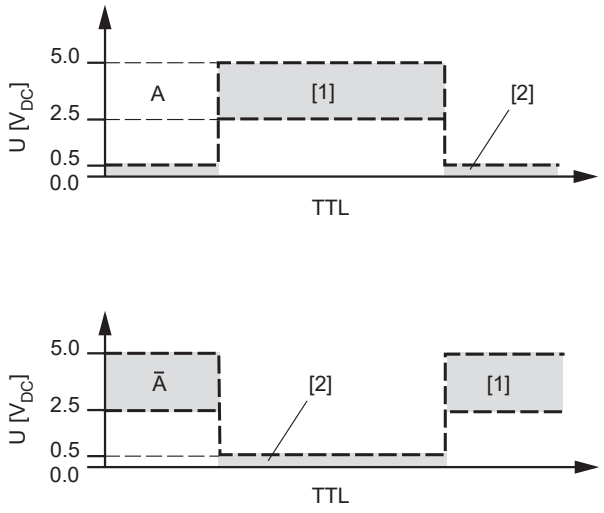
A distinction is made between 2 signal levels for incremental digital encoders:

- TTL (**T**ransistor-**T**ransistor-**L**ogic)
- HTL (**H**igh-voltage-**T**ransistor-**L**ogic)

31543952/EN – 10/2023

*TTL (**T**ransistor-**T**ransistor-**L**ogic)*

The signal levels are typically $V_{low} \leq 0.5$ V and $V_{high} \geq 2.5$ V. A positive and negative signal (e.g. A, $\overline{A}$) are each sent from the sender to the receiver and evaluated differentially. This symmetrical signal transmission and differential evaluation can minimize common mode interference and achieve higher data rates.



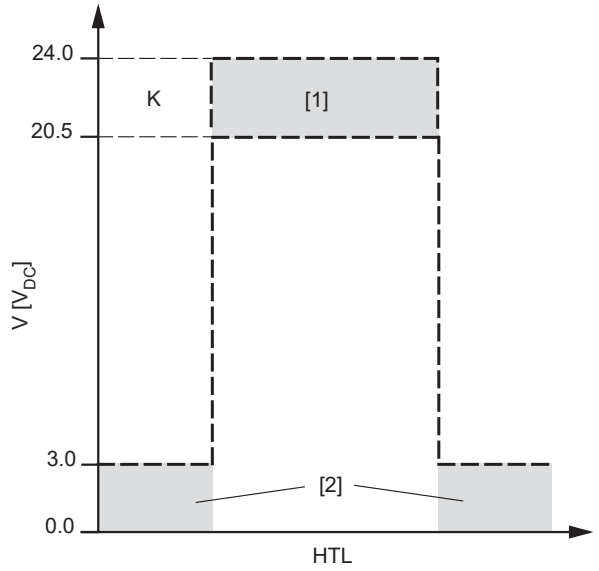
1369579787

[1] "1" area

[2] "0" area

*HTL (**H**igh-voltage-**T**ransistor-**L**ogic)*

The signal levels are typically V_{low} ≤ 3 V and V_{high} ≥ V_B-3.5 V. The signals are transferred symmetrically and evaluated differentially. Because of this and due to the high voltage level, HTL encoders have excellent EMC performance.



1369620619

[1] "1" area

[2] "0" area

Inverted HTL signals must not usually be connected directly to the inverter's encoder input, as the input stages may be overloaded and thereby destroyed.

31543952/EN – 10/2023

Incremental rotary encoders with sin/cos tracks

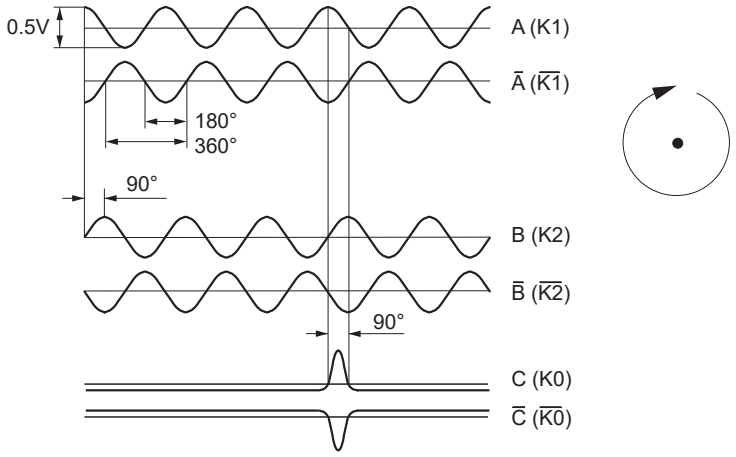
Structure and functional principle

Sin/cos encoders, also known as sine encoders, deliver two sinus signals offset by 90°. During the process, the number and the course of the sinus curves (interpolation and arcus tangent formation) are evaluated. With the help of these values, the rotational speed can be determined with a very high resolution and accuracy. This is particularly advantageous if large setting ranges and low speeds need to be precisely maintained. Furthermore, there is a very high level of control stability.

Sin/cos encoders normally have 2 tracks and a zero pulse track. Inverting the signals results in a total of 6 tracks. The 2 signals, which are offset by 90°, are on track A (K1) and B (K2). One sine half wave per revolution is provided at track C (K0) as the zero pulse. The tracks A (K1), B (K2), and C (K0) are inverted in the encoder and provided as inverted signals on tracks $\overline{A}$ ($\overline{K1}$), $\overline{B}$ ($\overline{K2}$) and $\overline{C}$ ($\overline{K0}$).

Track A = cos

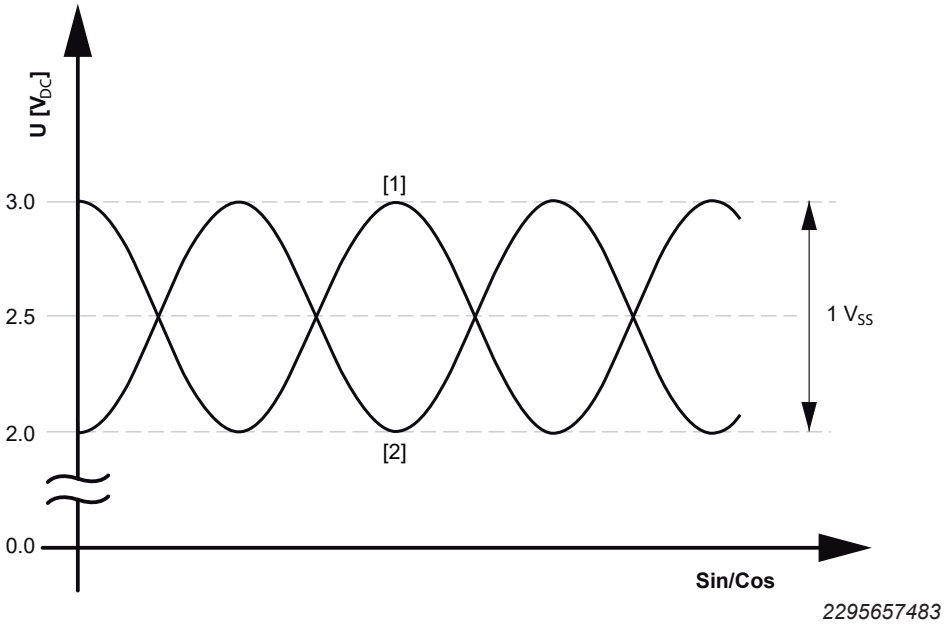
Track B = sin



1369570059

Signal level

Sin/cos signals are generally superimposed over a DC voltage of 2.5 V. As the sin/cos signals are transferred symmetrically and evaluated differentially (V_{SS} = 1 V), they are impervious to asymmetrical interference and have excellent EMC performance.



[1] A

[2] $\overline{A}$

Absolute encoder

Absolute encoder with asynchronous-serial interface

Over the past few years, so-called combi encoders have also established themselves on the market. These encoders are sin/cos encoders with absolute value information. In addition to the current motor speed, they also provide absolute value information and thus offer technical and financial advantages whenever an absolute encoder is required.

Structure

The absolute encoder with an asynchronous interface is a typical combi encoder. In addition to a sin/cos signal for recording the speed and for information on the absolute value, this encoder also has a typical electronic nameplate in which the drive data can be saved, among other things. This makes startup easier and reduces possible input errors by the user, as they do not have to enter any drive data.

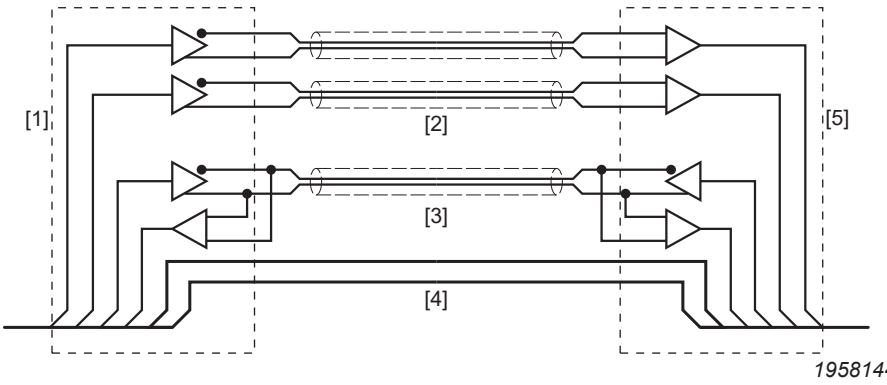
Absolute encoders with an asynchronous interface are available as:

1. Add-on encoders for asynchronous motors and synchronous servomotors
2. Built-in encoders for synchronous servomotors

Both are available in a single-turn design and in a multi-turn design.

Operating principle

At the start of the power-on process, the absolute encoder's component determines the absolute position. The inverter for synchronous motors can use this to calculate the commutation information. The inverter reads this position information via an RS485 connection (parameter channel) and sets a counter state. Based on this absolute value, the position changes are recorded via the tracks of the sin/cos encoder and analogously transferred to the inverter via the process data channel. Additional queries of the absolute position are then only performed cyclically for plausibility monitoring.



[1] Encoder systems

[2] Sin/cos signal

[3] RS485 parameter channel

[4] Supply voltage

[5] Inverter

An inverter with an asynchronous-serial interface receives both the position information and the time period for which this position is valid via the parameter channel. In parallel, the incoming analog signals (sin/cos signals) are constantly received and counted on the process data channel.

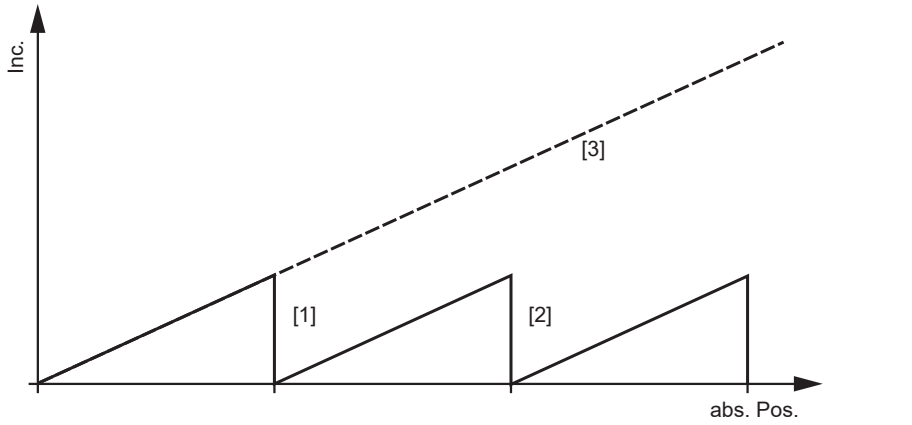
The encoder can be optionally designed as a single or multi-turn variant. Single-turn means that the absolute position information always refers to only one revolution. The multi-turn variant of the encoder can also provide information about the number of revolutions (typically e.g. 4096) via downstream code disks rotating at a reduced ratio or by using an electronic revolution counter. Thus, depending on the inverter, an encoder overflow occurs, e.g. after the maximum number of encoder revolutions, which is counted in the inverter's non-volatile memory (NVS). Up to 256 encoder overflows are saved (for 4096 revolutions). If the voltage at the supply pins falls below a limit value (e.g. in case of a power failure), the NVS detects this and the data is saved in non-volatile memory.

Overflow example:

When powered on again, the EEPROM in the inverter provides the following values:

- The absolute value within an overflow (typically 4096 x 4096)
- The number of overflows (0 – 255)

If the drive that is close to an overflow is moved beyond the encoder overflow point after removing the supply voltage, then there will be a discrepancy between the recorded and the saved absolute values when powered on again. The encoder electronics then corrects the saved values automatically with the recorded values.



[1] 1st encoder overflow

[2] 2nd encoder overflow

[3] Absolute position viewed by the user

The encoder overflows are also counted in the inverter, which can be used to determine the absolute position.

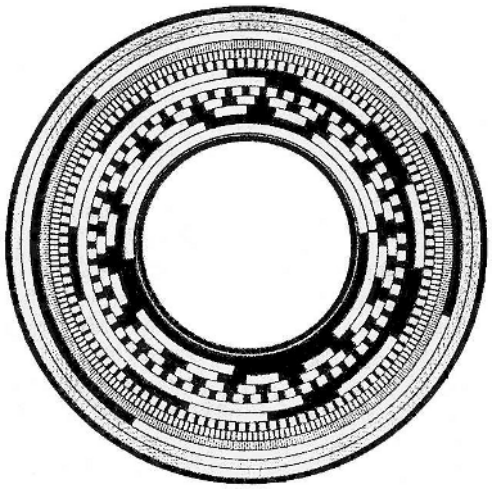
The user does not see the actual encoder overflows; they are saved in the inverter. As a result, the encoder with an asynchronous-serial interface is a true absolute encoder.

31543952/EN – 10/2023

Absolute encoder with SSI (synchronous-serial interface)

Single-turn encoder

The absolute value information is generated using a code disk, e.g. with Gray code, which is generally scanned optically. Each angle position is assigned a unique code pattern in the process. As a result, the motor shaft's absolute position can be determined. In contrast to binary code, the special feature of a single-step Gray code is that only 1 bit changes at a time, meaning that a faulty scanning process is detected immediately.



1369279371

Decimal	Gray code	Binary code
0	0000	0000
1	0001	0001
2	0011	0010
3	0010	0011
4	0110	0100
5	0111	0101
6	0101	0110
7	0100	0111
8	1100	1000
9	1101	1001
10	1111	1010
11	1110	1011
12	1010	1100
13	1011	1101
14	1001	1110
15	1000	1111

This encoder design is what is known as a single-turn encoder, since the absolute position of the motor shaft can be determined only via a single revolution.

31543952/EN – 10/2023

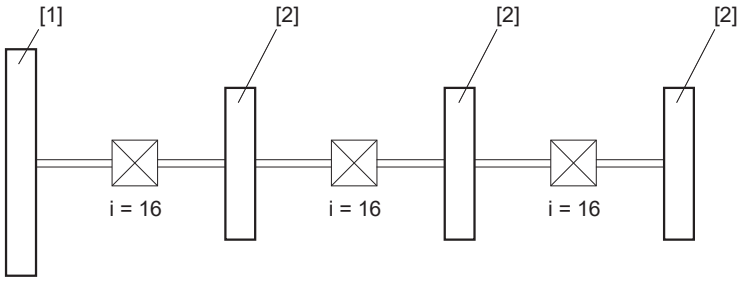
Multi-turn encoder

In addition to the single-turn design, there are also multi-turn encoders that determine the absolute position over multiple revolutions.

Different technical solutions are available to detect the revolutions. There are micro-gear unit stages that are magnetically or optically scanned using code disks.

The multi-turn unit is also available as an electronic counter that saves to memory.

In the case of an optical rotary encoder, the code disks are decoupled from each other via a gear unit stage with a reduction ratio of i = 16. In other words, with 3 additional code disks (common value), 16 x 16 x 16 = 4096 revolutions can be absolutely resolved.



1369572491

[1] Code disk to detect the angle position

[2] Code disk to detect the number of revolutions

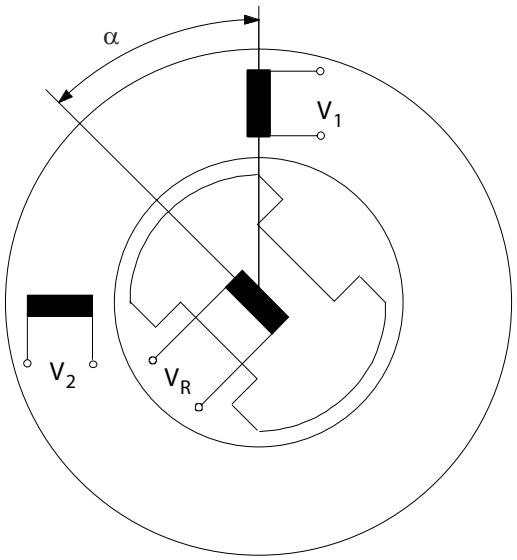
31543952/EN – 10/2023

Resolver

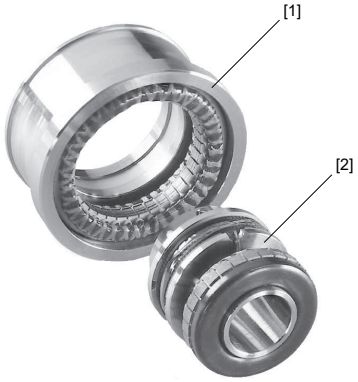
If designed as a two-pole version, a resolver can determine the absolute position of the motor shaft within one motor revolution. The speed and the absolute position per revolution are derived from the resolver signal.

Structure

The resolver consists of 2 function units, the stator, and the rotor.



1369284235



1369567627

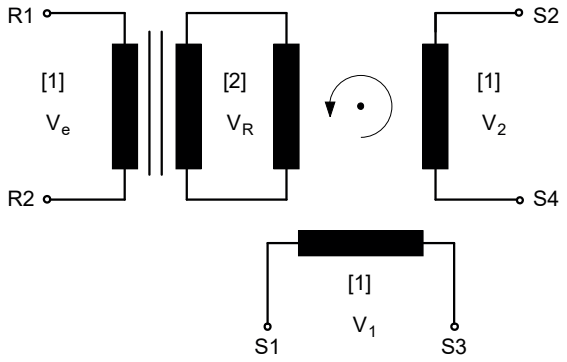
[1] Stator of the resolver

[2] Rotor of the resolver

Functional principle

The inverter delivers a high-frequency excitation signal with a constant amplitude and constant frequency. This high-frequency signal is transferred to the resolver's rotor via the stator.

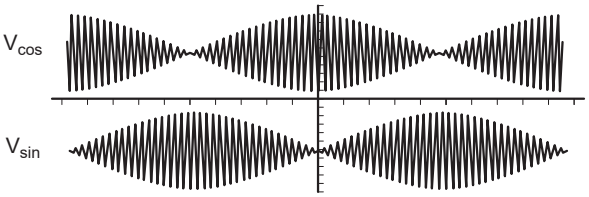
The rotation of the resolver's rotor induces voltages in the rotary transformer's stator winding; these voltages are based on the position of the rotor.



1369630347

[1] Stator

[2] Rotor



1369632779

Signal characteristics

The course of the signals is calculated as follows:

$V_{ref} = A \times \sin(\omega_{Exciter} \times t)$

$V_{cos}(t) = A \times ü \times \sin(\omega_{Exciter} \times t) \times \cos(p \times \alpha)$

$V_{sin}(t) = A \times ü \times \sin(\omega_{Exciter} \times t) \times \sin(p \times \alpha)$

$p \times \alpha = \arctan(V_{sin} / V_{cos})$

V_{ref}	Reference voltage
V_{cos}	Output voltage 1 of the stator
V_{sin}	Output voltage 2 of the stator
A	Amplitude of the input voltage
$\omega_{Exciter}$	Angle frequency of V_e
α	Rotor angle
ü	Gear ratio
p	Number of pole pairs of the resolver

The amplitudes of voltages V_{sin} and V_{cos} change based on the position of the rotor and are each fed the evaluation via a differential amplifier. The differential amplifiers filter out interference signals (common mode interference) on the isolated track signals V_{sin} and V_{cos}.

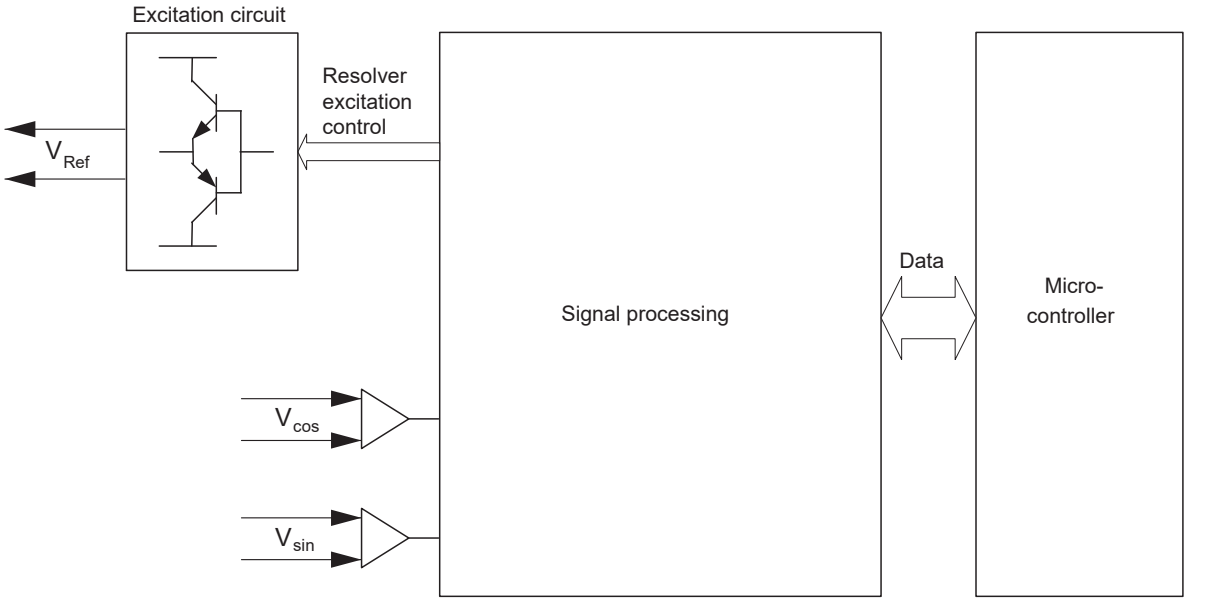
31543952/EN – 10/2023

The current mechanical position can be determined from the scanned track signals:

$$p \, x \, \alpha = \arctan(V_{sin} / V_{cos})$$

1367859979

The following graphic provides an overview of the main hardware structure of a resolver evaluation, which operates according to the scanning process:



2058735499

3.1.4 Which encoder with which motor?

Encoder systems for asynchronous DRN.., DRU.., DR2. AC motors or servomotors

In the case of asynchronous motors, encoder systems are generally used for two reasons:

- Speed control (to achieve high speed quality and to optimally respond to load changes)
- Positioning

The following encoders are generally used here:

- Low-resolution incremental encoders
  - Can only be used for positioning and not for speed control
  - Only simple positioning (rapid/creep speed) is possible
  - As a result, the system has lower dynamics
  - Reference travel required
- Incremental rotary encoders
  - For speed control
  - For positioning
  - Reference travel required
- Absolute encoder
  - For positioning
  - No reference travel required
  - If no real-time channel (combi encoder with either sin/cos, TTL or HTL signal) is present, then an additional encoder system is required for speed control

Encoder systems for CM.. synchronous servomotors and DR2C synchronous standard motors

For dynamic control of synchronous motors, the rotor position is still required for the control system. Generally, two rotor position detection systems are used in synchronous servomotors:

- Resolver
  - For rotor position detection
  - For speed control
  - For positioning
  - Reference travel required
- Absolute encoder
  - For rotor position detection
  - Absolute encoders for servomotors are generally combi encoders with a real-time channel (sin/cos) for speed control.
  - For positioning
  - Reference travel is usually necessary for single-turn encoders
  - Reference travel is unnecessary for multi-turn encoders

Encoder systems for linear motors

- Linear encoder and solid measures

31543952/EN – 10/2023

  - For positioning
  - No reference travel is required with absolute value information on the measuring tape
  - Reference travel is required in the event of purely incremental information on the measuring tape

Encoder systems for linear position detection

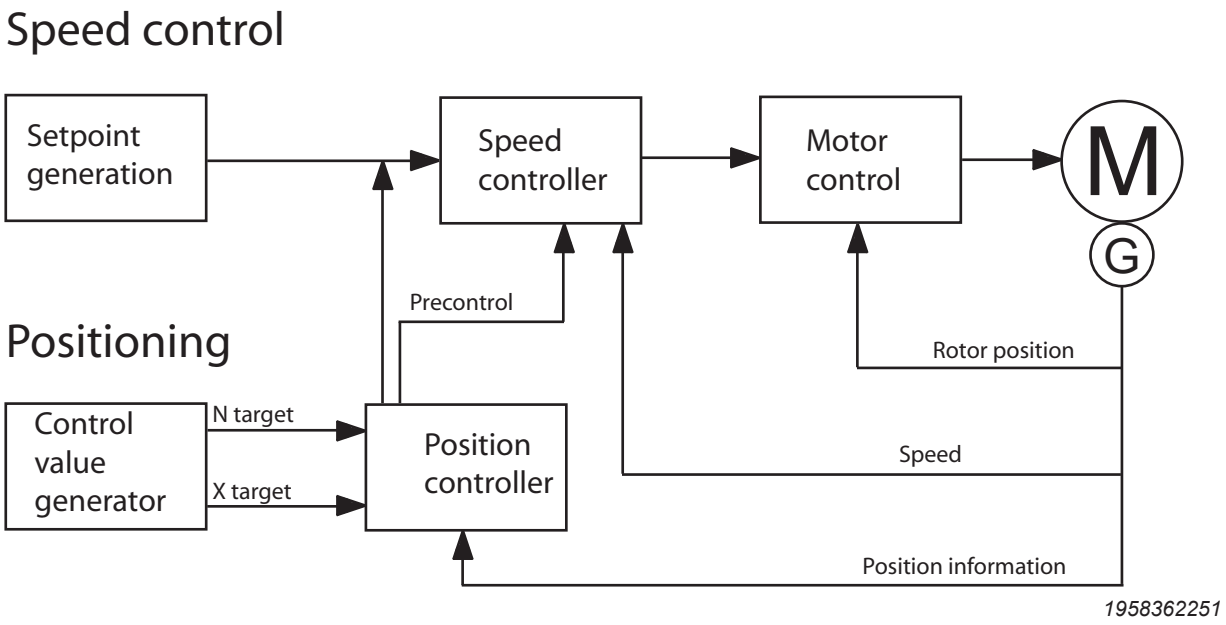
For precise positioning with systems that are prone to slip, it is necessary to install a measuring system on the track in addition to the encoders installed on the motor.

- Laser encoder
  - For measuring distances up to approx. 250 m
  - No curve mobility
- Barcode encoder
  - Can be used for measuring very long distances
  - Curve mobility and switches are possible
- Code rail
  - Can be used for measuring distances up to approx. 320 m
  - Very robust system
  - Curve mobility and switches are possible
- Wire-actuated encoder
  - Robust system
  - Ideal for vertical applications

31543952/EN – 10/2023

3.2 How are encoder systems used at SEW-EURODRIVE?

The typical closed loop system of a drive system, consisting of a motor (M) with encoder (G), is shown in simplified form below. As part of the simplification, note that the encoder generally outputs position values (rotor position or change in rotor position). All other sizes are derived from this.



3.2.1 Which encoder systems does SEW-EURODRIVE use?

Basic class incremental encoders of type EI71, EI72, EI76, EI7C

Low-resolution incremental encoders can be used to realize simple, non-dynamic positioning tasks. Furthermore, these encoders allow you to inexpensively check whether the motor is turning. If a two-track encoder is used, the direction of rotation of the motor can also be detected.

Incremental encoder type EI8., E..T, E..C, E..S, E..R

Incremental encoders are suitable for speed control and positioning. They have 2 signal tracks and a zero pulse track. The incremental encoders are designed as a hollow-shaft encoder, cone shaft, spread-shaft encoder, plug-in shaft with end thread, or solid-shaft encoder with coupling. Signal output: TTL, HTL or sin/cos.

Single-turn encoder type E..W

The E..W absolute encoders are combi encoders. They contain a single-turn absolute encoder and a high-resolution sine encoder. An asynchronous-serial interface is available for transferring the data of the absolute values. They are suitable for operating synchronous motors. They can be used for speed control or for positioning via a revolution. The E..W absolute encoders furthermore have an electronic nameplate.

31543952/EN – 10/2023

Multi-turn absolute encoders type A..Y, A..H, A..W

The A..Y, A..H and A..W absolute encoders are combi encoders. They contain a multi-turn absolute encoder and a high-resolution sine encoder. You can choose between an SSI interface or an asynchronous-serial interface for transmission of absolute value data. The A..H and A..W absolute encoders furthermore have an electronic nameplate.

3.2.2 How do you perform the project planning for encoder systems?

The use of a certain encoder is based on the requirements of the application. Each encoder in the offered capability classes can be used based on the application. If the application is not very dynamic, it may be sufficient to implement rapid/creep speed positioning via a low-resolution incremental encoder.

However, speed control is essential for dynamic positioning. A high encoder resolution is necessary for speed control quality. This is why SEW-EURODRIVE recommends sin/cos encoders. The signals are scanned with an A/D converter that achieves a higher resolution than the typical 1024 (4096 due to quadruple evaluation) increments of a TTL or HTL incremental encoder.

Linear systems are often used on the track for travel distance positioning. They have the advantage of measuring directly on the track and therefore being independent of the slip of the drive system.

The following table lists the most important characteristics of the encoder systems. You can also find additional information in chapter "Encoder capability class" (→ 🗎 34).

Encoder system	Sin/cos encoder	Incremental encoder	Low-resolution incremental encoder
Capability class	**High**	**Medium**	**Basic**
Output signal	1024 sin/cos periods/revolution	1024 periods/revolution (HTL-/TTL level)	1 to 24 periods/revolution
Accuracy	< 2 angular minutes	< 7 angular minutes	< 300 angular minutes (EI7C)
Maximum usable resolution	< 22 bits	< 14 bits	< 5 bits (EI7C)
Use	For speed control and "incremental" positioning	For speed control and "incremental" positioning	For simple "incremental" positioning
Suitable for	Asynchronous servomotors	Asynchronous AC motors	Asynchronous AC motors
Speed control	Suitable for dynamic applications	Suitable for dynamic applications with limitations in the lower speed range	–
Other characteristics	Simple startup due to electronic nameplate	Simple encoder system for standard applications	–

31543952/EN – 10/2023

Encoder system	Resolver	Absolute encoder with asynchronous-serial interface (sin/cos encoder with absolute value)	Absolute encoder with synchronous-serial interface (sin/cos encoder with SSI absolute value)
Capability class	**Medium**	**High**	**High**
Output signal	Amplitude-modulated sin/cos signal; 2-pole	• up to 2048 sin/cos periods • up to 32768 increments/revolution (absolute) • up to 65536 revolutions (absolute)	• up to 2048 sin/cos periods • up to 4096 increments/revolution (absolute) • up to 4096 revolutions (absolute)
Accuracy	< 40 angular minutes	< 2 angular minutes	< 2 angular minutes
Maximum usable resolution	< 16 bits	< 22 bits	< 22 bits
Use	For speed control and determining the rotor position within one motor revolution as well as "incremental" positioning	For speed control, determining the rotor position and absolute position	For speed control, determining the rotor position and absolute position
Suitable for	• Synchronous servomotors and standard motors	• Synchronous servomotors • Asynchronous servomotors • AC motors	• Synchronous servomotors • Asynchronous servomotors • AC motors
Speed control	Suitable for dynamic applications	Suitable for highly dynamic and dynamic applications	Suitable for highly dynamic and dynamic applications
Other characteristics	Mechanically very robust	Simple startup due to electronic nameplate	–

31543952/EN – 10/2023

4 Device structure

4.1 General information

Encoder technology

The task of an encoder is to detect the angular position of the motor shaft or the change of the angular position, and to pass on this information to a unit that evaluates this data, such as a PLC or frequency inverter.

This information is used to determine the rotational speed and angular acceleration. The evaluating unit (inverter, encoder card) can then monitor or control the speed and position the drive system accordingly.

Encoder in closed loop system

Encoders are connected to the inverter and allow for further improved motor control.

- The motor can be operated in positioning control or for a simple positioning task.
- The quality of torque control can be improved significantly.
- The quality of speed control can be improved significantly.

Encoder design

Encoders are available in various designs:

- Incremental encoders, single-turn absolute encoders, multi-turn absolute encoders
- Built-in encoders integrated in the motor and add-on encoders mounted to the motor
- Different mechanical connections of the motor shaft with the encoder.
- Different electrical connection options, such as terminal strip or plug connector.
- Different output signals: sin/cos, HTL, TTL, SSI, RS485 + sin/cos, HIPERFACE®, MOVILINK® DDI, resolvers.
- With or without electronic nameplate for startup on SEW-EURODRIVE inverters.
- Different resolutions and number of counted revolutions.
- Available for order ex works or mechanically prepared through mounting adapters for retrofitting.
- Various mechanical preparations for mounting encoders subsequently.
- Design as a safety encoder for implementing safety functions.
- Design as an encoder for use in potentially explosive areas according to ATEX/ IECEx and HazLoc-NA®.

SEW-EURODRIVE offers a wide range of encoders for different applications and different inverters. Before selecting the encoder, check the application environment as well as the encoder interface of the inverter.

Electronic nameplate

With EI8Z, E.8S, EK8W, EK8Z, AK8H, A.8W, and AK8Z encoders, important startup data are stored in an electronic nameplate. This facilitates starting up the drive and ensures that motor parameters are set correctly in the inverter.

During startup, the engineering software checks whether an electronic nameplate is present in the encoder and suggests the use of this data.

Advantages of auto identification of the drive:

- Complete and correct identification of encoder, motor, and gear unit

31543952/EN – 10/2023

- No manual entry of data is necessary, which saves time during startup.
- Easy startup of drives that are installed in locations that are difficult to access.

Modular encoder system

The modular encoder concept is standardized and improved. The encoders of the spread shaft (.S7.), plug-in shaft (.G7.) and hollow shaft (.H7.) variants have been converted into encoder variants with a cone shaft (.K8.). You will find significant advantages of the improved encoder in the following chapters.

Built-in encoders (EI..)

- EI7. and EI8. built-in encoders.
  - This encoder is integrated in the motor in a particular compact manner without adding extra length to the motor.
  - Brake wear can be measured without removing the encoder.
  - The encoder can be retrofitted.
  - The encoder does not have its own bearing. This is why the encoder is wear-free during operation and is suited for rough operating conditions, also with frequent working brake operations.

The EI7. encoder family is currently built in its second generation by SEW-EURODRIVE. The version ID EI7. B and EI7C FS is not listed in the type designation, however, and is therefore not listed in this document.

The add-on encoder is mounted on the B-side of the motor by means of various tool flanges. The standard for this is a cone shaft connection.

Cone shaft (.K8.)

- Encoders with cone shaft .K8.
  - The encoder type is available for sizes 71 to 355.
  - The encoders are available as safety encoders for implementing safety functions.
  - The encoders are suited for use in explosion-protected motors.
  - It is possible to measure the brake wear without removing the encoder.
  - The cone shaft connection is particularly robust and accurate.

Further product information and installation instructions for cone shaft encoders from SEW-EURODRIVE can be found via the following links:

DE: https://youtu.be/0vamJrbOUAk

EN: https://youtu.be/8-D5meLW7cg

Spread shaft (.S7.), plug-in shaft (.S7.), hollow shaft (.H7.)

The encoders with expansion, plug-in and hollow shafts are replaced by encoders with cone shaft (.K8.) and with built-in encoders (EI..). We recommend switching to the new encoder types in order to take advantage of the numerous advantages mentioned above. You can find more information on our website:

https://www.sew-eurodrive.de/produkte/motoren/drehstrommotoren/zubehoer_und_optionen/geber/geber.html .

31543952/EN – 10/2023

4.1.1 Manufacturer information about conical encoders

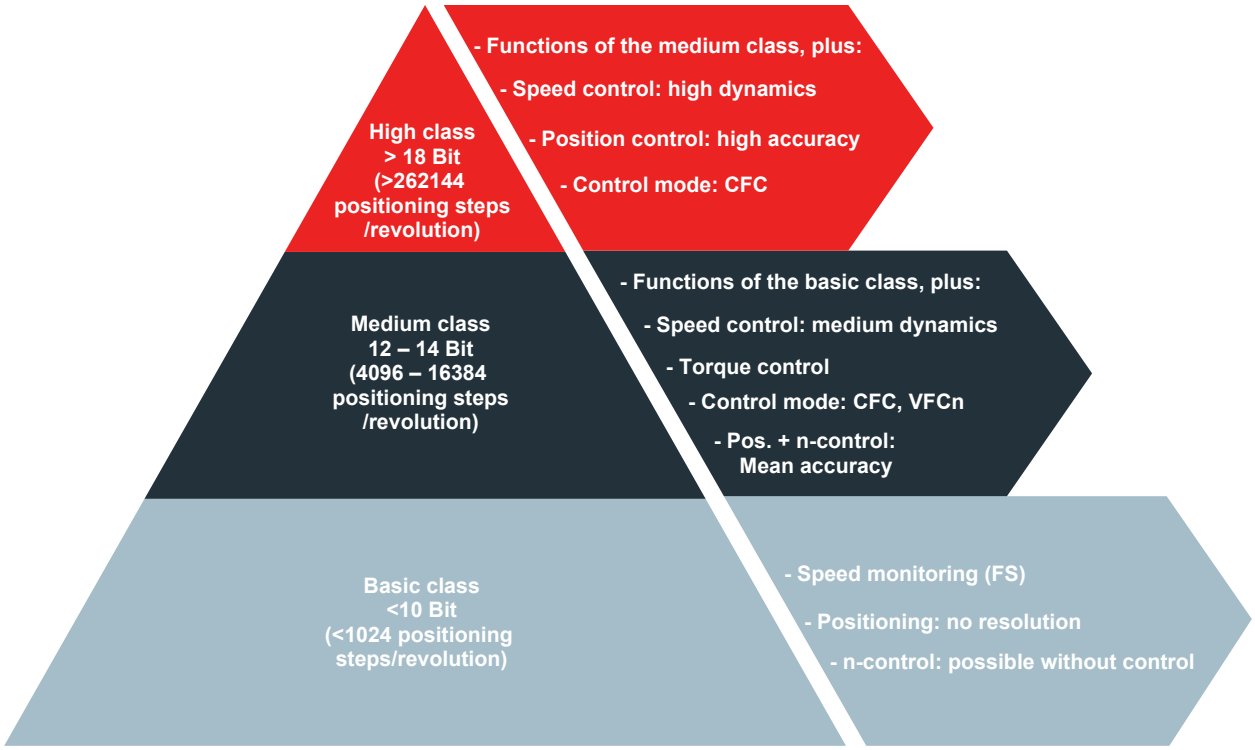
The conical encoders from SEW-EURODRIVE of the type EK8R/EV8R, EK8C/EV8C, EK8S/EV8S, EK8Z, AK8W/AV8W, AK8Y/AV8Y and AK8Z are offered by the manufacturers Baumer Hübner GmbH and Fritz Kübler GmbH. SEW-EURODRIVE uses two suppliers to ensure availability and short delivery times. Each type is compatible and interchangeable, even if the encoder is designed as a safety-related encoder or used in a potentially explosive area. All of the information about these encoder types shown in this document is valid for both manufacturers.

31543952/EN – 10/2023

4.1.2 Encoder capability class

Encoder systems by SEW-EURODRIVE are categorized into ability classes. The categorization into different ability classes provides an overview regarding which encoder can be used for what application. This allows for an optimal preselection.

In case of special applications, SEW-EURODRIVE will gladly assist you with the selection.



9007232170049675

Assignment of encoders to capability classes

Capability class	Encoder type	Electrical interface	Encoder function
Basic class	EI71	HTL	Incremental encoder
Basic class	EI72	HTL	Incremental encoder
Basic class	EI76	HTL	Incremental encoder
Basic class	EI7C	HTL	Incremental encoder
Medium class	EI8R	TTL	Incremental encoder
Medium class	EI8C	HTL	Incremental encoder
Medium class	EK8R/EV8R	TTL	Incremental encoder
Medium class	EK8C/EV8C	HTL	Incremental encoder
Medium class	EI8Z	MOVILINK® DDI	Incremental encoder
Medium class	RK8M	Resolver	Single-turn absolute encoder
High class	EK8S/EV8S	SinCos	Incremental encoder
High class	EK8W/EV8W	SinCos + RS485	Single-turn absolute encoder
High class	EK8Z	MOVILINK® DDI	Incremental encoder

31543952/EN – 10/2023

Capability class	Encoder type	Electrical interface	Encoder function
High class	EK9Z[1)]	MOVILINK® DDI	Single-turn absolute encoder
High class	AK8Z	MOVILINK® DDI	Multi-turn absolute encoder
High class	AK8W/AV8W	SinCos + RS485	Multi-turn absolute encoder
High class	AK8Y/AV8Y	SinCos + SSI	Multi-turn absolute encoder
High class	AK8H/AV8H	HIPERFACE®	Multi-turn absolute encoder

1) In preparation

31543952/EN – 10/2023

4.2 EI7., EI8. built-in encoder

The built-in encoders from SEW-EURODRIVE are completely integrated into the motor. This means the overall length of the drive remains unchanged. The components of the built-in encoder do not protrude beyond the contour of the drive, which means they are particularly well protected from environmental effects and damage. Built-in encoders enable a particularly compact motor design.

Area of application

EI7. built-in encoders are suited for the following applications:

- Simple positioning with up to 96 increments per revolution
- Speed monitoring
- Direction of rotation monitoring
- The EI7C encoder is also available as an EI7C FS safety encoder (not at size DR.63..).

EI8. built-in encoders are suited for the following applications:

- The EI8Z built-in encoder allows for a motor without additional length through the encoder in combination with single-cable technology and the fully digital MOVILINK® DDI interface.
- Speed monitoring
- Direction of rotation monitoring
- Positioning/position control up to a resolution of 12 bits (4096 increments/revolution)
- Speed control
- Torque control

Evaluation

EI7. built-in encoders can be evaluated with the following products from SEW-EURODRIVE:

- MOVI-C®: Can be evaluated in many devices of the modular inverter system. For further information, refer to the respective inverter documentation.
- MOVITRAC® B in the technology version: Evaluation via "Simple positioning" application software.
- MOVIFIT® FC with "technology" function level.
- MOVIPRO® with encoder option.
- MOVIDRIVE® B
- MOVIAXIS®

The EI7C FS safety encoder can be evaluated with the following products from SEW-EURODRIVE:

- MOVI-C®: Functional safety with MOVISAFE® CS..A safety card.
- MOVIFIT® FC: Functional safety with S12 safety option.

EI8. built-in encoders can be evaluated with the following products from SEW-EURODRIVE:

- MOVI-C®: Can be evaluated in many devices of the modular inverter system. For further information, refer to the respective inverter documentation.
- MOVIPRO® with encoder option. For further information, refer to the respective inverter documentation.
- MOVIDRIVE® B with encoder option. For further information, refer to the respective inverter documentation.
- MOVIAXIS®. For further information, refer to the respective inverter documentation.

31543952/EN – 10/2023

4.3 Functional safety (FS)

4.3.1 General information

For motors from SEW-EURODRIVE, optional safety encoders and safety brakes are available as functionally safe motor options. They are designed for implementing safety functions. When implementing safety functions in machines, it is necessary to evaluate in particular whether the components to be used are suitable in terms of functional safety. When using functionally safe motor options from SEW-EURODRIVE, the following safety-related requirements, e.g. in accordance with ISO 13849 – parts 1 and 2, are already taken into account:

- Application of basic safety principles
- Application of proven safety principles
- Specifications on failure probability (B_{10D}, $MTTF_D$, or PFH_D)
- Common cause failure (CCF)
- Determination of the category (Cat.)
- Production monitoring with 100% final inspection
- Retraceability by the unique motor assignment
- Notice of influences and ambient conditions
- Compliance with normative requirements regarding documentation

As an advantage for the machine designer, SEW-EURODRIVE has already fulfilled these safety-relevant requirements for functionally safe motor options. In the overall analysis of safety technology, the machine designer can rely on the manufacturer's confirmation, e.g. based on the product documentation or the German Technical Inspection Association (TÜV) certificate. The internal effort required for evaluation and documentation is reduced considerably.

If other components (standard components) are used for implementing safety functions, the machine designer has to evaluate the safety-related requirements.

31543952/EN – 10/2023

4.3.2 FS marking

SEW-EURODRIVE labels a functionally safe motor option at the drive with an FS logo and a 2-digit number on the motor nameplate. The number is a code that indicates which components in the drive are safety-related. This makes it possible to uniquely identify an available functional safety motor option via the motor nameplate.

FS logo	Available functionally safe motor option		
	Decentralized inverters	Safety brake	Safety encoder
	X		
		X	
			X
	X		X
		X	X

If the FS logo, e.g. with the code "FS-11" is present on the motor nameplate, the combination of safety encoder and safety brake is available for the motor. Drives can also be equipped with two encoders, e.g. built-in encoder and add-on encoder. In such cases, the FS logo for the safety encoder always relates to the add-on encoder. If an FS logo is available, adhere to the information specified in the corresponding documentation.

4.3.3 Safety encoders

Safety encoders from SEW-EURODRIVE are characterized by their exceptional reliability as well as electronic and mechanical load capacity.

Safety encoders allow you to improve the safety of your machines by implementing safety functions in relation to their speed, direction of rotation, idle state, relative position or absolute position. The safety encoder provides the safety-relevant signals in the intelligent interaction of sensor, control and actuator.

The safety function requires a reliable mechanical connection between encoder and motor. At SEW-EURODRIVE, this connection is dimensioned in such a way that fault exclusion is achieved.

The safety encoders cannot trigger a safe state at the machine autonomously. Therefore, they have to be monitored in the overall system. In case the encoder or the evaluation electronics detects a fault, a fault response is initiated in the overall system, such as safe state.

4.3.4 Retraceability

Functionally safe motor options can be retraced by SEW-EURODRIVE with the motor serial number and thus have a unique assignment to the motor.

31543952/EN – 10/2023

If the SEW-EURODRIVE service replaces a safety encoder or a safety brake, the retraceability is ensured.

If you replace a functionally safe motor option on your own, you revoke this assignment. To continue the assignment, document the replacement yourself.

4.3.5 Underlying standards

The safety assessment is based on the following standards and safety classes:

Safety encoder

	IEC 62061 IEC 61508	IEC 61800-5-2	ISO 13849
ES7S EG7S	X	–	X
AS7W AG7W	X	–	X
AS7Y AG7Y	X	–	X
EK8S AK8W AK8Y	X	–	X
EI7C FS	–	X	X

Safety class SIL 3 or PL e can be achieved if a suitable functionally safe motor option is integrated into a safety system. The requirements (e.g. on the system architecture, required diagnostics and failure probabilities) are to be implemented according to the normative specifications and to the document in hand.

31543952/EN – 10/2023

4.3.6 Safety functions of the safety encoder

INFORMATION

For AK8W and AK8Y encoders, the multi-turn absolute interface is not part of the PL d/SIL 2 approval. The absolute interface may not be used solely for implementing safety functions.

INFORMATION

The safety function is dependent on the evaluation electronics.

Safety functions – Rotational speed, direction of rotation, idle state, and relative position

Safety encoders can be used to implement the following safety functions in compliance with IEC 61800-5-2 with respect to rotational speed, direction of rotation, idle state, and relative position:

Encoders	SS1	SS2	SOS	SLA	SLS	SDI	SLI	SSR	SAR	SSM
ES7S	X	X	X	X	X	X	X	X	X	X
EG7S	X	X	X	X	X	X	X	X	X	X
AS7W	X	X	X	X	X	X	X	X	X	X
AG7W	X	X	X	X	X	X	X	X	X	X
AS7Y	X	X	X	X	X	X	X	X	X	X
AG7Y	X	X	X	X	X	X	X	X	X	X
EK8S	X	X	X	X	X	X	X	X	X	X
AK8W	X	X	X	X	X	X	X	X	X	X
AK8Y	X	X	X	X	X	X	X	X	X	X
EI7C FS	X	–	–	–	X	X	–	–	–	–

Safety functions – Absolute position

Safety encoders can be used to implement the following safety functions in compliance with IEC 61800-5-2 with respect to the absolute position:

Encoders	SCA	SLP
ES7S	X	X
EG7S	X	X
AS7W	X	X
AG7W	X	X
AS7Y	X	X
AG7Y	X	X
EK8S	X	X
AK8W	X	X
AK8Y	X	X

31543952/EN – 10/2023

Encoders	SCA	SLP
EI7C FS	–	–

4.3.7 Initializing the safety encoder

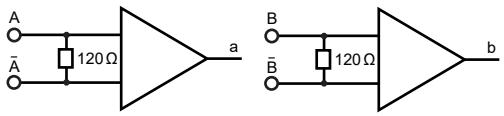
Switch the safety encoder off and on again at least once a year in accordance with IEC 61800-5-2.

4.3.8 Requirements for the evaluation electronics

Where safety encoders are used for safety-related reasons, evaluation electronics are needed to monitor the signals of the rotary encoder and check their validity. When a malfunction is detected, a fault response (e.g. the safe state) must be triggered in the overall system.

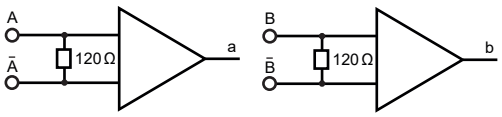
The evaluation electronics in the overall system have to meet the following requirements.

Safety encoder: ES7S, EG7S, AS7W, AG7W, AS7Y, AG7Y

Designation	Requirement
Safety requirements	≥ SIL 2
Diagnostic coverage ("DC")	≥ 90%
Error presumptions	According to IEC 61800-5-2:2016, table D.8
Monitoring of the phasor length "r"	$r = \sqrt{a^2 + b^2}$ with a = A – $\overline{A}$ for cosine signals and b = B – $\overline{B}$ for sine signals
Safe state	Phasor length "r" outside the range 350 mV ≤ r ≤ 700 mV
Terminating resistance between A and $\overline{A}$ or B and $\overline{B}$	120 Ω ±10% 
Terminating resistance between A, $\overline{A}$, B, $\overline{B}$ to the supply voltage and reference ground	> 1 kΩ
Scanning frequency	At least twice as high as the maximum frequency occurring in the application at the encoder signal outputs (Nyquist criterion)

If the safety encoders are operated with prefabricated encoder cables from SEW-EURODRIVE on evaluation electronics from SEW-EURODRIVE, these previously mentioned requirements have been met.

Safety encoder: EK8S, AK8W, AK8Y

Designation	Requirement
Safety requirements	≥ SIL 2
Diagnostic coverage ("DC")	≥ 90%
Error presumptions	According to IEC 61800-5-2:2016, table D.8
Monitoring of the phasor length "r"	$r = \sqrt{a^2 + b^2}$ with a = A – $\overline{A}$ for cosine signals and b = B – $\overline{B}$ for sine signals
Safe state	Phasor length "r" outside the range 350 mV ≤ r ≤ 700 mV
Terminating resistance between A and $\overline{A}$ or B and $\overline{B}$	120 Ω ±10% 
Terminating resistance between A, $\overline{A}$, B, $\overline{B}$ to the supply voltage and reference ground	> 1 kΩ
Scanning frequency	For the maximum frequency occurring in the application at the encoder signal outputs, the following sampling frequency must be met: • minimum 8 times with synchronous sampling • minimum 5 times with asynchronous sampling

The risk of an undetected fault at the safety encoder is increased if the sampling frequency is not adhered to. If you cannot adhere to the required sampling frequency when using the evaluation electronics, contact the manufacturer of the evaluation electronics to clarify any additional diagnostics.

If the safety encoders are operated with prefabricated encoder cables from SEW-EURODRIVE on evaluation electronics from SEW-EURODRIVE, these previously mentioned requirements have been met.

Safety encoder: EI7C FS

The built-in encoder EI7C FS is intended for operation with functionally safe encoder evaluation units from SEW-EURODRIVE, e.g. safety option S12 or safety card MOVISAFE® CS..A. Operating the encoder with encoder evaluation units from other manufacturers is not permitted.

31543952/EN – 10/2023

4.3.9 Acceptance

The system manufacturer has to perform an overall evaluation for determining the safety of a machine.

The effectiveness of each risk minimization must be checked. It must also be checked if the required safety integrity is reached for each implemented safety function.

To validate the safety integrity level you can use the "SISTEMA" calculation tool from the Institut für Arbeitsschutz (Institute for Occupational Safety and Health of the German Social Accident Insurance).

31543952/EN – 10/2023

4.4 Device overview

4.4.1 Phase-outs – Predecessor and successor encoder types

The newly developed encoder with cone shaft .K8. and the compact EI7. and EI8. encoders for asynchronous motors of the DRN../DRU../DR2. series replace the previous encoder types. The respective predecessors and the successors are shown for the various mechanical add-on variants.

Add-on encoder

Predecessor spread shaft – Integrated successor/cone shaft

	Predecessor	Successor
Incremental	ES7S	EK8S
	ES7R	EI8R, EK8R
	ES7C (used as TTL)	EK8C
	ES7C (used as HTL)	EI8C, EK8C
	ES12	EI72
	ES16	EI76
Multi-turn	AS7W	AK8W
	AS7Y	AK8Y
	AS7H	AK8H
	AS3H	AK8H
	AS4H	AK8H

Predecessor plug-in shaft – Successor cone shaft

	Predecessor	Successor
Incremental	EG7S	EK8S
	EG7R	EK8R
	EG7C	EK8C
Multi-turn	AG7W	AK8W
	AG7Y	AK8Y

31543952/EN – 10/2023

Hollow shaft – Cone shaft

	Predecessor	Successor
Incremental	EH7S	EK8S
	EH7R	EK8R
	EH7C	EK8C
	EH7T	EK8C (at UB = 5 V)
Multi-turn	AH7Y	AK8Y

Mounting adapters

	Predecessor	Successor
Mounting adapter	ES1A	EK8A
	ES7A	EK8A
	EG7A	EK8A
	EH7A	EK8A

31543952/EN – 10/2023

Add-on encoder with add-on fan guard with encoder mount

Predecessor spread shaft – Successor cone shaft

	Predecessor	Successor
Incremental	EV7S	EV8S
	EV7R	EV8R
	EV7C	EV8C
Multi-turn	AV7W	AV8W
	AV7Y	AV8Y

Predecessor solid shaft – Successor cone shaft

	Predecessor	Successor
Incremental	EV2S	EV8S
	EV2C	EV8C
	EV2R	EV8R
	EV2T	EV8C (at UB = 5 V)
Multi-turn	AV2Y	AV8Y

Mounting adapters

	Predecessor	Successor
Mounting adapter	EV7A	XV8A
	XV7A	XV8A

31543952/EN – 10/2023

4.4.2 Encoder designs

INFORMATION

A built-in encoder can generally be combined with an add-on encoder on the motor, e.g. EI7C built-in encoder and AK8W add-on encoder. This combination can also be made with an add-on encoder as a safety encoder, e.g. EI7C built-in encoder and EK8S safety encoder. Only the add-on encoder can be selected as the safety encoder in such combinations. The FS logo on the motor nameplate will then relate to the add-on encoder as the safety encoder.

Type	=	Type designation of the encoder
FS	=	Available as safety encoder
EX	=	Available for use in areas at risk of explosion

Incremental encoder

Type	Motors	Mech. interface	Shaft design	Supply DC V	Electrical interface	FS	EX
EG7C	(E)DR..160 – 280 (E)DRN132M – 280	Shaft-centered	Plug-in shaft	4.5 – 30	HTL/TTL (RS422)	–	Yes
EG7R	(E)DR..160 – 280 (E)DRN132M – 280	Shaft-centered	Plug-in shaft	7 – 30	TTL (RS422)	–	Yes
EG7S	(E)DR..160 – 280 (E)DRN132M – 280	Shaft-centered	Plug-in shaft	7 – 30	1 V_{pp} sin/cos + RS485	Yes	Yes
EH7C	(E)DR315	Shaft-centered	Hollow shaft	10 – 30	HTL	–	Yes
EH7R	(E)DR../DRN315	Shaft-centered	Hollow shaft	10 – 30	TTL (RS422)	–	Yes
EH7S	(E)DR315	Shaft-centered	Hollow shaft	10 – 30	1 V_{PP} sin/cos	–	Yes
EH7T	(E)DR315	Shaft-centered	Hollow shaft	5	TTL (RS422)	–	Yes
EI71	DR..71-132 DRN/DRU../DR2..71 – 132S	Integrated into motor	Standard shaft	9 – 30	HTL	–	–
EI72	DR..71-132 DRN/DRU../DR2..71 – 132S	Integrated into motor	Standard shaft	9 – 30	HTL	–	–
EI76	DR..71-132 DRN/DRU../DR2..71 – 132S	Integrated into motor	Standard shaft	9 – 30	HTL	–	–
EI7C	DR..71-132 DRN/DRU../DR2..63 – 132S	Integrated into motor	Standard shaft	9 – 30	HTL	–	–
EI7C FS	DR..71-132 DRN/DRU../ DR2..71-132S	Integrated into motor	Standard shaft	19.2 – 30	HTL	Yes	–

31543952/EN – 10/2023

Type	Motors	Mech. interface	Shaft design	Supply DC V	Electrical interface	FS	EX
EI8A	DRN/DRU../ DR2..71 – 132S	Integrated into motor	Standard shaft	No information for supply	Various	–	–
EI8C	DRN/DRU../DR2..71 – 132S	Integrated into motor	Standard shaft	7 – 30	HTL	–	–
EI8R	DRN/DRU../DR2..71 – 132S	Integrated into motor	Standard shaft	7 – 30	TTL	–	–
EI8Z	DRN/DRU../DR2..71 – 132S	Integrated into motor	Standard shaft	24	MOVILINK® DDI	–	–
EK8C	(E)DRN/DRU../ DR2..71-355	Shaft-centered	Cone shaft	4.5 – 30	HTL/TTL (RS-422)	–	Yes
EK8R	(E)DRN/DRU../ DR2..71-355	Shaft-centered	Cone shaft	7 – 30	TTL (RS-422)	–	Yes
EK8S	(E)DRN/DRU../ DR2..71-355	Shaft-centered	Cone shaft	7 – 30	1 V_{pp} sin/ cos + RS485	Yes[1) 2)]	Yes
EK8Z	DRN/DRU../DR2..71-355	Shaft-centered	Cone shaft	24	MOVILINK® DDI	–	–
ES7C	(E)DR..71 – 132 (E)DRN80 – 132S	Shaft-centered	Spread shaft	4.5 – 30	HTL/TTL (RS422)	–	Yes
ES7R	(E)DR..71 – 132 (E)DRN80 – 132S	Shaft-centered	Spread shaft	7 – 30	TTL (RS422)	–	Yes
ES7S	(E)DR..71 – 132 (E)DRN80 – 132S	Shaft-centered	Spread shaft	7 – 30	1 V_{pp} sin/ cos + RS485	Yes	Yes
EV2C	DR..71 – 225 DRN71 – 225	Flange-centered		9 – 26	HTL	–	–
EV2R	DR..71 – 225 DRN71 – 225	Flange-centered		9 – 26	TTL	–	–
EV2S	DR..71 – 225 DRN71 – 225	Flange-centered		24	1 V_{PP} sin/ cos	–	–
EV2T	DR..71 – 225 DRN71 – 225	Flange-centered		5	TTL	–	–
EV7C	(E)DR..71 – 280 (E)DRN80 – 280	Flange-centered		4.5 – 30	HTL/TTL (RS422)	–	Yes
EV7R	(E)DR..71 – 280 (E)DRN80 – 280	Flange-centered		7 – 30	TTL (RS422)	–	Yes
EV7S	(E)DR..71 – 280 (E)DRN80 – 280	Flange-centered		7 – 30	1 V_{pp} sin/ cos + RS485	–	Yes
EV8C	(E)DRN/DRU../ (E)DR2..71-355	Flange-centered		4.5 – 30	HTL/TTL (RS-422)	–	Yes
EV8R	(E)DRN/DRU../ DR2..71-355	Flange-centered		7 – 30	TTL (RS-422)	–	Yes

31543952/EN – 10/2023

Type	Motors	Mech. interface	Shaft design	Supply DC V	Electrical interface	FS	EX
EV8S	(E)DRN/DRU../ DR2..71-355	Flange-centered		7 – 30	1 V_{pp} sin/ cos + RS485	–	Yes

1) Available for motor sizes 71-315

2) Size DRN../DRU..255 or DR2.180 or larger only permitted with insulation coupling /IK

31543952/EN – 10/2023

Absolute encoder

Type	Motors	Mech. interface	Shaft design	Supply DC V	Electrical interface	FS	EX
AG7W	(E)DR..160 – 280 (E)DRN132M – 280	Shaft-centered	Plug-in shaft	7 – 30	1 V_{pp} sin/ cos + RS485	Yes[1)]	Yes
AG7Y	(E)DR..160 – 280, (E)DRN132M – 280	Shaft-centered	Plug-in shaft	7 – 30	1 V_{pp} sin/ cos + SSI	Yes[1)]	Yes
AH7Y	(E)DR315	Shaft-centered	Hollow shaft	9 – 30	TTL (RS422) + SSI	–	Yes
AK8H	DRN/DRU../DR2..71-355	Shaft-centered	Cone shaft	7 – 12	HIPERFACE®	–	–
AK8W	(E)DRN/DRU../ DR2..71-355	Shaft-centered	Cone shaft	7 – 30	1 V_{PP} sin/ cos + RS485	Yes [2)3)]	Yes
AK8Y	(E)DRN/DRU../ DR2..71-355	Shaft-centered	Cone shaft	7 – 30	1 V_{PP} sin/ cos + SSI	Yes [2)3)]	Yes
AK8Z	DRN/DRU../DR2..71-355	Shaft-centered	Cone shaft	24	MOVILINK® DDI	–	–
AS7W	(E)DR..71 – 132 (E)DRN80 – 132S	Shaft-centered	Spread shaft	7 – 30	1 V_{pp} sin/ cos + RS485	Yes	Yes
AS7Y	(E)DR..71 – 132 (E)DRN80 – 132S	Shaft-centered	Spread shaft	7 – 30	1 V_{pp} sin/ cos + SSI	Yes	Yes
AV1Y	DR..71 – 225 DRN71 – 280	Flange-centered		7 – 12	1 V_{pp} sin/ cos + SSI	–	–
AV1H	DR..71 – 225 DRN71 – 280	Flange-centered		7 – 12	HIPERFACE®	–	–
AV7W	(E)DR..71 – 280 (E)DRN80 – 280	Flange-centered		7 – 30	1 V_{pp} sin/ cos + RS485	–	Yes
AV7Y	(E)DR..71 – 280 (E)DRN80 – 280	Flange-centered		7 – 30	1 V_{pp} sin/ cos + SSI	–	Yes
AV8H	DRN/DRU../DR2..71-355	Flange-centered		7 – 12	HIPERFACE®	–	–
AV8W	(E)DRN/DRU../ DR2..71-355	Flange-centered		7 – 30	1 V_{pp} sin/ cos + RS485	–	Yes
AV8Y	(E)DRN/DRU../ DR2..71-355	Flange-centered		7 – 30	1 V_{PP} sin/ cos + SSI	–	Yes
EK8W[4)]	DR2C..71-132S	Shaft-centered	Cone shaft	7 – 30	1 V_{pp} sin/ cos + RS485	Yes	Yes
EK9Z[4)]	DR2C..71-132S	Shaft-centered	Cone shaft	24	MOVILINK® DDI	–	–

31543952/EN – 10/2023

Type	Motors	Mech. interface	Shaft design	Supply DC V	Electrical interface	FS	EX
RK8M	DRN/DRU../DR2..71-355	Shaft-centered	Cone shaft	7 V AC	Resolver	–	–

1) For motor design with a brake/safety brake, the AG7W/AG7Y encoders are available up to size DR../DRN225.
2) Available for motor sizes 71-315
3) Size DRN../DRU..255 or DR2.180 or larger only permitted with insulation coupling /IK
4) In preparation

31543952/EN – 10/2023

Encoder mounting adapters

Type	Motors	for encoder	FS	EX
EG7A	DR..160 – 280 DRN132M – 280	.G7.	Yes	Yes
EI7A	DRN/DRU../ DR2..71 – 132S	EI7.	–	–
EI8A	DRN/DRU../ DR2..71 – 132S	EI8.	–	–
EK8A	DRN/DRU../DR2..71-355	.K8.	Yes	Yes
ES7A	DR..71 – 132 DRN80 – 132S	.S7.	Yes	Yes
XH.A	–	Third-party encoder, hollow shaft	–	–
XV8A	DRN/DRU../ DR2..71 – 315	.V8.	–	Yes
XV.A	DR..71-280 DRN/DRU../ DR2..71 – 315	Third-party encoder, solid/plug-in shaft	–	–

31543952/EN – 10/2023

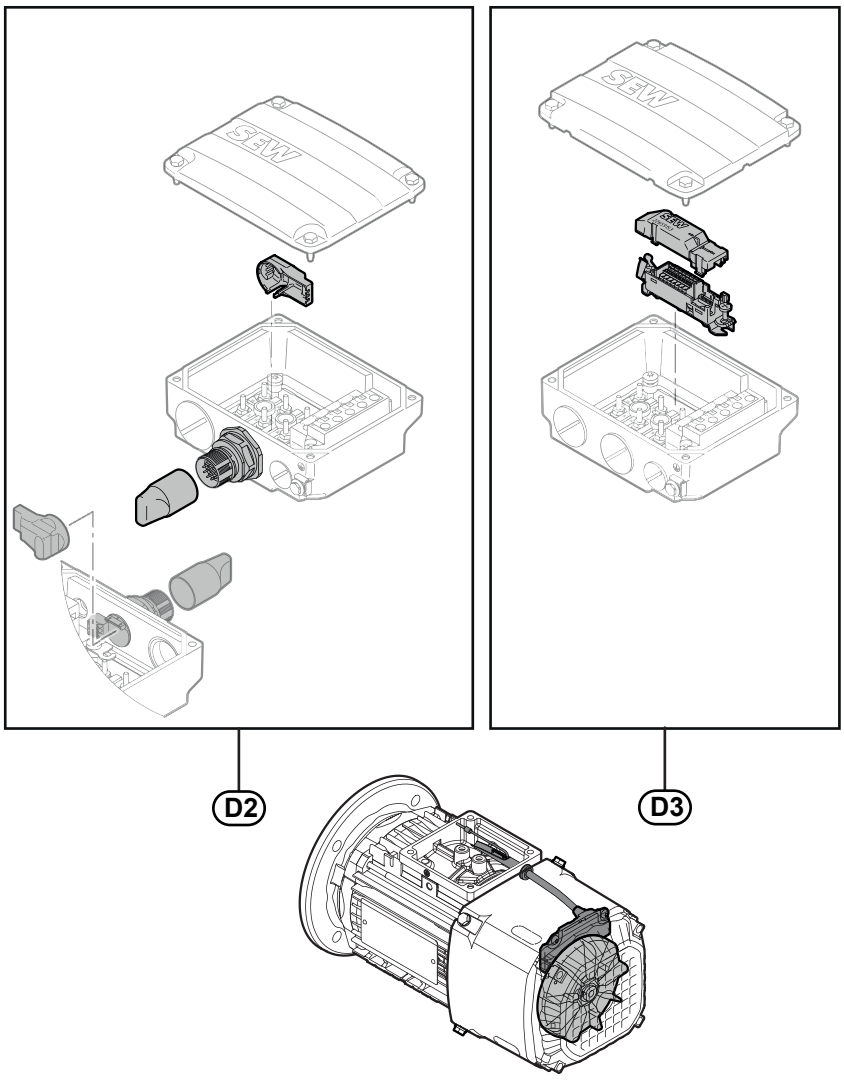
4.4.3 Connection options

SEW-EURODRIVE recommends using prefabricated cables.

The encoders are available with the following connection options:

/EI7.

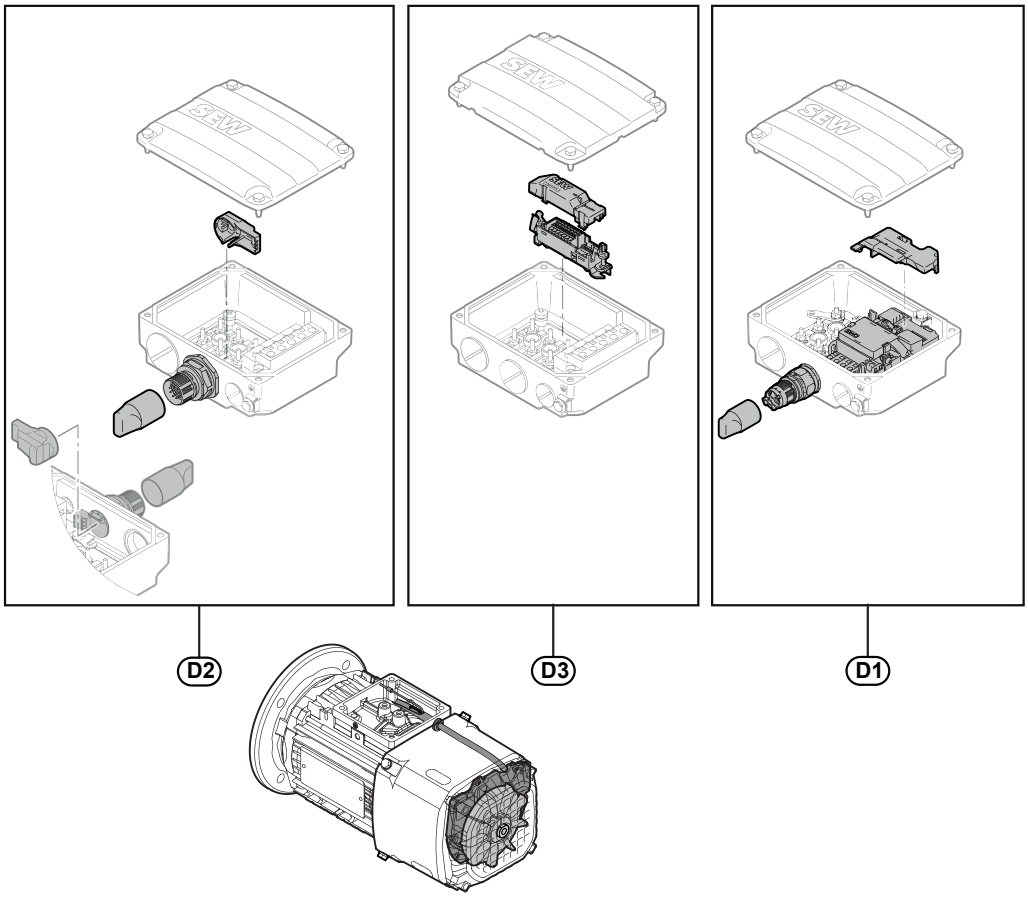
- On/in terminal box:
  - D2: With one M12 plug connector (8-pole with optional AVRE temperature sensor or 4-pole without AVSE temperature sensor) on the terminal box
  - D3: With a terminal strip (connection unit, with or without temperature sensor) in the terminal box (without type designation)



42812766475

/EI8.

- On/in terminal box:
  - D1: With connection technology of digital motor integration KD1, KDB, KD or KDD with MOVILINK® DDI interface (only EI8Z)
  - D2: With one M23 plug connector (with AIGB temperature sensor or without AIGA temperature sensor) on the terminal box
  - D3: With a terminal strip (connection unit, with or without temperature sensor) in the terminal box (without type designation)
  - with one M12 plug connector (8-pole with optional AVRE temperature sensor) on the terminal box (in preparation):



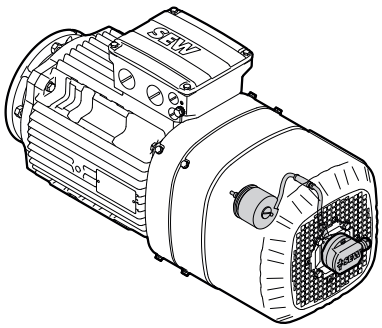
9007242067509899

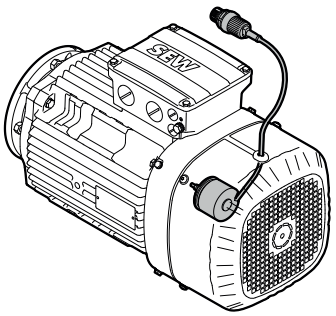
31543952/EN – 10/2023

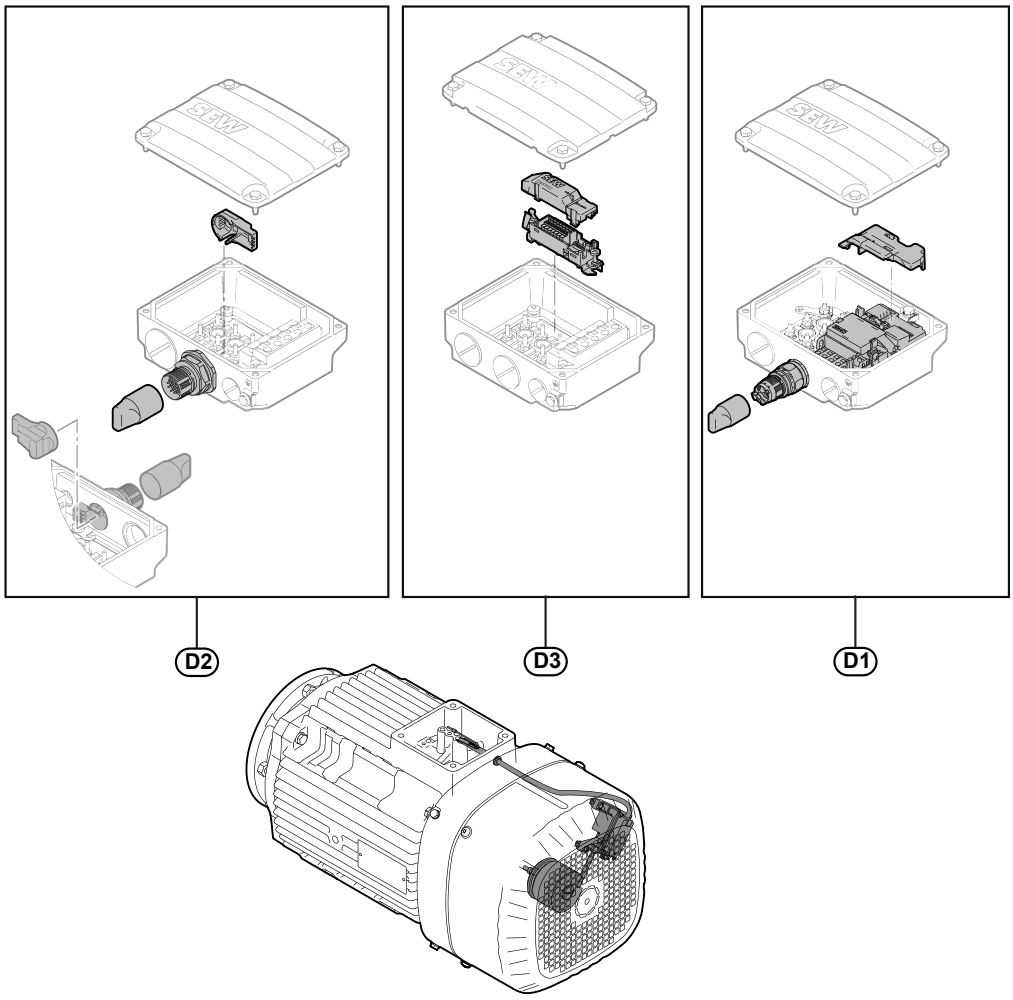
/EK8., /AK8., /EV8., /AV8., /RK8M

- On/in terminal box:
  - D1: With connection technology of digital motor integration KD1, KDB, KD or KDD with MOVILINK® DDI interface (only EK8Z, EK9Z and AK8Z)
  - D2: With one M23 plug connector (with AIGB temperature sensor or without AIGA temperature sensor) on the terminal box
  - D3: With a terminal strip (connection unit, with or without temperature sensor) in the terminal box (without type designation)
- With an integrated encoder connector, installed on the fan guard side or optionally on the rear of the fan guard:
  - Without A2GA connection cover
  - With A1GA connection cover
  - With A1GA connection cover, cable (length 0.36 m) and KIGA M23 plug connector
- Without integrated encoder plug connector:
  - with M23 and cable (length 0.36 m) directly on the KIGA encoder
- Connected in the terminal box:
  - With a terminal strip (connection unit, with or without temperature sensor) in the terminal box (without type designation)
  - With one M23 plug connector (with AIGB temperature sensor or without AIGA temperature sensor) on the terminal box

When using prefabricated cables from SEW-EURODRIVE, you can order the encoders without a connection cover because this cover is part of the cable.







/ES7., /EG7., /EV7., /AS7., /AG7., /AV7.

- On the encoder:
  - Without connection cover
  - With connection cover
  - With connection cover, cable (length 0.3 m) and M23 plug connector

When using prefabricated cables from SEW-EURODRIVE, you can order the encoders without a connection cover because this cover is part of the cable.

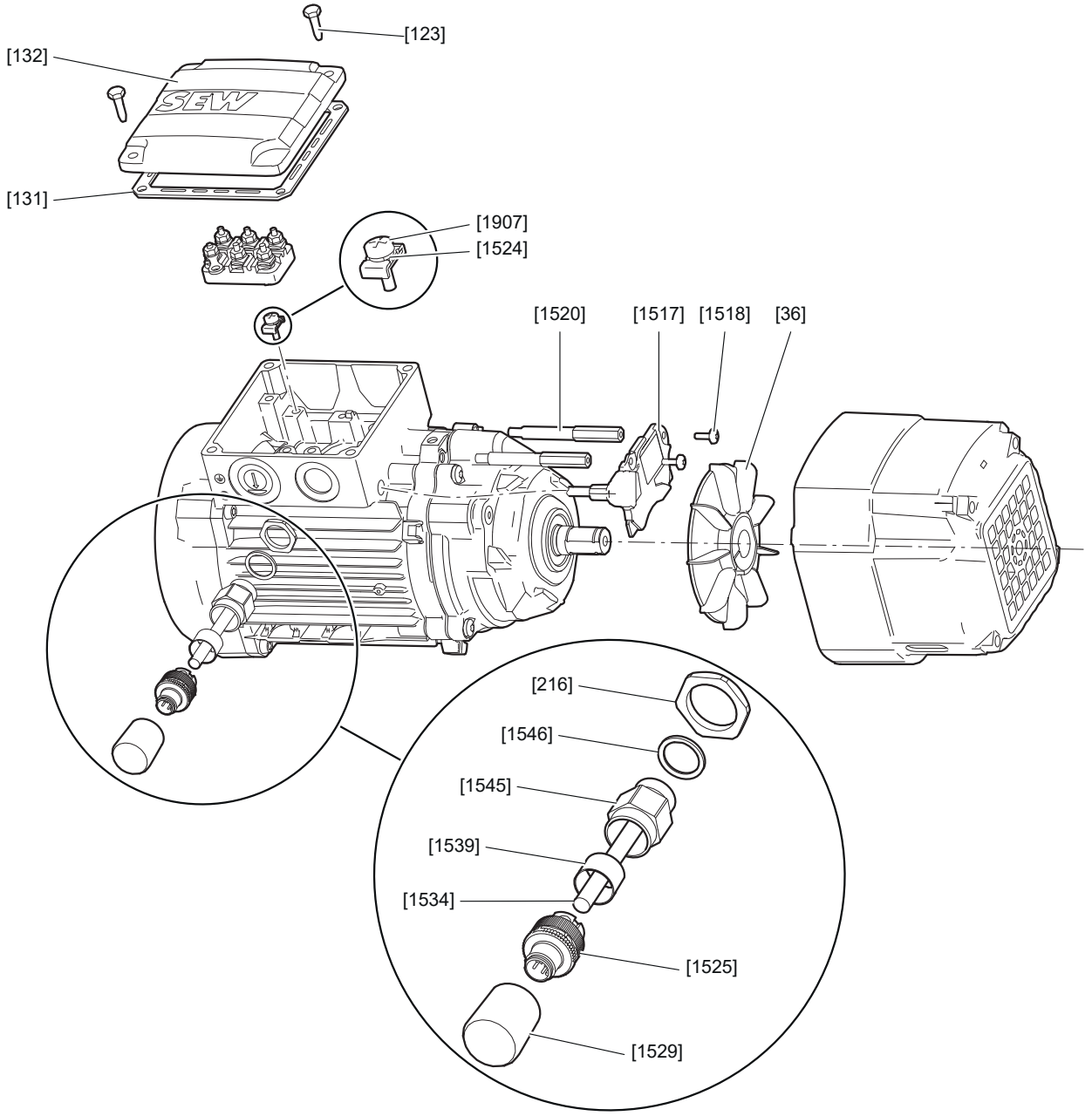
/EH7. /AH7.

- On the encoder:
  - With M23 plug connector

31543952/EN – 10/2023

4.4.4 Structure of built-in encoder

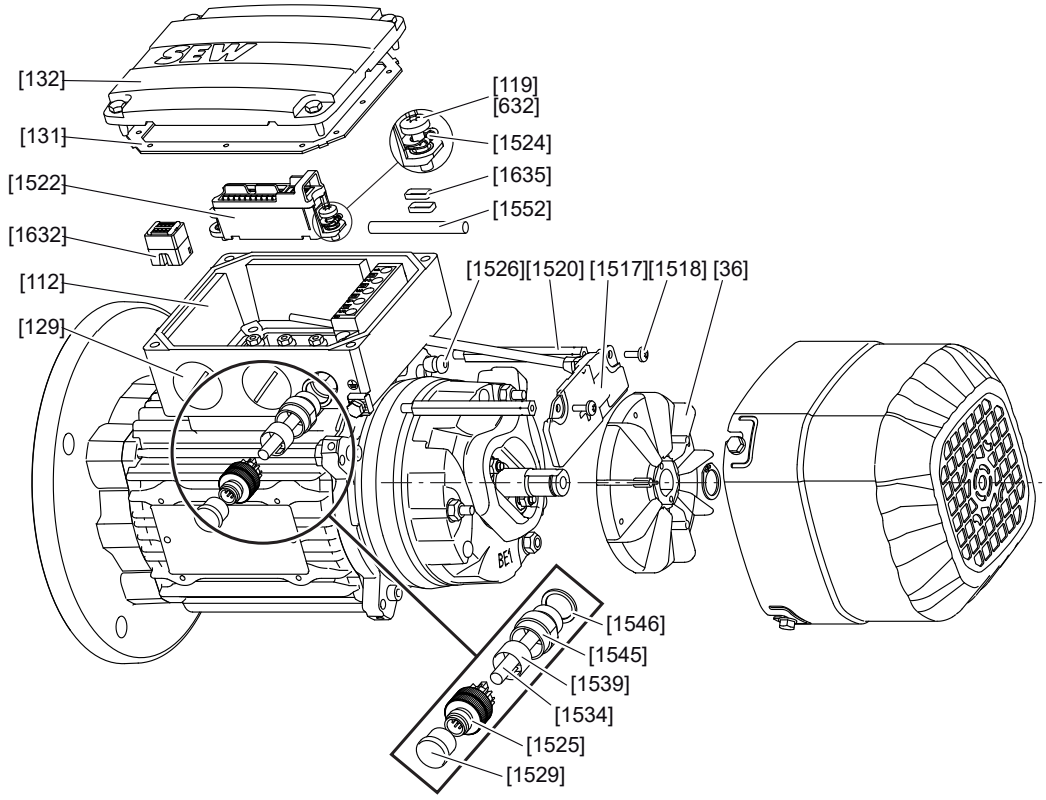
Structure of EI7C built-in encoder (DRN63 motors)



18014427980585099

[36]	Fan, complete	[1524]	Terminal washer
[123]	Screw	[1525]	Connector
[131]	Gasket for cover	[1529]	Protection cap
[132]	Terminal box cover	[1534]	Glass fiber sheathing
[216]	Nut	[1539]	Sleeve
[1517]	Encoder module	[1545]	Circular socket
[1518]	Flat head screw	[1546]	O-ring
[1520]	Spacer	[1907]	Screw

Structure of EI7C built-in encoder (DR./DRN 71-132S motors)

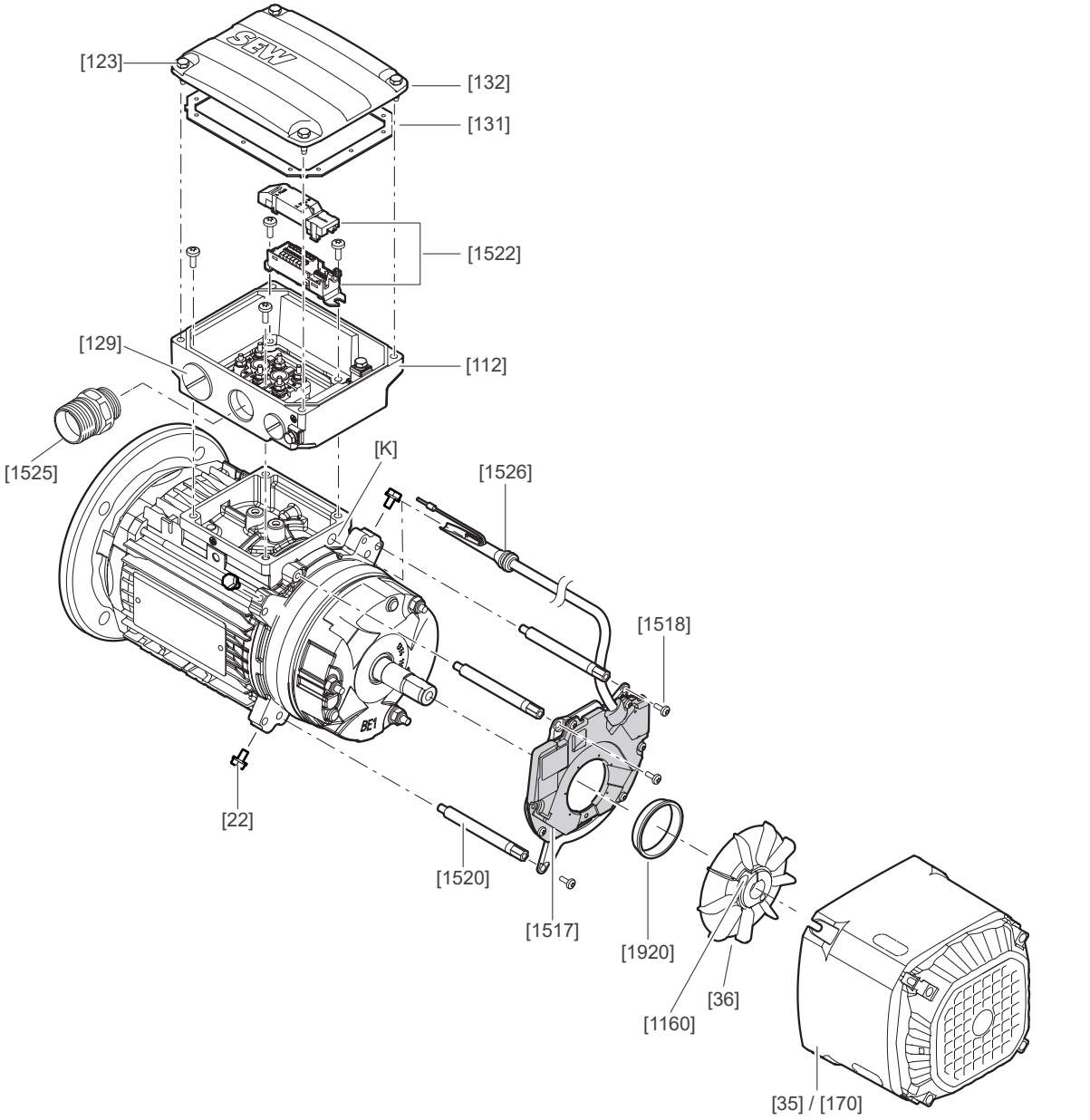


18014401416894731

[35]	Fan guard	[1524]	Terminal washer
[36]	Fan, complete	[1525]	M23 plug connector
[112]	Terminal box lower part	[1526]	Grommet
[119]	Screw	[1529]	Protection cap
[129]	Screw plug	[1534]	Glass fiber sheathing
[131]	Gasket for cover	[1539]	Sleeve
[132]	Terminal box cover	[1545]	Circular socket
[632]	Screw	[1546]	O-ring
[1517]	Encoder module	[1552]	Glass fiber sheathing
[1518]	Flat head screw	[1632]	Connection unit
[1520]	Spacer	[1635]	Cable ties
[1522]	Connection unit		

31543952/EN – 10/2023

Structure of EI8. built-in encoder (DRN../DRU../DR2..71-132S motors)

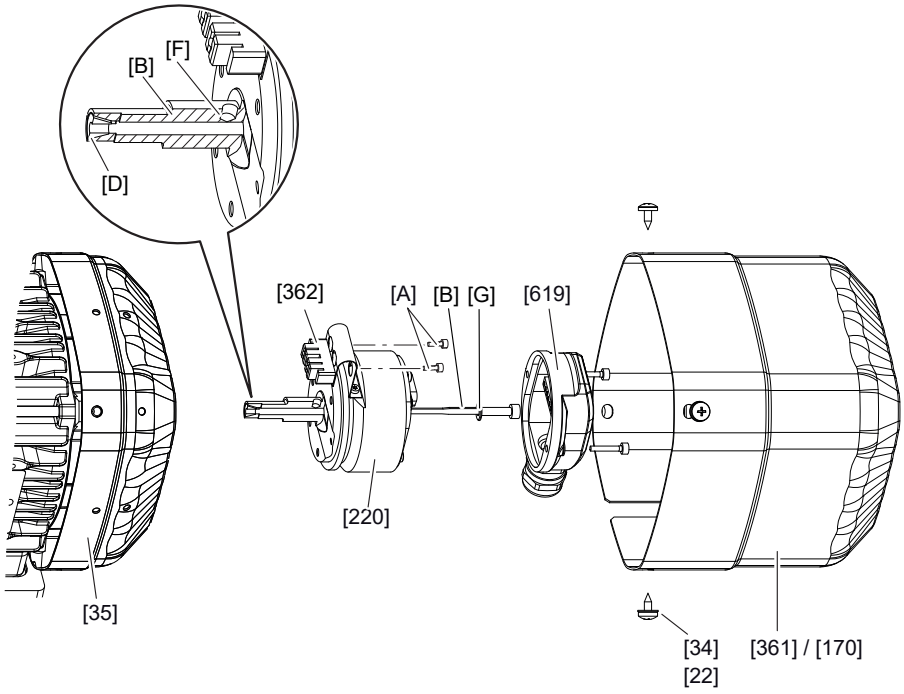


[22]	Screw	[131]	Gasket for cover	[1522]	Connection unit
[35]	Fan guard	[132]	Terminal box cover	[1525]	M23 plug connector
[36]	Fan, complete	[170]	Forced cooling fan	[1526]	Grommet
[112]	Terminal box lower part	[1160]	Cap screw	[1920]	Centering ring (aid)
[119]	Screw	[1517]	Encoder module	[K]	Knock-out
[123]	Screw	[1518]	Screw		
[129]	Screw plug	[1520]	Hexagonal spacer		

31543952/EN – 10/2023

4.4.5 Design of spread/plug-in shaft encoder

Removing/installing rotary encoder ES7./AS7. (DR..80 – 132S motors)

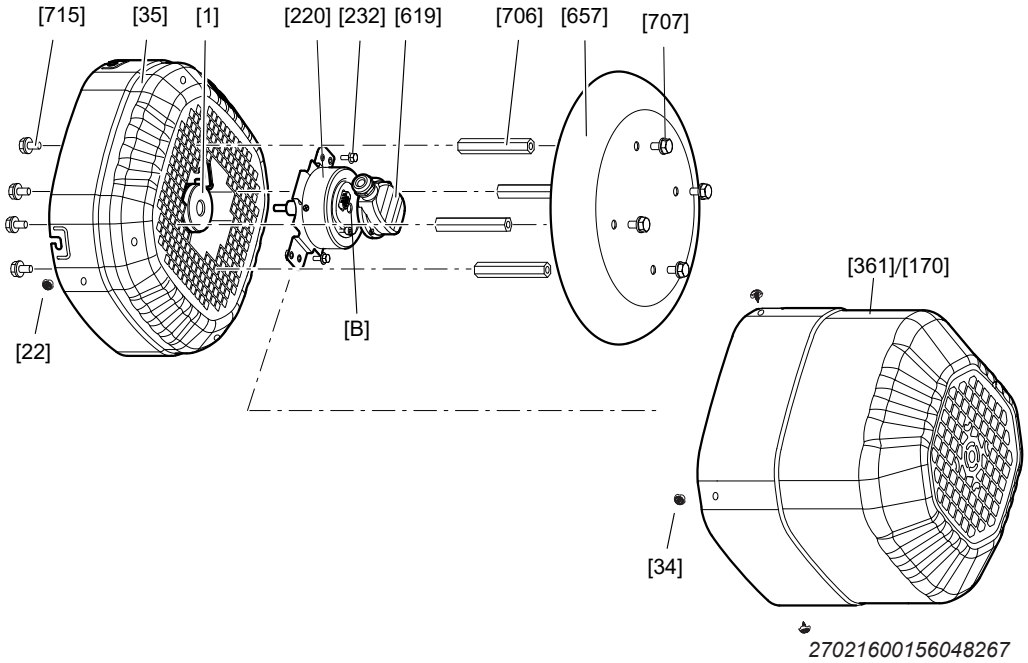


27021600347324171

[22] Screw
[34] Tapping screw
[35] Fan guard
[220] Encoder
[361] Safety cover
[170] Forced cooling fan
[362] Expansion anchor
[619] Connection cover
[A] Retaining screws for torque bracket
[B] Central retaining screw
[D] Cone
[F] Bore
[G] Tooth lock washer

31543952/EN – 10/2023

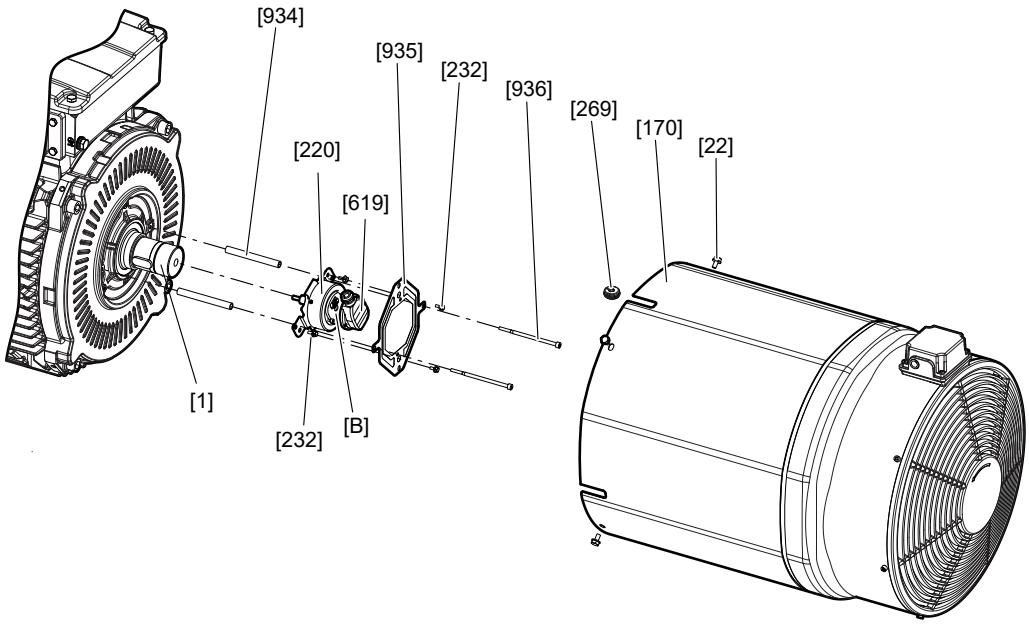
EG7., AG7. rotary encoders (DR..160 – 280, DRN132M – 280 motors)



[1]	Rotor	[619]	Connection cover
[34]	Tapping screw	[657]	Canopy
[35]	Fan guard	[706]	Spacer bolt
[220]	Encoder	[707] [715]	Screws
[232]	Screws	[B]	Central retaining screw
[361]	Safety cover		

31543952/EN – 10/2023

EG7., AG7. rotary encoder ((E)DR..160 – 280, (E)DRN132M – 280 motors) - with forced cooling fan /V

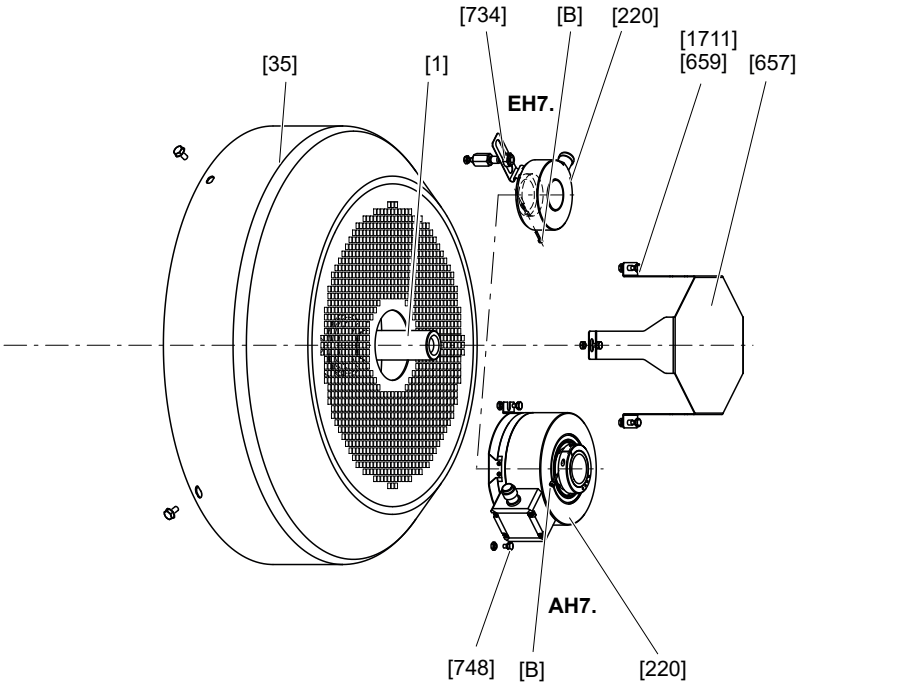


18014406225443979

[1]	Rotor	[619]	Connection cover
[22]	Screw	[934]	Spacer bushing
[170]	Forced cooling fan	[935]	Torque arm
[220]	Encoder	[936]	Screw
[232]	Screws		
[269]	Grommet	[B]	Retaining screw

31543952/EN – 10/2023

EH7., AH7. rotary encoder ((E)DR.. 315 motors)



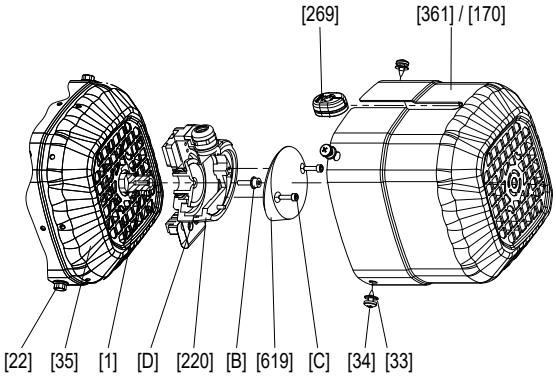
27021598171852427

[1]	Rotor	[659]	Screw
[35]	Fan guard	[1711]	Screw
[220]	Encoder	[734]	Nut
[367]	Retaining screw	[748]	Screw
[657]	Cover plate	[B]	Clamping screw

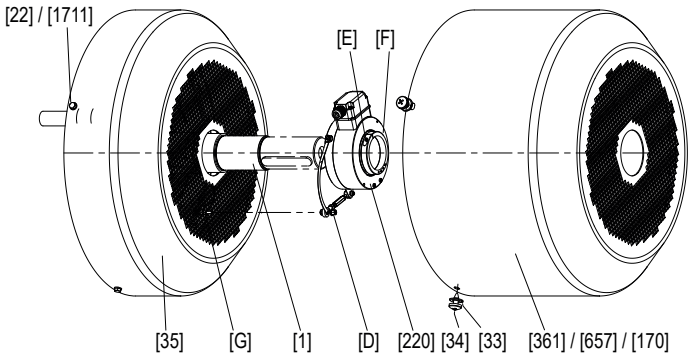
31543952/EN – 10/2023

XH.A hollow-shaft rotary encoders (DR..71 – 225, DRN71 – 225, DR2..71 – 80 motors)

Encoder mounting with XH1A encoder mounting adapter



Encoder mounting with XH7A and XH8A encoder mounting adapter



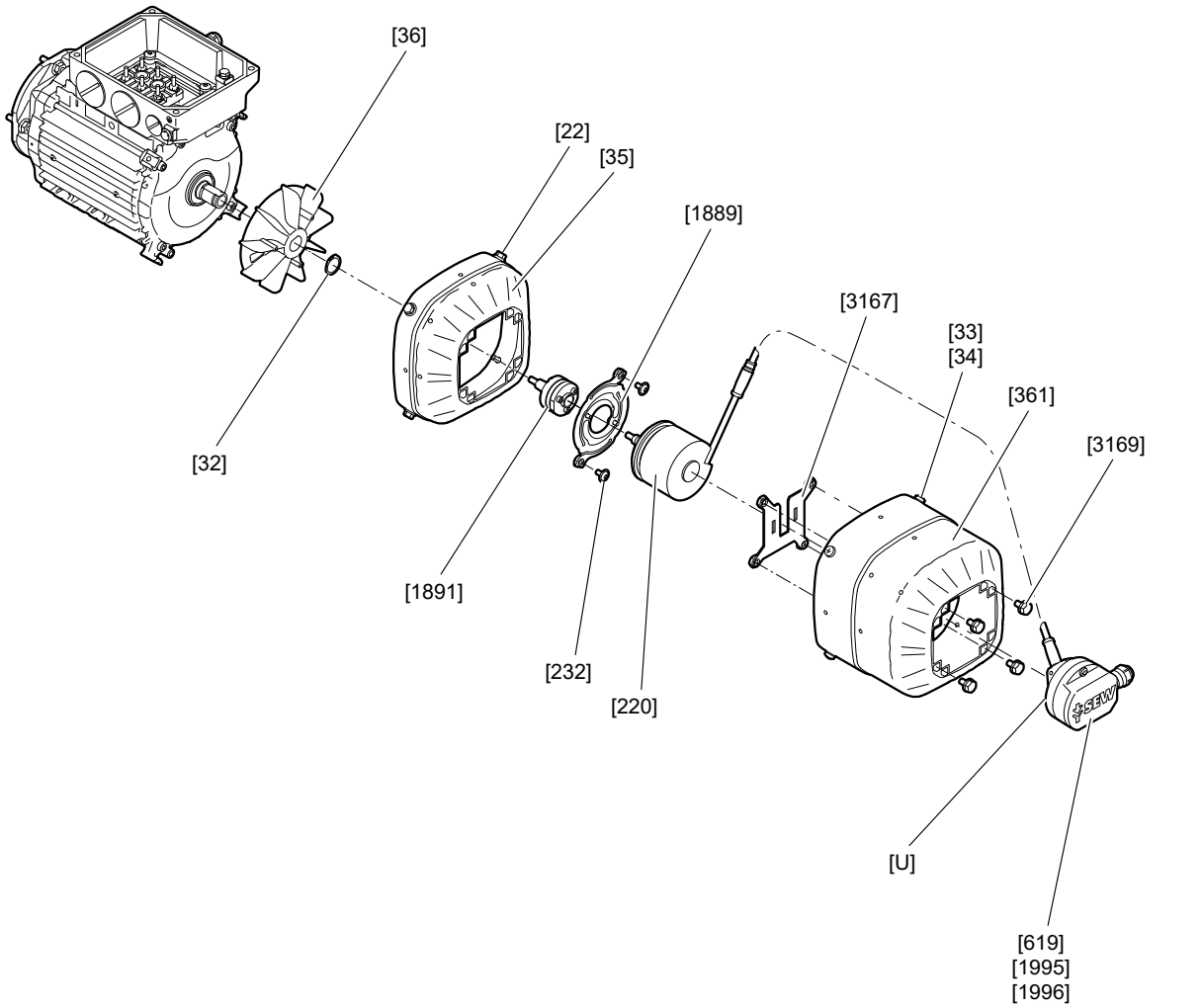
18014402142643851

[1]	Rotor	[619]	Connection cover
[33]	Washer	[1711]	Screw
[34]	Tapping screw	[B]	Central retaining screw
[35]	Fan guard	[C]	Connection cover screws
[170]	Forced cooling fan	[D]	Torque bracket screws
[220]	Encoder	[E]	Screw
[269]	Grommet	[F]	Clamping ring
[361]	Safety cover	[G]	Nut of the torque bracket
[657]	Safety cover		

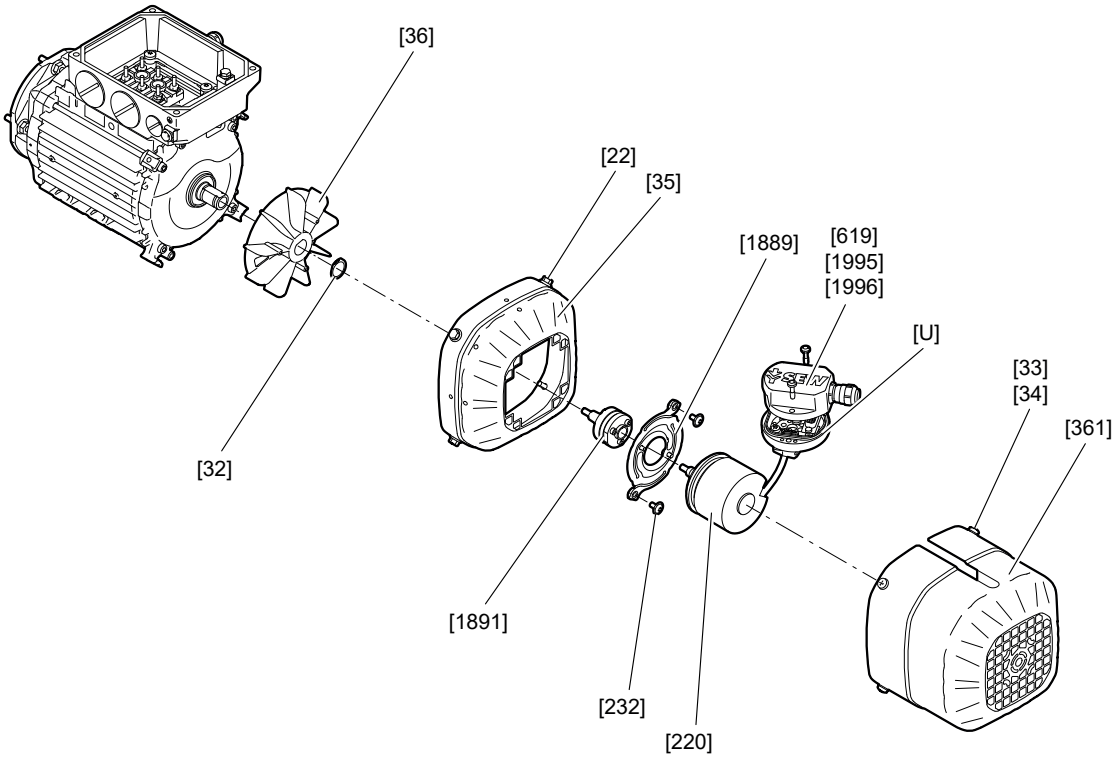
31543952/EN – 10/2023

4.4.6 Structure of conical encoders

Structure of .K8. conical encoder ((E)DRN../DRU../DR2..71 – 315 motors) with integrated encoder plug connector on the guard side or the rear side of the guard (with A1GA cover, without A2GA cover)



9007238955596939

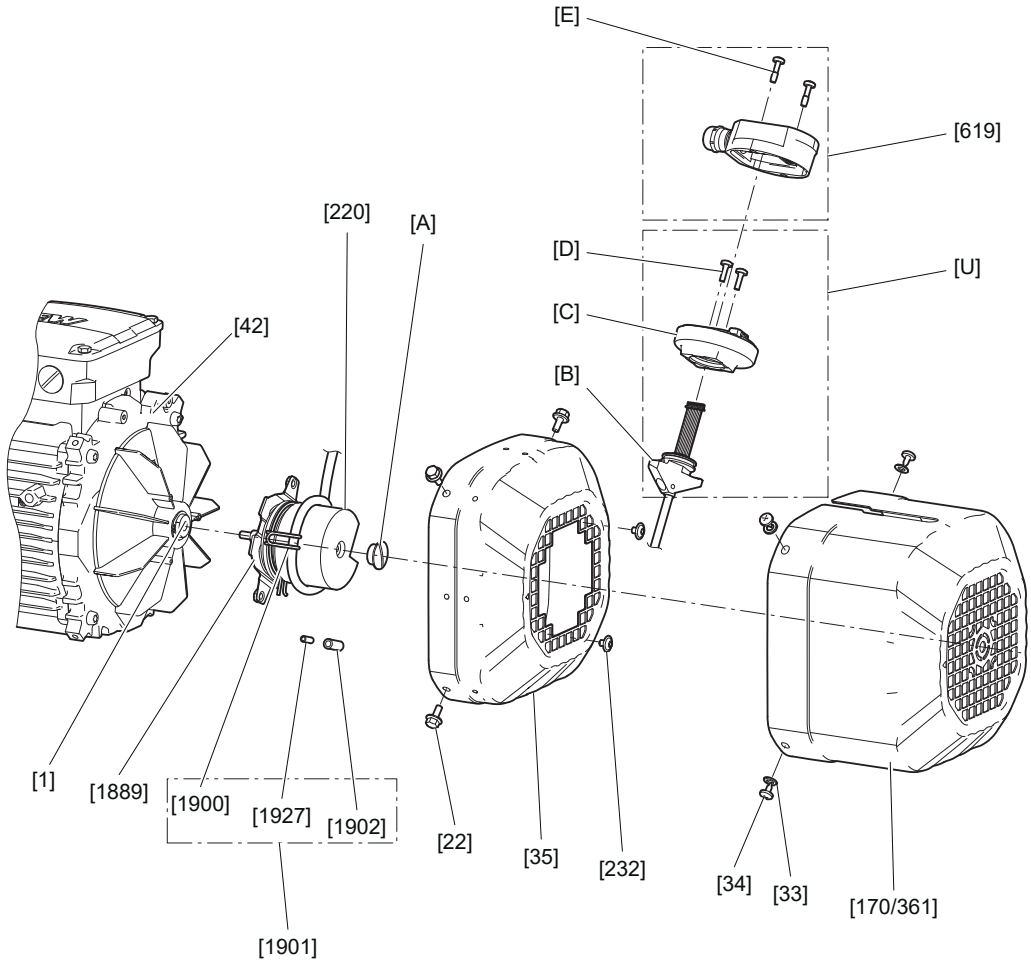


9007238955594507

[22] Screw (hexagonal)
[32] Retaining ring
[33] Washer
[34] Screw (cross recess)
[35] Fan guard
[36] Fan
[220] Encoder
[232] Screw (hexalobular)
[361] Safety cover
[619] Connection cover
[U] Connection adapter
[1889] Torque bracket
[1891] Insulation coupling
[1995] Connection cover
[1996] Flat head screw
[3169] Screw
[3167] Support plate

31543952/EN – 10/2023

Structure of .K8. conical encoder - (E)DRN../DRU../DR2..71 - 132S motors with integrated A1GA encoder plug connector with connection cover or A2GA without connection cover

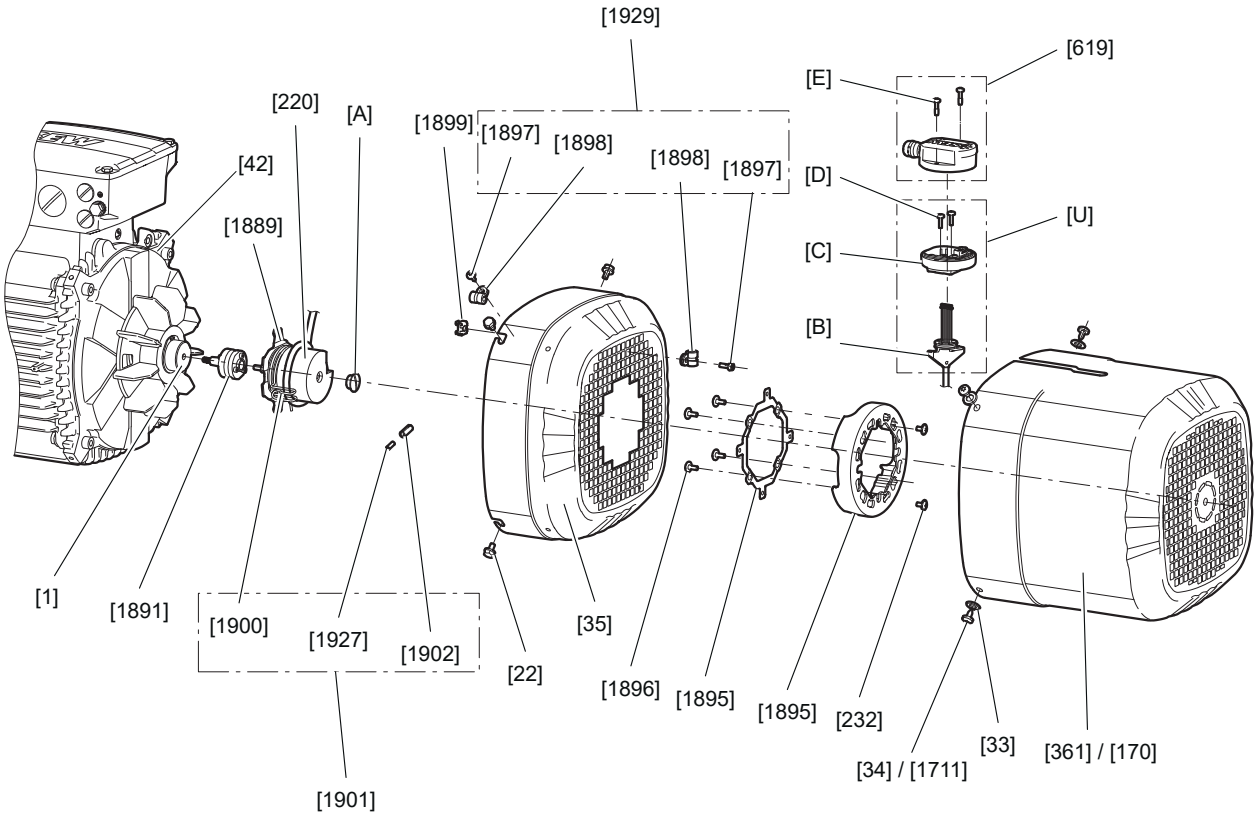


18014427029025803

[1]	Rotor	[U]	Connection adapter
[22]	Screw (hexagonal)	[1889]	Torque bracket
[33]	Washer	[1900]	Cable retainer
[34]	Screw (cross recess)	[1901]	Accessory bag
[35]	Fan guard	[1902]	Threaded sleeve
[42]	B-side endshield	[1927]	Set screw
[170]	Forced cooling fan	[A]	Screw plug
[220]	Encoder	[B]	T-slot nut
[232]	Screw (hexalobular)	[C]	Lower part
[361]	Safety cover	[D]	Screw
[619]	Connection cover	[E]	Screw

31543952/EN – 10/2023

Structure of .K8. conical encoder ((E)DRN../DRU../DR2..132M – 315 motors)

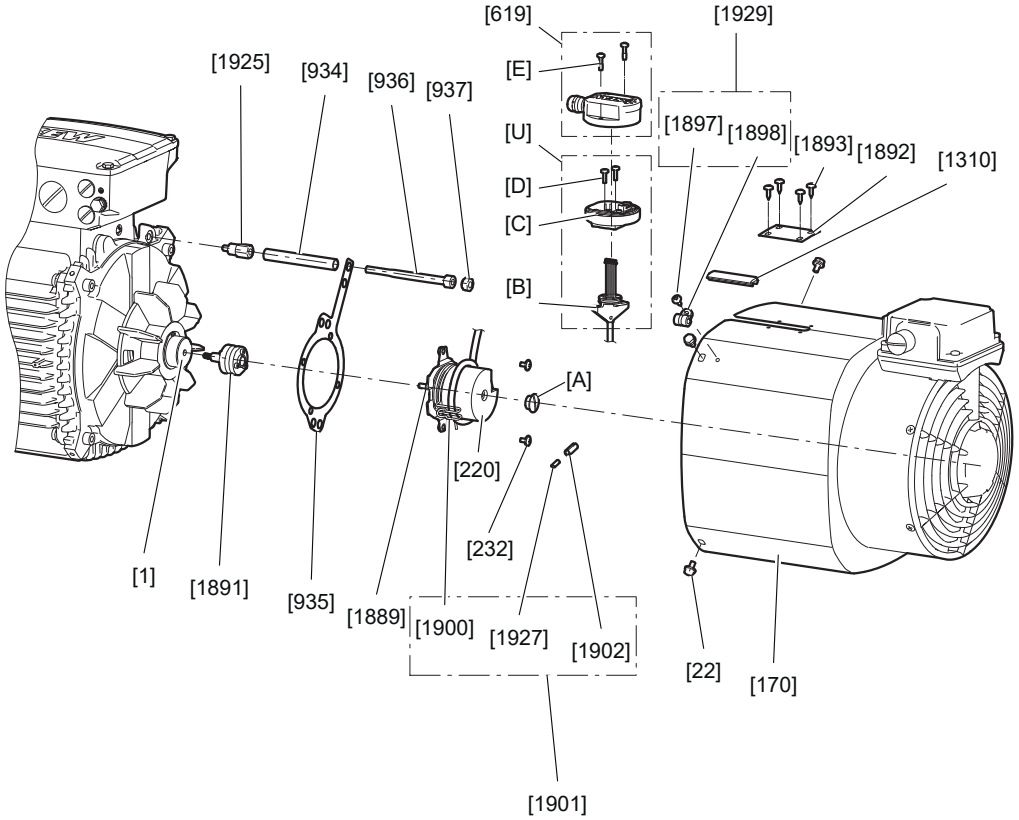


27021626298396683

[1]	Rotor	[1896]	Screw (hexalobular)
[22]	Screw (hexagonal)	[1897]	Screw (hexagon socket)
[33]	Washer	[1898]	Clamp
[34]	Screw (cross recess)	[1899]	Cage nut
[35]	Fan guard	[1900]	Cable retainer
[42]	B-side endshield	[1901]	Accessory bag
[170]	Forced cooling fan	[1902]	Threaded sleeve
[220]	Encoder	[1927]	Set screw
[232]	Screw (hexalobular)	[1929]	Accessory bag
[361]	Safety cover		
[619]	Connection cover	[A]	Screw plug
[U]	Connection adapter	[B]	T-slot nut
[1711]	Screw (hexagonal)	[C]	Lower part
[1889]	Torque bracket	[D]	Screw
[1891]	Insulation coupling	[E]	Screw
[1895]	Support ring/spacer ring		

31543952/EN – 10/2023

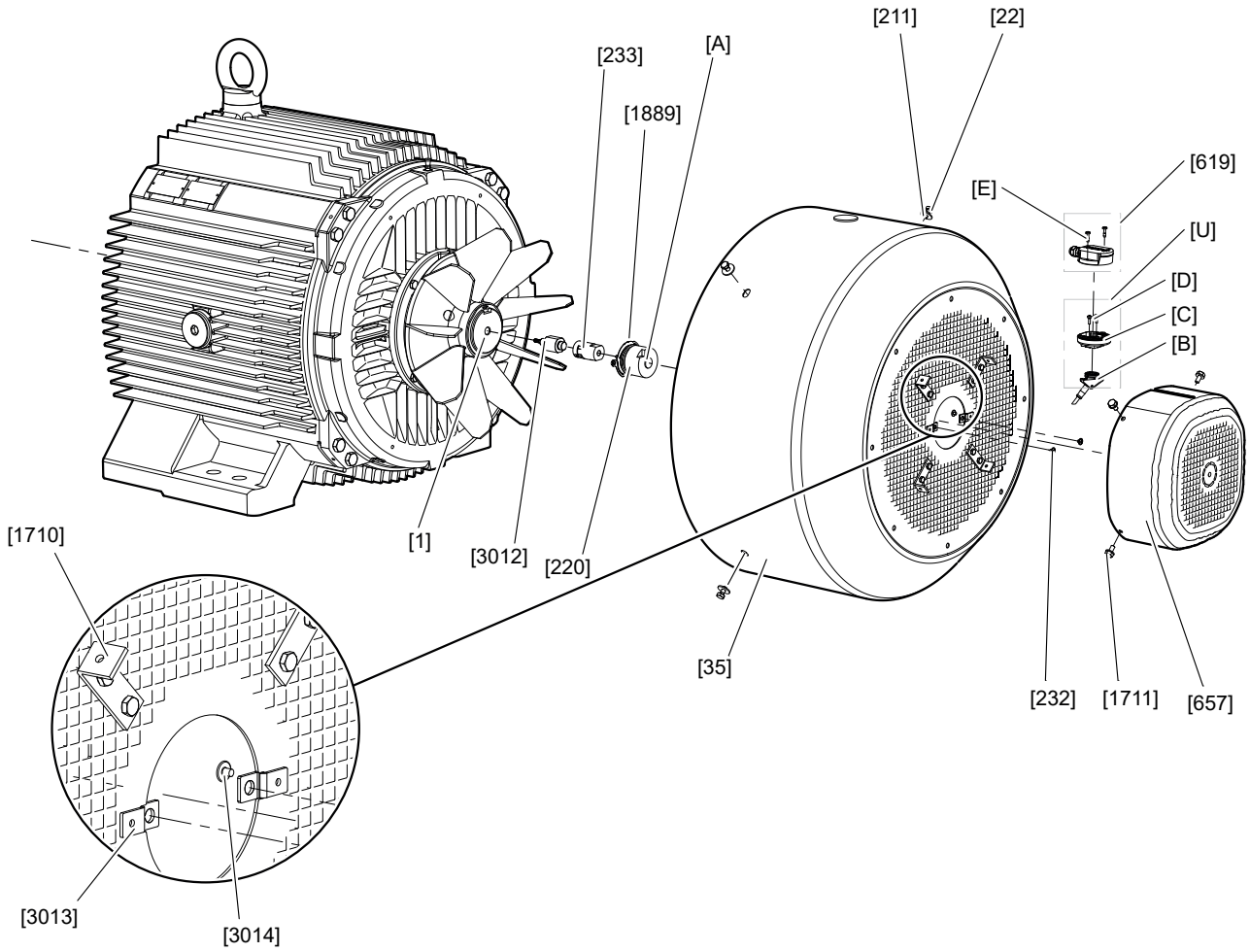
Structure of .K8. conical encoder - (E)DRN../DRU../DR2..132M - 355 motors with forced cooling fan and integrated A1GA encoder plug connector with connection cover or A2GA without connection cover



36028825563057675

[1]	Rotor
[22]	Screw (hexagonal)
[33]	Washer
[34]	Screw (cross recess)
[170]	Forced cooling fan
[220]	Encoder
[232]	Screw (hexalobular)
[361]	Safety cover
[619]	Connection cover
[934]	Spacer bushing
[935]	Torque bracket
[936]	Cap screw
[937]	Hex nut
[1310]	Sealing profile
[1889]	Torque bracket
[1891]	Insulation coupling
[1892]	Support plate
[1893]	Screw (cross recess)
[1897]	Screw (hexagon socket)
[1898]	Clamp
[1900]	Cable retainer
[1901]	Accessory bag
[1902]	Threaded sleeve
[1925]	Spacer bolt
[1927]	Set screw
[1929]	Accessory bag
[A]	Screw plug
[B]	T-slot nut
[C]	Lower part
[D]	Screw
[E]	Screw
[U]	Connection adapter

Structure of .K8. conical encoder - DRN 355 motors with integrated A1GA encoder plug connector with connection cover or A2GA without connection cover



9007232638950155

[1]	Rotor	[1889]	Torque bracket
[22]	Screw (hexagonal)	[1902]	Threaded sleeve
[35]	Fan guard	[1927]	Set screw
[211]	Washer	[3012]	Bolt
[220]	Encoder	[3013]	Fastening plate
[232]	Screw (hexalobular)	[3014]	Round-head screw
[233]	Coupling		
[619]	Connection cover	[A]	Screw plug
[657]	Safety cover	[B]	T-slot nut
[U]	Connection adapter	[C]	Lower part
[1710]	Angle bracket	[D]	Screw
[1711]	Screw (hexagonal)	[E]	Screw

31543952/EN – 10/2023

4.4.7 Encoder mounting adapter

An encoder mounting adapter allows for mounting an encoder, which is not part of the standard delivery, at a later time. SEW-EURODRIVE distinguishes between 2 types of encoder mounting adapters:

- Encoder mounting adapters for encoders from SEW-EURODRIVE
- Encoder mounting adapters for encoders of other manufacturers

Encoder mounting adapters for encoders from SEW-EURODRIVE

For the various tool flanges (depending on the size) for an encoder mounting adapter for encoders from SEW-EURODRIVE, refer to chapter "" and "Built-in encoder" (→ 🖹 36).

Encoder mounting adapters are available for all standard encoders from SEW-EURODRIVE:

Identifier	Description	Sizes
EI7A	For built-in encoders of types EI7.	71 – 132S
EI8A	For built-in encoders of types EI8.	71 – 132S
EK8A	For cone shaft encoders of types .K8. (For retrofitting with integrated encoder plug connector or M23 plug connector on the encoder)	71 – 355
XV8A	For cone-shaft encoders of types .K8. in coupling add-on with fan guard with encoder mount	71 – 280 315 (on request)
EG7A	For plug-in-shaft encoders of types .G7.	132M – 280
EV7A/XV7A	For spread-shaft encoders of types .S7. in coupling add-on with fan guard with encoder mount	80MS – 225
ES7A	For spread-shaft encoders of types .S7.	80M
EH7A	For hollow-shaft encoders of types .H7.	315

Encoder mounting adapters for EI7. and EI8. built-in encoders

An encoder mounting adapter allows for mounting an encoder, which is not part of the standard delivery, at a later time. This makes it possible to flexibly retrofit motors with an encoder.

EI7A is the encoder mounting adapter for retrofitting EI71, EI72, EI76 or EI7C encoders.

EI8A is the encoder mounting adapter for retrofitting EI8R or EI8C encoders.

The motor is fully prepared for subsequently installing these encoder types. Retrofit sets and service kits are available from SEW-EURODRIVE. Note possible limitations with the EI7C safety encoder. "Spare parts" (→ 🖹 192)

Connection technology for retrofitted encoder

The identical connection options such as EI7. and EI8. are available retrofitted. "Technical data" (→ 🖹 210)

Mechanical design of motors with mounting adapters

If you have selected an EI7A or EI8A encoder mounting adapter, the motor is equipped with an EI7./EI8.-capable rear endshield and a suitable terminal box to enable a retrofit.

31543952/EN – 10/2023

Combinatorics

The following applies for all first and second-generation DR.. motors:

- EI7A and EI8A mounting adapter for built-in encoders from the EI7. and EI8. family are available.
- Terminal boxes with an NPT cable gland are not possible with EI7A/EI8A, as the NPT terminal box cannot be retrofitted with M12/M23 connectors.
- EI7A can be combined with all motors and options with which an EI7. encoder can be combined.
- EI8A can be combined with all motors and options with which an EI8. encoder can be combined.
- EI7A and EI8A can be combined with add-on encoders of the .S7. and .K8. families.
- EI7A and EI8A cannot be combined with add-on encoders in the fan guard with encoder mount design .V7. and .V8.

The following also applies for DR2C motors:

- Built-in encoders are not included in the closed loop system retrofitted and are not suitable for closed-loop operation.
- Built-in encoders are suitable for an external evaluation device to obtain additional incremental position information.

The following also applies for DRM.. and DR2M motors:

- EI7A or EI8A are each possible only with an additional forced cooling fan.

31543952/EN – 10/2023

Encoder mounting adapters for XV.A encoders according to customer specifications

With this type of encoder mounting adapter, the AC motor is equipped with a mechanical interface that can be mounted to an encoder specified by the customer. This encoder is not a product of SEW-EURODRIVE and must be purchased separately. Third-party encoders are installed by SEW-EURODRIVE solely by means of special solutions. Contact SEW-EURODRIVE in such cases.

Dimensions

Refer to the following table for dimensions of XV.A encoder mounting adapters.

Mounting adapter	Design	
	Encoder shaft	Centering
XV0A	according to customer specification	
XV1A	6 mm	50 mm
XV2A	10 mm	50 mm
XV3A	12 mm	80 mm
XV4A	11 mm	85 mm
XV5A	12 mm	45 mm
XV6A	10 mm	36 mm

A fan guard with encoder mount allows the encoder to be mounted on the motor shaft. These encoders are usually attached using three conical spring washers.

The connection between the encoder shaft and the motor shaft is realized using a coupling.

The dimensions of the mounting adapters for customer-specific encoders are not listed here. Request the necessary dimension sheets from SEW-EURODRIVE, if required.

INFORMATION

The combinations with forced cooling fan require knowledge of the installation space of the encoder to be mounted. Several forced cooling fan guards with different lengths are available. Contact SEW-EURODRIVE for more information.

31543952/EN – 10/2023

4.5 Nameplates and type designations of encoders

4.5.1 Type designation for safety encoders

INFORMATION

Safety encoders do not have their own nameplate. Encoders that are available as a safety encoder have a corresponding FS marking on the nameplate.

4.5.2 Structure of the type designation

EI8R	
E	Encoder interface
I	Tool flange
8	Key figure for the generation of the encoder or type
R	Electrical interface

4.5.3 Type designation for encoders from SEW-EURODRIVE

The type designation of SEW-EURODRIVE encoders consists of 4 characters, e.g. EI8R, and is included in the type designation of the motor.

1st character: Encoder design

Identifier	Description
A	Multi-turn absolute encoder
E	Single-turn absolute encoder or incremental encoder
N	Low resolution proximity switch and incremental encoder
CW	Resolver
X	Special encoder

2nd character: Tool flange to the motor

The add-on encoder is mounted to the motor on the B-side by means of various tool flanges. The interface to be used depends on the motor size or the selected option.

Identifier	Description
K	Cone shaft (shaft centered)
V	Solid shaft with coupling (flange-centered with flange cover)
H	Hollow shaft (shaft centered)
I	Built-in encoder, integrated in the motor without additional length
F	positive
L	linear
S	Spread shaft (shaft centered)
G	Plug-in shaft (shaft centered)

31543952/EN – 10/2023

3rd character: Key figure for the generation of the encoder/type

Identifier	Description
9	Built-in encoders of the high class or add-on encoders of the medium and high class of the second generation
8	Built-in encoders of the medium class or add-on encoders of the medium and high class of the second generation
7	Built-in encoders of the basic class or add-on encoders of the medium and high class of the first generation
1 – 6	Various geometric variants
0	Special design

4th character: Electrical interface of the encoder

Identifier	Description
1 – 6	Signal periods per revolution
A	Design as mounting adapter (see chapter "Encoder mounting adapter")
C	HTL (with or without index track) at typically V_B = 9 – 30 V
H	sin/cos + RS485 HIPERFACE® (multi-turn)
L	Resolver signal
M	Resolver signal
R	TTL (RS422) at typically V_B = 9 – 30 V
S	Sin/cos + RS485 (optional)
T	TTL (RS422) at V_B = 5 V
W	Sin/cos + RS485 (single-turn or multi-turn)
Y	Sin/cos or TTL(RS422) + SSI (multi-turn)
Z	MOVILINK® DDI

31543952/EN – 10/2023

4.5.4 Part number

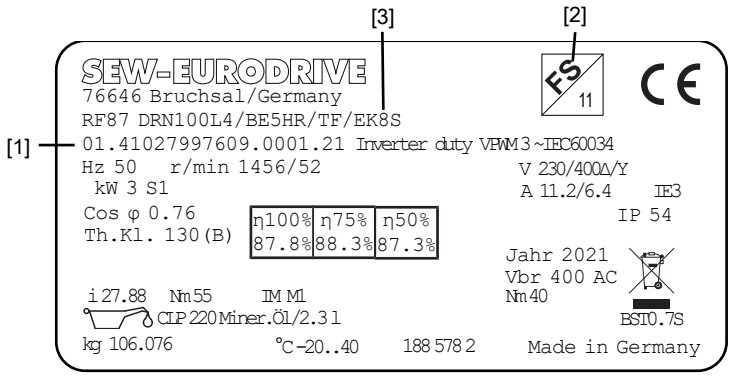
Two part numbers can be specified on the nameplate for the encoders.

The assignment of the part numbers and the position on the nameplate can be found in chapters ".K8. nameplate - Baumer" (→ 🗎 78) and ".K8. nameplate - Kübler" (→ 🗎 79).

Additional information can be found in chapters "Manufacturer information about conical encoders" (→ 🗎 33) and "Spare parts" (→ 🗎 192).

4.5.5 Motor

The existing encoder type is indicated in the motor type designation on the motor nameplate. If the FS logo is additionally displayed on the motor nameplate, then a functionally safe motor option is available, e.g. a safety encoder or a safety brake. The following figure shows an example motor nameplate with an EK8S encoder. The FS logo indicates that the EK8S encoder is designed as a safety encoder. For details on the FS logo, see "FS marking" (→ 🗎 38)



9007235322672395

[1] Motor serial number
[2] FS logo for functional safety
[3] Type designation

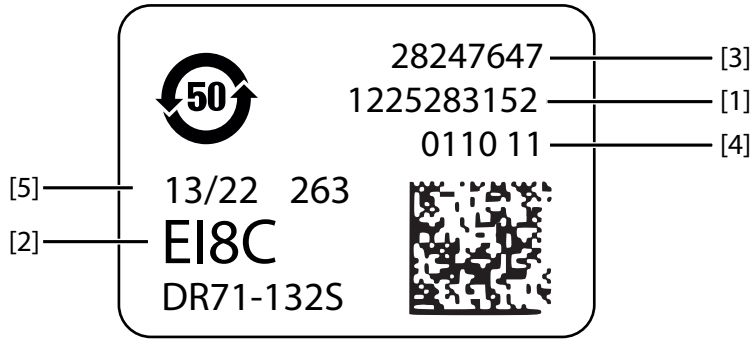
In addition to the motor nameplate, the encoder has its own nameplate with specific information on the encoder.

31543952/EN – 10/2023

4.5.6 EI7., EI8. built-in encoders

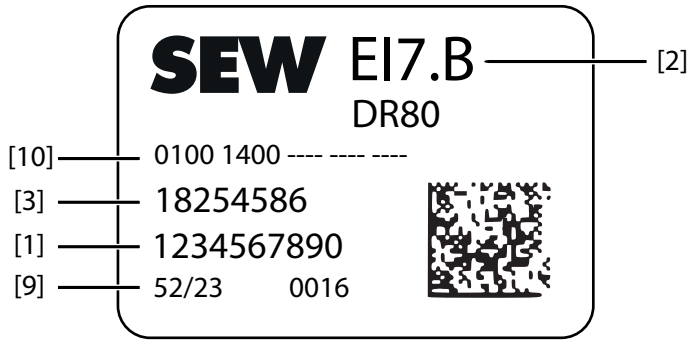
The following figures show examples of the nameplates of the EI7. and EI8. encoders. For the structure of the type designation, see chapter "Type designation".

Design 1



9007234990439179

Design 2



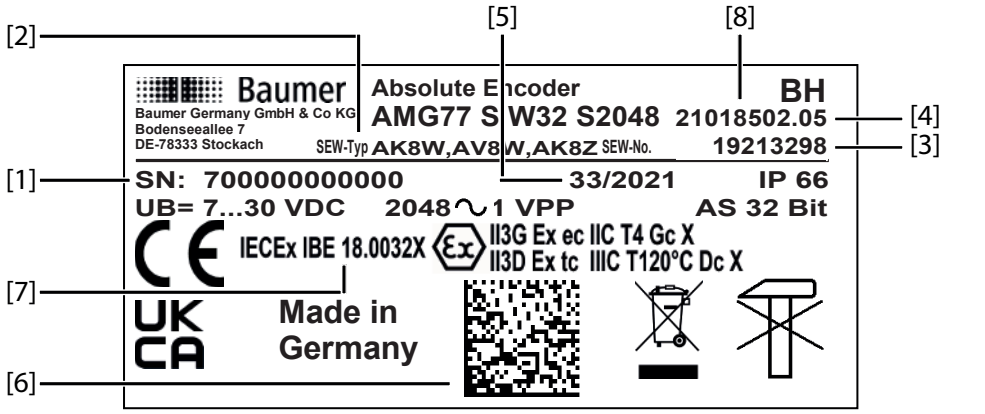
42411732491

[1] Serial number
[2] Type designation
[3] Part number from SEW-EURODRIVE
[4] Version
[5] Manufacturing date in ww/yy format
[9] Test date in ww/yy format
[10] Construction status

4.5.7 .K8. .V8. conical encoders

.K8. nameplate - Baumer

The following figure shows an example of a nameplate for a Baumer encoder. For the structure of the type designation, see chapter "Type designation".



18014434238808715

[1] Serial number

[2] Type designation

[3] Part number from SEW-EURODRIVE

[4] Version

[5] Manufacturing date in ww/yyyy format

[6] QR code

[7] Identifications relating to explosion protection

[8] SEW-EURODRIVE part number

For encoders with 1 part number on the nameplate

Part number of the encoder set (consisting of encoder and mount-on parts with the lower part of the integrated encoder plug connector)

For encoders with 2 part numbers on the nameplate

Part number of the encoder (without torque bracket and mount-on parts).

1st part number [8] + version [4] (listed above):

- Manufacturer-specific part number of the encoder.

2nd part number [3] (listed below):

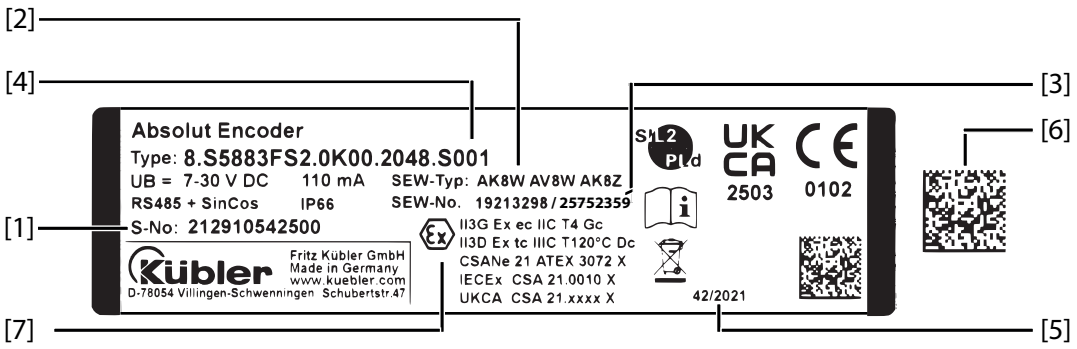
- Manufacturer-neutral part number of the encoder. This part number lists encoders from both manufacturers without any specific sorting.

For additional information, see chapter "Manufacturer information about conical encoders" (→ 🗎 33) and chapter "Spare parts" (→ 🗎 192).

31543952/EN – 10/2023

.K8. nameplate - Kübler

The following figure shows an example of a nameplate for a Kübler encoder. For the structure of the type designation, see chapter "Type designation".



18014434362846091

[1] Serial number

[2] Type designation

[3] Part number from SEW-EURODRIVE/manufacturer-specific part number

[4] Version

[5] Manufacturing date in ww/yyyy format

[6] QR code

[7] Identifications relating to explosion protection

For encoders with 1 part number on the nameplate

Part number of the encoder set (consisting of encoder and mount-on parts with the lower part of the integrated encoder plug connector)

For encoders with 2 part numbers on the nameplate

Part number of the encoder (without torque bracket and mount-on parts).

1st part number [3] (on the left)

- Manufacturer-neutral part number of the encoder. This part number lists encoders from both manufacturers without any specific sorting.

2nd part number [3] (on the right)

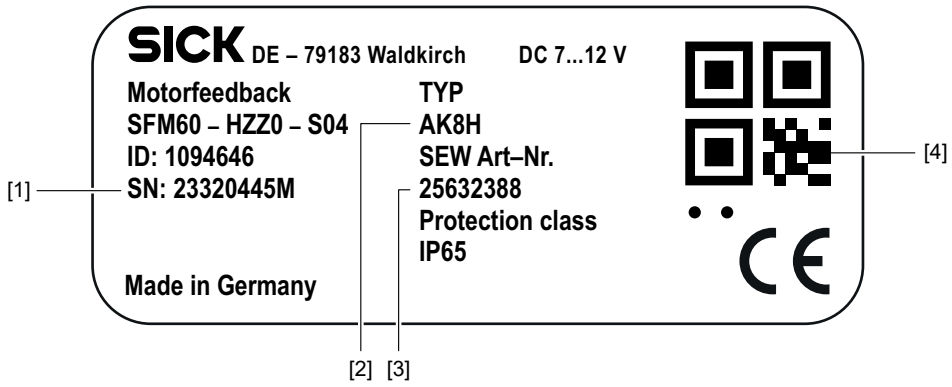
- Manufacturer-specific part number of the encoder.

For additional information, see chapter "Manufacturer information about conical encoders" (→ 🗎 33) and chapter "Spare parts" (→ 🗎 192).

31543952/EN – 10/2023

.K8. nameplate - Sick

The following figure shows an example of a nameplate for a Sick encoder. For the structure of the type designation, see chapter "Type designation".



43907564683

[1] Serial number

[2] Type designation

[3] Part number from SEW-EURODRIVE

[4] QR code

The following designs must be taken into account regarding the encoders:

Design 1

Manufacturing date up to CW31/2023 (date code 2331): Part number of the encoder set from SEW-EURODRIVE, consisting of encoder and mount-on parts with the lower part of the integrated encoder plug connector.

Design 2

Manufacturing date as of CW32/2023 (date code 2332): Part number of encoders from SEW-EURODRIVE.

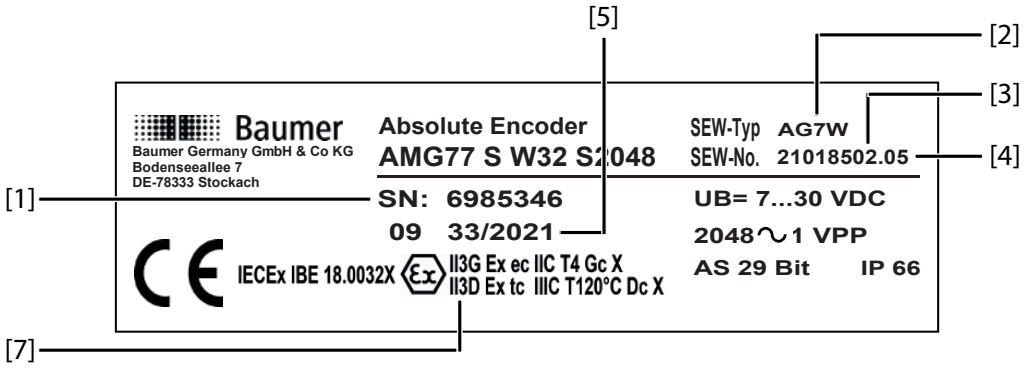
For additional information, see chapter "Manufacturer information about conical encoders" (→ 🗎 33) and chapter "Spare parts" (→ 🗎 192).

31543952/EN – 10/2023

4.5.8 .S7., .G7. spread/plug-in shaft encoders

.S7. nameplate / .G7. - Baumer

The following figure shows an example of a nameplate for a Baumer encoder. For the structure of the type designation, see chapter "Type designation".



39531662347

[1] Serial number

[2] Type designation

[3] Part number from SEW-EURODRIVE

[4] Version

[5] Manufacturing date in ww/yyyy format

[7] Identifications relating to explosion protection

For encoders with 1 part number on the nameplate

Part number of the encoder set (consisting of encoder and mount-on parts with the lower part of the integrated encoder plug connector)

For additional information, see chapter "Manufacturer information about conical encoders" (→ 🗎 33) and chapter "Spare parts" (→ 🗎 192).

5 Mechanical installation

5.1 Required tools

⚠ WARNING

Loss of the safety function due to a faulty mechanical connection between the motor and the safety encoder.

Death or severe injuries

✓ To ensure the exclusion of any errors in the mechanical connection between the motor and the safety encoder, comply with the following points in accordance with IEC 61800-5-2:

- Perform a proper disassembly/assembly procedure according to this documentation.
- Replace worn or damaged components.
- Adhere to the tightening torques specified in this documentation.

You need the following tools to assemble and disassemble the encoders. Make sure that all the tools are available before you remove/install an encoder.

Generally required tools and aids:

- Allen wrench in different sizes
- Hexagonal socket wrench in different sizes
- Flat tip screwdriver 04/05 and Torx TX20 and TX25
- Torque wrench for tightening torques of 1.6 Nm – 8.0 Nm

For .K8. / .V8.:

- Allen wrench: S2.5, S3, S4, S5
- Hexagonal socket wrench: SW8, SW10, SW13, SW30
- M6 screw with a min. length of 70 mm (AK8H only)
- Lubricant, e.g. Lub-L 3M

For EI7. / EI8.:

- Allen wrench: S2.5, S3, S4, S5
- Warming plate (130 °C)
- Lubricant, e.g. Lub-L 3M
- Assembly paste, e.g. Molykote

For encoders .S7. / .G7.

- NOCO®-FLUID (part number: 09107819)

Additionally required tools and aids for safety encoders:

- For ES7S, AS7W, AS7Y safety encoders: Sensor for measuring the wobble with a measuring range in the 1/100 mm range
- For ES7S, AS7W, AS7Y safety encoders: New expansion anchor (part number: 13617311)
- For EK8S, AK8W, AK8Y safety encoders: LOCTITE® 241

31543952/EN – 10/2023

5.2 Tightening torques

Unless otherwise described, a tolerance of ± 15% applies for all the specified tightening torques.

5.3 Safety encoders

5.3.1 General information for the installation of safety encoders

NOTICE

Improperly carried out work on drives with functionally safe motor options.

Loss of the safety function.

- Improperly carried out work on drives with functionally safe motor options can result in loss of the safety functions. This can cause injuries and damage.
- Only qualified specialists are allowed to carry out work on drives with functionally safe motor options.
- For information about retrofitting the EI7C FS safety encoder, contact SEW-EURODRIVE.
- With the EI7C FS built-in encoder, no work may be performed on the encoder. Place an order with SEW-EURODRIVE Service to have any necessary work on the encoder performed.

When used in a safety function, safety encoders have to meet increased requirements in terms of the mechanical mounting and the connection between the encoder shaft and motor shaft.

SEW-EURODRIVE meets the requirements of functional safety for the safety encoder in terms of the unwanted loosening of the encoder mounting and the connection between the encoder shaft and the motor shaft. Fault exclusion in compliance with IEC 61800-5-2 is assumed. Safety-related connecting elements are marked in the delivery state, for example using a locking compound or an adhesive label.

The following options are available for performing work on safety encoders or on the motor when the marked, safety-relevant connections need to be opened:

- Place an order with SEW-EURODRIVE Service to perform the work.
- Perform the work yourself.

When performing the work yourself:

Note that all work on the safety encoder and its mechanical coupling is carried out at your own risk. The user is responsible and liable for proper fulfillment of the work. The user has to ensure the traceability of the performed changes regarding functional safety.

Where applicable, pay particular attention to differing tightening torques or additional work steps that are described in this documentation.

31543952/EN – 10/2023

In case of proven compliance with the activities described in this documentation for the safety encoder, the characteristics regarding functional safety described by the manufacturer are maintained.

Type of work	Work permitted?	Comment
Replace the safety encoder	Yes	Replacement with a structurally identical safety encoder (same encoder type). Replacement of the safety encoder built-in encoder EI7C FS is not permitted.
Replace the existing encoder with a safety encoder.	No	Contact SEW-EURODRIVE.
Changes to the safety encoder.	No	The safety certification and any right to claim under limited warranty of SEW-EURODRIVE become void if the user modifies the safety encoder.
Loosening the central retaining screw of the insulation coupling [1891]	Yes	In case of service, loosen only the central retaining screw. If other screws are loosened, the insulation coupling is damaged [1891].

5.3.2 Drive with encoder/safety encoder

If an encoder/safety encoder is mounted onto the drive, then this must be disassembled before performing motor and brake maintenance.

⚠ WARNING

Loss of the safety functions due to a faulty mechanical connection between the motor and the safety encoder.

Death or severe injuries

- To ensure the exclusion of any errors in the mechanical connection between the motor and the safety encoder, comply with the following points in accordance with IEC 61800-5-2:

→ Perform a proper disassembly/assembly procedure according to the corresponding documentation.

→ Replace worn or damaged components.

→ Adhere to the tightening torques specified in the corresponding documentation.

Note that the work steps for a safety encoder differ from an encoder without safety technology (standard encoder).

First, check the FS logo on the motor nameplate to ascertain whether a safety encoder is installed (see chapter "FS marking").

Proceed as described in this documentation to remove and install the encoder/safety encoder.

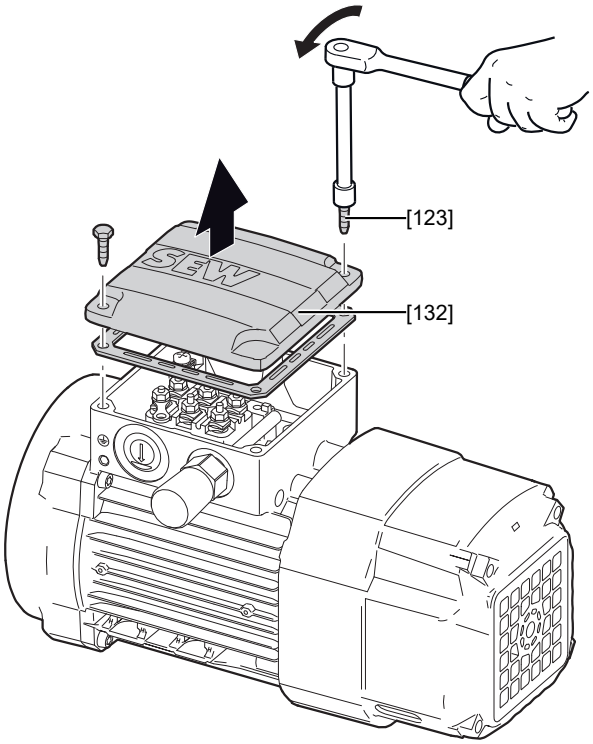
31543952/EN – 10/2023

5.4 Removing/installing built-in encoders

5.4.1 EI7. built-in encoders – DRN63 motors

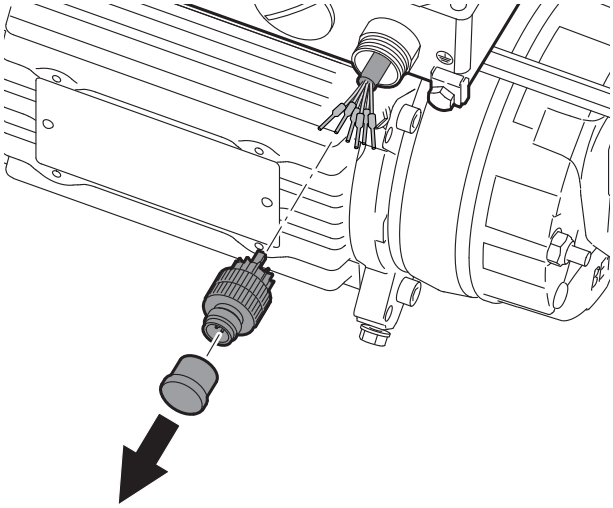
Removing EI7. – DRN63 motors

1. Unscrew the screws [123] to remove the terminal box cover [132].



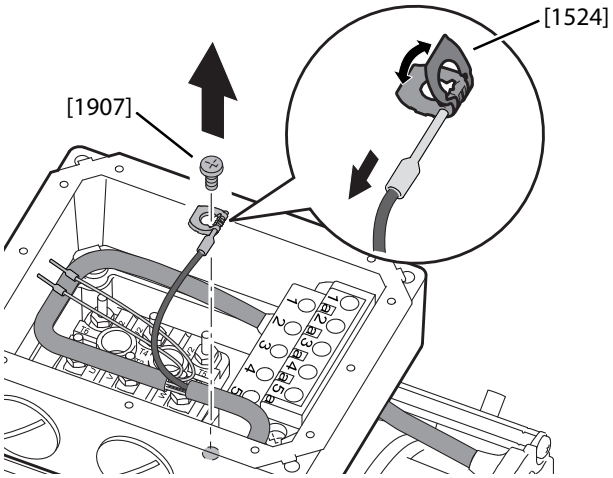
29491623563

2. Unscrew the M12 connector and disconnect the cores.



18014408102446347

3. Loosen the screw [1907] used for fastening the shielding to the terminal box.

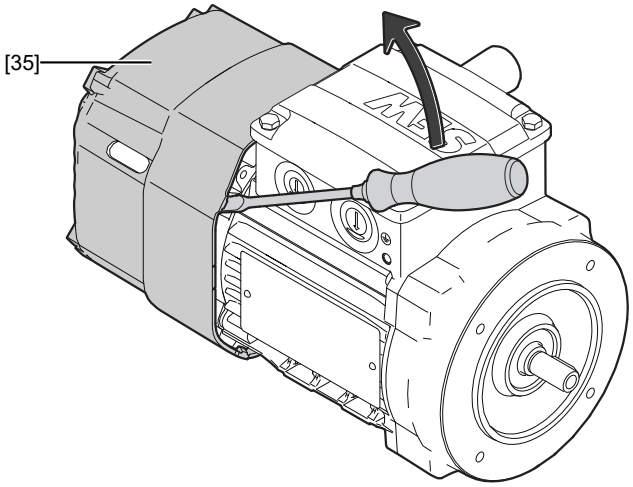


9007229317055755

4. Bend open the terminal washer [1524] and pull out the shielding of the encoder cable.

   ⇨ Dispose of the terminal washer [1524].

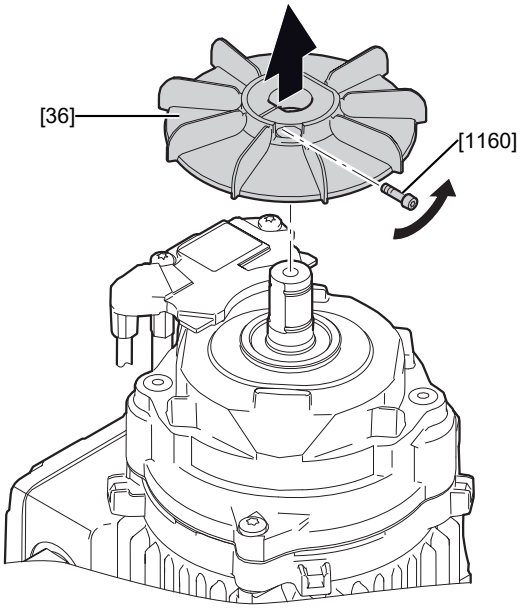
5. In order to remove the fan guard [35] lever out the 2 detents opposite of the terminal box. Then pull the detents over the latching cams of the endshield.



30062320139

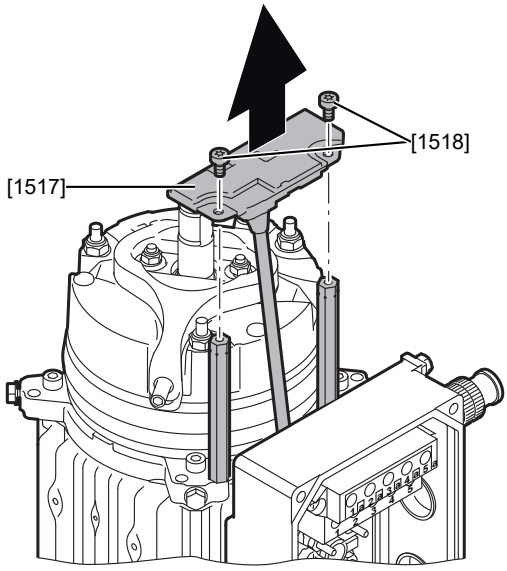
31543952/EN – 10/2023

6. Loosen the clamping screws [1160] and remove the fan [36]. If necessary, remove the retaining rings prior to this step.



29495711627

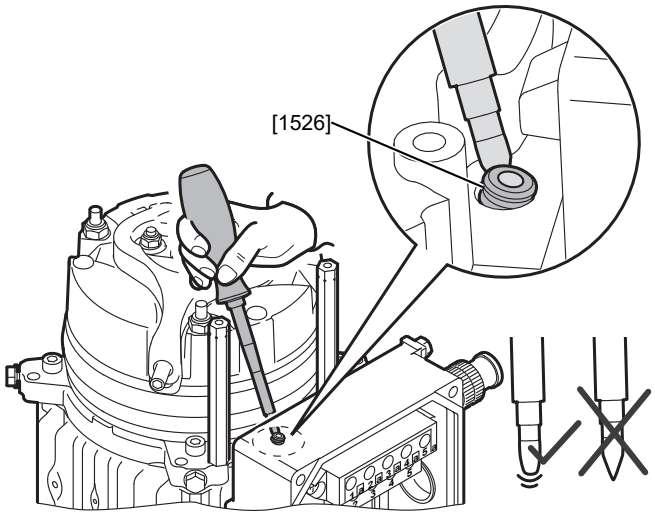
7. Loosen the screws [1518] and pull the encoder module [1517] out of the knock-out and the grommet.



30064499851

⇨ Dispose of the screws.

8. Remove the grommet [1526] from the knock-out.



30064502539

⇨ Dispose of the grommet.

31543952/EN – 10/2023

Installing EI7. – DRN63 motors

Before installation, the grommet [1526] with part number 13637339 must be obtained from SEW-EURODRIVE.

The grommet [1526] is also included in the respective retrofit sets and service kits.

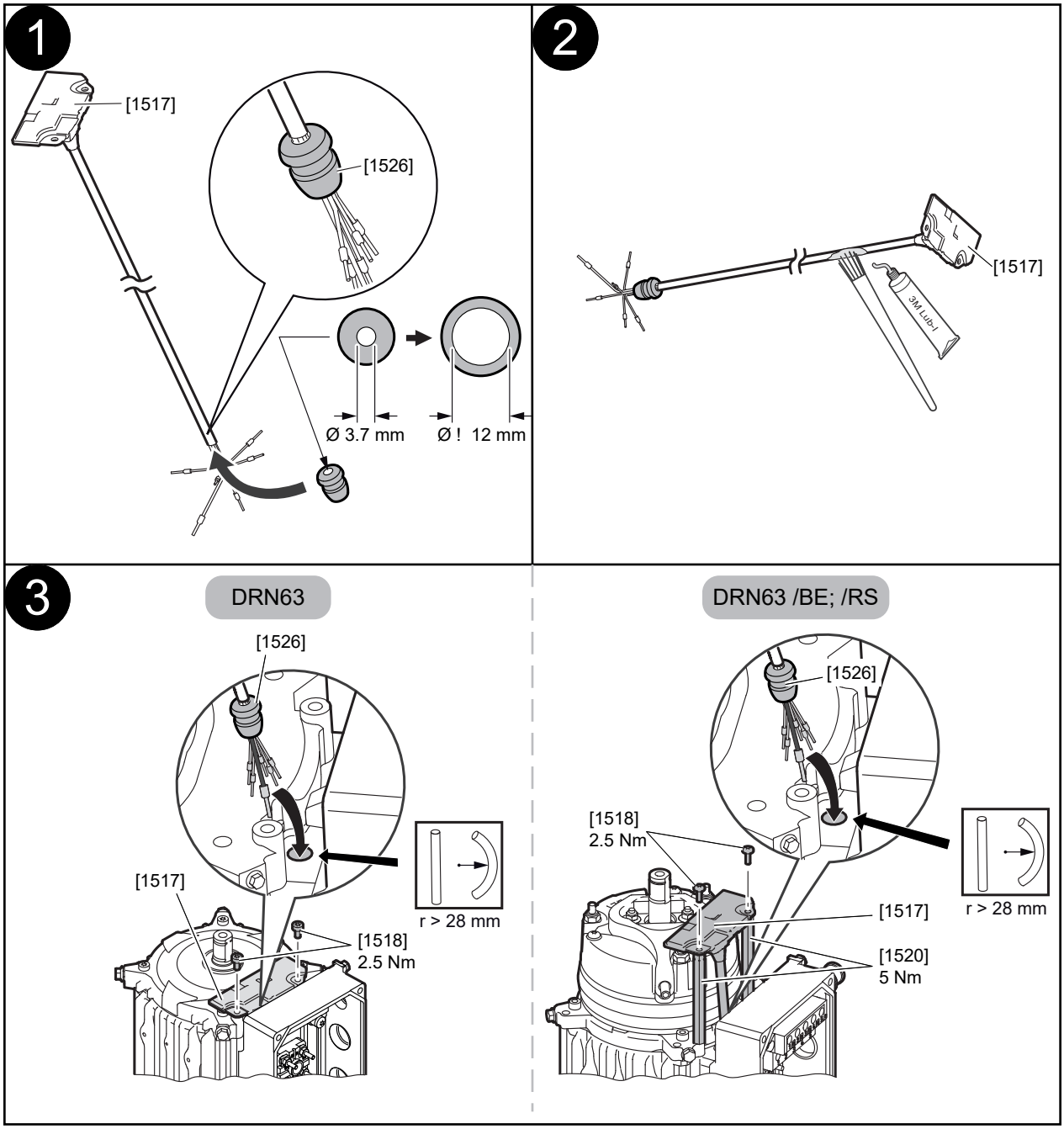
Before installation, the flat-head screws for the brake [1518] with part number 19103387 must be obtained from SEW-EURODRIVE.

The screws [1518] are also included in the respective retrofit sets and service kits.

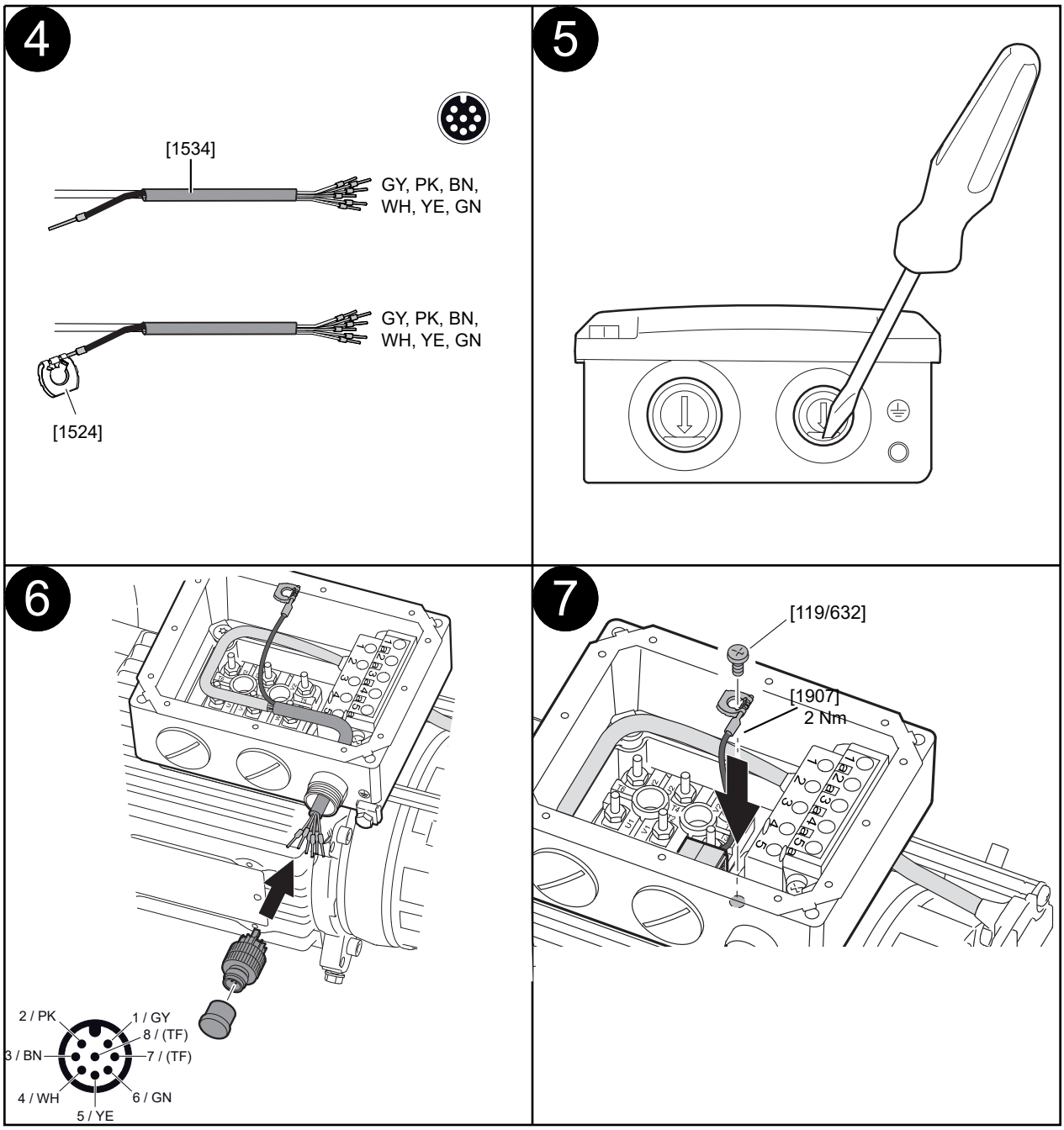
Before installation, a terminal washer [1524] with part number 13262130 must be obtained from SEW-EURODRIVE.

31543952/EN – 10/2023

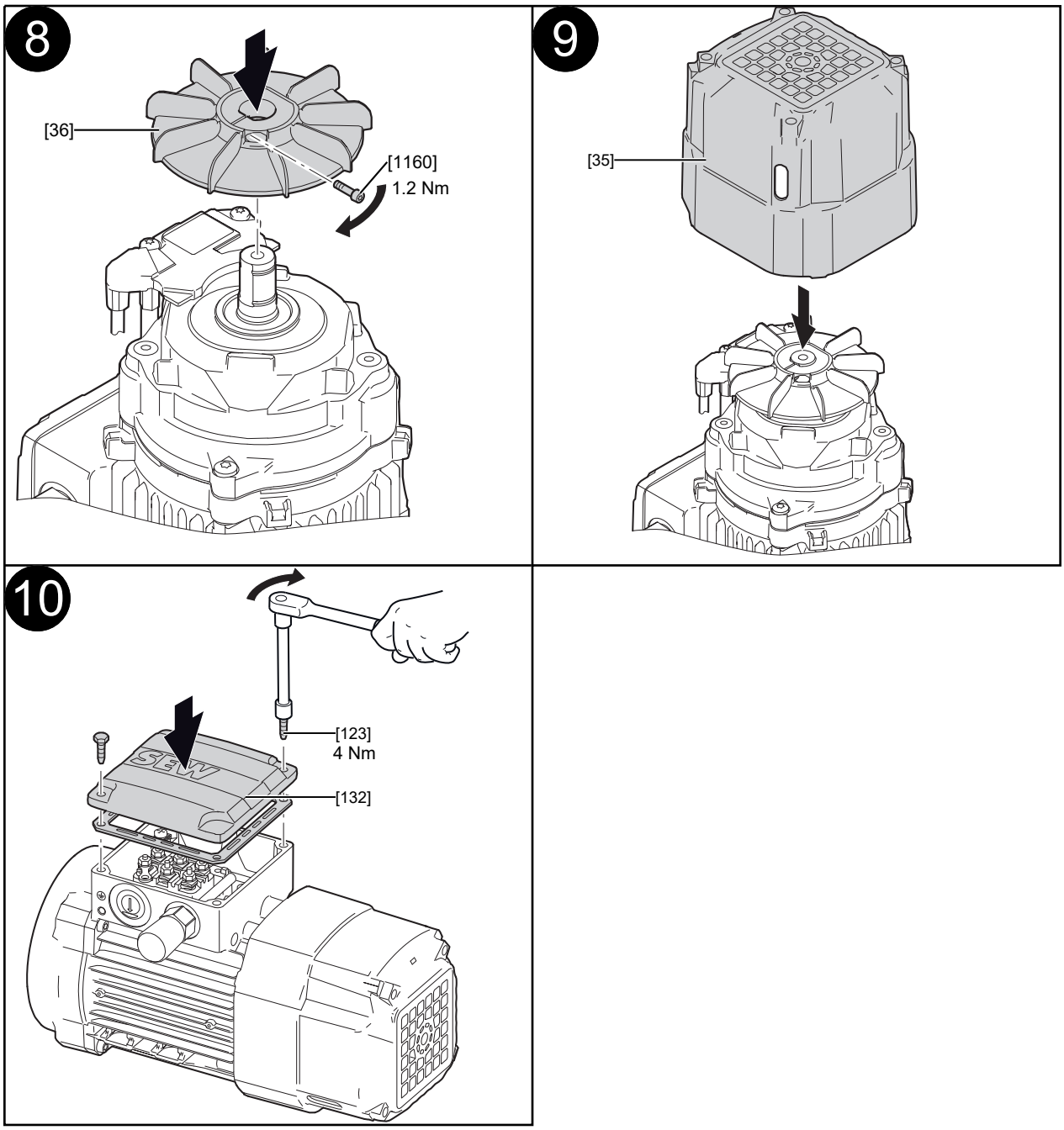
The terminal washer [1524] is also included in the respective retrofit sets and service kits.



9007235746432011



9007235747112971

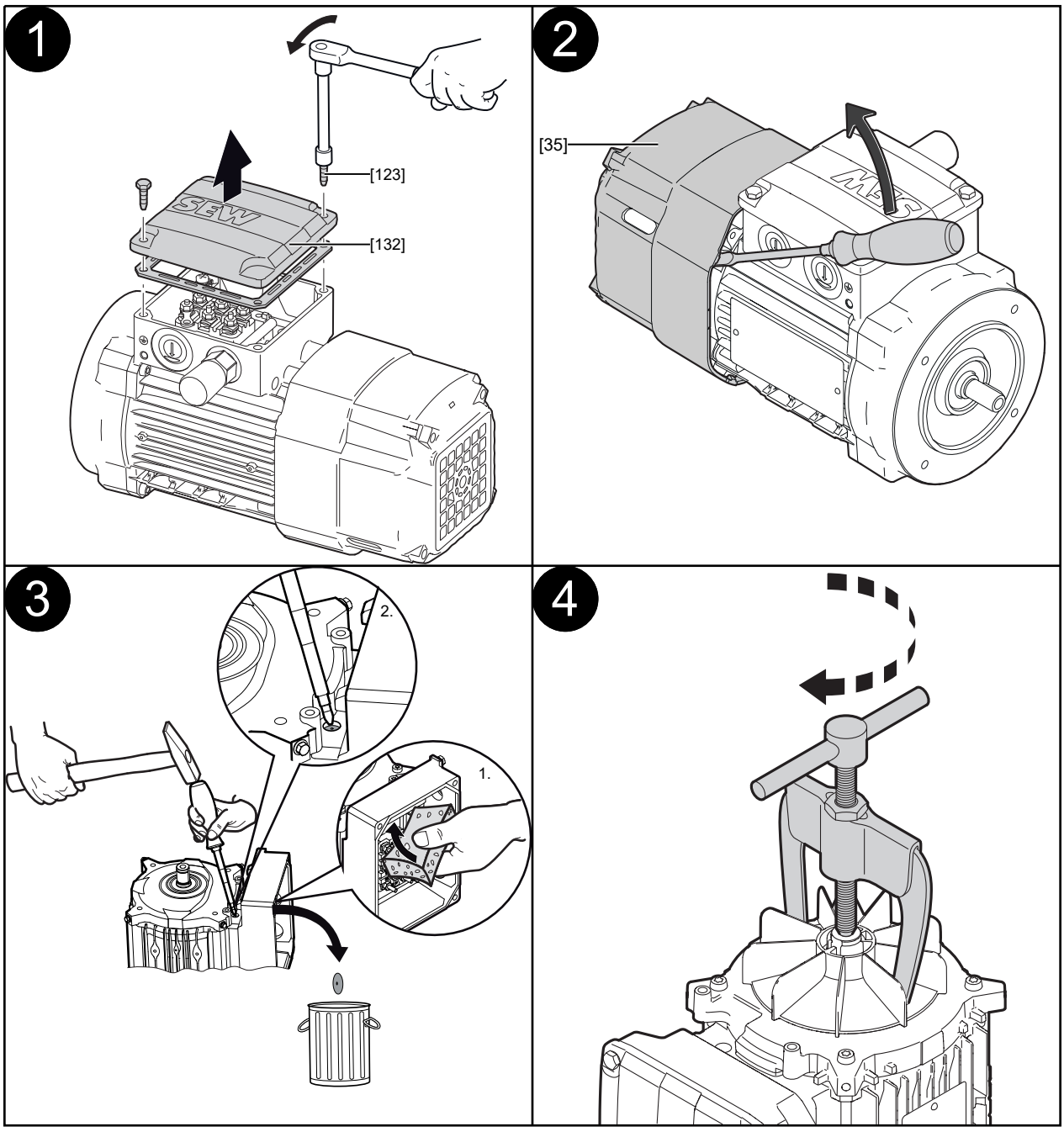


36492380427

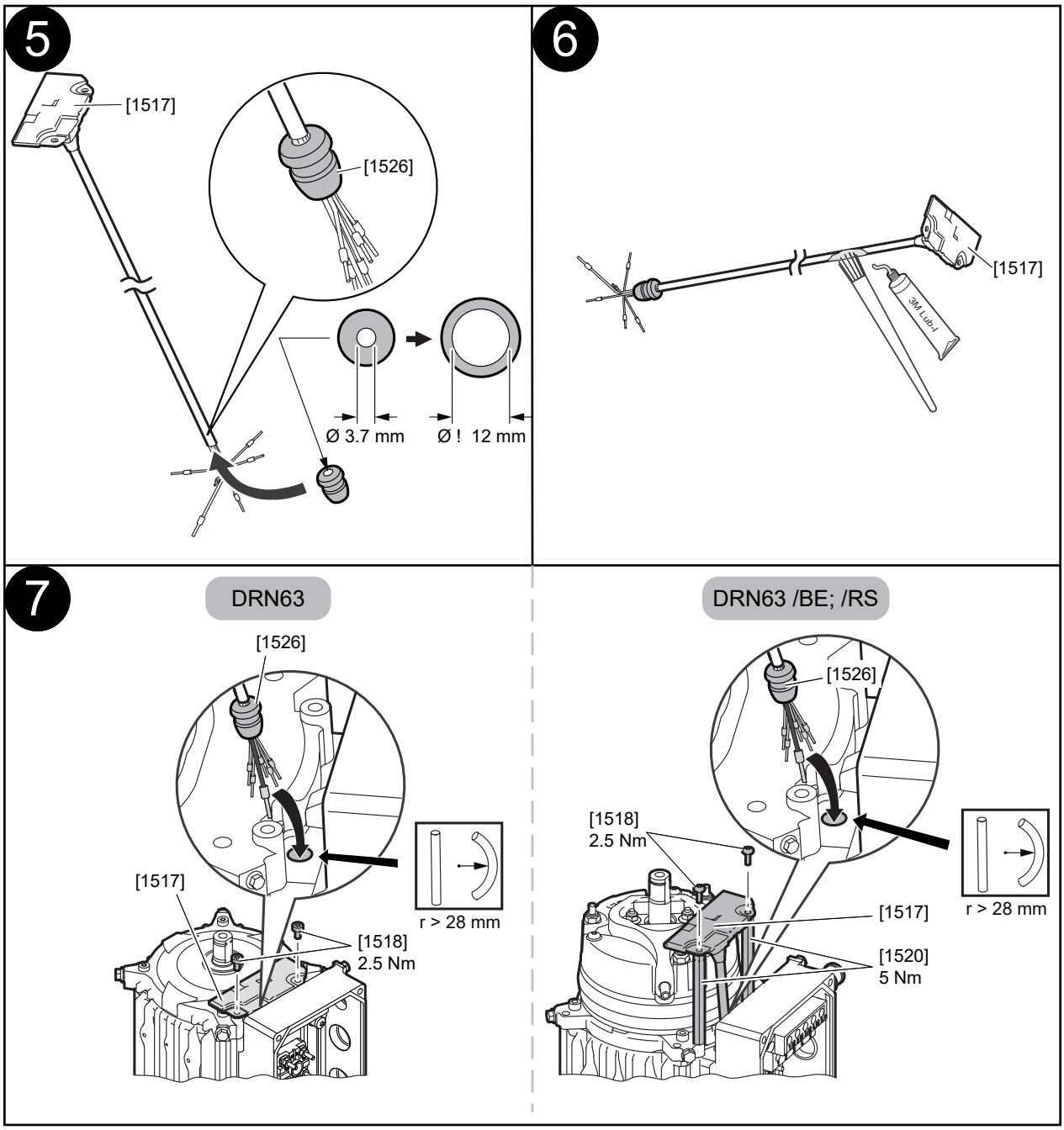
Retrofitting EI7. – DRN63 motors

INFORMATION

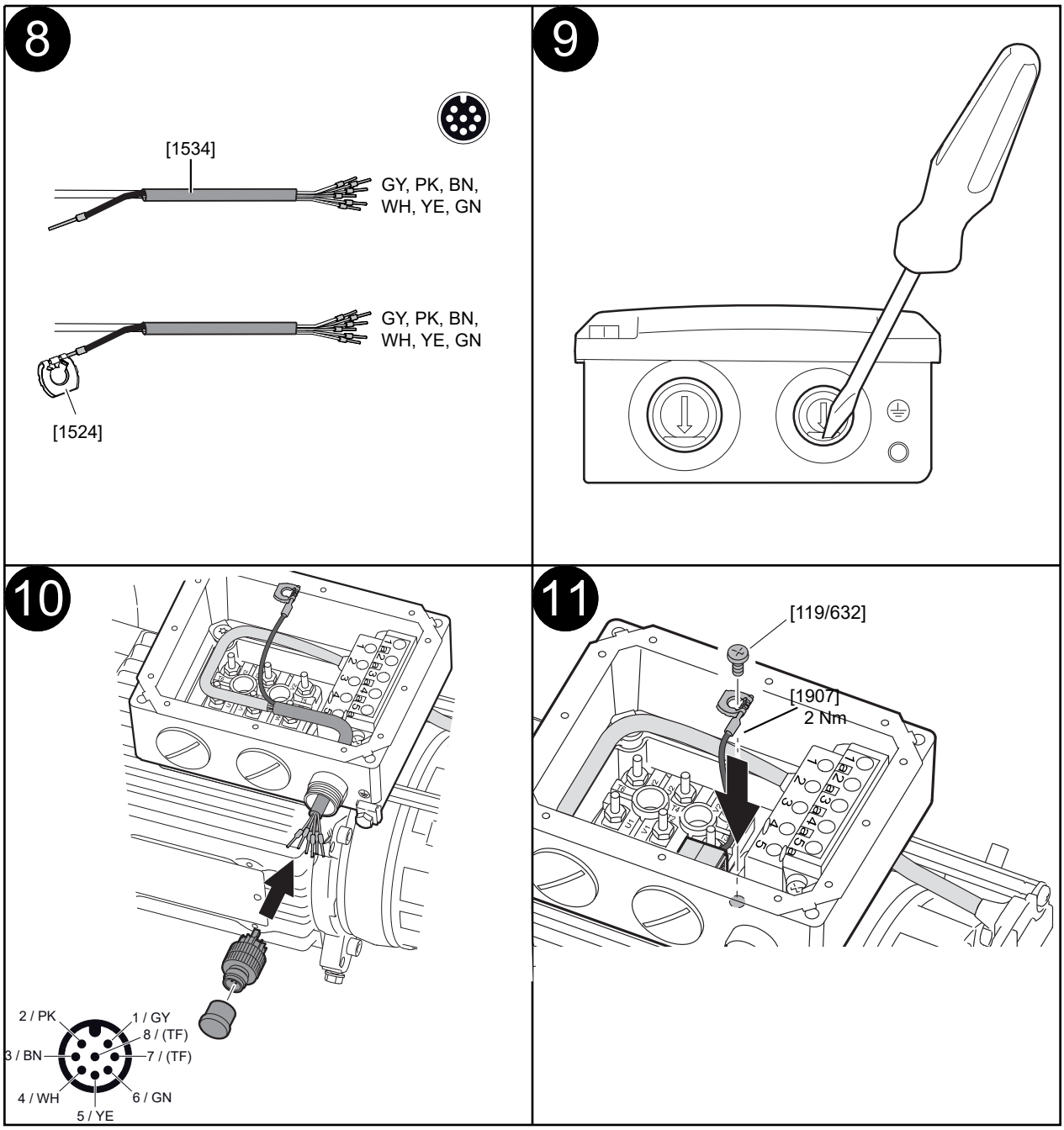
The required small parts are included in the retrofit set.



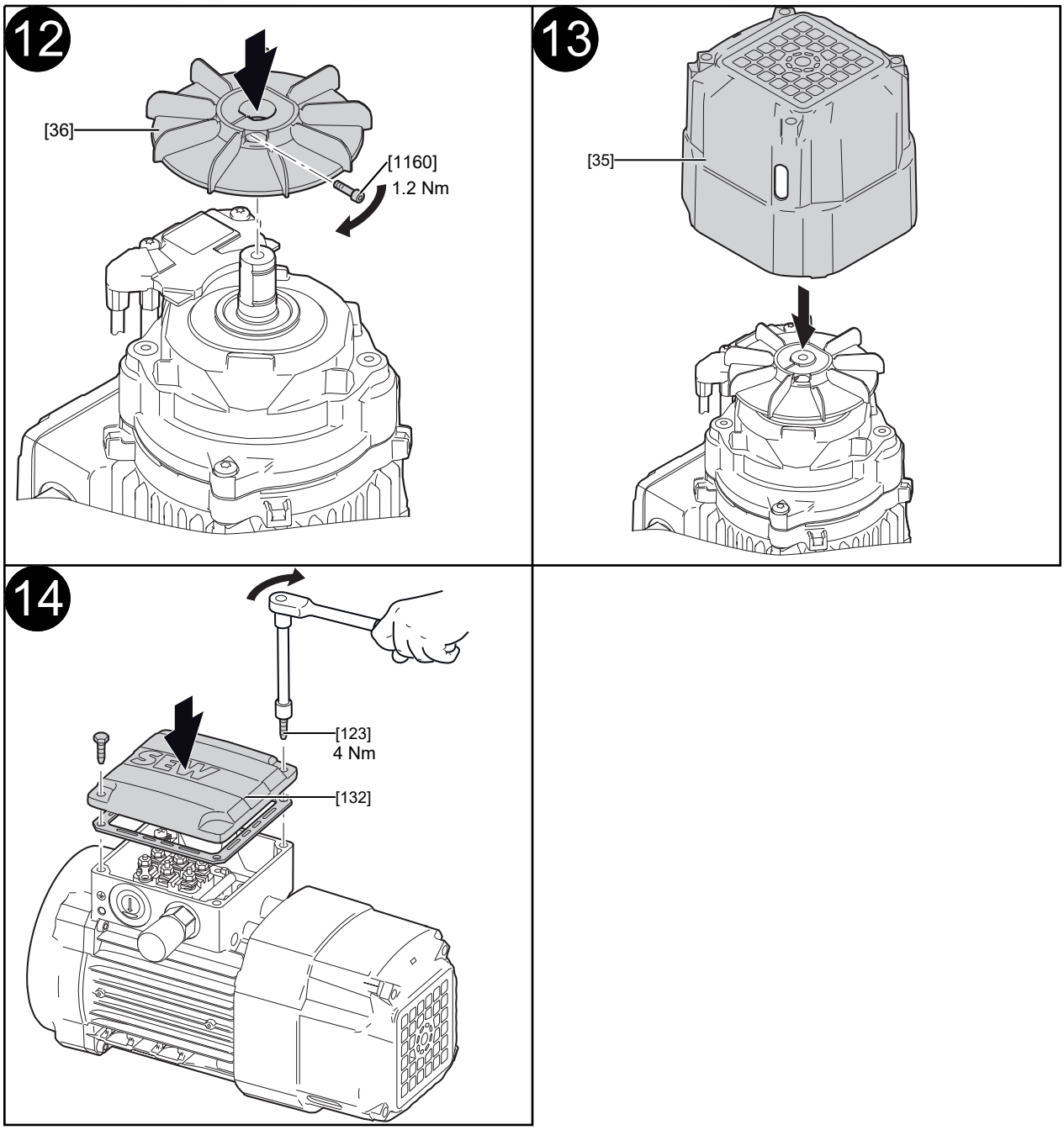
28906902027



9007228162827275



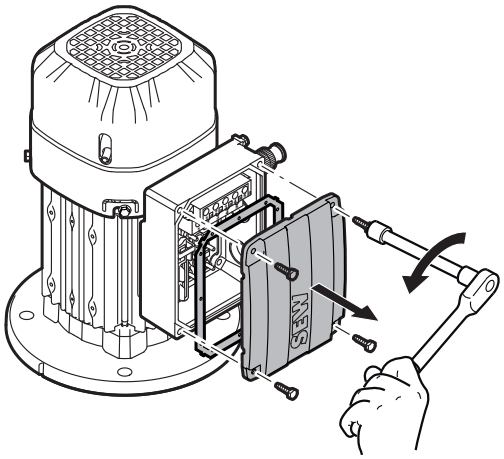
27021626672758539



18014428631220363

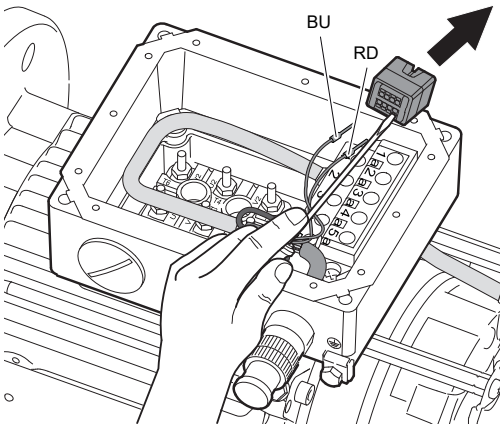
5.4.2 EI7. built-in encoders – DRN../DRU../DR2..71-132S motors

Removing EI7. – DRN../DRU../DR2..71-132S motors



9592975883

- Loosen the screws on the terminal box and remove the terminal box cover.

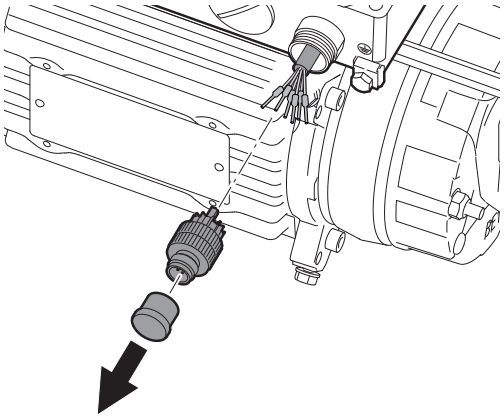


9592952843

If a connection unit with M12 plug connector is used:

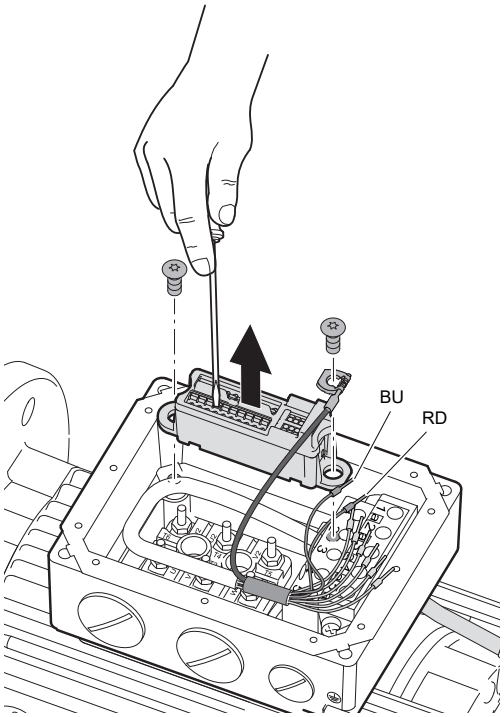
- Disconnect the conductors from the connection unit.

SEW-EURODRIVE recommends using the screwdriver 1205202 from Phoenix



18014408102446347

- Unscrew the M12 plug connector.
- Disconnect the conductors of the encoder cable from the M12 plug connector.

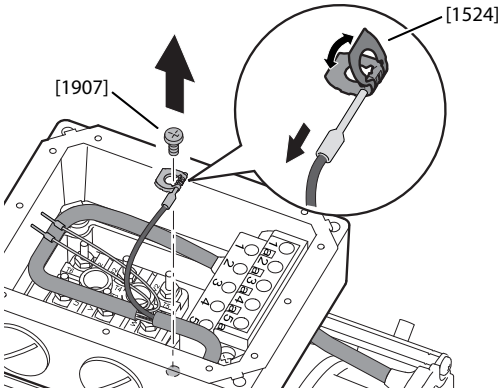


9592970123

If a connection unit without M12 plug connector is used:

- Disconnect the conductors of the encoder cable from the connection unit.

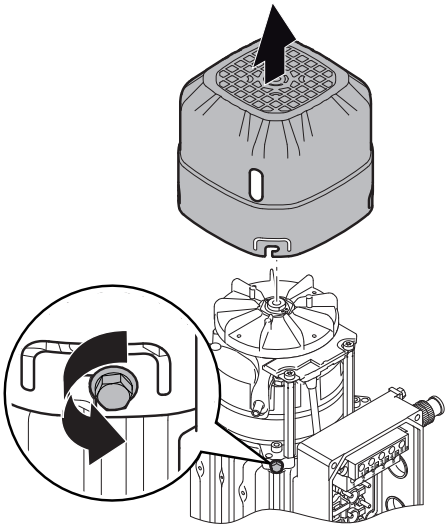
SEW-EURODRIVE recommends using the screwdriver 1205202 from Phoenix



9007208847714955

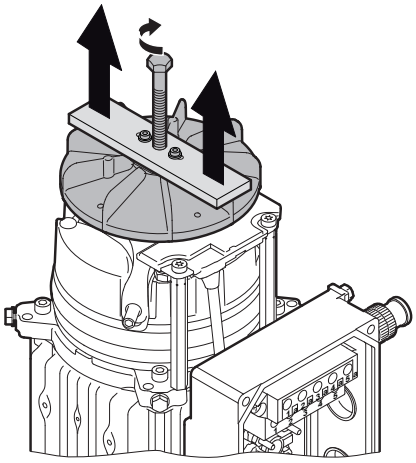
- Loosen the screw for fastening the shielding to the terminal box.
- Bend the terminal washer open and remove the encoder cable shielding together with the conductor end sleeve.
- Dispose of the terminal washer [1524].

31543952/EN – 10/2023



- Loosen the screws on the fan guard and remove the fan guard.

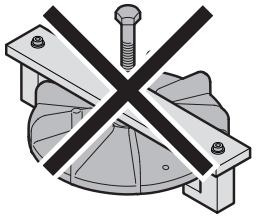
9683088139



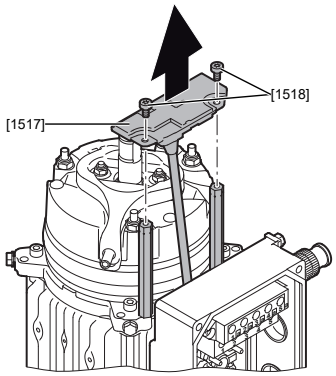
- Apply a puller to the bushing of the plastic fan and remove the plastic fan.

Notice: Applying direct force to the plastic fan can damage it!

9656067723

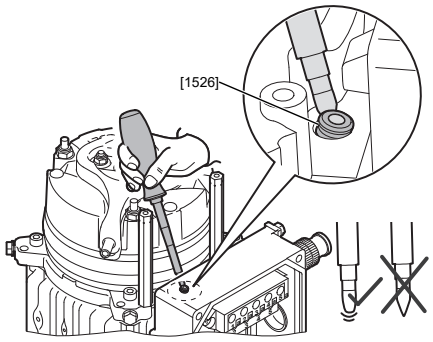


9744815115



30064499851

- Loosen the screws [1518] on the encoder module cover and remove the encoder module.
- Dispose of the screws.



30064502539

- Remove the grommet [1526] from the cable bushing of the terminal box
- Dispose of the grommet.

31543952/EN – 10/2023

Installing EI7. – DRN../DRU../DR2..71-132S motors

Before installation, the grommet [1526] with part number 13637339 must be obtained from SEW-EURODRIVE.

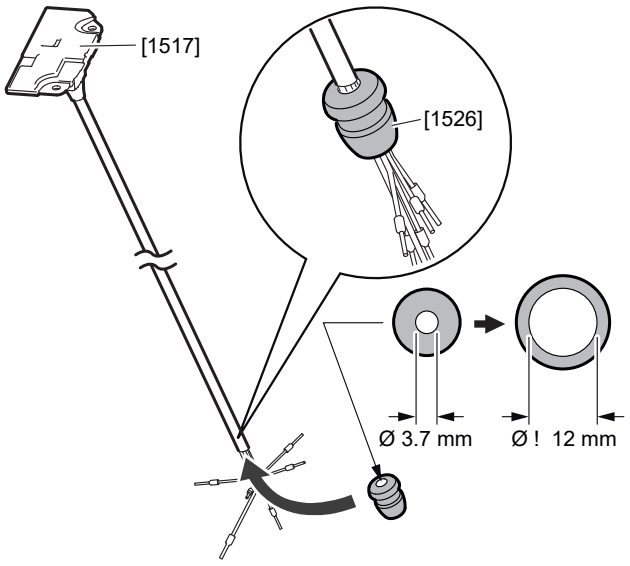
The grommet [1526] is also included in the respective retrofit sets and service kits.

Before installation, the flat-head screws for the brake [1518] with part number 19103387 must be obtained from SEW-EURODRIVE.

The screws [1518] are also included in the respective retrofit sets and service kits.

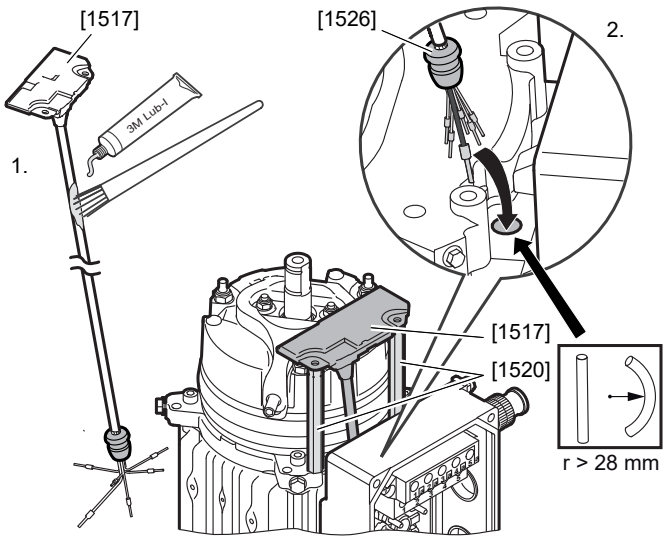
Before installation, a terminal washer [1524] with part number 13262130 must be obtained from SEW-EURODRIVE.

The terminal washer [1524] is also included in the respective retrofit sets and service kits.



9446005259

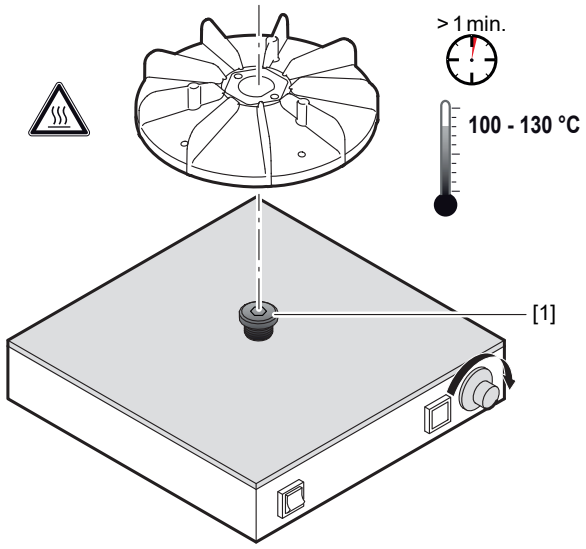
- Push the grommet [1526] onto the cable end of the encoder module [1517]. The inside diameter of the grommet may not exceed the maximum inner diameter of 12 mm.



9592966283

- Coat the cable jacket with wire lubricant, e.g. Lub-I from 3M™. Using a rotating movement, carefully pull the cable through the grommet into the terminal box. While doing so, ensure that the grommet does not inadvertently slide through into the terminal box.

The minimum bending radius of 28 mm must be observed.

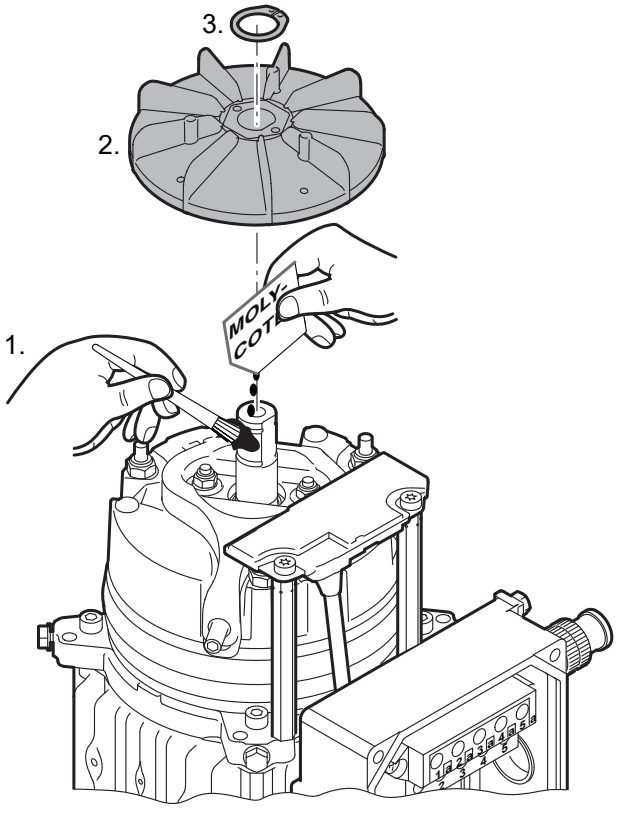


18014407955475723

- Prepare a warming plate.
- Place the bushing of the plastic fan on a warming plate and heat it up to a temperature of 100 to 130 °C.

While doing so, ensure that the plastic fan does not come into direct contact with the warming plate.

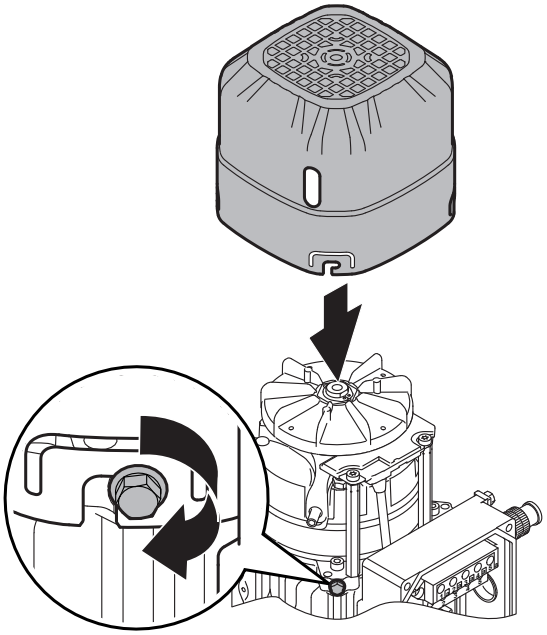
Any thermally conductive component [1] (e.g. a metal ring) can be used as a contact surface.



9007208910802699

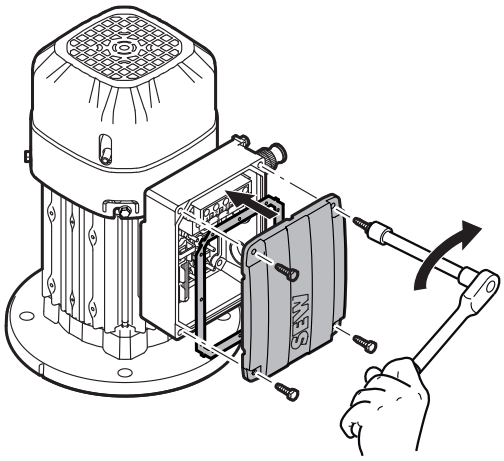
- Apply assembly paste to the shaft/fan seat e.g.: Molykote.
- Install the warmed fan.
- Fasten the fan using a retaining ring.

31543952/EN – 10/2023



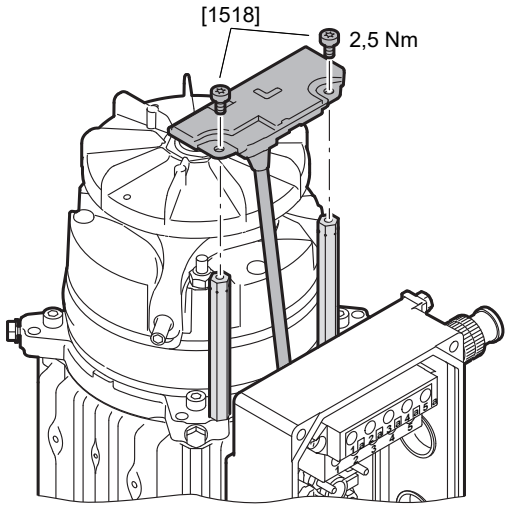
9592956683

- Mount the fan guard and fasten it with screws.
  - Tightening torque for metal fan guard: 3.3 Nm
  - Tightening torque for plastic fan guard: 2 Nm



9592987403

- Mount the terminal box cover and fasten it with screws.
  - Tightening torque: 4 Nm

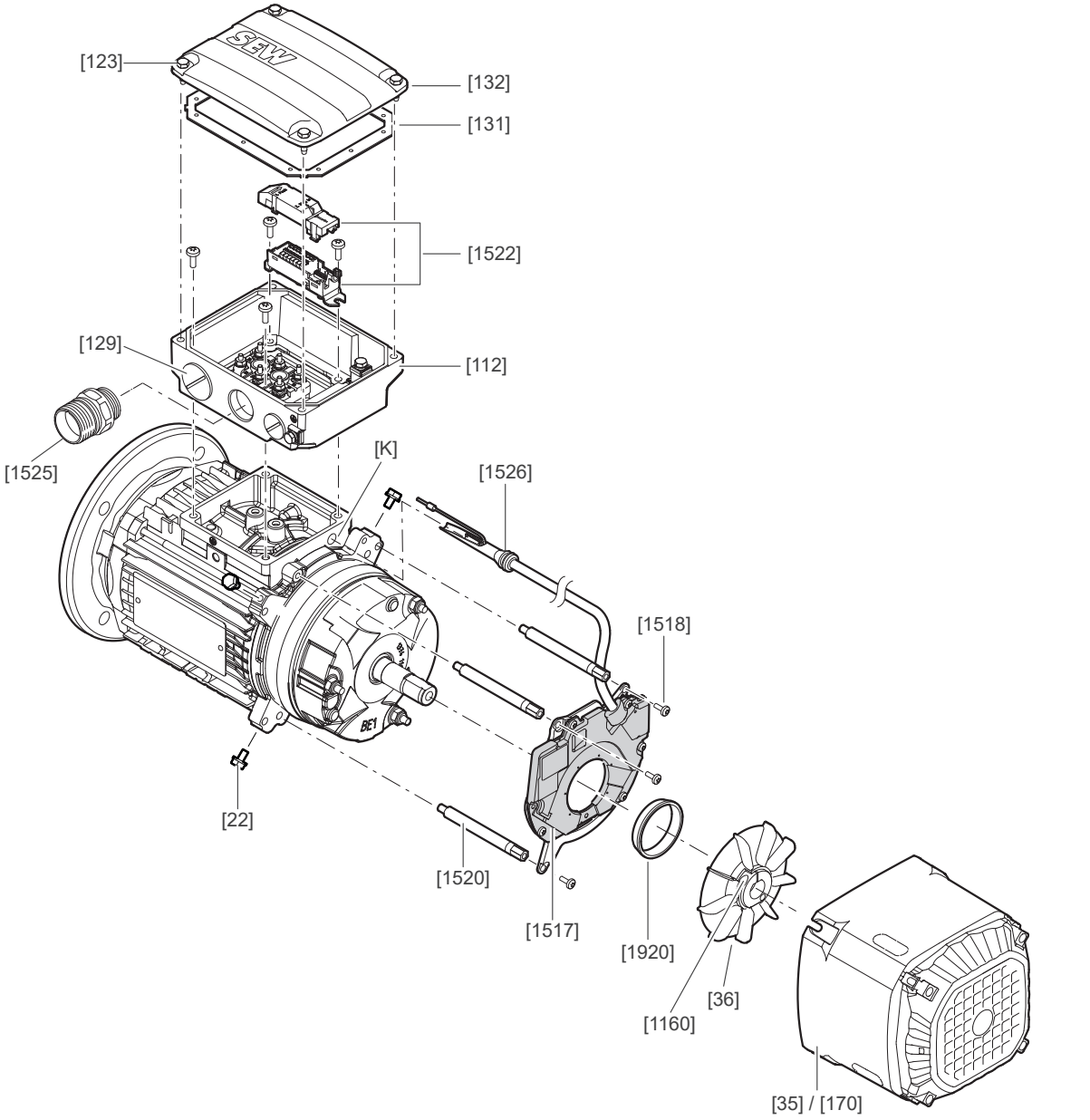


9592979723

- Fasten the encoder module to the spacers using 2 screws [1518].
  - Tightening torque: 2.5 Nm

31543952/EN – 10/2023

5.4.3 EI8. built-in encoders – DRN../DRU../DR2..71 - 132S motors, with connection unit



[22]	Screw	[131]	Gasket for cover	[1522]	Connection unit
[35]	Fan guard	[132]	Terminal box cover	[1525]	M23 plug connector
[36]	Fan, complete	[170]	Forced cooling fan	[1526]	Grommet
[112]	Terminal box lower part	[1160]	Cap screw	[1920]	Centering ring (aid)
[119]	Screw	[1517]	Encoder module	[K]	Knock-out
[123]	Screw	[1518]	Screw		
[129]	Screw plug	[1520]	Hexagonal spacer		

31543952/EN – 10/2023

Removing EI8. – DRN../DRU../DR2..71 - 132S motors, with connection unit

✓ Required resources: Screwdrivers (SW7, SW8, TX20, TX25)

1. Disassemble the forced cooling fan [170] if applicable.
2. Remove the screws [22] to disassemble the fan guard [35].
3. Loosen the radial clamping screw [1160]:
   - ⇨ DR..71 – 100: M3 with cylinder head
   - ⇨ DR..112/132S: M4 with cylinder head
4. Remove the fan [36] with bushing and pole ring from the shaft end.
5. Remove the 3 x M4 screws [1518] of the encoder module [1517].
6. If present, remove the hexagonal spacers [1520] (SW7).
7. Unscrew the screws [123] to remove the terminal box cover [132].
8. Remove the cover of the connection unit [1522] by pressing the cover on both sides behind the cable bushing.
9. Disconnect the 10-pin board connector.
10. Pull the female contact of the encoder cable from the connector.
11. Unscrew the grounding element of the encoder cable.
12. **NOTICE!** Possible defect of the encoder module. Physical damage can occur. Do not pull directly on the encoder module.
    To remove the encoder module [1517] from the motor, pull the encoder cable out of the grommet [1526] and the opening of the knock-out [K].

31543952/EN – 10/2023

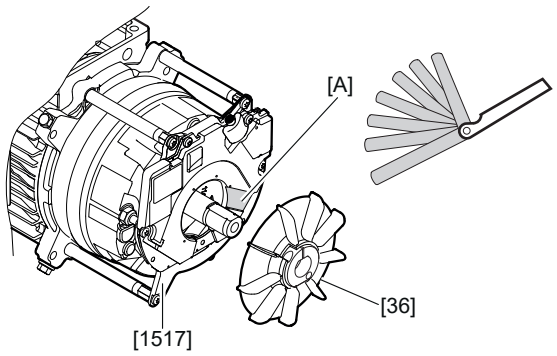
Installing EI8. – DRN../DRU../DR2..71 - 132S motors, with connection unit

Before installation, the centering ring [1920] with part number 22659129 must be obtained from SEW-EURODRIVE.

The centering ring [1920] is also included in the respective retrofit sets and service kits.

✓ Required resources: Feeler gauge (0.9 mm), screwdriver, centering ring [1920]

1. Unscrew the screws [123] to remove the terminal box cover [132].
2. **NOTICE!** Damage to the terminal box or fragments inside the motor. Possible physical damage. Exercise caution when breaking open the knock-out.
   Break open the knock-out [K] by using a chisel or screwdriver.
3. **NOTICE!** Damage to the connector. Possible physical damage. Do not subject the connector to excessive tension.
   Pull the grommet [1526] with encoder cable through the knock-out [K].
   ⇨ The grommet must engage into the opening of the knock-out [K].
4. If necessary, screw the hexagonal spacers [1520] into the brake endshield.
   ⇨ Tightening torque 5 Nm
5. Place the centering ring [1920] onto the pole ring.
6. Push the encoder module [1517] onto the shaft end.
7. Push the fan [36] with bushing and pole ring onto the shaft end.
8. Center the encoder module [1517] with the centering ring [1920] radially to the shaft.
9. Fasten the encoder module [1517] with 3 screws [1518] on the rear endshield or, if applicable, using 3 screws [1518] on the hexagonal spacers [1520] that are fastened to the brake endshield.
   ⇨ Tightening torque 2.5 Nm
10. Remove the fan [36] with bushing and pole ring from the shaft end and remove the centering ring [1920].
11. Push the fan [36] with bushing and pole ring onto the shaft end.
12. To set a clear span of 0.9 mm between the pole ring surface and the base of the notch, insert a 0.9 mm feeler gauge into the notch [A].

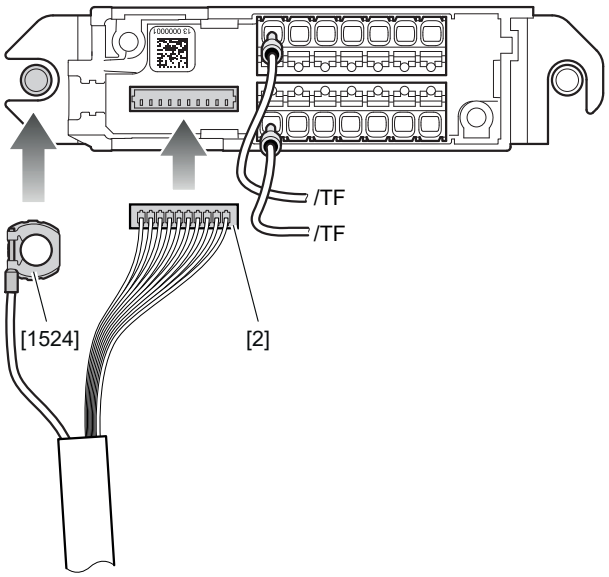


28744408843

13. Tighten the clamping screw [1160].
    ⇨ DR..71 – 100: Tightening torque 1.2 Nm
    ⇨ DR..112 – 132S: Tightening torque 3.3 Nm
14. Route the encoder cable in the terminal box in such a way that it is not crushed or improperly subjected to stress.

31543952/EN – 10/2023

15. Remove the cover of the connection unit [1522] by pressing the cover on both sides behind the cable bushing.
16. Apply the shielding of the encoder cable onto the terminal washer.
17. Place the connection unit [1522] in the terminal box.
18. To secure the connection unit [1522] in place, screw the terminal washer [1524] and the shield plate tightly in the terminal box.
    - ⇨ For gray cast iron terminal boxes: Tightening torque 1.8 Nm
    - ⇨ For aluminum terminal boxes: Tightening torque 5 Nm

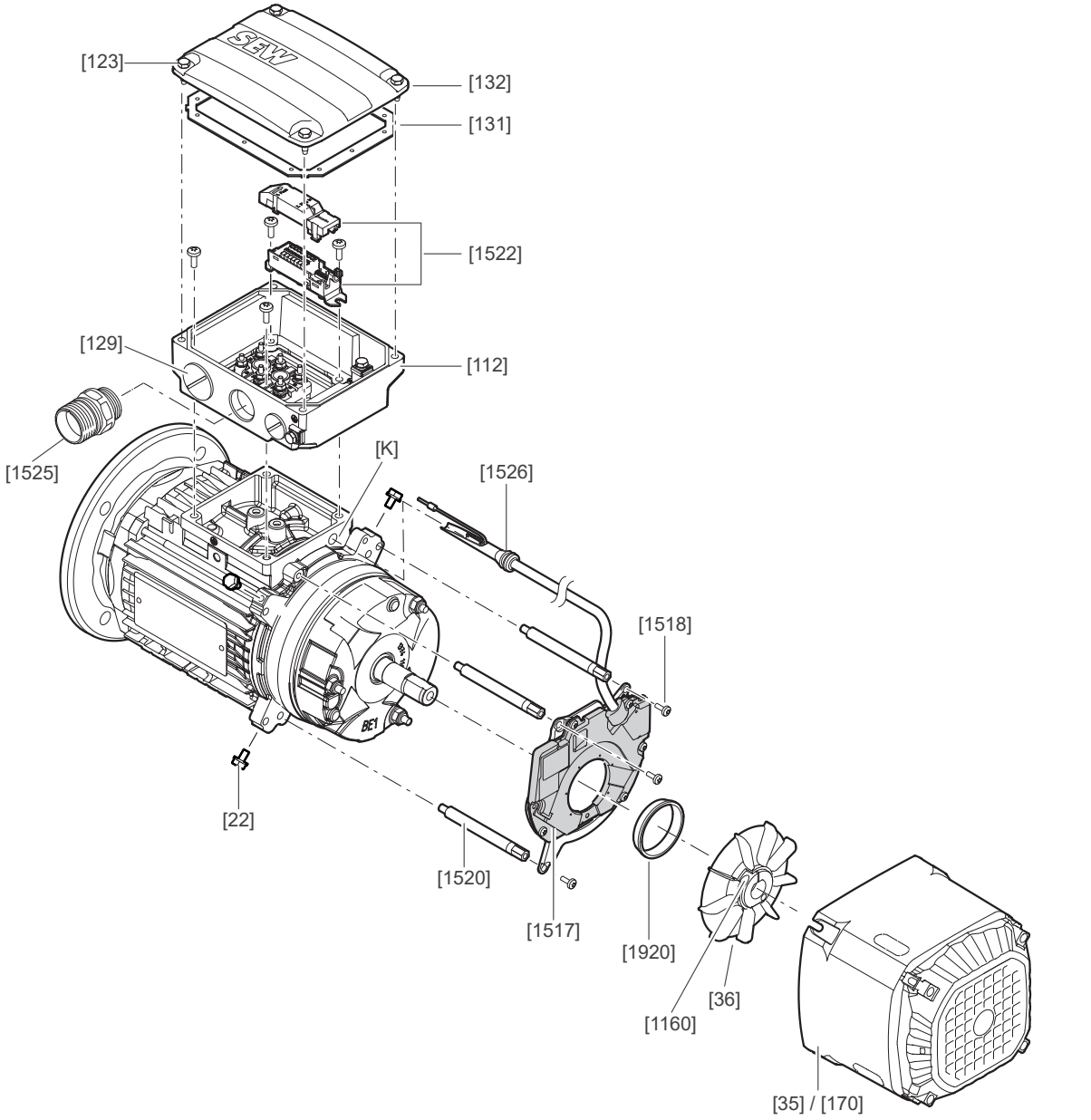


9007228013933835

19. Insert the jack of the encoder cable [2] into the connector on the board and insert the encoder cable into the hollow of the connection unit [1522], which serves as strain relief. If applicable, connect the temperature sensor /TF.
20. Connect the customer's evaluation unit for the encoder to the connection unit [1522] with a shield plate.
21. Connect the supply voltage and the signal cables of the encoder module [1517] to the connection unit [1522].
22. Attach the cover of the connection unit [1522].
23. Check the visual feedback of the status LED for the encoder module [1517].
    - ⇨ LED lights up green: The encoder module [1517] has been installed correctly and you can continue with the assembly process.
    - ⇨ LED lights up red: Switch off the supply voltage. Set the distance of 0.9 mm between the encoder module [1517] and the pole ring again. Switch the supply voltage back on. If the status LED still lights up red, contact the SEW-EURODRIVE Service department.
24. Mount the terminal box cover [132] using the screws [123] (4 × M5 SW8).
    - ⇨ Tightening torque 4 Nm
25. Mount the fan guard [35] with the screws [22].
    - ⇨ For plastic guard: Tightening torque 2 Nm
    - ⇨ For metal guard: Tightening torque 3.3 Nm
26. Mount the forced cooling fan [170] if applicable.

31543952/EN – 10/2023

5.4.4 EI8. built-in encoders – DRN../DRU../DR2..71 - 132S motors, with M23 plug connector



[22]	Screw	[131]	Gasket for cover	[1522]	Connection unit
[35]	Fan guard	[132]	Terminal box cover	[1525]	M23 plug connector
[36]	Fan, complete	[170]	Forced cooling fan	[1526]	Grommet
[112]	Terminal box lower part	[1160]	Cap screw	[1920]	Centering ring (aid)
[119]	Screw	[1517]	Encoder module	[K]	Knock-out
[123]	Screw	[1518]	Screw		
[129]	Screw plug	[1520]	Hexagonal spacer		

31543952/EN – 10/2023

Removing EI8. – DRN../DRU../DR2..71 - 132S motors, with M23 plug connector

✓ Required resources: Screwdriver

1. Disassemble the forced cooling fan [170] if applicable.
2. Remove the screws [22] to disassemble the fan guard [35].
3. Loosen the radial clamping screw [1160]:
   - ⇨ DR..71 – 100: M3 with cylinder head
   - ⇨ DR..112/132S: M4 with cylinder head
4. Remove the fan [36] with bushing and pole ring from the shaft end.
5. Remove the 3 x M4 screws [1518] of the encoder module [1517].
6. If present, remove the hexagonal spacers [1520] (SW7).
7. Unscrew the screws [123] to remove the terminal box cover [132].
8. Remove the protective cover of the M23 plug connector [1525] on the inside of the terminal box.
9. Pull the female contact of the encoder cable from the connector.
10. Remove the grounding element of the encoder.
11. **NOTICE!** Possible defect of the encoder module. Physical damage can occur. Do not pull directly on the encoder module.
    To remove the encoder module [1517] from the motor, pull the encoder cable out of the grommet [1526] and the opening of the knock-out [K].

31543952/EN – 10/2023

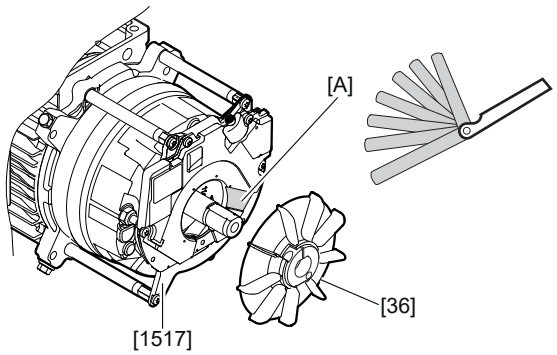
Installing EI8. – DRN../DRU../DR2..71 - 132S motors, with M23 plug connector

Before installation, the centering ring [1920] with part number 22659129 must be obtained from SEW-EURODRIVE.

The centering ring [1920] is also included in the respective retrofit sets and service kits.

✓ Required resources: Feeler gauge (0.9 mm), screwdriver, centering ring [1920]

1. Unscrew the screws [123] to remove the terminal box cover [132].
2. **NOTICE!** Damage to the terminal box or fragments inside the motor. Possible physical damage. Exercise caution when breaking open the knock-out.
   Break open the knock-out [K] by using a chisel or screwdriver.
3. **NOTICE!** Damage to the connector. Possible physical damage. Do not subject the connector to excessive tension.
   Pull the grommet [1526] with encoder cable through the knock-out [K].
   ⇨ The grommet must engage into the opening of the knock-out [K].
4. If necessary, screw the hexagonal spacers [1520] into the brake endshield.
   ⇨ Tightening torque 5 Nm
5. Place the centering ring [1920] onto the pole ring.
6. Push the encoder module [1517] onto the shaft end.
7. Push the fan [36] with bushing and pole ring onto the shaft end.
8. Center the encoder module [1517] with the centering ring [1920] radially to the shaft.
9. Fasten the encoder module [1517] with 3 screws [1518] on the rear endshield or, if applicable, using 3 screws [1518] on the hexagonal spacers [1520] that are fastened to the brake endshield.
   ⇨ Tightening torque 2.5 Nm
10. Remove the fan [36] with bushing and pole ring from the shaft end and remove the centering ring [1920].
11. Push the fan [36] with bushing and pole ring onto the shaft end.
12. To set a clear span of 0.9 mm between the pole ring surface and the base of the notch, insert a 0.9 mm feeler gauge into the notch [A].

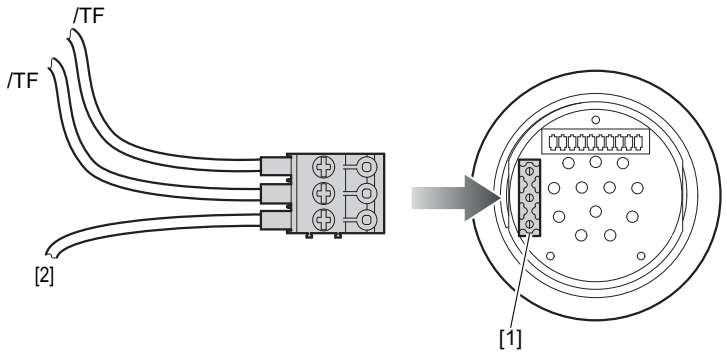


28744408843

13. Tighten the clamping screw [1160].
    ⇨ DR..71 – 100: Tightening torque 1.2 Nm
    ⇨ DR..112 – 132S: Tightening torque 3.3 Nm
14. Route the encoder cable in the terminal box in such a way that it is not crushed or improperly subjected to stress.

31543952/EN – 10/2023

15. Remove the protective cover of the M23 plug connector [1525] on the inside of the terminal box.
16. Insert the jack of the encoder cable into the connector on the board.
17. Connect the shielding of the encoder cable [2] and, if applicable, the temperature sensor /TF to the screw terminal.



9007228013937419

18. Insert the screw terminal with the connection side facing outwards into the plug connector [1] on the printed circuit board.
19. Install the protective cover of the M23 plug connector [1525] on the inside of the terminal box.
20. Connect the supply voltage and the signal cables of the encoder module [1517] to the connection unit [1522].
21. Check the visual feedback of the status LED for the encoder module [1517].
    - ⇨ LED lights up green: The encoder module [1517] has been installed correctly and you can continue with the assembly process.
    - ⇨ LED lights up red: Switch off the supply voltage. Set the distance of 0.9 mm between the encoder module [1517] and the pole ring again. Switch the supply voltage back on. If the status LED still lights up red, contact the SEW-EURODRIVE Service department.
22. Mount the terminal box cover [132] using the screws [123] (4 × M5 SW8).
    - ⇨ Tightening torque 4 Nm
23. Mount the fan guard [35] with the screws [22].
    - ⇨ For plastic guard: Tightening torque 2 Nm
    - ⇨ For metal guard: Tightening torque 3.3 Nm
24. Mount the forced cooling fan [170] if applicable.

31543952/EN – 10/2023

5.5 Removing/installing conical encoders

The integrated encoder plug connector (parts [U] and [619]) can be turned ± 180 degrees in steps of 90° to allow for a variable cable outlet of the connection cover [619]. To align, loosen the screws D in the lower part C.

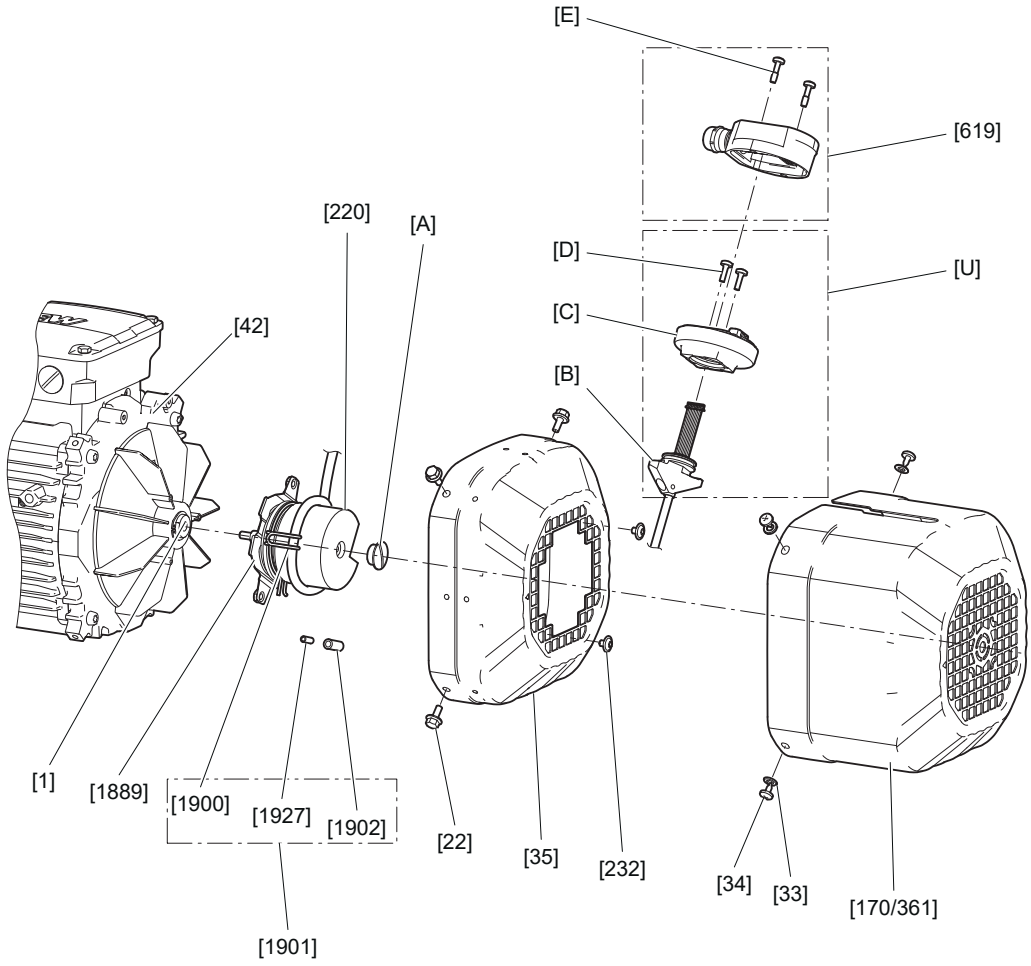
In addition, the encoder cover [361] can be turned 360 degrees in steps of 90° for many motor configurations to allow for a variable connection side of the integrated encoder plug connector (parts [U] and [619]). Loosen the screws [34] and the washers [33]. The ability to turn parts can be restricted by the following design features of the motor:

- Size
- Position of the manual brake release
- Certain gear unit combinations
- Dimensions of the feet of the motor
- Connection technology of the motor (e.g. plug connectors)
- Combination with a forced cooling fan
- Applicative limits of the system

31543952/EN – 10/2023

5.5.1 EK8./AK8./RK8M conical encoders – (E)DRN../DRU../DR2..71 - 355 motors

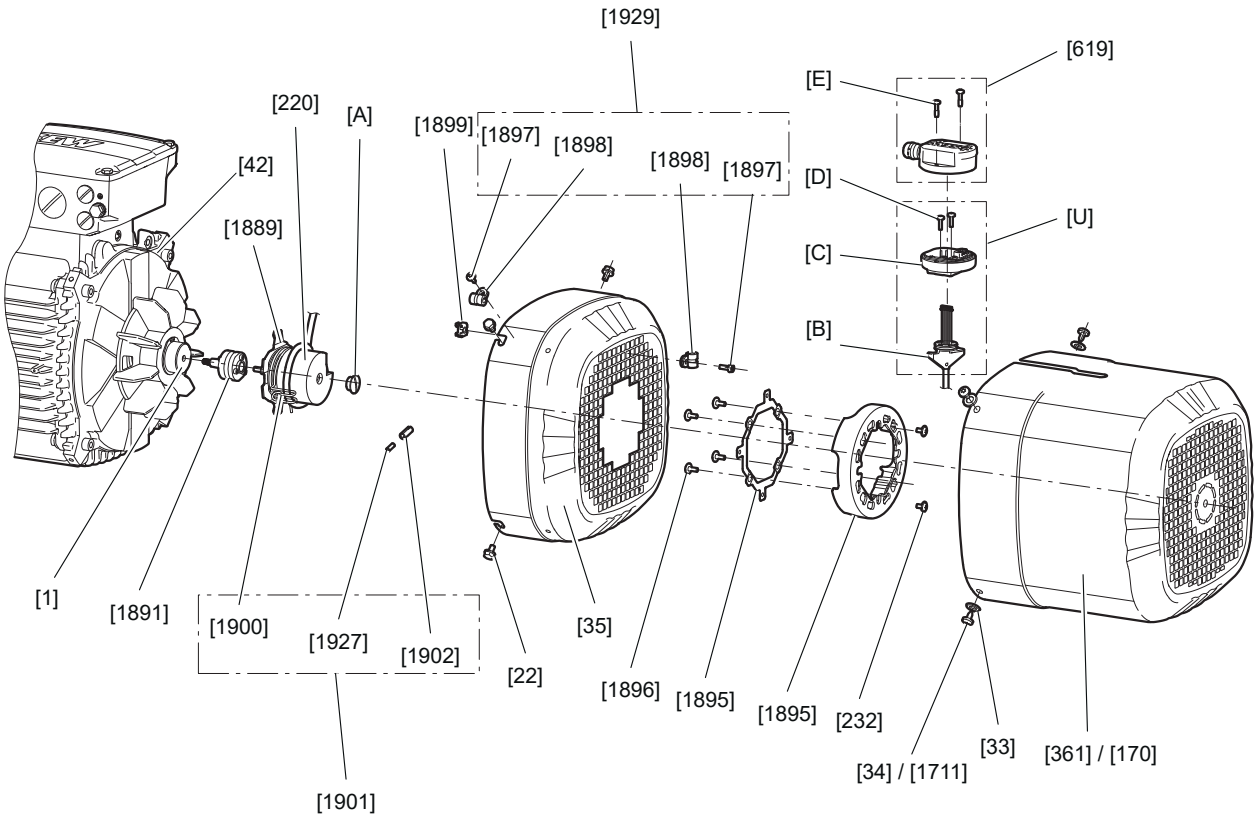
Structure of .K8. conical encoder - (E)DRN../DRU../DR2..71 - 132S motors with integrated A1GA encoder plug connector with connection cover or A2GA without connection cover



18014427029025803

[1]	Rotor	[U]	Connection adapter
[22]	Screw (hexagonal)	[1889]	Torque bracket
[33]	Washer	[1900]	Cable retainer
[34]	Screw (cross recess)	[1901]	Accessory bag
[35]	Fan guard	[1902]	Threaded sleeve
[42]	B-side endshield	[1927]	Set screw
[170]	Forced cooling fan	[A]	Screw plug
[220]	Encoder	[B]	T-slot nut
[232]	Screw (hexalobular)	[C]	Lower part
[361]	Safety cover	[D]	Screw
[619]	Connection cover	[E]	Screw

Structure of .K8. conical encoder - (E)DRN../DRU../DR2..132M - 315 motors with integrated A1GA encoder plug connector with connection cover or A2GA without connection cover

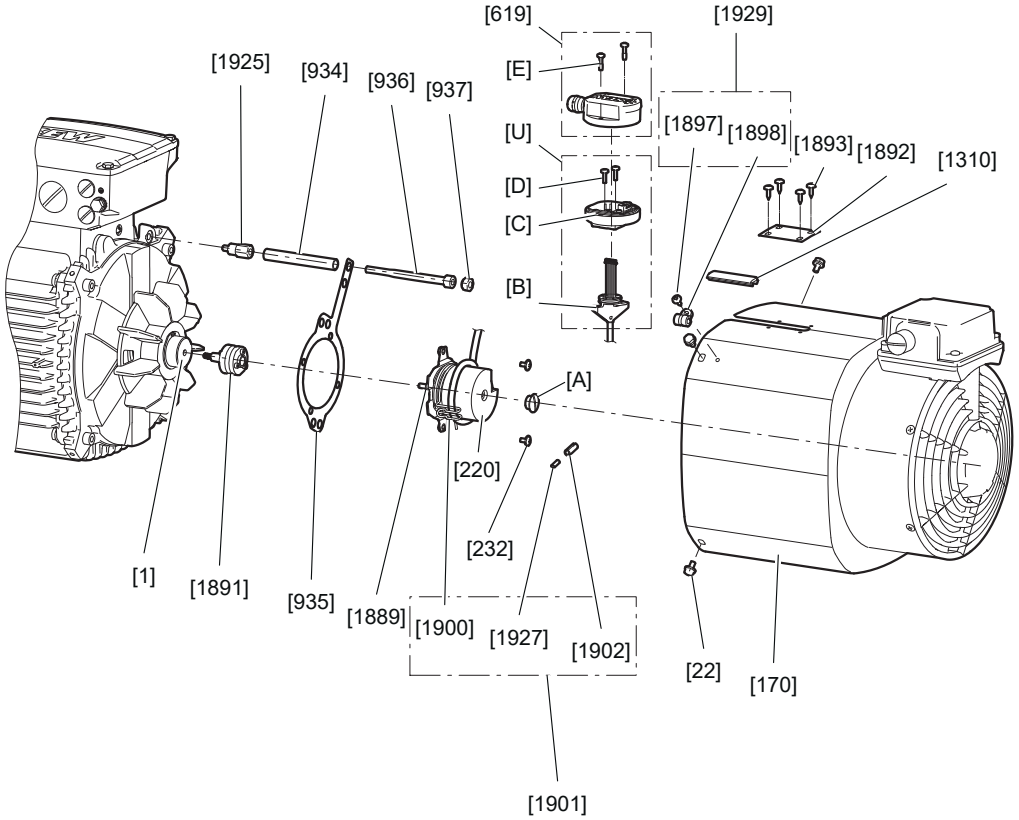


27021626298396683

[1]	Rotor	[1896]	Screw (hexalobular)
[22]	Screw (hexagonal)	[1897]	Screw (hexagon socket)
[33]	Washer	[1898]	Clamp
[34]	Screw (cross recess)	[1899]	Cage nut
[35]	Fan guard	[1900]	Cable retainer
[42]	B-side endshield	[1901]	Accessory bag
[170]	Forced cooling fan	[1902]	Threaded sleeve
[220]	Encoder	[1927]	Set screw
[232]	Screw (hexalobular)	[1929]	Accessory bag
[361]	Safety cover		
[619]	Connection cover	[A]	Screw plug
[U]	Connection adapter	[B]	T-slot nut
[1711]	Screw (hexagonal)	[C]	Lower part
[1889]	Torque bracket	[D]	Screw
[1891]	Insulation coupling	[E]	Screw
[1895]	Support ring/spacer ring		

31543952/EN – 10/2023

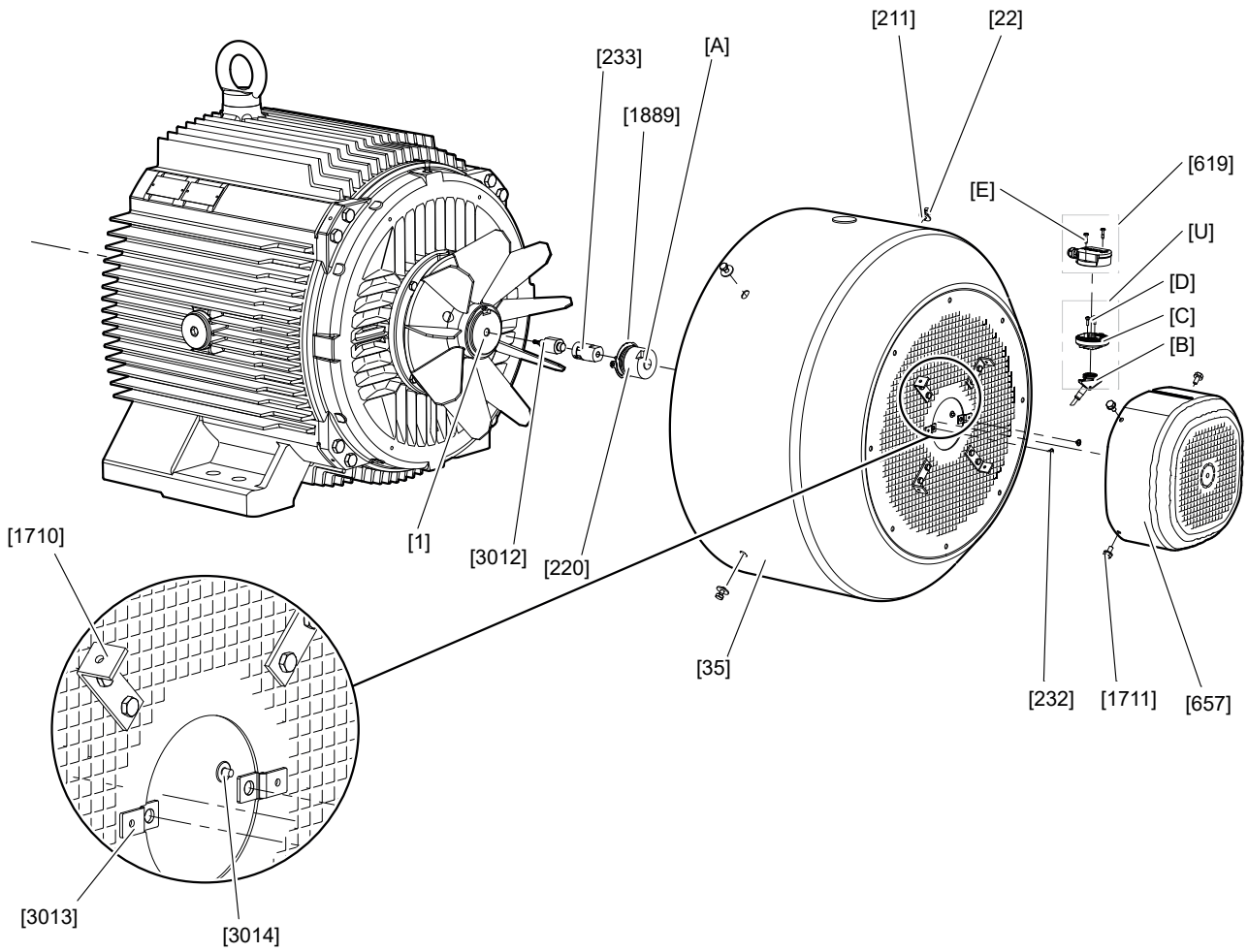
Structure of .K8. conical encoder - (E)DRN../DRU../DR2..132M - 355 motors with forced cooling fan and integrated A1GA encoder plug connector with connection cover or A2GA without connection cover



36028825563057675

[1]	Rotor
[22]	Screw (hexagonal)
[33]	Washer
[34]	Screw (cross recess)
[170]	Forced cooling fan
[220]	Encoder
[232]	Screw (hexalobular)
[361]	Safety cover
[619]	Connection cover
[934]	Spacer bushing
[935]	Torque bracket
[936]	Cap screw
[937]	Hex nut
[1310]	Sealing profile
[1889]	Torque bracket
[1891]	Insulation coupling
[1892]	Support plate
[1893]	Screw (cross recess)
[1897]	Screw (hexagon socket)
[1898]	Clamp
[1900]	Cable retainer
[1901]	Accessory bag
[1902]	Threaded sleeve
[1925]	Spacer bolt
[1927]	Set screw
[1929]	Accessory bag
[A]	Screw plug
[B]	T-slot nut
[C]	Lower part
[D]	Screw
[E]	Screw
[U]	Connection adapter

Structure of .K8. conical encoder - DRN 355 motors with integrated A1GA encoder plug connector with connection cover or A2GA without connection cover



9007232638950155

[1]	Rotor	[1889]	Torque bracket
[22]	Screw (hexagonal)	[1902]	Threaded sleeve
[35]	Fan guard	[1927]	Set screw
[211]	Washer	[3012]	Bolt
[220]	Encoder	[3013]	Fastening plate
[232]	Screw (hexalobular)	[3014]	Round-head screw
[233]	Coupling		
[619]	Connection cover	[A]	Screw plug
[657]	Safety cover	[B]	T-slot nut
[U]	Connection adapter	[C]	Lower part
[1710]	Angle bracket	[D]	Screw
[1711]	Screw (hexagonal)	[E]	Screw

31543952/EN – 10/2023

Disassembling EK8./AK8./RK8M – Add-on encoder set with integrated A1GA encoder plug connector with connection cover or without A2GA connection cover

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [U].
3. Loosen the screws [D] in the lower part [C].
   ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [U] can be moved in the recess of the safety cover [657]/forced cooling fan [170].
4. With forced cooling fan: Unscrew the screws [22].
5. Without forced cooling fan: Unscrew the screws [34]/[1711].
6. Remove the safety cover [361]/[657] or the forced cooling fan [170] from the motor. When doing this, slide the connection adapter [U] out of the recess.
7. With forced cooling fan: Remove the signal cable from the slot/3 wings of the cable retainer [1900].
8. Unscrew the screws [232].
9. Remove the fan guard [35] over the encoder [220]. Guide the connection adapter [U] with the signal cable through the cutout of the fan guard [35].
10. For size 132M - 355 with forced cooling fan: Remove the screw [936], the nuts [734]/[937], the spacer bushing [934], and the torque bracket [935].

NOTICE

In the case of encoders RK8M, EK8W, AK8H, and AK8W on DR2C motors, loosening the central retaining screw [A] of the encoder [220] or loosening the insulation coupling [1891] of the motor or encoder shaft desynchronizes the encoder and motor rotor.

Higher motor losses and lower torques.

- Perform a new adjustment.

11. Unscrew the screw plug [A] of the encoder [220].
12. Loosen the central retaining screw of the encoder [220]. Use a tool that is at least 45 mm long for this.
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
13. Loosen the cone connection.
    ⇨ Encoder EK8., AK8W, AK8Y, RK8M: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the conical connection, screw an M6 screw (≥ 70 mm long) into the bore.
14. Remove the encoder [220] from the rotor [1] or from the coupling [233]/[1891].

31543952/EN – 10/2023

Assembling EK8./AK8./RK8M – Add-on encoder set with integrated A1GA encoder plug connector with connection cover or without A2GA connection cover

1. For size 355: Connect the two halves of the coupling [233] by plugging them together using the coupling star. The coupling [233] must be firmly connected. Make sure that the encoder is centered [220].
2. For size 71 – 315: Clean the cone of the encoder [220].
3. For size 355: Clean the cone of the encoder [220] and the coupling [233].
4. Remove the screw plug [A] of the encoder.
5. For size 355: Place the coupling [233] onto the bolt [3012]. Tighten the retaining screw at the clamping hub on the motor side to fasten the coupling.
   ⇨ Tightening torque 3.3 Nm
6. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/ [1891].
7. To secure the encoder [220] in place, tighten the central retaining screw. Use a tool that is at least 45 mm long for this.
   ⇨ Counter-tighten the spanner flat SW27 of the coupling and SW10 of the encoder shaft.
   ⇨ Tightening torque 3.3 Nm
   ⇨ For safety encoders: Tightening torque 3.3 Nm ± 8%

NOTICE

For encoders RK8M, EK8W and AK8W on DR2C motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 🗎 132) and "Additional work for EK8W, AK8H and AK8W encoders on the DR2C.. motor" (→ 🗎 136)

Failure to calibrate results in greater motor losses and reduced torque. In the worst-case scenario, the motor will not run.

8. To seal the encoder [220], screw in the screw plug [A].
   ⇨ Tightening torque 1.8 Nm
9. For size 355 with forced cooling fan: Mount the spacer bolts [934].
10. For size 132M - 355 with forced cooling fan: Guide the torque bracket [935] over the connection adapter [U] and the encoder [220].
11. For size 132M - 355 with forced cooling fan: When mounting the torque bracket [935], make sure it is aligned centrally to the encoder [220]. Screw in the screw [936] with the spacer bushings [934].
    ⇨ Tightening torque 12 Nm
12. For size 132M - 355 with forced cooling fan: Screw the torque bracket of the encoder [1889] with the screws [232] through the bores of the torque bracket [935].
    ⇨ Tightening torque 3.3 Nm
13. For size 71 - 355 without forced cooling fan: Mount the fan guard [35] over the encoder [220] with the screws [22]. When doing this, guide the connection adapter [U] with the signal cable through the central grille cutout of the fan guard [35].
    ⇨ For size 71 – 132S: Tightening torque 3.3 Nm
    ⇨ For size 132M/L: Tightening torque 11 Nm
    ⇨ For size 160 – 355: Tightening torque 27 Nm

31543952/EN – 10/2023

14. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
15. For size 71 – 132S: Screw the screws [232] through the grille of the fan guard [35] and into the nuts of the torque bracket [1889].
    ⇨ Tightening torque 3.3 Nm
16. For size 132M – 355 without forced cooling fan: Screw the screws [232] through the grille of the fan guard [35] or the central opening of the support ring [1895] and into the nuts of the torque bracket [1889].
    ⇨ Tightening torque 3.3 Nm
    ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%
17. For size 132M - 355 with forced cooling fan: Screw the screws [232] through the torque bracket [935] and into the nuts of the torque bracket of the encoder [1889].
    ⇨ If you need to turn the encoder [220] in order for the screws to reach the nuts of the torque arm, turn the encoder [220] clockwise.
    ⇨ Make sure the signal cable is of a sufficient length so that the connection adapter [U] can be inserted into the recess of the safety cover [361]/[657] of the forced cooling fan [170].
    ⇨ Tightening torque 3.3 Nm
    ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%
18. Before you install the safety cover [361]/[657] or the forced cooling fan [170], slide the connection adapter [U] into the recess.
19. For size 71 - 280 without forced cooling fan: Place the safety cover [361] onto the fan guard [35].
20. For size 315 – 355: Place the safety cover [657] onto the metal brackets [1710].
21. For size 315 – 355: Secure the safety cover [657] in place by using the screws [1711].
    ⇨ Tightening torque 12 Nm
22. With forced cooling fan: Place the forced cooling fan [170] onto the screws [22].
23. Slide the connection adapter [U] into the recess of the safety cover [361] or the forced cooling fan [170] up to the stop. The standard alignment of the recess points towards the terminal box.
    ⇨ The arrow that is cast in the lower part [C] of the connection adapter [U] indicates the direction of the subsequent cable outlet for the connection cover [619].
    ⇨ If you wish to change the direction of the cable outlet: Unscrew the screws [D]. Twist the lower part [C] against the T-slot nut [B]. Screw in the screws [D]. When doing so, only tighten the screws [D] lightly.
24. With forced cooling fan: Secure the forced cooling fan [170] with the screws [22].
    ⇨ For size 71 – 132S: Tightening torque 3.3 Nm
    ⇨ For size 132M/L: Tightening torque 11 Nm
    ⇨ For size 160 – 355: Tightening torque 27 Nm
25. For size 71 – 132S with forced cooling fan: Additionally secure the forced cooling fan [170] in place by using the screws [34] and washers [33].
    ⇨ Tightening torque 2 Nm

31543952/EN – 10/2023

26. Without forced cooling fan: Secure the safety cover [361] in place by using the screws [34] and washers [33].
    - ⇨ For size 71 – 132S: Tightening torque 2 Nm
    - ⇨ For size 132M – 280: Tightening torque 3.5 Nm
27. Turn the connection adapter [U] clockwise up to the stop.
28. Secure the connection adapter [U] in place by tightening the screws [D].
    - ⇨ Tightening torque 2 Nm
    - ⇨ For safety encoders: Tightening torque 2 Nm ± 10%
29. Place the connection cover [619] onto the connection adapter [U].
30. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
31. Screw the screws [E] through the bores in the connection cover [619] and into the bores in the connection adapter [U].
    - ⇨ Tightening torque 2.25 Nm

31543952/EN – 10/2023

Disassembling EK8./AK8./RK8M – A1GA/A2GA axial add-on encoder set (installation on rear of fan guard)

1. Unscrew the screws [E].
2. Remove the connection cover [619] from the connection adapter [U].
3. Unscrew the screws [3169].
4. For size 71 – 280: Unscrew the screws [34].
5. For size 315 – 355: Unscrew the screws [1711].
6. For size 71 – 280: Remove the safety cover [361] from the fan guard [35].
7. For size 315 – 355: Remove the safety cover [657] from the fan guard [35].
8. Guide the connection adapter [U] mounted on the support plate [3167] through the opening in the grille of the safety cover [361]/[657].
9. Loosen the screws [D] in the lower part [C].
   ⇨ Only unscrew the screws [D] to such an extent that the connection adapter [U] can be moved in the recess of the support plate [3167].
10. When doing this, slide the connection adapter [U] out of the recess of the support plate [3167].
11. Remove the screws [22].
12. Unscrew the screws [232].
13. Remove the fan guard [35] over the encoder [220].
    ⇨ Guide the connection adapter [U] with the signal cable through the cutout of the fan guard [35].

NOTICE

In the case of encoders RK8M, EK8W, AK8H, and AK8W on DR2C motors, loosening the central retaining screw [A] of the encoder [220] or loosening the insulation coupling [1891] of the motor or encoder shaft desynchronizes the encoder and motor rotor.

Higher motor losses and lower torques.

- Perform a new adjustment.

14. Unscrew the screw plug [A] of the encoder [220].
15. Loosen the central retaining screw of the encoder [220]. Use a tool that is at least 45 mm long for this.
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
16. Loosen the cone connection.
    ⇨ Encoder EK8., AK8W, AK8Y, RK8M: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the conical connection, screw an M6 screw (≥ 70 mm long) into the bore.
17. Remove the encoder [220] from the rotor [1] or from the coupling [233]/[1891].

31543952/EN – 10/2023

Assembling EK8./AK8./RK8M – A1GA/A2GA axial add-on encoder set (installation on rear of fan guard)

1. For size 355: Connect the two halves of the coupling [233] by plugging them together using the coupling star. The coupling [233] must be firmly connected. Make sure that the encoder is centered [220].
2. For size 71 – 315: Clean the cone of the encoder [220].
3. For size 355: Clean the cone of the encoder [220] and the coupling [233].
4. Remove the screw plug [A] of the encoder.
5. For size 355: Place the coupling [233] onto the bolt [3012]. Tighten the retaining screw at the clamping hub on the motor side to fasten the coupling.
   ⇨ Tightening torque 3.3 Nm
6. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/[1891].
7. To secure the encoder [220] in place, tighten the central retaining screw. Use a tool that is at least 45 mm long for this.
   ⇨ Counter-tighten the spanner flat SW27 of the coupling and SW10 of the encoder shaft.
   ⇨ Tightening torque 3.3 Nm
   ⇨ For safety encoders: Tightening torque 3.3 Nm ± 8%

NOTICE

For encoders RK8M, EK8W and AK8W on DR2C motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 🗎 132) and "Additional work for EK8W, AK8H and AK8W encoders on the DR2C.. motor" (→ 🗎 136)

Failure to calibrate results in greater motor losses and reduced torque. In the worst-case scenario, the motor will not run.

8. To seal the encoder [220], screw in the screw plug [A].
   ⇨ Tightening torque 1.8 Nm
9. For size 71 – 355: Mount the fan guard [35] over the encoder [220]. When doing this, guide the connection adapter [U] with the signal cable through the central grille cutout of the fan guard [35]/the central opening of the support ring [1895].
10. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
11. For size 71 – 355: Screw the screws [232] through the grille of the fan guard [35] or the central opening of the support ring [1895] and into the nuts of the torque bracket [1889].
    ⇨ If you need to turn the encoder [220] in order for the screws to reach the nuts of the torque arm, turn the encoder [220] clockwise.
    ⇨ Tightening torque 3.3 Nm
    ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%
12. Screw the fan guard [35] firmly in place with the screws [22].

31543952/EN – 10/2023

13. Insert the connection adapter [U] into the recess of the support plate [3167].
    - ⇨ Turn the connection adapter [U] until the 4 rectangular ridges are on the fastening side of the connection adapter [U] in the designated recesses of the support plate [3167].
    - ⇨ Tighten the screws [D] in the connection adapter [U] and thereby fasten the support plate [3167] onto the connection adapter [U].
    - ⇨ Tightening torque 2 Nm
14. Mount the safety cover [361]/[657] over the encoder [220].
    - ⇨ Guide the connection adapter [U] through the central grille cutout of the safety cover [361]/[657].
    - ⇨ Screw the screws [3169] through the grille of the safety cover [361] or the support ring [3168] and into the thread of the support plate [3167].
    - ⇨ Tightening torque 3.3 Nm
15. For size 71 – 280: Place the safety cover [361] onto the fan guard [35].
16. For size 315 – 355: Place the safety cover [657] onto the metal brackets [1710].
17. Secure the safety cover [361]/[657] in place by using the screws [34]/[1711].
    - ⇨ For size 71 – 132S: Tightening torque 2 Nm
    - ⇨ For size 132M – 280: Tightening torque 3.5 Nm
    - ⇨ For size 315 – 355: Tightening torque 12 Nm
18. Place the connection cover [619] onto the connection adapter [U].
19. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
20. Screw the screws [E] through the bores in the connection cover [619] and into the bores in the connection adapter [U].
    - ⇨ Tightening torque 2.25 Nm

31543952/EN – 10/2023

Disassembling EK8./AK8./RK8M – Add-on encoder set with M23 plug connector directly on KIGA encoder

1. For size 71 – 132S with forced cooling fan: Remove the screw [22].
2. For size 71 – 132S with forced cooling fan: Remove the screws [34] and the washers [33].
3. For size 132M - 355 with forced cooling fan: Remove the screw [22].
4. Without forced cooling fan: Remove the screws [34]/[1711].
5. Remove the safety cover [361]/[657] or the forced cooling fan [170] from the motor. When doing this, slide the cable grommet [269] out of the recess.
6. With forced cooling fan: Remove the signal cable from the cable retainer [1900].
7. Unscrew the screws [232].
8. Without forced cooling fan: Remove the screws [22].
9. Remove the fan guard [35] over the encoder [220]. Guide the M23 connector [U] with the signal cable through the cutout of the fan guard [35].
10. For size 132M - 355 with forced cooling fan: Remove the screw [936] or the nut [734], the spacer bushing [934] and the torque bracket [935].

NOTICE

In the case of encoders RK8M, EK8W, AK8H, and AK8W on DR2C motors, loosening the central retaining screw [A] of the encoder [220] or loosening the insulation coupling [1891] of the motor or encoder shaft desynchronizes the encoder and motor rotor.

Higher motor losses and lower torques.

- Perform a new adjustment.

11. Unscrew the screw plug [A] of the encoder [220].
12. Loosen the central retaining screw of the encoder [220]. Use a tool that is at least 45 mm long for this.
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
13. Loosen the cone connection.
    ⇨ Encoder EK8., AK8W, AK8Y, RK8M: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the conical connection, screw an M6 screw (≥ 70 mm long) into the bore.
14. Remove the encoder [220] from the rotor [1] or from the coupling [233]/[1891].

31543952/EN – 10/2023

Assembling EK8./AK8./RK8M – Add-on encoder set with M23 plug connector directly on KIGA encoder

1. For size 355: Connect the two halves of the coupling [233] by plugging them together using the coupling star. The coupling [233] must be firmly connected. Make sure that the encoder is centered [220].
2. For size 71 – 315: Clean the cone of the encoder [220].
3. For size 355: Clean the cone of the encoder [220] and the coupling [233].
4. Remove the screw plug [A] of the encoder.
5. For size 355: Place the coupling [233] onto the bolt [3012]. Tighten the retaining screw at the clamping hub on the motor side to fasten the coupling.
   ⇨ Tightening torque 3.3 Nm
6. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/ [1891].
7. To secure the encoder [220] in place, tighten the central retaining screw. Use a tool that is at least 45 mm long for this.
   ⇨ Counter-tighten the spanner flat SW27 of the coupling and SW10 of the encoder shaft.
   ⇨ Tightening torque 3.3 Nm
   ⇨ For safety encoders: Tightening torque 3.3 Nm ± 8%

NOTICE

For encoders RK8M, EK8W and AK8W on DR2C motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 🗎 132) and "Additional work for EK8W, AK8H and AK8W encoders on the DR2C.. motor" (→ 🗎 136)

Failure to calibrate results in greater motor losses and reduced torque. In the worst-case scenario, the motor will not run.

8. To seal the encoder [220], screw in the screw plug [A].
   ⇨ Tightening torque 1.8 Nm
9. For size 355 with forced cooling fan: Mount the spacer bolts [934].
10. For size 132M - 355 with forced cooling fan: Guide the torque bracket [935] over the connection adapter [U] and the encoder [220].
11. For size 132M - 355 with forced cooling fan: When mounting the torque bracket [935], make sure it is aligned centrally to the encoder [220]. Screw in the screw [936] with the spacer bushings [934].
    ⇨ For size 132M – 355: Tightening torque 12 Nm
12. For size 132M - 355 with forced cooling fan: Screw the torque bracket of the encoder [1889] with the screws [232] through the bores of the torque bracket [935].
    ⇨ Tightening torque 3.3 Nm
    ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%
13. For size 71 - 355 without forced cooling fan: Mount the fan guard [35] over the encoder [220]. When doing this, guide the M23 connector with the signal cable through the central grille cutout of the fan guard [35].
    ⇨ For size 71 – 132S: Tightening torque 3.3 Nm
    ⇨ For size 132M/L: Tightening torque 12 Nm

31543952/EN – 10/2023

- ⇨ For size 160 – 355: Tightening torque 29 Nm

14. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
15. For size 71 – 132S: Screw the screws [232] through the grille of the fan guard [35] and into the nuts of the torque bracket [1889].
    - ⇨ Tightening torque 3.3 Nm
16. For size 132M – 355 without forced cooling fan: Screw the screws [232] through the grille of the fan guard [35] or the central opening of the support ring [1895] and into the nuts of the torque bracket [1889].
    - ⇨ Tightening torque 3.3 Nm
    - ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%
17. For size 132M - 355 with forced cooling fan: Screw the screws [232] through the torque bracket [935] and into the nuts of the torque bracket of the encoder [1889].
    - ⇨ If you need to turn the encoder [220] in order for the screws to reach the nuts of the torque arm, turn the encoder [220] clockwise.
    - ⇨ Make sure the signal cable is of a sufficient length so that the M23 connector can be inserted into the recess of the safety cover [361]/[657] of the forced cooling fan [170].
    - ⇨ Tightening torque 3.3 Nm
    - ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%
18. Before you install the safety cover [361]/[657] or the forced cooling fan [170], slide the cable grommet [269] into the recess.
19. For size 71 - 280 without forced cooling fan: Place the safety cover [361] onto the fan guard [35].
20. For size 315 – 355: Place the safety cover [657] onto the metal brackets [1710].
21. For size 315 – 355: Secure the safety cover [657] in place by using the screws [1711].
    - ⇨ Tightening torque 12 Nm
22. With forced cooling fan: Secure the forced cooling fan [170] with the screws [22].
    - ⇨ For size 71 – 132S: Tightening torque 3.3 Nm
    - ⇨ For size 132M/L: Tightening torque 12 Nm
    - ⇨ For size 160 – 355: Tightening torque 29 Nm
23. Insert the cable grommet [269] into the recess of the safety cover [361]/[657] or the forced cooling fan up to the stop.
24. For size 71 – 132S with forced cooling fan: Additionally secure the forced cooling fan [170] in place by using the screws [34] and washers [33].
    - ⇨ Tightening torque 2 Nm
25. Without forced cooling fan: Secure the safety cover [361] in place by using the screws [34] and washers [33].
    - ⇨ For size 71 – 132S: Tightening torque 2 Nm
    - ⇨ For size 132M – 280: Tightening torque 3.5 Nm

31543952/EN – 10/2023

Disassembling EK8./AK8./RK8M – Add-on encoder set A-Box-U for connection option in/on terminal box

1. With forced cooling fan: Unscrew the screws [22].
2. Without forced cooling fan: Unscrew the screws [34]/[1711].
3. Remove the safety cover [361]/[657] or the forced cooling fan [170] from the motor.
   ⇨ With forced cooling fan: Remove the signal cable from the 3 wings of the cable retainer [1900].
4. For size 80 with brake: Remove the cable tie [3229] that attaches the encoder cable [619] to the fan guard [35].
5. Unscrew the screws [1996] and remove the connection cover [1995] from the connection unit [U].
6. Without forced cooling fan: Loosen the screws [3200] on the connection unit [U] and then remove the connection unit [U] from the central grille of the fan guard [35].
7. For size 132M - 180 with forced cooling fan: Remove the screws [3188] with which the connection unit [U] is screwed to the torque bracket.
8. Unscrew the screws [232].
9. Remove the fan guard [35] over the encoder [220]. Guide the connection unit [U] with the signal cable through the cutout of the fan guard [35].
10. For size 132M - 180 with forced cooling fan: Remove the screw [936] or the nut [734], the spacer bushing [934], and the torque bracket [935].

NOTICE

In the case of encoders RK8M, EK8W, AK8H, and AK8W on DR2C motors, loosening the central retaining screw [A] of the encoder [220] or loosening the insulation coupling [1891] of the motor or encoder shaft desynchronizes the encoder and motor rotor.

Higher motor losses and lower torques.

- Perform a new adjustment.

11. Unscrew the screw plug [A] of the encoder [220].
12. Loosen the central retaining screw of the encoder [220]. Use a tool that is at least 45 mm long for this.
    ⇨ If the central retaining screw of the encoder [220] cannot be loosened, counter-tighten the spanner flat SW10 of the encoder shaft.
13. Loosen the cone connection.
    ⇨ Encoder EK8., AK8W, AK8Y, RK8M: To loosen the cone connection, continue turning the central retaining screw of the encoder [220] counterclockwise.
    ⇨ Encoder AK8H: Continue turning the central retaining screw of the encoder [220] counterclockwise. To loosen the conical connection, screw an M6 screw (≥ 70 mm long) into the bore.
14. Remove the encoder [220] from the rotor [1] or from the coupling [233]/[1891].

31543952/EN – 10/2023

Assembling EK8./AK8./RK8M – Add-on encoder set A-Box-U for connection option in/on terminal box

1. Force open the knock-out on the stator [16] and remove it.
2. Slide the grommet [1526] onto the cable end of the cover [619].
   - ⇨ To make it easier to insert the grommet [1526] into the opened knock-out on the stator [16], prevent the FCI connector from protruding out of the grommet [1526].
   - ⇨ When the grommet [1526] is inserted into the knock-out, retrieve the FCI connector from the grommet [1526].
   - ⇨ Pull the thin end of the grommet [1526] through the knock-out first. When doing this, make sure that the cable jacket is not yet located in the grommet [1526].
3. If the grommet [1526] is properly seated in the knock-out, use a cable lubricant such as Lub-I from 3M™ to pull the cable jacket through the grommet [1526] towards the terminal box [112].
4. Clean the cone of the encoder [220].
5. Remove the screw plug [A] of the encoder.
6. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/[1891].
7. To secure the encoder [220] in place, tighten the central retaining screw. Use a tool that is at least 45 mm long for this.
   - ⇨ Counter-tighten the spanner flat SW27 of the coupling and SW10 of the encoder shaft.
   - ⇨ Tightening torque 3.3 Nm
   - ⇨ For safety encoders: Tightening torque 3.3 Nm ± 8%

NOTICE

For encoders RK8M, EK8W and AK8W on DR2C motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 🗎 132) and "Additional work for EK8W, AK8H and AK8W encoders on the DR2C.. motor" (→ 🗎 136)

Failure to calibrate results in greater motor losses and reduced torque. In the worst-case scenario, the motor will not run.

8. To seal the encoder [220], screw in the screw plug [A].
   - ⇨ Tightening torque 1.8 Nm
9. For size 132M - 180 with forced cooling fan: Guide the torque bracket [935] over the connection unit [U] and the encoder [220].
10. For size 132M - 180 with forced cooling fan: When mounting the torque bracket [935], make sure it is aligned centrally to the encoder [220]. Screw in the screw [936] with the spacer bushings [934].
    - ⇨ Tightening torque 12 Nm
11. For size 132M - 180 with forced cooling fan: Screw the torque bracket of the encoder [1889] with the screws [232] through the bores of the torque bracket [935].
    - ⇨ Tightening torque 3.3 Nm
    - ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%

31543952/EN – 10/2023

12. For size 132M - 180 with forced cooling fan: Screw the connection unit [U] with the screws [3188] through the bores of the torque bracket [935].
    - ⇨ Tightening torque 1 Nm
13. For size 71 - 180 without forced cooling fan: Mount the fan guard [35] over the encoder [220].
    - ⇨ Guide the connection unit [U] with the signal cable through the central grille cutout of the fan guard [35] or the central opening of the support ring [1895].
    - ⇨ Guide the cover [619] with the signal cable through the designated opening of the fan guard [35].
    - ⇨ For size 71 – 132S: Tightening torque 3.3 Nm
    - ⇨ For size 132M/L: Tightening torque 12 Nm
    - ⇨ For size 160 – 180: Tightening torque 29 Nm
14. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
15. For size 71 – 132S: Screw the screws [232] through the grille of the fan guard [35] and into the nuts of the torque bracket [1889].
    - ⇨ Tightening torque 3.3 Nm
16. For size 132M – 180 without forced cooling fan: Screw the screws [232] through the grille of the fan guard [35] or the central opening of the support ring [1895] and into the nuts of the torque bracket [1889].
    - ⇨ If you need to turn the encoder [220] in order for the screws to reach the nuts of the torque arm, turn the encoder [220] clockwise.
    - ⇨ Tightening torque 3.3 Nm
    - ⇨ For safety encoders: Tightening torque 3.3 Nm ±10%
17. Without forced cooling fan: Insert the connection unit [U] with the expansion anchors into the corresponding punch-outs on the fan guard's grille [35] up to the stop.
    - ⇨ Fully insert and tighten the screws [3200].
    - ⇨ Tightening torque 1.6 Nm
18. Without forced cooling fan: Insert the signal cable of the cover [619] into the designated recess of the wear part [3069].
    - ⇨ Fasten the signal cable into the rectangular cutout of the fan guard [35].
19. Place the cover [619] onto the connection unit [U].
    - ⇨ Screw the cover [619] onto the connection unit [U] with the screws [1996].
    - ⇨ Tightening torque 1 Nm
20. Make sure that the signal cable of the cover [619] does not form a loop between the fan guard [35] or the torque bracket [935] and the terminal box [112] that can collide with the fan.
21. For size 80 with brake: Attach the encoder cable [619] to the fan guard [35] using the cable tie [3229].
22. With forced cooling fan: Insert the signal cable of the encoder [220] into the designated openings in the cable retainer [1900] in such a way that prevents it from colliding with the fan wheel of the forced cooling fan.

31543952/EN – 10/2023

23. For size 71 - 180 without forced cooling fan: Place the safety cover [361] onto the fan guard [35].
    - ⇨ For size 71 – 132S: Tightening torque 2 Nm
    - ⇨ For size 132M – 180: Tightening torque 3.5 Nm
24. With forced cooling fan: Secure the forced cooling fan [170] with the screws [22].
    - ⇨ For size 71 – 132S: Tightening torque 3.3 Nm
    - ⇨ For size 132M/L: Tightening torque 12 Nm
    - ⇨ For size 160 – 180: Tightening torque 29 Nm
25. For size 71 – 132S with forced cooling fan: Additionally secure the forced cooling fan [170] in place by using the screws [34] and washers [33].
    - ⇨ Tightening torque 2 Nm
26. Without forced cooling fan: Secure the safety cover [361] in place by using the screws [34] and washers [33].
    - ⇨ For size 71 – 132S: Tightening torque 2 Nm
    - ⇨ For size 132M – 180: Tightening torque 3.5 Nm

31543952/EN – 10/2023

5.5.2 Information on configuring the zero-angle position for EK8W/AK8W/RK8M encoders on the DR2C motor

The encoders can be electronically calibrated using a frequency inverter. During the process, the existing zero angle of the encoder is calibrated during assembly and compared to the defined zero angle. The offset is saved. The motor control operates with this saved value.

Alternatively, the RK8M encoder can be mechanically configured in order to match the defined zero angle in its real mounting position. See chapter "Additional work for the RK8M encoder on the DR2C.. motor" (→ 🗎 132) for more information.

Electronically calibrating the encoder

Note that the motor must be free of loads, the brake must be released, and the rotor must be able to freely rotate.

Using current injection (270° electrical position), the rotor adjusts itself to a certain position.

The current injection is achieved by supplying a direct current positive in phase W and negative in phase V. Phase U is not powered. It may not be powered with more than 80% of the respective motor's nominal current I_0.

In this position, the encoder position is subsequently set to 0° by the frequency inverter, or the discrepancy with the defined zero position is saved.

Thus, the offset of the encoder position to the electrical rotor angle of the motor is 270° or 4.7 rad.

Observe the following:

- The motor must be disconnected or disassembled to configure the system or machine’s encoder.
- Before the configuration process, the star or delta connection type that is selected for the subsequent control mode of the motor must be wired to the motor. A correct zero position can be determined only if the connection type is identical during the configuration process and operation.
- The zero angle position set at the factory applies only for the selected "star" or "delta" connection type. If the connection type is changed, the encoder zero angle position must be recalibrated. To do so, use the encoder adjustment function "FCB 18 Rotor position identification" of the SEW-EURODRIVE frequency inverter.

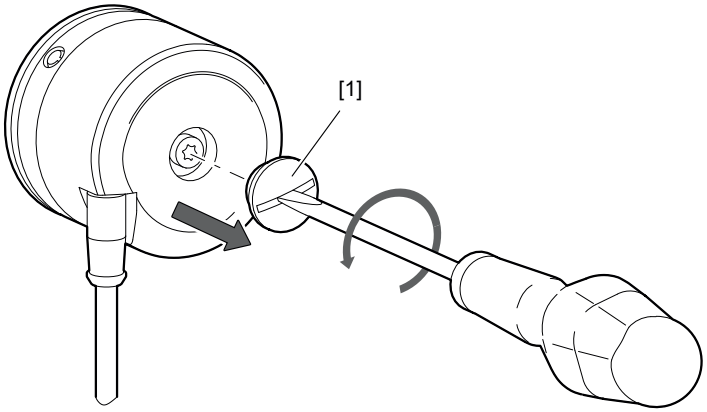
To that end, refer to the operating instructions for the frequency inverter or contact SEW-EURODRIVE Service.

31543952/EN – 10/2023

5.5.3 Additional work for the RK8M encoder on the DR2C.. motor

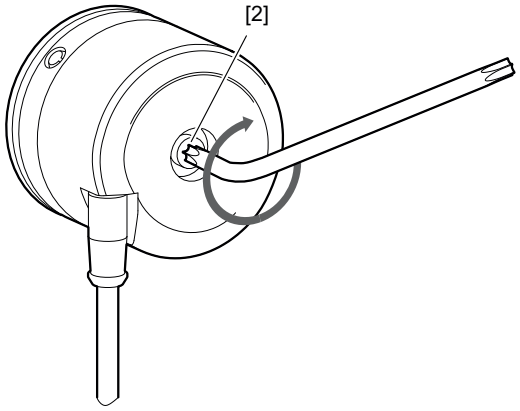
- ✓ Required tool:
- ✓ Slotted 1.6 x 8.0 mm
- ✓ Torx TX20
- ✓ Allen 2.5 mm

1. Remove the screw plugs [1] from the resolver.



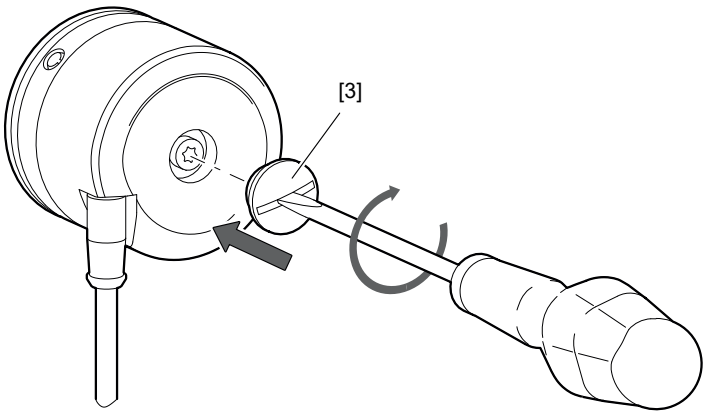
39849675531

2. Install the resolver by tightening the M5 central screw [2] with 3.3 Nm on the customer shaft.



39849677963

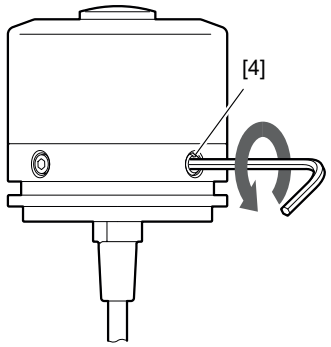
3. Reinstall the screw plug [3] on the resolver with 1.8 Nm.



39849680395

31543952/EN – 10/2023

4. Slightly loosen the set screw [4].



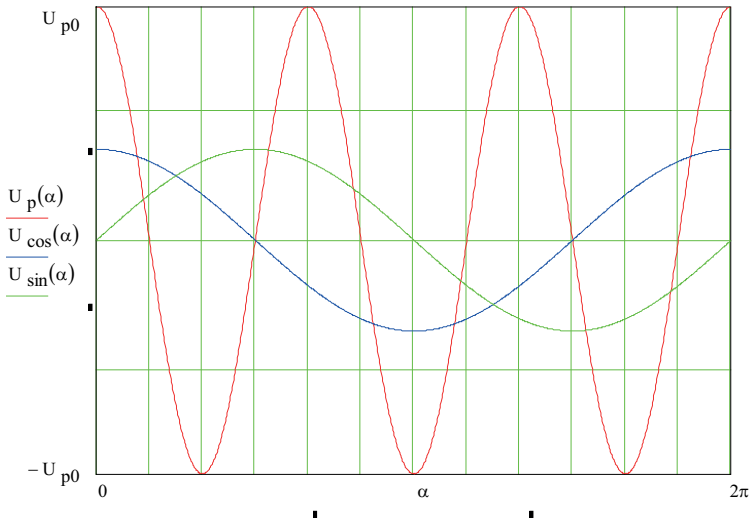
39849682827

⇨ The rear part of the resolver can now be moved.

Resolver setting specifications for synchronous motors from SEW-EURODRIVE

Number of pole pairs for motor: $p_M = 3$, number of pole pairs for resolver: $p_R = 1$

Setting specification:



40198853259

Resolver zero position (U_{cos} (S1 – S3) pos. max., U_{sin} (S2 – S4) pos. zero crossing) coincides with pos. maximum of excitation in magnetic circuit (EMF) U_p in phase u (with clockwise rotor rotation as viewed on the output shaft end).

Motor terminal	U	V	W
Supply	open	minus	plus

a) Adjustment check

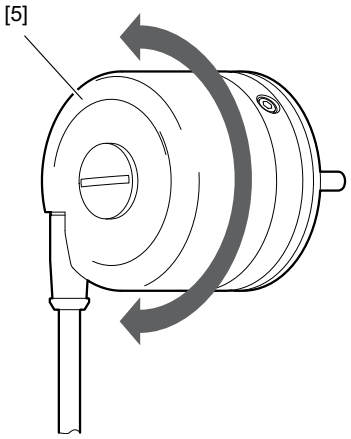
✓ The motor is unloaded and the brake released. The rotor can freely align itself in the stator field. Supply the motor with 60 – 80% direct current I_0 (for a maximum of 10 minutes).

✓ The rotor aligns in the field.

5. Turn the movable part [5] of the resolver until:

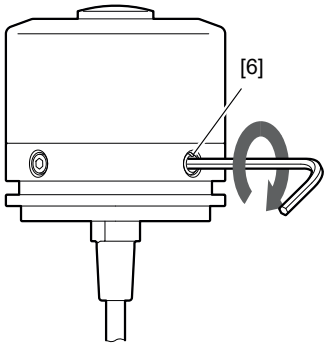
⇨ S2 - S4 (U_{sin}) pos. zero crossing

⇨ S1 - S3 (U_{cos}) pos. maximum



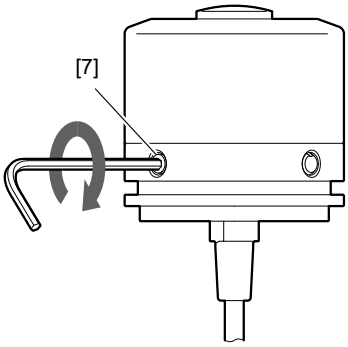
39849685259

6. Tighten the set screw [6] that was loosened at point (4) again with 1 Nm.



39849687691

7. Tighten the set screw [7] at position 2 with 1 Nm.



39849690123

8. Perform a direction of rotation check. To do so, change the supply on the motor terminals (see the following table).
   ⇨ The amplitude U_{cos}(S1 – S3) becomes smaller and the amplitude U_{sin} (S2 - S4) becomes larger.
9. End the encoder installation.

Motor terminal	U	V	W
Supply	plus	minus	plus

b) Adjustment check with frequency inverters from SEW-EURODRIVE

31543952/EN – 10/2023

Resolver adjustment is typically performed using SEW-EURODRIVE inverter functions:

- Rotor position identification FCB18 in the "With rotating motor" process in MOVISUITE®
- Encoder adjustment with MTEAdjust in MOVITOOLS® MotionStudio

After the SEW-EURODRIVE inverter has performed the calibration process, the resolver stator will be set to the resolver rotor so that the display shows a resolver offset angle of 0.0°.

31543952/EN – 10/2023

5.5.4 Additional work for EK8W, AK8H and AK8W encoders on the DR2C.. motor

For the EK8W, AK8H and AK8W encoders, perform the following steps after installing the encoder:

✓ The motor is unloaded and the brake released. The rotor can freely align itself in the stator field.

1. Supply the motor with direct current 60 – 80% I_0 (for no more than 10 minutes) to perform an adjustment check (see the following table).

   ⇨ The rotor aligns in the field.

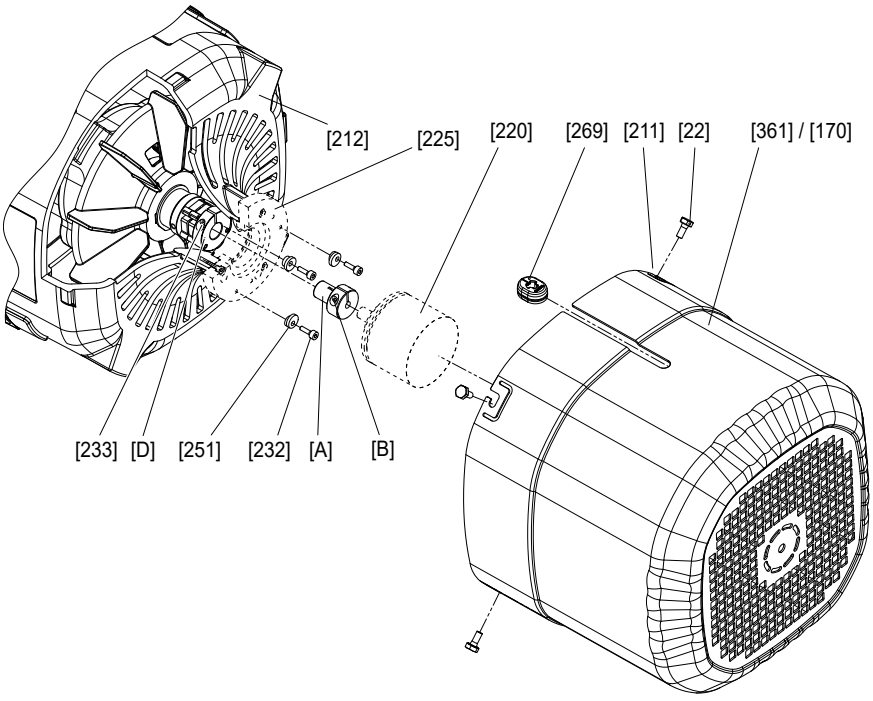
2. In this rotor position, set the encoder angle to 0 via SEW-EURODRIVE's inverter and the RS485 interface.

Motor terminal	U	V	W
Supply	open	minus	plus

31543952/EN – 10/2023

5.6 Removing/installing an add-on encoder with encoder mounting adapter

5.6.1 EV.., AV.., XV.. rotary encoder - (E)DRN../DRU../DR2..71 – 225 motors, with encoder mounting adapter



18014402142647691

[22]	Screw	[251]	Conical spring washers (included with XV1A and XV2A)
[170]	Forced cooling fan cover	[269]	Grommet
[211]	Washer	[361]	Safety cover (normal / long)
[212]	Fan guard with encoder mount		
[220]	Encoder	[A]	Adapter
[225]	Intermediate flange (not applicable for XV1A)	[B]	Clamping screw
[232]	Retaining screws (included with XV1A and XV2A)	[D]	Coupling (spread or solid shaft coupling)
[233]	Clamping screw		

Removing EV../AV../XV..

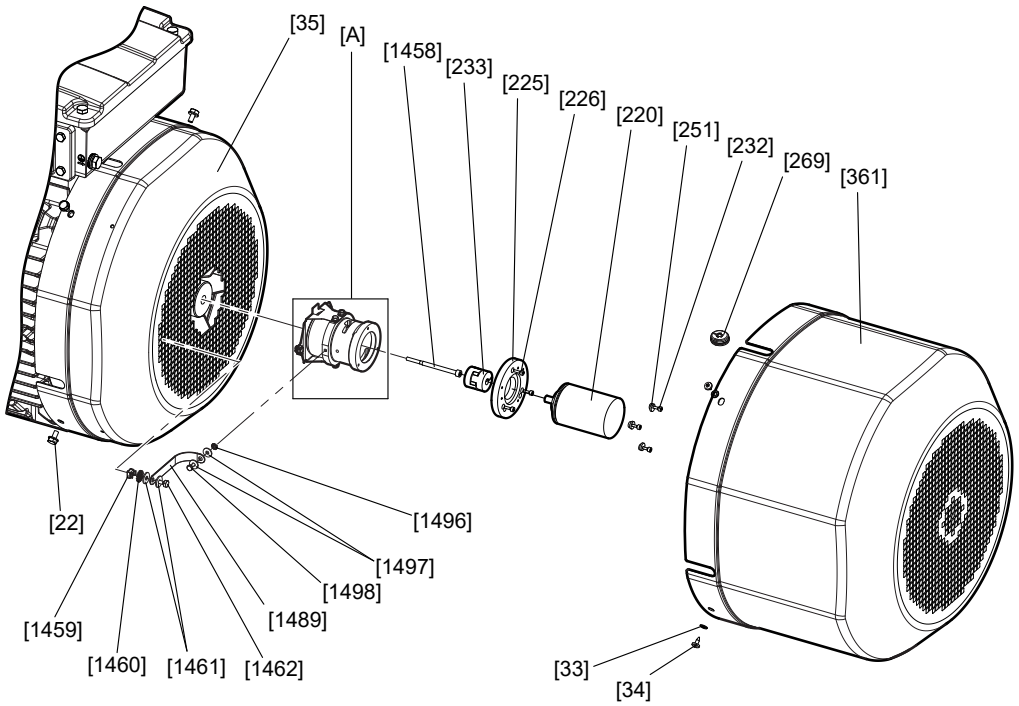
1. Remove the safety cover [361] or the forced cooling fan [170] if applicable.
2. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
3. Loosen the clamping screw [233] of the coupling.
4. Remove adapter [A] and encoder [220].

Installing EV../AV../XV..

1. Mount the intermediate flange [225] to the encoder mounting adapter [A] using screws [226].
2. Install the encoder [220]; refer to the chapter about installing encoders.
3. Secure the safety cover [361] or the forced cooling fan [170] in place by using the screws [22] and washers [211].

31543952/EN – 10/2023

5.6.2 EV.., AV.., XV.. rotary encoder - (E)DRN../DRU../DR2..250-280 motors, with encoder mounting adapter



18014406225445899

[22]	Screw	[361]	Safety cover (normal/long)
[33]	Washer	[1458]	Screw
[34]	Screw	[1459]	Cage nut
[35]	Fan guard	[1460]	Serrated lock washer
[220]	Encoders	[1461]	Washer
[225]	Intermediate flange (optional)	[1462]	Screw
[226]	Screw	[1489]	Ground strap
[232]	Screws (included with .V1A and .V2A)	[1496]	Serrated lock washer
[233]	Coupling	[1497]	Washer
[251]	Conical spring washers (included with .V1A and .V2A)	[1498]	Screw
[269]	Grommet	[A]	Encoder mounting adapter

31543952/EN – 10/2023

Removing the encoder mounting adapter

1. Remove the screws [34] to disassemble the safety cover [361].
2. Remove the encoder [220], see chapter "Removing EV../AV../XV.." (→ 🗎 139).
3. In order to remove the ground strap [1489] from the encoder mounting adapter [A], loosen the serrated lock washer [1496], washer [1497], and screw [1498].
4. Remove the screws [22] to disassemble the fan guard [35].
5. Loosen the screw [1458] to remove the encoder mounting adapter [A].
   ⇨ **If the encoder mounting adapter cannot easily be removed:** Screw an M6 set screw (length 20 – 35 mm) hand tight in the rotor bore. Screw an M8 set screw (length > 10 mm) into the same bore and push the encoder mounting adapter [A] off the rotor [1]. Remove the M6 set screw from the rotor bore.

Removing EV../AV../XV..

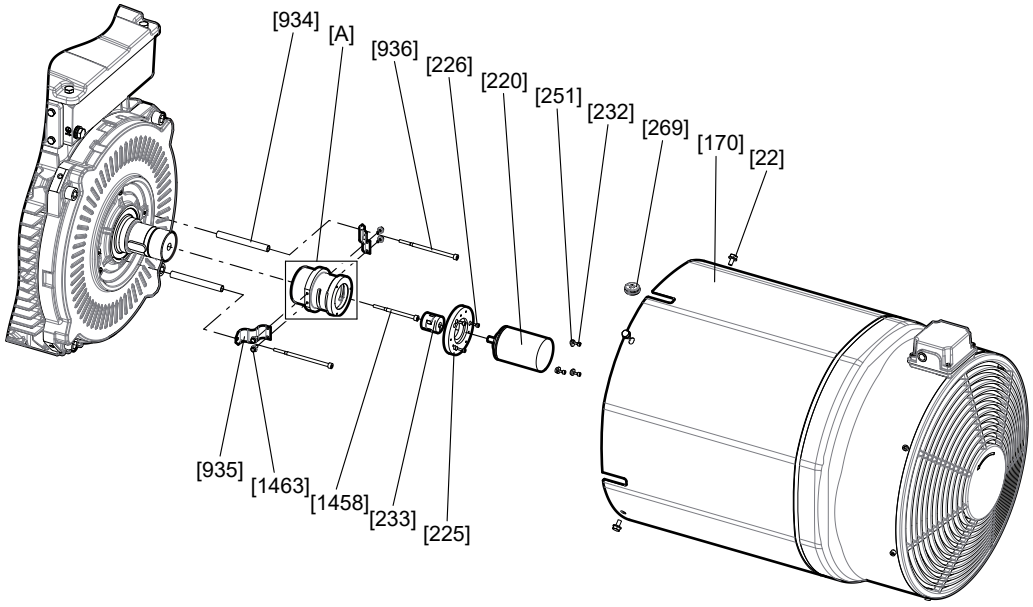
1. Remove the screws [34] to disassemble the safety cover [361].
2. Pull out the cable grommet [269] together with the encoder cable from the safety cover [361].
3. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
4. Loosen the screw at the coupling clamping hub [233] at the encoder end, the screw can be accessed through the slots of the encoder mounting adapter [A].
5. Remove the encoder [220] from the encoder mounting adapter [A] or the intermediate flange [225].

Installing EV../AV../XV..

1. Mount the intermediate flange [225] to the encoder mounting adapter [A] using screws [226].
2. Install the encoder [220]; refer to the chapter about installing encoders.
3. Secure the safety cover [361] in place by using the screws [34] and washers [33].

31543952/EN – 10/2023

5.6.3 EV.., AV.., XV.. rotary encoder - (E)DRN../DRU../DR2..250-280 motors, with encoder mounting adapter with forced cooling fan



7715965835

[22]	Screw	[269]	Grommet
[170]	Forced cooling fan cover	[934]	Spacer bushing
[220]	Encoders	[935]	Torque bracket
[225]	Intermediate flange (optional)	[936]	Screw
[226]	Screw	[1458]	Screw
[232]	Screws (included with .V1A and .V2A)	[1463]	Screw
[233]	Coupling	[A]	Encoder mounting adapter
[251]	Conical spring washers (included with .V1A and .V2A)		

Removing the encoder mounting adapter

1. Remove the screws [22] to disassemble the forced cooling fan [170].
2. Remove the cable grommet [269] with the encoder cable from the forced cooling fan [170].
3. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
4. Loosen the screw at the coupling clamping hub [233] at the encoder end, the screw can be accessed through the slots of the encoder mounting adapter [A].
5. Remove the encoder [220] from the encoder mounting adapter [A] or the intermediate flange [225].
6. Loosen the screws [1458] and [936] to remove the encoder mounting adapter [A]. The torque brackets [935] and screws [1463] can remain at the encoder mounting adapter [A].
   - ⇨ **If the encoder mounting adapter cannot easily be removed:** Screw an M6 set screw (length 20 – 35 mm) hand tight in the rotor bore. Screw an M8 set screw (length > 10 mm) into the same bore and push the encoder mounting adapter [A] off the rotor [1]. Remove the M6 set screw from the rotor bore.

31543952/EN – 10/2023

Removing EV../AV../XV..

1. Remove the screws [22] to disassemble the forced cooling fan [170].
2. Remove the cable grommet [269] with the encoder cable from the forced cooling fan [170].
3. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
4. Loosen the screw at the coupling clamping hub [233] at the encoder end, the screw can be accessed through the slots of the encoder mounting adapter [A].
5. Remove the encoder [220] from the encoder mounting adapter [A] or the intermediate flange [225].

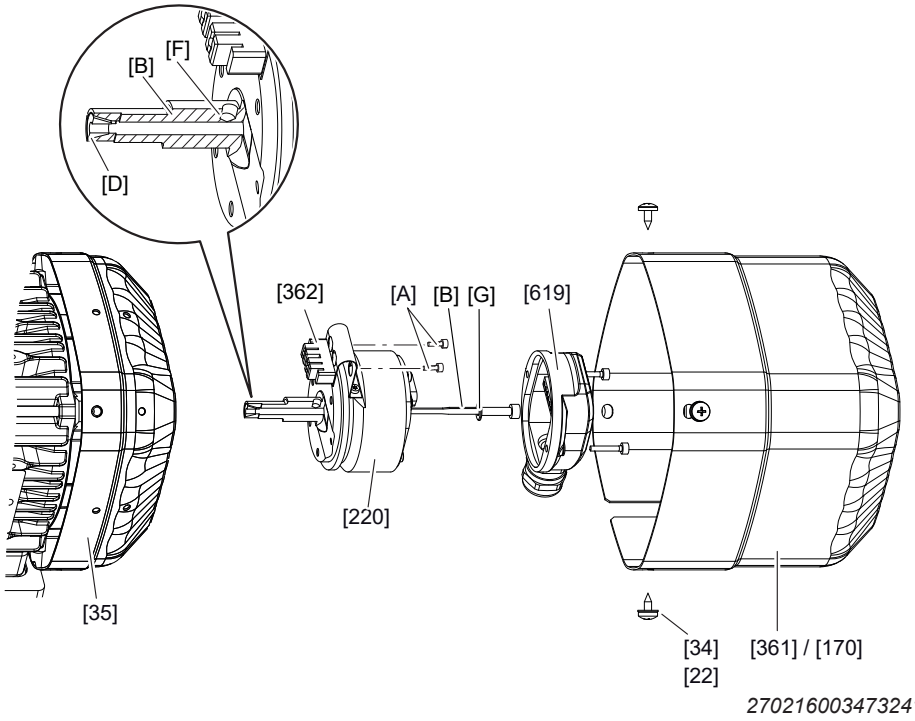
Installing EV../AV../XV..

1. Mount the intermediate flange [225] to the encoder mounting adapter [A] using screws [226].
2. Install the encoder [220]; refer to the chapter about installing encoders.
3. Secure the forced cooling fan [170] in place by using the screws [22].

31543952/EN – 10/2023

5.7 Removing/installing add-on encoders with spread shaft, plug-in shaft, and hollow shaft

5.7.1 ES7., AS7. rotary encoder - DR..71 – 132, DRN80 – 132S motors



27021600347324171

[22]	Screw	[619]	Connection cover
[34]	Tapping screw	[A]	Retaining screws for torque bracket
[35]	Fan guard	[B]	Central retaining screw
[170]	Forced cooling fan	[D]	Cone
[220]	Encoders	[F]	Bore
[361]	Safety cover	[G]	Tooth lock washer
[362]	Expansion anchor		

Removing ES7./AS7.

1. Remove the safety cover [361] or the forced cooling fan [170] if applicable.
2. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
3. Make sure the cone [D] does not fall out while the central retaining screw [B] is loosened. Loosen the central retaining screw [B] by 2 – 3 turns. Loosen the cone [D] by tapping lightly onto the screw head.
4. To loosen the expansion anchor [362], remove the retaining screw of the torque bracket [A]. Carefully pull the encoder [220] from the rotor bore.
5. For safety encoders: Dispose of the expansion anchor [362]

31543952/EN – 10/2023

Installing ES7./AS7.

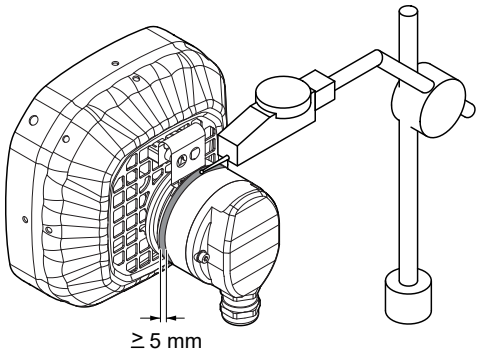
1. Apply a contact corrosion prevention compound, e.g. NOCO® fluid, to the encoder pins.
2. Attach the expansion anchor [362] to the torque bracket of the encoder.
   ⇨ For safety encoders: Use a new expansion anchor.
3. Push the encoder to the stop of the shaft end.
4. Tighten the central retaining screw [B].
   ⇨ Tightening torque 2.75 Nm ± 6%
5. Press the expansion anchor [362] into the fan guard [35] and check if it is seated correctly.
6. Screw the retaining screws of the torque bracket [A] into the expansion anchor [362] up to the stop. Tighten the retaining screws of the torque bracket [A].
   ⇨ Tightening torque 1.6 Nm ± 10%
7. Screw on the connection cover [619].
   ⇨ Tightening torque 2.25 Nm
8. For safety encoders: Perform a wobble measurement.
9. Mount the safety cover [361] or the forced cooling fan [170] if applicable.
   ⇨ For screw [22]: Tightening torque 3.3 Nm
   ⇨ For screw [34]: Tightening torque 2 Nm

Performing a wobble measurement (only for the safety encoder design)

Fault exclusion of the mechanical motor-encoder connection according to IEC 61800-5-2 requires that the encoder is seated properly. Wobbling must be measured each time an ES7S, AS7W, or AS7Y encoder is installed to ensure it is seated properly.

Measure wobbling as described in the following chapter.

1. Place the sensor on the upper edge of the encoder as shown in the figure below:



9007203225200139

2. The measurement must be made within the indicated zone (maximum width = 5 mm).
3. Turn the motor shaft. If required, start up the motor at low speed (< 60 min^{-1}).
4. Check the wobble on the sensor.
   ⇨ The maximum permitted wobble on the encoder must be ≤ 0.07 mm when turning the motor shaft.

Measured value exceeded

Repeat the check if the measured value is exceeded. Proceed as follows:

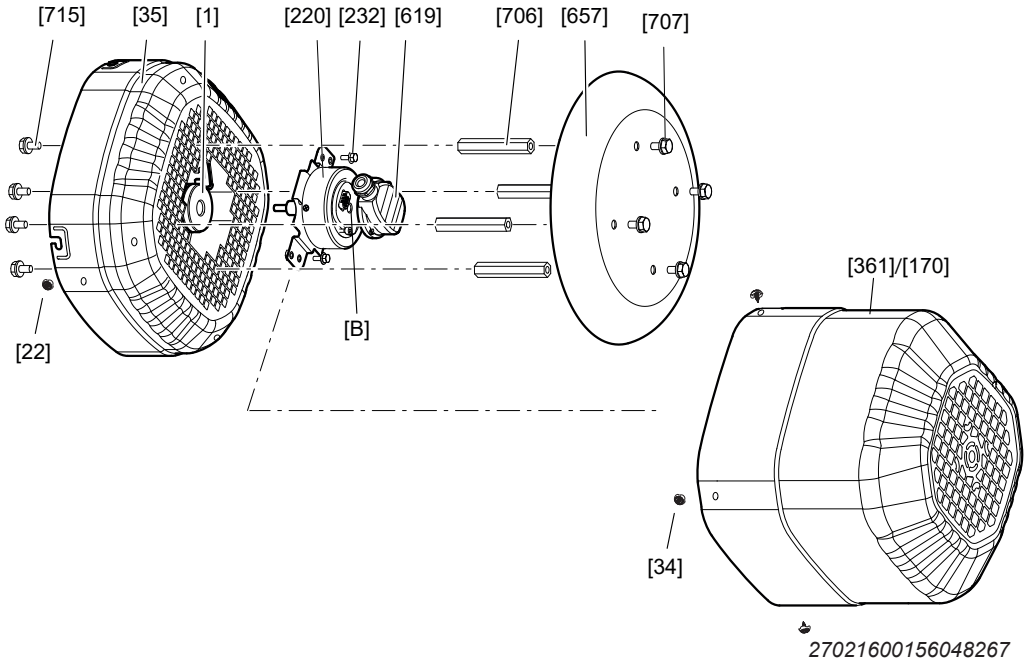
1. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
2. Make sure the cone [D] does not fall out while the central retaining screw [B] is loosened. Loosen the central retaining screw [B] by 2 – 3 turns. Loosen the cone [D] by tapping lightly onto the screw head.
3. Turn the motor shaft or the encoder shaft at the bore [F] by 120°.
4. Tighten the central retaining screw [B].
   ⇨ Tightening torque 2.75 Nm ± 6%
5. Screw on the connection cover [619].
   ⇨ Tightening torque 2.25 Nm
6. Repeat the wobble measurement.

INFORMATION

If it is not possible to carry out the measurement below the permitted wobble, contact the SEW-EURODRIVE Service department.

31543952/EN – 10/2023

5.7.2 EG7., AG7. rotary encoder - DR..160 – 280, DRN132M – 280 motors



[1]	Rotor	[361]	Safety cover
[22]	Screw	[619]	Connection cover
[34]	Tapping screw	[657]	Canopy
[35]	Fan guard	[706]	Spacer bolt
[170]	Forced cooling fan	[707] [715]	Screws
[220]	Encoders	[B]	Central retaining screw
[232]	Screws		

Removing EG7., AG7.

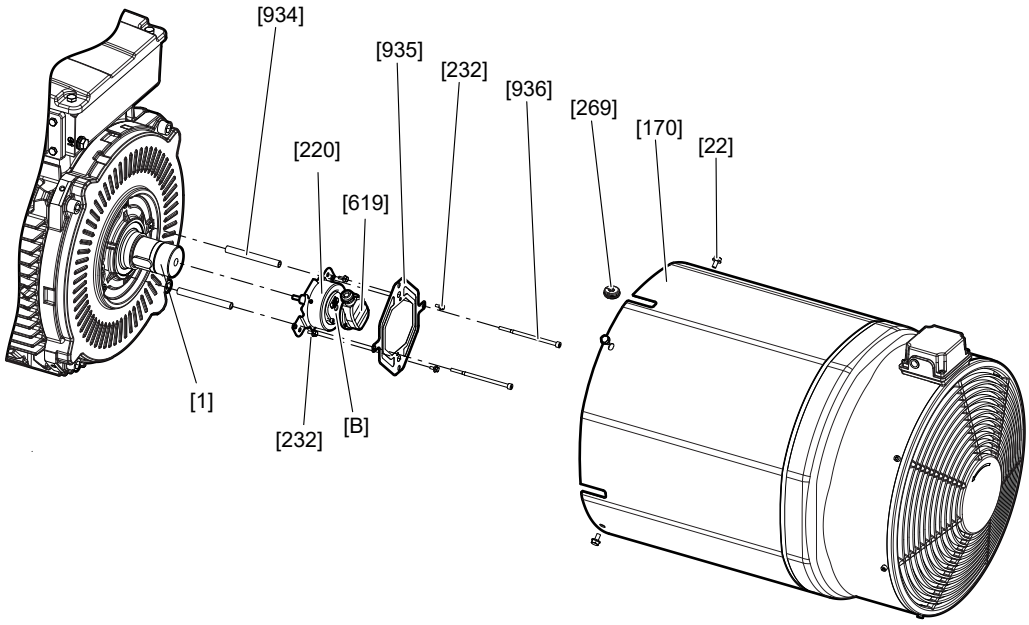
1. Proceed as follows, depending on the design:
   - ⇨ **With canopy:** Remove the screws [707] to disassemble the canopy [657]. If required, counter using a hexagon wrench SW13 on the spacer bolt [706].
   - ⇨ **Without canopy:** Remove the screws [22]/[34] to disassemble the safety cover [361] or the forced cooling fan [170].
2. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
3. Unscrew the retaining screws [232] of the torque arm.
4. Loosen the screw [B] by 2 – 3 revolutions to pull off the encoder [220].

Installing EG7., AG7.

1. Apply a contact corrosion prevention compound, e.g. NOCO® fluid, to the encoder pins.
2. Push the encoder to the stop of the shaft end.
3. Tighten the central retaining screw [B].
   ⇨ Tightening torque 8 Nm ± 5%
4. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
5. Tighten the retaining screws [232] of the torque arm.
   ⇨ Tightening torque 6 Nm ± 10%
6. Screw on the connection cover [619].
   ⇨ Tightening torque 2.25 Nm ± 10%
7. Mount the safety cover [361] or the forced cooling fan [170] if applicable.
   ⇨ Tightening torque for screw [22]: M6 = 11 Nm, M8 = 27 Nm
   ⇨ Tightening torque for screw [34]: 3.5 Nm
8. If necessary, mount the canopy [657] using the screws [707].
   ⇨ Tightening torque 27 Nm

31543952/EN – 10/2023

5.7.3 EG7., AG7. rotary encoder - (E)DR..160 – 225, (E)DRN132M – 315 motors, with forced cooling fan /V



18014406225443979

[1]	Rotor	[619]	Connection cover
[22]	Screw	[934]	Spacer bushing
[170]	Forced cooling fan	[935]	Torque arm
[220]	Encoder	[936]	Screw
[232]	Screws		
[269]	Grommet	[B]	Retaining screw

Removing EG7., AG7.

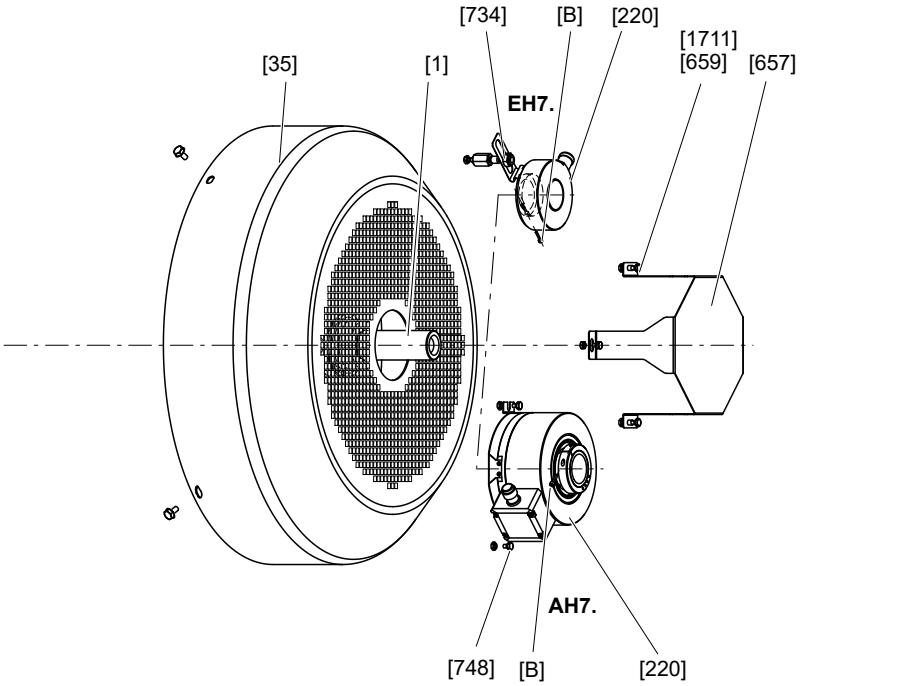
1. Remove the screws [22] to disassemble the forced cooling fan [170].
2. Remove the cable grommet [269] with the encoder cable from the forced cooling fan [170].
3. Remove the screws [232] and [936] to disassemble the torque bracket [935].
4. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
5. Loosen the screw [B] by 2 – 3 revolutions to pull off the encoder [220].

Installing EG7., AG7.

1. Apply a contact corrosion prevention compound, e.g. NOCO® fluid, to the encoder pins.
2. Push the encoder to the stop of the shaft end.
3. Tighten the central retaining screw [B].
   ⇨ Tightening torque 8 Nm ± 5%
4. Place the torque bracket [935] onto the spacer bushing [934] and tighten the screws [936].
   ⇨ Tightening torque: M6 = 11 Nm, M8 = 27 Nm
   ⇨ For safety encoders: M6 = 11 Nm ±10%, M8 = 27 Nm ±10%
5. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
6. Tighten the retaining screws [232] of the torque arm.
   ⇨ Tightening torque 6 Nm ± 10%
7. Screw on the connection cover [619].
   ⇨ Tightening torque 2.25 Nm ± 10%
8. Insert the cable grommet [269] into the forced cooling fan [170].
9. Mount the forced cooling fan [170] and tighten the screws [22].
   ⇨ Tightening torque 28 Nm

31543952/EN – 10/2023

5.7.4 EH7., AH7. rotary encoder - (E)DRN 315 motors



27021598171852427

[1]	Rotor	[659]	Screw
[35]	Fan guard	[734]	Nut
[220]	Encoders	[748]	Screw
[367]	Retaining screw	[1711]	Screw
[657]	Cover plate	[B]	Clamping screw

Removing EH7., AH7.

1. Remove the screws [659] to disassemble the cover plate [657].
2. Depending on the design, remove the encoder [220] from the fan guard [35] as follows:
   - ⇨ **EH7.:** Remove the nut [734].
   - ⇨ **AH7.:** Remove screw [748].
3. Loosen the screw [B] by 2 – 3 revolutions to pull off the encoder [220].

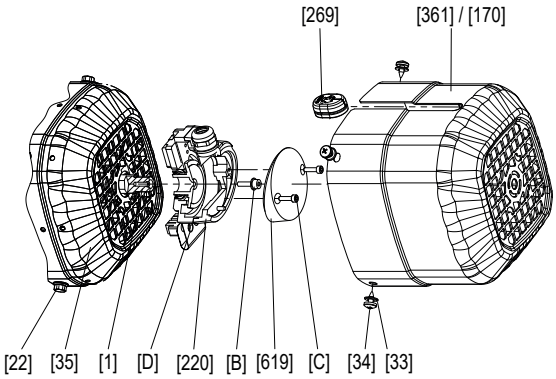
Installing EH7., AH7.

1. Push the encoder to the stop of the shaft end.
2. Tighten the screw [B].
   ⇨ Tightening torque 3 Nm
3. Proceed as follows, depending on the encoder:
   ⇨ **EH7.:** Install the nut [734].
   ⇨ Tightening torque 3 Nm
   ⇨ **AH7.:** Insert and tighten the screw [748].
   ⇨ Tightening torque 12 Nm
4. Mount the cover plate [657] using the screws [659] / [1711].
   ⇨ Tightening torque 11 Nm

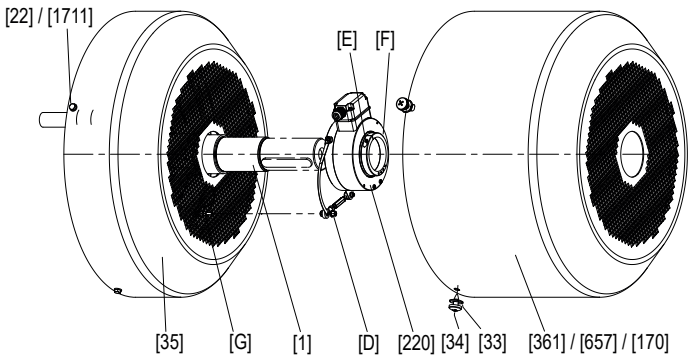
31543952/EN – 10/2023

5.7.5 XH.A hollow-shaft rotary encoders – DR..71 – 225, DRN71 – 225, DR2..71 – 80 motors

Encoder mounting with XH1A encoder mounting adapter



Encoder mounting with XH7A and XH8A encoder mounting adapter



18014402142643851

[1]	Rotor	[619]	Connection cover
[22]	Screws	[657]	Safety cover
[33]	Washer	[1711]	Screw
[34]	Tapping screw	[B]	Central retaining screw
[35]	Fan guard	[C]	Connection cover screws
[170]	Forced cooling fan cover	[D]	Torque bracket screws
[220]	Encoders	[E]	Screw
[269]	Grommet	[F]	Clamping ring
[361]	Safety cover	[G]	Nut of the torque bracket

Removing XH1A

1. Remove the safety cover [361] or the forced cooling fan [170] if applicable.
2. Loosen the screws of the connection cover [619] and remove it. Do not disconnect the encoder cable.
3. Screw out the central retaining screw [B].
4. Remove the torque bracket screws [D].
5. Pull the torque bracket off.
6. Remove the encoder [220] from the shaft end.

Removing XH7A, XH8A

1. Remove the safety cover [361] or the forced cooling fan [170] if applicable.
2. Loosen the screw [E] from clamping ring [F].
3. Remove the torque bracket screws [D].
4. Remove the encoder [220] from the shaft end.

31543952/EN – 10/2023

Installing XH1A

1. Push the encoder [220] onto the shaft end.
2. Screw in the screws [D] to mount the torque bracket.
   ⇨ Tightening torque 1.6 Nm ± 10%
3. Tighten the screw [B].
   ⇨ Tightening torque 2.9 Nm
4. Screw on the connection cover [619].
   ⇨ Tightening torque 3 Nm
5. Mount the safety cover [361] or the forced cooling fan [170] if applicable.
   ⇨ Tightening torque 3 Nm

Installing XH7A, XH8A

1. Push the encoder [220] onto the shaft end.
2. Screw in the screws [D] to mount the torque bracket.
   ⇨ Tightening torque 6 Nm
3. Tighten the screw [E] of the clamping ring [F].
   ⇨ Tightening torque 5 Nm
4. Mount the safety cover [657] or the forced cooling fan [170].
   ⇨ Screw [1711]: Tightening torque 11 Nm
   ⇨ Screw [22]: Tightening torque 28 Nm

31543952/EN – 10/2023

5.8 Checklist for installing safety encoders

The checklists allow you to document the performed and safety-related tasks when exchanging safety encoders.

5.8.1 Drive and encoder data

Drive and encoder data	
Technician:	
Date:	
Drive designation:	
Motor serial number:	
Encoder part number:	
Encoder serial number:	
Encoder manufacturer:	

5.8.2 ES7., AS7. checklist

Checklist for (E)DR..80 – 132/(E)DRN80 –132S motors with ES7., AS7. encoders	
Performed task	**Finished**
Encoder pin coated with NOCO® fluid	☐
Central retaining screw [B] of the encoder tightened (tightening torque 2.75 Nm ±6%)	☐
New expansion anchor [362] pressed into the fan guard [35]	☐
Retaining screws on the torque bracket [A] tightened into the expansion anchor [362] (tightening torque 1.6 Nm ±10%)	☐
Connection cover [619] screwed in place (tightening torque 2.25 Nm)	☐
Wobble measurement performed (tolerance ≤ 0.07 mm)	☐
Safety cover [361] or, if necessary, the forced cooling fan [170] installed	☐

5.8.3 EG7., AG7. checklist

Checklist for (E)DR..160 – 280/(E)DRN132M – 280 motors with EG7., AG7. encoders	
Performed task	**Finished**
Encoder pin coated with NOCO® fluid	☐
Central retaining screw [B] of the encoder tightened (tightening torque 8 Nm ± 5%)	☐
Retaining screws on the torque bracket [232] moistened with LOCTITE® 241	☐
Retaining screws on the torque bracket [232] tightened (tightening torque 6 Nm ± 10%)	☐
Connection cover [619] screwed in place (tightening torque 2.25 Nm ±10%)	☐
Safety cover [361] or, if necessary, the canopy [657] or the forced cooling fan [170] installed	☐

31543952/EN – 10/2023

5.8.4 EK8., AK8. checklist

Checklist for (E)DRN../DRU../DR2..71 – 315 motors with EK8., AK8. encoders	
Performed task	**Finished**
Cone of the encoder [220] and the rotor [1] and, if available, of the insulation coupling [1891] or the coupling [233] cleaned	☐
Central retaining screws of the encoder [220] tightened (tightening torque 3.3 Nm ± 8%)	☐
Screw plug [A] screwed in (Tightening torque 1.8 Nm)	☐
Fan guard [35] mounted	☐
Screws [232] moistened with LOCTITE® 241	☐
Screws [232] screwed into the nuts of the torque bracket [1889] through the grille of the fan guard [35]/support ring [1895] (For size 71 - 132S: Tightening torque 3.3 Nm) (For size 132M – 355: Tightening torque 3.3 Nm ± 10%)	☐
Safety cover [361]/[657] mounted	☐
Connection adapter [U] placed into recess of the safety cover [361]/[657] or the forced cooling fan [170] and tightened with screws [D] (tightening torque 2 Nm ±10%)	☐
Screws [E] for fastening the connection cover [619] moistened with LOCTITE® 241	☐
Connection cover [619] screwed onto connection adapter (tightening torque 2.25 Nm)	☐

31543952/EN – 10/2023

6 Electrical installation

6.1 General information

INFORMATION

When selecting and using cables as well as connection technology components that are not supplied by SEW-EURODRIVE or that are determined by the motor and encoder configuration, note the applicable requirements of the country of use with regard to conformity guidelines and standards.

⚠ DANGER

Cables and conductors with insufficient mechanical resistance.

Severe or fatal injuries due to electric shock. System damage.

- Note the mechanical operating conditions in the motor.
- Use fabric hoses to mechanically protect the cables and conductors.

⚠ DANGER

The cables and conductors have inadequate dielectric strength.

Severe or fatal injuries due to electric shock. System damage.

- Observe the electrical voltage and current values that are in the motor.
- Ensure that the cables and conductors used have the necessary dielectric strength.
- Observe air and creepage distances. If necessary, use additional materials for electrical insulation.

INFORMATION

SEW-EURODRIVE recommends using prefabricated cables from SEW-EURODRIVE to connect the safety encoders.

31543952/EN – 10/2023

6.2 Encoder connection

When connecting the encoders to the inverters, follow the operating instructions for the inverter and the wiring diagrams supplied with the encoders.

There may be differing requirements or limitations for the EI7C FS safety encoder due to the encoder evaluation unit, e.g. regarding the maximum cable lengths or the core cross sections. Observe the product documentation for the encoder evaluation unit for this.

Mechanical requirements

- For connection variants with M12 or M23 plug connector, a strain relief of the cable must be carried out by the customer in accordance with IEC 60079-14
- Note the following for connection variants with terminal strips or connection units:
  - Cables and cores must be mechanically protected against damage when they come into contact with motor components in the terminal box. Use fabric hoses.
  - Cables and cores must be electrically shielded from live parts such as terminal boards or power terminals of the motor. Observe the required clearance and creepage distances.
  - Observe possible requirements regarding conformity with UL or CSA. For mechanical and electrical protection, use suitable glass fiber tubing with UL style, for example.

Electrical requirements

⚠ WARNING

When connecting the encoders in the terminal box, observe the electrical voltage resistance requirements from IEC 61800-5-1.

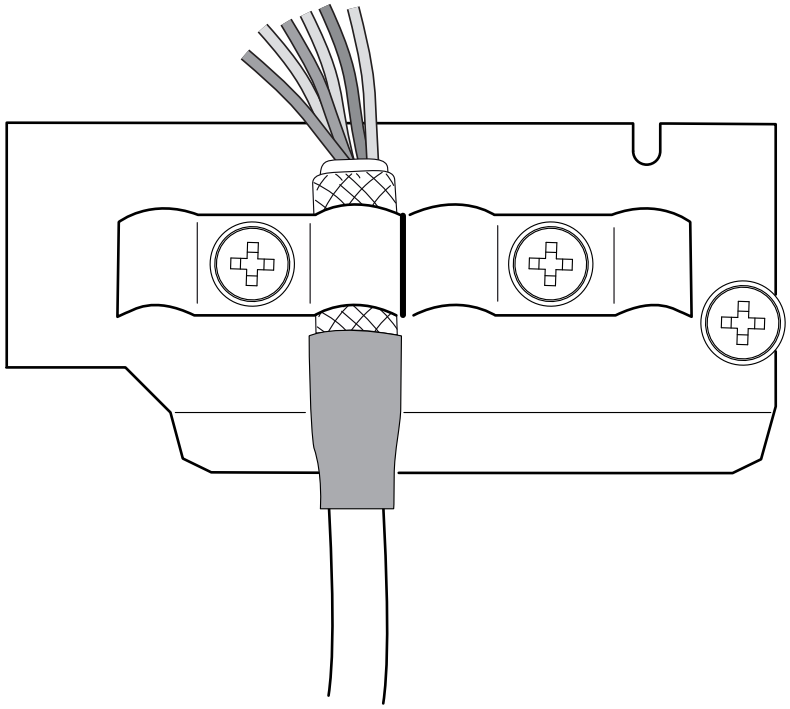
- Maximum cable length (inverter to encoder):
  - 100 m with a capacitance from conductor to shield ≤ 110 nF/km
  - 100 m with a capacitance from conductor to conductor ≤ 70 nF/km
- Core cross section:
  - Supply cores ≥ 0.25 mm^2 for cable lengths up to 50 m
  - Supply cores ≥ 0.5 mm^2 for cable lengths up to 100 m
  - Signal cores ≥ 0.25 mm^2
- Shielded cable with twisted core pairs. Connect the shield over a wide area at both ends:
  - On the encoder side: in the cable gland of the encoder connection cover or the terminal box or in the encoder connector.
  - On the inverter side or the side of the evaluation unit: on an electronics shield clamp and on the housing of the D-sub connector or another connector.
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm.
- Observe the technical data of the encoder when selecting the cabling, in particular with regard to the operating voltage or current.

31543952/EN – 10/2023

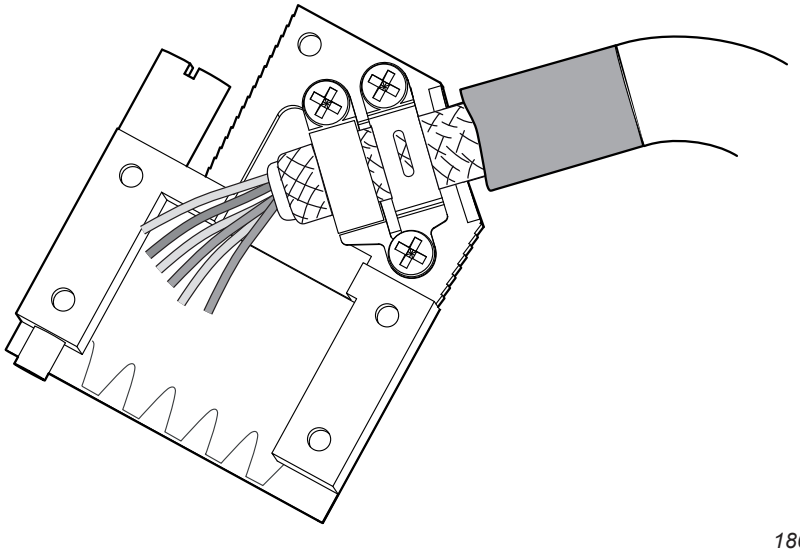
6.2.1 Installation requirements

Encoder line shield on inverter

Connect the shield of the encoder line on the inverter or the encoder evaluation unit over a wide area.



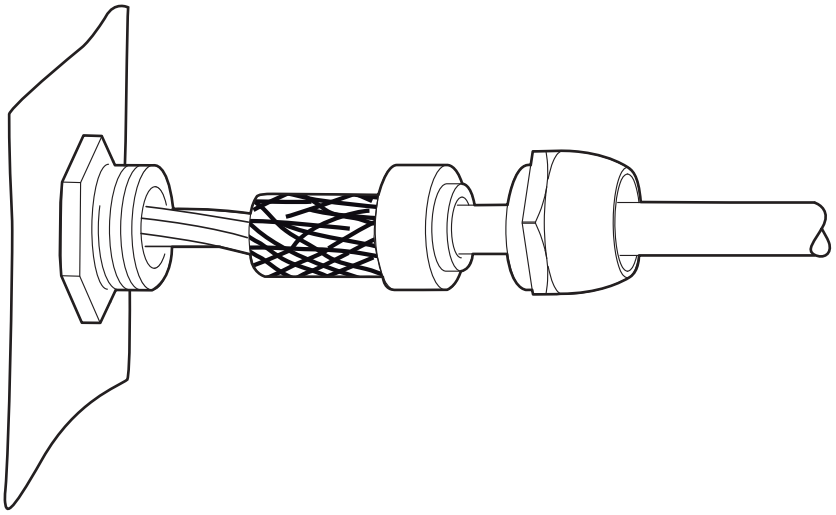
1866148491



1866145803

Encoder line shield on encoder

Connect the shield of the encoder line on the encoder, the encoder connector, the grounding terminal in the terminal box, or the grounded housing of the encoder connector over a wide area.



1866163979

31543952/EN – 10/2023

6.3 Overview of wiring diagrams

6.3.1 Assignment of wiring diagrams to encoder designs

Type	=	Type designation of the encoder
SB-SNR	=	Wiring diagram part number
SB-NR	=	Wiring diagram number
AIGA	=	M23 without temperature sensor /TF or /P
AD	=	Connection cover on encoder
AIGB	=	M23 with temperature sensor /TF or /P
AVSE	=	M12 without inverted signal tracks /A, /B and without temperature sensor /TF or /P
AVRE	=	M12 with non-inverted signal tracks A, B and with inverted signal tracks /A, /B and with temperature sensor /TF or /P
AE + AVRE	=	Connection unit + M12 with non-inverted signal tracks and with optional temperature sensor /TF or /P
AE	=	Terminal strip/connection unit in the terminal box
A1GA	=	Integrated encoder plug connector installed on the side or rear of the encoder cover, delivered with connection cover
A2GA	=	Integrated encoder plug connector installed on the side or rear of the encoder cover, delivered without connection cover
iGS	=	Integrated encoder plug connector: General designation for the encoder plug connector without specifying the design with/without connection cover or the installation location
KD1	=	Hybrid connector for MOVILINK® DDI: M23 (motor cable cross section 1.5 mm^2 - 4 mm^2)
KDB	=	Hybrid connector for MOVILINK® DDI: M40 (motor cable cross section 6 mm^2 - 10 mm^2)
KD	=	Hybrid cable screw fitting for MOVILINK® DDI: M25/M32 (motor cable cross section 1.5 mm^2 - 10 mm^2)
KDD	=	Power cable screw fitting and M23 signal connector for MOVILINK® DDI
KIGA	=	M23 plug connector with 0.36 m cable directly installed on the encoder, delivered without mating connector

31543952/EN – 10/2023

Incremental encoder

The wiring diagrams can be accessed via the SEW-EURODRIVE Online Support portal by specifying the wiring diagram part number (SB-SNR) or the wiring diagram number (SB-NR).

Type	Electrical interface	SB-SNR	SB-NR	Connection
EG7C	HTL/TTL (RS422)	63377500	---	AD
EG7R	TTL (RS422)	63377500	---	AD
EG7S	1 Vpp sin/cos + RS485	63377500	---	AD
EH7C	HTL	63160234	[08511xx08]	AIGA
EH7R	TTL (RS422)	63160234	[08511xx08]	AIGA
EH7S	1 Vpp sin/cos	63160234	[08511xx08]	AIGA
EH7T	TTL (RS422)	63160234	[08511xx08]	AIGA
EI7.	HTL	63089149	[80075xx13]	M12+AVSE
EI7.	HTL	63137259	[80242xx08]	M12+AVSE
EI7.	HTL	63088436	[80243xx08]	internal to the drive
EI7.	HTL	63277689	[80001xx19]	M12+AVSE
EI7.	HTL	63079925	[80085xx13]	internal to the drive
EI7.	HTL	63076977	[80115xx10]	M12+AVSE
EI71	HTL	63091062	[80032xx10]	internal to the drive
EI71	HTL	63255758	[80006xx18]	internal to the drive
EI71	HTL	63198207	[80047xx15]	internal to the drive
EI71	HTL	63080125	[80097xx13]	internal to the drive
EI71	HTL	63106329	[80050xx10]	internal to the drive
EI71	HTL	63198347	[80046xx15]	internal to the drive
EI71	HTL	63113911	[80106xx11]	internal to the drive
EI71	HTL	63012944	[80074xx10]	internal to the drive
EI71, EI72, EI76	HTL	63076365	[68178xx08]	M12+TF
EI71, EI72, EI76	HTL	63082659	[68317xx13]	M12+AVSE

31543952/EN – 10/2023

Type	Electrical interface	SB-SNR	SB-NR	Connection
EI71, EI72, EI76	HTL	63155176	[80241xx08]	M12+AVRE
EI71, EI72, EI76	HTL	63089238	[68316xx13]	M12+AVRE
EI71, EI72, EI76	HTL	63111063	[68314xx13]	M12+TF AVRE
EI71, EI72, EI76	HTL	63154439	[80076xx13]	M12+ AVRE
EI71, EI72, EI76	HTL	63189151	[68001xx07]	M12+AVRE
EI71, EI72, EI76	HTL	63069423	[68185xx08]	M12+AVSE
EI71, EI72, EI76	HTL	63125455	[68310xx13]	AE
EI7C	HTL	63076365	[68178xx08]	M12+TF
EI7C	HTL	63082659	[68317xx13]	M12+AVSE
EI7C	HTL	63155176	[80241xx08]	M12+AVRE
EI7C	HTL	63089238	[68316xx13]	M12+AVRE
EI7C	HTL	63111063	[68314xx13]	M12+TF AVRE
EI7C	HTL	63154439	[80076xx13]	M12+ AVRE
EI7C	HTL	63189151	[68001xx07]	M12+AVRE
EI7C	HTL	63069423	[68185xx08]	M12+AVSE
EI7C	HTL	63125455	[68310xx13]	AE
EI7C FS	HTL	63089238	[68316xx13]	M12+AVRE
EI8C	HTL	63290839	[68448xx19]	AE
EI8C	HTL	63290839	[68448xx19]	AE
EI8C	HTL	63286114	[68416xx18]	AIGA/AIGB
EI8C	HTL	63357615	[08355xx22]	AVRE
EI8R	TTL	63290839	[68448xx19]	AE
EI8R	TTL	63290839	[68448xx19]	AE
EI8R	TTL	63286114	[68416xx18]	AIGA/AIGB
EI8R	TTL	63357615	[08355xx22]	AVRE
EI8Z	Z200 MOVILINK® DDI BG1Z	63329050	[69170xx21]	KD

31543952/EN – 10/2023

Type	Electrical interface	SB-SNR	SB-NR	Connection
EI8Z	Z201 MOVILINK® DDI BG1Z	63329069	[69173xx21]	KD
EI8Z	Z200A MOVILINK® DDI + KD1 (M23) External brake rectifier	63329077	[69171xx21]	KD1
EI8Z	Z201A MOVILINK® DDI + KD1 (M23) BG.Z	63329085	[69174xx21]	KD1
EI8Z	Z200B MOVILINK® DDI + KDB (M40) External brake rectifier	63329093	[69172xx21]	KDB
EI8Z	Z200B MOVILINK® DDI + KDB (M40) BG.Z	63329115	[69175xx21]	KDB
EI8Z	Z201C MOVILINK® DDI + BG1Z + KDD (M23)	63338742	[69177xx21]	KDD
EI8Z	Z200C MOVILINK® DDI + KDD (M23)	63338734	[69178xx21]	KDD
EK8C	HTL/TTL (RS422)	63377500	---	A1GA/A2GA
EK8C	HTL/TTL (RS422)	63378043	---	AIGA/AIGB
EK8C	HTL/TTL (RS422)	63377454	---	KIGA (AIGA)
EK8C	HTL/TTL (RS422)	63378108	---	AE
EK8R	TTL (RS422)	63377500	---	A1GA/A2GA
EK8R	TTL (RS422)	63378043	---	AIGA/AIGB
EK8R	TTL (RS422)	63377454	---	KIGA (AIGA)
EK8R	TTL (RS422)	63378108	---	AE
EK8S	1 Vpp sin/cos + RS485	63377500	---	A1GA/A2GA
EK8S	1 Vpp sin/cos + RS485	63378043	---	AIGA/AIGB
EK8S	1 Vpp sin/cos + RS485	63377454	---	KIGA (AIGA)
EK8S	1 Vpp sin/cos + RS485	63378108	---	AE
EK8Z	Z200 MOVILINK® DDI BG1Z	63329050	[69170xx21]	KD
EK8Z	Z201 MOVILINK® DDI BG1Z	63329069	[69173xx21]	KD
EK8Z	Z200A MOVILINK® DDI + KD1 (M23) External brake rectifier	63329077	[69171xx21]	KD1
EK8Z	Z201A MOVILINK® DDI + KD1 (M23) BG.Z	63329085	[69174xx21]	KD1
EK8Z	Z200B MOVILINK® DDI + KDB (M40) External brake rectifier	63329093	[69172xx21]	KDB
EK8Z	Z200B MOVILINK® DDI + KDB (M40) BG.Z	63329115	[69175xx21]	KDB
EK8Z	Z201C MOVILINK® DDI + BG1Z + KDD (M23)	63338742	[69177xx21]	KDD

31543952/EN – 10/2023

Type	Electrical interface	SB-SNR	SB-NR	Connection
EK8Z	Z200C MOVILINK® DDI + KDD (M23)	63338734	[69178xx21]	KDD
ES7C	HTL/TTL (RS422)	63377500	---	AD
ES7R	HTL/TTL (RS422)	63377500	---	AD
ES7S	1 Vpp sin/cos + RS485	63377500	---	AD
EV8C	HTL/TTL (RS-422)	63377500	---	A1GA/A2GA
EV8C	HTL/TTL (RS422)	63377454	---	KIGA (AIGA)
EV8R	HTL/TTL (RS-422)	63377500	---	A1GA/A2GA
EV8R	TTL (RS422)	63377454	---	KIGA (AIGA)
EV8S	1 Vpp sin/cos + RS485	63377454	---	KIGA (AIGA)
EV8S	HTL/TTL (RS422)	63377500	---	A1GA/A2GA

31543952/EN – 10/2023

Absolute encoder

The wiring diagrams can be accessed via the SEW-EURODRIVE Online Support portal by specifying the wiring diagram part number (SB-SNR) or the wiring diagram number (SB-NR).

Type	Electrical interface	SB-SNR	SB-NR	Connection
AG7W	1 Vpp sin/cos + RS485	63377926	---	AD
AG7W	1 Vpp sin/cos + RS485	63377918	---	AIGA
AG7Y	1 Vpp sin/cos + SSI	63377926	---	AD
AH7Y	TTL (RS422) + SSI	63121085	[08259xx07]	AD
AK8H	HIPERFACE®	63377926	---	A1GA/A2GA
AK8H	HIPERFACE®	63377918	---	KIGA (AIGA)
AK8H	HIPERFACE®	63377276	---	AIGA/AIGB
AK8H	HIPERFACE®	63377292	---	AE
AK8W	1 Vpp sin/cos + RS485	63377926	---	A1GA/A2GA
AK8W	1 Vpp sin/cos + RS485	63377918	---	KIGA (AIGA)
AK8W	1 Vpp sin/cos + RS485	63377276	---	AIGA/AIGB
AK8W	1 Vpp sin/cos + RS485	63377292	---	AE
AK8Y	1 Vpp sin/cos + SSI	63377926	---	A1GA/A2GA
AK8Y	1 Vpp sin/cos + SSI	63377918	---	KIGA (AIGA)
AK8Y	1 Vpp sin/cos + SSI	63377276	---	AIGA/AIGB
AK8Y	1 Vpp sin/cos + SSI	63377292	---	AE
AK8Z	Z200 MOVILINK® DDI BG1Z	63329050	[69170xx21]	KD
AK8Z	Z201 MOVILINK® DDI BG1Z	63329069	[69173xx21]	KD
AK8Z	Z200A MOVILINK® DDI + KD1 (M23) External brake rectifier	63329077	[69171xx21]	KD1
AK8Z	Z201A MOVILINK® DDI + KD1 (M23) BG.Z	63329085	[69174xx21]	KD1
AK8Z	Z200B MOVILINK® DDI + KDB (M40) External brake rectifier	63329093	[69172xx21]	KDB
AK8Z	Z200B MOVILINK® DDI + KDB (M40) BG.Z	63329115	[69175xx21]	KDB
AK8Z	Z201C MOVILINK® DDI + BG1Z + KDD (M23)	63338742	[69177xx21]	KDD
AK8Z	Z200C MOVILINK® DDI + KDD (M23)	63338734	[69178xx21]	KDD
AS7W	1 Vpp sin/cos + RS485	63377926	---	AD
AS7W	1 Vpp sin/cos + RS485	63377918	---	AIGA
AS7Y	1 Vpp sin/cos + SSI	63377926	---	AD
AS7Y	1 Vpp sin/cos + SSI	63377918	---	AIGA

31543952/EN – 10/2023

Type	Electrical interface	SB-SNR	SB-NR	Connection
AV8H	HIPERFACE®	63377926	---	A1GA/A2GA
AV8H	HIPERFACE®	63377918	---	KIGA (AIGA)
AV8W	1 Vpp sin/cos + RS485	63377926	---	A1GA/A2GA
EV8W	1 Vpp sin/cos + RS485	63377926	---	A1GA/A2GA
AV8W	1 Vpp sin/cos + RS485	63377918	---	KIGA (AIGA)
AV8Y	1 Vpp sin/cos + SSI	63377918	---	KIGA (AIGA)
AV8Y	1 Vpp sin/cos + SSI	63377926	---	A1GA/A2GA
EK8W	1 Vpp sin/cos + RS485	63377926	---	A1GA/A2GA
EK8W	1 Vpp sin/cos + RS485	63377918	---	KIGA (AIGA)
EK8W	1 Vpp sin/cos + RS485	63377276	---	AIGA/AIGB
EK8W	1 Vpp sin/cos + RS485	63377292	---	AE
EV8W	1 Vpp sin/cos + RS485	63377918	---	KIGA (AIGA)

Resolver

The wiring diagrams can be accessed via the SEW-EURODRIVE Online Support portal by specifying the wiring diagram part number (SB-SNR) or the wiring diagram number (SB-NR).

Type	Electrical interface	SB-SNR	SB-NR	Connection
RK8M	Analog, modulated	63359685	[68465xx22]	A1GA/A2GA
RK8M	Analog, modulated	63374935	---	KIGA (AIGA)
RK8M	Analog, modulated	63377306	---	AE
RK8M	Analog, modulated	63377284	---	AIGA/AIGB

Encoder mounting adapters

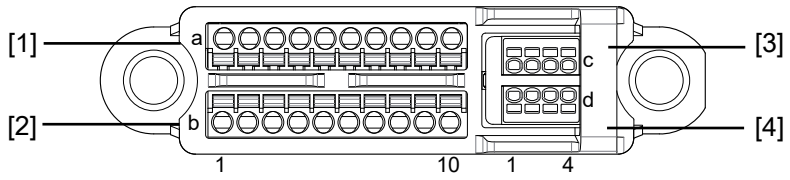
Encoder mounting adapters prepare the motor for retrofitting an encoder. The wiring diagrams of the respective encoder that is being retrofitted are therefore applicable.

31543952/EN – 10/2023

6.3.2 Structure of wiring diagram of EI7. built-in encoder

Connection via terminal strip

The encoder is equipped with a 10-pole terminal strip for connection:



29160248331

[1]	The range 1a – 10a has been pre-configured by SEW-EURODRIVE. It must not be changed.
[2]	The range 1b – 10b is intended for connection by the customer.
[3]	The range 1c – 4c has been pre-configured by SEW-EURODRIVE. It must not be changed.
[4]	The range 1d – 4d has been pre-configured by SEW-EURODRIVE. It must not be changed by the customer.

Basic connection:

The connections 1a – 10a, 1c – 4c and 1d – 4d lead to the encoder and/or the motor.

The connections 1b – 10b lead to the cable gland.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
a	TF1[1)]	TF1[1)]	TF2[1)] opt.	TF2[1)] opt.	+UB (GY)	GND (PK)	A (BN)	$\overline{A}$ (WH)	$\overline{B}$ (YE)	B (GN)
b	TF1[1)]	TF1[1)]	TF2[1)] opt.	TF2[1)] opt.	+UB	GND	A	$\overline{A}$	B	$\overline{B}$

1) TF, PI, PK motor temperature sensor (operation only in protective extra-low voltage)

Pin assignment EI7**C**				
	1	2	3	4
c	GND_ Config (BU)	n. c.	n. c.	n. c.
d	EI7C (RD)	n. c.	n. c.	n. c.

Pin assignment EI7**6**				
	1	2	3	4
c	GND_ Config (BU)	n. c.	n. c.	n. c.
d	n. c.	EI76 (RD)	n. c.	n. c.

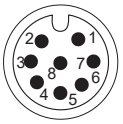
Pin assignment EI7**2**				
	1	2	3	4
c	GND_ Config (BU)	n. c.	n. c.	n. c.
d	n. c.	n. c.	EI72 (RD)	n. c.

Pin assignment EI7**1**				
	1	2	3	4
c	GND_ Config (BU)	n. c.	n. c.	n. c.
d	n. c.	n. c.	n. c.	EI71 (RD)

31543952/EN – 10/2023

Connection via M12 plug connector

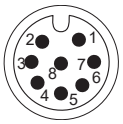
An 8-pin or a 4-pin M12 plug connector is available for the connection.

4-pin M12 plug connector AVSE		8-pin M12 plug connector AVRE	
• A-coded • Male 	Pin 1: $+V_B$ Pin 2: B Pin 3: GND Pin 4: A	• A-coded • Male 	Pin 1: $+V_B$ Pin 2: GND Pin 3: A Pin 4: $\overline{A}$ Pin 5: B Pin 6: $\overline{B}$ Pin 7: TF1 Pin 8: TF1

6.3.3 Structure of wiring diagram of EI7C FS built-in encoder

Connection via M12 plug connector

An 8-pin M12 plug connector is available on the terminal box for the connection.

8-pin M12 plug connector AVRE				
male, A-coded 	Pin 1:	$+U_B$	Pin 5:	B
	Pin 2:	GND	Pin 6:	$\overline{B}$
	Pin 3:	A	Pin 7:	n.c.
	Pin 4:	$\overline{A}$	Pin 8:	n.c.

INFORMATION

Pins 7 and 8 must **not** be used.

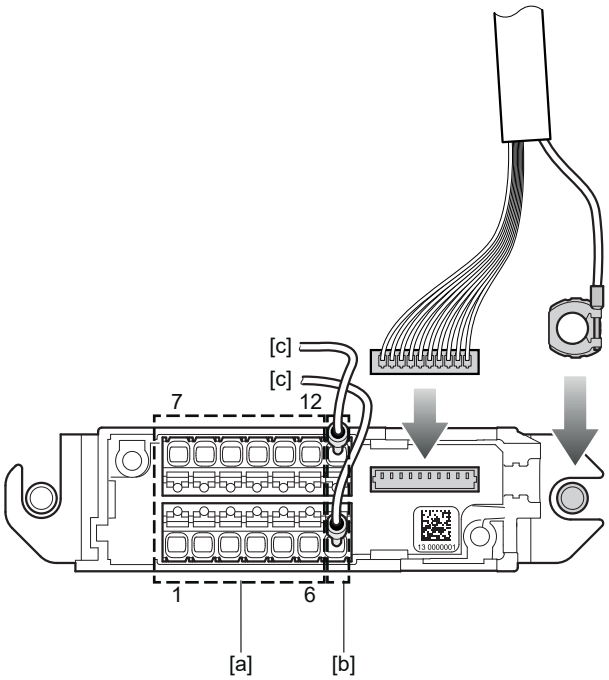
The following guidelines apply for the encoder cable:

- Max. length of the cable: 100 m. The cable length may be limited by the encoder evaluation unit.
- The minimum core cross section must meet the specifications of the encoder evaluation unit. If this value is not specified, the core cross section must be at least 0.25 mm².
- The cable must be shielded. The shield must be connected over a large surface area on both sides.
- The cable must have pairs of twisted conductors.

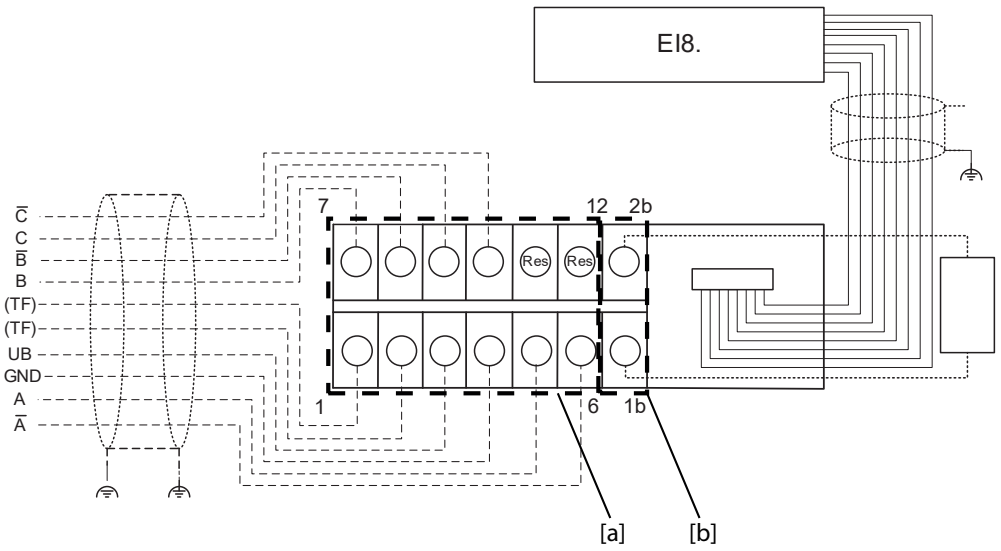
31543952/EN – 10/2023

6.3.4 Structure of wiring diagram of EI8R, EI8C

Connection unit (terminal strip)



41552400779



42439051659

[a]	The range 1 – 12 is intended for connection by the customer
[b]	The range 1b – 2b has been pre-configured by SEW-EURODRIVE. It must not be changed.
[c]	Temperature sensor

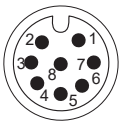
Basic connection:

The connections 1 – 12 lead to the cable gland.

1	2	3	4	5	6	7	8	9	10	11	12
(TF)	(TF)	UB	GND	A	/A	B	/B	C	/C	Res	Res

In preparation, connection via M12 plug connector

An 8-pin M12 plug connector is available for the connection.

8-pin M12 plug connector AVRE	
A-coded	Pin 1: $+U_B$
male	Pin 2: GND
	Pin 3: A
	Pin 4: n.c.
	Pin 5: B
	Pin 6: C
	Pin 7: TF
	Pin 8: TF

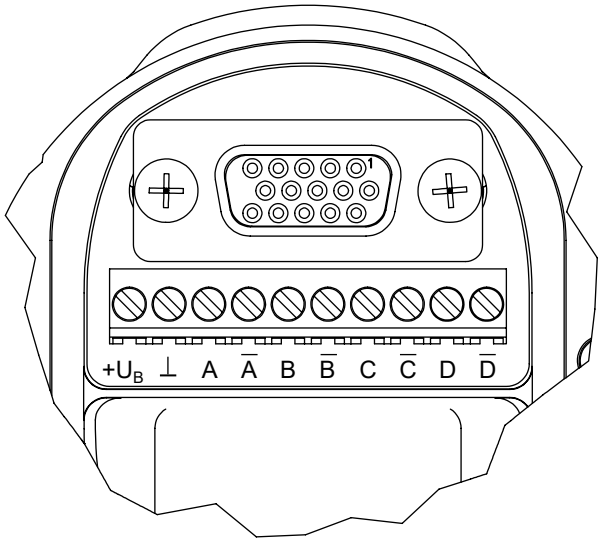
The following guidelines apply for the encoder cable:

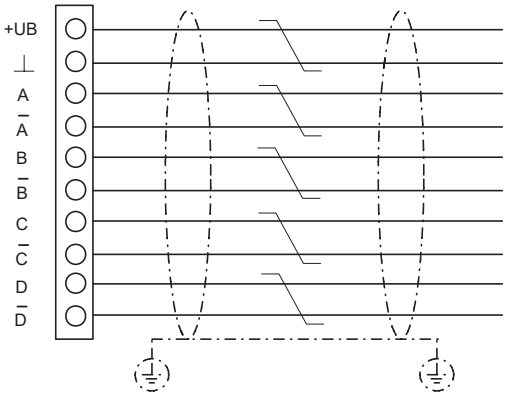
- Max. length of the cable: 100 m. The cable length may be limited by the encoder evaluation unit.
- The minimum core cross section must meet the specifications of the encoder evaluation unit. If this value is not specified, the core cross section must be at least 0.25 mm².
- The cable must be shielded. The shield must be connected over a large surface area on both sides.
- The cable must have pairs of twisted conductors.

31543952/EN – 10/2023

6.3.5 Structure of wiring diagram of EK8., AK8., ES7., AS7., EG7., AG7., RK8M add-on encoders

Observe the notes in the respective chapters about connecting your encoder when connecting the encoder.



		EK8W AK8W AS7W AG7W AV8W	AK8Y AS7Y AG7Y AV8Y	AK8H AV8H	EK8C EK8R ES7C EG7C ES7R EG7R EV8C EV8R	EK8S ES7S EG7S EV8S	RK8M
	$+U_B$	$+U_B$	$+U_B$	$+U_B$	$+U_B$	$+U_B$	R1 Ref+
	⊥	DGND	DGND	DGND	DGND	DGND	R2 Ref-
	A	Cos+	Cos+	Cos	A	Cos+	S1 Cos+
	$\overline{A}$	Cos-	Cos-	Cos Ref	$\overline{A}$	Cos-	S3 Cos-
	B	Sin+	Sin+	Sin	B	Sin+	S2 Sin+
	$\overline{B}$	Sin-	Sin-	Sin Ref	$\overline{B}$	Sin-	S4 Sin-
	C	–	Clock+	–	C	C	N.C.
	$\overline{C}$	–	Clock-	–	$\overline{C}$	$\overline{C}$	N.C.
	D	Data+	Data+	Data+	–	Data+	N.C.
	$\overline{D}$	Data-	Data-	Data-	–	Data-	N.C.

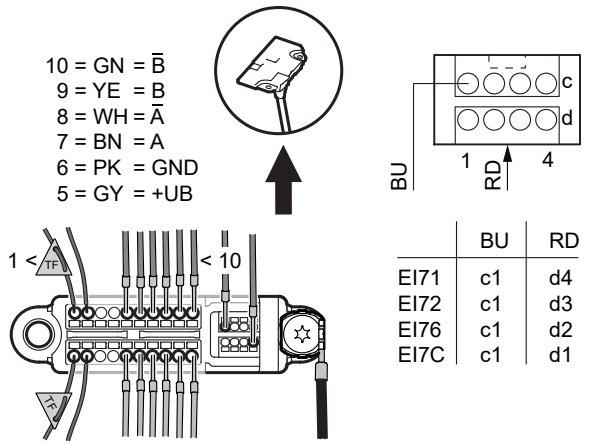
31543952/EN – 10/2023

6.4 Connecting EI7. built-in encoders

INFORMATION

Observe the wiring diagrams in chapter "Overview of wiring diagrams" (→ 🗎 159)

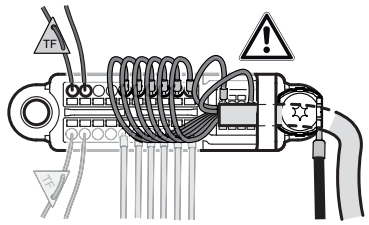
6.4.1 Wiring EI7. – with connection unit



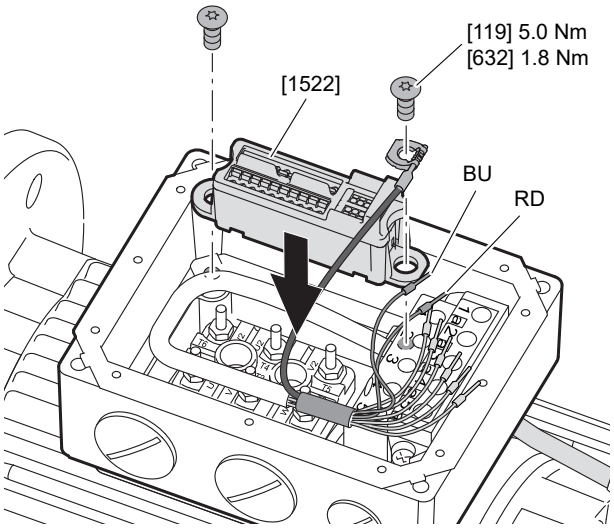
	BU	RD
EI71	c1	d4
EI72	c1	d3
EI76	c1	d2
EI7C	c1	d1

9591928587

1. Wire the connection unit [1522] in accordance with the installed encoder type and the wiring diagrams (see "Overview of wiring diagrams" (→ 🗎 159)).



9656059787

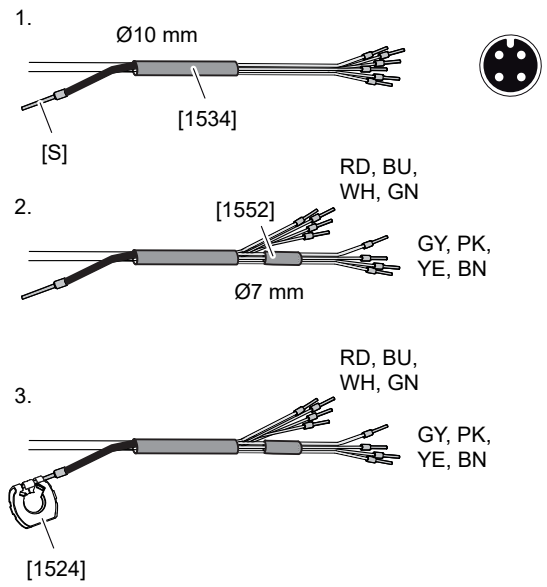


9592985483

1. Secure the connection unit with the M8 screws [119] or M4 screws [632].
   - ⇨ For M8 screws: Tightening torque 5 Nm
   - ⇨ For M4 screws: Tightening torque 1.8 Nm

31543952/EN – 10/2023

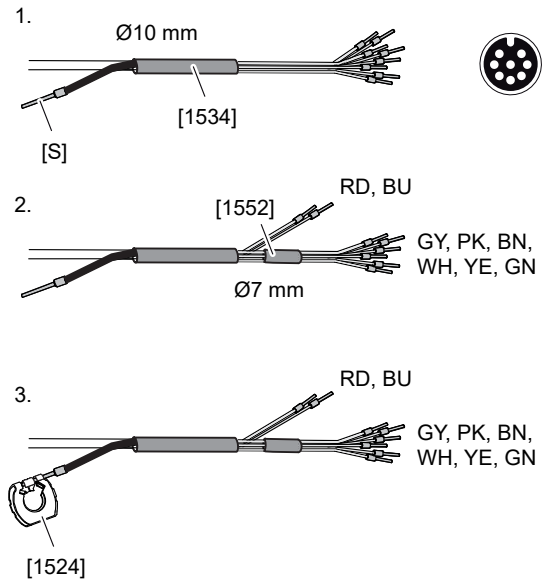
6.4.2 Wiring EI7. – with connection unit



18014407973893771

4-pin:

1. Push the long glass fiber sheathing [1534] over the single conductors of the encoder cable. Lay the shielding [S] in the opposite direction.
2. Push the short glass fiber sheathing [1552] over the single conductors.
3. Install the terminal washer [1524].

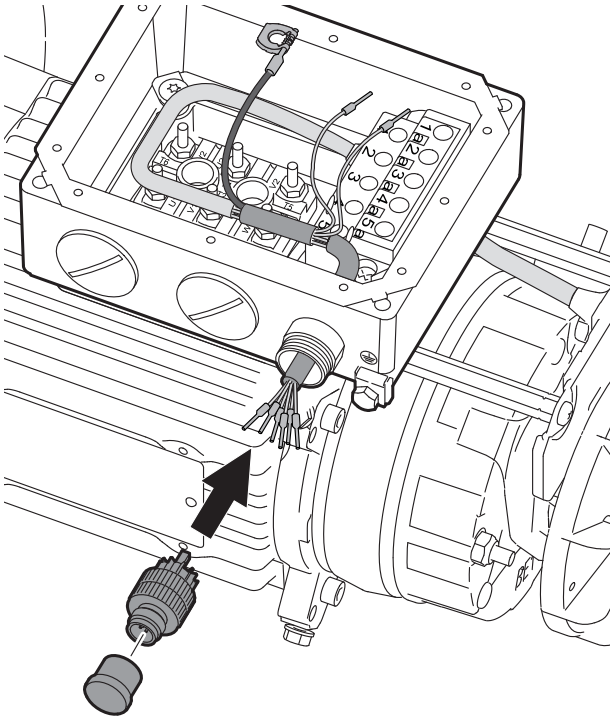


18014407973891467

8-pin:

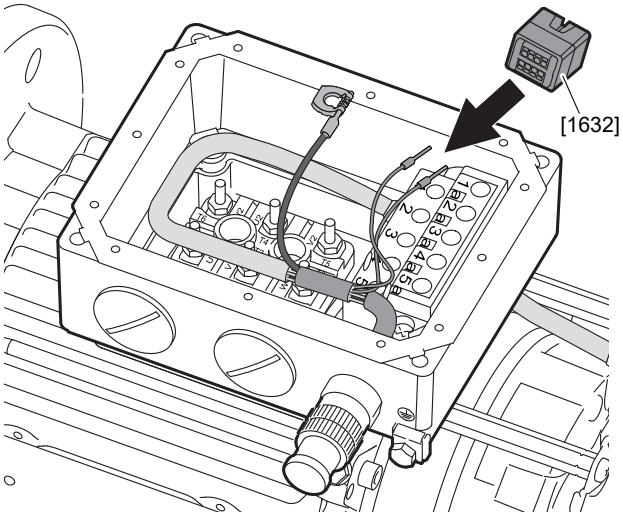
1. Push the long glass fiber sheathing [1534] over the single conductors of the encoder cable. Lay the shielding [S] in the opposite direction.
2. Push the short glass fiber sheathing [1552] over the single conductors.
3. Install the terminal washer [1524].

31543952/EN – 10/2023



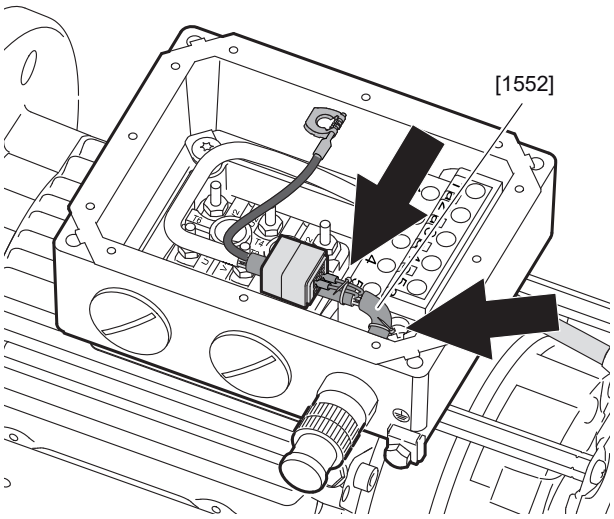
9007208847722635

1. Route the conductors through the thread reduction out of the terminal box to the outside.
2. Connect the M12 plug connector as shown in the wiring diagram (see "Overview of wiring diagrams" (→ 🗎 159)).
3. Screw the conductors to the M12 plug connector.
   ⇨ Tightening torque 0.8 Nm ± 10%
4. Fasten the connector.



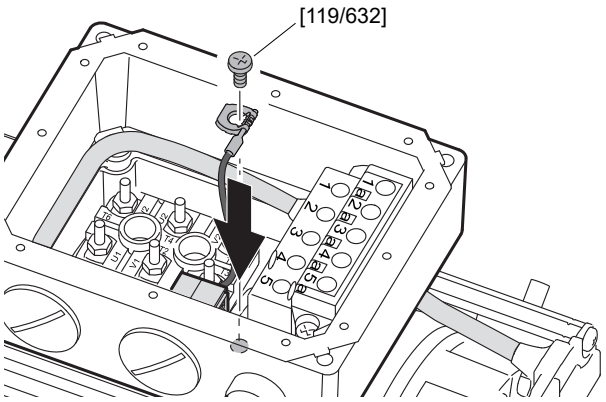
9007208847724555

1. Wire the connection unit [1632] in accordance with the previously installed encoder type (see "Overview of wiring diagrams" (→ 🗎 159)).



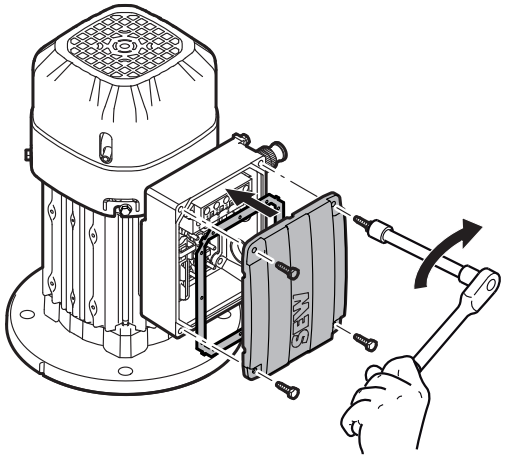
9007208847699595

1. Fasten the short glass fiber sheathing [1552] using a cable tie.
2. Fasten the connection unit using a cable tie as close to the conductor end sleeves on the glass fiber sheathing as possible.



9007208847701515

1. Screw the shielding onto the terminal box.
   - ⇨ Tightening torque [119]: 5 Nm
   - ⇨ Tightening torque [632]: 1.8 Nm



9592987403

1. Install the cover of the terminal box.
2. Fasten the cover using the screws.
   - ⇨ Tightening torque 4 Nm

31543952/EN – 10/2023

6.4.3 Connecting EI7C FS – with M12 plug connector

NOTICE

Improperly carried out work on drives with functionally safe motor options.

Loss of the safety function.

- Improperly carried out work on drives with functionally safe motor options can result in loss of the safety functions. This can cause injuries and damage.
- Only qualified specialists are allowed to carry out work on drives with functionally safe motor options.
- For information about retrofitting the EI7C FS safety encoder, contact SEW-EURODRIVE.
- With the EI7C FS built-in encoder, no work may be performed on the encoder. Place an order with SEW-EURODRIVE Service to have any necessary work on the encoder performed.

For further information, refer to the wiring diagrams in chapter "Overview of wiring diagrams" (→ 🗎 159).

6.5 Connecting EI8. built-in encoders

Observe the available wiring diagrams from the chapter "Overview of wiring diagrams" (→ 🗎 159) and the assembly procedure from "EI8. built-in encoders – DRN../DRU../DR2..71 - 132S motors, with connection unit" (→ 🗎 104) for this.

31543952/EN – 10/2023

6.6 Connecting .K8./.V8. conical encoders

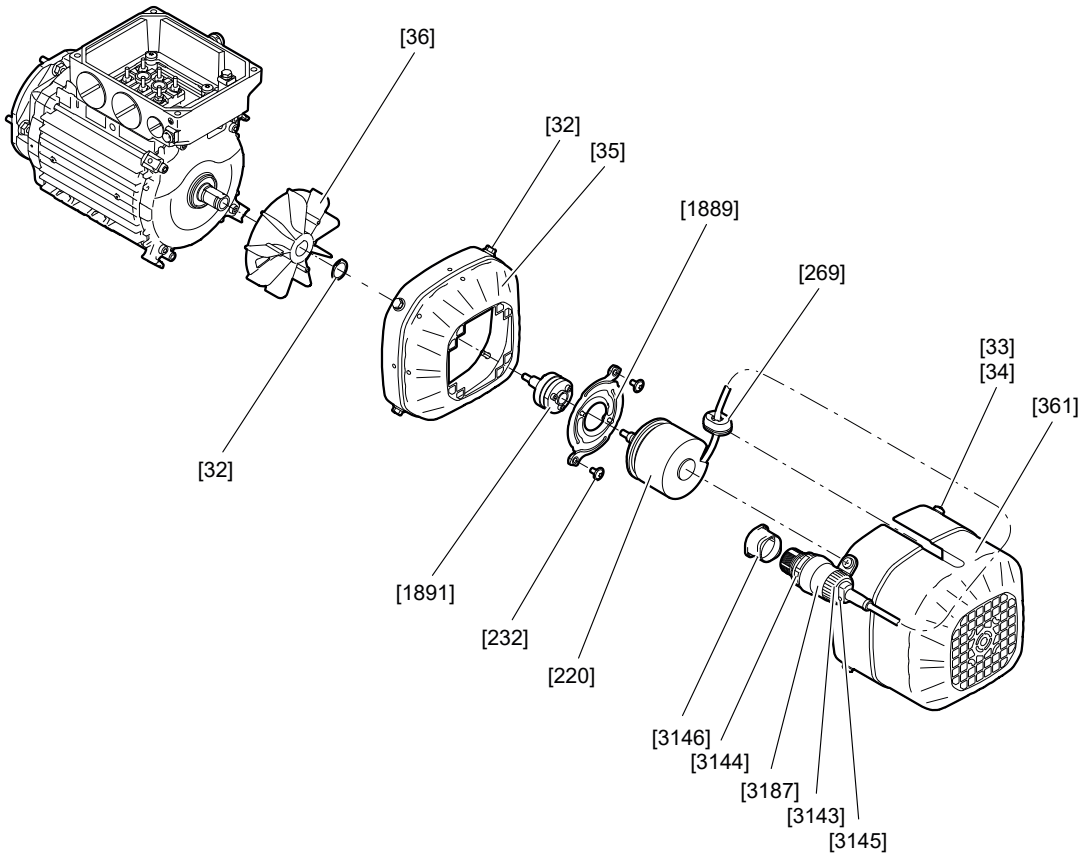
Note the available wiring diagrams from chapter "Overview of wiring diagrams" (→ 🗎 159) and the assembly procedure from "Removing/installing conical encoders" (→ 🗎 112).

6.6.1 Connecting the .K8./.V8. conical encoder with the integrated A1GA/A2GA encoder plug connector

1. Loosen the screws of the connection cover [619] and remove it.
2. Connect the encoder as shown in the wiring diagram. Observe the stripping length of 8 mm when connecting the encoder to the terminal block in the connection adapter [U]. The cable gland of the included connection adapter is suitable for cables with a diameter of 5 to 9.5 mm. Ensure that this clamping range is maintained. Note that the supplied cable gland must not be replaced with other types, as it enables use in potentially explosive atmospheres and provides suitable shielding against interference.
3. Place the connection cover [619] onto the connection adapter [U].
4. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
5. Screw the screws [E] through the bores in the connection cover [619] and into the bores in the connection adapter [U].
   ⇨ Secure the screws [E] using a medium-strength thread locker. The tightening torque is 2.25 Nm.
6. Tighten the cable gland.
   ⇨ Tightening torque 2 Nm ± 15%
7. Provide a strain relief in accordance with IEC 60079-14. Do not damage the signal cables.

31543952/EN – 10/2023

6.6.2 Connecting the .K8./.V8. conical encoder with cable and M23 plug connector directly to the KIGA encoder

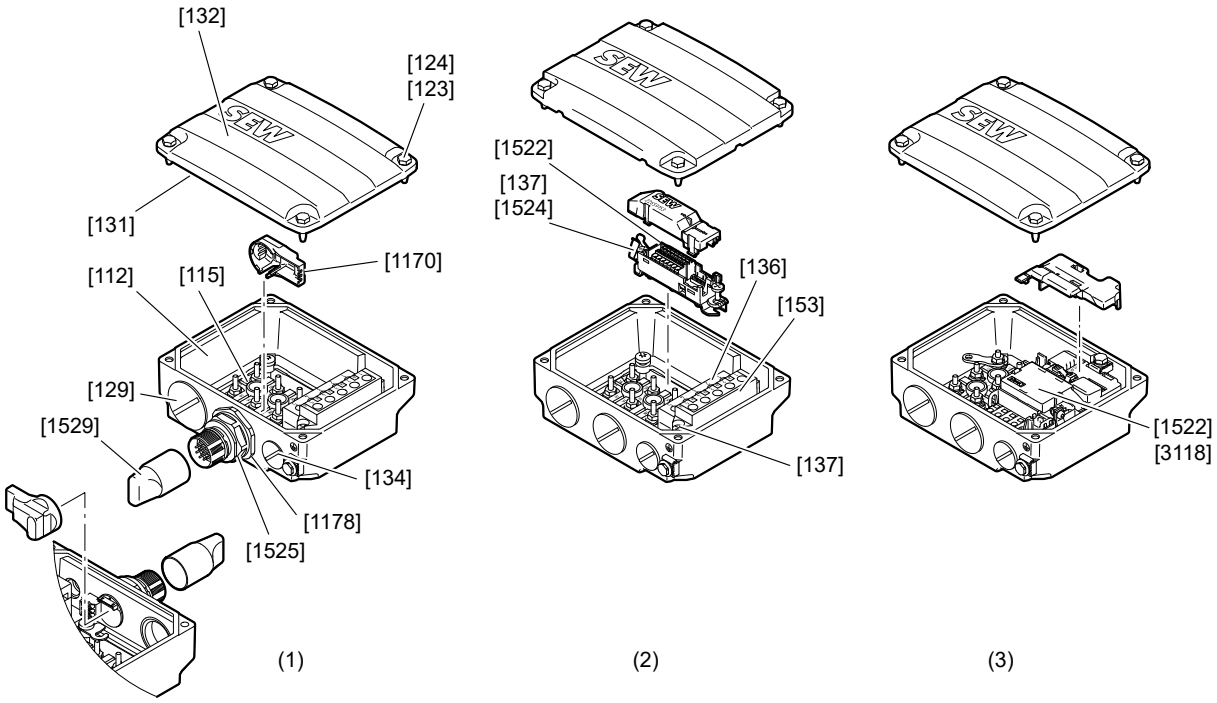


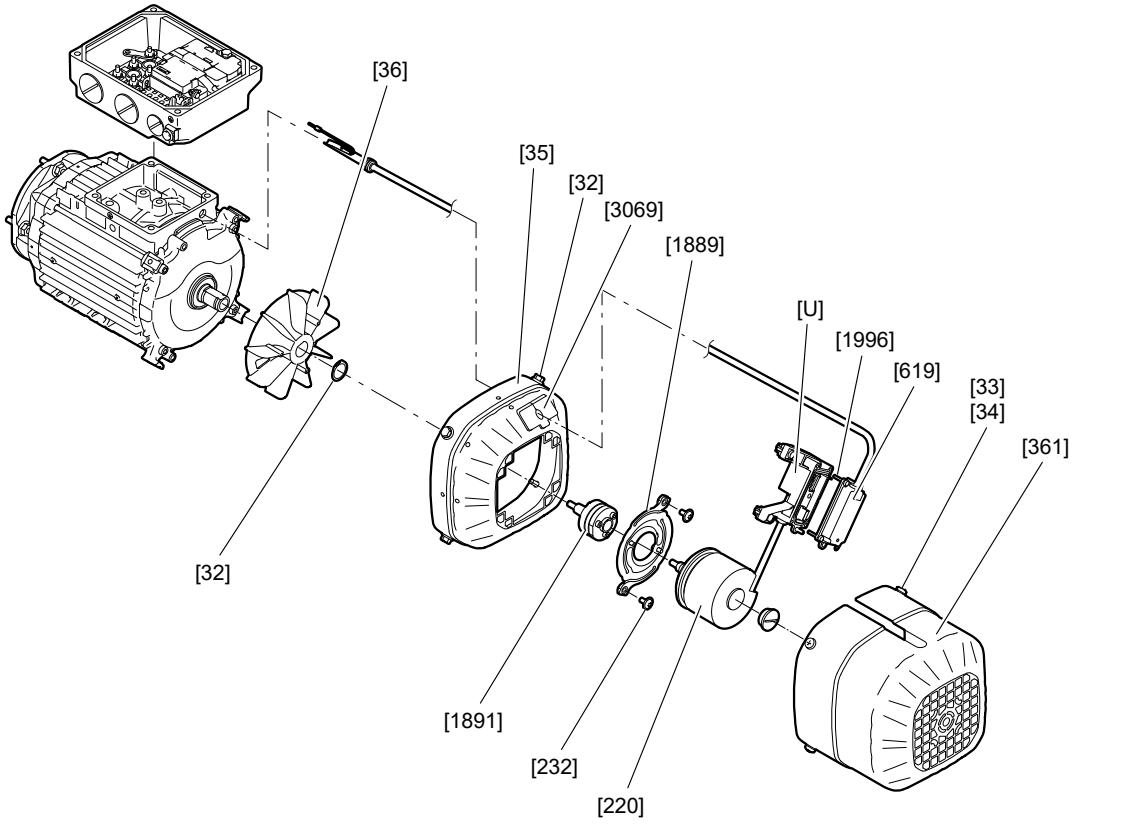
39700858379

✓ Required resources: Screwdriver

1. Release the transport protection clamp if present.
2. Remove the protection cap [3146] of the M23 plug connector [3144].
3. Connect the M23 plug connector [3144] to the corresponding connection cable with the M23 mating connector.
4. Ensure adequate strain relief.

6.6.3 Terminal box connections





9007238955601803

Connecting the .K8./.V8. conical encoder to the M23 plug connector on the AIGA/AIGB terminal box (1)

✓ Required resources: Screwdriver

1. Remove the protection cap [1529] of the M23 connector [1525].
2. Connect the M23 connector [1525] to the corresponding connection cable with the M23 mating connector [1].

Connecting the .K8./.V8. conical encoder to the connection unit in the terminal box (2)

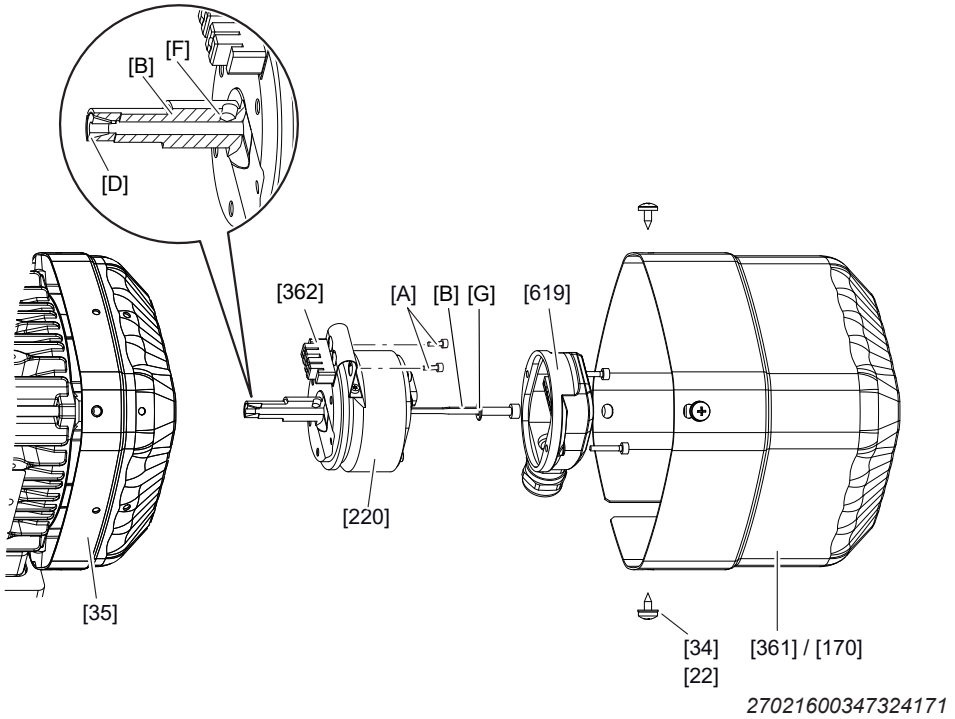
1. Unscrew the screws [123] to remove the terminal box cover [132].
2. Remove the cover of the connection unit [1522] by pressing the cover on both sides behind the cable bushing.
3. Connect the customer's evaluation unit for the encoder to the connection unit [1522] with a shield plate. Attach the cover of the connection unit [1522].
4. Mount the terminal box cover [132] using the screws [123] (4xM5 SW8).
   ⇨ Tightening torque 4 Nm

Connecting the .K8./.V8. conical encoder to DDI KD1, KDB, KD or KDD (3)

For more information, refer to the addendum to the "AC motors with MOVILINK® DDI interface" operating instructions.

31543952/EN – 10/2023

6.7 Connecting .S7./.V7./.G7. spread-shaft encoders/plug-in-shaft encoders



27021600347324171

1. Remove the safety cover [361] or the forced cooling fan [170] if applicable.
2. Loosen the screws of the connection cover [619] and remove it.
3. Connect the encoder as shown in the wiring diagram.
4. Screw on the connection cover [619].
   - ⇨ For size 71 – 132S: Tightening torque 2.25 Nm
   - ⇨ For size 132M – 315: Tightening torque 2.25 Nm ± 10%
5. Tighten the cable gland.
   - ⇨ Tightening torque 2 Nm ± 15%
6. Provide a strain relief in accordance with IEC 60079-14. Do not damage the signal cables.
7. Mount the safety cover [361] or the forced cooling fan [170] if applicable.
   - ⇨ Tightening torque for screw [22]: 3.3 Nm
   - ⇨ Tightening torque for screw [34]: 2 Nm

6.8 Connecting third-party encoders

When using third-party encoders, observe the installation requirements of the supplied manufacturer's operating instructions.

31543952/EN – 10/2023

7 Operation

7.1 General information

⚠ WARNING

Risk of injury if the drive starts up unintentionally.

Severe or fatal injuries.

- Before you start working on the unit, disconnect the motor and all connected options from the power supply.
- Secure the motor against unintended power-up.

⚠ CAUTION

The surfaces on the drive can be very hot during operation.

Risk of burns.

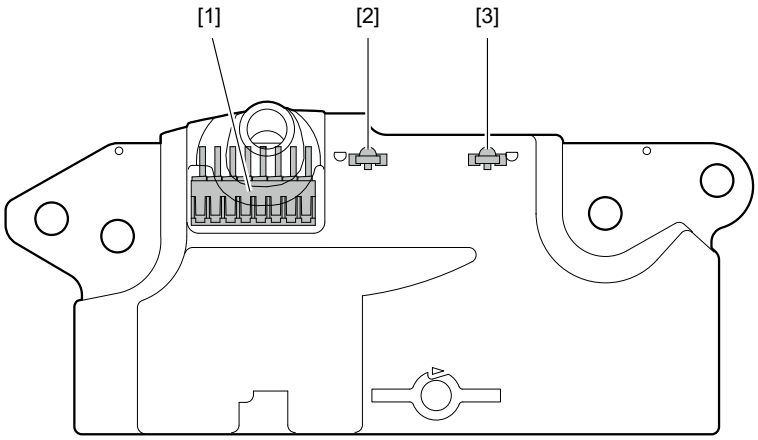
- Let the motor cool down sufficiently before you start working on it.

31543952/EN – 10/2023

7.2 Visual feedback of EI7., EI8. built-in encoders

7.2.1 Visual feedback of EI7. built-in encoders

The EI7. encoders use 2 duo LEDs (red + green in each case) to provide visual feedback on the operating state.



9007239132326411

[1] Plug connector

[2] Duo LED - H1

[3] Duo LED - H2

LED H1 – Status and error

The green LED indicates the status or the configuration of the encoder. It is designed to be flashing. The flashing frequency indicates the set number of periods.

LED H1 green	
Flash code	**Status/configuration**
LED off	Encoder de-energized or defective
0.6 Hz	EI71 (1 period per revolution)
1.2 Hz	EI72 (2 periods per revolution)
3 Hz	EI76 (6 periods per revolution)
15 Hz	EI7C (24 periods per revolution)
LED continuously on	Defective encoder

Errors detected by the encoder activate the red LED.

LED H1 red	
Flash code	**Meaning**
10 s with 1 Hz and 2 s continuously	No valid period number can be set
Miscellaneous	Output driver reports an error (e.g. due to short circuit, overtemperature)

31543952/EN – 10/2023

LED H2 - Signal track state

LED color	Track A	Track B	Track /A	Track /B
Orange (green and red)	0	0	1	1
Red	0	1	1	0
Green	1	0	0	1
Off	1	1	0	0

31543952/EN – 10/2023

7.2.2 EI7C FS visual feedback

The LED display, visible when the fan guard is removed, provides visual feedback about the signal track state.

A red LED and a green LED are used as a status display for the EI7C FS safety encoder.

- The **green** LED indicates the current status.
- The **red** LED is used to display an error history by means of a flash code.

The last error that occurred since the last switch-on process is always shown in the error history.

Indicating the normal state

During normal operation, the green status LED lights up constantly. Usually, no error has occurred and the red error history LED is off. If an error already occurred before the current normal operating state, this is indicated by the flash code on the red LED described below.

Indicating an internal diagnostics error

Encoder EI7C FS has its own diagnostics system. If this diagnostics system has a fault, the encoder enters a fault status. The fault can be reset by switching off the supply voltage of the encoder and then switching it back on.

Indicating service mode

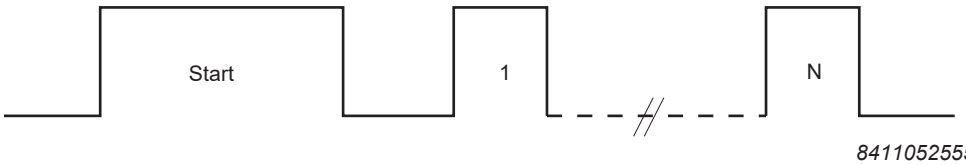
If the encoder is supplied with a voltage lower than that specified in chapter "EI7C FS" (→ 🗎 216) when it is switched on, it will automatically switch to the service mode. The service mode is used to configure and adjust the encoder. It may not be used as a safety encoder in this operating state.

During the process, the output drivers are disabled. The red error history LED indicates the service mode by lighting up constantly. The green status LED reports the distance between the encoder module and the fan wheel.

Pending service work on the encoder may be performed only by SEW-EURODRIVE.

Indicating error statuses

The start of an error code is indicated by a long pulse (START). The number of brief flash pulses indicates the most recent error since the encoder was switched on. The long START signal does not count as part of this number. The figure shows the structure of the flash code. The "Normal operation" (→ 🗎 185) table provides an overview of possible error statuses and the defined LED signals for these statuses.



8411052555

31543952/EN – 10/2023

LED codes for the operating statuses

Normal operation

Displayed status	Green LED (status)		Red LED (error)
No voltage or defective	OFF		OFF
Internal diagnostics error	ON		ON
No error	ON		OFF
Currently no error Last error is displayed.	ON		Fault code
An error is currently present Current error is displayed.	OFF		Fault code
		Temperature error	1x
		Supply voltage fault	2x
		Analog signal error	3x
		Error in digital track A or B	4x
		Travel distance error	5x
		Output driver error	6x

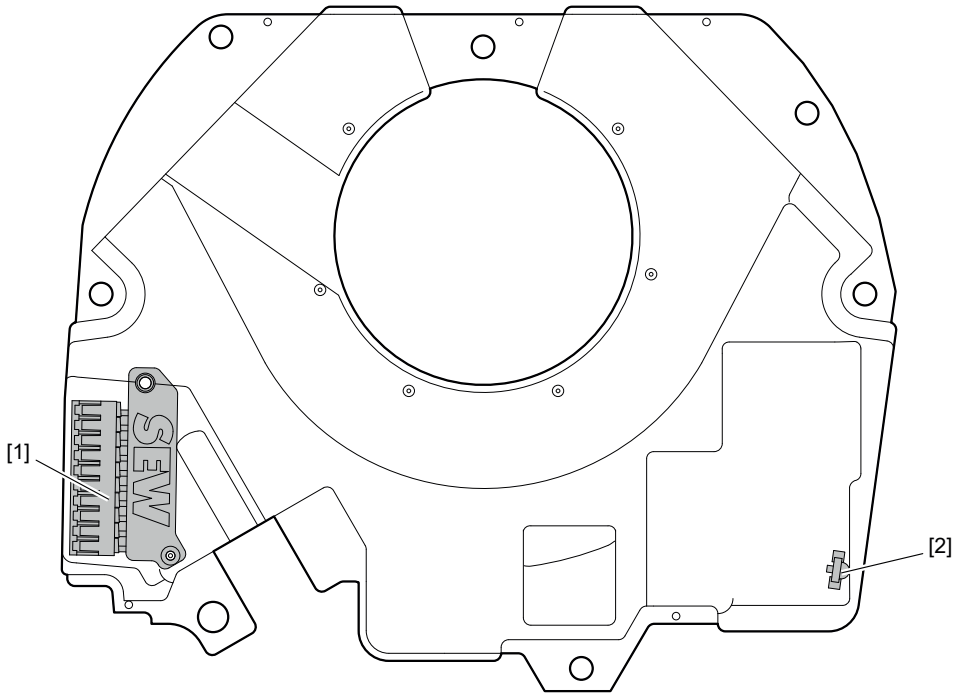
Service operation/setup mode

Status	Meaning	Green LED	Red LED
Service operation/setup mode (Defined voltage range while switching on)	Amplitude OK	OFF	ON
	Amplitude is too high	Flashes (approx. 2 Hz)	ON
	Amplitude is too low	Flashes (approx. 0.5 Hz)	ON

31543952/EN – 10/2023

7.2.3 Visual feedback of EI8C, EI8R built-in encoders

The EI8. built-in encoders report their operating state visually via a duo LED.



9007239132221835

[1] Plug connector

[2] Duo LED

Flash code	Meaning
Off	Encoder not supplied or defective
Permanently green	Encoder operational, no errors
Red/orange, permanent or flashing	Encoder reports self-diagnostic information or an error. The meaning depends on the color and the frequency.

31543952/EN – 10/2023

Diagnostics LED color orange/red	Meaning and measures
Red	Encoder diagnostics has detected an error. Permanently lit: Error regarding the internal encoder sensors (incremental sensors) Flashes 5 Hz: Error regarding the internal encoder sensors (index sensors): • Check the encoder and pole ring for damage or magnetizable contamination. Replace or clean the fan if necessary. • Check the fan to ensure it is seated correctly and check the distance between the pole ring and encoder. If necessary, adjust and secure the fan and pole ring (see chapter "Removing and mounting built-in encoder EI8."). Flashes 1 Hz: Error regarding the encoder module electrical interface: • Short circuit/overcurrent of the signal tracks: Eliminate the short circuit or limit the output current of the encoder module. • Interference on the signal tracks: Eliminate the external interference. Observe the information regarding connection technology.
Orange	Encoder diagnostics signals a warning (function of the encoder is given, maintenance may be required). Permanently lit: Warning regarding the internal encoder sensors (incremental sensors). • If necessary, implement any necessary measures; see "Diagnostics red" as maintenance measures. Flashes 1 Hz: Warning regarding the internal memory (encoder signal correction). • The encoder signal correction is reinitialized every time the encoder is started.

If none of the measures are successful, contact SEW-EURODRIVE Service. In this case, decommission the built-in encoder.

31543952/EN – 10/2023

7.2.4 Visual feedback of the EI8Z built-in encoder

The EI8. built-in encoders report their operating state visually via a duo LED. The feedback depends on the version of the firmware of the MOVILINK® DDI communication unit together with the EI8Z encoder.

The firmware version can be determined with the MOVISUITE® engineering software from SEW-EURODRIVE under the device and option characteristics of the motor with MOVILINK® DDI.

If none of the measures are successful, contact SEW-EURODRIVE Service. In this case, decommission the built-in encoder.

EI8Z visual feedback with firmware version 2.00 or later

LED color	Meaning
Off	Encoder not supplied or defective
Permanently green	Encoder operational, no errors
Permanently yellow	The encoder is reporting self-diagnostic information. The function of the encoder is given without restriction. The mechanical adjustment of the encoder is within the permitted tolerance range. • No measures are required. • In the case of applications with vibration stress or highly fluctuating ambient temperatures, we recommend a mechanical adjustment of the fan and of the distance between the pole ring and the encoder if there are functional errors. (Note the operating instructions or addendum to the operating instructions for the motor in chapter "Removing and mounting built-in encoder EI8.").
Permanently red Inverter error message; error 13.26, 13.27 on the inverter and in MOVISUITE®	Encoder reports self-diagnostic information or an error. The mechanical adjustment of the encoder is outside the permitted tolerance range. This error is also reported on the inverter. • Check the encoder and pole ring for damage or magnetizable contamination. Replace or clean the fan if necessary. • Check the fan to ensure it is seated correctly and check the distance between the pole ring and encoder. If necessary, adjust and secure the fan and pole ring, see chapter "Removing and mounting built-in encoder EI8.".

31543952/EN – 10/2023

EI8Z visual feedback with firmware version 1.00

In firmware version 1.00, the visual feedback of the EI8Z encoder is exclusively for product support. Note that, regardless of the LED color, an error will only be reported via an error message from the inverter as described below:

Diagnostics	Meaning and measures
Inverter error message; error 13.26, 13.27 on the inverter and in MOVISUITE®	The encoder diagnostics has detected an error or the encoder is defective. The mechanical adjustment of the encoder is outside the permitted tolerance range. This error is also reported on the inverter. • Check the encoder and pole ring for damage or magnetizable contamination. Replace or clean the fan if necessary. • Check the fan to ensure it is seated correctly and check the distance between the pole ring and encoder. If necessary, adjust and secure the fan and pole ring (see chapter "Removing and mounting built-in encoder EI8.").

8 Inspection/maintenance

8.1 General information

⚠ WARNING

Maintenance and replacement as well as retrofitting of an inverter should be performed only by trained specialists. Contact SEW-EURODRIVE Service in case of maintenance work or when retrofitting.

⚠ WARNING

Risk of injury if the drive starts up unintentionally.

Severe or fatal injuries.

- Before you start working on the unit, disconnect the motor and all connected options from the power supply.
- Secure the motor against unintended power-up.

NOTICE

Improperly carried out work on drives with functionally safe motor options.

Loss of the safety function.

- Improperly carried out work on drives with functionally safe motor options can result in loss of the safety functions. This can cause injuries and damages.
- Only qualified specialists are allowed to carry out work on drives with functionally safe motor options.
- For the retrofitting of the EI7C as a safety encoder, contact SEW-EURODRIVE.
- With the EI7C FS built-in encoder, no work may be performed on the encoder. Place an order with SEW-EURODRIVE Service to have any necessary work on the encoder performed.

⚠ CAUTION

The surfaces on the drive can be very hot during operation.

Risk of burns.

- Let the motor cool down sufficiently before you start working on it.

NOTICE

Improper troubleshooting measures may damage the drive.

The drive system might be damaged.

- Use only genuine spare parts in accordance with the valid parts list.

31543952/EN – 10/2023

8.2 Service

Have the following information available if you require customer service assistance:

- Nameplate data (complete)
- Type and extent of the failure
- Time the failure occurred and any accompanying circumstances
- Assumed cause
- Ambient conditions, e.g.:
  - Ambient temperature
  - Humidity
  - Installation altitude
  - Dirt
  - etc.

31543952/EN – 10/2023

8.3 Spare parts

8.3.1 EI7. service kits and retrofit sets

Retrofit set

The retrofit set includes the materials required to add an EI7. encoder onto an existing motor.

The following main components are included in the retrofit sets:

- Encoder module
- Fan
- Connection unit
- Fastening material

The following pieces of information are required for the selection of the correct material:

- Motor size
- Brakemotor or motor with backstop (relevant for motor sizes 71-132 – not relevant for size 63)
- Connection option with or without M12 connector

EI7. retrofit set with connection unit

AE = Connection unit

FS = Functional safety

Type	Motor size	Brake	Connection	FS	Material short text	Part number
EI7.	DRN/DRU../ DR2..71	Not relevant	AE	---	Retrofit set	28212185
EI7.	DRN/DRU../ DR2..80	Not relevant	AE	---	Retrofit set	28212207
EI7.	DR.90-100 DR2.90	With brake	AE	---	Retrofit set	28212223
EI7.	DR2.100	With brake	AE	---	Retrofit set	28225538
EI7.	DRN/DRU../ DR2..112-132	Not relevant	AE	---	Retrofit set	28212258

31543952/EN – 10/2023

EI7. retrofit set with M12 plug connector connection option

FS = Functional safety

Type	Motor size	Brake	Connec-tion	FS	Material short text	Part num-ber
EI7C	DRN63	Without brake	M12	---	Retrofit set	28251822
EI7C	DRN63	BE03	M12	---	Retrofit set	28251830
EI7.	DRN/DRU../ DR2..71	Not relevant	M12	---	Retrofit set	28214315
EI7.	DRN/DRU../ DR2..80	Not relevant	M12	---	Retrofit set	28214323
EI7.	DR.90-100 DR2.90	With brake	M12	---	Retrofit set	28214331
EI7.	DR2.100	With brake	M12	---	Retrofit set	28225546
EI7.	DRN/DRU../ DR2..112-132	Not relevant	M12	---	Retrofit set	28214358

31543952/EN – 10/2023

Service kits

The service kit includes all of the materials required to replace a defective encoder.

The following main components are included in the service kits:

- Encoder module
- Fan
- Connection unit
- Fastening material

The following pieces of information are required for the selection of the correct material:

- Motor size
- Brakemotor or motor with backstop (relevant for motor sizes 71-132 – not relevant for size 63)
- Connection option with or without M12 connector

EI7. service kits with connection unit

AE = Connection unit

FS = Functional safety

Type	Motor size	Brake	Connection	FS	Material short text	Part number
EI7.	DRN/DRU../ DR2..71	Not relevant	AE	---	Service kit	28214404
EI7.	DRN/DRU../ DR2..80	Not relevant	AE	---	Service kit	28214420
EI7.	DR..90-100 DR2.90	With brake	AE	---	Service kit	28214447
EI7.	DR2.100	With brake	AE	---	Service kit	28225554
EI7.	DRN/DRU../ DR2..112-132	Not relevant	AE	---	Service kit	28214463

31543952/EN – 10/2023

EI7. service kits with M12 plug connector connection option

FS = Functional safety

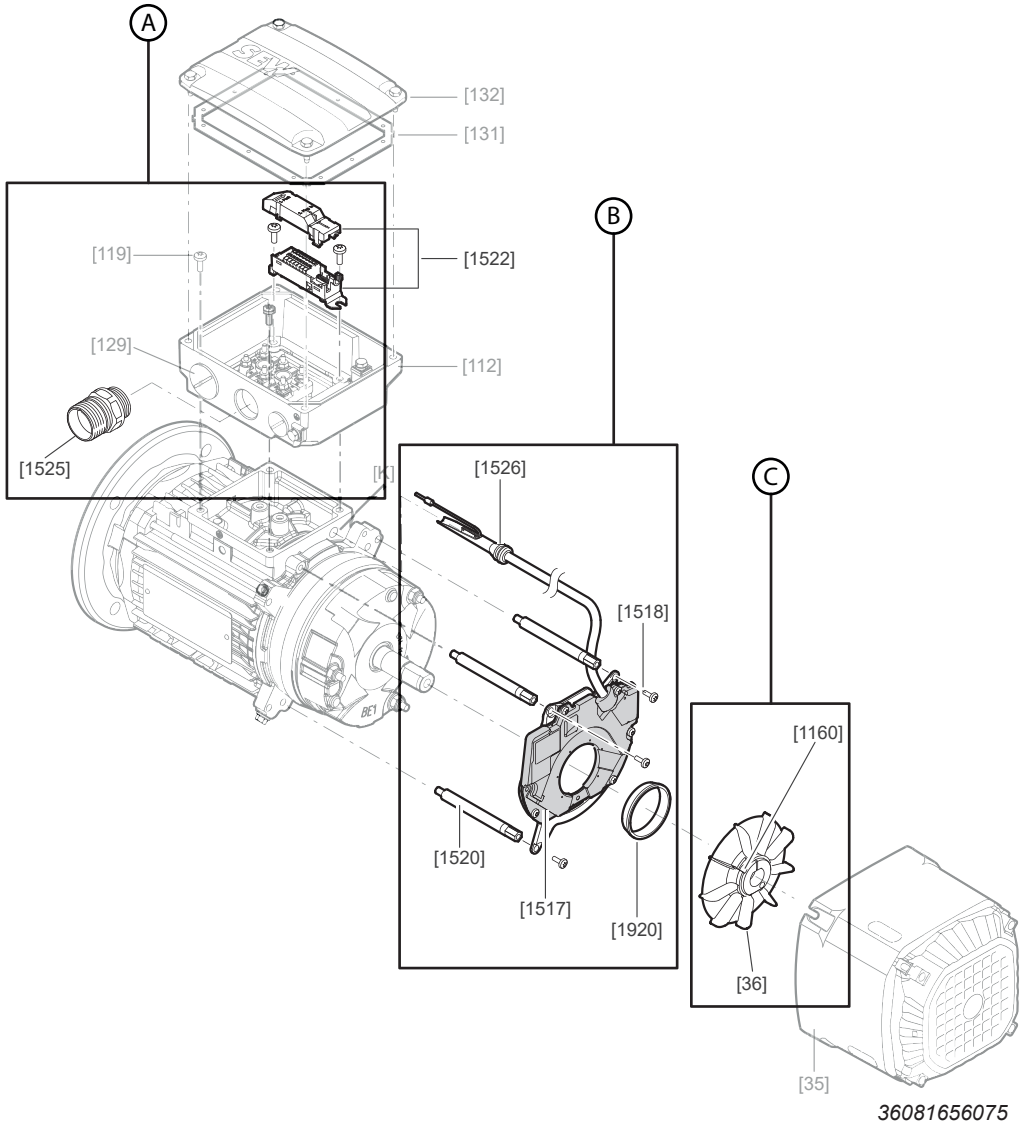
Material	Material short text	Motor size	Brake	Type	Connec-tion	FS
28254295	Service kit	DRN63	Without brake	EI7C	M12	---
28254309	Service kit	DRN63	BE03	EI7C	M12	---
28214366	Service kit	DRN/DRU../DR2..71	Not relevant	EI7.	M12	---
28214374	Service kit	DRN/DRU../DR2..80	Not relevant	EI7.	M12	---
28214382	Service kit	DR.90-100 DR2.90	With brake	EI7.	M12	---
28225562	Service kit	DR2.100	With brake	EI7.	M12	---
28214390	Service kit	DRN/DRU../DR2..112-132	Not relevant	EI7.	M12	---
28214412	Service kit	DRN/DRU../DR2..71	Not relevant	EI7C	M12	FS
28214439	Service kit	DRN/DRU../DR2..80	Not relevant	EI7C	M12	FS
28214455	Service kit	DRN/DRU../DR2..90-100	Not relevant	EI7C	M12	FS
28214471	Service kit	DRN/DRU../DR2..112-132	Not relevant	EI7C	M12	FS

31543952/EN – 10/2023

8.3.2 EI8. service kits

The service kit includes all of the materials required to replace a defective encoder.

Three individual service kits A, B and C are required for the installation of a complete EI8R, EI8C, or EI8Z encoder system.



A	**EI8. connection set service kit**
[1522]	Connection unit
[1525]	M23 plug connector
B	**EI8. encoder service kit**
[1517]	Encoder module
[1518]	Screw
[1520]	Spacer
[1526]	Grommet
[1920]	Centering ring (aid)
C	**EI8. fan service kit**
[36]	Fan guard
[1160]	Cap screw

31543952/EN – 10/2023

The following pieces of information are required for the selection of the encoder service kit:

- Motor size
- Brakemotor or motor with backstop
- Encoder type EI8C(HTL), EI8R(TTL), or EI8Z

The following information is required for the selection of the fan service kit:

- Motor size

The following pieces of information are required for the selection of the connection set service kit:

- Type of connection (M23 plug connector or connection unit)

No service kits are currently planned for the encoder type EI8Z.

Encoder service kits

EI8C encoder service kits

Part number	Material short text	Motor size	Brake	Type
28254627	Encoder service kit	DRN/DRU../DR2..71	Without brake	EI8C
28254635	Encoder service kit	DRN/DRU../DR2..71	BE	EI8C
28254643	Encoder service kit	DRN/DRU../DR2..80	Without brake	EI8C
28254651	Encoder service kit	DRN/DRU../DR2..80	BE	EI8C
28254678	Encoder service kit	DRN/DRU../DR2..90	Without brake	EI8C
28254686	Encoder service kit	DRN/DRU../DR2..90	BE	EI8C
28254694	Encoder service kit	DRN100	Without brake	EI8C
28254708	Encoder service kit	DRN100	BE	EI8C
28254716	Encoder service kit	DRN/DRU../ DR2..112/132	Without brake	EI8C
28254724	Encoder service kit	DRN/DRU../ DR2..112/132	BE	EI8C

EI8R encoder service kits

Part number	Material short text	Motor size	Brake	Type
28254732	Encoder service kit	DRN/DRU../DR2..71	Without brake	EI8R
28254740	Encoder service kit	DRN/DRU../DR2..71	BE	EI8R
28254759	Encoder service kit	DRN/DRU../DR2..80	Without brake	EI8R
28254767	Encoder service kit	DRN/DRU../DR2..80	BE	EI8R
28254775	Encoder service kit	DRN/DRU../DR2..90	Without brake	EI8R
28254783	Encoder service kit	DRN/DRU../DR2..90	BE	EI8R
28254791	Encoder service kit	DRN100	Without brake	EI8R
28254805	Encoder service kit	DRN100	BE	EI8R
28254813	Encoder service kit	DRN/DRU../ DR2..112/132	Without brake	EI8R

31543952/EN – 10/2023

Part number	Material short text	Motor size	Brake	Type
28254821	Encoder service kit	DRN/DRU../ DR2..112/132	BE	EI8R

EI8Z encoder service kits

INFORMATION

Improperly carried out work on the EI8Z encoder

Service work on the EI8Z encoder is carried out exclusively by SEW-EURODRIVE Service. Place an order with SEW-EURODRIVE Service to have any necessary work on the encoder performed correctly.

Part number	Material short text	Motor size	Brake	Type
28261011	Encoder service kit	DRN/DRU../DR2..71	Without brake	EI8Z
28261038	Encoder service kit	DRN/DRU../DR2..71	BE	EI8Z
28261046	Encoder service kit	DRN/DRU../DR2..80	Without brake	EI8Z
28261054	Encoder service kit	DRN/DRU../DR2..80	BE	EI8Z
28261062	Encoder service kit	DRN/DRU../DR2..90	Without brake	EI8Z
28261070	Encoder service kit	DRN/DRU../DR2..90	BE	EI8Z
28261089	Encoder service kit	DRN100	Without brake	EI8Z
28261097	Encoder service kit	DRN100	BE	EI8Z
28261100	Encoder service kit	DRN/DRU../ DR2..112/132	Without brake	EI8Z
28261119	Encoder service kit	DRN/DRU../ DR2..112/132	BE	EI8Z

Fan service kits

EI8C, EI8R, EI8Z fan service kits

Part number	Material short text	Motor size
22658491	Fan for encoder service kit	DRN/DRU../DR2..71
22658505	Fan for encoder service kit	DRN/DRU../DR2..80
22658513	Fan for encoder service kit	DRN90/100
22658521	Fan for encoder service kit	DRN/DRU../DR2..112/132

Connection set service kits

EI8C, EI8R connection set service kits

Part number	Material short text	Type
28261607	AE connection unit, connection set	EI8R/EI8C
28261615	M23 connection set	EI8R/EI8C

31543952/EN – 10/2023

Part number	Material short text	Type
28170938 13295950 00134147 28261607	M12 connection components	EI8R/EI8C

31543952/EN – 10/2023

8.3.3 .K8./.V8. service kits

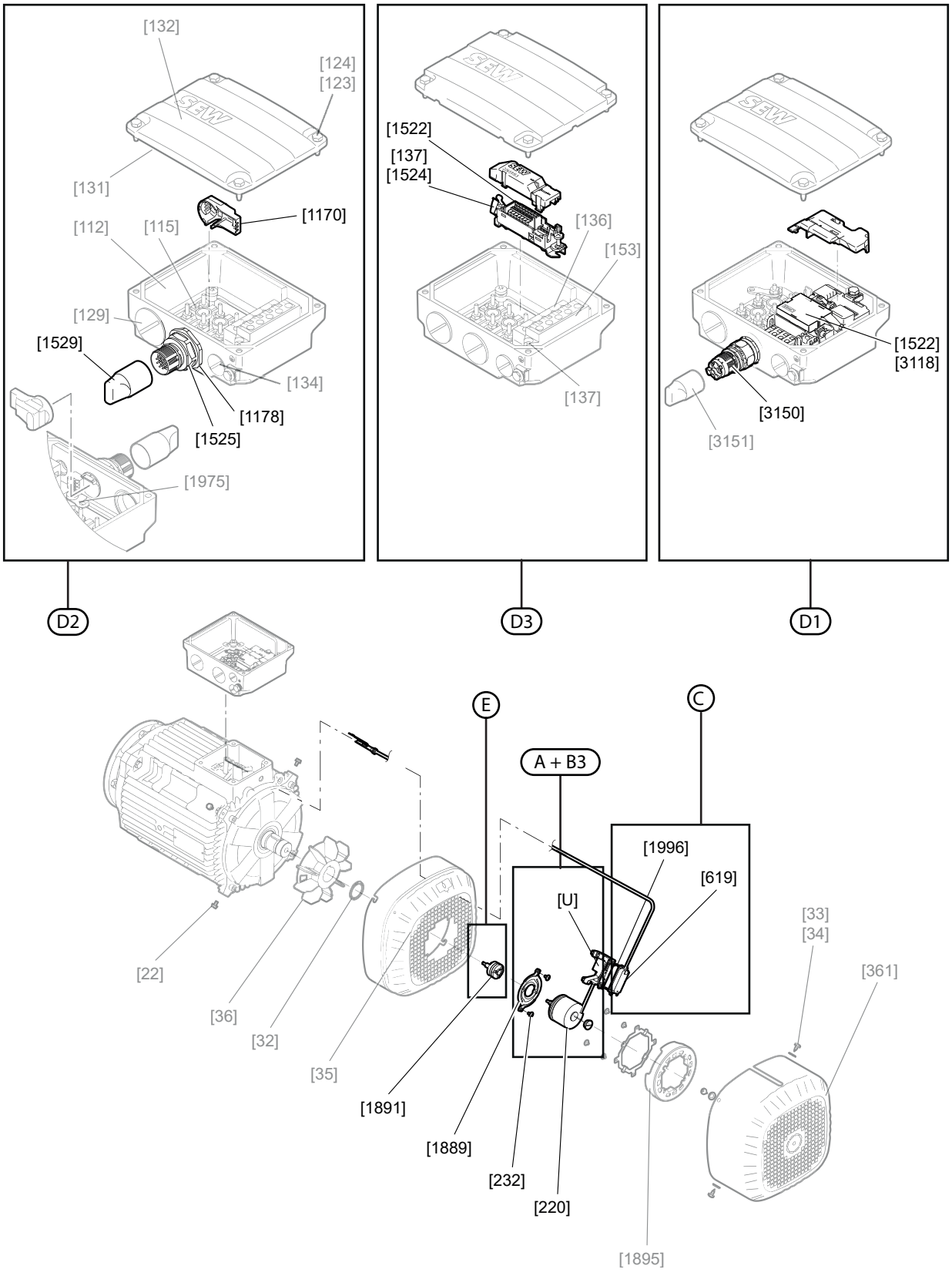
Service kits are available to retrofit an encoder and to provide spare parts.

For the retrofit, kits from the following groups A - F are selected with the connection variant, suitable for the motor and encoder design.

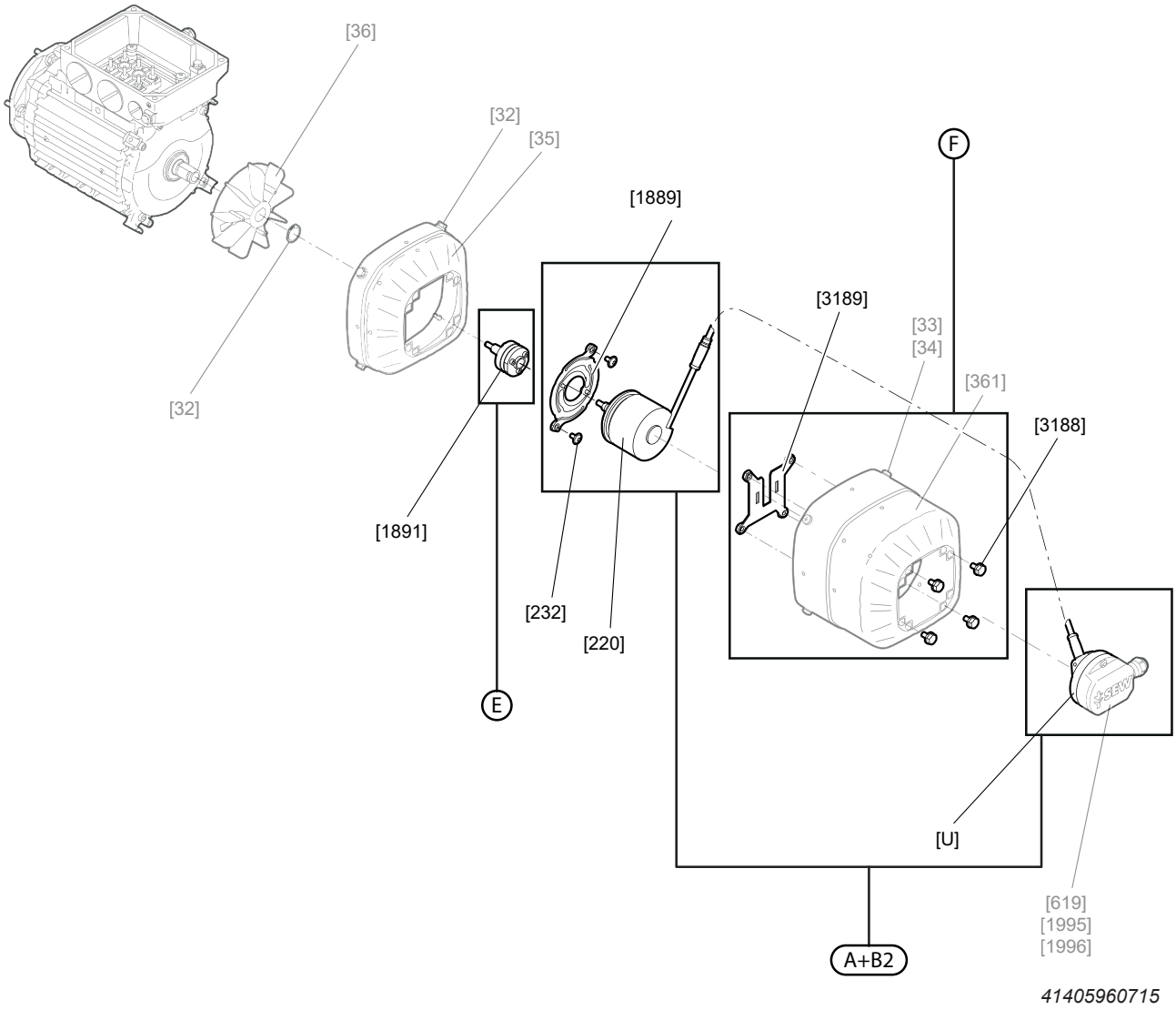
Note that kits from groups C and D are necessary only if the encoder is connected to the terminal strip or M23 plug connector on the terminal box by the customer.

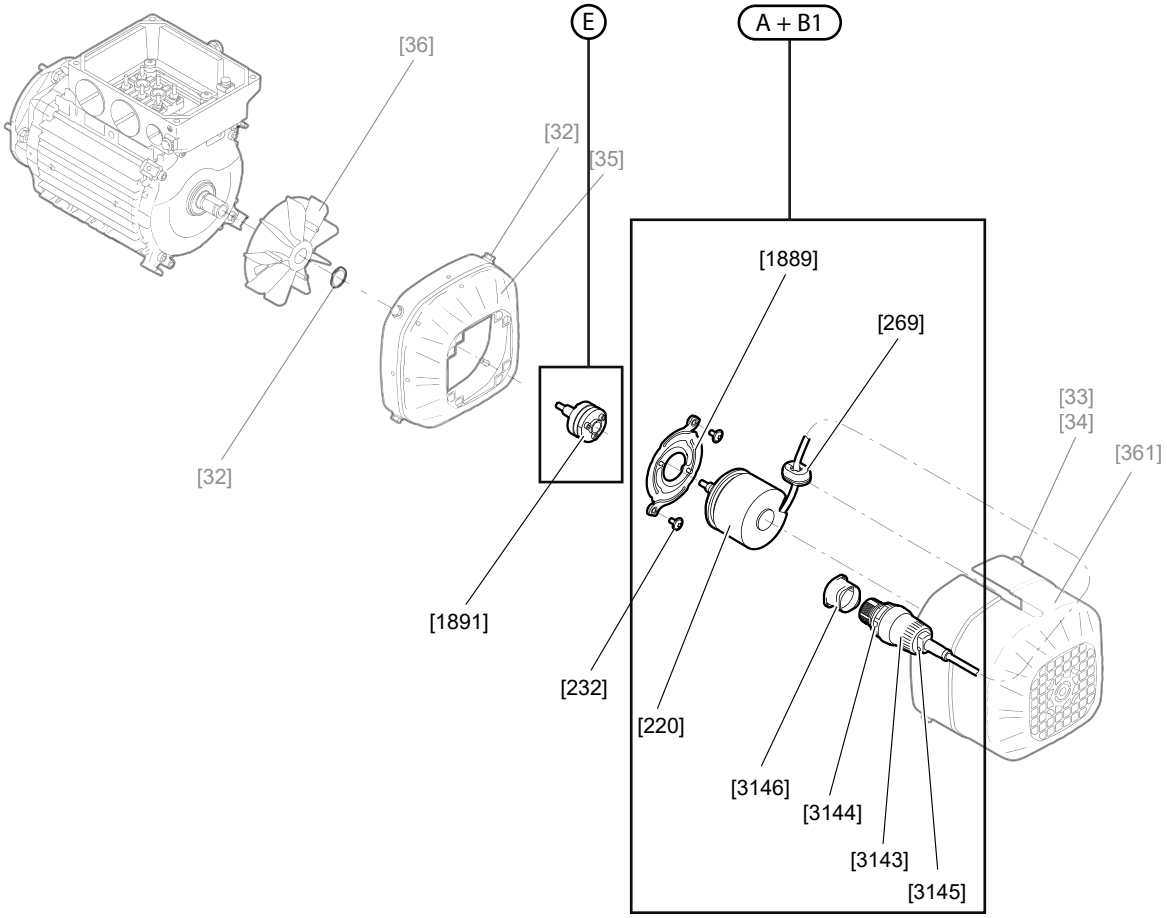
A	Encoder incl. connection cable on the encoder
B	Torque bracket for installing the encoder and additional connection components for the customer connection (integrated encoder plug connector or M23 connector with short cable on the encoder) or lower housing part connection unit for the cable connection in the motor terminal boxes
C	Upper housing part connection unit with cable for connection to the motor terminal boxes
D	Connection components for the customer connection in/on the terminal box (M23 on terminal box or terminal strip)
E	Encoder insulation coupling and spacer ring for installing the encoder (only for certain motor installation variants)
F	Integrated encoder plug connector on the rear of the fan guard

31543952/EN – 10/2023

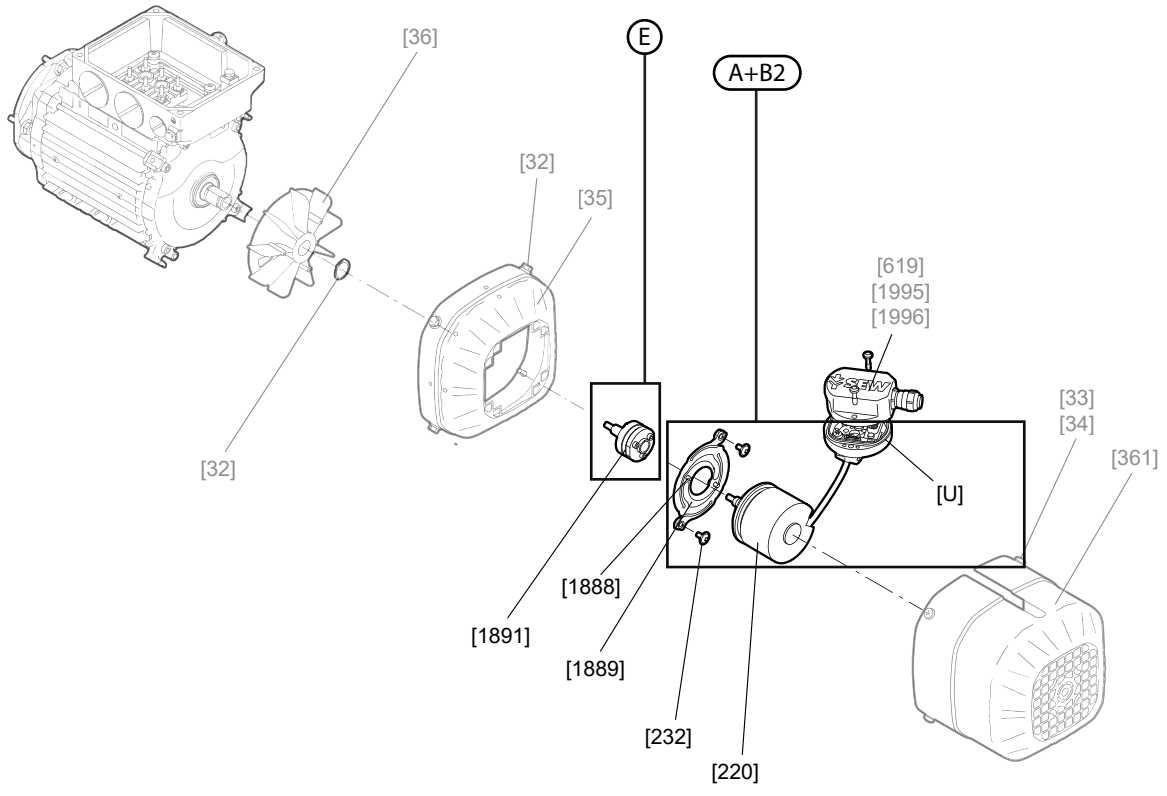


41279641099


[36]
[32]
[35]
[32]
[1889]
F
[3189]
[33]
[34]
[361]
[3188]
[1891]
[232]
[220]
E
[U]
[619]
[1995]
[1996]
A+B2
41405960715



9007240667851659



43273555339

[137]	Connection unit	[1525]	Plug connector
[220]	Rotary encoder set	[1529]	Protection cap
[232]	Round head screw	[1889]	Torque bracket
[619]	Connection cover	[1891]	Insulation coupling
[1170]	Protective cap	[1996]	Flat head screw
[1178]	Thread reduction	[3118]	Connection module
[1522]	Connection unit	[3146]	Cap
[1524]	Terminal washer		

Selecting a service kit

Various service kits are required for the installation of a complete .K8. encoder system. This chapter describes how to select the appropriate service kit.

1. Selection of the encoder

Selection of the encoder	Serial letter	
EK8R	A	
EK8C		
EK8S		
AK8W		
AK8Y		
AK8H		
EK8W		
EK9Z[1)]		
RK8M		

1) In preparation

2. Selection of the connection variant

Connection variant	Serial letters	
Encoder with M23 on encoder and torque bracket	A + B1	
Encoder with integrated encoder plug connector and torque bracket	A + B2	
Encoder with integrated encoder plug connector on the rear of the fan guard and torque bracket	A + B2 + F	
Encoder with MOVILINK® DDI in the terminal box and torque bracket	A + B3 + Cx + D1	
Encoder with M23 on the terminal box and torque bracket	A + B3 + Cx + D2	
Encoder with connection unit in the terminal box and torque bracket	A + B3 + Cx + D3	

31543952/EN – 10/2023

Serial letters A + B1

.K8./.V8. M23 connection on the encoder [A+B1]

Type	Motor size	Material short text	Part number
AK8H/AV8H	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-KIGA	21023352
AK8W/AK8Z/ AV8W	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-KIGA	21023271
AK8Y/AV8Y	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-KIGA	21023328
EK8C/EV8C	(E)DRN/DRU../DR2..71-355	Incremental encoder SET-KIGA	21023247
EK8R/EV8R	(E)DRN/DRU../DR2..71-355	Incremental encoder SET-KIGA	21023212
EK8S/EK8Z/EV8S	(E)DRN/DRU../DR2..71-355	Incremental encoder SET-KIGA	21023182
EK8W/EV8W	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-KIGA	21024413
RK8M/RV8M	(E)DRN/DRU../DR2..71-355	Resolver SET-KIGA	21024022

Serial letters A + B2 and A + B2 + F

K8./.V8. Integrated encoder plug connector (A1GA/A2GA) [A+B2]

Type	Motor size	Material short text	Part number
AK8H/AV8H	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-A.GA	21018510
AK8W/AK8Z/ AV8W	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-A.GA	21018502
AK8Y/AV8Y	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-A.GA	21018499
EK8C/EV8C	(E)DRN/DRU../DR2..71-355	Incremental encoder SET-A.GA	21018480
EK8R/EV8R	(E)DRN/DRU../DR2..71-355	Incremental encoder SET-A.GA	21018472
EK8S/EK8Z/EV8S	(E)DRN/DRU../DR2..71-355	Incremental encoder SET-A.GA	21018464
EK8W/EV8W	(E)DRN/DRU../DR2..71-355	Absolute encoder SET-A.GA	21024448
RK8M/RV8M	(E)DRN/DRU../DR2..71-355	Resolver SET-A.GA	21023581

A mounting panel [F] is additionally required for the encoder with integrated encoder plug connector on the rear of the fan guard and torque bracket.

Type	Motor size	Material short text	Part number
.K8.	(E)DRN/DRU../DR2..71-355	Support plate DR2.71 - 355/.K8.-variant	13604686

31543952/EN – 10/2023

Serial letters A+B3+Cx+D1, A+B3+Cx+D2 and A+B3+Cx+D3

.K8./.V8. Lower housing part connection unit - Encoder connection in terminal box [A+B3]

Type	Motor size	Material short text	Part number
AK8H	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Absolute encoder SET-A-Box-U	21023530
AK8W	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Absolute encoder SET-A-Box-U	21023484
AK8Y	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Absolute encoder SET-A-Box-U	21023506
EK8C	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Incremental encoder SET-A-Box-U	21023417
EK8R	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Incremental encoder SET-A-Box-U	21023441
EK8S	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Incremental encoder SET-A-Box-U	21023395
EK8W	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Absolute encoder SET-A-Box-U	21024421
RK8M	(E)DRN/DRU../DR2..71-132S (E)DRN/DRU../DR2..71-180	Resolver SET-A-Box-U	21024030

Serial letters C.

To select the "Upper housing part connection unit" service kit with cable for connection to the motor terminal boxes, the motor size and the type of connection variant are required.

Motor size	Connection variant	Serial letter	Service kit	Part number
DRN/DRU../DR2..71-132S motors without brake	MOVILINK® DDI in terminal box [D1]	C1	Cover compl. DRN/.K8Z L = 410 MOVILINK® DDI	28924290
DRN/DRU../DR2..71-132S motors with brake		C2[1)]	Cover compl. DRN/.K8Z L = 525 MOVILINK® DDI	28924150
DRN/DRU../DR2..132M-180 motors with and without brake		C3	Cover compl. DRN/.K8Z L = 725 MOVILINK® DDI	28924304
DRN/DRU../DR2..71-132S motors without brake	• M23 connector for connecting to the terminal box [D2] • Connection unit (terminal strip in terminal box) for connecting to terminal box [D3]	C4	Cover compl. DRN/.K8. L = 410	13606832
DRN/DRU../DR2..71-132S motors with brake		C5[1)]	Cover compl. DRN/.K8. L = 525	13608640
DRN/DRU../DR2..132M-180 motors with and without brake		C6	Cover compl. DRN/.K8. L = 725	13606808

1) When using C2 and C5 in size 80, it is imperative the encoder cable [619] is affixed with a suitable cable tie [3229].

31543952/EN – 10/2023

Serial letter D1

The serial letter D1 relates to the .K8. MOVILINK® DDI communication unit.

You can find more information on MOVILINK® DDI in the "Digital motor integration" manual and the respective addenda to the motor operating instructions.

Serial letter D2

.K8. M23 connector for connecting to the terminal box [D2]

Type	Motor size	Material short text	Part number
Connector DRN/DR/AIG. M23 [1525]	(E)DRN/DRU../DR2..71-132s (M23 in terminal box)	Connector DRN/DR/AIG. M23	21017719
Thread reduction AIG. M32x1.5 - M25x1.5 [1178]	(E)DRN/DRU../DR2..71-132s (M23 in terminal box)	Thread reduction	21020280
Protective cap DRN71-132S/EI8. [1170]	(E)DRN/DRU../DR2..71-132s (M23 in terminal box)	Protective cap DRN71-132S/EI8	21020159
Protection cap W4299 2-19.1-PE-BK [1529]	(E)DRN/DRU../DR2..71-132s (M23 in terminal box)	Protection cap W4299 2-19.1-PE-BK	13320874

Serial letter D3

.K8. Connection unit (terminal strip in terminal box) for connecting to terminal box [D3]

Type	Motor size	Material short text	Part number
Connection unit DRN71-132S/EI8. [1522]	(E)DRN/DRU../DR2..71-180 (connection unit in terminal box)	Connection unit DRN71-132S/EI8.	22659153
Screw DIN7500 CE-A-M4x8-A2F-GM1 [137]	(E)DRN/DRU../DR2..71-180 (connection unit in terminal box)	Screw DIN7500 CE-A-M4×8-A2F-GM1	00131032
Terminal washer W4726 5.14-CB-STO [1524]	(E)DRN/DRU../DR2..71-180 (connection unit in terminal box)	Terminal washer W4726 5.14-CB-STO	13262130

31543952/EN – 10/2023

Serial letter E

The motor size is required to select the insulation coupling.

Motor size	Service kit	Material short text	Part number
DRN/DRU../DR2. 71 – 200	No insulation coupling	–	–
DRN/DRU../DR2. 225 – 315	With insulation coupling	Insulation coupling DR2./.K8.	21018022
	Spacer ring	Spacer ring DRN160 - 315/.K8.	21018278
DR2S 180 - 225 with FS	With insulation coupling	Insulation coupling DR2./.K8.	21018022
	Spacer ring	Spacer ring DRN160 - 315/.K8.	21018278
DR2L 160 - 250 with FS	With insulation coupling	Insulation coupling DR2./.K8.	21018022
	Spacer ring	Spacer ring DRN160 - 315/.K8.	21018278

8.3.4 .S7./.G7. service kits

.S7./.G7. encoder service kits

Type	Motor size	Material short text	Part number
AS7Y	DR../(E)DRN/DRU/DR2..71-132 DR../(E)DRN/DRU/DR2..80-132S	Encoder service kit	13642847
AS7W	DR../(E)DRN/DRU/DR2..71-132 DR../(E)DRN/DRU/DR2..80-132S	Encoder service kit	13642855
ES7C	DR../(E)DRN/DRU/DR2..71-132 DR../(E)DRN/DRU/DR2..80-132S	Encoder service kit	13642863
ES7R	DR../(E)DRN/DRU/DR2..71-132 DR../(E)DRN/DRU/DR2..80-132S	Encoder service kit	13642871
ES7S	DR../(E)DRN/DRU/DR2..71-132 DR../(E)DRN/DRU/DR2..80-132S	Encoder service kit	13642898
XS7S	DR../(E)DRN/DRU/DR2..71-132 DR../(E)DRN/DRU/DR2..80-132S	Encoder service kit	13642987
XS7C	DR../(E)DRN/DRU/DR2..71-132 (DR../(E)DRN/DRU/DR2..80-132S	Encoder service kit	13643002
AG7W	DR../(E)DRN/DRU/DR2..160-280 DR../(E)DRN/DRU/DR2..132M-280	Encoder service kit	13642901
AG7Y	DR../(E)DRN/DRU/DR2..160-280 DR../(E)DRN/DRU/DR2..132M-280	Encoder service kit	13642928
EG7C	DR../(E)DRN/DRU/DR2..160-280 DR../(E)DRN/DRU/DR2..132M-280	Encoder service kit	13642936
EG7R	DR..160-280 DRN132M-2800	Encoder service kit	13642944
EG7S	DR..160-280 DRN132M-2800	Encoder service kit	13642952

31543952/EN – 10/2023

8.4 Waste disposal

Dispose of the product and all parts separately in accordance with their material structure and the national regulations. Put the product through a recycling process or contact a specialist waste disposal company. If possible, divide the product into the following categories:

- Iron, steel or cast iron
- Stainless steel
- Magnets
- Aluminum
- Copper
- Electronic parts
- Plastics

The following materials are hazardous to health and the environment. These materials must be collected and disposed of separately:

- Oil and grease

  Collect used oil and grease separately according to type. Ensure that the used oil is not mixed with solvent. Dispose of used oil and grease correctly.
- Screens
- Capacitors

Waste disposal according to WEEE Directive 2012/19/EU

This product and its accessories may fall within the scope of the country-specific application of the WEEE Directive. Dispose of the product and its accessories according to the national regulations of your country.

For further information, contact the responsible SEW-EURODRIVE branch or an authorized partner of SEW-EURODRIVE.

31543952/EN – 10/2023

9 Technical data

INFORMATION

The technical data of all the encoders in the portfolio is shown here without excluded combinations. Certain combinations may be excluded for optional designs such as functional safety, explosion protection, or connection options.

9.1 Additional operating conditions

The respective information for corrosion protection and surface protection apply for the encoder's operating conditions.

EI7., EI8R, EI8C, EI8Z, EK8R, EK8C, EK8S, EK8Z, AK8W, AK8Y, AK8Z encoders are additionally inspected for the following use:

- Proximity to electroplating baths (caustic sodas, phosphoric acids, sulfuric acids, nitric acids); the motor and encoder must not be directly exposed to the electroplating bath
- Environments with salty air and moisture; the encoder has been inspected according to:
  - 1440h salt spray (salt spray test in accordance with DIN EN ISO 9227 NSS: 2017-07),
  - 720h condensation (condensation constant climate in accordance with DIN EN ISO 6270-2 CH: 2018-04)
  - 240h CASS (salt spray test in accordance with DIN EN ISO 9227 CASS: 2017-07).

Note that disassembly can be made difficult due to prolonged, excessive exposure of the mount-on parts to salt.

31543952/EN – 10/2023

9.2 Built-in encoders

9.2.1 EI7., EI8.

EI7.

Encoder	Size, unit	EI71[1]	EI72[1]	EI76[1]	EI7C[1]
Signal output		HTL			
Supply voltage	V_B	DC 9 V – 30 V			
Maximum current consumption, free of load	I_{in}	120 mA			
Maximum pulse frequency	f_{pulse_max}	2.4 kHz			
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation			
Incremental tracks, periods per revolution	A, B	1, 2, 6, 24 (size 63: 24 only)			
	C	–			
Position resolution, increments per revolution	A, B	4, 8, 24, 96 (size 63: 96 only)			
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$)	V_{t_diff}	–			
Voltage output signal non-differential (peak-to-peak)	V_t	$V_{Low} \leq 3$ V $V_{High} \geq V_B - 3.5$ V			
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	V_{t_o}	–			
Load current	I_L	60 mA			
Resistance between tracks and reference ground	R_{gnd}	–			
Load capacitance, output	C_o	–			
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	–			
C track offset	g	–			
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	V_{t_C}	–			
Phase angle track C', n = constant	k, l	–			
Signal width track C	W_C	–			
Signal logic track C		–			
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 20%			
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 20°			
Incremental part accuracy		3.75° (225 ')			
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)			
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)			
Maximum permissible magnetic field external to the motor (outer motor contour)		25 mT/20 kA/m			
Maximum speed	n_{max}	6000 min^{-1}			
Maximum cable length[2]		50 m: MOVI-C® MOVITRAC® advanced inverters from SEW-EURODRIVE with connection to the binary input terminals and 24 V supply 100 m: Other inverters from SEW-EURODRIVE or third-party devices.			
Duration until error message (disabled outputs)		–			

Encoder	Size, unit	EI71[1)]	EI72[1)]	EI76[1)]	EI7C[1)]
Activation time of rotary encoder internal diagnostics after switching on		–			
Degree of protection according to EN 60529		IP66			
Installation altitude	h	≤ 4000 m above sea level			
Corrosion protection, surface protection		KS, OS1 – OS4, OSG			
Connection		Size 63: M12 (8-pin) Size 71 – 132S: M12 (8- or 4-pin) or connection unit (can be pre-assembled in the field) in a terminal box			
Ambient temperature	°C	-40 to +60 DR2C: -30 to +60			
Storage temperature	°C	-15 to +70			
Maximum angular acceleration		10^4 rad/s²			
Electronic nameplate		–			

1) See figure "HTL/TTL signals and phase relationship".

2) Observe the limitations of the motor and/or the frequency inverter.

31543952/EN – 10/2023

EI8.

EI8R, EI8C

Encoders	Unit, size	EI8R[1)]	EI8C[1)]
Signal output		TTL (RS422)	HTL
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V
Maximum current consumption, free of load	I_{in}	100 mA	
Maximum pulse frequency	f_{pulse_max}	102.4 kHz	
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation.	
Incremental tracks, periods per revolution	A, B	1024 (10 bits)	
	C	1	
Position resolution, increments per revolution	A, B	4096 (12 bits)	
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B - $\overline{B}$)	V_{t_diff}	–	
Voltage output signal non-differential (peak-to-peak)	V_t	$V_{Low} \leq 0.5$ V $V_{High} \geq 2.5$ V	$V_{Low} \leq 3$ V $V_{High} \geq V_B - 3.5$ V
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	V_{t_o}	–	
Load current	I_L	25 mA	60 mA
Resistance between tracks and reference ground	R_{gnd}	–	
Load capacitance, output	C_o	–	
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	–	
C track offset	g	–	
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	V_{t_C}	$V_{Low} \leq 0.5$ V $V_{High} \geq 2.5$ V	$V_{Low} \leq 3$ V $V_{High} \geq V_B - 2.5$ V
Phase angle track C', n = constant	k, l	–	
Signal width track C	W_C	90° electrical	
Signal logic track C		C = log 1 when A = B = log 1	
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 10%	
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 20°	
Incremental part accuracy		0.2° (720 ")	
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)	
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)	
Maximum permissible external magnetic field (outer contour of motor)		25 mT/20 kA/m	
Maximum speed	n_{max}	6000 min^{-1}	
Maximum cable length[2)]		100 m	50 m: MOVI-C® MOVITRAC® advanced inverters from SEW-EURODRIVE with connection to the binary input terminals and 24 V supply 100 m: Other inverters from SEW-EURODRIVE or third-party devices.
Duration until error message (disabled outputs)		–	

Encoders	Unit, size	EI8R[1)]	EI8C[1)]
Activation time of the rotary encoder internal diagnostics after switching on		–	
Degree of protection according to EN 60529		IP66	
Installation altitude	h	≤ 4000 m above sea level	≤ 4000 m above sea level
Corrosion protection, surface protection		KS, OS1 – OS4, OSG	
Connection		• M23 plug connector • Connection unit with terminals in the terminal box that can be assembled in the field • M12 plug connector (without negated tracks in non-differential/single-ended operation)	
Ambient temperature	°C	-30 to +60	
Storage temperature	°C	-15 to +70	
Maximum angular acceleration		10^4 rad/s²	
Electronic nameplate		–	–

1) See figure "HTL/TTL signals and phase relationship".

2) Observe the limitations of the motor and/or the frequency inverter.

31543952/EN – 10/2023

EI8Z

	Size, unit	EI8Z
Motor series		DRN/DR2S/DR2L
Motor sizes		71 – 132S
Combination of brake/brake control		With motor-integrated BG1Z brake control: BE.. With motor-external brake control: BE.., BE.. FS (functional safety[1)])
Combination of motor protection/ temperature		Motor protection: TF (in winding) Motor protection/motor temperature: PI (Pt1000 in stator housing and motor temperature model with MOVI-C® inverters)
Combination of forced cooling fans		Yes[1)]
Encoder type		Incremental encoder
Interface		MOVILINK® DDI, coaxial
MOVILINK® DDI type code		DI.E..
Electronic nameplate		ET2000 (MOVILINK® DDI, integrated)
Voltage supply		DC 24 V (MOVILINK® DDI, integrated)
Incremental resolution (Position steps per motor revolution)	A, B	4096 inc (12 bits)
Single-turn resolution (Position resolution per motor revolution)		–
Multi-turn resolution (max. counter for complete motor revolutions)		–
Maximum permissible magnetic field external to the motor		Motor outer contour: 25 mT / 20 kA/m
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum speed	n_{max}	6000 min^{-1}
Degree of protection according to EN 60529		IP66
Corrosion and surface protection		KS, OS1 – OS4, OSG
Installation altitude[2)]	h	≤ 3866 m
Ambient temperature of motor[2)]	°C	With MOVI-C® control cabinet inverters and MOVIMOT® flexible decentralized inverter: -20 – +40, (-40 – +60[1)2)]) With MOVIMOT® advanced decentralized inverters: See MOVIMOT® advanced operating instructions/manual DR2C: -30 to +60
Cable length, maximum[3)]	l	200 m
Connection technology		KD1: M23 hybrid plug connector on the terminal box, 1.5 – 4.0 mm^2 motor connection, 1.0 mm^2 brake connection KDB: M40 hybrid plug connector on the terminal box, 6.0 – 10.0 mm^2 motor connection, 1.5 mm^2 brake connection KD: Cable gland on the terminal box for hybrid cables with 1.5 – 10 mm^2 motor connection and 1 – 1.5 mm^2 brake connection KDD: Motor and brake connection via cable gland, M23 signal plug connector on the terminal box
Explosion protection		–
Functional safety		–

1) in preparation
2) Observe the restrictions of the ambient temperature and potential derating of the respective motor/inverter when used at an increased ambient temperature and/or depending on the installation altitude.
3) Also dependent on the selected inverter type and configured PWM frequency and/or brake type; see documentation of the respective inverters.

9.2.2 EI7C FS

Encoder	Size, unit	EI7C FS
Signal output		HTL
Supply voltage	V_B	DC 19.2 V – 30 V Exclusively SEL-/PELV circuits according to DIN EN 61131-2 are permitted
Maximum current consumption, free of load	I_{in}	120 mA
Maximum output current per track	I_{in}	±30 mA
Maximum pulse frequency	$f_{pulse\ max}$	1.44 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation
Periods per revolution	A, B	24
	C	–
Increments per revolution	A, B	96
Voltage output signal non-differential (peak-to-peak)	V_t	$V_{Low} \leq 3$ V $V_{High} \geq V_B - 3.5$ V
Pulse duty factor according to IEC 60469-1, n = constant		50% ± 20%
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 20°
Vibration resistance according to EN 60068-2-6		≤ 10 g (5 - 2000 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum permissible external magnetic field (outer contour of motor)		25 mT/20 kA/m
Maximum speed	n_{max}	3600 min^{-1}
Maximum angular acceleration	n_{max}	3000 rad/s^2
Maximum cable length[1)]		100 m
Duration until fault message[2)] (deactivated outputs)		min. 100 ms – max. 300 ms
Output leakage current in deactivated state (= error message)[2)]		250 µA
Activation time of encoder-internal diagnostics after switching on		300 ms (from V_B > 9V)
Degree of protection according to EN 60529		IP66
Installation altitude	h	≤ 3800 m above sea level
Corrosion protection, surface protection		KS, OS1 – OS4, OSG
Connection		M12 (8-pin) without temperature sensor[3)]
Ambient temperature	°C	-30 to +60
Storage temperature	°C	-15 to +70
Maximum angular acceleration		10^4 rad/s^2
Electronic nameplate		–

1) Observe the limitations of the motor and/or the frequency inverter.
2) The EI7C FS built-in encoder has a self-diagnostics function. If a fault is detected, the system reports it by deactivating the output signals to the encoder evaluation unit.
3) In the case of EI7C FS built-in encoders, the motor temperature sensor may not be included in the encoder cable due to functional safety requirements.

31543952/EN – 10/2023

9.2.3 Increase in inertia

J_{Mot}	Mass moment of inertia of the motor
J_{EI7}, J_{EI8}	Mass moment of inertia of the pole ring fan of the EI7. or EI8. encoder
J_{PA}	Mass moment of inertia of the standard plastic fan of the motor

EI7., EI7C FS

Motor	$J_{Mot} + J_{EI7} - J_{PA}$ 10^{-4} kgm²	Increase in inertia %
DRN63MS	3.4	14
DRN63M	4.2	11
DRN/DRU../DR2..71MS	8	48
DRN/DRU../DR2..71M	9.7	36
DRN/DRU../DR2..80MK	19.5	14
DRN/DRU../DR2..80MS	21	14
DRN/DRU../DR2..80M	27.2	10
DRN/DRU../DR2..90S	64.3	19
DRN/DRU../DR2..90L	77.5	15
DRN100LS	91.7	13
DRN100LM	100	11
DRN100L	121.6	9
DRN/DRU../DR2..112M	192	8
DRN/DRU../DR2..132S	255	6

EI8.

Motor	$J_{Mot} + J_{EI8} - J_{PA}$ 10^{-4} kgm²	Increase in inertia %
DRN/DRU../DR2..71MS	5.65	4
DRN/DRU../DR2..71M	7.37	3
DRN/DRU../DR2..80MK	16.7	-2
DRN/DRU../DR2..80MS	18.1	-2
DRN/DRU../DR2..80M	24.3	-2
DRN/DRU../DR2..90S	53.3	-1
DRN/DRU../DR2..90L	66.5	-1
DRN100LS	80.7	-1
DRN100LM	89.0	-1
DRN100L	111.3	-1
DRN/DRU../DR2..112M	179.6	1
DRN/DRU../DR2..132S	242.6	1

31543952/EN – 10/2023

9.3 Add-on encoders

9.3.1 EK8. EV8.

EK8.

EK8S, EK8R, EK8C

Encoder	Size, unit	EK8S	EK8R	EK8C
Signal output		sin/cos	TTL (RS422)	HTL/TTL
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V	DC 4.75 V – 30 V
Supply voltage for design as safety encoder	V_{B_FS}	DC 7 V – 30 V	–	–
Maximum current consumption, free of load	I_{in}	100 mA (at V_B = 7 V)		
Maximum pulse frequency	f_{pulse_max}	150 kHz	120 kHz	120 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	1024 (10 bits)		
	C	1		
Position resolution, increments per revolution	A, B	4096 (12 bits)		
Voltage output signal differential (peak-to-peak) (B' = B - $\overline{B}$) (A' = A - $\overline{A}$)	V_{t_diff}	1 V ± 10%	–	–
Voltage output signal non-differential (peak-to-peak)	V_t	0.5 V ± 10%	V_{Low} ≤ 0.5 V V_{High} ≥ 2.5 V	V_B ≤ 6 V: TTL V_{Low} = 0 V (≤ 0.5 V) V_{High} = 5 V (≥ 2.5 V) V_B > 6 V: HTL V_{Low} = 0 V - 3 V V_{High} = (V_B - 2.5 V) - V_B
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	V_{t_o}	2.5 V ± 0.3 V	–	–
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th harmonic	–	–
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	120 Ω ± 10%	V_B 6 V: 120 Ω ± 10% V_B > 6 V: 1 – 3 kΩ
Resistance between tracks and reference ground	R_{gnd}	≥ 1 kΩ	–	–
Load capacitance, output	C_o	≤ 20 nF	–	–
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	0.3 – 1.4 V	–	–
C track offset	g	192 mV ± 5 mV	–	–
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	V_{t_C}	–	V_{Low} ≤ 0.5 V V_{High} ≥ 2.5 V	V_B ≤ 6 V: V_{Low} ≤ 0.5 V V_{High} ≥ 2.5 V V_B > 6 V: V_{Low} ≤ 3 V V_{High} ≥ V_B - 2.5 V
Phase angle track C', n = constant	k, l	k = 180° ± 90° l = 180° ± 90°	–	–
Signal width track C	W_C	see "Phase relationships" (→ 🗎 252)	90° electrical	90° electrical
Signal logic track C		see "Phase relationships" (→ 🗎 252)	C = log 1, when A = B = log 1	C = log 1, when A = B = log 1
Pulse duty factor according to IEC 60469-1, n = constant		–	50% ± 10%	50% ± 10%
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 2°	90° ± 20°	90° ± 20°
Accuracy of the incremental section[1)]		0.0194° (70 ")	0.033° (120 ")	0.033° (120 ")
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)		

31543952/EN – 10/2023

Encoder		Size, unit	EK8S	EK8R	EK8C
Shock resistance according to EN 60068-2-27			≤ 100 g (t = 6 ms, 18 pulses)		
Maximum permitted external magnetic field (outer contour of motor)			25 mT / 20 kA/m (on the encoder housing: 10 mT / 8 kA/m)		
Maximum speed		n_{max}	6000 min^{-1}		
Maximum cable length[2]			100 m	300 m[3]	50 - 300 m[4]
Duration until fault message[5] (deactivated outputs)			≤ 25 ms	–	–
Activation time of rotary encoder-internal diagnostics after switching on			≤ 200 ms	–	–
Degree of protection according to EN 60529			IP66		
Installation altitude		h	≤ 4000 m above sea level		
			In areas at risk of explosion: Permitted external pressure 0.8 to 1.1 bar (at typical height ≤ 1800 m above sea level)		
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)		
IECEx certificate of conformity			IECEx IBE 18.0032X Kübler: IECEx CSA 21.0010X		
Corrosion protection, surface protection			KS, OS1 – OS4, OSG		
Connection			• M23 plug connector on the terminal box (optionally with or without temperature sensor) • Terminal strip in the terminal box (optionally with or without temperature sensor) • M23 plug connector with 0.36 m cable directly on the encoder (without temperature sensor) • Integrated encoder plug connector on the fan guard side (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor • Integrated encoder plug connector at the rear of the fan guard (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor[6]		
Ambient temperature	DRN../DR2./DRU. 71-132L	°C	-30 to +80 With FS encoder: -30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 160-355	°C	-30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 71-225	°C	-30 to +80	-30 to +60	-30 to +60
	DRN../DR2./DRU. 250	°C	-30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 280	°C	-30 to +40	-30 to +40	-30 to +40
	EDRN 71-280	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 71-280S	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 280M	°C	-30 to +40	-30 to +40	-30 to +40
Storage temperature		°C	-15 to +70		
Maximum angular acceleration			$2x10^4$ rad/s²		
Electronic nameplate			RS485 (serial, asynchronous); 1920 bytes	–	–

31543952/EN – 10/2023

Encoder	Size, unit	EK8S	EK8R	EK8C
Maximum degree of pollution during installation work		Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)		

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Observe the requirements for the cables and the supply voltage.
3) Cable length 300 m: Observe the voltage drop on the encoder signal cable and the requirements of the minimum input levels of the encoder evaluation card.
4) 50 m: MOVI-C® MOVITRAC® advanced inverters from SEW-EURODRIVE with connection to the binary input terminals and 24 V supply; 300 m: Inverters from the MOVI-C® modular automation system from SEW-EURODRIVE or generation B inverters with DEU21B encoder cards, or if the maximum encoder supply is 12 V; 100 m: in all other cases.
5) Sin/cos encoders have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.
6) Note that the permissible ambient temperature of the motor is limited with this connection variant. Contact SEW-EURODRIVE in this case.

31543952/EN – 10/2023

EK8W

Encoder	Size, unit	EK8W[1)]
Signal output		sin/cos + RS485
Supply voltage	V_B	DC 7 V – 30 V
Supply voltage for design as safety encoder	V_{B_FS}	–
Maximum current consumption, free of load	I_{in}	100 mA (at V_B = 7 V)
Maximum pulse frequency	f_{pulse_max}	200 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation
Incremental tracks, periods per revolution	A, B	2048 (11 bits)
	C	–
Position resolution, increments per revolution	A, B	65536 (16 bits) (RS485)
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B -) $\overline{B}$	V_{t_diff}	1 V ± 10%
Voltage output signal non-differential (peak-to-peak)	V_t	0.5 V ± 10%
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$) V	V_{t_o}	2.5 V ± 0.3 V
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th harmonic
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ
Load capacitance, output		≤ 20 nF
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	–
C track offset	g	–
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	V_{t_C}	–
Phase angle track C', n = constant	k, l	–
Signal width track C	W_C	–
Signal logic track C		–
Voltage output signal differential (peak-to-peak) (D' = D- $\overline{D}$)	V_{t_diff}	Typical: 6.6 V to 10 V (± 10%)
Voltage output signal non-differential (peak-to-peak) (D, /D)	V_t	Typical: 3.3 V to 5 V (± 10%)
Signal level output, offset nominal against 0 V (D, /D) V	V_{t_o}	Typical: 0V
Voltage input signal differential (peak-to-peak) (D' = D- $\overline{D}$)	V_{t_diff}	Typical: 6.6 V to 10 V (± 10%)
Voltage input signal non-differential (peak-to-peak) (D, /D)	V_t	Typical: 3.3 V to 5 V (± 10%)
Signal level input, offset nominal against 0 V (D, /D) V	V_{t_o}	Typical: 0V
Pulse duty factor according to IEC 60469-1, n = constant		–

Encoder		Size, unit	EK8W[1]
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant			90° ± 2°
Accuracy of the incremental section[1]			0.0194° (70 ")
Accuracy of the absolute section			±1 LSB (Least Significant Bit)
Scanning code/counting direction			Binary code, ascending with the direction of rotation specified above
Multi-turn resolution			–
Communication, interface			RS485 (asynchronous, serial)
Communication, modules			Driver to EIA RS485
Clock frequency/bandwidth			9600 Baud
Clock-pulse space period			–
Vibration resistance according to EN 60068-2-6			≤ 10 g (f > 18.5 Hz)
Shock resistance according to EN 60068-2-27			≤ 100 g (t = 6 ms, 18 pulses)
Maximum permitted external magnetic field (outer contour of motor)			25 mT / 20 kA/m (on the encoder housing: 10 mT / 8 kA/m)
Maximum speed		n_{max}	6000 min^{-1}
Maximum cable length[2]			100 m
Duration until fault message (disabled outputs)[3]			≤ 25 ms + 3/4 revolution
Activation time of the rotary encoder-internal diagnostics after switching on			200 ms
Degree of protection according to EN 60529			
Installation altitude		h	≤ 4000 m above sea level
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)
IECEx certificate of conformity			IECEx IBE 18.0032X
Corrosion protection, surface protection			KS, OS1 – OS4, OSG
Connection			Integrated encoder plug connector on the fan guard (can be pre-assembled and plugged in the field)
Storage temperature		°C	-15 to +70
Maximum angular acceleration			$2x10^4$ rad/s^2
Electronic nameplate			RS485 (serial, asynchronous); 1920 bytes
Maximum degree of pollution during installation work			Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)
Ambient temperature	DRN../DR2./DRU. 71-132	°C	–
	DRN../DR2./DRU. 160-355	°C	–
	DRN../DR2./DRU. 71-250	°C	–
	DRN../DR2./DRU. 280	°C	–
	EDRN 71-355	°C	–
	EDRN 71-280S	°C	–
	EDRN 280M	°C	–
	DR2C 71-132S	°C	-30 to +60

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Observe the requirements for the cables.
3) Absolute encoders A.8W and A.8Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

31543952/EN – 10/2023

EK8Z

	Size, unit	EK8Z
Motor series		DRN/DR2S/DR2L
Motor sizes		71 – 180
Combination of brake/brake control		With motor-integrated BG1Z brake control: BE.. With motor-external brake control: BE.. safety brake[1)]
Combination of motor protection/temperature		Motor protection: TF (in winding) Motor protection/motor temperature: PI (Pt1000 in stator housing and motor temperature model with MOVI-C® inverters)
Combination of forced cooling fans		Yes
Encoder type		Incremental encoder
Interface		MOVILINK® DDI, coaxial
MOVILINK® DDI type code		DI.E..
Electronic nameplate		ET2000 (MOVILINK® DDI, integrated)
Voltage supply		DC 24 V (MOVILINK® DDI, integrated)
Incremental resolution (Position steps per motor revolution)		16 bit 65536 inc
Single-turn resolution (Position resolution per motor revolution)		–
Multi-turn resolution (max. counter for complete motor revolutions)		–
Maximum permissible magnetic field external to the motor		Motor outer contour: 25 mT / 20 kA/m, On the encoder housing: 10 mT / 8 kA/m
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum speed		6000 min^{-1}
Degree of protection according to EN 60529		IP66
Corrosion and surface protection		KS, OS1 – OS4, OSG
Installation altitude[2)]		≤ 3866 m
Ambient temperature of motor[2)]		With MOVI-C® control cabinet inverters and MOVIMOT® flexible decentralized inverter: -20 – +40 °C, (-40 °C – +60 °C[1)2)]) With MOVIMOT® advanced decentralized inverters: See MOVIMOT® advanced operating instructions/manual
Cable length, maximum[3)]		200 m
Connection technology		• KD1: M23 hybrid plug connector on the terminal box, 1.5 – 4.0 mm^2 motor connection, 1.0 mm^2 brake connection • KDB: M40 hybrid plug connector on the terminal box, 6.0 – 10.0 mm^2 motor connection, 1.5 mm^2 brake connection • KD: Cable gland on the terminal box for hybrid cables with 1.5 – 10 mm^2 motor connection and 1 – 1.5 mm^2 brake connection • KDD: Motor and brake connection via cable gland, M23 signal plug connector on the terminal box
Explosion protection		–
Functional safety		Yes[1)]

1) in preparation
2) Observe the restrictions of the ambient temperature and potential derating of the respective motor/inverter when used at an increased ambient temperature and/or depending on the installation altitude.
3) Also dependent on the selected inverter type and configured PWM frequency and/or brake type; see documentation of the respective inverters.

EV8.

Encoder	Size, unit	EV8S[1]	EV8R[2]	EV8C[2]
Signal output		sin/cos	TTL (RS422)	HTL
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V	DC 4.75 V – 30 V
Supply voltage for design as safety encoder	V_{B_FS}	DC 7 V – 30 V	–	–
Maximum current consumption, free of load	I_{in}	100 mA (at V_B = 7 V)		
Maximum pulse frequency	f_{pulse_max}	150 kHz	120 kHz	120 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	1024 (10 bits)		
	C	1		
Position resolution, increments per revolution	A, B	4096 (12 bits)		
Voltage output signal differential (peak-to-peak) (B' = B - $\overline{B}$) (A' = A - $\overline{A}$)	V_{t_diff}	1 V ± 10%	–	–
Voltage output signal non-differential (peak-to-peak)	V_t	0.5 V ± 10%	V_{Low} ≤ 0.5 V V_{High} ≥ 2.5 V	V_B ≤ 6 V: V_{Low} ≤ 0.5 V V_{High} ≥ 2.5 V V_B > 6 V: V_{Low} ≤ 3 V V_{High} ≥ V_B - 2.5 V
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$)	V_{t_o}	2.5 V ± 0.3 V	–	–
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th harmonic	–	–
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	120 Ω ± 10%	V_B 6 V: 120 Ω ± 10% V_B > 6 V: 1 – 3 kΩ
Resistance between tracks and reference ground	R_{gnd}	≥ 1 kΩ	–	–
Load capacitance, output	C_o	≤ 20 nF	–	–
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	0.3 – 1.4 V	–	–
C track offset	g	192 mV ± 5 mV	–	–
Voltage output signal, non-differential (C, $\overline{C}$) (peak-to-peak)	V_{t_C}	–	V_{Low} ≤ 0.5 V V_{High} ≥ 2.5 V	V_B ≤ 6 V: V_{Low} ≤ 0.5 V V_{High} ≥ 2.5 V V_B > 6 V: V_{Low} ≤ 3 V V_{High} ≥ V_B - 2.5 V
Phase angle track C', n = constant	k, l	k = 180° ± 90° l = 180° ± 90°	–	–
Signal width track C	W_C	see figure	90° electrical	90° electrical
Signal logic track C		see figure	C = log 1, when A = B = log 1	C = log 1, when A = B = log 1
Pulse duty factor according to IEC 60469-1, n = constant		–	50% ± 10%	50% ± 10%
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant	d	90° ± 2°	90° ± 20°	90° ± 20°
Accuracy of the incremental section[3]		0.0194° (70 ")	0.033° (120 ")	0.033° (120 ")
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)		
Maximum speed	n_{max}	6000 min^{-1}		
Maximum cable length[4]		100 m	300 m[5]	100 m[6]

31543952/EN – 10/2023

Encoder		Size, unit	EV8S[1]	EV8R[2]	EV8C[2]
Duration until fault message[5] (deactivated outputs)			≤ 25 ms	–	–
Activation time of rotary encoder-internal diagnostics after switching on			≤ 200 ms	–	–
Degree of protection according to EN 60529			IP66		
Installation altitude		h	≤ 4000 m above sea level		
			In areas at risk of explosion: Permitted external pressure 0.8 to 1.1 bar (at typical height ≤ 1800 m above sea level)		
Explosion protection mark ATEX/ IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)		
IECEx certificate of conformity			IECEx IBE 18.0032X		
Corrosion protection, surface protection			KS, OS1 – OS4, OSG		
Connection			• M23 plug connector with 0.36 m cable directly on the encoder (without temperature sensor) • Integrated encoder plug connector on the fan guard side (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor • Integrated encoder plug connector at the rear of the fan guard (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor		
Ambient temperature of motor	DRN 71-132L	°C	-30 to +80	-30 to +60	-30 to +60
	DRN 160-355	°C	-30 to +60	-30 to +60	-30 to +60
	DRN 71-225	°C	-30 to +80	-30 to +60	-30 to +60
	DRN 250	°C	-30 to +60	-30 to +60	-30 to +60
	DRN 280	°C	-30 to +40	-30 to +40	-30 to +40
	EDRN 71-280	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 71-280S	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 280M	°C	-30 to +40	-30 to +40	-30 to +40
Storage temperature		°C	-15 to +70		
Maximum angular acceleration			$2x10^4$ rad/s²		
Electronic nameplate			RS485 (serial, asynchronous); 1920 bytes	–	–
Maximum degree of pollution during installation work			Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)		

1) See figure "Sin/cos signals and phase relationship".
2) See figure "HTL/TTL signals and phase relationship".
3) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
4) Observe the requirements for the cables and the supply voltage.
5) Sin/cos encoders have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

31543952/EN – 10/2023

9.3.2 RK8M

Functional description

A sinusoidal voltage is induced in the cos (S1 – S3) and sin (S2 – S4) secondary side when supplying the primary winding Ref1-Ref2 with a sinusoidal excitation signal.

The strength of the induced voltage depends on the transformation ratio and the angle position of the rotor α. The secondary windings are mechanically offset by 90°.

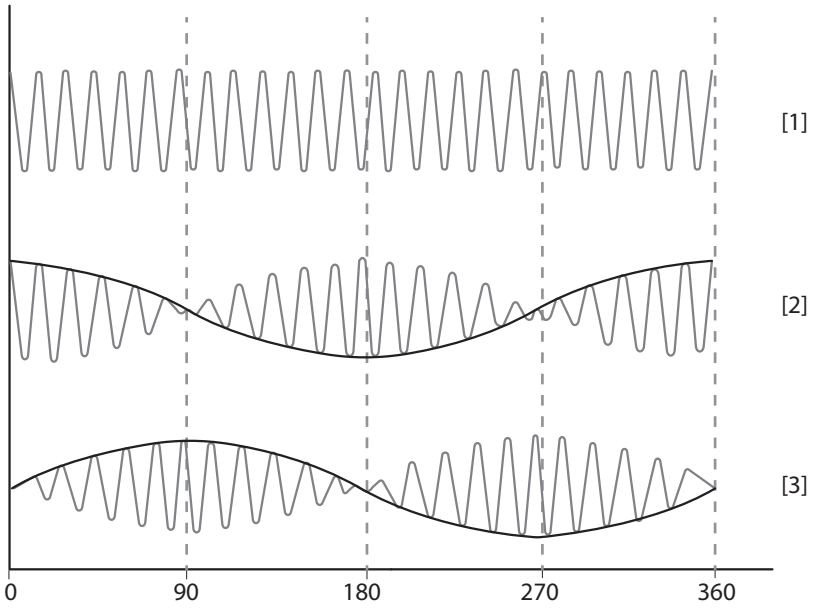
This results in 2 signals (sine and cosine) that are phase-shifted by 90°. These signals can be interpreted by the encoder evaluation unit in order to calculate an absolute position within a rotor revolution.

The sin and cos signal voltage are calculated according to the following calculation rule:

$V_{S1-S3} = T_R \times V_{Ref1-Ref2} \times \cos(\alpha)$

$V_{S2-S4} = T_R \times V_{Ref1-Ref2} \times \sin(\alpha)$

Signal pattern



9007239436657803

[1] Ref1 - Ref2 excitation voltage

[2] Signal Cos (S1 - S3)

[3] Signal Sin (S2 - S4)

The X-axis describes the mechanical rotor position.

31543952/EN – 10/2023

Technical data

The technical data presented here concerns typical values that apply within the specified limit values. It is possible to operate the encoder with differing parameters. Note that this may result in deviations from the specified transfer behavior of the signal tracks.

The encoder is approved for operation with encoder evaluation units and inverters from SEW-EURODRIVE.

The resolver can be operated on third-party inverters and controllers. Check the technical data for compatibility in this regard. If necessary, contact SEW-EURODRIVE.

Encoder	Size, unit	RK8M
Encoder type		Resolver
Excitation signal		Ref1 – Ref2
Signal output		sin/cos, differential, amplitude-modulated
Signal tracks	U_{S1-S3} U_{S2-S4}	Cos = S1-S3; Sin = S2-S4
Number of pole pairs	p_R	1 = 2 poles
Direction of rotation		Cos before sin when looking at the motor output shaft in clockwise rotation; see also functional description
Input voltage/excitation voltage	$U_{Ref1-Ref2}$	7 Vrms (2 to 10 Vrms) = 19.8 Vpp (5.7 to 28.2 Vpp)
Input frequency/excitation frequency	f_E	10 kHz (4 to 20 kHz)
Current consumption, free of load		60 mArms (≤ 100 mA) at 4 KHz
Encoder system accuracy, analog		± 10'
Gear ratio/transformation ratio	T_R	0.5 ± 10%
Phase shift		0° ± 5°
Residual voltage (offset voltage on signal tracks)		max. 25 mVrms
Ref1 - Ref2 input impedance, open between Ref1 and Ref2	Z_{RO} at f_E = 10 kHz	120 Ω (70 + j95 Ω) ± 15%
Ref1 - Ref2 input impedance, short circuit between S1 and S3 and between S2 and S4	Z_{RS} at f_E = 10 kHz	110 Ω (65 + j90 Ω) ± 15%
S2 - S4 output impedance at position 0° minimum coupling, open between Ref1 and Ref2	Z_{SO} at f_E = 10 kHz	230 Ω (120 + j200 Ω) ± 15%
S1 - S3 output impedance at position 0° maximum coupling, short circuit between Ref1 and Ref2	Z_{SS} at f_E = 10 kHz	305 Ω (150 + j270 Ω) ± 15%
Ref1 - Ref2 input inductance, open between Ref1 and Ref2	L_{RO} at f_E = 10 kHz	1.5 mH ± 20%

31543952/EN – 10/2023

Encoder	Size, unit	RK8M
Ref1 - Ref2 input inductance, short circuit between S1 and S3 and between S2 and S4	L_{RS} at f_E = 10 kHz	1.4 mH ± 20%
S2 - S4 output inductance at position 0° minimum coupling, open between Ref1 and Ref2	L_{SO} at f_E = 10 kHz	3.1 mH ± 20%
S1 - S3 output inductance at position 0° maximum coupling, short circuit between Ref1 and Ref2	L_{SS} at f_E = 10 kHz	4.3 mH ± 20%
DC resistance of the input	$R_{Ref1-Ref2}$	36 Ω ± 10%
DC resistance of the output	R_{S1-S3} R_{S2-S4}	62 Ω ± 10%
Temperature coefficient		0.39% / K
Connection		• M23 signal plug connector on the terminal box (optionally with or without temperature sensor) • Terminal strip in the terminal box (optionally with or without temperature sensor) • M23 with 0.36 m cable directly on the encoder (without temperature sensor) • Integrated encoder plug connector on the fan guard side (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor • Integrated encoder plug connector at the rear of the fan guard (can be preassembled and plugged in the field); optionally with M23 plug connector, without temperature sensor [1)]
Shaft load		max. ≤ 30 N axial; max. ≤ 40 N radial
Degree of protection according to EN 60529		IP66
Corrosion protection, surface protection for motor		KS, OS1 – OS4, OSG
Corrosion protection for encoder		IEC 60068-2-52 salt spray according to C5 (C5-I) as per ISO 12944-2
Installation altitude	h	≤ 4000 m above sea level
Maximum speed	n_{max}	6000 min^{-1}
Maximum mechanical speed	n_{max}	6000 min^{-1}
Vibration resistance according to EN 60068-2-6		10g = 98.1 m/s^2
Shock resistance according to EN 60068-2-27		100g = 981 m/s^2
Maximum angular acceleration		10^4 rad/s^2
Maximum degree of pollution during installation work		Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)

31543952/EN – 10/2023

Encoder	Size, unit	RK8M
DRN../DR2./DRU.315 ambient temperature[2)]	°C	-30 to +60 DR2C: -30 to +60
Ambient temperature of encoder	°C	-30 to +85
Storage temperature of encoder	°C	-15 to +70 (dry, dust-free, protected from the sun)
Maximum cable length		100 m
Explosion protection mark ATEX/ IECEx		–
IECEx certificate of conformity		–
Electronic nameplate		–
Functional safety		–

1) Note that the permissible ambient temperature of the motor is limited with this connection variant. Contact SEW-EURODRIVE in this case.
2) Observe possible speed and temperature limitations of the motor in atmospheres at risk of explosion.

31543952/EN – 10/2023

9.3.3 E.7S

EG7S, EH7S

Encoder		Size, unit	EG7S	EH7S
Signal output			sin/cos	
Supply voltage		V_B	DC 7 V – 30 V	DC 10 V – 30 V
Max. current consumption		I_{in}	140 mA_{RMS}	
Max. pulse frequency		f_{max}	150 kHz	180 kHz
Incremental tracks, periods per revolution		A, B	1024 (10 bits)	
		C	1	
Position resolution, increments per revolution		A, B	4096 (12 bits)	
Output amplitude per track		V_{high}	1 V_{pp}	
		V_{low}		
Output current per track		I_{out}	10 mA_{RMS}	
Pulse duty factor according to IEC 60469-1, n = constant			–	
Phase offset A: B n = constant			90° ± 2°	90° ± 10°
Accuracy[1]			0.0194°	–
Vibration resistance according to EN 60068-2-6			≤ 100 m/s^2 (at 10 Hz to 2 kHz)	
Shock resistance according to EN 60068-2-27			≤ 2000 m/s^2	
Maximum speed		n_{max}	6000 min^{-1}	
Maximum cable length			100 m	
Duration until fault message (disabled outputs)[2]			25 ms	–
Activation time of rotary encoder internal diagnostics after switching on			–	
Storage temperature		°C	-15 to +70	
Maximum angular acceleration			10^4 rad/s^2	
Degree of protection according to EN 60529			IP66	IP65
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD)IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD)
IECEx certificate of conformity			IECEx IBE 13.0015X	–
Connection			Terminal box on the encoder	M23, 12-pin plug connector
Maximum degree of pollution during installation work			Degree of pollution 2 (IEC 61010-1, EN 60664-1, VDE 0110-1)	
Ambient temperature[3]	DRN../DR2./DRU. 315	°C	–	-30 to +60
	DRN../DR2./DRU. 132 – 280	°C	-30 to +60	–
	DRN../DR2./DRU. 71 – 132S	°C	–	–
	DRN../DR2./DRU. 71 – 225	°C	–	–
	DRN../DR2./DRU. 250/280	°C	–	–
	EDRN	°C	-30 to +60	-20 to +60

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Sin/cos encoders have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.
3) Observe possible speed and temperature limitations of the motor in atmospheres at risk of explosion.

31543952/EN – 10/2023

ES7S, EV7S

Encoder		Size, unit	ES7S	EV7S
Signal output			sin/cos	
Supply voltage		V_B	DC 7 V – 30 V	DC 7 V – 30 V
Max. current consumption		I_{in}	140 mA_{RMS}	
Max. pulse frequency		f_{max}	150 kHz	150 kHz
Incremental tracks, periods per revolution		A, B	1024 (10 bits)	
		C	1	
Position resolution, increments per revolution		A, B	4096 (12 bits)	
Output amplitude per track		V_{high}	1 V_{pp}	
		V_{low}		
Output current per track		I_{out}	10 mA_{RMS}	
Pulse duty factor according to IEC 60469-1, n = constant			–	
Phase offset A: B n = constant			90° ± 2°	90° ± 2°
Accuracy[1]			0.0194°	0.0194°
Vibration resistance according to EN 60068-2-6			≤ 100 m/s^2 (at 10 Hz to 2 kHz)	
Shock resistance according to EN 60068-2-27			≤ 1000 m/s^2	≤ 1000 m/s^2
Maximum speed		n_{max}	6000 min^{-1}	
Maximum cable length			100 m	
Duration until fault message (disabled outputs)[2]			25 ms	25 ms
Activation time of rotary encoder internal diagnostics after switching on			–	
Storage temperature		°C	-15 to +70	
Maximum angular acceleration			10^4 rad/s^2	
Degree of protection according to EN 60529			IP66	IP66
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD)IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD)IECEx EPL .c (3G-c, 3D-c, 3GD-c)
IECEx certificate of conformity			IECEx IBE 13.0015X	IECEx IBE 13.0015X
Connection			Terminal box on the encoder	Terminal box on the encoder
Maximum degree of pollution during installation work			Degree of pollution 2 (IEC 61010-1, EN 60664-1, VDE 0110-1)	
Ambient temperature[3]	DRN../DR2./DRU. 315	°C	–	–
	DRN../DR2./DRU. 132 – 280	°C	–	–
	DRN../DR2./DRU. 71 – 132S	°C	-30 to +80 With FS encoder: -30 to +60	–
	DRN../DR2./DRU. 71 – 225	°C	–	-30 to +80
	DRN../DR2./DRU. 250/280	°C	–	-30 to +60
	EDRN	°C	-30 to +60	-30 to +60

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Sin/cos encoders have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.
3) Observe possible speed and temperature limitations of the motor in atmospheres at risk of explosion.

9.3.4 E.7R

EG7R, EH7R

Encoder		Size, unit	EG7R	EH7R
Signal output			TTL (RS422)	
Supply voltage		V_B	DC 7 V – 30 V	DC 10 V – 30 V
Max. current consumption		I_{in}	160 mA_{RMS}	140 mA_{RMS}
Max. pulse frequency		f_{max}	120 kHz	300 kHz
Incremental tracks, periods per revolution		A, B	1024 (10 bits)	
		C	1	
Position resolution, increments per revolution		A, B	4096 (12 bits)	
Output amplitude per track		V_{high}	≥ DC 2.5 V	
		V_{low}	≤ DC 0.5 V	
Output current per track		I_{out}	25 mA_{RMS}	20 mA_{RMS}
Pulse duty factor according to IEC 60469-1, n = constant			50% ± 10%	50% ± 20%
Phase offset A: B n = constant			90° ± 20°	
Vibration resistance according to EN 60068-2-6			≤ 100 m/s^2	
Shock resistance according to EN 60068-2-27			≤ 2000 m/s^2	≤ 2000 m/s^2
Maximum speed		n_{max}	6000 min^{-1}	
Maximum cable length			100 m	
Storage temperature		°C	-15 to +70	
Maximum angular acceleration			10^4 rad/s^2	
Degree of protection according to EN 60529			IP66	IP65
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD)IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD)
IECEx certificate of conformity			IECEx IBE 13.0015X	–
Connection			Terminal box on incremental encoder	M23, 12-pin plug connector
Ambient temperature	DRN../DR2./DRU. 71 – 250	°C	–	–
	DRN../DR2./DRU. 71 – 132S	°C	–	–
	DRN../DR2./DRU. 132M - 280	°C	-30 to +60	–
	DRN../DR2./DRU. 315	°C	–	-40 to +60
	DRN../DR2./DRU. 280	°C	–	–
	EDRN 80MS - 132S	°C	–	-40 to +60
	EDRN 132M - 200L	°C	-30 to +60	-40 to +60
	EDRN 225	°C	-30 to +60	-40 to +60
	EDRN 250 - 280	°C	-30 to +60	-40 to +60

31543952/EN – 10/2023

ES7R, EV7R

Encoder		Size, unit	ES7R	EV7R
Signal output			TTL (RS422)	
Supply voltage		V_B	DC 7 V – 30 V	
Max. current consumption		I_{in}	160 mA_{RMS}	
Max. pulse frequency		f_{max}	120 kHz	
Incremental tracks, periods per revolution		A, B	1024 (10 bits)	
		C	1	
Position resolution, increments per revolution		A, B	4096 (12 bits)	
Output amplitude per track		V_{high}	≥ DC 2.5 V	
		V_{low}	≤ DC 0.5 V	
Output current per track		I_{out}	25 mA_{RMS}	
Pulse duty factor according to IEC 60469-1, n = constant			50% ± 10%	
Phase offset A: B n = constant			90° ± 20°	
Vibration resistance according to EN 60068-2-6			≤ 100 m/s^2	
Shock resistance according to EN 60068-2-27			≤ 1000 m/s^2	
Maximum speed		n_{max}	6000 min^{-1}	
Maximum cable length			100 m	
Storage temperature		°C	-15 to +70	
Maximum angular acceleration			10^4 rad/s^2	
Degree of protection according to EN 60529			IP66	
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)	
IECEx certificate of conformity			IECEx IBE 13.0015X	
Connection			Terminal box on incremental encoder	
Ambient temperature	DRN../DR2./DRU. 71 – 250	°C	–	-30 to +60
	DRN../DR2./DRU. 71 – 132S	°C	-30 to +60	–
	DRN../DR2./DRU. 132M - 280	°C	–	–
	DRN../DR2./DRU. 315	°C	–	–
	DRN../DR2./DRU. 280	°C	–	-30 to +40
	EDRN 80MS - 132S	°C	-30 to +60	–
	EDRN 132M - 200L	°C	–	-30 to +50
	EDRN 225	°C	–	-30 to +60
	EDRN 250 - 280	°C	–	-30 to +40

31543952/EN – 10/2023

9.3.5 E.7C

EG7C, EH7C

Encoder		Size, unit	EG7C	EH7C
Signal output			HTL/TTL (RS422)	HTL
Supply voltage		V_B	DC 4.75 V – 30 V	DC 10 V – 30 V
Max. current consumption		I_{in}	240 mA_{RMS}	225 mA_{RMS}
Max. pulse frequency		f_{max}	120 kHz	300 kHz
Incremental tracks, periods per revolution		A, B	1024 (10 bits)	
		C	1	
Position resolution, increments per revolution		A, B	4096 (12 bits)	
Output amplitude per track		V_{high}	V_B -2.5 V	V_B -2 V
		V_{low}	≤ DC 1.1 V	≤ DC 2.5 V
Output current per track		I_{out}	60 mA_{RMS}	30 mA_{RMS}
Pulse duty factor according to IEC 60469-1, n = constant			50% ± 10%	50% ± 20%
Phase offset A: B n = constant			90° ± 20°	
Vibration resistance according to EN 60068-2-6			≤ 100 m/s^2	
Shock resistance according to EN 60068-2-27			≤ 2000 m/s^2	
Maximum speed		n_{max}	6000 min^{-1}	
Maximum cable length			50 – 100 m 50 m: MOVI-C® MOVITRAC® advanced inverters from SEW-EURODRIVE with connection to the binary input terminals and 24 V supply; 300 m: Inverters from the MOVI-C® modular automation system from SEW-EURODRIVE or generation B inverters with DEU21B encoder cards, or if the maximum encoder supply is 12 V; 100 m: in all other cases.	100 m
Storage temperature		°C	-15 to +70	
Maximum angular acceleration			10^4 rad/s^2	
Degree of protection according to EN 60529			IP66	IP65
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD)IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD)
IECEx certificate of conformity			IECEx IBE 13.0015X	–
Connection			Terminal box on incremental encoder	M23, 12-pin plug connector
Ambient temperature	DRN../DR2./DRU. 71 – 250	°C	–	–
	DRN../DR2./DRU. 80MS/M - 132S	°C	–	–
	DRN../DR2./DRU. 132M - 280	°C	-30 to +60	–
	DRN../DR2./DRU. 315	°C	–	-40 to +60
	DRN../DR2./DRU. 280	°C	–	–
	EDRN 80MS - 132S	°C	–	–
	EDRN 132M - 200L	°C	-30 to +60	–
	EDRN 225	°C	-30 to +60	–
	EDRN 250 - 280	°C	-30 to +60	–

31543952/EN – 10/2023

ES7C, EV7C

Encoder		Size, unit	ES7C	EV7C
Signal output			HTL/TTL (RS422)	
Supply voltage		V_B	DC 4.75 V – 30 V	
Max. current consumption		I_{in}	240 mA_{RMS}	
Max. pulse frequency		f_{max}	120 kHz	
Incremental tracks, periods per revolution		A, B	1024 (10 bits)	
		C	1	
Position resolution, increments per revolution		A, B	4096 (12 bits)	
Output amplitude per track		V_{high}	V_B -2.5 V	
		V_{low}	≤ DC 1.1 V	
Output current per track		I_{out}	60 mA_{RMS}	
Pulse duty factor according to IEC 60469-1, n = constant			50% ± 10%	
Phase offset A: B n = constant			90° ± 20°	
Vibration resistance according to EN 60068-2-6			≤ 100 m/s^2	
Shock resistance according to EN 60068-2-27			≤ 1000 m/s^2	
Maximum speed		n_{max}	6000 min^{-1}	
Maximum cable length			50 m: MOVI-C® MOVITRAC® advanced inverters from SEW-EURODRIVE with connection to the binary input terminals and 24 V supply; 300 m: Inverters from the MOVI-C® modular automation system from SEW-EURODRIVE or generation B inverters with DEU21B encoder cards, or if the maximum encoder supply is 12 V; 100 m: in all other cases	
Storage temperature		°C	-15 to +70	
Maximum angular acceleration			10^4 rad/s^2	
Degree of protection according to EN 60529			IP66	
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD)IECEx EPL .c (3G-c, 3D-c, 3GD-c)	
IECEx certificate of conformity			IECEx IBE 13.0015X	
Connection			Terminal box on incremental encoder	
Ambient temperature	DRN../DR2./DRU. 71 – 250	°C	–	-30 to +60
	DRN../DR2./DRU. 80MS/M - 132S	°C	-30 to +60	–
	DRN../DR2./DRU. 132M - 280	°C	–	–
	DRN../DR2./DRU. 315	°C	–	–
	DRN../DR2./DRU. 280	°C	–	-30 to +40
	EDRN 80MS - 132S	°C	-30 to +60	-30 to +60
	EDRN 132M - 200L	°C	–	-30 to +50
	EDRN 225	°C	–	-30 to +60
	EDRN 250 - 280	°C	–	-30 to +40

31543952/EN – 10/2023

9.3.6 E.7T

Encoder		Size, unit	EH7T
Signal output			TTL (RS422)
Supply voltage		V_B	DC 5 V
Max. current consumption		I_{in}	140 mA
Max. pulse frequency f_{max}		kHz	300
Incremental tracks, periods per revolution		A, B	1024 (10 bits)
		C	1
Position resolution, increments per revolution		A, B	4096 (12 bits)
Output amplitude		V_{high}	≥ DC 2.5 V
		V_{low}	≤ DC 0.5 V
Output current per track		I_{out}	20 mA
Pulse duty factor according to IEC 60469-1, n = constant			50% ± 20%
Phase offset A: B n = constant			90° ± 20°
Vibration resistance according to EN 60068-2-6 at 10 Hz – 2 kHz			≤ 100 m/s^2
Shock resistance according to EN 60068-2-27			≤ 2000 m/s^2
Maximum speed		n_{max}	6000 min^{-1}
Storage temperature		°C	-15 to +70
Maximum angular acceleration			10^4 rad/s^2
Degree of protection according to EN 60529			IP65
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD)
IECEx certificate of conformity			–
Connection			M23, 12-pin plug connector
Ambient temperature	DRN 315	°C	-40 to +60
	EDRN 315	°C	-20 to +60

31543952/EN – 10/2023

9.3.7 AK8. AV8.

AK8.

AK8H, AK8W

Encoder	Size, unit	AK8H	AK8W[1)]
Signal output		HIPERFACE®	sin/cos + RS485
Supply voltage	V_B	DC 7 V – 12 V	DC 7 V – 30 V
Supply voltage for design as safety encoder	V_{B_FS}	–	DC 7 V – 30 V
Maximum current consumption, free of load	I_{in}	80 mA	100 mA (at V_B = 7 V)
Maximum pulse frequency	f_{pulse_max}	200 kHz	
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation	
Incremental tracks, periods per revolution	A, B	1024 (10 bits)	2048 (11 bits)
	C	–	
Position resolution, increments per revolution	A, B	32768 (15 bits) HIPERFACE®	65536 (16 bits) (RS485)
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B -) $\overline{B}$	V_{t_diff}	1 V ± 10%	
Voltage output signal non-differential (peak-to-peak)	V_t	0.5 V ± 10%	
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$) V	V_{t_o}	2.5 V ± 0.3 V	
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th harmonic	
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ	
Load capacitance, output		≤ 20 nF	
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	–	
C track offset	g	–	
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	V_{t_C}	–	
Phase angle track C', n = constant	k, l	see "Phase relationships" (→ 🗎 252)	
Signal width track C	W_C	see "Phase relationships" (→ 🗎 252)	
Signal logic track C		–	
Voltage output signal differential (peak-to-peak) (D' = D- $\overline{D}$)	V_{t_diff}	Typical: 6.6 V to 10 V (± 10%)	
Voltage output signal non-differential (peak-to-peak) (D, /D)	V_t	Typical: 3.3 V to 5 V (± 10%)	
Signal level output, offset nominal against 0 V (D, /D) V	V_{t_o}	Typical: 0V	
Voltage input signal differential (peak-to-peak) (D' = D- $\overline{D}$)	V_{t_diff}	Typical: 6.6 V to 10 V (± 10%)	
Voltage input signal non-differential (peak-to-peak) (D, /D)	V_t	Typical: 3.3 V to 5 V (± 10%)	

Encoder	Size, unit	AK8H	AK8W[1)]
Signal level input, offset nominal against 0 V (D, /D) V	V_{t_o}	Typical: 0V	
Pulse duty factor according to IEC 60469-1, n = constant		–	
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant		90° ± 2°	
Accuracy of the incremental section[1)]		± 0.0144° (± 52 ")	0.0194° (70 ")
Accuracy of the absolute section		± 0.0144° (± 52 ")	±1 LSB (Least Significant Bit)
Scanning code/counting direction		–	Binary code, ascending with the direction of rotation specified above
Multi-turn resolution		4096 revolutions (12 bits)	65536 revolutions (16 bits)
Communication, interface		HIPERFACE®	RS485 (asynchronous, serial)
Communication, modules		Driver to EIA RS485	Driver to EIA RS485
Clock frequency/bandwidth		9600 Baud	
Clock-pulse space period		–	–
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)	
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)	
Maximum permitted external magnetic field (outer contour of motor)		25 mT / 20 kA/m (on the encoder housing: 10 mT / 8 kA/m)	
Maximum speed	n_{max}	6000 min^{-1}	
Maximum cable length[2)]		100 m	
Duration until fault message (disabled outputs)[3)]		–	≤ 25 ms + 3/4 revolution
Activation time of the rotary encoder-internal diagnostics after switching on		–	200 ms
Degree of protection according to EN 60529			
Installation altitude	h	≤ 2000 m above sea level	≤ 4000 m above sea level
Explosion protection mark ATEX/IECEx		–	ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)
IECEx certificate of conformity		–	IECEx IBE 18.0032X IECEx CSA 21.0010X
Corrosion protection, surface protection		KS, OS1 – OS4, OSG	
Connection		• M23 signal plug connector on the terminal box (optionally with or without temperature sensor) • Terminal strip in the terminal box (optionally with or without temperature sensor) • M23 with 0.36 m cable directly on the encoder (without temperature sensor) • Integrated encoder plug connector on the fan guard side (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor • Integrated encoder plug connector at the rear of the fan guard (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor[4)]	
Storage temperature	°C	-15 to +70	
Maximum angular acceleration		10^4 rad/s²	$2x10^4$ rad/s²
Electronic nameplate		HIPERFACE®; 1792 bytes	RS485 (serial, asynchronous); 1920 bytes
Maximum degree of pollution during installation work		Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)	

31543952/EN – 10/2023

Encoder		Size, unit	AK8H	AK8W[1)]
Ambient temperature	DRN../DR2./DRU. 71 – 132	°C	-30 to +60	-30 to +60
	DRN../DR2./DRU. 160 – 355	°C	-30 to +60	-30 to +60
	DRN../DR2./DRU. 71 – 250	°C	–	–
	DRN../DR2./DRU. 280	°C	–	–
	EDRN 71 - 355	°C	–	-30 to +60
	EDRN 71 - 280S	°C	–	–
	EDRN 280M	°C	–	–
	DR2C 71 - 132S	°C	-30 to +60	-30 to +60

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Observe the requirements for the cables.
3) Absolute encoders A.8W and A.8Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.
4) Note that the permissible ambient temperature of the motor is limited with this connection variant. Contact SEW-EURODRIVE in this case.

31543952/EN – 10/2023

AK8Y

Encoder	Size, unit	AK8Y[1)]
Signal output		sin/cos + SSI, RS422
Supply voltage	V_B	DC 7 V – 30 V
Supply voltage for design as safety encoder	V_{B_FS}	DC 7 V – 30 V
Maximum current consumption, free of load	I_{in}	100 mA (at V_B = 7 V)
Maximum pulse frequency	f_{pulse_max}	200 kHz
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation
Incremental tracks, periods per revolution	A, B	2048 (11 bits)
	C	–
Position resolution, increments per revolution	A, B	4096 (12 bits) (SSI, RS422)
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B -) $\overline{B}$	V_{t_diff}	1 V ± 10%
Voltage output signal non-differential (peak-to-peak)	V_t	0.5 V ± 10%
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$) V	V_{t_o}	2.5 V ± 0.3 V
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th harmonic
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ
Load capacitance, output		≤ 20 nF
Voltage output signal differential (peak-to-peak) (D' = D- $\overline{D}$)	V_{t_diff}	Typical: 6.6 V to 10 V (± 10%)
Voltage output signal non-differential (peak-to-peak) (D, /D)	V_t	Typical: 3.3 V to 5 V (± 10%)
Signal level output, offset nominal against 0 V (D, /D) V	V_{t_o}	Typical: 0V
Voltage input signal differential (peak-to-peak) (D' = D- $\overline{D}$)	V_{t_diff}	Typical: 6.6 V to 10 V (± 10%)
Voltage input signal non-differential (peak-to-peak) (D, /D)	V_t	Typical: 3.3 V to 5 V (± 10%)
Signal level input, offset nominal against 0 V (D, /D) V	V_{t_o}	Typical: 0V
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	–
C track offset	g	–
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	V_{t_C}	–
Phase angle track C', n = constant	k, l	–
Signal width track C	W_C	–
Signal logic track C		–
Pulse duty factor according to IEC 60469-1, n = constant		–

31543952/EN – 10/2023

Encoder	Size, unit	AK8Y[1)]
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant		90° ± 2°
Accuracy of the incremental section[2)]		0.0194° (70 ")
Accuracy of the absolute section		±1 LSB (Least Significant Bit)
Scanning code/counting direction		Gray code, ascending with the direction of rotation specified above
Multi-turn resolution		4096 revolutions (12 bits)
Communication, interface		SSI (synchronous, serial)
Communication, modules		Driver to EIA RS422
Clock frequency/bandwidth		100 – 800 kHz (100 m cable length with maximum 300 kHz)
Clock-pulse space period		12 – 30 µs
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum permitted external magnetic field (outer contour of motor)		25 mT / 20 kA/m (on the encoder housing: 10 mT / 8 kA/m)
Maximum speed	n_{max}	6000 min^{-1}
Maximum cable length[3)]		100 m
Duration until fault message (disabled outputs)[4)]		≤ 25 ms + 3/4 revolution
Activation time of the rotary encoder-internal diagnostics after switching on		200 ms
Degree of protection according to EN 60529		IP66
Installation altitude	h	≤ 4000 m above sea level
		In areas at risk of explosion: Permitted external pressure 0.8 – 1.1 bar (at typical height ≤ 1800 m above sea level)
Explosion protection mark ATEX/IECEx		ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)
IECEx certificate of conformity		IECEx IBE 18.0032X IECEx CSA 21.0010X
Corrosion protection, surface protection		KS, OS1 – OS4, OSG
Connection		• M23 signal plug connector on the terminal box (optionally with or without temperature sensor) • Terminal strip in the terminal box (optionally with or without temperature sensor) • M23 with 0.36 m cable directly on the encoder (without temperature sensor) • Integrated encoder plug connector on the fan guard side (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor • Integrated encoder plug connector at the rear of the fan guard (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor[5)]
Storage temperature	°C	-15 to +70
Maximum angular acceleration		$2x10^4$ rad/s^2
Electronic nameplate		–
Maximum degree of pollution during installation work		Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)

31543952/EN – 10/2023

Encoder		Size, unit	AK8Y[1)]
Ambient temperature	DRN../DR2./DRU. 71-132	°C	-30 to +60
	DRN../DR2./DRU. 160-355	°C	-30 to +60
	DRN../DR2./DRU. 71-250	°C	–
	DRN../DR2./DRU. 280	°C	–
	EDRN 71-355	°C	-30 to +60
	EDRN 71-280S	°C	–
	EDRN 280M	°C	–

1) See figure "Sin/cos signals and phase relationship".
2) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
3) Observe the requirements for the cables.
4) Absolute encoders A.8W and A.8Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.
5) Note that the permissible ambient temperature of the motor is limited with this connection variant. Contact SEW-EURODRIVE in this case.

31543952/EN – 10/2023

AK8Z

	Size, unit	AK8Z
Motor series		DRN/DR2S/DR2L
Motor sizes		71 – 180
Combination of brake/brake control		With motor-integrated BG1Z brake control: BE.. With motor-external brake control: BE.., BE.. FS (functional safety[1)])
Combination of motor protection/temperature		Motor protection: TF (in winding) Motor protection/motor temperature: PI (Pt1000 in stator housing and motor temperature model with MOVI-C® inverters)
Combination of forced cooling fans		Yes
Encoder type		Multi-turn absolute encoder
Interface		MOVILINK® DDI, coaxial
MOVILINK® DDI type code		DI.E..
Electronic nameplate		ET2000 (MOVILINK® DDI, integrated)
Voltage supply		DC 24 V (MOVILINK® DDI, integrated)
Incremental resolution (Position steps per motor revolution)		–
Single-turn resolution (Position resolution per motor revolution)		16 bit 65536 inc
Multi-turn resolution (max. counter for complete motor revolutions)		16 bit 65536 inc
Maximum permissible magnetic field external to the motor		Motor outer contour: 25 mT / 20 kA/m, On the encoder housing: 10 mT / 8 kA/m
Vibration resistance according to EN 60068-2-6		≤ 10 g (f > 18.5 Hz)
Shock resistance according to EN 60068-2-27		≤ 100 g (t = 6 ms, 18 pulses)
Maximum speed		6000 min^{-1}
Degree of protection according to EN 60529		IP66
Corrosion and surface protection		KS, OS1 – OS4, OSG
Installation altitude[2)]		≤ 3866 m
Ambient temperature of motor[2)]		With MOVI-C® control cabinet inverters and MOVIMOT® flexible decentralized inverter: -20 – +40 °C, (-40 °C – +60 °C[1)2)]) With MOVIMOT® advanced decentralized inverters: See MOVIMOT® advanced operating instructions/manual
Cable length, maximum[3)]		200 m
Connection technology		• KD1: M23 hybrid plug connector on the terminal box, 1.5 – 4.0 mm^2 motor connection, 1.0 mm^2 brake connection • KDB: M40 hybrid plug connector on the terminal box, 6.0 – 10.0 mm^2 motor connection, 1.5 mm^2 brake connection • KD: Cable gland on the terminal box for hybrid cables with 1.5 – 10 mm^2 motor connection and 1 – 1.5 mm^2 brake connection • KDD: Motor and brake connection via cable gland, M23 signal plug connector on the terminal box
Explosion protection		–
Functional safety		Yes[1)]

1) in preparation
2) Observe the restrictions of the ambient temperature and potential derating of the respective motor/inverter when used at an increased ambient temperature and/or depending on the installation altitude.
3) Also dependent on the selected inverter type and configured PWM frequency and/or brake type; see documentation of the respective inverters.

31543952/EN – 10/2023

AV8.

Encoder	Size, unit	AV8Y	AV8W[1)]	AV8H[2)]
Signal output		sin/cos + SSI, RS422	sin/cos + RS485	HIPERFACE®
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V	DC 7 V – 12 V
Supply voltage for design as safety encoder	V_{B_FS}	DC 7 V – 30 V	DC 7 V – 30 V	–
Maximum current consumption, free of load	I_{in}	100 mA (at V_B = 7 V)	100 mA (at V_B = 7 V)	80 mA
Maximum pulse frequency	f_{pulse_max}	200 kHz		
Direction of rotation		A before B when looking at the motor output shaft in clockwise rotation		
Incremental tracks, periods per revolution	A, B	2048 (11 bits)	2048 (11 bits)	1024 (10 bits)
	C	–		
Incremental tracks, increments per revolution	A, B	8192 (13 bits)	8192 (13 bits)	4096 (12 bits)
Position resolution, positions per revolution, digital protocol	Digital	4096 (12 bits) (SSI, RS422)	65536 (16 bits) (RS485)	32768 (15 bits) HIPERFACE®
Voltage output signal differential (peak-to-peak) (A' = A - $\overline{A}$; B' = B -) $\overline{B}$	V_{t_diff}	1 V ± 10%	1 V ± 10%	Typical: 6.6 V to 10 V (± 10%)
Voltage output signal non-differential (peak-to-peak)	V_t	0.5 V ± 10%	0.5 V ± 10%	Typical: 3.3 V to 5 V (± 10%)
Signal level output, offset nominal against 0 V (A, B, C, $\overline{A}$, $\overline{B}$, $\overline{C}$) V	V_{t_o}	2.5 V ± 0.3 V	2.5 V ± 0.3 V	Typical: 0V
Total harmonic distortion (THD)		40 dB (1%), 60 dB (0.1%) from 7th harmonic		
Load resistance/load current differential	R_L/I_L	120 Ω ± 10%	120 Ω ± 10%	120 Ω ± 10%
Resistance between track and reference ground	R_{gnd}	≥ 1 kΩ	≥ 1 kΩ	≥ 1 kΩ
Load capacitance, output		≤ 20 nF	≤ 20 nF	≤ 20 nF
Voltage output signal, differential (C' = C - $\overline{C}$) (peak-to-peak)	V_{t_diff} e	–	–	–
C track offset	g	–	–	–
Voltage output signal, non-differential (C,$\overline{C}$) (peak-to-peak)	V_{t_C}	–	–	–
Phase angle track C', n = constant	k, l	–	–	see "Phase relationships" (→ 🗎 252)
Signal width track C	W_C	see "Phase relationships" (→ 🗎 252)		
Signal logic track C		–		
Pulse duty factor according to IEC 60469-1, n = constant		–		
Phase offset A: B; $\overline{A}$: $\overline{B}$ n = constant		90° ± 2°		
Accuracy of the incremental section[3)]		0.0194° (70 ")	0.0194° (70 ")	± 0.0144° (± 52 ")
Accuracy of the absolute section		±1 LSB (Least Significant Bit)	±1 LSB (Least Significant Bit)	± 0.0144° (± 52 ")
Scanning code/counting direction		Gray code, ascending with the direction of rotation specified above	Binary code, ascending with the direction of rotation specified above	–
Multi-turn resolution		4096 revolutions (12 bits)	65536 revolutions (16 bits)	4096 revolutions (12 bits)
Communication, interface		SSI (synchronous, serial)	RS485 (asynchronous, serial)	HIPERFACE®
Communication, modules		Driver to EIA RS422	Driver to EIA RS485	Driver to EIA RS485
Clock frequency/bandwidth		100 – 800 kHz (100 m cable length with maximum 300 kHz)	9600 Baud	HIPERFACE®
Clock-pulse space period		12 – 30 µs	–	–

31543952/EN – 10/2023

Encoder		Size, unit	AV8Y	AV8W[1)]	AV8H[2)]
Vibration resistance according to EN 60068-2-6			≤ 10 g (f > 18.5 Hz)		
Shock resistance according to EN 60068-2-27			≤ 100 g (t = 6 ms, 18 pulses)		
Maximum speed		n_{max}	6000 min^{-1}		
Maximum cable length[4)]			100 m		
Duration until fault message (disabled outputs)[5)]			≤ 25 ms + 3/4 revolution	≤ 25 ms + 3/4 revolution	HIPERFACE®
Activation time of the rotary encoder-internal diagnostics after switching on			200 ms	200 ms	HIPERFACE®
Degree of protection according to EN 60529			IP66		
Installation altitude		h	≤ 4000 m above sea level	≤ 4000 m above sea level	≤ 2000 m above sea level
			In areas at risk of explosion: Permitted external pressure 0.8 – 1.1 bar (at typical height ≤ 1800 m above sea level)		
Explosion protection mark ATEX/IECEx			ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)	–
IECEx certificate of conformity			IECEx IBE 18.0032X	IECEx IBE 18.0032X	–
Corrosion protection, surface protection			KS, OS1 – OS4, OSG		
Connection			• M23 plug connector with 0.36 m cable directly on the encoder (without temperature sensor) • Integrated encoder plug connector on the fan guard side (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor • Integrated encoder plug connector at the rear of the fan guard (can be pre-assembled and plugged in the field); optionally with M23 plug connector, without temperature sensor		
Storage temperature		°C	-15 to +70		
Maximum angular acceleration			$2x10^4$ rad/s²	$2x10^4$ rad/s²	10^4 rad/s²
Electronic nameplate			–	RS485 (serial, asynchronous); 1920 bytes	HIPERFACE®; 1792 bytes
Maximum degree of pollution during installation work			Degree of pollution 1 (IEC 61010-1, EN 60664-1, VDE 0110-1)		
Ambient temperature	DRN../DR2./DRU. 71-132	°C	–	–	–
	DRN../DR2./DRU. 160-355	°C	–	–	–
	DRN../DR2./DRU. 71-250	°C	-30 to +60	-30 to +60	-30 to +60
	DRN../DR2./DRU. 280	°C	-30 to +40	-30 to +40	-30 to +40
	EDRN 71-355	°C	–	–	–
	EDRN 71-280S	°C	-30 to +60	-30 to +60	–
	EDRN 280M	°C	-30 to +40	-30 to +40	–
	DR2C 71-132S	°C	–	-30 to +60	-30 to +60

1) See figure "Sin/cos signals and phase relationship".
2) Observe the specification for the HIPERFACE® interface, Sick AG.
3) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
4) Observe the requirements for the cables.
5) Absolute encoders A.8W and A.8Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

9.3.8 A.7W

AS7W, AV7W, AG7W

Encoder	Size, unit	AS7W	AV7W	AG7W
Supply voltage	V_B	DC 7 V – 30 V		
Max. current consumption	I_{in}	150 mA		
Max. pulse frequency	f_{max}	200 kHz		
Incremental tracks, periods per revolution	A, B	2048 (11 bits)		
	C	–		
Output amplitude per track	V_{high}	1 V_{pp}		
	V_{low}			
Signal output		sin/cos		
Output current per track	I_{out}	10 mA		
Pulse duty factor according to IEC 60469-1, n = constant		–		
Phase offset A: B n = constant		90° ± 2°		
Accuracy of the incremental section[1)]		0.0194°		
Accuracy of the absolute section		±1 LSB (Least Significant Bit)		
Scanning code		Binary code		
Position resolution, increments per revolution	A, B	8192 (13 bits)		
Multi-turn resolution		65536 revolutions (16 bits)		
Data transmission		RS485		
Serial data output		Driver to EIA RS485		
Serial pulse input		Recommended driver to EIA RS485		
Clock frequency		9600 Baud		
Clock-pulse space period		–		
Vibration resistance according to EN 60068-2-6		≤ 100 m/s^2		
Shock resistance according to EN 60068-2-27		≤ 1000 m/s^2	≤ 1000 m/s^2	≤ 2000 m/s^2
Maximum speed	n_{max}	6000 min^{-1}		
				In area at risk of explosion: -30 to + 40 °C at max. 6000 min^{-1}
Duration until fault message (disabled outputs)[2)]		25 ms + 3/4 revolution		
Activation time of rotary encoder internal diagnostics after switching on		–		
Degree of protection according to EN 60529		IP66		
Installation altitude	h	≤ 4000 m above sea level		
		In areas at risk of explosion: Permitted external pressure 0.8 – 1.1 bar (at typical height ≤ 1800 m above sea level)		
Explosion protection mark ATEX/IECEx		ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)		
IECEx certificate of conformity		IECEx IBE 18.0032X		
Connection		Terminal strip in pluggable connection cover		
Storage temperature	°C	-15 to +70		
Maximum angular acceleration		10^4 rad/s^2		
Maximum degree of pollution during installation work		Degree of pollution 2 (IEC 61010-1, EN 60664-1, VDE 0110-1)		

31543952/EN – 10/2023

Encoder		Size, unit	AS7W	AV7W	AG7W
Ambient temperature	DRN../DR2./DRU. 71-132S	°C	-30 to +60	–	–
	DRN../DR2./DRU. 132M-280	°C	–	–	-30 to +60
	DRN../DR2./DRU. 71-250	°C	–	-30 to +60	–
	DRN../DR2./DRU. 280	°C	–	-30 to +40	–
	EDRN 80MS-132S	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 132M-200L	°C	-30 to +60	-30 to +50	-30 to +60
	EDRN 225	°C	-30 to +60	-30 to +60	-30 to +60
	EDRN 250-280	°C	-30 to +60	-30 to +40	-30 to +60

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Absolute encoders AS7W, AV7W, and AG7W have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

31543952/EN – 10/2023

9.3.9 A.7Y

AG7Y, AH7Y

Encoder	Size, unit	AG7Y	AH7Y
Signal output		sin/cos	TTL (RS422)
Supply voltage	V_B	DC 7 V – 30 V	DC 9 V – 30 V
Max. current consumption	I_{in}	150 mA	
Max. pulse frequency	f_{limit}	200 kHz	120 kHz
Incremental tracks, periods per revolution	A, B	2048 (11 bits)	
	C	–	
Output amplitude per track	V_{high}	1 V_{pp}	≥ DC 2.5 V_{PP}
	V_{low}	1 V_{pp}	≤ DC 0.5 V_{PP}
Output current per track	I_{out}	10 mA	20 mA
Pulse duty factor according to IEC 60469-1, n = constant		–	50 ± 20%
Phase offset A: B n = constant		90° ± 2°	90° ± 20°
Accuracy of the incremental section[1)]		0.0194°	–
Accuracy of the absolute section		±1 LSB (Least Significant Bit)	–
Scanning code		Gray code	
Position resolution, increments per revolution	A, B	8192 (13 bits)	
Position resolution of the absolute section, increments per revolution		4096 (12 bits)	
Multi-turn resolution		4096 revolutions (12 bits)	
Data transmission		synchronous serial (SSI)	
Serial data output		Driver to EIA RS422	Driver to EIA RS485
Serial pulse input		Recommended receiver to EIA RS422	Optocoupler, recommended driver to EIA RS485
Clock frequency		100 – 800 kHz	
Clock-pulse space period		12 – 30 µs	
Vibration resistance according to EN 60068-2-6		≤ 100 m/s^2	
Shock resistance according to EN 60068-2-27		≤ 2000 m/s^2	≤ 2000 m/s^2
Maximum speed	n_{max}	6000 min^{-1}	3500 min^{-1}
		In area at risk of explosion: -30 to + 60 °C at max. 4500 min^{-1}	
Duration until fault message (disabled outputs)[2)]		25 ms + 3/4 revolution	–
Activation time of rotary encoder internal diagnostics after switching on		–	
Degree of protection according to EN 60529		IP66	IP56
		-30 to + 60 °C at max. 4500 min^{-1}	
Installation altitude	h	≤ 4000 m above sea level	
		In areas at risk of explosion: Permitted external pressure 0.8 – 1.1 bar (at typical height ≤ 1800 m above sea level)	
Explosion protection mark ATEX/IECEx		ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD)
IECEx certificate of conformity		IECEx IBE 18.0032X	–
Connection		Terminal strip in pluggable connection cover	Terminal strip on encoder
Storage temperature	°C	-15 to +70	
Maximum angular acceleration		10^4 rad/s^2	
Maximum degree of pollution during installation work		Degree of pollution 2 (IEC 61010-1, EN 60664-1, VDE 0110-1)	

31543952/EN – 10/2023

Encoder		Size, unit	AG7Y	AH7Y
Ambient temperature	DRN../DR2./DRU. 71-250	°C	–	-20 to +40
	DRN../DR2./DRU. 71-132S	°C	–	–
	DRN../DR2./DRU. 132M-280	°C	-30 to +60	–
	DRN../DR2./DRU. 315	°C	–	-20 to +60
	DRN../DR2./DRU. 280	°C	–	–
	EDRN 80MS-132S	°C	-30 to +60	-20 to +60
	EDRN 132M-200L	°C	-30 to +60	-20 to +60
	EDRN 225	°C	-30 to +60	-20 to +60
	EDRN 250-280	°C	-30 to +60	-20 to +60

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Absolute encoders AS7Y, AV7Y, and AG7Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

31543952/EN – 10/2023

AS7Y, AV7Y

Encoder	Size, unit	AS7Y	AV7Y
Signal output		sin/cos	sin/cos
Supply voltage	V_B	DC 7 V – 30 V	DC 7 V – 30 V
Max. current consumption	I_{in}	150 mA	
Max. pulse frequency	f_{limit}	200 kHz	200 kHz
Incremental tracks, periods per revolution	A, B	2048 (11 bits)	
	C	–	
Output amplitude per track	V_{high}	1 V_{pp}	1 V_{pp}
	V_{low}	1 V_{pp}	1 V_{pp}
Output current per track	I_{out}	10 mA	10 mA
Pulse duty factor according to IEC 60469-1, n = constant		–	–
Phase offset A: B n = constant		90° ± 2°	90° ± 2°
Accuracy of the incremental section[1)]		0.0194°	0.0194°
Accuracy of the absolute section		±1 LSB (Least Significant Bit)	±1 LSB (Least Significant Bit)
Scanning code		Gray code	
Position resolution, increments per revolution	A, B	8192 (13 bits)	
Position resolution of the absolute section, increments per revolution		4096 (12 bits)	
Multi-turn resolution		4096 revolutions (12 bits)	
Data transmission		synchronous serial (SSI)	
Serial data output		Driver to EIA RS422	Driver to EIA RS422
Serial pulse input		Recommended receiver to EIA RS422	Recommended receiver to EIA RS422
Clock frequency		100 – 800 kHz	
Clock-pulse space period		12 – 30 µs	
Vibration resistance according to EN 60068-2-6		≤ 100 m/s^2	
Shock resistance according to EN 60068-2-27		≤ 1000 m/s^2	≤ 1000 m/s^2
Maximum speed	n_{max}	6000 min^{-1}	6000 min^{-1}
Duration until fault message (disabled outputs)[2)]		25 ms + 3/4 revolution	25 ms + 3/4 revolution
Activation time of rotary encoder internal diagnostics after switching on		–	
Degree of protection according to EN 60529		IP66	IP66
Installation altitude	h	≤ 4000 m above sea level	
		In areas at risk of explosion: Permitted external pressure 0.8 – 1.1 bar (at typical height ≤ 1800 m above sea level)	
Explosion protection mark ATEX/IECEx		ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)	ATEX equipment category 3 (3G, 3D, 3GD) IECEx EPL .c (3G-c, 3D-c, 3GD-c)
IECEx certificate of conformity		IECEx IBE 18.0032X	IECEx IBE 18.0032X
Connection		Terminal strip in pluggable connection cover	Terminal strip in pluggable connection cover
Storage temperature	°C	-15 to +70	
Maximum angular acceleration		10^4 rad/s^2	
Maximum degree of pollution during installation work		Degree of pollution 2 (IEC 61010-1, EN 60664-1, VDE 0110-1)	

31543952/EN – 10/2023

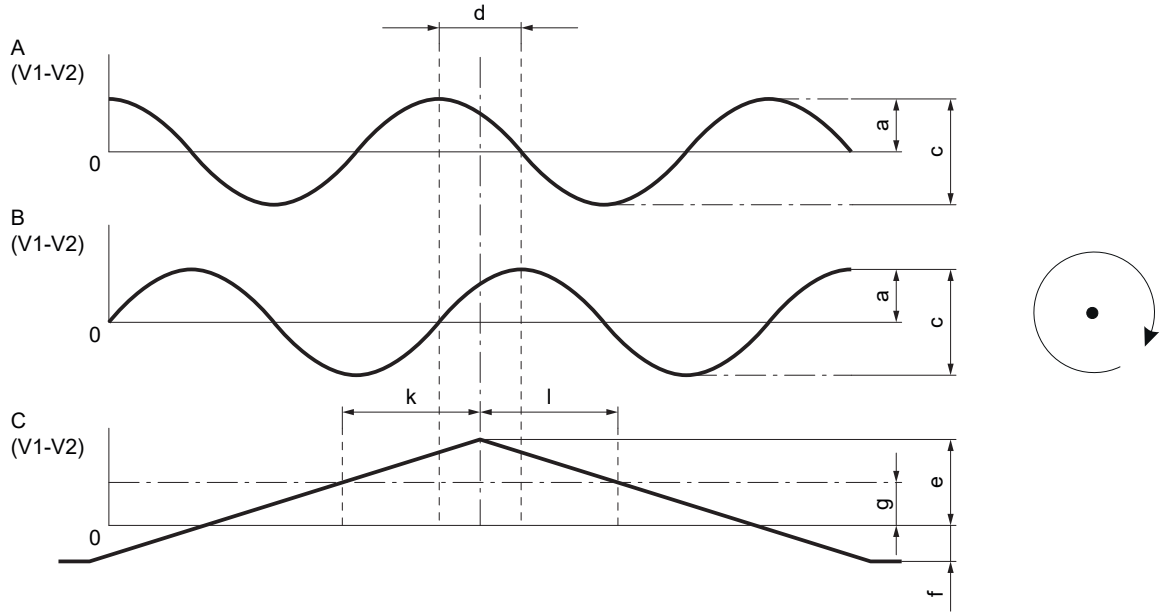
Encoder		Size, unit	AS7Y	AV7Y
Ambient temperature	DRN../DR2./DRU. 71-250	°C	–	-30 to +60
	DRN../DR2./DRU. 71-132S	°C	-30 to +60	–
	DRN../DR2./DRU. 132M-280	°C	–	–
	DRN../DR2./DRU. 315	°C	–	–
	DRN../DR2./DRU. 280	°C	–	-30 to +40
	EDRN 80MS-132S	°C	-30 to +60	-30 to +60
	EDRN 132M-200L	°C	-30 to +60	-30 to +50
	EDRN 225	°C	-30 to +60	-30 to +60
	EDRN 250-280	°C	-30 to +60	-30 to +40

1) Due to the stiffness of the torque bracket, you have to take into account an automatically resetting ±0.6° twist (depending on the direction of rotation) of the encoder housing compared to the encoder shaft.
2) Absolute encoders AS7Y, AV7Y, and AG7Y have a self-diagnostics function. If a fault is detected, the sensor reports it by deactivating the output signals to the encoder evaluation unit.

31543952/EN – 10/2023

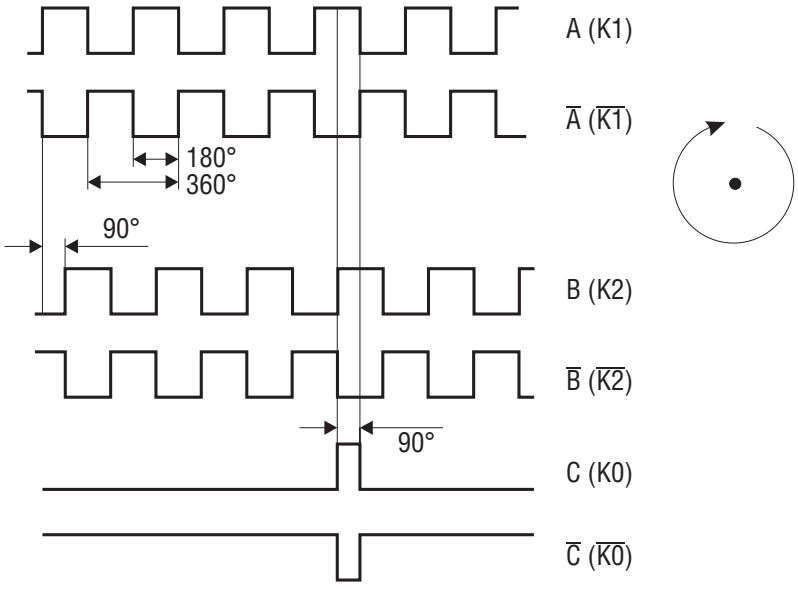
9.4 Phase relationships

9.4.1 sin/cos



28352869387

9.4.2 HTL/TTL



1369276939

31543952/EN – 10/2023

9.5 Characteristic safety values for safety encoder

INFORMATION

In addition to the documentation, you can also obtain the characteristic safety values of components by SEW-EURODRIVE in the SEW-EURODRIVE library for the "SISTEMA" software tool. The documentation and the library are available for download from www.sew-eurodrive.com.

9.5.1 EI7C FS

	Characteristic safety values according to	
	IEC 61800-5 2	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 0	1-channel (Cat. 2)
PFH_D value[1)]	8.0×10^{-8} 1/h = 80 FIT ($T_U \leq 60$ °C)	
$MTTF_d$ value[1)]	–	202 years ($T_{amb} \leq 60$ °C)
Service life/proof test interval	20 years	
Safe fault coverage (SFF)	95%	

1) The specified values apply when the requirements for the evaluation electronics are met (see the addendum to the operating instructions "Safety Encoders and Safety Brakes").

31543952/EN – 10/2023

9.5.2 EK8S

	Characteristic safety values according to	
	IEC 62061/IEC 61508	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 1	2-channel (Cat. 3)
PFH_D value[1)] (**without** mounting on the motor)	7.8×10^{-9} 1/h = 7.8 FIT ($T_{amb} \leq 45$ °C) 1.2×10^{-8} 1/h = 12 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_D$ value[1)] (**without** mounting on the motor)	–	1474 years ($T_{amb} \leq 45$ °C) 1030 years ($T_{amb} \leq 60$ °C)
PFH_D value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	5.0×10^{-8} 1/h = 50 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_d$ value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	–	212 years ($T_{amb} \leq 60$ °C)
Service life/proof test interval	20 years	
Motor/encoder connection (only for drives **with** FS logo)	Fault exclusion according to IEC 61800-5-2	

1) The specified values apply when the requirements for the encoder evaluation unit are met.

31543952/EN – 10/2023

9.5.3 AK8W, AK8Y

	Characteristic safety values according to	
	IEC 62061/IEC 61508	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 1	2-channel (Cat. 3)
PFH_D value[1)] (**without** mounting on the motor)	6.97×10^{-9} 1/h = 6.97 FIT ($T_{amb} \leq 45$ °C) 1.04×10^{-8} 1/h = 10.4 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_d$ value[1)] (**without** mounting on the motor)	–	1638 years ($T_{amb} \leq 45$ °C) 1098 years ($T_{amb} \leq 60$ °C)
PFH_D value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	5.0×10^{-8} 1/h = 50 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_d$ value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	–	212 years ($T_{amb} \leq 60$ °C)
Service life/proof test interval	20 years	
Motor/encoder connection (only for drives **with** FS logo)	Fault exclusion according to IEC 61800-5-2	

1) The specified values apply when the requirements for the encoder evaluation unit are met.

31543952/EN – 10/2023

9.5.4 ES7S, EG7S

	Characteristic safety values according to	
	IEC 62061/IEC 61508	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 1	2-channel (Cat. 3)
PFH_D value[1)] (**without** mounting on the motor)	8.5×10^{-9} 1/h = 8.5 FIT ($T_{amb} \leq 45$ °C) 1.3×10^{-8} 1/h = 13 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_D$ value[1)] (**without** mounting on the motor)	–	1306 years ($T_{amb} \leq 45$ °C) 895 years ($T_{amb} \leq 60$ °C)
PFH_D value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	5.0×10^{-8} 1/h = 50 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_d$ value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	–	212 years ($T_{amb} \leq 60$ °C)
Service life/proof test interval	20 years	
Motor/encoder connection (only for drives **with** FS logo)	Fault exclusion according to IEC 61800-5-2	

1) The specified values apply when the requirements for the encoder evaluation unit are met.

31543952/EN – 10/2023

9.5.5 AS7W, AG7W, AS7Y, AG7Y

	Characteristic safety values according to	
	IEC 62061/IEC 61508	**ISO 13849-1**
Classification	SIL 2	PL d
System structure	HFT = 1	2-channel (Cat. 3)
PFH_D value[1)] (**without** mounting on the motor)	9.3×10^{-9} 1/h = 9.3 FIT ($T_{amb} \leq 45$ °C) 1.4×10^{-8} 1/h = 14 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_d$ value[1)] (**without** mounting on the motor)	–	1155 years ($T_{amb} \leq 45$ °C) 753 years ($T_{amb} \leq 60$ °C)
PFH_D value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	5.0×10^{-8} 1/h = 50 FIT ($T_{amb} \leq 60$ °C)	
$MTTF_d$ value[1)] (**with** mounting on the motor; takes into account a derating due to motor reheating)	–	212 years ($T_{amb} \leq 60$ °C)
Service life/proof test interval	20 years	
Motor/encoder connection (only for drives **with** FS logo)	Fault exclusion according to IEC 61800-5-2	

1) The specified values apply when the requirements for the encoder evaluation unit are met.

31543952/EN – 10/2023

10 Dimension sheets

The CAD data of the motor with encoder option can be found in SEW-EURODRIVE's Online Support portal.

Dimension sheets of motors with encoders can be found in the catalog of the respective motor.

The following dimension sheets supplement the standard dimension sheets shown in the motor catalog.

31543952/EN – 10/2023

10.1 Dimension sheets for DRN, DR2., DRU, DR2C motors with encoders

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

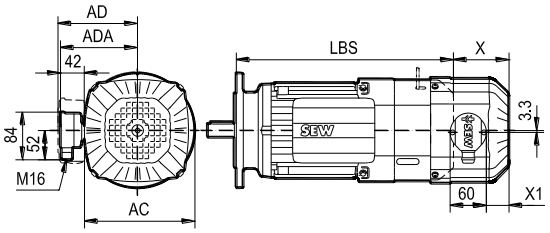
09 265 01 23
63411431.01

SEW EURODRIVE

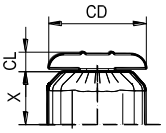
DE Seite **1**/8
MD-ST 05.07.2023

DR..71-100

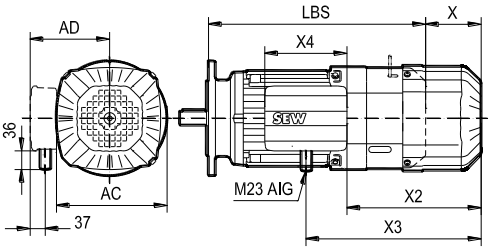
/.K8./BE
A1GA
A2GA
radial



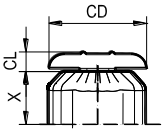
/C



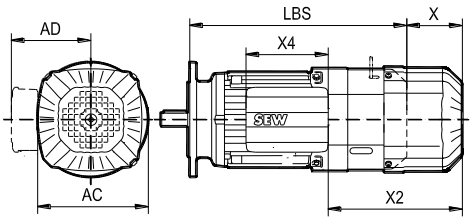
/.K8./BE
AIGA
AIGB



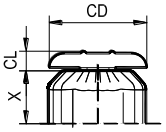
/C



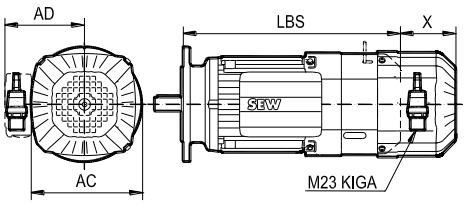
/.K8./BE



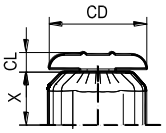
/C



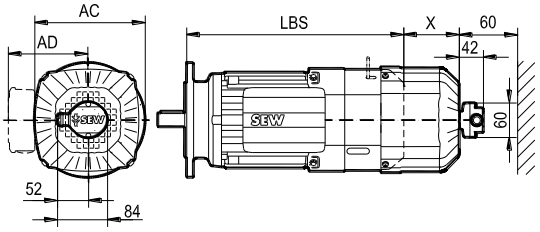
/.K8./BE
KIGA



/C



/.K8./BE
A1GA
A2GA
axial



SEW-EURODRIVE GmbH & Co KG • 76642 Bruchsal/Germany • Tel. (+49 7251) 75-0 • Fax (+49 7251) 75-1970 • http://www.sew.de

31543952/EN – 10/2023

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

09 265 01 23
63411431.01

SEW EURODRIVE

DE Seite **2**/8
MD-ST 05.07.2023

DR..71 – 100

Motor Type	LBS (B5/ B14)	LBS (B3)	AD	AC	ADA	X	X1	X2	X3	X4	CD	CL
DRN71MS DRN71MSR DR2C71MSA DR2S71MS DR2L71MS DR2M71MS	269	267	132	139	110	92	18	173	239	143	131	23
DRN71M DR2S71MR DR2S71M DR2L71M DR2M71M DR2C71MA	289	287										
DRN80MK DR2C80MKA DR2S80MK DR2L80MK	322	320	142	156	118	93	16	193	259	143	147	31
DRN80MS DR2S80MS	340	338										
DRN80M DR2C80MA DR2S80M DR2L80M	368	366										
DRN90S DRN90SR DR2S90S DRU90S	375	373	153	179	130	83	28	202	268	143	147	31
DRN90L DRU90L DR2S90L	407	405										
DRN100LS DR2S100LS DRU100LS/R	402	400	161	197	139	86	34	203	269	143	Ø170	34
DRN100LM DR2S100LM DRN100L DR2S100L DRU100L	452	450										

31543952/EN – 10/2023

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

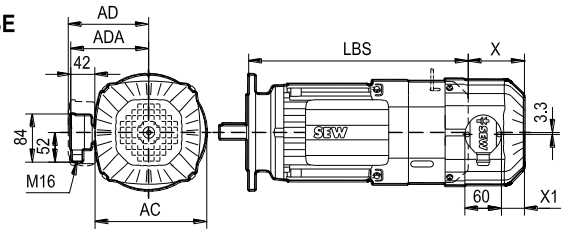
09 265 01 23
63411431.01

SEW EURODRIVE

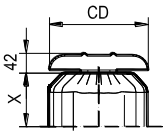
DE Seite **3**/8
MD-ST 05.07.2023

DR..112 – 180

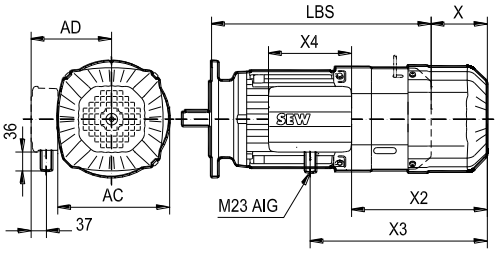
/.K8./BE
A1GA
A2GA
radial



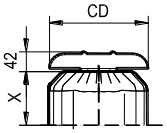
/C



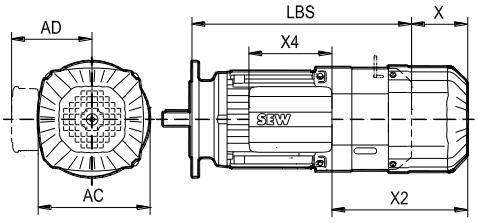
/.K8./BE
AIGA
AIGB



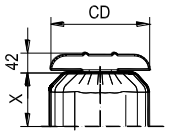
/C



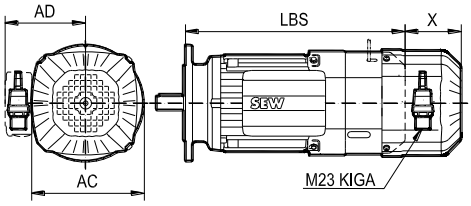
/.K8./BE



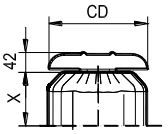
/C



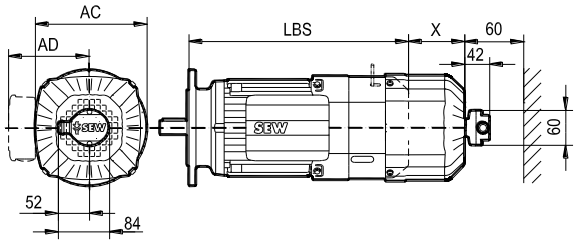
/.K8./BE
KIGA



/C



/.K8./BE
A1GA
A2GA
axial



SEW-EURODRIVE GmbH & Co KG • 76642 Bruchsal/Germany • Tel. (+49 7251) 75-0 • Fax (+49 7251) 75-1970 • http://www.sew.de

31543952/EN – 10/2023

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

09 265 01 23
63411431.01

SEW EURODRIVE

DE Seite **4**/8
MD-ST 05.07.2023

DR..112 - 180

Motor Type	LBS (B5/ B14)	LBS (B3)	AD	AC	ADA	X	X1	X2	X3	X4	CD
DRN112M DR2S112M	499	497	175	221	151	121	38	278	344	143	Ø221
DRN112M (6)	491										
DRN132S DR2S132S DR2S132SR DRU132S	549	547									
DRN132M DR2S132M DRU132M	576	574	228	261	172	84	27	278	353	186	Ø262
DRN132L(8) DR2L132L	599	597									
DRN132L(4,6)	601	599									
DRN160M DR2S160M DR2L160M DRU160M DRU160MP DRN160L DRU160LR DRU160L DR2S160L DR2L160L	721	718	253	316	199	84	38	348	423	186	Ø309
DRN180M DR2S180M DR2L180M DRU180M DRN180L DRU180L DR2S180L DR2L180L	748	745	268	357	220	84	38	348	423	186	Ø354

31543952/EN – 10/2023

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

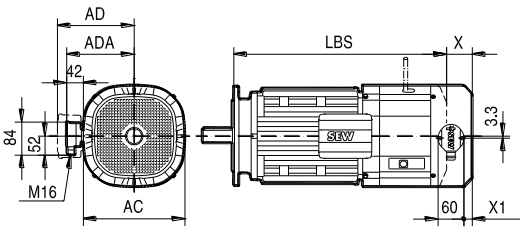
09 265 01 23
63411431.01

SEW EURODRIVE

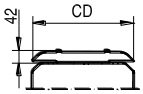
DE Seite **5**/8
MD-ST 05.07.2023

DR..200 – 280

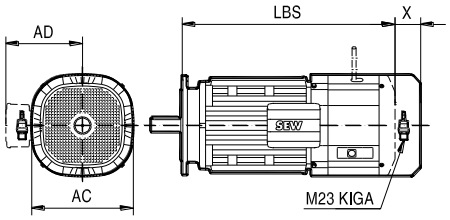
/.K8.BE
A1GA
A2GA
radial



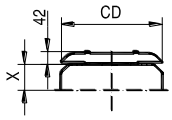
/C



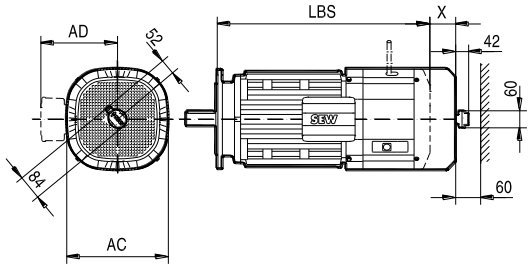
/.K8.BE
KIGA



/C



/.K8.BE
A1GA
A2GA
axial



SEW-EURODRIVE GmbH & Co KG • 76642 Bruchsal/Germany • Tel. (+49 7251) 75-0 • Fax (+49 7251) 75-1970 • http://www.sew.de

31543952/EN – 10/2023

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

09 265 01 23
63411431.01

SEW EURODRIVE

DE Seite **6**/8
MD-ST 05.07.2023

DR..200 – 280

Motor Type	LBS (B5/ B14)	LBS (B3)	AD	AC	ADA	X	X1	CD
DRN200L DRU200L DRU200LR DR2S200L DR2L200L	854	851	283	Ø394	237	84	35	Ø415
DRN225S DR2S225S DR2L225S DRU225S DRN225M	822	819	305	Ø434	259	84	29	Ø415
DRN225ME DRU225ME	902	899						
DRN250M DRN250ME DRU250M DRU250ME	992	990	394	Ø495	290	79	69	Ø490
DRN280S	992	990	394	Ø495	290	79	69	Ø490
DRN280M DRU280MR	1087	1085						

31543952/EN – 10/2023

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

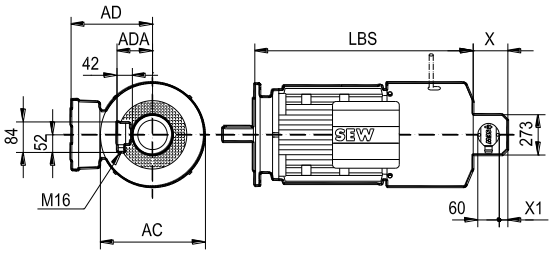
09 265 01 23
63411431.01

SEW EURODRIVE

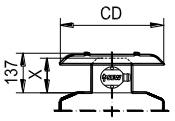
DE Seite **7**/8
MD-ST 05.07.2023

DR..315

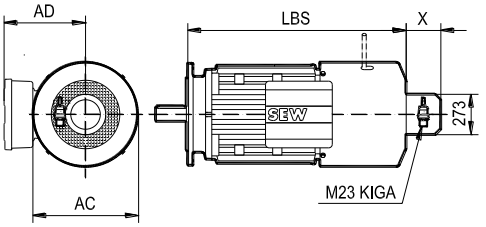
/.K8. BE
A1GA
A2GA
radial



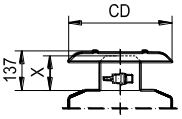
/C



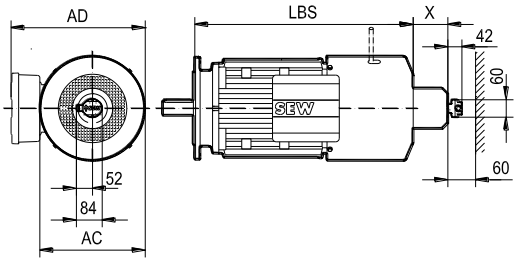
/.K8. BE
KIGA



/C



/.K8. BE
A1GA
A2GA
axial



SEW-EURODRIVE GmbH & Co KG • 76642 Bruchsal/Germany • Tel. (+49 7251) 75-0 • Fax (+49 7251) 75-1970 • http://www.sew.de

31543952/EN – 10/2023

Maßblatt

Drehstrombremsmotor DR..71-315
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

09 265 01 23
63411431.01

SEW EURODRIVE

DE Seite **8**/8
MD-ST 05.07.2023

DR..315

Motor Type	LBS (B5/ B14)	LBS (B3)	AD	AC	ADA	X	X1	CD
DRN315S DRN315M DRU315SR DRU315S DRU315M DRU315L DRU315LR	1192	1190	506	Ø624	199	129	29	Ø590
DRN315ME	1322	1320						
DRN315L DRN315H DRU315H DRU315HB DRU315HG DRU315HR	1322	1320	518	Ø624	199	129	29	Ø590

31543952/EN – 10/2023

10.2 Dimension sheets for connection options of .K8. and .V8. conical encoders

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

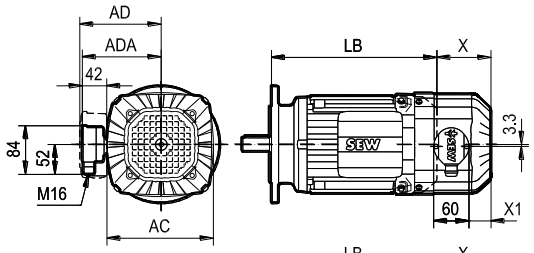
08 388 01 23
63374684.01

SEW EURODRIVE

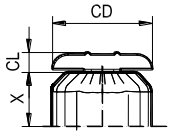
DE Seite **1**/8
EME-ST 05.07.2023

DR..71-100

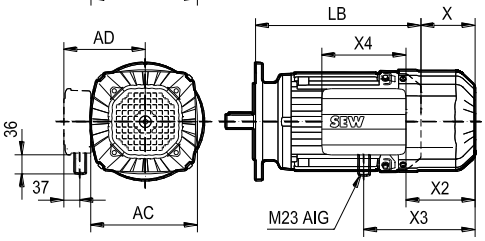
/.K8.
A1GA
A2GA
radial



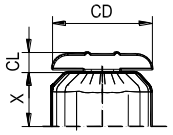
/C



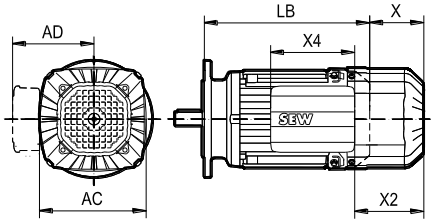
/.K8.
AIGA
AIGB



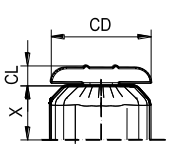
/C



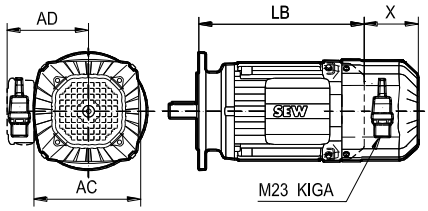
/.K8.



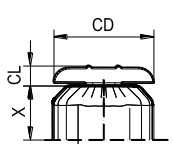
/C



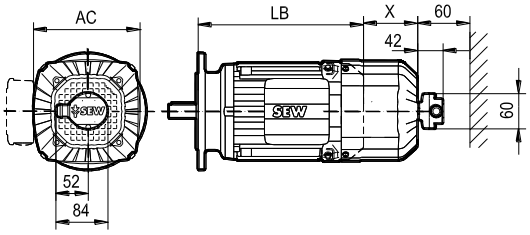
/.K8.
KIGA



/C



/.K8.
A1GA
A2GA
axial



SEW-EURODRIVE GmbH & Co KG • 76642 Bruchsal/Germany • Tel. (+49 7251) 75-0 • Fax (+49 7251) 75-1970 • http://www.sew.de

31543952/EN – 10/2023

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

08 388 01 23
63374684.01

SEW EURODRIVE

DE Seite **2**/8
EME-ST 05.07.2023

DR..71–100

Motor Type	LB (B5/ B14)	LB (B3)	AD	AC	ADA	X	X1	X2	X3	X4	CD	CL
DRN71MS DRN71MSR DR2C71MSA DR2S71MS DR2L71MS DR2M71MS	202	200	132	139	110	92	18	105	171	143	131	23
DRN71M DR2S71MR DR2S71M DR2L71M DR2M71M DR2C71MA	222	220										
DRN80MK DR2C80MKA DR2S80MK DR2L80MK	241	239	142	156	118	93	16	112	178	143	147	31
DRN80MS DR2S80MS	259	257										
DRN80M DR2C80MA DR2S80M DR2L80M	287	285										
DRN90S DRN90SR DR2S90S DRU90S	281	279	153	179	130	85	28	111	177	143	147	31
DRN90L DRU90L DR2S90L	313	311										
DRN100LS DR2S100LS DRU100LS/R	309	307	161	197	139	88	34	111	177	143	Ø170	34
DRN100LM DR2S100LM DRN100L DR2S100L DRU100L	359	357										

31543952/EN – 10/2023

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

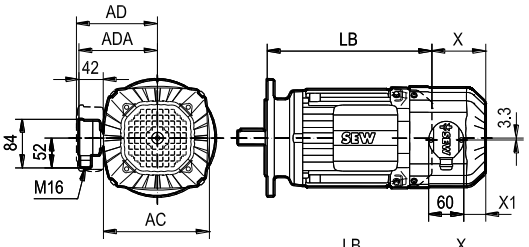
08 388 01 23
63374684.01

SEW EURODRIVE

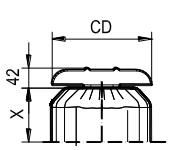
DE Seite **3**/8
EME-ST 05.07.2023

DR..112 – 180

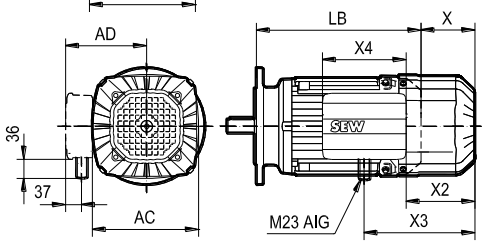
/.K8.
A1GA
A2GA
radial



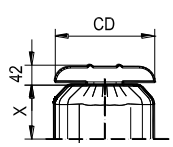
/C



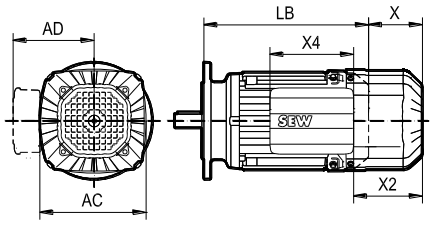
/.K8.
AIGA
AIGB



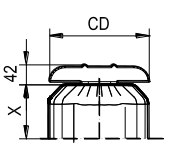
/C



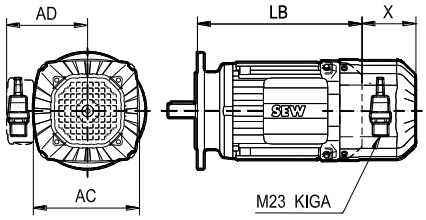
/.K8.



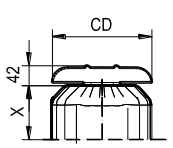
/C



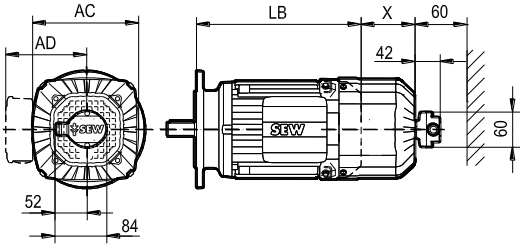
/.K8.
KIGA



/C



/.K8.
A1GA
A2GA
axial



SEW-EURODRIVE GmbH & Co KG • 76642 Bruchsal/Germany • Tel. (+49 7251) 75-0 • Fax (+49 7251) 75-1970 • http://www.sew.de

31543952/EN – 10/2023

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

08 388 01 23
63374684.01

SEW EURODRIVE

DE Seite **4**/8
EME-ST 05.07.2023

DR..112 – 180

Motor Type	LB (B5/ B14)	LB (B3)	AD	AC	ADA	X	X1	X2	X3	X4	CD
DRN112M DR2S112M	387	385	175	221	151	125	38	170	236	143	Ø221
DRN112M (6)	379										
DRN132S DR2S132S DR2S132SR DRU132S	437	435									
DRN132M DR2S132M DRU132M	439	437	228	261	172	84	27	141	216	186	Ø262
DRN132L(8) DR2L132L	462	462									
DRN132L(4,6)	464	462									
DRN160M DR2S160M DR2L160M DRU160M DRU160MP DRN160L DRU160LR DRU160L DR2S160L DR2L160L	532	529	253	316	199	84	38	159	234	186	Ø309
DRN180M DR2S180M DR2L180M DRU180M DRN180L DRU180L DR2S180L DR2L180L	555	554	268	357	220	84	38	159	234	186	Ø354

31543952/EN – 10/2023

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

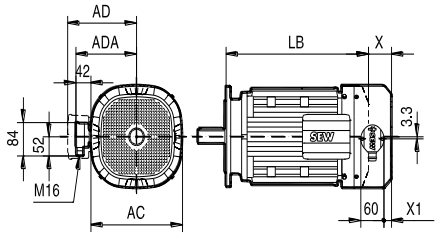
08 388 01 23
63374684.01

SEW EURODRIVE

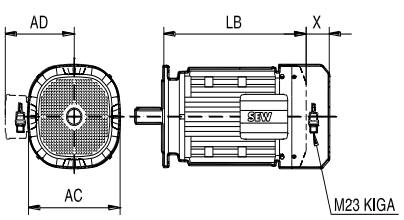
DE Seite **5**/8
EME-ST 05.07.2023

DR..200 – 280

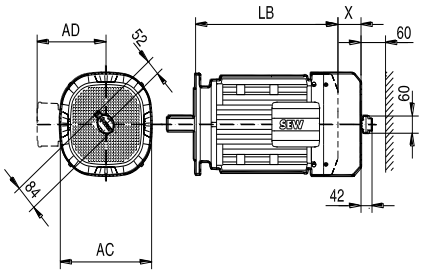
/.K8.
A1GA
A2GA
radial



/.K8.
KIGA



/.K8.
A1GA
A2GA
axial



SEW-EURODRIVE GmbH & Co KG • 76642 Bruchsal/Germany • Tel. (+49 7251) 75-0 • Fax (+49 7251) 75-1970 • http://www.sew.de

31543952/EN – 10/2023

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

08 388 01 23
63374684.01

SEW EURODRIVE

DE Seite **6**/8
EME-ST 05.07.2023

DR..200 – 280

Motor Type	**LB** (B5/ B14)	**LB** (B3)	**AD**	**AC**	**ADA**	**X**	**X1**	**CD**
DRN200L DRU200L DRU200LR DR2S200L DR2L200L	649	646	283	Ø394	237	84	35	Ø415
DRN225S DR2S225S DR2L225S DRU225S DRN225M	617	614	305	Ø434	259	84	29	Ø415
DRN225ME DRU225ME	697	694						
DRN250M DRN250ME DRU250M DRU250ME	752	750	394	Ø495	290	79	69	Ø490
DRN280S	752	750	394	Ø495	290	79	69	Ø490
DRN280M DRU280MR	847	845						

31543952/EN – 10/2023

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

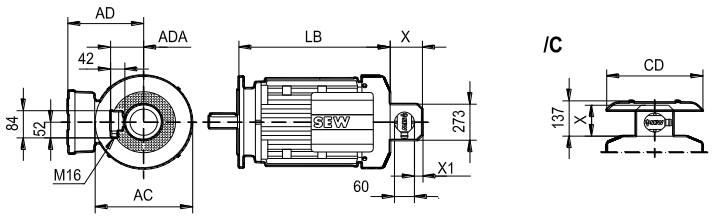
08 388 01 23
63374684.01

SEW EURODRIVE

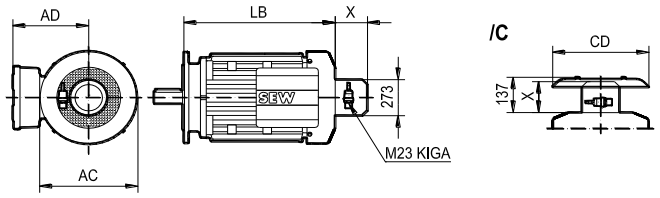
DE Seite **7**/8
EME-ST 05.07.2023

DR..315 - 355

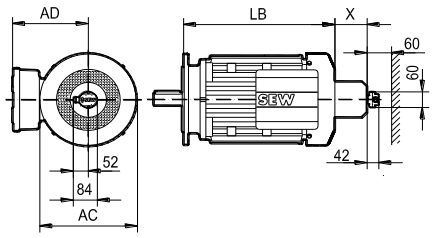
/.K8.
A1GA
A2GA
radial



/.K8.
KIGA



/.K8.
A1GA
A2GA
axial



31543952/EN – 10/2023

Maßblatt

Drehstrommotor DR..71-355
A1GA, A2GA; AIGA, AIGB; KIGA
.K8.

08 388 01 23
63374684.01

SEW EURODRIVE

DE Seite **8**/8
EME-ST 05.07.2023

DR..315 – 355

Motor Type	**LB** (B5/ B14)	**LB** (B3)	**AD**	**AC**	**ADA**	**X**	**X1**	**CD**
DRN315S DRN315M DRU315SR DRU315S DRU315M DRU315L DRU315LR	941	939	506	Ø624	199	129	29	Ø590
DRN315ME	1071	1069						
DRN315L DRN315H DRU315H DRU315HB DRU315HG DRU315HR	1071	1069	518	Ø624	199	129	29	Ø590
DRN355MS DRN355MR DRN355M DRN 355ML DRUI355 ML DRU355MS DRU355M DRU355ML	1367	1352	600	Ø700	178	129	29	Ø697

31543952/EN – 10/2023

10.3 Dimension sheets for encoder mounting adapters

Encoder mounting adapters	Motors	Document number
AV1A	DR71-225	63139375
	DRN71-225	63089378
AV7A	DR71-225	63139375
	DRN71-225	63089378
AV8A	DRN71-225	63089378
EG7A	DRN80-280	63155036
EH7A	DR/EDR315 DRN/EDRN315	099480214
EK8A	DRN71-355 EDRN71-315	080920118
ES7A	DRN80-280	63155036
EV1A	DR71-225	63139375
	DRN71-225	63089378
EV2A	DR71-225	63139375
	DRN71-225	63089378
EV7A	DR71-225	63139375
	DRN71-225	63089378
EV8A	DRN71-225	63089378
XV1A	DR/EDR 250-315 DRN/EDRN 250-315	63115379
	DR71-225	63139375
	DRN71-225	63089378
XV2A	DR/EDR 250-315 DRN/EDRN 250-315	63115379
	DR71-225	63060647
	DRN71-225	63008653
XV3A	DR/EDR 250-315 DRN/EDRN 250-315	63115379
	DR71-225	63060647
	DRN71-225	63008653
XV4A	DR/EDR 250-315 DRN/EDRN 250-315	63115379
	DR71-225	63060647
	DRN71-225	63008653

31543952/EN – 10/2023

Encoder mounting adapters	Motors	Document number
XV5A	DR/EDR 250-315 DRN/EDRN 250-315	63115379
	DR71-225	63060647
	DRN71-225	63008653
XV6A	DRN71-225	63008653
XV7A	DR/EDR 250-315 DRN/EDRN 250-315	63115379
	DR71-225	63139375
	DRN71-225	63089378
XV8A	DR/EDR 250-315 DRN/EDRN 250-315	63115379
	DRN71-225	63089378

31543952/EN – 10/2023

11 Approvals

The encoders described in this document are only approved as options for motors from SEW-EURODRIVE.

The approvals of the respective motor are observed when selecting the encoder. The encoders are only selectable and approved for motors if the approvals of the motor are supported by the encoder.

The encoders are approved as spare parts for the selected motors and are not permitted to be used on other motors or motors from third-party suppliers.

For details on the approvals of the motors with the encoders, refer to the respective applicable catalogs and operating instructions of the motor in question.

11.1 UKCA

Encoder type	Manufacturer	Address of contact person in UK
EI71 EI72 EI76 EI7C EI7C FS EI8C EI8R EI8Z EK8Z AK8Z	SEW-EURODRIVE	SEW-EURODRIVE Ltd DeVilliers Way Normanton West Yorkshire WF6 1GX United Kingdom
EK8R EK8C EK8S RK8M AK8W AK8Y	Baumer Group	Baumer Ltd Shrivenham Hundred, Business Park Majors Road 33/36 SN6 8TZ Watchfield, Swindon United Kingdom
EK8R EK8C EK8S EK8W AK8W AK8Y	Kübler Group	OEM Automatic Ltd. Whiteacres Whetstone Leicester LE8 6ZG, England United Kingdom

31543952/EN – 10/2023

Encoder type	Manufacturer	Address of contact person in UK
AK8H	Sick	SICK (UK) Ltd. Waldkirch House 39 Hedley Road, St. Albans Hertfordshire AL1 5BN United Kingdom

31543952/EN – 10/2023

12 Appendix

12.1 Troubleshooting checklist

SEW-EURODRIVE: Data recording/processing	
Date	
Name, department	
Information about the customer	
Company name, contact person	
Customer number	
Complaint number/GCom	
Service case number	
Industry/operating location of the customer: e.g. automotive, food, transport and logistics, raw material processing (stone, wood, etc.)	
Information about the motor and its options	
Type designation	
Serial number(s) of the affected drives	
Delivery date	
Control of the motor (frequency inverter (SEW, third party)/supply system)	
Brake rectifier and relay?	
FS motor option available (FS logo)? If so, which one?	
Are other options or retrofits available? If so, which ones?	
Grounding concept of the motor: How is the grounding carried out?	
Description of the electrical environment of the motor (other drives, switches, contactors, robots, safety technology, etc.)	
Information about the encoder	
Type (see labeling)	
Part number (see labeling)	
Batch number (see labeling)	
Delivery date (if different from the motor)	
Are other encoders/sensor components than the complained object in use? Are there any known problems with these other systems?	
Fault description	

31543952/EN – 10/2023

Is there a defect or is there a functional failure without a component defect?	
Explanation: Fault description?	
Measurements: Attach measuring results indicating the fault, if available.	
Include photos/videos of use case/error case (encoder system, cabling, system, motor, etc.)	
Repeated fault in this application? Details on frequency?	
Information about operating conditions	
Supply voltage • Nominal value and tolerance • Number of additionally connected units to the encoder, type of units	
Cable length	
Cable types • Technical basic data (cross section, material, other …) • Shielding? If so, what kind? • Are twisted pair signal cores present? • Connector types?	
Cable routing • Description of the routing • Distance to power • Are cable ducts present?	
Vibrations and shocks, internal to the motor • Is a brake present? • If so, what type?	
Vibrations and shocks, external to the motor • Total vibration of the drive? • Vibrations through the motor shaft?	
Thermal operating conditions: Operating temperature range	
Thermal operating conditions: Course/temperature gradient during use?	
Moisture values?	
Humidity: Course/gradient during use?	

31543952/EN – 10/2023

Media in the environment • Is the encoder exposed to special media such as cleaning agents? • Course of exposure (permanent, 1x per week, 10 min, etc.)	
Information about operating states in the application	
Start of the system • Course of the supply voltage • Chronological order/profile of connecting the sensor technology and power of the drive • Other special features?	
Ongoing operation of the system • Course of the supply voltage • Chronological order/profile of connecting the sensor technology and power of the drive • Other special features?	
Switching off the system • Course of the supply voltage • Chronological order/profile of connecting the sensor technology and power of the drive • Other special features?	
Encoder evaluation	
Evaluation device, type	
Have other units been evaluated on this device? If so, which ones?	
What load current is present through evaluation inputs?	
What query cycle time/polling rate is there for encoder information?	
In the case of incremental encoders: Are all signal tracks evaluated, or just individual ones? If applicable, which signal tracks?	
Other?	
Are there any other occurrences that may be significant for the functional failure or defect? What is your presumption regarding a cause?	

31543952/EN – 10/2023

Index

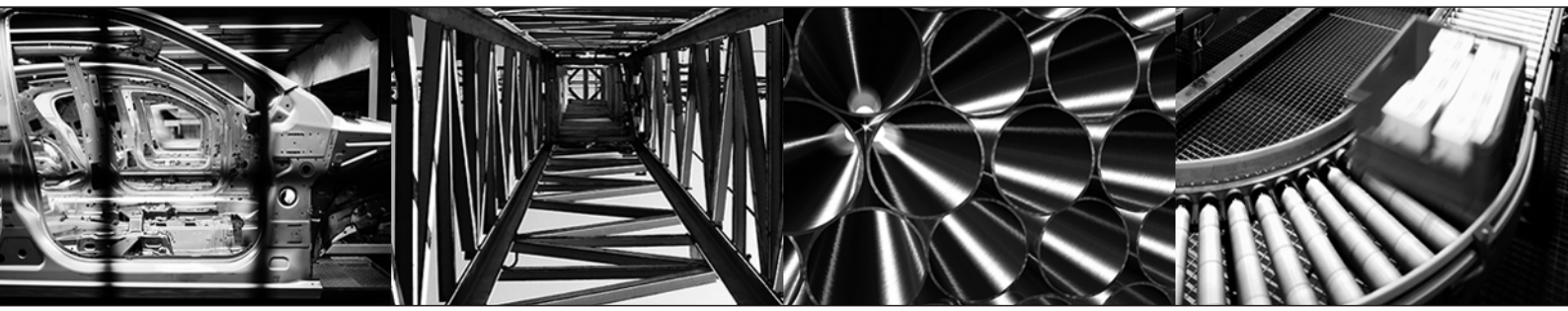
31543952/EN – 10/23

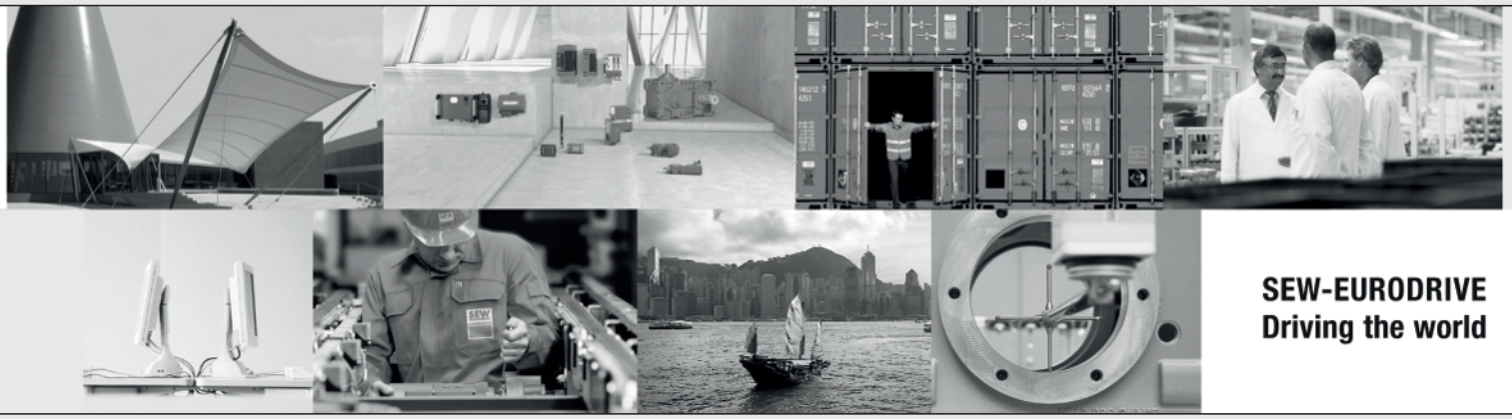
T

V

W

31543952/EN – 10/23





SEW-EURODRIVE
Driving the world

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Str. 42
76646 BRUCHSAL
GERMANY
Tel. +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com
➞ **www.sew-eurodrive.com**